

RESEARCH COUNCIL OF ALBERTA

Preliminary Soil Survey Report 64-1

EXPLORATORY SOIL SURVEY

of

Alberta Map Sheets 83-O, 83-P, and 73-M

by

A. Wynnyk, J. D. Lindsay, P. K. Heriags, and W. Odynsky



Alberta Soil Survey
Helicopter Project 1956
Revised 1963

Price \$1.00

Research Council of Alberta
87th Avenue and 14th Street
Edmonton, Alberta

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Foreword

Alberta has a large area of undeveloped land, primarily in the northern portion of the province. Although much of this northern area is relatively inaccessible to ordinary ground inspection, nevertheless information is very desirable for estimating its timber possibilities, for outlining the areas which may be suitable for future agricultural development, and for the planning of roads which could be utilized for any developments in the area.

To assist in obtaining this information the Soils Division, Earth Sciences Branch of the Research Council of Alberta, started an exploratory soil survey in 1952 using pack horses and in that year covered about 1,150,000 acres. In 1953 the area covered was around 1,350,000 acres, and in 1954 about 400,000 acres. Obviously this method of operation was too time-consuming in relation to the enormous region to be surveyed. Consequently, a new method using a helicopter was tried in 1955 and proved to be an excellent way of making a rapid preliminary inspection of large areas in this region. Since the inception of the helicopter method about 82 million acres have been covered, primarily in northern Alberta.

To carry out an exploratory soil survey efficiently and successfully, it is necessary to transfer all pertinent aerial photograph information - such as observations in soils, topography, and vegetation - to base maps for field use. Alberta is in the fortunate position of having available a complete set of aerial photographs of the region, on a scale of 3,300 feet to the inch.

The Research Council has published a series of reports and maps giving the location and characteristics of the exploratory soil survey areas. These reports are entitled Preliminary Soil Survey Reports 58-1, 59-1, 60-1, 61-1, 62-1, and 63-1 and deal with the exploratory soil survey areas covered in the years 1957 to 1962. Prior to 1957 the policy of the Research Council of Alberta was to publish only a limited number of exploratory soil survey reports. Thus the projects completed prior to that date were not given general circulation. This report deals with the area surveyed in 1956 and revised in 1963.

The exploratory soil survey represents only a portion of the work planned each year by the Alberta Soil Survey Advisory Committee, which is responsible for outlining the joint program conducted by the Soil Survey staff of the Research Branch, Canada Department of Agriculture, and the Research Council of Alberta, through the chairmanship of the Professor of Soil Science of the University of Alberta.

In the years 1928 to 1930 F.A. Wyatt, O.R. Younge, and J.L. Doughty from the Department of Soils, University of Alberta, made several pack horse traverses through certain portions of the area covered in this report. Their report of the traverses was not given general circulation, but includes much valuable information and frequently provides a useful comparison of agricultural development which has occurred in the area in the last thirty years.

Contents

	Page
Foreword	2
List of tables and illustrations	4
Acknowledgments	6
Introduction	8
Location and extent	8
Method of survey	8
Soil classification and mapping	9
Climate	11
Vegetation	13
Alberta map sheet 83-O	14
Area I	15
Area II	16
Area III	17
Area IV	19
Area V	21
Area VI	22
Area VII	23
Area VIII	23
Area IX	23
Area X	24
Summary	25
Alberta map sheet 83-P	26
Area I	27
Area II	29
Area III	30
Area IV	31
Area V	33
Area VI	34
Area VII	34
Area VIII	35
Summary	36
Alberta map sheet 73-M	36
Area I	37

	Page
Area II	40
Area III	41
Area IV	42
Area V	43
Area VI	44
Summary	44
Some chemical and physical characteristics of the soils	44
References cited	50
Preliminary soil survey rating maps:	
Alberta map sheet 83-O	51
Alberta map sheet 83-P	52
Alberta map sheet 73-M	53

Tables

Table I.	Mean monthly and annual temperature and precipitation data for selected stations in or near the 1956 exploratory soil survey area	12
Table II.	Frost-free periods at selected stations	13
Table III.	Summary of the acreage of the land rating categories for Alberta map sheet 83-O	26
Table IV.	Summary of the acreage of the land rating categories for Alberta map sheet 83-P	36
Table V.	Summary of the acreage of the land rating categories for Alberta map sheet 73-M	44
Table VI.	Soil reaction (pH), nitrogen, phosphorus, calcium carbonate equivalent, and textural components of some representative soil profiles	46
Table VII.	Cation exchange characteristics of some representative soil profiles	48

Illustrations

Figure 1.	Location map	7
Figure 2.	Heavy stand of spruce and aspen poplar typical of area south of Lesser Slave Lake	18

Figure 3. Cover typical of moss peat bogs, labrador tea and sphagnum moss in the foreground, black spruce in the background . . . 29

Acknowledgments

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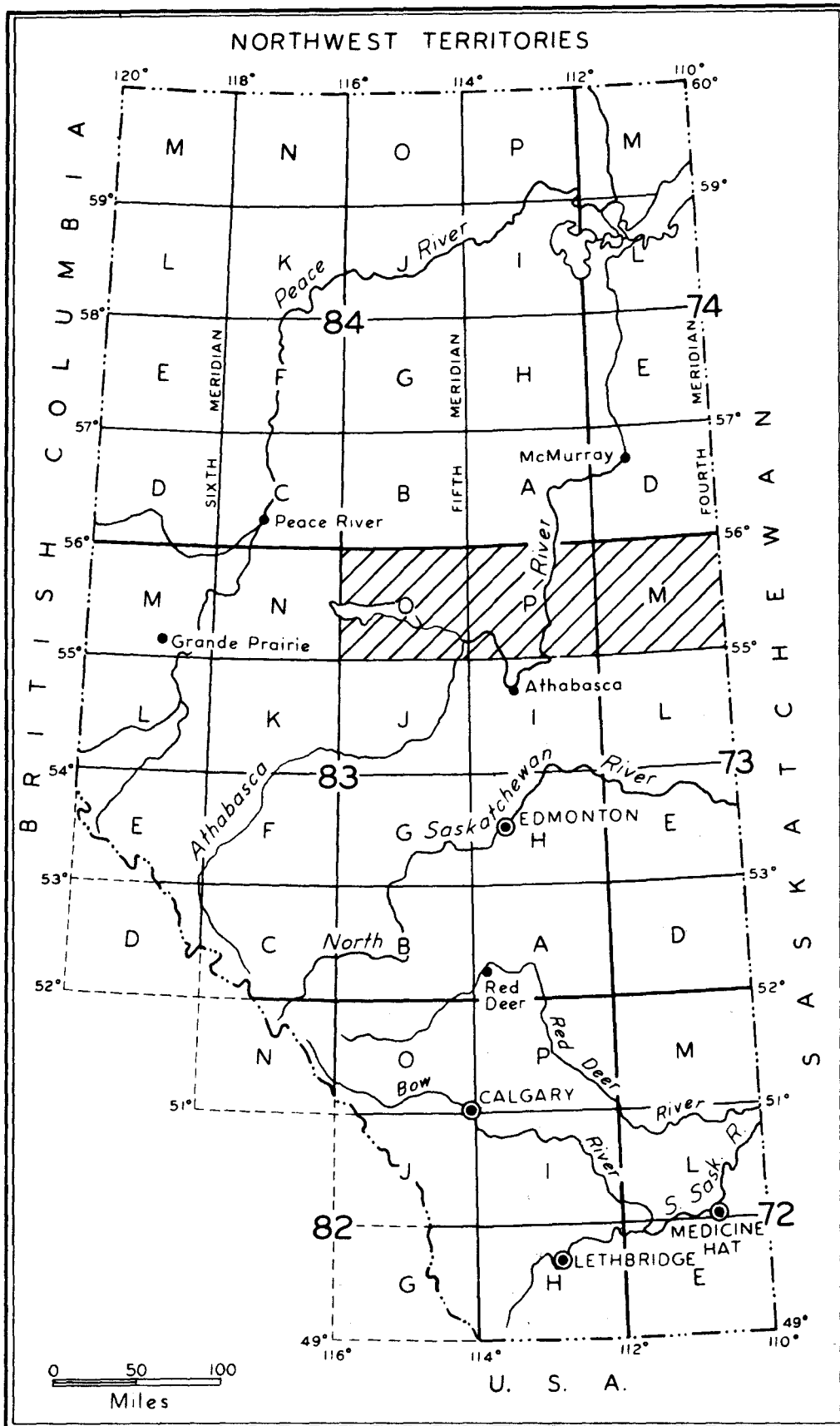


Figure 1. Sketch map of Alberta showing the location of the surveyed area.

EXPLORATORY SOIL SURVEY OF ALBERTA MAP SHEETS

83-O, 83-P, and 73-M

Introduction

Exploratory soil surveys by helicopter were initiated in 1955 by the Alberta Soil Survey, Research Council of Alberta, to provide information to the Alberta Department of Lands and Forests and other agencies interested in the development of the soil resources of northern Alberta.

The first two projects completed on this exploratory soil survey program were not described in published reports. With completion of the helicopter survey project in 1963, it was felt that further study should be given to these first areas to permit the publication of reports. Accordingly, the information obtained in the 1956 survey was reviewed and checked for the preparation of this report.

Location and Extent

The area traversed consists of Alberta map sheets 83-O, 83-P, and 73-M. Each map sheet extends approximately 69 miles north to south by 77 miles east to west, and covers about 5,300 square miles, or approximately 3,400,000 acres. As shown in figure 1, the area lies between 110 and 116 degrees west longitude and between 55 and 56 degrees north latitude.

More specifically, Alberta map sheet 73-M includes all or parts of townships 69 to 81 between ranges 1 and 14, west of the Fourth Meridian; map sheet 83-P includes all or parts of townships 69 to 81 between ranges 14 to 28 west of the Fourth Meridian; and map sheet 83-O includes all or parts of townships 69 to 81 between ranges 1 and 14 west of the Fifth Meridian. A total area of approximately 16,000 square miles (10,300,000 acres) is covered by these three map sheets.

Method of Survey

Preliminary information regarding topography and drainage characteristics of the area was transferred from the aerial photographs to the base maps. The ground work involved obtaining information about the soil and parent materials of the area as well as verifying and modifying information obtained from the aerial photographs. In the summer of 1956 five weeks were spent covering the accessible portions of the area by road while the remainder was covered in three weeks by helicopter.

Usually the helicopter survey operated from a central camp located near the center of the map sheet. The area was divided into 12 "pie-shaped" segments which extended from the central camp at 15-degree intervals. The radii of the segments were approximately 40 miles and the total distance traversed per

segment was about 90 miles. Approximately 80 to 90 landings were made in each map area for soil inspection. The distribution of the landings depended upon the nature of the terrain and forest cover but wherever possible attempts were made to land about every 10 miles along the line of traverse.

In map sheet 83-O, which includes Lesser Slave Lake, it was not possible to survey the entire area from a single central campsite. As a result, helicopter traverses of various lengths were made from several campsites.

Soil Classification and Mapping

The soils were mapped and classified very broadly and no attempt was made to correlate them with any of the established soil series in the province. An adaptation of a three-digit system, described in a previous report (3), was used in this exploratory soil survey. On the accompanying maps the soil types found at specific locations are indicated by this system of digits.

