

REGIONAL GEOGRAPHY OF THE WHITEMOUTH VALLEY, MANITOBA

A thesis

presented to

the Faculty of Graduate Studies and Research

University of Manitoba



In Partial Fulfillment

of the Requirements for the Degree of

Master of Arts

by

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December 1961

ABSTRACT

The Whitemouth Valley is largely a poorly drained plain. Only in the relatively small areas adjacent to the trunk streams is agriculture practiced.

The degree of development of drainage channels tributary to the Whitemouth River, as measured by drainage density values, decreases from north to south. Drainage density values, occurring in groups, show a direct relationship to available relief, (governed by the levels of Precambrian nick points) texture of surface materials and the vegetative cover in the areas adjacent to the trunk streams.

The valley is separated into two major regions; the Forest Region and the Agricultural Region. Within the Agricultural Region four sub-regions are recognized. These have been delineated on the basis of drainage density values, proportion of cultivated land per township, homogeneity of farming enterprises and population density, as indicated by the number of cultivated acres per person.

Each sub-region is discussed as follows: landscape description, agriculture, and villages and hamlets. In general terms, the type of land use is the same throughout the Agricultural Region. The differences among the sub-regions are indicated by differences in degree of land use and crop yields.

In the concluding section, agriculture in the Whitemouth Valley is compared to that of Manitoba.

PREFACE

This thesis, a regional study of the geography of the Whitemouth Valley, attempts to describe and interpret the landscape of the area.

The physical geography (geology, surface deposits, climate, native vegetation, soils and drainage) has been treated systematically for the entire area, without dividing it into regions. The Whitemouth River has been considered in some detail because it is responsible for the drainage in the valley, which in turn is an important factor in agriculture. The information for the study of the river has been obtained from air photos, for the most part.

Human geography (landscape, agriculture and villages and hamlets) has been treated regionally because of the great differences evident within the area and the distinctness of each region in the landscape.

Forest product extraction has not been considered in detail because it is beyond the main emphasis of this study, which is agriculture. However, it has been considered insofar as it relates to sources of income for farm operators.

Similarly, a small agricultural area near St. Labre School in the southwest has not been treated in detail because of (1) its separation from the main body of agricultural land in the valley and (2) its orientation toward the village of Woodridge, beyond the limits of the area of study.

Much of the information required was obtained while the author was an employee of the Manitoba Soil Survey in the area. A total of 124 farm interviews were carried out in September 1960, and form the basis of the sections treating agriculture.

ACKNOWLEDGEMENTS

The author wishes to express his gratitude for the guidance and encouragement given by Dr. J.H. Warkentin and the criticism and help given from time to time by Drs. Weir, Parker, and Nieuwolt of the University of Manitoba.

Thanks are given to R.E. Smith and Dr. W.A. Ehrlich of the Manitoba Soil Survey who gave freely of their time and resources to assist in the preparation of this thesis, both in the field and in the office.

The assistance given by B.R. Poston, Agricultural Representative at Whitemouth, and others is gratefully acknowledged.

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CHAPTER I

INTRODUCTION

Physical Characteristics

The drainage basin of the Whitemouth River and its tributaries, the more important of which are the Birch River, the Boggy and St. Labre creeks, is the area of study of this thesis. Along the lower reaches of the Whitemouth and Birch rivers are found the soils of best fertility and drainage that are basic to the practice of agriculture in the valley.

The boundary of the valley is generally ill defined due to the lack of drainage channels, which would normally make such definition quite simple. The large areas of bog have made it necessary to draw this boundary somewhat arbitrarily, particularly in the southeast.

The valley, of 1724 square miles, lying in southeastern Manitoba between Townships 3 and 13 in Ranges 11 and 16 E.P.M. (Figure 1) is part of the Winnipeg River drainage basin. The settled portions along the Whitemouth River are at the edge of the Precambrian shield, as shown by the rocks of Precambrian age that occur as outcrops in the river beds and in the area just east of the river. Indeed, much of the northeastern part of the valley is in the Precambrian shield, where rock bosses are dominant in the landscape. The main settlements are about 65 miles by road east of Winnipeg, extending along the trunk streams in a north-south orientation.

The valley is a poorly drained plain, falling from 1250 feet A.M.S.L. in the southwest to 835 feet A.M.S.L. at the mouth of the Whitemouth River in the north. Slopes in this plain exceed one per cent only in areas immediately adjacent to drainage channels, rock bosses and parts of the end moraine in the

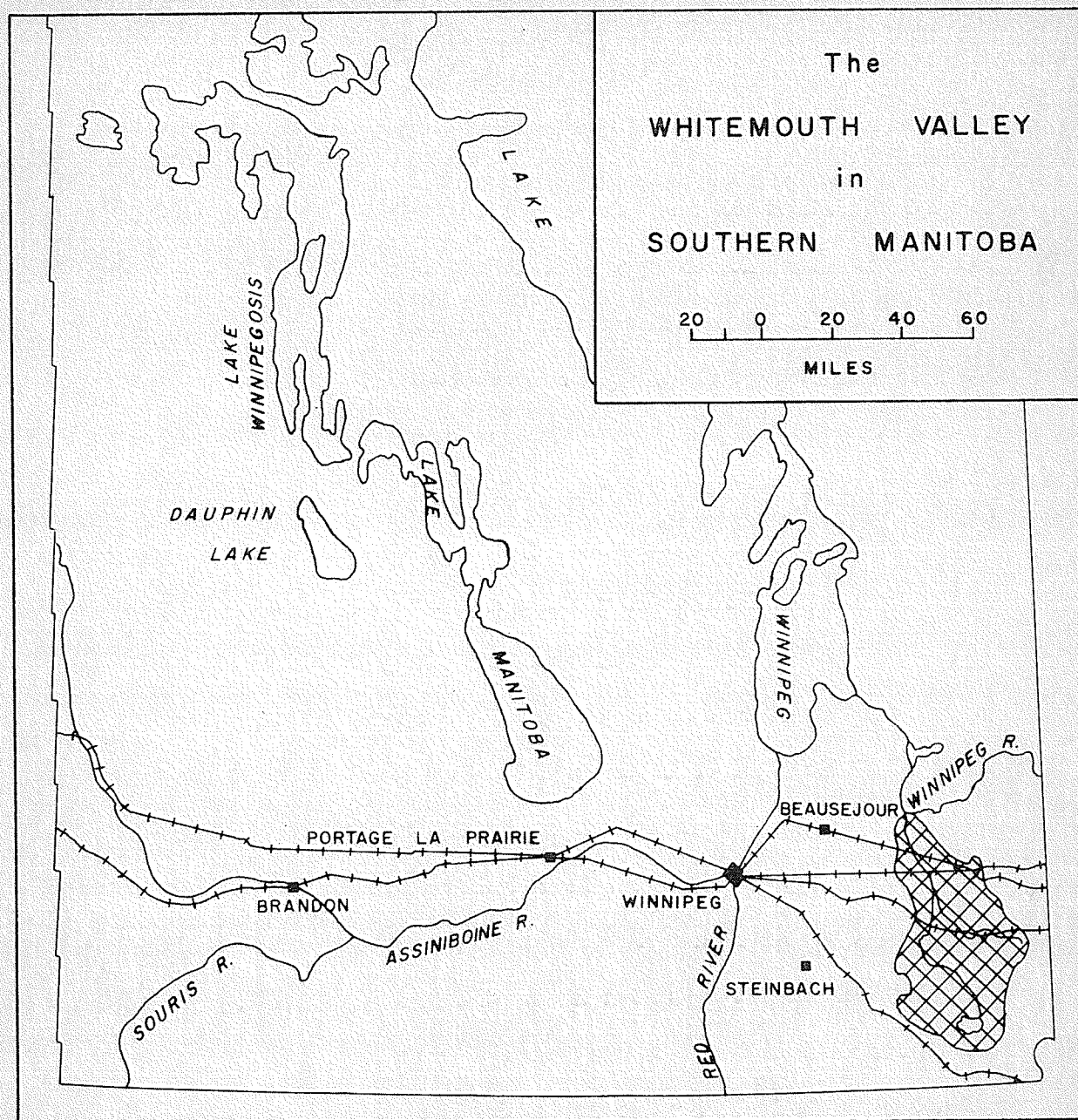


Figure 1

southwest.

The larger part of this plain is forested, the most common trees being black spruce, aspen, jack pine, black poplar, willow and alder. In addition, there are extensive areas of open bog and marsh.¹ The trees occur most frequently in pure stands, in a distribution governed by the complex site requirements of each species.

The commonly occurring soils in the valley are those of the Podzolic, Chernozemic, Gleysolic and Organic Orders. The soils of the cultivated lands generally are of the imperfectly and moderately well drained Dark Grey Wooded, Dark Grey and Regosol Sub-groups.^{2,3}

The surface deposits of the valley (Figure 2) are primarily coarse textured sediments contained within the basin of glacial Lake Agassiz. Local areas of finer textured materials of lacustrine and alluvial origin are found along the trunk streams in the valley. Small areas of lacustrine clay occur within the Precambrian Shield in the northeastern part of the basin. Small areas of medium to moderately fine textured glacial till also occur.

The climate of the area is the continental climate typical of Manitoba, with cool short summers and long cold winters. Although there is no recording meteorological station in the area there are four which are peripheral to it. These stations, Pinawa, Kenora, Sprague and Oakbank have annual precipitation averaging sixteen, twenty-four, twenty, and twenty inches⁴ respectively. Each

¹Land which is usually under water for part of the year, and has little or no peat on it.

²R.E. Smith, Manitoba Soil Survey, Personal Communication, December 1960.

³These names are used in the Report of the N.S.S.C.C. meeting of February 1960, at Guelph, Ont.

⁴Climatic Summaries for Selected Meteorological Stations in the Dominion of Canada, Canada, Dept. of Transport, Meteorological Division, Volume 1, Toronto.

shows a concentration of precipitation in the growing season (May to August). The mean July and January temperatures for the general area are 66° F and 0° F respectively.⁵ The Whitemouth Valley has an average frost free season of sixty-five to ninety days.⁶

History of Settlement⁷

The winter trips of Pierre La Verendrye from the North West Angle on the Lake of the Woods to Red River are the first explorations by a whiteman of which there is definite record. He had established a fur trading post on the Lake of the Woods in 1732. Fur trading continued as the only industry for many years.

The first development in this area subsequent to the fur trade was the construction of the Dawson Road which was built through the valley in Township 7, from the Lake of the Woods to the Red River in 1869-71 as part of an amphibious route from Central Canada to the newly acquired Rupert's Land. Its importance waned when the St. Paul to St. Boniface Railway was completed in 1878, and it was largely abandoned when the Canadian Pacific Railway was built through the valley in Township 11 in 1880. The Dawson Road did not come into use again until after 1900 when the first homesteads were taken up in the areas near it. At present this road is "all weather" as far east as Range 14 E.P.M. East of this point it is a winter road only.

After 1871, there was a high demand for timber in the Red River Plain, due to its rapid settlement. The Red River and its tributaries rising in south-

⁵Economic Atlas of Manitoba, T.R. Weir, Editor, Manitoba, Dept. of Industry and Commerce, Winnipeg 1960, p. 15.

⁶A.J. Connor, Climate of Manitoba, Economic Survey Board of Manitoba Winnipeg 1939, p. 11.

⁷Forest Resources Inventory Report No. 1, Manitoba, Dept. of Mines and Natural Resources, Forest Service, Winnipeg 1956, pp. 14-18.

eastern Manitoba provided easy transport of saw logs to the mills at Winnipeg. The building of the C.P.R. through the valley in 1880 provided a new outlet for wood via the Whitemouth River. Spruce and red pine were cut near and above the present site of Hadashville and driven down the river to the mill of David Ross at Whitemouth, which was operative from 1879 to 1900.

The completion of the C.P.R. in 1885 gave this area access to the main traffic artery of the country. The advantages of railroad transportation were among the assets of the first settlers. Even with this advantage the first homesteads in Townships 12 and 13 in Range 11 E.P.M. were not taken up until 1890. This portion of the valley, the first to be settled, was taken only after most of the grassland areas to the west of the Red River were settled. In the southwestern part of the valley the completion, in 1901, of the Canadian Northern Railway stimulated settlement and the villages of Woodridge, Carrick, Badger and Vassar were established. Although these settlements are not in the Whitemouth Valley their proximity to its southern boundary had a strong influence on the use made of the forests within it. The Greater Winnipeg Water District Railway was built through the central portion of the valley, mainly through Townships 7 and 8 in 1914. Stations were established at Reynolds (Hadashville), McKinley, McMunn and East Braintree in the plain adjacent to the trunk streams. In fact, the railway was built partly for colonization⁸ and has been shown to be at least partially successful in this regard by the fact that settlement adjacent to the railway occurred largely after 1914.

The building of the National Transcontinental Railway in 1910 saw the

⁸W.A. Johnston, Winnipegosis and Upper Whitemouth River Areas, Manitoba, Pleistocene and Recent Deposits, Canada, Dept. of Mines, Ottawa 1921, p. 20.

establishment of the village of Elma at the intersection of this railway and the roads running parallel to the Whitemouth River. However, this railway had little effect on settlement except possibly in Township 9 Range 12 E.P.M. because most of the land in Townships 10 and 11 Range 12 E.P.M. had already been taken. These early settlers had used the C.P.R. as a means of transportation.

By 1901 only the area north of Township 10 was settled. The population in these northern townships was about 200 persons each. By 1921 the population of these townships had increased to about 350 persons each. Townships 9 and 10 in Range 12 E.P.M. increased rapidly in population between 1901 and 1911, rising to 250 and 430 persons respectively. Increases after 1911 were of lesser magnitude. Township 8 in Ranges 12, 13 and 14 E.P.M. increased markedly in population from 1911 to 1921 at which time the population was 370, 325 and eighty persons respectively. This increase was probably due to the construction of the Greater Winnipeg Water District (G.W.W.D.) Railway and associated settlement.

The pulpwood boom of the 1920's, following the construction of a pulp and paper plant at Pine Falls in 1926⁹, provided employment for settlers cutting spruce on individually owned or leased land. The depression of the 1930's cut off this source of employment and much of the land came into the possession of the local municipalities by tax default. Some municipalities within the area lost their charters before the end of the depression; their affairs are now handled by the provincial government.

At present most of the area is in the Local Government Districts of Reynolds and Piney. Only Townships 10, 11, 12 and 13 in Ranges 11 and 12

⁹Economic Atlas of Manitoba, op. cit. p. 80.

E.P.M. are in the Municipality of Whitemouth, and as such, are the only townships in the valley under the direction of a local council.

General Economy

The economy of the Whitemouth Valley is based on agriculture and forestry. In the relatively few settled townships adjacent to the trunk streams, between East Braintree and Seven Sisters Falls, mixed farming is the characteristic form of agriculture. A typical farm in these townships has areas of forest, hay, wheat, oats, cleared pasture and summerfallow. Such a farm also has several cattle, frequently dual purpose, and a few pigs and chickens. Flax or barley may also be grown in small quantities. The only trends to specialization in agriculture are found in the northern townships where dairying and poultry farming have achieved some prominence.

South of Township 10, over half of the farmers derive their main income from non-farm work. The forests provide most of this non-farm work in the form of pulp extraction or employment with the Manitoba Forest Service. Smaller numbers are employed with the Department of Public Works or in construction connected with recreational developments at nearby places such as Falcon Lake. A few also find employment with the three railways passing through the valley. Blueberries (*Vaccinium angustifolium*) are an important minor product of the forests.¹⁰

¹⁰ Forest Resources Inventory Report No. 1, op. cit. p. 18.

CHAPTER II

PHYSICAL GEOGRAPHY

Geology¹

Nearly all of the Whitemouth Valley is underlain by Precambrian crystalline rocks. Only a small area in the southwest is underlain by flat lying Paleozoic limestone strata. The line of contact between the two is obscured by drift and has not been demarcated by well borings because of the depth of drift.

The Pleistocene deposits are glacial till, stratified sand and gravel of glacial outwash and lacustrine origin. There are also some finer textured lacustrine sediments. The glacial till was deposited by continental glaciers which had come from the north transporting large quantities of boulders, sand, silt and clay. Near the close of the Pleistocene glacial meltwater and run-off from the Red River drainage area was ponded between the retreating ice to the north and a highland area to the south, forming glacial Lake Agassiz. Several series of beaches were formed by the lake at various stages and several moraines occur in the basin of Lake Agassiz marking the stages of halt of the ice sheet during its retreat.

Recent deposits are alluvial floodplain sediments of the presently existing streams, aeolian sands, and pond and swamp deposits of peat.

Pleistocene Deposits. The surface deposits mentioned in the previous section are discussed. Glacial till, or glacial till covered with stratified deposits, is the general mineral surface material of most of the Valley (Figure 2).

¹W.A. Johnston, Winnipegosis and Upper Whitemouth River Areas, Manitoba, Pleistocene and Recent Deposits, Canada. Dept. of Mines, Ottawa, 1921 pp. 25-32.

Two distinct till sheets probably exist. Glacial striae indicate that the upper till sheet was laid down by glaciers moving from the northeast and contains little or no limestone. The material in the lower till sheet is derived from the north and northwest and contains an abundance of limestone. The calcareous till is common southwest of a line drawn through Elma and the southeast corner of Township 7 Range 15 E.P.M. The till usually has a remarkably even surface due to wave erosion by the water of Lake Agassiz and deposition as ground moraine. The till ranges from fine sandy loam to clay loam in texture. The surface of the till areas is usually nearly level or gently sloping.

A number of terminal moraines are found in the southwest, in Townships 3 and 4 Ranges 11 and 12 E.P.M. (Figure 2), forming a series of ridges occasionally exhibiting typical morainic topography of numerous irregularly shaped hills and undrained depressions. These deposits are of fine sandy loam to clay loam, over clay loam.

The lacustrine deposits of Lake Agassiz are widespread and not usually more than twenty feet in thickness. These sediments are thickest along the Whitemouth River, in the lowest portion of the valley. The surface textures of these deposits range from fine sand to clay. The former frequently overlie a clay substrate. Clay occurs most abundantly along the lower reaches of the Whitemouth River. The surface of these areas of lacustrine deposits is usually nearly level or very gently sloping.

Beach ridges occur frequently in the valley, especially near the well defined drainage divides. These beaches, in the highest parts of the valley, were formed when Lake Agassiz was at its larger stages and thus are strongly developed. Several beaches in the lower portions of the valley have been

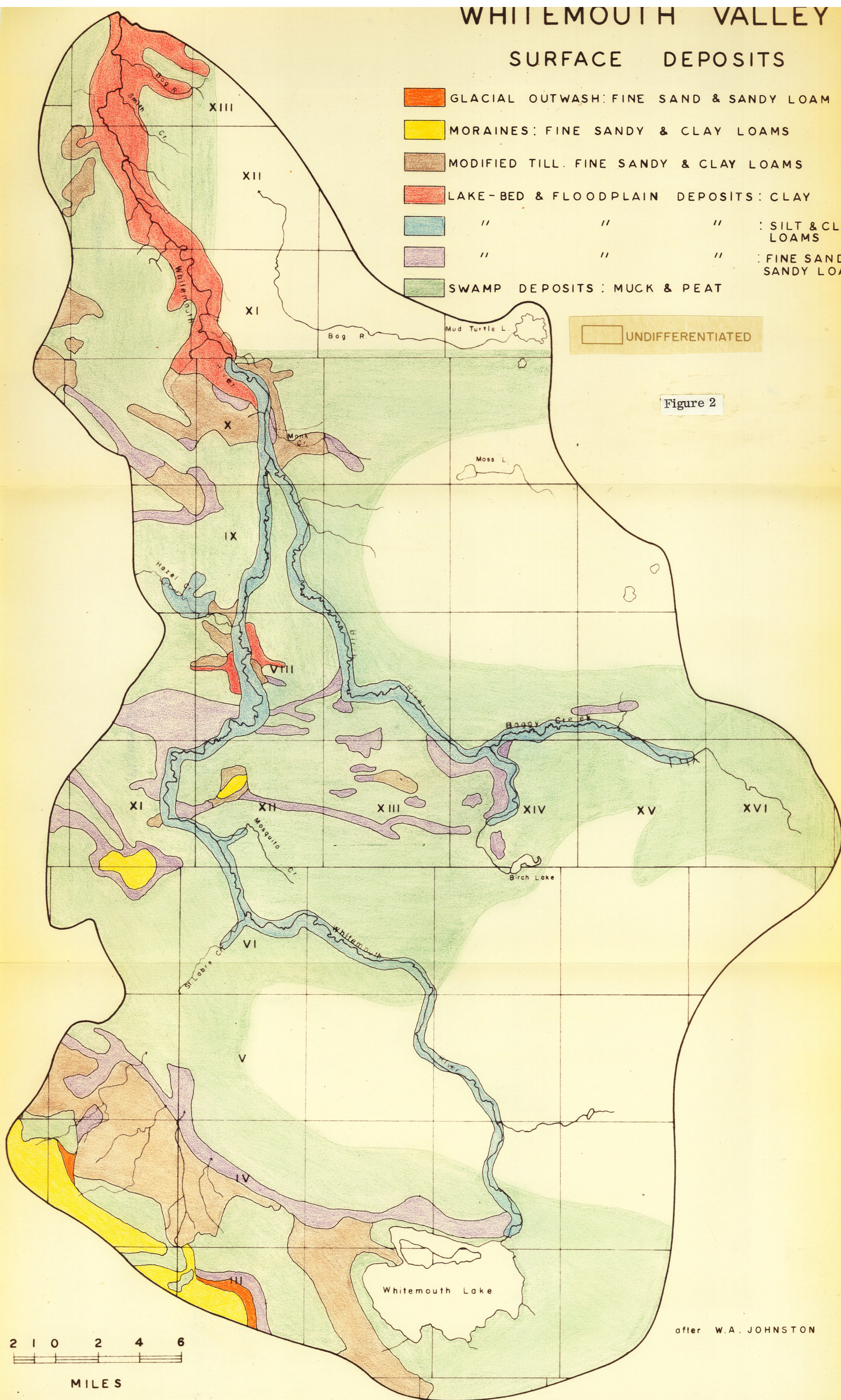
WHITEMOUTH VALLEY

SURFACE DEPOSITS

- GLACIAL OUTWASH: FINE SAND & SANDY LOAM
- MORAINES: FINE SANDY & CLAY LOAMS
- MODIFIED TILL: FINE SANDY & CLAY LOAMS
- LAKE-BED & FLOODPLAIN DEPOSITS: CLAY
- " " " : SILT & CLAY LOAMS
- " " " : FINE SAND & SANDY LOAM
- SWAMP DEPOSITS: MUCK & PEAT

UNDIFFERENTIATED

Figure 2



after W.A. JOHNSTON

breached by the streams of the Whitemouth System.

Recent Deposits. Of these deposits, the alluvial sediments range from fine sand to clay in texture. South of Township 7, where stream valleys are shallow, the streams still deposit materials on their floodplains. Alluvium has also been deposited adjacent to the streams farther north but under conditions different from those existing at present. North of Township 7 flooding does not now occur, except in one or two small areas because of the relatively deep stream valleys. Such alluvial deposits are relatively thin and rarely extend more than a quarter mile away from the streams.

There are small areas of aeolian sand in Township 4 Ranges 11 and 12 E.P.M. and in Township 7 Range 11 E.P.M. These areas are marked by the uniformity of texture of the surface materials, usually very fine sand, sometimes approaching silt. Cross-bedding is often seen in these deposits where a profile is exposed.

Peat of varying thicknesses occupies a very considerable portion of the area (Figure 2). The largest single area is that north of Whitemouth Lake, where peat has been found to be ten feet deep.²

Geomorphic Processes Active after the Disappearance of Lake Agassiz.

Following the close of the Pleistocene and the probable destruction of any previous drainage system during that period, the valley was subjected to fluvial erosion. Streams developed, flowing consequent to slope, from the south to the north where the Winnipeg River is the present base level. The development of these streams was very slow due to low gradient and numerous beach ridges which tended to pond water behind them. For example, Whitemouth Lake, a remnant of Lake Agassiz³ is ponded behind a beach ridge. Large amounts of

²Forest Inventory Maps, Manitoba Forest Service, Office Files, Winnipeg 1956.

³W.A. Johnston, op. cit. p. 24

organic matter deposited in these stagnant waters forming peat, which, acting much like a sponge in holding water, further impeded drainage.

In general, the effects of fluvial erosion are limited and visible only close to the trunk streams where tributary creeks have developed. These creeks give varying amounts of local relief to the areas adjacent to the rivers. Some other notable features of fluvial erosion and deposition are those associated with the present streams. Meanders, slip-off slopes, oxbow lakes, meander scars and steep undercut banks are all prominent features of the streams of the valley.

Flooding does not generally occur along the trunk streams except in the upper reaches where entrenchment is limited and in the area near Medika in Township 9 Range 12 E.P.M. where the valley is shallow and meandering.

Geography of Landforms

In this section, the valley is described in terms of slope, arrangement, and dimension, the common aspects of objective geomorphology.^{4,5}

In the Whitemouth Valley dimension is the most important factor as regards human geography.

Slope. A slope map (Figure 3),⁶ has been prepared from a 1:250,000 topographic sheet having a contour interval of fifty feet and is hence quite general. The map indicates that the entire drainage basin is very flat, no slope exceeding thirty-three feet per mile or 0.6 per cent. The lack of appreciable gradient is of major importance in considering the area inasmuch as it influences

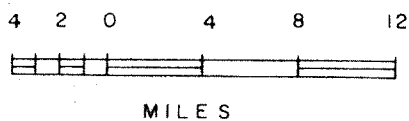
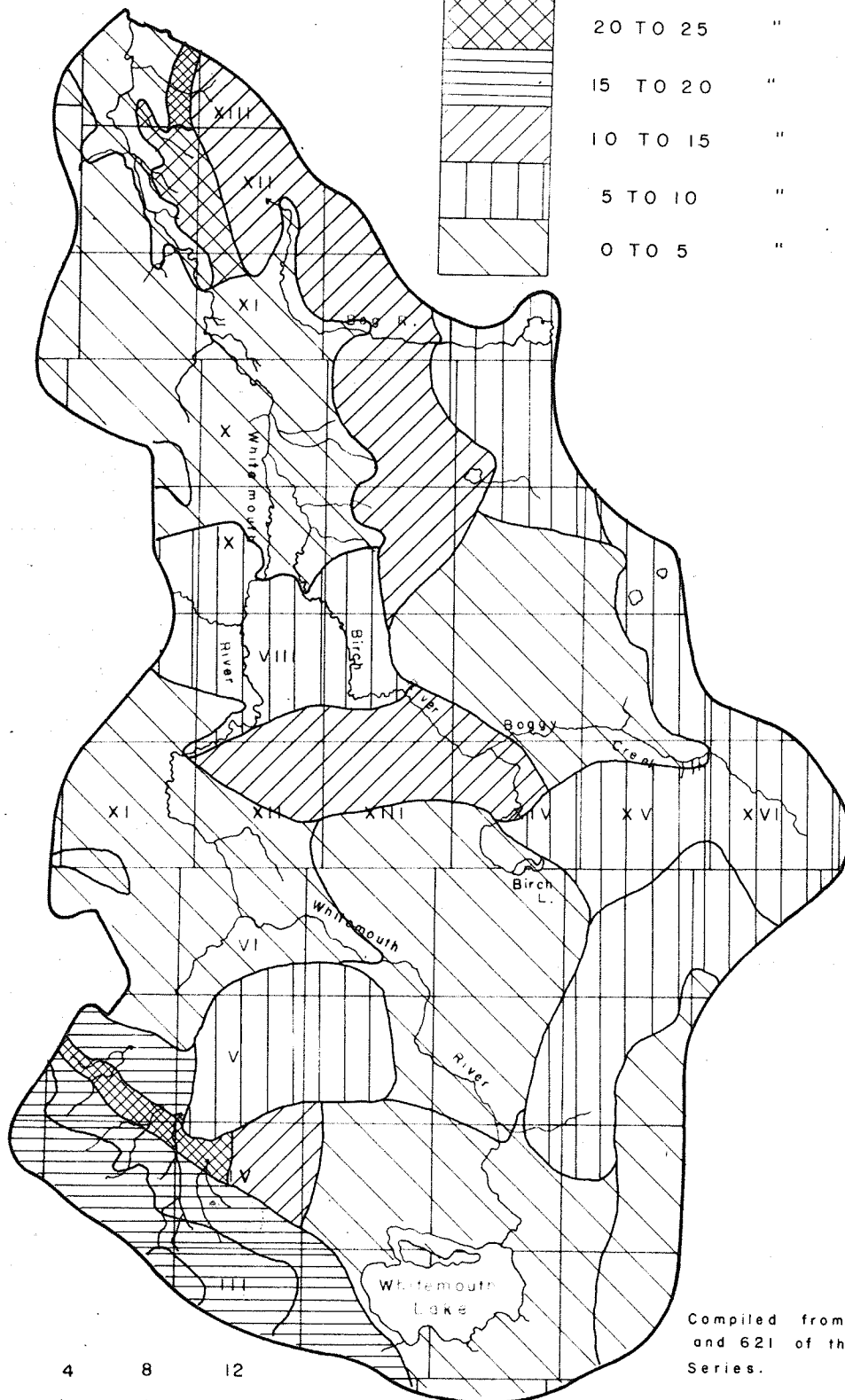
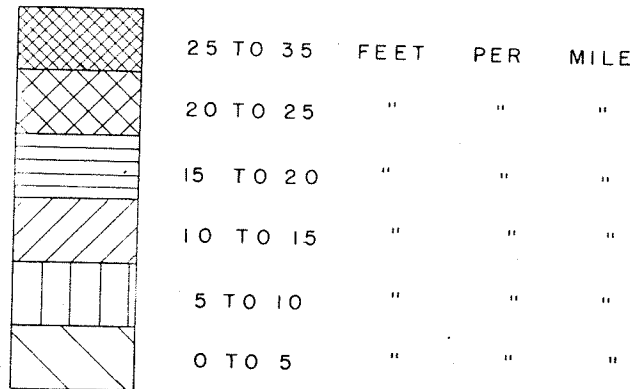
⁴Strahler A.N., Physical Geography. Second Edition New York, Wiley and Son. 1960 pp. 377-380.

⁵Finch et al. Elements of Geography, Fourth Edition, New York, McGraw Hill, 1957. pp. 208-212.

⁶The categories shown were chosen because they represent the minimal amount of generalization possible with fifty foot contour interval.

WHITEMOUTH VALLEY

SLOPE CATEGORIES



Compiled from maps 52E, 52L
and 62I of the Nat. Topographic
Series.

Figure 3

the development of drainage channels. Native vegetation is also strongly influenced by slope because of the latter's effect on drainage and site characteristics.

The steepest slopes are those associated with the terminal moraines in the southwest and the Precambrian rock knob upland in the northeast. These slopes occur over small areas and are not significant in human geography.

Figures 4 and 5 show three latitudinal and two longitudinal profiles of the basin. These together with the slope map indicate the attitude of the land surface in the valley. A salient feature of the latitudinal profiles is that the Whitemouth River is in the lowest part of the basin.

In all cases the stream divides within the valley are broad, level and without prominent features.

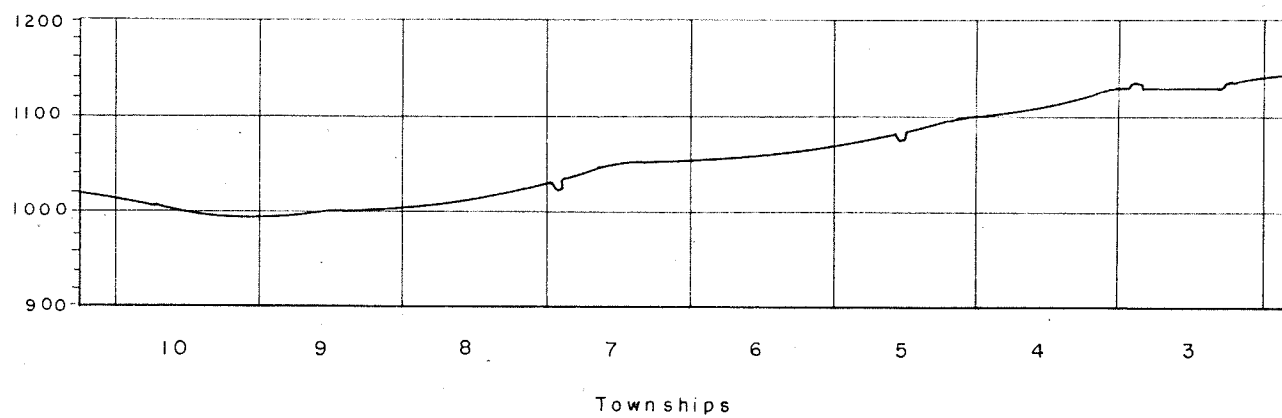
Vertical and Horizontal Dimension as Indicators of the Present Condition of Landforms. This aspect of objective geomorphology is used to describe physical features of the land in terms of vertical and horizontal dimension and the vertical and or horizontal distances between such features. The maximum local relief, the vertical distance between the highest and lowest points in the area, is 415 feet. The lowest point is at the mouth of the Whitemouth River at 835 feet A.M.S.L. and the highest, at 1250 feet A.M.S.L., is on the drift area in Township 3 Ranges 11 and 12 E.P.M.

The major relief feature and the only widespread relief feature is the network of drainage channels forming the Whitemouth System. In order to simplify the discussion on horizontal dimension two concepts are introduced. These are drainage density⁷ (the total length of drainage channels per unit area) and stream frequency⁸ (the total number of streams per unit area). Using

⁷Strahler, A.N., loc. cit.

⁸Thornbury, W.D. Principles of Geomorphology, New York, Wiley 1958, p. 126.

Profile along the boundary between ranges 13 and 14



Profile along the boundary between ranges 11 and 12

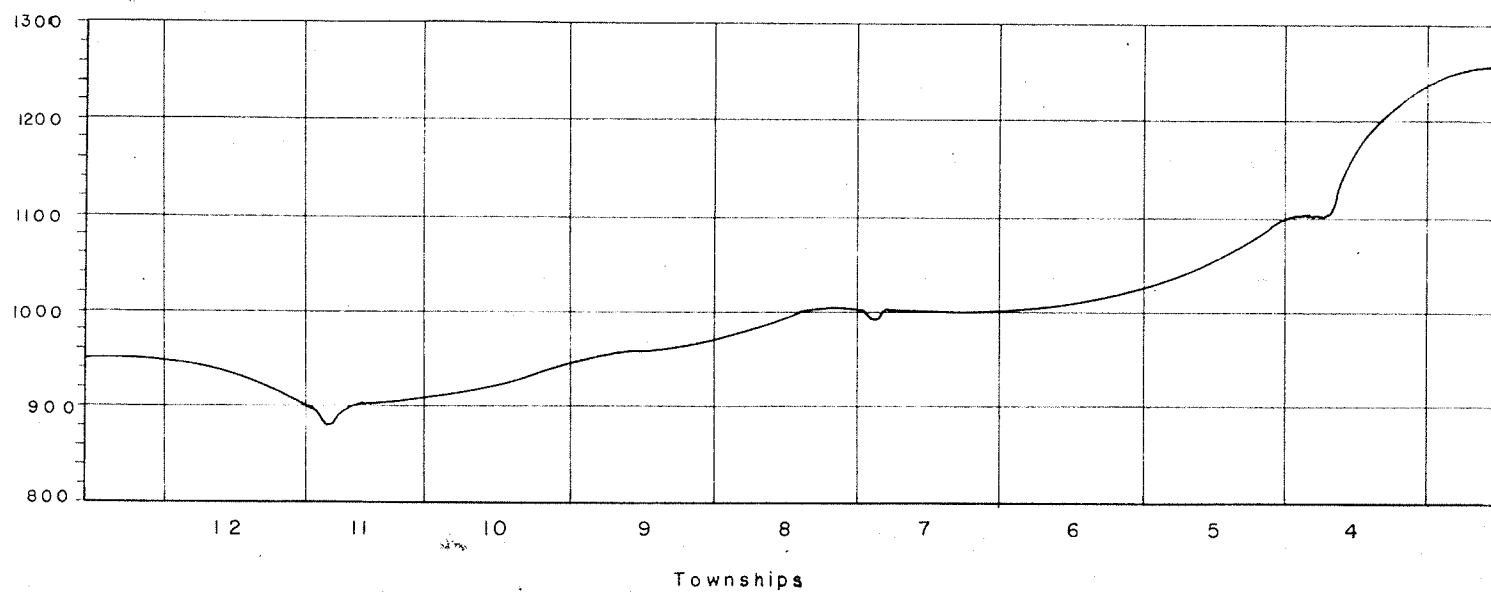
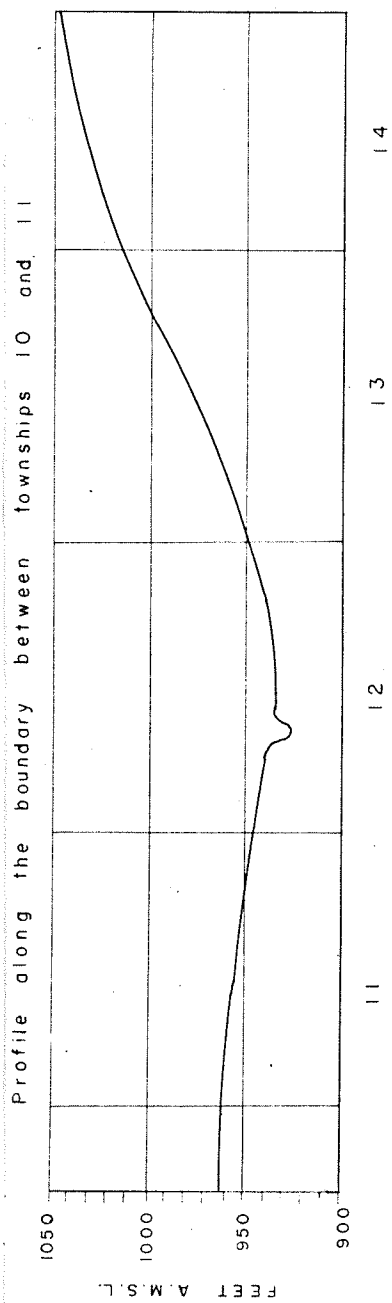
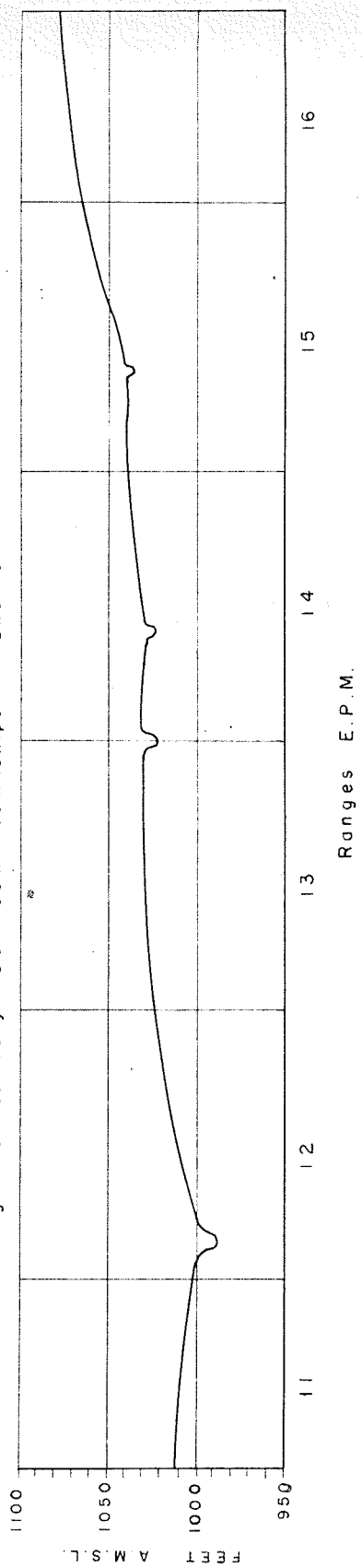


Figure 4



Profile along the boundary between townships 7 and 8



Profile along the boundary between townships 4 and 5

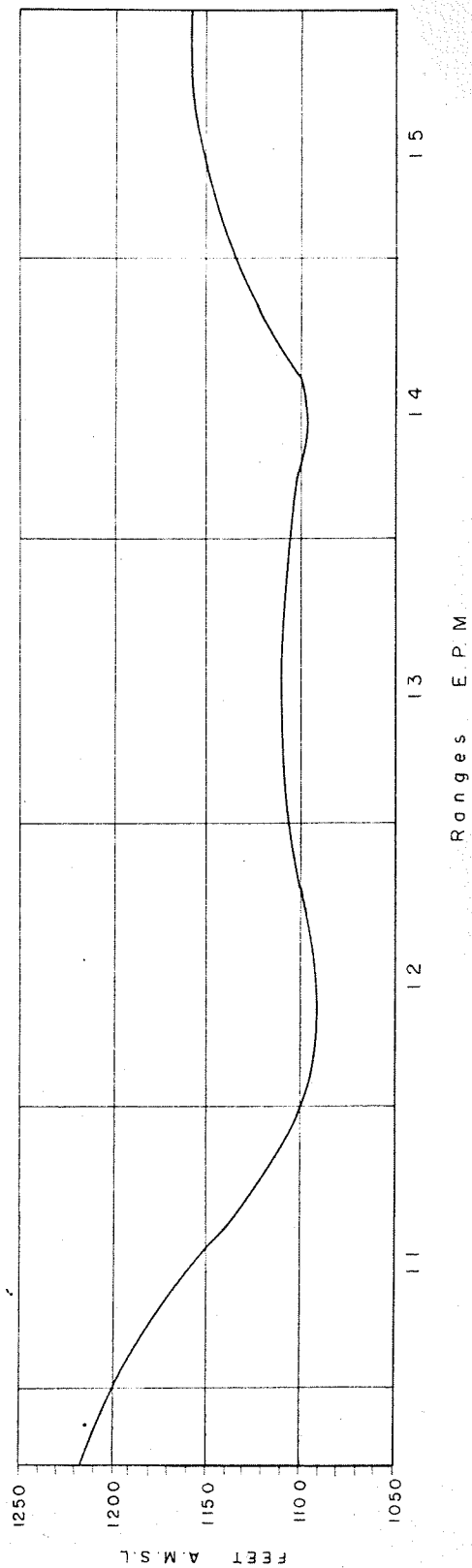


Figure 5

drainage density, and stream frequency, as a measure of drainage texture it is clear from Table I that the drainage texture of the valley is coarse and gross in nature. Strahler gives a drainage density value of three to four miles of channel per square mile, which is higher than that found anywhere in the valley, as an example of coarse texture. The following table gives drainage density and stream frequency for each township containing drainage channels directly connected with the trunk streams of the Whitemouth Valley.

TABLE I

DRAINAGE DENSITY AND STREAM FREQUENCY VALUES IN THE
WHITEMOUTH VALLEY

Township	13-11	12-11	11-11	11-12	10-12	10-11	9-12	8-12	8-13	8-14	8-15	7-11	7-12	7-14	7-15	7-16	6-12	6-13	5-13	5-14	4-14
Drainage density miles/mi ²	1.02	1.18	.16	.65	.68	.10	.72	.40	.45	.20	.20	.22	.31	.47	.17	.24	.39	.37	.15	.19	.34
Stream Fre- quency no. of streams/mi ²	.32	.39	.06	.29	.22	.03	.19	.06	.17	.08	.06	.03	.08	.17	.06	.08	.06	.06	.03	.03	.11

This table was prepared by measuring the lengths of drainage channels on 1:31,680 maps made for this study from air photo mosaics. The table indicates the change in tributary creek development from north to south along the trunk streams. Since these creeks are the most conspicuous physical features, except for the trunk streams, in the valley the values in the table give some indication of the way in which the land surface, as a whole, changes.

