

RESEARCH COUNCIL OF ALBERTA

Preliminary Soil Survey Report 64-2

EXPLORATORY SOIL SURVEY

of

Alberta Map Sheets 83-L, 83-K, 83-P and 83-J

by

J. G. Lindsay, A. Wynnyk, and W. Odynsky



Alberta Soil Survey
Helicopter Project 1961-1966
Revised 1969

Price \$1.00

Research Council of Alberta
87th Avenue and 114th Street
Edmonton, Alberta

RESEARCH COUNCIL OF ALBERTA

Preliminary Soil Survey Report 64-2

EXPLORATORY SOIL SURVEY

of

Alberta Map Sheets 83-L, 83-K, 83-F, and 83-J

by

J.D. Lindsay, A. Wynnyk, and W. Odynsky

Alberta Soil Survey
Exploratory Project
1954-1955
Revised 1963

Research Council of Alberta
87th Avenue and 114th Street
Edmonton, Alberta

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 mineral prospecting and other developments.

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 map sheet 83-K. In the successive years of 1953 and 1954 about 1,350,000 and 400,000 acres respectively were covered by the survey in this area. Obviously this method of operation was much 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 on 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 an 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 which 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 with maps, therefore, covers some of the original work carried out in the years 1945, 1954, and 1955. The report is entitled Preliminary Soil Survey Report 64-2.

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 programs conducted by the Soil Survey staffs 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.

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	14
Alberta map sheet 83-L	15
Area I	15
Area II	18
Area III	19
Area IV	21
Area V	21
Summary	22
Alberta map sheet 83-K	23
Area I	23
Area II	24
Area III	27
Area IV	27
Area V	28
Summary	28
Alberta map sheet 83-F	29
Area I	29
Area II	31
Area III	32
Area IV	34
Area V	35
Area VI	35
Area VII	37
Summary	38

	Page
Alberta map sheet 83-J	38
Area I	39
Area II	40
Area III	41
Area IV	42
Area V	42
Area VI	44
Area VII	44
Summary	45
Some chemical and physical characteristics of representative soil profiles	45
References cited	49
Preliminary soil survey rating maps:	
Alberta map sheet 83-L	50
Alberta map sheet 83-K	51
Alberta map sheet 83-F	52
Alberta map sheet 83-J	53

Tables

Table I. Temperature and precipitation data for selected stations in or near the exploratory soil survey area	13
Table II. Frost-free periods at selected stations	14
Table III. Summary of the acreage of the land rating categories for map sheet 83-L	23
Table IV. Summary of the acreage of the land rating categories for map sheet 83-K	28
Table V. Summary of the acreage of the land rating categories for map sheet 83-F	38
Table VI. Summary of the acreage of the land rating categories for map sheet 83-J	45
Table VII. Soil reaction (pH), organic carbon, nitrogen, carbon-nitrogen ratio, and particle size distribution of representative soil profiles	47
Table VIII. Total cation exchange capacity by determination and by summation, exchangeable cations, and percentage base saturation for representative soil profiles	48

Illustrations

	Page
Figure 1. Location map	7
Figure 2. Foothills region in southern portion of map sheet 83-L . . .	16
Figure 3. Weathered sandstone in high plateau area northwest of Edson	29

Acknowledgments

The base maps and aerial photographs for the map area were supplied by the Technical Division, Alberta Department of Lands and Forests.

The aerial photograph interpretations were made by various workers including Messrs. A.M.F. Hennig, M.D. Scheelar, C. van Waas, R. Fytch, and P. K. Heringa. The maps accompanying this report were prepared in the drafting office of the Research Council of Alberta.

Several workers contributed to the soil survey of map sheet 83-K; in 1945 W. Odynsky, and W.C. Hinman, with P. Meyer as packer traversed the area along the present highway between Whitecourt and Calais, while in the years 1952 to 1954 Messrs. F. Belcourt (packer), D. Graveland, A. Henley, D. Smith, and K.C. Stewart all gave valuable assistance to the survey of the remainder of the area. For the helicopter survey of map sheets 83-L, 83-F, and 83-J, the co-operation of the staff of Associated Helicopters Limited - Messrs. S.R. Kaufman, T. Vaasjo, J. Colbourne, and C. Sullivan - is gratefully acknowledged.

Mrs. A. Bembridge assisted in the preparation and proof reading of this report.

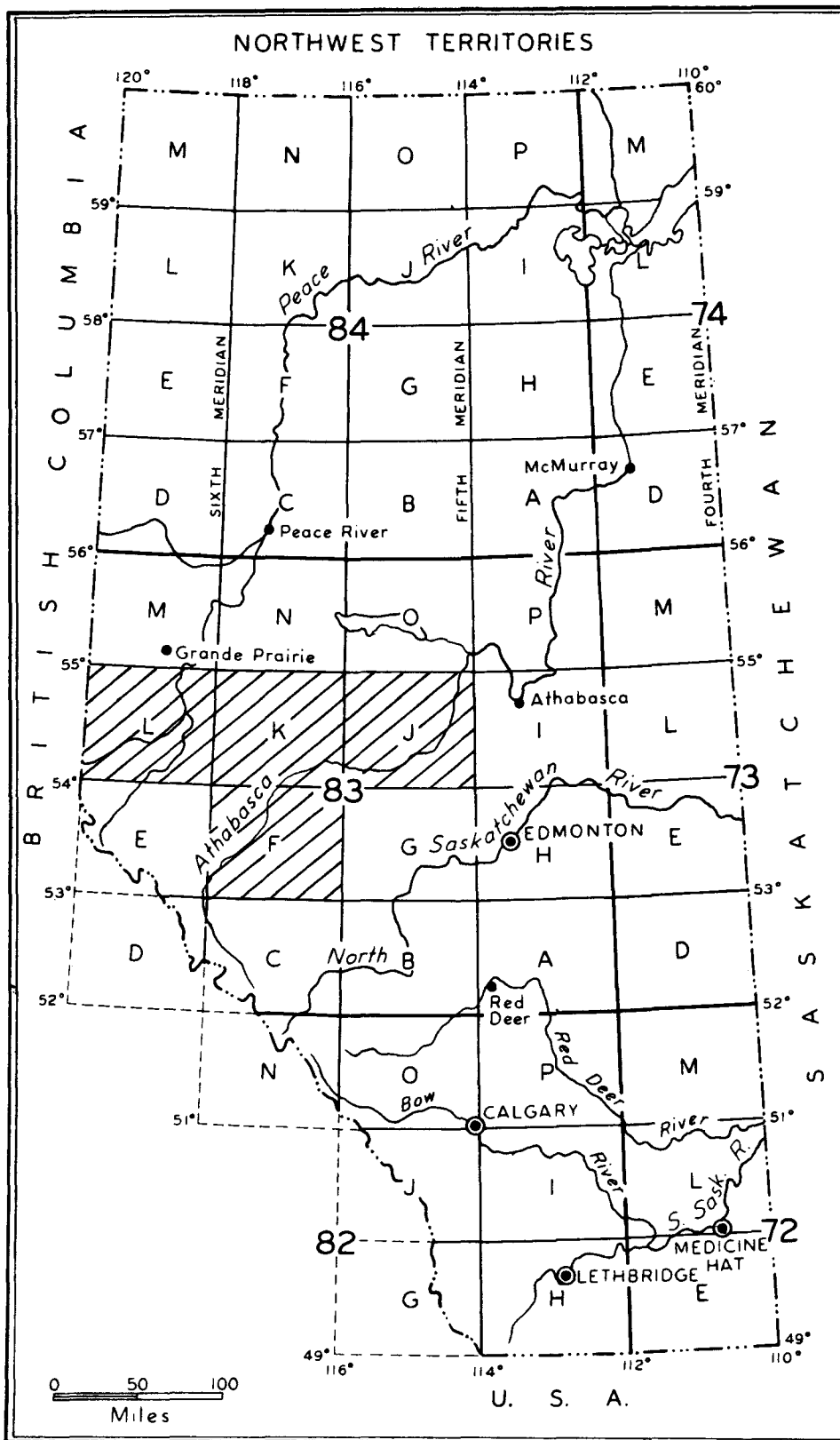


Figure 1. Sketch map of Alberta showing the location of the exploratory soil survey area.

EXPLORATORY SOIL SURVEY OF ALBERTA MAP SHEETS

83-L, 83-K, 83-F, and 83-J

Introduction

In 1952, the Soils Division of the Research Council of Alberta initiated a program of exploratory soil survey for the purpose of determining the location and extent of potentially arable land in the undeveloped northern portion of Alberta. From 1952 to 1954 the surveys were conducted using pack horses as a means of traversing the area but in 1955, in order to provide more rapid coverage, a helicopter was introduced to replace the pack horses. The information obtained is required by the Department of Lands and Forests to facilitate the establishment of a permanent forest management program, and also by other agencies interested in the soil resources of northern Alberta.

Location and Extent

This report covers the exploratory soil survey of Alberta map sheets 83-L, 83-K, 83-F, and 83-J. Each complete map sheet extends approximately 70 miles north to south by 80 miles east to west, and covers about 5,600 square miles or 3,500,000 acres. As shown in figure 1, this irregularly shaped area lies between 53 and 55 degrees north latitude and 114 and 120 degrees west longitude. The surveyed portion of these four map sheets covers approximately 20,000 square miles (12,800,000 acres) in the area south of Grande Prairie, between Valleyview and Whitecourt, near Edson and in the Swan Hills area of north central Alberta.

Alberta map sheet 83-L includes all, or parts, of townships 58 to 69 between ranges 1 and 14 west of the Sixth Meridian.

Alberta map sheet 83-K includes all, or parts, of townships 58 to 69 between ranges 14 and 27 west of the Fifth Meridian.

Alberta map sheet 83-F includes all, or parts, of townships 46 to 58 between ranges 14 and 28 west of the Fifth Meridian.

The soil surveyed portion of Alberta map sheet 83-J includes, for the most part, that part of the area lying north and west of the Athabasca River. This includes all, or parts, of townships 58 to 69 between ranges 1 and 14 west of the Fifth Meridian.

Method of Survey

The exploratory soil survey of Alberta map sheets 83-L, 83-F, and 83-J was carried out during the summer and fall of 1955. The accessible portions of the area were traversed by car while the inaccessible areas were covered in a three-

week period by helicopter. Alberta map sheet 83-K was covered primarily by pack horse in the years 1945 and 1952 to 1954. In later years, however, it was possible to inspect some portions of this area by car as a result of oil company exploration activity.

Prior to the field work a preliminary map on a scale of four miles to one inch was prepared from aerial photographs. This map showed the location of major land forms and, where possible, the type of surface geological material associated with these land features.

The helicopter survey was carried on from a central base camp located as near as possible to the center of each map sheet. The maps were divided into 12 "pie-shaped" segments which were lined from the base camp at 15-degree intervals. The radii of the segments ranged from 20 to 60 miles, thus making the total length of the traverses about 50 to 130 miles.

Approximately 80 to 90 landings were made in each map sheet for soil inspections. 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 ten miles along the lines of traverse.

Soil Classification and Mapping

The soils are mapped and classified very broadly; no attempt has been made to correlate them with any of the soil series established in the province.

The type of soil occurring at specific points in each map sheet is shown on the accompanying maps. For the purpose of this exploratory soil survey the three-number system formerly employed in Alberta (8) is used for describing most of the soil profiles. Organic and Gleysolic soils have simply been indicated as such on the maps.

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

The following table explains the system of numbers used in describing soil profiles:

<u>First number</u>	<u>Great soil group</u>
0	Regosol
3	Dark Grey
4	Brown Forest
5	Acid Brown Wooded
6	Brown Wooded
7	Grey Wooded
8	Bisequa Grey Wooded
9	Podzol

<u>Second number</u>	<u>Parent material</u>
1	Modified residual
2	Glacial till
3	Reworked till
4	Gravelly outwash
5	Alluvial, water-sorted
6	Aeolian, wind-sorted
7	Lacustrine
<u>Third number</u>	<u>Profile development</u>
0	Little profile development
1	Hillside soils (shallow)
2	Modal soils (normal soils of a Great Soil Group)
3	Depressional, non-saline
4	Saline or alkaline
5	Saline
6	Solod
7	High lime to surface

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

Each of the accompanying maps has been separated into two or more major areas on the basis of parent materials and designated Area I, Area II, etc. Topographic areas having a predominance of a particular type or types of soil parent material were grouped together on each map as one area, and numbered accordingly. Owing to the broad nature of the survey it was not possible to keep these areas to a single type of material, but the material first named on each map area is the one most frequently occurring.

