Fishing Lake Metis Settlement

This map describes the soil resources of an area within the Fishing Lake Metis Settlement. This area is part of a block within the province where the soils have not been previously mapped. This block covers township 57 and the southern third of township 58, ranges 1-10, west of the 4th meridian. The soil resources to the north and south of this map sheet are described in the Soil Survey of the Sand River Area (73L) (Kocaoglu 1975) and in the Soil Survey of Wainwright and Vermilion Sheets (Wyatt et al. 1944), respectively. The soils for the area west of this map are described on the Frog Lake Indian Reserve soils map (Brierley and

Field work for the soil survey of the Fishing Lake Metis Settlement was conducted in July, 1988. Initial delineations were drawn from interpretation of aerial photographs. Traverses were made along roads, trails and seismic lines in order to describe the soils and landscapes of these delineated areas. Some lines were altered, and the soil map units were etermined and documented, based on field observations. In the mapped portion of the Metis Settlement, 73 soil inspections were made.

General Description of Area The Fishing Lake Metis Settlement is in northeast central Alberta, adjacent to the Alberta-Saskatchewan border. The portion of the Settlement covered by this map sheet occurs between longitude 110° 00'-110° 17'W and latitude 53° 53'-54° 00' N (township 57, and southern third of 58; ranges 1 and 2). The surveyed area occupies approximately 24,000

The mapped area lies on the Frog Lake Upland (Pettapiece 1986), where the elevation ranges from 580 to 690 meters above sea level. The knob and kettle terrain of this upland consists of drift which was deposited by collapsed, stagnant ice sheets during the late Wisconsin Ice Age, approximately 11,000 years ago. The drift consists of randomly intermixed till and stratified sediment, averaging 60 meters thick. (Carlson and Kurrie 1974). Shale bedrock of the Lea Park formation underlies the map area (Green 1972).

The survey area lies within the Dry Mixedwood Subregion of the Boreal Mixedwood Ecoregion (Strong and Legatt 1981). Aspen is the modal tree cover. In the low lying areas where 'wet' poorly drained soils occur, vegetation consists of dominantly Black spruce, larch and willows.

The climate of the Boreal Mixedwood Ecoregion is continental. Long cold winters and short cool summers are characteristic of continental climates. This Ecoregion has a mean winter temperature of -15°C and is the coldest of all recognized ecoregions in Alberta (Strong and Legatt 1981). The mean summer temperature is approximately 13°C and ranges from 12.4°C at St. Lina to 13.9°C at Lloydminster. The frost free period in this area is approximately 90 days (Atmospheric Environment

Mean annual precipitation varies from 400 to 480 mm at various climatic stations in northeast central Alberta. Seventy percent of the precipitation occurs during the summer months (May through September). Subdivision of this ecoregion into dry, moist and wet subregions is based on the distribution of summer precipitation. The dry subregion receives between 200 and 300 mm whereas the wet subregion receives over 380 mm of precipitation during the summer months (Strong and Legatt 1981). According to the Land Capability Classification for Arable Agriculture in Alberta (ASAC 1987) the climate rating for this area is 4H. The H refers to heat or energy component and is based on the number of growing degree days. In this area, the energy component limits the production of agricultural crops.

Generalized Soil Characteristics

The area is dominated by soils of low natural fertility. They occur in a distinct dry and wet pattern reflecting the knob and kettle terrain. The drier soils have leached surface layers associated with long-term forest cover and are called Orthic Gray Luvisols (ACECSS 1987) (originally referred to as Gray Wooded soils). They commonly have a leaf litter layer on the surface, overlying a grayish to whitish layer (called an Ae horizon). A dense, brown, blocky structured layer (Bt) underlies the Ae. The Bt is dense because of enrichment with clay and other minerals leached from the Ae. Only the upper 80 to 100 cm of the drift are modified by soil

Poorly drained or 'wet' soils occupy a significant proportion of the map area. They are confined to low lying areas, where the water table is often within 1 meter of the surface. Wet soils are characterized by the presence of black spruce, willow and sedge. These Gleysolic and Organic soils have a layer of peat between 10 to 150 cm thick overlying saturated mineral material of variable texture. The peat layer must be greater than 40 cm thick before the soil is called an Organic. Gleysolic soils may or may not have a peat layer up to 40 cm thick (ACECSS

Interpretations and Management

The agricultural capability classes for the map units are derived according to the guidelines of the Land Capability Classification for Arable Agriculture in Alberta (ASAC 1987). This capability classification system has seven classes. Climate, soil and landscape limitations, as related to the production of agricultural crops, are considered in the determination of these capability classes. Areas of capability class 1 have no significant limitations, while class 6 or 7 areas have such severe limitations that annual cropping is not feasible. The capability class ratings are determined for soil map units in their present condition.

