SOILS OF THE NECHAKO-FRANCOIS LAKE AREA

(N.T.S. - 93 K/S½ , 93 F/N ½)

INTERIM REPORT

SOILS BRANCH, DEPT. OF AGRICULTURE,

KELOWNA, B.C.

SOILS

OF THE NECHAKO-FRANCOIS LAKE AREA

(N.T.S. 93K/S½, 93F/N½)

BY

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BRITISH COLUMBIA DEPARTMENT OF AGRICULTURE

KELOWNA, B.C.

1974

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INTRODUCTION

The soil survey of this area started in conjunction with Canada Land Inventory Capability Classification for Agriculture, Forestry, Wildlife, and Recreation. Soil mapping and sampling began in 1967 and finished in 1969, the correlation of fieldwork extended into 1971. The purpose of the report and accompanying maps is to provide basic information about soils to the wide range of users not only in forestry and agriculture but in general engineering as well as in wildlife management and recreation planning. If we take into consideration that most resources come from the land and water where most human activities also take place, then the soil has some relevance to all land users.

The report is organized into 1. An Introductory Section containing the topics Location and Extent; History, Development and Population; Resources, Industry and Economic aspects; 2. A Physical Section which includes Physiography, Geology, Climate and Vegetation; 3. A General Soil Section intended for the ordinary user and written with a minimum of technical language; 4. An Interpretive Section which discusses how the basic soil information can be utilized in the fields of Engineering, Forestry, Agriculture, Wildlife and Recreation; 5. A Technical Section which contains detailed soil descriptions with laboratory analysis.

ACKNOWLEDGEMENTS

The soils inventory of the Nechako-Francois Lake area was done by the Soils Branch, British Columbia Department of Agriculture. The Air Division, Surveys and Mapping Branch, Department of Lands, Forests and Water Resources supplied the air photos and base maps and developed the autopositives from which prints of the soil map were taken.

Soil mapping was done mainly by J.E. Belsham and I. Cotic with the participation of N.A. Gough and G.K. Young in a part of the area.

Soil analysis were done in the Soils Branch laboratory under direction of V.E. Osborne. The soil maps were initially compiled in the Soils drafting section by S. Bertolami and F. Waterman.

Climatic information was obtained from Climatology Section of Canada Land Inventory, Victoria as well as by using D.O.T. records. Mr. J.R. Marshall, reviewed the chapter on climate.

Vegetation in general and the ecological aspects of plant-soil relationships were studied and described by J. van Barneveld.

G.K. Young prepared the wildlife section with the help of A. Luckhurst and J. van Barneveld. R.H. Louie and R.C. Kowall prepared the section on forestry. The section on engineering was compiled with the help of V.E. Osborne.

G.I. Howell Jones and R.H. Reid contributed generously their work and ideas in compiling the original manuscript for soil maps and also provided different figures for the report.

D.B. Cann read (edited) the manuscript and J.H. Day participated in field correlation.

Mrs. B.A. Muir and Mrs. J.E. Fisher typed the report. Mrs. Muir also participated in all preparatory work for the publication.

Special acknowledgement is due to P.N. Sprout, Chief, Soils Branch, for his assistance in correlation during the fieldwork and advice while the report was being written.

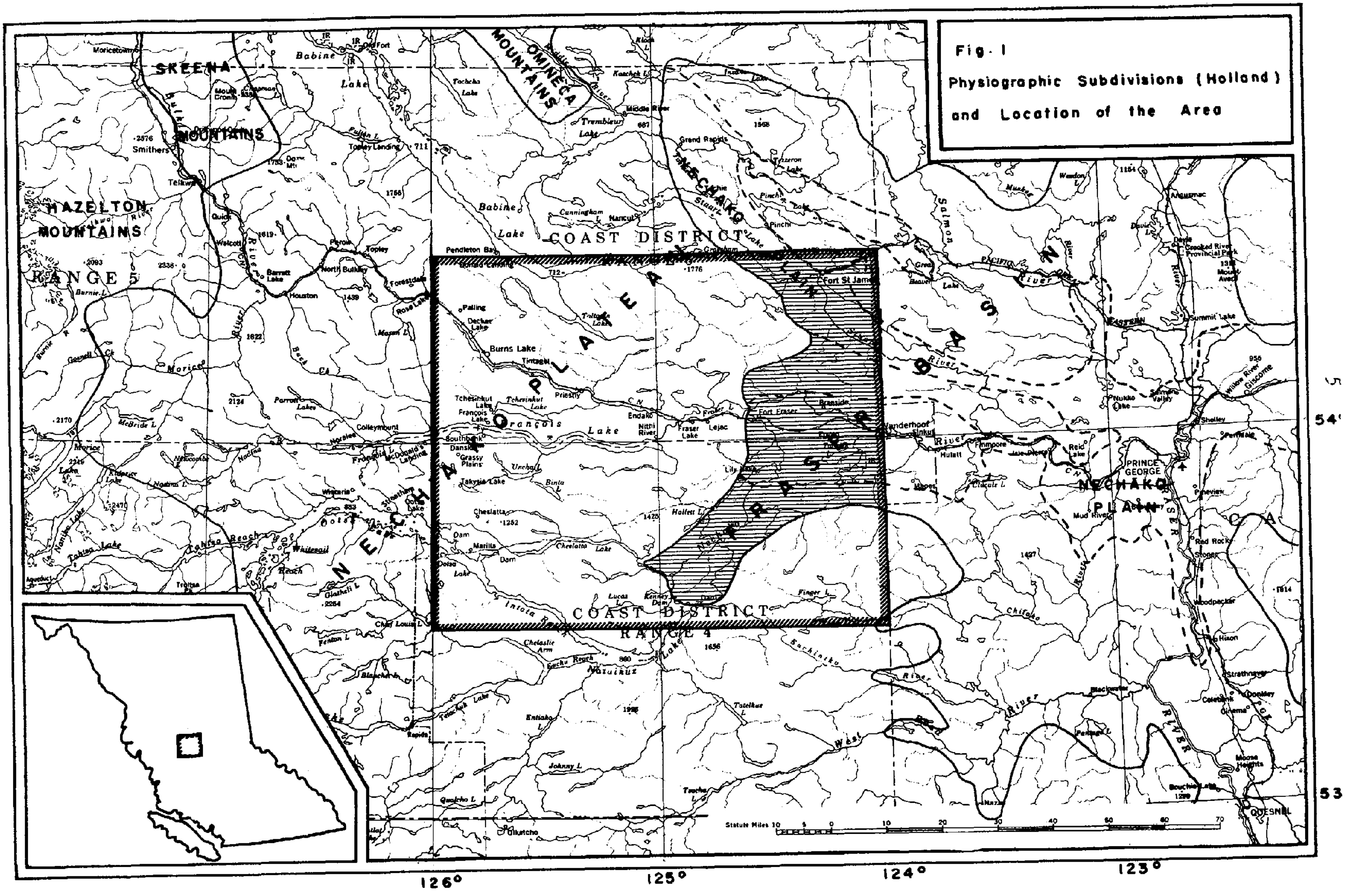


Fig. 1

Physiographic Subdivisions (Holland) and Location of the Area

I. GENERAL DESCRIPTION OF THE AREA

The surveyed area lies in Central British Columbia between 124° and 126° West Longitude and between 50°30' - 54°30' North Latitude (Figure 1.) It encompasses the north half of N.T.S. map sheet 93F and the south half of N.T.S. map sheet 93K, and extends about 70 miles from north to south and about 80 miles from east to west. The total area is about 5636 square miles or 3,607,000 acres.

History, Development and Population

Native Indians who had inhabited this region for centuries were first joined by white fur traders in 1806 when Fort St. James was established. The establishment of Fort Fraser followed a year later. The fur trade was the only occupation and source of income until the Cariboo gold rush in 1859 opened the northern region to exploration and settlement. An attempt to construct a telegraph line through British Columbia, Alaska and Siberia to Europe increased the activity in the area for a short while in the early 1860's.

The Cariboo Trail construction and the moving of people and merchandise during the Omineca and Klondike gold rush had an impact on the opening of the area to settlers and merchants. Construction of the railroad from Prince George to Prince Rupert at the beginning of the century was the single largest incentive for permanent settlement and increased population of small towns like Vanderhoof and Burns Lake. Many settlers became part-time farmers and agriculture production steadily increased.

The real growth of the area, road building, mining and lumbering increased greatly during World War II. After the war, logging and sawmilling were recognized as the main industries in the area.

With molybdenum mining and processing at Endako and mercury at Fort St. James, mining has gained in importance in recent years. Highway construction, secondary road improvement, and the railroad extension to Fort St. James from Prince George have also promoted development, enabling people and goods to move rapidly through the area. The easier access encourages new activities and industries like tourism, transportation and services. The last few years particularly have seen increased expansion in all mentioned activities and taking into account known mineral and forestry resources it only can be assumed that the growth will continue.

The estimated population of the area in 1971 was between 12,000 and 13,000, mostly centered in the communities of Vanderhoof, Fraser Lake and Burns Lake along the east-west transport corridor and at Fort St. James. Population growth is above the Provincial average and is expected to grow at an increased rate for the next decade.

Resources, Industries and Economic Aspects

The forest industries have been the most important factor in the growth of the Nechako region since World War II. Lodgepole pine, spruce and alpine fir are the dominant trees. Forests are managed on a sustained yield basis. Logging has become a steady year round operation in contrast to strictly seasonal work during the winter months - a decade or more ago. Small sawmill operations are phasing out and are being replaced with fewer large stationary sawmills. Current and proposed development in the production of lumber will greatly expand logging and milling operations. It is quite feasible that in addition to the veneer plant already in operation, a plywood plant will be built in the Fort St. James area.

Mining within the area gained major significance after the Endako molybdenum mine went into operation in 1965 and the Pinchi mercury mine, immediately north of Fort St. James, in 1968. The two mines employ around 600 workers. Ore reserves at Enkako will suffice for another 20 years of operation at the present level. No other mining activity is foreseen because the area is considered of low mineral potential.

Agricultural settlement started more than a century ago when the gold rush began. Railroad construction stimulated agricultural production and the major portion of settlement took place at that time. It has been on a slow increase ever since. The acreage of potentially arable land is much greater than that presently cultivated. Unfavourable climatic conditions can be considered as the primary factor for the difficulties experienced by the farmers in this area. A forage crop - livestock enterprise is best suited to the area and should be the basis for all future expansion of agriculture.

Recreation has a great potential in the area. Numerous large and small lakes are without parallel for all kinds of sports and outdoor activities. Fishing is generally good and hunting for moose is excellent. Black bear inhabit all of the region; waterfowl and grouse are found in varying degree.

Secondary manufacturing industry is not easily attracted to the undeveloped region because of a small consumers market and lack of skilled labour. Therefore resource oriented industry will be the major source of growth and employment in the foreseeable future.

Transportation of people and goods is by bus, trucks and rail along the main east-west transport corridor. The CNR and Highway 16 connecting Prince Rupert and Prince George pass through Burns Lake, Endako, Fort Fraser, Fraser Lake and Vanderhoof. British Columbia Railway from Prince George and a paved highway from Vanderhoof connect this corridor with Fort St. James. Rural areas on the side are connected with these arteries by gravel roads with no public transportation facilities. Small airports for charter flying are located at Vanderhoof, Burns Lake and Fort St. James.

Of public utilities, electricity is supplied to all major centers and to most rural areas by B. C. Hydro and Power Authority, and natural gas by Pacific Northern Gas Ltd. which from a main pipeline to Prince Rupert built in 1968, extended laterals to Vanderhoof, Burns Lake and Fort St. James. Telephone facilities are provided by B. C. Telephone.

Trade and other service industries, provide employment for many people. Vanderhoof is the main service centre followed by Burns Lake and Fort St. James.

The tourist industry is growing and taking a more important part in the area's economy every year. Natural attractions are numerous and should be preserved, while at the same time good services and accommodations should be available to visitors. Potential of the area in tourist trade as in many other fields has just started to develop.

II. PHYSICAL AND ENVIRONMENTAL FEATURES

Physiography and Drainage

Two-thirds of the surveyed area lie within the Nechako Plateau which is the northernmost of the three plateau subdivisions of the Interior Plateau(2).The remaining third at the east and north-east side of the area lies within the Fraser Basin. A few outliers of the Nechako Plateau also occur in this section (see Figure 1.).

The Nechako Plateau has relative relief up to 2500 feet; the valleys are relatively wide and the hills rounded. Plateau uplands between three and four thousand feet in elevation have mostly long, gentle and moderately steep slopes. The higher altitudes, above 4000 feet, representing around 15 percent of the area are steeper and more mountainous. Shass Mountain is the highest with an elevation of 5840 feet above sea level.

The Fraser Basin has an irregular shape and its boundary with Neckako Plateau follows the 3000 feet contour. The topography of the Basin is undulating to mildly rolling, with long, moderate slopes toward wide, flat valleys. It is dominated by a rolling to drumlinized till plain above 2600 feet elevation and by a level to rolling lacustrine basin below 2600 feet. The rivers have incised deep channels into the lacustrine plain. The elevation of Nechako River channel at Vanderhoof is below 2100 feet.

The whole area of the Nechako Plateau and Fraser Basin was covered by ice during the last glaciation. After the retreat and melting of the glacier, ice filled depressions became lakes. There are thousands of them of all sizes. Babine Lake and Stuart Lake, the second and third largest in the province, lie partly in the area. The other large and fairly large lakes are: Francois, Ootsa, Cheslatta, Fraser, Tchesinkut, Taltapin, Decker, Uncha, Tachick, Augier, Pinkut, Tatin, Nulki, Binta.

Most of the Nechako Plateau and all of the Fraser Basin is drained by the Fraser River system. The Nechako River about 80 miles long rises from Cheslatta Lake and flows through the area first in a northeastwardly direction - then toward east after being joined by Nautley at the east end of the Fraser Lake. Endako river rises from Rose Lake, enters Decker Lake, connects Decker and Burns Lake and continues eastward for 35 miles and empties into the Fraser Lake. The 6 mile long Stellako River connects Francois Lake and Fraser Lake. The Nithi River rises from Borel Lake, flows in u-shaped form for 15 miles and empties into the Francois Lake. Small Sinkut River rises at Nulki Hills and drains that part of the area into the Sinkut Lake. The Necoslie River flowing from the south-east empties into the Stuart River south of Fort St. James where the Stuart River rises out of it. The Stuart River flows almost parallel to Necoslie River but in opposite direction and joins the Nechako River outside the map sheet. The southeast part of the area, south of Nulki Hills is drained by the Chilako River which has a rise from the Tatuk Lake. Hundreds of creeks and mountain streams enter mentioned rivers and lakes. Waters of all of them unite with the Nechako River waters and finally with the Fraser River.

The water reservoir created by the Kenny Dam is partly within the southwest corner of the mapped area. It is composed of Ootsa, Newstubb, Natalkuz lakes and Intata Reach. The Chelaslie river and numerous creeks empty into this huge lake. Only the surplus water of this reservoir, controlled by spillways, drains into the Neckako River by way of Cheslatta Lake. The rest after passing through Kemano Tunnel (power station) drains into Kemano Bay.

The Babine Lake area belongs to the Skeena River drainage system. The only major stream is the Sutherland River, entering Babine Lake at the east end. It is close to 40 miles long and flows in the north-westerly direction. Its channel is one to two miles wide, deeply entrenched into the surrounding till plain. Many creeks enter either through lakes like Taltapin, Pinkut, Augier, by way of Sutherland river or directly into Babine Lake. The Skeena River drainage system covers about 700 square miles within the surveyed area.

Bedrock Geology

The geology of the area north of latitude 54° was described by J. E. Armstrong, in Geological Survey of Canada, Memoir 252, and of the area south of 54° by H. W. Tipper in the Memoir 324. This short presentation is based on their findings and interpretations. The Cache Creek group of Permian and possibly, in part, of Pensylvanian age is the oldest rock formation within the surveyed area. It includes sedimentary, extrusive and to a minor extent intrusive rocks and their metamorphosed equivalents. Of the four possible lithological divisions of this group two are represented within the mapped area. The limestone division consists of 90% or more of massive limestone and the ribbon chert division consists of ribbon chert (50%) argillite, slate and greenstone. The limestone formations were laid down in a northwesterly direction on the east side of Stuart Lake and are extensively exposed on the west side of Pope Mountain (4724 feet). Ribbon chert and argillite formations cover about a half of the area between Stuart and Babine Lakes.

The Takla group is not extensive and is mostly composed of volcanic rocks of the Upper Triassic and Lower Jurrassic age with andesite, basalt and associated tuffs and breccias as main components. The northern part of the map area is dotted with small units of this formation.

The Topley Intrusions are of Lower Jurrassic age and consist of granite, diorite, syenite and granodiorite. A large area of granite and granodiorite occurs with a few narrow interruptions from Hobson Mountain and Hallet Lake to Babine Lake. Diorite forms the Nulki Hills and an extensive area between McKnob and Camsell Lakes, with Shass Mountain as the highest peak (5840 feet).

The Hazelton group of rocks is of minor occurrence along the western boundary of the map area. These are volcanic and sedimentary rocks with andesite, related tuffs and breccias, chert, pebble, conglomerate, shale and sandstone.

The Ootsa Lake group with two distinguished subgroups of rocks is very extensive below 54° latitude and around Francois Lake. The suggested age of the first subgroup is Upper Creta - ceous or Paleocene and it is composed of basalt, andesite and related tuffs and breccias. The second is of Paleocene, Eocene and Oligocene age and composed of ryolite, dacite and associated tuffs and breccias.

The Endako group of rocks are thought to be of Oligocene (or later) or Miocene (or later) age. They consist of relatively flat-lying lava flows of basalt, andesite and dacite. This is the most abundant formation and only the north-east corner of the area around Stuart Lake is devoid of it.

The Trembleur Intrusions consisting of pyroxenite, peridotite, diorite and gabbro cover Sinkut Mountain at the east boundary of the map sheet.

Surficial Geology

During the last glaciation the entire area was covered by a thick glacial ice sheet. After the retreat and melting of the ice, the area was left overlain by glacial landforms. Glacial till is the most extensive of the deposits and is up to 400 feet thick. While there are thousands of acres occupied by drumlinized till plain, drumlins are not featured as prominently as further east, in the Prince George map sheet. Rock drumlins or - crag and tail - are quite common - where glacial drift is thinner over hard bedrock. Rolling and undulating till plain covers most of the area above the glacial lake level. The texture of the till is predominantly loam or clay loam with a range from sandy loam to clay. The mountainous areas at higher elevations have a thinner more eroded mantle of tills usually of coarser texture. The till was deposited by moving ice, but most of the other glacial features were formed during the stagnation or retreat of the glacier.

The ablation or dead-ice moraine with low relief and hummocky topography is one of such features. The ablation till is coarse and stony with many big boulders. The drainage is poorly organized and swamps are abundant. Ablation areas are scattered through the region, generally confined to somewhat lower, level ground, adjoining abandoned or existing stream channels. Pitted outwash, eskers, kettles, channels and gullies are usually a part of an ablation moraine.

Outwash plains are not very extensive and are found at the edges of ablation areas, along abandoned channels or existing streams as valley trains. They are predominantly gravelly, some are stony and a minor percentage is sandy. Three, predominantly gravelly deltas, one at the south shore of Stuart Lake, one along Sinkut River south of Nulki Lake and a third at the north shore of Fraser Lake are ones worth mentioning.

The largest of the esker complexes is found 10 miles south of Fort St. James, crossing the highway and extending in southeasterly directionfor 10 miles. It is a quarter of a mile to three miles wide. There are a few smaller complexes of gravelly ridges, some of them believed to be crevasse fillings.

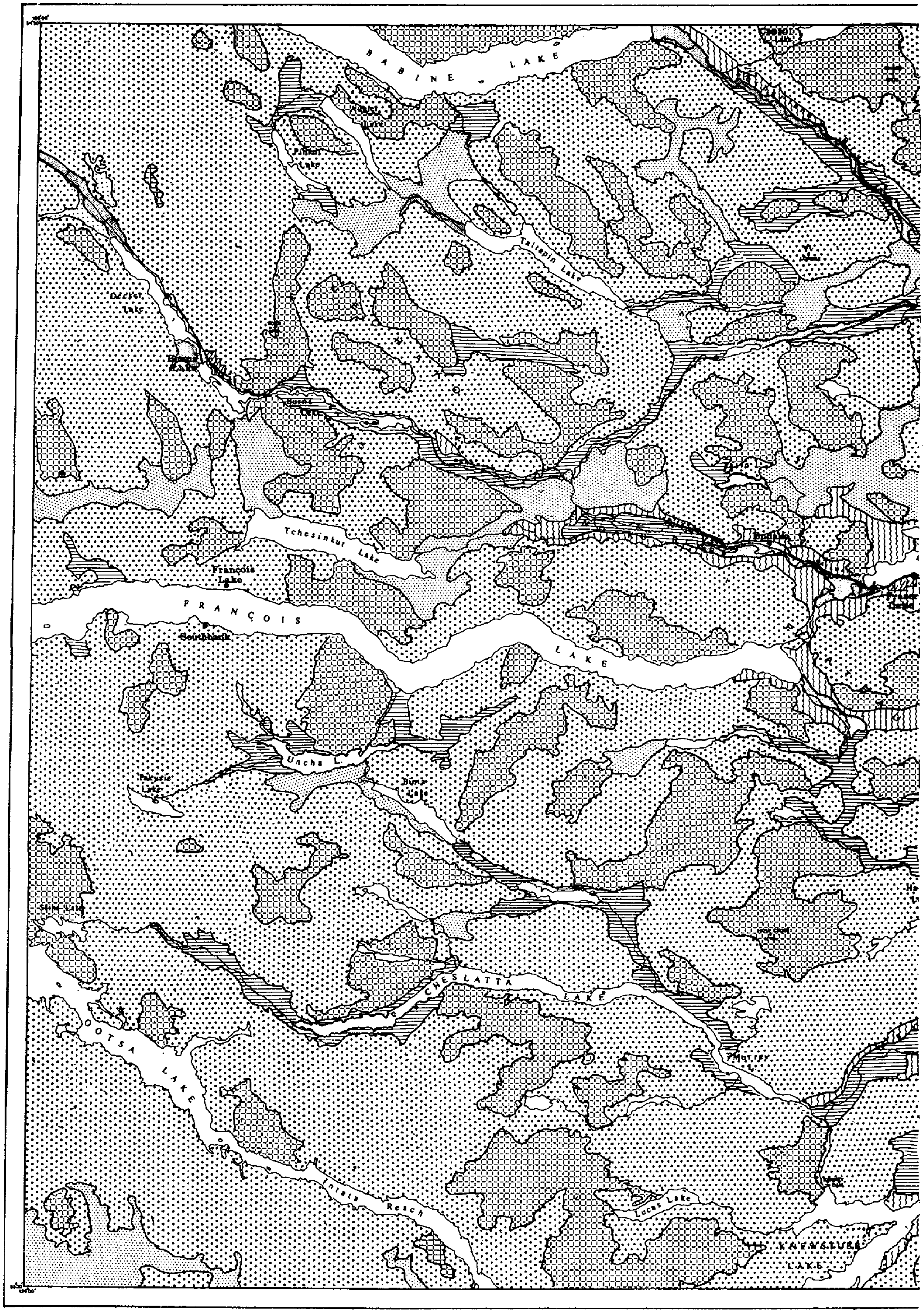
Numerous abandoned channels of subglacial streams cut through the till plain. Many large meltwater channels are partly or wholly occupied by existing lakes and along some of them major rivers flow. Judging by the width of those channels one can assume that the glacier was thawing fast and that the amount of water pouring off it was enormous (Tipper).

Glacial lacustrine deposits were formed in glacial lake basins during the final stages of glaciation, most likely as deltaic sediments. The lake level was between 2600 and 2700 feet in the Fort St. James and Vanderhoof basins. The thickness of the deposits is at least 260 feet at Vanderhoof and 100 feet at Fort St. James. Very heavy clays predominate at Fort St. James and lighter clays in the Vanderhoof area. Silts are less extensive. The continuity of lacustrine deposits is interrupted by Fraser Lake, and from there, along the Endako River, narrow non-continuous bands of silts flank the valley sides to the western boundary of the sheet.

Beach gravel and sand were deposited by wave action along part of the glacial lake shore. The occurrence of beaches only in certain areas indicates the prevailing wind direction.

Colluvium consists of coarse, loose material, overlying bedrock at shallow depths. It was deposited chiefly by mass-wasting, usually at the base of a steep slope.

Alluvial plains comprise materials of variable texture laid down by rivers and streams. The Nechako and Stuart River floodplains are the largest. Many small alluvial fans flank the valleys of the Endako and Sutherland Rivers.


BABINE LAKE
Decker Lake
Burns Lake
Tchesinkut Lake
François Lake
FRANÇOIS LAKE
Southbank
Uncha L.
Takysie Lake
Binta Lake
Shea Lake
CHESLATTA LAKE
OOTSA LAKE
Intata Reach
Lucas Lake
KNEWSTUBB LAKE
Murray

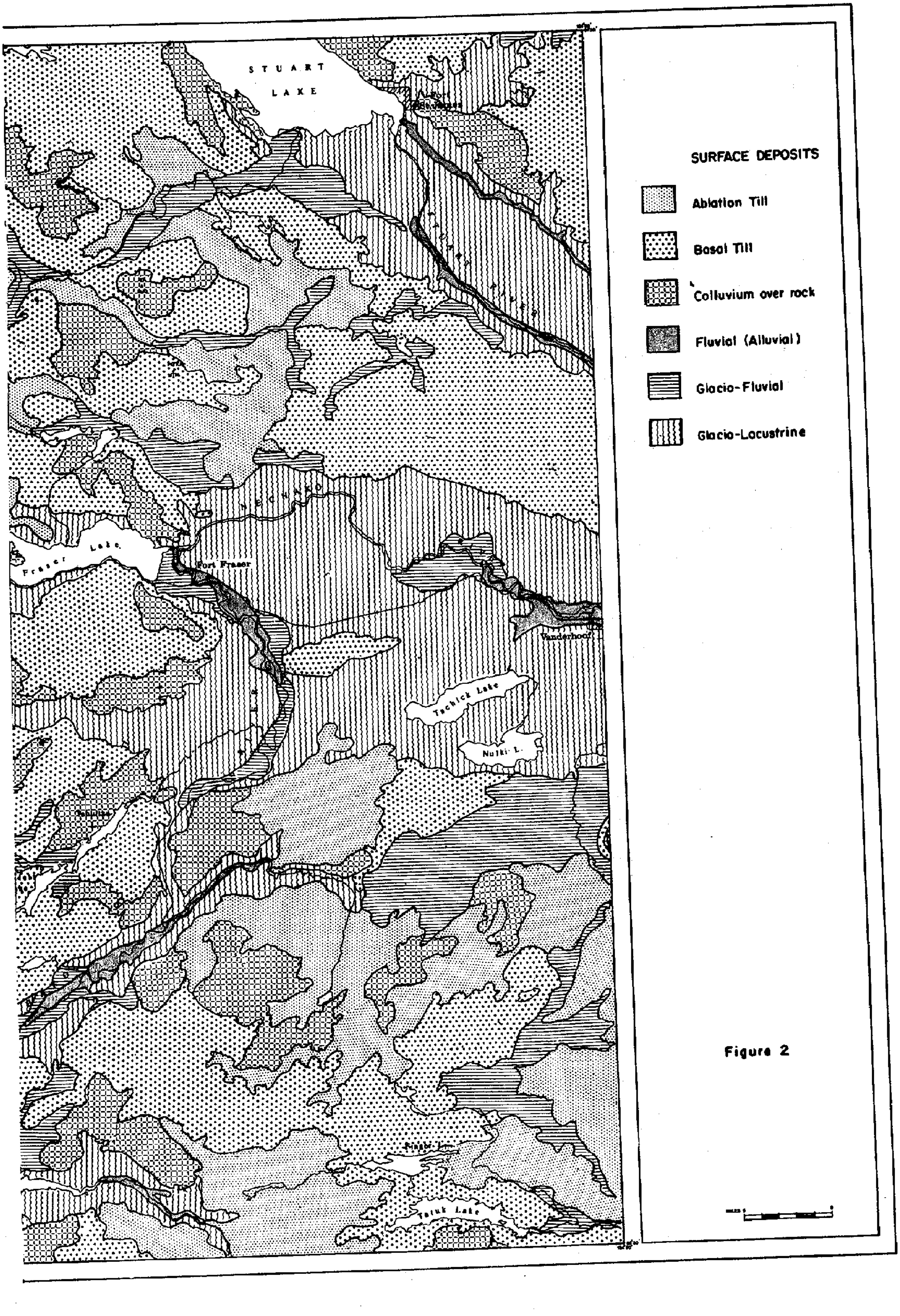

STUART LAKE
Fraser Lake
Fort Fraser
NECHAKO
Vanderhoof
Tachick Lake
Nulki L.
Tatuk Lake
SURFACE DEPOSITS
Ablation Till
Basal Till
Colluvium over rock
Fluvial (Alluvial)
Glacio-Fluvial
Glacio-Lacustrine

Figure 2

Climate

A continental type climate with long, cold winters and short, mild summers prevails. Climatic characterization of the area is deduced from the weather station data at Vanderhoof, Fort St. James and Wistaria, supplemented by short term station data and information provided by the Agroclimatology section of the Canada Land Inventory. There is no information for a vast area south of the main highway, representing almost half the map sheet and for the high mountainous region west of Fort St. James, except from some previously mentioned short term stations.

The mean annual temperature between 36^{0} and 37^{0}F at the three long range stations - Fort St. James, Vanderhoof and Wistaria could be considered typical for the elevations up to 3000 feet. By unfavourable comparison with the stations further west (New Hazelton 39.6 and Terrace 42.8 M.A.T.), the diminishing influence of the Pacific Ocean on weather pattern becomes evident. See Table 1 for annual distribution of temperatures for the above named stations on the next page.

The average frost-free period of 49 days at Vanderhoof and 62 days at Wistaria (15 miles from the western sheet boundary), could be considered as typical for lower elevations. There are frost pooling pockets with frost every month of the year and cold air drainage sites giving a larger frost free period in excess of 100 days; e.g. on the south aspect of long slopes, immediately adjacent to the larger lakes and on some hilltops. See Table 5 for frost data on page 126.

Precipitation is lighter than at Smithers-Terrace area on the west or Prince George area on the east. It falls between 16.5 and 18 inches at all three stations within the map sheet - 38 to 45 percent of it as snow. Slightly less than half of the precipitation occurs during the growing season. See precipitation, Table 1.

Vegetation

The significance of vegetation in the resource inventory is:

1 : Vegetation forming a natural resource by itself.

2 : Vegetation as an indicator of the state of other biophysical factors (such as: climate, geology, geomorphology and soils) which determine the nature and quality of the natural resources. The natural resources belong to a natural system, the functioning of which must be understood in order to manage the resources properly.

3 : Soils reflect the natural conditions. Vegetation performs an important role in the formation of a soil. Here the vegetation must be taken into account when studying or interpreting a soil.

Vegetation Parameters of Practical Importance are:

1 : Quality: Species composition, vegetation, structure, age

2 : Quantity: Quantity of species and the distribution of vegetation types.

3 : Dynamics: Secondary succession sequences and their ultimate climaxes, which reflect the potential of the resource.

In the following sections of this report it is attempted to present these parameters at various levels of detail, thus facilitating application at corresponding levels of management and planting.

Table 1. Temperatures and Precipitation

Station	Element	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Fort St. James 2280 ft. elevation 54°27'N/124°15'W														
	Mean daily temperature	10.1	15.0	25.9	37.1	47.7	54.4	58.0	56.0	48.6	39.0	25.9	15.7	36.1
	Mean daily maximum temperature	18.3	25.1	36.7	48.8	61.2	67.4	70.9	69.2	60.8	48.5	33.3	23.1	46.9
	Mean daily minimum temperature	1.9	4.8	15.1	25.4	34.1	41.4	45.0	42.7	36.4	29.5	18.4	8.3	25.3
	Maximum temperature	49	55	60	76	88	93	98	96	85	77	61	49	98
	Minimum temperature	-57	-56	-39	-19	11	21	24	18	11	-5	-36	-53	-57
	Mean rainfall (inches)	0.09	0.06	0.26	0.48	1.23	1.82	1.99	1.56	1.55	1.21	0.58	0.12	10.95
	Mean snowfall (inches)	15.0	12.8	7.0	2.8	T	0.0	0.0	0.0	0.1	3.0	11.5	15.6	67.8
	Mean total precipitation	1.59	1.34	0.96	0.76	1.23	1.82	1.99	1.56	1.56	1.51	1.73	1.68	17.73
Vanderhoof 2210 ft. elevation 54°03'N/124°08'W														
	Mean daily temperature	10.7	17.4	27.8	39.0	48.8	54.4	58.0	55.9	49.2	39.6	26.3	15.4	36.2
	Mean daily maximum temperature	19.9	28.5	39.0	50.7	63.4	67.7	72.2	70.1	63.0	50.0	34.2	23.6	47.8
	Mean daily minimum temperature	1.5	6.3	16.6	27.3	34.1	41.0	43.8	41.8	35.5	29.2	18.4	7.1	24.5
	Maximum temperature	54	62	68	87	92	93	104	92	88	79	62	52	104
	Minimum temperature	-61	-60	-45	-21	15	20	28	23	2	-15	-44	-59	-61
	Mean rainfall (inches)	0.03	0.02	0.22	0.51	1.13	1.92	1.49	1.45	1.25	1.21	0.58	0.36	10.17
	Mean snowfall (inches)	15.0	16.3	7.6	2.2	T	0.0	0.0	0.0	0.3	1.9	9.1	14.8	67.2
	Mean total precipitation	1.53	1.65	0.98	0.73	1.13	1.92	1.49	1.45	1.28	1.40	1.49	1.84	16.89
Wistaria 2865 ft. elevation 53°49'N/126°10'W														
	Mean daily temperature	13.7	18.8	27.9	36.4	46.0	52.0	55.8	55.3	48.9	39.2	27.4	18.7	36.7
	Mean daily maximum temperature	21.9	28.7	37.3	47.1	58.4	63.9	68.1	67.8	60.8	47.7	33.8	25.3	46.7
	Mean daily minimum temperature	5.5	8.9	18.5	25.6	33.5	40.0	43.4	42.7	37.0	30.6	21.0	12.1	26.6
	Maximum temperature	52	55	65	80	96	91	97	96	93	76	60	52	97
	Minimum temperature	-47	-41	-32	-14	15	24	27	26	-3	-2	-24	-40	-47
	Mean rainfall (inches)	0.19	0.05	0.10	0.33	0.93	1.67	1.68	1.52	1.26	1.22	0.65	0.25	9.85
	Mean snowfall (inches)	14.4	10.9	10.0	4.9	1.0	T	0.0	0.0	0.6	4.9	13.5	19.5	79.7
	Mean total precipitation	1.63	1.14	1.10	0.82	1.03	1.67	1.68	1.52	1.32	1.71	2.00	2.20	17.82
Prince George 2218 ft. elevation 53°53'N/122°41'W														
	Mean daily temperature	11.6	18.5	27.8	39.7	49.4	55.2	58.9	56.6	50.2	40.7	27.5	20.1	38.0
	Mean daily maximum temperature	20.1	28.3	37.9	50.4	62.4	67.0	72.0	69.0	62.1	49.3	34.5	26.9	48.3
	Mean daily minimum temperature	3.0	8.7	17.6	28.9	36.4	43.3	45.7	44.1	38.3	32.0	20.4	13.3	27.6
	Maximum temperature	49	55	64	74	86	93	94	92	81	76	61	53	94
	Minimum temperature	-58	-49	-36	-14	17	27	29	25	10	-14	-43	-50	-58
	Mean rainfall (inches)	0.25	0.18	0.53	0.84	1.67	2.44	2.53	2.56	2.17	2.03	1.04	0.47	16.71
	Mean snowfall (inches)	19.7	15.6	8.9	2.6	0.2	T	0.0	0.0	0.2	2.9	12.0	17.5	79.6
	Mean total precipitation	2.22	1.74	1.42	1.10	1.69	2.44	2.53	2.56	2.19	2.32	2.24	2.22	24.67
Terrace A 719 ft. elevation 54°28'N/128°35'W														
	Mean daily temperature	23.7	29.5	34.9	43.0	50.8	56.2	61.4	60.0	53.5	43.2	31.5	26.1	42.8
	Mean daily maximum temperature	27.5	34.1	40.9	51.4	60.8	65.2	71.2	68.4	61.0	47.7	34.8	29.5	49.4
	Mean daily minimum temperature	19.9	24.8	28.8	34.5	40.8	47.2	51.5	51.5	46.0	38.7	28.2	22.7	36.2
	Maximum temperature	49	47	62	75	90	94	93	93	80	65	55	45	94
	Minimum temperature	-11	-13	-1	25	28	33	38	39	32	23	0	-16	-16
	Mean rainfall (inches)	2.74	2.71	1.70	2.00	1.22	1.77	2.17	2.56	3.70	8.66	4.93	4.27	38.43
	Mean snowfall (inches)	33.3	22.3	17.1	4.6	T	0.0	0.0	0.0	0.0	3.5	24.3	43.7	148.8
	Mean total precipitation	6.07	4.94	3.41	2.46	1.22	1.77	2.17	2.56	3.70	9.01	7.36	8.64	53.51

F o r e s t   Z o n a t i o n s

The report area is located in the area transitional between the Sub-boreal Spruce Section of the Canadian Boreal Forest Region and the Canadian Cordilleran Forest Region of the South Central Interior. The position of any boundary line distinguishing the section from the latter region will vary depending on how each is defined.

The northern boundary of the Montane Forest Region as defined by Rowe (1972) coincides with the northern distribution limit of Douglas fir. The northern limit of the Canadian Cordilleran Forest as indicated on a map by Krajina (1965) coincides with the northern distribution limit of vegetation types in which trembling aspen or lodgepole pine and sometimes grasses form a more or less parkland type of cover. However, black spruce and tamarack, which are characteristics of the Canadian Boreal Forest Region (Krajina, 1965), penetrate southward to beyond Tatuk Lake.

The forest zonation classification (Krajina, 1965) is presented in Table 2. The major types of successional sequences are depicted in fig. 4.

Recognizing the arbitrariness of any boundary line in a gradual transition, the Sub-boreal and the Transition sections of the Canadian Boreal Forest Region and the Canadian Cordilleran Forest Region (fig. 3) were identified as follows:

Boreal-Cordilleran Transition

either a) The northern-most extent of potential Douglas fir climax stands on sites not strongly edaphically - modified. The strong edaphic modifications under consideration were:

i) lithic soils on south aspects
ii) soils developed on calcareous parent materials
iii) coarse textured soils
(gravelly sandy loam or coarser glacio-fluvial deposits)

and/or b) The occurrence of (albeit sparse) pine grass under lodgepole pine, trembling aspen or Douglas fir.

and/or c) The lack of white spruce regeneration even under over mature stands of lodgepole pine or aspen.

Canadian Boreal Forest Region Sub-boreal Section

a) Regeneration of spruce, at least under mature stands of lodgepole pine or trembling aspen when the herb layer is not hindering spruce establishment, on all but strongly edaphically modified sites below 3000' in elevation in the absence of Douglas fir or pinegrass.

b) Regeneration of alpine fir at elevations below 3000'.

c) The low evaporation condition allows the retention of moisture at the surface of the soil, thus allowing the establishment of continuous and often relatively thick moss layers on medium to fine textured soils. On coarser textured soils leaching of the nutrients from the parent material and the rapid drying of the surface allow only hardy pioneer-type plants, like lichens and drought tolerant mossess to establish during the earlier stages of succession.

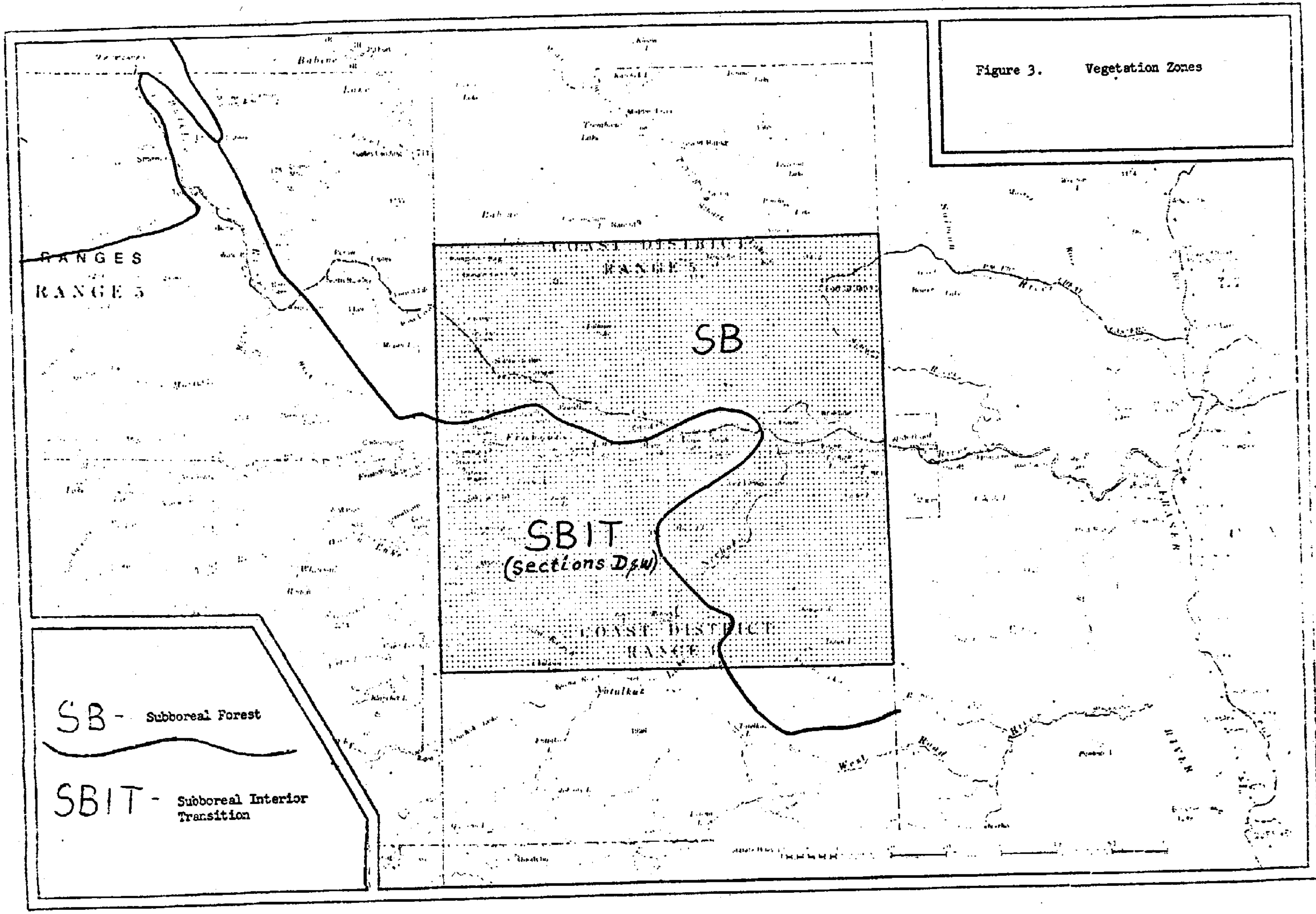


Figure 3. Vegetation Zones

Boreal-Cordilleran Transition (SBIT)

In the Boreal-Cordilleran Transition (SBIT), the drier Douglas fir transition (D) is found in the direct vicinity of Fraser Lake and the east half of Francois Lake. The moderating effect of these lakes on the climate (Chesseman, 1973 B.C.L.I., Climatology Sector) is evident from the occurrence of Douglas fir stands or regeneration on colluvial slopes and basal till below 3500' (4000') elevation regardless of aspect. On north facing slopes or more or less flat lying tills trembling aspen and occasionally lodgepole pine are seral species. On drier south facing slopes, open stands of trembling aspen or grass communties may form the more common seral communities. The rate of succession on such sites is slow.

The rolling uplands away from the the direct influence fo the major water bodies support a white spruce climax below 3500' (W). Where this zone is adjacentto the Sub alpine Englemann spruce-alpine fir zone, a belt is found in which the spruces hybridize, extending from approximately 3000' elevation, where the white spruce influence predominates to approximately 3500' where the Engelmann spruce characteristics are dominant.

Succession in this white spruce zone is primarily through trembling aspen or, particularly when approaching the Engelmann spruce-alpine fir zone, lodgepole pine. Alpine fir is usually absent.

The Sub-alpine Engelmann spruce-alpine fir zone extends from 3500' (locally on south facing slopes in the vicinity of the lakes 4000'). Above 5000' to approximately 5500' the densely forested vegetation yields to the Krummholz sub-zone which is characterized by clumps of stunted alpine fir intermixed with openings of alpine heather, herb or grass-lichen communities. The latter sub-zone is insignificant in extent since the rolling mountains reach this elevation range only in a few locations.

In the forested sub-zone of the Engelmann spruce-alpine fir zone, on better drained sites, fire succession proceeds through lodgepole pine, often accompanied by alder to climax stands in which proportions of Engelmann spruce and alpine fir vary with the moisture regime or black spruce on imperfectly to poorly drained soils. Clearing with subsequent burning on well drained sites will often promote the establishment of alder, which may somewhat inhibit the re-establishment of spruce and alpine fir. On less-well drained to moderately well drained sites a dense growth of shrubs or herbs may retard the relatively rapid invasion of Engelmann spruce and some alpine fir. In the Krummholz subzone fire will result in an expansion of the area occupied by alpine plant communities, often creating a considerable apparent addition to the Alpine tundra zone. Stunted alpine fir will pioneer on these sites. Re-establishment of the original cover is extremely slow.

Canadian Boreal Forest Region; Sub-boreal Forest Section (SB)

In this section of the boreal forest, the White spruce-alpine fir zone extends up to approximately 3500'. Locally, in areas of cold air drainage or cold air accumulation, the upper limit of the zone may be at 3000'. In the lower subzone, below 3000', white spruce and alpine fir are the characteristic climatic climax species. The proportion of white spruce in the stands increases with increasing soil moisture. However, poorly drained and very poorly drained organic soils support edaphic climaxes consisting of black spruce and/or tamarack. The upper subzone, extending from 3000' upwards to 3500' represents the transition towards the subalpine zone. Characteristically, the spruces in this zone show evidence of various degrees of hybridization between white spruce and Engelmann spruce. Where this transitional zone consists of small pockets contained in the higher elevation subalpine forest zone, Engelmann spruce may penetrate downwards to 3000'.

Succession in the lower subzone proceeds through lodgepole pine, aspen or willows depending on fire frequency and intensity, and moisture regime.

The characteristics of the Subalpine Engelmann spruce-alpine fir zone are similar to those described earlier. The Krunnholz subzone and the Alpine tundra zone were not observed in the area.

able 2: Classification of the Macro-Vegetation

Report Area	Nechako-Francois Lake Area								
B.G.C. Region	Boreal-Cordilleran Transition *						Canadian Boreal Forest		
Section	Drier Subboreal-Interior Douglas-fir transition SBIT(D)			Subboreal white spruce-Interior transition SBIT(W)			Subboreal Forest SB		
Vegetation Zonation	ZONE	SUBZONE	ALTITUDINAL LIMITS (ft) LOWER UPPER	ZONE	SUBZONE	ALTITUDINAL LIMITS(ft) LOWER UPPER	ZONE	SUBZONE	ALTITUDINAL LIMITS LOWER UPPER
	1) Interior Douglas-fir zone		-3500 (4000)	1) Subboreal white spruce-Interior transition zone	a) White spruce -Interior transition b) White spruce -Interior Engelmann spruce-Alpine fir transition	-3000 3000-3500	1) White spruce -Alpine fir	a) Subboreal White spruce-Alpine fir b) Subboreal White spruce-subalpine Engelmann spruce -alpine fir transitional	-3500 (3000) -3000 3000-3500
	2) Engelmann spruce-alpine fir zone	a) Engelmann spruce-alpine fir forest subzone	3500(4000)- 5000	2) Engelmann spruce-alpine fir zone	a) Engelmann spruce-alpine fir forested subzone b) Krummholz subzone	3500-5000 (probably) 5000-5500 (probably)	2) Engelmann spruce-alpine fir zone		(3000)3500- 5500 (probably)
	3) Alpine tundra		above (5000) 5500 - (on adjacent mountains)	3) Alpine tundra		5500- (probably)			

* Corresponds with Subboreal-Interior Transition (SBIT) of Smithers-Hazelton Report (Runka 1972)

Abbreviations used in Soil diagrams

ADB - Alpine Dystric Brunisol
BiHFP - Bisequa Humo-Ferric Podzol
BrGW - Brunisolic Gray Wooded
DB - Dystric Brunisol
DDB - Degraded Dystric Brunisol
DEB - Degraded Eutric Brunisol
DG - Dark Gray
DGL - Dark Gray Luvisol
EB - Eutric Brunisol
G - Gleysol - Gleysolics
GL - Gray Luvisol
GI - Gleyed
HFP - Humo-Ferric Podzol
Li - Lithic
O - Organic
ODB - Orthic Dystric Brunisol
ODG - Orthic Dark Gray
OEB - Orthic Eutric Brunisol
OGL - Orthic Gray Luvisol
OHFP - Orthic Humo-Ferric Podzol
OR - Orthic Regosol
RDG - Rego Dark Gray
Subs - Subgroups

Vegetation symbols used in soil diagrams

8

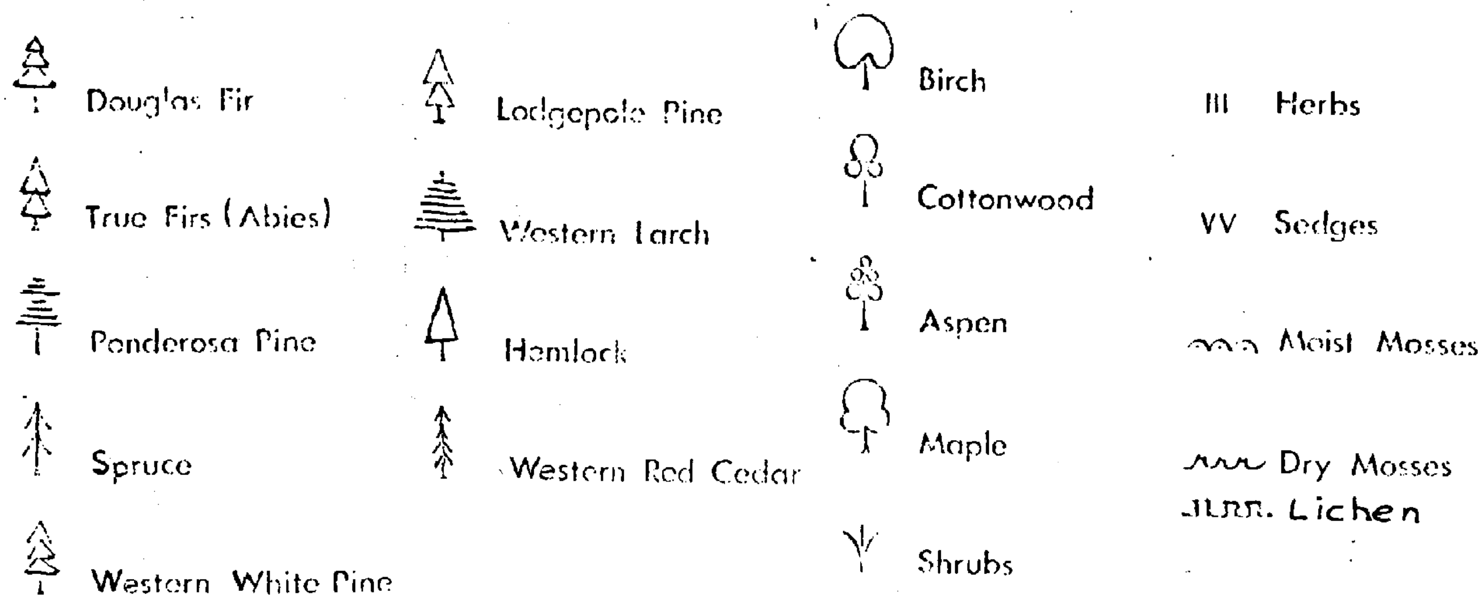


Figure 5

Figure 4.

Major succession trends, and their relation to soils, elevation and causal factors for the Subboreal and Subboreal - Interior transition. The rate of succession decreases towards the outer shells of the diagram. The length of the successional pathway is representative of the relative duration of completion of a succession cycle.

III GENERAL DESCRIPTION OF THE SOILS AND VEGETATION

How The Soils Were Mapped and Classified

This soil survey was done on a broad reconnaissance basis with the primary purpose of gaining more data as a base for the Canada Land Inventory. The soil surveyors were faced with two great obstacles - vastness of the area and no accessibility to most of it. Consequently, it was necessary to rely heavily on aerial photo-interpretation. This is a relatively new discipline but very widely used in many fields. To use it successfully in soil mapping one has to become familiar with the soil development, geological formations and vegetation of the accessible area and by studying it in three dimensional perspective on photographs, compare features of the accessible areas with similar features of the inaccessible areas. Soil surveyors travelled all existing roads checking road cuts, and walked reasonable distances from the roads to dig holes, expose and study soil profiles. A profile is the vertical section of the soil through its horizons or layers and extending into the parent material.

Soils are dynamic natural bodies developed through the interaction of soil forming factors such as relief, climate, vegetation and other living organisms with soil parent materials over a period of time. The complex and continuous process of soil development involves many changes that are reflected in soil morphology. Morphological characteristics are recognized by soil layers or horizons that differ in color, texture, structure, consistence, reaction, thickness or chemical and biological properties.

Soil is formed from the parent material by combination of many factors and processes. In the process through leaching, weathering and microbiological activity, additions, losses and transformations, result in soils with different profiles. Parent material does not change much with time because leaching, weathering and root penetration are very slow below the depth of two to five feet from the surface. Profiles are differentiated and defined by texture, the proportion of different particle sizes, structure - the way smaller particles are held together, consistence - how hard or soft the soil fabric is, and color, thickness and arrangement of layers. Arbitrary groupings are made on these morphological features supported by physical and chemical analyses. (For more detailed information on soil classification - read The System of Soil Classification for Canada, and for technical terms use the Glossary). All soil profiles are compared with others in the area and classified according to the national classification scheme. Soils on similar parent material, under similar climatic conditions and of about the same age comprise a soil association. Every soil association is given a local name, e.g. Barrett, Nechako, etc. It has a range in drainage, texture, structure, color, thickness of layers and depth.

The Association was subdivided into members by development and drainage to a single subgroup or to two and three subgroup combinations. Superimposed on delineated landforms, these association members thus become the basic mapping units. In this manner and according to the parent materials the soil subgroup was considered as the taxonomic unit. On uniform parent materials subgroups are often identical to soil series.

TABLE 3. Classification of Soils in each Association by Subgroup and Parent Meterial.

SOIL DEVELOPMENT \ PARENT MATERIAL	ABLATION TILL	ALLUVIAL FAN	BASAL TILL	COLLUVIUM OVER TILL	COLLUVIUM OVER ROCK	FLUVIAL (ALLUVIAL)	GLACIO-FLUVIAL GRAVELS	GLACIO-FLUVIAL SANDS	LACUSTRINE BEACHES	LACUSTRINE CLAYS	LACUSTRINE SILTS
BISEQUA HUMO-FERRIC PODZOL	↑		Twain Saunders	↑							
ORTHIC HUMO-FERRIC PODZOL	Cobb		↓ ↓	Tatin	Dragon Ooma Skins		Ramsey				
DEGRADED DYSTRIC BRUNISOL	↑	↑		↑	Decker Clucula		↑ Roaring ↑	Nithl Peta	↑		Knewstubb
ORTHIC DYSTRIC BRUNISOL	Crystal	Slug		Pinkut	Dahl Ormond		Alix ↓ Morice	Mapes ↓	Kluk		
ALPINE DYSTRIC BRUNISOL					Shass						
ORTHIC OR DEGRADED EUTRIC BRUNISOL					Pope						
BRUNISOLIC GRAY LUVISOL			Deserters								
ORTHIC GRAY LUVISOL			Barrett			Nechako				Babine Fort St. James Pineview Vanderhoof	Berman
DARK GRAY LUVISOL			Driftwood								Pradrie-dale
ORTHIC OR REGO DARY GRAY							Snodgrass				
ORTHIC REGOSOL						↑			Colony		
GLEYSOLS; GLEYED ORTHIC REGOSOL						Stellako					

There are six levels at which soils may be grouped in the Canadian system of soil classification: Order, Great Group, Subgroup, Family, Series and Type. The first three categories are divided on the basis of major morphological differences in the soil profile and lower three on the differences in the nature of the parent material and on the thickness and degree of development of soil horizons.

In Table 3 all dominant soil subgroups are listed. Modifying gleyed and lithic subgroups are not listed in the table but are shown as minor members of many associations that are included in the soil legend and general soil descriptions.

A short outline of the system of soil classification for Canada with the three upper categories is given in the glossary with definitions of all orders and great groups. Horizon designations and processes involved are also listed in the glossary.

With the concept of classification and naming soils established and all accessible areas surveyed, the final lines were drawn on aerial photographs delineating mapping units. To accomplish more accuracy in mapping, particularly in accessible and uniform areas, soil associations were further subdivided. Units of almost similar profiles (soil series) were separated from those where two or more different soils were present. In any mapping unit some other soil may occur but it is not considered likely to occupy more than 20 percent of the unit. The mapping unit is an entity on the soil map (or on the aerial photograph) with a symbol indicating to which association member (taxonomic unit) it belongs. If the soil surveyor was not able to separate two or three landforms (parent materials), their respective associations were complexed into one mapping unit, e.g. Barrett x Crystal.

Remote and inaccessible areas were mapped by use of helicopter and more than two hundred landings were made in 1967 and 1968. The check-spots were chosen by prestereoing aerial photographs to select the most representative sites. By comparing similarity of pattern and tone on different landforms of the landing sites and areas surveyed by foot with the unreached and unchecked areas it was possible to extrapolate and name the unknown soils. Spot-checking is far less accurate than traversing an area by foot or by car and Figure 3. Accessibility and reliability of mapping shows most of these areas as less reliable.

In mapping shallow over bedrock soils not all of the characteristics of the rock formations could be taken into account. This would have resulted in many more soils associations without justification. The age of rocks and the mode of origin and many other qualities like degree of shattering, could not be appropriately recognized at this scale of mapping. The position occupied by shallow to bedrock soils is a further obstacle to their closer examination and more detailed separation, because they are most extensive at higher elevations and distant areas, least approachable to a soil surveyor. The acidity or alkalinity of rocks is one property that has a significant bearing on soil development and its morphology. This facilitates the separation and classification of soils in the field. All the rock formations were divided into acidic, basic, calcareous and ultrabasic group. Where the mixture of two or more occurs, the dominant rock type prevails.

