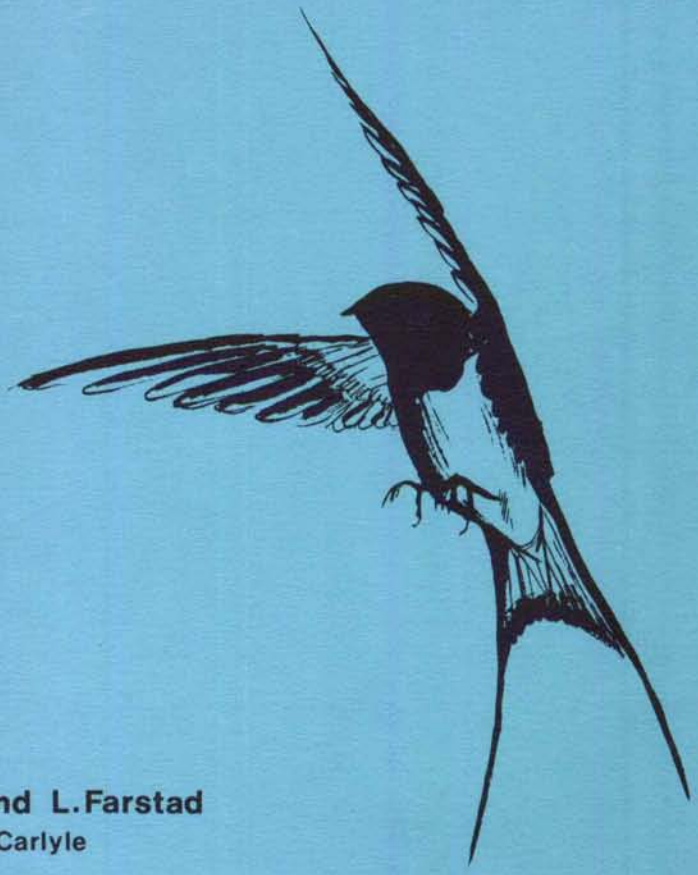
A Soil Resource and Land Use Survey of the

West Moberly Lake Indian Reserve no. 169



E.B. Wiken and L. Farstad
Edited by: R.E. Carlyle

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Research Station,
Agriculture Canada,
6660 N.W. Marine Dr.,
Vancouver 8, B.C.

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A SOIL RESOURCE AND LAND USE SURVEY OF THE WEST MOBERLY LAKE INDIAN RESERVE NO. 168A

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A SOIL RESOURCE AND LAND USE SURVEY OF THE WEST MOBERLY LAKE INDIAN RESERVE NO. 168A

Summary

The soils of the West Moberly Lake Indian Reserve are classified. A total of six soils are identified, described and mapped (Tables 1, 2, 3, 4 and Fig. 3).

The soils are also arranged into five soils management areas (Fig. 4). Each management area is described and its agricultural use is discussed. Selected analyses of the agriculturally important soils are tabulated (Table 1).

The agricultural productive capacity of this Reserve can be greatly increased. All of Soil Management Area A except for localized areas of Eaglesham soils can be utilized for forage or cereal production. With the aid of irrigation and fertilizers this Area of approximately 2400 acres should produce 7200 to 9600 tons of forage per year or comparable quantities of barley or oats. If a beef herd is maintained some combination of both forage and cereals is preferable.

Pasture improvement can be started in the more open parts of Areas B and C. This consists of shallow cultivation with a disc-harrow, seeding higher yielding grasses and the annual application of fertilizers. The advice of an agriculturist familiar with the region should be sought.

Area D is less adaptable to pasture improvement but certain parts can be treated as suggested for Areas B and C if the cost can be justified. Slash burning and the use of commercial fertilizers in the more open forested areas should be considered for the improvement of grazing ranges.

At the present time crop production can follow three possible courses. These are:

(a) use Area A for forage production producing a good quality saleable product,

(b) maintain a beef herd and produce both forage and cereals for the cattle, i.e. market the crops through the beef herd, or

(c) evolve a combination of (a) and (b).

A more detailed cost study is required to determine the most profitable course to follow. Factors other than monetary profit undoubtedly have to be considered.

The Reserve also has forest resources for supplying fence posts and rails. This could be the basis of a small industry providing it is well organized and reliable.

Utilization of Management Areas B, C and D requires the maintenance of livestock to graze these Areas. The other alternative is to lease this land for grazing.

Introduction

This report is one of a group describing the soil resources of some of the Indian Reserves in British Columbia. These surveys are done by the Soil Survey Section, Canada Department of Agriculture, Vancouver, at the request of the Department of Indian Affairs and Northern Development.

The West Moberly Lake Indian Reserve is occupied by the Hudson Hope Indian Band who live mainly on the Halfway River Reserve, 48 miles to the north. Communications between the two Reserves are difficult as there are no connecting roads, railroad or rivers.

Few Indians live on this Reserve. It is used mainly for grazing and approximately 20-25 percent of 2400 acres of arable land produces forage.

The purpose of the survey is as follows:

(a) to classify and map the soils of the Reserve,

(b) to examine the irrigation situation and determine which soils can be irrigated,

(c) to group the soils into management units describing the management of each unit as to irrigation, fertilizer applications, selection of crops, pasturing and grazing.

The Reserve was visited first in the summer of 1970 and arrangements were made to carry out the survey. Next the soils of the Reserve were classified and mapped. At the same time samples of the Pys and Sukunka soils were collected for laboratory analyses. Later the soils were grouped into soil management areas and these areas were mapped separately.