In the number system, the first digit refers to the Great Soil Group, the second digit denotes the type of parent material, and the third digit specifies certain special or differentiating characteristics of the soil profile.

The following table explains the system of numbers used:

<u>First digit</u>	<u>Great soil group</u>
5	Dark Grey
6	Brown Wooded
7	Grey Wooded
8	Bisequa Grey Wooded
9	Podzol
 <u>Second digit</u>	 <u>Parent material</u>
1	Residual (rock outcrop)
2	Glacial till
3	Reworked till
4	Gravelly outwash
5	Alluvial, water-sorted
6	Aeolian, wind-sorted
7	Lacustrine
 <u>Third digit</u>	 <u>Profile development</u>
1	Little profile development
2	Orthic soils (normal soils of a Great Soil Group)
3	Depressional, non-saline
4	Saline
5	Solod
6	High lime to surface

An example of the number system would be 7.2.2., which indicates a Grey Wooded soil developed on glacial till with normal profile development.

The soil color descriptions are those given in the Munsell Soil Color Charts.

The topography of the area is shown on the maps by a system of hatching. The system used for classifying the slopes is similar to the one described in previously published reports (5) and is shown in the following table:

<u>Per cent slope</u>	<u>Mapped phases</u>
0.0 - 0.5) 0.5 - 1.5)	Level and undulating
2 - 5) 6 - 9)	Gently rolling
10 - 15	Rolling
16 - 30	Hilly
Irregular, often steeply sloping banks adjacent to drainage courses	Rough and broken

The topographical classifications outlined on the map indicate the relative roughness of the surface area since the steepness of the slope as well as the frequency were considered when the areas were outlined.

The maps are colored to designate three categories of land areas - pasture and woodland, doubtful arable, and arable land. These categories are based on a consideration of such factors as the soil, degree of stoniness, topography, and the relative amount of bog. Those areas considered unsuitable for agricultural development for various reasons are classed as pasture and woodland. Areas in which the soil and topography are considered suitable for agricultural development are classed as arable land. The doubtful category includes mainly mixed areas of land suitable and unsuitable for agricultural development of marginal areas where some characteristic of the area such as drainage or stoniness makes the area of doubtful value for agricultural development.

For the convenience of describing the area, the accompanying maps have been divided into Area I, Area II, etc. and dealt with accordingly. The basis for separations into areas is the soil parent material (or various combinations of materials), the extent of bog, and topography.

Climate

The amount of meteorological data available (1) (2) for the area covered by this survey is very limited. Nevertheless, some of the data from adjacent recording stations should provide a fair indication of the climatic characteristics of the area.

Table I shows the mean monthly and mean annual temperature and precipitation data for seven stations in or adjacent to the map area. To assist in the interpretation of this data the elevations and locations (latitude and longitude) of the stations are also included in the table. Fort McMurray, Iron River, and Meanook are located a considerable distance from any large body of water, whereas Lac La Biche, Slave Lake, Wagner, and High Prairie are relatively close to large lakes. Generally, a close proximity to a large body of water has a moderating effect on the temperature of the area and may also influence the precipitation. Also, though meteorological records are available for a considerable length of time, the period covered by these records frequently varies with the stations. This often makes comparisons difficult.

The range in mean annual precipitation is between 13.97 inches at Iron River and 18.30 inches at Slave Lake. The mean annual temperature varies from 30.5°F. at Fort McMurray to 34.8°F. at High Prairie and Meanook. It is interesting to note that at Meanook, Iron River, and Fort McMurray about 66 per cent of the precipitation falls during the months May to September (inclusive), while at the other stations only 62 per cent occurs in the same period.

Table II shows frost-free periods for the same stations. The length of the frost-free period is an important consideration in assessing the agricultural potential of an area. The frost-free period is taken as that period between the last date in the spring on which the temperature fell below 32°F. and the first date in the fall on which the temperature dropped to 32°F.

The average frost-free period in the area ranges between 71 and 112 days. The longest average frost-free period occurs at Meanook, while the two most easterly stations, Fort McMurray and Iron River, have a relatively short frost-free period, averaging 71 and 78 days respectively. The four other stations are intermediate in length of frost-free period and may be more representative of the areas closer to large lakes. These records indicate that climate may impose a limitation on crop production in some portions of this area.

The similarities of the meteorological records of Fort McMurray and Iron River become much more striking, considering that of the seven stations listed Fort McMurray is the most northerly while Iron River is the most southerly.

Table 1. Mean monthly and annual temperature and precipitation data for selected stations in or near the 1956 exploratory soil survey area

Station	Approx. elev. feet	Location			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean annual temp., °F.	Mean annual precip., inches
		N. Lat.	W. Long.															
McMurray Airport	1216	56°39'	111°13'	T...	-6.2	.5	15.4	34.4	48.8	56.2	61.6	58.0	47.8	36.5	15.0	-1.8	30.5	--
				P...	.83	.62	.85	.77	1.39	2.10	3.08	2.25	1.67	.97	.95	.83	--	16.31
Iron River	1900	54°25'	111°	T...	1.8	4.5	18.4	36.0	48.4	55.7	61.4	58.8	48.3	38.0	19.4	5.3	33.1	--
				P...	.43	.46	.55	.94	1.45	2.58	2.18	1.79	1.40	.75	.84	.60	--	13.97
Lac La Biche Airport	1835	54°46'	112°01'	T...	1.0	7.5	20.2	33.2	50.6	57.9	62.7	59.1	50.7	40.1	22.5	9.4	34.6	--
				P...	1.07	.69	.76	.80	1.80	2.47	2.92	2.42	1.36	.90	1.08	1.03	--	17.30
Meanook	2250	54°37'	113°21'	T...	-8.9	11.3	21.1	38.7	52.2	58.6	63.8	60.6	50.8	38.3	22.0	9.6	34.8	--
				P...	.81	.58	.92	.96	2.04	2.71	3.30	2.01	1.32	.91	.72	.62	--	16.91
Slave Lake	1921	55°17'	114°46'	T...	3.3	7.1	20.5	36.4	49.0	55.7	61.3	57.6	48.6	38.2	21.5	7.1	33.9	--
				P...	.99	1.05	.92	.91	1.72	2.38	3.12	2.33	1.71	1.15	1.08	.94	--	18.30
Wagner	1915	55°21'	114°59'	T...	4.1	8.0	19.7	36.4	48.5	55.9	60.3	57.7	48.5	39.4	22.6	8.3	34.1	--
				P...	1.03	1.00	.50	.97	1.54	1.97	2.81	2.78	1.21	.78	1.06	1.16	--	16.81
High Prairie	1968	55°26'	116°30'	T...	5.5	8.3	21.8	38.1	50.3	56.8	61.2	58.2	49.6	39.5	20.8	7.5	34.8	--
				P...	.95	.86	.80	1.00	1.49	2.59	2.98	2.13	1.60	1.15	1.16	1.07	--	17.78

T... Temperature in degrees Fahrenheit

P... Precipitation in inches

Table II. Frost-free periods -- shortest, longest, and average -- at selected stations since records were started

Station	Average period, days	Shortest period, days	Longest period, days	Number of years records kept
Fort McMurray	71	22	116	39
Iron River	78	17	117	33
Lac La Biche	111	75	141	19
Meanook	112	91	143	26
Slave Lake	83	25	124	37
Wagner	96	50	117	20
High Prairie	87	54	116	32

Vegetation

The correlation of vegetative cover with soil type between areas is difficult because of the wide range of adaptability of some plant species and the fact that plant growth can be affected by many factors other than soil. Nevertheless, the vegetative cover is frequently a useful indicator of differences in soil drainage and texture within an area.

Most of the better drained positions are covered with trembling aspen (Populus tremuloides), white spruce (Picea glauca), and jack pine (Pinus banksiana). Occasionally some birch (Betula papyrifera) occurs in moderately well drained areas. South of Lesser Slave Lake lodgepole pine (Pinus contorta) and balsam fir (Abies lasiocarpa) are abundant in some locations.

Generally, aspen and white spruce predominate in the medium to fine textured soils in the south and western portions of the surveyed area. Lodgepole pine and balsam fir occur mainly in the Swan Hills, while jack pine and aspen predominate on the sandy soils of the northeastern portion of the map area.

Merchantable timber is confined to patches in the south and western portions of the area. In the northeastern portion where the soils are sandier, no timber was noted. This observation may provide support to Wyatt's (7) conclusion that the soils in this area are apparently unable to produce mill timber on a commercial scale.

The poorly drained positions throughout the area are usually occupied by moss bogs, or less frequently, sedge bogs. However, Peaty Meadow soils and occasionally Meadow soils also occur in the area.

Organic soils (soils with more than 12 inches of peat at the surface) occupy a large portion of the map area. Two types of Organic soils were recognized in the area. The sedge type formed from sedge and grasses is a relatively fine textured fibrous peat whereas the moss type (muskeg) is derived primarily from sphagnum moss and is coarser in texture. Black spruce (Picea mariana) and Labrador tea (Ledum groenlandicum) are characteristic tree and ground cover plants of the moss bogs.

Moss bogs are very abundant throughout the area. Generally, the depth of peat is 24 to 48 inches. However, in some places in the northeastern region, where the soil parent materials are sandy and the bogs occupy large elongated drainage basins along streams, these muskegs frequently are relatively shallow and exceedingly wet. They are characterized by a very sparse cover of coarse grasses and tamarack (Larix laricina) and are usually underlain by exceedingly wet and soft silty or sandy materials.

Generally, sedge bogs are not abundant; however, they occur extensively in the area immediately to the southeast of Lesser Slave Lake. A growth of sedges and marsh reedgrass (Calamagrostis canadensis) and a variable depth of sedge peat characterize these bogs.

The Peaty Meadow soils are characterized for the most part by the growth of sedges, marsh reedgrass, and in some cases dwarf birch (Betula glandulose) and willow (Salix). These soils usually have 3 to 12 inches of peat at the surface.

Alberta Map Sheet 83-O

Alberta map sheet 83-O includes most of Lesser Slave Lake and is found in the western portion of the area covered by this report. A considerable amount of settlement is located along the southern shore of the lake and this portion is traversed by the Northern Alberta Railways and Highway No. 2. Presently, a road is under construction from Slave Lake to Wabasca Lake in the northwestern portion of map sheet 83-P.

Map sheet 83-O includes areas which show considerable variation in soil parent material and physiography. The main features of this map sheet are Lesser Slave Lake, the high land (Swan Hills) south of this lake, another area of relatively high land east of Lesser Slave Lake, and the extensive relatively flat, poorly drained area to the northeast. This map sheet has been divided into 10 major areas as designated on the accompanying map. The bases for these divisions are differences in parent materials or quite frequently substantial variations in the proportion of these materials. For each area the various parent materials and the amount of bog occurring in the area are listed on the map in order of abundance.

Area I

Area I is situated in the southeast section of the map sheet and comprises about six per cent of the total area. This predominantly level to depressional area along the Lesser Slave and Athabasca Rivers consists of 80 per cent moss peat bog, the remainder being sands and some gravelly outwash. The elevations in Area I range between 1,900 and 2,100 feet above sea level.