Description of the Whitemouth Drainage System and the Associated Landforms

Following are several features that are typical of the Whitemouth System and which characterize it in broad general terms. The lower stream valleys of

this dendritic drainage system are "V" shaped. However in the lower reaches of the trunk streams lateral erosion has occurred producing considerable areas of slip-off slope. In all cases valley sides rise from the streams' edges. The areas between the trunk streams are extensive and poorly drained. For example, the area in Township 9 Range 12 E.P.M. between the Whitemouth and Birch rivers has peat to a depth of three feet. There are numerous rapids in the streams where they cross beds of resistant Precambrian rocks. The meanderings of these streams occur in narrow valleys that are relatively little entrenched below the surface of the plain. These general characteristics indicate that the area is in the youthful or juvenile stage of the idealized fluvial cycle of W.M. Davis.⁹

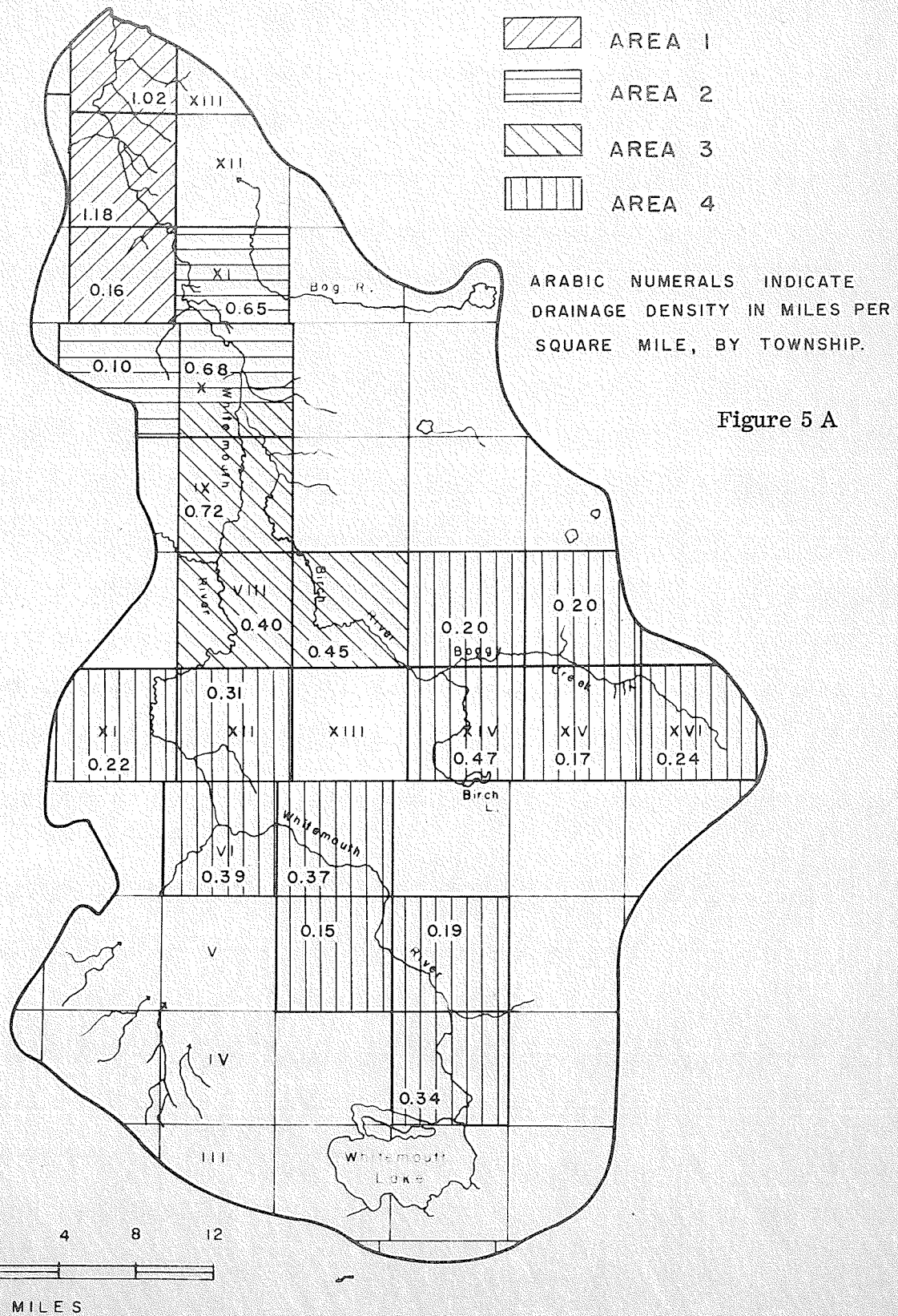
In order to facilitate the description of the Whitemouth System and its associated landforms, landform regions have been devised. While landform regions are usually based on the obvious physical features of an area such as mountains, hills, or bogs, or perhaps on slope, the area containing the Whitemouth System is a rather homogeneous plain, with the exception that the frequency of occurrence and the development of the drainage channels are variable within it, so that the development and frequency of occurrence of such channels have been used to delineate landform regions in that part of the plain containing the channels of the Whitemouth System. Drainage density values, representing the development of drainage channels, are the quantitative criteria used in this separation.

The values of drainage density given in Table 1 level themselves to a certain rough grouping of "drainage density" areas (See Figure 5A). The townships are grouped in these areas as follows:

⁹Thornbury, op. cit. p. 137

WHITEMOUTH VALLEY

DRAINAGE DENSITY
VALUES and AREAS



Area I contains Townships 11, 12 and 13 Range 11 E.P.M.

Area 2 contains Townships 11 and the northern two thirds of 10 Range 12 E.P.M. and Township 10 Range 11 E.P.M.

Area 3 contains Townships 8, 9 and the southern one third of 10 Range 12 E.P.M. and Townships 8 and 9 Range 13 E.P.M.

Area 4 contains Township 8 Ranges 14 and 15 E.P.M., Township 7 Ranges 11, 12, 13, 14, 15 and 16 E.P.M., Township 6 Ranges 12 and 13 E.P.M., Township 5 Ranges 13 and 14 E.P.M. and Township 4 Range 14 E.P.M.

It will have been noticed that all drainage density values have been calculated on the basis of townships. These values could obviously have been influenced by the chance position of the township grid on the drainage system. In order to insure that this was not the case two other sets of drainage density values were calculated as checks.

In the first set of check calculations drainage density was calculated individually for each square mile of the valley having one or more drainage channels. This set of values are of no use because generalizations could not be made from the scattering of values centred on each drainage channel.

In the second set of check calculations drainage density values were calculated for areas that were demarcated by measuring three miles parallel to the streams and two miles perpendicular to the streams, on each side. These areas were, with three exceptions, eight square miles, approximated to the nearest whole number. The values obtained occurred in groups which generally coincided with the groupings found in the values calculated by township. Thus, it is concluded that no false values or interpretations have been introduced by using the existing township grid.

Before proceeding to examine each of the drainage density areas the factors governing drainage density and drainage texture are discussed, with particular reference to the Whitemouth Valley. Generally, drainage texture is a function of the amount and type of vegetation and precipitation, the state of the ground (whether saturated or frozen), permeability of surface deposits, the amount of initial relief and the available relief.^{10,11} The amount and type of precipitation and initial relief is essentially the same throughout the valley.

However, the native vegetation adjacent to the trunk streams has been largely removed, north of Township 7. With almost no exceptions the cleared area along the lower reaches of the streams contains the creeks tributary to the trunk streams (Figures 27, 28, 29 and 30). South of Township 7 the native vegetation remains and the number of tributaries in this area is much smaller than is the case in the area to the north.

Similarly the texture, (and hence permeability) of surface deposits of the areas containing drainage channels change from fine and moderately fine in area one to moderately fine to medium, often over a fine to moderately fine substrate within thirty inches of the surface, in area two, to moderately coarse to coarse over a fine to medium substrate within thirty inches of the surface, in area three. Mineral surface deposits in area four are, for the most part, coarse. However, most of the tributaries in this area flow through areas of fibrous organic deposits. Thus, in the valley as a whole, drainage density values range from a maximum in areas of fine surface deposits to a minimum in areas of coarse mineral deposits and organic deposits.

¹⁰Thornbury, op. cit. p. 126

¹¹Available relief is the vertical distance between the initial upland flats to the level of the adjacent valleys.

Available relief decreases from about fifty feet in area one to ten feet or less in area four. Generally, available relief changes in a rather discrete manner in the neighbourhood of each of the many rapids, or nick points in the trunk streams. The nick points, thought to be the tops of Precambrian rock bosses from which the overlying mantle of till has been eroded, serve as temporary base levels for the portion of the stream above them, thus placing a limit on the amount of available relief present in these reaches. Generally, the nick points occur in groups, spread over distances ranging up to three miles, in the neighbourhood of the boundaries separating the drainage density areas.

Three factors influencing drainage texture in the valley, native vegetation, permeability of surface deposits, and available relief, combine to produce the distribution of drainage density and stream frequency values shown in Table I.

Drainage Density Area One. Townships 11, 12 and 13 Range 11 E.P.M. comprise this area and are those traversed by the Whitemouth River from its mouth to the northern boundary of Township 11 Range 11 E.P.M. (Figure 27) a distance of thirteen miles in a north-south direction.

The surface materials of this area are fine textured, ranging from clay to silty clay of lacustrine and alluvial origins. The characteristically low permeability of these materials is decreased by cultivation, in the areas where drainage channels have developed, thus increasing the tendency toward surface run off.

The available relief in this area is about fifty feet. The local relief, or the vertical distance between the highest and lowest points in a local area, varies from fifty feet near the Whitemouth River to nearly nil on the adjacent topographic surface away from the trunk stream and its tributaries.



Plate 1

Part of Drainage Density Area One in Township 13 Range 11 E.P.M.
(National Air Photo Library Photo No. A 14923-112)

The surface in the area is level to gently sloping. The maximum slope of 0.6 per cent is found on the east side of the Whitemouth River. This slope is reflected by the tributary streams, for those on the east side are more strongly developed than those on the west side.

The total length of river and creeks in this area is seventeen and fifty-six miles respectively. The Whitemouth River has an average width of 120 feet, with a maximum of 250 feet, while its tributary creeks have top valley widths of 200 to 300 feet reaching a maximum of 600 feet, and are entrenched from ten to thirty feet below the topographic surface. The Whitemouth River falls forty-four feet in this area, from 879 feet A.M.S.L. at the C.P.R. bridge at Whitemouth to 835 feet A.M.S.L. at the mouth of the stream,¹² indicating a mean gradient of 2.6 feet per mile. A drop of sixteen feet occurs at the nick point just below Whitemouth town.

Stranded slip-off slopes,¹³ or non-cyclic terraces, form twelve miles of the total thirty-three miles of river bank of the Whitemouth River. These measurements indicate the amount of lateral erosion which has occurred.

Many of the slip-off slopes along this reach of the Whitemouth River are up to twenty-five feet above the level of the river ice (January 1961). For example, those in Section 15 Township 12 Range 11 E.P.M., measured with a level in January 1961, average 22.3 feet above the ice and are not more than 3.5 feet apart, in terms of vertical distance.

The levels of the abrasions of tree bark by ice in the spring high water stage show that the high water mark is about ten feet below the general level

¹²McLean, Scovil and Johnston, Report on Manitoba Water Powers, Canada Dept. of the Interior, Ottawa 1914, p. 64.

¹³J. Ross Mackay has identified these features as slip-off slopes as opposed to point bar deposits. Personal Communication, November 1961.

Plate 2



The mouth of the Whitemouth River, at low water stage



The Whitemouth River at low water stage, in Township 12 Range 11 E.P.M.



The confluence of a creek and the Whitemouth River in Township 13 Range 11 E.P.M.



A tributary creek with interlocking valley side spurs in Township 12 Range 11 E.P.M.

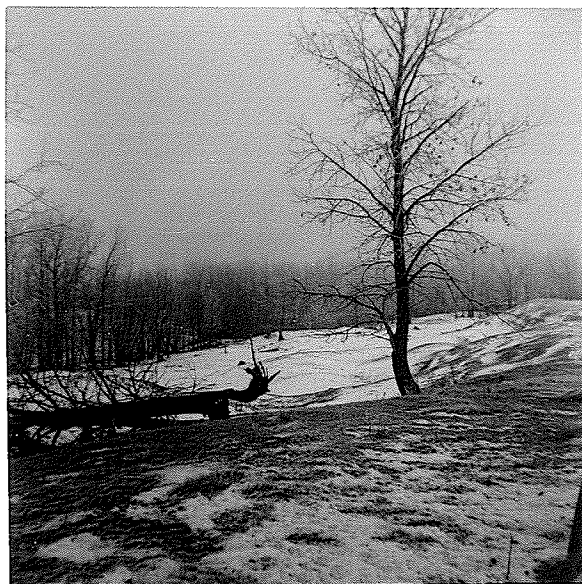
Plate 3



A cultivated slip-off slope in Township 12 Range 11 E.P.M.



A slip-off slope used for pasture in Township 13 Range 11 E.P.M.



A slip-off slope with slumping from the adjacent topographic surface in Township 12 Range 11 E.P.M.



A tributary creek in Township 13 Range 11 E.P.M. Sheet wash and gullying may be a problem on the cultivated slope.

of the slip-off slopes. Since the majority of the slip-off slopes are well above the general river level, the Whitemouth River has presumably begun downcutting with increased vigor following a period in which the rate of lateral erosion was greater than at present.

This change in stream behaviour could be caused by (1) a change in precipitation causing a change in volume of flow, or (2) a fairly sharp crustal movement of small magnitude,¹⁴ or (3) a change in the level of the water-body to which this stream is tributary, i.e. a change in local base level.

The existence of buried soil profiles along the Whitemouth River in Townships 8 and 9 Range 12 E.P.M. indicates the possibility that some drastic change has occurred which has caused the river to begin flooding after a period of stability that was sufficiently long to allow the formation of soil horizons. Such a change could very well be climatic. However, it is also possible that these profiles could have been buried under alluvium to the depth of one or two feet by a single flood.

Another possible cause of the increase of volume in the Whitemouth River that would cause it to resume downcutting with increased vigour after a period of greater lateral erosion is stream capture. Consideration of the uppermost and generally dry portion of Hazel Creek (Plate 5) shows the possibility of the part of the Whitemouth River, south of the northern boundary of Township 8 Range 12 E.P.M., once being part of the Brokenhead-Hazel Creek drainage system. The lower portion of the Whitemouth River would presumably have beheaded this system to produce the present extent of the Whitemouth River. A drastic change in stream characteristics immediately below the point of capture would be largely prevented by two very resistant

¹⁴Thornbury, op. cit. pp. 142-144.

Precambrian nick points. However downcutting would be resumed and continued upstream from these nick points until those portions of the stream become graded. The reach of the stream below this second nick point would be relatively free to react. It is much more deeply entrenched than any other portion of the stream, and as has been noted the slip-off slopes in this reach are well above the river.

Another possible cause for the increasing downstream entrenchment, other than that caused by normal downstream increase in volume, is that the concentration of sediment in a stream may decrease downstream.¹⁵ This is due, under normal circumstances, to the contribution of major portions of sediments from the upper parts of the drainage basin, whereas, the whole drainage basin provides run off. Thus, water in the lower reaches of the stream, carrying relatively small loads, is able to erode the lower channel. However, this effect may be lessened or reversed in the Whitemouth River because of the differences in surface cover and textures in the upper and lower portions of the valley.

In summary, it may be said that the resumption of more vigorous downcutting by the Whitemouth River after a period of greater lateral erosion is most probably due to an increased volume of flow caused by (1) an increase in precipitation and, or (2) stream capture. Differences in entrenchment in the lower and upper portions of the stream, other than that caused by normal increase of stream volume downstream, appears to be influenced by Precambrian nick points which act as local base levels for the portions of the stream above them.

¹⁵Kuiper, Notes on River Morphology, Canada, Dept. of Agriculture, P.F.R.A. Saskatchewan Reclamation Project, Interim Report No. 9. Winnipeg 1955. p. 22.

There are four sharp and somewhat angular curves in the river. (Figure 27) This angularity could be caused by the presence of large boulders or rock outcrops in the riverbank which would deflect the flow of the river. However, there is no direct evidence of such a situation in this particular area.

There are twenty-nine tributary creeks in the area of drainage density area one, the average length of which is 1.9 miles. These creeks range in length from 0.5 miles to about 3.5 miles. The valleys of these creeks meander, and usually have interlocking spurs. However, a few of them have trimmed these spurs by meandering within their valleys. For example, Smith Creek in Sections 3 and 9 Township 13 Range 11 E.P.M. has trimmed its valley side spurs. Cut-offs and meander scars are frequent along its course. The occurrence of the creek valleys at an average of 0.90 miles along the Whitemouth River makes them prominent in the landscape.

Drainage Density Area Two. Townships 11 and the northern two-thirds of 10 Range 12 E.P.M. and Township 10 Range 11 E.P.M. comprise this area and are those traversed by the Whitemouth River from the northern boundary of Township 11 Range 11 E.P.M. to the southern boundary of Section 22 Township 10 Range 12 E.P.M., a distance of eight miles in a north-south direction.

Surface materials are fine to moderately fine textured alluvial and lacustrine sediments in the northern part of this area, changing to fine to medium textured sediments of the same origin in the south. Permeability is decreased by cultivation in both of these materials.

The available relief in this area is about forty feet in the north decreasing to twenty or thirty feet in the south. In the areas away from the drainage channels relief is nearly nil, the land surface being level to gently sloping. As in the area of drainage density area one the greatest slopes are found on the east side



Plate 4

Part of Drainage Density Area Two in Townships 10 and 11 Range 12 E.P.M.
(National Air Photo Library Photo No. A 15545-188)

of the Whitemouth River where the land surface rises to the Precambrian Shield. The longest tributaries, Monk Creek for example, are found here.

The Whitemouth River falls about fifty feet in this area, from about 930 feet A.M.S.L. at the southern boundary of Section 22 Township 10 Range 12 E.P.M. to 879 feet A.M.S.L. at Whitemouth, indicating an average gradient of 3.2 feet per mile.

The total lengths of the Whitemouth River and its tributaries are sixteen and twenty-seven miles, respectively. The width of the Whitemouth River decreases from 120 feet in the north to ninety feet in the southern part of this area. The tributary creeks have mean top valley widths of 180 feet, with extremes of seventy and 440 feet. Between Whitemouth and Elma the creeks are entrenched fifteen to twenty feet below the upland surface. South of Elma the entrenchment decreases to ten or fifteen feet.

The parts of this area that contain the tributary drainage channels are generally cultivated. However, there is an occasional area left in forest due to such factors as locally poor drainage, stoniness or other adverse soil conditions. The general dependence of agriculture on drainage is shown by the narrow strip of cleared land that follows Monk Creek to the eastern boundary of Township 10 Range 12 E.P.M. (Figure 28)

Stranded slip-off slopes form fifteen miles of the total thirty-one miles of river bank on the Whitemouth River, indicating the extent of lateral erosion. These values compared to the equivalent values for the first area show that lateral erosion has proceeded to a considerably greater extent in this area than it has in the first area. The slip-off slopes of this area are considerably closer to the river than are those of the area of class one. The two measured in Section 30, Township 11 Range 12 E.P.M. were an average of twelve feet above the river

ice (January 1961), indicating that downcutting has not proceeded as far as it has in the first area, probably due to the nick point occurring near the boundary between the two areas.

Meandering is more extensive and fully developed than it is in the first area (cf Figures 27 and 28). Several of the meander curves are quite angular. The angularity is visibly due to rock outcrop in the river bed. Wide variations in the width of the river are frequently associated with the rock outcrops. For example, in Section 30 Township 11 Range 12 E.P.M. a large outcrop in the river has caused the river channel to widen by a factor of two. In times of low flow this outcrop appears as an island.

There are several islands in this reach of the Whitemouth River, usually consisting of a shallow deposit of alluvium on a rock outcrop. Some of these island support trees of six inch stump diameter.

The one meander scar in the area of drainage density class two indicates that, although meandering has reached a more advanced stage than it has in the first area, the river has not yet reached a stage of very free meandering. However, there are two meander necks in Section 18 Township 11 Range 12 E.P.M. that are only one or two river widths wide.

There are thirteen tributary creeks in this area, the average length of which is 2.5 miles. Most of the larger creeks such as that in Section 7 Township 11 Range 12 E.P.M. and that in Section 15 Township 10 Range 12 E.P.M. have developed small floodplains replete with meanders and meander scars. The creeks of intermediate development such as that in Section 27 Township 10 Range 12 E.P.M. have interlocking valley side spurs. Creeks occur at an average of 1.2 miles along the Whitemouth River. Although the average distance of the occurrence of creeks differs by only 0.3 miles between

this area and the first area, this difference and that in the entrenchment of these creeks is sufficient to change the aspect of the landscape. The second area is much more an uninterrupted plain. The differences in the extent of meandering between areas one and two, indicated by the portion of river bank in slip-off slopes are thought to be related to the nick points occurring near their boundary. That is, the portion of the Whitemouth River in area two has reached or is tending to grade. Downcutting is limited by the temporary base level of the nick points so that valley widening tends to become dominant,¹⁶ and meandering becomes more extensive.

Drainage Density Area Three. Townships 8, 9 and 10 south of the southern boundary of section 22 Range 12 E.P.M. and Townships 8 and 9 Range 13 E.P.M. comprise this area and are traversed by the Whitemouth and Birch Rivers. This area is fourteen miles in north-south extent. (Figure 29)

Surface materials along the rivers are of medium to moderately coarse textured sediments of alluvial and lacustrine origins. In Township 8 Range 12 E.P.M. there are considerable areas of fine sandy loam to clay loams of wave modified boulder till, that are locally quite stony. The characteristic permeabilities of these materials are decreased by cultivation.

The available relief ranges between fifteen and twenty-five feet throughout the area, with twenty feet being the general value. Away from the drainage channels the local relief is nearly nil, the land surface being level or gently sloping and without prominent features. However, there are a few small Precambrian outcrops in Township 8 Range 13 E.P.M.

The Whitemouth River falls about fifty-five feet, from about 985 feet A.M.S.L. at the southern boundary of Section 6 Township 8 Range 12 E.P.M.

¹⁶Thornbury, op. cit. p. 111

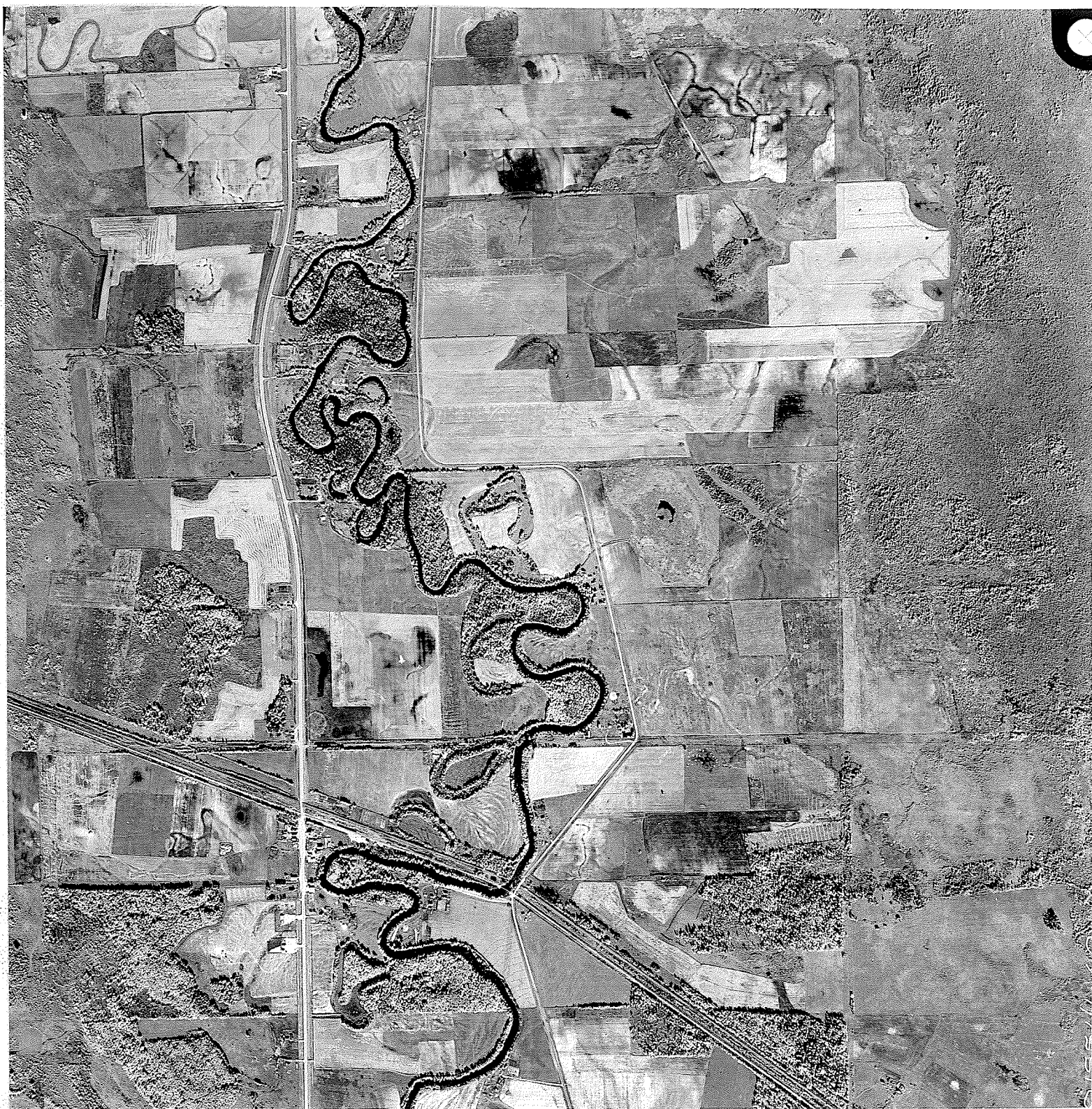


Plate 5

Part of Drainage Density Area Three in Township 8 Range 12 E.P.M.
(National Air Photo Library Photo No. A 15541-60)

to about 930 feet A.M.S.L. at the southern boundary of Section 22 Township 10 Range 12 E.P.M., indicating a mean gradient of 2.2 feet per mile. On the Birch River the corresponding fall is about eighty feet from approximately 1010 feet A.M.S.L. at the southern boundary of Section 1 Township 8 Range 13 E.P.M. The average gradient of this reach of the Birch River is 2.9 feet per mile.

The total lengths of the Whitemouth and Birch rivers and their tributary creeks are fifty-three and thirteen miles respectively. In the northern part of this area the mean width of the Whitemouth River is about seventy feet, decreasing in the south to about sixty-five feet on the Whitemouth and fifty feet on the Birch River. River width is quite variable in the southern parts of this area because of the close proximity of bedrock to the surface. The river channels widen to accommodate the volume of flow where rock resists downcutting by the stream. The mean top valley widths of the creeks in this area is 150 feet with extremes of forty-five and 375 feet, with entrenchment being about ten feet below the surface.

Generally the land adjacent to the drainage channels is cultivated. However, the most headward portions of several creeks lie beyond the limits of clearing. (Figure 29)

Stranded slip-off slopes form sixty-three miles of the total 106 miles of riverbank on the Whitemouth and Birch rivers, showing that lateral erosion has proceeded to a greater extent than it has in the previous two areas. The slip-off slopes are closer to the river level than is the case in the two areas downstream. For example, in Section 1 Township 9 Range 12 E.P.M. those measured were about seven feet above the level of the river ice. (January 1961) Downcutting has not proceeded in this area to the extent that it has in the areas

Plate 6



The Whitemouth River in Township 9
Range 12 E.P.M.



A new drainage ditch (one of few) in
Township 9 Range 12 E.P.M.



Meander Scars adjacent to the Whitemouth River in Township 9 Range
12 E.P.M.



downstream.

Meandering is relatively very well developed in this area. Indeed, there are many places where the river flows for a short distance in a direction opposite to that of the general direction of flow (Figure 29). In Section 17 Township 8 Range 13 E.P.M. the closest point of one meander scar is 0.1 mile away from the Birch River. In Section 1 Township 9 Range 12 E.P.M. there is a site where one meander scar is partially superimposed on another. These examples show that meandering is relatively free in this area. Recent and imminent cut-offs are frequent.

Angularity in river curves is increasingly frequent toward the south and east on the Birch River. There are two sites where bedrock is visibly the causal factor. Islands in the Birch River are common and are found in conjunction with rock outcrops.

There are twelve tributary creeks in this area with mean lengths of 1.1 miles. These creeks are much like those in area two. Some have developed small floodplain while others have not trimmed their interlocking valley side spurs. The smaller creeks have no well defined features of any kind and frequently flow only in very shallow depressions. Creeks occur at an average of 4.5 miles along the Whitemouth and Birch rivers, and because of their small size and number have only small effect on the appearance of the plain. The nick point in Township 10 Range 12 E.P.M. is thought to exercise the same control on the portion of the river in area three as does the nick point near Whitemouth on the area in class two, so that the streams in this area, are tending to, or, are at grade.

Drainage Density Area Four. Township 8 Ranges 14 and 15 E.P.M. Township 7 Ranges 11, 12, 13, 14, 15 and 16 E.P.M., Township 6 Ranges 12

and 13 E.P.M., Township 5 Ranges 13 and 14 E.P.M. and Township 4 Range 14 E.P.M. comprise this area and are traversed by the Whitemouth and Birch Rivers and Boggy Creek. The extent of the area is twenty-four miles in a north-south direction.

The surface materials lying along the streams are moderately coarse to coarse textured sediments of lacustrine and alluvial origins. These are also scattered areas of boulder till in the form of ground and end moraine. Peat varying from a few inches to over ten feet in thickness covers most of this area, except immediately adjacent to the streams. The peat and its covering of vegetation retain and release very slowly run-off waters in the area.

Available relief over most of the area is about ten feet or less. Along the lower reaches of the streams available relief increases to twenty or twenty-five feet. The land surface has but slight relief and is level to gently sloping. Two exceptions are found in the rock knob upland in the east and terminal moraine in the southwest.

The Whitemouth River falls 144 feet from 1129 feet A.M.S.L. at Whitemouth Lake to about 985 feet A.M.S.L. at the southern boundary of Township 8 Range 12 E.P.M., over a distance of fifty-three miles, indicating a mean gradient of 2.7 feet per mile. The Birch River has a mean gradient of 3.8 feet per mile, falling from about 1060 feet A.M.S.L. at Birch Lake to about 1010 feet A.M.S.L. at the southern boundary of Township 8 Range 13 E.P.M., a distance of thirteen miles. Boggy Creek falls about sixty feet from about 1075 feet A.M.S.L. in Township 7 Range 16 E.P.M. to about 1015 feet A.M.S.L. at the confluence of the Birch River and Boggy Creek, over a distance of 26 miles. The mean gradient is 2.3 feet per mile.

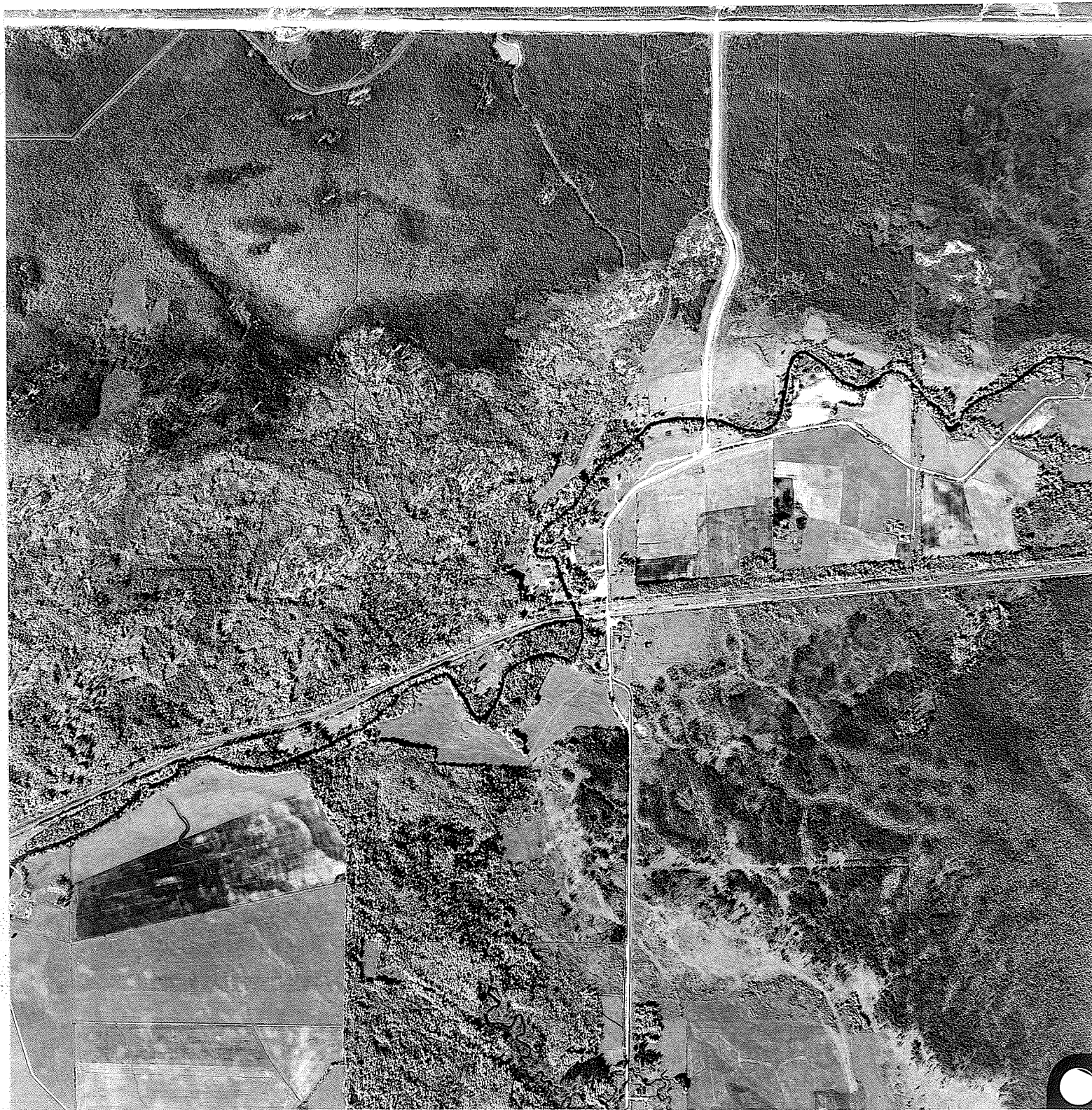


Plate 7

Part of Drainage Density Area Four in Townships 7 and 8, Range 14 E.P.M.
(National Air Photo Library Photo No. A 15543-165)

Plate 8



Boggy Creek near East Braintree



A nick point in the Birch River up-
stream from McMunn.

The total lengths of the trunk streams and their tributaries are ninety-two and thirty miles, respectively. The Whitemouth and Birch rivers and Boggy Creek decrease in width from sixty-five to twelve feet, twenty-two to six feet and forty-five to five feet, respectively, from north to south. The tributary creeks are generally without well defined valleys, flowing in broad "V" shaped depressions usually covered with sedges. The trunk stream and the tributaries are variable in width, especially at the outside points of meanders. Large boulders are common in the lower reaches of the trunk streams.

This area is covered by native vegetation except for small areas of cultivated land adjacent to the lower reaches of the trunk streams so that the effects of cultivation are extremely limited.

The small size of river features and the heavy covering of vegetation prevented measurements of slip-off slopes from air photographs, however, it is apparent from field observations and air photographs that they do form a very substantial proportion of the river banks (Plate 7). This, however, does not apply to the Birch River south of its junction with Boggy Creek. In this reach there is no evidence of lateral erosion, even though the stream valley meanders extensively. The slip-off slopes in this area are much closer to the level of the river ice than is the case in the previous three areas, the two measured (January 1961) in Section 33 Township 7 Range 14 E.P.M. were a mean distance of 2.0 feet above the level of the river ice.

Meanders are well developed throughout most of this area. Meander scars, and cut-offs occur very frequently except in the upper most reaches of the streams. There are many chute cut-offs in the central portions of this reach of the Whitemouth River (Plate 9). Regarding chute cut-offs, Thornbury

states:¹⁷

"A chute cut-off takes place through one of the sloughs of a point bar, resulting in isolation of a part of the bar as an island between two river channels. As this is a low angle cut-off part of the river may continue to follow its old route until it becomes filled with a sand plug at its upper end".

Chute cut-offs are probably found only in this particular reach because of very shallow entrenchment, poorly consolidated surface materials and a relatively low gradient. There are several islands in this reach of the river that will produce identical situations when one channel around the island becomes filled.

Angularity of curves in the streams of this area is a common occurrence. Channel width usually increases by factors ranging from 1.5 to 2.0 at these points. As in areas treated previously this angularity appears to be associated with rock outcrops or large boulders in the beds or the banks of the streams.

There are twenty-three creeks in this area, of which the mean length is 1.3 miles. Five of these creeks are not directly tributary to the trunk streams but flow into areas of bog from the terminal moraine in the southwest, or are internal drainage channels within the bog areas. The tributary creeks occur at an average of 5.1 miles along the trunk streams. These average values are reasonably representative of this large area.

A comparison of the reaches of the streams in the drainage density areas indicates that the change of stream characteristics, such as the extent of meandering, the entrenchment of the streams, and the degree to which adjacent areas are drained appears to be largely controlled by the nick points in the Whitemouth System. The textures of surface materials, cover of native vegetation and available relief appear to determine the development of

¹⁷Ibid. p. 169





Plate 9

Part of Drainage Density Area Four, in Township 6 Range 12 E.P.M.
(National Air Photo Library Photo No. A 15541-74)

tributary creeks.

Climate^{18,19}

The Whitemouth Valley has a humid continental climate with long cold winters, short cool summers and a summer concentration of precipitation. The records of weather observations at Oakbank, Pinawa, Kenora and Sprague, situated, west, north, east and south east of the area, respectively, indicate the nature of the climate. (Figure 6)

This area receives about two inches more precipitation annually than does Winnipeg. The mean annual temperature is about two Fahrenheit degrees less than that of Winnipeg, giving this area a higher precipitation efficiency. For example, some of the best crops known were harvested in Township 8 Range 13 E.P.M. during the 1930's when most of the Prairies experienced drought conditions.²⁰

The valley experiences a greater number of cool nights and a shorter frost free season than would be expected from its latitudinal position. Sprague, for example, has a mean frost free season of seventy-two days while the valley as a whole has a frost free season of sixty-five to ninety days.

The statement that:

"Probably the tongue of 20 inches or more extending from immediately east of Winnipeg to a broad base of 24 or 25 inches on the Lake of the Woods has real significance".²¹

indicates that the valley receives a probable minimum of twenty-two inches of annual precipitation. However, the values of annual precipitation at Sprague and Pinawa by no means substantiate this, being 20.26 and 16.17 inches

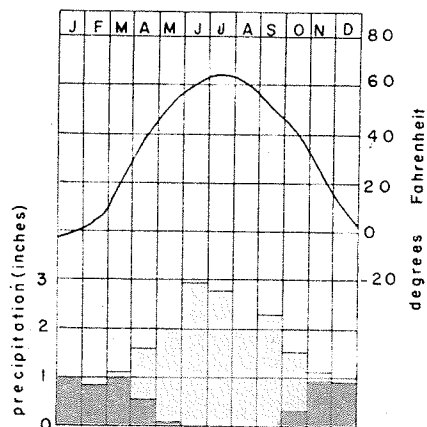
¹⁸Connor, A.J., Climate of Manitoba. Economic Survey Board of Manitoba, Winnipeg 1939, pp. 9-12.

¹⁹Climatic Summaries for Selected Meteorological Stations in the Dominion of Canada, Canada, Dept. of Transport, Meteorological Division, Volume I, Toronto.

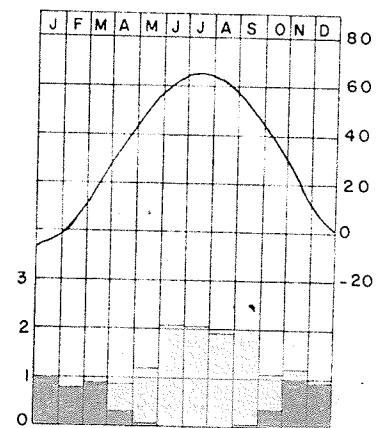
²⁰Local farmer, Personal Communication. September 1960.

²¹Connor, op. cit. p. 10.

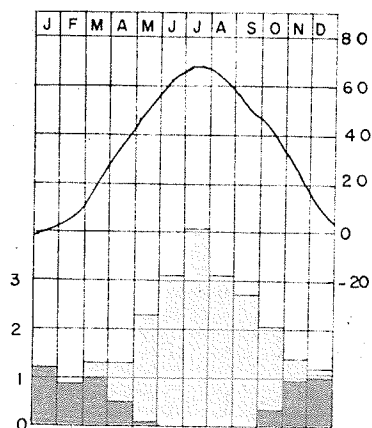
OAKBANK



PINAWA



KENORA



SPRAGUE

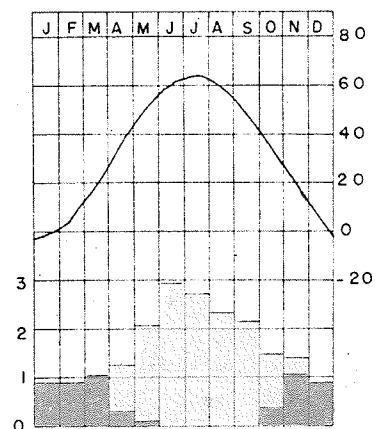


Figure 6

respectively.

The fact that the period of maximum precipitation coincides with the frost free period is of great importance to agriculture. The relatively small amounts of precipitation that occur in March and early April are also important because they allow spring seeding operations to be completed before the rainy season is well started. The following table indicates the variability of precipitation in the growing season.

TABLE II

PRECIPITATION IN THE GROWING SEASON AND STANDARD DEVIATIONS
FOR OAKBANK SPRAGUE, AND PINAWA*

Station	Years of Record	Precipitation in Growing Season	Standard Deviation	Percent that Standard Deviation is of the Growing Season Precipitation
Oakbank	46	9.61 inches	2.92 inches	30
Sprague	20	8.74 "	3.10 "	35
Pinawa	21	6.26 "	2.64 "	42

*Connor, A.J., Climate of Manitoba, p. 11.

The valley seems to be within an area of relatively high rainfall dependability, which may be supposed to have given trees an opportunity to become well established at the outset and to have allowed them to maintain sufficient growth, since, to avoid being killed by drought.

The relatively high precipitation efficiency coupled with relatively high rainfall dependability produces conditions that will give yields of the common grain, forage and root crops consistently higher than those in the drier areas to the west provided that soil drainage and fertility compare favourably.²²

²² Ellis, J.H., Agricultural Consultant with the Lands Branch, Manitoba Dept. of Mines and Natural Resources, Personal Communication, March 1961.

Native Vegetation^{23,24}

The forests of the basin are classified as part of the Rainy River Section of the Great Lakes - St. Lawrence Forest Region.²⁵ The following description of the forests of the areas is given by J.S. Rowe.²⁶

"The forest cover shows the influence of the northward movement of the Great Lakes - St. Lawrence Forest, ... as well as the influence of the tension zone between forest and adjoining prairie to the west. The red and white pines (*Pinus resinosa*, *P. strobus*), formerly of greater extent have now only a scattered representation on suitable sites, particularly in the eastern parts, for logging and fires have led to their almost complete replacement by jack pine (*Pinus banksiana*). Low relief and poor drainage has favoured the development of extensive swamps, with black spruce (*Picea mariana*), Tamarack (*Larix laricina*), eastern cedar (*Thuja occidentalis*), willow and alder scrub, particularly in the western portions over sedimentary rocks. The northwestern limits of the Section are principally coincident with the range of this swamp association and the presence of cedar, though isolated populations of this species are also found farther to the northwest. Large areas of balsam poplar (*Populus balsamifera*), white spruce (*Picea glauca*), balsam fir (*Abies balsamea*) and scattered tamarack (*Larix laricina*) are found inland from the rivers. On the river banks white elm (*Ulmus americana*), basswood (*Tilia americana*), Manitoba maple (*Acer negundo*) and bur oak (*Quercus macrocarpa*) occur, the latter species often forming a savanna type with grass openings. Trembling aspen (*Populus tremuloides*) is common throughout the Section.

Relief is low, and the topography is mostly flat to undulating, with coarse-textured materials, outwash, and old beaches and bars of Lake Agassiz in the west. Broad swamps are prominent features of the former lake bottom."

The tension or transition zone mentioned in the above passage is essentially a result of (1) a difference in elevation; the southern part of the basin is nearly 400 feet above the Red River Plain to the west, while the northern part is about 150 feet above this plain, (2) a mean annual temperature which is about two Fahrenheit degrees less than that at Winnipeg for example, (3) a mean annual

²³A. Kotowicz, Manitoba Forest Service, Personal Communication, January 1961.

²⁴Manitoba Forest Service, Forest Inventory Maps 1947, 56 on office file, Wpg.

²⁵J.S. Rowe, Forest Regions of Canada, Bulletin 123, Canada, Dept. Northern Affairs and Natural Resources, Forestry Branch, Ottawa 1959.

²⁶Ibid. p. 53.

precipitation about two inches greater than that at Winnipeg, (4) coarse-textured soil parent material which occasionally is silicious, and podzolic soils which are acid in reaction as opposed to the fine-textured calcareous black earth soils to the west, and (5) generally impeded drainage which favours the greater moisture demand of the forests as compared to the relatively free drainage in the areas to the west.

From Rowe's description it is clear that there is no single species or combination of species that dominate the forests of the basin. This is due to the wide variations in the factors influencing forest growth²⁷ (soil, climate, vegetation, saprobes, fauna and man). Hills states:²⁸

"Since many, if not all, the features of any area vary within short distances, a relatively homogeneous system for producing forests is confined to a relatively small area of the earth's surface. This relatively homogeneous area or place of forest production is called site."