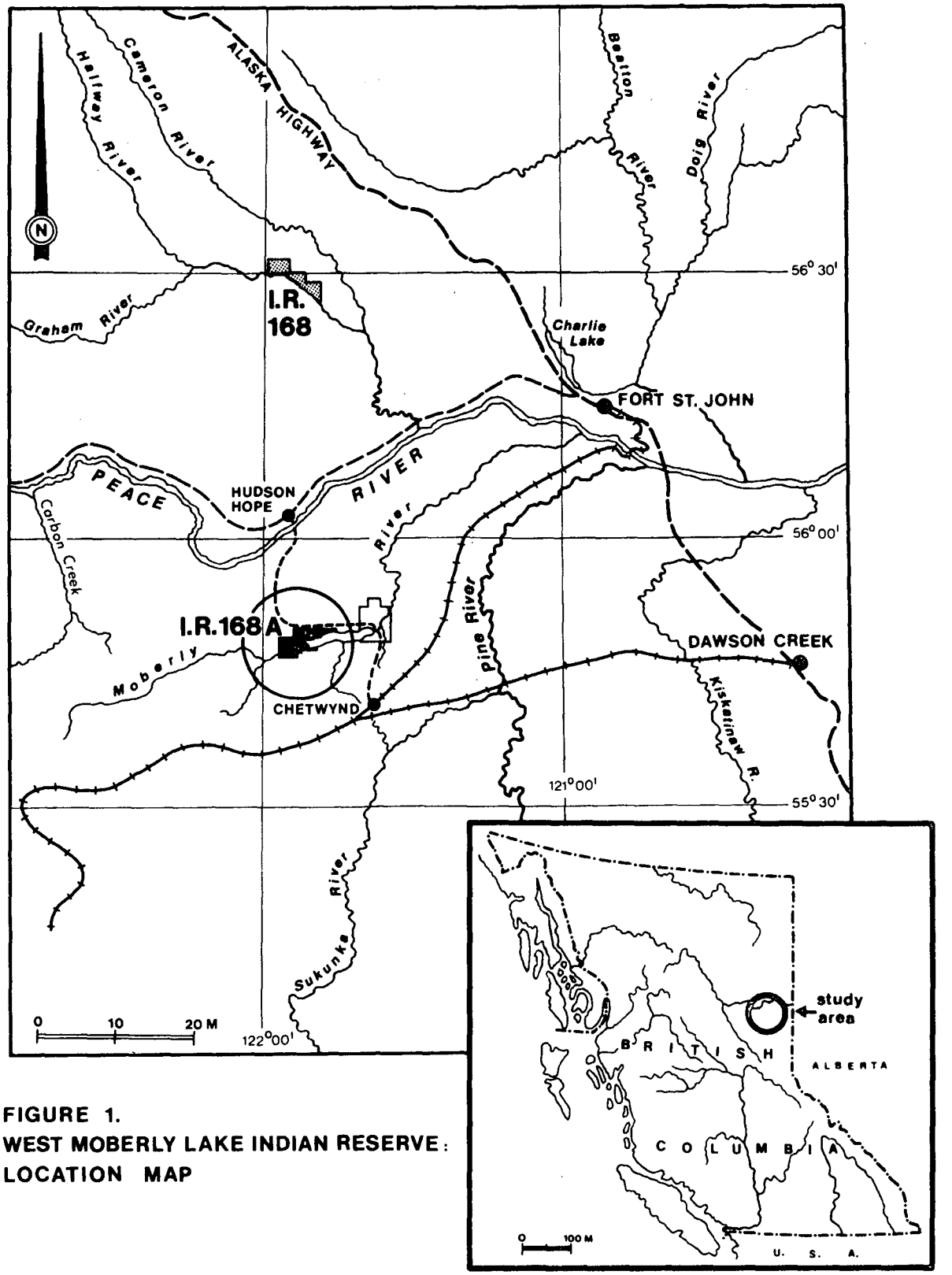

FIGURE 1.
WEST MOBERLY LAKE INDIAN RESERVE: LOCATION MAP

Location and Extent

West Moberly Lake Indian Reserve No. 168A is approximately 10 miles northwest of Chetwynd in the Peace River Region of British Columbia (Fig. 1). This Reserve, consisting of approximately 4800 acres[1], is located at the west end of Moberly Lake. The area covered by this report is found within the 93 P/13 map sheet of the National Topographic Series.

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[1] Acreages are estimated from aerial photographs.