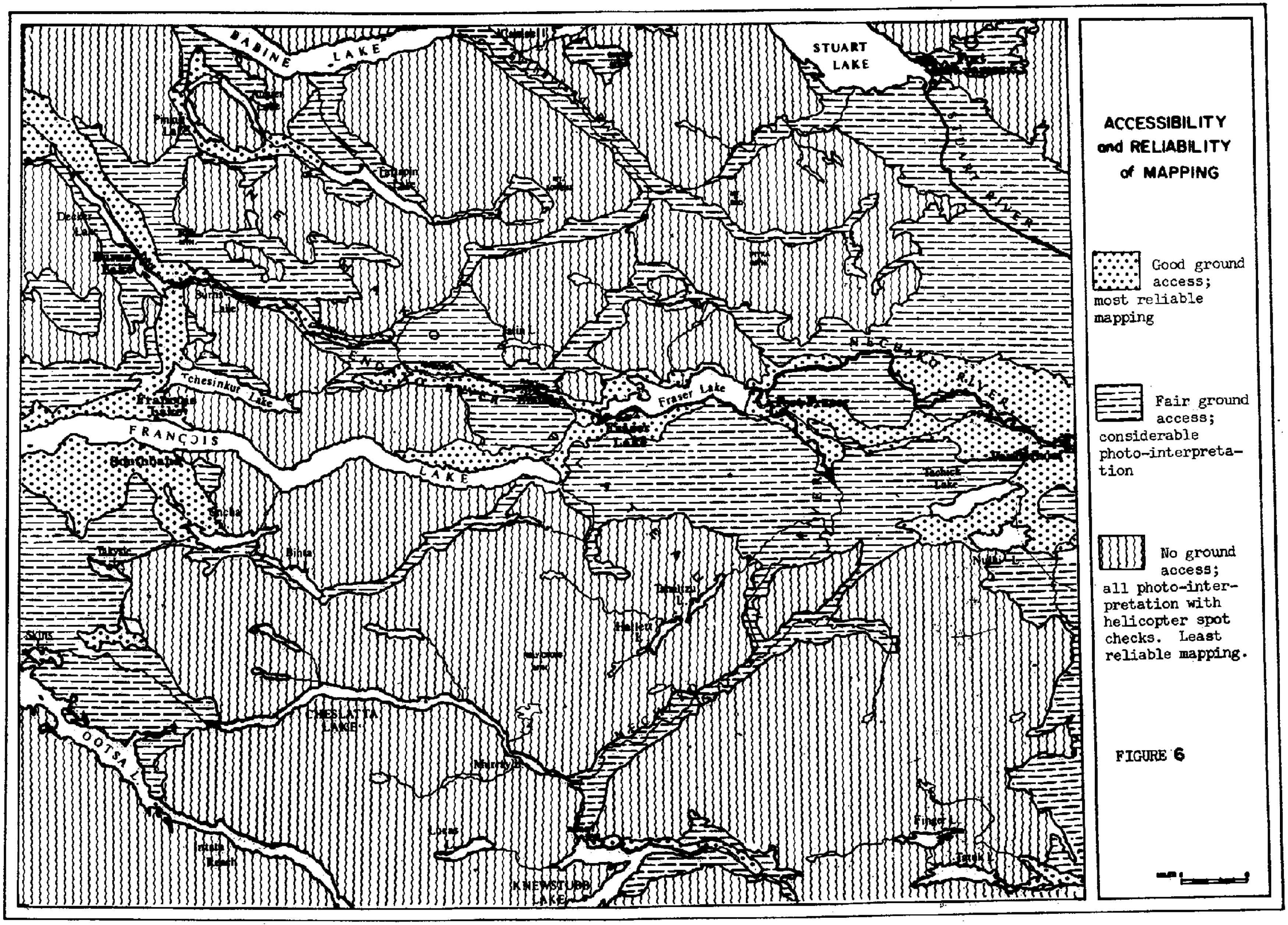

BABINE LAKE
STUART LAKE
STUART RIVER
Pinkut Lake
Decker Lake
Burns Lake
Tchesinkut Lake
FRANÇOIS LAKE
Fraser Lake
NECHAKO RIVER
Tachick Lake
Nulki L.
CHESLATTA LAKE
OOTSA L.
KNEWSTUBB LAKE
Finger L.
ACCESSIBILITY and RELIABILITY of MAPPING
Good ground access; most reliable mapping
Fair ground access; considerable photo-interpretation
No ground access; all photo-interpretation with helicopter spot checks. Least reliable mapping.

FIGURE 6

On higher altitudes, above 4500 feet, low temperature and high moisture take precedence over all other soil forming factors, and no separation was attempted even on the basis of acidity or alkalinity of parent rocks.

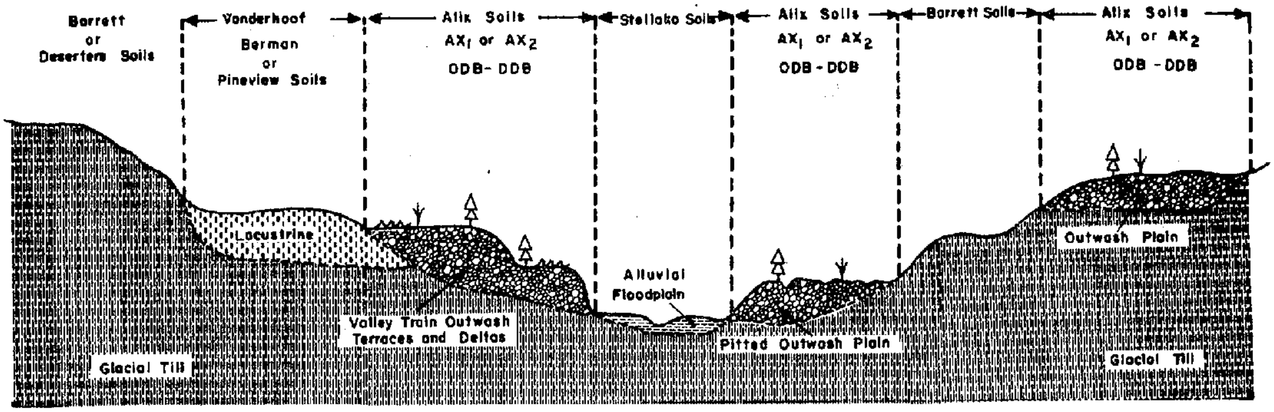
In this soil survey we were trying to find out more about soil-plant relationship, particularly how native plant associations are correlated with soil associations and association members. Toward this aim a botanist and pedologist worked together for a part of summer 1969, spot-checking and describing vegetation on all major soils. As a result, the vegetation site-types were tentatively set up and are part of each association description. Because an association is a fairly broad group of soils, more uniformity in vegetation and site types is expected on the association member level. More information about plant species, associations and site types is available in the chapter on vegetation and in the vegetation list at the end of the report.

A. Descriptions of the Soils

All profiles of the dominant and most of the significant members of soil associations were sampled and described. Physical and chemical analysis of soil samples were conducted in our laboratory. Field descriptions with chemical and physical analysis are used as a technical base for various interpretations. The mass of information gathered in the field and all laboratory data are organized and presented in tables and diagrams in Part IV of the report to be used by various groups or readers such as farmers, agriculturists, foresters and engineers. This was done to facilitate the task of those who are interested in technical data, while at the same time the elimination of these data from the first part of the report makes it more understandable to somebody who is interested only in general knowledge of the soils.

Alix Association

The Alix Association was mapped on gravelly glaciofluvial deposits in different patterns of landforms such as outwash plains, valley trains, terraces, deltas, gravel-filled channels and narrow valleys. Some of the forms are flat, some are rolling and kettled. These deposits are very coarse, gravelly, cobbly and sometimes stony with a thin capping of less coarse material. They are well sorted and of variable thickness, underlain mostly by glacial till or in some cases by pre-existing fluvial material, and glacio-lacustrine deposits. Gravelly glaciofluvial deposits are scattered in smaller or larger units on the till plain, adjacent to ablation till and along wide river valleys.



Physiographic Setting

Elevation: 2200'-3500'

The topography is flat or undulating and rolling to steeply sloping in some areas of pitted outwash. The elevation ranges between 2,200 to 3,500 feet. The texture of the surface capping is gravelly loamy sand, gravelly sand and occasionally gravelly sandy loam. Subsoil and parent material consist of stratified gravel and sand, mixed with cobbles and sometimes stones. Permeability and internal drainage are rapid and very rapid. Droughtiness is the main characteristic of these soils particularly where the deposits are thick and exceedingly coarse. The droughtiness is further enhanced by forest fires that destroy the organic litter and moss layer on the soil surface (and increase airflow near the ground surface).

The soils in the Alix Association are classified as Orthic and Degraded Dystric Brunisols. They are characterized by a brownish surface layer 6 to 10 inches thick in which slight accumulation of iron and aluminium oxides and organic matter occur. With sandy loam texture this layer is friable and has a granular or subangular blocky structure. If the texture is loamy sand or sand, the structure is weakly expressed and the soil is loose and single-grained. In addition to the brownish layer, the Degraded Dystric Brunisol has a thin, leached, ashy colored horizon

below the forest litter. The soil profile is shallow and the transition to the parent material is abrupt, with a change in color, consistence and usually texture.
At the present much of the forest cover consists of lodgepole pine mixed with aspen, a small percentage of white spruce and occasional black spruce. Most of the forest is of non-commercial value. The shrub and herb cover is sparse due to the lack of moisture. A thin layer of dry mosses covers the soil surface in most areas. Under mature stands, the shrubs and mosses are more abundant and a thicker organic mat is developed.

The Alix Association is fairly extensively mapped through the entire map sheet. Complexes with the ablation or basal till are common. It covers 128.511 acres or 3.56% of the map sheet.

These soils are entirely under forest and no other uses are foreseen at present.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
AX1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Predominance of the Orthic subgroup due to some inherent mineral characteristic of the parent material, or less moist environment.
AX2	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Opposite to the above; the degraded subgroup is predominant - indicating better moisture conditions.

Babine Association

The Babine Association was derived from shallow deposits of glacio-lacustrine clay over glacial till. These deposits are very extensive outside the map sheet and cover a large area north of Babine Lake and between Babine, Cunningham and Stuart Lakes. Within the map sheet they are found south and east of Babine Lake in two discontinuous narrow strips. The clay is between 1½ and 2½ feet thick and could be shallower at higher elevations. The deposition must have occurred in a shallow glacial lake of a very short duration.

The topography is rolling to steeply sloping. The elevation ranges between 2,350 and approximately 2,700 feet. In texture, Babine soils are similar to the Vanderhoof association and range from clay to silty clay loam. These are well drained soils with moderately slow to slow permeability.

The major soils of the Babine association are Orthic Gray Luvisol, while Gleyed Orthic Gray Luvisol is of minor occurrence. These soils have a pale leached horizon at the surface up to 8 inches thick with a clay to fine clay accumulation layer below it in the subsoil from 8 to 15 or 20 inches thick. A transitional horizon to the underlying till with partly discernible varving also has some fine clay accumulation. This layer sometimes is only a few inches thick and is sometimes missing. Compact or slightly changed reworked till underlies the lacustrine material at 18 to 30 inches depth. Presently the forest cover consists predominantly of lodgepole pine and mixed lodgepole pine and white spruce in some stands. Aspen is a common tree in many areas and birch is also found scattered in some locations. Composition and growth of shrub and herb layers depends greatly on density of the stand and also on exposure and available moisture. Moss cover is thicker on north facing shaded slopes.

Babine soils are very minor and were mapped in two units as a second member of the complex. They are under forest and no other uses are considered at present.

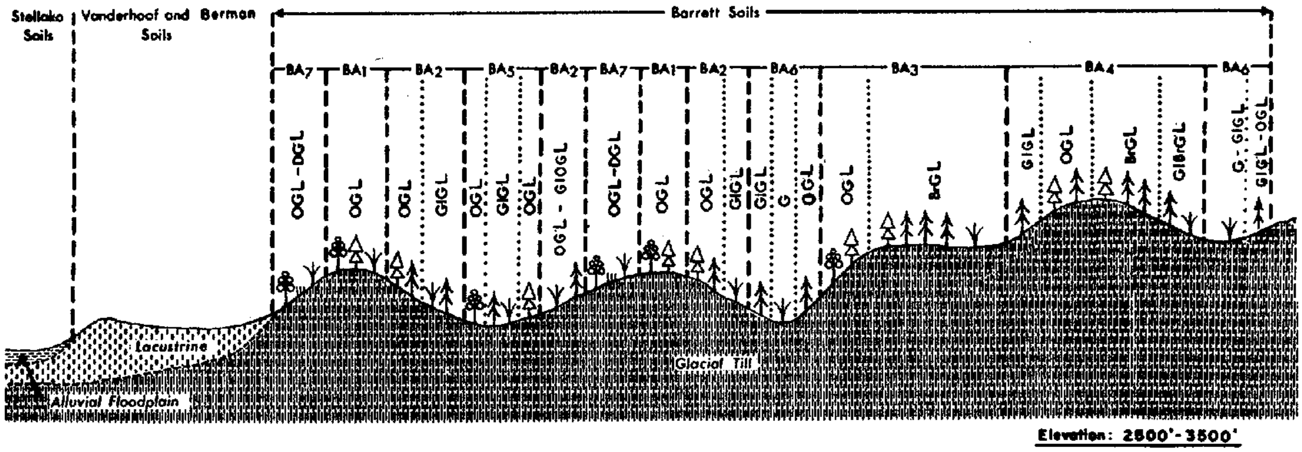
Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
BE1	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol	In a complex with other soils.

Barrett Association

The Barrett Association consists of soils developed on thick deposits of glacial till. The mantle of basal till is as much as 400 feet thick (1). Except for occasional moderately coarse textured enclaves, the till is medium to moderately fine textured and of very hard consistence. Mixed with gravel, stones and cobbles, the grayish colored till is so hard and compact that on deep road cuts it gives the impression of a concrete wall. The undulating to rolling, and in places drumlinized till plain rises gradually from the edges of the lacustrine basin and stretches back for miles in a wave-like form.

Extending over such a vast area of undulating to rolling (5-30% slopes) and sometimes steeply sloping (15-30% slopes) topography, the Barrett Association includes a range of drainage, texture and soil development. The range in elevation is from 2,500 to 3,500 feet. Loam and clay loam are the common textures of these soils, while modifications of sandy loam texture occur at the surface. Gravel and a moderate amount of stones are incorporated throughout the solum. Lime is leached deeply into the parent material and even slight effervescence (reaction with HCl) very rarely happens at depths less than 5 or 6 feet. Permeability is slow due to the fine texture and compactness of the till. Depth to unchanged or slightly changed parent material averages 4 feet. Roots occasionally penetrate into lower parts of the solum along cleavage faces. Predominantly these are well to moderately well drained soils.



Phisiographic Setting

More than 95% of the area mapped as parts of the Barrett Association consists of Gray Luvisol soils. Such soils are characterized by a light colored horizon at the surface or in the upper part of the subsoil, underlain by a horizon in which clay is the main accumulation product. The clay accumulation layer in the Barrett Association occurs usually below a depth of 18-20 inches and is indicated by a brownish cast and a blocky to subangular blocky structure.

Gentle, moderately steep (5-15%) to steep (15-30%) slopes and most of the plateau areas with a good external drainage have moderately well to well drained Orthic Gray Luvisol soils. In such locations, the present forest cover consists of lodgepole pine. Stands with greater proportions of white spruce among the lodgepole pine, were less frequent. Aspen grows with pine in many areas, and even predominates in some locations, particularly adjacent to the lacustrine basin. The shrub and herb layer is sparse under lodgepole pine and spruce, but regularly abundant under aspen; the reverse is true of moss cover. The moss layer consists mainly of mosses that prefer drier shaded sited.

The Dark Gray Luvisol soils as a very minor member of this Association differ from the Orthic Gray Luvisol in having a dark surface horizon sometimes only 2 inches thick. They were developed as a result of repeated forest fires or some other disturbance which destroyed the forest and encouraged herb, shrub and grass growth. Some dry, steep south slopes with rapid runoff and well drained Orthic or Dark Gray Luvisol soils, produce clumps of stunted aspen.

Shaded north slopes on higher elevations between 3,000 to 3,500 feet have Brunisolic Gray Luvisol soils. These are identified by their brown or rusty colored surface horizon enriched with iron and aluminum oxides, a leached pale layer beneath it, and a layer enriched with clay in the subsoil. Presently lodgepole pine, white spruce and white spruce-Engelmann spruce hybrids at the upper elevations are the main tree species. Shrubs in the understory are more abundant than on Orthic Gray Luvisol soil. The composition of the moss layer reflects better surface moisture conditions.

In depressional areas and the lower parts of gentle slopes, where water accumulates, moist gleyed and gleysolic soils are found. Mottled, gleyed and duller colored profiles of these imperfectly to poorly drained soils show the prevailing influence of moisture in such locations. Changes in composition and abundance of vegetation particularly in the understory compared with the previously mentioned well and moderately well drained sites is very striking. More rapid tree growth and greater vigor of moisture-loving shrubs reflects the improved moisture conditions on these soils.

The Barrett Association, as the most extensive soil, is spread throughout the map area, covering 1,002,911 acres or 27.80% of the map sheet.

This soil is mainly under forest with little arable agriculture conducted on it at the present time, although a large acreage with a flatter topography could be cultivated. Some smaller areas around settlements are periodically used as pastures.

M a p U n i t s

Symbol	Dominant Subgroup	Subgroup	Comments
BA1	Orthic Gray Luvisol		The most representative and the most extensive of Barrett soils; moderately well drained.
BA2	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol	This mapping unit includes sufficient percentages of low lying or seepage receiving imperfectly drained area, to be recognized as a separate entity. These parts of the unit are also distinguished by the better forest stands.

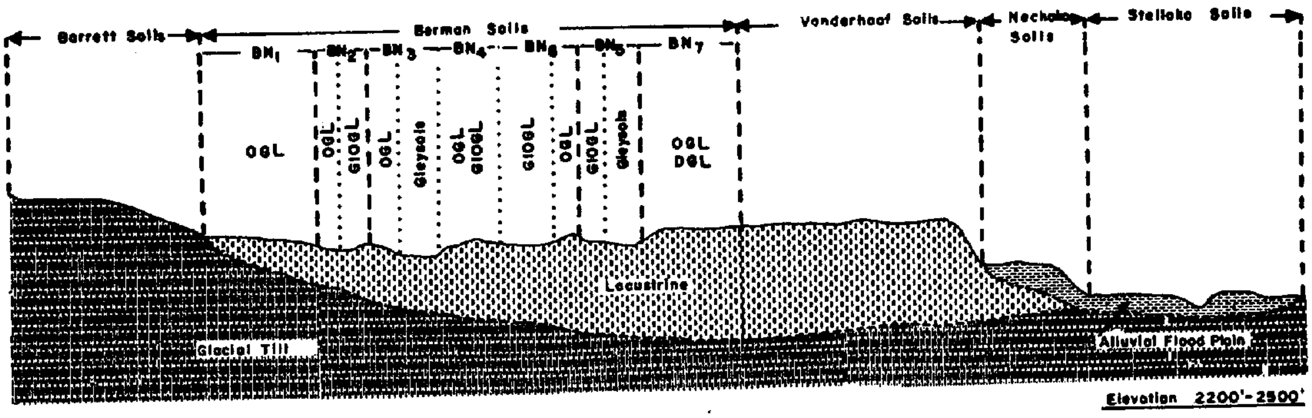
Map Units (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
BA3	Orthic Gray Luvisol	Brunisolic Gray Luvisol	This map unit has significant inclusions of Brunisolic Gray Luvisol indicative of greater moisture which occurs at somewhat higher elevations within the BA association and/or at more shaded northern exposures. A lighter textured surface is generally inherent to the Brunisolic soils.
BA4	Orthic Gray Luvisol	Brunisolic Gray Luvisol Gleyed Subgroups ?	This mapping unit consists of a combination of Orthic and Brunisolic Gray Luvisol and gleyed members of both.
BA5	Gleyed Orthic Gray Luvisol	Orthic Gray Luvisol	This mapping unit has the same components as BA2 but with predominance of gleyed member.
BA6	Gleysolics soils	Gleyed Orthic Gray Luvisol, Orthic Gray Luvisol	Dominantly depressional and seepage areas, often in complexes with organic soils. Rego and eluviated Humic Gleysols predominate.
BA7	Orthic Gray Luvisol	Dark Gray Luvisol	Dark Gray Luvisol as a minor member of this unit occurs on areas cleared for agriculture and sometimes under sparsely covered aspen sites with abundant herb and grass cover. This abundant cover has resulted in an accumulation of organic matter and a dark color in the surface layer.

Berman Association

The Berman Association of soils was developed from silty glaciolacustrine sediments. They were deposited in the Vanderhoof and Fort St. James laking basins during the retreating stage of the last glaciation.

Although silts are usually deposited closer to the lakeshore than clays, this cannot apply in many areas within this map sheet. The thickness of deposits varies according to the location within the basin from a few feet at the edges to a hundred feet or more a few miles inside the laking basin. The silts are varved with thin to relatively thick laminations ranging from $\frac{1}{4}$-8 inches. Areas bordering valleys are dissected by numerous gullies.



Physiographic Setting

The topography is level to undulating and gently rolling, but strongly and steeply sloping areas (9-30%) occur along the valley walls. The elevation of the main body of silts ranges between 2,200 and 2,500 feet. Some fringe areas of silt created by a temporary ponding separated from the main lacustrine basin, have elevations as high as 2,800 feet. Silt loam is by far the prevailing texture of the surface and subsoil, but some silty clay loam also occurs. The soil is predominantly well drained and moderately permeable. Depth to unchanged parent material averages 3 feet. Lime is leached out of the soil profile and the upper part of the parent material in most cases. Roots penetrate easily into the parent material.

The Berman Association includes Gray Luvisol and to a minor extent Gleysolic soils. The general characteristic of Gray Luvisols is a light colored horizon at the surface or in the lower part of the surface horizon and a clay accumulation layer in the subsoil.

The Orthic Gray Luvisol is by far the most widespread soil in the Berman Association. The whitish leached layer is 5-8 inches thick, of well developed platy structure and slightly hard when dry. The clay accumulation layer below the surface horizon consists of an upper part with well developed angular blocky structure and a lower part where varving is still discernible. At two and a half to three feet below the surface slightly changed parent material occurs. On these soils aspen is the major component of the present forest cover. Scattered white spruce and lodgepole pine were found. The shrub and herb layers vary in density but they are generally well developed. Some sites in the south half of the area are covered lightly by pine grass.

The Dark Gray Luvisol soils differ from the Orthic in having a dark surface mineral horizon more than 2 inches thick above the whitish, leached subsurface layer. The dark mineral surface horizon originated with successive forest fires and subsequent deciduous tree-and-shrub-herb-and-grass growth. The increased organic matter production, particularly from fibrous root decay was incorporated into the surface soil. Pasturing or cultivation helped further this process of building organic matter content. Such areas are partly covered by groves of aspen.

Gleyed Orthic Gray Luvisol soils are imperfectly drained and not much different than the Orthic subgroup. Their profile is somewhat duller and with a thicker organic litter on the surface. The most visible feature is mottling in subsoil and some blue gray gleying in the parent material caused by a temporarily high water table. Abundant vigorous growth of trees and the presence of moisture requiring shrubs and herbs are obvious differences between these wetter and the previously described well drained soils.

Gleysolic soils are poorly drained and include mainly three subgroups: Eluviated Humic Gleysol, Rego Humic Gleysol and Carbonated Humic Gleysol. A thick organic mat on the surface and a dark mineral horizon below it is their common feature. The pale blue color of the subsoil (gleying) with rusty spots (mottling) indicate a prevailing influence of a high water table on these soils. The Eluviated Humic Gleysol is the least wet and is also characterized by a pale, leached subsurface and clay accumulation layer in subsoil. The forest growth on gleysolic soils depends on the degree of water saturation. If the water table is very close to the surface most of the year, the forest growth is inhibited or prevented and only wet land plants (like horsetails and sedges) can survive. If saturation with water only lasts part of the growing season, the forest growth may be enhanced. White and black cottomwood and willow species are the major components of the tree cover. Moisture requiring shrubs and herbs are abundant.

The Berman Association is mapped mostly in the middle of the eastern half of the map sheet with some smaller areas elsewhere and covers 91.673 acres or 2.54% of the map sheet.

This soil is predominantly under forest with flatter areas closer to settlements cultivated or pastured.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
BN1	Orthic Gray Luvisol		These are well drained and most extensive soils of the Berman Association.

Map Units (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
BN2	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol	This map unit includes some low lying, (slightly depressional) areas with gleyed imperfectly drained soils. Better forest stands can be expected in such locations.
BN3	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol Gleysolic~~s~~ soils	This map unit is similar to BN2 but has a greater percentage of moist areas and wetter conditions in depressions which cause Gleysolic soil formation. In most cases such conditions enhance forest and minor vegetation growth.
BN4	Gleyed Orthic Gray Luvisol	Orthic Gray Luvisol Gleysolic~~s~~ soils	Gleyed soils are in predominance. This map unit occupies areas where flat depressional topography prevails. These are usually the best forest sites with enough moisture through the growing season, for optimal tree growth.
BN5	Gleysolic~~s~~ soils	Gleyed Orthic Gray Luvisol	Wetter than BN4 and consequently a predominance of poorly drained Gleysolic soils. It occupies smaller depressional areas-where forest growth is often inhibited by excessive moisture.
BN6	Gleysolic~~s~~ soils	Orthic Gray Luvisol Gleyed Orthic Gray Luvisol	This unit is identical to BN5, but has a percentage of well drained soils within it.
BN7	Orthic Gray Luvisol	Dark Gray Luvisol	Dark Gray Luvsiol as a minor member of this unit occurs on burned or cleared areas such as a pasture with herb, low shrub and grass cover.

Cluculz Association

The Cluculz Association is derived from shallow deposits overlying ultrabasic, serpentinized bedrock. The thin soil mantle (up to 5 feet thick) is composed of glacial till or weathered rock material. Water erosion has exposed some bare rocky slopes.

Cluculz soils were mapped on very steep to extremely steep slopes, (over 30%) above 4,000 feet elevation. Gravelly sandy loam and gravelly loam are the dominant soil textures. Angular gravel and stones are abundant. These are well to rapidly drained soils.

Degraded Dystric Brunsiol is the main soil. A think ashy layer is usually present below the forest litter, but its main characteristic is a reddish brown subsurface horizon slightly enriched in iron and aluminum oxides and decomposed organic matter. Orthic Humo-Ferric Podzol has similar profile but more pronounced iron-aluminum and organic matter accumulation.
The present forest cover consists of alpine fir with some Engelmann spruce and lodgepole pine. The abundance of shrubs, herbs, and mosses vary with the tree canopy, slope, aspect, and soil depth.

The Cluculz Association was mapped on Sinkut Mountain and covers only forty-eight acres.

M a p U n i t s

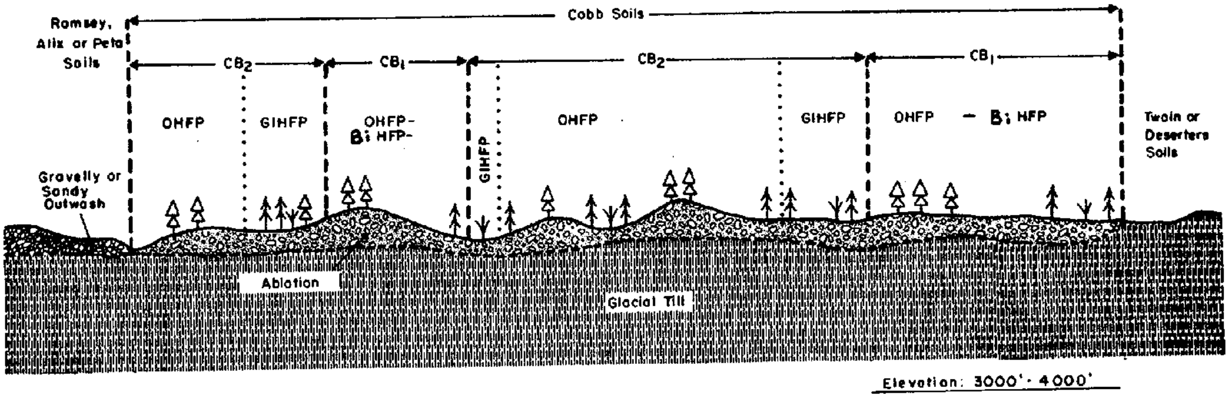
Symbol	Dominant Subgroup	Significant Subgroup	Comments
C2	Degraded Dystric Brunisol	Orthic Humo-Ferric Podzol Lithic subgroups	

?

Cobb Association

The Cobb Association is derived from ablation till deposits of moderately coarse to coarse texture. Fairly loose, but only partly worked by water, these deposits contain some finer particles. Stones, cobbles and boulders are much more plentiful than in the basal till. The ablation till landforms are generally characterized by low, hummocky and kettled relief with many depressions filled with water. Not all ablation areas are clearly kettled and hummocky and some could not be distinguished from basal till. The thickness of the deposits is variable, but it is generally less than 7 to 8 feet on top of basal till.

The ablation till occurs mostly at the edges of the basal till plain between 3,000 and 4,000 feet elevation with some high plateaus above 4,000 feet. Topography varies from gently to strongly rolling (5-30%) and sometimes very steeply sloping (30-60%). The common texture is gravelly or stony sandy loam and gravelly or stony loamy sand. Materials in the soil profile are often stratified with layers of till-like material, sand, coarse sand, gravel and sometimes silt. No lime was found at any depth in ablation materials. Permeability is moderately rapid to rapid. The depth of the soil profile may be up to 4 feet. These soils are generally well drained but drainage is more rapid in coarser textured areas. Differences among Cobb profiles in drainage, compactness, structure, permeability and water holding capacity are very wide due to the differences in thickness of the deposits, origin and textures of materials and sequences of horizons.



Physiographic Setting

The Cobb Association represents a range of podzolic soils from the Orthic to Bisequa and Gleyed Humo-Ferric Podzols. The main characteristic of all of them is a reddish-brown surface horizon up to 15 inches thick where iron and aluminum oxides and organic matter accumulate. The thin, ashy layer at the surface below the forest litter is 1 to 3 inches thick. In some Humo-Ferric Podzol soils this horizon is thin or missing. Stratification and some clay movement account for the formation of the Bisequa Podzol profiles with a finer textured layer in the subsoil often below a depth of 3 feet. The present forest cover consists of lodgepole pine, white spruce, Engelmann spruce, spruce hybrids and alpine fir. Lodgepole pine is predominant at lower elevations and drier areas. At higher elevations predominance of any of the species occurs depending on drainage, exposure, moisture status and fire history. Alpine fir is a component in stands at higher elevations. Shrub cover varies with soil moisture, density of the stand and succession stage but it is generally very dense. The moss layer is usually well developed.

Imperfectly and poorly drained areas with gleyed and gleysolic soils are found in depressions, kettle holes and around lakes. Such areas are invariably shallow over the impermeable basal till. Imperfectly and somewhat poorly drained areas have the best tree stands and the denser shrub growth. Permanent excessive moisture in very poorly drained soils inhibits tree growth and supports some wetland plants.

The Cobb Association is a fairly extensive soil and is found mainly in the eastern half of the surveyed area, sometimes in complexes, associated with a basal till. It covers 102.244 acres or 2.83% of the map sheet.

It is entirely under forest and no other uses are foreseen at present.

Map Units

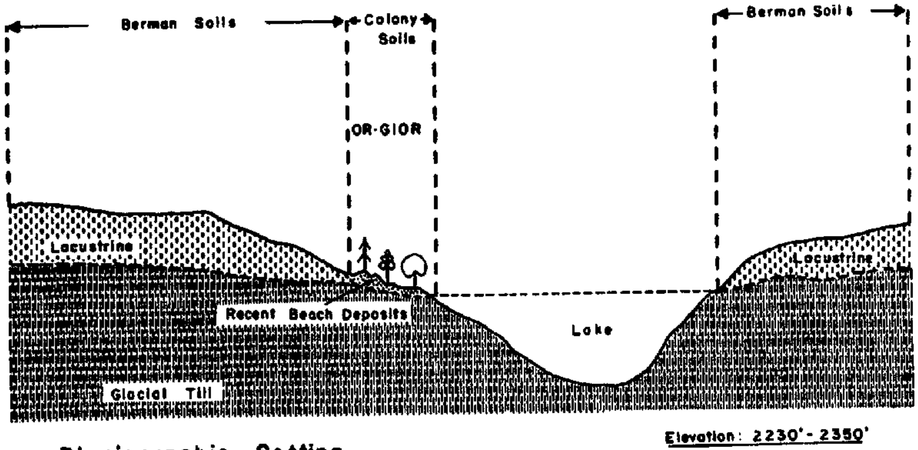
Symbol	Dominant Subgroup	Significant Subgroup	Comments
CB1	Orthic Humo-Ferric Podzol	Bisequa Humo-Ferric Podzol	This map unit occupies the largest acreage within the Cobb Association. Some of the units at the higher elevations have a significant proportion of Alpine fir in the forest stand.
CB2	Orthic Humo-Ferric Podzol	Gleyed Orthic Humo-Ferric Podzol	The map unit is similar to the first with the higher percentage of low lying or seepage areas with imperfectly drained soils to be recognized as a significant inclusion.

Colony Association

The Colony Association is developed from recent beach deposits. The thickness of these relatively new, coarse to very coarse deposits is variable, but mostly shallow. It probably averages no more than 2 feet thick, with some of the better expressed beach lines being 3-5 feet thick. It would be difficult to define the line of contact between beaches and underlying older deposits, mostly deltaic in origin. In fact recent beaches are just older deposits of sand and gravel being reworked, relocated and partly restratified at the surface by the waves. The layers are of different thicknesses, sometimes containing leaf material and thin lenses of different texture, or organic matter.

The Colony Association is mapped just above Stuart Lake between 2,230 and 2,250 feet. The topography is nearly level to undulating. Being of sandy, loamy sand and coarse sandy texture, with some mixture of gravel, Colony soils are rapidly drained. Minor proportions of them, occurring in depressions between beach lines or at the lowest parts along the shores are imperfectly and somewhat poorly drained.

These soils are without any distinguishing features of soil profile development and are classified as Orthic Regosols. Rusty stains of some sandy layers is caused by iron oxidation mottling that persists for a long time. Some mottling and gleying in wetter areas produces Gleyed Orthic Regosol. The forest litter in such locations is often thick.



Physiographic Setting

These sites are presently occupied by stands of white spruce, aspen, and birch. Pioneer shrub undergrowth is abundant where the moisture is within reach of the roots. Wet areas have willows and other wetland plants. Although these soils are coarse the proximity to the lake maintains a high water table allowing lush growth of vegetation.

The Colony Association is not extensive, occurring in three small mapping units on the south shore of Stuart Lake covering 575 acres or 0.02% of map sheet.

A part of the association is under settlement. The other much bigger area, although still forested, is being developed for recreation.

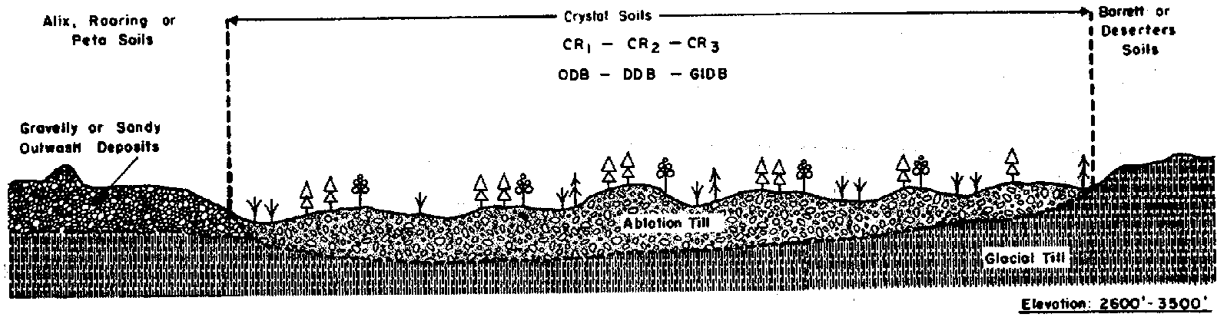
Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
CY 1	Orthic Regosol	Gleyed Orthic Regosol	Varying textures, depths to water table and ages of deposits are reflected in the varying vegetation.

X

Crystal Association

The Crystal Association is developed from ablation till deposits of moderately coarse to coarse texture. Fairly loose, but only partly worked by water, these deposits contain finer particles. Stones, cobbles and boulders are much more plentiful than in the basal till. The ablation till landforms are generally characterized by low, hummocky and kettled relief with many depressions filled with water. Not all ablation areas fit this landform description and some could not be distinguished from basal till. The thickness of the deposits is variable but usually no less than 5 feet. Only few areas were observed with thickness of 3-5 feet above basal till.



Physiographic Setting

Ablation till as the parent material of Crystal association occurs mostly at the edges of the basal till plain between 2,600 and 3,500 feet elevation. The topography ranges between gently to strongly rolling (5-30%) and very steeply sloping (30-60%) in places. The most common texture of the surface and subsoil is gravelly or stony sandy loam and gravelly or stony loamy sand. Stratification in the soil profile occurs with alternate layers of till-like material and sand, coarse sand, gravel and sometimes silt. Lime was not observed at any depth in the ablation material. Permeability is moderately rapid to rapid. The thickness of the soil profile ~~varies~~ ranges up to 4 feet. The drainage of these soils is good to rapid on more gravelly, stony or cobbly areas. Differences among Crystal profiles in drainage, compactness, structure, water holding capacity and permeability are very wide due to the difference in thickness of the deposits, origin and textures of materials and sequences of horizons.

Degraded and Orthic Dystric Brunisols are the major and, in most areas, only soils of the Crystal association. They are characterized by a brownish surface layer up to 1 foot or more thick of slight iron and aluminum oxide accumulation. This layer is very friable and has a granular to subangular blocky structure. In addition the degraded subgroup has a thin (less than 1 inch thick) leached, ashy horizon below the forest litter. Some clay accumulation in the subsoil was noted in certain spots which would qualify such profiles as Brunisolic or Orthic Gray Wooded. Because of their minor occurrence and very weak development, these were not recognized in mapping. The present forest cover consists of lodgepole pine mixed with white spruce in certain areas. Variability in soils is well reflected in variability of the forest by composition, quality and density of the stand, as well as by abundance of shrubs and mosses.

Imperfectly and poorly drained areas with gleyed and gleysolic soils are found in depressions, kettle holes and around many small lakes. Such areas are invariably shallow to the impermeable basal till. Imperfectly and somewhat poorly drained areas have the best tree stand and the thickest shrub growth.

The Crystal association is fairly extensive and was mapped mostly in the middle and western part of the area, sometimes in complexes with soils on basal till. It covers 198,724 acres or 5.51% of the map sheet.

It is entirely under forest and no other uses are contemplated at present.

M a p U n i t s

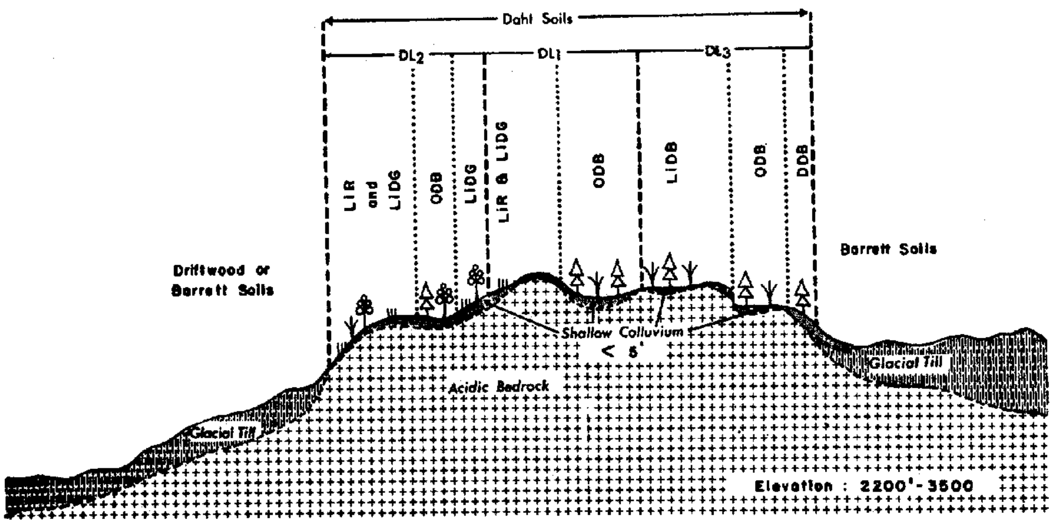
Symbol	Dominant Subgroup	Significant Subgroup	Comments
CR1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	This mapping unit of predominantly Orthic Dystric Brunisol well drained soils is very extensive and covers somewhat drier parts of the Crystal association.
CR2	Degraded Dystric Brunisol	Orthic Dystric Brunisol	This mapping unit has a predominance of Degraded Dystric Brunisol subgroup of soils and usually takes higher elevations within the association range.
CR3	Degraded Dystric Brunisol	Orthic Dystric Brunisol Gleyed subgroups	This map unit has significant inclusions of imperfectly or somewhat poorly drained soils-as a result of flatter topography.

Dahl Association

The Dahl Association is derived from shallow deposits overlying acidic bedrock, as is the Dragon and Decker association. There are three distinct rock formations within the mapped area from which parent material of the Dahl association originated. The most extensive formation is formed by the Topley Intrusions, Lower Jurassic intrusive rocks composed of large bodies of granite, granodiorite diorite and quartzdiorite (14;1). They occupy part of the north and north-eastern section of the map sheet.

Part of the Ootsa Lake group, volcanic rocks of Eocene or Oligocene age, with rhyolite as the predominant component and minor inclusions of dacite, trachyte and andesite (14) is spread through the southern and south-western part of the sheet, in smaller units than the Topley Intrusions. Interbedded sedimentary rocks of the Cache Creek group with a Ribbon Chert subdivision occupy a portion of the area along the north boundary of the map sheet.

During the last glaciation valleys were filled with glacial drift and many of the rugged features of the terrain were smoothed out, particularly at lower elevations. The topography thus created was less rugged and can be described as rolling and hilly. Water erosion in post glacial time removed part of the drift and exposed many rocky ridges and bare rock slopes. Nevertheless the most extensive areas are covered with shallow till, weathered rock material in situ or shallow colluvium creeping down steep rocky slopes. Hard or shattered rock is usually lying within three to five feet depth, but if the thickness of the deposits is less than 20 inches above the rock, the soil is classified as a lithic phase. Lithic phase



Phisiographic Setting

The Dahl association was mapped at elevations between 2,000 and 3,500 feet and thus occupies the lowest elevations of the three associations developed on the same parent material. While on southern slopes these soils sometimes are found above 3,500 feet, on the north and north-east slopes they usually do not go higher than 3,000 feet in elevation. The most common textures are sandy loam and loamy sand with angular gravel and stones in abundance. Dahl soils are rapidly and well drained, with moderately rapid and rapid permeability.

There is a wide range of soil development within the Dahl association. The main reason for this is the complexity of topography and slope aspect. It probably was enhanced by the frequency of forest fires on more exposed and drier locations. The dry southern exposures, sparsely forested and on places void of any trees, lend themselves well to development of Dark Gray Chernozemic and Regosolic soils, while shaded and treed areas within short distances have developed Dystric Brunisols.

The Orthic Dystric Brunisol is the most widespread soil of the Dahl association while the Degraded Dystric Brunisol is the least. Their common and the most characteristic feature is the brownish surface layer of slight iron and aluminum oxide accumulation. The Degraded Dystric Brunisol profiles usually indicative of better moisture conditions have a thin, less than one inch, ashy layer below the forest litter at the surface. The forest litter at the surface is 1 to 2 inches thick.

Presently lodgepole pine is the main occupant of this soil. Locally, aspen are mixed with the pine. On the northern exposures a minor amount of white spruce occurs. On the very shallow lithic soils tree cover is sparse and interspersed with bare rocks and boulders while on deeper portions the tree canopy is denser and shrubs are more abundant. Moss cover is also variable, very spotty and thinner on the drier south slopes and more uniform on the north slopes.

The Lithic Regosol and Lithic Rego or Orthic Dark Gray are differentiated on the basis of presence and thickness of the dark surface mineral horizon and profile development. Under virgin conditions the surface layer has to be thicker than 3½ inches in the Dark Gray but is non-existent or less than two inches thick in Regosols. This chernozemic horizon in the Dark Gray is sometimes a foot or more thick - loose or friable and with well expressed granular structure. The dark color of the surface is maintained by accumulation and decomposition of organic matter from the growth of herbs, shrubs and grasses. The other differences are lack of development in regosolic profiles while some leaching and a weak change of color by oxidation in the subsoil of the Dark Gray occur.

Vegetative cover consists of scattered, mostly stunted aspen, many species of shrubs and herbs and some grasses. Some less exposed sparsely treed sites have lodgepole pine while Douglas-fir is found in certain locations along the north shore of Francois Lake.

Dahl soils are fairly extensive and scattered through the area mostly adjacent to the till plain. They cover 78976 acres or 2.19% of the map sheet. These soils are covered by non-commercial forest stands. Some sparsely treed areas adjacent to population centers and with a good access are used as pastures.

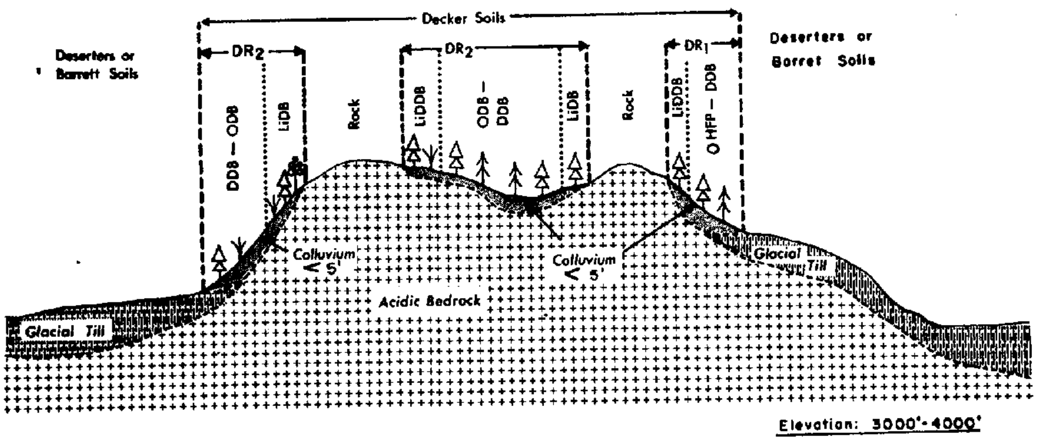
Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
DL1	Orthic Dystric Brunisol	Lithic Regosol Lithic Dark Gray	This map unit is the most representative and widespread. Because of the complex topography a significant proportion of dry, sparsely treed or bare slopes with regosolic and chernozemic soils are also included.
DL2	Lithic Regosol Lithic Dark Gray	Orthic Dystric Brunisol	This unit occupies the most exposed and many times very steep and bare southern slopes with shallow, lithic soils. Trees and shrubs are scarce, minor vegetation cover depends on depth of the soil, steepness and erosion.
DL3	Orthic Dystric Brunisol	Degraded Dystric Brunisol Lithic Subgroups	This map unit occupies higher elevations within the association range and is transitional to Decker soils.

Decker Association

The Decker Association was mapped on shallow deposits overlying acidic bedrock as are the Dragon and Dahl associations. There are three distinct rock formations within the mapped area from which parent material of the Decker association originated. The most extensive formation is formed by the Topley Intrusions, Lower Jurassic intrusive rocks composed of large bodies of granite, granodiorite, diorite and quartz-diorite (14;1). They occupy part of the north and north-eastern section of the map sheet. Part of the Ootsa Lake group, volcanic rocks of Eocene or Oligocene age, with a rhyolite as a predominant component and minor inclusions of dacite, trachyte and andesite (14) is spread through the southern and southwestern part of the sheet, in smaller units than the Topley Intrusions. Interbedded sedimentary rocks of the Cache Creek group with a Ribbon Chert subdivision occupies a portion of the area along the north boundary of the map sheet.

During the last glaciation, valleys were filled with a glacial drift and many irregularities of terrain were smoothed out especially at lower elevations. The topography thus created was less rugged and could be described as rolling and hilly. Water erosion in post glacial time removed part of the drift and revealed many ridges and bare rock slopes, but most extensive are covered with shallow till, weathered rock material in situ or shallow colluvium creeping down steep rocky slopes. Hard or shattered rock is usually lying within three to five feet depth, but if the thickness of deposits is less than 20 inches above the rock, the soil is classified as a lithic phase.



Physiographic Setting

The Decker association was mapped at elevations between 3,000 and 4,000 feet. On the north and northeast slopes the soils may develop at 3,000 feet but on south slopes they are developed at approximately 3,500 feet elevation. They are therefore situated in the middle position of the three soil associations developed on the same material. The most common textures are sandy loam and loamy sand with angular gravel and stones in abundance. Decker soils are rapidly, and well drained, with moderately rapid to rapid permeability.

Considering the climate of the area, typical soils within this range of elevation are Dystric Brunisols, of which Degraded and Orthic Dystric Brunisols are the most common and in many areas are the only soils of the Decker association. They are characterized by a brownish surface layer up to 1 foot thick where the slight accumulation of iron and aluminum oxides occur. Degraded Dystric Brunisol profiles have a thin (less than 1 inch) ashy layer below the forest litter which is usually indicative of somewhat moister conditions at the surface. The forest litter at the surface is 1 to 2 inches thick. A mixed forest of lodgepole pine and white spruce is often found in the described positions and elevation of the Decker association. Tree cover is sparse and interspersed with bare rocks and boulders on the very shallow, lithic soils, while on deeper materials the tree canopy is more extensive and shrubs more abundant. Moss cover is variable.

The Orthic Humo-Ferric Podzol is morphologically similar to the Degraded Dystric Brunisol. Its reddish-brown surface horizon contains more iron and aluminum and the upper part of it is usually enriched in organic matter. It occurs at higher elevations within the association range and on sites and slopes with more available moisture for more intensive leaching. Forest cover consists of white spruce-Engelmann spruce hybrids, Engelmann spruce, lodgepole pine and alpine fir. Shrubs and mosses indicate a moister and more productive site.

Decker soils are fairly extensive and cover the middle positions between the Dragon at higher and the Dahl soils at lower elevations. They are found in all parts of the area and cover 47178 acres or 1.31% of the map sheet.

These soils are exclusively covered by non-commercial forest and mostly occur in inaccessible parts of the map sheet.

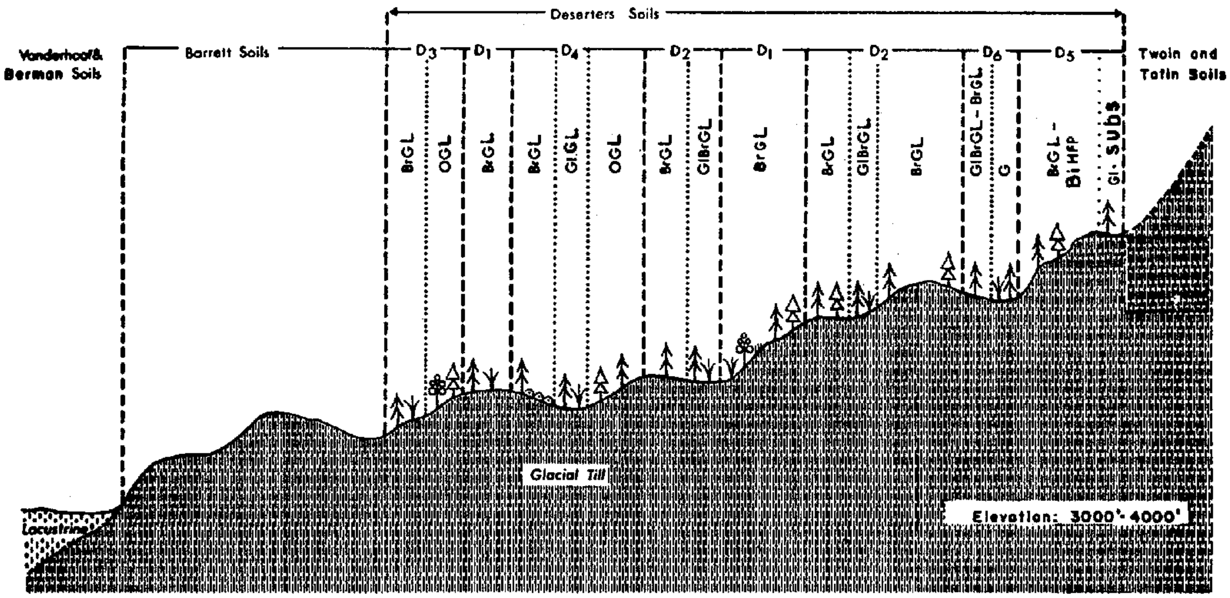
Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
DR1	Degraded Dystric Brunisol	Orthic Humo-Ferric Podzol Lithic Subgroups	This mapping unit is found at the higher elevations and on north, northeast exposures within the association range. The Orthic Podzol as a significant member indicates areas bordering or closely related to the Dragon soils. Lithic subgroups including a Lithic Regosol are also recognized.
DR2	Degraded Dystric Brunisol	Orthic Dystric Brunisol Lithic Subgroups	This unit occupies lower elevations on shaded mountain slopes or higher southern exposures. Some Lithic Regosols are included but not considered significant.

Deserters Association

The Deserters association is developed from glacial till deposits as much as 400 feet thick (1), predominantly of medium to moderately fine texture. The gray colored till is a very hard and compact mixture of soil, pebbles and gravel. Stony and cobbly areas also occur. It covers a rolling and drumlinized till plain in the middle position between the Barrett association on the lower till plain and the Twain association at higher elevations.

The Deserters soils have a wide range in topography from single elongated moderate slopes (5–9%) and complex gently to strongly rolling terrain (6–30%) to complex and very steep (6–60%) slopes. Elevations range between 3,000 and 4,000 feet. The texture regularly becomes finer with depth, from sandy loam or light loam at the surface to loam or clay loam in subsoil and parent material. Gravel and moderate amounts of stones and cobbles are found throughout the solum. Organic litter on the surface varies in thickness from one to four inches, while the peaty layer on poorly drained soils in depressions may be a foot thick or more. Lime is leached out of the profile, into the parent material, usually to 5 or 6 feet in depth. Permeability is slow to moderately slow, depending on variability of texture and consistence in the subsoil. Depth to the unchanged parent material averages four feet. Root penetration is frequently impeded by a hard, compact subsoil.



Physiographic Setting

Like the Barrett association these soils also belong to the broad group of Gray Luvisol soils. Their main characteristic is a leached (eluvial) horizon in the upper part of the profile and a horizon (illuvial) of clay accumulation in the subsoil.

The soils of the Deserters association belong mainly to the Brunisolic Gray Luvisol subgroup and are moderately well to well drained with granular or subangular blocky structure and coarser textured surface. Higher rainfall and more intensive leaching is required to develop these soils and consequently they are found at higher elevations than the Barrett soils. They have a reddish-brown surface horizon from iron and aluminum (oxide) accumulation, underlain by a leached, whitish horizon. This is transitional to the clay enriched, angular-blocky layer in the regularly below 20" depth subsoil. A thin ashy layer (1-2 inches) below forest litter is often present.

The present forest cover is composed of lodgepole pine and spruce species. The proportion of spruce is greater than in the tree composition on the Barrett association. In some stands alpine fir regeneration occurs. The abundance of shrubs and herbs varies with the density of the stand, but is generally greater than on the Orthic Gray Luvisol soils. The moss layer is thicker and its composition tends towards species requiring a moister site.

The Orthic Gray Luvisol subgroup was mapped as a minor member of some mapping units at lower elevations on south slopes. The surface horizon, sometimes slightly brown in the upper half is underlain by a clay accumulation horizon of angular blocky structure. The tree species are the same as on the Brunisolic Gray Luvisol soils with white spruce replacing Engelmann spruce. The composition and density of shrub and herb layers differ slightly, indicating a somewhat drier environment. The moss layer is thinner and species of drier sites prevail. Good

Bisequa Humo-Ferric Podzols are also included as a minor subgroup of the Deserters association and are found on the higher elevations within the association range. Morphologically they are not much different from the Brunisolic Gray Luvisols except for a thicker or redder layer and usually thicker organic mat at the soil surface. Engelmann spruce and alpine fir are the main tree species. The shrub layer is abundant and invaded by the species typical of higher elevations. Moss layer is thick and composed of species preferring medium moist sites. Good

In depressional areas and lower parts of gentle slopes, where moisture accumulates, gleyed and gleysolic soils are formed. Mottled, gleyed and duller colored profiles of these imperfectly to poorly drained soils show the prevailing influence of moisture in such locations. Tree growth is faster and the understory more abundant on imperfectly and somewhat poorly drained sites, while very poorly drained areas are usually devoid of tree growth. The Deserters association is very extensive in the area. It covers 479721 acres or 13.30% of the map sheet.

This soil is largely under forest and no other uses are considered feasible at present.

Map Units

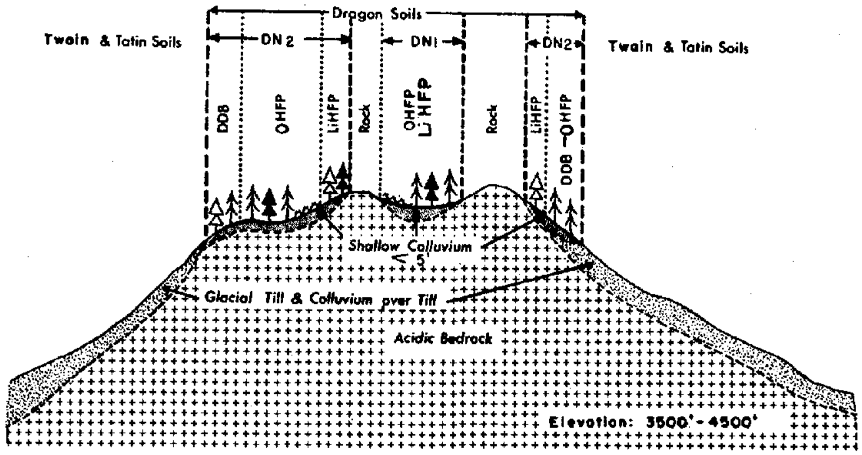
Symbol	Dominant Subgroup	Significant Subgroup	Comments
D1	Brunisolic Gray Luvisol		The most extensive of Deserters soils; moderately well drained. Sandy loam to loam surface capping regularly occurs.

M a p   U n i t s   (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
D2	Brunisolic Gray Luvisol	Gleyed Brunisolic Gray Luvisol	Inclusions of low lying and seepage areas with imperfectly drained Orthic and/or Brunisolic Gray Luvisol soils are considered significant. These sites have also better forest stands.
D3	Brunisolic Gray Luvisol	Orthic Gray Luvisol	Orthic Gray Luvisol as a significant member of the unit usually occupies lower elevations, drier southern exposures or portions with finer textured and compact surface. Lodgepole pine forest is in prevalence on these sites.
D4	Brunisolic Gray Luvisol	Orthic Gray Luvisol Gleyed Subgroups ?	This map unit is a combination of D2 and D3.
D5	Brunisolic Gray Luvisol	Bisequa Humo-Ferric Podzol Gleyed Subgroups ?	Bisequa Humo-Ferric Podzol as a minor member covers more moist, higher or shaded parts of the mapping unit. It is distinguished by a thick reddish-brown layer on the surface and in most cases by the leached, ashy layer below forest litter, one to three inches thick. Gleyed subgroups of imperfectly to somewhat poorly drained Gray and Podzolic soils occur in depressions and seepage positions.
D6	Gleyed Brunisolic Gray Luvisol	Brunisolic Gray Luvisol Gleysolics soils	Mostly flat-depressional areas with predominance of gleyed imperfectly drained soils, and significant inclusions of poorly drained ones. Moderately well drained Brunisolic Gray Luvisol occurs on humps or slopes with a good external drainage.