The Organic soils in Area I are mostly moss peat bogs. Sedge peat bogs and wet hayfields occur mainly in the vicinity of Lesser Slave Lake.

The mineral soils of Area I are mostly Bisequa Grey Wooded, Grey Wooded, and Podzol soils developed on coarse textured materials. Wherever the coarse textured mantle overlying the till is 18 inches or less in thickness, the soils are usually Grey Wooded in character, while in places of deeper overlay and good drainage the soils are usually Bisequa Grey Wooded or Podzol in character.

The following description is that of a Bisequa Grey Wooded soil developed on sand to loamy sand in this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1 - 2	Leaf and coniferous needle mat, slightly decomposed in lower portion.
Ae	3	Light grey (10YR 7/2 moist), loamy sand, platy, very friable.
Bf1	3	Light brownish grey (10YR 6/2 moist), loamy sand, platy, very friable.
Bf2	3	Light yellowish brown (10YR 6/4 moist), loamy sand, darker colored and firmer than Ae horizon.
Bt	10	Dark yellowish brown (10YR 4/4 moist), loam, weak subangular blocky.
BC	6	Yellowish brown (10YR 5/4 moist), loamy sand with occasional clay loam strata.
Ck	at 27-48 inches	Similar to above horizon with lime concentration increasing with depth.

In this area there are also soils, similar in texture to the one described above, which differ in that they do not have a light grey Ae or a brownish Bf horizon. These soils frequently have a pale brown Ae horizon and are generally Grey Wooded in appearance.

Another soil type which occurs in Area I is a Grey Wooded soil developed on gravelly outwash material which overlies glacial till. The following description is that of such a soil:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Leaf and needle litter.
Ah	1	Light brownish grey (10YR 6/2 moist), loam, often absent.
Ae	5	Very pale brown (10YR 7/3 moist), loamy sand, coarse platy.
Btj	10	Yellowish brown (10YR 5/4 moist), sandy loam, weak subangular blocky, with gravel lenses and stones.
IIC	at 17 inches below surface	Dark greyish brown to brown (10YR 4/3 moist), clay loam, blocky, till.

The high percentage of muskeg and the coarse textured soils make this area unsuitable for agricultural development. Area I, which comprises about 173,000 acres, is designated as pasture and woodland.

Area II

Area II, which comprises one per cent of the map sheet, is about 36,000 acres in size and lies in the vicinity of Smith and along the Athabasca River. It is a gently rolling and rolling sand dune area containing a high percentage of bog.

The upland soils of this area are usually Podzol or Minimal Podzol soils developed on sand to loamy sand. The following is a description of a Podzol soil developed on this sand:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Pine needle litter.
Ae	1 - 2	Pinkish grey (7.5YR 6/2 dry), sand, single grain, loose.
Bf	5	Reddish brown (5YR 3/4 dry), sand, single grain, loose.
BC	24	Yellowish brown (10YR 5/4 dry), sand, single grain, loose.

Ck at 32 inches Greyish brown (10YR 5/2 dry), sand.
 below surface

Organic soils comprise 30 to 40 per cent of Area II and are mostly moss peat bogs or occasionally mixed bogs (sphagnum and sedge).

The sandy Podzol soils and the large amount of bog makes this area unsuitable for agricultural development. This area is classified as pasture and woodland.

Area III

Area III is situated in the south central portion of the map sheet and forms the northern extremity of the Swan Hills. This area comprises less than 10 per cent of the map sheet and is predominantly hilly but minor areas of rolling and gently rolling topography occur throughout. The elevations in the area range between 2,000 feet (above sea level) in the valleys to 4,000 feet on some uplands. Generally, the area is fairly well drained with but a minor occurrence of moss bogs. The drainage is mostly by way of Sawridge Creek and Swan, Otauwau, and Drift-pile Rivers which form a part of the Athabasca River system.

The tree cover in Area III is fairly heavy and consists primarily of spruce, pine, balsam fir, and aspen poplar. Some commercial stands of timber occur in this area.

The soils of Area III are exceedingly variable in parent materials but are mainly Minimal Podzol, Bisequa Grey Wooded, or Grey Wooded in character. The sequence of materials in Area III appears to be gravels on upland, yellowish brown soft sandstone on the intermediate slopes, and a grey brown or olive brown glacial till on lower slopes. Outwash materials also occur throughout the area.

The soils developed on these preglacial gravels and on the associated bedrock are usually yellowish brown in color and exceedingly variable in composition. The parent materials of these soils may range between a very pale brown stony or cobbly sandy loam to a yellowish brown silt loam with occasional cobbles. Frequently these gravelly or stony soils vary in thickness from two to twenty feet and overlie a yellowish brown very fine sandstone.

The following description is that of a Minimal Podzol developed on sandy loam in the Swan Hills area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1 - 2	Pine needle litter and moss.
Ae	1	Pinkish grey (7.5YR 6/2 dry), sandy loam, weak platy, pH 4.5.

Bf	8	Yellowish brown (10YR 5/6 dry), sandy loam, weak granular, very stony or cobbly, pH 4.5.
C	at 10 to 35 inches below surface	Light yellowish brown (10YR 6/4 dry), sandy loam, cobbly, pH 5.0.



Figure 2. Heavy stand of spruce and aspen poplar typical of the area south of Lesser Slave Lake.

The soils developed on weathered sandstone in the area are Grey Wooded and show the following characteristics:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Leaf and needle litter.
Ah	1	Very dark grey (10YR 3/1 dry), sandy loam, granular, very friable.
Ae	5	Light grey (10YR 7/2 dry), sandy loam, platy, friable.
AB	2	Yellowish brown (10YR 5/4 dry), loam, weak coarse platy.
Bt	12	Yellowish brown (10YR 5/4 dry), loam, medium sub-angular blocky, compact.

C at 22 inches below surface Light olive brown (2.5Y 5/4 dry), sandy loam, massive, unconsolidated sandstone.

Grey Wooded soils developed on till frequently occur in the valleys of this area. The following is a description of this type of soil:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle and leaf litter.
Ah	1	Dark greyish brown (10YR 4/2 moist), sandy loam.
Ae	2	Pale brown (10YR 6/3 moist), sandy loam, platy, very friable.
Bt	12	Yellowish brown (10YR 5/4 moist), clay, blocky.
C	at 16 inches below surface	Olive brown (2.5Y 4/4 moist), sandy clay loam to sandy clay, large blocky, somewhat stony.

Area III is about 275,000 acres in size. The relatively high elevations, the rough nature of the terrain, and the extensive occurrence of gravels make this area unsuitable for agricultural development. This area is classified as pasture and woodland.

Area IV

Area IV, which comprises 34 per cent of the map sheet, is the largest area delineated. The distinguishing features of this area are the abundance (about 70 per cent) of moss bog and the variable soil parent materials. Glacial till is the predominant material in the area but coarse textured outwash material is also of fairly common occurrence. The outwash materials are relatively shallow and frequently the till occurs within 36 inches of the surface.

Area IV consists of two separately outlined areas. Area IVA is the large undulating and depressional area to the east of Utikuma Lake, while Area IVB is a gently rolling portion of the moraine southwest of this lake. However, these areas are similar in soil parent materials. In order of predominance the materials are moss peat, glacial till, and outwash materials.

Generally, poor drainage is a characteristic of this area. Lakes are numerous in both portions of this area and range in size from a few acres to the largest - Utikuma Lake - which is approximately 76,000 acres in size. The range in elevations in this area is between 1,900 and 2,300 feet above sea level. The main

rivers draining the area are the Nipisi and Pastecho which flow north into the Peace River.

In the poorly drained positions a sphagnum moss type of Organic soil is predominant, while in the better drained locations Grey Wooded and Podzol soils occur on till or outwash materials.

A Grey Wooded soil, similar to that found in this area, has been described in the previous section of this report. The following is a description of a Podzol soil which has developed on coarse textured material. The entire profile lacks chroma but appears to have two weakly colored Bf horizons which differ slightly in value.

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	3	Deciduous leaf and coniferous needle litter. Slightly decomposed in lower portion.
Ae	3	Light grey (10YR 7/2 moist), fine sand, platy.
Bfj	2	Very pale brown (10YR 7/3 moist), fine sandy loam, single grain.
Bf	12	Pale brown (10YR 6/3 moist), fine sandy loam with lenses of fine and coarse sand, single grain.
C	at 18 to 40 inches below surface	Light brownish grey (10YR 6/2 moist), fine sand, single grain.

Podzol soils developed on gravelly outwash materials also occur in this area. The following is a description of this type of soil:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle mat.
Ae	4	Pinkish white (5YR 8/2 moist), fine sand, platy, some stones.
Bf	12	Reddish yellow (5YR 6/6 moist), sand and gravel, single grain.
C	at 17 inches below surface	Yellowish red (5YR 5/6 moist), sand and gravel, single grain.

Area IV is about 1,126,000 acres in size. This area is unsuitable for agricultural development because of the extensive area of moss peat bog. The area is classified as pasture and woodland.

Area V

Area V constitutes 10 per cent of the map sheet. The distinguishing characteristics are rough topography and an extensive occurrence of outwash materials. The soil parent materials are predominantly gravelly outwash material and some glacial till.

Area V occurs in two separate locations. Area VA is found in the east central portion of the map sheet between Marten Mountain and Pelican Mountain. Area VB represents the lower slopes of the Swan Hills southeast of the town of Slave Lake.

The drainage of the entire area is relatively good and muskegs are of minor occurrence. The elevation of the area is in the range 2,200 to 3,000 feet above sea level. The topography is rolling and hilly. The tree cover is fairly heavy and consists primarily of aspen poplar, pine, and spruce.

The soils of Area V have developed on two parent materials which, though distinct and different, occur intimately mixed. The outwash is usually gravelly and quite variable in depth. In some locations the glacial till occurs at the surface but usually underlies the outwash material at depths from 12 to 40 inches below surface.

Considerable variability in the soils developed on outwash material occurs within this area. Generally, the colors of the soils are relatively low in chroma. These soils vary in textural composition as well as type of profile development and in many respects are similar to Codesa, Heart, and Pinto soil series (6) that have been mapped in the Peace River district of Alberta. Grey Wooded, Bisequa Grey Wooded, and Brunisolic soils commonly occur on these materials.

The following description is that of a Grey Wooded soil developed on a mantle of gravelly outwash material:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Leaf mat, slightly decomposed in lower portion.
Ae	2	Light grey (10YR 7/2 moist), loamy sand, coarse platy.
Btj	5	Pale brown (10YR 6/3 moist), sandy loam, coarse platy.

C	10	Yellowish brown (10YR 5/4 moist), loamy sand, weak subangular blocky, gravel lenses and stones frequently occur.
IIC	at 19 inches below surface	Dark greyish brown (10YR 4/2 moist), clay loam, blocky to subangular blocky, glacial till.

The soils developed on glacial till are Grey Wooded. The following is a description of such a soil from this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Leaf mat, slightly decomposed in lower portion.
Ae	5	Pale brown (10YR 6/3 moist), fine sandy loam, weak platy, loose.
AB	3	Brown (10YR 5/3 moist), clay loam, subangular blocky, fairly firm.
Bt	15	Dark brown (10YR 3/2 moist), clay, blocky, fairly hard.
C	at 25 inches below surface	Dark greyish brown (10YR 4/2 moist), sandy clay, blocky, no lime to 40 inches.