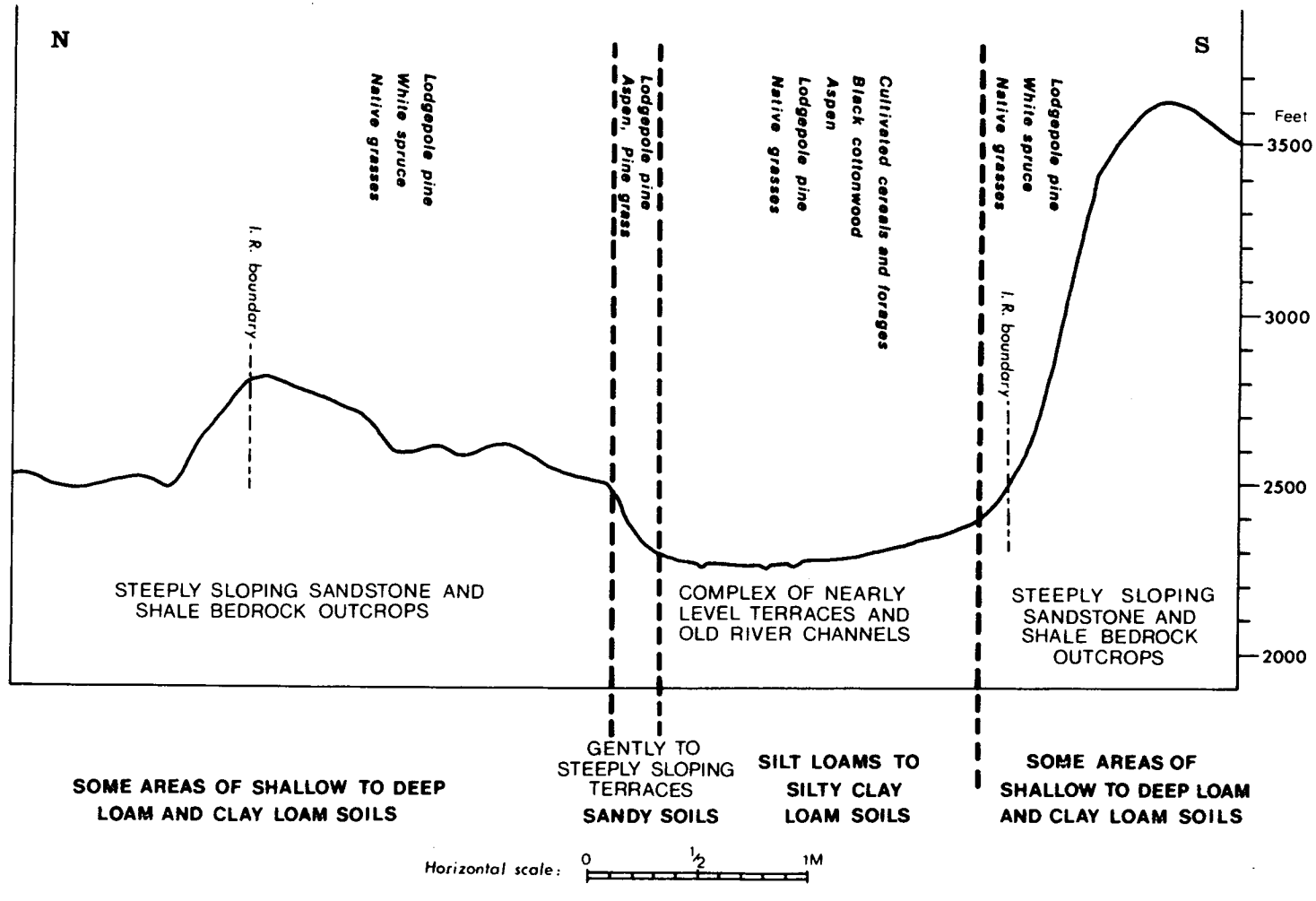


FIGURE 2. WEST MOBERLY LAKE INDIAN RESERVE: TOPOGRAPHICAL CROSS SECTION

Nature of the Landscape

The topography of the Reserve is shown in cross-section in Fig. 2. The Reserve occupies the lower portions of a steep-sided valley through which the Moberly River meanders into the west end of Moberly Lake.

The lower parts of the valley within the confines of the Reserve consist of the river flood plains above which are benches which integrate into the till deposits on the mid and upper slopes. Throughout the area are glacial deposits variously reworked and relatively unaltered. Undrained depressional areas occur at the river level where organic matter has accumulated to form peat bogs.

Climate

Frost-free period -	75-90 days
Range of growing degree days above 42°F -	1900 - 2150
Annual precipitation -	less than 15 inches
May to September precipitation -	less than 8-10 inches
Mean annual temperature -	35°F
Mean summer temperature -	51°F

The Reserve is in a region with a moderate continental climate. The summers are warm but relatively short. The winters are cold. The region has approximately 2000 hours of sunshine annually (1).

The last spring frosts vary from early May to June 25, while the occurrence of the first frost in the fall varies from the first week in August to September 30. Generally, the frost-free period in the area is 75-90 days.

The other important crop limiting factor is precipitation; there is approximately 8 inches of rainfall in the May-August period. In addition, fall weather conditions unfavorable to the harvesting of cereals is resulting in a greater concentration on forage production.

Vegetation

The surveyed area is in the Boreal Forest Region of Canada. The dominant native vegetation is typical of the foothill part of the Peace River region.

The coarser textured soils on the higher benches and upland areas support stands of white spruce and lodgepole pine with some aspen. Black spruce, aspen, balsam and willow are found on the finer textured soils.

The natural wet depressions where organic soils have formed grow black spruce, tamarack, willows, sedges and coarse grasses.

Shrubs are found fairly well distributed over the Reserve. Wild rose, kinnikinnick, shepherdia and blueberry are the species most commonly seen.

Grassland vegetation consists of pine grass, native wheat grass, brome, fescue, wildrye grass and several sedges. In general, the forested areas are too heavily wooded to encourage heavy grass growth. Thus, very little land has a high grazing value for domestic animals.

Soil Descriptions

Six soils, five mineral and one organic, are described in this section. With the exception of the Pys soils, more detailed technical descriptions are contained in the Soil Survey of the Peace River Area (2).

In this region soils tend to be secondary in importance to climate in agricultural terms. However, a certain level of soil fertility and a topography which permits tillage are necessary for crop production. In the West Moberly Indian Reserve a large tract of land lying on both sides of the Moberly River is characterized by fertile soils (Pys Series) with no significant limitations for crop production other than climate. On the other hand, about one quarter of the Reserve (Moberly Series) is non-arable because the topography bars cultivation by modern machinery. The remainder of the Reserve made up of the Codesa, the Sundance, and Sukunka soils is arable but has some production limitations such as impermeability (Sukunka), erosion (Sundance), and a generally low level of fertility (Codesa).

The chemical analyses for the Pys and Sukunka soils are shown in Table 1. Profile descriptions are given in Tables 2 and 3.

Descriptions of the six soils found in the Reserve follow.

Codesa Series (Co)

The Codesa soils (Orthic Gray Wooded) are dominantly sandy loam materials. These soils occur in strongly to steeply sloping topography which hinders cultivation in some parts. They are well drained and have a low ability to hold water. The fertility of the Codesa soils is low. The native vegetation found on these soils consists of aspen, lodgepole pine and some spruce. The undergrowth is mainly pine grass, shepherdia, and Kinnikinnick.