In this basin the influence of man has been strong. Cutting and fires have, in many areas, destroyed the natural vegetation characteristic of a particular site. Following those occurrences stands of secondary succession frequently become dominant. The explanation of the distributions of these stands secondary succession requires knowledge of the history of these occurrences, and the state of the forests immediately after them, especially regarding seed supply.

The forest inventory map (Figure 7) has been compiled from forest inventory maps of individual townships at a scale of 1:15,840. The areas on this map shown as being under some particular species or combination of species (with the exception of willow and alder and scrub) are capable of and do produce merchantable timber (trees over thirty feet in height and having a stump diameter

²⁷G.A. Hills, "Regional Site Research", The Forestry Chronicle, Dec. 1960. Vol. 35, No. 4. p. 401

²⁸Ibid p. 403

WHITEMOUTH VALLEY FOREST INVENTORY

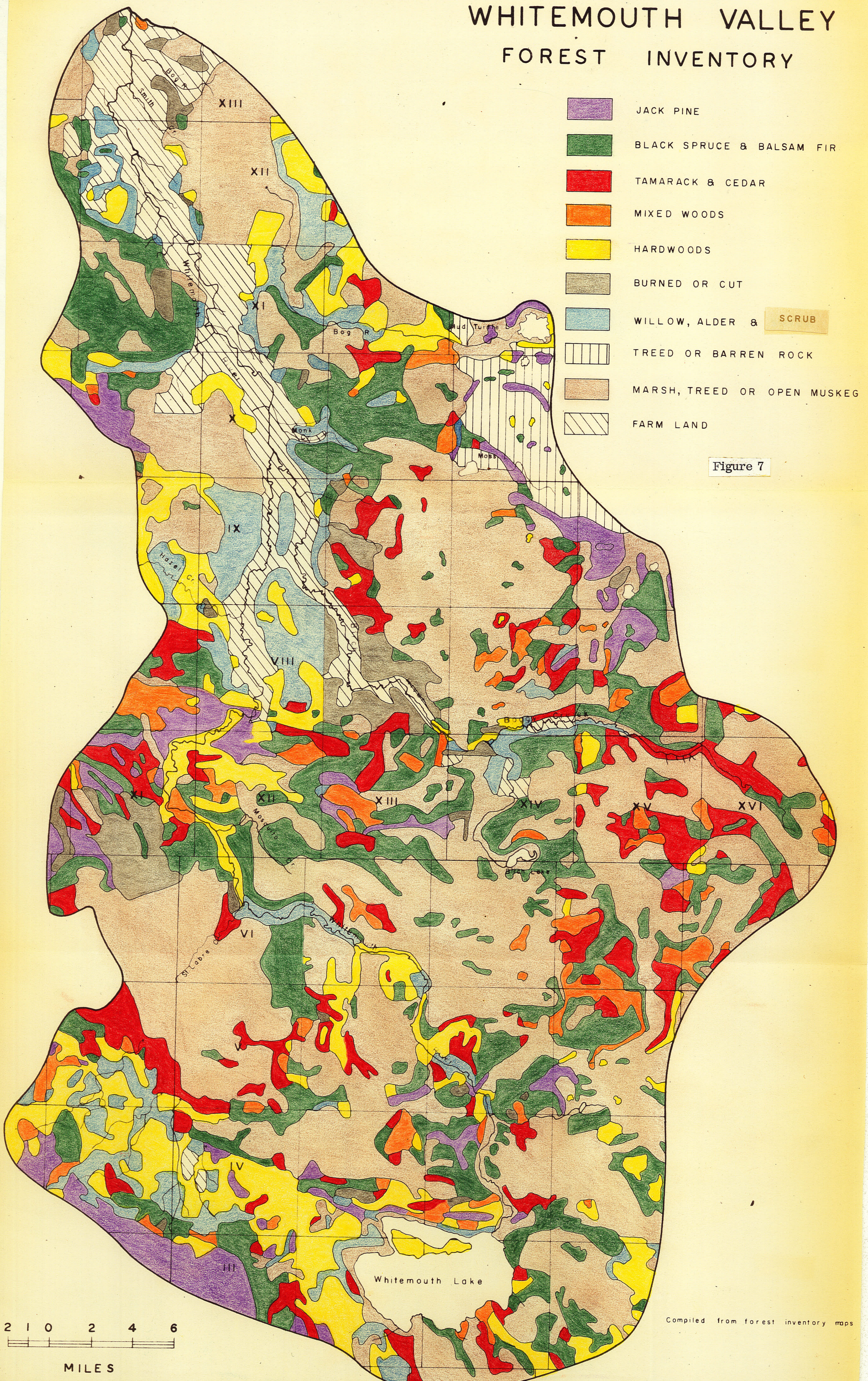


Figure 7

Compiled from forest inventory maps

A horizontal number line with tick marks at 0, 2, 4, and 6. The word "MILES" is written below the line.

exceeding six inches). The other categories (willow, alder and scrub treed or barren rock, marsh, open or treed muskeg) do not and are usually not capable of producing merchantable timber. For example, large portions of the area shown as marsh, open or treed muskeg is covered with stagnated black spruce or tamarack that will not exceed 30 feet in height, even in 140 years. This category forms the largest single area in the basin (Figure 7) and is largely determined by drainage conditions. (See Appendix I for a description of individual species).

In the following sections vegetation is treated by species rather than by area or region because (1) each species is found throughout the valley, (2) sites favourable to each species occur as small areas in intimate inter-relations over most of the basin making a separation of sites very difficult and (3) any area or region of practicable size that could be chosen would be very similar to any other such area or region making the discussion of each repetitious.

Jack Pine. This species occupies the deep droughty sands of the high-land drift areas in Township 3 Range 12 E.P.M. and Township 4 Range 11 E.P.M. Other large areas under this species occur in Townships 7, 8 and 10 Range 11 E.P.M.; occupying areas of deep, well or excessively drained sands found in the form of beach ridges or aeolian deposits. The droughty sites in the Precambrian Shield in Townships 9 and 10 Range 14 E.P.M. and Townships 8 and 9 Range 15 E.P.M. often support jack pine.

Black Spruce and Balsam Fir. These species are widely distributed throughout the basin. Generally they are found in bogs and the edges of swamps. Such poorly drained sites as these are, however, considerably drier than those that will not support a productive forest. For example the relatively high sandy

areas in Townships 4 and 5 Ranges 14 and 12 E.P.M. respectively, known locally as Big John's and Levesque's Ridges have black spruce growing on sites that are slightly higher and drier than those adjacent, not producing merchantable timber. In Township 7 Range 16 E.P.M. the drainage effected by Boggy Creek allows merchantable timber to grow in a belt along the creek.

Mixed Woods. The main species found in this category are black and white spruce, balsam fir, jack pine, white birch, trembling aspen, balsam poplar. Very small quantities of white elm, mountain, showy mountain, black, red and green ashes also occur. The climax sites are usually of intermediate drainage and relatively fine texture, such as are found in areas of clayey till. However, it is common to find a mixed stand on a site that would normally be climax for some one particular species such as black spruce or jack pine. This is due to the quick spread of poplars by means of root suckers. Other species such as white birch, the spruces and balsam fir may grow, depending on the availability of seeds of the various species in the area. An example is provided by the area of mixed woods Township 8 Range 11 E.P.M. that would normally support jack pine; it being of deep, droughty sands.

Hardwoods. The most common species of hardwoods are balsam poplar, trembling aspen and white birch, occurring in widely distributed stands in the basin. The largest area, in the southwest is surrounded by jack pine, black spruce, willow, alder and scrub. This stand has grown up following repeated fires in the previously existing jack pine. The areas that are covered by hardwoods (poplars especially) following fires, revert back to the previously existing climax species, given sufficient time. Climax sites for the hardwood stands are found along the rivers on moderately well to imperfectly drained alluvial soils that are of relatively fine texture. Such a stand is found along the Whitemouth

River in Townships 6 and 8 Range 12 E.P.M. and Township 7 Range 11 E.P.M.

Cedar and Tamarack. These species have a wide distribution in the basin, although their areas are of only moderate size. They are confined to bogs, swamps and similar wet sites. For example a stand of these species is found in Township 7 Range 16 E.P.M. along Boggy Creek where drainage is sufficiently improved, over adjacent swamp areas, to provide a suitable site. In addition to the improved drainage the amounts of mineral material present is also important in determining whether or not a site will produce merchantable timber. In areas of very deep peat mineral material is limited in amount. However in areas such as that cited above mineral material has been deposited by streams and hence provides the nutrients required for forest growth. There are very few mature tamarack left in the basin due to a severe infestation of the European Larch sawfly in 1910²⁹ that nearly destroyed this species.

Willow, Alder and Scrub. The areas of willow, alder and scrub are large and widespread. These species commonly occur on wet sites and along streams as in Township 6 Ranges 12 and 13 E.P.M. on the Whitemouth and along Boggy Creek in Township 8 Range 15 E.P.M. Willow and alder frequently grow up on wet sites following cutting or fires. This has occurred in large areas in Township 4 Ranges 11 and 12 E.P.M. and is particularly noticeable in the areas adjoining the cultivated lands along the Whitemouth River in the northern part of the area where settlement has resulted in the destruction of forests either by fire or cutting.

Treed³⁰ or Barren Rock. The only areas of appreciable size in this category occur in the northeast on the Precambrian Shield in Townships 10 and

²⁹Stevenson, I.H. Forests of Manitoba, Economic Survey Board of Manitoba Winnipeg, 1938. p. 21

³⁰Treed rock is that which does not support over two cords per acre of merchantable timber. (Definition used by the Manitoba Forest Service).

11 Ranges 14 and 15 E.P.M. respectively. However, there are areas of outcrop east of Range 12 in Townships 7 and 8 which are too small to map on the scale used.

The influence of man, in the form of fires and cutting, on the distribution of tree species in this basin has been very important and should be borne in mind in the consideration of the previous section and the forest inventory map. Some specific examples have already been given. Although these effects may be temporary it should be realized that the time required for a climax species to regain its position is very considerable, once a secondary succession is established. However, the reforestation program of the Manitoba Forest Service generally attempts the re-establishment of climax species for a particular site under consideration, especially as regards jack pine.

The single largest area shown on the forest inventory map (marsh, treed or open muskeg) is undergoing continuous change. Parts of this area (in a stage of hydrarch succession) are being built up by further deposition of plant remains. In the case of floating bog the water-filled space below the floating mat of vegetation is gradually filled, giving solid deep peat. Sphagnum moss is important in this process. At the edges of this floating mat are found shrubs such as willow, alder and water birch. Behind these tamarack will usually be found. Black spruce occupies the oldest part of the bog and will succeed the tamarack.³¹

Soils³²

The common soils of the Whitemouth Valley are those of the Organic,

³¹Oosting, H.J. The Study of Plant Communities, San Francisco, Freeman 1956. pp. 242-245.

³²The information in this section has been provided through the courtesy of R.E. Smith of the Manitoba Soil Survey, and is to be regarded as preliminary.

Podzolic, Gleysolic, Chernozemic and Regosolic Orders.³³ Of these, the soils of the Organic Order predominate in terms of areas of occurrence. Within the areas of mineral deposits soils of the Podzolic Order predominate in terms of (1) numbers of genetic profile types and (2) areas of occurrence. Within the Podzolic Order soils of the Orthic and Gleyed Dark Grey Wooded Sub-groups are the most frequent.

The soils of the drainage area (over fifty genetic profile types are recognized in this area by the Manitoba Soil Survey) occur in a complex distribution, which is governed, here as elsewhere, by geologic parent material, relief, drainage, natural vegetation, climate and age. The fact that this is an area of climatic and geologic transitions tend to make the soils and their distribution more complex than perhaps they might otherwise be.

The wide range and distribution of geologic parent materials is due, primarily, to the geomorphic processes which have acted in this area. Original glacial movement of deposits and their subsequent working by glacial melt waters have been important in determining the distribution of surface materials, especially in the area of end moraine in the southwest. Deposition of materials (sand to clay) in Lake Agassiz and the formation of beaches and other lacustrine features by the waters of the lake have determined the distribution of surface materials and the nature of the land surface over very large portions of the area. Similarly, subsequent to the disappearance of Lake Agassiz, the erosion and deposition of material by the Whitemouth System has resulted in an extremely complex distribution of surface materials adjacent to the streams, especially south of Elma.

The climatic transition has been discussed previously under Native Vegetation and is indicated to be of importance by the wide occurrence of soils

³³National Soil Survey Committee of Canada Classification, 1960.

that are intergrades between soils of the Chernozemic and Podzolic Orders. The geologic transition consists of (1) the change from the Precambrian crystalline rocks of the Canadian Shield to the adjacent Paleozoic sedimentary rocks and (2) the effect that this change has had on type (calcareous and acid) and composition of tills found in the area.

Profile descriptions of some of the soils of the drainage area are given in Appendix II, arranged according to the areas of surface deposits used in the map of broad soil associations (Figure 8).

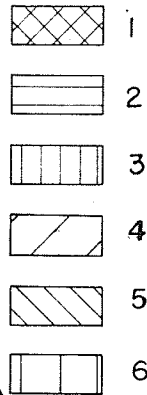
The following sections give the most common genetic profile type associated with each of these areas of surface deposits. In addition, the topography, vegetation and use are given for the dominant soil series of each area.³⁴

1. In the areas of strongly water-worked, sandy end moraine deposits the well to excessively drained members of the Minimal Podzol and Orthic Grey Wooded Sub Groups predominate. The surface of these areas is smooth level to undulating. The run-off of surface waters is nil, internal percolation in these sands being very rapid. Ground water tables are absent. Jack pine forest and associated vegetation are usually found on these soils, whose main use in fact is as a growth site for jack pine and red pine. These forest soils are not suitable for arable culture because they are acid, droughty and have a low organic matter content and cation exchange capacity. Such conditions lead to severe nutrient deficiencies in crops.

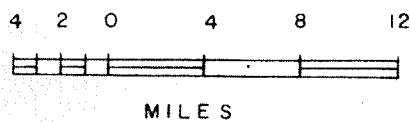
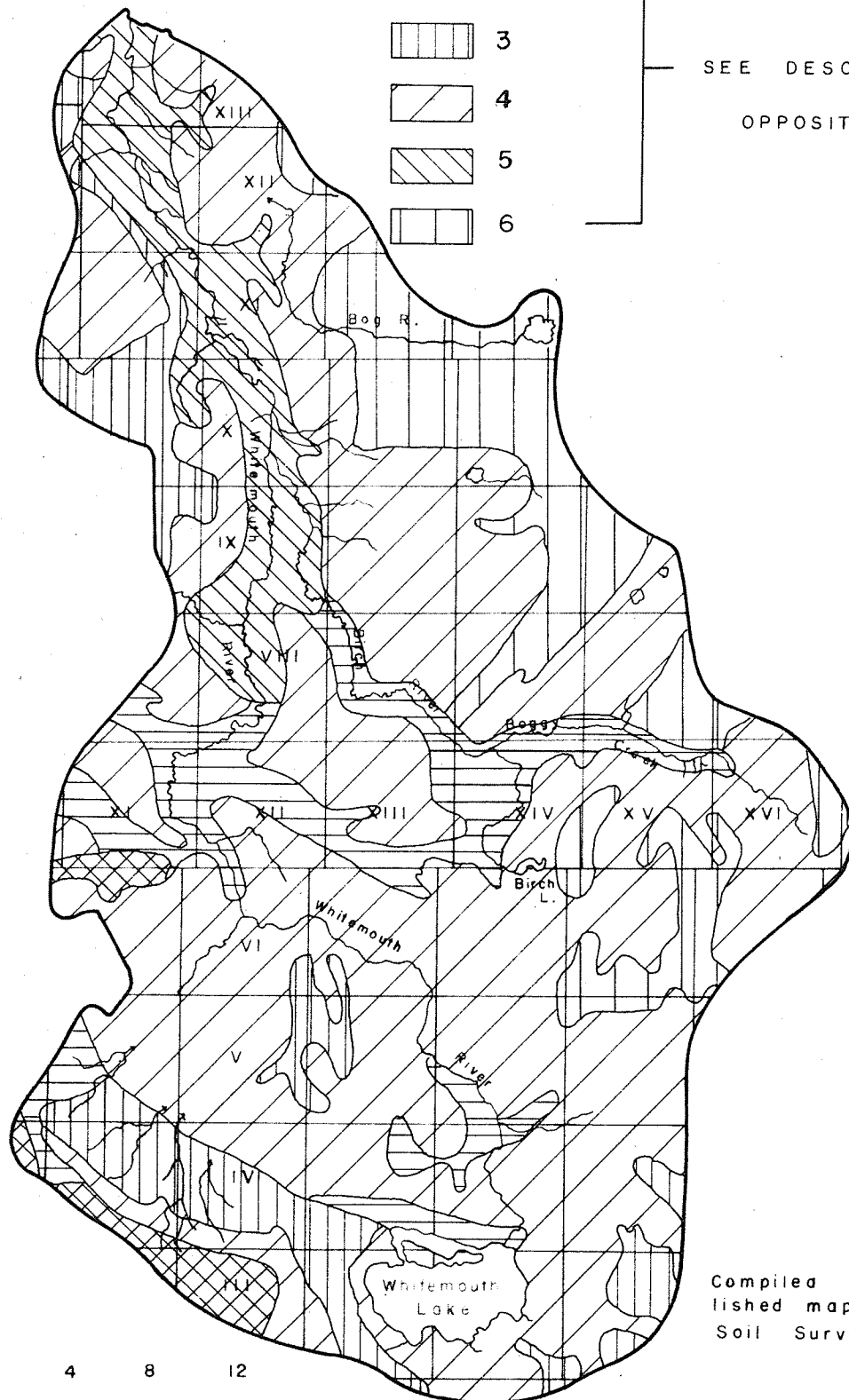
2. Moderately well and imperfectly drained soils of the Orthic and Gleyed Grey Wooded and Podzol Sub-groups predominate in the areas of sandy to gravelly textured beach lake bed, alluvial and aeolian deposits. The terrain associated with these soils is generally smooth level to undulating in areas of

³⁴This data is from preliminary work done in the area by the Manitoba Soil Survey.

WHITEMOUTH VALLEY BROAD SOIL ASSOCIATIONS



SEE DESCRIPTIONS ON
OPPOSITE PAGE



Compiled from an unpub-
lished map. Manitoba
Soil Survey.

Figure 8

LEGEND

1. Podzolic and Grey Wooded soils developed on stony, sandy textured, strongly water worked morainic deposits.
2. Imperfectly and poorly drained Podzolic and Grey Wooded soils developed on sandy to gravelly textured lacustrine, alluvial, and aeolian deposits.
3. Well to imperfectly drained Grey Wooded soils developed on this sand to clay textured deposits over calcareous boulder till and boulder till.
4. Organic soils consisting of shallow and deep fibrous peats.
5. Imperfectly to moderately well drained Grey Wooded and Dark Grey soils developed on silty to clay textured lacustrine and alluvial deposits.
6. Podzolic soils developed on extremely stony, sandy textured acidic till in association with organic soils and rock outcrops.

Figure 8

duned sand. The run-off of surface waters is nil, internal percolation being very rapid to the level of the ground water table. Ground water tables occur at or very near the surface in spring and early summer, then recedes to four or five feet below the surface by fall. Generally the imperfectly drained sites support hardwood forests of aspen and balsam poplar while mixed forests of jack pine and aspen are found on the moderately well drained sites. The factors outlined in the previous paragraph that preclude these soils from arable culture are compounded by the presence of ground water in the solum for at least part of the summer.

3. Well to imperfectly drained Grey Wooded soils predominate in areas of thin sand to clay textured deposits over calcareous boulder till and boulder till. These areas, have irregular, very gently sloping surfaces. The run-off of surface waters from these soils is medium, they being of medium internal drainage. Ground water is absent from the sola in the well drained sites, although a temporary perched water table may occur above a clay textured Bt horizon. On the imperfectly drained sites ground water is present in the sola for at least part of the summer. These soils usually support a forest cover of aspen, birch, and balsam poplar. Balsam poplar may become predominant on the imperfectly drained sites. As aspen and balsam poplar are not usually commercial species these areas are generally wasteland.³⁵ However, where the vegetation has been removed, grazing or crop production is attempted with varying degrees of success. These soils are often of moderately fine texture (clay loams) and hence may have a medium to high cation exchange capacity. However, their organic matter content is low. Stoniness and a high calcium carbonate level in these till soils may introduce serious problems in the practice of arable culture.

³⁵ A pressed board factory at Sprague utilizing these species has made them commercially valuable, in that district.

4. Areas of silty to clay textured lake-bed and alluvial floodplain deposits. have soils which are predominantly of the Orthic and Gleyed Dark Grey Wooded and Gleyed Dark Grey Sub-groups. The surface typical of these areas is smooth level to irregular very gently sloping. The run-off of surface waters is usually slow, internal drainage being medium to very slow, depending on the texture and position of the sola. The ground water table occurs at or near the surface for short periods during the spring and recedes to well below the solum by fall in the imperfectly drained sites. However, in the moderately well drained sites ground water tables are absent, although a temporary, perched water table may occur above a clay textured Bt horizon. These soils support dense stands of aspen, balsam poplar, birch, shrubs and the occasional spruce. Under their native vegetation these areas are usually wasteland because the vegetation is essentially non-commercial. However, when this vegetation has been removed these soils are used for the production of small grains, hay and forage crops. These soils are the most productive of the Whitemouth Valley, having moderately high levels of organic matter and cation exchange capacity, and although they are usually deficient in nitrogen and available phosphorous they are quite satisfactory for the operation of mixed farming enterprises, with proper field husbandry. These areas are classed as land of good to moderate productivity.

5. The soils of the extensive organic deposits consist of shallow (twelve to thirty-six inches) and deep (thirty-six inches and over) peats. These areas are smooth level to gently sloping and are very poorly drained, and usually support stands of black spruce, tamarack or cedar. However, in the most poorly drained sites these forest stands may be stagnated and unmerchantable. Some of these latter sites may not have a forest cover but consist of open bog.

These areas are best suited for forest production.

6. Areas of Precambrian rock outcrop and organic soils, together with smaller areas of mineral soils ranging from sand to clay in texture occur in the northeast. The mineral soils in this area consist of poorly to well drained soils of the Dark Grey, Grey Wooded, Podzol, Gleysol and Meadow Great Groups. The areas of mineral soils are usually small and confined to (1) the low areas between rock bosses and (2) the intermediate slopes between rock bosses and adjacent organic soils. The vegetation found on these areas is widely variable, in accordance with the wide variability of growth sites. Agricultural use of these areas is precluded by the facts that, they are, (1) too small to cultivate economically (2) often inaccessible and (3) quite variable in texture over small distances.

CHAPTER III

A REGIONAL STUDY OF THE WHITEMOUTH VALLEY

Two major regions are recognized; the agricultural region and the forest region.

Forest Region

This region is readily identified by its vegetation¹ (Figure 7). Although this forested area has been strongly influenced by man's activities, especially with respect to fires and cutting, its appearance generally fails to show the results of such activities to the casual observer.

The forest region is a plain without prominent terrain features except the area of Precambrian rock outcrop in the northeast and the area of end moraine in the southwest. One of the striking features in the landscape of this region is the large extent of bog and marsh (Figure 7) due to a poorly developed drainage system.

Peat, muck and sand are the predominant surface materials in this area. Only relatively small areas (Figure 2) have mineral deposits finer than sand. These occur principally as lake-bed and floodplain deposits of silt to clay loams along the trunk streams in the region.

The major transportation routes in this region are the Greater Winnipeg Water District Railway, Canadian National and Canadian Pacific Railways and Provincial Trunk Highways I (Trans Canada), 11 and 4. None of these routes, except Provincial Trunk Highway 11 has been built to serve this area. Except for the latter there is a general lack of road development. However, the number of

¹Hartshorne considers this as part of the wild landscape. . . .
Perspective on the Nature of Geography, Chicago, Rand McNally and Co. 1959, p. 49.

roads is increasing, due to the efforts of the Manitoba Forest Service who are building all weather forest access roads. Winter roads, for the removal of wood, are common and the most obvious, if not the only cultural feature, visible on aerial photographs of this area. These roads are merely cuts through the forest; their usefulness being dependent on the muck and peat below being frozen.

Buildings in this region are few and of rudimentary construction, being used seasonally by wood cutters or by employees of the Manitoba Forest Service. In addition there are buildings housing service facilities along the various trunk transportation routes and the occasional building used for recreation in the vicinity of Whitemouth Lake.

A distinct regional characteristic is the lack of permanent population (Figure 9). Human occupancy of these lands is seasonal and limited in extent because of its dependence on the extraction of forest products such as pulp-wood and blueberries (*Vaccinium angustifolium*). The labour for these operations is provided in the main by farmers from the neighbouring agricultural regions.

Agricultural Region

This region, as the name implies, is readily identified by the cultivated areas and other features typical of an agricultural area. These areas are (1) the agricultural lands adjacent to the streams of the Whitemouth System north of Township 6 and (2) very small areas of cultivated land near St. Labre School in Township 4 Range 11 E.P.M.

The agricultural area along the lower Whitemouth System is a very gently sloping plain, level to irregular. The most prominent physical features of this plain and generally distinguishing it from the surrounding forest region are the valleys of tributary creeks which become farther apart and less deeply entrenched



Plate 10
Confluence of the Winnipeg (right) and Whitemouth rivers.
(National Air Photo Library Photo No. F.A. 236.84).

from north to south. The limits of this region coincide with the points at which the creeks begin to have appreciable valleys, appearing to indicate that agriculture is dependent on the drainage provided by the creeks.

Another characteristic distinguishing the Agricultural Region from the forest region is the predominance of medium to fine (very fine sandy loam to clay) surface deposits (Figure 2) as opposed to coarse textured deposits of the forest region.

Cultural features and influences are evident through this area of agricultural lands. The most important and basic cultural feature of this area is its permanent population, mainly engaged in agriculture. The single most imposing feature is the Seven Sisters Falls Generating Station and Dam. However, the hamlets and villages, farmsteads and the road network define the region.

The other agricultural area, near St. Labre School in Township 4 Range 11 E.P.M., is a plain, level to irregular very gently sloping. This area is traversed by a few deeply entrenched creeks running from the higher parts of the end moraine on the west to the areas to bog on the east. Unlike the agricultural area to the north, these creeks are not peculiar to the cultivated lands, but are present in adjacent forest areas as well.

These cultivated lands, on variable depths of sand over till, represent a small settlement in the early part of the century. This settlement has since regressed until at present there are perhaps twenty farms. These farms, almost without exception produce only forage crops for ten or fifteen cattle. The farmers of this area derive their main income from non-farm work, usually pulp extraction.

The St. Labre agricultural area is oriented toward Woodridge, a community of about 400 persons, beyond the western boundary of the Whitemouth

WHITEMOUTH VALLEY

POPULATION DISTRIBUTION

RURAL

ONE DOT REPRESENTS FIVE PERSONS

URBAN

SIZE OF CIRCLE INDICATES POPULATION

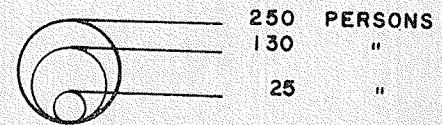
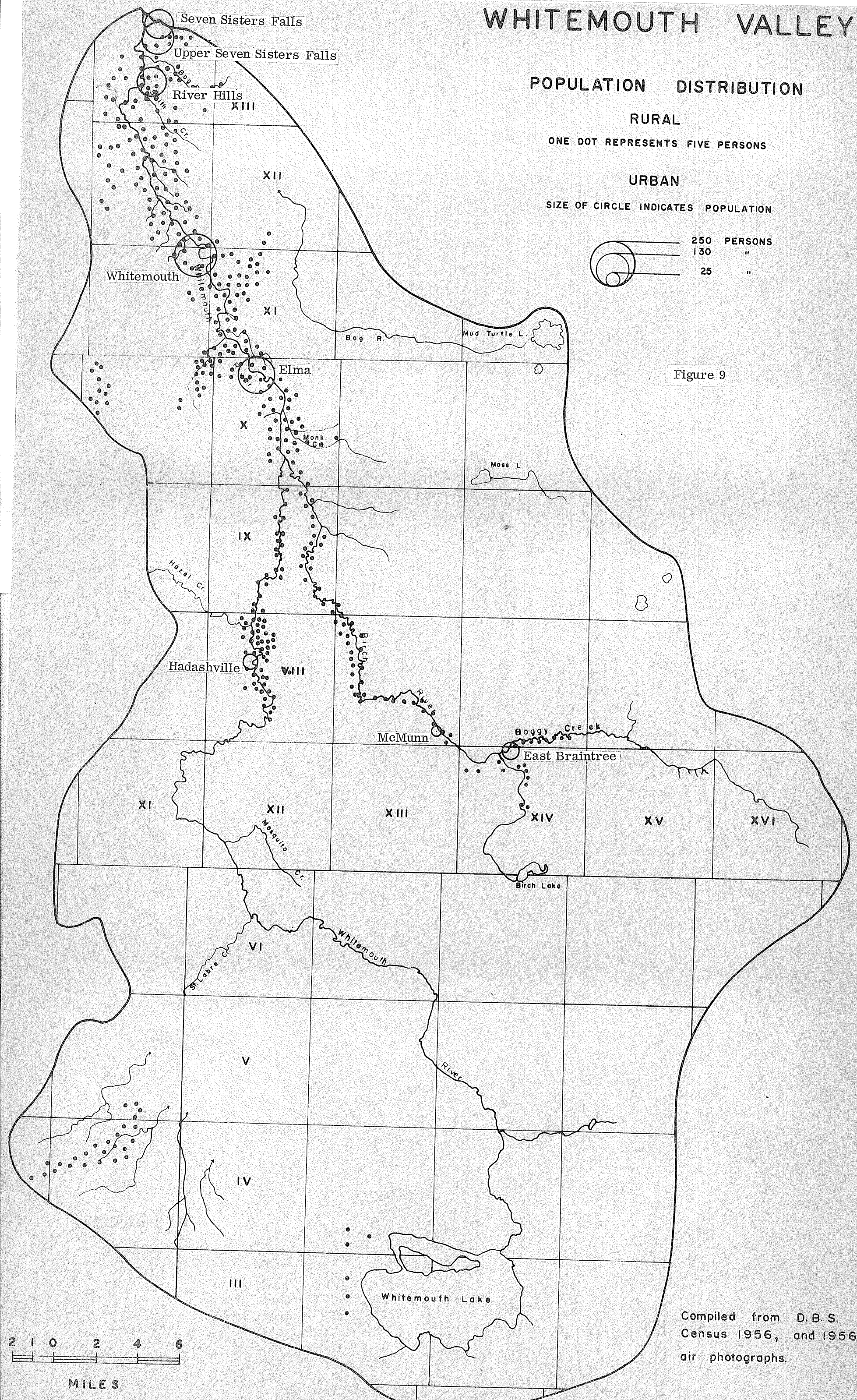


Figure 9



Compiled from D.B.S.
Census 1956, and 1956
air photographs.

Valley, and is hence of little consequence to a study of the Whitemouth Valley. Accordingly, this area has not been studied in the detail given to the main agricultural area to the north.

The forest region has been treated generally in Chapters 1 and 2, leaving the agricultural area adjacent to the trunk streams of the Whitemouth System to be studied. Four sub-regions within this area have been delineated.

The bases for the delineation of the sub-regions are; (1) drainage density values, (2) proportion of townships under cultivation and (3) homogeneity of farming enterprise as measured by crop acreages, numbers of livestock and grain yields, and (4) cultivated acres per person.

The first two factors appear to exist in a causal relationship giving rise to a direct and simple correlation between them. The use of these two characteristics substantiates the relationships between the physical aspects of the land and the apparently resulting cultural aspects. The third factor, like the second, appears to be related to the first, because of the influence of drainage on soils and crops. The last factor is influenced by the soils and general economic condition of the area and, is hence widely variable.

These four, inter-related factors are considered to provide the bases for the separation of sub-regions having different physical and cultural characteristics.

The classification of townships into categories of drainage density is found on page 18.

The following table shows the proportion of cleared land in each township in the agricultural region. These values lend themselves to groupings that correspond with those given for drainage density values, appearing to indicate a causal relationship between the two. The low values, of the proportion shown

TABLE III

PROPORTION OF CLEARED LAND IN EACH TOWNSHIP IN THE
AGRICULTURAL REGION*

TWP %	13-11	12-11	12-12	11-11	11-12	10-12	10-11	9-12	8-12	8-13	8-14	7-14
Cleared	46.7	52.3	2.8	10.0	33.6	41.5	10.2	28.5	18.7	15.2	1.9	5.9

*Forest Inventory, Manitoba Forest Service.

by Township 12 Range 12 E.P.M. and Townships 10 and 11 Range 11 E.P.M. are due to their position with respect to the Whitemouth River. The classification of these areas into their present categories has been guided by field observations.

Some 124 persons (nearly all farmers) were interviewed in September 1960 to obtain data regarding agriculture in the region. The agricultural data given in the Census of Canada are of little value in delineating sub-regions because they are given by municipality or census division.

The 1960 grain permits of the Canadian Wheat Board were extracted.² No data were provided for Townships 7 and 8 Range 14 E.P.M. because no farmers in these townships deliver grain to the elevators. This source however, provides no information regarding livestock, crop yields or other important data regarding farm enterprises. The interviews cover 25 to 35 per cent of the total farmers throughout the area, and hence provide a reasonably uniform sample. For this reason the data from the interviews are taken to be representative of the area. The data obtained from the Canadian Wheat Board Permits are given in Appendix III.

The data gathered from the interviews were averaged on a township basis. The townships were grouped into larger units. These larger units were formed on the basis that they would be areas wherein useful generalizations

²Through the courtesy of Mr. Wilson, Permit Dept., Canadian Wheat Board, Winnipeg.

about agriculture could be made. These larger units, or sub-regions, were found to correspond with those delineated by the previous two criteria.

Population density is the fourth criteria used in the delineation of sub-regions.

TABLE IV

CULTIVATED ACRES PER PERSON IN THE AGRICULTURAL REGION*

Township	Cultivated acres per person	Cultivated acres per person sub-region & region names
13-11	49.5	
12-11	36.9	42.6 (Whitemouth)
11-11	51.2	
11-12	34.4	
10-12	43.5	34.1 (Elma)
10-11	17.5	
9-12	34.4	
8-12	18.4	25.1 (Hadashville)
8-13	23.4	
7-14	24.3	17.6 (East Braintree)
8-14	9.5	

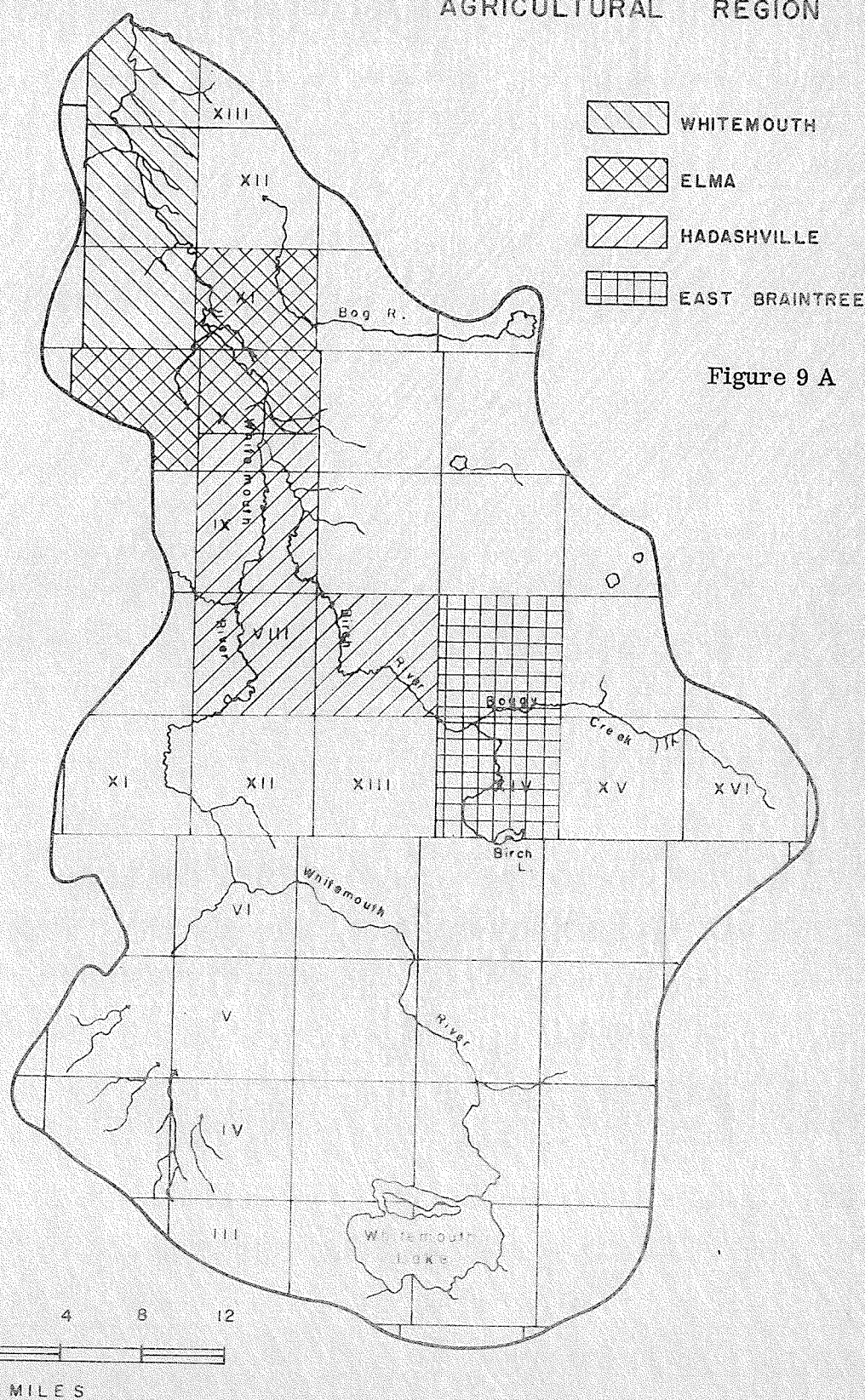
*Forest Inventory, Manitoba Forest Service and D.B.S. Census 1956.

The table indicates that township values of cultivated acres per person may be grouped into classes, corresponding to the groupings that appear much more clearly in the three previous sets of criteria.

The sub-regions (See Figure 9 A) thus delineated on the basis of, (1) drainage density values, (2) proportion of each township cultivated, (3) homogeneity of agricultural enterprise and (4) cultivated acres per person,

WHITEMOUTH VALLEY

SUB-REGIONS
OF THE
AGRICULTURAL REGION



are as follows:

Whitemouth Sub-Region: The cleared portions of Townships 11, 12 and 13 Range 11 E.P.M.

Elma Sub-Region: The cleared portions of Townships 12, 11 and 10 north of the southern boundary of section 22 Range 12 E.P.M. and Township 10 Range 11 E.P.M.

Hadashville Sub-Region: The cleared portions of Townships 8, 9 and 10 south of the southern boundary of section 22 Range 12 E.P.M. and Townships 8 and 9 Range 13 E.P.M.

East Braintree Sub-Region: The cleared portions of Townships 7 and 8 Range 14 E.P.M.

The Whitemouth Sub-Region

The agricultural land along the Whitemouth River between its mouth and the eastern boundary of Township 11 Range 11 E.P.M. comprise this sub-region; making it about thirteen miles in north-south extent and between two and four miles in east-west extent (Figure 27). Whitemouth is the largest centre of the sub-region.

Landscape Description. Tributary creeks of the Whitemouth River and the river itself are prominent in the landscape because (1) they are the major relief features of the area and (2) they usually support a heavy growth of poplar and ash trees along at least a part of their lengths. Only in the south near Whitemouth and in the north between River Hills and Seven Sisters Falls does black spruce grow intermixed with these species.

The plain of the sub-region is smooth level. Only near drainage channels does the plain have any appreciable relief.

Plate 11



Undulating land adjacent to the Whitemouth River in Township 12 Range 11 E.P.M.



Level gently sloping land near a creek in Township 13 Range 11 E.P.M.



Burning peat on the periphery of cultivated land in Township 13 Range 11 E.P.M. Note the uneven manner in which the peat burns and the black spruce in the back ground.



An unprotected farmstead in Township 12 Range 11 E.P.M. on level very gently sloping land near the Whitemouth River.

The first roads of the sub-region were those traversing the narrow belts of relatively high land adjacent to the Whitemouth River and have resulted from a combination of the following factors: (1) the land on which roads could most easily be built is adjacent to the streams and has been built up by the deposition of the streams, (2) settlers in this area chose the better drained land along the streams for the sites of their dwellings and hence roads serving these dwellings are also oriented along the streams, and (3) originally and at the present the transportation routes connecting the Agricultural Region with other settled areas to the east and west could only be reached by the north-south roads parallel to the streams. Similarly the service centres of the Agricultural Region grew up on these traffic routes. The north-south orientation of the roads gave access to these centres. Thus the streams have strongly influenced the place of construction and the orientation of the first roads of the Agricultural Region. However, the roads built at later dates conform largely to the sectional survey of the area (Figure 27) and are built on land designated as road allowances. This discussion applies to the Agricultural Region as a whole.

The road network of this sub-region is relatively extensive and is certainly sufficient to serve the population of the area. Most of these roads have a gravel surface. However, there are considerable distances of hard surface Provincial Trunk Highway and lesser distances of graded unimproved surface roads. (Figure 27)

This area has a dispersed form of settlement with certain lineations along the Whitemouth River and its tributary creeks (Figure 27). Figure 27 and Plate 1 show a close correspondence between the Whitemouth River, its tributary creeks and the locations of farmsteads. An examination of the Provincial Land Entry Books indicates that the farmers, especially formerly, favoured settlement near the channels of the Whitemouth System. These sites were favoured because

(1) they are relatively well drained, (2) the ground water table is near the surface in the lower portions of the drainage channels, (3) the drainage channels provide shelter for livestock and (4) the improvement of natural drainage by ditching is made relatively easy by the proximity of such channels. Some of the newer farmsteads have been built closer to roads for convenience of travel. The sites formerly favoured are not now so popular because most of the cultivated areas of the sub-region can be drained into roadside ditches and wells are relatively easy to dig with modern equipment.

Unlike many areas of Manitoba, the rectangular survey system has made only small impression on settlement patterns because of the strong counter-influence of the channels of the Whitemouth System. The rectangular survey has in most areas of relatively uniform land (e.g. the Red River Plain) been of major importance in determining the locations of farmsteads because of the (1) set positions of the roads and (2) lack of other relevant factors. However, in this area the two main service roads are not on road allowances and pioneers found that the advantages gained by settling near drainage channels exceeded those to be gained by settling on prescribed road allowances.

The influence of the rectangular survey system on the shape and position of land holdings has also been disrupted by the Whitemouth River. Farmers owning land traversed by the river usually do not retain the portion of the land on the side of the river opposite to that of the farmstead because of the difficulty in travelling from one portion of the holding to the other.

Nearly all of the artificial drains of the area are found in conjunction with the network of graded roads, or have been constructed by individual farmers. The few municipal drains not built in conjunction with roads are only of very local importance and do not contribute significantly to the drainage of the area.

Plate 12



Smooth level area of lacustrine sediments
in Township 12 Range 11 E.P.M.



Level very gently sloping land in Town-
ship 13 Range 11 E.P.M.



Level very gently sloping area in Town-
ship 12 Range 11 E.P.M. The large farm
in the background is part of Hutterite
Colony.



A rural Pentecostal Church in Town-
ship 12 Range 11 E.P.M.

Fence rows and ditches support a heavy growth of tall grass throughout this sub-region. North of Township 12 Range 11 E.P.M. aspen scrub occurs occasionally in uncultivated field corners. The stranded slip-off slopes along the Whitemouth River are, cultivated and are quite rolling compared to the adjacent topographic surface. Stone piles are quite frequent in the cultivated areas on the west side of the sub-region in Township 12., adjacent to an area of end moraine just west of the valley. The areas of cultivated land in the sub-region are clean and well worked.

The farmsteads near the Forest Region are small, unpainted and of log construction. Near the Whitemouth River the buildings are larger, painted and are usually of more elaborate construction. In this particular case the farmsteads reflect the nature of the land upon which they are built. The farms near the Forest Region are usually on poorly drained soils and have a smaller proportion of cleared land. Such farms give small cash returns preventing the construction of more elaborate buildings.

Houses in the area are generally of frame construction. Most of the houses are well maintained, especially in the southern half of the sub-region. In the north however, a few have been allowed to fall into disrepair. Indeed there are two or three abandoned houses in the area between Seven Sisters Falls and River Hills. Barns are the most prominent and best maintained of the buildings on most of the farmsteads.

Only in southern part of the sub-region do trees appear to have been planted with the idea of forming a shelter belt. Such trees usually show a lack of care, being bushy and rank. Further to the north, planted shelter belts are not in evidence, but most of the farmsteads have partial shelter from a haphazard scattering of trees about them.