The color descriptions used in the field and in this report are those given in the Munsell Soil Color Name Charts. All descriptions and analyses referred to are of virgin soils.

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 published reports of the Alberta Soil Survey (6) and is shown in the following table:

<u>Per cent slope</u>	<u>Mapped phases</u>
0.0 - 0.5)	----- Level and undulating
0.5 - 1.5)	
2 - 5)	----- Gently rolling
6 - 9)	
10 - 15	----- Rolling
16 - 30	----- Hilly

Irregular, often
steeply sloping
banks adjacent
to drainage courses -- Rough and broken

The topographical classification includes a consideration of the steepness of slope, as well as the shape and frequency of the various slopes which determine the relative roughness of the surface.

The maps are colored on a soil rating basis. The soil rating is that used and described in published reports and is based on a consideration of such factors as the characteristics of the soil profile, the degree of stoniness, and the topography. For the purpose of this survey the mapped areas have been separated into three soil rating categories, namely, pasture and woodland, doubtful, and arable.

The first category - pasture and woodland - refers to those areas considered unsuitable for agricultural development for reasons of poor soil, excessive stoniness, rough topography, or poor drainage. No attempt has been made to delineate, within this category, land that can be utilized for pasture and land that is not suitable for this purpose.

The doubtful category embraces areas in which some feature of the soil or terrain makes their value uncertain at present. Perhaps at some time in the future an increased demand for agricultural land may stimulate consideration of these less desirable areas for agricultural development. For example, some of the bog areas might become suitable agricultural land if satisfactory drainage were provided. The broad general nature of this exploratory survey did not allow for detailed separations in the marginal areas and hence the need arose for a doubtful category.

The third category - arable land - consists of those areas in which the soil and topography are considered suitable for agricultural development. In assessing the agricultural potential of any area, however, it is realized that factors other than the soil and topography must be considered. Such economic factors as the cost of land clearing, accessibility, and distance to markets are features which would have to be evaluated before any of the arable land indicated in this exploratory soil survey could be opened for settlement. Present economic conditions would seem to suggest that much of this remote area will remain undeveloped for the time being.

Climate

The number of stations recording meteorological data (1) (2) in the map area is limited. However, a sufficient number of recording stations either in or near the area makes it possible to draw some generalized conclusions with regard to climate.

Table 1 shows the mean monthly and mean annual temperature and precipitation data for six stations in or near the map area.

The range in annual precipitation in this general area is from about 20 inches in the southern portion near Edson and Whitecourt to about 17 inches in the northern portion as represented by Beaverlodge and High Prairie.

Carder (5) notes that the total annual precipitation at Beaverlodge almost suggests semi-arid conditions; however, he points out that two-thirds of the precipitation falls during the spring, summer, and fall months when it can be used by vegetation. This feature, combined with a comparatively low rate of evaporation, provides a favorable moisture balance for crop growth in most years. A similar distribution pattern would appear to exist at the other stations recorded in table 1.

Jasper has been included in table 1 to represent that portion of the map area that is mountainous. It is noted that the total annual precipitation at this station is somewhat lower, 14 inches, than at the other stations located in the Great Plains region to the east and north. However, it is not known if the data for Jasper is truly representative of the mountainous area since orographic effects must have a profound influence on the climate of this region.

The mean annual temperature does not vary significantly between stations representing the northern and southern portions of the map area, as shown in table 1. At Beaverlodge in the north it is 34.8 degrees Fahrenheit, while at Edson in the south the mean annual temperature is 35.6 degrees Fahrenheit. The summer temperatures at all stations are comparatively warm, reaching a mean of about 60 degrees Fahrenheit in July. At Jasper, in the Rocky Mountains, the mean annual temperature is 37.6 degrees Fahrenheit and it is therefore somewhat higher than the other recording stations listed in table 1.

The length of 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 time the temperature drops below 32 degrees Fahrenheit in the spring and the first time it reaches 32 degrees Fahrenheit in the fall of the year. The frost-free period for nine stations is shown in table II. Data for Edmonton and Lethbridge are included for comparison.

Table II would seem to indicate that local conditions in the map area have a profound effect on the length of frost-free period since no marked trend can be inferred from the data presented. Generally, however, the length of frost-free period decreases in a northerly direction. In the map area Beaverlodge has the longest frost-free period with 101 days while Entrance and Edson, located relatively near the front range of the Rocky Mountains, have only 42 and 59 days respectively without frost.

Generally, however, a temperature of 32 degrees is not considered to be a killing frost and crop damage does not occur until a temperature of 28 degrees Fahrenheit or lower is reached. On this basis, for a 30-year period, the average length of cropping season at Beaverlodge is 133 days while the shortest and longest seasons for the same period are 70 and 172 days respectively.

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

Station	Map sheet	Approx. elev., feet		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Mean annual temp., °F.	Mean annual precip., inches
Beaverlodge	83-M	2,360	T...	8.4	10.1	20.8	36.8	49.2	55.4	59.3	57.0	49.0	38.9	22.0	11.4	34.8	--
			P...	1.19	1.07	1.03	.87	1.50	2.01	2.31	1.92	1.87	1.04	1.35	1.16	--	17.32
Jasper	83-D	3,470	T...	13.3	19.1	28.3	38.3	47.8	54.6	59.5	57.2	50.2	40.8	26.4	15.7	37.6	--
			P...	.99	.91	.62	.69	1.12	1.69	1.87	1.85	1.39	1.15	.99	1.04	--	14.31
Edson	83-F	2,985	T...	10.2	14.2	24.8	37.9	48.1	54.4	59.3	56.7	48.5	38.6	23.3	12.1	35.6	--
			P...	.91	.68	.98	1.05	1.82	3.34	3.53	2.99	1.65	.84	1.18	.94	--	19.91
Whitecourt	83-J	2,280	T...	6.0	10.9	22.8	34.9	48.4	54.6	59.0	56.6	47.9	38.6	20.9	9.5	34.2	--
			P...	1.32	1.00	.84	1.30	2.09	2.77	3.94	3.29	1.42	.74	.80	1.00	--	20.51
Campsie	83-J	2,150	T...	5.9	9.6	22.2	38.3	49.3	56.0	60.7	57.4	49.0	39.1	22.0	8.8	34.8	--
			P...	.88	.84	.80	.97	1.95	2.85	3.50	2.47	1.23	.76	.90	.85	--	18.00
High Prairie	83-N	1,968	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 (degrees Fahrenheit)

P... Precipitation (in inches)

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

Station	Map sheet	Average period, days	Shortest period, days	Longest period, days	Number of years of record
High Prairie	83-N	81	54	116	20
Slave Lake	83-O	78	25	124	26
Beaverlodge	83-M	101	48	140	43
Edson	83-F	59	4	127	35
Entrance	83-F	42	4	75	32
Campsie	83-J	65	19	94	38
Jasper	83-D	73	22	128	33
Edmonton	83-H	100	44	144	60
Lethbridge	82-H	111	80	147	26

Factors such as these are extremely important and must be given careful consideration when selecting the kind and variety of crop to be grown in these areas.

Vegetation

Vegetative cover is a factor of soil formation and provides some information for differentiating soil drainage and texture within an area.

The major portion of mineral soils has a mixed cover of trembling aspen (Populus tremuloides), white spruce (Picea glauca), and jack pine (Pinus banksiana). On the porous sandy soils jack pine is the most prominent tree species while aspen and white spruce predominate on the finer textured soils.

Gleysolic soils are of fairly common occurrence throughout the entire map area. The plants associated with the Gleysolic soils are generally those adaptable to growing conditions characterized by somewhat poorly drained soil conditions and may include sedges (Carex), marsh reedgrass (Calamagrostis canadensis), horse-tail (Equisetum arvense), and in some cases dwarf birch (Betula glandulosa), paper birch (Betula papyrifera), and willow (Salix). Many of the Gleysolic soils are characterized by a thin accumulation of peat (3 to 12 inches) at the surface.

Organic soils, those having more than 12 inches of peat at the surface, occupy a significant proportion of the map area. Two types of Organic soils - sedge and moss (muskeg) - were recognized in the area. The sedge type, formed from sedge and grasses, is a relatively fine textured fibrous peat whereas the moss type, derived primarily from sphagnum moss, is more coarse textured. Black spruce (*Picea mariana*) and labrador tea (*Ledum groenlandicum*) are characteristic tree and ground cover plants of the moss bogs in this area.

The Organic soils of this region are frozen to a depth of 20 to 24 inches in early May. This frozen layer generally recedes with the warmer temperatures of late spring and early summer and by late July, the frozen layer usually disappears in the vicinity of Whitecourt. However, farther to the north, near the northern boundary of the map area, the ice layer persists in some instances throughout the summer months and has been found in moss bogs in the vicinity of Wapiti Post Office and the village of Debolt in early September. A persistent ice layer also occurs in the moss bogs of the Swan Hills area where the relatively high elevations apparently have the effect of lowering temperatures to a point where a complete thawing of the organic soils does not take place. The occurrence of ice or a frozen condition in some of the bogs of northern Alberta has been noted previously (3) (4).

Alberta Map Sheet 83-L

There is a very limited amount of settlement in map sheet 83-L. Scattered settlement occurs only in townships 68 and 69 in the vicinity of South Wapiti and south of Grovedale. The Hinton - Grand Prairie Forestry road traverses the eastern portion of the map sheet and provides the only major all-weather access route in the area. Townships 67 to 69 inclusive have been covered by reconnaissance soil survey and have been reported in previous publications (5) (6) of the Alberta Soil Survey.

Area I

Area I is the largest area separated in map sheet 83-L and comprises about 80 per cent of the total area.

Three major physiographic regions, the Great Plains, the Foothills, and the Mountains are represented in Area I. The lowest elevations occur in the northern and northeastern portions of the area while the highest are found in the mountains of the southwest. The general range in elevation is from about 2,300 feet in the northeast to over 6,000 feet above sea level in the southwest. A portion of the Foothills region of Area I is shown in figure 2.

Area I is drained by numerous streams and rivers, the more important of which are the Kakwa (Porcupine), Smoky, and Simonette Rivers in the southeastern portion and the Nose and Narraway Rivers in the west and northwestern section of the map sheet.

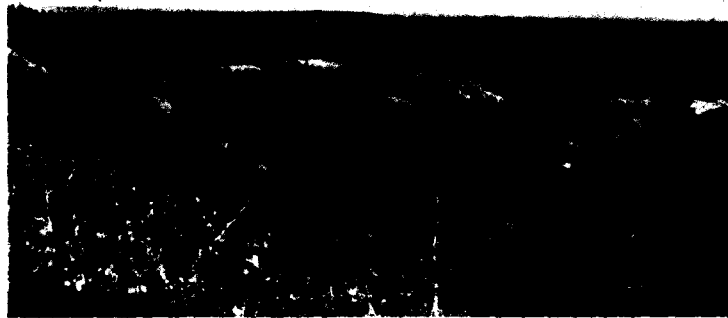


Figure 2. Foothills region in southern portion of map sheet 83-L.

Hilly topography predominates throughout the greater proportion of Area I. However, all classes of topography, from undulating to mountainous, are represented in some portion of the area. The more gently sloping topography is found, for the most part, in the northern section of the map sheet.

The most commonly occurring soil in this area is a Grey Wooded soil developed from glacial till. These soils are typified by an eluvial or leached horizon (Ae) at the surface that is underlain by a horizon of alluviation (Bt) in which fine clay and sesquioxides have accumulated. The following soil profile description is that of such a Grey Wooded soil found in this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Deciduous leaf or coniferous needle litter, slightly decomposed in lower portion.
Ae1	3	Light grey (10YR 7/1 dry) to grey (10YR 6/1 dry), sandy loam, platy, friable, pH 4.5.
Ae2	3	Yellowish brown (10YR 5/8 dry), fine sandy loam, platy, friable, pH 4.5.
AB	6	Brown (10YR 4/3 dry), clay loam, medium subangular blocky, slightly firm, pH 5.0.
Bt	10	Light yellowish brown (10YR 6/4 dry) to brown (10YR 5/3 dry), clay, medium blocky, firm, pH 5.0.
C	at 24 inches below surface	Brown (10YR 5/3 dry) to greyish brown (10YR 5/2 dry), sandy clay to clay, coal flecks, some stones, pH 6.0.