The Codesa soils are useful for grazing. Thus, management practices should encourage the growth of the native grasses. Controlled slash

burning in certain parts might be helpful and the application of commercial fertilizers in the more open areas should be considered. Over-grazing must be avoided as these soils are subject to erosion. Certain parts can be cultivated but fertilizers and careful soil management are required.

Eaglesham Series (Eg)

These soils are organic (Terric Mesisol) with a high water table throughout the year. They are semi-decomposed sedges, coarse grasses and woody materials that have accumulated in depressions and ponds. On this Reserve several small areas of these soils are located adjacent to the River and three bog areas are situated at the west end of the lake.

The vegetation is sedges, coarse grasses, willow and some dwarf birch.

These soils are too wet for cultivation and drainage is not practicable. They have some pasturing value and offer some sanctuary to waterfowl and wild animals.

Moberly Series (Mo)

The Moberly soils (Brunisolic Gray Wooded) occur in the northwest and northeast parts of the Reserve. The textures vary from sandy loam to clay loam. The topography is variable but tends to be steeply sloping making most of the Moberly soils non-arable. Some areas where the slopes are more moderate can be cultivated. Glacial stones and boulders are common as well as exposed bedrock. Drainage is good to excessive.

The vegetation found on the Moberly soils is spruce, lodgepole pine and aspen with an undergrowth of shepherdia, blueberry, kinnikinnick and various grasses.

The area occupied by the Moberly soils is suitable for summer grazing and a source of timber. Overgrazing should be avoided and grass growth in some parts can be encouraged by commercial fertilizers and slash burning.

Pys Series (Py)

The Pys soils (Rego Dark Brown Chernozem) have developed on well drained alluvial deposits which lie on both sides of the Moberly River. The textures of these soils range from silty clays to silt loams. The topography varies from level to gently sloping.

Most of the native vegetation has been eliminated but some aspen, black poplar, black spruce and lodgepole pine still exist.

The Pys soils are fertile (Table 1) and are or have been cultivated. They are well suited for grains and forages. Natural fertility is easily maintained with good soil management.

The Sukunka Series (Sk)

Sukunka soils (Orthic Gray Luvisols) occur on a minor deposit of lake clay extending in a relatively narrow strip to the northern border of the reserve. These soils are clayey in texture. The topography is nearly level. Drainage is good but surface ponding can be a problem. These soils are moderately fertile but physical problems require special attention.

The native vegetation is a sparse forest cover of lodgepole pine and aspen. Kinnikinnick, blueberry and pinegrass form the ground cover.

The Sukunka soils have a tendency to bake when dry and are sticky and difficult to work when wet. Any management system that builds up the organic matter content is beneficial. Considering both climate and soils, the best crops for the Sukunka soils are forage crops consisting of grasses and legumes. Cereals can be grown on these soils in a rotation with grasses and legumes but continuous cereal production would worsen the unfavourable physical aspects.

Sundance Series (Su)

The Sundance soils are loamy sands or sandy loams. They occur in the northwest part of the Reserve occupying about 428 acres. The topography is moderately sloping. These soils are excessively drained and have a low water storage capacity. When cleared the Sundance soils are susceptible to wind erosion.

The forest cover is mostly lodgepole pine with scattered poplar. The undergrowth is kinnikinnick, blueberry and grasses. The grass growth tends to be sparse. The fertility of these soils is low.

Attempts to cultivate the Sundance soils generally have been unsuccessful. Their low fertility combined with a low ability to hold water cause susceptibility to drought. The finer textured soils can be used to grow legumes. The remainder should be left in their native state.

Soil Management Areas

Soils of this Reserve can be grouped in many ways, depending on present and probable use. The present and probable future use of these

lands is not intensive. The soils, therefore, have been grouped geographically for broad planning and land use purposes. These groups, called soil management areas, are shown on a map (Fig. 4) at the back of this report. In preparing these groupings the kinds of soil, parent material, topography, and climate are considered. Each area consists of a single soil or a group of soils which, in a general way, lend themselves to similar systems of management or rotation and have the same potential ability to respond and produce the desired crop. However, within each management area some soils may be included that are markedly different. These are incorporated because the acreage is small or because they occur in small, isolated individual areas, making separate management impracticable.

In this report, each of the five soil management areas is shown on the map by capital letters (Fig. 4). The data used in discussing fertilizer rates and crop yields are based on local experience, regional records and soil characteristics.

Management Area A (2400 acres)

This Area consists of the land on both sides of the meandering Moberly River. The soils are silty loams to silty clays, moderately well to imperfectly drained. The topography varies from level to gently sloping.

This relatively large tract of arable soils is a unit of major agricultural importance on this Reserve. The soils are reasonably fertile (Table 1) and should be productive. At the present time, the

Area is only partially cultivated producing cereals for a beef herd.

A large proportion of Area A could be irrigated. The topography and texture of the soils are suitable and a plentiful supply of water is available from the Moberly River.

In addition to the present limited cultivation of cereals the Area should be capable of producing forage at the rate of 3 or more tons per acre, annually. To obtain this amount, fertilizers should be applied. The recommendations of the local District Agriculturist should be followed regarding the most adaptable species, seeding rates and the kinds and amounts of fertilizer to apply.

Management Area B (790 acres)

This Management Area consists of two tracts of land which include the Sundance and Codesa soils. The soils range from sandy loams to loamy sand with gravel outcroppings which would hinder cultivation. They are subject to wind erosion if cultivated. Permeability is rapid.

The permeability, tendency to erode and gravel outcroppings all suggest that this Area be left for pasture and grazing. Certain selected acreages can be improved by seeding to higher yielding grasses and applying fertilizer each spring. Otherwise the Area does not lend itself to cultivation and cropping.