The distribution of population in the Whitemouth Sub-Region (Figure 9) is not uniform, as shown by the following table, nor does rural population density,

TABLE V

CULTIVATED AREA*, RURAL POPULATION** AND CULTIVATED AREAS
PER PERSON IN THE WHITEMOUTH SUB-REGION

Township	Cultivated Area Acres	Rural Population	Cultivated Acres per Person	Average Farm size***
13-11	10,790	218	49.5	153
12-11	12,080	327	36.9	222
11-11	2,300	45	51.2	230
TOTALS	25,170	590	42.6	197

*Forest Inventory, Manitoba Forest Service.

**D.B.S. Census, 1956.

***Based on a 60% sample derived from 1960 Can. Wheat Board Permits 1960.

bear any apparent relation to farm size. In Township 13 Range 11 E.P.M. over two thirds of the population is urban and it is likely that many of the farm operators live in River Hills or Upper Seven Sisters Falls, since several of the farms in this township have no milk cows. In Township 12 Range 11 E.P.M. importance of dairying tends to preclude farmers living in urban areas so that rural population density is larger than that in Township 13 Range 11 E.P.M. In Township 11 Range 11 E.P.M. slightly larger farms and the few farms located around the edges of Whitemouth (not included in rural population figures) tend to decrease the township's rural population density.

Germans form the largest single ethnic group (Figure 10) and are found throughout the sub-region. Anglo Saxons, forming the next largest group, are found mainly around the town of Whitemouth. Mennonites, French,
2A
Scandinavians, Eastern Europeans (mainly Ukrainians) and Hutterites are present

^{2A}See Appendix v, p. 204.

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ETHNIC GROUPS

-  GERMAN
-  EASTERN EUROPEAN
-  GERMAN—EASTERN EUROPEAN
-  ENGLISH
-  FRENCH
-  MENNONITE—EASTERN EUROPEAN

SCALE

1:253,440

Figure 10

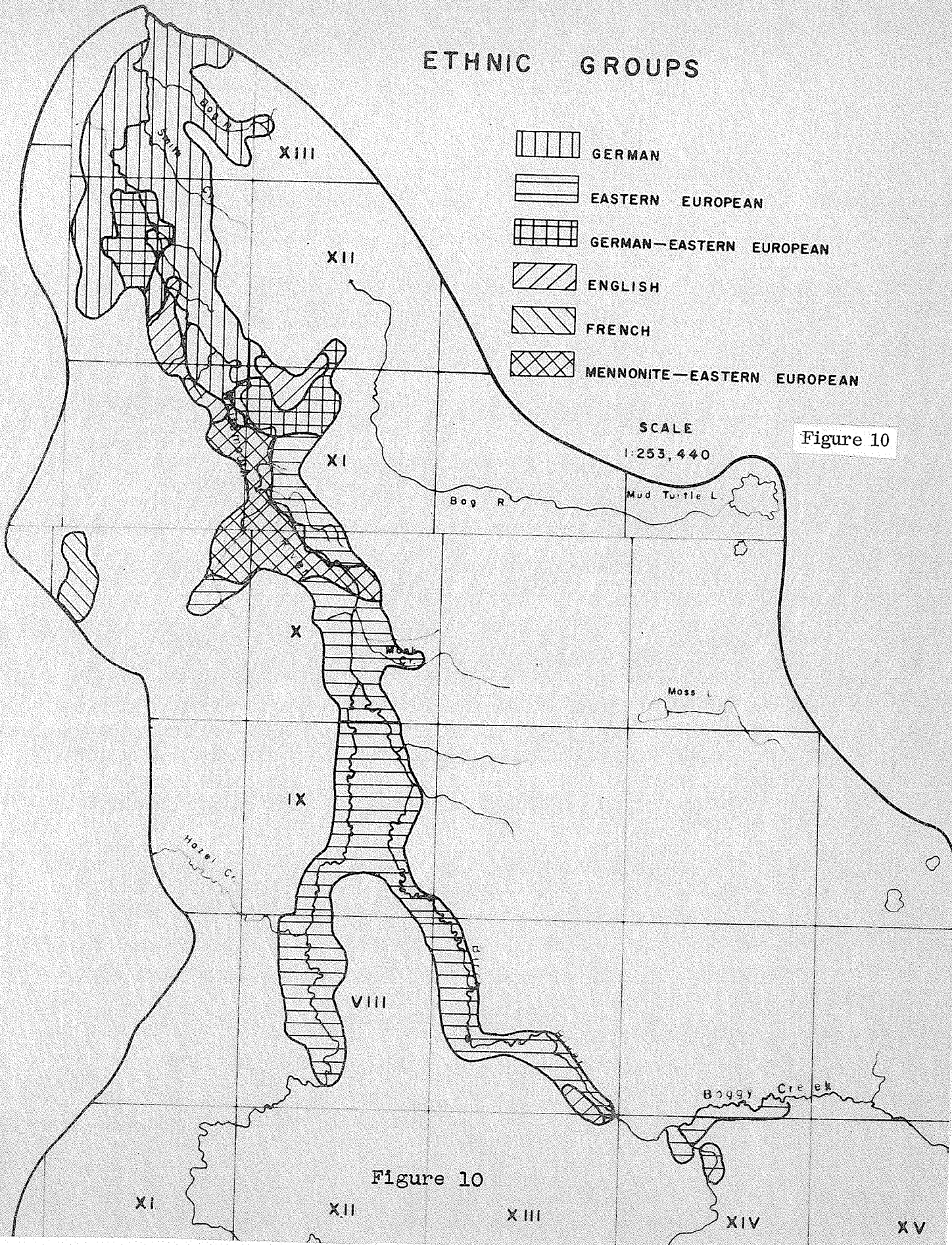


Figure 10

only in small numbers (Figure 10).

Differences in ethnic origin are not generally reflected in agriculture or in any other way except for the Mennonite poultry farms and the Hutterite communal farm.

Agriculture in the Whitemouth Sub-Region

The data given in this section was obtained from forty-two interviews. Comparable data from Canadian Wheat Board Permits are given in Appendix III.

Mixed farming is the predominant type of agriculture practiced in this sub-region.^{2B} Generally both grain and cattle or cattle products are sold. The large barns and extensive pastures reflect an important emphasis on dairying.

Land Use. The average land use on farms in 1960 in this area is given in the following table.

TABLE VI*

LAND USE IN THE WHITEMOUTH SUB-REGION

Land Use	Wheat	Oats	Barley	Flax	Hay	Cleared Pasture	Summer Fallow	Forest
Acres	25.1	37.2	6.5	3.5	58.3	31.8	13.0	67.4
% of Farm	10.3	15.3	2.7	1.3	24.2	13.1	5.4	27.7
Yields bu/a	25.6	35.1	21.7	14.8	1.5**	-	-	-

*Data from farm interviews

**tons/acre

The average farm size is 238 acres. However, farms in the area vary from a forty acre poultry farm to a 640 acre dairy farm.

The single outstanding category shown in the table is forest. Almost

^{2B}See Appendix IV, page 203.

invariably forest areas are uncleared because the land may be too steeply sloping, as is the case along certain creeks and the banks of the Whitemouth River or the land may be poorly drained or too stony to cultivate.

The small farm size indicated in Table VII arises from the fact that in the first days of settlement nearly all of the land in this area was under heavy forest. The clearing of only a few acres required very much labour and time forcing the pioneers to begin farming with very small cultivated areas and accordingly small incomes. Even where all of the arable land of the pioneers original homestead is cleared the cultivated area is still relatively small so that these farmers find it difficult to purchase additional cleared land that is necessary to form an economic unit.

TABLE VII

A COMPARISON OF PER FARM AREAS OF VARIOUS LAND USES IN THE PROVINCE OF MANITOBA*, THE MUNICIPALITY OF WHITEMOUTH* AND THE WHITEMOUTH SUB-REGION**

Area/Crop (ac.)	Wheat	Oats	Barley	Flax	Hay	Summer Fallow	Total Farm
Whitemouth Sub-Region	25	37	65	35	58	13	238
Municipality of Whitemouth	14	25	50	31	31	8	182
Manitoba	45	42	33	16	13	58	365

*D.B.S. Census 1956.

**Data from farm interviews.

The trend to larger farms experienced across the Prairies is common to this area but to a lesser extent. For example, in 1951 there were 346 farm operators occupying 57,966 acres³ in the Municipality of Whitemouth.⁴ In 1956

³D.B.S. Census 1956.

⁴The municipality contains Townships 10, 11, 12 and 13 south of the Winnipeg River in Ranges 11 and 12 E.P.M.

there were 321 farm operators occupying 58,215⁵ acres in the Municipality. This represents an increase of thirteen acres per farm. The corresponding change for Manitoba was twenty-five acres per farm. The general lack of the capital required to purchase more land is offset to some extent by the dairy emphasis in this area, as opposed to the grain emphasis elsewhere in Manitoba. The fact that hay yields are high and of good quality also tends to reduce the adverse effect of small farm size.

Many of the farmers on the periphery of the cultivated area are still reclaiming small areas of very poorly drained soils using their own equipment and labour. The farmers may manage to clear five to ten acres per year in this way. The hiring of labour and equipment for land clearing is generally prohibited by its cost which several farmers of the area claim is forty to fifty dollars per acre.

The proportion of farmland under hay and pasture is large, indicating the importance of cattle in this area. Pasture frequently occupies land of relatively poor drainage. Hay may also be relegated to such areas. However, not all of the hay will be in such areas because of its importance in the rotation scheme and hence must be on land sufficiently well drained for the growth of cereals. According to the local farmers and pedologists⁶ this area grows hay in good quality and quantity. Indeed, hay was a valuable cash crop when horses were used in the extraction of pulpwood and on the farms to the west. Even at present at least two farmers sell hay; one to a logging camp near Kenora and the other to a racing stable near Winnipeg.

Wheat grown in relatively small amounts serves as a cash crop, little being fed to livestock. This area is not especially favourable for wheat

⁵D.B.S. Census 1956.

⁶W.A. Ehrlich, Manitoba Soil Survey, Personal Communication, June 1960.

production; soils are usually deficient in nitrogen and phosphorous and the relatively cool, wet summers tend to produce "softer" wheat than do the warmer and drier areas to the west.

Oats, growing well under cool moist conditions are generally fed to livestock on the farms. The acreages of oats per farm in the sub-region compare favourably to those of Manitoba, indicating the importance of livestock.

Barley is grown only in very small amounts relative to most areas of Manitoba, due to soil acidity and relatively wet conditions. Leaf fungus is sometimes a problem.⁷

Flax, grown in even smaller acreages than barley, serves as a cash crop, usually in years with late wet springs because the need for an early harvest is not as critical as it is with the cereals.

The usual crop rotation scheme followed in this area is: three years of hay, one year of wheat and two years of oats. However, flax may replace wheat and barley may replace the first year of oats in this system, depending on climatic and soil conditions. This is a suitable rotation scheme for this area because the three years in hay allows the accumulation of organic matter which contains nitrogen and phosphorous and also improves the physical structure of the soil. This is especially important in areas of fine textured soils which may become very hard and cloddy.

Generally all available barnyard manure is applied to the fields. The application of this manure is of course most significant on farms with large numbers of livestock. Commercial fertilizers are not in common use, the general opinion among the farmers being that their cost is not justified by

⁷B.R. Poston, Agricultural Representative at Whitemouth, Personal Communication, November 1960.

the increase in crop yields. However, the Mennonite poultry farmers use commercial fertilizers consistently because (1) they do not have sufficient quantities of barnyard manure, (2) they do not use a hay - cereal rotation, but rather a cereal - summerfallow rotation and (3) they were accustomed to its use in the Ste. Anne district before moving to this area. The fertilizers that they commonly use are 27-14-0, 16-20-0 and 11-48-0.⁸

The acreages of summerfallow per farm in the Whitemouth Sub-Region are small compared to those of Manitoba. The difference is due to (1) a higher precipitation efficiency in this area, (2) a relatively high ground water table and (3) the relatively large quantities of hay grown in the sub-region. However, summerfallow still serves the purpose of allowing the farmer to clear his fields of noxious plants by repeated cultivations during the summer.

Because of the importance of hay and pasture in the rotation, together with the liberal application of barnyard manure, crop yields compare favourably with most other areas of Manitoba. The soil of this area responds well to diligent field husbandry, without which it quickly becomes depleted and infertile.

Livestock. Nearly all of the farms in this sub-region have livestock. The following table indicates the average livestock holdings in the area. The outstanding value for poultry has been distorted by two Mennonite poultry farms having 4,000 and 10,000 birds respectively. Aside from these two exceptions the average holdings are between fifty and one hundred birds maintained primarily for home use.

⁸These are the common designations of the proportion of nitrogen, phosphate and potash by weight in the fertilizer.

TABLE VIII*

AVERAGE LIVESTOCK HOLDINGS PER FARM IN THE WHITEMOUTH
SUB-REGION

Type of Livestock	Cattle		Pigs	Poultry
	Total	Milk		
Average numbers/ Farm	24.6	8.9	4.1	401
% of Farmers owning each type	86	62	50	79

*Data from farm interviews

Within this sub-region there is a distinct grouping of total cattle, milk cows and pigs.

TABLE IX*

AVERAGE LIVESTOCK HOLDINGS PER FARM IN THE WHITEMOUTH
SUB-REGION, BY TOWNSHIP

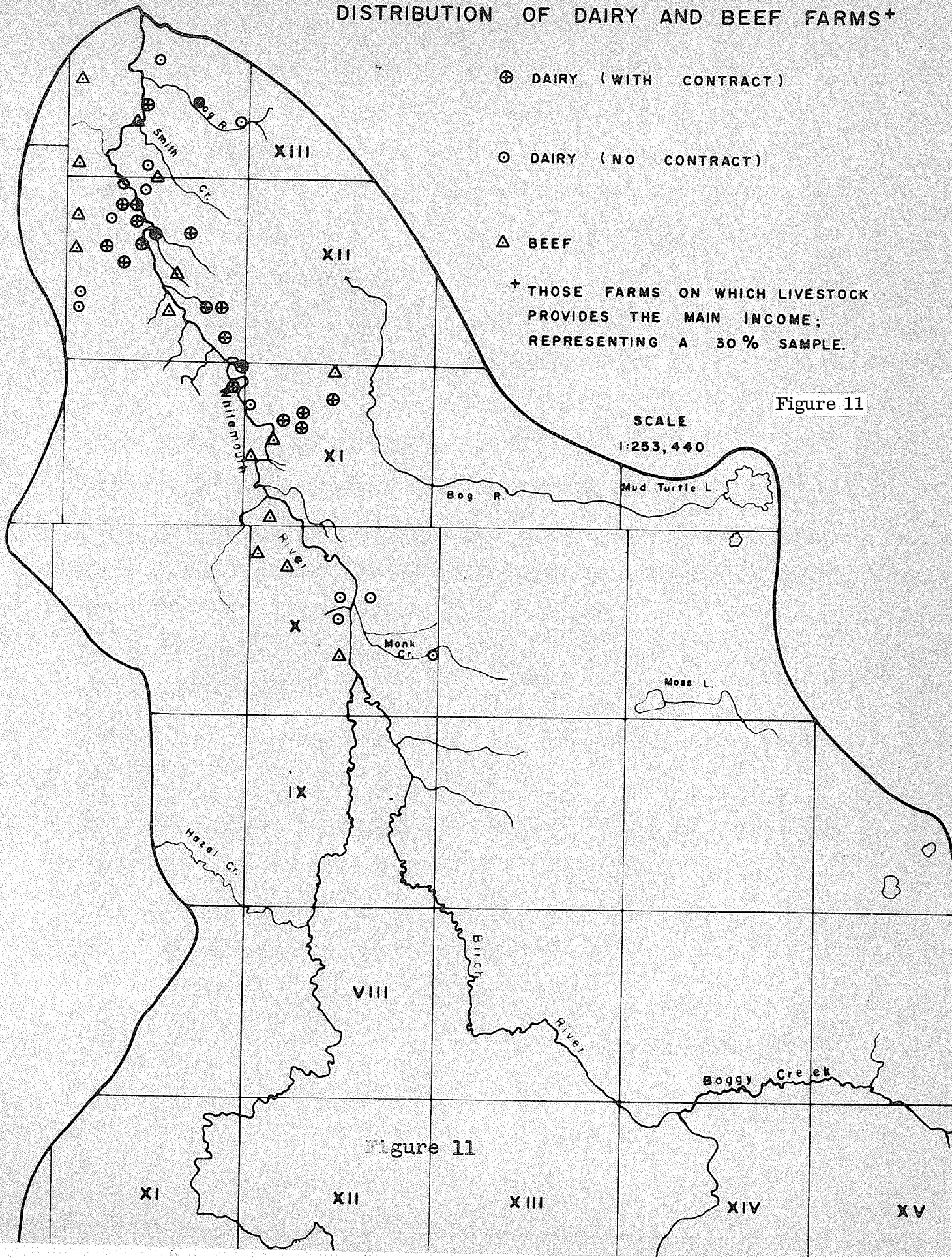
Type of Livestock	Cattle		Pigs	Township
	Total	Milk		
Average numbers/ Farm	11.9	3.3	2.7	13-11
"	32.0	11.7	5.3	12-11
"	41.5	21.0	1.5	11-11

*Data from farm interviews.

There are about twice the number of farmers in Township 12 Range 11 E.P.M. with cattle as there are in Township 13 Range 11 E.P.M. Figure 11 shows the clustering of dairy farmers holding contracts with Safeway Company Limited along Provincial Trunk Highway 4, with the greatest number in Township 12 Range 11 E.P.M. This distribution is readily explained. Prior to the use of trucks fresh milk was shipped by rail to Winnipeg and Kenora. Under such circumstances proximity to Whitemouth, the railroad loading

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DISTRIBUTION OF DAIRY AND BEEF FARMS⁺



point was important.⁹ When transport by truck became common, proximity to good roads was essential, thus discouraging those not close to Provincial Trunk Highway 4. Since 1950 Safeway has encouraged about thirty milk shippers to install bulk tanks. These farms were selected within a relatively small area, well served with roads, in order to facilitate collection of the milk. Before 1950, and the encouragement from Safeway, milk shipments from this area were not on a contract basis.¹⁰

In the past few years the number of milk shippers has decreased because of the cost of installing bulk tank equipment.

The thirty milk producers on contract in this area ship about 500,000 pounds of milk per month to Winnipeg, the main market for this area.¹¹ The largest single producer in this area is the Iberville Hutterite Colony, in Section 33, Township 12, Range 11 E.P.M., which ships about 58,000 pounds of milk per month. The average shipment from these farms is 10,000 pounds of milk per month, while the smallest is 2,000 pounds per month.

Dairying did not develop in Township 13 Range 12 E.P.M. to the same extent that it did in the township to the south because of the greater distance from the C.P.R. at Whitemouth. Just after World War II, before this area became part of the Winnipeg daily milkshed, farmers in Township 13 Range 11 E.P.M. had prospered from the sale of alfalfa seed and wheat, and were not especially interested in dairying.¹² Also, non-farm work is more readily available in this township, it being closer to Seven Sisters Falls and construction enterprises.¹³

⁹W.D. Meyers, Clerk of the Municipality of Whitemouth. Personal Communication, April 1961.

¹⁰J.D. Cameron, Secretary, Milk Control Board of Manitoba, Personal Communication, April 1961.

¹¹J.D. Cameron op. cit.

¹²W.D. Meyers, op. cit.

¹³Ibid.

Expansion in the shipment of milk to Winnipeg is impossible under the present market conditions of supply and demand.¹⁴ Since the producers already established in Township 12 Range 11 E.P.M. might readily increase their production to meet any future increase in demand in the Winnipeg market, it is unlikely that any further farms in Township 13 Range 11 E.P.M. will obtain milk shipping contracts.

Table VI shows that there are a relatively large number of pigs per farm in Township 12 Range 11 E.P.M. compared to the farms in the other two townships of the sub-region. Most of these pigs are raised on a commercial basis in conjunction with cattle, especially dairy cattle, to provide a use for excess or skimmed milk. The one or two pigs kept by the farmers in Township 13 Range 11 E.P.M. are for home consumption.

Farm Machinery Holdings

TABLE X*

FARM MACHINERY HOLDINGS IN THE WHITEMOUTH SUB-REGION IN 1960

Type	Tractors	Binders	Threshers	Swathers	Combines	Feed Mills	Hay Balers
% Farmers owning each type	1.6**	17.0	7.3	71.5	75.5	90.5	58.5

*Data from farm interviews

**Tractors per farm

These values, except that for hay balers, are representative of the sub-region. There are three times as many hay balers in Township 12 Range 11 E.P.M. as there are in Township 13 Range 11 E.P.M. due to greater areas of forage crops in Township 12 Range 11 E.P.M.

¹⁴J.D. Cameron, op. cit.

The farms of the sub-region are heavily mechanized compared to many other parts of Manitoba in terms of value of machinery per farm acre.

Farm Income and Farm Types ^{14A}

TABLE XI*

PROPORTION OF FARMERS DERIVING THEIR MAIN INCOME FROM
EACH OF THE COMMON SOURCES IN THE WHITEMOUTH
SUB-REGION

Source	Dairy	Beef	Grain	Poultry	Non-Farm
% of Farmers in each type	50	14	12	5	19

*Data from farm interviews

Although this table shows the proportion of interviewed farmers deriving their main income from common sources it should be noted that, there may be two or three nearly equal sources of income for the farm, with one being only slightly larger than the others.

There is significant variation within the sub-region. In Township 13 Range 11 E.P.M. grain production and non-farm work are the main sources of income whereas dairy and beef production are the most important in Townships 11 and 12 Range 11 E.P.M.

There is a trend toward specialization in milk and poultry production, which in the case of poultry is represented by two Mennonite farmers from Ste. Anne, whose sole source of income is the sale of eggs. These farmers chose this area for relocation because land could then be obtained for a reasonable price, it is suitable for the production of poultry feed and road communications to Winnipeg are good.

^{14A} See Appendix iv, p. 203

Plate 13



A mixed farm with limited emphasis on dairying on smooth level lacustrine deposits in Township 13 Range 11 E.P.M. Note the planted windbreak.



A mixed farm of beef and dairy emphasis in Township 12 Range 11 E.P.M. This farm has been built beside the creek because of good drainage and available water.



An abandoned farm house just south of River Hills. The dwellings at the right are the outskirts of the village.

Figure 12, following, is an example of land use on one of the poultry farms in the Whitemouth Sub-Region.

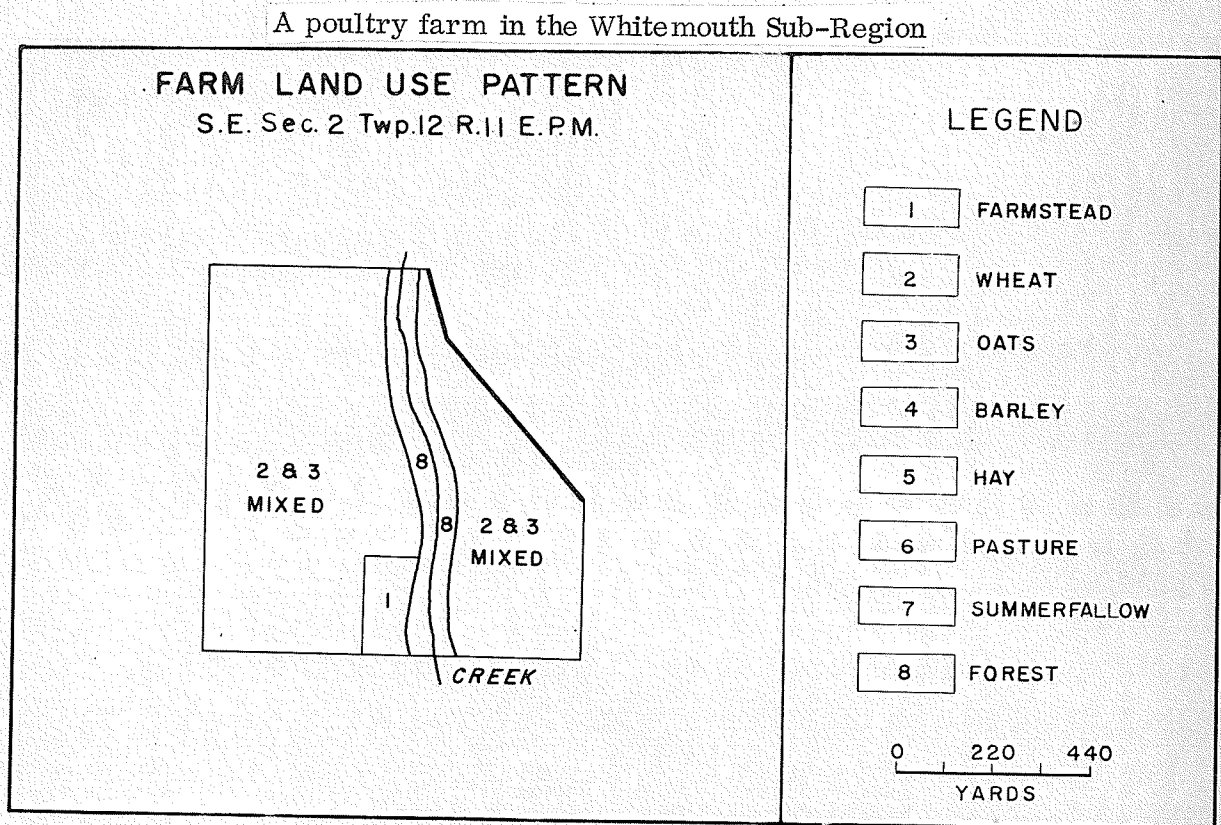


Figure 12

This farm supports a flock of 10,000 birds, but no other livestock and has a complement of machinery consisting primarily of two tractors, a swather, combine and a large feed mill. The operator has, under usual conditions, no difficulty in marketing eggs or growing feed for the poultry. Commercial

fertilizer (27-14-0) is used consistently, with good results.

Figure 13 shows land use on a fairly typical dairy farm with contract in the area.

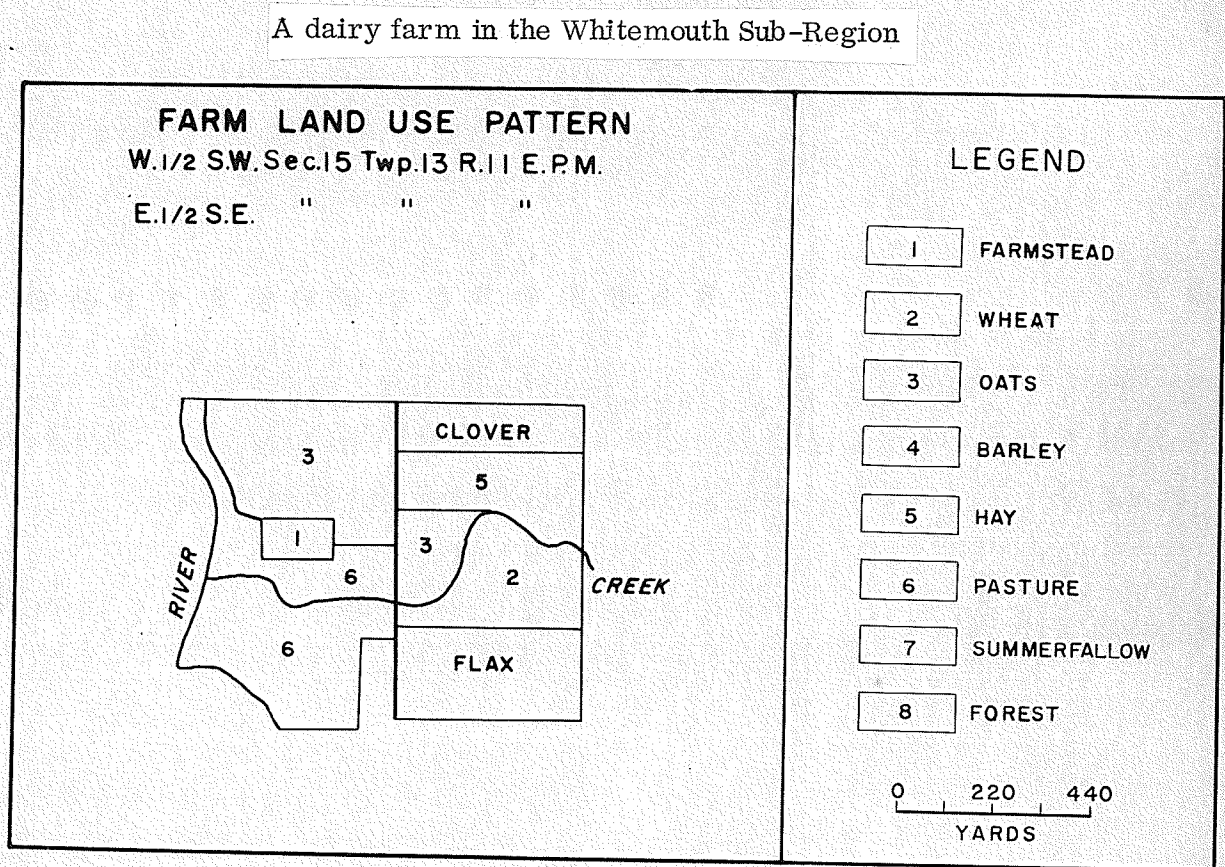


Figure 13

Livestock on this farm consists of thirty-two cattle(seventeen of which are milked)and sixty chickens,and is the main source of income while wheat, clover seed, flax and a little non-farm work are secondary sources. Two tractors,

a swather, combine and hay baler are the main pieces of machinery, a large complement for a farm of 110 cultivated acres but the operator has a stable income from the sale of milk.

An example of land use on one of several beef - grain mixed farms where non-farm^{work} is significant is given in Figure 14.

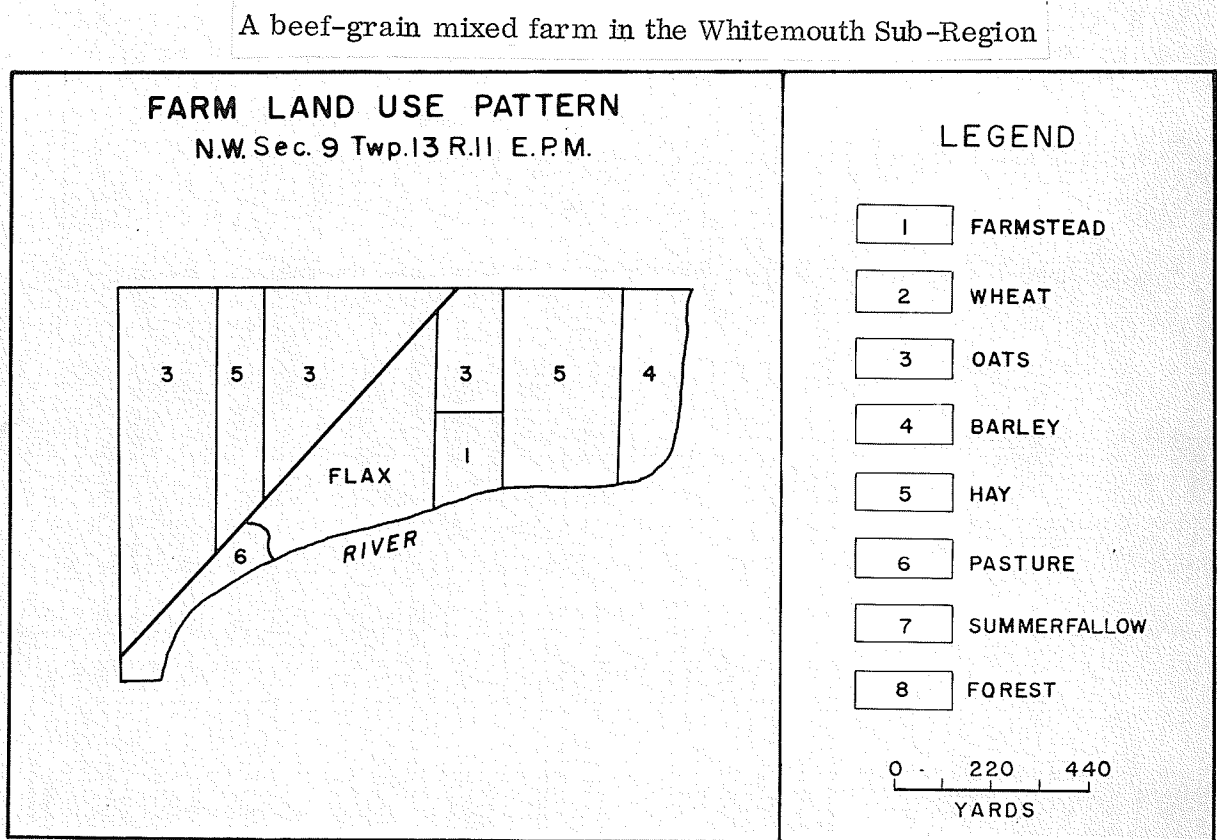


Figure 14

Plate 14



A mixed farm on which dairying and non-farm work are important. Note the new house and indiscriminate scattering of trees forming the windbreak.



A poultry and grain farm in Township 12 Range 11 E.P.M. Note the flat roofed chicken coop on the left and the several grainaries on the right.

The livestock on the farm consists of sixteen beef cattle, two hogs for home use and twenty-five chickens. A tractor, combine, hay baler and feed mill comprise the major part of this farm's machinery. In addition this farmer works as a line man during four or five months of the year. Grain provides the main income for the farm.

Although this example of mixed farming cannot properly be called an example of specialization it may be recognized as a definite sub-type since it includes nearly one third of the farmers interviewed in Township 13 Range 11 E.P.M. This "sub-type" is quite different from the mixed farm, in general, which has extremely wide variations within a small area.

Non-Farm Work. Nineteen per cent of the interviewed farmers in the Whitemouth Sub-Region derive their main income from non-farm work spending about five months per year in this enterprise. Most of these farmers are found in Township 13 Range 11 E.P.M. where 38 per cent are in this category. However, only 9 per cent of those in Township 12 Range 11 E.P.M. derive their main income from non-farm work. In Township 13 Range 11 E.P.M. the farmers doing non-farm work are engaged in construction (33 per cent), pulp extraction (22 per cent) and miscellaneous skilled trades (45 per cent). This group of skilled tradesmen, are for the most part, engaged in the "sub-type" of mixed farming discussed in the preceding section. Usually "the sub-type" of mixed farming has been adjusted to the non-farm work so that the farmer is not held to the farm by daily chores as he would be on a dairy farm for example.

Part of the money from the non-farm work is frequently used to equip small farms with machinery that would be otherwise unobtainable.

Farm Size. The following table showing the increase of total farm size and the average cleared area per farm in the Municipality of Whitemouth

over the past thirty years is generally true of the Whitemouth Sub-Region.

TABLE XII

FARM SIZE AND NUMBERS ETC. IN THE MUNICIPALITY OF
WHITEMOUTH 1926-1956*

Census Year	Number of Farms	Occupied Land (ac)	Improved Land (ac)	Av. Total Farm size (ac)	Av. Area of Improved Land per Farm (ac)
1956	321	58,215	35,198	182	110
1951	346	57,966	33,304	168	97
1946	391	57,930	33,347	148	86
1941	403	61,817	32,760	153	81
1936	362	54,144	25,213	149	70
1931	358	46,414	19,378	130	54
1926	314	48,745	19,772	152	62

*D.B.S. Census 1921-1956.

The area of occupied land has been relatively constant since 1936 while farm numbers have decreased since 1941. Very little new land has been bought from the Crown or the Municipality. Thus, average farm size has been increased through the sale of already occupied land. These sales are often an indirect result of young people moving to urban centres leaving their parents on the farm. When the parents become too old to operate the farm it is sold, usually to other farmers in the area.¹⁵ However, the young people may return to the farm on their parents retirement or the land may be bought by people from outside the area as it is offered for sale. For example, in July 1960 the Hutterite Colony at Elie purchased three of the largest farms in the area (33-12-11 E and 14-13-11 E). The Mennonite farmers in the area are also examples of people from other areas

¹⁵ These reasons have been given by several interviewed farmers of the area.

purchasing land as it becomes available.

The Whitemouth Sub-Region has experienced little farm abandonment. However, what little there was occurred in the late 1930's and early 1940's. Lands, peripheral to the main agricultural area, settled in the drought and depression of the 1930's, became too wet to farm when the drought ended. This very small trend to farm abandonment was also encouraged by the general improvement of the economy following the depression and the beginning of World War II, when non-farm work became readily available.

Agricultural Problems and Trends. Problems with drainage frequently take the form of undrained depressions which retain water in the spring or after rains. In the areas adjacent to very poorly drained organic soils a high ground water table presents a serious problem as regards plant growth and soil fertility. The soils of these areas are cold, causing poor, slow seed germination. The presence of ground water near the top of the solum precludes the action of aerobic bacteria, essential in nitrogen fixation and nitrification. Where roads are common, drainage has been substantially improved by roadside ditches. Nearly all of the moderately well drained areas in the sub-region are found adjacent to the Whitemouth River. Drainage problems are compounded by the spring time occurrence of perched water tables over the fine textured B horizons found in many of the soils of the area.

Stoniness is not a serious problem in the Whitemouth Sub-Region. Only in small areas of Townships 12 and 13 Range 11 E.P.M. are they found at all. These stones do not exceed ten inches in diameter and farmers have to remove only three or four hundred pounds per year.

Gully and sheet erosion are problems of very limited extent and seriousness. The only areas with slopes sufficient to suffer from this erosion

are adjacent to the Whitemouth River and its tributary creeks, and are usually under a forest or grass cover. However, where this cover is removed gully erosion can be a local problem.

Soil management problems occur in areas of very fine textured deposits. Soils developed in these deposits are easily puddled to form large, extremely hard clods. This problem is not of great importance as only 5 per cent of the interviewed farmers mentioned it. The usual crop rotation scheme, which puts the land under hay half of the time, and the use of barnyard manure, reduces the incidence and seriousness of puddling by supplying organic matter to the soil, mellowing it.

The crops in this sub-region respond well to nitrogen and phosphorous fertilizers, as is to be expected in an area of Dark Grey wooded and Dark Grey soils.¹⁶ However, the crop rotation scheme generally used and the use of barnyard manure keep soil fertility at a fairly high level, as indicated by the yields given in Table IV. Only three farmers in Sections 7, 18 and 19 of Township 12 Range 11 E.P.M., close to the limits of the cultivated area, in areas of poorly drained and somewhat stony soils, mentioned low fertility as a problem.

These problems are not especially serious, except possibly that of drainage which is being improved by ditching, and do not impose serious limitations on the present land use which is well suited to the conditions of this sub-region.¹⁷

Some economic problems are more difficult of solution. The national problem of grain marketing is not of primary importance in this area since only twelve per cent of the interviewed farmers derived their main income from grain sales.

¹⁶J.H. Ellis, Agricultural Consultant with the Lands Branch, Manitoba, Dept. of Mines and Natural Resources, Personal Communication, March 1961.

¹⁷B.R. Poston, op. cit.

The farmers of the Whitemouth Sub-Region, and the Agricultural Region generally, are forced to buy more machinery for their relatively small farms than is economically sound. For example, a farmer with 120 cultivated acres has a tractor, a swather, a combine and a hay baler. Of all this expensive machinery only perhaps the tractor is used to an extent which even approaches its full potential. The use of binders and threshing machines is generally precluded by the cost of labour required to stook grain and operate the threshing machine. In addition these machines are unpopular because they are considered to be old fashioned. The hiring of "custom work" for harvesting is economically sound for these farms but farmers find that such equipment is usually not available at the required time. This is particularly significant in years of unfavourable weather conditions. However there are some cases where machinery is shared by two farmers. For example, one farmer may have a swather but no hay baler while the other has a hay baler but no swather. With only two farmers using the machinery the probability of one of them having to wait for its use is quite small especially on the small farms of this area. This type of arrangement could be much more widespread to the advantage of the farmers.

Generally the major economic trends are those that prevail on the Prairies as a whole. The interviewed farmers spoke of the high wages demanded by farm labourers, the "cost-price squeeze", the advances in farming techniques and equipment (especially since 1945 when the first combine appeared in this area) and the general decline of subsistence farming. A treatment of these trends is beyond the scope of this thesis.

In the Whitemouth Sub-Region farmers indicated such specific trends as an increase in numbers of beef cattle,¹⁸ a gradual increase in the amount of

¹⁸The following data from the D.B.S. Census for the Municipality of Whitemouth substantiate this.

Census Year	Total Cattle other than Milk Cows
1956	3643
1951	2784
1946	3067

cleared land, a gradual improvement in drainage and in a few specific instances decreases in yields.

The latter three trends normally accompany the development of an area until many of its physical characteristics become quasi-static. These trends have been discussed in the sections on Land Use, Agricultural Problems and Trends and Farm Size. The trend to increased beef raising may be explained by the difficulty of grain sales and the realization that the local conditions of soils and climate are better suited to the production of hay and forage crops than they are to the production of grains, especially wheat.

Villages of the Whitemouth Sub-Region

The villages in this sub-region are Whitemouth, River Hills, Seven Sisters Falls and Upper Seven Sisters Falls (Figure 27). All villages are service centres with the exception of Seven Sisters Falls, which is a "company town" populated by the workers at the Seven Sisters Hydroelectric Plant.

Whitemouth is situated on the west bank of the Whitemouth River about 11 miles south of its mouth. It occupies a reasonably well drained portion of the plain between Provincial Trunk Highway 4 and the Whitemouth River, adjacent to the C.P.R. main line.

The site of the village was determined by the intersection of the C.P.R. and the Whitemouth River. Logs, run down the river from areas to the south, were milled and shipped to Winnipeg via the new railroad. As the land north and south of this site became settled, Whitemouth grew because of its advantageous site on the railway and became the focal point of the roads built on the relatively well drained land adjacent to the river. In 1931 these advantages were further augmented by the completion of Provincial Trunk Highway 4, then the Trans Canada Highway.

Plate 15



Portions of the main street of Whitemouth, facing the C.P.R. In the left photo the municipal office is on the extreme left. Note the unused water tower and railroad station in the right background in the right photo.



The drying sheds of an unused brickyard in Whitemouth. A deposit of lacustrine clay was used in this enterprise.

Until 1931 the morphology of Whitemouth (Figure 15) was determined almost entirely by the railroad. Most of the business enterprises and public buildings were located on the street facing the railroad. After the completion of the highway 4 in 1931, several business enterprises, mainly service stations and farm implement agencies were built adjacent to it. The urban area of the town grew up to the north of the railroad between the highway and the river. The R.C.M. Police detachment and the Whitemouth Hospital have since been built in the northern and eastern parts of this urban area.

Whitemouth, with a population of 245 persons,¹⁹ is the largest village and the main service and administrative centre of the Agricultural Region. The office of the Clerk of the Municipality of Whitemouth is located here, administering Townships 10, 11, 12 and 13 (south of the Winnipeg River) in Ranges 11 and 12 E.P.M., an area slightly larger than that of the Whitemouth and Elma Sub-Regions combined.

The Whitemouth Hospital, and physician serves the entire Agricultural Region. This is also true of the R.C.M. Police Detachment and the Agricultural Representative located in the village. In addition, there is a drug store (with liquor commission), a bank, an electric shop, a construction firm and a bus line, mainly concerned with the transportation of school children. These services make Whitemouth unique among the villages of the Agricultural Region. See Figure 16 for other services offered in the village.

The hinterland with respect to groceries (Figure 17) indicates that in general, people living north of Township 10 purchase their groceries in Whitemouth. The smaller centres such as Upper Seven Sisters Falls, River Hills and Elma do not seriously compete with Whitemouth, but serve as

¹⁹D.B.S. Census 1956.