The depth to lime carbonate varies considerably in this region, but on the average appeared to be encountered at about 36 inches from the surface. In the above described soil profile, it will be noted that the Ae horizon has been subdivided into upper and lower Ae1 and Ae2 horizons. This characteristic frequently occurs in the Grey Wooded soils of Area I and it is suggested that the upper light greyish colored Ae1 horizon represents the initial stage of the development of a Podzol profile in the upper portion of a Grey Wooded soil. In the reconnaissance soil survey of the Beaverlodge and Blueberry Mountain Sheets (5) such soils were designated as the Hillburn soil series.

A second soil profile encountered in Area I is a soil developed from sandstone. These soils are most commonly found in the hilly areas at the higher elevations where bedrock occurs near the surface. These soils vary considerably in degree of development ranging from Grey Wooded to Podzol. The following description is that of a Podzol soil developed on weathered sandstone:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Coniferous needle or deciduous leaf mat, slightly decomposed in lower portions.
Ae	2	Grey (10YR 5/1 moist), sandy loam, platy, friable.
Bf	6	Strong brown (7.5YR 5/6 moist), sandy loam, gritty, weak small subangular blocky, friable, some sandstone pieces.
C	at 10 inches below surface	Light olive brown (2.5Y 5/6 moist), sandy loam, partially decomposed sandstone.

Soils developed on glacial outwash are also of common occurrence throughout Area I. These soils are often found adjacent to the drainage courses of rivers and streams and are usually moderately to strongly podzolized. The depth of the outwash material is quite variable and may range from a few inches to several feet or more. The following description is that of a Podzol soil developed on relatively thin outwash material overlying glacial till:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Deciduous leaf mat and/or coniferous needle litter.
Ae	2	Light grey (10YR 7/1 dry), sandy loam to loamy sand, platy, loose, some stones.
Bf	6	Reddish brown (5YR dry), sandy loam, coarse platy, friable, some stones.

C	6	Yellowish brown (10YR 5/4 dry), sandy loam, stones.
IIC	at 16 inches below surface	Greyish brown (10YR 5/2 dry), sandy clay loam, glacial fill.

Area I is about 2,870,000 acres in size. The nature of the terrain, for the most part, is too steeply sloping and at too high an elevation to be considered suitable for agricultural development. Also, the soils are deeply leached in this area and would be relatively infertile. Therefore, about 2,483,000 acres of Area I are classed as pasture and woodland while the remainder consists of 377,000 acres of doubtful arable land and 10,000 acres of potentially arable land. The doubtful arable area consists essentially of some of the gently rolling and rolling portion of Area I which may have some agricultural potential. However, agricultural development in this area will be limited by elevations, generally over 3,000 feet above sea level, and by excessive stoniness in some locations. The arable section of Area I is a small undulating area adjacent to the Latornell River in the northeastern portion of the map sheet.

Area II

Area II comprises about one per cent of the total area of map sheet 83-L.

The presence of gravels, believed to be of Tertiary geological age, necessitated the separation of this area. The outline of this area is somewhat conjectured because the area is difficult of access; however, these gravels have been inspected in some detail in the area immediately to the east in map sheet 83-K. From this latter location the soil line delineating the gravels has been extended into map sheet 83-L to include an area possessing similar topographic features. The topography for the most part is hilly and rolling.

The following soil profile description is that of a Podzol soil developed on gravelly material in this general area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	3	Coniferous needle mat.
Ae	7	Light grey (10YR 6/1 dry), sand, gravelly, loose.
Bf	8	Reddish brown (5YR 5/4 dry), sand, gravelly, strongly cemented.
C	at 18 inches below surface	Yellowish brown (10YR 5/4 dry), sandy loam, gravelly, loose. Gravel well-rounded and primarily quartzitic in character.

There is an extreme degree of variability in the horizon development of the above described soils. For example, at one site, in a distance of only a few feet, the depth of the Ae horizon ranged from 12 to 30 inches. A similar variability was noted in respect to the depth of the Bf horizon.

The associated soils in this area are Grey Wooded and Podzol soils developed on glacial till and sandstone. These soils have previously been described in Area I.

Area II is about 39,000 acres in size. The area is classified as pasture and woodland - unsuitable for agricultural development - owing to the gravelly nature of the soils and the occurrence of steeply sloping topography.

Area III

Area III comprises about 10 per cent of the total area of map sheet 83-L.

This area lies for the most part in the northern portion of the map sheet and consists essentially of an undulating to gently rolling plain.

The area is dissected by the deep valleys of the Wapiti, Smoky, and Simonette Rivers. Taken as a whole Area,III can be described as being well drained.

The soils are principally Grey Wooded Solod soils developed on somewhat saline lacustrine sediments. In addition, some Dark Grey Solod and Meadow soils have developed on this material in this area. It should be noted that at a 1963 meeting of the National Soil Survey Committee the term Meadow soil was changed to Humic Gleysol. However, to maintain continuity with previous exploratory soil survey reports the term Meadow soils will be adhered to in this report.

The following description is that of a Grey Wooded Solod soil developed on lacustrine material in Area III:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Dark brown (10YR 3/3 moist), leaf litter, pH 6.7.
Ah	1	Dark greyish brown (10YR 4/2 moist) to dark grey (10YR 4/1 moist), loam to clay loam, weak granular, loose, pH 6.0.
Ae	3	Light yellowish brown (10YR 6/4 moist), fine sandy loam, medium platy, friable, pH 5.4.
AB	2	Light yellowish brown (10YR 6/4 moist) to brown (10YR 5/3 moist), loam to clay loam, subangular blocky, vesicular, friable, pH 4.9.

Bt	12	Dark yellowish brown (10YR 4/4 moist) to dark brown (10YR 3/3 moist), clay, columnar breaking to blocky, firm, pH 5.3.
BC	8	Dark greyish brown (10YR 4/2 moist) to dark grey (10YR 4/1 moist), clay, blocky, firm, pH 6.2.
Cks	at 27 inches below surface	Greyish brown (10YR 5/2 moist) to dark grey (10YR 4/1 moist), clay, with occasional yellowish brown (10YR 5/4 moist), sandy clay loam strata that may be stony. Moderate lime and salt content, pH 7.5.

The Dark Grey soils developed on this type of material vary from the soil description above primarily with respect to the depth of Ah horizon. Whereas the Grey Wooded soils have an Ah horizon not exceeding a thickness of two inches, the Dark Grey soils in this area normally possess about four to five inches thus making them a more desirable soil from an agricultural development standpoint.

The Meadow soils are found in some of the depressional areas. These soils are characterized by mottling and gleying as a result of poor drainage conditions in at least some part of the year. The following is a description of such a soil described in Area III:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Dark brown (10YR 4/3 moist), organic debris, often peaty, pH 5.6.
Ah	6	Very dark grey (10YR 3/1 moist) to black (10YR 2/1 moist), silty clay loam, weakly granular to shot-like, friable to slightly firm, pH 5.9.
ABg	10	Dark grey (10YR 4/1 moist) to very dark grey (10YR 3/1 moist), silty clay to clay, small nuciform, coloring may occur as splotches or streaks, pH 5.7.
Bg	10	Dark grey (10YR 4/1 moist) with yellowish brown (10YR 5/4 moist) mottles, silty clay to clay, massive, sticky when wet and very firm when dry, pH 6.1.
BCg	4	Grey (10YR 5/1 moist) to dark grey (10YR 4/1 moist) clay with some yellowish brown (10YR 5/4 moist) mottles, massive, firm, pH 7.1.
C	at 32 inches below surface	Dark grey (10YR 4/1 moist) to very dark grey (10YR 3/1 moist), clay, on drying breaks into blocky fragments that are somewhat friable, pH 7.6.

Area III is about 403,000 acres in size. The greater proportion, 370,000 acres, is considered suitable for agricultural development. This area is similar in regard to soils and topography to a considerable proportion of the Peace River district that is presently being fairly extensively cultivated. About 33,000 acres are classified as pasture and woodland. This latter area consists essentially of the rough and broken slopes adjacent to the major drainage courses.

Area IV

Area IV is one of the smaller areas separated in map sheet 83-L; about seven per cent of the total map area is included in Area IV.

The topography consists essentially of undulating to rolling U-shaped and longitudinal sand dunes. Some portions of the area are characterized by a combination of sand and moss or sedge bog. The bog areas are confined to the intra-dune areas and in some locations represent the greater proportion of the area.

The soils of Area IV are extremely complex in regard to soil development. Podzolic and Brunisolic soils are the most commonly occurring soil profiles found in the better drained sand areas. The following description is that of a Podzol soil profile examined in Area IV:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle litter and organic debris.
Ae	4	Light grey (10YR 7/2 moist), sand, single grain, loose, pH 4.9.
Bf	7	Strong brown (7.5YR 5/8 moist), sand, single grain, loose, pH 6.0.
BC	13	Brownish yellow (10YR 6/6 dry), sand, single grain, loose, pH 5.8.
Ck	at 25 inches below surface	Yellowish brown (10YR 5/4 moist), sand, moderate lime carbonate content, pH 8.1.

Area IV is 239,000 acres in size. A combination of sandy soils and a fairly high proportion of moss bog indicate that this area is unsuitable for agricultural development. The area, therefore, has been classified as pasture and woodland.

Area V

Area V is the smallest area separated in map sheet 83-L, and comprises less than one per cent of the total area.

This area includes the river terraces along the Smoky and Simonette Rivers in the northern portion of the map area.

The river terraces are usually flat-lying and generally well drained. In some locations, particularly immediately adjacent to the present river level, some periodic flooding and poor drainage conditions may occur.

These alluvial soils are generally immature and exhibit little soil profile development beyond the accumulation of some organic matter at the surface. Buried organic horizons are common where periodic flooding and deposition of mineral material has taken place.

The following description is that of a Regosolic soil examined on the flood plain of the Smoky River in the northern portion of map sheet 83-L:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
Ah	6	Black (10YR 2/1 moist) grading to dark brown (10YR 2/1 moist) grading to dark brown (10YR 4/3 moist), silt loam.
C	18	Alternating strata of brown (10YR 5/3 moist), silt loam, and yellowish brown (10YR 5/6 moist), very fine sandy loam, pH 5.7.
IIC	at 24 inches below surface	Cobbly gravel.

Area V is about 13,000 acres in size and is classed as potential arable land. Some of the lower lying terraces, however, may have some undesirable characteristics due to periodic flooding which would limit their use for agricultural production. A more detailed survey than the one reported herein is required to delineate these undesirable areas.

Summary

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

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

Area	Arable, acres	Doubtful, acres	Pasture and Woodland, acres
Area I	10,000	377,000	2,483,000
Area II			39,000
Area III	370,000		33,000
Area IV			239,000
Area V	13,000		
Total	393,000	377,000	2,794,000

Alberta Map Sheet 83-K

Agricultural settlement is limited in extent in map sheet 83-K and is confined mainly to the area adjacent to Highway 43 in the northern portion of the area. Settlement has now progressed as far south as township 65 in this map sheet. In recent years, however, a considerable amount of interest has been shown in the area in connection with the oil and gas industry. The Kaybob, Simonette, and Little Smoky oil fields and the Berland River, Pine Creek, Fox Creek, and Windfall gas fields are all located in map sheet 83-K. Small settlements at Fox Creek (Iosegun Post Office) and Little Smoky have been established as a result of oil company activity in the area. The northern portion of the area has been previously reported (6) (7) in reconnaissance soil survey reports of the Alberta Soil Survey.

Area I

Area I comprises about 17 per cent of map sheet 83-K. This section of the map sheet includes portions of the highland area and is characterized for the most part by rolling and hilly topography.