Management Area C (220 acres)

This Area occupies a strip of land extending north from the lake to the northern side of the Reserve. The topography is very gently sloping.

The cultivated layer of the soils has a high silt and clay content. They are low in organic matter and neutral in reaction. They may puddle after showers or seeding and subsequent drying may create crusts sufficiently hard to interfere with emerging seedlings.

The Area could be cleared and used to produce forage and cereals but good farming practices must be followed to obtain satisfactory crop yields. Otherwise, this Area can be treated like Area B, that is, improve the pasture carrying capacity in the more open spaces and use the entire area for grazing.

Management Area D (1300 acres)

Management Area D consists of two parts, both being moderately to strongly sloping and more heavily wooded than other parts of the Reserve. The soils are loams to clay loams, well drained and slightly acid.

The portions located on gently sloping topography have moderate natural grazing capacity which might be improved by grass seeding and the application of fertilizers. The remaining land is too steeply sloping to permit the use of farm machinery so improvement is impracticable. Over-grazing should be avoided.

Management Area E (80 acres)

This Management Area consists of three small bog areas located on the western edge of the Lake plus small bogs scattered in the Pys soils. The soils (Eaglesham) are organic, very poorly drained and unsuitable for cultivation. The vegetation consists of black spruce, willows, sedges and mosses.

The agricultural value of this Area is limited grazing of the sedges. Otherwise, the Area should be left for the encouragement of waterfowl and wildlife.

Table 1. West Moberly Lake Indian Reserve: Physical and Chemical Analyses - Pys and Sukunka Soil Series

Pys Series (Rego Dark Gray Chernozem)

Horizon Particle Size Distribution %

Horizon	Sand	Silt	Clay	Fine Clay
Ap	2.4	67.5	30.1	8.5
11AC	0.5	53.2	46.3	11.7
111C	21.5	65.5	13.0	4.6

Chemical Analyses

Horizon	Organic Matter %N	Organic Matter %O.M	Cation Exch. Capacity me/100g	Exchangeable Cations me/100g Ca	Mg	K	Other Available Nutrients ppm Zn	Cu	Reaction H_2O	$CaCl_2$
Ap	0.63	16.1	43.7	8.3	4.5	0.4	80.0	2.3	6.5	5.6
11AC	0.31	8.6	37.3	6.2	4.1	0.2	25.0	5.4	6.3	5.3
111C	0.12	2.8	11.9	2.7	1.7	0.1	11.1	5.4	6.5	5.5

Sukunka Series (Orthic Gray Luvisol)

Horizon Particle Size Distribution %

Horizon	Sand	Silt	Clay	Fine Clay
Ahe	25.6	33.4	42.0	15.8
AB	20.9	34.8	44.3	16.8
Bt	15.3	34.6	50.1	19.8
Ck	1.8	13.8	84.4	27.3

Chemical Analyses

Horizon	Organic Matter %N	Organic Matter %O.M	Cation Exch. Capacity me/ 100g	Exchangeable Cations me/100g Ca	Mg	K	Other Available Nutrients ppm Zn	Cu	Reaction H_2O	$CaCl_2$
Ah	0.84	19.5	82.7	19.4	11.9	0.7	48.0	1.1	6.6	6.0
Ahe	0.28	6.6	40.4	8.3	6.8	0.4	0.7	0.8	6.7	5.9
AB	0.16	2.7	27.1	5.3	5.1	0.3	9.8	4.8	6.9	6.1
Bt	0.14	2.5	26.8	5.4	5.4	0.3	11.6	0.7	7.3	6.5
Ck	0.18	0.5	30.4	11.1	6.9	0.2	-	0.5	8.2	7.3

Table 2. West Moberly Lake Indian Reserve: Soil Profile Description - Pys Soil Series (Rego Dark Gray Chernozem)

Horizon	Depths	Color - (Moist, Dry)	Primary Structure	Reaction	Texture
Ap	0 - 6.5"	D - Dark Gray 10YR 4/1.5 M - Very Dark Brown 10YR 3/2	Weak, Medium Plate Like Structure	Slightly acid	Silty Clay Loam
IIAC	6.5 - 10"	D - Light Gray 10YR 7/2 M - Grayish Brown 10YR 5/2	Weak, Medium Plate Like Structure	Slightly acid	Silty Clay
IIIC	10" +	D - Lt. Brownish Gray 10YR 6/2 M - Dk. Grayish Brown 10YR 4/2	Weak, Medium Plate Like Structure	Slightly acid	Silt loam

Table 3. West Moberly Lake Indian Reserve: Soil Profile Description - Sukunka Soil Series (Ortho Gray Luvisols)

Horizon	Depths	Color - (Moist, Dry)	Primary Structure	Reaction	Texture
Ah	0 - 1.5"	D - Very Dk. Gray 10YR 3/1 M - Black 10YR 2/1	Moderate, Block Like, Granular	Neutral	Clay
Ahe	1.5 - 3"	D - Gray 10YR 6/1 M - Grayish Brown 10YR 5/2	Moderate Block Like, Granular	Neutral	Clay
AB	3 - 7.5"	D - Gray 10YR 5/1 M - Gray 10YR 6/1	Strong, Subangular, Blocky	Neutral	Clay
Bt	7.5 - 13.5"	D - Gray 10YR 5/1 M - Dark Gray 10YR 4/1	Strong, Subangular, Blocky	Neutral	Clay
Ck	13.5 +	D - Dark Gray 10YR 4/1 M - Very Dk. Gray 10YR 3/1	Strong, Blocky	Moderately Alkaline	Heavy Clay

Table 4. West Moberly Indian Reserve: Summary of Practical Data for the Six Soils of the Reserve