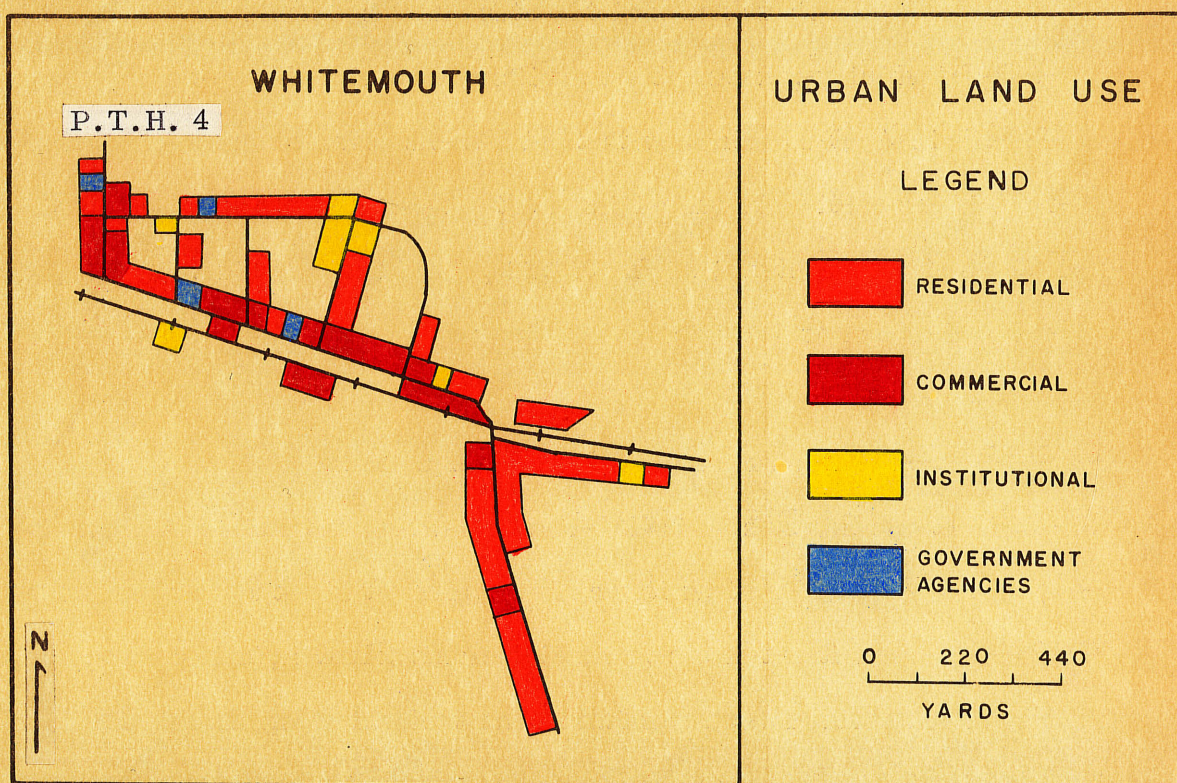
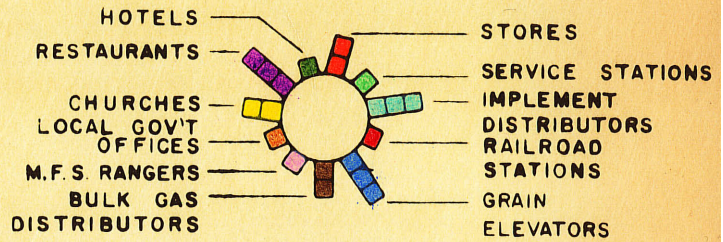


Figure 15

LOWER WHITEMOUTH VALLEY

NUMBER AND KIND OF SERVICES

IN URBAN CENTRES



THE NUMBER OF SQUARES IN EACH SPOKE
INDICATES THE NUMBER OF ESTABLISHMENTS
OFFERING THE SERVICE INDICATED BY THE
SPOKE.

Figure 16

SCALE
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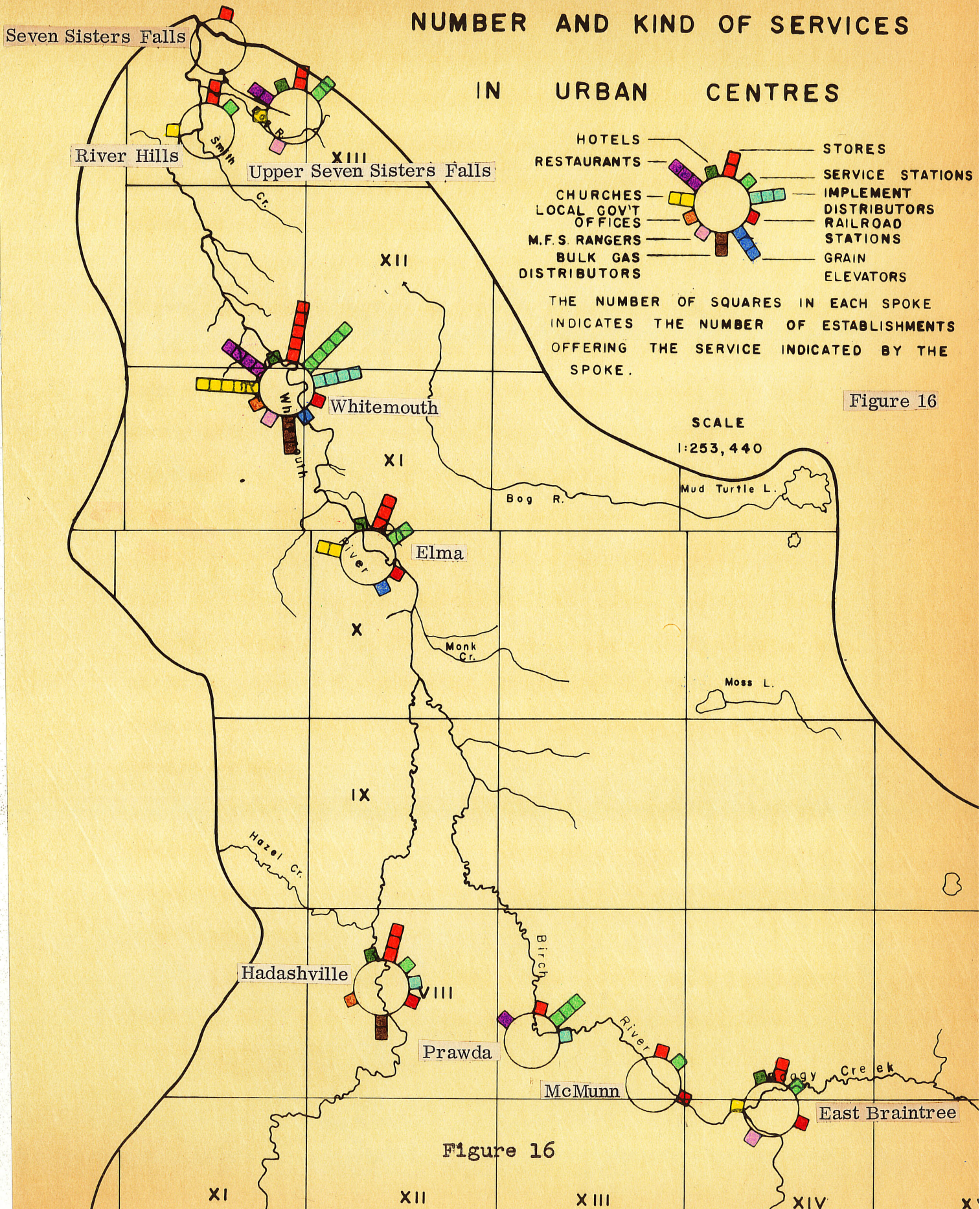


Figure 16

auxiliary centres for purchases of a small nature that do not warrant a journey to Whitemouth. Because Whitemouth has many services not offered in these smaller centres, it tends to draw many people to it. Outside centres such as Winnipeg and Beausejour make slight inroads on the trade of Whitemouth because of the attractiveness of a much wider selection of services, newer stores and perhaps lower prices.

The hinterland of Whitemouth with respect to farm implements (Figure 18) extends through the Agricultural Region as far south as Township 8. However Hadashville and Prawda make serious inroads on it in the area south of Township 10. The machinery hinterland of Whitemouth, is most clearly defined in the area north of Township 9, which contains most of the better and more prosperous farms of the Agricultural Region. Outside centres such as Lac du Bonnet, Winnipeg and especially Beausejour and Steinbach draw a substantial number of customers from the Whitemouth Valley because of their wider selection of implements and possibly lower prices. The use of these centres for the purchase of machinery is much more widespread than is their use for the purchase of groceries because the relatively high value and infrequency of such purchases makes travel to those distant centres feasible and perhaps profitable.

Seven Sisters Falls with a population of 121 persons²⁰ was built on the plain adjacent the east side of the Whitemouth River near its mouth, as was determined by the location of the hydro-electric plant on Seven Sisters Falls in the Winnipeg River.

The morphology of this village, unlike any other in the Agricultural Region, has been determined by plan rather than by geographical factors. The

²⁰B.B.S. Census 1956.

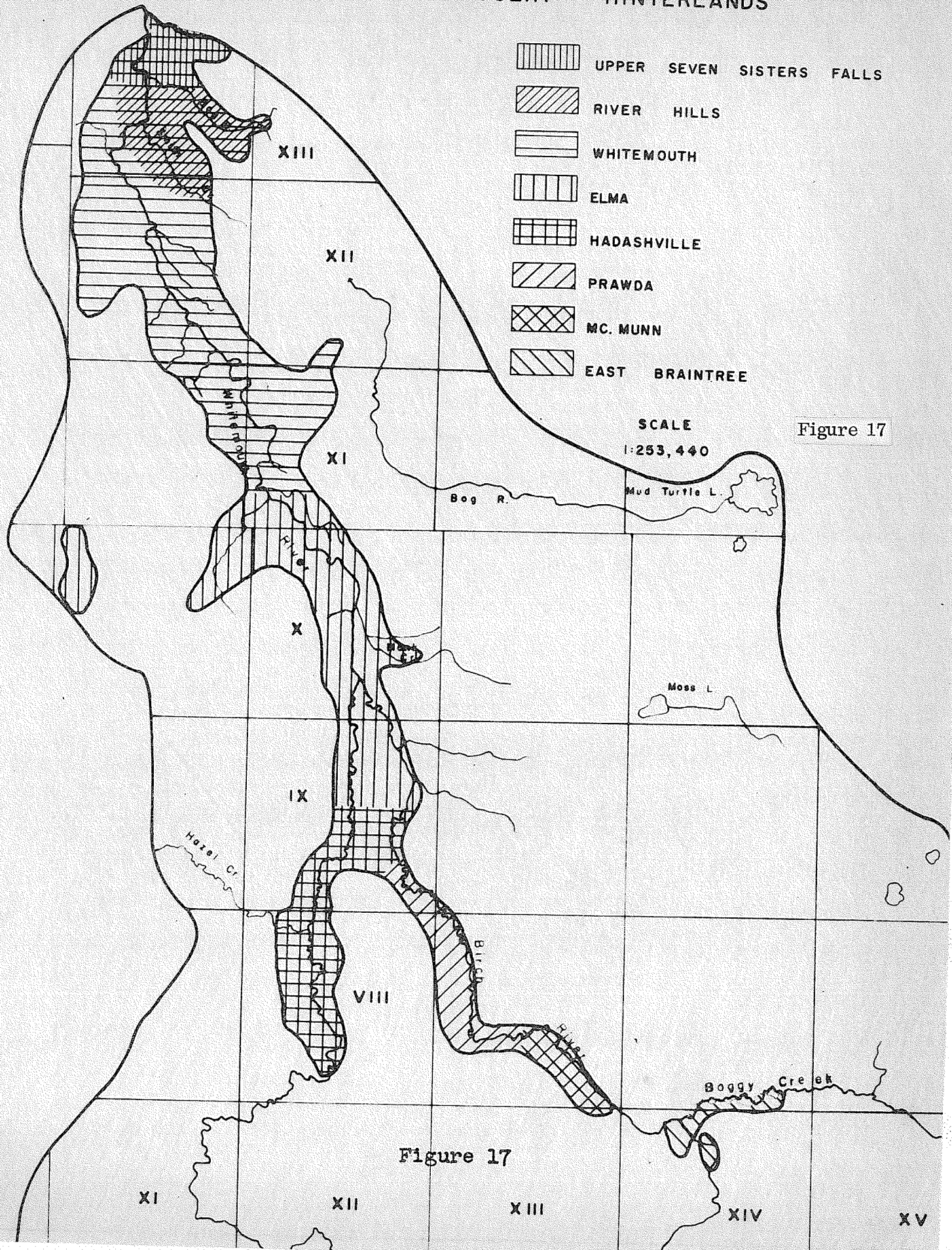
102 LOWER WHITEMOUTH VALLEY

GROCERY HINTERLANDS

- | | |
|---|---------------------------|
|  | UPPER SEVEN SISTERS FALLS |
|  | RIVER HILLS |
|  | WHITEMOUTH |
|  | ELMA |
|  | HADASHVILLE |
|  | PRAWDA |
|  | MC. MUNN |
|  | EAST BRAINTREE |

SCALE
1:253,440

Figure 17



FARM MACHINERY HINTERLANDS

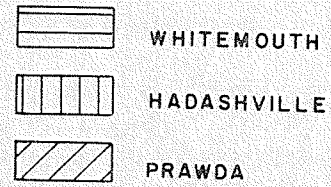


Figure 18

SCALE
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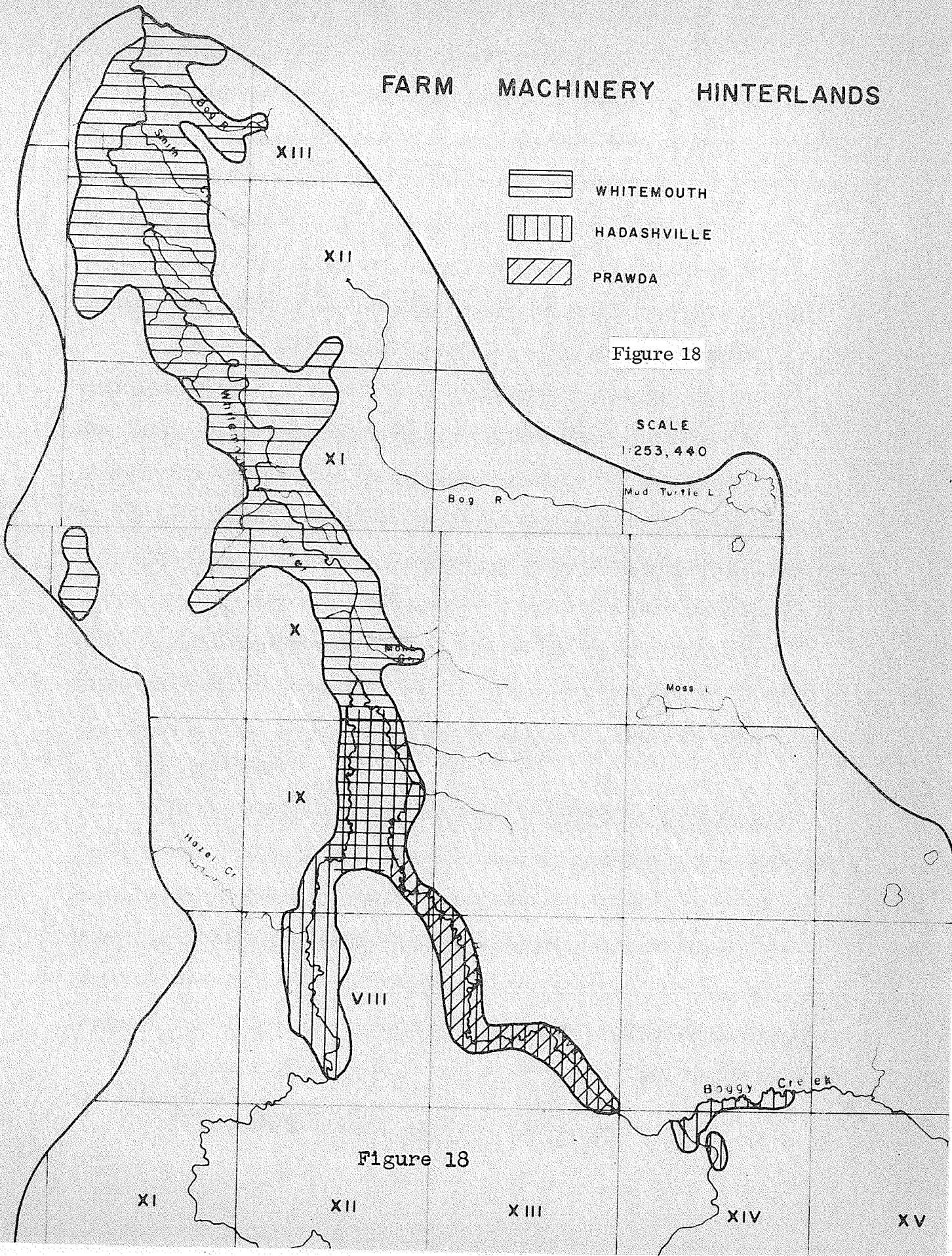


Figure 18

plan is a good one, providing easy access to all the buildings of the town as well as to the hydro-electric plant and to the main road to the south.

The function of serving solely as a place of residence is unique among the villages of the Agricultural Region, and keeps the village relatively isolated from the remainder of the area because its unique function does not lead to the mixing that is fostered by farm service centres such as Whitemouth. The village consists of dwellings, a store and post office (which also serves Upper Seven Sisters Falls) and such amenities as enclosed curling and hockey rinks.

Upper Seven Sisters Falls (Figure 19) is on the east side of the Whitemouth River about half a mile from its mouth, in the plain adjacent to the stream. The village grew up as a "tin town", indeed it is called "Tin Town" by the local populace, during the construction of the Seven Sisters Falls Hydro-electric Plant and was near a bridging point on the Whitemouth River (this factor has become more significant since the washout of the bridge at River Hills) and the road running parallel to the river on its east side. As the Whiteshell Forest Reserve to the east became a popular resort area the Central Whiteshell Road was built from Provincial Trunk Highway 11 to the forest reserve through the village. Thus Upper Seven Sisters Falls came to be on an important traffic route.

The morphology of Upper Seven Sisters Falls has been determined by the Central Whiteshell Road. All of the dwellings and business establishments are adjacent to this road and largely on the south side because most of the land to north is owned by the Winnipeg Electric Company. The village has grown up without the benefit of strong town-forming factors and with a lack of vigour as is shown by the indiscriminate mixing of dwellings and business establishments.

Upper Seven Sisters Falls, with a population of 129 persons,²¹ exists

²¹D.B.S. Census, 1956

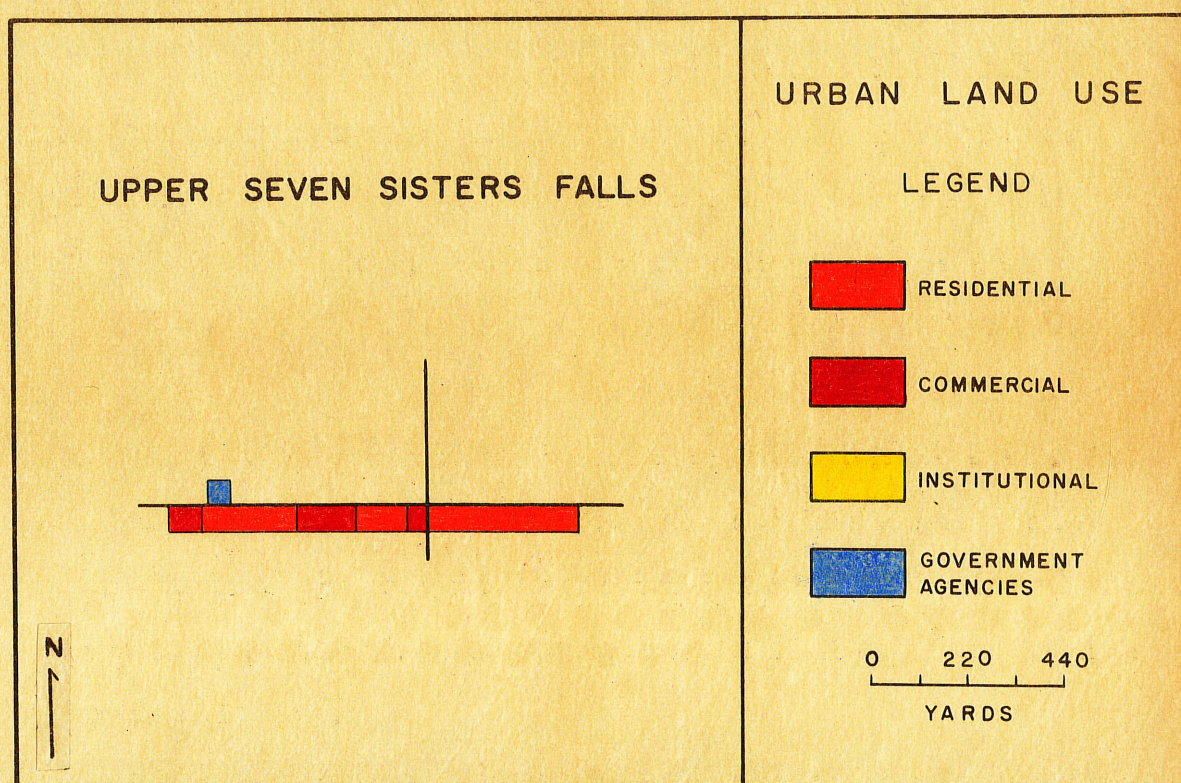


Figure 19

Plate 16



The main business establishments of Upper Seven Sisters Falls, looking west.



Store and dwellings in Seven Sisters Falls.



The business establishments of River Hills.



The church in River Hills

primarily as a service centre for farmers in the surrounding area and secondarily as a place of residence. See Figure 16 for the services offered in this village. The grocery hinterland of the village is small, being limited to the north portion of Township 13 Range 11 E.P.M. and small areas to the east. However, in the summers the village has a large transient hinterland in the form of the many travellers on the Central Whiteshell Road. This village cannot compete with Whitemouth and is used for only small purchases by people who trade in larger quantity in Whitemouth.

River Hills (Figure 20) is on the plain east of the Whitemouth River two miles south of Upper Seven Sisters Falls.

The site of the village was determined by the intersection of the road running parallel to the Whitemouth River, and the bridge over the Whitemouth River. This bridge was recently washed out and is not yet rebuilt.

The morphology of River Hills was set by the intersection of the two roads about which it is built. The few business establishments, and public institutions are located on this intersection. The main part of the village, the dwellings, are built along both sides of the north-south road through the village.

River Hills with a population of 111 persons²² serves primarily as a place of residence for non-agriculturally engaged persons such as the owners of gravel trucks, retired persons and the labourers of the area. It serves secondarily as a service center (Figure 16). The grocery hinterland of this village is extremely limited. The purchases made in the stores by farmers from the surrounding area are small. The hinterland has been decreased by the washout of the bridge across the Whitemouth River. People on the west side of the river now find it more convenient to buy at Seven Sisters or Whitemouth, rather than travel to River

²²D.B.S. Census 1956.

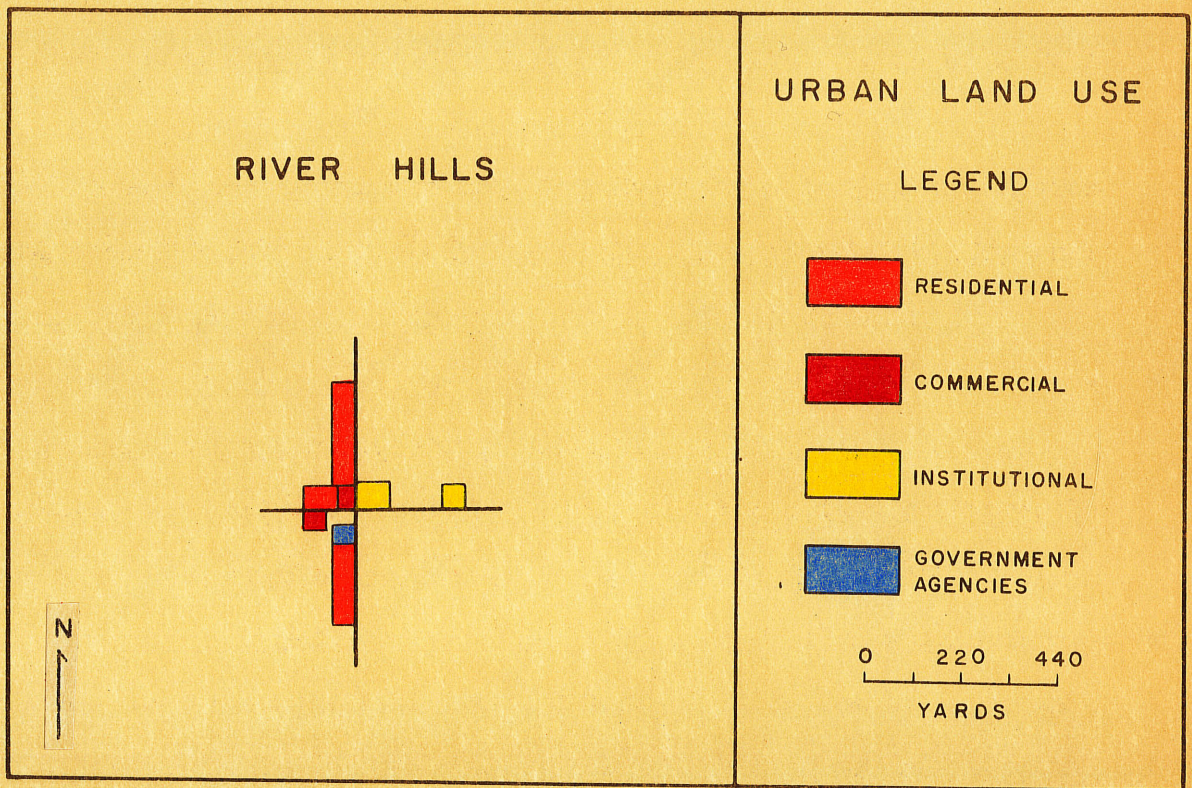


Figure 20

Hills via one of these bridging points. However this has been offset to some extent by the fact that many persons on the west side of river have to go to River Hills to their post office, school and church.

The Elma Sub-Region

The agricultural land along the Whitemouth River between the eastern boundary of Township 11 Range 11 E.P.M. and the southern boundary of Section 22 Township 10 Range 12 E.P.M. forms this sub-region. This area is about twelve miles in north-south extent or length and between one and three miles in width (Figure 28). Elma is the trading centre of this sub-region.

Landscape Description. Tributary creeks of the Whitemouth River are prominent in the landscape north of the nick point at Elma. South of this point they occur less frequently and are not so deeply entrenched. The plain in the Elma Sub-Region is level becoming irregular and gently sloping with the occurrence of small knolls caused by irregularities in the underlying drift in the southeastern part of Township 10 Range 12 E.P.M. and in the Stony Hill district of Township 10 Range 11 E.P.M. These knolls have a local relief of about five feet, giving rise to gentle slopes.

Hardwoods, mainly aspen, are scattered throughout the area and are generally found on the periphery of the agricultural land as well. However, in Township 10 Range 12 E.P.M. and in the north of Township 11 Range 12 E.P.M. on the west side of the Whitemouth River black spruce replaces the aspen on the periphery of the agricultural land. Aspen and ash occur on the banks of the Whitemouth River.

While the network of roads in the Elma Sub-Region is not extensive it is sufficient to serve the residents of the area adequately because settlement occurs in distinct lineations (Figure 28). Most of these roads have a gravel

surface although there are several miles of hard surface provincial trunk highway and lesser distances of graded unimproved surface roads.

The Elma Sub-Region has a dispersed form of settlement (Figure 28 and Plate 4) with lineations along the Whitemouth River, its two main tributary creeks and certain roads, especially P.T.H. 11.

Sites along the Whitemouth River are popular for the location of farmsteads, for the reasons given in this section of the Whitemouth Sub-Region. About half of the farmsteads in this area are immediately adjacent to the Whitemouth River.

The number of creeks providing suitable sites for the location of farmsteads is limited and there is no relation between the creeks and the location of farmsteads in this area, except in the southeast of Township 10 Range 12 E.P.M. and the area of till soils (Stony Hill district) in the northeast of Township 10 Range 11 E.P.M. The creeks in these two areas are the best developed in the sub-region, indicating that, the development of a creek largely determines its usefulness in providing suitable sites for farmsteads.

Provincial Trunk Highway 11, the major north-south traffic artery in the Agricultural Lands, is important in influencing the location of farmsteads because of the good communications it provides. Also areas of imperfectly and moderately well drained till soils of medium to moderately fine texture and deep graded ditches in areas immediately adjacent to the highway have made the construction of farm field drains relatively easy, and make the area attractive even though it is generally unsuited to agriculture. Many of the dwellings along this highway are the homes of people engaged in non-farm work.

Because of the farmsteads situated along this straight highway,

settlement in this sub-region appears to conform to the rectangular survey pattern relatively closely (cf. the Whitemouth Sub-Region).

The influence of the rectangular survey system on the shape and position of land holdings has been weakened by the Whitemouth River to the same extent and for the same reasons as it has in the Whitemouth Sub-Region.

Nearly all of the artificial drains in this area are found in conjunction with graded roads or have been constructed by individual farmers. The municipal drains, not associated with roads, do not contribute greatly to the improvement of drainage in the area because of their small number.

Cultivated land is clean and well worked. Glacial till occurs at the surface in several local areas resulting in many stone piles when the land is cleared and cultivated. There are few cultivated stranded slip-off slopes in this area because they are small and relatively close to the level of the Whitemouth River.

Farmsteads farthest from the Whitemouth River are smaller and less well kept than those near the river. The reasons for this have been discussed in the Whitemouth Sub-Region.

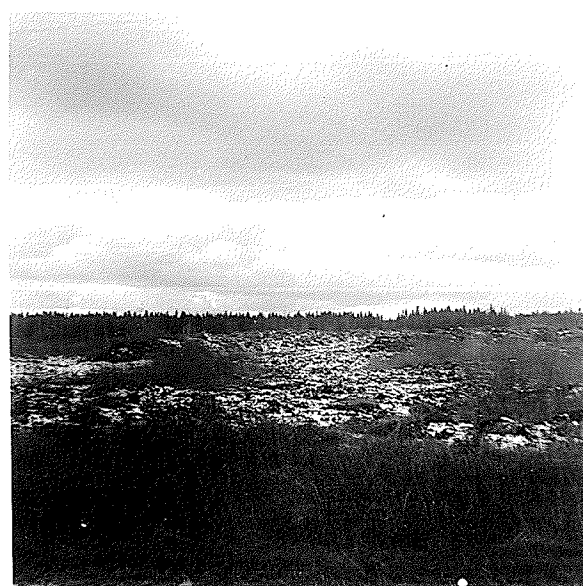
The dwellings used by persons engaged in non-farm work are often unpainted and of hewn log construction while those of individuals whose full time occupation is farming are usually painted and of frame construction. New dwellings, either rural or urban, are rare in the area, except for a few belonging to Mennonites, in Township 10 Range 12 E.P.M. Several abandoned log dwellings, occur in Township 10 Range 12 E.P.M., south of Elma, on poorly drained land.

Barns in this sub-region are small and frequently unpainted (cf Whitemouth Sub-Region). However, those belonging to milk contract holders

Plate 17



One of the larger creeks in Township 11
Range 12 E.P.M.



Peat being burned in Township 11
Range 12 E.P.M. Note the black
spruce in the background.



A smooth level area of thin lacustrine
sediments over till in Township 11
Range 12 E.P.M. Note the many erratics along
the fence.

in Township 11 Range 12 E.P.M. are large and in good repair. An indiscriminate scattering of trees about the farmsteads is the most common form of windbreak, although there is often no windbreak at all, especially in the area south of Elma in Township 10 Range 12 E.P.M.

Population distribution in the Elma Sub-Region is relatively uniform except in Township 10 Range 11 E.P.M. where a concentration of Mennonites and French, usually having large families have tended to increase rural population density (Figure 9).

TABLE XIII

CULTIVATED AREA,* RURAL POPULATION** AND CULTIVATED AREAS
PER PERSON IN THE ELMA SUB-REGION

Township	Cultivated Area Acres	Rural Population	Cultivated Acres per Person	Average*** Total Farm Size
11-12	7750	225	34.4	236
10-12	9570	220	43.5	189
10-11	2360	131	17.5	212
TOTALS	19,680	576	34.1	210

*Forest Inventory, Manitoba Forest Service

**D.B.S. Census 1956

***Based on 69% sample derived from grain permit of the Canadian Wheat Board 1960.

There is no apparent correspondence between farm size and rural population density. The high value for cultivated acres per person in Township 10 Range 12 E.P.M. is probably due to the relatively large numbers of farms operated by old people whose families have left the farm.

Eastern Europeans (mainly Ukrainians) form the largest single group in the Elma Sub-Region. Mennonites, Germans and Anglo-Saxons form smaller

(and nearly equal) minority groups (Figure 10). Eastern Europeans settled this area after 1900 by which time the open land to the west had been settled.

Generally the ethnic groups are not reflected in the landscape except that Eastern Europeans usually have churches with "bulbous" towers and frequently use "shadouf - type" wells, whereas large rectangular, flat-topped chicken houses are common to many Mennonite farms.

Ethnic origin is important in farming practices only as regards the Mennonites who use commercial fertilizers and who do no non-farm work. There are no apparent differences in agriculture as practiced by other groups.

Agriculture in the Elma Sub-Region

The data presented in the following section were obtained from thirty-three interviews. Comparable data from Canadian Wheat Board permits are given in appendix III.

Mixed farming, with cattle, cattle products and grain sales, is the predominant type of agriculture in this sub-region. And, although dairy emphasis is important throughout the area there are only a few milk contract holders.

Land Use. The average 1960 land use on farms in the Elma Sub-Region is given in the following table.

TABLE XIV*

LAND USE IN THE ELMA SUB-REGION**								
Land Use	Wheat	Oats	Barley	Flax	Hay	Cleared Pasture	Summer-Fallow	Forest
Acres	22.1	43.7	1.5	1.6	43.8	12.9	25.1	63.9
% of Farm	10.3	20.3	0.7	0.7	20.4	6.0	11.7	29.7
Yields bu/a.	21.9	32.0	15.5	12.5	1.1**	-	-	-

*Data from farm interviews
**tons/acre

In general terms, the values in this table are subject to the explanations given for Table IV of the Whitemouth Sub-Region. The pattern of land use in the two sub-regions is similar because the effects of the differences between the two areas on the land use pattern has been largely hidden by similar mixed farming types and similar economic conditions prevailing in the Agricultural Lands. Only in degree of land use do the effects of differences in the land become evident.

The comparisons between census figures for Manitoba and the Municipality of Whitemouth are equally valid for both sub-regions because they are both in the Municipality of Whitemouth; each forms about half of the municipality.

The average farm size in the sub-region is 217 acres. The extremes are represented by a twenty-five acre mixed farm whose owner derives his main income from non-farm work, and a 440 acre poultry farm.

The discussion of various land use categories in the Whitemouth Sub-Region is applicable in the Elma Sub-Region, for reasons discussed previously, and may be applied to this area.

A crop rotation scheme consisting of three years hay, one year wheat and two years oats or one year oats and one year summerfallow is commonly used in this sub-region. However a few farmers not having cattle, use a grain, summerfallow rotation in conjunction with applications of commercial fertilizer.

All available barnyard manure is applied to cropped lands in the area. In addition, the use of commercial fertilizers is relatively widespread due to the presence of (1) Mennonite poultry farmers who rely on it in their grain-summerfallow rotation and (2) several farms with a grain emphasis. It appears that the example set by the Mennonites in the use of commercial

fertilizer is influencing their neighbours, in that its use is becoming more widespread.

The 1960 yields of the various crops in the area shown in Table XIV are reasonably good and compare favourably with certain other areas of Manitoba, although barley yields are quite low due to adverse growing conditions (cf Whitemouth Sub-Region).

The aspect of fields and attitudes of the farmers regarding field crops indicate that the land of the Elma Sub-Region is much better than marginal,²³ regarding agriculture as it is presently practiced.

Livestock. Livestock is important on most of the farms in the Elma Sub-Region. The following table indicates the average livestock holdings per farm in the area.

TABLE XV*

AVERAGE LIVESTOCK HOLDINGS PER FARM IN THE ELMA SUB-REGION				
Type	Cattle		Pigs	Poultry
	Total	Milk		
Numbers	16.4	5.8	2.1	970
% Farms Having	87	70	55	73

*Data from farm interviews

The value given for poultry is unusually high because of the large poultry holdings (up to 10,000 birds) of several Mennonite farmers. The usual flocks, kept for home use, are about one hundred birds.

Milk production on a contract basis is limited to a small group of farmers clustered about the intersection of P.T.H'S 4 and 11, who are, for the

²³Land that is barely able under optimum conditions, to provide the farm operator with a suitable living, under present land use etc.

most part, in the Kenora daily milk shed. The development of contract shipping of milk in this area is similar to that in the Whitemouth Sub-Region.

Other dairy farms in this sub-region ship cream to Winnipeg and in a few cases to Kenora. Excess or skinned milk is fed to young cattle rather than to pigs as it is in the Whitemouth Sub-Region.

Farmers in this area indicate that the operation of a farm with live-stock or dairy emphasis and non-farm work are generally not compatible. (cf. Township 13 Range 11 E.P.M. Whitemouth Sub-Region). Hence, there are several farmers, mainly in Township 10 Range 12 E.P.M., engaged in non-farm work and the growing of cereals. On the other hand farmers doing no non-farm work tend to concentrate on dairy and livestock production. This group occurs, for the most part, in Township 11 Range 12 E.P.M.

Dual purpose cattle, often serving neither purpose very well are found on most the farms of this area.

Pigs are kept almost exclusively for home use. Only four interviewed farmers raised pigs for commercial purposes, the remainder had no more than two or three, and in a few instances, none.

Farm Machinery Holdings. The following table indicates the state of farm mechanization in the Elma Sub-Region.

TABLE XVI*

FARM MACHINERY HOLDINGS IN THE ELMA SUB-REGION

Type	Tractors	Binders	Threshers	Swathers	Combines	Feed Mills	Hay Balers
% Inter-viewed Farmers Having	1.2**	27.3	12.1	39.4	51.5	75.7	33.3

*Data from farm interviews

**Tractors per farm

The values given in the table are representative over the sub-region, except for slightly higher proportions of farmers having (1) combines in Township 10 Range 12 E.P.M., the area of grain emphasis (2) hay balers in Township 11 Range 12 E.P.M., the area of livestock emphasis.

The values given for swathers, combines and hay balers in Table XVI indicates that farm mechanization is at a relatively low level in this area, especially in terms of the machinery holdings of each farmer.

However, in terms value of machinery per acre, (cf. Whitemouth Sub-Region) the farms are relatively heavily mechanized.

Farm Income and Farm Types. The following table indicates the proportions of interviewed farmers deriving their main income from each of the common sources.

TABLE XVII*

PROPORTION OF FARMERS DERIVING THEIR MAIN INCOME FROM EACH
OF THE COMMON SOURCES IN THE ELMA SUB-REGION

Source	Dairy	Beef	Grain	Poultry	Non-Farm
Proportion of Interviewed Farmers	23%	18%	18%	16%	25%

*Data from farm interviews

Although this table shows the proportion of the interviewed farmers deriving their main income from the common sources it should be noted that in fact there may be two or more contributing sources of income of nearly equal magnitude, as is to be expected in a mixed farming area.

There is significant variation regarding these sources within the sub-region. In Township 11 Range 12 E.P.M. dairy followed by beef, poultry and non-farm work (the latter three are of equal value) are the leading sources

of income. In Township 10 Range 12 E.P.M. non-farm work, followed by grain, beef and dairy (the latter two are of equal value) are the main sources of income. The difference between the two townships is due to the fact that coarser-textured surface deposits and poorer drainage in Township 10 Range 12 E.P.M. encourage non-farm work which tends to favour grain over a livestock emphasis, as discussed previously.

Table XVII indicates that the Elma Sub-Region is an area of diversified agricultural emphasis, beef, grain and poultry being of similar importance, with non-farm work and dairy predominating.

There is some agricultural specialization in the Elma Sub-Region, as shown by the following examples.

The specialization in poultry is represented by several Mennonite poultry farmers who like those in the Whitemouth Sub-Region have come to this area from St. Anne since 1945.

Figure 21 illustrates a fairly typical poultry farm in the Elma Sub-Region.

The livestock on this farm consists of eight beef cattle, three hogs and 5,700 hens, which consume all of the grain grown and are the main sources of income. A tractor, combine and swather comprise the major portion of the farm's machinery. Commercial fertilizer (27-14-0) is used in conjunction with barnyard manure in a grain-fallow rotation.

Land use on one of the few contract holding dairy farms in the Elma Sub-Region is shown in Figure 22.

Livestock on this farm consists of thirty-three dairy cattle (thirteen milking) and 210 hens which consume three-quarters of the grain produced on the farm, the remainder being sold as a cash crop. However, dairying provides

A poultry farm in the Elma Sub-Region

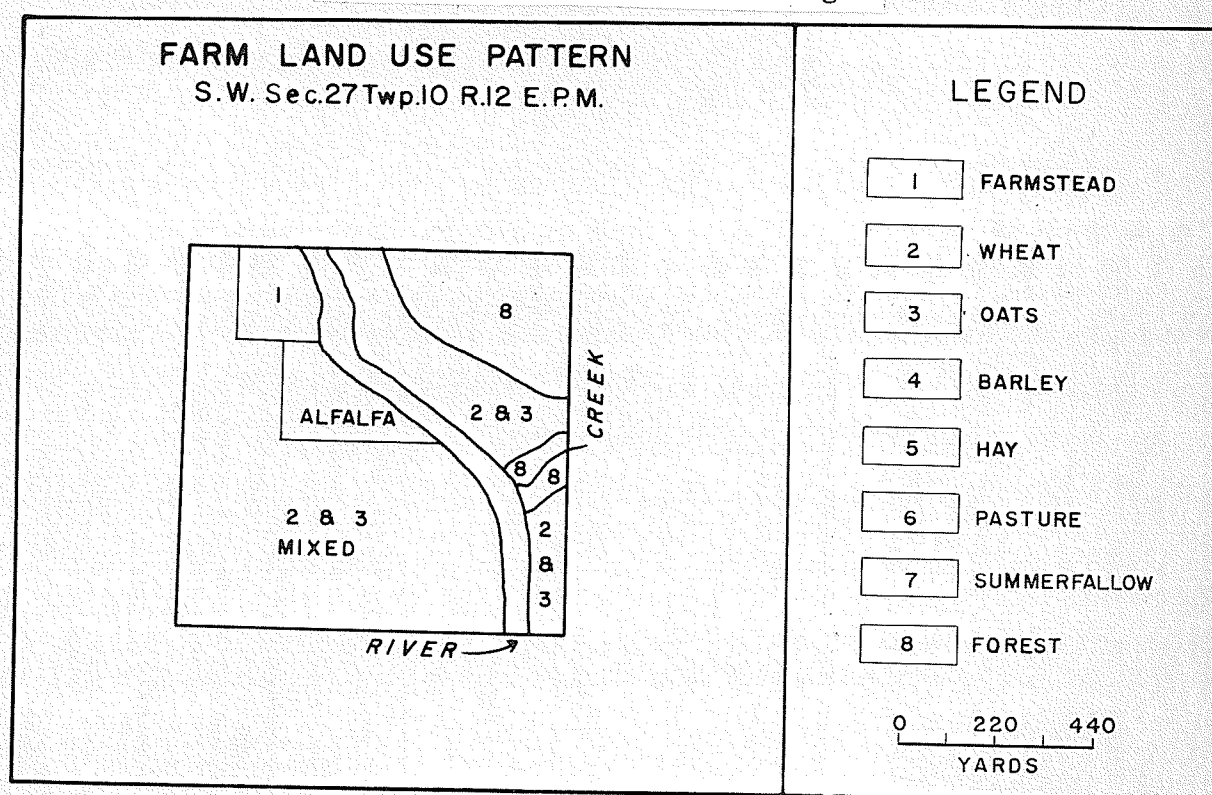


Figure 21

Plate 18



Two dairy farms in Township 11 Range 12 E.P.M. on smooth level till areas



A large poultry farm in Township 11 Range 12 E.P.M.

Figure 22

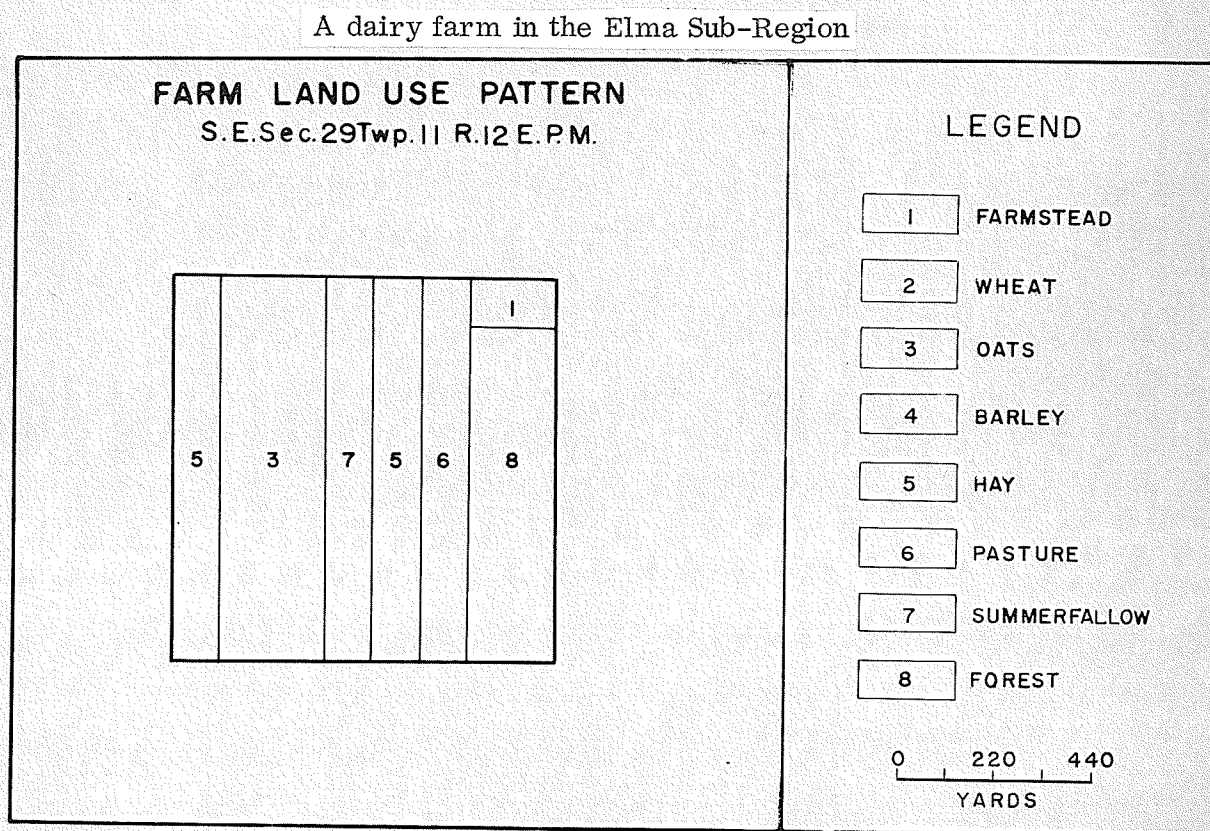


Figure 22

a stable main income which financed the purchase of a tractor, swather and hay baler, the major items of farm machinery. Barnyard manure is used in conjunction with 16-20-0, and the usual hay, wheat and oats rotation scheme.