Glacial till is found throughout most of this high plateau area but some of the highest hills are capped with gravel. For example, Goose Mountain in township 66 range 14 is capped with gravel. This gravel is also easily distinguishable in the cobble-lined banks of the drainage courses in the vicinity of township 61 range 26. In some locations exposures have shown a relatively thin capping of glacial till overlying the gravels which would suggest that the gravels are pre-glacial in origin and perhaps of Tertiary geological age.

The exact location of an area in which the gravels constitute a common soil parent material is difficult to determine because of the inaccessible nature of the area. Therefore, the lines shown on the map have been established partly through conjecture but an attempt has been made to outline the area so as to include the highland area between about 3,500 and 4,500 feet elevation.

The soils in Area I are similar to those described in Area I of map sheet 83-L. Those developed from glacial till are usually Grey Wooded but in some locations these soils exhibit various degrees of podzolization in the upper portion of the profile. One such soil, a Bisequa Grey Wooded, had the following description:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Deciduous leaf litter.
Ae	2	Light brownish grey (10YR 6/2 dry) to pinkish grey (7.5YR 7/2 dry), silt loam, weak platy, friable.
Bf	2	Brownish yellow (10YR 6/8 dry) to greyish brown (10YR 5/2 dry), silt loam, coarse platy and weak small subangular blocky, friable.
Ae	3	Light yellowish brown (2.5Y 6/4 dry) to yellowish brown (10YR 5/4 dry), silt loam to sandy loam, platy, friable.
Bt	10	Light olive brown (2.5Y 5/4 dry) to brown (10YR 5/3 dry), clay loam, medium subangular blocky, firm.
C	at 18 inches below surface	Brown (10YR 5/3 dry) to greyish brown (10YR 5/2 dry), sandy clay loam, glacial till.

Area I is about 568,000 acres in size. The steeply sloping topography, relatively high elevations, and stony soils are deterrents to agricultural development and the area has been classified as pasture and woodland.

Area II

Area II is the largest area separated in map sheet 83-K. In all, about 54 per cent of the map sheet is included in this area.

Area II represents the rough morainic portion of the mapped area and the topography consists generally of gently rolling to hilly slopes.

Area II is found in five separate locations in the map sheet. Moss bog occurs primarily on the lower slopes of the area with the upland areas being generally fairly well drained.

Glacial till is the principal soil parent material in Area II and the soils developed on this material are Grey Wooded. Low Humic Eluviated Gleysols commonly occur in many of the low-lying depressional areas. The following description of a Grey Wooded soil developed on till is representative of this type of soil in Area II:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Deciduous leaf litter, pH 5.2.
Ah	1	Very dark greyish brown (10YR 3/2 dry), loam, granular, friable.
Ae1	2	Light brownish grey (10YR 6/2 dry), sandy loam, platy, vesicular, friable, pH 5.4.
Ae2	3	Pale brown (10YR 6/3 dry), sandy loam, platy, vesicular, friable, some mottling, pH 5.4.
AB	3	Pale brown (10YR 6/3 dry) on surface, brown (10YR 5/3 dry) on broken ped faces, clay loam, medium blocky, firm to slightly hard, pH 4.8.
Bt	10	Dark greyish brown (10YR 4/2 moist), clay, weakly prismatic breaking to large blocky, slightly hard, compact, pH 4.6.
BC	10	Brown (10YR 5/3 moist), clay loam, massive, compact, pH 6.0.
Ck	at 31 inches below surface	Brown (10YR 5/3 moist), clay loam, glacial till, pH 7.2.

The Low Humic Eluviated Gleysols are typified by mottling and gleying as a result of restricted drainage conditions. The following is a description of this type of soil profile examined in Area II:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Dark brown (10YR 4/3 moist), peat, slightly decomposed in lower portion, pH 5.9.
Ah	1	Dark greyish brown (10YR 4/2 moist), loam, weak granular, friable, pH 5.6.
Aeg	5	Light grey (10YR 7/2 moist) with some yellowish brown

		(10YR 5/4 moist) mottles, silt loam, platy, friable, pH 5.2.
ABg	2	Grey (10YR 5/1 moist) to dark grey (10YR 4/1 moist), clay, medium subangular blocky, firm, pH 4.9.
Btg	11	Grey (10YR 5/1 moist) to dark grey (10YR 4/1 moist), clay, blocky, firm, pH 5.3.
BCg	11	Dark grey (10YR 4/1 moist), clay, subangular blocky, friable, pH 6.9.
Ck	at 32 inches below surface	Greyish brown (10YR 5/2 moist), clay loam, glacial till, pH 7.3.

In some locations, particularly on the upper slopes of some of the prominent hills, the soils are developed on weathered sandstone. These soils are Grey Wooded and have a yellowish brown subsoil in which pieces or slabs of sandstone are of common occurrence. A description of this type of soil is as follows:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Deciduous leaf litter.
Ah	2	Very dark grey (10YR 3/1 dry), sandy loam, loose.
Ae	5	Very pale brown (10YR 7/3 dry), sandy loam, platy, loose.
Bt1	6	Yellowish brown (10YR 5/6 dry), fine sandy loam, weak columnar, firm.
Bt2	12	Grey (10YR 5/1 dry), fine sandy loam, weak columnar, with small sandstone fragments.
C	at 26 inches below surface	Yellowish brown (10YR 5/6 dry), weakly consolidated sandstone.

Area II is about 1,960,000 acres in size. The greater proportion of the area, 1,246,000 acres, is classified as pasture and woodland because of relatively high elevations and steeply sloping topography. The remainder consists of about 431,000 acres of doubtful arable and 283,000 acres of potential arable land. These latter two areas are found primarily on the lower slopes of the morainic area where the terrain is somewhat more gently sloping. The area adjacent to Meekwap Lake is classified as doubtful arable owing to the occurrence of a fairly high proportion of moss bog in this vicinity.

Area III

Area III comprises about 15 per cent of map sheet 83-K.

This area represents an extensive lacustrine basin in the central and northern portion of the map sheet. The Little Smoky River and its tributaries, the Goose and Iosegun Rivers, provide the major drainage for this area.

The topography is generally undulating to depressional with only occasional gently rolling slopes. A major portion of the area is poorly drained and moss bog is of widespread occurrence, particularly in the vicinity of Iosegun Lake.

The soils are principally Grey Wooded Solod soils developed on saline lacustrine sediments. Some Dark Grey Solod and Meadow soils also occur in this area in association with the Grey Wooded soils. In some portions of this lacustrine basin, particularly on ridges or at the edges of the basin, glacial till forms the parent material for some of the soils.

The soils in this area are similar to those of Area III of 83-L. The appropriate descriptions are included in that section of this report.

Area III is about 537,000 acres in size. The greater proportion of this area, 405,000 acres, is considered suitable for agricultural development. Areas similar to this are presently being fairly extensively farmed in the Peace River district of Alberta.

The doubtful arable land amounts to about 108,000 acres in Area III. It is confined to the region north and east of Iosegun Lake where moss bog occurs to such an extent as to be a deterrent to agricultural development of the area. The pasture and woodland category amounts to about 24,000 acres in Area III and includes primarily the rough broken land adjacent to stream courses.

Area IV

About seven per cent of the map area is included in Area IV.

This area is found in the southern portion of the map sheet and includes the aeolian and alluvial sand deposits associated with the Little Smoky and Athabasca Rivers. The topography of the area ranges from undulating to depressional on some of the alluvial terraces to gently rolling and rolling in areas characterized by U-shaped sand dunes.

The soils of Area IV are Podzolic and Brunisolic in character. Some excellent examples of these soils occur adjacent to the highway in township 60 range 14. The soil profile description is similar to that reported in Area IV of map sheet 83-L.

The area amounts to about 235,000 acres. The entire area is classified as only suitable for pasture and woodland owing to the sandy nature of the soils.

Area V

Area V is a comparatively small area comprising only three per cent of the map area. The area includes the river terraces along the Athabasca, Little Smoky, Simonette, and Goose Rivers.

The river terraces are extremely variable in size and are often dissected by old stream channels. Also, there is a considerable variability in regard to the depth and texture of the sediments. In some locations the terraces consist mainly of gravel deposits while at other sites several feet of sandy and silty material may overlie gravel.

A description of a typical Regosolic soil found on these river terraces is given under Area V of map sheet 83-L.

In map sheet 83-K the river terraces delineated as Area V consist of about 114,000 acres. Of this amount about 39,000 acres are considered potential arable, 41,000 acres as doubtful arable, and 34,000 acres pasture and woodland.

Summary

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

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

Area	Arable, acres	Doubtful, acres	Pasture and Woodland, acres
Area I	568,000		
Area II	1,246,000	431,000	283,000
Area III	24,000	108,000	405,000
Area IV			235,000
Area V	39,000	41,000	34,000
Total	1,877,000	580,000	957,000

Alberta Map Sheet 83-F

Highway 16 and the mainline of the Canadian National Railways traverse the central portion of map sheet 83-F in an east to west direction. At the present time the lumber industry appears to provide the main source of revenue in the area. A considerable proportion of the area is under lease to a pulp and paper company at Hinton. The coal mines that once operated at Coal Valley, Mercoal, Cadomin, and several other centers in the southern part of map sheet 83-F are now mostly closed as a result of a depressed economy in the coal industry.

Area I

Area I delineates a high plateau in the northeastern section of the map sheet. About ten per cent of the total map area is included in this section.

The topography in Area I is rather steeply sloping and ranges from gently rolling to hilly. The soils are developed on a variety of materials that include glacial till, gravel, and weathered sandstone. At the highest elevations the till is often absent and about 20 to 30 feet of gravel overlies sandstone. In other locations, however, the gravel is also absent and the sandstone reaches the surface. An exposure of this weathered sandstone is shown in figure 3.

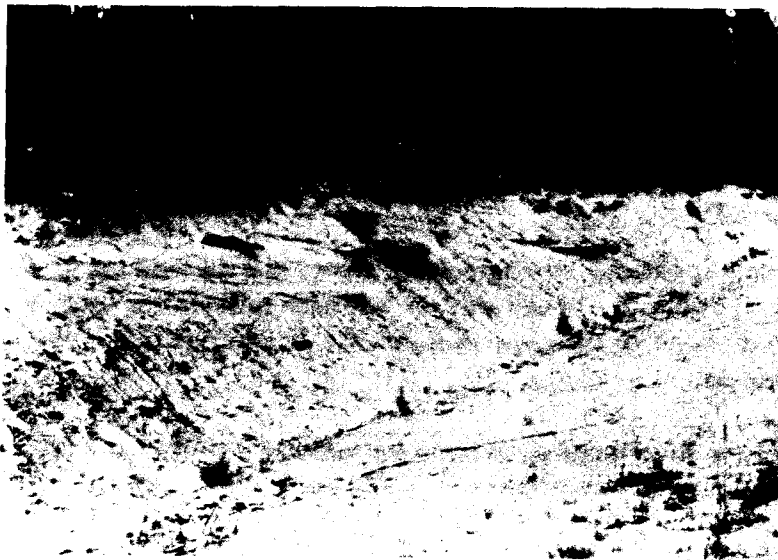


Figure 3. Weathered sandstone in high plateau area northwest of Edson.

The soils are Grey Wooded and Podzols; the following is a description of a Podzol soil developed on gravel in Area I:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Coniferous needle litter.

Ae	3	Light grey (10YR 7/1 dry), loamy sand to sand, loose, gravelly.
Bf	12	Reddish brown (5YR 5/4 dry), loam, loose, gravelly.
C	at 17 inches below surface	Greyish brown (10YR 4/2 dry), sandy loam, quartzitic gravels.

The Grey Wooded soils developed on till in Area I have the following description:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Dark brown (10YR 4/3 dry), organic debris and needle litter.
Ae	4	Pale brown (10YR 6/3 dry), sandy loam, platy, friable.
AB	3	Yellowish brown (10YR 5/4 dry), sandy clay loam, medium subangular blocky, firm.
Bt	9	Yellowish brown (10YR 5/6 dry), sandy clay, medium blocky, firm, some sandstone fragments.
C	at 17 inches below surface	Yellowish brown (10YR 5/4 dry), sandy clay loam, quartzitic stones and sandstone fragments in glacial till.

In some locations, the upper portion of the Ae horizon is noticeably much lighter colored than the lower portion in these soils. This feature is interpreted as being the initial stage of the development of a Podzol profile in the upper portion of a Grey Wooded soil.