Soil Series	Texture	Drainage	Reaction	Topography
Codesa	Sandy loam Gravelly sandy loam	Excessive	Neutral	Irregular steep slopes
Eaglesham	Organic	Poorly drained	Neutral medium acid	Low areas adjacent to lake
Moberly	Loam clay loam	Well drained	Slightly acid	Steeply sloping hilly
Pys	Silty clay silty loam	Moderate to well drained	Slightly acid	Level to gently sloping
Sukunka	Clay	Well drained	Neutral	Nearly level
Sundance	Loamy sands sandy loams	Excessive	Neutral slightly acid	Gentle to moderate slopes

Table 5. West Moberly Lake Indian Reserve: Summary of the Soil Management Area Descriptions

Soil Series Names and Textures	Erosion Susceptibility	Fertility Status	Cultivation Suitability
	Management Area A		
Pys Silty clay loam	Slight	Available nitrogen and phosphorus low	Suitable for a wide range of crops
	Management Area B		
Codesa Sandy loam; gravelly sandy loam Sundance Loamy sands; sandy loams	Wind and water erosion when protective vegetation removed.	Low organic matter, low fertility, low cation exchange capacity, low water holding capacity	Limited areas suitable for cultivation
	Management Area C		
Sukunka Clay	Water erosion when protective vegetation removed	Low availability of nitrogen, phosphorus and sulfur, low organic matter content	Suitability restricted by high clay content of soil
	Management Area D		
Moberly Loam and clay loam, rock, sandstone and shale	Susceptible to water erosion on steeper slopes	Low organic matter, low nitrogen and phosphorus availability	Unsuitable
	Management Area E		
Eaglesham Organic soils	Nil	Low general fertility	Unsuitable due to poor drainage

References

1. Climate of British Columbia. Tables of Comparative Precipitation and Sunshine. Report for 1970. Department of Agriculture, Victoria, British Columbia.

2. Soil Survey of the Peace River Area in British Columbia, Report No. 8 of the British Columbia Soil Survey, Research Branch, Canada Department of Agriculture, 1965.

3. The system of soil classification for Canada. Canada Department of Agriculture, Ottawa, 1970.

Glossary

alkaline soil - Any soil that has a pH greater than 7.0. See also - reaction, soil.

alluvial fan - A fan-shaped deposit of alluvium laid down by a stream where it emerges from an upland into a less steeply sloping terrain.

alluvium - Material such as clay, silt, sand, and gravel deposited by modern rivers and streams.

available water storage capacity - The range in soil water between field capacity and permanent wilting point. Units: percentage of oven dry weight of soil, inches of water per foot of soil or per effective rooting depth.

calcareous soil - Soil containing sufficient calcium carbonate, often with magnesium carbonate, to effervesce visibly when treated with cold 0.1N hydrochloric acid.

colluvium - A heterogeneous mixture of material that as a result of gravitational action has moved down a slope and settled at its base.

drainage soil - Classes used on Soil Map are as follows:

1) Rapidly drained - The soil moisture content seldom exceeds field capacity in any horizon except immediately after water additions.
2) Well drained - The soil moisture content does not normally exceed field capacity in any horizon (except possibly the C) for a significant part of the year.
3) Moderately well drained - The soil moisture in excess of field capacity remains for a small but significant period of the year.
4) Imperfectly drained - The soil moisture in excess of field capacity remains in subsurface horizons for moderately long periods during the year.
5) Poorly drained - The soil moisture in excess of field capacity remains in all horizons for a large part of the year.
6) Very poorly drained - Free water remains at or within 12 inches of the surface most of the year.

dunes - Wind-built ridges and hills of sand formed in the same manner as snowdrifts.

frost-free period - Average number of days between last spring frost and first fall frost, based on 32°F.

glaciofluvial deposits - Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melted ice.

growing degree days (also, degree-days, above 42°F) - The number of degrees above 42 accumulated for all days during the growing season. This expresses the length and warmth of the growing season in a single figure.

growing season - The dates in spring and fall corresponding to a mean temperature of 42°F are used as the start and end of the growing season.

lacustrine deposit - Material deposited in lake water and later exposed either by lowering the water level or by uplifting of the land. These sediments range in texture from sands to clays.

leaching - The process of removing soluble material from the soil by passage of water through the soil.

outwash - Sediments washed out by flowing water beyond the glacier and laid down as stratified drift in thin forest beds. The particle size may vary from boulders to silt.

permeability, soil (1) - The ease with which gases, liquids or plant roots penetrate or pass through a bulk mass of soil or a layer of soil. In the absence of precise measurements, soils may be placed into relative permeability classes through studies of structure, texture, porosity and cracking in the soil profile in relation to local use experience. The relative classes presented in this report are estimated and are as follows:

	Possible rates in inches per hour
Slow	less than 0.20
Moderate	0.20 to 5.00
Rapid	over 5.00

pH - The negative logarithm of the hydrogen-ion activity of a soil. The degree of acidity or alkalinity of a soil as determined by means of a glass, quinhydrone, or other suitable electrode or indicator at a specified moisture content or soil-water ratio, and expressed in terms of the pH scale.

plow layer - Ap - A layer of soil disturbed by man's activities, that is, by cultivation or pasturing or both.

reaction, soil - The degree of acidity or alkalinity of a soil, usually expressed as a pH value. Descriptive terms, commonly associated with certain ranges in pH (H_2O) are: Moderately acid, 5.6-6.0; slightly acid, 6.1-6.5; neutral, 6.6-7.3; slightly alkaline, 7.4-7.8; moderately alkaline, 7.9-8.4.

root zone - That part of the soil occupied by plant roots.

soil - (i) The unconsolidated material on the immediate surface of the earth that serves as a natural medium for the growth of land plants.