Dragon Association

The Dragon Association is mapped on shallow deposits overlying the acidic bedrock on three distinct rock formations within the area. The most extensive formation is formed by the Topley Intrusions-Lower Jurassic intrusive rocks composed of large bodies of granite, granodiorite, diorite and quartz diorite (14;1). They occupy part of the north and north-eastern section of the map sheet.



Physiographic Setting

Part of the Ootsa Lake Group or similar volcanic rocks of Eocene or Oligocene age, with rhyolite as a predominant component and minor inclusions of dacite, trachyte and andesite (14) is spread through the southern and south-western part of the sheet, in smaller units than the Topley Intrusions. Interbeded sedimentary rocks of Cache Creek group with a Ribbon Chert sub-division occupies a position of the area along the north boundary of the map sheet.

All areas of these rock formations were covered by glacial drift during the last glaciation. Some of it was subsequently eroded, and many peaks and side slopes are exposed as bare rock, but the most extensive areas are covered by a shallow drift, weathered rock material in situ or shallow colluvium creeping down steep rocky slopes. These shallow deposits form the parent materials of the Dragon, Decker and Dahl associations, depending on the profile development. Hard or disintegrating rock is usually encountered within three to five feet depth; if shallower than 20 inches, the soil is classified as lithic.

The topography of these rock formations varies considerably from rolling and steeply sloping (10-30%) at lower elevations to very steep and extremely steep, mountainous over (30%) in many areas at the elevation of 4,000 feet or higher. The Dragon association was mapped at elevations between 3,500 and 4,500 feet, where a cold climate and higher precipitation prevail. The soils develop at lower altitudes on the north and northeast slopes and at much higher elevations on southerly exposures. Sandy loam and loamy sand with angular gravel and stones are the main textures of the Dragon soils. As a result of leaching and clay movement a loam texture in the subsoil occurs in places. Dragon soils are well to rapidly drained, with moderately rapid to rapid permeability.

Above certain elevations Orthic Humo-Ferric Podzol soils occur. The main characteristic feature of the Orthic Humo-Ferric Podzol profile is 1 to 4 inch ashy layer at the surface. This leached horizon is underlain by a reddish-brown subsurface layer 12-15 inches thick, where iron and aluminum oxides and decomposed organic matter accumulate. This iron-rich layer is very friable and has a well developed granular structure. The forest litter at the surface is up to 4 inches thick. The present forest cover consists of Engelmann spruce, lodgepole pine and Alpine fir with predominance of either at different locations. Alpine fir is more abundant at higher elevations mainly as a result of fire history. Tree and shrub cover is low and interspersed with bare rock pavement and boulders on shallow, lithic soils, while in deeper positions tree canopy might be quite dense and shrubs abundant. The moss layer is variable also, usually being thicker and more uniform on the northern exposures. At foothill positions where seepage water moving downward along rock faces is collected, forest growth is more virorous regardless of soil depth. Besides moisture, this may be due also to some other factors such as fertility.

The Degraded Dystric Brunisol was mapped as a minor member of some mapping units. It is morphologically very similar to the Orthic Humo-Ferric Podzol. The reddish-brown surface horizon is sometimes thinner than in Podzols, but the most important difference is its lesser content of iron and aluminum. Present forest cover is similar to the above with lodgepole pine being usually predominant to the Engelmann spruce; Alpine fir is of the minor occurrence.

The Dragon association was mapped mostly in the north and northeast section of the area covering 81672 acres or 2.26% of the map sheet.

Dragon soils are predominantly under non-commercial forest stand and in inaccessible parts of the surveyed area.

M a p U n i t s

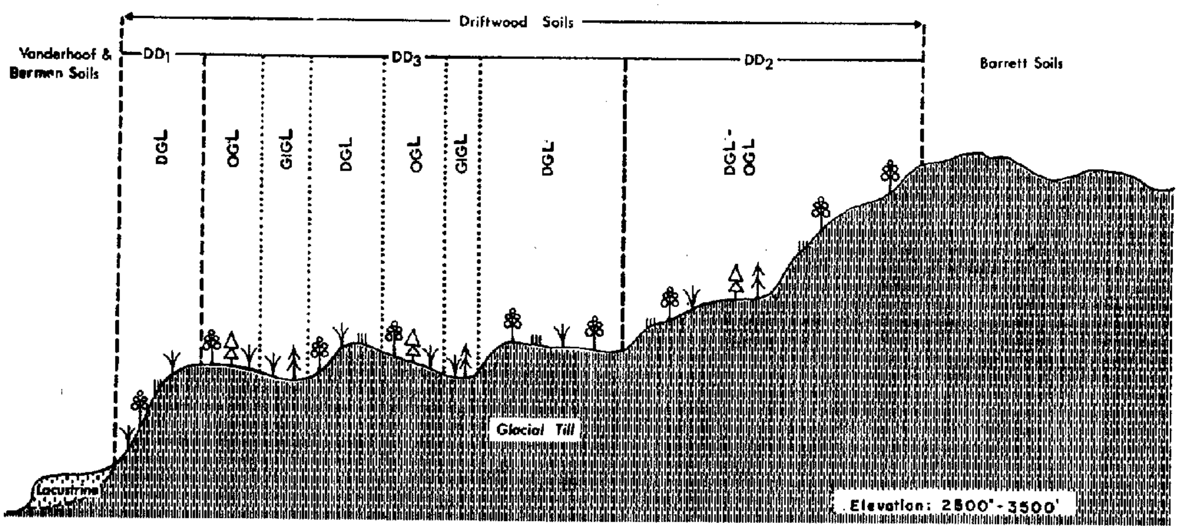
Symbol	Dominant Subgroup	Significant Subgroup	Comments
DN1	Orthic Humo-Ferric Podzol	Lithic Orthic Humo-Ferric Podzol	This is the more extensive member of the Dragon association, some very shallow lithic regosol soils may occur, but it consists mostly of podzolic and lithic podzol soils. It is usually mapped in complexes with soils on basal till and/or colluvial soils.

M a p U n i t s (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
DN2	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol Lithic Subgroups	This map unit includes some drier parts with Degraded Dystric Brunisol soils and lithic subgroups. Regosolic soils are of minor occurrence.

Driftwood Association

The Driftwood association consists of a group of soils developed on glacial till deposits. The mantle of basal till is up to 400 feet thick (1). Except for an occasional moderately coarse textured area, the till is of medium to moderately fine texture and of very hard consistence. Gravel, pebbles, cobbles, stones and sometimes boulders are components of the till.



Physiographic Setting

The undulating and rolling till (5-15% slope) is the parent material of Driftwood soils and represents a very small part of a till plain which is occupied by the Barrett association. Elevation ranges between 2,500 and 3,500 feet. Loam and clay loam are common textures of these soils with modifications of sandy loam texture at the surface in certain locations. Lime is leached deep into the parent material. Permeability is slow due to the texture and compactness of the soil. Root penetration is impeded for the same reason.

The Driftwood soils belong to the Dark Gray Luvisol subgroup. They are well to moderately well drained and distinguished by a dark surface horizon more than 2 inches thick under natural vegetation and 6 inches or more thick when cultivated. This dark horizon is underlain by a pale leached layer 10 to 15 inches thick. A clay accumulation layer beneath it is of similar thickness and has well developed angular blocky structure. The dark colored surface horizon of Dark Gray Luvisol soils is a result of the incorporation of decomposed organic matter, mostly from fibrous roots, into the surface mineral horizon. This could have happened either by introducing agriculture practices or by natural causes such as the burning of an area and the successive invasion by grasses, herbs, shrubs and deciduous trees. Both of these factors played a role in forming and maintaining Driftwood soils, but more than three-quarters of the soils are under cultivation or pasture.
The natural vegetation is changed by the influence of man and domestic animals. Uncultivated areas have sparse or young aspen forest and abundant shrub and herb cover. Steep, and sometimes very steep and droughty southern exposures have aspen forest and herbs and on some places stunted aspen growth-with grasses dominating the ground cover.

The Orthic Gray Luvisol soil is a component of some mapping units. It has a similar profile as Dark Gray Luvisol, except for the dark top which is missing, because it was developed under coniferous forest. The shrub and herb layers are not as well developed as under aspen, but the moss layer is continuous, composed mostly of mosses growing on drier, shaded sites.

In depressional areas and lower parts of gentle slopes, where water accumulates, gleyed and gleysolic soils occur. Mottled, gleyed and duller colored profiles of these imperfectly to poorly drained soils show the prevailing influence of moisture in such locations. Changes in composition and abundance of vegetation, particularly in the understory, compared to the well and moderately well drained sites, is very noticeable.

The Driftwood association is not extensive and is located mostly around Grassy Plains, Francois Lake and Palling settlements. It covers only 34359 acres or 0.95% of the map sheet.

It is predominantly used for agriculture as pasture, for hay production or grain growing for green feed and silage.

Map Units

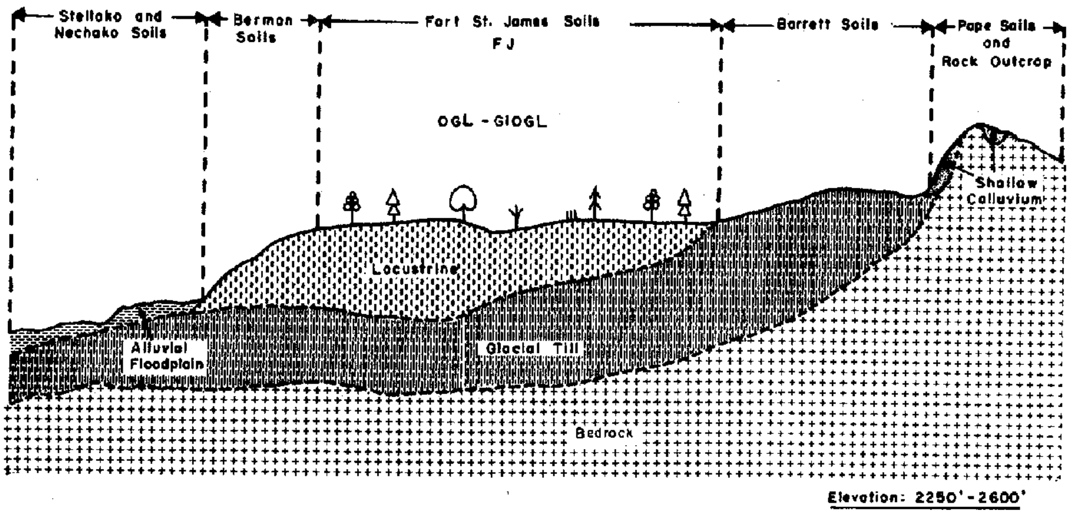
Symbol	Dominant Subgroup	Significant Subgroup	Comments
DD1	Dark Gray Luvisol		There is a very small cultivated area of this unit of moderately well drained Dark Gray Luvisol soil.

M a p U n i t s (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
DD2	Dark Gray Luvisol	Orthic Gray Luvisol	This is a mapping unit of predominantly cultivated or pastured areas, with significant inclusions of forest land with Orthic Gray Luvisol soils.
DD3	Dark Gray Luvisol	Orthic Gray Luvisol Gleyed Subgroups	Significant inclusions of low lying and/or seepage areas with gleyed, imperfectly drained Orthic and Dark Gray Luvisol soils.

Fort St. James Association

The Fort St. James association was derived from glaciolacustrine clay sediments. They were deposited in the Fort St. James laking basin during the recession stage of the last glaciation. The thickness of the deposits varies from a few feet at the edges of the basin to more than a hundred feet in the deepest portions. The clays are varved, with laminations up to 8 inches thick. Judging by a few deep cuts the clays are underlain by silts at 10-12 feet from the surface.



Physiographic Setting

The topography is mostly level to undulating with some minor areas of shallow lacustrine overlying till having gently to moderately rollind topography. The elevation ranges between 2,250 and 2,600 feet. The texture of the soil and parent material is heavy clay. The Fort St. James soils are moderately well to imperfectly drained with an extremely low percolation rate and a very high water holding capacity. The depth to unchanged parent material averages 3 feet. Lime is generally leached out of the soil profile and the upper part of the parent material. Occasional roots penetrate into the subsoil along cracks.

The Gray Luvisol is the major soil subgroup in the Fort St. James association. The general characteristic of Gray Luvisolic is a light colored leached horizon at the surface and a clay and fine clay accumulation layer in the subsoil. The Orthic Gray Luvisol is by far the most widespread soil of the Fort St. James association. The whitish, leached layer below the thin leaf mat is 5 to 6 inches thick. The upper half has a moderately well developed platy structure and the lower half breaks into angular blocks transitional to the subsoil. The subsoil layer which has more fine clay than the horizons above or below, occurs between 6 and 24 inches. It can be subdivided into an upper part with well developed prismatic or columnar structure and a lower part where laminations are often discernible. In a dry condition it breaks along cleavage faces into large lumps or columns which are extremely hard and sometimes impossible to break into smaller pieces. Aspen, white spruce and lodgepole pine are the main tree species presently occupying these soils. Aspen is usually dominant. The shrub and herb layers are generally well developed.

Gleyed Orthic Gray Luvisol soils are imperfectly drained with a somewhat duller colored profile than Orthic Gray Luvisol. The surface organic litter is thicker, but the most obvious feature is mottling in the subsoil and some gleying in the lower subsoil and upper part of the parent material caused by a longer water saturation. Abundant and more vigorous growth as well as slight difference in composition of vegetation distinguish these imperfectly drained from the previously described moderately well drained soils. Shrubs and herbs, usually associated with a moister environment, occupy a more prominent place in the understory.

The Fort St. James association was mapped only at the extreme northeast corner of the map area. It covers 58666 acres or 1.63% of the map sheet.

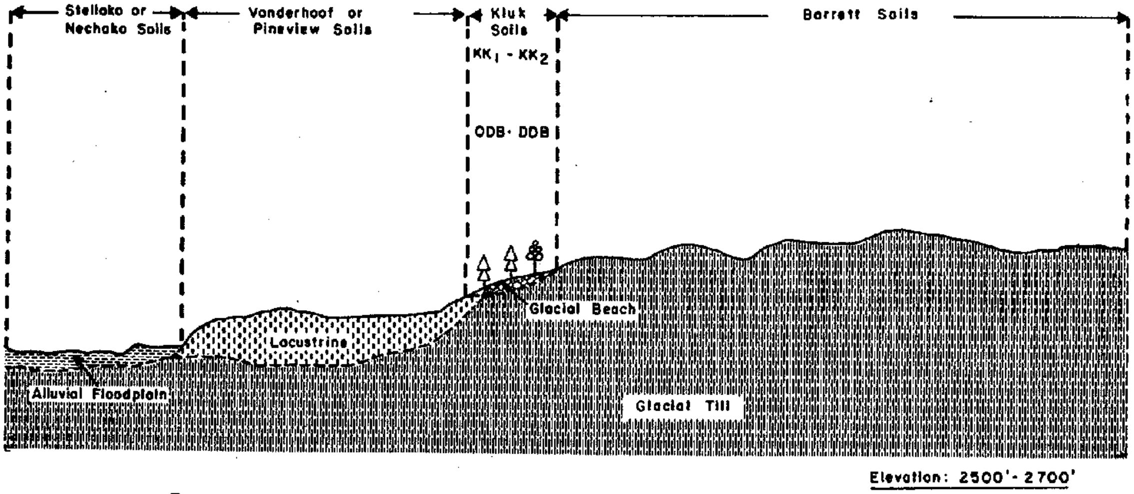
These soils are under forest and due to their very fine texture, coarse structure and extremely hard consistence in dry conditions are not suitable for arable agriculture.

Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
FJ1	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol	

Kluk Association

The Kluk association was mapped on glaciolacustrine beach deposits. These deposits were formed along some lakeshores of Vanderhoof and Fort St. James laking basins, that were exposed to prevailing winds. Beach ridges marking shore line positions of different water levels are well expressed in certain locations. Wave action washed out fine silt and clay particles from the underlying till, leaving sand, gravel and some stones. Layers of different texture and thickness often alternate. The thickness of these deposits rarely exceeds 5 to 6 feet and is mostly between 3 and 4 feet. The beach deposits are underlain by glacial till and in places by lacustrine clays.



Physiographic Setting

The topography is moderately to strongly sloping (6–15%), and the elevation ranges between 2,500 and 2,700 feet. Gravelly loamy sand and gravelly sand capping overlies stratified gravels and sands. These soils are very rapidly drained and very rapidly permeable and consequently are liable to severe droughtiness. Better moisture status of the soil occurs in areas where slowly permeable till is not far from the surface, and a perched water table occurs.

Orthic and Degraded Dystric Brunisols are the two subgroups of soils in the Kluk association. They are characterized by a brownish surface layer about 6 inches thick where slight accumulation of iron and aluminum oxides and organic matter occurs. In addition the Degraded Dystric Brunisol has a very thin, leached, ashy layer below the forest litter. The soil profile is very shallow and the transition to parent material abrupt with a sharp change in color and a slight change in consistence and texture.

Presently the forest cover consists of lodgepole pine mixed with white spruce and in certain locations with aspen. The shrub and herb cover is sparse due to the lack of moisture. A thin layer of dry mosses and/or lichens covers the soil surface in most areas. Under mature forest stands a thicker organic matt is developed and the shrub and moss cover is more abundant.

The Kluk association represents a relatively small area and is confined to the margin of lacustrine basin around Vanderhoof and Fort St. James. It covers 8705 acres or 0.24% of the map sheet.

These soils are entirely under forest and no other uses are foreseen at present.

Map Units

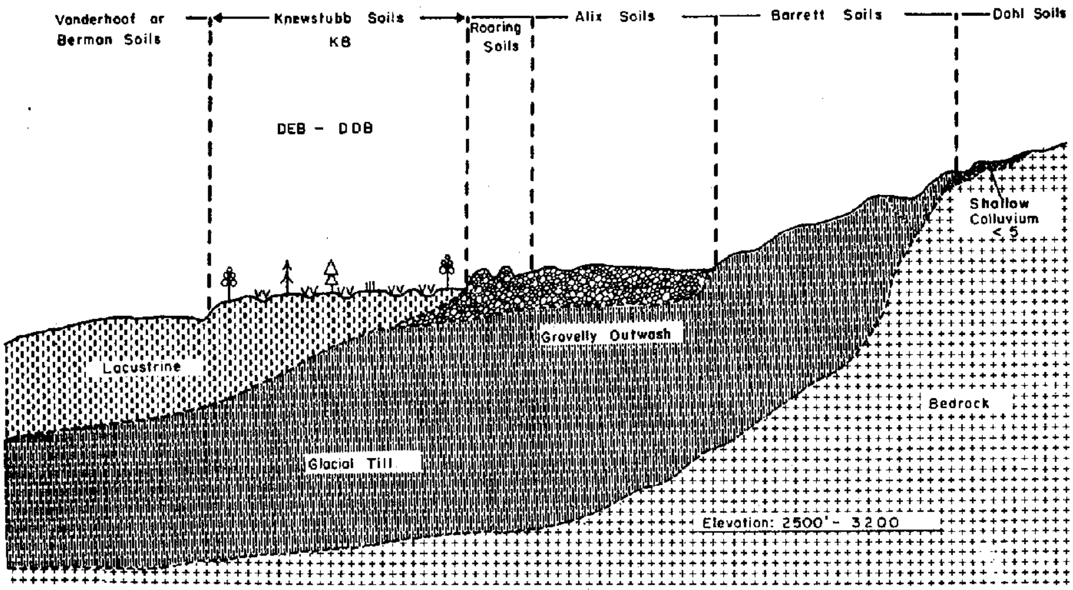
Symbol	Dominant Subgroup	Significant Subgroup	Comments
KK1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	This unit has predominantly the Orthic subgroup - due to a less moist micro-environment under open stands.
KK2	Degraded Dystric Brunisol	Orthic Dystric Brunisol	The Degraded subgroup predominates indicating better moisture conditions.

Knewstubb Association

The Knewstubb association was mapped on medium textured glaciolacustrine deposits. From the coarser texture compared to the other lacustrine deposits and from its position at only certain locations at the edges of a lacustrine basin, it is concluded that these deposits were laid down close to the mouth of glacial streams feeding the lakes. Such deposits are found covering lower ends of esker complexes at the boundaries with a lacustrine basin or separating outwash plains in wide channels from somewhat lower lying lacustrine sediments. In certain areas these deposits were found at elevations much higher than the main laking basin, indicating temporary glacial lakes at such locations. Most of the Knewstubb deposits are shallow, usually pitted or ridged and channelled, underlain by gravelly or sandy outwash and unsorted esker material.

The topography is variable ranging (due to severe erodibility) from moderately rolling (9-15%) to very strongly (15-30%) sloping. The elevation ranges between 2,500 and approximately 3,200 feet. Fine sandy loam and silt loam are predominant textures with some sandy loam modifications. Interlayering of different textures in the profile is common. These are well drained soils with moderate to moderately rapid permeability. Runoff is also rapid in many areas.

The Knewstubb association contains two groups of soils: Degraded Dystric Brunisols and Degraded Eutric Brunisols. The Degraded Dystric Brunisols are distinguished by a thin leached layer below the forest litter, less than an inch thick and a brownish layer 6 to 10 inches thick beneath it. Slight iron and aluminum accumulation gives it a brownish-reddish cast which fades with depth. The surface soil is very friable and has a granular to subangular blocky structure. The subsoil has the same fine sandy loam or silty loam texture as the surface, but with increasing depth, usually below three feet, the texture becomes coarser. The soil is acid through the whole profile.



Physiographic Setting

The Degraded Eutric Brunisol has a weak brownish surface layer 5 to 10 inches thick, sometimes overlain by a thin, weakly leached horizon below the forest litter. This brownish color is a result of slight accumulation of iron and aluminum oxides. The surface soil is very friable and of granular to subangular blocky structure. The second, somewhat leached horizon up to a foot or more thick occurs in the subsoil. This is a transitional horizon with some clay peds and small pockets of clay flows, which leads to the last layer of the profile where clay accumulation in thin layers and pockets are more evident.

Lodgepole pine and aspen with some mixture of white spruce make up the present forest cover of these soils. Semi-open stands of aspen and lodgepole pine are found on southern exposures on many ridges and humps while northern shaded sides and locations around depressions have a denser forest of lodgepole pine and white spruce. Better growth of understory is also confined to such locations because of less droughty conditions during the growing season. Moss layer of any significance is also confined to the same locations.

Knewstubb soils are not too extensive and were mapped on both sides of Big Bend Creek, along the lower part of the Sutherland River valley and at Babine Lake, along part of Fort St. James esker, along the Nithi River and Newstubb Lake. They comprise less than ten mapping units, mostly in complexes with other lacustrine or glacio-flucial soils covering 37120 acres or 1.03% of the map sheet.

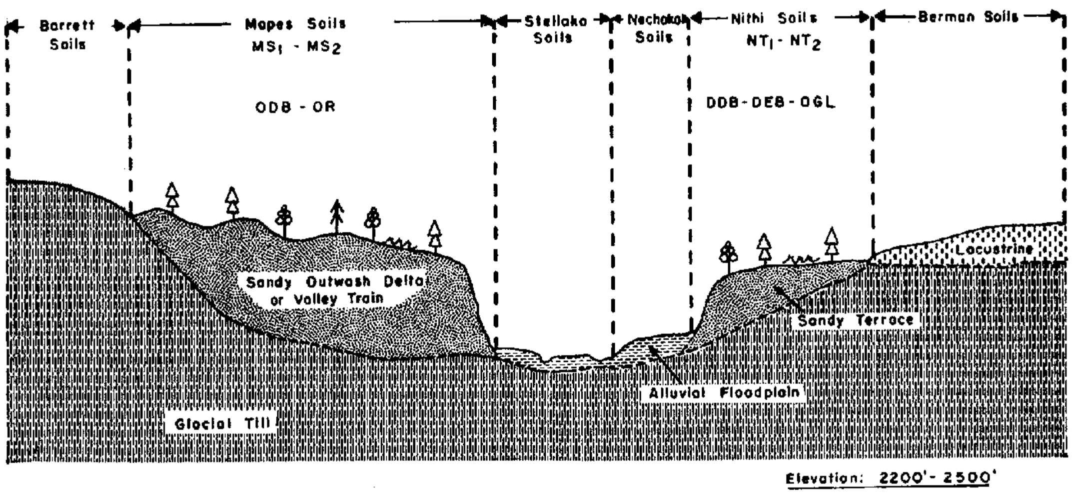
The Knewstubb association is under forest mostly of non-commercial value. Due to the rough topography, these soils are not suitable for agriculture.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
KB1	Degraded Dystric Brunisol	Degraded Eutric Brunisol	

Mapes Association

The Mapes association was mapped on sandy post-glacial river terraces, sandy outwash plains along the wider river valleys and sandy deltaic deposits. It has the same parent material as the Nithi association, coarse and very coarse sands, but lacks a finer capping as Nithi soils have. Occasional gravelly patches occur but are not widespread. The wind left its mark on the landscape in the form of many (small and medium size) dunes.



Physiographic Setting

Although some channels and kettles occur, they are not typical of the undulating to gentle rolling topography (2-9% slopes). The elevation ranges between 2,200 and 2,500 feet with the largest percentage falling between 2,200 and 2,300 feet. The common textures are sand and loamy sand with medium or coarse sand and a minor percentage of fine sand. These are very droughty, rapidly permeable and rapidly drained soils.

There are two soil groups included in the Mapes association: the Orthic Regosol and the Orthic Dystric Brunisol. The Orthic Regosol has no profile development or it is so weakly expressed that no appreciable difference exists between the surface soil, subsoil or parent material. Some differences in color and texture were observed on places, due to differences in parent material. No development of structure and little change in consistence has taken place in the upper 4 to 5 feet.

The Orthic Dystric Brunisol has a brownish surface layer from weak oxidation and accumulation of iron and aluminum. It is 6 to 10 inches thick and usually could be subdivided into an upper 4 to 5 inches of the distinct reddish-brown color and a lower half that fades out toward dull variegated tones of the underlying sands. This brownish horizon is loose and has weak subangular blocky structure. The subsoil is composed of medium and coarse sands.

The present forest cover consists of semi-open stands of non-commercial lodgepole pine. Some white spruce, aspen and birch are scattered on the shaded sides of humps and ridges or in small depressions and channels. The growth of shrubs and herbs under the forest is very poor except in some depressions and shaded sites where limited moisture is available for a longer period. Moss layer is thin and irregular and often has a significant proportion of lichens. Unforested or sparsely forested areas have some poorly growing herbs and grasses. Most of the Mapes soils are forested, but some of the areas adjacent to lacustrine soils were cleared in unsuccessful farming attempts. Such areas have mostly reverted back to wild pasture and brush.

The Mapes association is of medium extent and mostly mapped on upper terraces along the Nechako river from Vanderhoof, to Knewstubb Lake and also on outwash plains and terraces along the Endako to Burns Lake. It covers 27464 acres or 0.76% of the map sheet.

Map Units

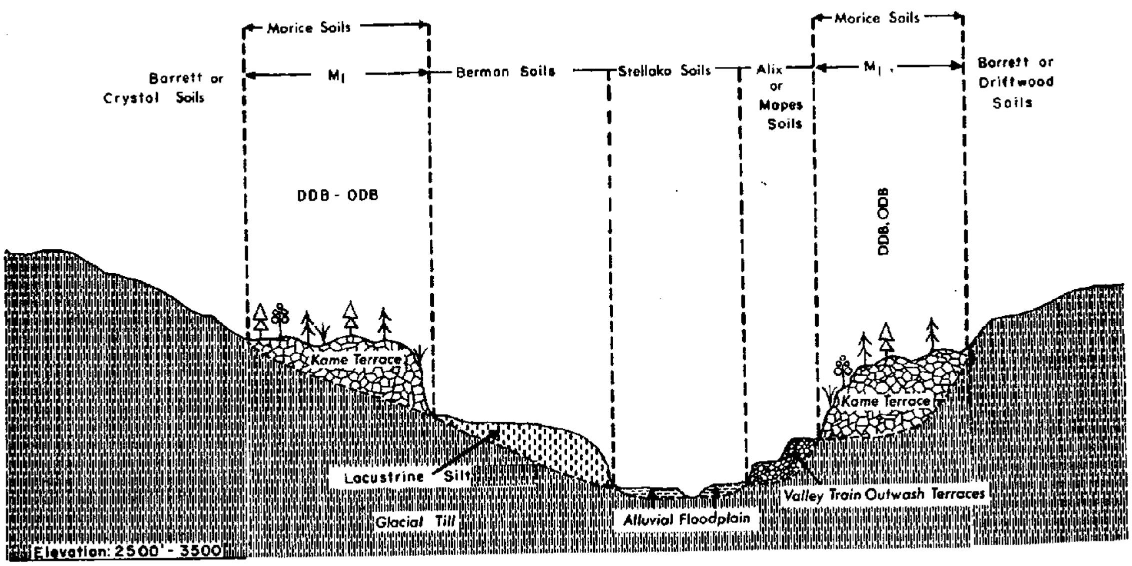
Symbol	Dominant Subgroup	Significant Subgroup	Comments
MS1	Orthic Dystric Brunisol	Orthic Regosol	There are less mapping units where the Orthic Dystric Brunisol predominates, because of the weak development of the soil profile in most areas.

Map Units (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
MS2	Orthic Regosol	Orthic Dystric Brunisol	All of the Mapes soils within the northern part of the map sheet were assigned to this mapping unit.

Morice Association

The Morice association was mapped on sandy and gravelly kames and kame terraces. These deposits are not sorted or are very poorly sorted because of ice-contact deposition and incomplete sorting by short-lived streams. Most kames were formed by slumping and shifting of glacial material along the valley walls and subsequently eroded by fluvial action. Kames are made up of shallow mistures of sand and gravel overlying glacial till and in places bedrock. Some better preserved humps are 20 to 30 feet thick. Usually these deposits are found on lower parts of slopes in the valleys and along the shores of some lakes.



Physiographic Setting

The topography is irregular and hummocky in kames, and rolling to steeply or very steeply sloping in kame terraces, conforming partly to the pre-existing till slopes or rock faces. Members of the Morice association are found between 2,500 and 3,500 feet. This elevation range corresponds closely to where a retreat or stagnation of ice occurred. At this elevation most of the ablation areas are also found. Gravelly sand and gravelly loamy sand are the most common textures; gravelly sandy loam is less common. Stoniness is variable from very stony to stone-free. Lime was not observed at any depth in kame materials. Permeability and drainage are rapid to very rapid.

Orthic and Degraded Dystric Brunisols are the two subgroups of soils in the Morice association, with the Orthic in predominance. These soils have a brownish surface layer up to one foot thick as a result of a weak accumulation and oxidation of iron and aluminum. In addition the Degraded Dystric Brunisol has a thin, (less than an inch thick) leached, ashy layer below the forest litter. The surface soil has a weak granular structure. The depth of the soil profile to unchanged parent material varies, but does not exceed 3 feet.

Presently the forest cover consists of lodgepole pine with a small percentage of spruce and aspen. The composition, abundance and growth of the understory depends on exposure, slope and the depth of coarse material over underlying till. The shallower the deposits over the till, the better the moisture condition of the soil.

The Morice association is of minor occurrence and was mapped in not more than 10 mapping units within the surveyed area, covering 6534 acres or 0.18% of the map sheet.

It is entirely under forest and no other uses are feasible at present except gravel supply for road building.

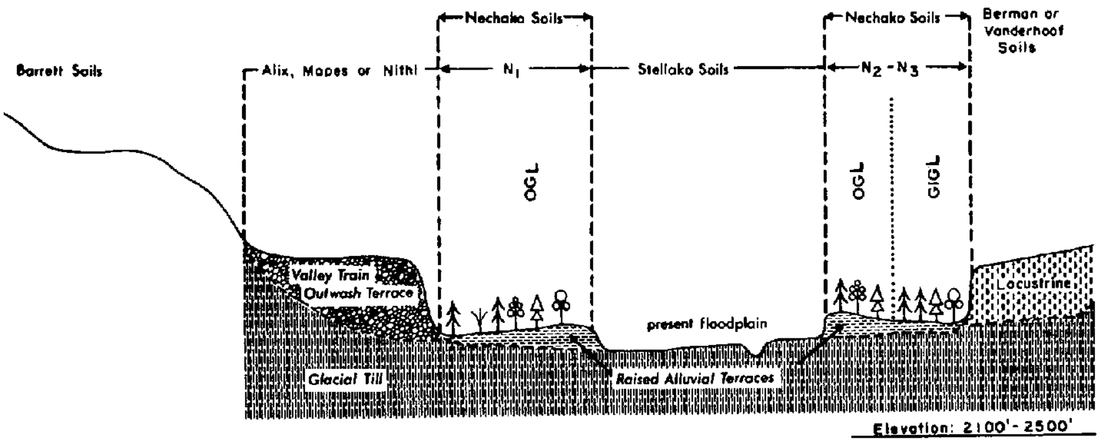
Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
M1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Vegetation expresses the variability of the materials.

Nechako Association

The Nechako association consists of soils developed on vertically accreted alluvial river terraces. They are situated along larger streams above the present flood plain with some terraces 50 to 100 feet above the river. These alluvial deposits are of variable texture and originate as the deposition product of materials eroded from the surrounding lacustrine and till deposits.

The topography of Nechako soils varies from level to undulating (0-5%) and gently rolling to moderately sloping (5-9%), rarely strongly sloping (10-15%). The elevation ranges between 2,100 and 2,500 feet. A finer textured capping of silty loam from 1 to 3 feet thick is underlain by fine or medium sands. These soils are above present flood level and are mainly well drained. Some depressional or flat areas with very slow or without external drainage are imperfectly drained.



Physiographic Setting

The Nechako association is composed of Gray Luvisol soils whose main characteristic is a light colored horizon at the surface and a layer of clay accumulation in the subsoil. The Orthic Gray Luvisol subgroup is the most widespread of Nechako soils. Its whitish, leached layer below the leaf mat is 5 to 8 inches thick. It has moderately well developed platy structure. The upper few inches of this horizon commonly have a weak brownish cast. The clay accumulation layer in the subsoil varies in thickness as well as in clay content, sometimes it is only 5 to 6 inches thick, while at other times it is 15 inches thick. It has moderately well to well developed angular blocky structure. A abrupt break separates this layer from the underlying sandy material. The present tree cover consists mainly of aspen with scattered white spruce and lodgepole pine. The shrub and herb layers are generally thin.

The Gleyed Orthic Gray Luvisol soils are imperfectly drained giving them a profile somewhat duller in color than the Orthic Gray Luvisol soils. Mottling and gleying in the lower subsoil is caused by a temporary high water table. Here vegetative growth is vigorous. Particularly noticeable in the shrub and herb layer are species requiring a moister environment.

The Nechako association is mapped on terraces and alluvial plains along the Nechako and Endako Rivers, sometimes in complexes with Stellako or Nithi soils. It covers 9772 acres or 0.27% of the map sheet.

This soil is partly cleared and under agricultural production, mostly of forage crops. Small acreages around settlements are used for home-grown hardy vegetables.

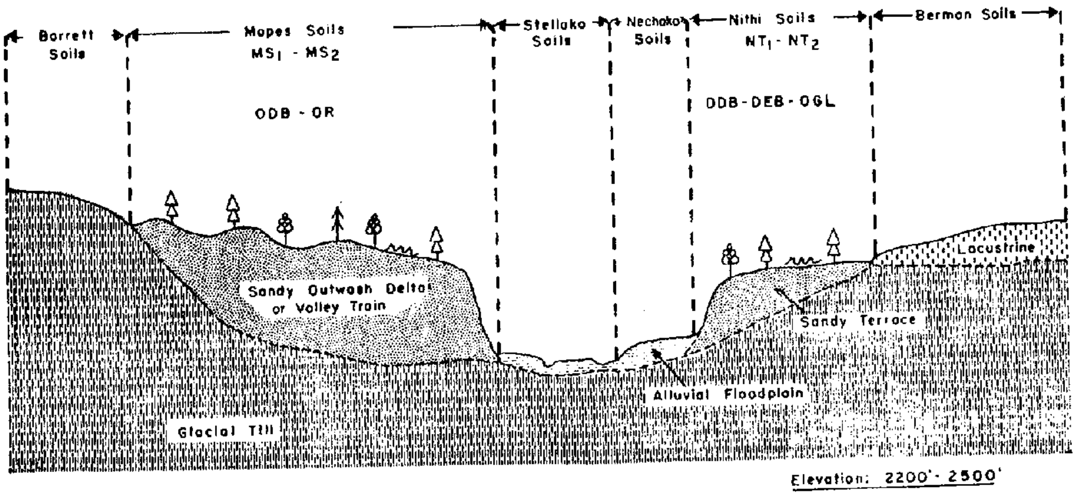
Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
N1	Orthic Gray Luvisol		This map unit of well drained Nechako soils is the most extensive.
N2	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol	Inclusions of low lying, slightly depressional areas with gleyed imperfectly drained soils give this map unit partly better forest stands and more vigorous lower vegetation.
N3	Gleyed Orthic Gray Luvisol	Orthic Gray Luvisol	This map unit occupies areas where flat depressional topography prevails and consequently Gleyed Gray Luvisol soils predominate. These are better forest sites with enough moisture during the growing season for optimal tree growth.

Nithi Association

The Nithi association is developed on sandy postglacial river terraces and sandy outwash plains situated in wide river valleys. These coarse and very coarse sands are the same parent material as those forming the Mapes association. The Nithi association is distinct from the latter in that it has two to two and a half feet of finer textured capping. At two areas on the edges of the lacustrine basin, thinner stratification of silty layers alternating with sands indicate some influence of laking. Some stones and gravels may occur in spots but the content is insignificant.

The topography varies from level to undulating and gently rolling (0.5-9%). The elevation ranges between 2,200 and 2,500 feet with most areas falling between 2,200 and 2,300 feet. Fine and very find sandy loam are the main textures with silt loam as a very minor component. These are well drained soils with moderate to moderately rapid permeability.



Physiographic Setting

The Nithi association contains three groups of soils: Degraded Dystric Brunisol, Degraded Eutric Brunisol, and Orthic Gray Luvisol. The first two cover approximately the same acreage and the third only occasionally occurs. The Degraded Dystric Brunisols are distinguished by a thin light colored layer no thicker than an inch immediately below the forest litter which in turn is underlain by a 6 to 10 inch brownish layer. A slight iron and aluminum oxide concentration gives the latter its brownish color. The surface soil is very friable and of granular of subangular blocky structure. The subsoil becomes somewhat coarser occasionally, but mostly it is of the same fine sandy loam texture as the surface. Medium and coarse variegated sands occur at a depth of two to two and one-half feet.

Presently lodgepole pine, spruce and scattered aspen are the main tree species. In small depressions or at the foot of slopes where the underlying till holds seepage moisture longer (and closer to the root zone) the percentage of spruce increases. The abundance and growth of shrubs and herbs depends in the same way on micro-topography and closeness to the valley sides. The moss layer is patchy and mostly thin.

The Degraded Eutric Brunisol has a brownish surface horizon usually no more than 6 inches thick, sometimes overlain by a thin weakly leached layer below the forest litter. The brownish color of the surface horizon originates from a slight iron and aluminum accumulation and oxidation. A second leached layer up to one foot or more thick occurs in the upper subsoil. The surface soil and subsoil are very friable and have well developed granular or subangular blocky structure. In the lower subsoil some clay accumulation occurs in small pockets or thin silty layers. Orthic Gray Luvisol soils result if silt loam layers are thicker and clay movement more evident. Very thin layers of finer texture sometimes persist to 4 or 5 feet in depth.

The present forest cover on these soils are similar to that on the previously described Degraded Dystric Brunisols. Retention of moisture in the subsoil is somewhat better for a short duration. This may have a slight effect on forest and shrub growth.

The Nithi association is not an extensive soil. It is mapped mostly in complexes with other sandy outwash, alluvial or lacustrine soils.

It is found in the valleys along the Nechako and Endako rivers and covers 8706 acres or 0.24% of the map sheet.

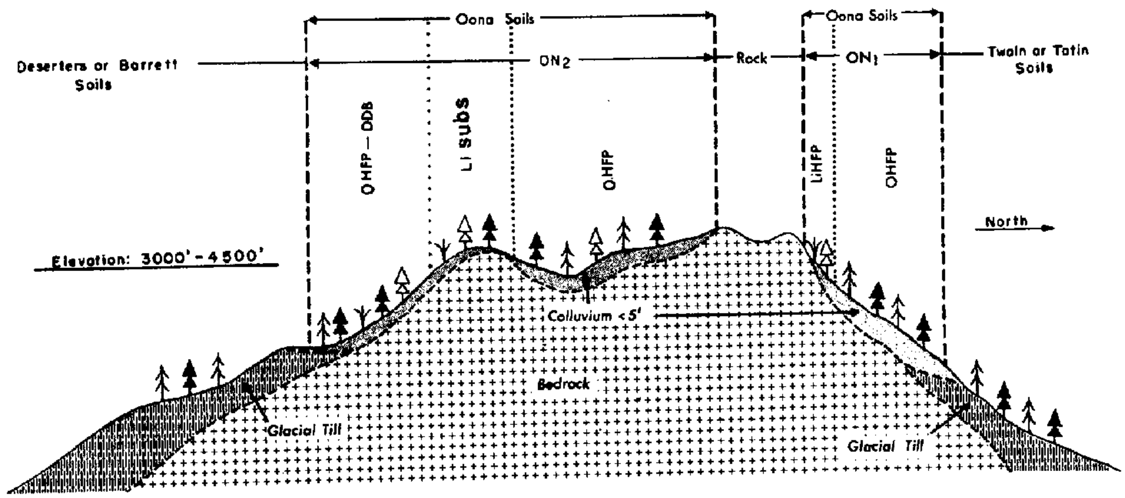
Nithi soils are almost exclusively under forest. Some smaller areas are cleared and cultivated, but the intricate pattern of finer textured Nithi and coarser Mapes soils makes it difficult to farm profitably because of the high droughtiness of Mapes soils during the growing season.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
NT1	Degraded Dystric Brunisol	Degraded Eutric Brunisol	Degraded Dystric Brunisols are in predominance. They usually have thicker brownish layer at the surface, while Degraded Eutric Brunisols are of finer texture, particularly in subsoil.
NT2	Degraded Eutric Brunisol	Degraded Dystric Brunisol Orthic Gray Luvisol	This is the reverse to the above comination with some Orthic Gray Luvisol as a minor component.

Oona Association

The Oona association is derived from shallow deposits overlying basic bedrock. There are four major rock formations within the map area that are the source of the parent material of Oona soils. The most extensive and uniformly spread throughout the area is the Endako group of rocks, of Miocene (13-25 million years ago) and later age. This group consists of red, brown, gray and black andesitic and basaltic, massive, vesicular and amygdaloidal lava flows (14), breccia, and tuffs. Of smaller extent and confined mostly to the south and south-west portion of the area is a part of the Ootsa Lake group or similar rocks of Upper Cretaecous and Paleocene (58 million years ago) age (14) with andesite as the predominant and basalt as a minor component. Some dacitic and rhyolitic flows also occur. In the western half of the map sheet, part of the Hazelton group of rocks of Middle and Lower Jurassic age (135 million years ago) (14) is found. It is composed of green, dark gray, black and reddish-brown andesite and basalt and of chert pebble conglomerate, sedimentary rocks. The Tackla group of Upper Triassic and Lower Jurassic age (181 million years ago) is composed of gray to green andesite and basalt and associated tuffs and breccias with interbedded sedimentary rocks. It is distributed in smaller units throughout the south half of the map sheet.



Physiographic Setting

The whole area was covered by glacial drift during the last glaciation and many rugged and uneven features of the terrain were smoothed out. Subsequent erosion left many peaks and ridges of bare rock exposed. The most extensive areas are covered by shallow till, weathered rock material in situ or shallow colluvium creeping downslope. Soils formed from such shallow deposits were assigned to Oona and Ormond association, depending on the profile development. Hard or disintegrating rock is usually encountered within three to five feet depth; if shallower than 20 inches above the rock, the soil is called lithic.

The Oona association was mapped at elevations between 3,000 and 4,500 feet, occupying higher altitudes of the same rock formations as Ormond soils. The Oona soils are developed at lower altitudes on the north and north-east slopes, and at higher elevations on southerly exposures. The topography varies from rolling and hilly at lower elevations to very steep and extremely steep or mountainous in areas at 4,000 feet and higher. Sandy loam and loamy sand with angular gravel and stones are the dominant textures of Oona soils; a loam texture in the subsoil occurs in places. These soils are well and rapidly drained, with the moderately rapid and rapid permeability.

At the elevations described for the Oona association Humo-Ferric Podzol soils are developed. The main characteristic feature of the Orthic Humo-Ferric Podzol profile is 1 to 3 inches thick ashy layer at the surface sometimes this layer is less than 1 inch thick or missing. The leached layer is underlain by a reddish-brown subsurface layer up to a foot or more thick, where iron and aluminum oxides and decomposed organic matter accumulate. This horizon is very friable and has a well developed granular or subangular blocky structure. The forest litter at the surface is 2 to 4 inches thick. The forest cover presently consists of Engelmann spruce, lodgepole pine and alpine fir with predominance of either possible at different locations, exposures and stand history. Alpine fir is more abundant at higher elevations. On shallow lithic soils the light ground cover is interspersed with bare rock pavement and boulders. The tree and shrub layers are open. On deeper portions of the soil the tree canopy might be quite thick and shrubs abundant. Moss cover is variable also. It is generally thicker and more uniform on the northern exposures. At foot-slope positions, where seepage water moving downward along rock faces collects, forest growth is more vigorous regardless of soil depth. This may be due not only to the moisture but to some other factors like fertility and thickness of the organic litter.

A Degraded Dystric Brunisol was mapped as a minor member of some mapping units. It is morphologically similar to the Orthic Humo-Ferric Podzol. The reddish-brown surface horizon is sometimes thinner than in Podzols, but the most important difference is its lesser content of iron and aluminum.
The present forest cover consists of lodgepole pine and Engelmann spruce. Lodgepole pine is predominant in most areas. Alpine fir is of minor occurrence.

The Oona association was mapped fairly extensively through the area covering 139906 acres or 3.88% of the map sheet.

Oona soils are predominantly under non-commercial forest stand and in inaccessible parts of the map sheet.

M a p U n i t s

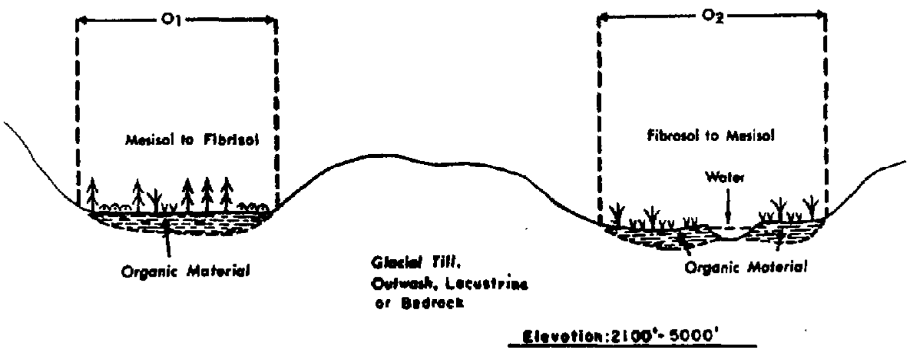
Symbol	Dominant Subgroup	Significant Subgroup	Comments
ON1	Orthic Humo-Ferric Podzol	Orthic Humo-Ferric Podzol	Some very shallow regosolic lithis soils may occur within this map unit, but it is mostly made up of podzolic and podzolic lithic soils. It is usually mapped in complexes with colluvium over till or steepland till soils.

Map Units (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
ON2	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol Lithic subgroups	This map unit occupies lower elevations within the association range. Some drier parts are mapped as Degraded Dystric Brunisol soils. Lithic subgroups including some regosolic soils are also part of the map unit.

Organic Soils

Organic deposits are strewn throughout the whole area in depressions and filled ponds in the till plain, in kettle holes in ablation and outwash materials, in old oxbows and side channels along rivers and on flat marshy lakeshores. There are numerous different shapes to these organic units and their size ranges from a few acres to several hundred acres.



Physiographic Setting

These soils contain at least 30% organic matter and are predominantly derived from plant remains. They are very poorly drained and permanently water saturated. Organic matter accumulation is faster than its decomposition due to wetness which enhances (vegetation) growth and retards decay.

Organic soils are classified on depth and degree of decomposition and on the presence of other materials in their profile (mineral soil, lime, ash, etc.). In reconnaissance mapping of such a vast area with numerous areas of organic soils, separation on this basis was not possible or considering their small importance at this stage, practical. Consequently they were separated into two groups of practical value: forested and unforested organic soils. This feature could be determined from aerial photographs.

Forested organic soils are predominantly covered by black spruce with labrador tea and some other shrubs in the understory. The thick layer of peat moss raises the surface above the water table. Decomposition of organic matter in deeper layers is partly advanced, beyond the stage where the original forms of plant parts can be recognized. Such organic soils with an intermediate stage of decomposition are called Mesisols.

More recent or less developed bogs do not support tree growth. Unforested organic soils are usually wetter, with water at the surface all or almost all of the time. Sedges and other water loving plants grow in such locations. Mosses have grown only on slightly elevated positions. Trees do not survive under such conditions. The surface layers as well as the organic material below is still fairly well preserved. Such raw organic soils are called Fibrisols.

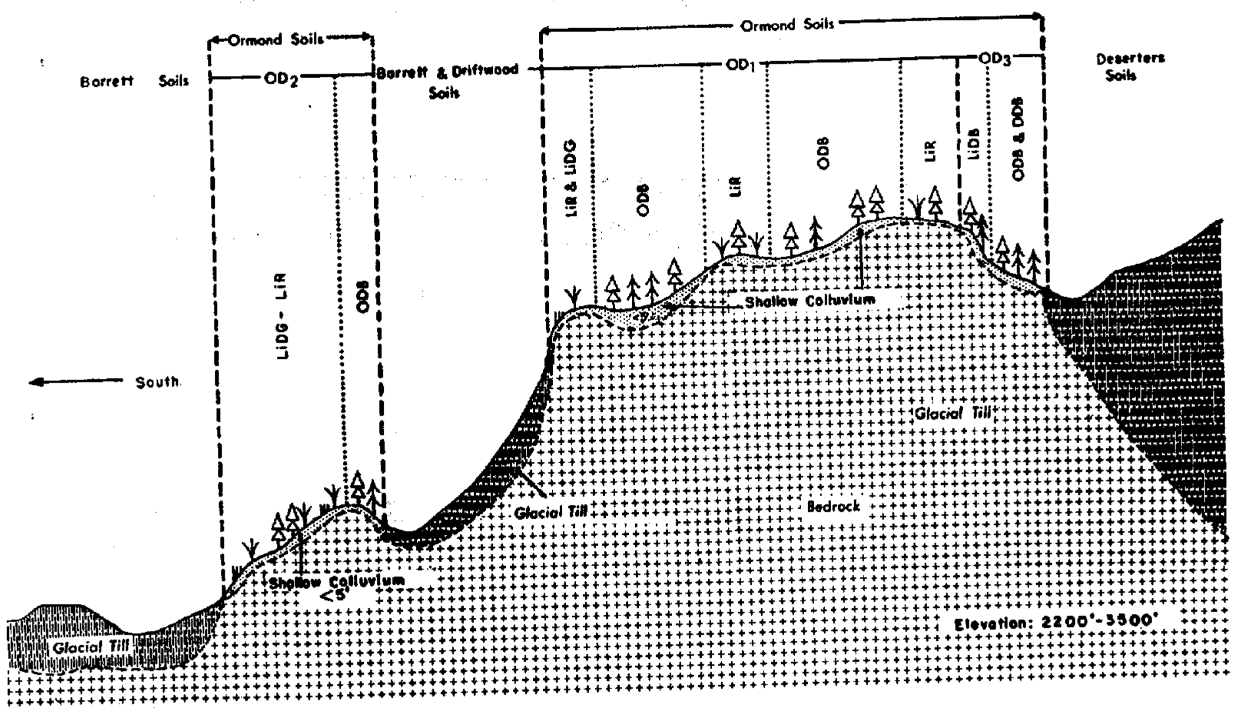
Organic soils cover 62687 acres or 1.74% of the map sheet. Almost all organic areas are in their natural state. They are used as pasture or resting places by moose and other wildlife. A few organic soils situated within the lacustrine basin and close to settlements, are used for natural hay production. For this reason also, no attempt was made to separate organic soils on the basis of climate, elevation and other environmental characteristics.

Map Units

Symbol	Dominant Great Group	Significant Great Group	Comments
01	Mesisol	Fibrisol	This map unit covers predominantly forested organic areas but inclusions of sedge meadows and some swampy areas regularly occur.
02	Fibrisol	Mesisol	This map unit is composed of sedge meadows with different degrees of wetness and inclusions of swampy areas or smaller open bodies of water. Combination of a sedge meadow and forest or shrub and moss covered parts also occurs. Very often the rims of organic areas are forested with the middle part open sedge or bog.

Ormond Association

The Ormond association was mapped on shallow deposits overlying basic bedrock. There are four major rock formations within the map area from which parent material of the Ormond association originated. The most extensive and uniformly spread throughout the area is the Endako group of rocks, of Miocene (13-25 million years) and later age. It consists of red, brown, gray and black andesitic and basaltic, massive vesicular and amygdaloidal lava flows, breccia and tuffs (14). Of smaller extent and confined mostly to the south-southwest portion of the area is a part of the Ootsa Lake group or similar rock of Upper Cretaecous (63-84 million years) and Paleocene (58-63 million years) age (14) with andesite as the predominant and basalt as a minor component. Some dacitic and rhyolitic flows also occur. In the western half of the map sheet, part of the Hazelton group of rocks of Middle and Lower Jurassic (166-180 million years) age are found. It is composed of green, dark gray, black and reddish-brown andesite and basalt and of chert-pebble conglomerate sedimentary rocks. Tackla group of Upper Triassic and Lower Jurassic (160-200 million years) age is composed of gray to green andesite, basalt and associated tuffs and breccias with interbedded sedimentary rocks. It is distributed in smaller units throughout the south half of the map sheet.



Physiographic Setting

During the last glaciation valleys were filled with glacial drift and many rugged and uneven features of the terrain were smoothed out, particularly at lower elevations. The topography thus created was less rugged and can be described as rolling and hilly. Water erosion in post glacial time removed part of the drift and revealed many rocky ridges and bare rocky slopes. The most extensive areas are covered by shallow till, in situ weathered rock material or shallow colluvium creeping down steep rocky slopes.

Consolidated or shattered rock is usually lying within three to five feet depth, but if the thickness of the deposits is less than 20 inches above the rock, the soil is classified as lithic. The Ormond association was mapped at elevations between 2,200 and 3,500 feet, occupying lower parts of the same rocky formations as the Oona soils. While on southern aspects these soils are sometimes found above 3,500 feet, on the north and north-east facing slopes they usually do not go higher than 3,000 feet in elevation. The most common textures of these soils are sandy loam and loamy sand with angular gravel and stones in abundance. These soils are well and rapidly drained, with moderately rapid and rapid permeability.

There is a wide range of soil development within the Ormond association, because of the complexity of topography and slope aspect. It probably was enhanced by the frequency of forest fires on more exposed and drier locations. The dry southern exposures, sparsely forested and in places devoid of any trees, lend themselves well to the development of Dark Gray Chernozemic and Regosolic soils, while on shaded and treed areas within short distances Dystric Brunisols have developed.

Orthic Dystric Brunisol soils are the most widespread of the Ormond association, and the Degraded Dystric Brunisol covers a much lesser area. Their common and most characteristic feature is the brownish surface layer of slight iron and aluminum accumulation. The Degraded Dystric Brunisol profiles have a thin, less than one inch, ashy layer at the surface below one or two inches of forest litter.
Lodgepole pine is the main tree species presently occupying these soils with some aspen on certain locations. Some white spruce as a minor component on the north exposures usually occurs. On the very shallow lithic soils the tree canopy is open since large boulders and bare bedrock prevent the establishment of regeneration. On deeper portions of this soil the tree canopy is thicker and the shrubs more abundant. The moss layer varies from very patchy and thin on the drier south slopes to more uniform on the north slopes.

The Lithic Regosol and the Lithic or Orthic Dark Gray are differentiated on the basis of presence and thickness of the dark surface mineral horizon. It has to be thicker than 3½ inches in the Dark Gray under virgin conditions, but non-existent or less than 2 inches thick in Regosols. This horizon is up to 1 foot or more thick in the Dark Gray soils, very friable, with well expressed granular structure. The dark color of the surface is maintained by accumulation and decomposition or organic matter from the growth of herbs and grasses. The other difference between Regosols and the Dark Gray soils is the lack of development of a regosolic profile, but some leaching and a weak change of color in subsoil of the Dark Gray profile.

Vegetative cover consists of scattered mostly stunted aspen, many species of shrubs and herbs and some grasses. In less exposed sites, lodgepole pine and Douglas-fir presently form the sparse tree cover.

The Ormond soils are fairly extensive and scattered through the area, adjacent to the till plain and lacustrine basin. They cover 116098 acres or 3.22% of the map sheet.

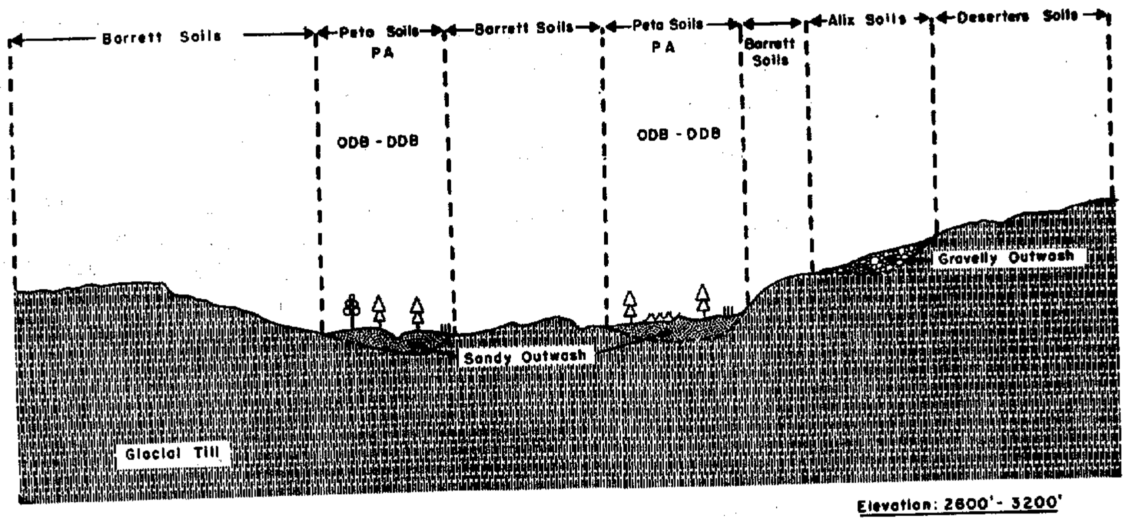
These soils are covered by a non-commercial forest stand. Some easily accessible sparsely treed areas adjacent to population centres are used as pastures.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
OD1	Orthic Dystric Brunisol	Lithic Regosol Lithic Dark Gray	This map unit is the most representative and widespread. Because of the complex topography, significant proportion of dry, sparsely treed or bare slopes with Regosolic and Chernozemic soils are also included.
OD2	Lithic Regosol Lithic Dark Gray	Orthic Dystric Brunisol	This unit occupies the most exposed and often very steep and bare southern slopes with shallow, lithic soils. Major vegetation is scarce, minor vegetation depends on depth of the soil, steepness and erosion.
OD3	Orthic Dystric Brunisol	Degraded Dystric Brunisol	This map unit occupies higher elevations within the association range and is transitional to Oona soils.