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

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Deciduous leaf litter.
Ah	1	Very dark grey (10YR 3/1 dry), sandy loam, granular, loose.
Ae	5	Light brownish grey (10YR 6/2 moist) and light grey (10YR 7/2 dry), sandy loam, platy, friable.

AB	2	Yellowish brown (10YR 5/4 dry), loam, coarse platy to medium subangular blocky, firm.
Bt	12	Yellowish brown (10YR 5/4 dry), loam, medium subangular blocky, firm, compact.
C	at 22 inches below surface	Light olive brown (2.5Y 5/4 dry), sandy loam, massive, unconsolidated sandstone.

Area I is about 337,000 acres in size. The steeply sloping topography coupled with relatively high elevations and inferior soils make this area unsuitable for agricultural development. The area, therefore, is classified as pasture and woodland.

Area II

Area II is found in five separate locations in map sheet 83-F and comprises about 52 per cent of the total area.

The area extends from the Mountains in the southwest through the Foothills to the Great Plains. Thus a wide range in topography and elevation is included in the area. Elevations exceeding 8,500 feet above sea level occur in the Mountainous region while in the Great Plains region near Edson elevations of 2,700 to 3,000 feet are common.

Area II is drained by numerous streams and rivers, the most important of which are the Wild Hay, Athabasca, and McLeod Rivers. Moss bogs are scattered throughout the area, but appear to be most prevalent in the areas of level and undulating topography in the northern portion of Area II.

In the upland sections of Area II the soils are primarily Grey Wooded developed on till and weathered sandstone. Along the drainage courses, however, glacial outwash is of common occurrence and the soils are characteristically Podzols and Bisequa Grey Wooded.

The following description is that of a Podzol soil developed on glacial outwash in Area II:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Coniferous needle litter.
Ae	3	Pinkish grey (5YR 6/2 dry), sandy loam, platy, friable, stony.
Bf	8	Reddish brown (5YR 5/3 dry), sandy loam, weak small subangular blocky, slightly compact.

C at 13 inches Yellowish brown (10YR 5/4 dry), sandy loam, gravelly
 below surface outwash.

The soils developed on glacial till and on weathered sandstone in Area II are similar to those described for Area I. The soils on till are medium textured Grey Wooded clay loams while the soils developed on weathered sandstone are usually Grey Wooded and of a sandy loam to silt loam texture.

Area II is 1,760,000 acres in size of which 1,520,000 acres are classified as pasture and woodland. The relatively high elevations in most of this area combined with steeply sloping topography makes the greater proportion of the area unsuitable for agricultural development. The doubtful arable and potential arable land consist of 113,000 and 127,000 acres respectively. These latter two areas are located in the vicinity of Edson where the elevation is lower and the topography more gently sloping. The area outlined as doubtful arable land is characterized by a fairly high percentage of moss bog.

Area III

Area III is located in the southeast quarter of the map sheet and includes about 24 per cent of the total area.

The elevations in this section of the map sheet range from 3,000 to 4,000 feet above sea level. The topography consists of undulating to gently rolling ridges.

Moss and sedge bogs are common throughout this section of the map sheet and it is estimated that about 40 per cent of the area is covered with these Organic soils. The depth of surface peat is quite variable in Area III but generally does not appear to be as thick as in the bogs to the north.

The soils in this section of the mapped area are developed on a variety of materials that include glacial till, alluvial and aeolian deposits. The finer textured soils, those developed on till, are usually Grey Wooded while those on the coarser textured materials are generally Bisequa Grey Wooded and Podzol.

The following description is that of a Grey Wooded soil developed on till found in Area III:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Dark brown (10YR 4/3 dry), organic debris.
Ae	3	Pale brown (10YR 6/3 dry), sandy loam, platy, friable.
AB	3	Yellowish brown (10YR 5/6 dry), sandy clay loam, medium subangular blocky, firm.

Bt	10	Yellowish brown (10YR 5/4 dry), sandy clay, medium blocky, firm.
C	at 17 inches below surface	Yellowish brown (10YR 5/4 dry), clay loam, glacial till.

The soils developed on alluvial materials in Area III are generally sandy loam to silt loam in texture. The following description is that of a Bisequa Grey Wooded soil examined in this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	3	Deciduous leaf litter, slightly decomposed in lower portion, very dark greyish brown (10YR 3/2 dry).
Ah	1	Very dark greyish brown (10YR 3/2 dry), loam, granular, loose.
Ae	1	Light brownish grey (10YR 6/2 dry), sandy loam, platy loose.
Bf	4	Brown (10YR 4/3 moist), sandy loam, weak small sub-angular blocky, crushing easily to single grain.
Ae	3	Light yellowish brown (10YR 6/4 moist), sandy loam, platy, friable.
Bt	14	Yellowish brown (10YR 5/6 dry), loam, medium sub-angular blocky breaking to granular, slight suggestion of 1/2 inch thick clay bands.
BC	16	Light yellowish brown (2.5Y 6/4 dry), sandy loam, massive.
Ck	at 42 inches below surface	Light brownish grey (2.5Y 6/2 dry), sandy loam, flecked with lime.

Sand dunes are found scattered throughout Area III in a number of locations from west of the McLeod River to the eastern boundary of the map sheet. The soils developed in the dune areas are generally coarse textured and Podzolic in character. The following description is that of such a soil examined in Area III:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle litter.

Ae	2	Light grey (10YR 7/1 dry), loamy sand, platy, loose.
Bf	3	Brown (10YR 5/3 dry), loamy sand, single grain, loose.
C	at 6 inches below surface	Yellowish brown (10YR 5/4 dry), loamy sand to sand, lime carbonate-free to a depth of 40 inches.

Area III is about 799,000 acres in size. Of this amount, about 572,000 acres are classified as pasture and woodland, 221,000 acres as doubtful arable land, and 6,000 acres as potential arable. The extent of coarse textured soils and bog makes the greater proportion of Area III unsuitable for agricultural development. The doubtful arable land is located in the southwestern portion of Area III where the extent of moss bog is limited. The elevations in this region, however, range from 3,400 to 4,000 feet above sea level and may represent a serious deterrent to agricultural development of the area.

Area IV

Area IV is a relatively small area amounting to about four per cent of the map sheet. This area is located south of Edson and Bickerdike in the east central portion of the map sheet.

This area is characterized by sand dunes and bog. The topography associated with the U-shaped and longitudinal dunes is gently rolling to rolling; the intra-dune areas are normally depressional and characterized by the occurrence of moss bog. In some locations, however, the deposition of sand is shallow and glacial till is encountered at depths of 18 to 24 inches below the surface.

The soils developed on the dune sands are Podzol soils showing the following characteristics:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Coniferous needle litter.
Ae	3	Grey (10YR 6/1 dry), sand, single grain, loose.
Bf	8	Reddish brown (10YR 5/4 dry), sand, single grain, loose.
C	at 13 inches below surface	Greyish brown (10YR 5/2 dry), sand; lime carbonate encountered at 72 inches below surface.

Area IV is about 146,000 acres in size. The area is classified as pasture and woodland owing to the widespread occurrence of sand and bog in this section of the map sheet.

Area V

Area V is a relatively small area comprising about two per cent of the total map sheet.

The topography in this section of the area is generally undulating to gently rolling with some moss and sedge bog in the depressions. The depressional topography is a characteristic of the northern portion of the area.

The soils of Area V are primarily medium to fine textured Grey Wooded soils developed on lacustrine and glacial till materials. The lacustrine sediments in this area vary in depth from less than a foot to several feet or more and overlie glacial till. The following description is that of such a Grey Wooded soil developed on lacustrine silty clay in Area V:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Deciduous leaf litter.
Ae	4	Grey (10YR 6/1 dry), silt loam, platy, friable.
AB	3	Pale brown (10YR 6/3 dry), silty clay loam, medium subangular blocky, firm.
Bt	8	Brown (10YR 5/3 dry), silty clay, medium blocky, firm.
Ck	at 17 inches below surface	Yellowish brown (10YR 5/4 dry), silty clay loam, calcareous, lacustrine sediments.

The soils developed on till in Area V are similar to those described for Area III of this map sheet.

Area V is about 85,000 acres in size, of which about 59,500 acres are classified as potential arable land and 25,000 acres as doubtful arable land. Much of this area is presently under cultivation. The doubtful arable land category includes the northern portion where moss bog is prevalent.

Area VI

Area VI includes the area adjacent to the Athabasca and McLeod Rivers. In all, about seven per cent of the map sheet is included in this area.

A wide range in topography is found in Area VI. Undulating to depressional topography predominates in the area north of Obed while gently rolling and rolling slopes are found adjacent to the drainage courses in other portions of the area. Moss bog is of common occurrence in the undulating to depressional area.

Along Highway 16 from the National Park boundary to about Galloway the area is floored with a greyish colored calcareous gravelly outwash. This material is often overlain with a relatively thin cover of sandy alluvial material on which Podzol, Bisequa Grey Wooded, and Brunisolic soils are of common occurrence.

The following description is that of a Brown Wooded soil examined in Area VI:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Deciduous leaf litter.
Bm1	4	Strong brown (7.5YR 5/6 dry), sand, single grain, loose.
Bm2	10	Brown (10YR 5/2 dry), sand, single grain, loose.
Ca	4	White (10YR 8/1 dry), sand, single grain, loose, highly calcareous.
Ck	at 19 inches below surface	Grey (10YR 6/1 dry), sandy alluvium.

The Bisequa Grey Wooded soils in this area have the following soil profile description:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	3	Deciduous leaf litter.
Ae	1	Grey (10YR 6/1 dry), sand, single grain, loose.
Bf	5	Reddish brown (5YR 5/4 dry), sand, single grain, loose.
Ae	3	Yellowish brown (10YR 5/4 dry), sand, single grain, loose.
Bt	2	Brown (10YR 5/3 dry), loam, small subangular blocky, firm.
C	4	Yellowish brown (10YR 5/3 dry), sand.
IIC	at 18 inches below surface	Grey (10YR 6/1 dry), calcareous, gravelly outwash.

At some locations along the highway, in Area VI, the calcareous gravels form the parent materials for some of the soils. One such soil, a Bisequa Grey Wooded, was examined near Obed and described as follows:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Deciduous leaf litter.
Ae	1	Light grey (10YR 7/1 dry), sand, single grain, loose, gravelly.
Bf	2	Reddish brown (5YR 5/4 dry), sand, single grain, loose, gravelly.
Ae	3	Yellowish brown (10YR 5/4 dry), loamy sand, single grain, gravelly.
Bt	3	Brown (10YR 5/3 dry), loam, medium subangular blocky, friable.
Ck	at 10 inches below surface	Grey (10YR 5/1 dry), calcareous, gravelly outwash.

The upper Ae horizon in the above described soils is not always continuous. At some sites it is absent and such soils are classified as Brunisolic Grey Wooded.

Area VI is about 244,000 acres in size. The area is, for the most part, classified as pasture and woodland since the soils are sandy and gravelly in nature. A small area in the vicinity of Marlboro is classified as potential arable. About 219,000 acres are included in the pasture and woodland rating category and 25,000 acres in the potential arable category. Some of the undulating and gently sloping land near the Athabasca River may be suitable for growing garden crops.

Area VII

The amount of land included in Area VII amounts to less than one per cent of the map sheet. This comparatively small area is confined to some of the low lying terraces along the Athabasca and McLeod Rivers.

A variety of conditions are encountered on these river terraces. The size and shape of the terraces, as well as the soil texture and drainage conditions, are extremely variable.

The soils are relatively immature throughout the area and in some locations, particularly on the lower lying terraces, periodic additions of sediments may be taking place as a result of flooding. Normally, some organic matter is accumu-

lated at the surface but, at depth, soil horizons are very weakly expressed. Buried organic horizons are not uncommon in these alluvial soils.

Area VII is about 23,000 acres in size. Of this amount, about 13,000 acres are considered to be potential arable land, 5,700 acres doubtful arable land, and 4,300 acres pasture and woodland.