Area V is approximately 335,000 acres in size and is classified as pasture and woodland. The rough nature of the topography and the abundance of gravelly outwash material make the area unsuitable for agricultural development.

Area VI

Area VI constitutes about 10 per cent of the map sheet and occurs south of Lesser Slave Lake in two separate sections. The soil parent materials in this area are similar to those previously described (Area V) but the relative abundance of the various materials is considerably different. In Area VI the parent materials are predominantly glacial till, some sandy and gravelly outwash materials, and a minor amount of bog. A patchy occurrence of stones is also a characteristic of the area.

This area is fairly well drained and the elevations range between 2,000 and 3,000 feet above sea level. In Area VIA the topography is gently rolling and rolling, while Area VIB is predominantly gently rolling. Generally, the tree cover in this area is medium to heavy.

The soils in this area are similar to those described in the preceding section of this report. Generally, Grey Wooded soils occur on the till and Bisequa Grey Wooded soils on the coarse textured materials which frequently overlie the till.

Area VI is about 312,000 acres in size and is classified as doubtful arable land because of the occurrence of outwash materials, stony patches, and bog. The rolling portion of this area is classified as pasture and woodland.

Area VII

Area VII occurs in three separate locations in the map sheet. It is approximately 476,000 acres in size and comprises 14 per cent of the total area. Area VIIA is adjacent to Fawcett Lake and south of the high land extending from Marten Mountain to Pelican Mountain; Area VIIB is adjacent to Lesser Slave Lake and Utikuma Lake; and Area VIIC is west of Utikuma Lake.

The elevations range between 2,000 and 2,800 feet above sea level. The area is fairly well drained. The topography in these areas is mostly gently rolling with some rolling. The tree cover is fairly heavy, consisting mainly of aspen poplar and black spruce.

The soil parent materials in Area VII are similar to those described for Areas V and VI. However, in this area, the order of relative abundance of the three common parent materials is glacial till, bog, and outwash material. The mineral soil types occurring in this area are similar to those previously described. Generally, Grey Wooded soils occur on the till while on the shallow outwash materials the soils are Grey Wooded or Bisequa Grey Wooded in character.

The Organic soils of this area are mainly of the sphagnum moss type.

Area VII is classified as doubtful arable land mainly because of an appreciable amount of muskeg and the occurrence of sandy and gravelly outwash or stony patches within the area.

Area VIII

Area VIII is found in two locations along the western edge of this map sheet and comprises about four per cent of the map sheet. Area VIIIA is north of Lesser Slave Lake and Area VIIIB is in the southwest corner of the map sheet. In both of these portions of the area, the topography is gently rolling and the elevations are in the range 2,000 to 2,800 feet above sea level.

Grey Wooded soils developed on a glacial till are predominant in these areas. Sandy outwash materials or large moss peat bogs are of infrequent occurrence.

Area VIII is approximately 135,000 acres in size and is classified as potentially arable land. Steep eroded slopes and moss peat bogs occur within the area but are usually too small to outline on the map.

Area IX

Area IX is 134,000 acres in size and comprises about four per cent of

the map sheet. This area occurs in the southwestern portion of this map sheet and is generally characterized by undulating topography. The tree cover of the area consists of a fairly heavy stand of aspen poplar, spruce, and some pine. The soil parent materials in this area are mixed lacustrine and till materials which frequently appear to grade together.

The soils of this area are Grey Wooded, Dark Grey Wooded, and Dark Grey in character. The Dark Grey Wooded soils are perhaps of most frequent occurrence with about equal amounts of Grey Wooded and Dark Grey soils.

The following is a description of a Dark Grey Solod, similar to the Esher (4) developed on a greyish brown and dark grey clay to clay loam in this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Dark brown (10YR 4/2 moist), leaf litter.
Ah	3	Dark brown (10YR 4/2 moist), silt loam, weak subangular blocky.
Ae	3	Light yellowish brown (10YR 6/4 moist), silt loam, platy.
AB	2	Light yellowish brown (10YR 6/4 moist), silty clay loam, subangular blocky.
Bt	12	Dark yellowish brown (10YR 4/4 moist), clay, medium columnar breaking to fine blocky.
BC	10	Greyish brown (10YR 5/2 moist), to dark grey (10YR 4/1 moist), clay, compact, weak subangular blocky to massive.
Ck	5	Greyish brown (10YR 5/2 moist), to dark grey (10 YR 4/1 moist), clay, moderate lime content.
Csk	at 36 inches below surface	Greyish brown (10YR 5/2 moist), clay, some strata of dark grey clay in which salt pockets occur.

Area IX is considered to be suitable for agricultural development because of a favorable combination of topography and soils. Soils similar to those found in this area are extensively cultivated in other portions of the Peace River district of Alberta.

Area X

Area X occurs adjacent to Lesser Slave Lake and forms the deltas of

Driftpile and Swan Rivers as well as several streams in the vicinity of the town of Slave Lake. The topography of these deltas is undulating and depressional. The vegetative cover is of medium to heavy density. Aspen poplar and some willow occur in better drained positions while sedge and willow predominate in the poorly drained positions.

The soils in this area show very little horizon development except for an Ah horizon but frequently show a stratification of sandy and silty materials in the profile. Staining, or other evidence of imperfect or poor drainage, is common. The soils in this area are similar to the High Prairie and Enilda series which have been described (4) in reconnaissance soil survey reports. Sedge bogs commonly occur in this area.

The following is a description of a soil commonly occurring in this area, a Gleyed Dark Grey soil developed on recent alluvium:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Dark brown (10YR 3/3 moist), leaf and grass litter, pH 7.2.
Ah	4	Dark greyish brown (10YR 4/2 moist), with splotches of dark grey (10YR 5/2 moist), silt loam, friable, pH 7.0.
Bmg	12	Brown (10YR 5/3 moist), to pale brown (10YR 6/3 moist), silty loam, subangular blocky, friable. Upper portion often splotched with dark grey and iron stains, pH 6.3.
Cg	at 17 inches below surface	Brown (10YR 5/3 moist), stratified materials, with little uniformity as to thickness or texture of the various strata. Occasional buried Ah horizon, pH 6.5 to 7.0.

Area X is approximately 86,000 acres in size and comprises less than three per cent of the map sheet. With the exception of a few large bogs, Area X is classified as arable land.

Summary

A summary of the acreage in each of the land rating categories for map sheet 83-O is given in table III:

Table III. Land rating classification for map sheet 83-O

Area	Arable, acres	Doubtful, acres	Pasture and Woodland, acres	Water, acres
Area I			173,000	
Area II			36,000	
Area III			275,000	
Area IV			1,126,000	
Area V			335,000	
Area VI		255,000	57,000	
Area VII		476,000		
Area VIII	134,500			
Area IX	134,000			
Area X	86,500			
Lesser Slave Lake				269,000
Utikuma Lake				76,000
Total	355,000	731,000	2,002,000	345,000

Alberta Map Sheet 83-P

Alberta map sheet 83-P represents the central portion of the mapped area. Only a small portion of this map sheet is accessible by road. The roads traversed for this survey included Slave Lake to Wabasca Lake, Athabasca to Calling Lake, Highway No. 2 and the portion of the road between Lac La Biche and Wandering River. At present a new highway is under construction between Wandering River and Fort McMurray in map sheet 74-D.

The physiographic features of this map sheet generally show less diversity than those of map sheet 83-O but the variations in soil parent materials are similar with one major exception. In this map sheet no area was found which could compare to the characteristic combination of preglacial gravels and bedrock encountered in the Swan Hills area of map sheet 83-O.

This map sheet has been divided into eight major areas as shown on the accompanying map. As previously stated, the basis for these separations is differences in parent materials or variations in their proportions. The areas are indicated on the accompanying map and the parent materials listed in order of abundance.

The prominent features of this map sheet are the high land associated with Pelican Mountain (Area II), the extensive and predominantly bog area along the Athabasca River (Area I), and the sands (Area VII) associated with the Athabasca River. The greater portion of this map sheet area consists of a till plain with varying proportions of three common soil parent materials - glacial till, bog, and outwash materials.

Settlement in this map sheet is very limited, the largest being in the vicinity of Wandering River. Other settlements in this map sheet are adjacent to Wabasca and Calling Lakes and along Highway No. 2.

Some commercial timber occurs in patches in the vicinity of Calling Lake and Pelican Mountain.

Area I

Area I is about 1,240,000 acres in size and comprises 36 per cent of the map sheet. The area extends along the Athabasca River and includes the northern portion of the map sheet. Approximately 70 per cent of this area is moss peat bog. The distinguishing features of Area I are the high proportion of bog, and the level and depressional topography. Sandy outwash of variable thickness occurs more frequently than till.

The area is poorly drained and relatively flat, with elevations that range between 1,800 and 2,200 feet above sea level. Drainage is by way of the Athabasca River, mainly through its tributaries the Pelican, Parallel, Calling, House, and La Biche Rivers. Numerous lakes, which range in size from a few acres to several thousand acres, occur in this area. The lakes appear to be quite shallow and sedge or moss peat bogs are commonly found around their edges.

Generally, the tree cover is of medium to heavy density. In the better drained position jack pine, aspen poplar or spruce occur in mixed and pure stands; while in poorly drained areas black spruce and tamarack are the most common tree species.

Sphagnum peat bogs predominate but sedge peat bogs also occur in this area.

Most of the mineral soils occurring in this area have developed on relatively shallow sandy or occasionally gravelly materials. These coarse textured materials overlying the till vary in thickness from several inches to over three feet. The soils are exceedingly variable in regards to the type of profile development and

frequently Podzol, Minimal Podzol, Bisequa Grey Wooded, or Grey Wooded soils occur close together. Grey Wooded soils tend to occur on till or sometimes on relatively shallow outwash.

The following is a description of a Podzol soil developed on a sandy mantle which overlies glacial till:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Semi-decomposed leaves.
Ae	6	White (10YR 8/2 moist), sand, single grain, pH 6.0.
Bf	8	Brownish yellow (10YR 6/8 moist), sand, single grain, pH 6.0.
C	10	Yellow (10YR 7/6 moist), sand, single grain, pH 6.0.
IIC	at 25 inches below surface	Light yellowish brown (10YR 6/4 moist), to dark grey brown (10YR 4/2 moist), sandy clay loam, subangular blocky, till, pH 6.5.

Another soil frequently found in Area I is a Minimal Podzol (with a weakly expressed Bf horizon) developed on a coarse textured alluvial material. The following is a description of this soil type:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
Ah	1	Very dark grey (10YR 3/1 moist), fine sand.
Ae	4	Very pale brown (10YR 7/4 moist), fine sand, single grain.
Bfj	8	Light yellowish brown (10YR 6/4 moist), fine sand, single grain.
C	at 13 inches below surface	Pale brown (10YR 6/3 moist), alternating strata of fine sand and coarse sand to below 40 inches. No lime.

The extensive occurrence of moss peat bogs and sandy soils makes this area unsuitable for agricultural development. Area I is classified as pasture and woodland.