The Fishing Lake Metis Settlement occurs in an area of the province where the climate capability class is 4H. Therefore, no agricultural capability rating may be better than class 4. Map units are rated lower (eg. class 5 or 6) when soil components and landscape features are con-

Luvisolic soils require special attention once the native vegetation has been removed and they are used for agricultural crop production. The white Ae horizon is low in organic matter and plant nutrients. This layer has poor inherent structure and tilth, and is susceptible to crusting and puddling. Agricultural productivity of Luvisolic soils may be improved by increasing the organic matter content of the cultivated layer. These improvements may be acheived through the appropriate use of fertilizers in association with crop rotations (Bentley et al. 1971).

Organic and Gleysolic soils may be improved for agricultural production by regulating the depth of the water table. Drainage of these soils is a problem because most are associated with closed basins.

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Tp 58 Tp 58 <-\ABC1/5 ABC2/5 ABC2/5 ABC2/5 ABC8/6 ABC8/6 ABC6/5 FROGABGM1/5 ABC2/5 LAKEABC8/5 ABC8/5 ABC6/61 ABC8/6 ABC6/5 ABC8/5 ABC2/4~

Fishing Lake Metis Settlement Soil Key

Soil Series Abbreviation and Name	Parent Material Texture and Coarse Fragments %	Agroclimatic Zone	Canadian System of Soil Classification
ABC Athabasca	Medium textured till. 5-15% gravels, cobbles and stones.	4H	Orthic Gray Luvisol
BLT Bluet	Medium textured lacustrine. 0-10% gravels and cobbles.	4H	Orthic Humic Gleysol
CTW Chatwin	Moderately decomposed fen peat and forest fen peat, greater than 160 cm thick.	3-4H	Typic Mesisol
GMT Grosmont	Medium textured till. 5-15% gravels, cobbles and stones.	4H	Dark Gray Luvisol
MNT Manatokan	Moderately decomposed fen peat and forest fen peat, less than 160 cm thick over medium textured sediment.	3-4H	Terric Mesisol
TOM Tolman	Medium textured glaciolacustrine. 0-10% gravels and cobbles.	4H	Orthic Gray Luvisol

Agricultural Capability Class Symbol

Capability Classes - (Degree of Limitation)

- 3 Moderate limitations restrict range of crops that can be grown or require
- special management practices. 4 - Severe limitations restrict range of crops that can be grown or require
- 5 Severe limitations restrict sustained arable agriculture. Annual cultivation using common cropping practices not adviseable.
- 6 Very severe limitations for arable agriculture. Cropping on an occasional 7 – No capability for arable agriculture.

special management practice.

Capability Subclasses - (Kind of Limitation)

- Limitation E - Lacking sufficient depth of topsoil or an organic matter rich layer.
- H Temperature, expressed as growing degree days. J - Obstacles (sloughs, wellsites, powerpoles, etc.)
- M Insufficient moisture holding capacity. P - Surface stoniness.
- T Steep slopes. W - Drainage, high water table.

(ASAC 1987)

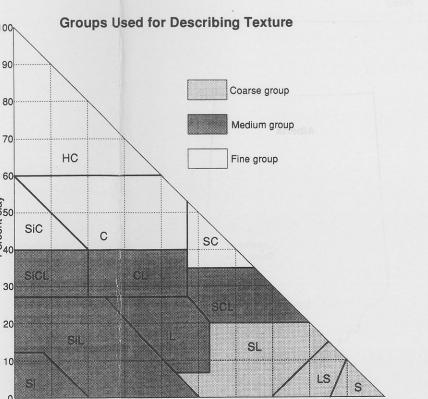
Explanation of Soil Map Unit Symbol and Legend Terminology

Soil unit Complex soil unit

Topography - slope class Soil map units are described in the map unit legend. eg. a) ABC 6 contains ABC* soils and coarse variants in major amounts. b) ABMN 1 contains ABC* and MNT* soils in major amounts. * For a definition of ABC and MNT soils refer to the Soil Key.