Summary

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

Table V. Land rating classification for map sheet 83-F

Area	Arable, acres	Doubtful, acres	Pasture and Woodland, acres
Area I			337,000
Area II	127,000	113,000	1,520,000
Area III	6,000	221,000	572,000
Area IV			146,000
Area V	59,500	25,500	
Area VI	25,000		219,000
Area VII	13,000	5,700	4,300
Total	230,500	365,200	2,798,300

Alberta Map Sheet 83-J

Alberta map sheet 83-J is located in the Barrhead-Swan Hills area of north central Alberta. The southern and eastern section of the map sheet is extensively cultivated but north of the Athabasca River agricultural settlement is scattered and confined to the area adjacent to the river. In recent years the northern and western portions of this map sheet have been the center of considerable activity in connection with oil company exploration. A number of oil and gas fields have been discovered in the area. These include the Virginia Hills, Judy Creek, Carson Creek, Swan Hills, and Deer Mountain oil fields and the Carson Creek gas field. The exploratory soil survey of this map sheet was confined mostly to the section north and west of the Athabasca River. The more heavily settled area to the south will be covered in the near future by a reconnaissance soil survey.

Area I

Area I is found at the higher elevations in the northwestern section of the map area. About 26 per cent of the surveyed portion of the map sheet is included in this area.

This high plateau area reaches an elevation of about 4,500 feet above sea level at the highest point. The topography is generally very steeply sloping and hilly topography characterizes the greater proportion of the area.

The soils are developed on glacial till, gravels, and in places weathered sandstone. The gravels, believed to be of Tertiary age, are most widespread at the highest elevations of the plateau. The soils developed on this material are primarily Podzols and have the following generalized description:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle litter.
Ae	3	Pinkish grey (7.5Y 6/2 dry), sandy loam, coarse platy, gravelly, loose.
Bf	10	Yellowish brown (10YR 5/4 dry), sandy loam, single grain, gravelly, loose.
C	at 14 inches below surface	Light yellowish brown (10YR 6/4 dry), sandy loam, gravelly.

The glacial till in this area is characteristically stony, probably as a result of the close proximity of the gravels in this area. The following description is typical of the Grey Wooded soils developed on till in this area:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle litter.
Ah	1	Dark grey (10YR 4/1 dry), sandy loam, granular, loose.
Ae	2	Brown (10YR 5/3 dry), loam, platy, friable.
Bt	12	Yellowish brown (10YR 5/4 dry), clay loam, medium blocky, firm.
C	at 16 inches below surface	Olive brown (2.5Y 4/4 dry), sandy clay loam to sandy clay, glacial till, stony.

In some locations in Area I the soils are developed from a weathered sandstone. These soils are usually Grey Wooded or Podzols and are similar to those described in earlier sections of this report.

Area I is about 644,000 acres in size. The relatively high elevations, steeply sloping topography, and somewhat gravelly soils suggest that this area is unsuitable for agricultural development. Therefore, the area is classified as pasture and woodland.

Area II

Area II is the largest area separated in the map area and comprises about 30 per cent of the area. This area is characterized by long gradual slopes from the high plateau (Area I) to the Athabasca River. Low elongated ridges with a northwest-southeast lineation are a characteristic of this section of the map area. These ridges generally are typified by undulating to gently rolling topography.

Moss and sedge bog occur to a significant extent in the central portion of Area II; however, the remainder of the area is relatively well drained and free of bog.

The soils of Area II are extremely variable and are characterized for the most part by stoniness. The soils associated with many of the ridges have developed from coarse textured outwash. This material ranges from one to three feet in depth and overlies glacial till. Much of the gravelly outwash appears to have eroded down slope from the high plateau to the west. The following soils description is typical of a Podzol soil developed on this gravelly outwash material:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle litter.
Ae	2	Light grey (10YR 7/1 dry), fine sandy loam, platy, loose, stony.
Bf	6	Strong brown (7.5YR 5/6 dry), fine sandy loam, weak small subangular blocky, friable, stony.
C	15	Yellowish brown (10YR 5/4 dry), sandy loam, very stony.
IIC	at 24 inches below surface	Greyish brown (10YR 5/2 dry), sandy clay loam, glacial till.

The soils developed on till are primarily Grey Wooded but in some local areas these soils show the development of a Podzol soil in the upper portion

of the profile. These soils are called Bisequa Grey Wooded and have the following characteristics:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Coniferous needle litter.
Ae	1	Pinkish grey (7.5YR 6/2 dry), sandy loam, platy, friable.
Bf	5	Strong brown (7.5YR 5/6 dry), fine sandy loam, weak small subangular blocky, friable.
Bt	14	Yellowish brown (10YR 5/6 dry), sandy clay loam, small subangular blocky, firm.
C	at 21 inches below surface	Dark greyish brown (2.5Y 4/2 dry), sandy clay loam, glacial till.

Area II is about 736,000 acres in size. The greater proportion, 547,000 acres, is classified as doubtful arable land. The stone content of most of the soils in this area is such as to be a serious handicap to agricultural development. Some areas where stoniness is not excessive may be suitable for future agricultural development. The pasture and woodland area amounts to about 189,000 acres and includes the central portion of Area III where the amount of moss bog is excessive.

Area III

Area III constitutes about 21 per cent of the mapped area and is found primarily in the southwestern section of the area.

The topography throughout the greater proportion of Area III is rather steeply sloping. Rolling and hilly topography is characteristic of much of this area. The gently rolling topography is confined mostly to the areas adjacent to the McLeod and Athabasca Rivers.

The soils in this area are similar to those described in other sections of this report. This area represents an extension of Area II of map sheet 83-K. The soils are primarily Grey Wooded soils developed on till and weathered sandstone. In low-lying depressional areas the soils are often Low Humic Eluviated Gleysols; however, the amount of poorly drained land in this area is not excessive. Moss and sedge bogs are of infrequent occurrence in this rather steeply sloping area.

Area III is about 518,000 acres in size of which 494,000 acres are classified as pasture and woodland. The remainder is made up of 4,000 acres of doubtful arable land and 20,000 acres of potential arable land. These latter two areas are located southeast of Whitecourt in a region of undulating to gently

rolling topography and along Bruce Creek in the northwestern section of the map sheet.

Area IV

Eleven per cent of the mapped area is included in Area IV which is located along the Athabasca River in the southern and eastern sections of the area. Area IV is found in seven separate locations along the river.

The elevations are the lowest in the mapped area and range from about 2,000 to 2,200 feet above sea level. In the southern portion the topography consists of undulating to rolling sand ridges and dunes while the northeastern section is essentially level to depressional.

A considerable proportion of Area IV is poorly drained. This is particularly true of the northern portion where moss and sedge bogs are found in association with the U-shaped sand dunes.

The soils developed on this sandy material are Podzols and possess the following characteristics:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	2	Coniferous needle litter.
Ae	2	Pinkish grey (7.5YR 6/2 dry), loamy sand, coarse platy, loose.
Bf1	3	Brown (7.5YR 5/4 dry), loamy sand, single grain, loose.
Bf2	12	Strong brown (7.5YR 5/6 dry), loamy sand, single grain, loose.
C	at 19 inches below surface	Brown (7.5YR 4/4 dry), sand.

Area IV is 275,000 acres in size. A combination of sand and moss bog suggests that this area is unsuitable for agricultural development and the area, therefore, has been classified as pasture and woodland.

Area V

Area V is located along the north side of the Athabasca River and includes about eight per cent of the surveyed portion of map sheet 83-J.

This area, generally, is one of fairly uniform topography ranging from undulating to gently rolling. There is a gradual slope to the river with a range in elevation from about 2,900 to 2,200 feet above sea level.

Area V is a well drained area and moss and sedge bogs are of infrequent occurrence in this section of the map sheet.

The soils of Area V are exceedingly variable in respect to degree of development and to the nature of the soil parent materials. Generally, the soils are medium textured and developed on lacustrine and glacial till materials. Along the river, however, some fairly coarse textured alluvial soils are encountered. Grey Wooded, Dark Grey Wooded, and Bisequa Grey Wooded soils make up the soil pattern on these materials.

The following description is that of a severely leached Grey Wooded soil developed on silty clay lacustrine parent material in Area V:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Deciduous leaf and coniferous needle mat.
Ae1	2	Light grey (10YR 6/1 dry), sandy loam, platy, loose.
Ae2	6	Very pale brown (10YR 7/3 dry), fine sandy loam, platy, friable.
Bt	10	Brown (10YR 5/3 dry), clay, medium blocky, firm.
Ck	at 19 inches below surface	Yellowish brown (10YR 5/4 dry), silty clay, lacustrine sediments, pH 7.5.

The Dark Grey Wooded soils are not extensive in Area V but a typical example of this type profile is as follows:

<u>Horizon</u>	<u>Thickness, in inches</u>	<u>Description</u>
L-H	1	Deciduous leaf mat.
Ah	3	Dark grey (10YR 4/1 dry), silt loam, granular, friable.
Ae	2	Pale brown (10YR 6/3 dry), loam, platy, friable.
Bt	10	Brown (10YR 5/3 dry), clay, medium blocky, firm.
C	at 16 inches below surface	Brown (10YR 5/3 dry), stratified lacustrine clay.

Area V is about 185,000 acres in size. The soils and topography throughout the greater proportion of this area are considered suitable for agricultural development. Hence, about 178,000 acres are classified as potential arable land. The remaining 7,000 acres consist primarily of rough broken land adjacent to stream courses, which have been classed as pasture and woodland.

Area VI

Area VI is a relatively small area comprising about three per cent of the surveyed portion of map sheet 83-J.

The low-lying terraces along the Athabasca and McLeod Rivers are included in Area VI. These terraces are extremely variable and in certain locations represent land suitable for agricultural development but in other locations poor drainage, gravelly soils, and badly dissected terraces make some of these areas of doubtful value for development.

The topography of the terraces is usually level to depressional. The soils are invariably immature and show little soil profile development. In some locations buried organic horizons are encountered at depth indicating that flooding and deposition is still a periodic occurrence.

Area VI is about 85,000 acres in size. The better drained areas with fairly deep soils are classified as potential arable land while the somewhat dissected areas have been designated as doubtful arable land. The rough and broken banks adjacent to the drainage courses are classified as pasture and woodland. In all, 34,000 acres are potential arable, 30,000 acres doubtful arable, and 21,000 acres pasture and woodland.

Area VII

Area VII consists of that section of the map sheet located south and east of the Athabasca River. A considerable portion of this area is under cultivation and for this reason was not included as part of the exploratory soil survey. This area, however, will be included in future reconnaissance soil surveys.

A cursory examination of the soils in Area VII has shown that some of these soils are Dark Grey Wooded and Grey Wooded. Also, a significant extent of Gleysolic soils is known to occur in this area.

Area VII is about 1,057,000 acres in size. Since this area was not included in the survey it is not possible to estimate the extent of the various land rating categories. Certain portions of the area, near Barrhead for example, are presently extensively cultivated; however, other portions of the area, particularly to the north, appear to be characterized by a fairly high proportion of moss bog which is unsuitable for agricultural development.

Summary

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

Table VI. Land rating classification for map sheet 83-J

Area	Arable, acres	Doubtful, acres	Pasture and Woodland, acres
Area I			644,000
Area II		547,000	189,000
Area III	20,000	4,000	494,000
Area IV			275,000
Area V	178,000		7,000
Area VI	34,000	30,000	21,000
Total	232,000	581,000	1,630,000

Some Chemical and Physical Characteristics of Representative Soil Profiles

Soil samples were collected in the surveyed area and taken to the laboratory for analysis. These analyses assist in the classification of the soils and at the same time give some indication of the productive capacity of the soils.

Table VII shows some chemical and physical data for three soil profiles sampled in the survey area.

In general, the nitrogen content is highest in the surface organic horizons and decreases with depth in all the soils. There is a pronounced decrease in the amount of this constituent from the L and Ah horizons to the Ae and B horizons.

The organic carbon content of the soils follows a somewhat similar pattern to that of nitrogen in that it is highest at the surface and decreases with depth. The analyses indicate a slight accumulation of organic carbon in the B horizons, particularly in the Bf horizon of the Podzol soil.

The carbon-nitrogen ratios are highest in the L-H horizon and lowest in the Ae horizon. It is generally considered that where the carbon-nitrogen ratio is above 15:1 the nitrogen becomes unavailable for plant growth. On this basis,

the nitrogen in the cultivated layer of these soils would appear to be unavailable for crop growth. The nitrogen levels in Profiles 1 and 3 are extremely low, suggesting that these soils would respond to the application of nitrogenous fertilizers.