Peta Association

The Peta association was mapped on sandy outwash deposits. Such deposits overlie glacial till and occur in a few small-size units on the till plain. They are of coarse texture with a finer textured surface capping. Variable thickness of the deposits is generally shallower than on the larger gravelly outwash plains and valley trains, but in most areas it exceeds 10 to 15 feet. In deeper strata the sand is mixed with some smaller size gravel.



Physiographic Setting

The topography is undulating to moderately rolling. The elevation ranges between 2,600 and 3,200 feet. The texture of the surface capping is sandy loam or loamy sand. It grades into stratified layers of medium and coarse sand in the subsoil and parent material. Permeability and internal soil drainage is rapid. Surface droughtiness is the main characteristic of these soils.

The Orthic and Degraded Dystric Brunisol are the two subgroups of soils in the Peta association. They are characterized by a brownish surface layer 6 to 10 inches thick where slight accumulation of iron and aluminum oxides and organic matter occur. With sandy loam texture this layer is friable and has a granular or subangular blocky structure. If the texture is loamy sand or sand, the structure is weakly expressed and soil is loose and non-coherent. In addition to the brownish layer, the Degraded Dystric Brunisol has a thin, leached, ashy layer below the forest litter. The soil profile is very shallow and transition to the parent material abrupt with a change in color, texture and consistence of sandy layer.
The present forest cover consists of lodgepole pine mixed with aspen and a small percentage of white spruce. Most of the forest is of non-commercial value. The shrub and herb cover is sparse due to the lack of moisture. A thin layer of dry mosses and lichens cover the soil surface. Under the more mature stands a thicker organic mat is developed and the shrub and moss layer is more abundant.

The Peta association was mapped in a few small units in complexes with Alix or Crystal soils. It covers 3346 acres or 0.09% of the map sheet.

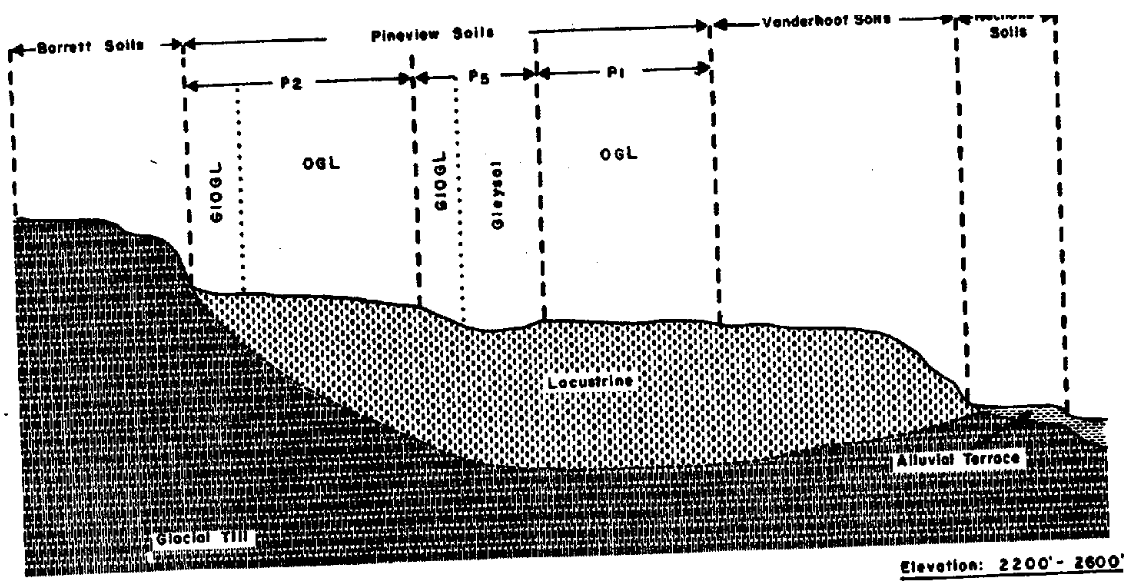
Peta soils are entirely under forest and no other uses are foreseen at present.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
PA1	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Predominance of the Degraded Dystric Brunisol indicates somewhat better moisture conditions probably due to more mature forest stand and preserved organic litter on the surface.
PA2	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Predominance of the Orthic subgroup indicates somewhat drier conditions within the soil.

Pineview Association

The Pineview association was derived from glaciolacustrine clay sediments. They were deposited in the Vanderhoof and Fort St. James laking basins during the recession stage of the last glaciation. The deposit thickness varies (according to the location within the basin) from a few feet at the edges and shallow parts of the glacial lake to more than 200 feet in the deep portions. The clays are varved, with laminations from $\frac{1}{4}$ to 8 inches thick (14). Judging by a few deep cuts, the clays are underlain by silts within 10 to 12 feet of the surface.



Physiographic Setting

The topography varies from level and undulating on the main lacustrine deposits, to strongly rolling and sloping on some rougher parts underlain by till at shallow depth. The elevation ranges between 2,200 and 2,600 feet. Silty clay or clay are the textures of the thin surface layer, while heavy clay and sometimes clay textures occur in the subsoil and parent material. The soil is predominantely moderately well drained and very slowly permeable. Depth to unchanged or slightly changed parent material averages 3 feet. Lime is generally leached out of the soil profile and upper part of the parent material. Roots can penetrate into subsoil only along cleavage faces.

The Pineview association includes Gray Luvisol and to a minor extent Gleysolic soils. The general characteristic of Gray Luvisol soils is a light colored horizon at the surface and a clay and fine clay accumulation layer in the subsoil. The Orthic Gray Luvisol soils are by far the most widespread soils of the Pineview association. The whitish leached layer below the thin leaf mat is 6 to 7 inches thick with the upper 2 to 3 inches having moderately well to well developed platy structure and the lower part having angular blocky structure transitional to the subsoil. The layer containing the most fine clay occurs between 6 and 24 inches depth. It can be subdivided into an upper part with well developed prismatic and angular blocky structure, very to extremely hard in a dry condition, and a lower part where laminations are still discernible. Aspen, white spruce and lodgepole pine are the main tree species presently occupying these soils. Probably due to recent fires and disturbances the percentage of white spruce and lodgepole pine varies, but is almost always less than that of aspen. Under aspen the shrub and herb layers are generally well developed. They are less dense under evergreens.

The Gleyed Orthic Gray Luvisol soils are imperfectly drained with a somewhat duller colored profile than the Orthic Gray Luvisol. The surface organic litter is thicker, but the most obvious or visible feature is mottling in the subsoil and some gleying in the lower subsoil and upper part of parent material caused by the longer water saturation. Abundant and vigorous growth of moisture loving vegetation distinguish these from the previously described moderately well drained soils.

Gleysolic soils are poorly drained and include mainly three subgroups: the Eluviated Humic Gleysol, the Rego Humic Gleysol and the Carbonated Humic Gleysol. A thick organic mat on the surface and a dark mineral horizon below it are their common features. A pale-bluish color of the subsoil (gleying) with rusty spots (mottling) indicates a prevailing wet soil condition, mostly in a form of a high water table. The Eluviated Humic Gleysol, the least moist, is also characterized by a pale, leached subsurface and a clay accumulation layer in subsoil. The tree growth in gleysolic soils depends on the degree of water saturation. If the water table is very close to the surface permanently, the tree growth is inhibited or prevented and only wetland plants, like sedges, can grow. If saturation with water lasts only part of the growing season, the forest growth is enhanced. White and black spruce with scattered black cottonwood and birch trees cover such soils. Moisture loving shrubs and mosses are abundant.

The Pineview association was mapped in two areas adjacent to the eastern boundary, north of Vanderhoof and south of Fort St. James. It covers 30639 acres or 0.85% of the map sheet.

Pineview soils are predominantly under forest with the remainder being cultivated for forage production.

Map Units

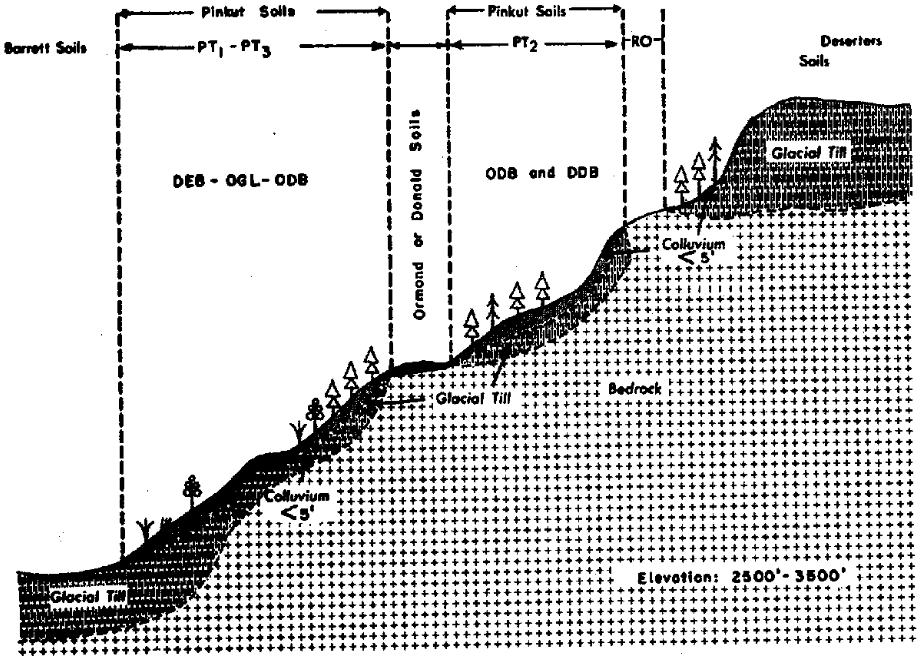
Symbol	Dominant Subgroup	Significant Subgroup	Comments
P1	Orthic Gray Luvisol		This map unit has moderately well drained soils and is mapped in minor extent.
P2	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol	This map unit represents flat to undulating topography with a large percentage of slightly depressional areas where imperfectly drained, gleyed soils occur. Better forest stands and more abundant lower vegetation is found in such locations.
P5	Gleysolic Soils	Gleyed Orthic Gray Luvisol	This map unit covers wet depressional areas where a predominance of poorly drained gleysolic soils occur. In parts of such areas forest growth is often inhibited by excessive moisture.

Pinkut Association

The Pinkut association consists of colluvium overlying glacial till on very steep and extremely steep slopes (over 30%). The texture ranges from coarse to moderately coarse with a medium texture as a minor component. Stone content varies from insignificant to excessive. The thickness of colluvium is variable within short distances, but rarely exceeds five feet on many very steep and topographically homogeneous slopes. Glacial till is regularly intermixed with colluvium.

The elevation range for the Pinkut association is the same as for the Barrett association, between 2,500 and 3,500 feet. The texture of these soils ranges from gravelly or stony loamy sand to gravelly or stony sandy loam at the surface and gravelly loam and gravelly sandy loam in the subsoil. Streaks of lime were observed at a depth of 3 to 5 feet in road cuts particularly along south facing slopes on the north side of Francois Lake.

Pinkut soils are well drained; permeability is moderate. Seepage areas may occur but are minor in extent.



Physiographic Setting

The Pinkut association contains two subgroups of soils: Dystric Brunisols derived from deeply leached acid parent material and Eutric Brunisols, derived mostly from less leached parent material.

The Dystric Brunisols are characterized by a brownish surface horizon up to 1 foot thick or more, where iron and aluminum oxides accumulate, but not in sufficient quantity to be classified as podzolic. Degraded Dystric Brunisol profiles have a thin ashy, leached layer (less than 1 inch thick) below the forest litter. Shaded north, north-east and northwest slopes have Dystric Brunisol soils. At the present a mixed forest of lodgepole pine and white spruce is typical for the described elevation and exposure. Shrub cover depends on density of the stand and availability of moisture. It is usually more abundant at the foot of the slope. The moss layer is thick.

The Degraded Eutric Brunisol has a weakly leached surface horizon varying in thickness and underlain by a brownish layer of slight iron-enrichment and/or a layer of some clay accumulation. If leaching of the surface horizon is more advanced and clay accumulation in subsoil is more evident, the Orthic Gray Luvisol soil is formed. It was recognized as a minor member of the Pinkut association and mapped with the Orthic Dystric and Degraded Eutric Brunisol subgroups, usually at finer textured areas. Degraded Eutric Brunisol and Orthic Gray Luvisols are confined mainly to the more open southern exposures. The present forest cover is composed predominantly of aspen and stunted aspen, lodgepole pine and, in some locations, Douglas-fir. More exposure resistant shrubs and herbs are found under open aspen forest. Mosses are confined to relatively moist micro habitats.

The Pinkut association is not very extensive and was mapped mostly in complexes with soils on glacial till or soils shallow to bedrock. It covers 23145 acres or 0.64% of the map sheet.

It is entirely under forest and no other uses are contemplated.

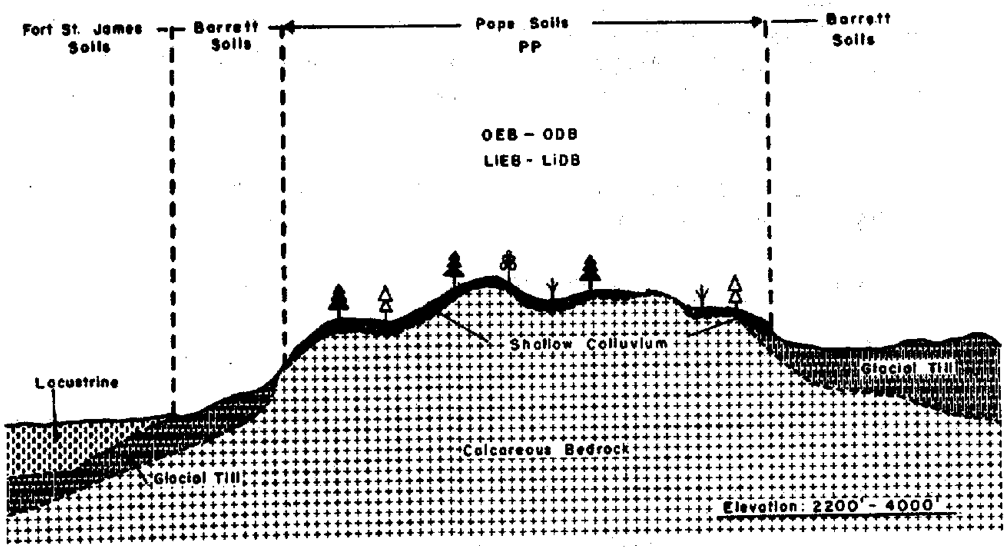
M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
PT1	Orthic Dystric Brunisol	Degraded Eutric Brunisol	Soils of this mapping unit are well to somewhat excessively drained with some moisture deficiency during the growing season.
PT2	Orthic Dystric Brunisol	Degraded Dystric Brunisol	This mapping unit represents well drained Brunisolic soils on the north, northeast and northwest colluvial slopes. The lack of moisture on these sites occurs less often, and forest growth is better than on PT1.
PT3	Degraded Eutric Brunisol	Orthic Dystric Brunisol Orthic Gray Luvisol	This map unit represents the driest areas of Pinkut soils. Exclusive south aspects indicate exposed, dry forest sites.

Pope Association

The Pope association was mapped on shallow deposits overlying calcareous bedrock. The limestone division of the Cache Creek group of rocks of Permian age (280-230 million years ago) (1) is the only formation of calcareous rocks in the area. It consists of 90 per cent or more of massive blue-gray limestone and is located along the north side of Stuart Lake and Necoslie River in the northeast corner of the map sheet.

During the last glaciation lower elevations were filled with a thick glacial drift, but subsequent erosion removed part of it and revealed many rocky ridges. Some areas are covered with a shallow till, some with material weathered in place or with colluvium creeping down steep slopes. Consolidated or shattered rock is usually lying within three to five feet of the surface but if the thickness of the deposits is less than 20 inches above the rock, the soil is classified as lithic.



Physiographic Setting

The topography of the elongated limestone ridge, which lies only partly within the mapped area, is rolling and hilly at the south end and rough and mountainous on the north end. It rises from Stuart Lake in successive, extremely steep rocky terraces up to 4,000 feet in a very short distance. The Pope association was mapped between elevations of 2,200 and 4,000 feet, adjacent to soils on the till plain and lacustrine plain. The most common textures of these soils are sandy loam and loamy sand with high percentage of angular gravel and stones. Pope soils are rapidly and well drained with moderately rapid and rapid permeability.

The Orthic Eutric Brunisol is most widespread soil of the Pope association. Its profile shows a change from the regosolic character of parent material. Slow leaching and weathering results in a weakly developed brownish surface horizon. Lime is moved down to 1½ to 2 feet depth. Where leaching progressed further, an eluvial horizon may develop on the surface and a Degraded Eutric Brunisol is formed. It is of very minor occurrence and therefore not taken into account in the mapping. The forest litter is thin.
The forest cover is composed of Douglas-fir, lodgepole pine and aspen. In many places the tree cover is sparse because of shallow, lithic soils and rock outcrops. The abundance and vigor of shrubs and herbs depend on depth of th soil and the density of the stand. Commonly plants are not abundant and they are species of drier sites. The moss layer is also very patchy and thin.

The Dystric Brunisols are more advanced in development than Eutric Brunisols. Their brownish surface layer is better expressed and usually thicker. Lime is leached deeper or out of the profile entirely. Surface and subsurface layers show acidic reactions. These soils are found on the north and north-east, shaded sides of the mountain and at the higher elevations where cooler temperatures and more available moisture have prevailing influence in soil formation. The forest litter is about 1 to 2 inches thick.
Presently lodgepole pine is the main tree species. White spruce occurs locally. The tree canopy is denser than on Eutric Brunisols and the shrub and moss layers are better developed.

The Pope association is not widespread and covers only 6953 acres of 0.19% of the map sheet.

Pope soils are predominantly under non-commercial forest.

M a p U n i t s

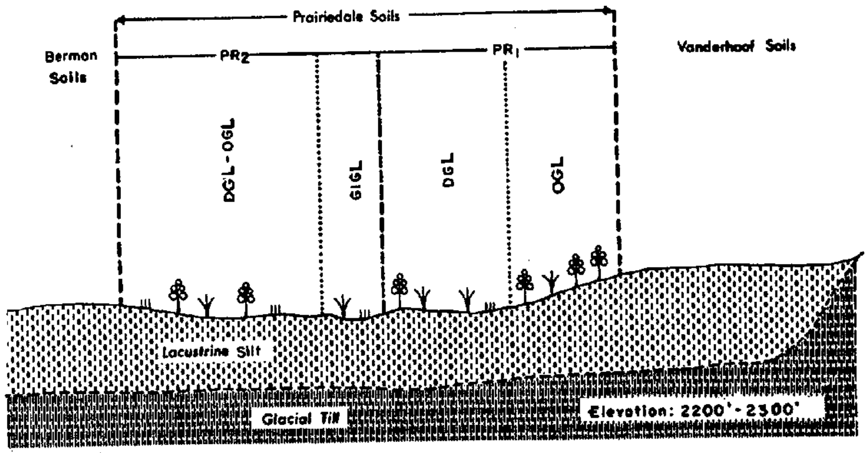
Symbol	Dominant Subgroup	Significant Subgroup	Comments
PP	Orthic Eutric Brunisol	Orthic Dystric Brunisol Lithic subgroups	

Prairiedale Association

The Prairiedale association of soils was developed from silty glacio-lacustrine sediments. They were deposited in the Vanderhoof lake basin at the stagnation and decay stage of the last glaciation. These deposits are very thick and, according to Armstrong, exceed 260 feet in some parts (1). The silts are varved with laminations ranging from $\frac{1}{4}$ inch to eight inches (14). In comparison with the clays the silty deposits are not widespread and probably do not represent much more than a fourth of the basin area.

Where Prairiedale soils are found the laking basin topography is level to undulating. It is situated between 2,200 and 2,300 feet elevation. Silt loam is the prevailing surface and subsoil texture but some silty clay loam textures also occur. The soil is well drained and moderately permeable. Roots penetrate easily into the parent material.

The Prairiedale association includes three subgroups of Gray Luvisol soils: Dark Gray Luvisol, Orthic Gray Luvisol and their gleyed members. The most widespread is the Dark Gray Luvisol with a dark surface mineral horizon 5 to 6 inches thick and sometimes thicker. It is high in organic matter and has a well developed granular structure. The formation of the dark mineral surface horizon in this climatic region is (somewhat of) an anomaly. It may be the result of successive forest fires and subsequently low shrub, herb and grass growth with a large volume of fibrous roots which decay and are subsequently incorporated in the soil. Clearing, cultivation and pasturing of these soils has enhanced this process. Draining and ploughing of some low wet areas that had accumulated organic forest litter on the surface has also caused formation of a dark mineral surface horizon.



Physiographic Setting

A leached, whitish layer below the surface about 6 inches thick, has a well developed platy structure and is slightly hard. The clay accumulation layer starts at a relatively shallow depth of 9 to 12 inches. It can be divided in two parts, an upper part displaying well developed angular blocky structure, when dry and hard, and a lower half with discernible lacustrine stratifications and some added clay. At approximately two and a half feet depth the unchanged or slightly changed parent material is encountered. It is sometimes limy at this depth.

All of this soil has been cleared and cultivated for a long time. The Orthic Gray Luvisol development, identical to that of the Berman soils, is also found within the Prairiedale association. It occurs under aspen groves scattered through the cultivated fields and in locations where a dark top has not developed or is very thin. The whitish, leached horizon starts at the surface or below a thin surface organic layer and is regularly thicker than in Dark Gray Luvisol soils. Gleyed Orthic Gray Luvisol and sometimes Gleyed Dark Gray Luvisol soils are found in low lying areas. Gleysolic soils are also found but not in mappable proportions. These soils are also cultivated or under aspen and willows.

Only two map units and one complex of Prairiedale soils were mapped covering 6803 acres or 0.19% of the map sheet.

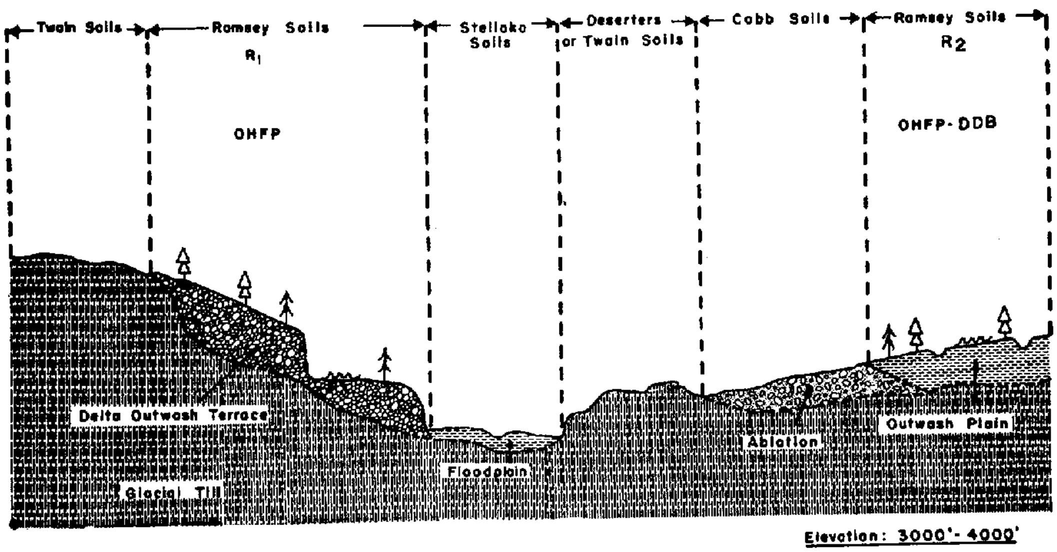
These soils are used for forage production and to a very small extent for growing coarse grains like oats and barley.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
PR1	Dark Gray Luvisol	Orthic Gray Luvisol	There is only one map unit of this combination, on the Nautley River.
PR2	Dark Gray Luvisol	Orthic Gray Luvisol Gleyed subgroups	There is one large unit and one complex of this combination mapped on the flats between the Vanderhoof airfield and Braeside.

Ramsey Association

The Ramsey association is derived from gravelly glaciofluvial deposits. These deposits comprise different landforms such as outwash plains, valley train terraces, gravel-filled channels and narrow valleys. Some of the forms are flat, some are rolling and kettled. These deposits are very coarse, gravelly, cobbly and sometimes stony with a thin capping of less coarse material. They are well sorted and of variable thickness, underlain mostly by glacial till or in some cases by pre-existing fluvial material. Glaciofluvial deposits are scattered in smaller or larger units on the till plain, adjacent to ablation till and along wide river valleys.



Physiographic Setting

The topography is flat, undulating and rolling to steeply sloping in some areas of pitted outwash. The elevation ranges between 3,000 and 4,000 feet and is rarely higher. The texture of the surface capping is gravelly loamy sand, gravelly sand and occasionally gravelly sandy loam. Subsoil and parent material consists of stratified gravel and sand, mixed with cobbles and sometimes stones. Permeability and internal drainage are rapid and very rapid. Droughtiness is the main characteristic of these soils particularly where the deposits are thick and exceedingly coarse. Droughtiness is further enhanced by forest fires that destroy organic litter and the moss layer on the soil surface.

The Ramsey association consists mostly of the Orthic Humo-Ferric Podzols. They have 1 to 3 inches forest litter on the surface and an ashy, white mineral layer below it. This leached layer is usually from 2 to 4 inches thick, sometimes is missing and sometimes in pockets up to 6 inches thick. The reddish-brown subsurface layer, between 8 and 12 inches thick, is characteristic for Humo-Ferric Podzols. It could be subdivided into an upper more reddish and darker part where iron and aluminum oxides and organic matter have accumulated and a lower yellowish part where less accumulation has taken place. This layer has a sandy loam texture and well developed granular or subangular blocky structure. Coarser textures usually have weakly expressed or single grained structure. The soil profile is shallow and the transition to the parent material as a rule is observed by an abrupt change in color, consistence and texture.

Degraded Dystric Brunisol was mapped as a minor member of some mapping units. It is morphologically very similar to the Orthic Humo-Ferric Podzol. The reddish-brown surface horizon is sometimes thinner than in Podzols, but the most important difference is its lesser content of iron and aluminum. The present forest cover consists of lodgepole pine and Engelmann spruce with lodgepole pine predominant on drier sites and at lower elevations. At higher elevations an alpine fir and Engelmann spruce mixture is found more frequently than lodgepole pine. Even in open stands shrub and herb cover is poor due to the lack of moisture. In such locations thin layers of drought resistant mosses and lichens cover the soil surface. Under mature stands at higher elevations more vigorous growth of shrubs and particularly a thicker layer of mosses is found.

Ramsey soils are of minor extent covering only 35957 acres or 1.00% of the area. They are mostly mapped in complexes with basal till, ablation deposits or organic soils.

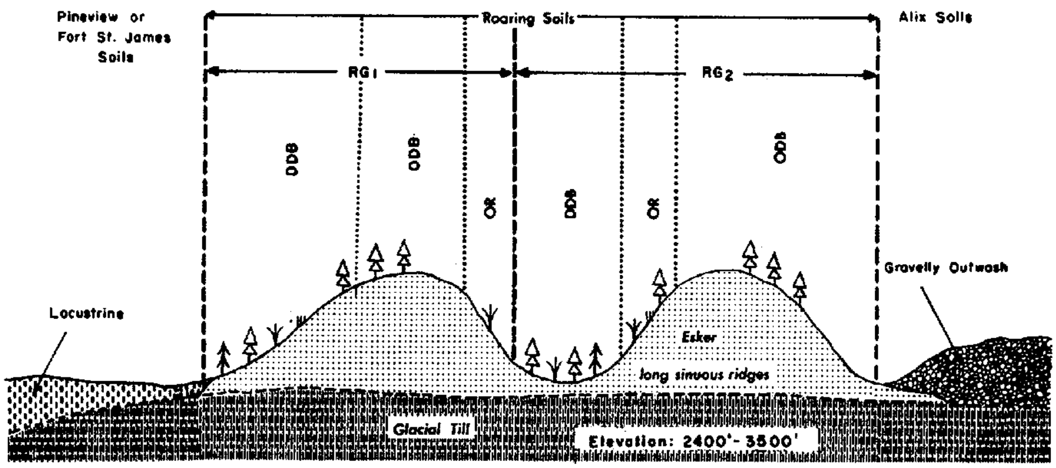
The Ramsey association is entirely under forest and no other uses are foreseen at present.

Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
R1	Orthic Humo-Ferric Podzol		This is the more widespread unit of the association.
R2	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol	There are only a few map units with this combination.

Roaring Association

The Roaring association was mapped on esker and crevasse filling deposits. They originated mostly during the retreat and melting of ice when many streams and streamlets formed. The meltwater swept the drift from the glacier surface and deposited it in open channels or in subglacial tunnels. Many narrow single sinuous esker ridges exist in the area. They were found particularly on the big delta-outwash complex in the Sinkut River area and in the Sutherland river valley. Only a few esker complexes with many ridges enclosing deep kettle holes are found. The biggest one $9\frac{1}{2}$ miles long and from $\frac{1}{4}$ to over 3 miles wide lies south of Stuart Lake. In places the thickness of the deposits exceeds 300 feet. They are composed of stratified, sometimes poorly, sometimes well sorted gravels and sands. Lenses and pockets of silt and bouldery layers also occur.



Physiographic Setting ← North

Esker slopes are usually very steep and/or extremely steep. Intricate topographic patterns occur on esker complexes. Most of the esker deposits are found between 2,400 and 3,500 feet elevation. The texture of the surface capping is gravelly loamy sand, sand and occasionally gravelly sandy loam. The subsoil and parent material consist of stratified sand and gravel with occasional layers of silts. Permeability, internal drainage and runoff are rapid and very rapid. These soils are very droughty due to their coarseness and steep slopes.

Orthic and Degraded Dystric Brunisols are the two main soil subgroups, while Orthic Regosols often occur. The first two are characterized by a brownish surface layer 6 to 10 inches thick where slight accumulation of iron and aluminum oxides and organic matter has occurred. The Degraded Dystric Brunisol also has a thin, leached, whitish layer below the forest litter, usually less than an inch thick or discontinuous. With the sandy loam texture the brownish surface horizon is very friable to loose and has granular or subangular blocky structure, but is single grained or has very weak structure if the texture is sand or loamy sand. The Orthic Regosol differs from the Brunisols in the duller color of the surface layer and in indistinct transition to the subsoil and parent material. They occur more often on dry southern exposures where less moisture is available for the leaching.

The present forest cover consists of lodgepole pine mixed with aspen, or Douglas-fir and scattered white spruce. Most of the forest is for pulp harvest or of non-commercial value. The shrub and herb cover is sparse except for depressions between ridges where more moisture is available. Under closed stands on the northern slopes a somewhat thicker organic litter layer develops, since the shrub and moss layers are better developed. Very steep south exposures are particularly dry, often partly bare or with stunted aspen forest.

The Roaring association is not extensive and covers 16555 acres or 0.46% of the map sheet. A great deal is mapped in complexes with soils on glacial outwash.

These soils are entirely under forest and no other uses are foreseen at present.

Map Units

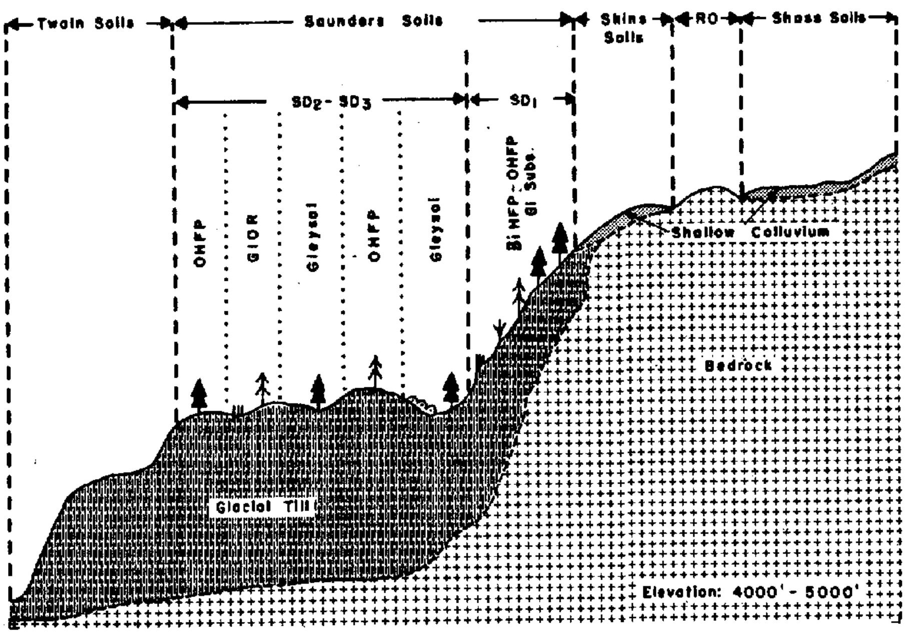
Symbol	Dominant Subgroup	Significant Subgroup	Comments
RG1	Degraded Dystric Brunisol	Orthic Dystric Brunisol Orthic Regosol	Predominance of the Degraded Dystric Brunisol indicates somewhat better moisture conditions of this unit.

M a p   U n i t s (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
RG2	Orthic Dystric Brunisol	Degraded Dystric Brunisol Orthic Regosol	Predominance of the Orthic subgroup indicating less available moisture or some mineral characteristic of the parent material.

Saunders Association

The Saunders association is developed from glacial till deposits of moderately coarse to moderately fine texture above 4,000-4,500 feet elevation. These deposits are not nearly as thick as the basal till at lower altitudes, and rocky ridges and bare mountain sides protrude in many places. Stoniness is excessive in certain areas.



Physiographic Setting

Except for some high plateaus of rolling and undulating till that were also included in the Saunders soils, this association consists mostly of mountainous topography with very to extremely steep (>30%) complex slopes. Commonly the textures of these soils are gravelly and stony sandy loam and loam in the surface layers and gravelly loam and clay loam in subsoil and parent material. Average depth to the parent material is about 3 to 3½ feet.

The Saunders association is comprised of a very diversified group of soils. Because of the inaccessibility of the area, it was not possible to sort out all the variations.

On the positions with good external drainage Bisequa and Orthic Humo-Ferric Podzols are predominant. They are characterized by one to three inches of ashy, leached horizon on the surface and below it a gritty dark reddish-brown horizon of iron-aluminum and organic matter accumulation 12 to 15 inches thick. In addition Bisequa Humo-Ferric Podzols have a clay accumulation layer in the subsoil. It occurs at 20 to 24 inches in depth, is more compact and of blocky or pseudoplaty structure. Organic litter on the surface varies in thickness from 1 to 4 inches. The forest cover is predominantly alpine fir which becomes stunted at higher elevations. Up to 15% of Engelmann spruce is found in some stands.

Gleyed Orthic Regosol and Gleysolic soils in flat and depressional areas or on shaded northern slopes are very characteristic on these high altitudes, where water stagnates on the surface for a long time after snow melt. Low temperatures contribute to low evaporation and a slow thawing of the soil, water is unable to percolate into the compact subsoil. The profiles do not show any development and even gleying on very poorly drained soils is very much subdued. Shallow and small bogs are often found on the high plateaus. The peat layer on such soils is up to 2 feet thick. These gleyed and gleysolic soils have stunted alpine fir forest.

Saunders soils are not very extensive due to relatively small areas of till above 4,000-4,500 feet elevation. It covers 25,072 acres or 0.69% of the map sheet and are centered around Shass Mountain and Mount Lorentz and at Nulki Hills.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
SD1	Bisequa Humo-Ferric Podzol	Orthic Humo-Ferric Podzol Gleyed sub-groups	This map unit represents most of Saunders association and a great deal of it in complexes with shallow to bedrock soils. They are moderately well drained soils with the exception of seepage slopes and some depressional areas where gleyed imperfectly to somewhat poorly drained sub-groups occur.

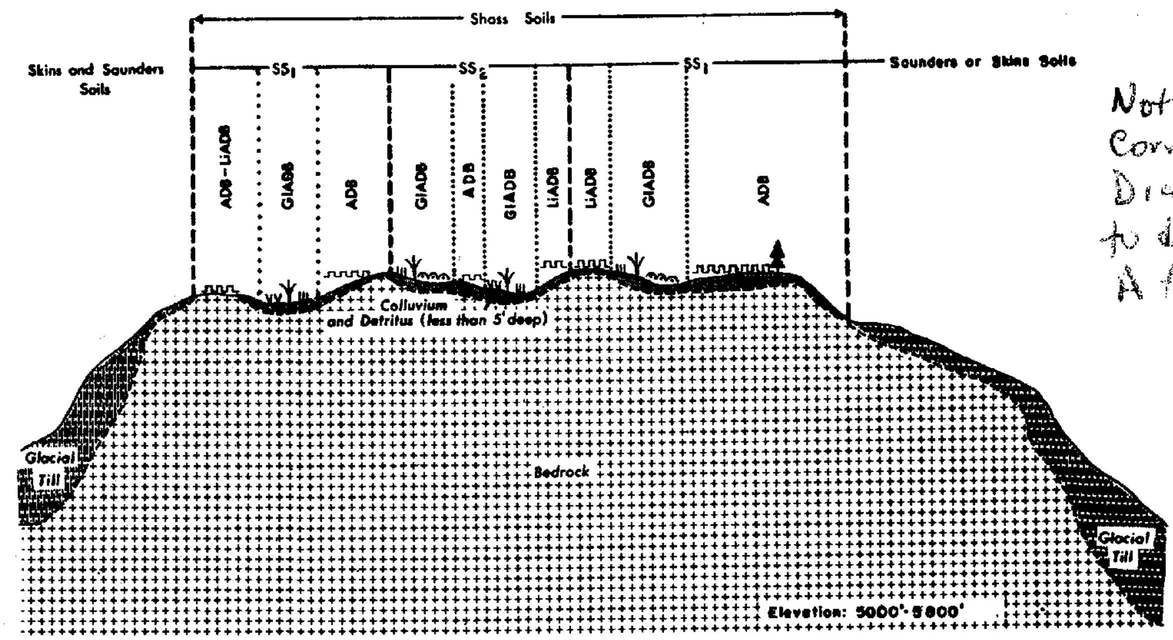
M a p U n i t s (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
SD2	Gleyed Orthic Regosol	Orthic Humo-Ferric Podzol Gleysolics	This mapping unit is less extensive and covers areas of basal, undulating till at higher plateaus - where imperfectly drained Orthic Regosols and poorly drained Rego Gleysols are typical soils. Gentle slopes are imperfectly drained and almost exclusively regosolic due to the cold temperature and excessive moisture.
SD3	Gleysolics	Gleyed Orthic Regosol Orthic Humo-Ferric Podzol	This map unit includes areas with many scattered bogs usually of smaller size. Organic layer on the surface of these bogs rarely exceeds two feet in thickness.

Shass Association

The Shass association was derived from shallow deposits overlying bedrock. It occupies the highest part of Shass Mountain above timberline which occurs around 5,400 feet elevation. The bedrock here belongs to the diorite section of the Topley Intrusion, an acidic rock of probable pre-Jurassic (181-135 million years ago) age (14). In its position the Shass association is found above and sometimes in combination with the Skins and Saunders soil associations.

The parent material of these soils consists of weathering residual rock and colluvium or soil creep from the same rock weathered above the present position. These deposits do not exceed 5 feet in depth and frequently they are much thinner. If shallower than 20 inches above rock, they are called lithic. Sandy loam and loam with a high percentage of angular stones and gravel are the common textures. The surface layers seem to be more stony than the subsoil and certain areas are paved with flat angular pieces of fractured rock. The topography is in part rough and mountainous where shallow colluvium is a minor component and rock outcrop prevails such as around the top peaks of Shass Mountain. Below these rocky ridges there are shallow stony areas gently sloping to rolling in a form of mountain saddle where most of the Alpine soils occur.



Note Correct Diagram to delete A for Alp…

Phisiographic Setting

The Shass association soils ~~are classified as Alpine soils~~ [occur in Alpine Environments]. They develop at high altitudes where cold temperatures prevail and long winters alternate with short, cool summers. Under this environment the trees do not grow, but many shrubs, herbs and grasses are adjusted to such conditions. These plants develop dense root systems and because of the slow decomposition, a thick turfy organic layer is formed on the surface. This is the main characteristic of well drained Alpine Dystric Brunisol soils. The turfy layer is up to 6 inches thick with the lower part of it having some indication of slight leaching. The subsoil layer is brownish to yellowish-brown with no observable clay movement. It is very friable and of subangular blocky structure with medium permeability and external drainage.

Many species of shrubs, grasses and herbs, well adjusted to the vigorous Alpine climatic conditions are found. Any Alpine fir tree that starts growing at the edges of grassland remains stunted and shrubby. The moss and lichen layers are usually thick and well developed.

The Gleyed Alpine Dystric Brunisol is a component of one of the mapping units. These soils differ from the previously described by having a thinner turfy layer on the surface, a weakly expressed brownish color and some gleying and mottling in the subsoil. They are also associated with small depressions of poorly drained alpine bigs that do not occur in a mappable proportion in the area.

The Shass association covers only 663 acres or 0.02% of the map sheet.

Alpine areas are used by wildlife as a summer pasture and could be considered very useful as watershed storage.

M a p   U n i t s

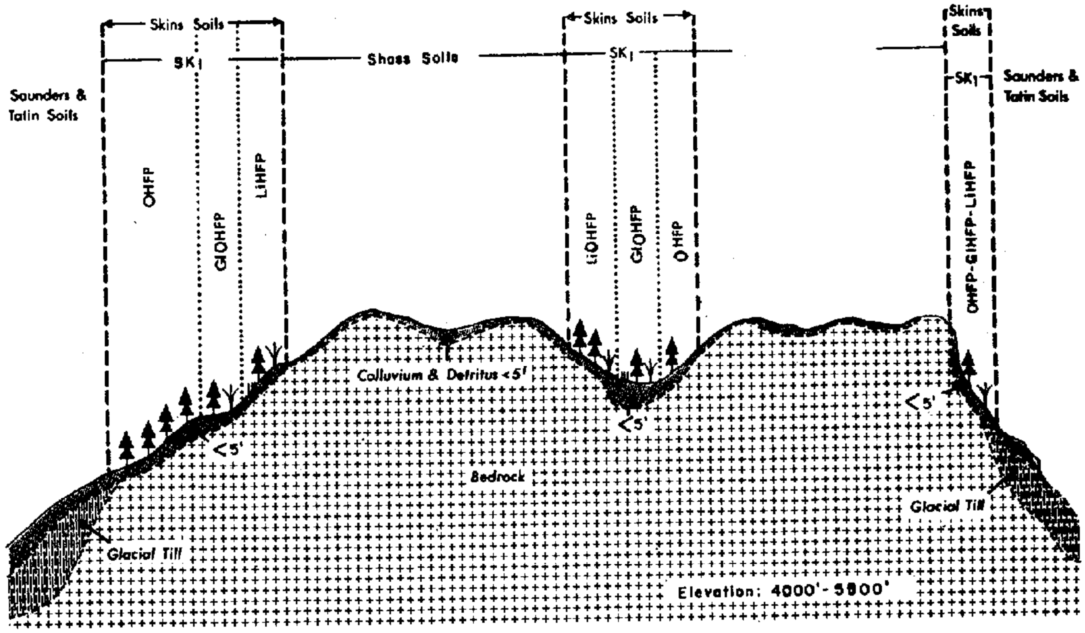
Symbol	Dominant Subgroup	Significant Subgroup	Comments
SS1	Alpine Dystric Brunisol	Gleyed Alpine Dystric Brunisol Lithic subgroups	This map unit is composed predominantly of rock outcrops on elongated rocky ridges and in smaller extent of shallow colluvial soils and detritus in small terraced enclosures on slopes.
SS2	Gleyed Alpine Dystric Brunisol	Alpine Dystric Brunisol Lithic subgroups	This map unit occupies a saddle below the rocky peaks of the Shass mountain. Gleyed Alpine Dystric Brunisols are predominant, with inclusions of Lithic soils and some alpine bogs.

Skins Association

The Skins association was mapped on shallow deposits overlying bedrock. Shallow (in places) weathered rock or colluvium creeping downslope make the parent material of Skins soils. Consolidated or shattered rock lies within three to five feet in depth, but if it is less than 20 inches deep, the soil is classified as lithic. The rock formations were not differentiated on their acidic and basic character as was done with the other shallow to bedrock associations, because of the prevailing influence of climate over all other soil forming factors at these high altitudes.

The Skins association occupies the highest forested areas of mountains above the Dragon and Oona associations at elevation between 4,000 and 5,000 feet. The topography is very rough and mountainous with very steep slopes (>30%) and many bare rocky ridges. Sandy loam and loam with a high percent of angular gravel and stones are the common textures of these soils; some loamy sand textures occur in places. Skins soils are well drained with the moderately rapid permeability.

At the altitudes mentioned above, under high precipitation and cold temperatures Podzols are formed as the zonal soils. They are characterized by a reddish-brown horizon 6 to 12 inches or more thick where iron and aluminum oxides and decomposed organic matter accumulate. The Orthic Humo-Ferric Podzol also has 2 to 4 inches of leached layer on top of the reddish-brown horizon, below the forest litter. This iron-humus enriched layer is very friable and of granular to subangular blocky structure. The forest litter is up to 4 inches thick.



Physiographic Setting

Presently the forest cover consists almost exclusively of alpine fir. Tree growth is slowed down by the short growing season and cold temperatures. More stunted and dwarfed trees show up Krummholz with increased altitude. The shrub layer is composed of many species adapted to higher elevations, and in places is quite dense. The moss cover is thick.

Skins soils are not very extensive and are mostly found concentrated around Shass Mountain, between Lorentz and Taltapin Mountain and in a smaller extent on the Nulki Hills. They cover 29,829 acres or 0.83% of the map sheet.

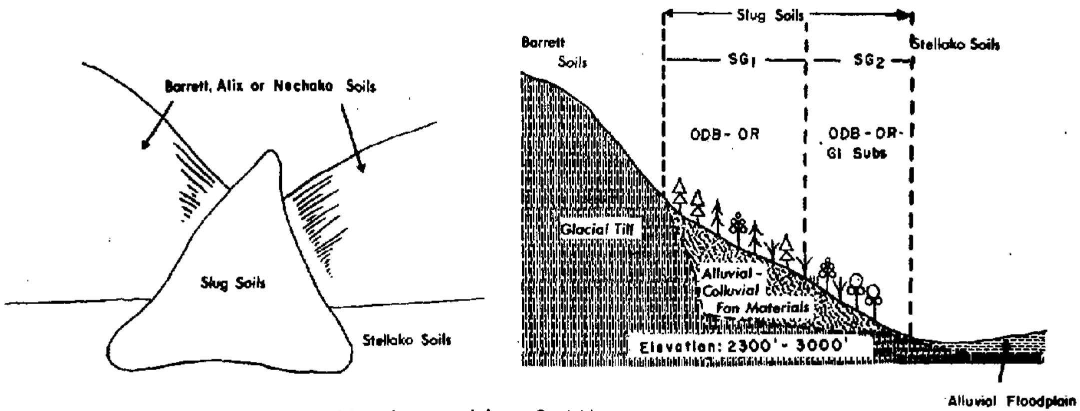
The Skins association is entirely under non-commercial forest stand and occurs in inaccessible parts of the surveyed area.

Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
SK1	Orthic Humo-Ferric Podzol	Gleyed Orthic Humo-Ferric Podzol Lithic sub-groups	

Slug Association

The Slug association is developed on alluvial fan deposits. There are many fans in the area, some well defined and some have partly lost their shape due to the other formations. The fans were formed where side streams enter a main valley. These deposits are sometimes well and sometimes poorly sorted. Parts of the larger fans with active streams are still accumulating sediments particularly with spring flooding and when big storms occur. The amount of cobbles and stones varies from none at all to very stony areas especially at the fan apex and along the creek beds. Cappings of finer material over coarse to very coarse materials are general. Not all fans are shown on the soil map, only those of a larger, mappable size.



Physiographic Setting

The topography of Slug soils is very gently to moderately sloping with strongly sloping areas in lesser extent. The elevation ranges between 2,300 and 3,000 feet, with most areas between 2,300 and 2,600 feet. The surface textures are sandy loam, loam and silt loam, while the subsoil textures range from sandy loam to loamy sand. The substratum is coarser with stratified gravelly sand, sandy gravel and gravel. These are well to rapidly drained soils with moderate to rapid permeability. Part of some fans are imperfectly to somewhat poorly drained.

There are two main subgroups of soils within the Slug association: the Orthic Dystric Brunisol and the Orthic Regosol and as a minor member a gleyed subgroup of either. The Orthic Dystric Brunisol has a brownish surface layer from slight iron and aluminum accumulation and oxidation between 5 and 10 inches thick. It is friable and has well expressed granular or subangular blocky structure. If cultivated or pastured, the mineral surface horizon becomes darker as a result of organic matter build-up at the surface. The lower part of brownish layer usually keeps its color for a long time. The transitional horizon to the unchanged parent material is regularly no more than 6 to 8 inches thick. The Orthic Regosol has no profile development or is so weakly expressed that no appreciable difference exists between the surface soil, subsoil or parent material. The coarser and more recent part of fans are usually regosolic.

The natural forest vegetation is presently composed of lodgepole pine and aspen with minor inclusions of white spruce and birch on the sites with better moisture status. The understory of shrubs and herbs is usually dense along creek beds where more moisture is available. On more open areas herbs and grasses grow.

On the lower parts of fans, usually along a stream or lakeshore, where the topography becomes level or almost level, gleyed and, in smaller extent, gleysolic soils occur. These parts of the fan apron are very often mixed with alluvial floodplain deposits. The main characteristic of these soils is the permanent influence of moisture on their morphology and behaviour. The vegetation accordingly is influenced by readily available moisture which is many times in excess of need. The forest cover consists of spruce, some cottonwood and a dense shrub cover.

Slug soils are partly under forest, and partly cultivated for forage production. Some cultivated areas, and some previously used for homesteads have been abandoned and serve as pasture.

The Slug association represents a minor group of soils - mapped mostly in the main valley along the Endako river and along Francois Lake and in a few small units scattered elsewhere. It covers 11,858 acres and 0.33% of the map sheet.

Map Units

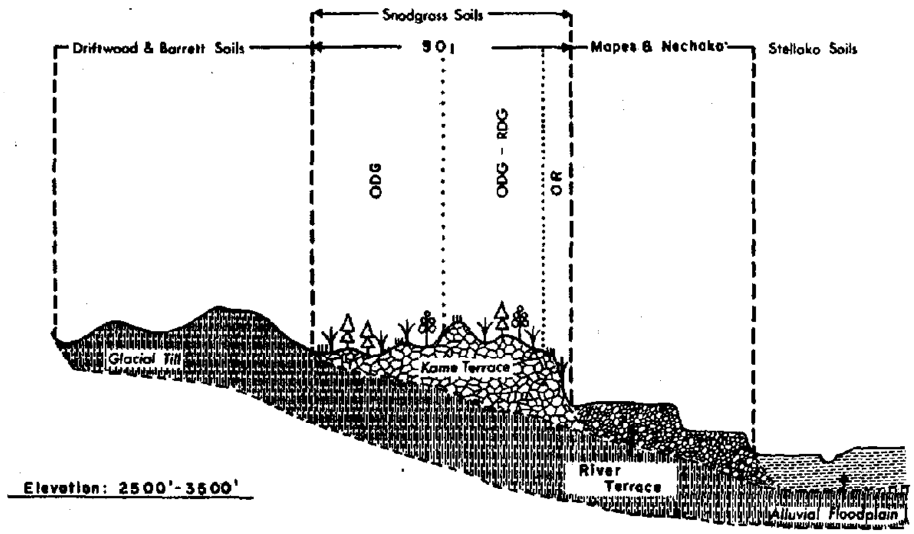
Symbol	Dominant Subgroup	Significant Subgroup	Comments
SG1	Orthic Dystric Brunisol	Orthic Regosol	This unit occupies smaller fans or upper parts of bigger fans with coarser textured regosolic soils along the creek and along recent stream scars.

M a p U n i t s (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
SG2	Orthic Dystric Brunisol	Orthic Regosol Gleyed sub-groups	This unit occurs on a few larger, flatter fans bordering rivers or lakes where lower parts are susceptible to flooding and gleying.

Snodgrass Association

The Snodgrass association was mapped on sandy and gravelly kame terraces and kames, the same parent material as the Morice association. These deposits are not sorted or are very poorly sorted because of ice contact deposition and very short-lived partial water action. Most kames were formed by slumping and shifting of glacial material along valley walls and subsequently were eroded by fluvial action. Kames are made of shallow mixtures of sand and gravel overlying glacial till and in places bedrock. Often these deposits are found in slopes along the shorelines of some bigger lakes. Along the north shore of Francois Lake parts of some vaguely defined kame terraces were subjected to wave action when the lake water level was higher than at present. Such areas are considered as beach lines but were not separated due to their small extent.



Physiographic Setting

The topography is irregular to hummocky in kames and rolling to steeply or very steeply sloping in kame terraces, conforming partly to pre-existing till or rocky slopes. The elevation between the 2,500 and 3,500 feet of the Snodgrass association corresponds closely to where a retreat or stagnation of ice occurred. At this elevation ablation areas are also found closely associated with the kame deposits. The common textures of these soils are gravelly loamy sand, gravelly sand and gravelly sandy loam. The content of stones varies from stone free to very stony. Lime was not observed at any depth in the kame materials. Permeability and drainage are rapid to very rapid. Permeability and runoff are inversely related.

The Orthic and Rego Dark Gray subgroups are the main soils of the Snodgrass association with the Orthic Regosol as a minor member. The Dark Gray Chernozemic soils are distinguished by a dark surface mineral horizon more than $3\frac{1}{2}$ inches thick under virgin conditions. The dark color of the surface is maintained by accumulation and decomposition of organic matter from the growth of herbs, shrubs and grasses. This layer has a well developed granular structure and better moisture properties due to organic matter content. The subsoil is partly changed by leaching resulting in a weakly developed brownish color and subangular blocky structure in the Orthic Dark Gray. The Rego Dark Gray and the Orthic Regosol lack these changes in the subsoil or else they are very weakly expressed. The Orthic Regosol has a thinner, (less than 2 inches thick) dark, organo-mineral horizon at the surface.

In their natural environment these soils are found on dry southern exposures where seasonal lack of moisture slows down forest growth and is more favourable to vegetation such as herbs, shrubs and grasses. Scattered sometimes stunted aspen also occurs. Close to settlements man's activity played a role by burning forest, cultivating land and seeding grasses.

Snodgrass soils close to settlements are used as domestic animal pastures and only one area was cultivated for green feed production. Somewhat remote and steep areas are used as pasture by wild animals.

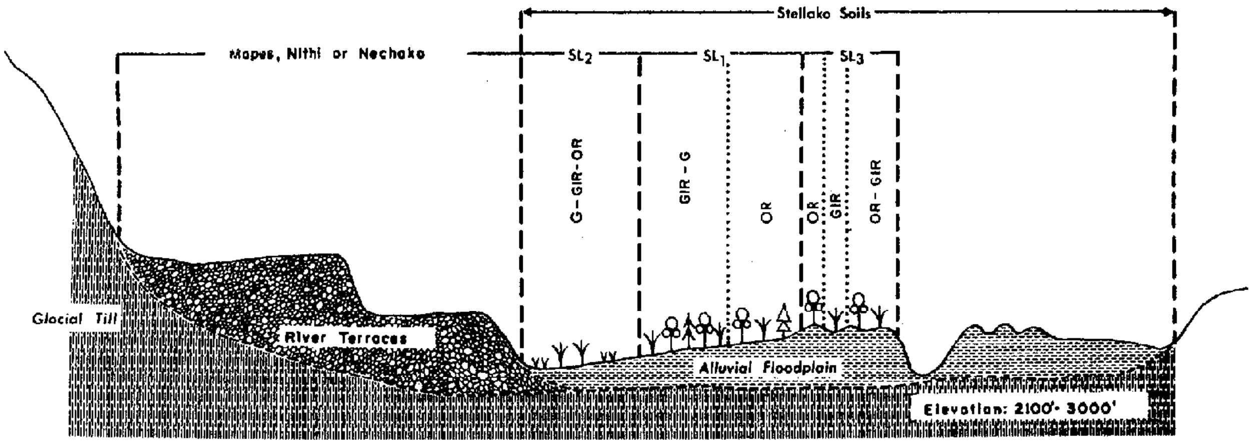
The Snodgrass association is of very minor occurrence and was mapped exclusively in complexes with till associations in a few map units covering 2,682 acres or 0.08% of the map sheet.

M a p U n i t s

Symbol	Dominant Subgroup	Significant Subgroup	Comments
S01	Orthic Dark Gray	Rego Dark Gray Orthic Regosol	

Stellako Association

The Stellako association consists of soils developed on floodplain deposits. It occupies bottom lands along present streams on lateral accretions, braided channels and oxbows. The very coarse to medium and fine textured alluvium is an erosional product from the surrounding lacustrine and till deposits. It stretches through main river valleys for miles and ranges from almost a mile to only a hundred feet wide.



Physiographic Setting

The topography of Stellako soils varies from nearly level to undulating or gently sloping (0.5-5% slope); minor areas are gently to moderately sloping (6-15% slope). The elevation ranges between 2,100 to 3,000 feet, with major areas between 2,100 and 2,600 feet. The most common textures of the surface and subsoil are sandy loam and silt loam. Coarser textures or loamy sand and sand or finer textured of silty clay loam are less common. Gravelly textures occur, particularly where creeks from side valleys join the main stream. The majority of these soils are flooded in the spring and some have quite high water tables for the rest of the year. They are imperfectly to poorly and very poorly drained. The higher areas, usually farthest from the stream, represent a minor percentage of the Stellako soils and are well drained.