Topographic Slope Classes

- 2 dominant slopes between 0 2%. B - dominant slopes between 2 - 5%.
- 4 dominant slopes between 5 9%.
- dominant slopes between 9 15%. 6 - dominant slopes between 15 - 30%.



Glossary

Agroclimatic class - Classification of climate which is based on an energy and moisture component. Blanket – A mantle of unconsolidated materials greater than one meter thick.

Capability class (soil) - The class indicates the general suitability of the soils for agricultural use. It is a grouping of subclasses that have the same relative degree of limitation or hazard. The limitation or hazard becomes progressively greater from Class 1 to Class 7

Coarse fragments – Rock or mineral particles greater than 2.0 mm in diameter (gravels 2 to 7.5 cm, cobbles 7.5 to 25 cm, stones 25 to 60 cm). Coarse texture - The texture exhibited by sands, loamy sands and sandy loams except very fine sandy loam. A soil containing large quantities of these textural classes.

Drainage - Soil drainage refers to the frequency and duration of periods when the soil is not saturated. Terms used are moderately well, imperfectly and poorly drained. Fen - Peatland comprised of neutral to basic pH, accumulations of organic materials derived mainly from sedges. A mineral-rich water table persists very near the surface.

Fen peat – Decomposed, nutrient-rich peat formed under sedge-fen vegetation.

Forest fen peat – Decomposed, nutrient-rich peat formed under black spruce-fen vegetation.

R1 W4M

Glaciofluvial deposits – Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, deltas, kames, es-

Growing degree days (GDD) - The accumulated heat units above a threshold temperature of 5°C. They are calculated as (mean daily temperature - 5) x days. Hummocky – Abounding in rounded or conical knolls or mounds, generally of equidimensional shape and not ridge-like.

Lacustrine - Material deposited in lake water and later exposed. Medium texture - Intermediate between fine-textured and coarse-textured soils. A soil containing large quantities of these textural classes: very fine sandy loam, loam, silt loam and silt.

Modal – The described soil or entity is representative of the central concept of the named soil or entity in question. Morainal - Term used to describe features created by the movement and deposition of glacial ice. Composition is

Parent material – The unconsolidated and more or less chemically unweathered mineral or organic matter from which the solum of a soil is developed by pedogenic processes. **Peat** – Material consisting of organic residues accumulated as a result of incomplete decomposition of dead plant constituents under conditions of excessive moisture. Puddling - Soil condition in which soil structure has been mechanically destroyed, which allows the soil to run

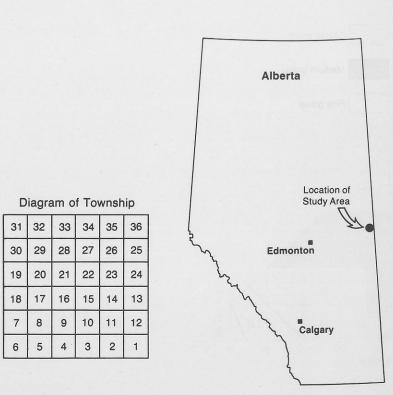
together when saturated with water. Structure - The natural combination or arrangement of individual soil particles into definable aggregates, which are characterized and classified on the basis of size, shape and degree of distinctness. Texture – The relative proportions of sand (0.5 to 2 mm), silt (0.002 to 0.5 mm) and clay (<0.002 mm), the soil separates. It is described in terms such as sand (S), loamy sand (LS), sandy loam (SL), loam (L), silt loam (SiL), clay loam (CL), silty clay loam (SiCL) and clay (C).

Till - Material deposited directly by the glacial ice, consisting of clay, sand, gravel and boulders intermingled in Tilth - The physical condition of soil as related to its ease of tillage, fitness as a seedbed and its impedance to seeding emergence and root penetration.

Variant – A soil that exhibits variation from the norm. Veneer - A deposit of unconsolidated material less than one meter thick.