The soil reaction is similar in all the profiles. These wooded soils are all fairly severely leached and the solums generally range from very strongly acid to medium acid. The parent materials are calcareous and are from neutral to moderately alkaline in reaction.

The soils shown in table VII are representative of those developed on glacial till, lacustrine, and aeolian sand in the mapped area. As shown in the table the soils developed on lacustrine materials are the finest textured and the aeolian sand the most coarse textured, with the soils developed on till intermediate between the two. The data for fine clay indicates a fairly pronounced movement of this constituent from the Ae to the Bt horizons in the Grey Wooded and Dark Grey Solod soils, but little translocation of clay in the sandy Podzol soil. The particle size distribution analyses indicate that soil profiles 1 and 2 would have a satisfactory moisture holding capacity whereas Profiles 3, with the sand fraction amounting to about 90 per cent, would be extremely droughty.

Table VIII shows the total cation exchange capacity, exchangeable cations, and base saturation percentage for the three soil profiles.

The total exchange capacity closely parallels that of the clay and organic matter content in all profiles. Profile 2 is the finest textured and possesses the highest total cation exchange capacity whereas the lowest values occur in Profile 3, the sandy Podzol soil.

The base-saturation data indicate a medium to high base status in all the soil profiles reported in table VIII. The base-saturation percentages are lowest in the Ae horizon and increase with depth in all three soils. The relative amounts of exchangeable sodium and magnesium are low and should not be a deterrent to plant growth. On the basis of field morphology, Profile 2 is typical of a group of soils called Solod soils which are normally associated with somewhat saline conditions. However, the chemical data shown in table VIII indicates that the per cent exchangeable sodium and the ratio of exchangeable sodium plus magnesium to calcium is much lower than the criteria set down in the National Soil Survey Classification for Solod soils. However, on the basis of morphology these soils have been classified as Solod soils for the purpose of this survey.

Table VII. Soil reaction (pH), organic carbon, nitrogen, carbon-nitrogen ratio, and particle size distribution of representative soil profiles

Horizon	Thickness, in inches	pH	Organic carbon %	Nitrogen %	C/N ratio	Sand 2.0-0.05 mm., %	Silt 0.05-0.002 mm., %	Clay <0.002 mm., %	Fine Clay <0.0002 mm., %
Profile 1 - (7.2.2.) Orthic Grey Wooded, clay loam (27-61-15 W.5)									
L-H	2	5.2	33.75	.410	82	-	-	-	-
Ae1	2	5.4	1.04	.061	17	27	62	11	3
Ae2	3	5.4	0.33	.028	12	23	42	35	2
AB	3	4.8	0.58	.039	15	18	52	30	14
Bt	10	4.6	0.51	.028	18	27	32	41	25
BC	10	6.0	-	-	-	30	35	35	19
Ck	at 30 inches below surface	7.2	-	-	-	29	33	38	20
Profile 2 - (3.7.2.) Dark Grey Solod, clay (26-66-22 W.5)									
L-H	2	5.3	33.40	1.25	27	-	-	-	-
Ah	4	4.9	8.04	.330	24	7	41	52	22
Ae	2	5.0	0.74	.065	11	26	59	15	3
AB	3	4.8	0.88	.063	14	11	42	47	28
Bt	18	4.8	0.76	.040	19	10	24	66	46
Ck	at 29 inches below surface	7.2	-	-	-	0	19	81	45
Profile 3 - (9.6.2.) Podzol, sand (21-60-15 W.5)									
L-H	1	-	26.05	0.81	32	-	-	-	-
Ae	3	4.9	0.41	0.04	10	91	8	1	0
Bf	7	6.0	1.11	0.05	24	87	7	4	1
BC	13	5.8	0.47	0.05	19	93	4	3	1
Ck	at 24 inches below surface	8.1	0.25	0.02	15	93	2	5	2

Table VIII. Total cation exchange capacity by determination and by summation, exchangeable cations, and percentage base saturation for representative soil profiles

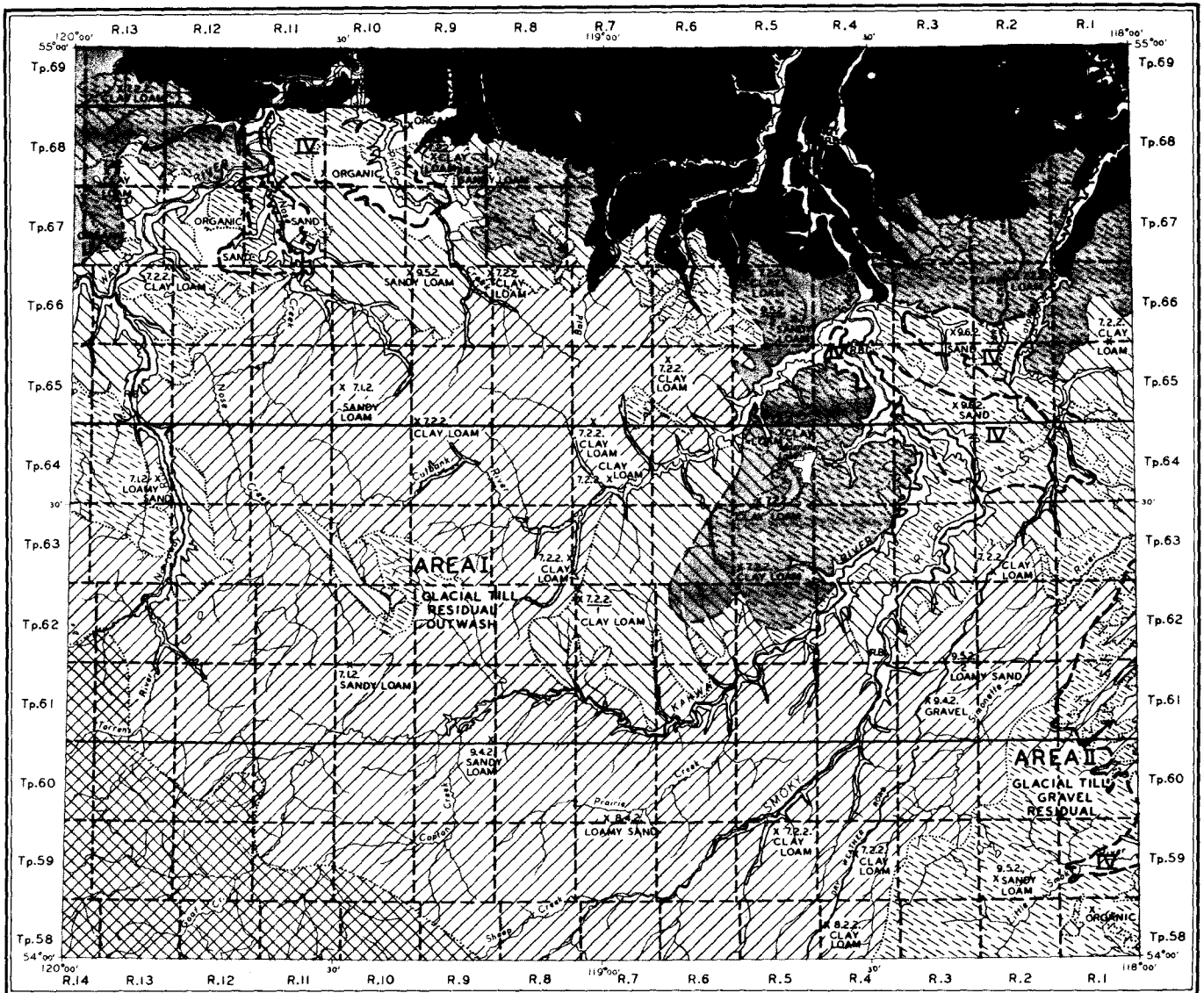
Horizon	Thickness, in inches	Total exchange capacity		Ca	m.e./100 gms.			H	Base sat., %
		Deter. m.e./100 gms.	Sum. m.e./100 gms.		Mg	K	Na		
Profile 1 - (7.2.2.) Orthic Grey Wooded, clay loam (27-61-15 W.5)									
L-H	2	66.5	43.1	32.0	4.7	0.7	0.0	5.7	87
Ae1	2	8.9	9.2	4.8	1.6	0.3	0.1	2.4	74
Ae2	3	7.7	8.4	4.0	2.0	0.2	0.1	2.1	75
AB	3	20.5	20.0	12.5	3.4	0.4	0.1	3.6	82
Bt	10	27.7	27.8	18.3	4.5	0.5	0.1	4.4	84
BC	10	19.7	26.5	20.3	4.5	0.4	0.1	1.2	96
Ck	at 30 inches below surface	-	-	-	-	-	-	-	-
Profile 2 - (3.7.2.) Dark Grey Solod, clay (26-66-22 W.5)									
L-H	2	77.0	66.9	44.0	14.8	3.8	0.0	4.3	94
Ah	4	40.6	37.2	18.0	7.8	1.6	0.0	9.8	74
Ae	2	11.5	11.5	3.7	2.8	0.5	0.1	4.4	62
AB	3	26.0	25.9	11.5	7.1	0.5	0.1	6.7	74
Bt	18	42.0	40.2	20.5	12.3	0.7	0.3	6.4	84
Ck	at 29 inches below surface	-	-	-	-	-	-	-	-
Profile 3 - (9.6.2.) Podzol, sand (21-60-15 W.5)									
L-H	1	-	-	-	-	-	-	-	-
Ae	3	2.4	3.1	0.6	0.6	0.1	0.0	1.8	42
Bf	7	3.3	3.0	0.9	0.7	0.1	0.0	1.3	61
BC	13	3.0	4.3	1.6	1.9	0.1	0.0	0.7	77
Ck	at 24 inches below surface	-	-	-	-	-	-	-	-

References Cited

1. Government of Canada (1956): Climatic summaries; Meteor. Division, Dept. Transport, Toronto, Vol. III, 94 pages.
2. _____ (1962): Meteorological observations in Canada; Meteor. Division, Dept. of Transport, Toronto.
3. Lindsay, J.D. and Odynsky, W., (1963): Permafrost in the Organic soils of northern Alberta; Res. Coun. of Alberta, Soils Division, (unpublished).
4. Moss, E.H., (1953): Marsh and bog vegetation in northwestern Alberta; Canada J. Bot., Vol. 31, p. 448-470.
5. Odynsky, W., et al. (1961): Soil survey of the Beaverlodge and Blueberry Mountain sheets, (Appendix by A.C. Carder); Res. Coun. Alberta Rept. 81, 123 pages.
6. Odynsky, W., et al. (1956): Soil survey of the Grande Prairie and Sturgeon Lake sheets; Res. Coun. Alberta Rept. 74, 111 pages.
7. Odynsky, W., et al. (1952): Soil survey of the High Prairie and McLennan sheets; Res. Coun. Alberta Rept. 63, 112 pages.
8. Wyatt, F.A., et al. (1944): Soil survey of Wainwright and Vermilion sheets; Univ. of Alberta, Coll. of Agriculture Bull. 42, 122 pages.