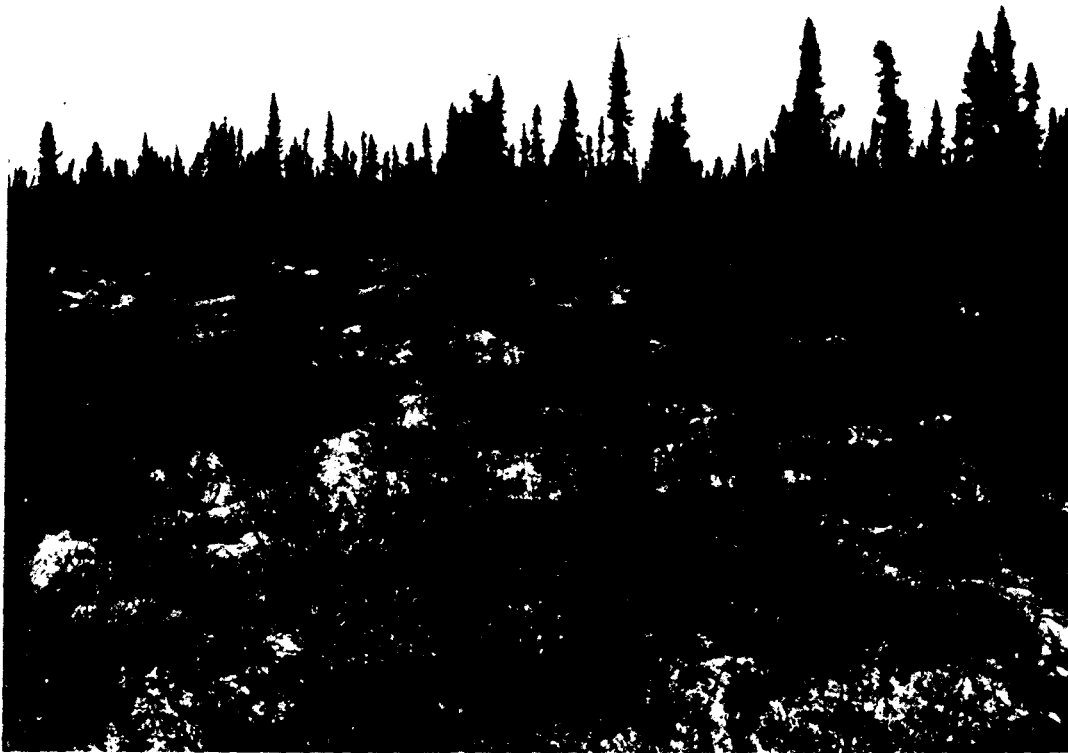


Figure 3. Cover typical of moss peat bogs, labrador tea and sphagnum moss in the foreground, black spruce in the background.

Area II

Area II is about 190,000 acres in size or six per cent of the map sheet. This area forms the divide between the Peace River and the Athabasca River Drainage system. The Wabasca River flows north to the Peace River while the drainage into the Athabasca River is by way of Fawcett and Calling Rivers.

Area II includes Pelican Mountain and the adjacent rolling area. The elevations range between 2,000 and 3,000 feet above sea level. The rough nature of the topography and the predominance of gravelly outwash materials are the two outstanding characteristics of this area. The soil parent materials are coarse textured outwash, glacial till, and moss peat bog. The area is fairly well drained. Tree cover is heavy and some stands are of commercial value.

Inspections indicate that the soils are principally Bisequa Grey Wooded or Grey Wooded in character and have developed on coarse textured alluvial material which overlies glacial till.

The following is a description of a Grey Wooded soil with a weakly expressed B horizon on a sandy material:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H and Ah	1	Leaves and sandy loom, brown (10YR 5/3 moist), loose.

Ae	4	Light greyish brown (10YR 6/2 moist), fine sand, single grain.
Btj	20	Pale brown (10YR 6/3 moist), loamy sand, single grain.
C	16	Greyish brown (10YR 5/2 moist), alternating strata of coarse and fine sand.
IIC	at 41 inches below surface	Greyish brown (10YR 5/2 moist), clay loam, blocky, till.

The rough nature of the topography and the sandy and gravelly outwash materials make this area unsuitable for agricultural development. As previously stated, the tree cover is heavy and this area apparently is capable of supporting a good stand of timber. Area II is classified as pasture and woodland.

Area III

Area III is found in the east central portion of the map sheet and comprises about 13 per cent of the area. In all, approximately 475,000 acres are included in this area. The main characteristics of this area are the predominantly gently rolling topography and the occurrence of the three dominant soil parent materials common to most of the till plain areas in this general region. In this area sandy outwash is predominant but a considerable amount of moss peat bog and smaller amounts of till are found throughout the area.

The entire area is drained by the Athabasca River and its tributaries, the Wandering and House Rivers. The elevations in the area are between 2,000 and 2,500 feet above sea level. Generally, this area is poorly drained as evidenced by the extensive occurrence of bogs. Approximately 40 per cent of the area is sphagnum moss bog.

The tree cover is medium in size and density and consists mainly of mixed stands of immature jack pine, aspen poplar, and white spruce. No commercial stands of timber were noted. In the poorly drained positions black spruce and tamarack are the predominant trees.

The mineral soils of this area are Bisequa Grey Wooded, Podzol, or Grey Wooded in character and have developed usually on either a sandy alluvium overlying glacial till, or on the glacial till. Usually the soils on the coarser textured material are Bisequa Grey Wooded or Podzol soils while those on till are Grey Wooded.

The following is a description of a Podzol soil developed on sand:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Semi-decomposed leaves.
Ae	5	Light grey (10YR 6/1 moist), sand, single grain, pH 5.0.
Bf	8	Yellowish red (5YR 5/6 moist), sand, single grain, pH 5.5.
C	at 14 inches below surface	Yellowish brown (10YR 5/6 moist), sand, single grain, pH 5.5.

The following is a description of a Grey Wooded soil typical of those developed on till:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Partly decomposed leaves.
Ae1	3	Light grey to grey (10YR 6/1 moist), fine sandy loam, weak platy.
Ae2	2	Greyish brown (10YR 5/2 moist), fine sandy loam, weak platy.
Bt	12	Brown (7.5 YR 5/4 moist), clay loam, subangular blocky.
C	at 18 inches below surface	Brown to greyish brown (10YR 5/3 moist), clay loam, sub-angular blocky, till.

The widespread occurrence of sandy soils and moss peat bogs makes this area unsuitable for agricultural development. Area III is classified as pasture and woodland.

Area IV

Area IV occurs in two separate locations on the map sheet. Area IVA is found adjacent to and north of Calling Lake, while Area IVB is located east of the Wandering River settlement. These areas constitute about 800,000 acres or 23 per cent of the map sheet.

The three soil parent materials of this area are similar to those in the previously described area but the relative proportions of these materials are different. In Area IV till predominates, followed by sphagnum moss bog and sandy outwash.

The topography varies considerably in the area. In Area IVA the topography is predominantly gently rolling with occasional small areas of rolling, while Area IVB is undulating. The elevations in these areas range between 2,000 and 2,600 feet above sea level. Throughout most of the area drainage is fair but in some areas it is very restricted. Sphagnum moss bogs constitute about 25 per cent of the area.

The tree cover is medium to heavy and consists mostly of an immature mixed stand of spruce, aspen, poplar, and jack pine. Occasionally small areas of commercial timber occur. Black spruce and some tamarack are found in the poorly drained positions.

The mineral soils of Area IV are Grey Wooded, Bisequa Grey Wooded, or Podzol in character and have developed on glacial till or a relatively shallow deposit of sand which overlies the till. Frequently, portions of this area are quite stony. As frequently noted in other areas of this region the soils in Area IV which have developed on till tend to be Grey Wooded in character while those developed on coarser material tend to be Bisequa Grey Wooded or Podzol.

The following is a description of a shallow Podzol soil developed on sand overlying glacial till. This soil type is of fairly common occurrence in this area.

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Semi-decomposed leaves.
Ae	5	Light grey (10YR 7/2 moist), sand, single grain, pH 5.6.
Bf	8	Yellowish brown (10YR 5/6 moist), sand, single grain, some stones, pH 5.8.
C	6	Light yellowish brown (10YR 6/4 moist), sand, single grain, some stones, pH 6.0.
IIC	at 20 inches below surface	Olive brown (2.5Y 4/4 moist), sandy clay loam, sub-angular blocky, till, pH 6.5.

In addition to the above described soil profile Grey Wooded and Bisequa Grey Wooded soils on similar material frequently occur in this area.

Most of Area IV is classified as doubtful arable land because of the appreciable amount of bog, variable topography, and the occurrence of excessively stony or sandy soils. Part of Area IVB is classified as pasture and woodland because of a somewhat greater proportion of moss peat bog.

Area V

Area V occurs in two separate locations in this map sheet. Area VA is adjacent to Wabasca Lake and Area VB is south of Calling Lake. In both of these areas the topography is undulating to depressional and approximately 70 per cent of the area consists of sphagnum moss bog. The elevations range between 1,900 feet above sea level.

Area V is similar to Area I in topography and in predominance of moss bog. However, these areas differ in that in Area V glacial till is of more extensive occurrence than glacial outwash.

Area V is approximately 480,000 acres in size and constitutes 14 per cent of the map sheet.

Aspen poplar, spruce, and jack pine occur in pure or mixed stands in the better drained positions, while black spruce and tamarack are abundant in the moss bogs.

Organic soils of the sphagnum moss type predominate in this area.

The mineral soils of this area are quite varied. They may be Grey Wooded, Bisequa Grey Wooded, Podzol, or occasionally Brown Wooded in character, and have developed on glacial till or a sandy outwash which overlies the till. Grey Wooded soils developed on till are the most common of the mineral soils occurring in this area.

The following is a description of a Grey Wooded soil developed on glacial till:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Dark brown (10YR 3/3 moist), organic debris.
Ah	1	Greyish brown (10YR 5/2 moist), loam.
Ae	6	Light yellowish brown (10YR 6/4 moist), fine sandy loam, platy.
AB	1	Yellowish brown (10YR 5/4 moist), silty clay loam, subangular blocky.
Bt	10	Dark yellowish brown (10YR 4/4 moist), clay loam, blocky.
C	at 19 inches below surface	Brown (10YR 5/4 moist), sandy clay loam, blocky, till.

Area V is considered unsuitable for agricultural development because of the extensive area of moss bog. This area is classified as pasture and woodland.

Area VI

Area VI is about 80,000 acres in size and constitutes two per cent of the map sheet. This area occurs in the southwest corner of the map sheet as three islands or ridges of till separated by the sands which are associated with the Athabasca River.

In order of their abundance the three common soil parent materials are till, shallow sandy outwash, and bog. The topography of this area is gently rolling and rolling and the elevations are in the range of 2,000 to 2,300 feet above sea level. Generally, the area is fairly well drained but some bogs of sphagnum peat and sedge peat occur throughout.

The tree cover is medium to heavy and consists mostly of aspen poplar, spruce, and jack pine.

Soil profiles similar to those occurring in Area VI have been described in previous sections of this report. The most common soil type in the area is Grey Wooded in character and has developed on a clay loam till. Soils developed on sandy outwash are frequently Bisequa Grey Wooded.