Most of the Stellako soils have developed under the prevailing influence of moisture. Some of them are saturated with water almost permenently, some for most of the year, and some for a shorter period. Blue-gray gleying, rusty mottling and/or dull colors indicate wet anaerobic conditions. These features of the profile regularly show degree of oxidation or reduction and according to such differences soils were classified as gleysols or gleyed Regosols. Gleysolic soils are subjected to reducing conditions of longer duration than Gleyed Regosols. The Rego and the Eluviated Humic Gleysol are the two predominant subgroups whereas the Orthic Humic Gleysol does not occur as often. They all have a dark surface mineral horizon more than 3 inches thick and many times a peaty layer above it. Leaching and clay movement of significance is taking place in the Eluviated Humic Gleysol. Other subgroups like the Rego Gleysol or carbonated gleysolic soils occur, but in minor extent.

There is a range of plant species on these soils reflecting the variation in wetness. Willows are widespread and cottonwood is scattered. Some white spruce, aspen and birch are found in certain locations. Also common are many other moisture loving species of shrubs besides sedges that grow abundantly. Moss cover and species depend on the thickness of the organic layer on the surface and on the wetness of the soil.

Gleyed Regosolic soils are somewhat similar to Gleysols, but are exposed to excessive moisture for a shorter period or only in the subsoil and parent material. Their colours are not as dull, gleying is not very pronounced and mottling usually starts in the upper subsoil. The less wet conditions are sometimes due to their position in relation to the river level and sometimes to their coarser sandy textures or both. The natural especially minor vegetation is similar to that of gleysolic soils, but some lack of moisture during the growing season has an effect on growth, and the presence and abundance of some species.

Within the Stellako soils there are some areas of well drained, usually coarser soils. They have very weak or no profile development and are included in the Orthic Regosols. Presently the major vegetation on these soils is composed of lodgepole pine and aspen. Commonly the understory shows poor growth.

Stellako soils are not very extensive and were mostly mapped in complexes with other soils on river terraces and with organics. They cover 29,453 acres or 0.8 % of the map sheet.

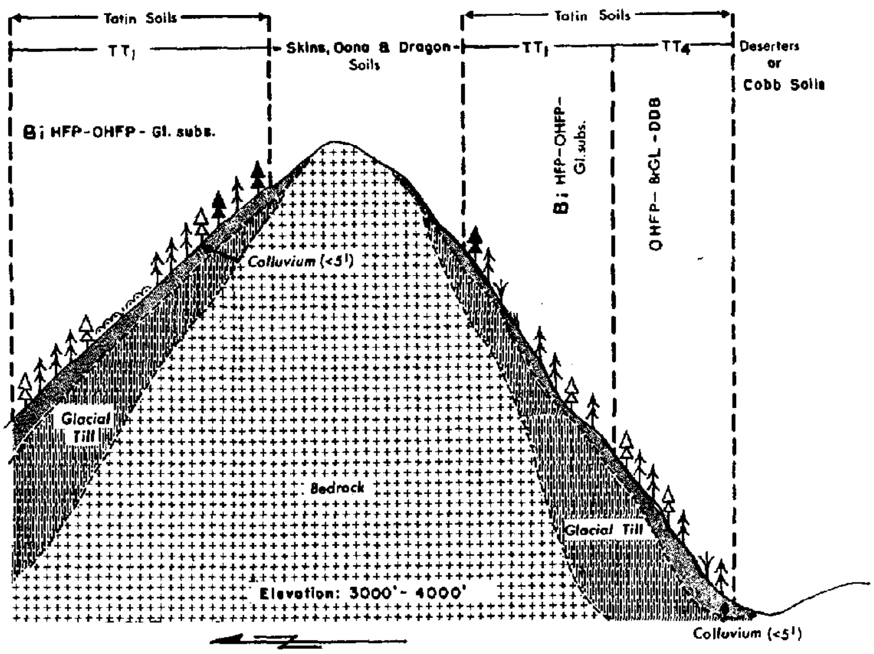
These soils are mostly under forest; while some areas near settlements are used as pastures or for hay production.

Map Units

Symbols	Dominant Subgroup	Significant Subgroup	Comments
SL1	Gleyed Orthic Regosol	Gleysolic soils Orthic Regosol	These are more uniform areas with less oxbow, stream scars and back swamp areas where gleysolic soils occur.
SL2	Gleysolic soils	Gleyed Orthic Regosol Orthic Regosol	These areas are more wet and interspersed with shallow organic deposits.
SL3	Orthic Regosol	Gleyed Orthic Regosol	Only a minor portion of this unit is under the influence of excessive moisture.

Tatin Association

The Tatin association is developed on colluvium overlying glacial till on very steep and extremely steep slopes (over 30%). The texture ranges from moderately coarse to moderately fine, with a coarse texture as a minor component. Stone content varies from moderate to excessive. The thickness of colluvium varies from three to five feet. Colluvial deposits are often intermixed with the glacial till deposits or shallow to bedrock deposits. Lime may occur in these deposits if limestone or other calcareous material occurs above the colluvial slopes.



Physiographic Setting

The elevation ranges between 3,000 and 4,000 feet. The textures of Tatin soils include gravelly or stony sandy loam as the most widespread and gravelly or stony loam or clay loam to a lesser extent. These soils are well to moderately well drained with moderate permeability. Seepage areas occur at the foot of slopes, but form too low a percentage of the map units to be recognized.

The Tatin association comprises Bisequa and Orthic Humo-Ferric Podzols, Brunisolic Gray Luvisols and Degraded Dystric Brunisols. A thin ashy layer 1 to 4 inches thick below the forest litter is characteristic for Podzols. Diagnostic for all Humo-Ferric Podzols in this area is a reddish-brown subsurface layer up to 12 to 15 inches thick. The dark brown, rusty color results from iron, aluminum and organic matter accumulation. This layer is very friable and has well developed granular or subangular blocky structure. Bisequa Humo-Ferric Podzol profiles also have a clay accumulation layer, usually below 20 to 24 inches depth. The subsoil as a transitional zone has some qualities of both the surface and the parent material. It is slightly brownish in the upper part, becoming pale and more compact with depth. It has weakly expressed subangular blocky structure.

The Degraded Dystric Brunisol and the Brunisolic Gray Luvisol are morphologically similar to the Humo-Ferric Podzols. The reddish-brown surface horizon is sometimes thinner than in Podzol soils, but the most important difference is that it contains less iron and aluminum oxides. The clay accumulation layer in the Brunisolic Gray Luvisol corresponds to a similar layer in the Bisequa Humo-Ferric Podzol.
Mixed Engelmann spruce and lodgepole pine forest presently occupy Tatin colluvial slopes with either of the two tree species predominant. At the higher elevations alpine fir becomes the prevalent tree species. Thick shrub cover occurs where tree canopy is not very dense or at the foot of slopes where more moisture is available. The moss cover is thick and composed of species characteristic of a moist, podzolic habitat.

The Tatin association was mapped mostly in complexes with soils on glacial till and shallow to bedrock, because slopes covered uniformly with deep colluvium are rarely found. These soils occupy 12,511 acres or 0.35% of the map sheet.

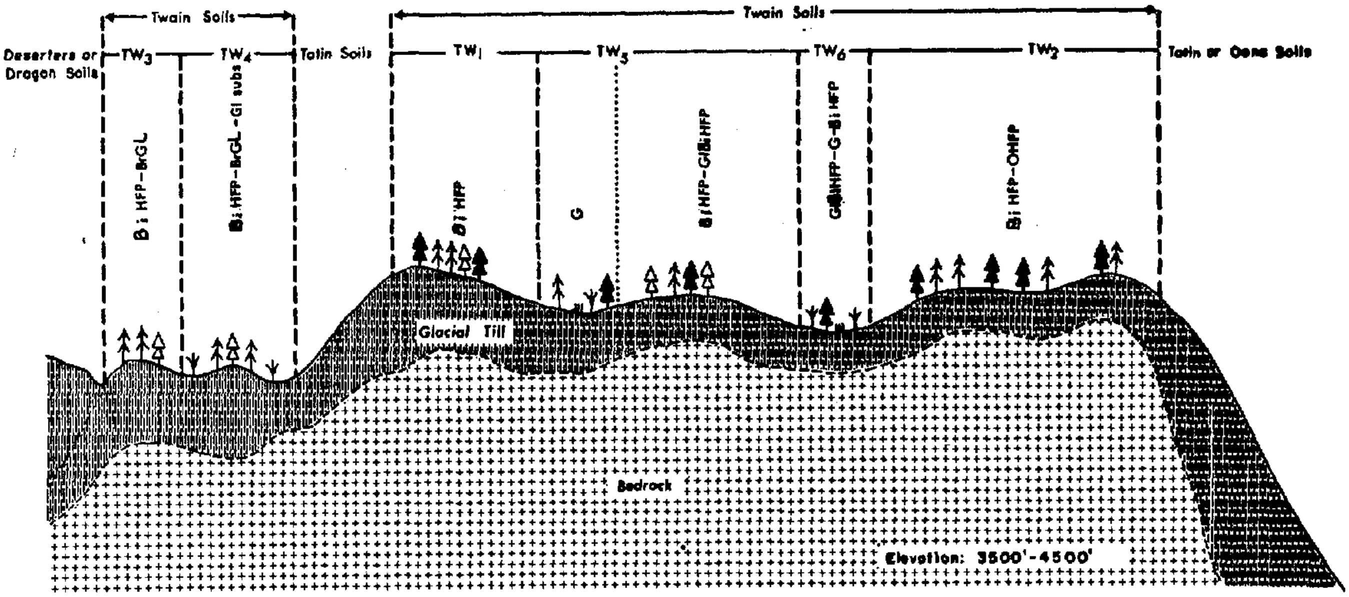
It is entirely under forest and no other uses are contemplated.

Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
TT1	Bisequa Humo-Ferric Podzol	Orthic Humo-Ferric Podzol Gleyed subgroups	This map unit occupies more moist areas on shaded north, northeast and northwest slopes. It is also the more extensive of the two Tatin association members.
TT4	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol Brunisolic Gray Luvisol	This mapping unit covers somewhat drier slopes on lower elevations within the association range or south aspects on higher elevations. In a mixed forest lodgepole pine usually predominates over Engelmann spruce.

Twain Association

The Twain association consists of soils developed on glacial till deposits on high plateaus, and steep mountain slopes. The basal till is of variable thickness - shallow in mountainous regions where many rock humps and peaks protrude, but fairly deep on undulating or gently sloping areas and on foothill positions. The texture of the till is medium to moderately fine. The gravel and stone content is usually moderate. Parts of the steeper slopes may be covered by shallow colluvium. The Twain association is found at higher elevations above the Barrett and Deserters associations.



Physiographic Setting

The topography varies from gently rolling and steeply sloping (6 to 30%), to complex very steep (30-60%) and extremely steep (over 60%) slopes in rugged mountain regions. The elevation ranges between 3,500 and 4,500 feet. The texture of the surface soil varies from gravelly sandy loam to gravelly loam, and the subsoil texture is mostly gravelly loam, but gravelly clay loam also occurs. No lime could be detected in the soil profile or the upper part of the parent material. Permeability is moderately low in the upper part of the solum and low in the lower part and parent material because of compactness and finer texture. The average depth to unchanged parent material is about four feet.

The Twain association belongs to the Humo-Ferric Podzol great group of soils. They are characterized by a thin (1 to 4 inches thick), ashy, leached layer below the forest litter, and a twelve to fifteen inch thick reddish-brown layer of hydrated iron-aluminum and organic matter accumulation. This layer is diagnostic to all podzolic soils. Organic litter on the surface varies in thickness from two to four inches. The Bisequa Humo-Ferric Podzol, moderately well drained, is the most widespread soil in the Twain association. Besides the ashy and the iron-aluminum layer, on the surface it has another leached layer above a clay accumulation horizon in the subsoil. The clay accumulation occurs below twenty to twenty-four inches from the surface. The latter is more compact than the surface horizons and of subangular or pseudoplaty structure with grayish to slightly brownish color. The Orthic Humo-Ferric Podzol soils lack this horizon of clay accumulation or have it very weakly expressed or deeper in the subsoil.

The forest cover is composed of Engelmann spruce and alpine fir with the predominance of either depending on site quality and stage of succession. Alpine fir is more abundant on higher elevations, becoming almost exclusive at an altitude of 4,500 feet. Lodgepole pine is of minor occurrence and generally is the first tree to establish following a fire. The Bisequa Humo-Ferric Podzol has the most favourable moisture conditions for forest growth due to the range in elevation, higher precipitation, and lower evaporation due to cool temperatures. The shrub layer is well developed if it is not hindered by tree density and is composed of species preferring acid soils and higher elevations. The moss cover is thick and composed of species preferring a moister habitat.

Somewhat similar to the Bisequa Podzols are the Brunisolic Gray Luvisols which occur in certain areas with the other soils of the Twain association. They correspond to the Deserters soils with a leached, ashy surface layer, thinner than in Podzols, and a brown layer below also thinner or of a weaker reddish-brown color and having a lower accumulation of iron and aluminum oxides.
Lodgepole pine and Engelmann spruce are the main tree species. Some stands are invaded by alpine fir and some have it as an understory. The shrub layer depends on the density of the stand, but generally is fairly abundant. The moss cover is usually thick.

Fairly flat and depressional areas of soils of the Twain association where no runoff exists, are moisture accumulation sites with gleyed and gleysolic soils. Some gentle slopes situated below the till plateaus or mountain peaks are continuously fed by seepage water and have a similar kind of soil. Such areas occupy a relatively large acreage. Gleyed soils increase the forest growth rate, but so much water is present in the Gleysolic soils that insufficient oxygen is available with the result that tree growth is much reduced. Water in the seepage areas is aerated, allowing good forest growth.

The Twain association is the third largest covering 240,408 acres or 6.66% of the map sheet.

It is under forest and no other uses are contemplated.

Map Units

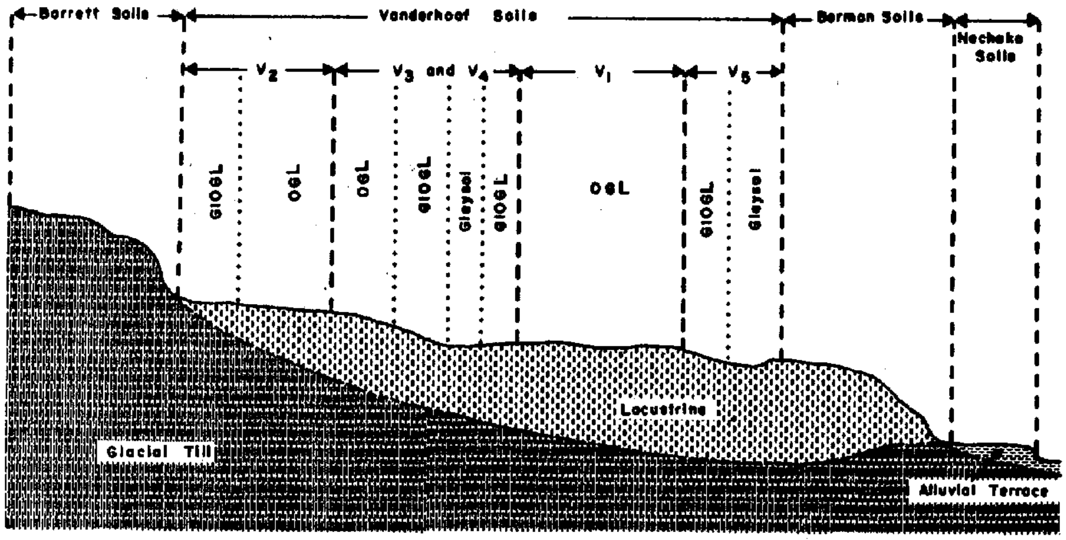
Symbol	Dominant Subgroup	Significant Subgroup	Comments
TW1	Bisequa Humo-Ferric Podzol		This unit occupies a few smaller areas of moderately well drained Twain soils (and is mapped mostly in complexes with Dragon or Oona associations).

Map Units (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
TW2	Bisequa Humo-Ferric Podzol	Orthic Humo-Ferric Podzol	Significant inclusions of Orthic Humo-Ferric Podzol implies some coarser textured areas where no appreciable clay movement into subsoil is taking place. This map unit occurs on very steep slopes and often in combination with colluvial soils.
TW3	Bisequa Humo-Ferric Podzol	Brunisolic Gray Luvisol	In some map units with drier souther exposures or with a part of a unit with somewhat finer surface texture only a Brunisolic surface horizon has developed. These are classified as Brunisolic Gray Luvisol moderately well drained soils.
TW4	Bisequa Humo-Ferric Podzol	Brunisolic Gray Luvisol Gleyed subgroups	This map unit is very similar to TW3, but for some seepage or flat areas where gleyed, imperfectly drained soils occur.
TW5	Bisequa Humo-Ferric Podzol	Bisequa Humo-Ferric-Podzol Gleyed subgroups Gleysolics	Percentage of flat, depressional or seepage areas with gleyed and gleysolic soils, imperfectly to poorly drained, is fairly large in this map unit. These are flat to undulating till plateaus.
TW6	Gleyed Bisequa Humo-Ferric Podzol	Bisequa Humo-Ferric Podzol Gleysolics	Depressional and seepage areas are in predominance in this map unit.

Vanderhoof Association

The soils of the Vanderhoof association were developed from glacio-lacustrine clay sediments. They were deposited in the Vanderhoof laking basin during the retreating and decay stage of the last glaciation. The thickness of the deposits varies according to the location within the basin, from a few feet at the edges and other shallow parts of the glacial lake to more than 260 feet in the deepest portion. The clays are varved with laminations from $\frac{1}{4}$ to 8 inches thick (14). Judging by a few deep cuts the clays are underlain by silts within 10 to 12 feet of the surface. Some pebbles and stones are scattered through the area south of Vanderhoof, this is caused by the re-advance of the ice (14).



Elevation: 2200'- 2600'

Physiographic Setting

The topography is level to undulating and moderately rolling. Strongly rolling areas occur where the shallow lacustrine deposit overlies a drumlinized till plain. The elevation ranges between 2,200 and 2,500 feet. Silty clay loam and silty clay are the most common textures of the shallow surface layer, while clay and silty clay textures occur in the subsoil and parent material. The soil is predominantly well drained and slowly permeable. The depth to unchanged or slightly changed parent material averages 3 feet. Lime is leached out of the soil profile and upper part of parent material in most cases. Root penetration through the subsoil occurs but not to a great extent.

The Vanderhoof association includes Gray Luvisol and to a minor extent Gleysolic soils. The general characteristic of Gray Luvisol soils is a light colored horizon at the surface and a clay and fine clay layer of accumulation in the subsoil. The Orthic Gray Luvisol is by far the most widespread soil in the Vanderhoof association. The whitish leached layer below the thin leaf mat is 3 to 6 inches thick with moderately to well developed platy structure and hard consistence when dry. The layer with

more fine clay than the layers above or below occurs between 6 and 24 inches depth and can be subdivided into an upper part with well developed angular blocky structure and a lower part where varving is discernible. Although hard when dry the clods of aggregated soil can be crushed without much difficulty with the bare hands.
Presently aspen is the main tree species on these soils but some scattered white spruce and lodgepole pine also occur. The shrubs and herbs are generally abundant. Some stands in the south half of the area have a light to medium dense pinegrass cover.

Gleyed Orthic Gray Luvisol soils are imperfectly drained with a somewhat duller colored layer than in the Orthic Gray Luvisol soils. The surface organic litter is thicker, but the most recognizable features are mottling in subsoil and some gleying in the lower subsoil and upper part of parent material. This is caused by a temporary higher water table. Abundant and more vigorous growth and a composition of moisture loving vegetation are the differences between these and the well drained Orthic Gray Luvisol soils.

Gleysolic soils are poorly drained and include mainly three subgroups: the Eluviated Humic Gleysol, the Rego Humic Gleysol and the Carbonated Humic Gleysol. A thick organic mat on the surface and a dark mineral horizon below it is their common feature. A pale bluish color of the subsoil (gleying) with rusty spots (mottling) indicates the prevailing influence of wetness on these soils, mostly in form of a high water table. The Eluviated Humic Gleysol, (the least wet) is also characterized by a pale, leached subsurface and a clay accumulation in the subsoil. The forest growth on Gleysolic soils depends on the degree of water saturation. If the water table is very close to the surface most of the year, the forest growth is inhibited or prevented and only water tolerant plants like sedges and if sufficiently acidic, black spruce can grow. If saturation with water lasts only a part of the growing season, the forest growth is enhanced. White spruce with scattered aspen and birch are the trees covering such soils. Moisture loving shrubs and mosses are abundant.

The Vanderhoof association is quite extensive and was mapped in the middle portion of the east half of the map area. It covers 130,719 acres or 3.62% of the map sheet.

Vanderhoof soils are partly under forest and partly cultivated. During the last 4 to 5 decades a large acreage of flat to undulating areas have been cleared for agricultural production. More land is added annually to this use.

Map Units

Symbol	Dominant Subgroup	Significant Subgroup	Comments
V1	Orthic Gray Luvisol		Well drained and most extensive of the Vanderhoof soils.

M a p U n i t s (Cont'd)

Symbol	Dominant Subgroup	Significant Subgroup	Comments
V2	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol	This map unit includes some low lying slightly depressional areas or bottoms of slopes with seepage positions, where imperfectly drained gleyed soils occur. Better forest stands and more abundant lower vegetation can be expected in such locations.
V3	Orthic Gray Luvisol	Gleyed Orthic Gray Luvisol Gleysolics	Similar to V2, but has a greater percentage of moist areas and wetter conditons in depressions which cause Gleysolic soil formation. In most cases such conditions enhance forest and lower vegetation growth by ample water supply during the growing season.
V4	Gleyed Orthic Gray Luvisol	Orthic Gray Luvisol Gleysolics	Gleyed soils predominate. This map unit occupies certain areas where flat to depressional topography prevails. These are the best forest sites with enough moisture throughout the growing season for optional tree growth.
V5	Gleysolics	Gleyed Orthic Gray Luvisol	This map unit is wetter than V4 and has predominantly Gleysolic soils. It occupies depressional areas where in part forest growth is inhibited by continuous excessive moisture.

B. Description of Vegetation Types

Dissimilarity analysis of 56 sample plots resulted in 8 interim[1] vegetation types.

1: Spruce-highbush cranberry - bunchberry - moss

The tree canopy of this vegetation type is composed of trembling aspen and white spruce, frequently accompanied by lodgepole pine on better drained soils or black cottonwood on wetter sites.

The shrub layer may vary from moderate to dense, consisting of highbush cranberry and black twinberry interspersed with trembling aspen suckers and northern rose. White spruce regeneration, sitka alder, willows and lower bushes of saskatoon, raspberry, flat-topped spirea and soopolallie are often found among the former shrubs.

Although the herb layer may be dominated by sarsaparilla or common horsetail, always present are false Solomon's seal, bunchberry, twinflower, pink wintergreen, one-sided wintergreen and trailing raspberry. Heart-leaved arnica, showy aster, aster species, small mitrewort, sweet cicely, coltsfoot, american vetch and light requiring disturbance plants, common fireweed, northern bedstraw, glaucous strawberry and creamy-flowered peavine are often found.

The medium-thickness continuous moss layer is dominated by common moss. Patches of layered moss are always found. Patches of feather moss are often scattered through this layer.

This vegetation type is found at lower elevations (< 3500') on well to imperfectly drained soils of good moisture-holding capacity, or on coarser soils with a high watertable or a good moisture supply. The vegetation type is found on slightly acidic to near neutral soils.

The variability of the herbaceous layer suggests that this vegetation type could be divided into types more closely associated with specific site qualities.

The vegetation type represents a seral stage to the white spruce climax of the transition (SBITW) region.

2: Trembling aspen - black twinberry - rose - cowparsnip

Trembling aspen is the single species dominating the tree canopy since the lush herb growth strongly hinders the establishment of white spruce. Black cottonwood may be found where high watertables occur.

In the usually light shrub layer, small amounts of trembling aspen suckers, northern rose, black twinberry willows, white spruce regeneration, saskatoon, snowberry and raspberry are always found. Flat-topped spirea may occur in the lush herb layer.

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1 These samples were included in a more comprehensive analysis presently under preparation by J.W.C. Arlidge of B.C.F.S., Research Division.

The latter is characterized by the conspicuous cowparsnip, tall larkspur and golden rod. False Solomon's seal, meadow roe, american vetch, asters, starflower and the less shade tolerant plants, yarrow, northern bedstraw, glaucous, strawberry, and creamy-flowered peavine are always in the herb layer. Baneberry, wheatgrasses, stemmed low pussytoe, sarsaparilla, showy aster, bluejoint, 6-leaved bedstraw, geraniums, large-leaved yellow avens, sweet cicely, timothy, bluegrasses, trailing raspberry, Columbia needle grass, dandelion and violets are frequently a component of this lush herb layer.

The moss layer often consists of patches of brachytheciums, common moss or layered moss. The annual supply of leaves and herbaceous litter results in a thin layer of mull humus.

The soils on which this herb rich vegetation type occur, are well to moderately well drained, rich in organic material, and of good moisture status due to finer textures or sub surface moisture supply. This pioneer type may be expected to develop only slowly towards its climax of white spruce because of heavy competition between plants.

3: <u>Trembling aspen - saskatoon - bluejoint - coltsfoot</u>

The tree canopy of this vegetation type is formed by dominant lodgepole pine and trembling aspen. An occasional white spruce occurs in such stands.

In the often dense shrub layer, trembling aspen, northern rose, black twinberry, willows, saskatoon, snowberry, soopolallie, the sometimes dominant Douglas spirea, and some scattered white spruce regeneration are always present. Flat-topped spirea and highbush cranberry are frequently associated with this vegetation type.

In the well developed herb layer, common fireweed, bluejoint, showy aster coltsfoot, bromegrasses, bluebell and the less conspicuous bunchberry, twinflower, pink wintergreen, one-sided wintergreen, large ricegrass, trailing raspberry, and dwarf blueberry are always present. A great number of moisture-loving species may be found associated with the former species. (See list of species in key in appendix).

The virtually masked moss layer is formed by common moss and layered moss. Patches of mniums, feathermoss and/or red-stemmed pipecleaner may be found mixed in with the former.

This vegetation type is found on well to moderately well drained fine textured soils, in which relatively little organic material remains in the upper layer. The insulating moss layer will keep the soil temperatures low.

4: <u>Spruce - highbush cranberry - oakfern - cowparsnip</u>

Alpine fir and frequently Engelmann spruce or overmature lodgepole pine make up the tree canopy of this vegetation type.

In the shrub layer, mountain bilberry and often abundant alpine fir regeneration are always present among frequently associated Engelmann spruce regeneration, black twinberry, devil's club, northern black current, prickly gooseberry, raspberry and the often abundant thimbleberry. Sitka alder may form a fairly dense "tall shrub" layer.

The light herb layer is characterized by the presence of heart-leaved arnica, dwarf raspberry, stiff club moss, and one-sided wintergreen. Bunchberry is also always present, although sparsely so. A great number of shade tolerant moisture-loving plants frequently occur in association with the above. (See list in key on page).

The continuous, medium to thick moss layer is composed of feather moss, common moss, and frequently barbilophozia, layered moss and mniums.

This medium elevation vegetation type is found on moist well to moderately well drained tills, varying from moderately acidic to very acidic at the main rooting depth. It represents an overmature seral stage or turnover stage to the Alpine fir - Engelmann spruce climax.

The "Picea-Viburnum - Gymnocarpium - Heracleum" type, which was reported for the adjacent Smithers-Hazelton area, represents a community type that fall within the more broadly defined "Alpine fir - blueberry - wintergreen - layered moss" vegetation type.

5: Alpine fir - blueberry - oakfern - feather moss

In the tree canopy, the always present Alpine fir, may be accompanied by black spruce in the bogs or lodgepole pine in sometimes better drained sites.

Alpine fir regeneration and often black spruce or white spruce, are found amongst the always present mountain bilberry, black twinberry and prickly gooseberry. Depending on the specific habitat under consideration, one or more of several shrubs may be encountered.

The variable herb layer, in which heart-leaved arnica, dwarf raspberry, stiff club moss, bunchberry, twinflower, coltsfoot, oakfern, small mitrewort, valerian blue-joint, and sedges are always found, may be dominated by bunchberry, oakfern or horsetails. Depending on the quality of the site, a variety of species is frequently found amongst the above constants.

The moss layer may vary considerably from relatively thick under a heavy herbaceous cover to a thick layer of peat moss in bogs. Feather moss, common moss, layered moss and mniums are always present. Frequently found are brachytheciums, large cushion moss, timmia and red-stemmed pipecleaner.

This vegetation type occurs on imperfectly to poorly drained soils. It represents a wet - mature seral to near climax, edaphic condition.

6: Lodgepole pine - peavine - bastard toadflax - cusion moss

The tree canopy of this vegetation type consists of lodgepole pine, frequently mixed with clumps of trembling aspen and/or scattered white spruce.

In the shrub layer regeneration of white spruce, scattered lodgepole pine, frequent trembling aspen suckers, and where the conditions are suitable, Alpine fir or paper birch are encountered. The usually sparse shrub layer, consists of flat-topped spirea, northern rose, soopolallie, taller willows which are frequently accompanied by Sitka alder, saskatoon, velvet-leaf blueberry and/or common juniper.

The herb layer is sparse. It is composed of scattered twinflower, glaucous strawberry, creamy-flowered peavine, bunchberry, pinegrass, common fireweed, large ricegrass, dwarf blueberry, northern bedstraw, kinnikinnick, bastard toadflax, woods snapdragon, pink wintergreen and frequently one or more of the following species: yarrow, heart-leaved arnica, asters, showy aster, spiked wood sedge, indian paint brush, loosely flowered little ricegrass, one-sided wintergreen, greenish flowered wintergreen, and violets.

The moss layer is usually thin. It consists of common moss, interspersed with patches of large cushion moss. Small amounts of layered moss and feather moss and sometimes abundant greyish foliose lichen are frequently associated with the former mosses.

This vegetation type occurs on alluvial and coarser lacustrine soils of low organic content. These well drained soils of low moisture holding capacity are susceptible to surface draught. These soils must be considered susceptible to degradation under repeated or intensive disturbances.

7: Spirea - peavine - aster - twinflower

The tree canopy of this vegetation type may vary in composition. Lodgepole pine, trembling aspen, or a mixture of both with or without scattered white spruce may be found. The warmer extreme of this vegetation type may support Douglas-fir.

The shrub layer may be moderately dense and high. It consists of flat-topped spirea and northern rose, frequently in association with white spruce regeneration, trembling aspen suckers, paper birch regeneration, saskatoon, black twinberry, soopolallie, and/or highbush cranberry.

The light to moderately dense herb layer consists of twinflower, glaucous strawberry, creamy-flowered peavine and asters. Frequently associated with the former species are yarrow, some scattered sarsaparilla, kinnikinnick, heart-leaved arnica, pinegrass, spiked woods sedge, Hooker's fairybell, common fireweed, northern bedstraw, large ricegrass, pink wintergreen, one-sided wintergreen, greenish-flowered wintergreen, scattered false Solomon's seal and meadow roe. The thin and patchy moss layer consists of common moss, hairy-cap moss, and fruticose lichens. Patches of large cushion moss and layered moss may also occur.

This vegetation type occurs on medium textured soils in exposed or shedding positions. The intensive disturbance, which gave rise to the early seral condition, removed the important humus layer, thus permitting surficial droughts to occur. Re-establishment of usually the white spruce climax vegetation is expected to be slow until sufficient shading from tree crowns will prevent drying of the surface.

8: Lodgepole pine - dwarf blueberry - hairy-cap moss - lichen

This vegetation type is characterized by a high degree of variability, thus reflecting the significance of the depth of the soil over the underlying bedrock. The often open to parkland-like tree canopy consists of lodgepole pine frequently accompanied by scattered spruce and/or paper birch.

Regeneration of lodgepole pine, Alpine fir, spruce, and willows are constant components of the shrub layer. Aspen suckers are frequently found as well. The lower part of the variable shrub layer is formed by flat-topped spirea, northern rose, saskatoon, common juniper and mountain bilberry. Also Rocky Mountain maple, prickly gooseberry, raspberry, and highbush cranberry may be found in this layer.

The similarly variable, but never lush, herb layer consists of twinflower, scattered yarrow, frequent clumps of stemmed low-pussytoe, occasional sarsaparilla, often frequent showy aster, occasional Hooker's fairybell, fescues, a few rattlesnake plantain, frequent hawkweed, some little ricegrass, rare false Solomon's seal, some common fireweed, one-sided wintergreen and frequent dwarf blueberry. Frequently associated are a great variety of species generally indicating the range of conditions found on the sites. The moss layer is usually thin. It is composed of common moss interspersed with patches of fruticose lichens, small cushion moss, hairy-cap moss and often minor amounts of feather moss.

This vegetation type is found at low to medium elevations on well to rapidly drained, usually shallow soils. Under influence of fire disturbance, the site quality would likely deteriorate rapidly.

The described vegetation type represents a relatively young seral stage of an Engelmann spruce - Alpine fir climax.

IV USES AND MANAGEMENT OF THE SOILS

Forestry

Introduction

The Nechako-Francois Lake report area includes portions of the Fort St. James Special Sales Area, Pulp Harvesting Area 1 and 4, and portions of the Stuart Lake, Ootsa, Burns Lake, Babine, Fort St. James and Nechako (P.S.Y.U.'s).

Information on a number of forest management considerations is presented in Table 4. "Forestry Interpretations" and the following explanations apply to that table.

Average Forest Capability

The potential capability of each soil association to grow wood fibre was determined by the location and measurement of forest productivity plots. The methodology of locating and measuring forest productivity plots, and assessing the capability of the soils is outlined by Kowall, 1971. The seven capability classes are based on a productivity range as follows:

Class 7 has a mean annual increment range of 0-10 cubic feet per acre per year; Class 6, 11-30; Class 5, 31-50; Class 4, 51-70; Class 3, 71-90; Class 2, 91-110; Class 1, 111-130; Class 1a, 131-150 and Class 1b, 151-170. Class 1 is assumed to have no limitations to tree growth and therefore has no subclass designation. The subclasses used to indicate limitations to tree growth for classes 2 to 7 are: A - high evapotranspiration due to southerly and westerly exposure, D - physical restriction to rooting by dense or consolidated layers, other than bedrock, H - low temperatures, I - periodic inundation, M - soil moisture deficiency, R - restriction to rooting by bedrock, S - a combination of soil factors which collectively lower the capability class, and W - soil moisture excess.

Average Percent Slope

The percent slope was broken into three categories; (1) less than 15%, (2) less than 30% and (3) greater than 30%.

Windthrow Hazard

Windthrow hazard ratings are based on such soil characteristics as texture, soil depth, slope and water table that control the development of tree roots and thus affect wind firmness. Rooting characteristics of the different tree species, local wind conditions and stand history are not taken into account.
Three ratings are given:

Low - Factors indicate windthrow is not likely. The effective rooting depth is generally greater than 36 inches, the soils usually medium textured, and the topography reasonably flat.

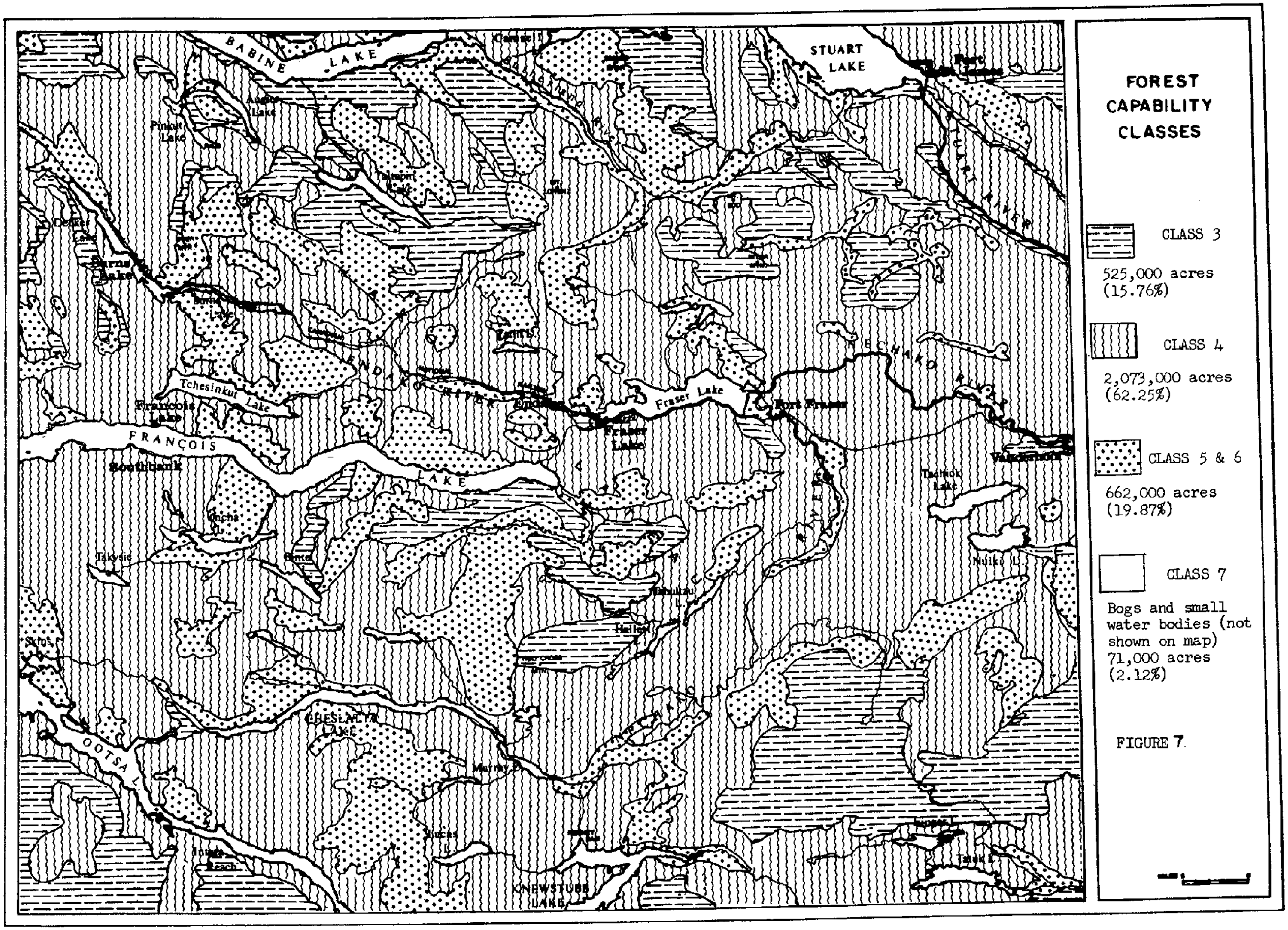
BABINE LAKE
STUART LAKE
Pinkut Lake
Decker Lake
Burns Lake
Tchesinkut Lake
Francois Lake
FRANÇOIS LAKE
Southbank
ENDAKO RIVER
Fraser Lake
Fort Fraser
NECHAKO RIVER
Vanderhoof
Tachick Lake
Nulki L.
Takysie
CHESLATTA LAKE
Murray L.
OOTSA
KNEWSTUBB LAKE
FOREST CAPABILITY CLASSES
CLASS 3
525,000 acres (15.76%)
CLASS 4
2,073,000 acres (62.25%)
CLASS 5 & 6
662,000 acres (19.87%)
CLASS 7
Bogs and small water bodies (not shown on map) 71,000 acres (2.12%)

FIGURE 7.

Moderate - Factors indicate some susceptibility to windthrow, but major problems are not likely. Where the topography is fairly flat the effective rooting depth is generally between 18 and 36 inches on fine textured soils, and deeper on coarse textured non-cohesive soils. Moderate windthrow hazard can occur on any soil texture on slopes greater than 30 percent.

High - Factors indicate that windthrow hazard is high. The effective rooting depth is generally less than 18 inches, the soils having any texture and the topography, any slope.

Plant Competition

This item refers to the rate of invasion by undesirable trees, and shrubs following harvesting. The ratings are based on soil characteristics and performance, and three are presented.

Low - Indicates that plant competition does not prevent adequate establishment of a desirable stand of trees.

Moderate - Indicates that plant competition delays the establishment and slows the growth of seedlings but does not prevent the development of a desirable stand of trees.

High - Indicates that plant competition prevents adequate establishment of a desirable stand of trees without site preparation.

Regeneration Potential

This interpretation indicates the potential for each soil association to regenerate tree cover to an acceptable level of stocking. Factors included in this interpretation are soil characteristics, climate, aspect, elevation, frost hazard, brush competition, and tree species. Three ratings are as follows:

Low - This rating indicates the potential for regeneration is low. Probability of success is very limited. Major regeneration problems can be expected and reseeding or replanting may be required throughout the area. Several years may elapse before an adequate stocking level is achieved.

Moderate - This rating indicates that some problem will be encountered in attaining a satisfactory stocking level. Usually regeneration is spotty and some replanting will be necessary.

High - This rating indicates that regeneration has a high probability of success. Few problems should be encountered in attaining good stocking levels.

Limits to Regeneration

The major limits to regeneration are indicated as follows:

(a) frost heaving - usually on finer textured soils
(b) low fertility - mostly associated with very coarse textured soils
(c) drought - mostly associated with very coarse textured soils
(d) soil moisture limitations - mostly associated with moderately coarse to coarse textured soils
(e) excess soil moisture
(f) high elevations - climatic (cold soil and air temperatures, short growing season)
(g) low elevations - climatic (high evapotranspiration especially on south and west exposures)
(h) surface slides - instability of soil surface (mass movement)
(i) shallow soils - shallow rooting medium (usually less than 20 inches)
(j) rockiness - rocks effectively reduce the soil rooting medium and limit soil moisture

Species to Plant

This column recommends the tree species that the soil, climate, and topographic factors indicate would be best suited for planting. They include alpine fir - alF, lodgepole pine - lP, black spruce - bS, and white spruce - wS, and trembling aspen - tA.

Natural Regeneration

These are the indigenous species that are likely to regenerate naturally.

Degree and type of soil damage by harvesting

This interpretation indicates the susceptibility of soils and other resources to incur damage during timber harvest. This includes timber removal, spur roads, slash burning, landing and other activities related to timber harvest operations. Damage is caused to soils by creating soil disturbance which may destroy soil structure, cause compaction and increase erosion. This may affect other resources through loss of timber production, lower water quality and yield, and loss of fisheries. Factors involved in making these ratings are soil texture, percentage of coarse fragments, slope and drainage.
The ratings are as follows:

<u>Low</u> - This rating indicates that soils and other resources are likely to incur minor damage.

<u>Moderate</u> - This rating indicates that soil and other resources are likely to incur moderate damage.

<u>High</u> - This rating indicates that soils and other resources are likely to incur major damage.

The type of soil or other resource damage anticipated during and subsequent to timber harvest operation includes:

(a) loss of soil structure
(b) increased compaction
(c) soil damage from skidding
(d) loss of soil organic matter
(e) loss of soil resource from skidding and erosion
(f) road waste damage to resources
(g) road construction damage
(h) increased erosion
(i) increased mass movement potential
(j) increased slide hazard
(k) stream sedimentation
(l) stream siltation

Table 4

Forestry Interpretations

Soil Association And Symbol	Average Capability and Limitation	Dominant Slope Range	Wind-Throw Hazard	Plant Compe-tition	Regener-ation Potential	Limits to Regeneration	Natural Regener-ation	Species to Plant	Damage from Harvesting: Degree	Damage from Harvesting: Type of Damage	Species Capability: lP	wS	bS	alF	tA	bCo
Alix AX	5M, 4M	<15	L-M	L	H-M	drought, low fertility	1P	1P	L	loss of organic matter	5-4	5	NS	5-6	5	NS
Babine BE	3D	<30	M	H	M	some frost heaving	wS, 1P	wS, 1P	H	soil compaction, loss of soil structure, erosion, stream siltation	3	3	NS	NS	3-4	NS
Barrett BA	4^{M}_{D}, 3S	<30	M	M	M-H	some frost heaving, slight soil moisture limitation	1P, wS tA	1P, wS tA	L-M	some loss of soil structure, compaction, stream siltation	4	4-5	NS	NS	4	NS
Berman BN	4^{M}_{D}, 3D	<15	M	M	M-H	frost heaving	1P, wS tA	1P, wS tA	M	soil compaction, loss of soil structure, erosion, stream siltation	4	4-5	NS	NS	4	NS
Cluculz CZ	4^{M}_{R}, 5^{R}_{M}	>30	H	L	L	shallow soils, rockiness, soil moisture limitations	1P	1P	H	loss of soil resource from skidding and erosion	4	5-4	NS	5	NS	NS
Cobb CB	3M, 4M	<30	L-M	L	M-H	soil moisture limitations	1P, wS	1P, wS	L	none	3-4	3-4	NS	4	NS	NS
Colony CY	4M, 3S	<15	L-M	M	M	soil moisture limitations	1P, wS tA	1P, wS	L	loss of organic matter	4-3	4-3	NS	NS	4	NS
Crystal CR	4M	<30	L-M	L	M-H	soil moisture limitations	1P	1P	L	none	4	4-5	NS	NS	4-5	NS
Dahl DL	5^{R}_{M}, 6^{R}_{M}	>30	H	L	L	shallow soils, rockiness, soil moisture limitations	1P	1P	H	loss of soil resource from skidding and erosion	5-6	6	NS	NS	6-5	NS

Table 4 (cont'd)

Forestry Interpretations

Soil Association And Symbol	Average Capability and Limitation	Dominant Slope Range	Wind-Throw Hazard	Plant Compe-tition	Regener-ation Potential	Limits to Regeneration	Natural Regener-ation	Species to Plant	Damage from Harvesting: Degree	Damage from Harvesting: Type of Damage	Species Capability: 1P	wS	bS	alF	tA	b
Decker DR	5^{R}_{M}, 6^{R}_{M}	>30	H	L	L	shallow soils, rockiness, soil moisture limitations	1P	1P	H	loss of soil resource from skidding and erosion	5–6	6	NS	6	NS	NS
Desert-ers D	3S, 4^{M}_{D}	<30 >30	M	M–H	M–H	some soil moisture limitations, some frost heaving	1P, wS	1P, wS	M	stream sedimentation	3	3	NS	4	4	NS
Dragon DN	4^{M}_{R}, 5^{R}_{M}	>30	H	L	L	shallow soils, rockiness, soil moisture limitations	1P, wS alF	1P, wS	H	loss of soil resource from skidding and erosion	4–5	5	NS	5	NS	NS
Drift-wood DD	5^{M}_{D}, 4^{M}_{D}	<30	M	L	L	soil moisture limitations, some frost heaving	tA, 1P	1P, tA	M	some loss of soil structure and compaction	5	NS	NS	NS	5	NS
Fort St. James FJ	4^{D}_{M}, 3D	<15	H	M	M	some frost heaving	1P, wS	1P, wS	H	loss of soil structure, erosion, stream siltation	4	4	NS	NS	4	NS
Kluk KK	5M, 4M	<15	M	L	H	soil moisture limitation	1P	1P	L	loss of organic matter, mixing of surface	5–4	5–6	NS	NS	5–6	NS
Knew-stubb KB	4M, 5M	<30	M	M	M–H	frost heaving	1P, wS	1P	M	soil compaction, loss of soil structure, erosion, stream sedimentation	4–5	5	NS	NS	5	NS
Mapes MS	5M	<15	L–M	L	H	soil moisture limitations, fertility	1P	1P	L	loss of soil organic matter, mixing of sur-face	5	5–6	NS	NS	5–6	NS

Table 4 (cont'd)

Forestry Interpretations

Soil Association And Symbol	Average Capability and Limitation	Dominant Slope Range	Wind-Throw Hazard	Plant Compe-tition	Regener-ation Potential	Limits to Regeneration	Natural Regener-ation	Species to Plant	Damage from Harvesting: Degree	Damage from Harvesting: Type of Damage	Species Capability: 1P	wS	bS	alF	tA	bCo
Morice M	4M, 5M	>30	M	L-M	M	soil moisture limitations	1P, wS	1P, wS	L-M	loss of soil organic matter, mixing of surface, erosion and steep slopes	4-5	5-4	NS	5	5	NS
Nechako N	3M, 4M	<15	L-M	M-H	M-L	N/A	wS, bCo 1P	1P, wS bCo	L	stream sedimentation	3-4	3-4	NS	NS	4	4-1b
Nithi NT	4M, 5M	<15	L-M	L-M	H	soil moisture limitations fertility	1P	1P	L	loss of soil organic matter, mixing of surface	3-5	3-6	NS	NS	4-5	NS
Oona ON	4^{M}_{R}, 5^{R}_{M}	>30	H-M	L	L-M	shallow soils, rockiness soil moisture limitations	1P, alF wS	1P, alF	H-M	loss of soil resource from skidding and erosion	4-5	5-6	NS	5	NS	NS
Organics O	7W	<5	H	L	L	excess soil moisture	none or bS	none or bS	L	N/A	NS	NS	7	NS	NS	NS
Ormond OD	5^{R}_{M}, 6^{R}_{M}	>30	H	L	L	shallow soils, rockiness, soil moisture limitations	1P, wS	1P	H	loss of soil resource from skidding and erosion	5-6	6-5	NS	NS	6-5	NS
Peta PA	4M, 5M	<15	L-M	L	H	soil moisture limitations, fertility	1P, wS	1P, wS	L	loss of soil organic matter, mixing of surface layer	4-5	5	NS	NS	5	NS
Pineview P	4^{D}_{M}, 3D	<15	H	M	M	frost heaving	1P, wS	1P, wS	H	loss of soil structure, compaction, erosion, stream siltation	4	4	NS	NS	4	NS

Table 4 (cont'd)

Forestry Interpretations

Soil Association And Symbol	Average Capability and Limitation	Dominant Slope Range	Wind-Throw Hazard	Plant Compe-tition	Regener-ation Potential	Limits to Regeneration	Natural Regener-ation	Species to Plant	Damage from Harvesting: Degree	Damage from Harvesting: Type of Damage	Species Capability: 1P	wS	bS	alF	tA	bCo
Pinkut PT	4M, 5M	>30	M	M	M	soil moisture limitations, surface slides	1P, tA wS	1P	M	soil erosion, roads increase mass movement potential	4	4	NS	5	4-5	NS
Pope PP	5^R_M, 6^R_M	>30	H	L	L	shallow soils, rockiness, soil moisture limitation	1P	1P	H	loss of soil resource from skidding and erosion	5	6-5	NS	NS	5-6	NS
Prairie-PR dale	5^D_M, 4^M_D	<15	H	L-M	L-M	frost heaving, soil moisture limitation	1P, tA	1P, tA	H	loss of soil structure, compaction, erosion and stream sedimentation	5	NS	NS	NS	5	NS
Ramsey R	4M, 3M	<15	L-M	L	H-M	drought, low fertility	1P, wS	1P, wS	L	loss of organic matter, mixing of surface	3-4	3-4	NS	5-4	NS	NS
Roaring RG	5M	>30	M	L	M	drought, low fertility	1P, wS	1P, wS	L-M	loss of organic matter, mixing of surface, erosion and mass movement potential	5	5-6	NS	NS	5-6	NS
Rock RO Outcrop	7R	>30	H	L	L	rockiness	none	none	none	none	NS	NS	NS	NS	NS	NS
Saunders SD	5H, 4H	>30	H-M	M	M	high elevation climate, frost heaving	alF, wS 1P	alF, wS 1P	M	soil erosion, roads increase mass movement potential	5-4	5-4	NS	5-4	NS	NS
Shass SS	7^C_R	>30	H	H	L	high elevation climatic, shallow soils, rocky	none	none	H	soil erosion, mass movement potential, stream siltation	NS	NS	NS	NS	NS	NS

Table 4 (cont'd)

Forestry Interpretations

Soil Association and Symbol	Average Capability and Limitation	Dominant Slope Range	Wind-Throw Hazard	Plant Competition	Regeneration Potential	Limits to Regeneration	Natural Regeneration	Species to Plant	Damage from Harvesting: Degree	Damage from Harvesting: Type of Damage	Species Capability: 1P	wS	bS	alF	tA	bC[illegible]
Skins SK	5^{H}_{R}, 6^{H}_{R}	>30	H-M	M	L-M	high elevation climatic, shallow soils, rockiness	alF, wS 1P	alF, wS	H-M	loss of soil resource from skidding and erosion	5-4	5-4	NS	5-4	NS	NS
Slug SL	4M, 5M	< 15	L-M	M-L	H	fertility, soil moisture limitation	1P, wS	1P, wS	L	loss of soil organic matter, mixing of surface	4	4	NS	NS	4-5	NS
Snodgrass SO	6^{A}_{M}	<30	M-L	L	L	soil moisture limitations, aspect	1P, tA	1P	L	loss of soil organic matter, mixing of surface, erosion on steep slopes	6	NS	NS	NS	6	NS
Stellako SL	3S, 4^{M}_{I}	<15	L	H	M-L	none	wS, bCo	wS, bCo	L	stream sedimentation	3	3	NS	NS	3-4	1b
Tatin TT	3S, 4H	>30	H	M	M	high elevation-climatic	alF, wS 1P	wS, 1P alF	M-H	road construction damage, soil damage from skidding, increased mass movement potential, stream siltation	3	3	NS	4	NS	NS
Twain TW	3S, 4H	>30 <30	M-H	M	M	frost heaving, high elevation -climatic	wS, 1P alF	wS, 1P alF	M	loss of soil structure, compaction, erosion, stream siltation	3	3	NS	4	NS	NS
Vanderhoof V	4^{D}_{M}, 3D	<15	H	L-M	M	frost heaving	1P, wS tA	1P, wS	H	loss of soil structure, increased compaction, erosion, stream sedimentation	4	4	NS	NS	4	NS

Agriculture

Land use

Agriculture in the area has basically developed on forage crop and livestock production. Besides economic motives (self sustained small farms, distance from the market etc.), climate is the main reason for such orientation. The properties of the soils under agricultural use also make a forage-livestock economy most desirable. These mostly fine and very fine textured soils would not stand the intensive cultivation required for many agricultural crops.

Tests conducted by the Prince George Research Station showed that perenial forage crops have an advantage by reason of their higher yields and their beneficial influence on soil properties, particularly structure. Alfalfa, red clover, alsike and sweet clover are well established in the area and should be used in combination with grasses like bromegrass, timothy, red canary grass and red fescue. Heavy clays like the Fort St. James and Pineview soils are not suitable for alfalfa due to poor moisture relationships. A red clover-grass mixture is well adapted to these soils, shows satisfactory productivity, and is probably the most used legume-grass combination in the area. Alsike and sweet clover are also widespread. Where alfalfa can be grown, a mixture of alfalfa with bromegrass is the most productive forage crop. The yield of forage crops vary a great deal. The average yield is about one ton of hay per acre. However, under good management forage crops should average about 2.5 tons per acre or better. Early harvesting gives better quality hay and often makes a second cut possible.

Cereal crops are not well adapted to the area and only earliest varieties of oats and barley can be grown with moderate success. These crops mature slowly and sometimes never reach maturity due to low temperatures in the latter part of growing season. Cereals should be grown only in rotation with legumes and grasses and should not comprise more than one third of the rotation. Oats and barley, when grown as companion crops with legumes and grasses, are used for green forage, silage or hay.

Some vegetable production such as potatoes, turnips, carrots and cabbage is carried out in a small way for home consumption but no commercial enterprise of such kind exists in the area. Within limits there is a good potential for such special crops, but efficient production methods, modern equipment and a readily available market are necessary to encourage it.

Soil fertility and fertilizer use

In order to be able to farm profitably one has to maintain soil fertility. In certain areas soils are most fertile when first broken and cropped while in others natural fertility is low for initial agricultural production. In the Nechako-Francois Lake area the soils have developed under forest in subhumid to humid climates where leaching is intensive and acid soil conditions prevail. As a result, there is a low natural fertility. In a portion of this area where agriculture was established and where it has a chance for further development due to somewhat better climatic conditions, Gray Luvisol soils predominate and all arable agriculture is confined to these soils. Gray Luvisol soils are known for their low organic matter and low nitrogen content and low natural fertility. Most of these soils are fine and very fine clayey soils which further aggravates their use because of unfavourable physical conditions. The structure of the plow layer is poorly developed and increased organic matter content is necessary to form more stable and durable aggregates. By this means porosity, permeability and moisture status of the soil is improved. Organic matter is a permanent source of nitrogen and to a lesser extent of some other elements necessary to sustain plant growth. It is also the most active part of the soil medium where micro-organisms thrive, continually decomposing organic matter and releasing nutrients from it and making them available to the plant root system. Addition of fresh organic matter to the soil is therefore a very important part of good soil management to keep its fertility at a satisfactory level. If livestock is a part of the farm operation usually barnyard manure is used to replenish the organic matter supply to the soil, otherwise a green manure crop is recommended.

Depleted nutrients are returned to the soil through use of commercial fertilizers. For the best results and largest commercial return it is necessary to conduct fertilizer tests to gain more insight into fertilizer need. A general idea about fertilizer requirements can be drawn from tests conducted by the Experimental Farm Prince George on three main agricultural soils in the area: the Vanderhoof, Driftwood and Pineview soils. Response to nitrogen application was noticeable in grains and grasses but not impressive, while application of sulfur alone gave a substantial increase in yields of legumes and grains. Applied with sulfur, nitrogen gave the most impressive results, sometimes doubling the yields of oats and barley. Phosphorus alone or with sulfur did not give much increase in yield either in grain or forage production, but when used with nitrogen, the yields would increase as much as 50% in certain cases. This indicates a partial compensation for lack of sulfur by presence of these two elements and/or their interaction in yields when applied together. The general conclusion drawn from these tests is that there is a high sulfur deficiency in all Gray Wooded soils in the area, particularly in Vanderhoof clay and there is a general need for nitrogen fertilizer but no apparent lack of phosphorus and potassium.

Soil Management

Soil conservation practices include all operations connected with soil and crop management to ease the problems of erosion, moisture and drainage. Past erosion marks are preserved on the landscape and excepting natural erosional processes are more or less consolidated by forces of stabilization. Vegetation, particularly forest stands, cover most of the area and have a stabilizing influence on soils. Erosion usually becomes a problem only when part of the land is taken out of its natural state, cleared and used for some other purpose, usually agricultural production. The damage from erosion is multiple. By removal of the finest particles and organic compounds the soil is depleted of nutrients but at the same time its physical properties deteriorate. The ability of the soil to sustain good vegetative cover is thus greatly diminished and its susceptibility to further erosion is increased. Corrective measures should be taken to prevent such occurrences and these procedures are effective in soil moisture preservation. Growing vegetative cover slows down leaching action of rain and lowers the runoff and erosion. When land of high erosion hazard like the fine clays and silts in the area are cultivated, vegetative and mechanical measures should be combined for runoff and erosion control. Even on positions less susceptible to erosion some of these soils are not well suited for agriculture due to their physical properties, and their tillage should be kept at the minimum.

Some signs of past wind erosion (duning) are apparent in landforms of the Mapes soils. These soils are stabilized now, but clearing and cultivation would expose them needlessly to renewed wind blowing.

In dry farming the lack of adequate soil moisture in summer months is usually a limiting factor of plant growth. With about 8 inches of rainfall during the growing season, the Nechako-Francois Lake area is usually deficient in moisture for most crops. Irrigation tests conducted by the Prince George Experimental Farm on the Vanderhoof soil show a brome-alfalfa mixture doubled its yield in normal years and produced three times as much in dry years compared to non-irrigated land. Four two-inch irrigation applications were required to maintain optimum moisture conditions when rainfall was normal and five applications in a dry season. Irrigation is out of the question for most farmers because of the prohibitive cost. Some farms do not have adequate water supply due to the distance from suitable water bodies.