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

Scale in Miles
4 3 2 1 0 4 8



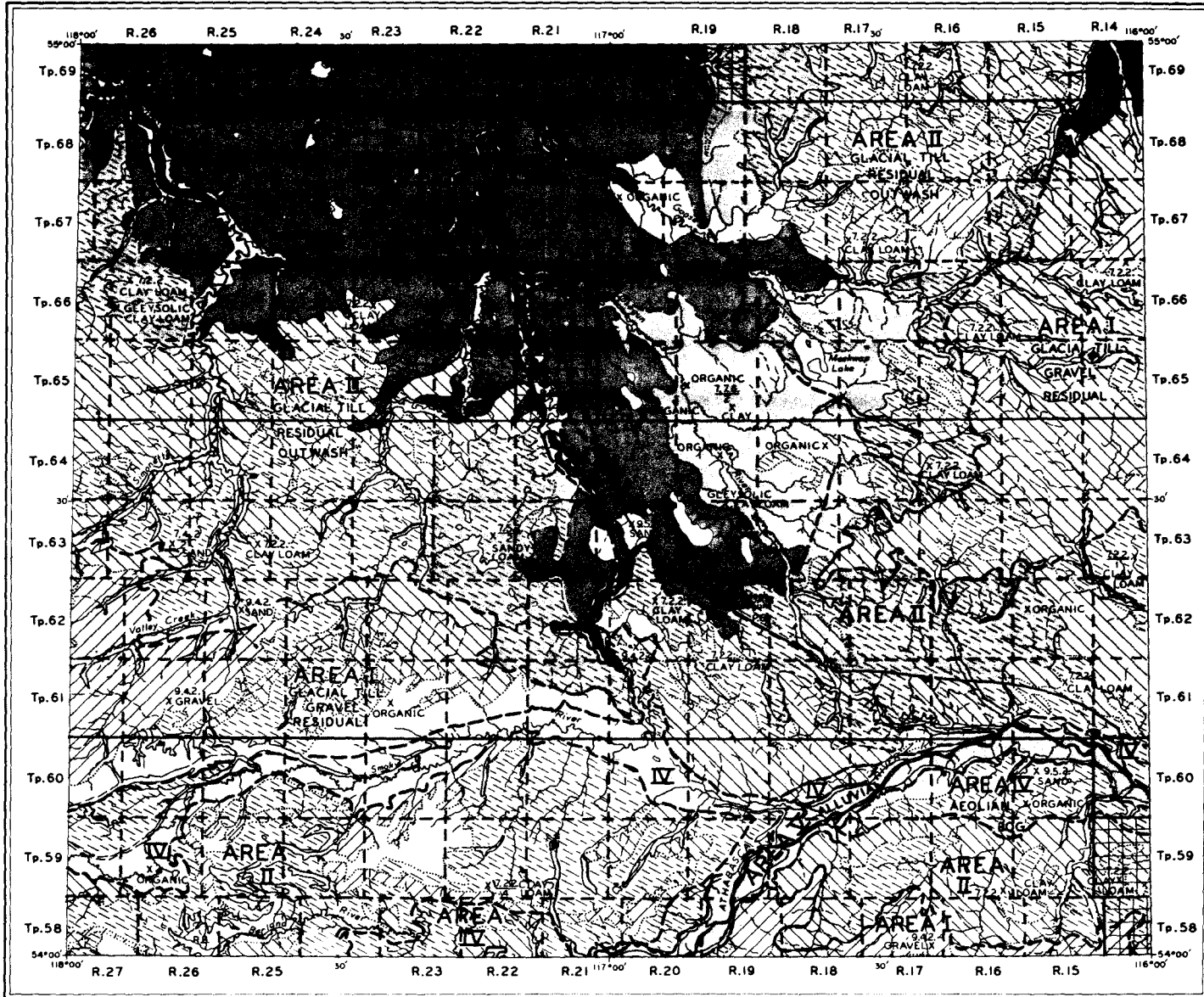
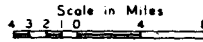
LEGEND

Soil information by Alberta Soil Survey,
Research Council of Alberta,
Helicopter Project - 1955.

Pasture and Woodland.....		Level and Undulating Topography.....	
Doubtful Arable Land.....		Gently Rolling Topography.....	
Potential Arable Land.....		Rolling Topography.....	
		Hilly Topography.....	
		Mountainous 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 83-K



Soil information by Alberta Soil Survey,
Research Council of Alberta,
Exploratory Project 1954.

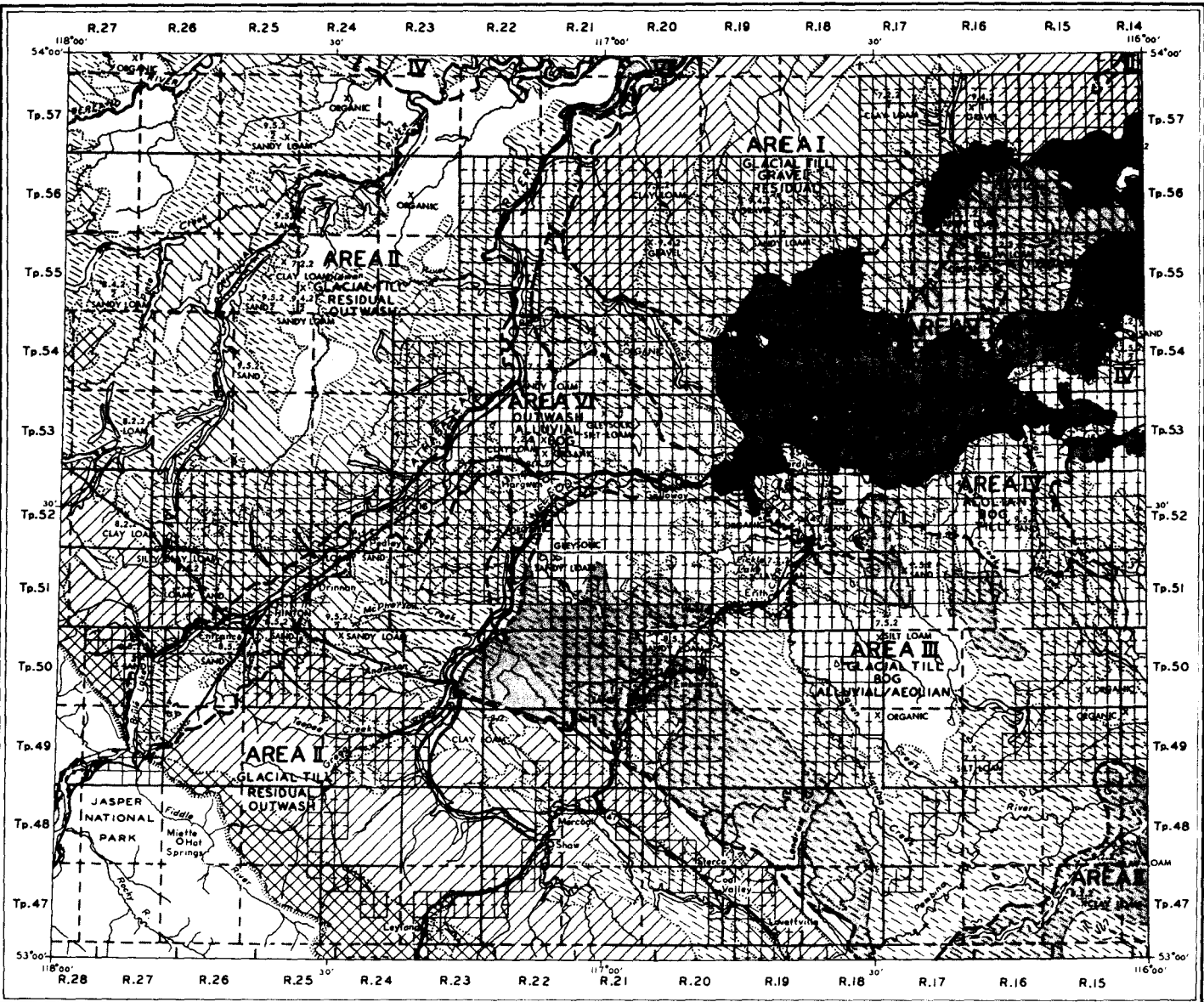
LEGEND

<p>Pasture and Woodland.....</p> <p>Doubtful Arable Land.....</p> <p>Potential Arable Land.....</p>	<p>Level and Undulating Topography</p> <p>Gently Rolling Topography.....</p> <p>Rolling Topography.....</p> <p>Hilly Topography.....</p> <p>Rough Broken Land.....</p>	
---	--	--

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 83-F

Scale in Miles
4 3 2 1 0 4 8



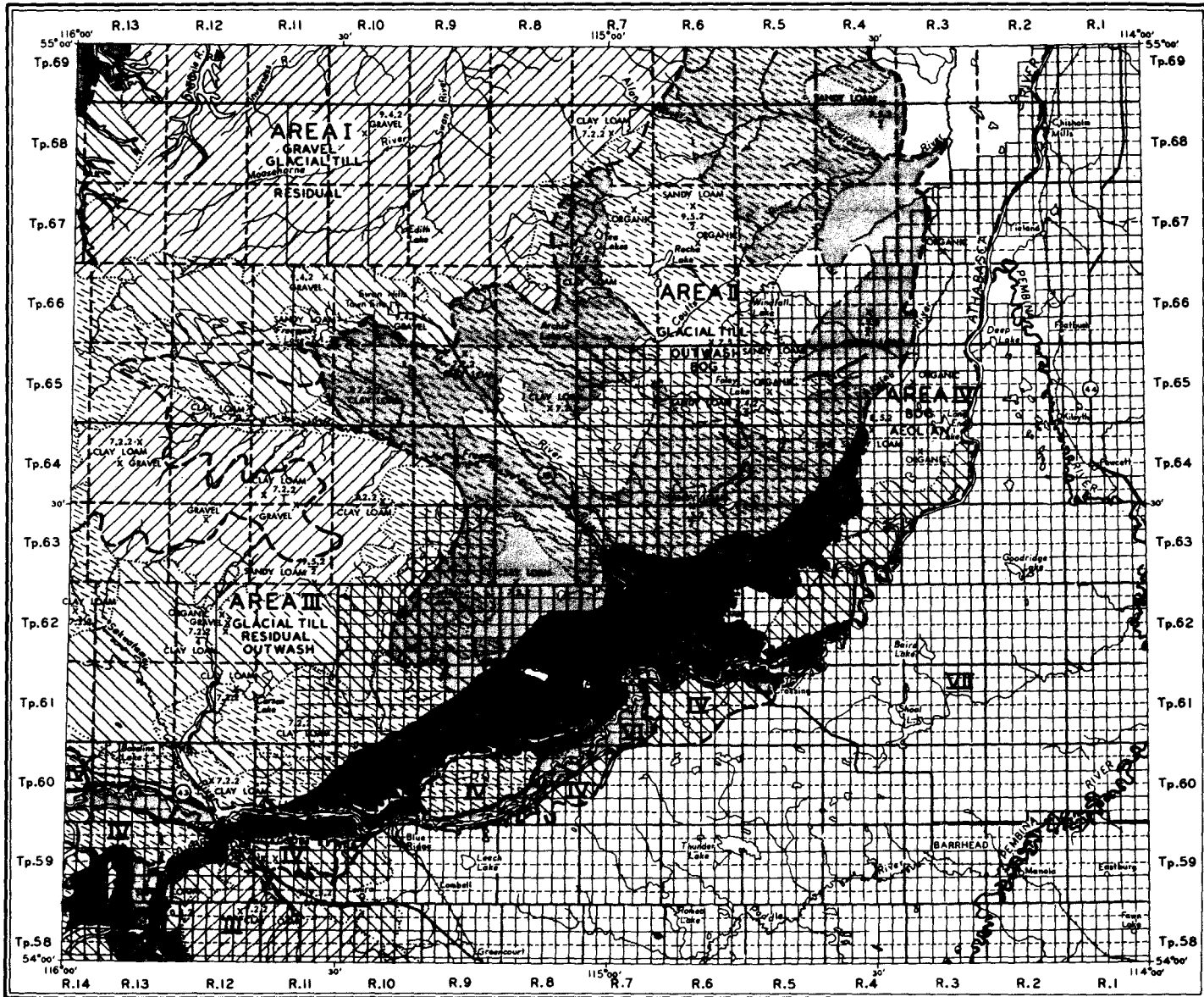
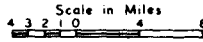
Soil information by Alberta Soil Survey,
Research Council of Alberta
Helicopter Project - 1955.

LEGEND

Pasture and Woodland.....		Level and Undulating Topography.....	
Doubtful Arable Land.....		Gently Rolling Topography.....	
Potential Arable Land.....		Rolling Topography.....	
		Hilly Topography.....	
		Mountainous 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 83-J



LEGEND

Soil information by Alberta Soil Survey,
Research Council of Alberta,
Helicopter Project - 1955.

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

<p>Pasture and Woodland</p> <p>Doubtful Arable Land</p> <p>Potential Arable Land</p>	 	<p>Level and Undulating Topography</p> <p>Gently Rolling Topography</p> <p>Rolling Topography</p> <p>Hilly Topography</p> <p>Rough Broken Land</p>	
--	--------------	--	------------------