(ii) The naturally occurring unconsolidated material on the surface of the earth that has been influenced by parent material, climate, macro- and microorganisms, and topography, all acting over a period of time to produce soil that may differ from the material from which it was derived in many physical, chemical, mineralogical, biological, and morphological properties.

soil classification - The systematic arrangement of soils into groups or categories on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties.

soil horizon - A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil forming processes.

soil profile - A vertical section of the soil through all its horizons and extending into the parent material.

soil series - This is the basic unit of soil classification, and consists of soils that are essentially alike in all major profile characteristics except the texture of the surface.

stoniness - The classes of stoniness are defined as follows:

1) Slightly stony land - There are some stones, but they offer only slight to no hindrance to cultivation.
2) Moderately stony land - There are enough stones to cause some interference with cultivation.
3) Very stony land - There are enough stones to constitute a serious handicap to cultivation and some clearing is required.
4) Exceedingly stony land - There are enough stones to prevent cultivation until considerable clearing is done.
5) Excessively stony land - This land is too stony to permit any cultivation (boulder or stone pavement).

texture, soil - The percentages of sand (S), silt (Si), and clay (C) in a soil determine its texture. Size groups from 2 mm to 0.05 mm in diameter are called sand, those from 0.05 to 0.002 mm are called silt, and those less than 0.002 mm in diameter are called clay.

From: Tuogood, J. A.—A Simplified Textural Classification Diagram. Can. J. Soil 38: 51-53. 1958

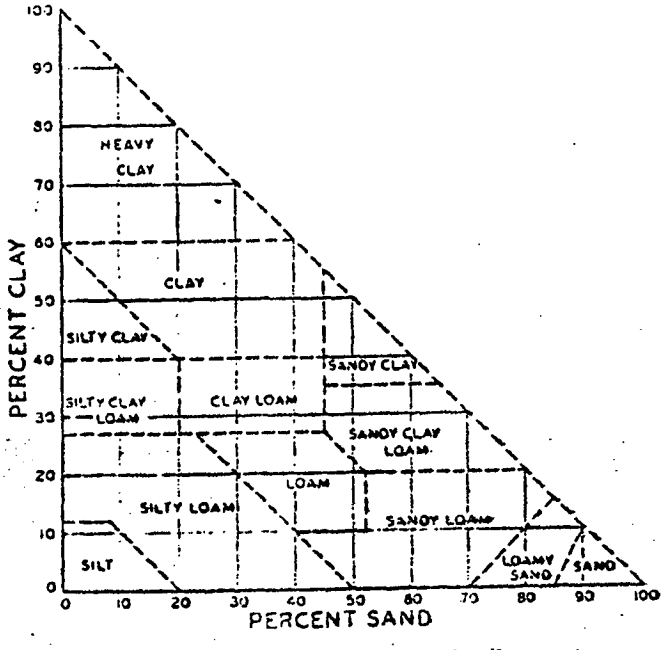
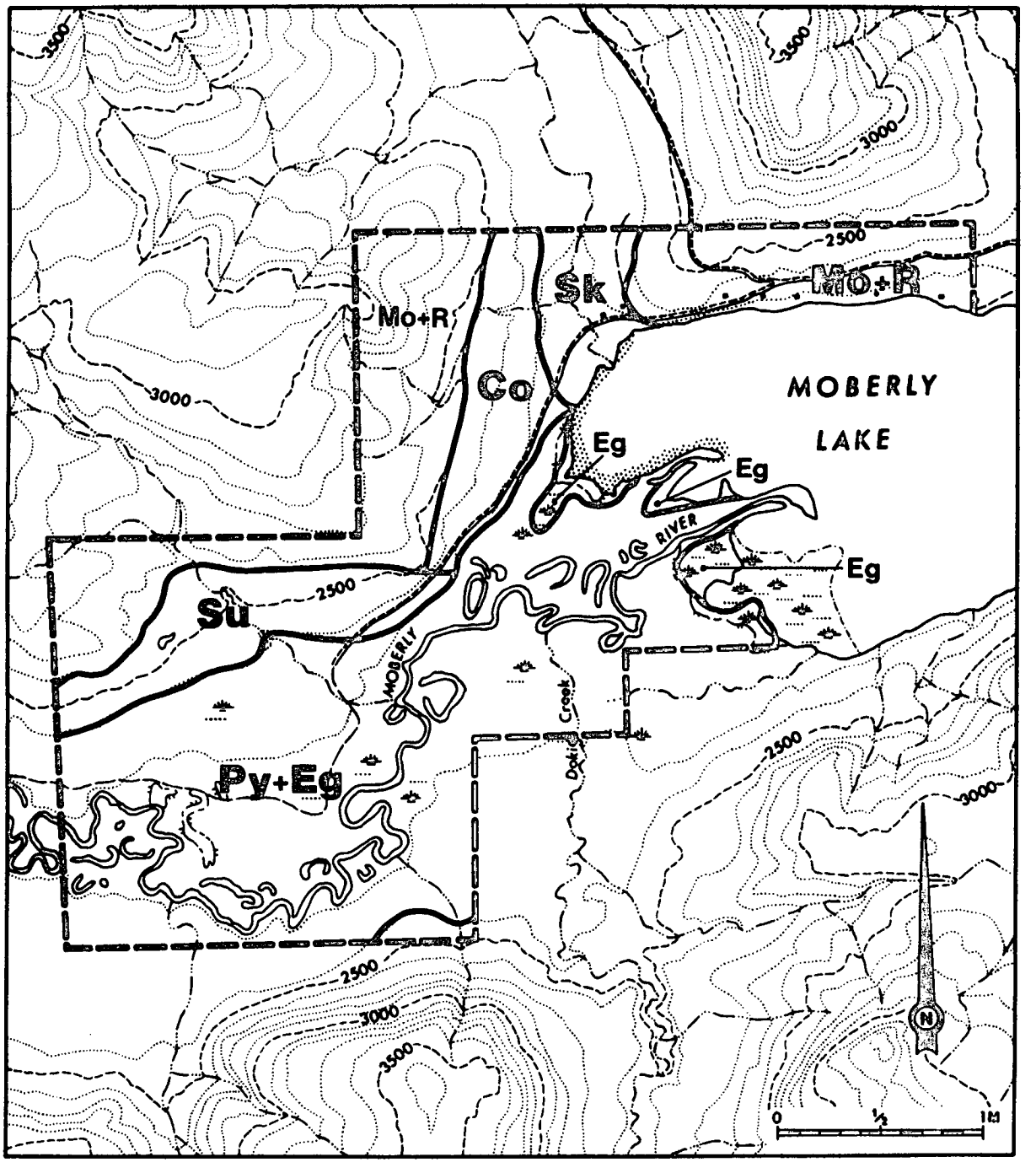