The following example (Figure 23) is typical of the mixed farms in the Elma Sub-Region.

Figure 23

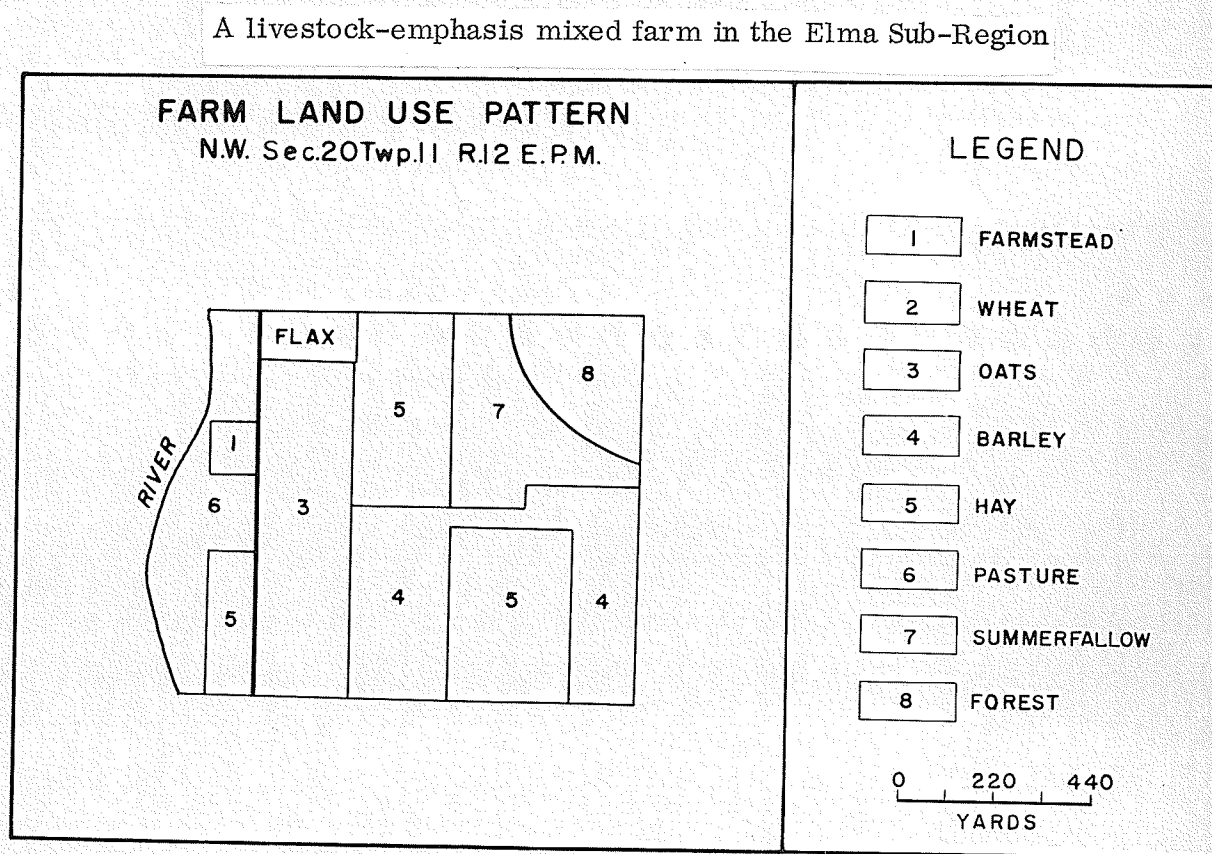


Figure 23

Livestock on the farm consists of twenty-eight cattle of which nine are milked, two pigs and ninety chickens. A tractor, binder and thresher are the main pieces of machinery on the farm. Although the operator spends six months per year in the extraction of pulpwood, cattle provide the main income of the farm, while wheat and flax are minor cash sources, oats being used on the farm. Barnyard manure is used in conjunction ^{with} the usual

hay, wheat or flax, oats rotation scheme.

Non-farm Work. The distribution of farmers deriving their main income from non-farm work is relatively uniform throughout the sub-region. The fact that 25 per cent of the farmers interviewed derive their main income from non-farm work indicates the failure of many of the farms in the area to provide a satisfactory return to their operators.

Pulpwood cutting (both sale and permit) is the main type (55 per cent) of non-farm work while construction work, the Provincial Department of Public Works (18 per cent each) and skilled trades (carpentry etc.) (27 per cent) are minor types of employment for this group which spends 6.3 months per year in non-farm work.

In many cases a considerable portion of the money earned in non-farm work is used to equip relatively small farms with full compliments of machinery which would otherwise be unattainable.

Farm Size. Table XII and the discussion of it applies to the Elma Sub-Region as well as to the Whitemouth Sub-Region, since each sub-region is about half of the Municipality of Whitemouth.

In addition to farm expansion mentioned in this discussion it may be noted that the Mennonites who have moved in this sub-region subsequent to 1945 are generally expanding their farms quite rapidly, buying and renting land as it becomes available and as it is required. These farmers say that land in this area is very easily rented, especially from those people engaged in temporary non-farm work. Such people, however, are reluctant to sell their land and will do so only at exorbitant prices in order to maintain an alternate source of income in the event that their non-farm employment ceases to exist.

Several abandoned farmsteads occurring in Township 10 Range 12 E.P.M. on poorly drained land were given up in the late thirties and early forties (cf. Whitemouth Sub-Region).

The relatively large numbers of farms operated by elderly persons in Township 10 Range 12 E.P.M. indicates that agriculture in the area is not flourishing and is unattractive to younger people, capable of obtaining non-farm work. In many cases, the elderly persons remaining on these farms do not have the strength to operate them efficiently nor perhaps the attitude necessary to improve them.

Agricultural Problems and Trends. Problems of both an economic and physical nature exist regarding agriculture as it is presently practised in the Elma Sub-Region.

The major physical problem is insufficient drainage of crop land (cf. the Whitemouth Sub-Region) which may be related to (1) the few and shallowly entrenched tributary creeks of the Whitemouth River, (2) the limited network of roads and, hence roadside ditches and (3) the fact that the narrow strip of cultivated land adjacent to the Whitemouth River is bordered by bogs which tend to keep the ground water table at a high level.

In addition to insufficient drainage, stoniness of cultivated land is a serious problem in this area where the mantle of lacustrine and alluvial deposits overlying till is relatively thin and in many places absent. The stones found in the till areas especially, present considerable difficulties to cultivation, since they frequently exceed two feet in diameter.

Soil fertility is a problem over considerable portions of the area, especially where surface textures are coarse, being fine sand to loamy very fine sand. In addition to fertility problems related to soil texture, some of

the till soils found farther away from the river may contain sufficient calcium carbonate to inhibit nutrient uptake by plants. Commercial fertilizers as well as barnyard manure give a good plant growth response on the soils of this area, and most of the problems of soil fertility may be remedied by these means.

Noxious plants present another problem, and one that is by no means unique to this area. Wild oats and couch grass²⁵ are common. Difficulty of control of such plants is increased by the use of barnyard manure on cropland. Also common are deep rooted perennial plants such as thistles which are often present on abandoned land from which their seeds may blow, making their control difficult.

In comparison to these relatively serious problems the difficulties encountered regarding soil erosion are slight. Gully erosion is limited to areas of steep slope found adjacent to drainage channels in the area. However wind erosion is somewhat more serious because of the relatively large areas of summerfallow and the sandy texture of surface deposits which do not form stable aggregates. Fortunately, severe wind erosion in this area is kept in check by many forested areas, which serve as windbreaks.

The main soil management problems in the Elma Sub-Region are coarse surface deposits that lack, (1) the nutrients usually associated with finer textured deposits and (2) the water retention capacity of fine textured materials. The surface layers of such soils may become very dry, inhibiting seed germination, even though the lower layers of these soils may contain sufficient water for plant growth once their roots have become established.

These problems are a result of the nature of the land and tend to be aggravated by the relatively heavy grain emphasis in this area.

²⁵Agropyron repens (L.) Beauv.

Similar to many areas and types of agriculture in the Prairies, this sub-region and its mixed farming enterprises are faced with certain economic problems. The two most important being grain sales and the requirements and cost of machinery for the relatively small farms in this area.

Grain sales are of relatively high importance to the farmers of this area (18 per cent derive their main income from this source) so that problems in grain marketing tend to affect this area more seriously than they affect the Whitemouth Sub-Region.

The buying of farm machinery is usually a problem (cf. Whitemouth Sub-Region) because of the small areas under cultivation. Farmers in this area having a full complement of machinery usually do not make maximum use of it, leading to an expensive and serious inefficiency on these farms.

Many of the farmers lack the necessary resources to purchase a complete complement of machinery; and rely on custom work for a part of their harvest, thus overcoming the high costs of machinery. However, this arrangement is often unsatisfactory because custom machinery is not always available just when it is required.

The sharing of machinery between farmers is almost exclusively limited to the Mennonite minority of this area. It is probable that a more widespread use of this simple expedient would sharply reduce the seriousness of the problem of large machinery holdings.

As is common to most areas of the Prairies this area is in a state of flux. The general changes and trends are very similar to those of the Whitemouth Sub-Region and may be briefly listed as (1) higher wages demanded by farm laborers, (2) the 'cost price squeeze' and (3) the advances in farming techniques and equipment.

Trends, peculiar to this area, according to the interviewed farmers are towards larger numbers of beef cattle, and to a lesser degree, larger numbers of dairy cattle (for cream shipments). These trends probably reflect the difficulty in grain marketing. Commercial fertilizer is becoming more widely used in this area, possibly due to the example set by the Mennonite minority. The small increases in areas of cleared land and farm incorporation will benefit the farmers by giving them a larger and more economic unit with which to work (cf. Whitemouth Sub-Region).

Villages and Hamlets of the Elma Sub-Region

Elma (Plate 4) on the west bank of the Whitemouth River is, six miles upstream from the village of Whitemouth, in the plain adjacent to the river.

The site of the village is the intersection of the C.N.R. and the main north-south road running parallel to the Whitemouth River. The advantages of this site were later augmented by the (construction) of Provincial Trunk Highway 15, from Winnipeg to Elma. Elma is bounded by the Whitemouth River and the C.N.R. Right of Way except on the west and a small part of the village south of the C.N.R. along Provincial Trunk Highway 11, which in this particular area is built on the older, original north-south road. In addition to this site being the intersection of rail and road communications the prominent nick point in the Whitemouth River and the direction of the river itself provides an excellent place for the construction of a bridge on the north-south road.

The morphology of Elma was originally determined by the C.N.R. (Figure 24) as is shown by the concentration of business establishments on the street parallel to the railroad. However, the importance of road communication is shown by the service stations, dwellings and church on Provincial Trunk Highway 11. The business establishments are found only on the street facing

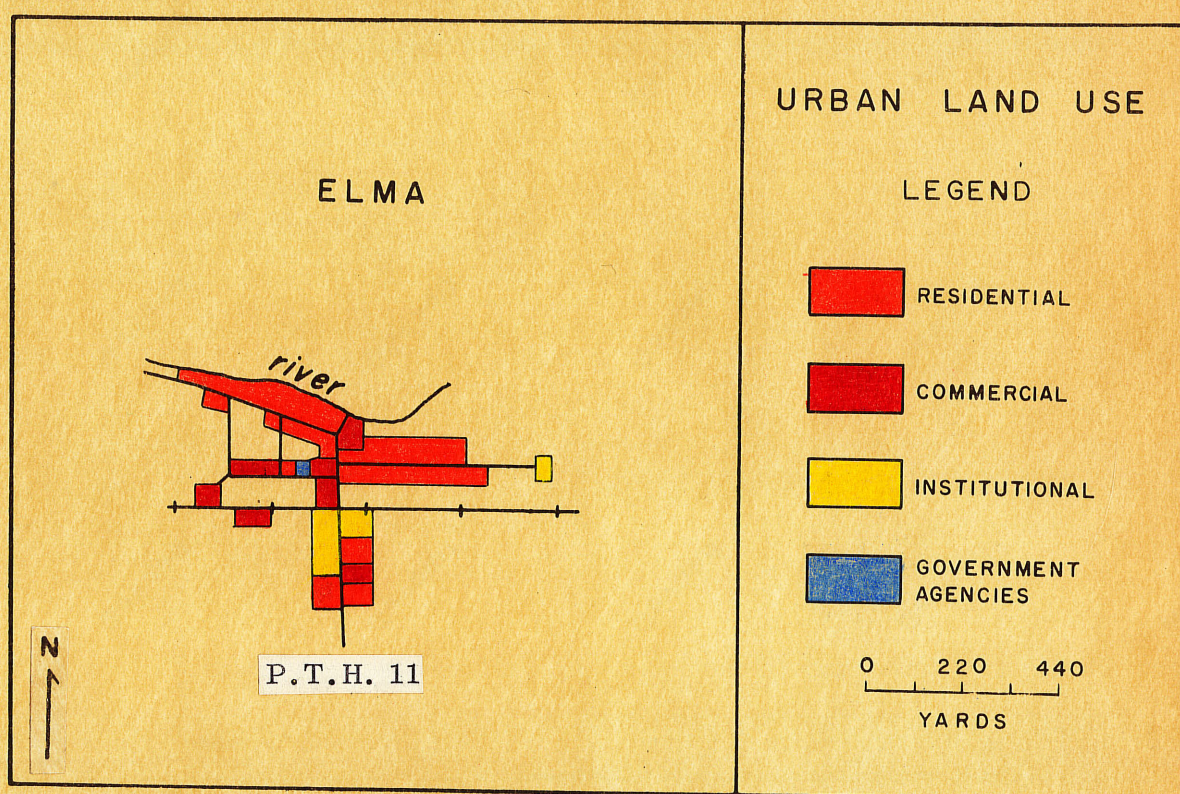
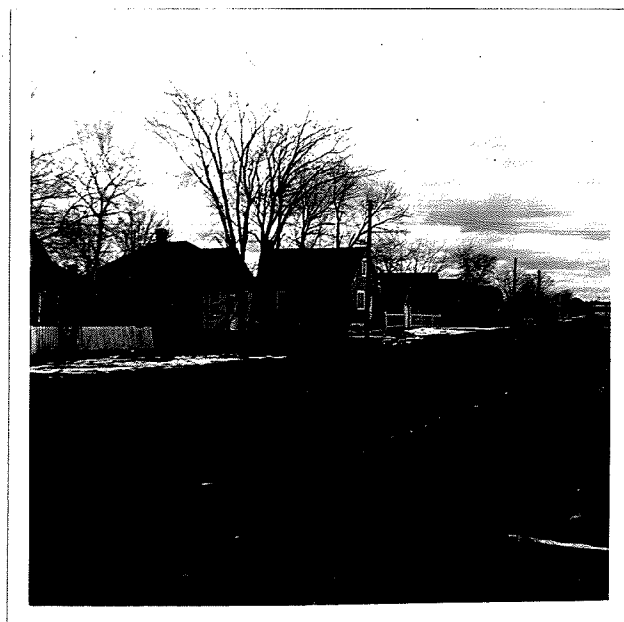


Figure 24

Plate 19



The main business establishments of Elma facing the C.N.R.



One of the residential streets of Elma.

the C.N.R. and on the highway thus giving the village a well defined business district (Figure 24). The entrance of roads from the south, the northeast and the northwest are shown to be of importance by the dwellings, the church the hall and the school that have been built adjacent to them, stretching away from the central part of the village.

Elma, with a population of 172 persons,²⁶ is the second largest village of the Agricultural Region and the only village of this sub-region. The village is primarily a service centre for part of the sub-region (See Figure 16). Its secondary function is that of serving as a place of residence, with some urban amenities, for retired farmers, about fifteen employees of the C.N.R. and those people operating the services offered in the town. There are no farm implement agencies, nor were there at any previous time, (although one of the service stations deals in used equipment to a small degree) indicating the relative unimportance of this village as a service centre. The hinterland of Elma (Figure 17) is relatively small compared to that of Whitemouth, as is to be expected in view of the facts that it has been hindered in its growth by Whitemouth which was given a headstart by the early building of the C.P.R. and the building of Provincial Trunk Highway 4 which was the Trans Canada Highway for 24 years (1931-1955). In addition, the hinterlands of Elma have neither the population nor the agricultural productivity that those of Whitemouth have.

The previously mentioned factors indicate why Elma has not become the major centre of the Agricultural Region and why it will not become the major centre.

The Hadashville Sub-Region

The Hadashville Sub-Region consists of the agricultural lands along

²⁶D.B.S. Census of 1956.

the Whitemouth and Birch Rivers between the southern boundary of Section 22, Township 10 Range 12 E.P.M. and the southern boundaries of Township 8 Ranges 12 and 13 E.P.M. making it about fourteen miles in north-south extent (Figure 29). The belt of agricultural land adjacent to the streams varies in width from one-eighth mile in the south of Township 8 Range 13 to two miles in the north of Township 9 Range 12 E.P.M. The main trading centre, Hadashville, is in the centre of Township 8 Range 12 E.P.M.

Landscape. This sub-region is a level to very gently sloping plain which becomes slightly undulating in the northern part of Township 9, Range 12 E.P.M. and in the areas immediately adjacent to the streams. The few creeks tributary to the Whitemouth and Birch rivers are not prominent in the landscape because they are short and shallowly entrenched. The creeks flowing into the Birch River in the south of Township 8 Range 13 E.P.M. are extremely small, being only about 250 yards long and carrying small amounts of water from the adjacent bogs.

The native vegetation peripheral to this area is mainly aspen and balsam poplar. In the south, willow and alder shrub occur mixed with the poplars. Black spruce occurs mixed with the aspen and balsam poplar in the northern parts of the Hadashville Sub-Region. Hardwoods occur along the Whitemouth and Birch rivers, the principal species being aspen, balsam poplar, birch, elm and ash.

The factors discussed in this section of the Whitemouth Sub-Region regarding the first roads and orientations in that area apply equally well here because these roads are continuous throughout the Agricultural Region and were extended southward as the more southern areas became settled. The fact that the land has been surveyed into river lots in Township 8 Ranges 12 and 13 E.P.M. has absolutely no effect on the road pattern (Figure 29).

The road network in the Hadashville Sub-Region is not extensive relative to most settled areas but it is sufficient to serve this area adequately because of the shape of the cultivated area and the settlement pattern. Generally the roads in this sub-region are gravelled (Figure 29). However, there are considerable distances of paved highway and lesser distances of slightly graded unimproved surface roads. Due to the nature of the surface materials in the southern part of the sub-region these unimproved surface roads are usually of sand and gravel.

The Hadashville Sub-Region shows a dispersed form of settlement (Figure 29 and Plate 5). The farmsteads are, almost without exception, found in the area, up to a quarter mile wide, bounded by the Whitemouth or Birch River and the roads parallel to the stream. The reasons for the location of farmsteads near rivers have been discussed in the section on the Whitemouth Sub-Region.

Provincial Trunk Highway 11 has had little influence on the settlement pattern in this area because (1) it follows the Whitemouth River very closely through most of Township 8 Range 12 E.P.M. and (2) it passes through very poorly drained and stony areas in Township 9 Range 12 E.P.M. that are not attractive for settlement. However in that part of Township 8 Range 12 E.P.M. where Provincial Trunk Highway 11 is about one half mile from the Whitemouth River (Figure 29) a few farmsteads have been located near it, indicating that, in a few instances, transportation facilities have been a determining factor in the location of farmsteads. The Trans Canada Highway has had little influence on the location of dwellings because (1) it passes through an area unattractive to settlement and (2) it was completed only recently (1955). However, one or two dwellings of low quality have been established near the Trans Canada Highway

between the junction of Provincial Trunk Highway 11 and the Whitemouth River by persons engaged in pulp extraction.

There are two types of land survey in the Hadashville Sub-Region; the rectangular survey in Township 9 Range 12 E.P.M. and the rectangular - river lot survey in Township 8 Ranges 12 and 13 E.P.M. In Township 9 Range 12 E.P.M. the rectangular survey has made no visible effect on the location of farmsteads, although, of course, land holdings generally conform to the grid except where the Whitemouth River has divided quarter sections. In Township 8 Ranges 12 and 13 E.P.M. the sections through which the Whitemouth and Birch rivers flow have been divided into river lots one quarter mile wide and about one half mile long which range in area between 130 and 180 acres. This survey system has had no visible effect on the location of farmsteads, and in fact no appreciable effect on the cultivated parts of farmer's holdings. This conclusion may be drawn from the fact that settlement patterns are identical throughout the sub-region, even though there is a change in survey systems.

Nearly all of the artificial drains in the sub-region are found in conjunction with graded roads or have been constructed by individual farmers. There are one or two municipal drains but these are not especially important. In fact, the individual farm drains and the municipal drains do not contribute to drainage of the area except locally because they do not occur in sufficient number or in an integrated network.

Roadside ditches are generally grown up with grass. In the southern part of Township 8 Range 13 the ditches adjacent to the secondary roads are frequently grown up with willow and poplar scrub. Unused land occurs frequently, and is covered with a rank growth of grasses, weeds and scrub. Abandoned farm buildings, of hewn log construction, are often found on these lands.

Plate 20



Level very gently sloping land adjacent to the Birch River in Township 9 Range 12 E.P.M. The new farm house on the left is the result of non-farm work.



One of the original farmsteads of Township 9 Range 12 E.P.M. The banks of the White-mouth River are in the background.



Burning peat in Township 9 Range 12 E.P.M. Note the hummocky surface.

Cultivated land in this sub-region is clean and well worked. The occurrence of glacial till near or at the surface over relatively small areas in Township 9 Range 12 E.P.M. and the south of Township 8 Range 13 has given rise to stone piles in these areas.

The outbuildings on the farms in this sub-region are generally small, unpainted and of hewn log construction. Farmhouses in the Hadashville Sub-Region are of moderate size and frame construction. Several new bungalow-type dwellings owned by persons employed at the Pineland Forest Nursery occur along the Birch River in Township 9 Range 12 E.P.M. and Township 8 Range 13 E.P.M.

Planted windbreaks, are rare. Usually however the farmstead is built in a stand of trees adjacent to the river banks or is surrounded by an indiscriminate scattering of trees, so that farmsteads are sheltered from the wind.

Distribution of population in the Hadashville Sub-Region is relatively uniform except for Township 9 Range 12 E.P.M. where farms are relatively large. Several farms operated by old people whose families have left the farm has resulted in a low total population and hence a high value of cultivated acres per person (Figure 9).

TABLE XVIII

CULTIVATED AREA,* RURAL POPULATION** AND CULTIVATED ACRES
PER PERSON IN THE HADASHVILLE SUB-REGION

Township	Cultivated Area Acres	Rural Population	Cultivated Acres per Person	Average*** Total Farm Size
9-12	6,580	191	34.4	241
8-12	4,320	235	18.4	190
8-13	3,510	150	23.4	119
TOTALS	14,410	576	25.1	216

*Forest Inventory, Manitoba Forest Service

**D.B.S. Census 1956

***30% sample of farm interviews.

The low value of cultivated acres per person in Township 8 Range 12 E.P.M. is due to the fact that this township's population is rather large, combining marginal agriculture with non-farm work. The population of Township 8 Range 13 E.P.M., however, is much smaller and is limited very largely to non-farm work and similar to Township 9 Range 12 E.P.M. there appears to be a relatively large number of farms operated by old people whose families have left the farm.

Eastern Europeans are the main ethnic group (Figure 10) in the Hadashville Sub-Region, and are reflected in the landscape by (1) a church with bulbous towers, (2) "shadouf type" wells and (3) the occasional white-washed log house, with a steeply pitched roof. The attitude of this group toward land ownership is thought to be the reason for the comparatively small number of land sales.²⁷

Other ethnic groups represented in this area are Germans (one), Mennonites (one) and Anglo-Saxons (three). There is little or no significance to be attached to any of these groups. These three minority groups have not produced a distinctive landscape, nor are their agricultural practices visibly different.

Agriculture in the Hadashville Sub-Region. The data presented in this section were obtained from 41 interviewed farmers. Comparable data from Canadian Wheat Board permits are given in Appendix III.

Mixed farming, with grain and cattle sales, is the predominant type of agriculture practised in this sub-region, and although there are no milk contract holders in the area, cream sales to Winnipeg are an important source of income for many farmers.

²⁷H. Dubois, Clerk, L.G.D. Reynolds, Personal Communication, Sept. 1960.

Land Use. The average 1960 land use on farms in the Hadashville Sub-Region is given in the following table.

TABLE XIX*

LAND USE IN THE HADASHVILLE SUB-REGION								
Land Use	Wheat	Oats	Barley	Flax	Hay	Cleared Pasture	Summer-Fallow	Forest
Acres	10.8	18.9	1.2	4.1	39.6	19.2	19.9	84.0
% of Farm	5.5	9.4	0.7	2.5	20.0	9.7	10.0	42.3
Yields bu/a.	12.3	23.1	12.5	15.0	1.0**	-	-	-

*Data from farm interviews

**tons per acre

The values shown in Table XIX are subject to the same general explanations as those given in Table VI in the discussion of the Whitemouth Sub-Region. The effects of the decrease of the land quality²⁸ between these two sub-regions is indicated by a decrease in yields and crop acreages. However, mixed farming types and the economic conditions are similar to those prevailing in the Agricultural regions as a whole.

The small average farm size in this sub-region of 192 acres, with extremes of 466 and fifty-three acres, is due to the same factors discussed in this section of the Whitemouth Sub-Region. However average farm size has increased by thirty-two acres from 1951 to 1956 in L.G.D. Reynolds as opposed to a twenty-five acre increase per farm in Manitoba in the same period. Most of this increase is in the form of rentals from many people engaging more actively in non-farm work.

The difference between the values for the Hadashville Sub-Region

²⁸As regards this type of agriculture.

TABLE XX

A COMPARISON OF PER FARM AREAS OF VARIOUS LAND USES IN THE PROVINCE OF MANITOBA,* THE LOCAL GOVERNMENT DISTRICT OF REYNOLDS* AND THE HADASHVILLE SUB-REGION**

Area/Crop (ac.)	Wheat	Oats	Barley	Flax	Hay	Summer-Fallow	Total Farm
Hadashville Sub-Region	11	19	1.2	4.1	40	20	192
L.G.D. Reynolds	8.1	15	4.6	1.9	34	15	206
Manitoba	45	42	33	16	13	58	365

*D.B.S. Census 1956.

**This information was obtained from farm interviews September 1960.

and L.G.D. Reynolds are due to differences in areas, proportion and date of sample.

The areas of the various crops, except hay, are very low due to small areas of cultivated land of medium to coarse surface textures which is at best only imperfectly drained. These soils are not suited to the production of cereals. However conditions in the area are much more suited to the growth of hay and accordingly more emphasis is given to this crop. However much of this hay is grown in poorly drained areas where cereals can not be grown. Many farmers with large areas suitable to the production of grains keep many cattle and buy hay from their neighbours who have few cattle and who do considerable amounts of non-farm work.

Most grain is grown for feed, but small quantities of wheat and flax are grown as cash crops by many of the farmers.

The usual crop rotation scheme used is three years hay, one year wheat, and two years oats. However the crop rotation schemes vary from one year summerfallow and two years oats to one year wheat, one year oats, five years alfalfa and one year summerfallow. A frequent variation in the usual

scheme is the substitution of one year summerfallow for three years hay. This substitution is used by farmers having few or no cattle because (1) hay grown is not used and (2) soil nutrients normally obtained from hay sod and barnyard manure become available, partially at least, by summer-fallowing. Of the forty-one farmers interviewed only one used commercial fertilizer and only two others were contemplating its use for 1961. However, barnyard manure, in all available quantities, is applied to the cultivated lands.

When the field management practices of this sub-region are considered in the light of the knowledge of the soils found here the relatively low yields indicated in Table XIV are easily understood and, indeed, are to be expected. The attitudes of the farmers of this sub-region toward agriculture, expressed in field management practices, is a partial result, at least, of agriculture being a secondary source of income for more than half of the farmer operators in the Hadashville Sub-Region.

Livestock. Table XXI indicates the proportion of farmers owning cattle, milk cows, pigs and poultry.

TABLE XXI*

PROPORTION OF FARMERS OWNING VARIOUS TYPES OF LIVESTOCK IN
THE HADASHVILLE SUB-REGION

Type of Livestock	Cattle	Milk Cows	Pigs	Poultry
Proportion of Farmers Owning	75.6 %	53.7 %	51.2 %	51.2 %

*Data from farm interviews

The relatively low proportion of farms having various types of livestock and, Table XXII, showing the average numbers of various types of livestock per farm, indicates that the Hadashville Sub-Region is not an area of uniform livestock emphasis.

TABLE XXII*

AVERAGE LIVESTOCK HOLDINGS PER FARM IN THE HADASHVILLE
SUB-REGION

Type	Cattle		Pigs	Poultry
	Total	Milk		
Av. Nos. per Farm	10.8	3.3	4.8	38.1

*Data from farm interviews

Generally, farmers having the most cattle do the least non-farm work. Such farmers usually have about twenty cattle (ten of which are milked) and are concentrated in Townships 8 and 9 Range 12 E.P.M., which contain the best land in the sub-region. Cream the main dairy product, is sold in Winnipeg, while the skimmed milk is fed to young stock or pigs.

Pigs in the Hadashville Sub-Region are kept primarily for home use. However there are six farmers keeping herds of about twenty pigs for commercial purposes. Poultry is also kept for home use.

Farm Machinery Holdings. The possibility that money derived from non-farm work may be used for the purchase of farm machinery, alone, precludes the use of the values in Table XXIII as measures of agricultural returns.

TABLE XXIII*

FARM MACHINERY HOLDINGS IN THE HADASHVILLE SUB-REGION

Type	Tractors	Binders	Threshers	Swathers	Combines	Feed Mills	Hay Balers
Proportion of Farmers having %	1.1**	46.4	31.7	17.0	29.3	56.1	34.2

*Data from farm interviews

**Tractors per farm

The values given in Table XXIII are not representative throughout the sub-region. Table XXIV gives farm machinery holdings in the Hadashville Sub-Region by Township.

TABLE XXIV*

FARM MACHINERY HOLDINGS IN THE HADASHVILLE SUB-REGION
BY TOWNSHIP

Type	Township	Tractors	Binders	Threshers	Swathers	Combines	Feed Mills	Hay Balers
Proportion of Farmers Owning	9-12%	1.2**	41.1 %	17.7 %	29.4 %	58.8%	64.7%	35.3%
"	8-12	1.2**	38.5	23.1	15.4	15.4	53.8	46.2
"	8-13	0.9**	63.6	63.6	0	0	45.5	18.4

*Data from farm interviews

**Tractors per farm

The proportions of farmers having swathers and combines (by township) decreases in an inverse relationship to the proportion of farmers deriving their main income from non-farm work (by township). Similarly there is a reasonably direct relationship between the proportions of farmers (by township) having binders and threshers and the proportion of farmers (by township) deriving their main income from non-farm work. Hence, it appears that farmers deriving their main income from non-farm work are not inclined to purchase new machinery such as swathers and combines and that these farmers do not make serious efforts in agriculture.

The farm machinery holdings (by township) in this sub-region exist in a direct relationship with the quality of land. The suitability of the land for the type of agriculture practised in the Hadashville Sub-Region decreases in the order: Township 9 Range 12 E.P.M. to Township 8 Range 12 E.P.M. to Township 8

Range 12 E.P.M. to Township 8 Range 13 E.P.M. as do the quantity and quality of farm machinery holdings.

Tables XXIII and XXIV also indicate that farms in the sub-region are poorly mechanized as compared to the Whitemouth or Elma Sub-Regions.

Farm Income and Farm Types. The following table indicates the proportion of interviewed farmers deriving their main income from various common sources.

TABLE XXV*

PROPORTION OF FARMERS DERIVING THEIR MAIN INCOME FROM EACH OF THE COMMON SOURCES IN THE HADASHVILLE SUB-REGION

Type	Dairy	Beef	Grain	Poultry	Non-Farm
Proportion of Farmers engaged in each type	19.5 %	12.2 %	7.3%	0 %	61.0%

*Data from farm interviews

Although the table shows the proportion of the interviewed farmers deriving their main income from various sources it should be noted that there may be two or more contributing sources of income of nearly equal magnitude. The values given in the table are generally representative of the Hadashville Sub-Region even though there is a definite rise, from Township 9 Range 12 E.P.M. to Township 8 Range 12 E.P.M. to Township 8 Range 13 E.P.M. in that order, in the proportion of farmers deriving their main income from non-farm work. The high values shown for non-farm work indicates that it, and not agriculture, is the more important source in this area.

Cattle, dairy especially, are of relatively high importance as sources

Plate 21



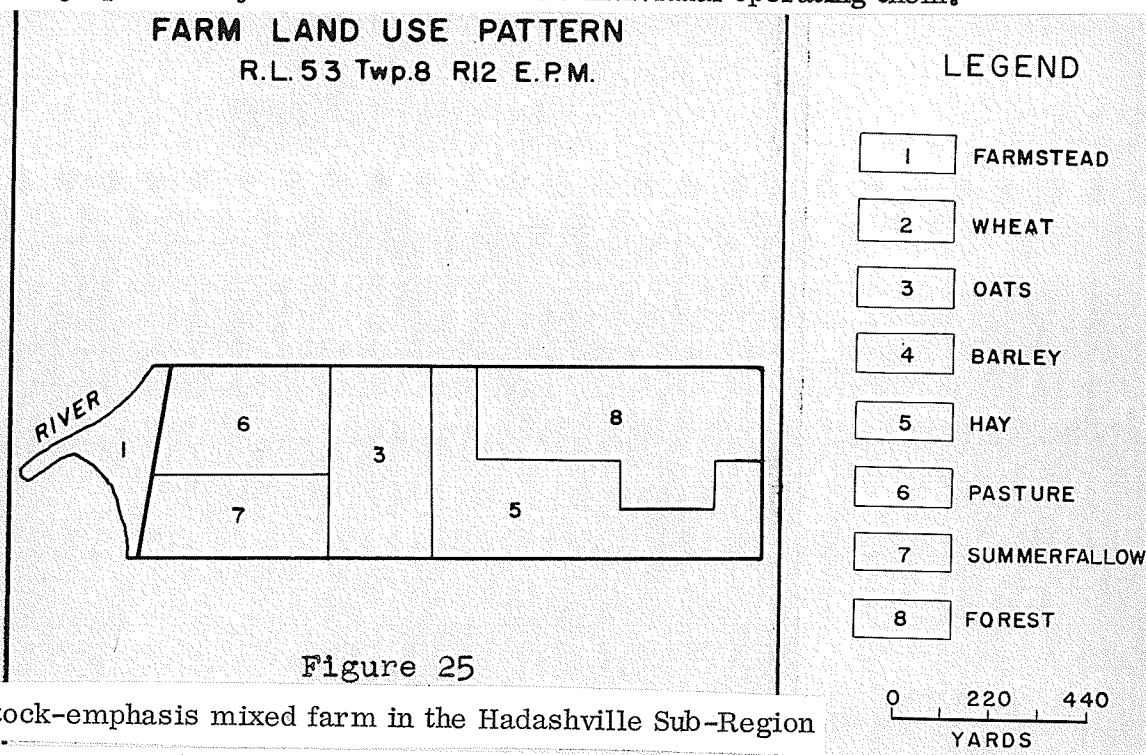
Outbuildings on a mixed farm on which beef is important in Township 8 Range 13 E.P.M.



Greek Orthodox Churchyard in Township 8 Range 12 E.P.M.

of income in this area, as to be expected since the soils of this area are not well suited to the production of grains.

There are no trends to specialization of farm types in the Hadashville Sub-Region, and the following example (Figure 25) is typical of the better farms in the area, although they usually do not have such large numbers of livestock. Non-farm work is usually predominant on the poorer farms so that they reflect very specifically the inclinations of the individual operating them.



The forty-nine cattle (eight milked) provide the major income of the farm, while forty hogs, two-hundred chickens and forty cords of pulpwood cut in winter are minor sources.

Barnyard manure is used in conjunction with a hay, wheat, oats, summerfallow rotation scheme. The operator intends to try commercial fertilizers in an attempt to solve the feed problems imposed by a shortage of pasture. The major pieces of farm machinery are two tractors and a hay baler and a half share in a swather and combine. In this area summerfallow

is used primarily in the extermination of such noxious plants as couch grass and wild oats which are major problems in the area.

Non-Farm Work in the Hadashville Sub-Region. The proportion of farmers deriving their main income from non-farm work is relatively high (61 per cent) in this sub-region. This value varies from 47 per cent in Township 9 Range 12 E.P.M. to 69 per cent in Township 8 Range 12 E.P.M. to 82 per cent in Township 8 Range 13 E.P.M. These indicating that major proportions of the farms in the Hadashville Sub-Region do not provide a satisfactory return to their operators.

The Manitoba Forest Service, with its Pineland Forest Nursery, Forest Ranger Station at Hadashville, and forest access road building programme, is the main employer in the area. The forest nursery may hire as many as fifty people per year, usually for periods of about six months while the other two sources may hire as many as ten men each for similar periods. Pulp extraction (permit and sale) is the other major source of non-farm income for farmers in this area.

In addition, there is a small group of skilled tradesmen such as carpenters, welders and mechanics who find employment as far afield as Winnipeg. Another small group is employed by the Greater Winnipeg Water District Railway. The average time spent on non-farm work is 5.8 months per year, indicating the extensive nature of non-farm work in this sub-region.

Farm Size in the Hadashville Sub-Region. The following table indicates the relatively rapid increase in farm size and areas of improved land per farm, especially, While land clearing is continuing, most of these increases are due to a decrease in farm numbers. See the discussion given in this section of the treatment of the Whitemouth Sub-Region.

TABLE XXVI

FARM SIZE AND NUMBERS* ETC. IN L.G.D. REYNOLDS** 1926-1956

Census Year	Number of Farms	Occupied Land (ac)	Improved Land (ac)	Av. Total Farm size (ac)	Av. Area of Improved Land per Farm (ac)
1956	172	35,368	15,451	205.8	89.9
1951	201	34,858	13,373	174.1	66.7
1946	173	27,536	10,733	159.1	62.0
1941	234	31,623	10,865	135.2	46.4
1936	218	30,436	6,955	139.7	31.9
1931	193	26,200	4,616	135.8	23.9
1926	217	27,070	4,031	124.8	18.7

*D.B.S. Census 1926-1956

**Prior to 1946 this subdivision was the old Municipality of Birch River and was made up solely by the Hadashville Sub-Region. After this date and the collapse of the municipality the sub-division became the L.G.D. Reynolds, which covers the Hadashville and East Braintree Sub-Regions.

Farms in the area have increased in size since 1941. Much of this increase is in the form of rented land, present land owners being unwilling to sell, except at very high prices, even though their land may not be used and even though they reside outside the area, in Winnipeg for example. Despite the increase in farm size most of the farms in the sub-region are not economic units under present conditions and type of agriculture practised. This fact strongly encourages farmers to engage in non-farm work.

Abandoned farmsteads are common in this sub-region, especially in Township 8 Ranges 12 and 13 E.P.M. As in the Whitemouth and Elma Sub-Regions these farms were left in the early forties and were frequently on the most poorly drained areas. Many of the poorer farms in the area are operated by their original settlers who are now old and often unable to operate their

farms efficiently, forcing them to live largely on a subsistence basis.

The long periods spent in non-farm work by farmers of this area may supply the money necessary to purchase additional land, which is generally necessary because any existing uncleared land is poorly drained and unarable without extensive artificial drainage. On the other hand, long periods of non-farm work tends to draw the individual away from the farm, to concentrate his concern elsewhere, so that he may not have sufficient interest to purchase the land required to enlarge his farm to an economic unit.

Agricultural Problems and Trends in the Hadashville Sub-Region. Insufficient drainage of cropland is the most serious single problem regarding agriculture in this area. Drainage channels tributary to the Whitemouth River are shallowly entrenched, short and infrequent. The few artificial drains and a limited network of roadside ditches have not improved the insufficient natural drainage to the point where the land is suitably drained. The close proximity of bogs tends to keep the ground water table at a relatively high level, thus compounding the problem of relatively poor drainage in the cultivated lands.

Low fertility of cropped land, with respect to grains in particular, is generally considered, by the interviewed farmers, to be the next most serious problem in the area. The low yields experienced are due to (1) relatively coarse textured surface deposits, low in clay and exchange capacity, (2) the nature of pedological processes which often tend to compound the first factor by leaching nutrients and (3) the adverse effects of relatively poor drainage on plant growth and field management practices. These latter effects are primarily slow germination due to cold wet soil conditions and late seeding due to moisture. The present rates of application of barnyard manure are apparently insufficient to increase fertility to a satisfactory level. However the application

of nitrogen-phosphorous fertilizers would improve yields very substantially.

Stoniness is a problem of some seriousness in parts of this area where till occurs at or near the surface. Stones associated with the till may make cultivation difficult and occasionally impossible, without very high clearing costs.

Wind erosion on these soils, usually poorly aggregated with low organic matter contents, may be serious under certain conditions. Usually, however, wind erosion is curtailed by the frequent occurrence of forested areas.

Noxious plants such as wild oats and couch grass are not a serious problem according to the interviewed farmers. Whether this is true or whether the general attitude to field husbandry is such that they are not considered serious is open to considerable debate.

Economic problems of the cost and efficient use of farm machinery, the high cost of farm labour and generally the "cost-price squeeze" are present in this area. The discussion of these problems in the Whitemouth and Elma Sub-Regions applies equally well in this area.

There is a trend toward larger numbers of beef cattle in this area. It is clear, in the light of the previous discussion, that this trend is a good one, especially from the point of view of the best land use.

Another significant trend is that toward farm enlargement. As stated previously, such enlargement is largely in the form of rented land. This trend is also a healthy one as it will produce larger, more economic farm units.

The numbers of farmers engaged in non-farm work is increasing due, in part, to the increasing incidence of farm rentals and sales.

There is little or no new clearing of land because of poor drainage in the uncleared areas. The drainage, clearing and breaking of this land is a very expensive enterprise.

The Extension Service of the Manitoba Department of Agriculture and Conservation has recently, (May 1961) with the cooperation of several local farmers, set up a cooperative and trial plot for the production of small fruits, (strawberries to start) near Hadashville. This area was chosen for this project because (1) some local areas of soil are quite suitable for this use, (2) there is a good supply of labour available for the production of this demanding crop, (3) water for irrigation of the crop is easily obtained from the Whitemouth River and (4) probably because the Provincial Government is interested in establishing a money providing enterprise that will employ many people and hence help a large portion of the population in this none too prosperous area. Providing that this area is reasonably suitable for the consistent production of strawberries, and it is thought to be, then the success of this project will depend on the people of the area since markets are apparently available and will cause farmers in certain parts of the Hadashville Sub-Region to turn to agriculture again for their livelihood.

Hamlets of the Hadashville Sub-Region. Hadashville the largest hamlet of the sub-region has grown up in the plain on the west side of the Whitemouth River about twenty miles south of Whitemouth, at the site of the intersection of the Greater Winnipeg Water District Railroad and the road (now Provincial Trunk Highway 11) parallel to the Whitemouth River.

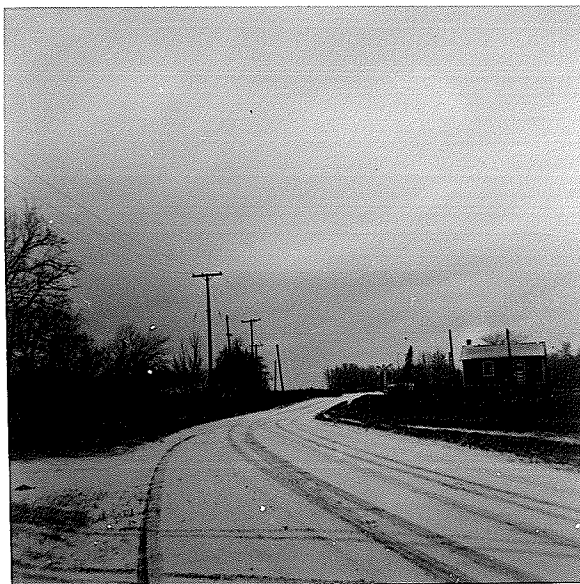
The morphology of Hadashville (Plate 5) has been fixed almost entirely by the road upon which it is centred. The businesses and dwellings are inter-mixed on both sides of the road, there being no other street.