Fishing Lake Metis Settlement Map Unit Legend

Map Symbol	Surface Expression Landform & Slope	Major Soils (occupy up to 70% of area)	Minor Soils (occupy up to 30% of area)	Capability Class	Comments	
ABC1/5	Hummocky morainal landform. Dominant slopes 9-15%.	Medium textured, moderately well drained soils, ABC.	Coarse textured soils. Imperfectly and poorly drained soils.	4HEM	ABC soils occur in lower mid to upper slope positions. Coarse textured soils occur infrequently, in discrete pock Wet soils occupy depressions between hummocks.	
ABC1/6	Hummocky morainal landform. Dominant slopes 15-30%.	Medium textured, moderately well drained soils, ABC.	Coarse textured soils. Imperfectly and poorly drained soils.	5T	ABC and GMT soils occur in lower mid to opper sings occurred to opper sings positions. The proportion of GMT indices so in areas that have been pullivated. Charge teaching soils, which make	
ABC2/4	Hummocky morainal landform. Dominant slopes 5-9%.	Medium textured, moderately well drained soils, ABC. Imperfectly and poorly drained soils.	Coarse textured soils.	4HE ⁷ 6W ³	ABC soils occur in lower mid to upper slope positions. Wet soils occupy 15-50% of the delineations and are associated with low lying, depressional portions of the landscape. Coarse textured soils occur infrequently, in discrete pockets.	
ABC2/5	Hummocky morainal landform. Dominant slopes 9-15%.	Medium textured, moderately well drained soils, ABC. Imperfectly and poorly drained soils.	Coarse textured soils.	4HE ⁷ 6W ³	ABC2 soil units have dual capability classes because wet soils are dissimilar from ABC soils and occur as discrete entities. The amount of wet soils is estimated at 30%, but varies among delineations.	
ABC2/6	Hummocky morainal landform. Dominant slopes 15-30%.	Medium textured, moderately well drained soils, ABC. Imperfectly and poorly drained soils.	Coarse textured soils.	5T ⁷ 6W ³		
ABC6/5	Hummocky morainal landform. Dominant slopes 9-15%.	Medium textured, moderately well drained soils, ABC. Coarse textured soils.	Imperfectly and poorly drained soils.	4HEP	ABC soils occur in lower mid to upper slope positions. Coarse textured soils, which are sandier and contain more coarse fragments (gravels, cobbles and stones) than ABC soils occur randomly, in discrete pockets. Wet soils occupy the depressional areas between hummocks. 6i topography decreases capability rating by 2 classes due to the high potential for water erosion on long inclined slopes.	
ABC6/6i	Hummocky and inclined morainal landform. Dominant slopes 15-30%.	Medium textured, moderately well drained soils, ABC. Coarse textured soils.	Imperfectly and poorly drained soils.	6T		
ABC8/5	Hummocky morainal landform. Dominant slopes 9-15%.	Medium textured, moderately well drained soils, ABC. Imperfectly and poorly drained soils. Coarse textured soils.	Imperiedly and a vive diamon soils	4HEP ⁷ 6W ³	ABC soils occur in lower mid to upper slope positions. Coarse textured soils, which are sandier and contain more coarse fragments (gravels, cobbles and stones) than ABC soils, occur randomly, in discrete pockets. Wet soils occupy 15-50% of the delineations and are associated with low lying depressional portions of the landscape. ABC8 soil units have dual capability classes because wet soils are dissimilar from ABC-like soils, and occur in discrete entities. The amount of wet soils is estimated at 30%, but varies among delineations. ABC and GMT soils occur in lower mid to upper slope positions. The proportion of GMT increases in areas that have been cultivated. Wet soils occupy depressional areas between hummocks.	
ABC8/6	Hummocky morainal landform. Dominant slopes 15-30%.	Medium textured, moderately well drained soils, ABC. Imperfectly and poorly drained soils. Coarse textured soils.	Coolee loctured soils	5T ⁷ 6W ³		
ABGM1/4	Hummocky morainal landform. Dominant slopes 5-9%.	Medium textured, moderately well drained soils, ABC and GMT.	Imperfectly and poorly drained soils.	4HEM		
ABGM1/5	Hummocky morainal landform. Dominant slopes 9-15%.	Medium textured, moderately well drained soils, ABC and GMT.	Imperfectly and poorly drained soils.	4HEM		