The rolling portion of this area has been classified as pasture and woodland while the gently rolling portion has been classified as doubtful arable land.

Area VII

Area VII is the sand and bog area in the vicinity of Smith and other locations adjacent to the Athabasca River. It is approximately 93,000 acres in size and constitutes three per cent of the map sheet. Area VII is shown on the map in three separate locations. Area VIIA and VIIB are in the southwest corner of the map sheet while Area VIIC occurs in townships 69 and 70, range 19, along the Athabasca River.

These areas, though separated, are quite similar in character in that 50 to 70 per cent of the area is moss or mixed moss and sedge peat bog while the remainder is mostly sand (frequently sand dunes) with occasional patches of sandy loam. The topography is gently rolling and the elevations are in the range of 1,900 to 2,100 feet above sea level.

The mineral soils of the area are Podzol or Minimal Podzol in character and have developed on fine sand or sandy loam. The following is a description of a Podzol soil which occurs in this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Undecomposed leaves.
Ae	6	Very pale brown (10YR 7/4 dry), fine sandy loam, single grain, pH 6.7
Bf	16	Yellowish brown (10YR 5/8 dry), fine sand to fine sandy loam, single grain, pH 6.1.
BC	10	Light olive brown (2.5Y 5/4 dry), fine sand, single grain, pH 7.6.
Ck	at 33 inches below surface	Light yellowish brown (2.5Y 6/4 dry), fine sand, single grain, pH 8.3.

Most of Area VII is classified as pasture and woodland because of the predominance of sand and bog. However, some portions of this area are better drained, contain less bog, and are sandy loam in texture. These portions are classified as doubtful arable land.

Area VIII

Area VIII includes most of the settlement in the vicinity of Wandering River. It is approximately 70,000 acres in size and comprises two per cent of the map sheet.

The topography in this area is predominantly gently rolling with undulating patches. Approximately 20 per cent of this area is moss peat bog. The distinguishing characteristics of Area VIII are a variety of soil parent materials and the occurrence of Dark Grey Wooded and occasionally Dark Grey soils in a predominantly Grey Wooded area. In order of abundance the four commonly occurring soil parent materials in the area are glacial till, shallow outwash overlying the till, shallow lacustrine clays which occur in small separated basins, and peat bog. Generally, the area is fairly well drained. Most of the soils are Grey Wooded or Dark Grey Wooded in character and many are similar to soils on comparable parent materials which have been described in earlier sections of this report. In areas of restricted drainage gleyed soils are of common occurrence. Stony patches occur in the area and the soils in the northern portion of Area VIII are somewhat stonier and coarser in texture than those in the southern portion.

Area VIII is generally arable land except for the isolated bogs that occur throughout the area.

Summary

A summary of the acreage in each of the land rating categories for map sheet 83-P is given in table IV:

Table IV. Land rating classification for map sheet 83-P

Area	Arable, acres	Doubtful, acres	Pasture and Woodland, acres	Water, acres
Area I			1,230,000	15,000
Area II			190,000	
Area III			473,000	
Area IV		768,000		33,000
Area V			462,000	17,000
Area VI		33,000	47,000	
Area VII		3,000	90,000	
Area VIII	70,000			
Total	70,000	804,000	2,492,000	65,000

Alberta Map Sheet 73-M

Alberta map sheet 73-M is the most eastern portion of the area covered in this report. This map sheet is traversed by the Northern Alberta Railways but there are no roads in the area except for an occasional trail.

The entire map sheet consists mainly of an extensive till plain area which slopes gradually to the northeast. The streams in the area flow slowly, seldom are contained by steep banks or large valleys, and often make abrupt changes in their general direction of flow (for example, Christina River). The abundance of moss peat bogs and the absence (over large areas) of grass and forage are characteristic of this map sheet. The predominant soil parent materials (moss peat bog, outwash materials, and glacial till) vary only in relative proportions throughout the mapped area. The high, rough land in the vicinity of Cowpar Lake (Area II) and the spillway associated with Sand River (Area IV) are prominent physiographic features of this map sheet.

The map sheet is divided into six areas as shown on the accompanying map and described accordingly. The soil parent materials of each area are also designated (in order of decreasing predominance) on the map.

In 1928 Wyatt and Younge (7) traversed a considerable portion of this area by pack horses but their report was never published. Their description of the general area and its physiographic and glacial features and specific observations of vegetation and bog characteristics are very interesting.

Settlement in this map sheet is limited and is confined to two Indian Reserves and an occasional house along the railroad. There is practically no agricultural development but there are some lumber camps in the southern portion of the map sheet.

Area I

Area I is the largest area outlined on this map sheet. It is approximately 2,802,000 acres in size and constitutes 82 per cent of the map sheet.

The main characteristic of this area is the widespread occurrence of a mixture of three commonly occurring soil parent materials. The materials, in order of their abundance, are sphagnum moss bog, sandy or gravelly outwash materials, and glacial till. Although the soil parent materials are similar throughout, this area contains a considerable range and variation in topography and physiographic or local surface features. The elevations range from a low of 1,600 feet in Range 5 along the Christina River, to a high of 2,400 feet above sea level in the morainic areas south and east of Winefred Lake.

The height of land separating the Athabasca and the North Saskatchewan drainage systems extends across this area south of Winefred Lake. The rise to this height of land, from the north, is quite pronounced. Rolling areas are shown on the map in this vicinity. These areas have long complex slopes which generally extend from the crown of this divide to the north. The top is predominantly gently rolling. Some portions of the crown are characterized by low, irregular morainal ridges and bog, with no fixed trend of direction; other portions show a pronounced orientation and elongation of bogs and ridges in a northwest to southeast direction.

The central and the northern portions of Area I are gently rolling and undulating. Frequently throughout this area, a two-directional pattern of surface features can be observed. The smaller drainage courses and ridges are in a northwest to southeast direction, while the large main river courses are in a southwest to northeast direction. In this area none of the streams have pronounced valleys or banks. Many of the individual drainage basins consist of large elongated moss peat bogs containing slow flowing streams which meander through the middle. These drainage basins may be three or four miles wide and many miles long. Similar observations about the streams and directional characteristics of land surface pattern were recorded by Wyatt (7).

Generally, this area is poorly drained and frequently within the area the amount of moss peat bog will range between 50 and 80 per cent.

The mineral soils in the area are Podzol, Minimal Podzol, Gleyed Podzol, and occasionally Bisequa Grey Wooded or Grey Wooded in character. The brightly colored Podzol soils occur on moderate to deep sandy or gravelly outwash materials in well drained positions.

In most gently rolling and rolling areas the soils tend to be uniform in type of profile development. The ridges are usually well drained and the soils on the coarse textured materials are predominantly Podzol in character. In undulating and gently rolling areas, like the northern and central portion, the mineral soils in this region are generally more variable in type of profile development and drainage characteristics. In addition to moss peat bogs found occurring in poorly drained positions and well developed brightly colored Podzol soils found in well drained positions, other mineral soils occur in areas of intermediate drainage. Numerous mixtures and variants of Minimal Podzol (Podzolic soils with weak color contrasts between horizons), Podzol and Gleyed Podzol soils may be found in these areas.

The following description is of a Podzol soil developed on sand in the vicinity of Conklin:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Partly decomposed leaves.
Ae	5	Pinkish grey (7.5YR 7/2 moist), sand, weak platy, pH 5.1.
Bf	8	Strong brown (7.5YR 5/8 moist), sand, single grain, pH 6.5.
BC	12	Yellow (10YR 7/6 moist), sand, single grain, pH 6.1.
C	14	Very pale brown to yellow (10YR 7/4 - 7/6 moist), sand, single grain, pH 5.9.
IIC	at 40 inches below surface	Greyish brown (10YR 5/2 moist), clay loam, subangular blocky, till, pH 4.8.

Numerous soils, similar to that just described, occur in this area but are often found on a shallow outwash. Frequently the mantle of outwash is a gravelly and stony loamy sand and less than two feet in thickness.

In the northeast portion of the map sheet and throughout other level to undulating portions of this area, Gleyed Podzol soils frequently occur on the outwash materials. The following is a description of a Gleyed Podzol:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needles and deciduous leaf mat.
Ae	4	Pinkish grey (7.5YR 7/2 moist), sand, weak platy, pH 5.0.
Bfg	8	Yellowish brown (10YR 5/6 moist), with splotches of yellowish red (5YR 5/6 moist), sand, single grain, pH 5.5.
Cg	30	Brown (10YR 5/3 moist) with splotches of reddish brown (5YR 5/4 moist), sand, single grain, pH 5.8.
II Cg	at 42 inches below surface	Yellowish brown (10YR 5/4 moist), with occasional yellowish red (5YR 5/6 moist), clay loam, blocky, iron stained till, pH 6.2.

In areas where the outwash materials do not occur or are very shallow, the soils are usually Grey Wooded in character. The following description is that of a Grey Wooded soil developed on till:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Semi-decomposed leaves.
Ae	4	Very pale brown (10YR 7/4 moist), sandy loam, weak platy.
AB	2	Brown (10YR 5/3 moist), clay loam, subangular blocky, fairly firm.
Bt	11	Brown to dark brown (10YR 4/3 moist), clay loam, blocky, firm.
BC	12	Dark greyish brown (10YR 4/2 moist), clay loam, blocky, firm.
C	at 30 inches below surface	Greyish brown (10YR 5/2 moist), clay loam, large blocky, till.

The large amount of muskeg and the abundance of sandy or gravelly outwash materials make this area unsuitable for agricultural development. Area I is classified as pasture and woodland.

Area II

The area in the vicinity of Cowper Lake is relatively rough land which rises above the immediate land surface. The elevations in this area range between 1,600 and 1,900 feet above sea level. The area, designated on the map as Area II is approximately 128,000 acres in size and comprises four per cent of the map sheet.

The distinguishing features of the area are the rolling and occasionally hilly topography, the generally good drainage, and the mixture of soil parent materials in the area. In order of relative abundance the common soil parent materials are coarse textured outwash, glacial till, and bog.

The tree cover in this area is fairly heavy and consists mainly of aspen poplar and some spruce, pine, and alder. Black spruce, tamarack, and willow are common in the poorly drained positions.

The mineral soils of Area II are quite similar to those of Area I. The outwash material ranges in texture from a stone-free fine sand to a gravelly stony coarse sand, and may vary in thickness from several inches to four feet. The soils developed on till are Grey Wooded in character while those developed on outwash materials are Podzol or Bisequa Grey Wooded in character.

The Grey Wooded soils developed on till frequently have two leached horizons which differ slightly in color. The following is a description of such a soil from this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle mat, slightly decomposed in lower portion.
Ae1	2	Light grey (10YR 7/2 moist), fine sandy loam, platy.
Ae2	4	Pale brown (10YR 6/3 moist), fine sandy loam, platy.
AB	2	Pale brown (10YR 6/3 moist), clay loam, subangular blocky.
Bt	10	Brown (10YR 5/3 moist), silty clay to clay, blocky, firm.
BC	19	Light greyish brown (10YR 6/2 moist), silty clay, blocky, firm.
C	at 38 inches below surface	Greyish brown (10YR 5/2 moist), clay loam to clay, blocky, till.