Hadashville (population about 25) is almost entirely a service centre, (Figure 16). Hadashville is the site of the office of the Clerk of the Local Government District of Reynolds. The hinterland (Figure 17) with respect to gro-

Plate 22



Hadashville, from the south



McMunn, from the north

series of Hadashville is relatively large because of (1) the relatively well populated area surrounding it and (2) the presence of a hotel and the office of the Local Government District of Reynolds. The recent construction of the Trans Canada Highway, two miles to the south while providing excellent road communication with larger, centres such as Winnipeg and Kenora, has had very little effect on the retail trade of this centre. There is a possibility that Hadashville may migrate to the intersection of Provincial Trunk Highway 11 and the Trans Canada Highway or at least that another hamlet may grow up at this site, as shown by a forest ranger station and two service stations (one with a restaurant) found there. The machinery hinterland of Hadashville (Figure 18) is small due to the fact that this agency operates in competition with several in Whitemouth and one in Prawda.

Prawda like Hadashville, grew up in the belt of agricultural land adjacent to a trunk stream, in this case the Birch River. Its location was determined by a bridge over the Birch River and McKinley Station on the Greater Winnipeg Water District Railroad. However after the completion of the Trans Canada Highway the hamlet moved one-half mile south to the intersection of the road running parallel to the Birch River and the Trans Canada Highway in order to benefit from the trade given by persons using this route, also bringing it closer to McKinley Station.

Prawda is the second service centre of this sub-region, and has a population of about five persons (Figure 16). McKinley Station, one-half mile to the south, serves in the transportation of mail and cream from farms in the surrounding area. The grocery hinterland of Prawda (Figure 17) is small due to competition from Hadashville and the limited selection of goods offered. However Prawda does considerable trade with travellers on the Trans Canada Highway.

Thus an accurate picture cannot be given of this centre's hinterland because of its transient nature. The machinery hinterland of Prawda (Figure 18) is also small because it has a small settled area from which to draw and because it operates in competition with Hadashville and Whitemouth. Hadashville, the most serious competitor of the two as regards machinery sales, is far ahead of Prawda because its farms implement agency is old and well established whereas that at Prawda is relatively new and the brand of tractors sold at Hadashville are particularly popular for use in the extraction of pulpwood.

Similar to the other hamlets of the sub-region McMunn is at the site of the intersection of the Greater Winnipeg Water District Railroad and the road running parallel to the Birch River.

This hamlet of about twenty-five persons is primarily a service centre for a small area. Unlike Hadashville and Prawda, McMunn serves also as a place of residence (Figure 16). The grocery hinterland of McMunn is small because of the competition from Prawda and especially East Braintree, which is nearby. The Trans Canada Highway, a half mile north of the hamlet, while providing excellent road communication does not give any other benefits.

Winnipeg and Steinbach are service centres for a few persons in Townships 8 and 9 Range 12 E.P.M. by reason of the larger selection of goods, new stores, and perhaps lower prices, found in these centres (cf Winnipeg and Beausejour in this connection in the Whitemouth and Elma Sub-Regions).

The East Braintree Sub-Region

The agricultural land along the Birch River and Boggy Creek in Townships 7 and 8 Range 14 E.P.M. form this sub-region. It is about six miles in east-west extent and nearly three miles wide. However the areas of

cleared land occurring immediately adjacent to the streams, are only two or three hundred yards wide (Figure 30). East Braintree, the only trading centre of the area is in the northern part of Township 7 Range 14 E.P.M.

The few tributary channels are very short and very little entrenched. The East Braintree Sub-Region is a level to very gently sloping plain. Only near the banks of the trunk streams and the rock outcrop in the centre of the area does the land surface have any appreciable slope.

The native vegetation peripheral to this area is black spruce near McMunn and aspen, with occasional black spruce or jack pine, adjacent to other parts of the sub-region. Aspen shrub, with some willow, alder and rose, is usually found near the roads, traversing the cultivated lands. Mixed hardwoods (aspen, black poplar, elm and ash, with the occasional black spruce) occur along the banks of the trunk streams.

The first roads of the area were built on the relatively well drained and settled lands, adjacent to the trunk streams (Figure 30) connecting this area to the trading centres to the north. The well used part of the Dawson Trail west of the Whitemouth River in Township 7 Range 11 E.P.M. provided road communication with centres to the west such as Steinbach and Winnipeg. The fact that this area is surveyed into river lots has had absolutely no effect on the road pattern.

While the road network cannot be called extensive it adequately serves the people of the area due to the pattern and orientation of cultivated land and settlements. The roads of the sub-region are of sand and gravel due to the nature of the surface deposits and are generally only slightly graded. The few roads built of finer textured materials are nearly impassable in wet weather. The Trans Canada Highway is the only hard surface road in the sub-region.

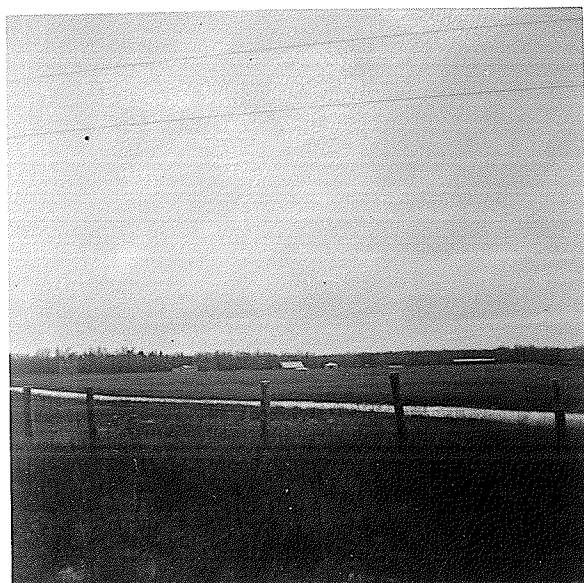
Plate 23



One of the poorer farmsteads in Township 7 Range 14 E.P.M.



A poorly drained sandy area near East Braintree. Note the black spruce bog in the background.



This area in Township 7 Range 14 E.P.M. is the largest single cultivated area in the East Braintree Sub-Region.

The East Braintree Sub-Region shows a dispersed form of settlement (Figure 30 and Plate 7). The farmsteads, almost without exception, are found close to the trunk streams for reasons previously discussed in the section on the Whitemouth Sub-Region. The Trans Canada Highway has had no effect on settlement because it passes through areas generally unattractive to settlement and because it is of quite recent construction. The fact that the area has been surveyed into river lots has no visible effects on settlement or land clearing because of the major importance of drainage provided by the trunk streams along which settlement has occurred.

There are very few drains of government construction in this area. Nearly all of the artificial drains are found in conjunction with graded roads, but most of these are shallow. The artificial drains do not contribute significantly to the overall drainage of the area because of their small number and because they do not form an integrated network.

Roadside ditches are grown up with grass and aspen scrub. Fences are well maintained only in the areas which are presently used. Cultivated lands are generally stone free. However areas of till soils occur adjacent to the cultivated areas. These stony areas are uncleared and may be used for pasture, if at all. The used fields are generally clean and well cultivated. The unused fields, often having peat a foot deep, have a rank growth of grasses and weeds. Abandoned farmsteads, of hewn log construction, often occupy these areas.

Farmsteads in the area are small and of poor aspect. A small frame house with outbuildings of hewn logs is typical of the sub-region. However, log houses do occur in a few farmsteads. The use of farmsteads as a place of residence only is common to those engaged in non-farm work. The barns in the farmsteads of the area are usually small, unpainted, although whitewashed

perhaps, and of log construction. These buildings are often in serious need of repair. Planted windbreaks, are rare in the sub-region, although most farmsteads are protected from the wind by an indiscriminate scattering of trees.

The East Braintree Sub-Region has a distinctly sub-marginal²⁹ appearance as regards the type of agricultural presently being practiced.

Distribution of population in the East Braintree Sub-Region is not uniform (Figure 9). While agriculture is not now important cleared areas vary with the degree to which it was important thus giving divergent values for cultivated acres per person in the two townships in the sub-region. And while there

TABLE XXVII

CULTIVATED AREA,* RURAL POPULATION** AND CULTIVATED ACRES
PER PERSON IN THE EAST BRAINTREE SUB-REGION

Township	Cultivated Area Acres	Rural Population	Cultivated Acres per Person	Average*** Total Farm Size
7-14	1360	56	24.3	215
8-14	438	46	9.5	238
TOTALS	1798	102	17.6	221

* Forest Inventory, Manitoba Forest Service.

** D.B.S. Census, 1956.

*** Based on a 33 per cent sample of farm interviews

are a few farms operated by old people in Township 7 Range 14 E.P.M. whose children have left the farm there are only younger people, usually with children, who derive their income from non-farm work in Township 8 Range 14 E.P.M.

Eastern Europeans form the main ethnic group in the East Braintree Sub-Region (Figure 10) and, except for log houses with steeply pitched roofs and the occasional "shadouf type" well, their presence is not reflected in the landscape.

²⁹ Land that, under present conditions of farm size and agriculture, will not provide its owner with a satisfactory living.

Other ethnic groups present are Anglo-Saxon (1), Scandinavian (2) and French (1). These ethnic groups are without significance in the economy of the area, regarding agriculture or non-farm work.

Agriculture in the East Braintree Sub-Region. The data presented in this section were obtained from seven farmers in the area and represents a 33 per cent sample.

Mixed farming is the only form of agriculture in this area, although there is no grain sold. Cattle and cream are the only products sold and are not sufficient to provide the farmers with suitable incomes. The most important sources of income are non-agricultural.

Land Use. The average 1960 land use on the farms in the East Braintree Sub-Region is given in the following table.

TABLE XXVIII*

LAND USE IN THE EAST BRAINTREE SUB-REGION								
Land Use	Wheat	Oats	Barley	Flax	Hay	Cleared Pasture	Summer-Fallow	Forest
Acres	1	6	0.7	0	52	10	21	151
% of Farm	0.1	2.6	0.3	0	21.2	2.4	8.8	62.3
Yields bu/a.	10	20	10	-	1.0**	-	-	-

*Data from farm interviews

**tons per acre

The average farm size is 221 acres. The large areas of forest are largely wasteland, although in a few cases some pulpwood may be extracted. The average useful area of these farms is thus only about eighty acres. All grain produced is used on the farms. The values given in Table XXVIII indicate that

agriculture is a secondary enterprise in the area.

The small areas of the farms in the various field crops shown in the table are a result of the concentration of the farmers' interest in non-farm work, and a general lack of money for the purchase of machinery, the clearing of land, the improvement of drainage and the improvement of soil fertility. However, even were money available, expenditures on machinery, clearing, fertilizers and drainage would not be economic for the present type of agriculture, in the present situation where returns from sub-marginal land would not justify the expense of making it productive agricultural land.

The relative importance of cattle and the comparatively large proportion of idle land have resulted in relatively large acreages of hay in the area. The areas of summerfallow are relatively large in this area due to low soil fertility, which the farmers expect to increase by nutrient release in the soil during the fallow year, and unfavourable conditions in 1959, which prevented fall ploughing.

Barnyard manure is applied in all available quantities to the cropped fields of this area. No commercial fertilizer is used however. The crop rotation scheme generally followed in this area is three years of hay, one year of wheat, one year of oats and one year of summerfallow. However, hay may be continued for more than three years in this rotation.

Physical conditions indicate that the low yields given in Table XX are to be expected. Attitudes to agriculture, expressed in poor field management practices, are a partial result of agriculture being a secondary source of income for the farmers in the area. Table XXVIII indicates the sub-marginal nature of the land.

Livestock. Table XXIX shows the proportion of farmers having cattle,

milk cows, pigs and poultry.

TABLE XXIX*

PROPORTION OF FARMERS OWNING VARIOUS TYPES OF LIVESTOCK IN
THE EAST BRAINTREE SUB-REGION

Type of Livestock	Cattle	Milk Cows	Pigs	Poultry
% of Farmers with each Type	57	57	43	43

*Data from farm interviews

These low values, considered in conjunction with the fact that livestock is the main source of income for these farms, indicates that agriculture is at an extremely low level in this area. Table XXX showing the average numbers per farm of the various types of livestock also indicates that agriculture does not support the persons living in this area.

TABLE XXX*

AVERAGE LIVESTOCK HOLDINGS PER FARM IN THE EAST BRAINTREE
SUB-REGION

Type	Cattle		Pigs	Poultry
	Total	Milk		
Av. Nos. per Farm	5.6	1.9	1.0	31

*Data from farm interviews

The values given for cattle in this table are not representative. Two farmers have fifteen cattle each while the remainder have none or one or two. The first two farmers are old and do relatively little non-farm work, having to rely on their farms for income while the others are engaged much more actively in non-farm work. The owners of the larger herds sell both cattle and cream, relying heavily on these sources. Skim milk is fed primarily to young stock. The

milk from the smaller herds of one or two head is used on the farm.

Pigs and poultry in this sub-region are kept exclusively for home use, the largest number owned by any one farmer being three and 110 respectively.

Farm Machinery. The following table showing machinery holdings indicates, to some degree at least, the sub-marginal status of agriculture in the area. Usually the tractor is the only relatively new piece of equipment and is often used primarily for pulp extraction.

TABLE XXXI

FARM MACHINERY HOLDINGS IN THE EAST BRAINTREE SUB-REGION							
Type	Tractors	Binders	Threshers	Swathers	Combines	Feed Mills	Hay Balers
% of Farmers with each type	100	70	14	0	0	28	0

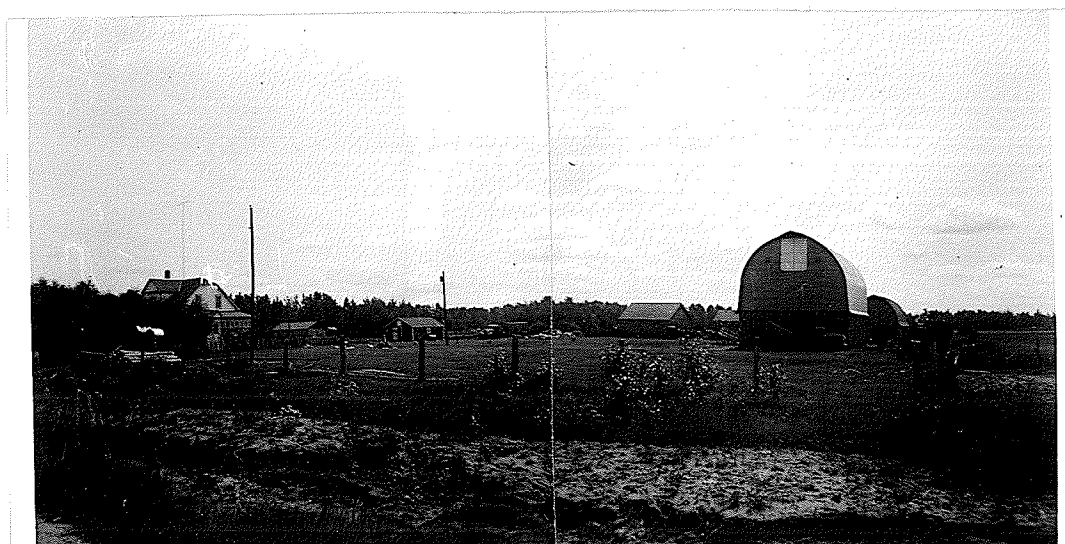
The low level of mechanization indicated by the values of Table XXXI is to be expected from the values given in Table XX. The growing of grains is so limited that required harvesting equipment is usually hired or borrowed.

Farm Income and Farm Types. The main sources of income for all farmers in the East Braintree Sub-Region are non-agricultural, indicating once more, that the farms do not provide satisfactory returns. The extraction of pulpwood provides the main income for 58 per cent of the farmers here, while construction (28 per cent) and the Manitoba Forest Service (14 per cent) are secondary sources. The average time spent in non-farm work is 6.4 months per year. This value is limited by the seasonal nature of the available work and would undoubtedly increase if employment of longer duration was obtainable. Generally agricultural enterprise is so insignificant that there is no adjustment, or need for

Plate 24



An abandoned farmstead south of East Braintree, on coarse textured deposits.



One of the better farmsteads in the East Braintree Sub-Region, in Township 7 Range 14 E.P.M. This farmstead was built up by the proceeds from non-farm work.

adjustment, between it and non-farm work.

The East Braintree Sub-Region is economically non-agricultural, and its very few farms differ widely in size and emphasis. The following example (Figure 26) is not typical nor is it the most active of the farms but rather one of the farms of greatest agricultural potential in the area.

Three hundred hens are the only livestock on this farm. The operator sold all his cattle, recently, claiming that greater returns are to be made from pulp extraction or construction work. Two tractors are the major pieces of farm machinery, others that may be required are borrowed or hired. Non-farm work is usually done during eight months of the year. This farmer, with such quantities of hay, can easily return to the raising of cattle.

Farm Size. The actual farm size (the cleared area of the farm) in this area is very small. It has not increased in the past twenty years nor is it likely to do so in the future. Farm abandonment in this area proportionately far exceeds that which has occurred in any other part of the Agricultural Region, because of very small areas of relatively well drained land and soils of low fertility. This area has at present reached a state where it essentially non-agricultural, especially in terms of income sources. It is probable that in the future all attempts at this type of land use presently practiced will be discontinued.

Agricultural Problems and Trends. The two most serious problems regarding agriculture in this sub-region are drainage and low soil fertility. Drainage is poor due to the lack of creeks tributary to the trunk streams and a high ground water table due to nearby bogs. However, the coarse textured surface deposits allow free internal drainage when the ground water table is sufficiently low.

Thus at a time when the ground water table is low, crops may suffer

The farm having the largest cleared area in the East Braintree Sub-Region.

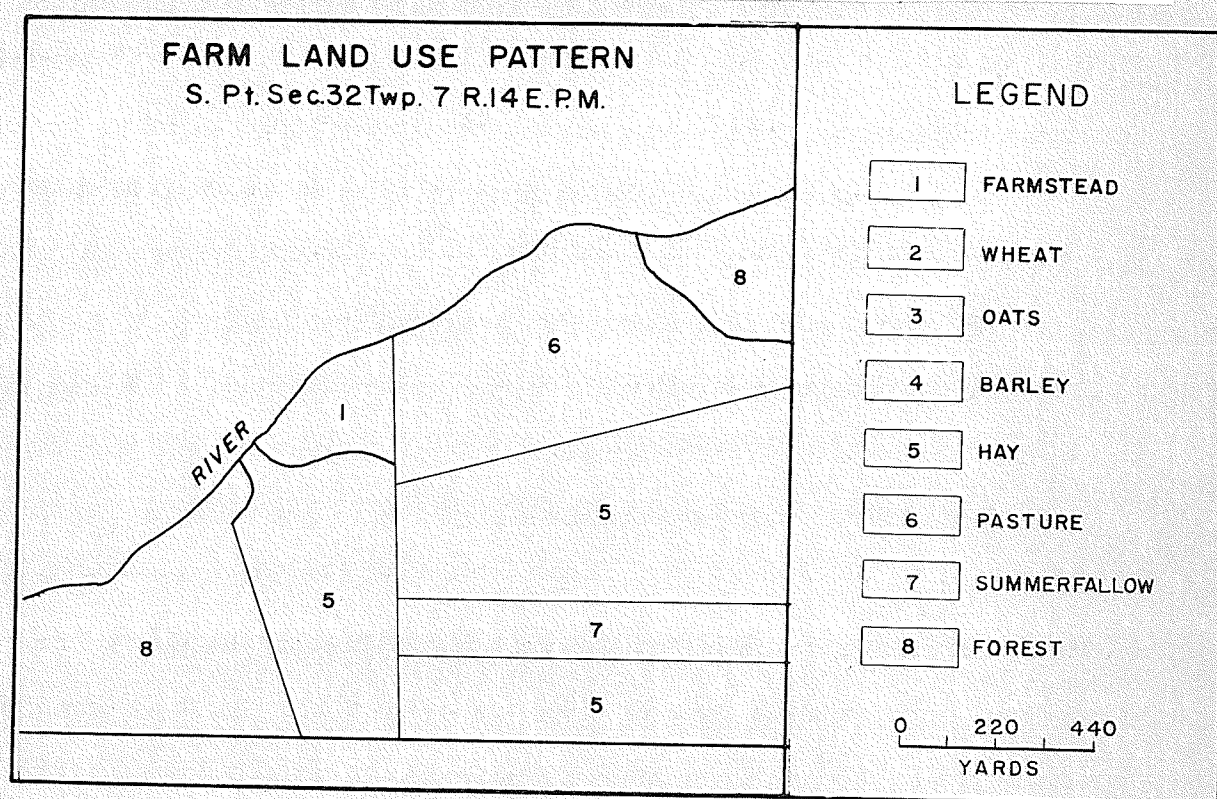


Figure 26

from drought because of the free internal drainage. The low level of soil fertility, shown clearly by the yields in Table XX, is a result of the coarse textured surface deposits of low cation exchange capacity and, poor drainage responsible for anaerobic conditions and relatively cold seed beds, which inhibits germination. The fact that the pedological processes acting in the imperfectly drained sites tends to produce a soil low in nitrogen and phosphorous is a secondary but contributing factor to the low fertility of some of these soils. The amounts of barnyard manure are not sufficient to bring the fertility of these soils up to a reasonable level.

Horseflies ("bulldogs") are a serious problem regarding livestock, in the early summer. Smudge fires and shelters must be provided to protect the animals from the insects.

The economic changes and problems regarding agriculture generally present on the Prairies are of little real moment here because of the insignificance of agriculture. According to the interviewed farmers there is only one trend operative in this area. This trend is to non-farm work and to decreasing amounts and importance of agriculture.

Hamlets of the East Braintree Sub-Region. East Braintree (Plate 7) the only hamlet of the sub-region, on Boggy Creek near the confluence of Boggy Creek and the Birch River, grew up at the site of the intersection of the road running parallel to the trunk streams and the Greater Winnipeg Water District Railroad.

The morphology of the hamlet has been largely determined by the road upon which it is centred. Businesses occupy positions on the only road near the railroad. The dwellings are built north and south of the businesses.

The main function of East Braintree (population about fifty persons) is

Plate 25



East Braintree, from the north

that of a service centre serving most of its sub-region. A considerable portion of the hamlet's population is engaged in non-agriculture enterprises not connected with the hamlet's services (Figure 16).

The hinterland (groceries) of East Braintree, limited to the small surrounding agricultural area, is very small (Figure 17). Except for providing excellent road communications, the Trans Canada Highway, a mile to the north, does not provide any other appreciable benefits.

Comparative Geography of the Sub-Regions of the Agricultural Region

In this section an attempt is made to compare various features of the four sub-regions. These comparisons are made under the sub-heading used in the discussions of the sub-regions to facilitate cross reference.

Landscape. Generally, the road network is the same through the whole region. However the basic, original system of two roads, one on either side of the trunk streams, leading to the railroads and service centres, has been increased by the building of hard surface highways, and secondary roads on the road allowances of the sectional survey in the Whitemouth and Elma Sub-Regions. The remainder of the Region is relatively unchanged. This is of course, due to differences in size of populated areas, which in turn is largely determined by the nature of the land in the sub-regions.

Similarly, settlement patterns are basically the same throughout the Region. Only in the Whitemouth and Elma Sub-Regions is the area of cultivated land sufficiently large to permit settlement any appreciable distance away from the trunk streams. In these areas the land survey system has influenced settlement.

The quality of the farmsteads, the areas of cultivated land, the fineness of the surface deposits, the areas of relatively well drained soils and the returns from agriculture all decrease in approximate correlation between the Whitemouth

and East Braintree Sub-Regions.

Agriculture. The discussions of agriculture for each of the sub-regions has shown that the product emphases are nearly identical throughout the Agricultural Region except for the few Mennonite poultry farmers in the Whitemouth and Elma Sub-Regions. The differences in agriculture between the four sub-regions is then a matter of degree and quality. For example, the areas of cultivated land per farm decreases between each sub-region from north to south. Accordingly, the area of land under any crop except hay decreases in a similar manner. Also the crop yields experienced in the sub-regions decreases between the Whitemouth and East Braintree Sub-Regions. Thus, the type of farming is largely the same throughout the Agricultural Region, while the quantities of crops and the yields of these crops decrease from north to south, giving decreasing returns from agriculture.

The present type of farming, reasonably well suited to the Agricultural Region, was developed by trial and error at a time when subsistence agriculture was made necessary by lack of money and small areas of cleared land. As the areas of cultivated land and numbers of livestock increased more of the products became available for sale, until the present state was reached where there is primarily commercial mixed farming with a livestock emphasis.

Land Use. A comparison of Tables VI, XIV, XIX and XXVIII indicates a decline in the importance of wheat, oats and barley from north to south, but especially in Hadashville and East Braintree Sub-Regions where surface textures are moderately coarse and areas of relatively well drained soils are small. This decline is reflected equally well by the proportion of the farms in forest and for the same reasons.

The proportion of farmland in hay is similar throughout the Agricultural

Region. However, as stated previously, significant proportions of the hay in the Hadashville and East Braintree Sub-Regions is unused, whereas all the hay available in the Whitemouth and Elma Sub-Regions is used, indicating a decline in "real" hay proportions from north to south. This decline is not so much attributable to less favourable physical conditions for the growth of hay as it is to physical conditions less favourable for the growth of grain, and the general operation of a mixed farm.

The proportion of farm land in cleared pasture is a function of the number of cattle on the farm. In the north where milk contracts have been let cattle are numerous and the amounts of non-farm work done is small. In the south however the numbers of cattle on the farms is low because of the large amounts of non-farm work done by the farmers of the areas, and because the grain grown on the farms is insufficient for large numbers of cattle, no grain being bought for the cattle.

The proportion of farm land in summerfallow shown for the various sub-regions is a reflection of the soil fertility and the numbers of livestock present to provide barnyard manure and to make economic a rotation scheme in which hay is dominant.

The tables relating to land use generally indicate the correspondence between drainage density values, soil texture and fertility, grain yields and the prominence of grains in the mixed farms of the various sub-regions.

Livestock. A comparison of tables VIII, XV, XXII and XXX shows a general decrease in the numbers of cattle and milk cows per farm from north to south. Once again this decrease follows the decline in the quality of mixed farming enterprise, discussed previously. Cattle holdings in the Whitemouth Sub-Region have been greatly encouraged over those in the other sub-regions by the milk contracts let in that area. In addition, the larger areas of cleared land in the

Whitemouth and Elma Sub-Regions make it easier to own herds of economic size. The smaller areas of cleared land in Hadashville and East Braintree Sub-Regions inhibit the presence or development of economic livestock holdings and at the same time encourage farmers to engage in non-farm work. Generally farmers spending long periods in non-farm work are not inclined to keep sizable herds. Pigs are generally of little importance in the Agricultural Region, being kept largely for home use. Poultry are likewise unimportant except for the few Mennonite poultry farms in the Whitemouth and Elma Sub-Regions.

Farm Machinery. A comparison of tables X, XVI, XXIV and XXXI indicates that farms in the Whitemouth Sub-Region are the most highly mechanized. South of this mechanization decreases while the incidence of older machinery (binders and threshers) increases. Machinery holdings appear to indicate generally less successful mixed farms to the south of the Whitemouth Sub-Region. However, this criterion is unreliable because it may not represent the status of farming economy but rather amounts of money earned from non-farm work spent on machinery.

Farm Income. Tables XI, XVII and XXV indicate again that, as a source of income, agriculture decreases in importance from north to south, due as before to the changes in the land. Dairying provides the main agricultural income in the three northern sub-regions. The land of the Agricultural Region is best suited to the production of forage crops and feed grains and hence promotes cattle to the position of being the main source of income.

Beef cattle in the Whitemouth, Hadashville and East Braintree Sub-Regions are not of major importance. The lack of importance is due, in part at least, to the fact that the income from milk or cream sales is largely absent

with beef cattle. However, the larger value for beef in the Elma Sub-Region (found in conjunction with a relatively heavy grain emphasis) may be explained on the basis that while milk contracts are not available the farms are of sufficient size and quality to provide a reasonable income from beef or grain. The land of the Hadashville Sub-Region is marginal, or perhaps slightly better making non-farm work almost essential. The non-farm work (pulp extraction) done by the farmers of this area is not so incompatible with dairy cattle, as some type of work done to the north. In addition these farmers have relatively few cows to milk.

Grain is generally of little significance as a main source of income in the Agricultural Region. Only in the Elma Sub-Region is grain important. As mentioned previously this grain emphasis is found in conjunction with a beef emphasis and non-farm work. Poultry is significant only in the Elma Sub-Region where the presence of a particular ethnic group (Mennonites) explains the specialization.

Agricultural Problems. The main agricultural problem throughout the Agricultural Region is drainage. This problem becomes more serious from north to south. Problems of soil fertility are present throughout the area. Deficiency of nitrogen and phosphorous are typical of these soils. This problem is compounded by the relatively coarse textured deposits of the Hadashville and East Braintree Sub-Regions. Economic problems of agriculture common to the Prairies are less serious in the Agriculture Region of the Whitemouth Valley, especially in the Hadashville and East Braintree Sub-Regions where non-farm work is of major importance. The Whitemouth and Elma Sub-Regions, where 64 per cent and 41 per cent respectively, derive their main income from cattle or dairy products are economically stable, especially compared to areas of grain emphasis.

Villages and Hamlets

The sites of most of the villages and hamlets (Whitemouth, Elma, Hadashville, McMunn and East Braintree) were determined by the crossing of rail, road and, to a very slight extent in the case of Whitemouth, water communications. Upper Seven Sisters Falls, River Hills and Prawda have sites that were determined largely by roads and bridging points on the trunk streams.

The functions of these centres are generally the same. However, Whitemouth and Elma have more services than the other centres because of their size and location in the better lands of the Agricultural Region. For example both of these villages have grain elevators.

The morphology of Whitemouth and Elma are generally the same, both showing the influence of rail and road communications. The other centres, too small to show any distinctive morphology, are a heterogeneous mixture of buildings of various functions.

While the grocery hinterlands for these centres are quite discrete and quite limited the machinery hinterland of Whitemouth includes most of the Agricultural Region, except in the south where the hinterlands of Hadashville and Prawda make inroads on it.

CHAPTER IV

Conclusions to the Regional Geography of the Whitemouth Valley

Agriculture of the Whitemouth Valley in perspective

In this section an attempt is made to put the Agricultural Region of the valley into perspective with the agriculture of Manitoba, as a whole. If such an attempt is not to be a complete study unto itself in comparative geography, it must be done in a general way. This general approach does not purport to supply basic data for either the Whitemouth Valley or Manitoba, but rather to evaluate agriculture in the valley generally in terms of an arbitrary standard, agriculture in Manitoba. Choropleth maps contained in the Economic Atlas of Manitoba,¹ are the basis of this comparison.

The Agricultural Region of the Whitemouth Valley forms part of the mixed farming area lying along the northern and eastern boundaries of the main agricultural area of Manitoba.² This belt of mixed farms is broken by the beef raising area around Lake Manitoba and the area of mixed grain farms of the Swan River Valley in the northwest. Like most of this belt, the Agricultural Region is an area where the income from livestock exceeds that from grain, but does not exceed 70 per cent of the farm's gross income. This area of mixed farming, with livestock emphasis, is small in terms of the areas of (1) mixed farming with a grain emphasis, (2) wheat farms and (3) mixed grain farms.

Land Use. Between 30 and 50 per cent of the farmland of the Agricultural Region is under crops.³ This value is the same as the values given for areas

¹Economic Atlas of Manitoba, T.R. Weir, editor, Manitoba, Dept. of Industry and Commerce, Winnipeg 1960. pp. 41-51.

²Ibid., p. 41, plate 18.

³Ibid. p. 43 plate 19E

southwest of a line between Lake Dauphin and Morden. Values for the Red River Plain are much higher (60 to 80 per cent) while those of the Interlake and West-lake areas are lower (0 to 30 per cent). The former is high due to the high incidence of grains and special crops while the latter is low due to the fact that it is a beef raising area with large areas of natural pasture.

In terms of acreages of the four main field crops of Manitoba⁴ (wheat, oats, barley and flax) the Agricultural Region occupies a relatively low position. The proportions of farmland under wheat in the Agricultural Region are moderately low (8 to 24 per cent) compared to those (32 per cent) for large areas in the Red River Plain, South Central and South Western Manitoba. On the other hand, the values for the Agricultural Region are well above those given for the Western Interlake area (less than 16 per cent). The values given for oats in the Agricultural Region are medium to moderately high (24 to 32 per cent), generally similar to those in other mixed farming areas of Manitoba. Usually areas with the highest proportions of oats are those concerned with beef raising. Provincial values for barley (16 to 24 per cent) far exceed those of the Whitemouth Valley. The proportion of land in crops under flax in the Whitemouth Valley (less than 8 per cent) are similar to those throughout Manitoba except for the single large block, along the southern boundary of the province between Winnipeg and the Manitoba - Saskatchewan boundary, where values are much higher (16 to 40 per cent) than those of the Whitemouth Valley.

Thus, the Whitemouth Valley has low proportions of cropped land in the four main field crops, indicating that direct income from this source is below the provincial average and is perhaps the lowest in the province.

⁴Ibid. p. 45 plates 20 A, B, C, D.

Livestock. Generally, the Whitemouth Valley occupies a medium position as regards gross income from livestock in Manitoba. In the Whitemouth Valley the gross income from beef is (\$ 2 to 3 per acre of farmland) considerably below the average for Manitoba.⁵ On the other hand, the gross returns per acre of farmland from dairy cattle (\$ 3 to 5 per acre) in the Whitemouth Valley are well above most of Manitoba (less than \$2 per acre), exceeded only by the Ste Anne area (above \$5 per acre), also in the Winnipeg daily milkshed.⁶ As regards gross income per acre of farmland from poultry,⁷ Whitemouth Municipality is well above most of Manitoba (\$ 1 to 3 per acre) and is exceeded only by the areas of maximum concentration in the Municipalities of Hanover and Ste Anne (above \$3 per acre). The values for the Local Government District of Reynolds are quite low and are similar to the values representative over most of Manitoba. The gross returns per acre of farmland from hogs⁸ are moderately low (\$.25 to .50 per acre) compared to most of Manitoba. Only the Interlake and West lake areas have lower values (less than \$.25 per acre). The heaviest concentrations of hogs are found in the Red River Plain and the Swan River Valley, where the gross returns per acre (above \$1.50 per acre) far exceed those of the Whitemouth Valley.

Thus, relative to Manitoba, the Whitemouth Valley occupies a moderately low position as regards gross returns from livestock per farm acre. Similarly, the value of livestock per farm⁹ in the Whitemouth Valley is among the lowest (less than \$2000 per farm) of the province. However the value of livestock per acre of land in farms¹⁰ in the Whitemouth Valley is quite high (\$9 to 12 per acre).

⁵Ibid. p. 47, plate 21 A.

⁶Ibid. p. 47, plate 21 B.

⁷Ibid. p. 47, plate 21 E.

⁸Ibid. p. 47, plate 21 F.

⁹Ibid. p. 49, plate 22 C.

¹⁰Ibid. p. 49, plate 22 D.

These criteria indicate the farms in the Whitemouth Valley are small and that perhaps this is one main reasons for the generally low incomes prevalent in the area.

Farm Machinery. The value of machinery per farm¹¹ in the Whitemouth Valley is low (\$2000 to 3000 per farm), but it is typical of the mixed farming area peripheral to the main agricultural area of Manitoba from Lake Manitoba to the International Boundary. However, the value of machinery per acre of farmland¹² in the Whitemouth Valley is moderately high (\$12 to 18 per acre) compared to the values given for most of Manitoba. Thus, the farms of the Whitemouth Valley are not highly mechanized, but in terms of value of machinery per acre they are highly mechanized, once more indicating that many of the farms of the Whitemouth Valley are not economic units.

Non-Farm Work. The average number of days that farm operators are engaged in non-farm work¹³ in the Whitemouth Valley are among the highest in Manitoba (40 to 80 days per year). Only in the northern part of the Red River Plain does non-farm work reach the level of that in the Whitemouth Valley. The high values given for non-farm work in the Whitemouth Valley indicate the inadequacy of many farms in that area to provide suitable returns to their operators.

General Economic Situation. The average value of farms¹⁴ (based on the total of land, buildings, machinery and livestock) in the Whitemouth Valley is low (less than \$12,000 per farm) compared to the values given to farms in the main block of agricultural land in Manitoba (\$16 to 24,000 per farm).

Less than 80 per cent of the farms in the Whitemouth Valley are commercial.^{15,16}

¹¹Ibid. p. 51, plate 23 A.

¹²Ibid. p. 51, plate 23 B.

¹³Ibid. p. 51, plate 23 F.

¹⁴Ibid. p. 49, plate 22 A

¹⁵Ibid. p. 51, plate 23 E.

¹⁶Commercial farms are those with a gross income of \$1200 and over.

This lowest category is shared only by some parts of the Interlake and Westlake areas and by the northern part of the Red River Plain. The average gross income per farm¹⁷ is one to two thousand dollars and under one thousand dollars in the Municipality of Whitemouth and the Local Government District of Reynolds, respectively. These values are well below those given for most of Manitoba (\$4-5000 and above per farm) but are typical of the belt of mixed farms around the periphery of the main block of agricultural land of Manitoba. However, the average gross income per acre¹⁸ for the Municipality of Whitemouth and the Local Government District of Reynolds is eight to ten dollars and four to six dollars respectively. In terms of the rest of Manitoba (\$8 to 14 and above per acre) the value given for L.G.D. Reynolds is low while the value for the Municipality of Whitemouth is medium. These criteria indicate that for the Municipality of Whitemouth, at least, the low gross income per farm is due to the small farms rather than to the inherent characteristics of the land or its population.

Recommended Changes. The following changes are recommended as means by which the income of the farms of the Whitemouth Valley may be raised.

1. Increase of farm size. This may be done in the Municipality of Whitemouth by draining land with organic deposits over fine to moderately fine textured mineral deposits. South of the municipality in the Local Government District of Reynolds deposits are much coarser and not so well suited to arable culture. However, organic soils may be drained, cleared and used for pasture, thus increasing farm size. These suggestions are probably not economically

¹⁷ Economic Atlas of Manitoba, op. cit., p. 51, plate 23 C.

¹⁸ Ibid. p. 51, plate 23 D.

feasible because of the relatively small demand for land and the high cost of drainage.

2. Change of Product Emphasis. The product emphasis in the Whitemouth Sub-Region is one which, in conjunction with milk contracts, makes this area the most prosperous of the Whitemouth Valley. The product emphasis is well suited to the land of the area. However, while the product emphasis of the remainder of the Agricultural Region is moderately well suited to the area the quantities of grains grown should be decreased to allow a greater emphasis on beef or dairy production. This change should allow the farmer to decrease expenditures on farm machinery. If at all possible, the production of small fruits and vegetables should be carried to its ultimate limit. These crops will greatly increase the "effective" farm size.

3. Change of field management practices. The use of commercial fertilizers would increase yields substantially, tending to increase "effective" farm size. The Agricultural Region would doubtless benefit from increased control of weeds such as couch grass and wildoats.

Generally, these changes are slowly being made in the Whitemouth Valley. Farm size however is being increased by farm sales and rentals rather than by any extensive drainage programs. (See Tables XII and XXVI).

Recommended Studies. It is suggested that a study be made of present forest extraction in the Whitemouth Valley. Such a study of forest land use would include a detailed investigation of the relationships between forest harvests and soil types. In addition, a study of the labour force engaged in forest extraction would complete the study by setting the forests into their proper context, which is human use.

Further, it is suggested that a study in historical comparative geography of the Whitemouth Valley be made to show and interpret the transition from the pure extraction of forest products in the latter part of the last century to the present economy in which both mixed farming, with a livestock emphasis, and forest extraction are significant.

General Conclusions. The following section deals with general conclusions deduced from this study of the Whitemouth Valley.

The drainage channels of the Whitemouth System appear to have had a very strong influence on the landscape of the Whitemouth Valley, especially along the lower reaches of the stream, where the areas of moderately well and imperfectly drained soils and the areas of cultivated land are found to be in close correlation with drainage density values, because of the essential nature of drainage. The agriculture of the Whitemouth Valley, measured by farmsteads, crop acreages, crop yields and livestock holdings, also appears to bear a close relationship to drainage density values and texture of surface deposits which happen to follow the same general trend as the drainage density values.

In areas of the Whitemouth Valley where land and holdings are not of sufficient quality and size, respectively, to provide reasonable incomes, as many as 100 per cent of the farm operators turn to non-farm work, usually pulp extraction. The turning to the forests for additional income is not a new or a "stop-gap" measure. Forest extraction in these areas is as typical and long term as is the practice of arable culture itself, and while this combination may not be desirable, it is necessary.

As in most rural areas of the Prairies the population of the valley is decreasing. The population of the area reached a maximum of 3879¹⁹ in the

¹⁹D.B.S. Census 1901-1956.

1930's and remained relatively unchanged until the outbreak of World War II when rural depopulation began. The major part of this depopulation occurred between 1941 and 1951, during which period the total population decreased by 25 per cent. The high rate of emigration has decreased very substantially so that there was only a 6 per cent decrease in the period 1951 to 1956.

This decrease has occurred in conjunction with increased mechanization and the formation of larger, more economic farm units, as well as the greater availability of non-farm work, in fact, in conjunction with all of the general factors influencing rural depopulation on the western plains.

Until recently the Agricultural Region has for the most part been relatively isolated from Manitoba's main populated area. It has developed an economy which changes emphasis with changes in the economy of the Prairies. Farmers in all parts of this area, except the Whitemouth and parts of the Elma Sub-Regions, engaged in all available non-farm work. When non-farm work becomes scarce these people turn to their farms for a living. Thus these people are as self-sufficient as is possible, as shown by the general reluctance of the farmers to sell their land, except at very high prices.

Writers and government agencies have included this area in a "Pioneer Fringe" which borders the main areas of cultivated land of the Prairies.²⁰ W.A. Mackintosh²¹ states:

"a region is economically at a pioneer stage when its population in relation to its resources is obviously below the optimum made possible by mature techniques (industrial arts of mature economies) available to it".

This statement no longer applies to the Agricultural Region of the Whitemouth

²⁰Putnam, et. al. Canadian Regions. Toronto, Dent. 1954, p. 377

²¹W.A. Mackintosh, "Some Aspects of Pioneer Economy", Canadian Journal of Economics and Political Science, Vol. II, p. 457, 1936.

Valley. Generally, this area has reached, or at least approximated as closely as most areas of Manitoba, a state of equilibrium, as is to be expected of an area that has been settled for at least forty-five years.

This area is not pioneer in terms of spirit, agriculture or income because (1) a definite land use program is well established, (2) definite livestock holdings have been established, (3) definite and quasi-permanent sources of income have been established, (4) the area is well served with roads, electric power and telephones, (5) the amount of cleared land has been nearly constant for the past twenty years and (6) most of the area has been undergoing depopulation for at least twenty years.

Future Development. Generally, it is probable that this area will follow, as it has in the past, the general trends in agriculture and economy that prevail throughout the Prairies. It is expected that farm numbers will decrease while farm size increases. Little increase in farm size is likely to result from the claiming of presently non-arable land because of the high costs involved. Probably the largest change will be caused by the initiation of small fruits and vegetables as cash crops. If these crops are managed satisfactorily by the farmers of the area, and if physical conditions are as favourable as they are thought to be at present such a program will probably increase the income, and perhaps the population of the areas turning to the production of these crops.

The impact of the town, of at least ten thousand persons associated with the Manitoba Nuclear Research Station, being constructed five or six miles from Seven Sisters Falls will probably not be especially noticeable because any demand for agricultural produce will be shared with the Lac du Bonnet agricultural area and with Winnipeg and Beausejour because of the good road communications with these points. It is very unlikely that this large town would have any good

effect on the villages of the Whitemouth Valley because of their limited size and number of services offered. Indeed, it is more likely that the new town will draw many persons from the Whitemouth Valley to it, thus making inroads on the sales of its merchants.

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APPENDIX I

Native Vegetation¹

Jack pine (*Pinus banksiana* Lamb). On good sites in closed stands this tree is ordinarily forty to fifty feet tall and eight to twelve inches in diameter with a narrow open crown. The root system is moderately deep. It grows in pure stands on poor soils and in pure stands or mixed with black spruce, the aspens and white birch on dry, deep sandy soils. Rarely is it found on moist or wet sites. It is very important as a lumber producer. The wood takes creosote well and is used extensively for railway ties, poles and in the manufacture of kraft pulp.

Tamarack (*Larix laricina* (Du Roi) K. Koch). This is a medium sized tree, sixty to seventy feet tall, one to two feet in diameter. In dense stands the crown is narrowly pyramidal in outline. The root system is shallow and spreading, especially in bogs. This species is confined chiefly to bogs and swamps growing with balsam fir, black spruce and cedar, rarely forming pure stands of any extent. Tamarack is the heaviest and strongest of the soft-woods of this area. It is resistant to decay and for that reason is suitable for railway ties, posts and telegraph poles.