The farmer has to cope with the problem by adjusting his farming practices to the dry summer condition in order to minimize its adverse effect and still produce a good forage crop to feed his animals. As trials on the same soil (Vanderhoof) in previously mentioned tests showed, the application of 200 pounds of ammonium phosphate per acre to a brome-alfalfa mixture increased the yield as much as irrigation in all but the driest seasons.

Thus adequate fertility is essential for the efficient use of soil moisture. Well distributed and adequately supplied nutrients encourage vigorous development of roots and their penetration deeper into the subsoil thus enlarging the area from which soil moisture can be drawn.

A similar comparison can be made between annual crops and perennials regarding effective use of stored soil moisture. Perennials like alfalfa with well developed, deep roots utilize moisture from a much larger area than annual crops with roots mostly in a plow layer. In the upper layer of the soil profile the moisture is least stable and in a dry period is depleted first. Perennials with the roots already developed start using water earlier in the spring than the annual crops. At that time more moisture is available even in the upper soil.

Many agricultural practices are aimed at the possibility of storing more water in the soil and preserving the existing moisture longer. Summer fallow is the practice most used in grain crop production in dry climates. It is not widely practised in this area of minimal grain production. Different tillage practices like subsoiling and contour cultivation on sloping land have some effect on diminishing runoff by slowing down water movement on the surface and leaving more time for water infiltration.

Some other practices like pulverizing the soil surface are not effective in reducing evaporation. Finely divided surface soil under the impact of rain becomes sealed and hard to infiltrate by water. The heavy clay soils of the area are almost impermeable. By growing perennials, cultivation is kept to the minimum and many adverse effects of it avoided (like pulverization, compaction, erosion hazard etc.).

Adequate cover provided by growing vegetation or residues on the surface of cultivated land helps to conserve moisture and diminish soil losses by runoff. Deep rooted plants like some perennials (alfalfa) not only make better use of available moisture but make water infiltration easier because spaces around living and dead roots serve as infiltration routes for water. Root penetration and opening of the subsoil is particularly important in heavy clayey soils of the area.

Water losses through transpiration are also very high, and useless if they are caused by weeds, which is very often the case in low intensity agriculture as practised in the surveyed area.

The maximum utilization of all available moisture is usually the goal in selecting the crop. Past experience and the above-mentioned irrigation and fertilizer tests show what is the best for the kinds of soil under the prevailing climate in the area.

Drainage

Excess water occurs in many areas on flood plain caused by flooding during high freshets or by seepage. A high water table persists throughout the year in lower positions, the soils are poorly drained and only natural moisture loving vegetation like reeds and sedges thrive in such locations. Major reclamation work would be required to rid these areas of surplus water and that hardly seems justified at this stage of agricultural development in the area. Low lying, and some areas adjoining hills on lacustrine plains also accummulate water from runoff, seepage or restricted subsoil drainage. Most of these soils are poorly drained and some of them have thick organic deposits on the surface. No drainage of any of these areas has been tried and they are used as a source of low quality hay or as a pasture in summer and fall.

Land Clearing

Dense forest growth and large size trees make land clearing very expensive. The use of modern land clearing equipment has facilitated and accelerated land clearing operations. Sometimes the ease and speed of such operation lead to the removal of trees from the land unsuitable for farming due to topography or some other adverse soil characteristic. When clearing land particular attention should be given to preserving the organic layer in the surface and prevention of exposing too much of the subsoil. Often forest litter is burned and part of it is deeply buried and the inactive subsoil brought to the surface. This causes a loss of fertility and deterioration of structure of the surface soil. Some cleared land is abandoned after being cultivated for a number of years and some have never been broken. Clearing of agriculturally marginal and unsuitable land may increase in the future, because the most suitable land is already alienated (privately owned). Proper steps should be taken to prevent such developments contrary to the land use planning initiated by the Canada Land Inventory.

Soil Capability Classification for Agriculture *

The soil capability classification is a grouping of soils according to their suitability and limitations for agricultural use. The seven capability classes in the Canadian system are designated by arabic numerals. Class one soils have few or no limitations and the widest range of use. The soils in other classes have progressively greater natural limitations.

The first three classes are considered capable for sustained production of the cultivated crops common to the area, the fourth class is marginal for sustained arable agriculture, the fifth is suitable for perennial forage and improved pasture, the sixth can be used only for natural pasture, while the seventh is not suitable for agricultural use.

The second level of this classification system is the subclass. The subclass indicates the major kinds of limitation within the classes. Each subclass is designated by one or more letters beside the class numeral, for example 5D.

The subclass denotations are:

C - Adverse climate
D - Undesirable soil structure and/or permeability
E - Erosion
F - Low fertility
M - Moisture limitation
P - Stoniness
R - Consolidated bedrock
T - Topography (slope)
W - Excess water
X - Cumulative minor adverse characteristics

The climate is the most important limitation imposed on soils in the area. This can be easily concluded from climatic data in the table 1 (page 15) and table 5 (next page). With a growing season of around 150 days; 1500 degree days, and averaging 50 to 60 days of frost-free period, a basic class 4 climate was established. A 5C rating was assigned to the areas above 3000 feet and to the frost pooling narrow valleys at lower elevations. Above 3400 feet in elevation a class 7 climate for agriculture occurs frequently. Above 5000 feet the climate is solely class 7. A 3C rating was applied to a narrow belt along Francois Lake.

Due to severe climatic conditions the best soil in the area cannot be rated better than Class 4. On the other hand since Class 5 is the upper limits of severity of limitations restricting land use for cultivation, all soils used for arable agriculture in the area are squeezed into two classes, Class 4 and 5. Soil properties as a means of distinguishing among them are very much subdued and many completely different soils are included in the same class. Class 5 particularly is a collection of soils which in normal climate would be distributed among several classes. The range of crops that can be grown is also very limited not only be severity of climate, but also by rainfall distribution. With only a few crops to grow management practices are also simplified.

* Consult CLI - capability maps for Agriculture 93K/SE, 93K/SW, 93F/NE, 93F/NW.

Table 5. Frost Data

Last Spring and First Fall Date of Occurrence: Minimum Temperatures of 26, 28, 30, 32, 34, 36 (°F)

For Probability Levels: 50% - 10%

Fort St. James (46 Years)

SPRING — Last Occurrence (°F)

	<26	<28	<30	<32	<34	<36
SE	2.5	2.3	2.4	2.3	2.0	
Mean 50%	May 21	May 30	Jun 11	Jun 21	Jun 26	
40%	May 35	Jun 3	Jun 15	Jun 25	Jun 30	
30%	May 29	Jun 7	Jun 19	Jun 29	Jul 3	
20%	Jun 4	Jun 12	Jun 25	Jul 4	Jul 8	
10%	Jun 11	Jun 19	Jul 2	Jul 11	Jul 14	

FALL — First Occurrence (°F)

	<36	<34	<32	<30	<28	<26
SE		2.6	2.5	2.3	2.2	2.3
Mean 50%		Aug 11	Aug 19	Aug 28	Sep 9	Sep 17
40%		Aug 6	Aug 14	Aug 24	Sep 6	Sep 13
30%		Aug 2	Aug 11	Aug 20	Sep 2	Sep 10
20%		Jul 26	Aug 5	Aug 14	Aug 27	Sep 4
10%		Jul 19	Jul 28	Aug 8	Aug 21	Aug 29

Vanderhoof (15 Years)

SPRING — Last Occurrence (°F)

	<26	<28	<30	<32	<34	<36
SE	3.0	2.9	3.0	2.3	1.9	1.7
Mean 50%	May 23	Jun 2	Jun 13	Jun 26	Jun 30	Jul 6
40%	May 27	Jun 6	Jun 17	Jun 29	Jul 3	Jul 8
30%	May 30	Jun 10	Jun 21	Jul 2	Jul 5	Jul 10
20%	Jun 6	Jun 15	Jun 27	Jul 6	Jul 9	Jul 14
10%	Jun 12	Jun 21	Jul 3	Jul 11	Jul 13	Jul 17

FALL — First Occurrence (°F)

	<36	<34	<32	<30	<28	<26
SE	2.2	2.3			2.3	3.0
Mean 50%	Jul 29	Aug 4	Aug 14	Aug 25	Sep 10	Sep 20
40%	Jul 26	Aug 1	Aug 10	Aug 21	Sep 7	Sep 16
30%	Jul 23	Jul 29	Aug 6	Aug 18	Sep 4	Sep 12
20%	Jul 19	Jul 24	Aug 1	Aug 12	Aug 31	Sep 7
10%	Jul 14	Jul 18	Jul 25	Aug 6	Aug 26	Aug 31

Wistaria (40 Years)

SPRING — Last Occurrence (°F)

	<26	<28	<30	<32	<34	<36
SE	1.9	2.8	2.7	2.3	2.1	1.6
Mean 50%	May 20	May 31	Jun 14	Jun 23	Jun 30	Jul 4
40%	May 23	Jun 5	Jun 19	Jun 27	Jul 3	Jul 6
30%	May 26	Jun 9	Jun 23	Jul 1	Jul 6	Jul 9
20%	May 30	Jun 15	Jun 29	Jul 6	Jul 11	Jul 12
10%	Jun 5	Jun 23	Jul 6	Jul 12	——	——

FALL — First Occurrence (°F)

	<36	<34	<32	<30	<28	<26
SE	2.3	2.6	2.6	3.0	2.3	1.9
Mean 50%	Aug 1	Aug 12	Aug 24	Aug 31	Sep 11	Sep 21
40%	Jul 28	Aug 8	Aug 20	Aug 27	Sep 8	Sep 18
30%	Jul 25	Jul 31	Aug 16	Aug 22	Sep 4	Sep 15
20%	Jul 20	Jul 29	Aug 10	Aug 15	Aug 30	Sep 11
10%	——	Jul 22	Aug 3	Aug 7	Aug 24	Sep 6

Minimum Period (Days) Between Last Spring and First Fall Occurrence

For 50% - 90% Probability Levels

Fort St. James, 2280 feet

	<26	<28	<30	<32	<34	<36
50%	119	102	78	59	46	
60%	111	95	80	50	37	
70%	104	87	62	43	30	
80%	92	76	48	32	18	
87%	86	70	43	25	12	
90%	79	63	37	17	5	

For 36° Shortest Period
34° Shortest Period 1936 1 Day
32° Shortest Period 1943 13 Days
30° Shortest Period 1921 24 Days
28° Shortest Period 1933 51 Days
26° Shortest Period 1933 51 Days

For 36° Longest Period
34° Longest Period 1948 120 Days
32° Longest Period 1948 121 Days
30° Longest Period 1953 131 Days
28° Longest Period 1953 150 Days
26° Longest Period 1953 181 Days

Vanderhoof, 2093 feet

	<26	<28	<30	<32	<34	<36
50%	120	100	73	49	36	23
60%	112	93	65	42	29	18
70%	104	86	58	35	24	13
80%	93	77	46	26	15	5
87%	86	71	40	20	10	—

1936
For 36° Shortest Period 1930 0 Days
34° Shortest Period 1954 10 Days
32° Shortest Period 1945 13 Days
30° Shortest Period 1930 16 Days
28° Shortest Period 1945 55 Days
26° Shortest Period 1945 58 Days

For 36° Longest Period 1958 50 Days
34° Longest Period 1953 57 Days
32° Longest Period 1953 98 Days
30° Longest Period 1941 115 Days
28° Longest Period 1958 126 Days
26° Longest Period 1953 168 Days

Note: The values here are to be regarded as very approximate–the series is too short to compute reliable statistics.

Wistaria, 2865 feet

	<26	<28	<30	<32	<34	<36
50%	124	103	78	62	43	28
60%	118	95	69	54	36	22
70%	112	87	60	46	25	16
80%	104	76	47	35	18	8
87%	98	69	39	28	—	—
90%	93	62	32	22	—	—

1936
For 36° Shortest Period 1928 0 Days
34° Shortest Period 1930 0 Days
32° Shortest Period 1929 7 Days
30° Shortest Period 1933 19 Days
28° Shortest Period 1930 22 Days
26° Shortest Period 1965 79 Days

For 36° Longest Period 1958 80 Days
34° Longest Period 1953 95 Days
32° Longest Period 1953 113 Days
30° Longest Period 1958 127 Days
28° Longest Period 1944 133 Days
26° Longest Period 1938 156 Days

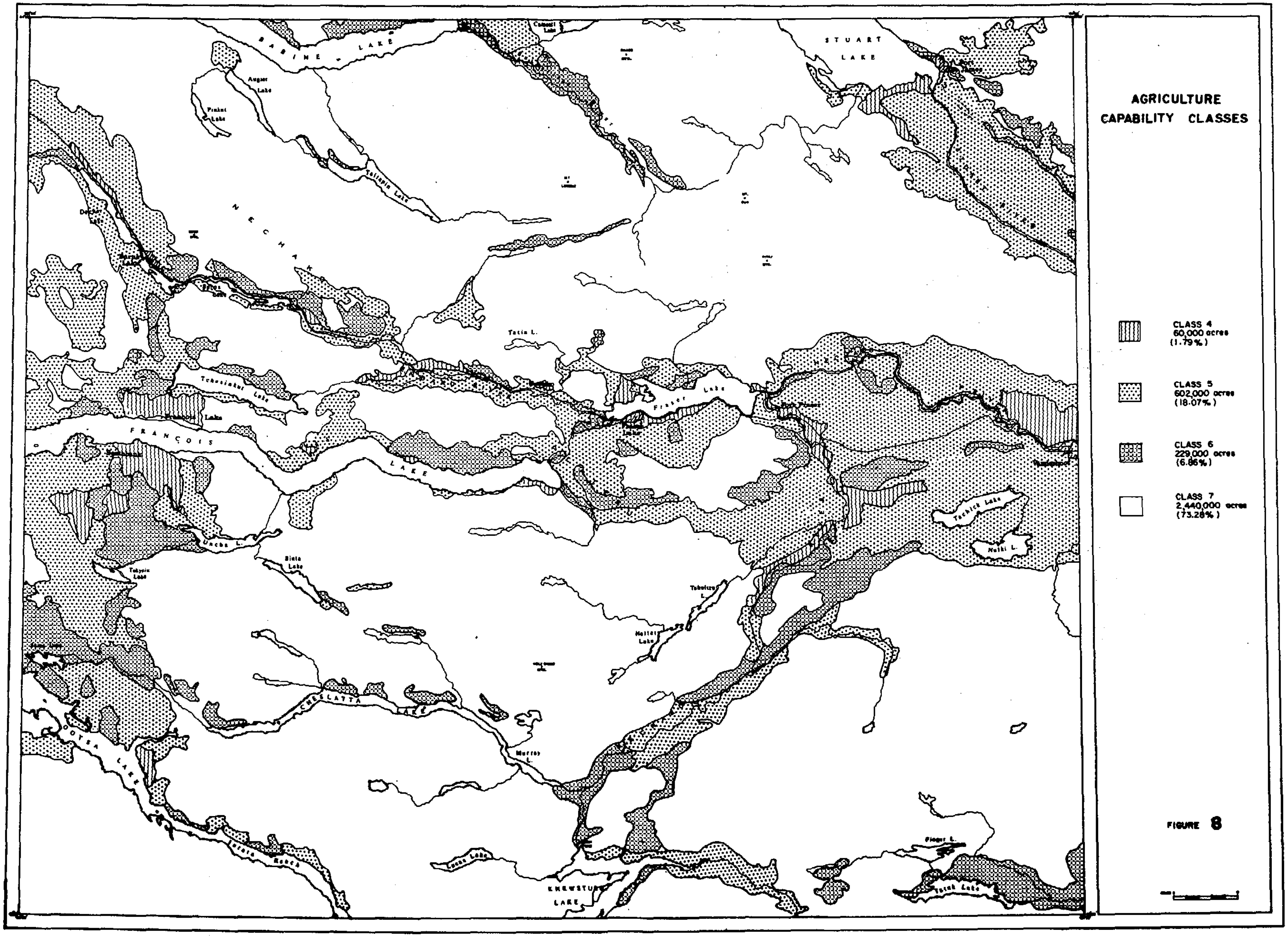
AGRICULTURE
CAPABILITY CLASSES
CLASS 4
60,000 acres
(1.79%)
CLASS 5
602,000 acres
(18.07%)
CLASS 6
229,000 acres
(6.86%)
CLASS 7
2,440,000 acres
(73.28%)
FIGURE 8
BABINE LAKE
STUART LAKE
NECHAKO
FRANÇOIS LAKE
Fraser Lake
Tatin L.
CHESLATTA LAKE
OOTSA LAKE
KNEWSTUBB LAKE

Table 6 Management and Capability Groupings of Agricultural Soils

Soil Association	Class and Sub-Class	Limitations	Management Problems	Suitability for farming (crop range)
Alix AX_1, AX_2	5X, 5M	Droughtiness Stoniness	Moisture deficiency, low natural fertility	Pasture, perennial forage crops
	6M, 6^{P}_{M}, 6^{M}_{P}		"	Limited forest grazing
Babine BE	5T	Slope	Steepness, moisture deficiency, low natural fertility, erodibility	Perennial forage crops, pasture
	6T	"	"	Limited forest grazing
Barrett				
BA_1, BA_2, BA_7	4C, 4X	Climate, low permeability, stoniness	Low natural fertility, moisture deficiency, workability	Perennial forage crops, pasture (coarse grain on flatter areas)
BA_1, BA_2, BA_3, BA_7	5X, 5T	Low permeability, slope, stoniness	Low natural fertility, moisture deficiency, stoniness, steep slopes	Perennial forage crops, pasture
BA_1, BA_2, BA_3, BA_4, BA_7	5C	Climate	Low natural fertility, moisture deficiency, stoniness	Pasture, perennial forage crops
BA_1, BA_2, BA_7	6T, 6^{T}_{P}	Slope, stoniness	Steepness, moisture deficiency, low natural fertility	Limited forest grazing
Berman BN1	3C 4C, 4X, 4T	Climate, slope, droughtiness	Slight compaction and puddling, low natural fertility, moisture deficiency	Forage crops coarse grain
BN_1, BN_2, BN_3, BN_7	5X, 5T	Slope	Low natural fertility, moisture deficiency, erodibility, surface puddling and crusting	Perennial forage crops, pasture
BN_3, BN_4, BN_5, BN_6	5W	Excess water	High water table, poor drainage	Pasture, low quality hay
BN_1, BN_2, BN_3	6T, 6^{T}_{M}	Slope, droughtiness	Steepness, erodibility, low natural fertility, moisture deficiency	Limited forest grazing
Crystal CR_1, CR_2, CR_3	6T, 6^{T}_{P}, 6^{T}_{M}	Slope, stoniness droughtiness	Steepness, moisture deficiency, low natural fertility	Limited forest grazing
Dahl DL_1, DL_2	6^{T}_{R}, 6^{R}_{T}	Slope, rockiness	Moisture deficiency, low natural fertility	Limited forest grazing
Deserters D_1, D_2, D_3, D_4	5C, 5X	Climate, low permeability, stoniness	Low natural fertility, stoniness, moisture deficiency	Pasture, perennial forage crops

Soil Association	Class and Sub-Class	Limitations	Management Problems	Suitability for farming (crop range)
Driftwood DD_1, DD_2, DD_3	3C, 4C	Climate	Soil workability, moisture deficiency	Perennial forage crops, pasture, coarse grain
	5X	Low permeability slope stoniness	Moisture deficiency, stoniness, soil workability	Perennial forage crops, pasture
DD_2	5C	Climate	"	Pasture, perennial forage crops
DD_1, DD_2	6T	Slope	Steepness, moisture deficiency	Natural forest grazing
Fort St. James FJ	5D	Low permeability	Soil workability, low natural fertility	Perennial forage crops
Kluk KK_1, KK_2	5M	Droughtiness	Moisture deficiency, low natural fertility	Pasture, perennial forage crops
	6M, 6T, 6^P_T	"	"	Limited forest grazing
Knewstubb KB	5X, 5T	Slope, droughtiness erosion	Moisture deficiency, erosion, low natural fertility	Pasture, perennial forage crops
	6T	Slope	"	Natural forest grazing
Mapes MS_1, MS_2	5C, 5M	Climate Droughtiness	Moisture deficiency, low natural fertility, wind erosion	Pasture, perennial forage crops
	6M, 6^M_T	Droughtiness	"	Natural forest grazing
Nechako Nithi N_1 N_2	4C	Climate	Moisture deficiency, low natural fertility	Forage crops, coarse grain
N_3, NT_1, NT_2	5X, 5M, 5T	Droughtiness, slope erosion	Moisture deficiency, low natural fertility, erodibility	Perennial forage crops, pasture (coarse grain to a minor extent)
Ormond OD_1, OD_2	6^T_R, 6^R_T	Slope, rockiness	Moisture deficiency, low natural fertility	Limited forest grazing
Peta PA_2, PA_2	6M	Droughtiness	Moisture deficiency, low natural fertility	Limited forest grazing
Pineview P_1, P_2	5D, 5T	Low permeability, slope	Soil workability, low natural fertility	Perennial forage crops
P_5	5W	Excess water	Poor drainage, high water table, workability	Low quality hay or pasture
P_1, P_2	6T	Slope	Steepiness, low natural fertility	Limited forest grazing

Table 6 (cont'd) Management and Capability Groupings of Agricultural Soils

Soil Association	Class and Sub-Class	Limitations	Management Problems	Suitability for farming (crop range)
Pinkut PT_1, PT_3	6T	Slope	Steepness, moisture deficiency, low natural fertility	Natural forest grazing
Pope PP	6^T_R, 6^R_T	Slope, rockiness	Moisture deficiency, low natural fertility	Limited forest grazing
Prairiedale PR_1, PR_2	4C	Climate	Moisture deficiency, slight puddling and/or crusting on the surface	Forage crops, coarse grain
	5X	Slope, droughtiness	"	"
Rearing RG_1, RG_2	6^T_P, 6^P_M	Droughtiness, slope stoniness	Moisture deficiency, low natural fertility	Limited forest grazing
Slug SG_1, SG_2	4C, 4X, 4M	Climate, slope, droughtiness	Moisture deficiency, low natural fertility	Forage crops, coarse grain, pasture
	5C, 5X, 5M, 5^T_M	Climate, droughtiness, slope, stoniness	"	Perennial forage crops, pasture
	5W, 6W	Excess water	High water table, poor drainage	Limited grazing on low quality hay
Snodgrass SO_1	5M, 5T	Droughtiness, slope	Moisture deficiency, steepness	Pasture
	6T	Slope	"	Limited forest grazing
Stellako SL_1, SL_3	5X, 5M	Wetness, droughtiness, flooding	Wetness and flooding, moisture deficiency	Forage crops, hay
SL_1, SL_2	5W, 6W, 6^W_I, 6^I_W	Excess water, flooding	High water table, poor drainage	Limited grazing, low quality hay
Vanderhoof V_1, V_2	4C	Climate	Low natural fertility, moisture deficiency, soil workability	Forage crops, coarse grain
V_1, V_2, V_3, V_4	5X, 5T, 5D	Permeability, slope	"	Perennial forage crops, minor coarse grain
V_2. V_4, V_5	5W	Excessive water	Poor drainage, high water table	Low quality hay, pasture

Note: All Class 7 soils have little agricultural potential, but some short term natural grazing may occur immediately after logging.

Recreation*

More widespread use of outdoor recreation from the increased influx of tourists and people's awareness of recreational need will require better planning and management of recreational facilities in the future.

In the Central Interior of British Columbia where the surveyed area is situated, sport fishing and hunting are probably the two most practised recreational activities. Numerous lakes and rivers make this the best sport fishing area in the province. It is also one of the best for moose hunting.

Picnicking and camping although seasonal are important forms of recreation in the area. The potential for hiking and scenic viewing is not great, but some parts of the area offer high satisfaction for such endeavors.

In planning sites for recreational purposes such as campsites, tentsites, roads, hiking trails, buildings, playgrounds, or cottages soil properties should be considered. Soil texture, structure, consistence, depth, stoniness or rockiness, drainage, flooding, permeability and slope, are factors to be considered in the choice of a suitable recreation site. The same soil property has a different effect on various recreational uses, but most soil properties' influence all uses.

Coarse sandy soils have severe limitations for intensive play areas, but moderate limitations for paths and trails and no limitations for building sites. Fine clayey soils have severe limitations for almost all recreational uses because they have very slow permeability and are sticky and slippery when wet. Poorly drained, wet soils are also severely limiting for most recreational facilities. The same is true for soils subject to frequent flooding. Droughty soils also have severe limitations for intensive recreational uses like playgrounds because it is difficult to establish and maintain a good sod. Stones, cobbles, rocks, and gravel limit soil use for recreation in different degrees depending on their quantity and the proposed use.

Steep and very steep slopes are limiting factors for most facilities disregarding other soil properties (scenic trails and paths being an exception). Intensive recreational areas should have sanitary facilities. Poorly drained, slow permeable and shallow soils have severe limitations for septic tank waste disposal.

Level or nearly level soil of sandy loam or loam texture, well drained, stone and gravel free would be ideal for every use recreational or agricultural.

The ability of a soil to produce and maintain vegetation is closely connected with soil fertility and is important in maintaining the environmental character of recreational sites.

* Guides and interpretations for this Section are taken from Chapter 10 "Use of Soil Surveys in Planning for Recreation", by P.H. Montgomery and F.C. Edminster in Soil Surveys and Land Use Planning, L.J. Bartelli et al., Soil Science Society of America and Society of Agronomy, 1966.

A detailed soil survey would be necessary for proper placement of soils in the recreational classes. Reconnaissance soil survey of the nature conducted in the Nechako-Francois Lake area is less reliable.

In Table 7 the soils were classified for different recreational purposes in three basic ratings according to the soil properties listed in the last column of the table. Limitations and ratings are based on the soils without considering other aspects like aesthetic and economic values, vicinity of lakes and proximity to the population centres.

None to slight soil limitations mean that the soil is free of limitations or the limitations such as slight stoniness or gentle slopes can be easily eliminated.

Moderate soil limitations indicate that the soil still can be used satisfactorily for a particular purpose with correct planning and good management. The main limitations include: somewhat poor drainage, moderate or not too steep slopes, silty or sandy texture, stoniness, shallower water table, restricted depth, occasional flooding, seepage or ponding, moderately slow permeability.

Severe soil limitations almost exclude use of the soil for the stated purpose. In certain cases a particular limitation can be overcome, but often only with major reclamation work. Severe limitations include: steep or very steep slopes, high water table, poor drainage, flooding, serious ponding and seepage, unfavorable texture (loose sand, clay), acidity, excessive stoniness and rockiness, shallow depth, very slow permeability and organic deposits.

Table 7 — Limitations of Soils for Recreational Use

Soil Name	Map Symbol	Intensive Camp and Picnic Areas	Bldg. sites in Recreational Areas	Paths and Trails	Intensive Play Areas	Cottaging	Ecological Damage Hazard	Soil features affecting use
Alix	AX	none to slight	none	none	moderate	none	moderate	Rapidly drained, rapid permeability, coarse and moderately coarse texture, fairly flat.
Babine	BE	moderate	moderate	moderate	severe	moderate	moderate	Very slow permeability, fine texture, sticky and slippery when wet, strongly to steeply sloping.
Barrett	BA 1-4	moderate	moderate	none to slight	moderate to severe	moderate	slight	Moderately slow permeability, medium to moderately fine texture, sticky and slippery when wet, gently to strongly rolling.
	BA 5	moderate	moderate to severe	moderate	moderate	moderate to severe	moderate	As above with seasonably high water table.
	BA 6	severe	severe	severe	severe	severe	moderate	Poor drainage, high water table subject to ponding.
	BA 7	moderate	moderate	none	severe to moderate	moderate	slight to moderate	Moderately slow permeability, medium to moderately fine texture, sticky and slippery when wet - rolling and steeply sloping.
Berman	BN 1-3	moderate	moderate	moderate	moderate to severe	moderate to severe	severe to moderate	Moderately slow permeability, silty texture, sticky and slippery when wet, gently to steeply sloping.
	BN 4	moderate to severe	moderate to severe	moderate	moderate to severe	severe	moderate	As above with seasonally high water table.
	BN 5-6	severe	severe	severe	severe	severe	moderate	Poor drainage, high water table, subject to ponding.
	BN 7	moderate	moderate	moderate to slight	moderate to severe	moderate to severe	moderate	Moderately slow permeability, medium to moderately fine texture, sticky and slippery when wet, rolling.
Cobb	CB 1-2	moderate	moderate to slight	none to slight	severe	moderate to slight	slight	Well to rapidly drained, rapid permeability coarse to medium coarse texture, generally stony - rolling to steeply sloping.
Colony	CY	moderate to severe	severe to moderate	moderate to severe	severe to moderate	severe	severe	Coarse texture, seasonally high water table, some flood hazard.
Crystal	CR 1-3	moderate	moderate to slight	none to slight	severe	moderate	slight	Well to rapidly drained, rapid permeability, coarse to moderately coarse texture, generally stony, rolling and steeply sloping.

Table 7 (cont'd) Limitations of Soils for Recreational Use

Soil Name	Map Symbol	Intensive Camp and Picnic Areas	Bldg. sites in Recreational Areas	Paths and Trails	Intensive Play Areas	Cottaging	Ecological Damage Hazard	Soil features affecting use
Dahl	DL 1-3	severe	severe to moderate	moderate to severe	severe	severe	moderate	Shallow soil depth, rock outcrops, very steep and steep topography.
Decker	DR 1-2	severe	severe	severe to moderate	severe	severe	moderate	Shallow soil depth, rock outcrops, very steep and steep topography.
Deserters	D 1-5	moderate to slight	moderate	none to moderate	severe to moderate	moderate	slight	Moderately slow permeability, moderately coarse to medium texture, rolling to very steeply sloping topography.
	D 6	moderate	severe	moderate	severe	severe	moderate	As above with seasonally high water table.
Dragon	DN 1-2	severe	severe to moderate	severe to moderate	severe	severe	moderate	Shallow soil depth, rock outcrops, very steep and steep topography.
Driftwood	DD 1-3	moderate to slight	moderate	slight to moderate	severe to moderate	moderate	severe	Moderately slow permeability, medium to moderately fine texture, sticky and slippery when wet gently rolling to steeply and very steeply sloping.
Cluculz	C 2	severe	severe	severe	severe	severe	moderate	Shallow soil depth, rock outcrops, very steep and steep topography.
Fort St. James	FJ	severe	severe	severe	severe	severe	moderate	Very slow permeability, very plastic and slippery when wet, very fine texture (heavy clay).
Kluk	KK 1-2	moderate	slight to none	moderate	severe	moderate	moderate	Rapidly drained, coarse texture, gently to moderately rolling topography.
Knewstubb	KB	moderate to severe	moderate	moderate	severe	moderate to severe	moderate	Moderate to moderately slow permeability, silty texture, slippery when wet, moderately to very steeply sloping.
Mapes	MS 1-2	moderate to slight	none	moderate	moderate	none to slight	moderate	Very rapid permeability, sand and loose sand, subject to blowing in places.
Morice	M 1	moderate	moderate	moderate	severe	moderate	moderate	Steep and very steep topography, coarse texture.
Nechako	N 1-2	moderate to slight	slight to none	moderate to slight	moderate	moderate	moderate	Moderate permeability, silty surface, sandy lower subsoil.
	N 3	moderate	moderate to severe	moderate	moderate to severe	severe to moderate	moderate	Slow permeability, high water table and some ponding for part of the year, silty surface.

Table 7 (cont'd) Limitations of Soils for Recreational Use

Soil Name	Map Symbol	Intensive Camp and Picnic Areas	Bldg. sites in Recreational Areas	Paths and Trails	Intensive Play Areas	Cottaging	Ecological Damage Hazard	Soil features affecting use
Nithi	NT 1-2	slight to moderate	none	none to slight	slight to moderate	none	slight	Sandy and very fine sandy to silty in places; flat.
Oona	ON 1-2	severe	moderate to severe	moderate	severe	severe	moderate	Shallow soil depth, rock outcrops, very steep and steep topography.
Organics	01-02	severe	severe	severe	severe	severe	severe	Very poorly drained, high water table, organic
Ormond	OD 1-3	severe	severe to moderate	moderate	severe	severe	severe	Shallow soil depth, rock outcrops, very steep and steep topography.
Peta	PA 1-2	slight to moderate	none	none to moderate	slight to moderate	none	moderate	Rapid permeability, coarse texture (loamy sand), flat.
Pineview	P 1-2	severe	severe	severe	severe	severe	moderate	Clay, very sticky and slippery when wet.
	P 5	severe	severe	severe	severe	severe	moderate	Clay, high water table, poor drainage.
Pinkut	PT 1-3	severe	severe	severe	severe	severe	moderate	Very steep topography.
Pope	PP	severe	severe	severe	severe	severe	moderate	Shallow soil depth, rock outcrops, very steep and steep topography.
Prairiedale	PR 1-2	moderate to slight	moderate	moderate to slight	moderate	moderate to severe	none	Moderately slow permeability, silty texture sticky and slippery when wet, flat or gently undulating.
Ramsey	R 1-2	none to slight	none	none to moderate	moderate	none	slight	Rapidly drained, rapid permeability, coarse and moderately coarse texture, fairly flat.
Roaring	RG 1-2	moderate	moderate	moderate	severe	moderate	none	Very steep and extremely steep topography, rapidly drained, coarse texture.
Saunders	SD 1	severeto moderate	severe to moderate	severe to moderate	severe	severe	moderate	Very steep topography, moderately slow permeability, medium to moderately fine texture.
	SD 2	moderate to severe	severe to moderate	severe to moderate	severe	severe	moderate	Rolling topography, high water table in part of the season of use.
	SD 3	severe	severe	severe	severe	severe	severe	High water table, ponding, very poorly drained.
Shass	SS 1	severe to moderate	severe	moderate	severe	severe	v. severe	Shallow soil depth, rock outcrop, steep and very steep topography.

Table 7 (cont'd) Limitations of Soils for Recreational Use

Soil Name	Map Symbol	Intensive Camp and Picnic Areas	Bldg. sites in Recreational Areas	Paths and Trails	Intensive Play Areas	Cottaging	Ecological Damage Hazard	Soil features affecting use
	SS 2	severe	severe	severe to moderate		severe	severe	Shallow soil depth, steep and very steep topography, subject to seepage, high water table.
Skins	SK 1	severe	severe to moderate	severe to moderate	severe	severe	moderate	Shallow soil depth, rock outcrops, very steep and steep topography.
Slug	SL 1-2	none to slight	none	none	moderate	none	moderate to slight	Rapidly drained, rapid permeability, moderately coarse texture, gently to moderately sloping.
Snodgrass	SO 1	moderate	moderate	moderate	severe	moderate	moderate	Steep, irregular topography, coarse texture rapid permeability.
Stellako	SL 1	moderate	moderate	moderate	moderate	severe	moderate	Seasonal high water table - some flooding hazard, variable permeability.
	SL 2	severe	severe	severe	severe	severe	moderate	High water table, subject to flooding and ponding, very poor and poor drainage, peaty surface in places.
	SL 3	moderate	slight to moderate	none	moderate	moderate to severe	moderate	Sand and loamy sand texture, subject to occasional flooding.
Tatin	TT 1-4	severe	severe	severe	severe	severe	moderate	Very steep and extremely steep topography medium to moderately fine texture, moderately slow permeability.
Twain	TW 1-5	moderate to severe	moderate to severe	none to severe	severe	moderate to severe	none	Moderately slow permeability, medium to moderately fine texture, sticky and slippery when wet, rolling to very steeply sloping.
	TW 6	severe	severe	severe	severe	severe	moderate	Poor and very poor drainage, subject to ponding, high water table, peaty surface on places.
Vanderhoof	V 1-3	moderate	moderate	moderate	moderate to severe	severe	moderate	Slow to very slow permeability, silty clay loam surface, sticky and slippery when wet, fairly flat.
	V 4	moderate to severe	moderate to severe	moderate	moderate to severe	severe	moderate	Very slow permeability, seasonally high water table, sticky and slippery when wet, fairly flat.
	V 5	severe	severe	moderate	severe	severe	moderate	Poor drainage, very slow permeability, high water table, peaty surface on places

Engineering*

This section gives some information about engineering properties of soils in the Nechako-Francois Lake region. The most important of these properties are permeability, water holding capacity, shear strength, compaction characteristics, soil drainage, shrink-swell potential, grain size, plasticity and reaction. Depth to water table, depth to bedrock, slope and particularly in this area, susceptibility to frost action, are also important.

Before soil is used as a structural material or building site, the user should be aware of its suitability for the intended purpose. Due to the broad scale of mapping in the Nechako-Francois Lake area, the value of engineering interpretations and their applicability will be limited. The soil map will be most useful for planning more detailed field investigations and foreseeing the kind of problems that may be encountered - particularly in undertaking major engineering projects.

Information obtained in this section can generally help or assist in:

1. Selection of potential residential, industrial, commercial and recreational areas.
2. Evaluation of alternate routes for roads, highways and pipelines.
3. Location of probable source of gravel, sand, or clay.
4. Planning of farm drainage and irrigation systems, ponds and other structures controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kind of soil for the purpose of predicting the performance of structures on the same or similar soil in other locations.
6. Develop preliminary estimates pertinent to construction in a particular area.

Some of the terms used by the soil scientist may be unfamiliar to the engineer. The Glossary defines many of these terms.

Engineering Soil Classification Systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system, used by most engineers, and AASHO system adopted by the American Association of State Highway Officials. In the Unified system soils are classified according to particle size distribution, plasticity, liquid limit, and organic matter. Soils are grouped in 15 classes. These are eight classes of coarse grained soils identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine grained soils, identified ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as PT. The AASHO system is used in classifying soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A-1 to A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A-1 are gravelly soils of high bearing strength, the best soils for sub-grade (foundations). At the other extreme, in group A-7, are clay soils that have low strength when wet and that are the poorest mineral soils for subgrade.

Engineering Test Data

Table (8) contains engineering test data for the major soil parent materials in the Nechako-Francois Lake area. These tests were made to help evaluate the soils for engineering purposes. Most samples were taken from the depth between 4 and 6 feet, to obtain uniform and representative samples and to avoid influence of weathering and soil development.

The engineering classifications given are based on data obtained by mechanical analyses and by determination of liquid and plastic limits.

The tests for the liquid limit and plastic limit measure the effect of water on the consistence of the soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semi-solid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from the semi-solid to the plastic state, and the liquid limit from the plastic to the liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Some silty and sandy soils are nonplastic (NP).

Estimated Soil Properties significant to Engineering

Several estimated soil properties significant to engineering are given in table (9). Evaluations are made for the typical profile and parent material of each association, based on field observations, test data and comparison on similarity among soils. Soil horizons are not listed and given values pertain to the solum as well as to the parent material, except in cases where significant differences occur. Uniformity of the major parent materials such as lacustrine deposits and outwash extends to a depth of at least 10 feet, and in glacial till much deeper.

Following are explanations of the columns in table (9).

Depth to bedrock is the distance from the surface of the soil downward to the upper surface of the rock layer.

Depth to seasonal high water table is the distance from the surface of the soil downward to the highest level reached in most years by groundwater.

Soil texture is determined on the basis of percent of sand, silt and clay in soil material that is less than 2mm in diameter. Texture terms and abbreviations are given on the soil map and in the Glossary.

The range in Unified and AASHO classification and particle size distribution is given on the basis of data in table (8) other soil analyses and field experience.

Permeability is the rate at which water moves through undisturbed soil material and depends largely on the texture and structure of the soil.

Available water capability is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount in the soil at the wilting point of most crop plants.

The shrink-swell potential indicates the change in volume caused by a change in moisture content. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil.

Potential frost action refers to the probable effects on structures resulting from the freezing of soil material and its subsequent thawing. Soils that are nearly clay free but high in silt and very fine sand have the highest potential for frost action.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values.

Engineering Interpretations of the Soils

The estimated interpretations in table (10) are based on the engineering properties in table (9), on test data and experience gained during the soil survey work in Nechako-Francois Lake area. In table (10) soils are rated for their suitability for some engineering purposes or soil features most unfavorable for a specific practice.

Soil limitations are indicated by the rating slight, moderate, and severe and suitability is rated by the terms good, fair, and poor.

Following are explanations of some of the columns in table (10).

Soil properties that affect septic tank filter fields are depth to water table or rock, permeability, susceptibility to flooding and slope.

Shallow excavations require digging or trenching to a depth of less than 6 feet, for example excavations for pipelines, sewer lines, telephone and power transmission lines, ditches and cemeteries. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, absence of rocks or big stones, and freedom from flooding or high water table.

The suitability of a soil for low dwellings (less than three stories high) is related to its capacity to support a load and depends on wetness, susceptibility to flooding, density, texture, plasticity, shrink-swell, potential frost action, slope and depth to bedrock.

Soil properties that most affect road construction are load supporting capacity, stability of the subgrade and quality and quantity of cut-and-fill material, and will depend on soil wetness, flooding, slope, depth to rock, shrink-swell, potential, susceptibility to frost action and content of stones.

Road fill is soil material used in embankments for roads. Its suitability depends on the predicted performance in embankments and the relative ease of excavation.

The suitability of the soils for gravel and/or sand is primarily intended to guide readers to local sources. A soil rated good or fair generally has a layer at least 3 feet thick, the top of which is within a depth of 6 feet.

Table 8 — Engineering

Surficial Deposits	Soil Association	General Location	Depth	PERCENTAGE LESS THAN 3 INCHES 3/4"	No. 4	10	20	40
Lacustrine clays	Fort St. James	South of Ft. St. James	4'-6'					
	Pineview	Summit Lake	3'-4'					
		Summit Lake	4'-5'					
		South of P. George	4'-5'					
	Vanderhoof	North of Vanderhoof	4'-6'					
		SE of Vanderhoof	4'-5'					
Lacustrine silts	Berman (Prairiedale Knewstubb)	North of Vanderhoof	4'-6'					
GRAVELLY Outwash and river terraces	Alix, (Ramsey Roaring Morice Snodgrass)	North of Vanderhoof	4'-6'	49.48	42.16	31.28	16.81	2.96
SANDY Outwash and river terraces	medium) Mapes and coarse)(Peta)	North of Vanderhoof	4'-6'					99.94
	medium) Nechako and fine) (Nithi)	At Fort Fraser	4'-6'				99.92	99.68
Ablation Till	Cobb, Crystal			82.79	75.86	68.22	61.45	52.96
				67.96	61.96	53.56	46.42	38.97
Basal Till	Barrett	North of Vanderhoof	4'-6'	62.91	54.03	45.01	40.11	36.16
	Driftwood	North of Burns Lake	4'-6'	75.46	67.30	60.11	55.74	51.79
	Deserters	West Lake	3'-4'	80.09	74.67	67.64	62.75	58.00
	Twain	West Lake	4'-6'	73.84	77.88	66.00	58.85	52.67
		Tabor Mountain	4'-5'	90.91	80.67	63.77	58.16	54.48

Table 9 — Estimated Soil Properties

Soil Association	Parent Material	Depth in Ft. to Bedrock	Water Table	Depth From Surface	Classification Texture Range	Unified	AASHO	Percentage Passing 3/8"	No. 4 4.7mm	No.10 2.0mm
Alix - AX	Gravelly outwash		>10	8" +	sg-stg	GP, GW	A-1	45-55	40-50	30-40
Babine - BE	Shallow lacustrine		>10	0-30" 30" +	sic-c 1-cl	ML or CL GM or GC	A-7 A-2 to A-6	60-80	50-70	45-65
Barrett - BA	Basal till		>10	12" +	gl-gcl	GM or GC	A-2 to A-6	60-80	50-70	45-65
Berman - BN	Lacustrine silts		>10	0 +	sil	ML	A-4			
Cluculz - CZ	Shallow over rock	<5			gsl, gl					
Cobb - CB	Ablation till		>5	0 +	gsl, gls, gl	GM	A-2	65-90	60-80	65-75
Colony - CY	Recent beach		2-5	0 +	s, ls, cos, g	SP	A-1	100	95-100	75-95
Crystal - CR	Ablation till		>5	0 +	gsl, gls, gl	GM	A-2	65-90	60-80	65-75
Dahl - DL	Shallow over rock	<5			gsl, gls					
Decker - DR	Shallow over rock	<5			gsl, gls					
Deserters - D	Basal till	>5	>10	12" +	gl, gcl	GM or GC	A-2 to A-6	60-85	50-80	45-70

Test Data

PASSING SIEVE 60	140	200	LL	PL	PI	SL	Cole	AASHO	Unified	USDA
		100	63.15	30.89	32.26	29.71	0.14	A-7	MH-CH	heavy clay
		100	68.52	33.81	34.71	23.89	0.18	A-7	MH-CH	heavy clay
		100	59.58	38.14	21.44	24.13	0.15	A-7	MH	heavy clay
		100	69.10	31.79	37.31	27.43	0.16	A-7	MH-CH	heavy clay
		100	37.05	25.88	11.17	20.11	0.07	A-7	ML	silty clay to silty clay loam
		100	45.80	28.17	17.63	8.40	0.20	A-7	ML&CL	silty clay
		100	30.15	25.48	4.67	24.59	0.04	A-4	ML	silty loam
0.67	0.16	0.11	NP	NP	NP	NP	-	A-1	GP	gravel, sandy gravel
90.36	11.02	5.69	NP					A-3	SP	sand
98.72	65.75	52.68	NP					A-4 (A-2)	SP	very fine sand
40.57	28.89	27.67	NP					A-2	GM	gravelly
31.06	17.17	14.36	NP					A-2	GM	sandy loam
33.04	27.40	25.63	NP					A-2	GM	
48.62	42.33	40.99	31.53	17.89	13.64	16.13	0.07	A-6	GC	
52.07	43.61	42.16	23.07	16.50	6.57	13.45	0.06	A-4	GM-GC	
46.98	38.40	36.17	24.60	15.76	8.84	16.32	0.06	A-4	GC	
52.67	46.16	44.12	26.83	15.45	11.38	17.91	0.07	A-6	GC	

Significant to Engineering

Sieve No.40 0.42mm	No.200 0.074mm	Liquid Limit	Pl. Index	Permeability	Available Water in Upper 3 Ft.-Inches:	Shrink-Swell Potential	Potential Frost Action	Reaction (Range)
0-5		NP*	NP	Very rapid	2.0	Very low	Low	5.5-6.5
	100	35-50	10-25	Slow	6.0-7.0	High to v. high	Moderate	6.0-6.5
35-55	20-45	NP	NP	Slow		Moderate	Moderate to high	6.0-7.5
35-55	20-45	NP-40	NP-20	Slow	6.3	Moderate (low to high	Moderate to high	6.0-8.0
	100	30-40	5-15	Moderate	7.5	Low to Moderate	High	6.5-8.5
		NP	NP	Rapid to moderate	3.8	Low	Low	5.5-6.5
40-60	10-30	NP	NP	Moderate	3.9	Low	Moderate to low	6.0-7.0
40-60	0-5	NP	NP	Rapid	2.0	Very low	Low	6.0-6.5
40-60	10-30	NP	NP	Moderate	3.9	Low	Moderate to low	6.0-7.0
		NP	NP	Rapid to moderate	3.8	Low	Low	5.5-6.0
		NP	NP	Rapid to moderate	3.8	Low	Low	5.5-6.0
35-55	20-45	NP-40	NP-20	Slow	6.3	Moderate	Moderate to high	5.5-7.0

* NP - non-plastic

Table 9 (cont'd) Estimated Soil Properties

Soil Association	Parent Material	Depth in Ft. to Bedrock	Water Table	Depth From Surface	Classification Texture Range	Unified	AASHO	Percentage Passing 3/8"	No. 4 4.7mm	No. 10 2.0mm
Dragon - DN	Shallow over rock	<5			gsl, gls					
Driftwood -DD	Basal till		>10	12" +	gl, gcl	GM or GC	A-2 to A-6	60-80	50-70	45-65
Fort St. James - FJ	Lacustrine clays		>10	0" +	hc	CH or MH	A-7			
Kluk - KK	Glacial beach		>10	8" +	g, sg, gs	GP, GW	A-1	45-55	40-45	30-40
Knewstubb -KB	Lacustrine silts		>10	0" +	fsl, sil	ML	A-4			
Mapes - MS	Sandy outwash		>10	0" +	s, cos	SP or SM	A-3			
Morice - M	Kames		>10	6" +	gs, sg	GP, GW	A-1	45-55	40-50	30-40
Nechako - N	River terrace		> 5	0-30" 30" +	sil fs, s	ML SP or SM	A-4 A-3 or A-4			
Nithi - NT	Valley train		>10	0 +	fs, s	SP or SM	A-3 or A-4			
Oona - ON	Shallow over rock	<5			gsl, gls, gl					
Organics - O	Organic deposits		0			Pt				
Ormond - OD	Shallow over rock	<5			gsl, gls, gl					
Peta - PA	Sandy outwash		>10	10" +	cos, s	SP	A-1	100	95-100	85-95
Pineview - P	Lacustrine clays		>10	0" +	c, hc	MH - CH	A-7			
Pinkut - PT	Colluvium/T		>10	0" +	gsl, gl, gls	GM	A-2	60-80	50-70	40-60
Pope - PP	Shallow over rock	<5			gsl, gl					
Prairiedale - PR	Lacustrine silts		>10	0" +	sil	ML	A-4			
Ramsey - R	Gr. outwash		>10	8" +	sg, stg	GP, GW	A-1	45-55	40-50	30-40
Roaring - RG	Esker and crevasse filling		>10 >10	6" + 6" +	sg, gs s, cos	GP, GW SP	A-1 A-1	45-55 100	40-50 95-100	30-40 85-95
Saunders -SD	Basal till		>10		gl, gcl	GM or GC	A-2 to A-6	60-85	50-80	45-70
Shass - SS	Shallow over rock	<5			gsl, stl					
Skins - SK	Shallow over rock	<5			gsl, stl					
Slug - SG	Alluvial fan		>5*	12" +	g, gs	GP, GW	A-1	45-55	40-50	30-40
Snodgrass -SO	Kames		>10	6" +	gs, sg	GP, GW	A-1	45-55	40-50	30-40
Stellako - SL	Alluvium		1-5		variable					
Tatin - TT	Colluvium/T		>10	0" +	gsl, gl, gls	GM	A-2	60-80	50-70	40-60
Twain - TW	Basal till		>10	12" +	gl, gcl	GM or GC	A-2 to A-6	60-85	50-80	45-70
Vanderhoof -V	Lacustrine		>10	0 +	sic, c	ML or CL	A-7			

Significant to Engineering

Sieve No. 40 0.42mm	Sieve No. 200 0.074mm	Liquid Limit	Pl. Index	Permeability	Available Water in Upper 3 Ft.-Inches:	Shrink-Swell Potential	Potential Frost Action	Reaction (Range)
		NP	NP	Rapid to moderate	3.8	Low	Low	5.5-6.0
35-55	20-45	NP-40	NP-20	Slow	6.3	Moderate	Moderate to high	6.0-8.0
	100	>60	>30	Very slow	5.5	Very high	Moderate	5.5-7.5
0-5		NP	NP	Rapid	2.0	Very low	Low	5.5-6.5
	70-95	NP	NP	Moderate	6.0	Low	High	6.0-7.0
95-100	5-15	NP	NP	Rapid	2.2	Very low	Low	6.0-7.0
0-5		NP	NP	Rapid	2.0	Very low	Low	5.5-6.5
	100	30-40	5-15	Moderate	6.5	Low to moderate	High	6.0-7.0
95-100	5-50	NP	NP	Rapid		Very low	Low to moderate	6.0-7.0
95-100	5-50	NP	NP	Rapid	4.0	Very low	Low to moderate	6.0-7.0
		NP	NP	Rapid to moderate	4.2	Low	Low	5.5-6.0
		NP	NP	Rapid to moderate	4.2	Low	Low	6.0-6.5
40-50	0-5	NP	NP	Rapid	2.2	Very low	Low	5.5-6.5
	100	>55	>25	Very slow	5.5	Very high	Moderate	6.0-8.0
30-40	10-30	NP	NP	Moderate	4.0	Low	Moderate to Low	6.0-8.0
		NP	NP	Rapid to moderate	3.8	Low	Low	6.5-8.0
	100	30-40	5-15	Moderate	7.5	Low to moderate	High	6.5-8.5
0-5		NP	NP	Very rapid	2.0	Very low	Low	5.0-6.0
0-5		NP	NP	Very rapid	2.0	Very low	Low	6.0-6.5
40-50	0-5	NP	NP	Very rapid	2.0	Very low	Low	6.0-6.5
35-55	20-40	NP-40	NP-20	Slow	6.3	Moderate	Moderate to High	5.0-6.0
		NP	NP	Rapid to moderate	3.8	Low	Low	5.0-6.0
		NP	NP	Rapid to moderate	3.8	Low	Low	5.0-6.0
0-5		NP	NP	Very rapid	2.0	Very low	Low	5.5-6.5
0-5		NP	NP	Rapid	2.0	Very low	Low	6.0-6.5
				Mostly rapid to moderate	2.3-6.5	Mostly low	Mostly low	6.0-8.0
30-40	10-30	NP	NP	Moderate	4.0	Low	Moderate to Low	5.5-6.5
35-55	20-45	NP-40	NP-20	Slow	5.9	Moderate	Moderate to high	5.5-7.0
	100	35-50	10-25	Slow	6.0-7.0	High to v. high	Moderate to high	6.0-8.0

* Apron part of some fans with high water table

Table 10 Interpretations of Engineering

Soil Assoc. and Symbol	Degree and Kind of Limitation for – Septic Tank Absorption Fields	Shallow Excavations	Dwellings with Basements	Local Roads and Streets
Alix – AX	Slight	Severe; sidewall instability	Slight	Slight
Babine – BE	Severe; slow permeability	Moderate to severe, difficult to work	Moderate; moderate, shrink-swell; moderate to high frost action in underlying till	Moderate to severe, moderate to high frost action, moderate shrink-swell, slope
Barrett – BA	Severe; slow permeability	Moderate to severe; difficult to work, slope	Moderate; Moderate shrink-swell, moderate to high frost action	Moderate to severe; moderate to high frost action, moderate shrink-swell, slope
Berman – BN	Moderate to severe; moderate to moderately slow permeability	Slight	Moderate to severe; high frost action	Severe; high susceptibility to frost action, high erodibility
Cluculz – CZ	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; slope, shallow over rock
Cobb – CB	Moderate; permeability, slope	Moderate to severe; slope, stones, sidewall instability	Moderate to severe; slope, stones	Moderate; slope, stones in places organics (swamps)
Colony – CY	Slight to moderate; water table	Severe; sidewall instability, water table	Moderate; seasonal water table	Slight; (moderate to severe close to lakeshore)
Crystal – CR	Moderate; permeability, slope	Moderate to severe; slope, stones, sidewall instability	Moderate to severe; slope, stones	Moderate; slopes, stones, in places organics (swamps)
Dahl – DL	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope
Decker – DR	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope
Deserters – D	Severe; slow permeability, slope	Moderate to severe; difficult to work, slope	Moderate; moderate shrink-swell, moderate to high frost action	Moderate to severe; moderate to high frost action, moderate shrink-swell, slope
Dragon – DN	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope
Driftwood – DD	Severe; slow permeability	Moderate to severe; difficult to work, slope	Moderate; moderate shrink-swell, moderate to high frost action	Moderate to severe; moderate to high frost action, moderate shrink-swell potential, slope
Fort St. James – FJ	Severe; very slow permeability	Severe; difficult to work	Severe; very high shrink-swell potential	Severe; very high shrink-swell potential
Kluk – KK	Slight; (severe if till substratum close to surface)	Severe; sidewall instability	Slight	Slight to moderate; slope
Knewstubb – KB	Moderate; moderate permeability	Slight	Moderate to severe; high frost action	Severe; high frost action, slope, erodibility
Mapes – MS	Slight	Severe; sidewall instability, too sandy to hold water	Slight	Slight
Morice – M	Moderate to severe; slope	Severe; sidewall instability, slope	Moderate to severe; slope, stones	Moderate to severe; slope, stones
Nechako – N	Slight to moderate	Moderate; sidewall instability	Slight	Slight

Properties of the Soils

Soil Features Affecting: Reservoir Area	Embankments	Depth	Suitability as Source of - Road Fill	Gravel	Sand	Topsoil
Very rapid permeability	High permeability, low compressibility	12" +	Good	Good	Poor to Fair	Poor
Slope, deep water table	Medium to low shear strength, fair stability	0-30"	Poor; high shrink-swell, thin layer Fair to poor; moderate to high frost action, moderate shrink-swell	Unsuitable; no gravel Unsuitable; no gravel	Unsuitable; no sand Unsuitable; no sand	Poor; clay texture Poor; clay texture
Slope, deep water table, slow permeability	Medium to high shear strength, fair stability		Fair to poor; moderate to high frost action, moderate shrink-swell, slope	Poor	Poor	Poor; gravel, pebbles
Moderate permeability	Moderate permeability fair stability		Poor to fair; high susceptibility to frost action	Unsuitable; no gravel	Unsuitable; no sand	Fair to good
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallowness over rock, slope, stones	Poor	Poor	Poor; shallow, stony
Moderate permeability, stones. Compact till 5 to 10 feet from surface	Medium permeability and internal erosion good stability		Fair; stones, slope	Poor to fair	Poor; gravelly	Poor; gravel, stones slope
Rapid permeability, high water table	Medium shear strength, high permeability		Fair, shallow depth	Poor to fair	Fair	Poor; coarse
Moderate permeability, stones. Compact till 5 to 10 feet from surface	Medium permeability and internal erosion, good stability		Fair; stones, slope	Poor to fair	Poor; gravelly	Poor; gravel, stones slope
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, slope, stones	Poor	Poor	Poor; shallow, stony
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, slope, stones	Poor	Poor	Poor; shallow, stony
Slope, slow permeability	Medium to high shear strength, fair stability		Fair to poor; moderate to high frost action, moderate shrink-swell potential, slope	Poor	Poor	Poor; gravel, pebble
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, stones slope	Poor	Poor	Poor; shallow, stony rocky
Slope, slow permeability	Medium to high shear strength, fair stability		Fair to poor; moderate to high frost action, moderate shrink-swell, slope	Poor	Poor	Poor; gravel, pebble
Low seepage potential, very slow permeability	High shrink-swell potential, medium to low shear strength, fair to poor compaction characteristics		Poor; very high shrink-swell potential	Unsuitable	Unsuitable	Poor; heavy clay
Rapid permeability (underlain by till at any depth below 3-4 feet)	High permeability low compressibility		Good	Good to fair	Poor to fair	Poor; gravel, sand
Moderate permeability	Medium shear strength, medium permeability, high internal erodibility		Fair; high susceptibility to frost action	Unsuitable	Unsuitable	Fair to good
Rapid permeability, too sandy to hold water	High permeability, medium shear strength medium susceptibility to piping		Good	Poor	Good	Poor; sandy
Rapid permeability, slope, stones	High permeability low compressability		Fair; slope	Good to fair	Good to poor	Poor; gravel, sand
Rapid to moderate permeability	Medium shear strength, medium to high susceptibility to piping	0-30" 30" +	Poor; high frost action, shallow depth Good to fair; low to moderate frost action	Unsuitable Poor	Unsuitable Fair to good	Fair to good Fair to good

Table 10 (cont'd) Interpretations of Engineering

Soil Assoc. and Symbol	Degree and Kind of Limitation For – Septic and Absorption Fields	Shallow Excavations	Dwellings with Basements	Local Roads and Streets
Nithi – NT	Slight	Moderate to severe; sidewall instability	Slight	Slight
Oona – ON	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope
Organics – O	Unsuitable	Unsuitable	Unsuitable	Severe; high water table
Ormond – OD	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope
Peta – PA	Slight	Severe; sidewall instability – too sandy to hold water	Slight	Slight
Pineview – P	Severe; very slow permeability	Severe; difficult to work	Severe; very high shrink-swell potential	Severe; very high shrink-swell potential
Pinkut – PT	Severe; slope	Severe; slope	Severe; slope	Severe, slope
Pope – PP	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe; shallowness over rock, slope	Severe, shallowness over rock, slope
Prairiedale – PR	Moderate to severe; moderate to moderate slow permeability	Slight	Moderate to severe; high frost action	Severe; high susceptibility to frost action, high erodibility
Ramsey – R	Slight	Severe; sidewall instability (gravel)	Slight	Slight
Roaring – RG	Severe; slope	Severe; slope, sidewall instability	Severe; slope	Severe; slope
Saunders – SD	Severe; slow permeability, slope	Moderate to severe; difficult to work, slope	Moderate; moderate shrink-swell, moderate to high frost action	Moderate to severe; moderate to high frost action, moderate shrink-swell, slope
Shass – SS	Severe; shallowness over rock, stones	Severe; shallowness over rock, stones	Severe; shallowness over rock, stones	Severe; shallowness over rock, stones
Skins – SK	Severe; shallowness over rock, stones	Severe; shallowness over rock, stones	Severe; shallowness over rock, stones	Severe; shallowness over rock, stones
Slug – SG	Slight	Severe; sidewall instability	Slight	Slight
Snodgrass – SO	Moderate to severe; slope	Severe; sidewall instability	Moderate to severe; slope, stones	Moderate to severe; slope, stones
Stellako – SL	Severe to moderate; water table, flooding	Moderate to severe; drainage, flooding workability, sidewall instability	Moderate to severe; drainage, flooding	Moderate to severe; flooding, drainage
Tatin – TT	Severe; slope	Severe; slope	Severe; slope	Severe; slope
Twain – TW	Severe; slow permeability, slope	Moderate to severe; difficult to work	Moderate; moderate shrink-swell, moderate to high frost action	Moderate to severe; moderate to high frost action, moderate shrink-swell, slope
Vanderhoof – V	Severe; slow permeability	Moderate; difficult to work	Severe; high to very high shrink-swell potential	Severe; high to very high shrink-swell potential

Properties of the Soils

Soil Features Affecting: Reservoir Area	Embankments	Depth	Suitability as Source of - Road Fill	Gravel	Sand	Topsoil
Rapid permeability	High permeability, medium shear strength, medium susceptibility to piping		Good	Poor	Good to fair	Poor; sandy
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, stones slope	Poor	Poor	Poor; shallow, stony rocky
Unsuitable	Unsuitable		Unsuitable	Unsuitable	Unsuitable	Poor
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, stones slope	Poor	Poor	Poor; shallow, stones, rocks
Rapid permeability, too sandy to hold water	High permeability, medium shear strength, medium susceptibility to piping		Good	Poor	Good	Poor; sandy
Low seepage potential, very slow permeability	High shrink-swell, medium to low shear strength, fair to poor compressibility		Poor; very high shrink-swell potential	Unsuitable	Unsuitable	Poor; heavy clay
Steep slope, moderate permeability	Medium permeability, good stability	0-5'	Poor; slope	Poor	Poor	Poor
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, stones, slope	Unsuitable	Unsuitable	Poor; shallow, stones rock
Moderate permeability	Moderate permeability, fair stability		Poor to fair; high	Unsuitable	Unsuitable	Good to fair
Very rapid permeability	High permeability low compressibility		Good	Good	Poor to fair	Poor; gravel
Rapid permeability, slope	High permeability, low compressibility		Poor to good, slope	Good to fair	Good to poor	Poor; gravel, sand
Slope	Medium to high shear strength, fair stability		Fair to poor; moderate to high frost action, moderate shrink-swell potential, slope	Unsuitable	Unsuitable	Poor; gravel, pebbles
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, stones slope	Unsuitable	Unsuitable	Poor; shallow, stones rocks
Shallow over rock, stones, slope	Shallow over rock, stones, slope		Poor to fair; shallow over rock, stones slope	Unsuitable	Unsuitable	Poor; shallow, stones rocks
Rapid permeability	High permeability, low compressibility		Good	Fair	Fair to poor	Poor; gravel, sand
Rapid permeability, slope, stones	High permeability, low compressibility		Fair; slope	Good to fair	Good to poor	Poor; sand, gravel
Variable	Variable		Poor to good; drainage	Variable (unsuitable to good)	Variable (good to unsuitable)	Poor
Steep slope, moderate permeability	Medium permeability, good stability	0-5'	Poor; slope	Poor	Poor	Poor
Slope	Medium to high shear strength fair stability		Fair to poor; moderate to high frost action, moderate shrink-swell slope	Poor	Poor	Poor; gravel, pebble
Slow permeability	High shrink-swell, moderate to low shear strength, fair to poor compaction characteristic		Poor; high to very high shrink-swell potential	Unsuitable	Unsuitable	Poor; silty clay and

The ratings for the topsoil are based mainly on the texture of the soil, ease of working and spreading of the material, thickness of the layers, natural fertility or the response to fertilizer application, stoniness, soil drainage and presence of toxic substances.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoirs have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Dykes, levees and other embankments for retention of water require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, compactibility and shear strength. The presence of stones or organic material is unfavorable.