Chart showing proportions of soil separates.

topography - definition of classes used on Soil Map (Fig. 3):

Simple topography Single slopes (regular surface)	Complex topography Multiple slopes (irregular surface)	Slope %
A depressional to level	a nearly level	0 to 0.5
B very gently sloping	b gently undulating	0.5+ to 2
C gently sloping	c undulating	2+ to 5
D moderately sloping	d gently rolling	5+ to 9
E strongly sloping	e moderately rolling	9+ to 15
F steeply sloping	f strongly rolling	15+ to 30
G very steeply sloping	g hilly	30+ to 60
H extremely sloping	h very hilly	over 60

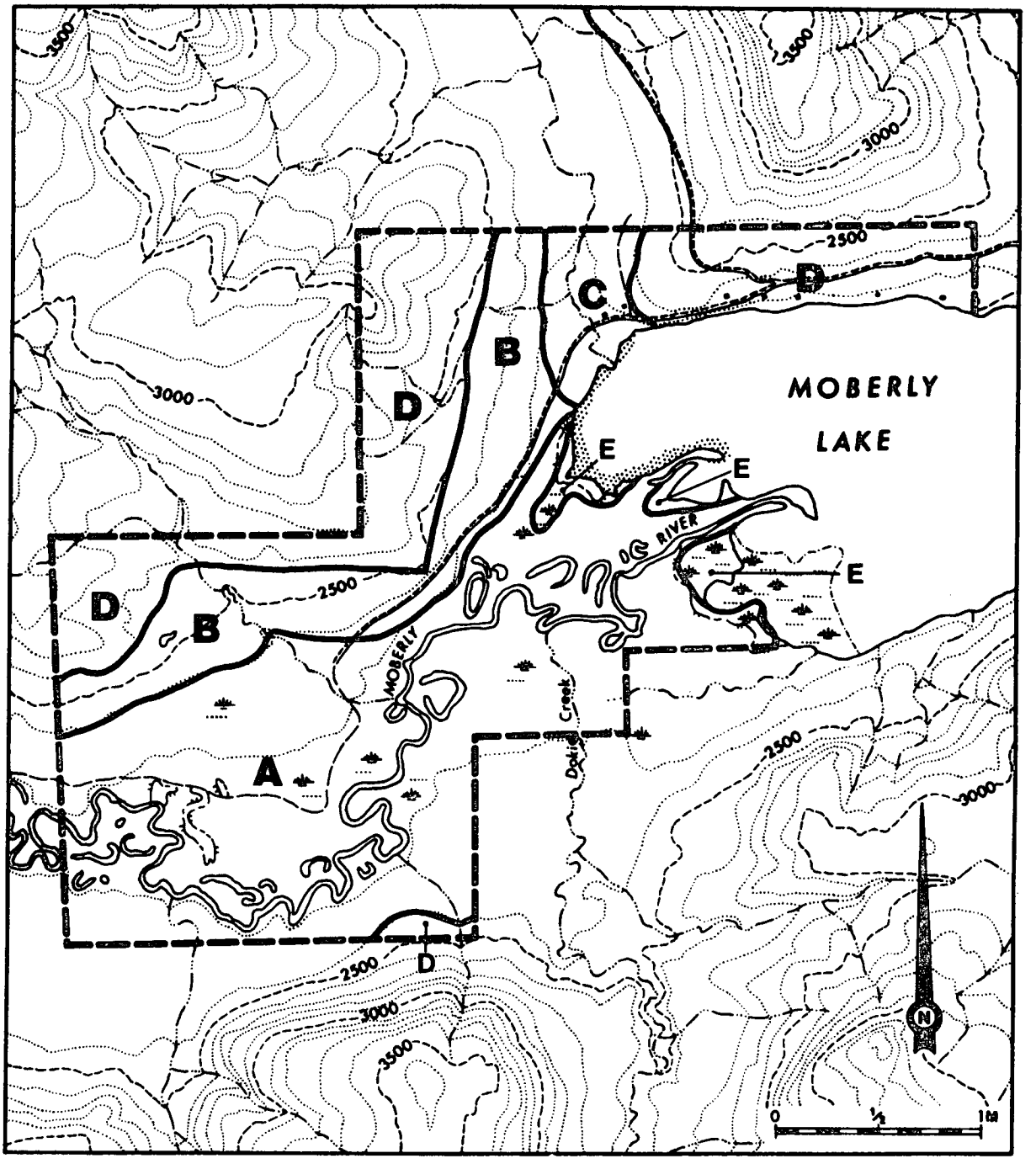
topsoil - The layer of soil moved in cultivation.



LEGEND

Co	CODESA silt loam	Mo	MOBERLY clay loam	Sk	SUKUNKA clay
Eg	EAGLESHAM fibrous peat	Py	PYS silty clay loam	Su	SUNDANCE sandy loam
		R	ROCK		

FIGURE 3. WEST MOBERLY LAKE INDIAN RESERVE: SOIL MAP



Refer to Report for Discussion of Management Areas

FIGURE 4. WEST MOBERLY LAKE INDIAN RESERVE: MANAGEMENT AREA MAP