ABGM6/4	Hummocky morainal landform. Dominant slopes 5-9%.	Medium textured, moderately well drained soils, ABC and GMT. Coarse textured soils.	Imperfectly and poorly drained soils.	4HEP	ABC and GMT soils occur in lower mid to upper slope positions. The proportion of GMT increases in areas that have been cultivated. Coarse textured soils, which are s and contain more coarse fragments (gravel, cobbles and stones) than ABC-like soils, occur randomly, in discrete Wet soils occupy depressional areas between hummock	
ABMN1/5	Hummocky morainal landform, interspersed with fens. Dominant slopes 9-15%.	Medium textured, moderately well drained soils, ABC. Moderately decomposed peat, 50-150 cm thick, very poorly drained soils, MNT.		4HE ⁶ 6W ⁴	ABC soils occur in mid to upper slope positions. MNT and associated wet soils occupy level, low lying portions of the landscape. Level areas between hummocks are larger than other dry and wet ('2') map units, but their shapes are too intricate to delineate individually. They account for between 30-60% of the unit. ABMN1 soil units have dual capability classes because MN and associated wet soils are dissimilar from the ABC soils and occur as discrete entities. The amount of wet soils is estimated at 40%, overall.	
ABMN1/6	Hummocky morainal landform interspersed with fens. Dominant slopes 15-30%.	Medium textured, moderately well drained soils, ABC. Moderately decomposed peat, 50-150 cm thick, very poorly drained soils, MNT.		5T ⁶ 6W ⁴		
BLT4/2-3	Level to undulating morainal or lacustrine landform. Dominant slopes 0-4%.	Medium textured, poorly drained soils, BLT. Carbonated variants of the poorly drained soils.	Medium textured, moderately well drained soils.	6W	BLT and associated wet soils occupy the majority of the unit. Moderately well drained soils occur near the perima and in association with higher relief portions of the lands Shallow water tables limit agricultural crop production.	
CTMN1/2	Level organic deposits overlying morainal or lacustrine landforms. Dominant slopes 0-2%.	Moderately decomposed peat over till or lacustrine, very poorly drained soils. CTW (peat >160 cm), MNT (peat 40-160 cm).	Medium textured, poorly drained soils.	7W	CTW and MNT soils are developed on fen peat and fore peat of variable thickness. Black spruce, larch, willow ar sedge vegetation are characteristic of these soils, which occur on broad, level, poorly drained areas. This soil unit is not suitable for the production of agricultural crops because the water table is at, or near the surface.	
TOM8/4	Hummocky glaciofluvial landform. Dominant slopes 5-9%.	Medium textured, moderately well drained soils, TOM. Imperfectly and poorly drained soils. Coarse textured soils.		4HE ⁸ 6W ²	TOM soils occur in lower mid to upper slope positions. Of textured soils, which are sandier and contain more coars fragments (gravel, cobbles and stones) than TOM soils or randomly, in discrete pockets. Wet soils occupy depress areas between hummocks and range from 15-40% of delineations. TOM8 soil unit has dual capability classes because wet soils are dissimilar from TOM soils and occ discrete entities. The amount of wet soils is estimated to	
ZAV2	Fluvial floodplain terrain. Slopes variable 0-30%.	Imperfectly and poorly drained soils of variable texture.	Moderately well drained soils of variable texture.	6WT	Miscellaneous landscape unit depicting creek and river floodplains and associated erosional side slopes. The floplain segment of ZAV2 units occupies more than 50% of delineation. Wet soils dominate the floodplain area. Soils of better drainage may occur as isolated locales within the floodplain and on the side-slopes.	
ZRB4	Fluvial channels or large gullies. Slopes variable 2-30%.	Moderately well drained soils of variable texture.	Imperfectly and poorly drained soils of variable texture.	6T	Miscellaneous landscape unit depicting steep sided V-shaped erosional channels. The floodplain segment o units occupies less than 50% of a delineation. Wet soils commonly associated with the floodplain segment. The dominant, better drained soils occur on the inclined, erosional, side-slopes.	
ZW	Water			_	Miscellaneous unit for labelling unnamed lakes.	



Miles 1 Metres 1000 0 Yards 1000 0 1000

Soils of the Fishing Lake Metis Settlement, **Alberta**

Open file report No. 1989-12

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