* 1/ Guide for Interpreting Engineer uses of soils USDA, Soil Conservation Service, November 1971.

2/ Soil Survey of Prince Georges County, Maryland.

Wildlife Habitat & Management Considerations

(by G.K. Young, with contributions from
J. van Barneveld and A. Luckhurst)

The area comprising the soil resources inventory can be subdivided into two broad regions on the basis of vegetation.

The northern part consists of the Subboreal white spruce region which contains two distinct biogeoclimatic zones. A Subboreal white spruce zone below 3000 feet; a transitional zone between 3000 feet and 3500 feet; and the Engelmann spruce-Subalpine fir zone above 3500 feet elevation. Douglas-fir, in this region, is restricted to edaphic sites on very coarse textured soils, or in the direct vicinity of a major waterbodies, or soils formed on calcareous parent materials within the lower white spruce zone. (See vegetation section on page 16.)

The southern part comprises the Subboreal-Interior Region which contains three biogeoclimatic zones. The Subboreal-Interior Douglas-fir Transition section is found in a fairly continuous belt along the major lakes in the central portion of the map-area at elevations less than 3500 feet. On moister sites and on heavy textured soils within the same elevation range, the Subboreal white spruce zone occurs.

Moose (*Alces alces americana*) are the most common and widespread ungulate species in the area; mule deer (*Odocoileus hemionus hemionus*) are more severely restricted in range than moose, primarily due to a lack of suitable winter habitat.

Mountain caribou (*Rangifer tarandus montanus*), which are common to the west of the area, occur only in minor numbers in the southwest corner of the area near Tweedsmuir Park. This species is commonly found in the Subalpine forest and alpine habitat, however, these habitats are not extensive within the map area. Fire has reduced the distribution of climax forest habitat but has expanded the alpine environment.

Moose winter range limitation due to high average snow depth occurs at elevations above 3200 feet. Local edaphic variations caused by aspect, exposure and soil association result in a 200 to 300 foot variation in the winter range limit. During the winter the animals move from the Engelmann spruce-Subalpine fir uplands to the adjacent and commonly nearest Subboreal white spruce lowlands, especially river floodplains and associated south facing slopes. The central corridor, comprising the Subboreal-Interior Douglas-fir section, contains the greatest proportion of winter range for moose and is the centre of winter distribution.

Deer are commonly restricted in range to the southern region (Subboreal-Interior Transition Region) and winter ranges are restricted to the warmer, wind exposed, south facing slopes that contain stands of Douglas-fir or aspen and lower snow depths. These occur primarily along the north side of Francois, Fraser, Cheslatta and Ootsa lakes and on Nithi Mountain. Smaller ranges occur along the Stuart, Endako and Nechako rivers.

TABLE 11 Selected Soil and Vegetation Data, Their Recommended Management and Suitability for Wildlife

Forest Zone	Soil Association	Soil Mgmt. Limitations	Vegetation				Animal Species	Winter Range	General Comments
			Site Type	Browse Quantity	Rate of Succession	Mgmt. Limitations			
Subboreal white spruce	Alix	low nutrient status; droughty, highly leachable	Lodgepole pine-moss, lodgepole pine-lichen	poor	slow	do not burn	Moose	-	Generally occurs below 3500', but productivity is very low, therefore winter range potential is low.
Subboreal white spruce	Babine	moderate to severe erosion potential	Spruce-squashberry-sarsaparilla-pink winter green	good	normal	do not expose mineral soil by burning or scarification	Moose	+	Severe erosion potential occurs wher slopes exceed 15%-30% and where mineral soil surface is exposed.
Subboreal white spruce	Barrett 1, 7	slight erosion potential; summer moisture deficiency	Aspen-rose-pinegrass	moderate	slow-normal	none	Deer-Moose	+	Optimum browse quality is achieved by maintaining an open forest canopy and for mosaic of forest openings. On units where slopes exceed 15%, pile and burn or controlled "cool" burning.
	Barrett 2,3,4	moderate erosion potential, excessive moisture in swales	Lodgepole pine squashberry-pink peavine	moderate	normal	none	Moose	+	Higher elevations may have snow depth limitation.
	Barrett 5, 6	excessive moisture	Aspen-spruce-squashberry-colts foot, equisetum	good	normal to slower than normal	none	Moose	+	Higher elevations may have snow dept limitation. Habitat manipulation difficult due to excessive moisture.
Subboreal white spruce	Berman 1, 7	severe erosion potential, summer moisture deficiency	Aspen-peavine-toadflax	low	slower than normal	do not burn	Moose-Deer	+	Exposure of mineral soil may result gulleying, sheet erosion, slumping leading to site degradation.
	Berman 2, 3	severe erosion potential	Spruce-squashberry-sarsaparilla-showy aster, Aspen-aster-peavine	good	normal	do not burn	Moose	+	As for Berman 1, 7 lesser vegetatio re-establishment is faster which may permit "cool" burning on south slopes. Do not expose mineral soil surface.
	Berman 4,5,6	excessive moisture	Spruce-aspen-squashberry-coltsfoot, red osier-squashberry	good	normal to slower than normal	none	Moose	+	Habitat manipulation difficult due t excessive moisture.

TABLE 11 Selected Soil and Vegetation Data, Their Recommended Management and Suitability for Wildlife (cont'd)

Forest Zone	Soil Association	Soil Mgmt. Limitations	Vegetation				Animal Species	Winter Range	General Comments
			Site Type	Browse Quantity	Rate of Succession	Mgmt. Limitations			
Subboreal white spruce & Engelmann spruce - Subalpine Fir	Cobb	low nutrient status, droughty, highly leachable		low-moderate	normal	do not burn	Moose	-	Exposure of mineral soil and repeated burning will result in site degradation by leaching of nutrients. Snow depth limitation to wintering ungulates.
Subboreal white spruce	Crystal	low nutrient status, droughty knolls; excessive moisture in swales	Kinnikinnik-moss-lichen, blueberry-moss	low-moderate	slower than normal	do not burn	Moose-Deer	+	Exposure of mineral soil and repeat[ed] burning will result in site degrada[-]tion by leaching. Vegetation varia[-]bility due to soil moisture regime enhances habitat capability.
Subboreal white spruce	Colony	highly fluctuating watertable within rooting zone	Highly variable	good	normal	do not level land	Moose-Deer	+	Small units restricted to Stuart and Babine lakes. Highly variable habitat potential.
Subboreal white spruce	Dahl	shallow, low nutrient status, droughty, highly erodable	Saskatoon-grass	low-good	slow	do not burn	Moose-Deer	+	Shattered rock units of Dahl 1, 2 o[n] south aspects generally more favour[-]able than Dahl 3. Solid rock units generally low habitat potential.
Subboreal white spruce & Engelmann spruce - Subalpine Fir	Decker	shallow, low nutrient status, droughty, highly erodable	Alder-moss, Blueberry-moss	poor	slower than normal	do not burn	Moose	-	Snow depth limitation to wintering ungulates.
Subboreal white spruce & Engelmann spruce - Subalpine Fir	Deserters	moderate erosion potential	Spruce-balsam-alder-moss	good	normal to faster than normal	none	Moose	+ -	Regeneration on moist slopes may be rapid. Upper elevations have snow depth limitations for wintering ungulates.
Engelmann spruce - Subalpine Fir	Dragon	shallow, low nutrient status, acid pH, highly erodable	Spruce-balsam-blueberry-moss	low	normal	do not burn	Moose	-	Excessive snow depth for wintering ungulates, vegetation removal by burning will result in increased erosion and leaching, thus degrading habitat potential.
Subboreal white spruce	Driftwood	slight erosion potential	Cultivated, Aspen-cow parsnip	low (grazing potential is moderate)	slow	none	Moose-Deer	+	Exposed south aspects have higher capability but may have revegetatio[n] problems. The moister soil may hav[e] dense herb layer.

TABLE 11 Selected Soil and Vegetation Data, Their Recommended Management and Suitability for Wildlife (cont'd)

Forest Zone	Soil Association	Soil Mgmt. Limitations	Vegetation				Animal Species	Winter Range	General Comments
			Site Type	Browse Quantity	Rate of Succession	Mgmt. Limitations			
Subboreal white spruce	Fort St. James	moderate to severe erosion potential	Spruce-squashberry-black twinberry-Douglas spirea.	good	normal to slower than normal	do not burn	Moose	+	Sites may "brush-in" rapidly after disturbance. Severe erosion (gulleying and sheet erosion and slumps) exist where slopes exceed 15-30% and mineral soil surface is exposed.
Subboreal white spruce	Knewstubb	severe erosion potential. Droughty on knolls, may be excessively moist in swales	Variable	low	normal to slower than	do not burn	Moose-Deer	+	Potential winter range for Deer. Exposure of mineral soil surface will result in erosion by gulleying, shee erosion and slumping as well as inflation by wind.
Subboreal white spruce	Mapes	low nutrient status, droughty, highly leachable	Aspen-peavine toadflax-moss	low	normal	do not burn	Moose-Deer	+	Map units often associated with flod plain soils which enhances their utilization particularly by wintering ungulates. Exposure of mineral soil will result in site degradation.
Subboreal white spruce	Nechako	Severe erosion potential, droughty	Cultivated, Aspen-peavine toadflax-moss	low	normal	do not burn	Moose	+	Exposure of mineral soil surface wil result in erosion and subsequent sit degradation.
Subboreal white spruce	Nithi	see "Nechako"							
	Oona	see "Dragon"							
Variable	Organics	excessive moisture, acidic, low nutrient availability	Sedge sedge-sphagnum spruce-sphagnam	low low-medium low-medium	slow slow slow	none	Moose	+ -	Characteristics are highly variable depending on site.
	Ormond	see "Dahl"							
	Peta	see "Alix"							
	Pineview	see "Ft.St. James"							
Subboreal white spruce	Pinkut	droughty, moderate erosion potential	Aspen-peavine aster	moderate	slow to normal	none	Moose-Deer	+ -	rowse production variable. Optimu browse maintained by opening the fo est canopy. Some snow depth limita tion at higher elevations.
Subboreal white spruce	Pope	shallow overlying limestone bedrock, highly erodable	Douglas-fir-spirea-aster-twinflower	low-medium	slower than normal	do not burn	Moose-Deer	+	aintain open forest through select cutting.

TABLE 11 Selected Soil and Vegetation Data, Their Recommended Management and Suitability for Wildlife (cont'd)

Forest Zone	Soil Association	Soil Mgmt. Limitations	Vegetation				Animal Species	Winter Range	General Comments
			Site Type	Browse Quantity	Rate of Succession	Mgmt. Limitations			
Subboreal white spruce	Prairiedale	slight erosion potential, droughty	Cultivated						
Subboreal white spruce & Engelmann spruce	Ramsey	low nutrient status, highly leachable, acid	Balsam-moss	low-very low	normal-faster than normal	do not burn	Moose	-	Dense forest regeneration after disturbance, excessive snow depth for wintering ungulates. Low potential as summer habitat.
White Spruce	Roaring	droughty, low nutrient status, severe erosion potential	Spruce-moss, Douglas-fir-peavine-toad flax-moss (south aspects)	nil (N-aspect) low (S-aspect)	faster than normal	do not burn	Moose-Deer	+	Erosion potential is severe on steep slopes particularly if the mineral soil is exposed. Exposure of mineral soil will result in excessive leaching of nutrients.
Variable	RO (Rock Out-Crops)	4" soil. highly erodable	Lichen, saskatoon-choke-cherry	nil	slow	do not burn	Moose-Deer	+ -	Low potential winter range in areas below 3200 feet.
Engelmann spruce - Subalpine Fir	Saunders 1	moderate to severe erosion potential highly leachable, acid	Balsam-blueberry-dwarf rubus-feather moss	low-moderate	normal	do not burn	Moose	-	Exposure of mineral soil surface will result in erosion, leaching of nutrients and site degradation. Excessive snow depth limitation for wintering ungulates.
Engelmann spruce - Subalpine Fir	Saunders 2, 3	severe erosion hazard, highly leachable	Krummholz-hellabore-valerian	low	slower than normal	moderately tolerant of use but extremely sensitive to abuse	Moose	-	Generally excessive snow depth limitation except where sites may be exposed to the wind.
Engelmann spruce - Subalpine Fir	Shass	shallow, highly leachable, acid, highly erodable	Krummholz-lupine-blueberry	low-nil	very slow	do not touch	Moose	-	Excessive snow depth limitation for wintering ungulates except for site exposed by wind.
Engelmann spruce - Subalpine Fir	Skins	shallow, highly erodable, low nutrients status, highly leachable	Krummholz-false hellabore-valerian balsam-blueberry-false hellabore-liverwort	low	slower than normal to normal	do not burn	Moose	-	Exposure of mineral soil surface will result in erosion and degradation.

TABLE 11 Selected Soil and Vegetation Data, Their Recommended Management and Suitability for Wildlife (cont'd)

Forest Zone	Soil Association	Soil Mgmt. Limitations	Vegetation: Site Type	Vegetation: Browse Quantity	Vegetation: Rate of Succession	Vegetation: Mgmt. Limitations	Animal Species	Winter Range	General Comments
Subboreal white spruce	Slug 1, 2	surface droughtiness	Lodgepole pine common moss	low-high	normal	do not burn	Moose	+	Habitat production is highly variab due to soil texture and variable depth to the watertable. Exposure of mineral soil surface will result in site degradation in well drained sections.
Subboreal white spruce	Stellako 1	floodplain soil-very fertile	Aspen-rose-bluejoint-grass	moderate	normal	do not burn	Moose	+	Exposure of mineral soil surface wi result in leaching of nutrients.
	Stellako 2	floodplain soil-watertable near soil surface	Cottonwood-red osier-dogwood	high	normal	none	Moose	+	Light ("cool") fires will enhance habitat productivity
	Stellako 3	floodplain soil, high watertable throughout the year	Willow	high	normal	none no clearing	Moose	+	Prime winter habitat, Willows may grow out of reach and may require cutting or spot burning.
Subboreal white spruce Engelmann Spruce - Subalpine Fir	Tatin	moderate to severe erosion potential, acid solum	Balsam-blueberry-dwarf rubus-feather moss, balsam-blueberry-wintergreen-feathermoss	medium	normal	none except on steep slopes	Moose	-	Exposure of mineral soil surface wi result in erosion of soil and leaching of nutrients; snow depth limitation for wintering ungulates.
Engelmann spruce - Subalpine Fir	Twain	moderate-severe erosion potential, acid solum	Balsam-blueberry-wintergreen-feather moss, balsam-blueberry-oak fern-moss	low-medium	normal to slower than normal	none except on steep slopes	Moose	-	Excessive snow depth limitation for wintering ungulates. Exposure of mineral soil surface will result in erosion and leaching of nutrients
Subboreal white spruce	Vanderhoof 1, 2	severe erosion potential, acid solum, droughty	Lodgepole pine squashberry-pink peavine	moderate	normal	do not burn	Moose-Deer	+	Exposure of soil surface will resul in erosion and destruction of upper solum.
	Vanderhoof 3	moderate erosion potential, moist depressions	Spruce-squashberry-sarsaparilla-pink wintergreen	good	normal	do not burn	Moose	+	As for Vanderhoof 1, 2
	Vanderhoof 4, 5	slight erosion potential, moist depressions	Spruce-aspen-squashberry-coltsfoot	moderate-good	normal	do not burn	Moose	+	As for Vanderhoof 1, 2, 3

In this report the term habitat is defined as that part of the environment which will provide the combination of cover, food and water necessary to support wildlife.

The following table, originally presented in the Creston Wildlife Pilot Project Report (BCLI, 1973) illustrates the link between soils, vegetation, wildlife, and the management of the resource. Detailed data for vegetation and soil chemical and physical properties are found elsewhere in this report.

Table : Selected Soil and Vegetation Data, Their Recommended Management and Suitability for Wildlife

Moose and deer populations, the two major ungulate species found in the report area, owe the greatest part of their success to their adaptation to seral plant communities. Historically, fire has created for the animals a variety of seral habitats. The resultant mosaic of plant communities across the landscape, to a great extent, controls the distribution of moose and deer.

Logging activities can be distributed so as to optimize the benefits for wildlife, furthermore, coordination of cutting boundaries with soil boundaries will help to achieve this goal. Properly used management practices such as burning (of slash), patch logging, clearcut, clearcut and slash burn, selective logging, etc., can enhance the wildlife. Improper use of these may result in site erosion, leaching of nutrients, and subsequent site degradation, particularly on coarse soils or at higher elevations where precipitation is higher. Co-ordination of management activities within the limits of watersheds (BCLI, 1973) may well optimize the resources integrated use of potential.

For many of the soils in the preceeding table the repeated use of fire is not recommended. However, the objective of the expressed management limitation is to ensure that the biologic production potential of the site is not seriously affected and that a certain desired effect is produced. A mosaic of lesser vegetation and exposed soil in a cut-block will impede erosion processes, thus preserving the capability of the site and reducing stream sedimentation. The controlled "cool" fire, which is intended to destroy slash while maintaining lesser vegetation, may well be a useful management tool on sites where erosion potential is low to moderate.

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Analytical Methods

pH measurements were made on 1:1 soil:water suspensions for mineral soils, and 1:5 soil:water suspensions for organic soils (5). pH was also determined using a 1:5 soil : M/100 $CaCl_2$ solution (4) modified by shaking one half hour instead of 5 days. (An IL 245) pH meter and a combination electrode were used for all pH measurements. Soil organic matter was determined by the wet combustion method as described by Grewelling and Peach (5).

Total nitrogen was determined using the method described by Bremner (3).
Laverty's method (8) modified by John (6) was used to determine acid soluble and available phosphorus. Color development was made following John's (7) procedure.

Exchange capacity was determined using the method described by Peach (12). The ammonium acetate extract was analysed for exchangeable cations using a Techtron AA4 atomic absorption spectrophotometer.
Oxalate extractable iron and aluminum were determined using the method of McKeague and Day (10) and Pyrophosphate iron and aluminum were determined following procedures described by McKeague (11) and Bascomb (2).

Sulphur analyses were made following the procedure of Bardaley and Lancaster (1).
Manganese values were obtained by analysing the extract from 1:5 soil : calcium chloride suspensions used for pH determination.

Boron analyses were made following the method of Grewelling and Peach (5).

The perchloric-nitric acid digestion for copper and zinc were made following the procedure of Lundblad (12) and analyses were made using a Techtron AA4 atomic absorption spectrophotometer.

Sulphur

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Cation Exchange Capacity and Exchangeable Cations

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Total phosphorus was analysed using the digestion procedure of Lundblad (9) and the color development procedure described by John (7).

Manganese

The centrifuge te from the 1:5 soil calcium chloride solution used for pH measurement was analysed for manganese using the Techtron AA4 Atomic Absorption Spectrophotometer.

Exchangeable Cations - Exchange Capacity - Base Saturation

Exchangeable cations or exchangeable bases as they are generally called, refer to those elements of plant food (calcium, magnesium, potassium sodium) which are attracted to and held by negative charges on soil mineral and organic particles.

The negative charge on the soil mineral particles are of two kinds. The first kind, known as the fixed charge, is a characteristic of the particular kind of clay and fine silt present in the soil, and is constant no matter what the pH of the soil may be. The second type of negative charge is the pH-dependent charge and as the name implies, it varies with the pH, increasing as the pH increases. This charge is characteristic of organic colloids and is the predominant charge on certain kinds of clay besides being present to some degree on most clays and silts.

When soil particles weather or are subjected to severe leaching, some of these exchangeable bases are lost and their place taken by aluminum and/or hydrogen. Their presence on the exchange sites is indicated by low soil pH, and the failure of plants to grow well on soil with low pH can be attributed chiefly to aluminum toxicity. Sometimes however, poor growth is caused by manganese toxicity which arises through the solubility of manganese when the pH is low. Manganese toxicity can take place at low pH or sometimes when manganese/iron ratios are unfavourable.

The cation exchange capacity of a soil is that characteristic which determines how much of these exchangeable bases a soil is capable of attracting and holding. If this capacity of the soil to hold bases is measured, and the actual amount of bases present in the soil is determined, the two together give us a measure of the base saturation of that soil.

The object of fertilizer application and liming is to increase the base saturation so that plants may have adequate reserves of plant food and reduced amounts of toxic elements such as aluminum and manganese.
There are two aspects of the base exchange capacity/exchangeable base complex that are of further interest to people interested in soil fertility. First the total base exchange capacity, which may be so low that the soil is not capable of reserving enough plant food to nurture a crop through its growth to maturity. This is the aspect that determines the advisability to making split fertilizer applications. The second is the ratio of exchangeable bases to each other. The ability of plants to get suitable amounts of an element is not solely dependent on the absolute amount of the element present, but is also highly dependent on the ratios of the elements present with regard to each other. It is therefore important to examine calcium:magnesium, magnesium: potassium ratios carefully with due consideration given to the type of soil colloids and the kind of crop being grown.

It has been widely accepted that soils having a base saturation of 65% calcium, 10% magnesium, 5% potassium, 20% hydrogen is a satisfactory medium for plant growth, and where K/Mg ratios exceed 0.5, antagonistic effects of potassium on the uptake of magnesium may likely occur.

The ease with which cations are supplied to plants vary with the type colloid and the percent base saturation. A soil having a base saturation of 80% supplies plant food more readily than one having a base saturation of 40% and soils having a non-swelling (kaolinitic) or organic type colloid will supply cations to plants at a much lower degree of base saturation than soils which have a swelling (montmorillonitic) type colloid.

Soil colloids also tend to retain divalent cations more tightly than monovalent. If therefore, heavy applications of ammonium and potassium fertilizers are applied to soils low in magnesium and calcium, the plant uptake of K and NH_4 will be much greater than the uptake of calcium and magnesium.

In the interpretation of cation exchange capacity and base saturation percent, it is important to take into account the pH at which the exchange capacity was determined. While the amount of exchangeable bases extracted by any method will remain mostly constant, the exchange capacity will increase with increasing pH of the extracting solution and the base saturation determined may not truly reflect the effective base saturation of the soil or the soils capacity to hold nutrients under its natural condition.

Phosphorus

Phosphorus is one of the most important elements of food for every living organism. This is easily understood when it is recognised that phosphorus interconversions in the cell are the driving force for all respiration whether it takes place in the presence or in the absence of air. Soil:phosphorus relationships are strongly governed by the pH of the soil as it reflects the presence of soluble aluminum, and iron, aluminum and iron compounds, soluble calcium and calcium carbonate.

The pH range through which phosphorus is considered most soluble and therefore more readily available to plants is 5.5 to 7.0. When the pH decreases, the aluminum concentration in the soil solution also increases, combines with phosphorus and makes it less available to plants. Phosphorus is also absorbed on the surface of aluminum compounds present in the soil and becomes less and less available to plants responsible for the reduction in the availability of phosphorus.

Pollution of lakes and streams is less likely to occur where pH is low and the soil contains large amounts of aluminum and aluminum compounds since these compounds will hold phosphorus and prevent its being leached easily. The same thing applies at high pH where calcium and calcium compounds perform a similar function. It is therefore possible to compare soils as regards their effectiveness for phosphate retention by measuring phosphate absorption coefficients (the capability of soil to retain applied phosphate).

Measurement of phosphate availability and adequacy for crop needs cannot successfully be made without due consideration of the soil test crop yield characteristics for the soil in question and the type of crop to be grown. However, it is useful to consider a level of 40 pounds per acre of phosphorus as adequate. Below that level, amounts applied should depend on the soil test level and the type of crop to be grown.

Boron

The availability of boron to crops is dependent on the soil texture, soil moisture, soil layers other than the surface, and the presence of organic matter. Boron availability is strongly influenced by soil pH. Uptake is favoured by increasing acidity, but below pH 7.0, the effect is small. However, liming of acid soils may result in boron deficiency because of increased fixation of boron by organic matter and minerals, and the physiological effect of pH and high calcium on plant roots. This may cause reduction in absorption and translocation in the plant.

Once absorbed, boron is immobile in the plant and a continuous supply is therefore needed. As a general statement, levels of boron between 0.1 to 0.7 ppm. may be considered inadequate while levels from 1.0 to 5.0 may be considered excessive. It is necessary to consider the specific crop before making precise recommendations since crops vary in need for boron and their susceptibility to boron toxicity within exceedingly narrow limits.

pH

pH is defined as the negative logarithm of the hydrogen ion concentration, and is measured on a scale of from near 0 to 14. pH 7.0 is the neutral point, below pH 7 is the acid range and above pH 7 we have the alkaline renge.

Traditionally it has been the custom to measure soil pH using a 1:1 soil:water suspension. Recently, however, it has been more universally recognised and accepted that there are advantages to using soil:dilute salt suspensions rather than soil water.

The presence of soluble salts influence soil pH, and to obtain a true estimate of the soil pH (per se) the time consuming process of leaching out the salts before pH measurement would be necessary. The alternative to leaching before measuring pH is to add 0.01 M $CaCl_2$. One hundredth molar calcium chloride concentration is so much greater than the salt concentration found naturally in soils that it produces a levelling effect and eliminates seasonal fluctuations in pH measurements which are due to temporary causes and are not the result of the characteristics of the soil itself. The addition of calcium chloride also eliminates the suspension effect. This effect is shown by the fact that pH measurements made with electrodes immersed in the suspension are always lower than those made with the electrodes placed in the clear supernatant solution. The addition of calcium chloride flocculates the suspended soil particles and removes this source of error. It is necessary to remember that pH measured in a salt suspension are about 0.5 pH units lower than those made in water.

Soil acidity has several sources. Humus, hydroxyaluminum compounds, hydrous oxides of aluminum and iron, alumino-silicate clays, carbon dioxide and soluble salts.

Agencies such as high rainfall or over irrigation tend to leach the exchangeable bases of the soil. Their place on the soil exchange complex is taken by aluminum, hydroxyaluminum ions, and at low pH by hydrogen. pH is therefore a very useful first approximation of the condition of a soil with respect to several characteristics important to plant nutrition.

It is used to indicate when, at low pH, there is danger of aluminum or manganese toxicity, and a low level of exchangeable bases which are essential elements of plant food.

It cannot by itself give the complete picture however, since calcium:aluminum ratios are more complete indicators of aluminum toxicity. Aluminum can be considered as being the agency responsible for most (H^+) ion activity because many aluminum compounds hydrolise and release the hydrogen which is measured when taking pHs. While pH measures th activity of (H^+) it does not give the potential of the soil to dissociate these ions. By itself this measurement cannot, therefore, predict the quantity of lime needed to raise the soil pH to some desirable level.

Though pH indicates the level of base saturation it cannot give the ratio of bases present on the soil exchange complex. This ratio is an important consideration in deciding how much of each element to apply.

Soils having pH 5.5 to 7.0 $(CaCl_2)$ are considered suitable for plant growth.

When liming acid soils to reduce aluminum or manganese toxidity care must be taken to avoid overliming since most of the minor elements except molybdenum are less soluble at high pH. It is possible, by overliming, to induce deficiencies of minor elements such as boron, zinc and manganese. Generally, increase in crop yield is not observed when liming above pH 6. pH values above 8.5 indicate that sodium carbonate is dominating the chemistry of the soil. We can then expect all the undesirable effects which are associated with alkali soils such as minor element deficiencies and poor soil physical structure.

Profile Description:

LOCATION: 124° 08'W/54° 08' N

SOIL NAME: Alix

CLASSIFICATION: Orthic Dystric Brunisol

PARENT MATERIAL: Gravelly glaciofluvial deposits

DRAINAGE: Rapidly drained

ELEVATION: 2650 feet

SLOPE & ASPECT: Level

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LH	1-0					Abundant		Raw to decomposed forest litter
Bm	0-7	10YR5/4 D 7.5YR4/4 M	Sandy loam	Weak fine to medium subangular blocky	Very friable	Abundant		
BC	7-11	10YR6/3 D 4/4 M	Gravelly sandy loam	Weak fine subangular blocky	Very friable	Abundant		
II C1	11-20	Variegated	Sandy fine gravel	Single-grained	Loose	Common		
II C2	20+	Variegated	Sandy fine gravel	Single-grained	Loose	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exchangeable bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/268	L-H	1-0	11:11	4.7	4.1	99.0	1.52	37.69	21.22	6.44	0.07	3.00	30.73	83.80	36.7
269	Bm	0-7	2:46	5.9	4.9	1.8	0.10	10.6	1.49	0.20	0.01	0.14	1.84	9.24	19.9
270	BC	7-11	1:42	6.2	5.0	-	-	-	1.93	0.20	0.01	0.15	2.29	6.03	38.0
271	II C1	11-20	1:31	6.0	5.1	-	-	-	2.94	0.51	0.01	0.14	3.60	5.73	62.8
272	II C2	20+	1:11	6.0	5.1	-	-	-	3.03	0.71	0.01	0.17	3.92	5.97	65.7

LAB. NO.	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn		Percent SAND	SILT	TOTAL CLAY	FINE CLAY
67/268	-	-			60.0	136.1										
269	0.71	0.66			115.3	276.6	3.8	13.6	79.4							
270	0.55	0.40			145.6	227.0	1.7	20.0	79.9							
271	0.30	0.19			19.8	50.7	1.5	22.5	42.8							
272					8.6	24.8	1.5	23.8	42.7							

Profile Description:

LOCATION: 124° 01'W/53° 49'N

SOIL NAME: Alix

PARENT MATERIAL: Gravelly glaciofluvial deposits

ELEVATION: 3300 feet

CLASSIFICATION: Degraded Dystric Brunisol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: Level

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LH	2-0					Abundant		Raw to decomposed forest litter
Ae	0-½	10YR7/1 D 6/1 M	Gravelly loamy sand	Single-grained	Soft	Abundant		
Bm	½-6	10YR5/4 D 7.5YR4/4 M	Gravelly loamy sand	Weak fine subangular blocky	Soft	Abundant		
CB	6-11	2.5Y5/4 D 2.5Y4/4 M	Gravelly sand	Single-grained	Loose	Common		
C	11-19	10YR5/2 D 4/2 M	Gravelly sand	Single-grained	Loose	Occasional		
II C	19+	Variegated	Stony sandy gravel	Single-grained	Very weakly cemented	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
66/301	L-H	1-0	16.69	4.6	4.1	104.83	1.17	35.5	8.75	2.17	0.12	1.33	12.37	106.19	11.65
302	Ae	0-½	-	-	-	-	-	-	-	-	-	-	-	-	-
303	Bm	½-6	2.72	5.7	4.9	2.38	0.05	31.5	1.03	0.30	0.04	0.10	1.47	10.37	14.18
304	CB	6-11	1.21	6.0	4.9	1.84	0.02	28.4	1.19	0.38	0.04	0.10	1.71	6.48	26.39
305	C	11-19	0.96	6.1	5.0				1.19	0.40	0.04	0.10	1.73	5.50	31.45
306	II C	19+	0.81	6.1	5.0				1.19	0.55	0.05	0.15	2.74	6.20	44.19

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
66/301	-	-			-		-										
302	-																
303	0.77	1.06			160.21		6.2										
304	1.26	0.52			157.9		3.0										
305	0.56	0.43			63.8		3.3										
306					33.3		3.0										

LOCATION: 125° 39'/54°29'

Profile Description:

SOIL NAME: Babine

PARENT MATERIAL: Lacustrine clay overlying till

ELEVATION: 2500 feet

CLASSIFICATION: Orthic Gray Luvisol

DRAINAGE: Well to moderately well drained

SLOPE & ASPECT: NE 4%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LH	2-0					Abundant		
Ae	0-2	10YR6/2 D 4/3 M	Clay loam	Moderate medium platy	Hard	Abundant		
AB	2-5	10YR7/2 D 4/3 M	Silty clay to silty clay loam	Moderate coarse platy to moderate medium angular blocky	Very hard	Abundant		
Bt1	5-14	10YR6/2 D 4/2 M	Clay-heavy clay	Strong coarse prismatic	Very firm	Common	Few fine faint	Many clay skins;coatings along cracks
Bt2	14-23	10YR6/2 D 4/2 M	Clay-heavy clay	Strong coarse prismatic	Very firm	Occasional	Few fine faint	Many clay skins;coatings along cracks
C	23-27	10YR6/3 D 4/3 M	Silt loam (silty clay loam)	Stratified	Friable	Occasional		
IIC	27+	10YR5/3 D 4/3 M	Clay loam till	Pseudoplaty	Extremely firm	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST. -	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
353A	LH	2-0	12.87		6.18	94.83	0.950	57.91							
B	Ae	0-2	1.73	6.2	5.74	3.37	0.107	18.27	8.80	2.43	0.04	1.98	12.25	18.74	65.37
C	AB	2-5	1.52	5.7	5.08	2.68	0.087	17.82	6.90	2.74	0.04	0.81	10.49	15.59	67.29
D	Bt1	5-14	2.25	5.8	5.14	1.29	0.075	10.00	12.07	4.67	2.17	0.32	19.23	19.12	100
E	Bt2	14-23	2.35	5.6	4.82	1.29	0.073	10.25	13.00	6.08	0.23	0.24	19.55	22.46	87.04
F	C	23-27	1.63	5.7	4.99				8.13	3.90	0.24	0.13	12.40	13.27	93.44
G	IIC	27+	1.94	6.4	6.02				10.50	5.55	0.32	0.18	16.55	16.06	100

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
353A					108.8	186.2	71.11									
B					233.9	317.4	3.31				12.0		1.50	49.74	48.76	6.10
C					40.61	81.22	2.28				9.39		0.54	46.49	52.97	8.75
D					2.05	5.12	2.30				2.81		1.77	38.23	60.00	20.35
E					2.05	19.25	10.24				1.56		0.43	43.99	55.58	17.85
F					2.54	142.2	17.79				1.02		38.30	33.63	28.07	14.54
G					2.04	91.7	7.39				1.53					

LOCATION: 125° 44'W/54° 17'N

Profile Description:

SOIL NAME: Barrett

PARENT MATERIAL: Basal till

ELEVATION: 3100 feet

CLASSIFICATION: Orthic Gray Luvisol

DRAINAGE: Moderately well drained

SLOPE & ASPECT: S 18%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0							
Ae1	0-5	10YR7/2 D 45/2 M	Gravelly loam	Moderate coarse platy in upper part and fine subangular blocky in lower part	Friable	Abundant		
Ae2	5-10	10YR7/2 D 45/3 M	Gravelly loam	Moderate fine to medium subangular blocky	Friable	Abundant		
ABgj	10-13	10YR6.5/2 D 4.5/3 M	Gravelly loam to gravelly clay loam	Moderate fine to medium subangular blocky	Firm	Abundant	Few fine faint	
Btgj1	13-16	10YR6/3 D 3.5/3 M	Gravelly clay loam	Moderate fine to medium subangular blocky	Firm	Common	Few fine distinct mottles	
Btgj2	16-20	10YR5/3 D 3.5/4 M	Gravelly clay loam	Moderate medium angular blocky	Firm	Occasional	Few fine faint	Common clay skins
BC1	20-27	10YR5.5/3 D 3.5/4 M	Gravelly clay loam	Moderate medium angular blocky	Firm	Occasional		Some clay skins and/or coatings
BC2	27-34	10YR5/3 D 3.5/3 M	Gravelly clay loam	Moderate, medium subangular blocky to pseudoplaty	Firm	Occasional		Some clay skins and/or coatings
C1	34-42	10YR5.5/3 D 3.5/3 M	Gravelly loam to gravelly clay loam	Pseudoplaty	Very firm	Occasional		Organic coating along cracks
C2	42+	10YR5.5/3 D 3.5/4 M	Gravelly loam to gravelly clay loam till	Pseudoplaty	Very firm	None		Organic coating along cracks

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/579	L-H	1-0	11.11	4.3	3.93	112.54	1.222	53.42	24.94	5.39	0.17	2.22	32.72	16.01	28.20
580	Ae1	0-5	1.01	6.0	5.16	1.06	0.043	14.19	3.79	1.29	0.08	0.18	5.34	9.23	57.85
581	Ae2	5-10	1.32	5.9	5.10	0.81	0.033	14.24	4.71	1.73	0.08	0.16	6.68	10.44	63.98
582	ABgj	10-13	2.56	6.0	5.00	0.63	0.035	10.57	9.49	3.65	0.11	0.29	13.54	18.12	74.72
583	Btgj1	13-16	3.63	6.0	4.99	0.78	0.036	12.50	12.69	5.37	0.17	0.39	18.62	25.56	72.85
584	Btgj2	16-20	3.73	6.2	5.17	0.78	0.033	13.64	16.08	6.67	0.22	0.43	23.40	28.87	81.05
585	BC1	20-27	3.63	6.7	5.80	0.57	0.024	13.75	16.32	6.66	0.22	0.35	23.55	27.58	85.39
586	BC2	27-34	3.41	7.4	6.19										
587	C1	34-42	3.09	7.5	6.38										
588	C2	42+	1.21	7.8	6.70										

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/579					57.8	74.4	63.33	8.06	72.22								
580					24.3	67.4	4.55	10.35	69.94					46.42	40.22	13.36	7.46
581					18.2	118.0	3.55	11.91	51.42								
582					13.5	130.2	4.36	11.54	56.41								
583					10.4	111.4	6.48	28.24	63.47					27.42	39.39	33.19	11.70
584					8.8	119.2	4.67	32.16	65.61					27.63	37.44	34.93	14.54
585					3.3	191.7	6.48	33.42	69.43					29.36	40.69	29.95	12.54
586					3.1	253.4	6.46	32.32	67.22					31.75	39.49	28.76	11.83
587					2.9	273.2	4.38	31.96	70.87					32.26	39.20	28.54	12.57
588					3.2	278.3	3.04	30.87	71.89					31.69	39.96	28.35	12.20

LOCATION: 123° 59'W/54° 06'N

Profile Description:

SOIL NAME: Barrett

PARENT MATERIAL: Basal till

ELEVATION: 2650 feet

CLASSIFICATION: Gleyed Gray Luvisol

DRAINAGE: Imperfectly drained

SLOPE & ASPECT: In depression

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1½-0					Abundant		
Aegj	0-8	2.5Y6/2 D 2.5Y5/2 M	Loam	Weak fine to moderate medium subangular blocky	Friable	Abundant	Common prominent 10YR5/6	Scattered gravel
ABgj	8-16	2.5Y5/2 D 2.5Y4.5/2 M	Gravelly loam to gravelly silt loam	Moderate medium subangular blocky and angular blocky	Firm	Common	Common prominent 10YR4/4	
Btgj1	16-25	10YR4/2 M	Gravelly clay loam	Moderate medium to coarse angular blocky	Firm	Occasional	Common distinct 10YR4/4	
Btgj2	25-32	10YR4/2 M	Gravelly loam to gravelly clay loam	Moderate medium to coarse angular blocky	Firm	Occasional	Few distinct 10YR4/4	
BC	32-38	2.5Y4/2 M	Gravelly loam	Moderate medium to coarse angular and subangular blocky	Firm			
C	38+	2.5Y4/2 M	Gravelly loam till	Massive grading to pseudoplaty with depth	Firm			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/1	L-H	1½-0	14.42	5.3	5.10		1.245	35.88	18.88	5.72	0.18	1.08	25.86	55.86	46.29
2	Aegj	0-8	1.01	5.8	4.84	0.45	0.040	6.55	2.91	1.30	0.08	0.23	4.52	6.61	68.38
3	ABgj	8-16	2.46	6.2	5.24	0.46	0.038	8.03	6.01	3.52	0.11	0.26	9.91	11.83	83.77
4	Btgj1	16-25	3.52	6.9	5.90		0.034	6.79	10.97	6.81	0.24	0.30	18.22	17.99	100
5	Btgj2	25-32	3.09	7.3	6.32	0.40	0.031	7.45	11.22	6.70	0.27	0.25	18.44	16.97	100
6	BC	32-38	2.56	7.6	6.63				9.62	5.26	0.25	0.19	15.32	13.85	100
7	C	38+	2.35	7.9	7.01				7.68	3.89	0.19	0.20	11.96	11.20	100

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/1					78.38	108.13	14.87									
2					24.65	80.81	1.26						42.30	44.73	12.97	1.45
3					7.89	251.03	3.07						30.08	47.57	22.35	6.81
4					2.69	215.32	1.29						41.92	29.13	28.95	15.91
5					2.06	231.95	2.58						39.81	32.25	27.94	14.57
6					2.46	235.89	2.56									
7					3.07	271.23	3.58						49.54	28.94	21.52	12.76

LOCATION: 125° 45'W/54° 17'N

Profile Description:

SOIL NAME: Barrett

PARENT MATERIAL: Basal till

ELEVATION: 2950 feet

CLASSIFICATION: Rego Humic Gleysol

DRAINAGE: Poorly drained

SLOPE & ASPECT: In depression

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
Om	14-6					Abundant		
Oh	6-0					Abundant		
Ah	0-5	10YR2/1 M	Loam	Massive	Sticky	Common		
ACg1	5-9	2.5Y/4.5 M	Gravelly loam to gravelly clay loam	Massive	Plastic	Occasional	Common medium distinct .5YR4/4 M	Thin Ah inter-layers
ACg2	9-15	2.5Y5/2 M	Gravelly loam to gravelly clay loam	Massive	Plastic	None	Many medium prominent 10YR4/4 M	Thin Ah inter-layers
Cg1	15-21	2.5Y5/2 M	Gravelly loam	Massive	Slightly plastic	None	Many fine prominent 7.5YR5/6 M	
Cg2	21-23	2.5Y5/2 M	Gravelly loam to gravelly sandy loam	Massive	Slightly plastic	None	Common fine prominent 10YR5/4 M	
Cg3	23-30	2.5Y5/2 M	Gravelly loam	Massive	Slightly plastic	None	Common fine prominent 10YR5/4 M	
Cg 4	30+	2.5Y5/2 M	Gravelly loam to gravelly clay loam	Massive	Slightly plastic	None	Common fine prominent 10YR5/5 M	

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/224	Om	14-6	17.65	6.0	5.49	79.88	1.408	32.91	77.65	20.00	0.64	0.49	98.78	134.25	73.58					9.65	19.77	32.94	26.47	63.83								
225	Oh	6-0	16.55	6.1	5.63	57.74	1.279	26.19	84.85	18.65	0.54	0.45	104.49	139.03	75.16					12.70	27.16	25.64	42.25	99.07								
226	Ah	0-5	13.12	6.3	5.87	29.20	0.888	19.07	61.76	15.84	0.47	0.62	78.69	101.30	77.68					32.13	91.06	9.00	83.14	157.24								
227	ACg1	5-9	4.17	7.0	6.18	2.19	0.174	7.29	22.40	6.69	0.22	0.43	29.74	31.94	93.11					39.58	350.01	4.95	118.49	136.72								
228	ACg2	9-15	3.20	7.1	6.33	1.46	0.086	9.81	17.75	5.57	0.16	0.34	23.82	23.51	100					8.67	>400	3.10	118.68									
229	Cg1	15-21	2.35	7.2	6.75				13.82	4.84	0.14	0.32	19.12	18.37	100					4.50	337.76	3.58	40.94	64.74								
230	Cg3	23-30	2.56	7.2	6.66															2.36	339.47	1.03	30.51	73.59								
231	Cg4	30+	3.74	7.3	6.57															2.80	334.04	2.59	29.31	75.73								

LOCATION: 124° 30'W/54° 07'N

Profile Description:

SOIL NAME: Berman

PARENT MATERIAL: Lacustrine silts

ELEVATION: 2250 feet

CLASSIFICATION: Orthic Gray Luvisol

DRAINAGE: Well drained

SLOPE & ASPECT: Level

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	½-0							Leaves, twigs and some well decomposed organic material
Ae1	0-3	10YR6.5/3 D 4.5/3 M	Silt to silt loam	Moderate to strong medium platy	Slightly hard	Abundant		
Ae2	3-7	10YR7/2.5 D 5/3 M	Silt to silt loam	Moderate medium platy	Slightly hard to hard	Abundant		
Bt1	7-14	10YR7/2.5 D 5/3 M	Silt loam	Moderate fine to medium angular to subangular blocky	Slightly hard	Common		Common clay skins
Bt2	14-19	10YR7/3 D 5/3 M	Silt loam	Moderate fine to medium angular to subangular blocky	Slightly hard	Common		Common clay skins
BC	19-24	10YR7/2.5 D 5/3 M	Silt loam	Weak fine subangular to angular blocky	Slightly hard	Common		Some clay skins
CB	24-29	10YR7/2 D 5.5/3 M	Silt loam	Weak fine subangular blocky	Slightly hard	Common		
C1	29-36	10YR7/2 D 5.5/3 M	Silt loam	Varved silts	Slightly hard	Occasional		
C2	36+	10YR7/2 D 5.5/3 M	Silt loam to silty clay loam	Varved silts	Slightly hard	Occasional		

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Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/341	L-H	½-0	12.87	6.2	5.3	82.6	1.63	29.4	45.15	10.38	0.07	2.93	58.53	104.52	56.0
342	Ae1	0-3	2.56	6.3	5.1	2.1	0.08	16.0	4.31	1.54	0.05	0.93	6.83	14.51	47.1
343	Ae2	3-7	1.94	6.5	5.3	0.5	0.04	7.4	3.67	1.27	0.04	0.46	5.44	11.26	48.3
344	Bt1	7-14	2.67	6.4	5.4			9.2	9.55	2.46	0.09	0.28	12.38	15.30	80.9
345	Bt2	14-19	2.88	6.6	5.6				12.14	3.09	0.13	0.23	15.59	15.59	100
346	BC	19-24	2.56	6.8	5.8				12.31	3.08	0.17	0.22	15.78	17.02	92.7
347	CB	24-29	2.35	7.3	5.9				10.64	2.86	0.15	0.22	13.87	15.86	87.4
348	C1	29-36	1.94	7.6	6.3				10.19	3.16	0.21	0.21	13.[illegible]7		88.2
349	C2	36+	2.14	8.1	6.9				12.77	2.86	0.21	0.20	16.04		100.0

LAB. NO.	HORIZON	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/341	L-H					46	214		16.1	194.7								
342	Ae1					197	410	1.5	12.1	142.6								
343	Ae2					58	190	1.0	10.2	70.8					6.83	80.78	12,39	2,23
344	Bt1					12	200	0.8	25.9	60.8					1.16	78.07	20,77	6,68
345	Bt2					4	391	1.5	26.7	59.2					0.71	81.93	17,36	6,69
346	BC					2	600	1.5	30.3	62.8								
347	CB					2	600	1.5	27.1	58.9								
348	C1					2	700	1.1	32.6	70.8					0.13	84.33	15,54	4.68
349	C2					2	700	1.5	29.3	70.0								

LOCATION: 124° 17'W/54° 26'N

Profile Description:

SOIL NAME: Berman

PARENT MATERIAL: Lacustrine silts

ELEVATION: 2250 feet

CLASSIFICATION: Orthic Carb. Gleysol

DRAINAGE: Poorly drained

SLOPE & ASPECT: Level

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-F	4-3					Abundant		Leaves, twigs, some partly decomposed
H	3-0					Abundant		Decomposed plant remains
Ahe	0-5	10YR3/1 M	Silty loam	Weak medium subangular blocky	Sticky	Abundant		
A3g	5-9	5Y4.5/1 M	Silty loam	Weak to moderate medium platy	Sticky	Common	Many fine distinct 5YR4/3 M	
B3t	9-15	5Y5/2 M	Silty loam	Weak to moderate subangular blocky	Sticky	Occasional to common	Common fine faint 5YR4/3 M	
Ckg1	15-22	5Y5/2 M	Silty loam	Weak fine to medium subangular blocky	Sticky	Occasional	Few fine distinct 5YR4/4 M	Slight efferv.
Ckg2	22-28	5Y5/3 M	Silty clay loam	Massive	Firm	Occasional		Slight efferv.
Ckg3	28-33	2.5Y5/2 M	Silt loam	Massive with stratifications	Firm	Occasional		Slight efferv.
Ckg4	33-40	2.5Y5/2 M	Silt loam	Massive with stratifications	Firm	Occasional		Strong efferv.
Ckg5	40+	2.5Y4.5/2 M	Silt loam	Massive with stratifications	Firm	None		Strong efferv.