Black spruce (*Picea Mariana* (Mill) BSP). This is a small, slow growing tree, thirty to fifty feet tall and six to ten inches in diameter. Young trees develop narrow symmetrical crown of short slender mostly horizontal spreading branches. On wet sites the root system is a shallow compact mass of many rootlets spreading just below the surface. Roots go deeper on well drained sites and the tree is then quite wind firm. Confined mostly to sphagnum bogs and the

¹Native Trees of Canada. Canada, Department Northern Affairs and Natural Resources, Forestry Branch. Bulletin 61 - fifth edition, Ottawa, 1956.

margins of swamps, it grows in pure stands or in mixture with white spruce balsam fir, jack pine, tamarack, white birch and trembling aspen. Black spruce is especially valued for pulpwood, not being used for saw timber to the same extent as other spruces because of the small sizes attained. It is also used for mine timbers etc.

Balsam fir (*Abies balsamea* (L.) Mill). This tree attains medium size of fifty to seventy feet tall, one to two feet in diameter. The crown of slender regularly whorled branches is dense and spire shaped. The root system is usually a shallow mat of spreading lateral roots. Only rarely is the tree more than moderately wind firm. It is found in pure stands or mixed with black and white spruce, tamarack, aspens and white birch. Adapted to a wide variety of sites, from cold swamps to high rocky mountain sides it makes best growth on moist well drained loams. Balsam fir, though slightly inferior in quality and strength to the spruces is a valuable commercial species used extensively for pulp and lumber. As a rule it is sold mixed with spruce.

Eastern White Cedar (*Thuja occidentalis* L.). This is a small tree about forty-five feet tall and one foot in diameter. The trunk is much tapered and frequently twisted. Its crown is conical, dense, long and narrow. The root system is shallow as is the case with other species found in swamps and similar wet sites. Cedar grows in pure stands of considerable size or in mixtures of spruce, balsam fir, tamarack, speckled alder and white elm. The wood is the lightest in weight of the Canadian timbers and is one of the most resistant to decay. It is particularly valuable for poles, posts, shingles etc. and in fact in any situation where timber is exposed to decay without great mechanical wear.

Trembling Aspen (*Populus tremuloides* Michx). This is not a large tree, being about forty feet tall and eight to ten inches in diameter. The trunk is slender,

of gradual taper and extends almost to the top of the tree. The crown is of moderately stout, ascending branches and is round topped and open. The tree is supported by a shallow system of widely spread lateral roots. It grows best on well drained loam but occurs on a wide variety of soils. It is intolerant of dense shade and occurs most frequently in pure stands or mixed with other light demanding species such as white birch and balsam poplar. Like all poplars trembling aspen reproduces easily and quickly with the result that it comes in very rapidly on new burns. The wood is used for veneer, matches and boxes and in the manufacture of excelsior and pulp, especially soda pulp.

Balsam poplar (*Populus balsamifera* L.). This tree is of medium size, fifty to sixty feet tall and one to two feet thick. It has a long cylindrical trunk and a narrow open crown composed of a few stout mostly ascending limbs. The root system is usually shallow. For the most part it is confined to rich moist soils such as the banks of streams and bottom lands. It occurs in pure stands or mixed with willow, alder, white birch, balsam fir and black and white spruces. This tree is very intolerant of shade. The wood is used for lumber, veneer, excelsior, pulp and fuel wood.

Willow (*Salix* L.). This species is a large shrub or small half-shrubby tree occurring for the most part in thickets along the banks of streams and on low wet places. The wood is light and soft with considerable toughness and shrink resistance for its weight. It is used for artificial limbs.

White Birch (*Betula papyrifera* Marsh). This tree is of medium size, up to eighty feet tall and two feet in diameter. In the forest the trunk is long and clear and the crown is large, irregular and made of many stout limbs and ascending branches. The root system is usually rather shallow. This tree occurs on a very wide variety of sites and soils in pure stands or mixed with black spruce,

balsam fir and the aspens. The wood may be sawn into lumber. Large quantities are used for fuel wood. Industrial uses are limited to spoolwood, plywood and small turnery.

Speckled Alder (*Alnus rugosa* (Du Roi) Spreng var. *americana* (Regel) Fern.). This species is a low, crooked, often declining shrub six to fifteen feet high and three or four inches in diameter which grows in clumps of many stems which branch off close to the ground. The fibrous roots rarely penetrate far into the soil. It is commonly found in thickets along streams and in swamps. The best growth is made on wet but well drained sandy or gravelly soil. It is not tolerant of shade. There are no commercial uses of this species but it does serve a useful purpose in checking the rush of water during spring floods.

The following is a list of species that occur only locally or in limited quantities:

- Eastern white pine (*Pinus strobus* L.)
- Canadian red pine (*Pinus resinosa* Ait.)
- White spruce (*Picea glauca* (Moench.) Voss.)
- Large tooth aspen (*Populus grandidentata* Michx.)
- Eastern Cottonwood (*Populus deltoides* Bartr.)
- Ironwood (*Ostrya virginiana* (Mill.) K. Koch)
- Water Birch (*Betula occidentalis* Hook)
- Bur Oak (*Quercus macrocarpa* Michx.)
- White Elm (*Ulmus americana* L.)
- Showy mountain ash (*Sorbus decora* (Sarg.) Schneid.)
- American Mountain ash (*Sorbus americana* Marsh.)
- Pin Cherry (*Prunus pensylvanica* L.f.)
- Choke Cherry (*Prunus virginiana* L.)

Canada Plum (*Prunus nigra* Ait.)

Wild plum (*Prunus americana* Marsh.)

Mountain maple (*Acer spicatum* Lam.)

Manitoba maple (*Acer Negundo* L.)

Black Ash (*Fraxinus nigra* Marsh.)

Red Ash (*Fraxinus pennsylvanica* Marsh.)

Green Ash (*Fraxinus pennsylvanica* Marsh. var. *lanceolata*
(Borkh.) Sarg.)

APPENDIX II

Descriptions of soil profiles¹

These profiles are grouped according to areas of surface deposits as given on the map of Broad Soil Associations (Figure 8). The profiles here listed are typical of each of these areas.

The Area of End Moraine in the Southwest

Sandilands Series. This series consists of well to somewhat excessively drained Minimal Podzol soils developed on fine to medium sandy morainic till, lacustrine, outwash and aeolian deposits. The profiles of this series are characterized by L-H, Aej, Bfj, and C horizon sequences with weakly developed colour differences in the B horizon.

Profile Description

Sandilands Fine Sand (virgin site SW1/4-28-5-10 E.P.M.)

L-H: 1-0 inches, very dark brown partially to well decomposed leaf, herb and grass litter, medium acid in reaction.

Ahe: 0-1 inches, very dark greyish brown fine sand, grey when dry; loose; medium acid in reaction.

Aej 1: 1-3 inches, dark yellowish brown to yellowish brown fine sand, brown to pale brown when dry; loose; strongly acid in reaction.

Aej 2: 3-8 inches, light yellowish brown fine sand; very pale brown when dry; loose; strongly acid in reaction.

Aej 3: 9-13 inches, greyish brown to yellowish brown fine sand, light brownish grey to very pale brown when dry; loose; strongly acid in reaction.

¹These descriptions are from the preliminary field notes of Whitemouth-Piney Map Sheet Areas and were obtained through the courtesy of R.E. Smith, of the Manitoba Soil Survey.

Bfj: 13-18 inches, yellowish brown to brownish yellow fine sand, pale brown to very pale brown when dry; loose to weakly cemented when dry; medium acid in reaction.

C1: 18-37 inches, pale brown to brownish yellow stratified fine to medium sand, pale brown to yellow when dry; loose; medium to slightly acid in reaction.

C2: 37 inches plus, pale brown to light grey, stratified fine to medium sand, very pale brown to light grey when dry; loose; mildly to moderately alkaline in reaction, effervesces with dilute HCl.

Topography: smooth level to undulating sandy morainic, outwash, lacustrine and aeolian deposits.

Drainage: well to excessively drained, run off is nil, internal percolation is very rapid, ground water tables are absent.

Vegetation: jack pine forest and associated vegetation.

Major Uses: forestry, this soil is a fair growth site for jack pine and red pine.

Pine Ridge Series

This series consists of well drained or Orthic Grey Wooded soils developed on slightly to moderately calcareous fine to medium sand which may contain thin lenses of coarse sand and gravel.

Profile Description

Pine Ridge Sand (virgin site SE 1/4 17-2-11 E.P.M.)

L-H: 1-0 inches, partially to well decomposed needles, twigs, bark and grasses.

Ahe: 0-1 inches, dark yellowish brown sand, structureless, loose when moist, loose when dry, slightly acid in reaction.

Ae: 1-8 inches, pale brown sand, light brownish grey when dry, structureless; loose when dry, loose when wet, medium acid in reaction.

Bt: 8-12 inches, yellowish brown coarse sand, light yellowish brown when dry, weak fine crumb structure, friable when moist, soft when dry, strongly acid in reaction.

Bc: 12-18 inches, yellowish brown sand, brownish yellow when dry, structureless, loose when dry, loose when moist, medium acid in reaction.

C₁: 18-22 inches, pale brown sand, very pale brown when dry, structureless, loose when dry, loose when moist, mildly alkaline in reaction, effervesces with dilute HCl.

C₂: 22 inches plus, light grey sand, white when dry, structureless, loose when dry and moist, mildly alkaline in reaction, effervesces with dilute HCl.

Topography: nearly level to irregular gently sloping lacustrine, deltaic, sandy beach, outwash and sandy end morainic deposits.

Drainage: moderately well to excessively drained, run off is nil, internal drainage is rapid, ground water table is absent in well to excessively drained sites and may occur near the surface for a short period in early spring in moderately well drained sites.

Vegetation: Pure stands of jack pine in well to excessively drained sites and tall shrub.

Major Uses: forestry, this soil provides fair growth sites for jack pine and red pine.

The Pine Ridge Series is also significant in the second area which consists of sandy to gravelly textured lake-bed and alluvial flood plain deposits. There are some sandy aeolian deposits.

The Area of Sandy to Gravelly Textured Lacustrine and Alluvial and Sandy Aeolian Deposits.

Lonesand Series

This series consists of moderately well to imperfectly drained or Gleyed Podzol soils developed on fine to medium sandy morainic till, sandy lacustrine, outwash and aeolian deposits. Profiles are characterized by L-H, Ae, Bf and C horizon sequences with a moderately developed Bf horizons.

Profile Description

Lonesand Fine Sand (virgin site SW 18-2-12 E.P.M.)

L-H: 2-0 inches, very dark greyish brown partially to well decomposed leaf, root and herb litter, dark greyish brown when dry, medium acid in reaction.

Ahe: 0-1 inches, dark grey loamy fine sand, grey when dry, loose, extremely acid in reaction.

Aeg: 1-3 inches: light brownish grey, fine sand, light grey when dry, loose, very strongly acid, stained with iron mottles.

Abg: 3-5 inches, dark brown fine sand, brown when dry, loose, very strongly acid, stained with iron mottles.

Bfg: 5-11 inches, yellowish brown fine sand, brownish yellow when dry, loosely to weakly cemented when dry, very strongly acid, with numerous yellowish red iron concretions.

C1g: 11-30 inches, yellowish brown fine sand, light yellowish brown to brownish yellow when dry, loose, medium acid, stained with iron mottles.

C2g: 30 inches plus, light brownish grey to light olive brown, very fine sand, light grey to light yellowish brown when dry; loose; moderately alkaline in reaction, stained with iron mottles, effervesces with dilute HCl.

Topography: smooth level to duned sandy deposits.

Drainage: moderately well to imperfectly drained, run off is nil, internal drainage very rapid to ground water table. Ground water tables

occur at or very near the surface in spring and early summer, then recede to four or five feet below the surface by fall.

Vegetation: Mainly aspen and balsam poplar. Mixed jack pine and aspen occur on the moderately well drained sites.

Major Uses: forestry, this soil provides a good growth site for white spruce as well as aspen and birch.

The Pine Ridge Series described under the first area is also significant in this area.

The Area of Thin Sand to Clay Textured Deposits over Calcareous Boulder Till and Boulder Till.

Caliento Series

Caliento series comprise imperfectly drained or Gleyed Grey Wooded soils developed on a thin deposit of sand, 6 to 30 inches thick, over moderately to strongly calcareous boulder till. Their profiles are characterized by L-H, Aeg, Btg, CKg, Cg horizon sequences with weakly to moderately developed color, texture and structure Bg horizons.

Profile Description

Caliento Fine Sand (virgin site - SE1/4 20-1-13 EPM)

- L-H: 1½-0", very dark brown partially to well decomposed leaf, twig, herb and grass litter, dark brown when dry, medium acid in reaction.
- Aheg: 0-1", very dark grey loamy fine sand, dark grey when dry; structureless; loose when moist or dry; medium acid in reaction.
- Aeg: 1-17", light brownish grey fine sand, light grey when dry; structureless; loose when moist or dry; slightly acid in reaction; with numerous, medium sized, dark reddish brown iron mottles, reddish brown when dry.

- ABg: 17-18½", very pale brown fine sandy loam; weak, fine, granular structure to moderate fine crumb structure; friable when moist, soft when dry; slightly acid in reaction; numerous, medium sized, weakly cemented reddish brown iron mottles.
- Btg: 18½-22", dark brown clay loam, brown when dry; moderate, fine sub-angular blocky structure; firm when moist, hard when dry; slightly acid in reaction; few medium sized reddish brown iron mottles.
- Cgl: 22-26", pale brown fine sandy loam, very pale brown fine sandy loam, very pale brown when dry; weak, pseudo, fine fragmental structure; friable when moist, slightly hard when dry; mildly alkaline in reaction; numerous, medium sized reddish brown iron mottles; effervesces strongly with dilute HCl.
- Ckg: 26-28", light grey silt loam, white when dry; weak, fine pseudo fragmental structure; very friable when moist, soft when dry; moderately alkaline in reaction; effervesces violently with dilute HCl.
- Cg2 28" +, light yellowish brown fine sandy loam, very pale brown when dry; weak, fine, pseudo fragmental structure; friable when moist, slightly hard when dry; moderately alkaline in reaction; effervesces strongly with dilute HCl; scattered, medium sized, reddish brown iron mottles.

Topography: Irregular level to irregular very gently sloping till plains of the glacial-lake-terrace landscape area.

Drainage: Imperfectly drained; run off is slow; internal drainage is medium to impeded; ground water tables occur at or near the surface until late spring then recedes rapidly to well below the solum during the rest of the growing season.

Vegetation: Dominantly dense stands of aspen with frequent balsam poplar, some birch and occasional cedar. Dense scrub layer.

Major Uses: Wasteland; some grazing and forage crop production where the native vegetation has been removed.

Carrick Series

This series comprises moderately well to well drained Orthic Grey-Wooded soils developed in moderately to strongly calcareous boulder till. They have L-H, Ae, Bt and C horizon sequences with well developed horizonation. Although the profile is strongly developed the solum is relatively shallow compared to Orthic Grey-Wooded soils developed in parent material containing less calcium carbonate.

Profile Description

Carrick Fine Sand (virgin site NW 1/4 2-3-10 E.P.M.)

- O: 0-2 inches, light grey to greyish brown fine sand, weak medium platy structure, very friable when moist, slightly hard when dry, medium acid.
- Bir: 2-6 inches, very pale brown to brown fine sand, weak medium platy structure, very friable when moist, slightly hard when dry, medium acid.
- Bt: 6-10 inches, yellowish brown to dark brown heavy clay loam, moderate fine sub-angular blocky structure, firm when moist, very hard when dry, medium acid.
- B3: 10-12 inches very pale brown to pale brown clay loam, weak fine granular structure, firm when moist, hard when dry, mildly alkaline in reaction.
- C: 12 inches plus, white to light grey clay loam to silty clay, strong medium fragmental pseudo-structure, firm when moist, strongly cemented when dry, moderately alkaline in reaction, effervesces strongly with dilute HCl.

Topography: irregular very gently sloping till plains.

Drainage: moderately well to well drained, run off is medium, internal drainage is medium; ground water is absent from the solum. A temporary perched water table may occur above a clay textured Bt.

Vegetation: mainly aspen with some birch and balsam poplar.

Major Uses: wasteland, where natural vegetation has been removed by man or fires some grazing and limited forage crops production is attempted.

The Area of Silty to Clay Textured Lacustrine and Alluvial Deposits

Peguis Series

The Peguis series comprise imperfectly drained or Gleyed Dark Grey soils developed in a thin deposit of slightly to moderately calcareous clay which may have a boulder till substrate within 30 inches of the surface. They have Ah_{eg}, Bt_g, C_g horizon profiles but have little or no textural built up in the B horizon. The soil profile has a low degree of horizonation.

Profile Description

Peguis Till Substrate Phase (virgin site EC 27-2-10 E.P.M.)

- L-H 3-0", black to dark olive partially to well decomposed grasses, herbs and leaf litter.
- Ah_g: 0-2", black clay; medium, strong to fine, moderate, granular structure; firm when moist, hard when dry; neutral in reaction.
- Ah_{eg}: 2-12", very dark grey clay, mingled with patches of black clay to silty clay; medium, strong, granular structure; firm when moist, hard when dry; neutral in reaction.
- B_g: 12-18", very dark greyish brown clay; medium, strong, granular structure; firm when moist, very hard when dry; mildly alkaline in reaction; effervesces with dilute HCl.

Cg: 18-24", dark greyish brown clay with pale yellow clay with pale yellow calcium carbonate concretions; massive structure; firm when moist, very hard when dry; mildly alkaline in reaction; effervesces with dilute HCl.

HCg: 24"+ , pale brown fine sandy loam boulder till; pseudo, fine, weak crumb structure; friable when moist, slightly hard when dry; mildly alkaline in reaction; effervesces strongly with dilute HCl.

Topography: Smooth level to irregular very gently sloping shallow lacustrine plains.

Drainage: Imperfectly drained; run off is slow, internal drainage is slow to very slow; ground water tables near the surface only for a short time in spring.

Vegetation: Dominantly aspen with some balsam poplar. Tall shrubs are common.

Use: Dry land production of small grains and cultivated hay crops.

Middlebro Series

The Middlebro series comprise imperfectly drained or Gleyed Grey Wooded soils developed on a thin deposit of slightly to moderately calcareous lacustrine and alluvial clay over moderately to strongly calcareous stratified sediments dominantly clay loam in texture. Their profiles are characterized by L-H, Aeg, Btg, HCg horizon sequences with moderately to strongly developed texture, structure and color differences in the B horizon.

Profile Description

Middlebro clay (virgin site - SW 1/4 10-1-13E P.M.)

L-H: 2½-0", very dark brown moist and dry, partially to well decomposed leaf, herb and grass litter; slightly acid in reaction.

Ah: 0-1", black very fine sandy loam, very dark grey when dry; weak, fine, crumb structure; very friable when moist, soft when dry; medium acid

in reaction.

Aeg: 1-4", grey very fine sandy loam, light grey when dry; weak, fine, platy structure; very friable when moist, soft when dry; medium acid in reaction; numerous, small sizes, iron mottles.

Btg: 4-13", very dark grey clay, dark grey when dry; strong, medium, granular structure, firm when moist, very hard when dry; neutral in reaction; some iron mottles.

IIBCg: 13-18", greyish brown clay loam, light brownish grey when dry; weak, medium, crumb structure; friable when moist, hard when dry; mildly alkaline in reaction; effervesces with dilute HCl. L., slightly iron mottled.

IICg 18"+ , light grey very fine sandy loam, white when dry; weak, fine, pseudo-crumb structure; very friable when moist, slightly hard when dry, effervesces strongly with dilute HCl. L., iron mottled.

Topography: Smooth level to irregular very gently sloping lacustrine alluvial plains.

Drainage: Imperfectly drained; run off is slow; internal drainage is slow to medium; ground water tables occur near the surface for a short period in spring and gradually recede to well below the solum by fall.

Vegetation: Dense mixed stand of aspen, balsam poplar, with some birch, spruce and American elm. Shrubs are common.

Major Uses: Where native vegetation has been removed, it has been used for the production of small grains, alfalfa seed and hay.

Seven Sisters Series

Seven Sisters series consists of well drained Orthic Grey Wooded soils

developed on slightly to moderately calcareous lacustrine clay or clay till which may be underlain by strongly calcareous boulder till within 30 inches of the surface. They have L-H, Ae, Bt, C horizon profiles with strongly developed textural and structural B horizons. This soil lacks a distinct horizon of lime carbonate accumulation.

Profile Description

Seven Sisters clay (NE 1/4 31-1-14 E P.M.)

- L-H: 1-0", black partially to well decomposed grasses, herbs and leaf litter, very dark brown when dry; strongly acid in reaction.
- Ae: 0-4", light grey loam, white when dry; medium, moderate, platy structure; very friable when moist, soft when dry; strongly acid in reaction.
- AB: 4-6", dark grey to light grey clay loam to silty clay, light grey to white when dry; medium, moderate, blocky structure; firm when moist, hard when dry; medium acid in reaction.
- Bt: 6-12", very dark brown to very dark grey clay, very dark greyish brown to dark grey when dry; medium, moderate, columnar structure which breaks readily into medium strong, blocky structure; very firm when moist, very hard when dry; neutral in reaction.
- BC: 12-16", dark greyish brown silty clay to clay, light brownish grey when dry, fine, moderate, subangular blocky structure; firm when moist, hard when dry; mildly alkaline in reaction; effervesces with dilute HCl.
- Cl: 16-24", greyish brown clay, light brownish grey when dry; pseudo, fine, moderate, fragmental structure; firm when moist, hard when dry, mildly alkaline in reaction; effervesces strongly with dilute HCl. a few, medium calcium carbonate concretions.

C2 24"+, dark greyish brown clay, greyish brown clay, greyish brown when dry; pseudo, fine, moderate, fragmental structure; firm when moist, hard when dry; mildly alkaline in reaction; effervesces strongly with dilute HCl .; a few, medium, calcium carbonate concretions.

Topography: Smooth level to irregular very gently sloping lacustrine plains.

Drainage: Moderately well drained to well drained, run off is slow to medium; internal drainage is slow; ground water tables are absent however, a temporary perched water table may occur for a very short time above the Bt horizon.

Vegetation: Dense mixed stand of aspen, birch and white spruce with some balsam fir and balsam poplar. Tall shrubs are common.

Major Uses: Where the native vegetation has been removed the major use of this series has been for the production of small grains and alfalfa seed and hay.

Brokenhead Series

The Brokenhead Series comprises imperfectly drained or Gleyed Grey Wooded soils developed on slightly to moderately calcareous lacustrine clay which may have a moderately to strongly calcareous boulder till or a moderately calcareous sand substrate within 30 inches of the surface.

Profile Description

Brokenhead Clay, till substrate phase (virgin site NW 1/4, 4-1-15 E.P.M.)

L-H: 2-0 inches, black partially to well decomposed leaf, twig, herb and grass litter, very dark brown when dry, slightly acid in reaction.

Aeg: 0-1½ inches, grey clay loam, light grey when dry, weak medium platy structure, very friable when moist, soft when dry, slightly acid, numerous medium sized iron mottled.

BAg: $1\frac{1}{2}$ - $3\frac{1}{2}$ inches, dark grey to grey clay loam, grey to light grey when dry, moderate, coarse, columnar structure that breaks to moderate, medium sub-angular blocky structure, very firm when moist, extremely hard when dry, strongly acid, iron mottles.

Btg: $3\frac{1}{2}$ - 8 inches, very dark brown clay, dark greyish brown when dry, moderate coarse, columnar structure which breaks to strong coarse sub-angular blocky structure, very firm when moist, extremely hard when dry, strongly acid, iron mottles.

II BCg: 8-14 inches, dark greyish brown to brown clay, greyish brown to pale brown when dry, moderate fine blocky structure to moderate medium sub-angular blocky structure, firm when moist, slightly hard when dry, mildly alkaline, effervesces with dilute HCl , iron mottles.

II Cg: 14 inches plus, pale brown to dark greyish brown stratified silt loam and clay, very pale brown to greyish brown when dry, moderate fine pseudo-fragmental structure to weak medium pseudo-blocky structure, friable when moist, soft to slightly hard when dry, mildly alkaline, effervesces strongly with dilute H.C.L., iron mottles.

Topography: smooth level to irregular gently sloping lacustrine plains of the glacial-lake-terrace area.

Drainage: imperfectly drained, run off is slow, internal drainage is slow, ground water tables occur at or near the surface for short periods during the spring and recedes to well below the solum by fall.

Vegetation: dense stands of aspen and balsam poplar with occasional cedar, shrubs are common.

Major Uses: where native vegetation has been removed the land has been used for the production of small grains, alfalfa seed and hay.

Hungarian Series

The Hungarian Series comprises imperfectly drained or Gleyed Grey Wooded soils developed on moderately to strongly calcareous lacustrine and alluvial floodplain deposits ranging in texture from sandy loam to silt loam which may have a boulder till substrate within 30 inches of the surface.

Profile Description

Hungarian Fine Sandy Loam (virgin site EC 15-1-15 E.P.M.)

- L-H: 2-0 inches, very dark brown partially to well decomposed leaf, herbs and grass litter, very dark greyish brown, slightly acid.
- Aeg: 0-1½ inches, greyish brown fine sandy loam, light grey when dry, structureless, loose when moist or dry, slightly acid, iron stained.
- BAG: 1: - 4 inches, dark greyish brown fine sandy loam, greyish brown when dry, weak fine granular structure, very friable when moist, soft when dry, neutral, iron stained.
- Btg: 4-6 inches, very dark greyish brown fine sandy loam, dark greyish brown when dry, weak medium granular structure, friable when moist, slightly hard when dry, neutral in reaction, iron stained.
- BCg: 6 - 7½ inches, brown fine sandy loam, pale brown when dry, fine granular structure, very friable when moist, soft when dry, mildly alkaline, effervesces with dilute HCl., iron stained.
- Cg: 7½ inches plus; pale brown silt loam, white when dry, moderate medium pseudo crumb structure, friable when moist, very hard when dry, moderately alkaline effervesces strongly with dilute HCl., iron stained.

Topography: smooth level to irregular very gently sloping alluvial and lacustrine deposits.

Drainage: imperfectly drained, run off is slow, internal drainage is medium, ground water table occurs at or near the surface for a short period in spring and gradually recedes to well below the solum by mid-summer.

Vegetation: dense stands of aspen with some birch and balsam poplar and shrub.

Major Uses: where the native vegetation has been removed it has been used for the production of small grains, forage crops, alfalfa seed and hay.

The Area of Organic Deposits

Shallow Peat

These soils consist of 12 to 36 inches of fibrous and woody peat.

Deep Peat

The deep peat soils consist of woody and fibrous peats, 3 to 10 feet in depth.

The Southern Fringe of the Precambrian Shield

This area is dominantly rock outcrop and undifferentiated drift deposits. Indian Bay Complex is the name given to undifferentiated soils of the Podzolic Order developed in deposits ranging from sand to clay. Most of these soils are imperfectly to moderately well drained.

APPENDIX III

The following data on land use in the Agricultural Region have been derived from Canadian Wheat Board Permits for 1960.¹ No data are given for Townships 7 and 8 Range 14 E.P.M. and Township 10 Range 11 E.P.M. because no farmers in these townships held permits.

TABLE XXXII

AVERAGE PER FARM LAND USE IN THE AGRICULTURAL REGION,
DERIVED FROM CANADIAN WHEAT BOARD PERMITS

Township	13-11	12-11	11-11	11-12	10-12	9-12	8-12	8-13
Land Use Proportion with permits	83%	42%	25%	54%	80%	100%	29%	23%
Average (ac.) Farm size	153	222	230	236	189	233	255	241
Wheat (ac.)	18	17	7	19	24	20	19	5
Oats (ac.)	26	51	31	55	33	33	27	26
Barley (ac.)	7	8	0	5	1	3	3	4
Flax (ac.)	4	5	4	1	1	9	0	0
Eligible* (ac.) Forage crops	40	68	84	40	31	41	58	49
Summer-(ac.) Fallow	9	25	29	36	29	50	40	36
Forest (ac.)	40	50	76	63	60	78	108	120

*This category includes hay and cleared pasture

¹Through the courtesy of Mr. Wilson, Permit Department, Canadian Wheat Board, Winnipeg.

APPENDIX IV

Criteria for Farm Types

For the purposes of this study farm types have been defined on the basis of the definition of mixed farms used in the Economic Atlas of Manitoba: mixed farms are those on which less than 70 per cent of the gross revenue is from either crops or livestock.¹

Farms of dairy, beef or grain emphasis (types of mixed farms) are those on which the gross revenue from dairy, beef or grain is less than 70 per cent of the total gross revenue for the farm and at the same time is the greatest single source of revenue.

Dairy, beef, grain and poultry farms (outside the definition of mixed farms) are those on which the gross revenue from dairy, beef, grain or poultry exceeds 70 per cent of the total gross revenue of the farm. In practice these are easily recognized by their high degrees of specialization in the various products.

The main source of farms income is that branch of the farm programme which supplies the largest portion of the farm's gross revenue. The greatest merit of this simple definition is that it allows accurate determinations of farm type without unduly complex interviews.

¹Economic Atlas of Manitoba, T.R. Weir, editor, Manitoba, Dept. of Industry and Commerce, Winnipeg 1960. p. 40.

APPENDIX V

Population of the Municipalities of Whitemouth and Birch River
by Principal Origins

The map of ethnic groups (Figure 10) was made by the estimation of ethnic origin from names on the municipal and L.G.D. tax rolls, in consultation with their clerks. This approach made it necessary to put Hungarians, Poles, Ukrainians and others into one group: Eastern European.

The Census of Canada has not distinguished various ethnic groups on the basis of census sub-divisions since 1941. The following table gives the data for 1941.

TABLE XXXIII

POPULATION BY PRINCIPAL ORIGINS 1941*

Origin	English	French	German	Polish	Ukrainian	Others**	Total
Municipality of Birch River	39	25	1	262	797	41	1,165
Municipality of Whitemouth	376	52	1,035	303	647	346	2,759

*D.B.S. Census 1941.

** Consists of Czech, Slovak, Finnish, Russian and Scandinavian.

This table indicates the numbers of each group and gives a break down of the ill-defined Eastern European group.

Figure 27 - Whitemouth Sub-Region
Figure 28 - Elma Sub-Region
Figure 29 - Hadashville Sub-Region
Figure 30 - East Braintree Sub-Region
Figure 31 - Reference Map of the Whitemouth Valley

Figure 27

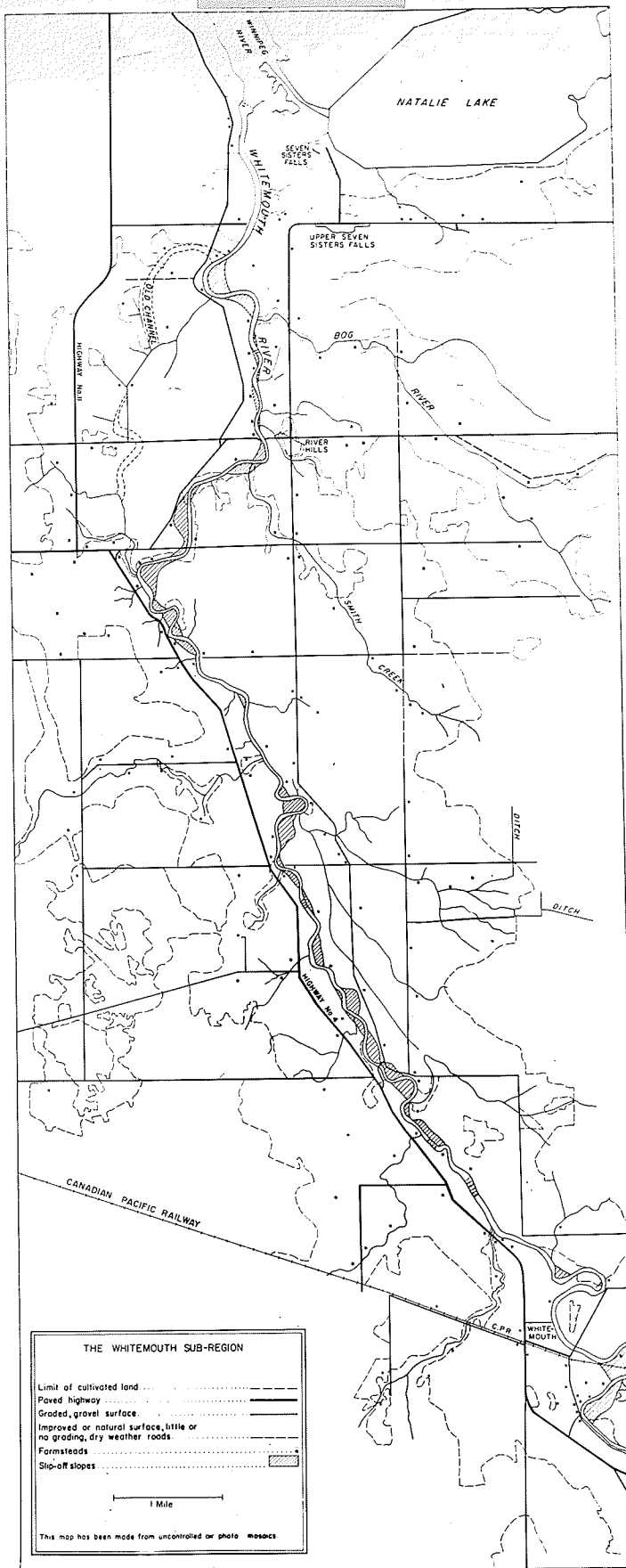


Figure 28

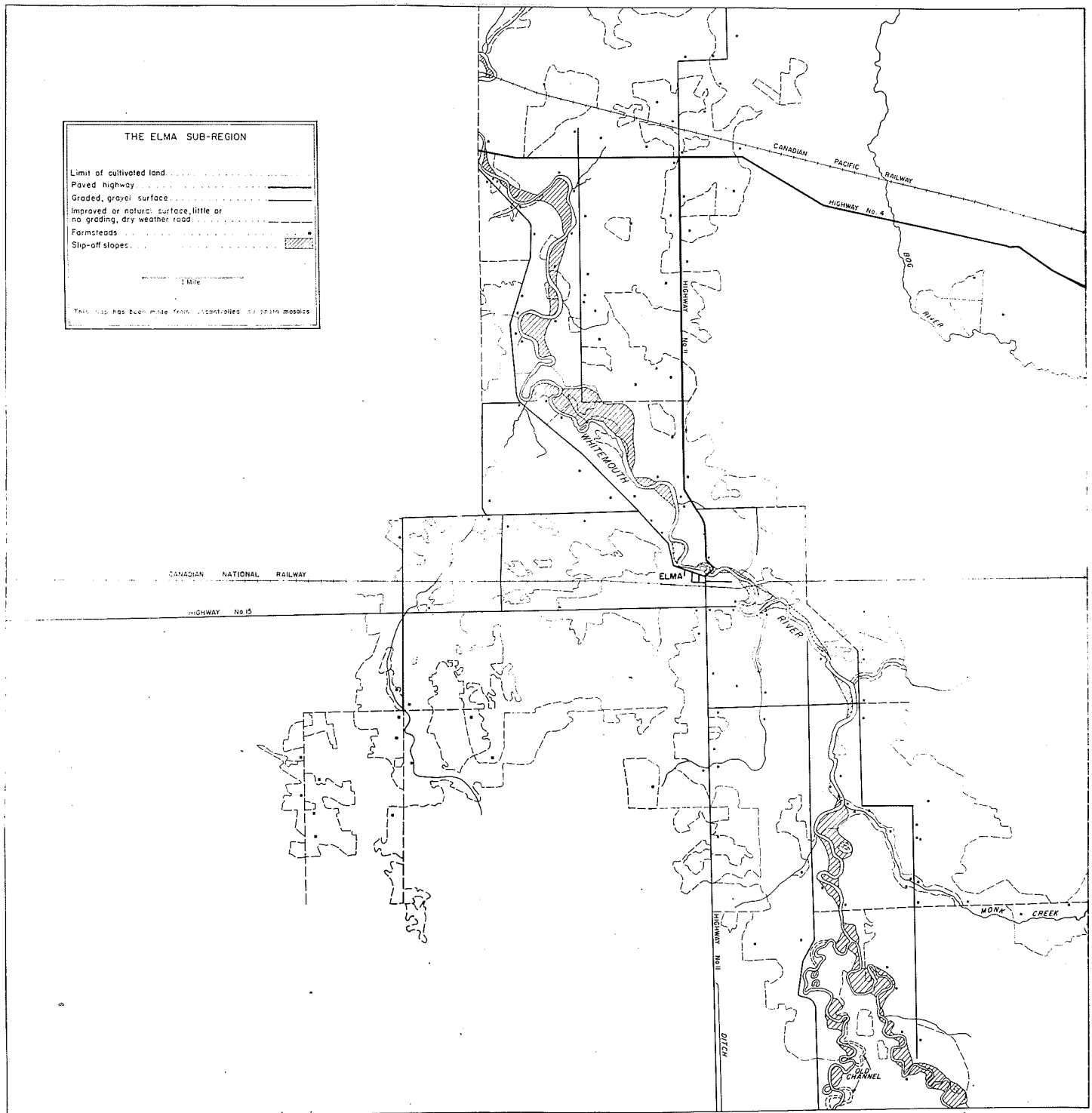


Figure 29

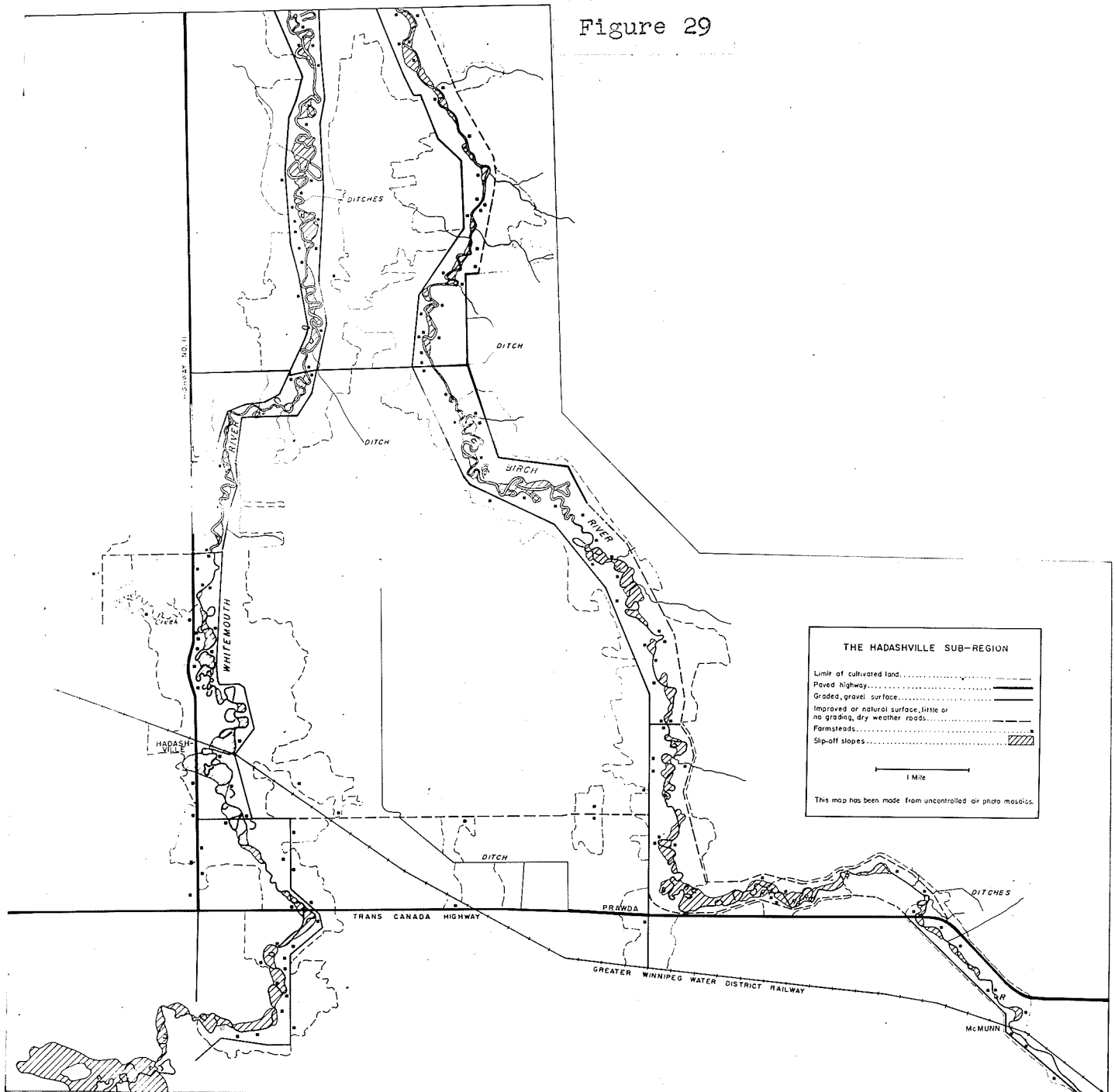
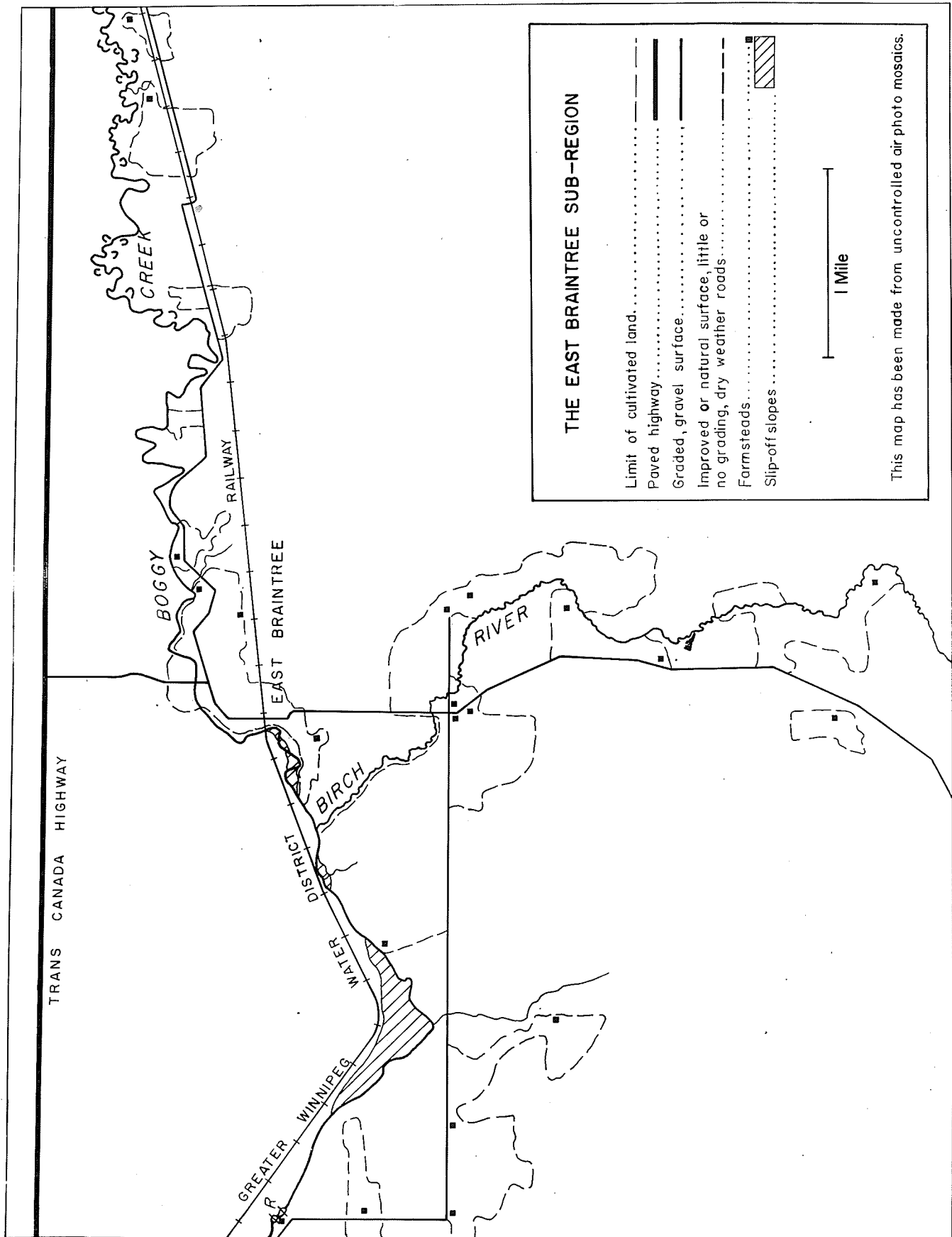


Figure 30



SOUTHEASTERN MANITOBA

— Limit of the Whitemouth Valley

one inch represents eight miles

Figure 31