In addition to the well drained soils developed on till or outwash material, some poorly drained soils occur throughout this area. These soils are usually either Low Humic Eluviated Gleysol or Gleyed Grey Wooded in character.

The following is a description of a Low Humic Eluviated Gleysol soil developed on till:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Leaf and sedge litter.
Ah	2	Black (10YR 2/1 moist), sandy loam.
Aeg	4	Light grey (10YR 7/1 moist), sandy loam, coarse platy, mottled.
Btg	12	Greyish brown (10YR 5/2 moist), clay, massive, mottled, sticky.
Cg	at 19 inches below surface	Dark greyish brown (10YR 4/2 moist), sandy clay, massive, wet and sticky.

Area II is unsuitable for agricultural development because of the rough nature of the topography and the frequent occurrence of sandy outwash material. This area is classified as pasture and woodland.

Area III

Area III occurs in the southwest corner of the map sheet. This area is approximately 330,000 in size and comprises nine per cent of the map sheet.

Generally, this area is characterized by gently rolling and rolling sandy outwash ridges which are separated by moss peat bog or occasionally by sedge peat bog. Approximately 30 to 40 per cent of the area consists of mass bog. In order of abundance the common soil parent materials are sandy outwash, bog, and glacial till. The elevations in this area range between 1,900 and 2,300 feet above sea level.

The tree cover is light to medium and consists mainly of aspen, poplar, jack pine, and spruce. In some of the poorer drained positions some willow occurs.

In this area the mineral soils are Podzol or Bisequa Grey Wooded in character and occur predominantly on a sandy outwash material. The following is a description of a Podzol soil from this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Pine needle litter.
Ae	4	Pinkish grey (7.5YR 7/2 moist), sand, single grain, loose.
Bf	6	Strong brown (7.5YR 5/8 moist), sand, single grain, loose.
C1	20	Light yellowish brown (2.5Y 6/4 moist), sand, single grain, loose.
C2	at 31 inches below surface	Light yellowish brown (2.5Y 6/4 moist), sand and gravel.

Area III is considered unsuitable for agriculture development because of the widespread occurrence of sandy soils and moss peat bog.

Area IV

Area IV is approximately 56,000 acres in size and comprises only about one per cent of the map sheet.

This area appears to be the beginning of a large spillway which extends south along Sand River. It is extremely variable in topography. In general, however, it is gently rolling to rolling.

The soils of this area are usually Podzol in character and have developed on a coarse textured outwash material that is associated with the wide spillway. The following is a description of a Podzol soil from the area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Pine needle litter.
Ae	4	Pinkish white (5YR 8/2 dry), sand, single grain, loose.
Bf	3	Reddish brown (5YR 5/4 dry), sand, single grain, loose.
BC	14	Yellowish brown (10YR 5/6 dry), sand, single grain, loose.
C	at 22 inches below surface	Pale brown (10YR 6/3 dry), sand, single grain, loose.

The sandy nature of the soils makes this area unsuitable for agricultural development.

Area V

Area V is approximately 104,000 acres in size and constitutes three per cent of the map sheet. It is the gently rolling and rolling area in the vicinity of Heart Lake. The three commonly occurring soil parent materials, in order of abundance, are glacial till, outwash, and bog. The elevations in this area range between 2,000 and 2,400 feet above sea level.

Generally, the drainage is fairly good. The major portion of this area is drained by the Owl and Heart Rivers, which are tributaries of the Athabasca River. About 20 per cent of the area consists of moss bog.

The tree cover is similar to that in Area III and consists mainly of aspen poplar, jack pine, and spruce.

The soils of Area V are mainly Grey Wooded in character and have developed on a sandy clay loam till. However, some outwash materials also occur in this area and the soils developed on these materials are Grey Wooded or Bisequa Grey Wooded in character.

The following is a description of a Grey Wooded soil found in this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Deciduous leaf litter.
Ah	1	Grey (10YR 5/1 moist), sandy loam, platy, friable.
Ae	5	Pale brown (10YR 6/3 moist), fine sandy loam, platy.
AB	2	Brown (10YR 5/3 moist), sandy clay loam, subangular blocky.
Bt	10	Yellowish brown (10YR 5/4 moist), sandy clay loam, blocky.
BC	6	Greyish brown (10YR 5/2 moist), sandy clay loam, large blocky.
Ck	at 25 inches below surface	Greyish brown (10YR 5/2 moist), sandy clay loam, massive to large blocky.

Area V is classified as doubtful arable land because of the abundance of stony outwash materials and bog.

Area VI

Area VI comprises the recent alluvial flats along the Christina River in the northern portion of the map sheet. The area is approximately 10,000 acres in size and constitutes less than one per cent of the map sheet. The topography is undulating but the flats are relatively small and badly dissected by stream channels.

The vegetative cover is predominantly grass and clumps of poplar or willow.

The soils are relatively recent alluvial soils characterized by depositional strata which frequently vary in texture but are predominantly fine sandy loam to fine sand. The Ah horizon is seldom over three inches in thickness. The soils in this area are generally similar to those in Area X of Alberta Map Sheet 83-O.

Area VI is classified as doubtful arable land because of the badly dissected nature of the river flats.

Summary

A summary of the acreage in each of the land rating categories for map sheet 73-M is given in table V:

Table V. Land rating classification for map sheet 73-M

	Arable, acres	Doubtful, acres	Pasture and Woodland, acres	Water, acres
Area I			2,770,000	32,000
Area II			128,000	
Area III			330,000	
Area IV			56,000	
Area V		82,000	8,000	14,000
Area VI		10,000		
Total		92,000	3,292,000	46,000

Some Chemical and Physical Characteristics of Representative Soil Profiles

A number of soil profiles were sampled for laboratory analysis. The main purpose of the analysis was to characterize the soils and to obtain some idea of their

relative fertility. Table VI gives the pH, nitrogen, phosphorus, calcium carbonate equivalent and textural composition of the soil profiles analyzed.

The samples analyzed indicate a generally acid soil reaction but there is considerable variation in the soils of the area.

The nitrogen content of a soil depends largely on the organic matter content and as a result a wide variation may be expected. The Ah horizon of Profile 6 contains 0.81 per cent nitrogen while the C horizon of Profile 4 contains less than 0.01 per cent nitrogen. In other areas (5) the nitrogen content in the surface foot of Grey Wooded soils varied from 0.04 per cent in coarse textured soils to 0.11 per cent in finer textured soils. The extremely low nitrogen content of the majority of the samples from this area can only partly be explained by the nature of their texture. Generally, in this area, the soils are extremely low in nitrogen while the phosphorus content is fairly comparable to that of the Grey Wooded soils of the Peace River District (4, 5). Consequently, the total phosphorus content of the soils frequently exceeds the nitrogen content. This is not typical of soils in most of the settled portions of the province and is in agreement with observations made by Wyatt and Younge (7).

The analyses for calcium carbonate equivalent confirm the field observations in that free lime carbonate occurs in some profiles.

Generally, the total exchange capacity of a soil depends mainly on the clay and organic matter content of the sample. This general parallelism is readily observable in the data of tables VI and VII. The Ah horizon of Profile 6 has a very high exchange capacity and is extremely high in the amount of exchangeable hydrogen.

The base saturation data indicate a relatively high base status throughout the profile in Profiles 1, 2, 3 and 5; while a considerably lower base status occurs in the upper solum of Profiles 4 and 6.

The relative predominance of the various basic cations varies with the soil sample but usually, in order of decreasing abundance, they are calcium, magnesium, potassium, and sodium. An outstanding exception is the large amount of magnesium in the C horizon of Profile 3.

Table VI. Soil reaction (pH), nitrogen, phosphorus, calcium carbonate equivalent and textural components of some representative soil profiles

Horizon	Thickness, in inches	pH	Nitrogen %	Phosphorus %	CaCO ₃ equiv.	Textural Components		
						sand %	silt %	clay %
Profile 1 - (7.2.2.) Grey Wooded, loam (5-75-3 W5)								
L-H	1	-	-	-	-	-	-	-
Ae	5	4.5	.027	.036	-	50	36	14
Bt	12	4.4	.039	.042	-	41	26	33
BC	22	4.4	.044	.045	-	39	27	34
C	at 40	5.7	.038	.051	.03	39	29	32
Profile 2 - (7.5/2.2.) Grey Wooded, sandy loam (31-74-3 W4)								
L-H	1	-	-	-	-	-	-	-
Ae	7	3.9	.051	.025	-	49	41	10
Bt	7	4.9	.038	.032	-	35	49	16
IIC1	20	4.6	.050	.038	-	16	34	50
IIC2	at 40	5.0	.032	.046	0.0	44	32	24
Profile 3 - (8.5/2.2.) Bisequa Grey Wooded, sandy loam (2-76-5 W4)								
L-H	1	-	-	-	-	-	-	-
Ae	3	5.2	.019	.015	-	75	22	3
Bt _{fj}	8	4.8	.018	.027	-	47	31	22
Bt	20	5.2	.005	.029	-	50	22	28
Ck	at 40	7.6	.011	.039	6.46	64	22	14
Profile 4 - (9.6.2.) Minimal Podzol, sand (24-70-14 W4)								
L-H	1	-	-	-	-	-	-	-
Aej	T	-	-	-	-	-	-	-
Bf	15	6.3	.0013	.038	-	91	5	4
BC	10	6.1	.006	.028	-	95	0	5
C	at 40	6.3	.002	.024	0.0	96	1	3

Profile 5 - (9.6.2.) Podzol, loamy sand (13-71-1 W5)

L-H	1	-	-	-	-	-	-	-
Ae	7	6.7	.038	.073	-	63	26	11
Bf	16	6.1	.0015	.044	-	88	4	8
BC	10	7.6	.0012	.049	.07	93	2	5
Cks	at 36	8.3	.0011	.042	11.33	94	1	5

Profile 6 - (9.6.2.) Podzol, loamy sand (9-72-2 W5)

Ah	1	3.8	.81	-	-	48	39	13
Ae	4	4.3	.04	-	-	83	12	5
Bf	4	4.7	.04	-	-	78	15	7
BC	6	4.6	.02	-	-	92	4	4
C	at 24	4.8	.02	-	0.0	91	4	5

T - Trace

Table VII. Cation exchange characteristics of some representative soil profiles

Horizon	Thickness, in inches	Total exchange capacity		Ca	Cations (m.e./100 gms.)			H	Base Sat., %
		Deter. (m.e./100 gms.)	Sum of cations (m.e./100 gms.)		Mg	K	Na		
Profile 1 - (7.2.2.) Grey Wooded, loam (5-75-3 W5)									
L-H	1	-	-	-	-	-	-	-	-
Ae	5	7.1	8.6	3.1	1.2	0.2	0.1	4.0	63
Bt	12	20.3	20.2	10.3	4.9	0.3	0.1	4.8	76
BC	22	22.9	24.4	13.1	6.0	0.4	0.1	4.8	85
C	at 40	19.5	22.8	14.2	6.1	0.4	0.1	2.0	100
Profile 2 - (7.5/2.2.) Grey Wooded, sandy loam (31-74-3 W5)									
L-H	1	-	-	-	-	-	-	-	-
Ae	7	9.3	9.3	1.5	0.6	0.2	T	7.0	26
Bt	7	7.0	7.7	3.0	1.2	0.2	0.1	3.0	67
IIC1	20	21.8	22.4	10.3	6.4	0.6	0.1	7.4	69
IIC2	at 40	14.0	13.9	6.4	3.8	0.2	0.1	3.4	75
Profile 3 - (8.5/2.2.) Bisequa Grey Wooded, sandy loam (2-76-5 W4)									
L-H	1	-	-	-	-	-	-	-	-
Ae ₁	3	1.7	1.8	1.1	0.3	0.1	0.1	0.2	94
Bt _{fj}	8	8.8	9.8	5.0	1.6	0.2	0.2	2.8	80
Bt	20	13.6	15.0	9.5	3.6	0.3	0.2	1.4	100
C	at 40	6.6	41.9	1.6	39.9	0.2	0.2	-	100
Profile 4 - (9.6.2.) Minimal Podzol, sand (24-70-14 W4)									
L-H	1	-	-	-	-	-	-	-	-
Ae _j	T	-	-	-	-	-	-	-	-
Bf	15	1.6	1.5	0.7	T	T	T	0.8	44
BC	10	1.1	1.1	0.6	T	T	0.1	0.4	64
C	at 40	0.8	1.4	0.6	0.1	T	0.1	0.6	100

Profile 5 - (9.6.2.) Podzol, loamy sand (13-71-1 W5)

L-H	1	-	-	-	-	-	-	-	-
Ae	7	8.3	9.3	6.7	1.0	0.2	T	1.4	95
Bf	16	5.6	6.7	4.5	0.7	0.1	T	1.4	95
BC	10	3.8	3.8	3.4	0.3	0.1	T	-	100
Cks	at 36	2.6	17.8	17.4	0.3	0.1	T	-	100

Profile 6 - (9.6.2.) Podzol, loamy sand (9-72-2 W5)

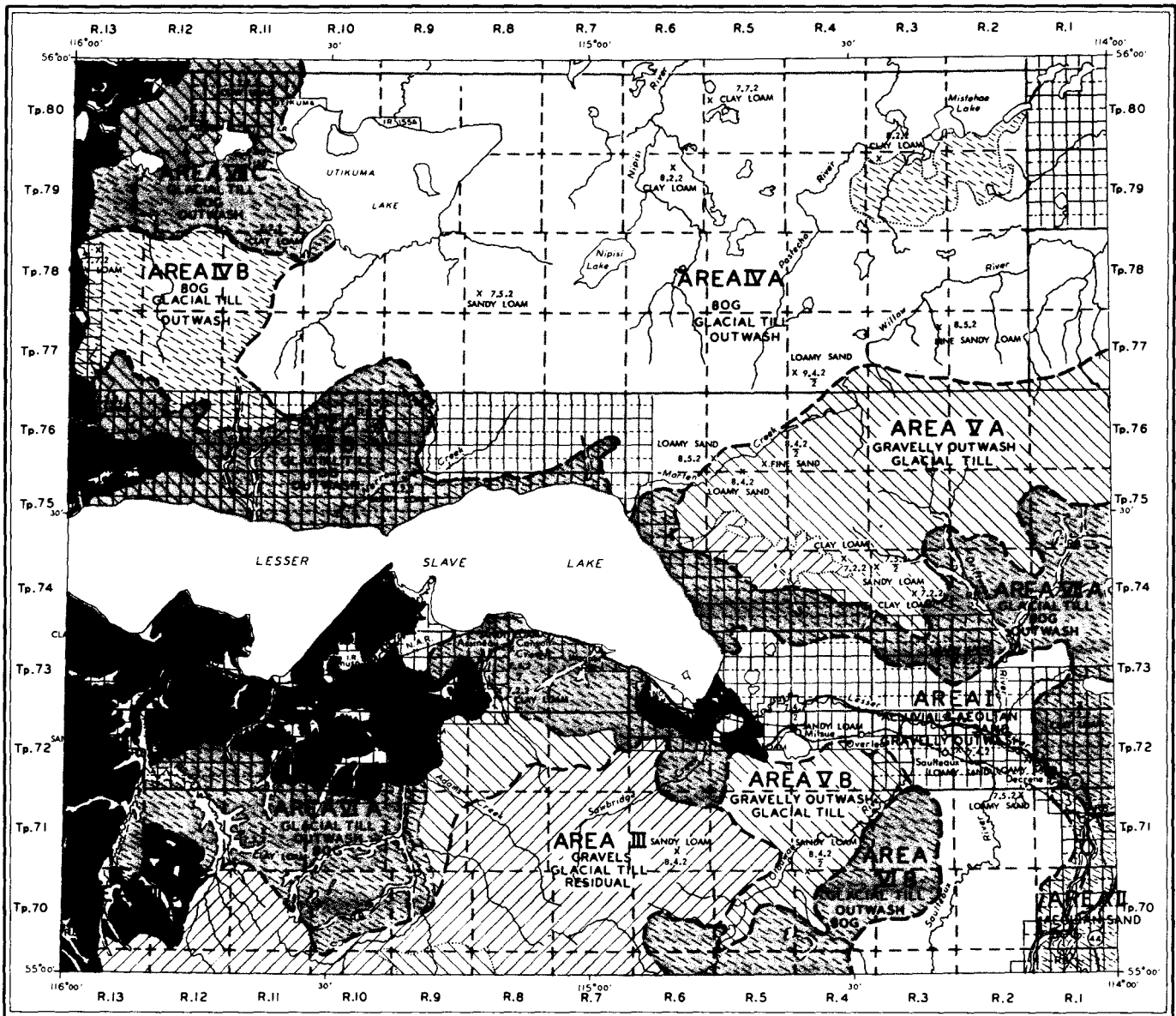
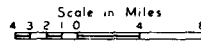
L-H and									
Ah	2	54.8	54.7	10.0	2.6	1.4	0.0	40.7	26
Ae	4	5.8	4.3	1.1	0.5	0.1	0.0	2.6	29
Bf1	4	10.2	8.8	2.2	0.6	0.1	0.0	5.9	28
BC	6	6.6	5.7	1.6	0.6	0.1	0.0	3.4	35
C	at 24	5.6	6.2	3.1	1.1	0.1	0.0	1.9	77

T - Trace

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PRELIMINARY SOIL SURVEY AND RATING MAP OF THE ALBERTA SHEET 83-0



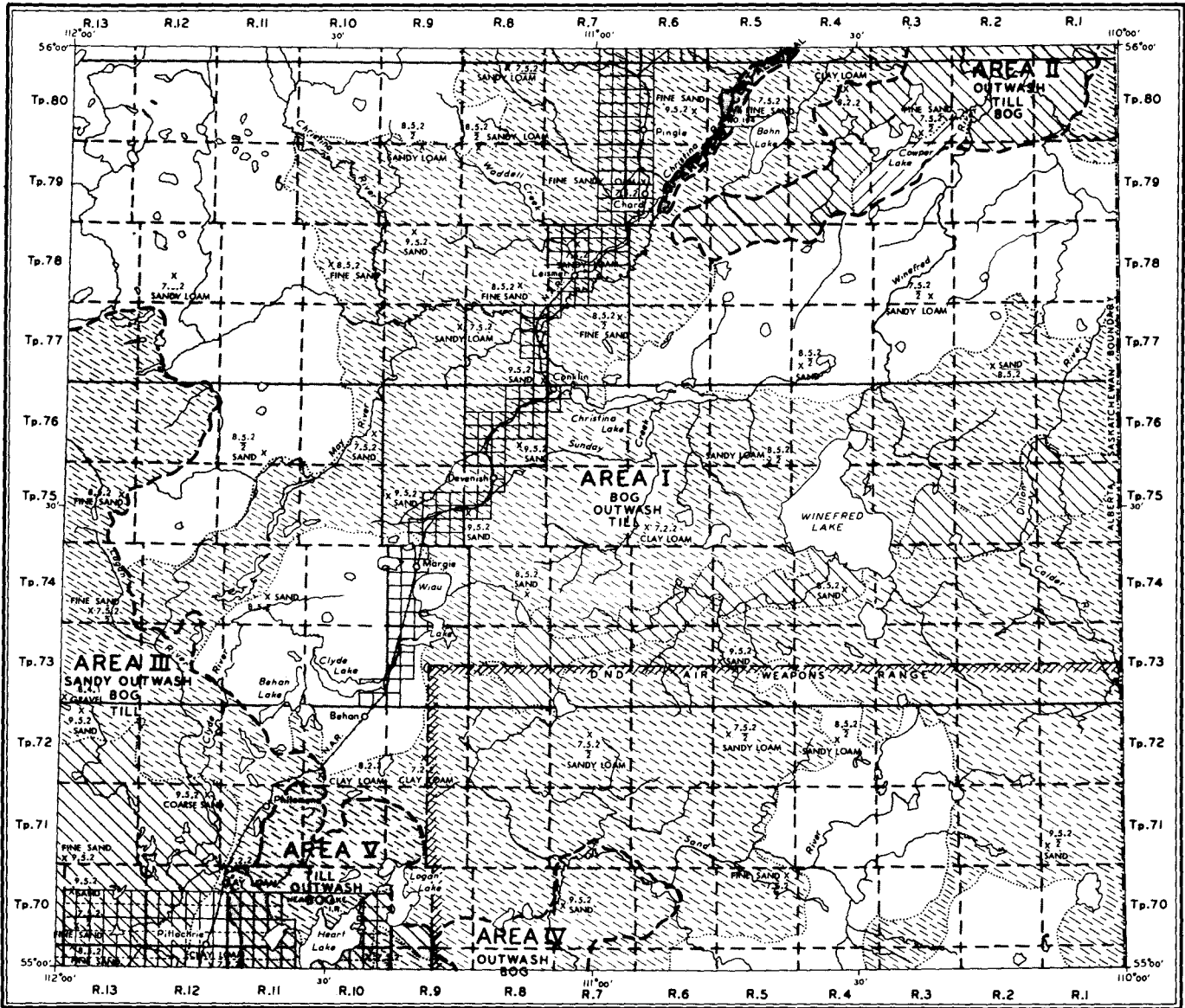
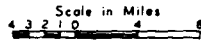
Soil information by Alberta Soil Survey,
Research Council of Alberta,
Helicopter Project - 1956.

LEGEND

Pasture and Woodland.....		Level and Undulating Topography.....	
Doubtful Arable Land.....		Gently Rolling Topography.....	
Potential Arable Land.....		Rolling Topography.....	
		Hilly Topography.....	
		Rough Broken Land.....	

Prepared by Research Council of Alberta-1963.
Base Map Supplied by Technical Division,
Department of Lands and Forests,
Province of Alberta.

PRELIMINARY SOIL SURVEY AND RATING MAP OF THE ALBERTA SHEET 73-M



LEGEND

Soil information by Alberta Soil Survey,
Research Council of Alberta,
Helicopter Project - 1956.

Pasture and Woodland
Doubtful Arable Land

Level and Undulating Topography
Gently Rolling Topography
Rolling Topography
Hilly Topography



Prepared by Research Council of Alberta-1963.
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