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	OM	N	C/N	Exchangeable Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/295	L-F	4-3	11.86	7.0	6.49	74.87	1.326	32.75	74.72	17.00	0.41	1.90	94.03	90.90	100
296	H	3-0	17.37	7.1	6.67	92.80	1.777	30.29	117.37	24.98	0.55	12.58	155.48	136.90	100
297	Ahe	0-5	2.88	7.7	6.97	5.53	0.244	13.16	26.75	7.30	0.14	0.48	34.67	28.05	100
298	A3g	5-9	1.42	8.1	7.27	0.64	0.046	8.07	11.36	4.67	0.11	0.29	16.43	10.82	100
299	Bgt	9-15	2.04	8.0	7.36	0.64	0.038	9.82	7.35	9.39	0.17	0.22	17.13	14.16	100
300	Ckg1	15-22	2.56	8.3	7.56										
301	Ckg2	22-28	1.83	8.5	7.70										
302	Ckg3	28-33	1.52	8.5	7.62										
303	Ckg4	33-40	1.32	8.5	7.67										
304	Ckg5	40+	1.42	8.5	7.67										

LAB. NO.	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn		Percent SAND	SILT	TOTAL CLAY	FINE CLAY
69/295					43.07	177.86	31.0	22.09	192.96							
296					36.15	279.34	46.0	23.47	255.28							
297					5.56	65.84	8.0	32.15	75.87							
298					0.81	91.28	5.75	17.24	64.91				9.11	75.25	15.64	6.79
299					1.12	277.55	2.5	49.74	72.70				1.28	75.13	23.59	11.81
300					0.92	31.28	56.75	56.41	94.87							
301					0.81	3.56	72.5	34.88	78.92				0.00	65.31	34.69	12.18
302					1.02	5.07	64.0	36.29	78.68							
303					1.01	8.51	62.5	33.94	75.99							
304					0.71	7.10	64.0	34.48	80.12				0.00	79.31	20.69	7.62

LOCATION: 123° 59'W/53° 50'N

SOIL NAME: Clucul*s*

CLASSIFICATION: Orthic Humo-Ferric Podzol

PARENT MATERIAL: Shallow glacial till/or colluvium overlying ultrabasic bedrock

DRAINAGE: Rapid

Profile Description:

ELEVATION: 4600 feet

SLOPE & ASPECT: E 15%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-F	2-0					Abundant		Raw to partially decomposed litter
Ae	0-1½	10YR7/2 D 6/2 M	Sandy loam	Single-grained	Loose	Abundant		
Bf1	1½-6	7.5YR5/6 D 4/4 M	Sandy loam	Weak fine granular	Very friable	Abundant		
Bf2	6-10	7.5YR5/6 D 4/4 M	Sandy loam	Weak fine subangular blocky	Very friable	Abundant		
Bm	10-15	2.5Y6/4 D 10YR5/6 M	Sandy loam	Weak fine subangular blocky	Friable	Abundant		
BC1	15-22	2.5Y5.5/2 D 4.5/2 M	Gravelly sandy loam	Moderate medium to coarse sub-angular blocky	Firm	Common		
BC2	22-28	2.5Y5.5/2 D 4.5/2 M	Gravelly sandy loam	Moderate medium to coarse sub-angular blocky	Firm	Occasional		
R	28+		Peridotite bedrock			Occasional in fractures		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
68/204	L-F	2-0	8.46	3.8	3.13	83.82	1.089	44.62												59.65	70.50		11.39	40.76							
205	Bf1	1½-6	1.63	5.6	4.79	2.66	0.049	31.43	2.03	0.76	0.04	0.30	3.13	12.13	25.80	0.65	0.43			59.45	94.01	2.54	15.24	60.98							
206	Bf2	6-10	1.63	5.7	5.10	1.46	0.042	20.14	1.15	0.57	0.06	0.23	2.01	9.63	20.87	0.64	0.64			38.11	63.52	2.54	17.79	59.20							
207	Bm	10-15	1.42	6.0	5.32	0.70	0.032	12.69	0.89	0.51	0.04	0.22	1.66	7.22	22.99					58.32	98.88	3.80	18.51	50.71							
208	BC1	15-22	1.11	6.0	5.41				1.26	0.70	0.05	0.19	2.20	7.00	31.43					48.03	108.69		22.75	40.44							
209	BC2	22-28	1.52	6.2	5.52				1.40	0.95	0.07	0.22	2.64	9.19	28.72					33.0	86.29		50.76	55.84							
209A	R	28+	2.67		5.71															2.57	11.81		121.92	100.10							

LOCATION: 123° 48'W/53° 45'N

Profile Description:

SOIL NAME: Cobb

PARENT MATERIAL: Ablation till

ELEVATION: 3300 feet

CLASSIFICATION: Bisequa Humo-Ferric Podzol

DRAINAGE: Well drained

SLOPE & ASPECT: S 15%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-F	2-0					Abundant		Raw to partially decomposed litter
Ae	0-1	10YR7/2 D 6/2 M	Sandy loam	Single-grained	Loose	Abundant		
Bf1	1-6	10YR5/6 D 7.5YR4/4 M	Sandy loam	Weak fine subangular blocky	Very friable	Abundant		
Bf2	6-12	10YR5/6 D 4/4 M	Sandy loam	Weak fine to medium subangular blocky	Very friable	Abundant		
AB	12-20	10YR6/25 D 5/2 M	Sandy loam	Weak medium subangular blocky	Very friable	Common		
C1	20-31	10YR6/2 D 5.5/2 M	Gravelly sand	Single-grained	Loose	Occasional		
BA	31-42	10YR6/2 D 4.5/2 M	Sandy loam	Moderate medium to coarse subangular blocky	Friable to firm	Occasional		Few clay films
Bt	42-50	10YR6/3 D 4/2 M	Sandy loam or loam	Moderate coarse blocky	Firm	Occasional		Common clay films
C2	50-60	10YR5.5/2 D 4/2 M	Sandy loam or loam	Massive	Firm			
IIC	60+	10YR5.5/2 D 4/2 M	Sandy loam or loam till	Massive grading to pseudoplaty with depth	Firm			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	[illegible]	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
66/282	L-H	2-0	11.73	4.8	4.3	83.72	0.09	43.8	9.50	2.88	0.09	1.05	13.52	106.33	12.72					68.0											
283	Ae	0-1																													
284	Bf1	1-6	2.09	6.0	5.1	1.60	0.05	20.7	1.43	0.48	0.05	0.19	2.15	8.17	26.32	0.97	0.80			136.0		4.6									
285	Bf2	6-12	1.52	6.2	5.3	0.73	0.03	15.4	1.37	0.48	0.06	0.14	2.05	6.09	33.36	0.81	0.56			72.8		7.1									
286	AB	12-20	0.76	6.3	5.4				2.86	0.81	0.06	0.13	3.86	5.29	72.97					10.1		2.0									
287	C1	20-31	0.86	6.5	5.8				3.46	1.38	0.06	0.12	5.02	5.65	88.85					4.7		3.3									
288	BA	21-42	1.01	6.5	5.9				4.75	3.45	0.12	0.15	8.47	8.03	100.					1.9		4.3									
289	Bt	42-50	1.52	6.5	6.0				6.51	3.76	0.14	0.26	10.67	11.72	91.04					1.4		4.3									
290	C 2	51-60	2.04	6.7	6.1				7.12	4.06	0.14	0.26	11.60	11.68	99.32	0.29	0.07			2.1		2.0									
291	IIC	60+	1.42	6.6	6.1				5.78	3.48	0.13	0.23	9.62	10.65	90.33					2.0		3.3									

LOCATION: 124° 17'W/54° 26'N

Profile Description:

SOIL NAME: Colony

PARENT MATERIAL: Recent beach deposits

ELEVATION: 2240 feet

CLASSIFICATION: Orthic Regosol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: N 3-4%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L	4-3							Deciduous leaves and twigs
FH	3-0							Well and partly decomposed litter
C	0-2	Variegated sand grains	Loamy sand	Weak fine granular	Soft	Abundant		
IIC1	2-13	Variegated sand grains	Sandy gravel	Single-grained	Loose	Common to abundant		
IIC2	13-14	Variegated sand grains	Loamy sand	Single-grained	Loose	Common		
IIC3	14-20	Variegated sand grains	Coarse sand	Single-grained	Loose	Common		Thin lenses of fine sand
IIC4	20-29	Variegated sand grains	Coarse sand	Single-grained	Loose	Common		Thin lenses of fine sand
IIC5	29+	Variegated sand grains	Coarse sand	Single-grained	Loose	Occasional		Thin lenses of fine sand

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/294	L	4-3	27.88	6.3	5.7	88.5	1.67	30.7	70.21	16.11	0.17	4.07	90.56	109.21	82.9
295	FH	3-0	7.99	5.8	5.3	12.1	0.43	16.3	43.75	6.70	0.09	1.98	52.51	66.73	78.7
296	C	0-2	1.01	6.3	5.1	1.2	0.05	14.5	3.54	0.91	0.02	0.34	4.81	7.03	68.4
297	IIC1	2-13	0.60	6.4	5.2				1.41	0.50	0.02	0.23	2.16	3.43	63.0
298	IIC3	14-20	0.40	6.5	5.5				0.95	0.50	0.08	0.18	1.71	2.98	57.4
299	IIC4	20-29	0.50	6.4	5.5				0.95	0.55	0.07	0.15	1.72	2.74	62.8
300	IIC5	29+	0.70	6.5	5.6				1.16	0.81	0.07	0.11	2.15	3.19	67.4

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/294					63	122		25.6	319.7								
295					60	162		10.5	90.4								
296					81	258	2.5	3.8	41.2								
297					4	22	3.8	7.3	30.9								
298					2	14	0.5	7.5	31.4								
299					1	10	0.5	6.8	30.2								
300					1	27	2.5	6.3	32.7								

LOCATION: 126° 36'W/54° 01'N

Profile Description:

SOIL NAME: Crystal

PARENT MATERIAL: Ablation till

ELEVATION: 2550 feet

CLASSIFICATION: Degraded Dystric Brunisol

DRAINAGE: Well to rapidly drained

SLOPE & ASPECT: S 5%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-F	1-0							Needles and leaves partly de-composed
Aej	0-½		Sandy loam	Moderate fine granular	Soft	Abundant		
Bm1	½-5	10YR5.5/3 D 3.5/3 M	Sandy loam	Moderate fine granular	Soft	Abundant		
Bm2	5-9	10YR5/3 D 3.5/3 M	Sandy loam	Moderate fine granular	Soft	Abundant		
C1	9-14	10YR6/2 D 4/2 M	Sand	Single-grained	Loose	Common		
C2	14-20	10YR6/2 D 4/2 M	Gravelly loamy sand	Weak fine subangular blocky	Soft	Common		
C3	20-29	10YR6/2.5 D 4/2 M	Gravelly sandy loam to gravelly loamy sand	Moderate fine subangular blocky	Soft	Common		
C4	29+	10YR6/2.5 D 4.5/3 M	Gravelly loamy sand	Single-grained	Soft	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al
69/248	L-F	2-0	10.38	4.6	4.14	96.88	1.286	43.70	22.08	4.53	0.24	2.98	29.83	39.46	75.60				
249	Bm1	½-5	1.32	5.6	5.17	0.98	0.033	17.27	1.52	0.20	0.05	0.16	1.93	6.08	31.74				
250	Bm2	5-9	1.01	6.0	5.34	0.36	0.021	10.05	1.52	0.30	0.07	0.13	2.02	4.63	43.62				
251	C1	9-14	0.50	6.1	5.65		0.023		2.41	0.36	0.09	0.14	3.00	4.04	74.26				
252	C2	14-20	0.60	6.3	5.84														
253	C3	20-29	0.81	6.7	6.10														
254	C4	29+	0.50	6.7	6.26														

LAB. NO.	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/248	54.09	75.06	5.0	7.45	65.68								
249	159.07	279.64	2.03	10.13	63.33								
250	116.16	140.40		10.61	55.56								
251	10.15	26.83	0.75	9.55	43.97								
252	6.64	36.52		10.81	43.26								
253	4.74	90.73	2.52	13.61	52.17								
254	2.91	86.43		14.07	52.01								

Profile Description:

LOCATION: 125° 40'W/54° 15'N

SOIL NAME: Dahl

CLASSIFICATION: Orthic Dystric Brunisol

PARENT MATERIAL: Shallow colluvium or till overlying acidic bedrock

DRAINAGE: Rapidly to well drained

ELEVATION: 3500 feet

SLOPE & ASPECT: S 44%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0					Abundant		Forest litter
Bm1	0-4	10YR5/3 D 7.5YR4.5/4 M	Sandy loam to loam	Moderate fine to medium granular	Very friable	Abundant		Scattered angular gravel
Bm2	4-7	10YR5/3 D 7.5YR4.5/4 M	Sandy loam to loam	Moderate fine to medium granular	Very friable	Abundant		Scattered angular gravel
CB	7-13	10YR5.5/3 D 4/3 M	Sandy loam to loam	Moderate fine to medium subangular blocky	Very friable	Abundant		Scattered angular gravel
IIC1	13-19	10YR6/3 D 4.5/3 M	Stony loam to stony sandy loam	Moderate fine to medium subangular blocky	Friable	Common		Angular stones and gravel
IIC2	19-24	10YR6/3 D 4.5/3 M	Stony loam to stony sandy loam	Moderate fine to medium subangular blocky	Friable	Common		
R	24+							

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
68/497	L-H	1-0	13.38	6.8	6.80	101.08	2.643	22.18	79.37	9.78	0.07	3.83	93.05	105.41	88.27					25.40	130.39	57.82	16.44	164.40								
498	Bm1	0-4	1.42	5.5	5.15	2.88	0.093	17.96	6.09	0.89	0.04	0.37	7.39	12.36	59.79	0.47	0.30			1.83	4.06	5.07	12.93	65.92								
499	Bm2	4-7	1.11	5.5	5.01	1.93	0.067	16.72	4.43	0.76	0.03	0.25	5.47	10.81	50.60	0.48	0.33			1.52	4.85	5.31	14.91	69.51								
500	CB	7-13	1.11	5.7	5.37	1.26	0.051	14.31	4.68	0.82	0.04	0.18	5.72	9.33	61.31					1.21	5.76	3.54	36.40	89.74								
501	IIC1	13-19	1.11	5.9	5.71	1.20	0.048	14.58	5.56	0.76	0.05	0.11	6.48	9.43	68.72	0.38	0.29			1.52	8.09	4.30	18.20	71.28								
502	IIC2	19-24	1.52	5.9	5.79				9.27	1.27	0.07	0.14	10.75	13.41	80.16					1.12	17.06	2.79	24.36	65.99								
503	R	24+				NOT SAMPLED																										

LOCATION: 123° 21'W/53° 53'N

Profile Description:

SOIL NAME: Decker

PARENT MATERIAL: Shallow glacial till and/or colluvium overlying acidic bedrock

ELEVATION: 3000 feet

CLASSIFICATION: Degraded Dystric Brunisol

DRAINAGE: Rapid

SLOPE & ASPECT: S 7%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-F						Abundant		Raw to partially decomposed litter
Ae	0-1	10YR6/1 D 5/1 M	Gravelly sandy loam	Weak fine subangular blocky	Soft	Abundant		
Bm1	1-4	10YR4.5/4 D 4/4 M	Gravelly sandy loam	Weak fine subangular blocky	Soft	Abundant		
Bm2	4-8	10YR5/4 D 4/4 M	Gravelly sandy loam	Weak fine to medium subangular blocky	Soft	Abundant		
BC1	8-12	10YR5/3 D 5/2 M	Gravelly sandy loam	Moderate medium to coarse sub-angular blocky	Slightly hard	Occasional		
BC2	12-24	10YR6/2 D 5/2 M	Gravelly loam	Strong medium to coarse subangular blocky and blocky	Hard	Occasional		
R	24+		Bedrock			Occasional in bedding		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
65/223	L-F	1-0	11.11	5.4	5.2	84.7	1.61	34.2							
224	Ae	0-1	1.11	5.1	4.5	3.3	0.05	22.8	3.31	0.54	0.04	0.25	4.14	8.21	50.43
225	Bm1	1-4	2.04	5.8	4.5	1.2	0.03	20.7	2.01	0.84	0.04	0.34	3.23	12.34	26.18
226	Bm2	4-8	1.52	5.7	4.9	0.6	0.02	14.6	1.64	1.05	0.05	0.41	3.15	7.85	40.13
227	BC1	8-12	1.21	5.7	4.8	0.3	0.01	14.6	2.06	0.81	0.05	0.22	3.14	6.92	45.38
228	BC2	12-24	1.21	5.8	5.1				4.35	0.82	0.08	0.09	5.34	7.96	67.09

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
65/223					81.0											
224					80.0		5-10									
225	0.92	0.76			155.0		5-10									
226	0.71	0.61			70.0		5-10									
227					35.0		5-10									
228	0.64	0.51														

LOCATION: 124° 37'W/54° 02'N

SOIL NAME: Deserters

CLASSIFICATION: Brunisolic Gray Luvisol

PARENT MATERIAL: Basal till

DRAINAGE: Well drained

Profile Description:

ELEVATION: 3300 feet

SLOPE & ASPECT: SE 7%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0							
Ae1	0-½	10YR6/2 D 5/2 M	Sandy loam	Moderate fine granular	Very friable	Abundant		
Bm1	½-7	10YR4.5/3 D 3/3 M	Sandy loam to loam	Strong fine to medium subangular blocky	Very friable	Abundant		
Bm2	7-14	10YR5.5/3 D 4/3 M	Gravelly sandy loam to loam	Strong fine to medium granular	Very friable	Abundant		
Ae2	14-19	10YR6/2 D 4.5/2 M	Loam to gravelly loam	Moderate fine subangular blocky	Friable	Common		
Ae3	19-23	10YR6/2 D 4.5/2 M	Loam to gravelly loam	Moderate fine subangular blocky	Friable	Common		
AB	23-28	10YR7/2.5 D 4/2.5 M	Loam to gravelly loam	Moderate fine angular to sub-angular blocky	Friable	Occasional		
Bt	28-36	10YR6/3 D 4/2 M	Loam to gravelly loam	Moderate to strong medium angular blocky	Firm	Occasional		Common clay films
BC	36-46	10YR7/3 D 4/3.5 M	Loam to gravelly loam	Weak to moderate fine angular blocky	Friable	Occasional		
C	46+	10YR7/2.5 D 4/2.5 M	Loam to gravelly loam till	Pseudoplaty	Friable	None		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/214	L-H	½-0	8.93	3.8	3.96	76.66	1.020	43.60	11.98	3.33	0.14	2.18	17.63	63.59	27.72					168.84	260.34	12.5	8.44	80.61							
215	Bm1	1-7	2.56	5.7	5.16	2.72	0.071	22.20	4.10	0.69	0.05	0.58	5.42	13.83	39.19	0.82	0.98			230.76	74.00	3.33	13.08	90.25							
216	Bm2	7-14	2.46	6.0	5.46	1.72	0.053	18.83	4.82	0.87	0.06	0.40	6.15	12.24	50.25	0.61	0.84			194.67	362.71	2.56	15.88	80.69							
217	Ae2	14-19	1.11	6.3	5.86	0.41	0.025	9.60	4.85	1.41	0.08	0.27	6.61	7.77	85.07	0.35	0.36			9.91	78.87	1.01	16.94	35.89							
218	Ae3	19-23	1.32	6.4	5.96	0.36	0.021	10.10	6.08	2.06	0.09	0.24	8.47	9.32	90.88						158.06	1.27	23.56	38.50							
219	AB	23-28	1.32	6.5	6.00	0.28	0.020	8.25	6.59	2.53	0.15	0.27	9.54	10.54	90.51					3.55	209.73	1.27	24.57	38.00							
220	Bt	28-36	1.73	6.5	5.90				8.34	3.28	0.16	0.30	12.08	13.19	91.58					6.92	189.22	2.29	30.26	40.18							
221	BC1	36-41	1.94	7.0	6.40															1.63	223.25	2.29	47.40	42.56							
222	BC2	41-46	1.73	7.0	6.52															1.63	266.54	3.56	34.59	42.47							
223	C	46+	1.62	7.0	6.28															1.63	283.52	1.02	31.50	42.43							

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LOCATION: 126° 25'W/53° 55'N

Profile Description:

SOIL NAME: Deserters

PARENT MATERIAL: Basal till

ELEVATION: 3400 feet

CLASSIFICATION: Gleyed Brunisolic Gray Luvisol

DRAINAGE: Imperfectly drained

SLOPE & ASPECT: NW 24%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	2-0					Abundant		Forest litter in different stages of decomposition
Ae	0-1	10YR7/2 D 6/2 M	Sandy loam	Single-grained	Loose	Abundant		
Bm1	1-6	10YR6/3 D 4/4 M	Sandy loam to loam	Moderate fine to medium granular	Very friable	Abundant		
Bmgj	6-12	10YR6/3 D 4/3 M	Sandy loam to loam	Weak to moderate fine granular	Very friable	Abundant	Few fine faint 10YR4/4 M	
Aegj	12-19	10YR7/2 D 4.5/3 M	Gravelly loam	Weak fine subangular blocky	Very friable	Common	Common fine distinct 7.5YR5/6 M	
ABg	19-24	10YR7/2 D 5/3 M	Gravelly loam	Weak to moderate medium subangular blocky	Friable	Occasional		
Btgj1	24-29	10YR6/2 D 4/3 M	Gravelly loam	Moderate fine to medium subangular and angular blocky	Firm	None	Common fine distinct 7.5YR4.5/4M	Common clay skins
Btgj2	29-35	10YR7/3 D 4/3 M	Gravelly loam	Moderate fine to medium subangular and angular blocky	Very firm	None	Few fine distinct 7.5YR4.5/4 M	Common clay skins
BCgj	35-43	10YR7/2 D 4/3 M	Gravelly loam	Moderate medium subangular blocky to pseudoplaty	Very firm	None	Few fine distinct 7.5YR5/4 M	Some clay skins
C	43+	10YR7/2 D 4.5/3 M	Gravelly loam till	Pseudoplaty	Very firm	None		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/184	L-H	2-0	10.13	4.6	4.35	79.79	1.269	36.47	26.87	3.74	0.22	1.38	32.21	72.80	44.24
185	Ae	0-1	1.11	4.6	4.02	2.82	0.085	19.25	1.72	0.45	0.09	0.24	2.50	11.05	22.62
186	Bm1	1-6	1.73	5.1	4.46	2.14	0.089	13.92	2.03	0.64	0.09	0.24	3.00	12.26	24.47
187	Bmgj	6-12	1.21	5.2	4.57	0.84	0.029	16.70	2.43	0.74	0.10	0.19	3.46	8.91	38.83
188	Aegj	12-19	1.42	5.4	4.71	0.28	0.021	7.71	4.97	1.71	0.20	0.18	7.06	10.52	67.11
189	ABg	19-24	1.62	5.5	4.75	0.28	0.018	9.00	6.20	1.96	0.13	0.16	8.45	10.75	78.60
190	Btgj1	24-29	2.04	5.8	5.28										
191	Btgj2	29-35	2.04	5.9	5.37										
192	BCgj	35-43	1.73	6.5	5.95										
193	C	43+	1.94	6.6	6.00										

LAB. NO.	HORIZON	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/184	L-H					36.45	50.66	1.70	8.26	63.32								
185	Ae					54.60	83.92	2.53	7.08	36.65								
186	Bm1					46.80	75.28	4.83	11.44	60.53								
187	Bmgj					15.08	52.12	2.53	11.89	53.14								
188	Aegj					4.56	58.32	3.55	17.75	58.32					43.27	37.83	18.90	4.42
189	ABg					4.67	78.26	3.56	16.77	54.11								
190	Btgj1					5.20	124.49	3.57	20.41	59.95								
191	Btgj2					3.47	129.59	2.55	22.45	64.54					42.03	34.17	23.80	10.68
192	BCgj					2.03	180.06	2.54	23.40	71.97								
193	C					1.43	214.07	2.55	24.21	73.14					41.76	35.54	22.70	11.24

LOCATION: 124° 50'W/54° 00'N

Profile Description:

SOIL NAME: Dragon

PARENT MATERIAL: Shallow colluvium and till overlying acidic bedrock

ELEVATION: 3700 feet

CLASSIFICATION: Orthic Humo-Ferric Podzol

DRAINAGE: Rapidly to well drained

SLOPE & ASPECT: SE 20%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	2-0					Abundant		Well preserved to decomposed plant remains
Ae	0-2	10YR7/1 D 5.5/2 M	Sandy loam	Weak fine subangular blocky	Loose	Abundant		
Bf1	2-3½	10YR5/4 D 4/3 M	Sandy loam	Moderate fine to medium subangular blocky	Very friable	Abundant		
Bf2	3½-8	10YR5/5 D 7.5YR4/4 M	Sandy loam to loam	Moderate fine to medium subangular blocky	Very friable	Abundant		Scattered gravel
BC1	8-13	10YR6.5/3 D 5/3 M	Gravelly sandy loam	Moderate fine to medium subangular blocky	Very friable	Common		
BC2	13-18	10YR6.5/3 D 6/3 M	Gravelly sandy loam	Moderate fine to medium subangular blocky	Very friable	Common		
C	18-22	10YR6/2 D 5/2 M	Gravelly sandy loam	Medium subangular blocky to pseudoplaty	Friable	Occasional		
R	22+		Bedrock					

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exchangeable Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/406	L-H	2-0	8.45	4.7	3.9	102.2	1.21	31.1	22.45	2.93	0.04	2.00	27.42	106.98	25.6
407	Ae	0-2	2.14	4.8	3.7	3.0	1.14	27.5	2.45	0.26	0.01	0.22	2.94	12.35	23.8
408	Bf1	2-3½	2.99	5.5		3.5			1.39	0.15	0.01	0.18	1.73	14.08	12.3
409	Bf2	3½-8	3.53	6.0		2.9	0.07	23.3	1.45	0.16	0.01	0.13	1.75	13.52	12.9
410	BC1	8-13	1.63	6.0					0.81	0.15	0.01	0.11	1.08	9.35	11.6
411	BC2	13-18	1.21	6.0					0.71	0.10	0.03	0.11	0.93	5.87	15.8
412	C	18-22	1.01	6.1											

LAB. NO.	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn			Percent SAND	SILT	TOTAL CLAY	FINE CLAY
67/406					42	54		9.5	42.0								
407					7	14	7.7	3.10	19.2								
408	0.95	0.58			51	99	9.0	8.2	47.6								
409	0.92	0.95			44	93	9.1	13.2	51.8								
410	0.50	0.61			66	112	6.4	15.2	28.7								
411	0.55	0.38			27	62	5.1	17.7	24.0								
412	0.39	0.28			28	62		16.7	25.3								

LOCATION: 125° 51'W/54° 21'N

Profile Description:

SOIL NAME: Driftwood

PARENT MATERIAL: Basal till

ELEVATION: 2450 feet

CLASSIFICATION: Dark Gray Luvisol

DRAINAGE: Well to moderately well drained

SLOPE & ASPECT: Level.

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
Ap1	0-4	10YR3.5/2 D 2/1.5 M	Loam	Strong fine granular	Soft	Abundant		
Ap2	4-6	10YR4/2 D 3/2 M	Loam	Strong fine to medium granular	Soft	Abundant		
Ae	6-10	10YR6.5/2 D 5.5/3 M	Gravelly loam	Moderate to strong fine sub-angular blocky	Slightly hard	Common		
AB	10-15	10YR6.2/2.5D 5/3 M	Gravelly clay loam	Moderate to strong medium sub-angular and angular blocky	Slightly hard	Common		Some clay skins
Bt1	15-19	10YR6/2 D 4/3 M	Clay loam to gravelly clay loam	Moderate to strong medium angular blocky	Hard	Common		Common clay skins
Bt2	19-26	10YR5/3 D 3.5/3 M	Clay	Strong medium to coarse angular blocky	Very hard to extremely hard	Occasional		Many clay skins
Bt3	26-31	10YR6/3 D 3.5/3 M	Gravelly clay loam	Moderate medium angular blocky	Very hard to extremely hard	Occasional		Common clay skins
CB	31-35	10YR5.5/3 D 4/3 M	Gravelly clay loam	Pseudoplaty to moderate medium subangular blocky	Very hard	Occasional		Some clay skins
C1	35-42	10YR5/2.5 D 2.5/3 M	Gravelly clay loam	Pseudoplaty	Very hard	Occasional		
C2	42+	10YR5/2.5 D 2.5/3 M	Gravelly clay loam	Pseudoplaty	Very hard	None		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exchangeable Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn		Percent SAND	SILT	TOTAL CLAY	FINE CLAY
68/569	Ap1	0-4	3.95	6.0	5.49	16.50	0.668	14.33	22.74	3.84	0.09	0.40	27.07	39.43	68.65					8.8	23.9	1.56	22.87	197.25							
570	Ap2	4-6	2.67	6.1	5.61	8.79	0.342	14.91	14.12	2.63	0.11	0.26	17.12	25.54	67.03					10.8	28.7	4.62	14.89	178.65							
571	Ae	6-10	1.21	6.3	5.59	1.11	0.053	12.08	4.64	1.85	0.23	0.09	6.81	10.15	67.09					1.8	20.2	3.80	14.93	55.67				33.44	48.00	18.56	2.30
572	AB	10-15	1.52	6.0	5.20	0.81	0.052	9.04	5.85	2.94	0.21	0.10	9.10	13.31	68.37					2.0	25.9	3.05	23.86	62.18				22.19	48.87	27.96	5.36
573	Bt1	15-19	2.04	5.7	4.48	0.93	0.048	11.25	6.89	4.85	0.44	0.16	12.34	19.64	62.82					2.6	24.4	5.61	34.18	73.47				21.63	41.70	36.67	14.03
574	Bt2	19-26	3.09	5.5	4.21	0.94	0.055	10.00	9.02	7.28	0.68	0.22	17.20	26.79	64.20					4.1	27.8	6.44	55.67	77.32				20.54	34.32	45.14	20.64
575	Bt3	26-31	2.99	5.6	4.43															3.6	27.5	6.44	47.89	72.09							
576	CB	31-35	2.46	5.9	4.95															2.6	87.1	7.68	46.88	76.80				25.97	42.27	31.76	18.40
577	C1	35-42	1.94	7.3	6.44															1.0	178.5	10.19		85.88				25.55	37.91	36.54	15.21
578	C2	42+	1.52	7.9	6.93															1.1	228.4	7.87	36.04	81.22							

LOCATION: 124° 16'W/54° 23'N

SOIL NAME: Fort St. James

CLASSIFICATION: Orthic Gray Luvisol

Profile Description:

PARENT MATERIAL: Glaciolacustrine clay deposits

ELEVATION: 2350 feet

DRAINAGE: Moderately well

SLOPE & ASPECT: Level

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	2-0					Abundant		Raw to decomposed deciduous litter
Ae	0-2	10YR6.5/2 D 5/2 M	Clay	Moderate coarse platy crushing to coarse granular	Soft	Common		
AB	2-5	10YR6/2 D 5/2 M	Heavy clay	Moderate medium blocky	Hard	Common		
Bt1	5-10	10YR5.5/3.5D 3.5/3 M	Heavy clay	Strong coarse to very coarse columnar	Very hard to extremely hard	Common	Few faint 10YR5/6 M	Many clay films
Bt2	10-20	10YR5.5/3.5D 3.5/3 M	Heavy clay	Strong coarse to very coarse prismatic	Very hard to extremely hard	Common		Many clay films
BC	20-28	10YR5/2 D 3.5/3 M	Heavy clay	Strong coarse prismatic	Very hard to extremely hard	Occasional		Few clay films along root channels and structure interfaces
C	28+	10YR6/3 D 3/3 M	Heavy clay	Stratified	Very hard			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exchangeable Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/372	L-H	2-0	8.93	6.2	5.4	42.4	1.00	24.7	39.65	27.78	0.28	4.35	72.06	104.46	69.0
68/422	Ae	0-2	5.37	5.5	4.88	4.51	0.190	13.79	8.30	11.06	0.14	0.85	20.35	36.31	56.1
68/423	AB	2-5	4.06	5.5	4.84	2.45	0.130	10.92	5.72	10.34	0.15	0.52	16.73	26.64	62.8
67/374	Bt1	5-10	5.37	5.4	4.5	1.8	0.12	8.8	8.43	16.75	0.16	1.12	26.46	37.14	71.2
375	Bt2	10-20	4.93	5.4	4.5	1.9	0.10	10.9	9.44	22.98	0.70	0.68	33.80	45.38	74.5
376	BC	20-28	4.60	5.5	4.7				8.16	21.18	0.94	0.46	30.74	37.03	83.0
377	C	28+	3.63	6.5	5.6				7.46	21.45	1.34	0.30	29.55	30.98	95.4

LAB. NO.	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn		Percent Sand	Silt	Total Clay	Fine Clay
67/372					57	106										
68/422					22.65	31.61	2.63	29.40	165.08							
68/423					6.24	15.61		17.23	117.07				6.50	26.72	66.78	13.[illegible]
67/374					2	4		35.3	83.0				0.96	15.72	83.32	29.[illegible]
375					1	18		67.2	127.5				1.17	14.05	84.78	28.[illegible]
376					1	94		63.8	117.17							
377					2	392		56.5	125.7				0.51	30.81	68.60	17.[illegible]

Profile Description:

LOCATION: 124° 15'W/54° 08'N

SOIL NAME: Kluk

CLASSIFICATION: Orthic Dystric Brunisol

PARENT MATERIAL: Gravelly glacial lake beach deposits

DRAINAGE: Rapid

ELEVATION: 2650 feet

SLOPE & ASPECT: S 13%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0					Abundant		
Bm	0-6	10YR5.5/4 D 3/3 M	Gravelly loamy sand to gravelly sand	Weak fine granular crushing to single-grained	Loose	Abundant		
CB	6-10	10YR6/3 D 3/3 M	Gravelly sand	Single-grained	Loose	Abundant		
IIC1	10-17	Variegated	Sandy gravel	Single-grained	Loose	Abundant		
IIC2	17-26	Variegated	Sandy gravel	Single-grained	Loose	Common		
IIC3	26+	Variegated	Interstratified gravel, gravelly coarse sand and coarse sand	Single-grained	Loose	Common		
					Loose	Common		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exchangeable Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/288	L-H	1-0	14.94	5.4	4.6	91.04	1.35	39.1	43.10	5.17	0.24	2.31	50.8	111.5	45.6
289	Bm	0-6	1.63	5.9	5.0	1.88	0.075	14.5	2.19	0.41	0.04	0.36	3.00	9.12	32.9
290	CB	6-10	1.52	6.4	5.4				2.99	0.41	0.05	0.25	3.70	7.64	48.4
291	IIC1	10-17	0.91	6.3	5.4				2.02	0.56	0.03	0.32	2.93	5.42	54.1
292	IIC2	17-26	0.91	6.3	5.5				2.32	0.56	0.03	0.30	3.21	5.23	61.4
293	IIC3	26+	0.91	6.2	5.4				2.93	0.71	0.03	0.29	3.96	5.57	71.1

LAB. NO.	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn		Percent Sand	Silt	Total Clay	Fine Clay
67/288					66.7	63.2		62.9	129.3							
289					325.2	487.8	2.54	9.7	100.4							
290					175.0	294.4		8.4	87.6							
291					34	34.3	6.30	14.4	51.7							
292					23.2	54.5	2.5	14.1	51.7							
293					6.6	25.7	1.3	12.5	39.1							

Profile Description:

LOCATION: 124° 48'W/53° 34'N

SOIL NAME: Knewstubb

CLASSIFICATION: Degraded Eutric Brunisol

PARENT MATERIAL: Lacustrine fine sands and silts

DRAINAGE: Well drained

ELEVATION: 2900 feet

SLOPE & ASPECT: S 12%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0					Abundant		
Aej	0-½	10YR6/2 D 5/1 M	Sandy loam	Single-grained	Loose	Abundant		
Bm1	½-4½	10YR6/3 D 5/4 M	Sandy loam	Weak medium granular	Loose	Abundant		
Bm2	4½-10	10YR7/3 D 5/3 M	Sandy loam to loam	Weak medium subangular blocky	Very friable	Abundant		
AB	10-16	10YR6.5/3 D 5.5/3 M	Sandy loam to loam	Weak medium subangular blocky	Very friable	Common		
Btj	16-19	10YR6/3 D 4.5/2 M	Silt loam	Moderate medium subangular blocky	Friable	Common		Some clay skins
CB	19-29	10YR7/2 D 5/2 M	Silt loam	Weak fine subangular blocky; partly stratified	Very friable	Occasional		
C	29+	10YR7/2 D 5/2 M	Fine sandy loam	Single-grained				

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Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/321	L-H	1-0	16.70	5.1		100.4	1.58	40.1	46.21	5.60	0.27	2.35	54.43	110.51	58.3
322	Bm1	0-4½	7.18	6.0	5.0	1.2	0.08	9.6	4.29	0.70	0.09	0.38	5.46	10.07	54.2
323	Bm2	4½-10	6.61	6.2	5.4	0.5	0.03	10.6	4.42	0.85	0.08	0.42	5.77	7.77	74.3
324	AB	10-16	1.42	6.5	5.7				4.56	1.27	0.08	0.34	6.25	7.98	78.3
325	Btj	16-19	2.04	6.7	6.0				8.06	2.55	0.11	0.48	11.20	13.32	84.1
326	CB	19-29	2.04	6.7	6.1				8.72	2.96	0.19	6.14	12.01	13.61	88.2
327	C	29+	1.01	6.9	6.1				5.30	1.62	0.22	0.08	7.22	7.95	90.8

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/321																	
322	0.77	0.43			104	193		10.5	53								
323	0.66	0.37			45	83		6.7	41.3								
324	0.86	0.53			19	58		10.1	40.0								
325	0.82	0.57			13	54		20.9	43.4								
326	0.36	0.18			5	189		25.3	48.0								
327						174		13.6	45.5								

LOCATION: 124° 34'W/54° 03'N

Profile Description:

SOIL NAME: Mapes

PARENT MATERIAL: Sandy valley trains and deltas

ELEVATION: 2250 feet

CLASSIFICATION: Orthic Regosol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: NE 9%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L	½-0							forest litter
Ah	0-2	10YR4.5/2 D 3/3 M	Sand	Single-grained	Loose	Abundant		
AC	2-4	10YR5.5/2 D 4/3 M	Sand	Single-grained	Loose	Abundant		
C1	4-10	Variegated	Sand	Single-grained	Loose	Common		
C2	10-19	Variegated	Sand	Single-grained	Loose	Common		
C3	19-28	Variegated	Sand	Single-grained	Loose	Occasional		Few Fe stains
C4	28+	Variegated	Sand	Single-grained	Loose	None		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/301	L-H	½-0	10.18	4.9	4.5	72.2	1.25	33.5	18.84	7.71	0.18	2.38	29.11	88.81	32.8
302	Ah	0-2	1.94	6.0	5.0	2.8	0.11	14.4	3.77	0.46	0.09	0.41	4.73	10.37	45.6
303	AC	2-4	1.42	6.1	5.1	0.7	0.03	12.5	2.33	0.46	0.09	0.15	3.03	6.42	47.2
304	C1	4-10	1.21	6.1	5.2				2.94	0.56	0.08	0.13	3.71	5.59	66.4
305	C2	10-19	1.32	6.3	5.9				3.75	1.01	0.09	0.13	4.98	6.41	77.7
306	C3	19-28	1.32	6.6	5.7				3.90	1.01	0.09	0.15	5.15	6.32	81.5
307	C4	28+	1.21	6.7	5.8				3.54	1.01	0.11	0.17	4.83	5.92	81.6

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/301					55	63		9.10	84.0								
302					158	240	2.5	12.2	101.9								
303					85	122	2.5	9.6	65.9								
304					22	37		9.6	50.6								
305					8	34	2.5	10.6	43.1								
306					6	65	0.5	10.9	49.4								
307					5	63	1.3	13.2	50.6								

Profile Description:

LOCATION: 126° 55'W/54° 12'N

SOIL NAME: Morice

CLASSIFICATION: Degraded Dystric Brunisol

PARENT MATERIAL: Kame terraces

DRAINAGE: Rapidly drained

ELEVATION: 2700 feet

SLOPE & ASPECT: NE 22%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LF	1-0					Abundant		Forest litter
Aej	0-½	10YR6/2 D 5/1 M	Gravelly sand	Weak fine granular	Loose	Abundant		
Bm	½-5	10YR5/3 D 3.5/3 M	Gravelly sand	Weak fine granular	Loose	Abundant		
BC	5-9	Variegated	Gravelly sand	Single-grained	Loose	Common		
C1	9-17	Variegated	Gravelly sand	Single-grained	Loose	Common		
C2	17-27	Variegated	Gravelly sand	Single-grained	Soft	Occasional		
C3	27-36	Variegated	Gravelly sand	Single-grained	Soft	Occasional		
C4	36+	Variegated	Gravelly sand	Single-grained	Soft	None		Thin silty band (½-1")

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Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/256	LF	1-0	8.46	5.8	5.51	33.98	0.746	26.42	36.23	4.62	0.33	2.28	43.46	58.90	73.97					73.75	107.92	23.86	14.37	284.71							
257	Bm	½-5	1.42	5.4	4.83	1.85	0.046	23.28	0.71	0.20	0.04	0.14	1.09	5.78	18.86					183.57	405.68	2.28	8.11	168.61							
258	BC	5-9	0.81	5.7	5.34	0.64	0.023	16.00	0.71	0.15	0.04	0.10	1.00	3.02	33.11					66.03	135.09	1.01	10.33	56.20							
259	C1	9-17	0.70	5.9	5.84				0.70	0.14	0.03	0.10	0.97	2.09	46.41					19.33	38.47	2.52	11.83	52.87							
260	C2	17-27	0.50	6.0	5.58				0.80	0.14	0.04	0.11	1.09	2.20	49.55					14.57	31.26	1.01	16.08	53.52							
261	C3	27-36	0.30	5.9	5.69															15.45	33.30	4.51	16.55	54.41							
																				4.03	22.08	5.80	24.95	52.93							

LOCATION: 123° 59'W/54° 02'N

SOIL NAME: Nechako

CLASSIFICATION: Orthic Gray Luvisol

PARENT MATERIAL: Fluvial deposits

DRAINAGE: Moderately well drained

Profile Description:

ELEVATION: 2200 feet

SLOPE & ASPECT: Level

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0					Abundant		
Ae1	0-3	10YR7/2 D 7.5YR4/2 M	Silt loam	Weak fine platy	Soft	Abundant		
Ae2	3-7	10YR7/2 D 4/2 M	Silt loam	Weak fine platy	Soft	Abundant		
Bt1	7-17	10YR6/4 D 4/3 M	Silt loam	Moderate fine to medium subangular blocky	Slightly hard	Common		Three silty clay loam bands ¼ to ½ inch thick
Bt2	17-22	10YR7/3 D 4/2 M	Silt loam	Moderate medium subangular blocky	Slightly hard	Common		
BC	22-26	10YR7/3 D 4/3 M	Silt loam	Moderate fine subangular blocky	Slightly hard	Common		
IICgj	26-31	10YR6/3 D 5/2 M	Very fine sandy loam	Weak fine subangular blocky	Soft to slightly hard	Occasional	Common distinct 10YR5/6 M	
IIICgj	31+	Variegated	Sand	Single-grained	Loose	Occasional	Common distinct 10YR5/6 M	

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
66/331	L-H	1-0	13.61	5.8	5.7	74.88	1.42	30.5	32.45	5.56	0.06	2.48	40.55	96.44	42.05
332	Ae1	0-3	6.21	5.7	5.0	1.72	0.07	13.5	3.40	0.90	0.04	0.56	4.90	11.52	42.53
333	Ae2	3-2	1.27	6.0	5.2	0.36	0.04	5.8	4.25	1.42	0.06	0.32	6.05	8.81	68.67
334	Bt1	7-17	2.46	5.8	5.4	0.56	0.04	9.1	7.68	3.51	0.09	0.50	11.78	16.39	71.87
335	Bt2	17-22	2.25	6.1	5.6	0.56	0.03	11.0	8.08	4.14	0.16	0.33	12.71	16.67	76.24
336	BC	22-26	2.56	6.2	5.6				9.13	4.95	0.26	0.30	14.64	18.97	77.17
337	IICgj	26-31	1.73	6.4	5.8				6.18	3.15	0.23	0.17	5.78	12.72	76.49
338	IIICgj	31+	0.81	6.5	5.9				3.18	2.07	0.08	0.12	9.73	6.55	83.21

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
66/331					70.9											
332					161.2		5.3						18.7	74.5	6.8	2.3
333					23.1		5.1									
334					32.4		7.9						12.9	67.9	19.2	10.8
335													1.8	80.5	17.7	6.5
336					17.7		5.4									
337					10.4		2.8						31.7	56.9	11.4	5.4
338					7.4		2.5									

LOCATION: 125° 26'W/54° 20'N

Profile Description:

SOIL NAME: Nechako

PARENT MATERIAL: Fluvial deposits

ELEVATION: 2850 feet

CLASSIFICATION: Gleyed Gray Luvisol

DRAINAGE: Imperfectly drained

SLOPE & ASPECT: Level

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L	2-1							Needles and living moss
F	1-0					Abundant		Partly decomposed forest litter
Ae	0-4	10YR6/3 D 4.5/3 M	Silt loam	Moderate fine platy	Very friable	Abundant		
Aegj	4-9	10YR5/3 D 4/3 M	Silt loam	Strong fine to medium platy	Very friable	Common	Few, fine prominent 5Y4/4 M	
ABgj	9-14	10YR5/2.5 D 4/2 M	Silt loam	Moderate fine pseudoplaty or subangular blocky	Very friable	Common	Common fine prominent 5YR3/2 M	
Btg	14-23	2.5Y4/2 M	Silt loam	Moderate fine subangular blocky	Friable	Occasional	Common fine prominent 7.5Y4/4 M	
Cg	23-32	2.5Y4/2 M	Silt loam	Pseudoplaty	Very friable		Common fine prominent 7.5Y4/4 M	
IICg	32+	5YR3/4 M	Gravelly sand	Single-grained	Loose			Fe - stains

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/240	L	2-1	8.93	4.9		74.86	1.004	43.25							
241	F	1-0	11.86	4.4	3.97	89.22	1.230	42.07	26.85	4.85	0.46	3.13	35.29	80.09	44.06
242	Ae	0-4	2.15	6.1	5.55	0.85	0.059	8.34	10.73	2.70	0.12	0.11	13.66	15.89	85.97
243	Aegj	4-9	1.94	6.3	5.68	0.70	0.032	12.75	9.48	2.61	0.10	0.08	12.27	13.06	93.95
244	ABgj	9-14	2.35	6.4	5.70	0.85	0.051	9.67	10.54	2.77	0.12	0.09	13.52	15.05	89.83
245	Btg	14-23	2.25	6.6	5.77		0.049		10.74	2.66	0.13	0.09	13.62	14.82	91.90
246	Cg	23-32	1.94	6.7	5.87				8.66	2.61	0.12	0.09	11.48	12.39	92.66
247	IICg	32+	1.83	6.8	6.12				6.36	2.24	0.09	0.09	8.78	10.51	83.54

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/240						124.18	23.96										
241					104.59	107.39	22.71	5.03	27.41								
242					10.11	93.98	2.30	16.34	60.01					50.62	38.29	11.09	
243					6.42	152.91	2.80	14.53	58.62								
244					3.17	112.59	2.81	17.14	58.85								
245					5.38	150.31	1.02	20.19	62.63					34.16	48.49	17.35	
246					5.81	132.01		19.62	51.73					9.11	75.24	15.65	
247					3.26	39.20	5.60	10.95	48.88								

Profile Description:

LOCATION: 124° 36'W/54° 03'N

SOIL NAME: Nithi

PARENT MATERIAL: Fine sandy and silty valley trains

ELEVATION: 2200 feet

CLASSIFICATION: Orthic Gray Luvisol

DRAINAGE: Well drained

SLOPE & ASPECT: E 3%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0							forest litter
Ae1	0-6	10YR6/3 D 5/2.5 M	Silt loam to very fine sandy loam	Weak fine platy	Very friable	Abundant		
Ae2	6-15	10YR7/2.5 D 5/2 M	Silt loam	Moderate fine platy to subangular blocky	Very friable	Abundant		
Bt1	15-17	10YR6/3 D 4.5/3 M	Silt loam	Moderate fine angular blocky	Friable	Common		Some clay skins
Bt2	17-23	10YR6/3 D 4.5/3 M	Silt loam	Weak fine to medium subangular blocky	Very friable	Occasional		Clay skins in pores
C	23-29	10YR6/3 D 4.5/3 M	Fine sandy loam	Single-grained	Loose	Occasional		
IIC	29+	Variegated	Loamy sand	Single-grained	Loose	None		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/314	L-H	2-0	11.61	5.7	5.0	69.9	1.38	29.4	45.20	7.03	0.23	4.25	56.71	86.32	65.7
315	Ae1	0-6	2.04	6.0	5.0	1.2	0.04	15.1	3.27	0.46	0.11	0.20	4.04	9.64	41.9
316	Ae2	6-15	1.21	6.4	5.5	0.3	0.02	8.9	3.90	0.71	0.10	0.21	4.92	6.56	75.0
317	Bt1	15-17	2.88	5.9	5.4	0.2	0.03	4.8	8.64	2.47	0.15	0.46	11.72	15.70	74.6
318	Bt2	17-23	1.94	6.4	5.6	0.1			6.12	1.63	0.13	0.24	8.12	10.42	77.9
319	C	23-29	1.84	6.4	5.7				5.86	1.68	0.14	0.23	7.91	10.74	73.6
320	IIC	29+	1.21	6.6	5.7				4.55	1.11	0.13	0.21	6.00	7.19	83.4

LAB. NO.	HORIZON	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/314	L-H					98	162		7.5	212.1								
315	Ae1					1.58	298		8.4	75.3								
316	Ae2					24	101		9.1	36.2					23.44	76.62	3.94	
317	Bt1					5	33		28.3	48.4					5.96	75.79	18.25	8.64
318	Bt2					7	127		16.1	44.6					27.58	66.10	6.32	0.71
319	C					4	153		14.3	47.1								
320	IIC					5	116		11.4	44.8								

LOCATION: 125° 34'W/54° 27'N

Profile Description:

SOIL NAME: Oona

PARENT MATERIAL: Shallow colluvium overlying basic bedrock

ELEVATION: 3500 feet

CLASSIFICATION: Orthic Humo-Ferric Podzol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: NE 42%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	2-0							Raw and decomposed forest litter
Bhf	0-3	10YR3.5/3 D 7.5YR3/2 M	Gravelly sandy loam to loam	Moderate fine to medium granular	Soft	Abundant		angular fine gravel
Bm 1	3-6	10YR4/3 D 7.5YR4/4 M	Gravelly sandy loam to loam	Moderate fine to medium granular	Soft	Abundant		
Bm 2	6-10	10YR5/4 D 7.5YR4.5/4 M	Gravelly sandy loam to loam	Moderate fine to medium granular	Soft	Abundant		
Bm 3	10-15	10YR5/3.5 D 7.5YR5/4 M	Gravelly sandy loam to loam	Moderate fine to medium granular	Soft	Abundant		
BC	15-24	10YR5.5/3 D 4/3 M	Gravelly loam	Moderate fine subangular blocky	Soft	Abundant		
C	24-32	10YR6.5/3 D 5/3 M	Gravelly loam	Moderate fine subangular blocky	Soft	Common		
IIC	32-38	10YR5.5/4 D 7.5YR4.5/4 M	Gravelly loam till	Pseudoplaty	Very hard	Occasional		
R	38+							

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exch. Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
68/504	L-H	1-0	10.62	4.5	4.17	110.98	1.233	52.21	18.81	4.42	0.07	2.21	25.51	102.41	24.91					41.59	64.16	13.27	4.98	71.90								
505	Bhf	0-3	5.82	6.1	5.76	11.24	0.223	29.24	25.13	2.44	0.04	1.06	28.67	41.95	68.93	0.91	0.93			339.68	400	5.29	11.64	121.16								
506	Bm1	3-6	4.17	5.7	5.17	4.89	0.125	22.72	11.59	2.34	0.04	0.60	14.57	28.14	51.78	0.78	0.85			279.18	400	4.43	16.15	95.58								
507	Bm2	6-10	3.31	5.5	4.61	4.76	0.098	28.16	6.59	1.55	0.03	0.71	8.88	22.98	38.64	0.73	0.77			13.4	30.0		19.37	86.52								
508	Bm 3	10-15	2.89	5.4	4.43	2.64	0.074	20.68	5.92	1.35	0.04	0.66	7.97	21.74	36.66	0.67	0.65			92.6	180.0		19.81	83.86								
509	BC	15-24	2.15	5.5	4.54	1.69	0.049	20.00	7.41	1.34	0.07	0.41	9.23	15.98	57.76	0.41	0.28			29.9	138.9		19.15	72.27								
510	C	24-32	3.09	5.4	4.32	2.05	0.071	16.76	4.64	0.71	0.07	0.25	5.67	18.53	30.60	0.40	0.56			74.7	126.2	0.77	21.91	64.69								
511	IIC	32-38	3.41	5.5	4.52											0.40	1.10			36.2	83.8	0.52	26.11	73.16								

Profile Description:

LOCATION: 124° 38'W/54° 08'N

SOIL NAME: Ormond

PARENT MATERIAL: Shallow colluvium and till overlying basic rock

ELEVATION: 2900 feet

CLASSIFICATION: Lithic Orthic Dystric Brunisol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: NE 14%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0							Forest litter
Bm1	0-3	10YR5.5/3 D 7.5YR4/2 M	Gravelly loam to gravelly sandy loam	Weak to moderate subangular blocky	Very friable	Abundant		
Bm2	3-7	10YR5/3 D 5YR3.5/3 M	Gravelly loam	Weak to moderate subangular blocky	Very friable	Abundant		
Bm3	7-11	10YR5/3 D 5YR3.5/3 M	Gravelly loam	Weak fine subangular blocky	Slightly hard	Abundant		
C	11-18	10YR6.5/2 D 3.5/3 M	Gravelly loam till	Pseudoplaty	Hard	Common		
R	18+		Basaltic rock					

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/394	L-H	1-0	6.61	5.2	4.2	13.9	1.60	19.6	15.35	3.84	0.08	1.36	20.63	44.70	46.2
395	Bm1	0-3	3.89	6.1	4.8	18.0	0.94	11.1	3.22	0.71	0.01	0.56	4.50	17.89	25.2
396	Bm2	3-7	3.20	6.2	4.8	5.0	0.25	11.6	2.22	0.59	0.01	0.23	3.05	16.56	18.4
397	Bm3	7-11	2.88	6.2	4.7	3.3	0.17	11.0	2.98	1.46	0.05	0.24	4.73	16.53	28.6
398	C	11-18	2.44	6.2	4.9	1.9	0.13	8.5	3.80	2.30	0.08	0.20	6.44	12.58	51.2

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/394					10.3	186.6		13.6	64.0								
395	0.79	0.92			88	150.6	6.7	14.0	08.8								
396	0.77	0.96			104.5	194	5.2	14.7	71.0								
397	0.70	0.70			118.8	242	9.0	16.2	64.3								
398	0.56	0.46			54.3	159	7.7	12.5	44.8								

LOCATION: 125° 56'W/53° 49'N

SOIL NAME: Ormond

CLASSIFICATION: Lithic Rego Dark Gray

PARENT MATERIAL: Shallow colluvium overlying basic rock

DRAINAGE: Rapidly drained

Profile Description:

ELEVATION: 3200 feet

SLOPE & ASPECT: S 60%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LF	2-1							Leaves and stems partly decomposed
H	1-0							Decomposed plant remains
Ah	0-4	10YR3.5/2 D 2.5/2 M	Gravelly sandy loam	Strong fine to medium granular	Loose	Abundant		Angular gravel
Ahe	4-12	10YR4/2 D 3/1 M	Gravelly sandy loam	Strong fine to medium granular	Loose	Abundant		
AC	12-18	10YR4.5/3 D 3/2.5 M	Stony loamy sand	Moderate fine granular	Loose	Common		Angular stones and gravel
R	18+							

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST -	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/276	LF	2-1	12.36	6.6	6.00	77.53	2.260	19.90	82.25	12.13	0.08	3.19	97.65	98.73	98.91
277	H	1-0	9.17	6.9	6.52	50.02	1.557	18.64	76.42	9.93	0.08	2.95	89.38	90.93	98.30
278	Ah	0-4	6.84	6.7	6.16	20.94	0.896	13.56	46.80	4.80	0.05	0.16	51.80	55.74	92.93
279	Ahe	4-12	5.37	6.4	6.25	13.89	0.632	12.75	34.14	4.00	0.05	0.09	38.28	43.40	88.20
280	AC	12-18	3.84	6.3	5.97	6.71	0.320	12.16	19.73	2.74	0.04	0.83	23.34	27.67	84.35

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/276					65.73	400	29.21	28.37	344.1								
277					92.79	> 400	17.47	41.48	470.8								
278					149.6	> 400	4.54	43.00	410.0								
279					97.47	306.6	4.48	61.64	318.7								
280					83.07	201.4	5.97	33.23	236.2								

Profile Description:

LOCATION: 124° 13'W/54° 16'N

SOIL NAME: Peta

CLASSIFICATION: Degraded Dystric Brunisol

PARENT MATERIAL: Sandy glaciofluvial deposits

DRAINAGE: Rapid

ELEVATION: 2700 feet

SLOPE & ASPECT: Level

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0					Abundant		
Ae	0-½	10YR6/2 D 3.5/2 M	Sandy loam	Weak to moderate fine subangular blocky	Soft	Abundant		Incipient to 2" thick
Bm1	½-6	10YR5/4 D 3/3 M	Sandy loam	Weak to moderate fine subangular blocky	Soft	Abundant		
Bm2	6-10	10YR6/4 D 4/3 M	Loamy sand	Weak fine subangular blocky	Soft	Abundant		
IIC1	10-20	Variegated	Sand	Single-grained	Loose	Common		Some fine gravel
IIC2	20+	Variegated	Coarse sand	Single-grained	Loose	Occasional		Some fine gravel

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/274	L-H	½-0	11.61	4.2	3.6	86.2	1.17	42.8	16.41	1.79	0.10	2.38	20.68	92.52	22.4
275	Ae	0-½	0.70	4.2	3.7	2.84	1.21	13.6	0.60	0.25	0.04	0.18	1.07	12.28	8.7
276	Bm1	½-6	2.25	5.8	4.8	1.04	.078	8.7	1.64	0.31	0.05	0.20	2.20	8.78	25.1
277	Bm2	6-10	1.73	6.1	5.0	0.70			2.19	0.41	0.04	0.28	2.92	7.17	40.7
278	IIC1	10-20	1.21	6.2	5.1				2.23	0.25	0.03	0.22	2.74	5.49	49.9
279	IIC2	20+	0.81	6.3	5.2				2.82	0.71	0.04	0.25	3.82	5.66	67.5

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/274					63.6	67.0		17.0	72.5							
275					88.1	191.3	2.5	10.8	49.1							
276	0.59	0.72			>300	>500	2.4	19.4	88.2							
277	0.55	0.56			203.5	366.2	2.3	20.9	78.8							
278	0.72	0.51			51.9	146.8	0.8	21.8	43.0							
279					11.1	43.3	1.5	30.2	42.8							

LOCATION: 124° 08'W/54° 07'N

Profile Description:

SOIL NAME: Pineview

PARENT MATERIAL: Lacustrine clays

ELEVATION: 2450 feet

CLASSIFICATION: Orthic Gray Luvisol

DRAINAGE: Well drained

SLOPE & ASPECT: Level

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0							Forest litter
Ae	0-4	10YR7/2 D 5/3 M	Silty clay to silty clay loam	Moderate medium platy	Hard	Abundant		
AB	4-7	10YR7/2 D 5.5/3 M	Silty clay	Moderate medium platy to angular blocky	Hard	Abundant		
BA	7-10	10YR7/2.5 D 4.5/3 M	Heavy clay	Strong medium to coarse angular blocky	Very hard	Abundant		Some clay skins
Bt1	10-18	10YR6/3.5 D 4/3 M	Heavy clay	Strong coarse to very coarse prismatic	Extremely hard	Common		Many clay skins; dark coatings along cleavages
Bt2	18-26	10YR7/3 D 5/3 M	Heavy clay	Moderate to strong coarse and very coarse angular blocky	Very to extremely hard	Occasional		Many clay skins; dark coatings along cleavages
BC	26-36	10YR7/3 D 5/3 M	Heavy clay	Moderate coarse and very coarse angular blocky	Very hard	Occasional		Common clay films; dark coatings
C	36+	10YR7/3 D	Heavy clay	Stratified				

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/356	L-H	1-0	5.26	5.7	4.9	80.2	1.18	39.4	29.68	11.58	0.15	8.00	41.41	93.90	44.10
357	Ae	0-4	1.76	6.0	4.7	1.9	0.08	12.9	5.39	2.44	0.11	0.44	8.38	17.14	48.9
358	AB	4-7	1.73	6.2	4.8	1.0	0.06	9.8	6.61	3.66	0.12	0.46	10.85	15.54	69.8
359	BA	7-10	3.09	6.1	5.0	0.8	0.05	8.3	9.79	6.34	0.18	0.52	16.83	20.86	80.7
360	Bt1	10-18	4.49	6.2	5.1	0.7	0.05	7.8	13.06	9.04	0.30	0.62	23.02	28.84	79.8
361	Bt2	18-26	4.06	6.6	5.7				13.42	9.16	0.48	0.52	23.58	26.48	89.0
362	BC	26-36	4.71	7.0	6.0				18.11	14.45	0.73	0.63	33.92	38.29	87.0
363	C	36+	4.28	7.3	6.3				16.89	13.45	0.73	0.60	31.76	34.93	90.7

LAB. NO.	HORIZON	DEPTH	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/356	L-H	1-0					89	134		13.2	105.3							
357	Ae	0-4					104	64	2.5	12.7	115							
358	AB	4-7					45	198	3.8	17.3	82.7				3.62	56.08	40.30	4.54
359	BA	7-10					24	394	3.9	33.0	86.3							
360	Bt1	10-18					10	400	3.9	45	98				1.39	34.21	64.40	15.63
361	Bt2	18-26					5	593	2.1	43.2	89.8				0.58	39.72	59.70	22.40
362	BC	26-36					8	600	3.9	47	115.2				0.33	25.10	74.57	27.21
363	C	36+					2	600	3.9	47	116.0				0.49	10.52	88.99	19.76

LOCATION: 123° 46'W/53° 55'N

SOIL NAME: Pineview

CLASSIFICATION: Gleyed Gray Luvisol

PARENT MATERIAL: Glaciolacustrine clay deposits

DRAINAGE: Imperfect

Profile Description:

ELEVATION: 2450 feet

SLOPE & ASPECT: In depression

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
F	1-1½					Abundant		
H	½-0							
Ae	0-4	10YR4/3 M	Silty clay	Moderate coarse platy	Firm	Abundant		
AB	4-7	10YR6/2 M	Clay	Moderate coarse blocky	Firm	Common		
Btgj	7-14	5YR5/2 M	Heavy clay	Strong coarse to very coarse prismatic	Very firm	Occasional	Few distinct 7.5YR4/4 M	Many clay films
Btg	14-20	7.5YR 4/4 M	Heavy clay	Moderate medium to coarse angular blocky	Firm	Occasional	Common distinct 7.5YR4/4 M	Many clay films
BCgj	20-26	10YR6/2 M	Clay	Moderate medium to coarse angular blocky	Firm	Occasional	Few to common distinct 7.5YR4/4 M	
C	26+	7.5YR4.5/2 M	Clay	Stratified	Firm			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
66/346	F	1-½	18.34	4.9	4.8	117.9	1.49	45.8	23.67	8.88	0.20	1.94	34.69	129.4	26.80
347	H	½-0	19.62	4.9	4.8	112.4	1.63	40.1	29.93	13.85	0.45	3.34	47.57	139.7	34.05
348	Ae	0-4	2.51	5.9	5.3	2.72	0.11	14.9	6.97	4.46	0.14	0.51	12.08	18.3	66.01
349	AB	4-7	2.14	6.1	5.5	1.38	0.07	11.2	6.18	5.21	0.14	0.70	12.23	15.9	76.92
350	Btgj	7-14	3.73	6.6	6.1	1.34	0.08	10.4	10.68	13.28	0.39	0.67	24.91	28.8	86.58
351	Btg	14-20	3.57	7.1	6.6	1.06	0.06	9.9	9.63	12.95	0.47	0.57	23.62	28.3	83.37
352	BCgj	20-26	2.99	7.6	7.0				8.34	11.64	0.56	0.53	21.07	23.6	89.28
353	C	26+	3.20	7.8	7.5				14.04	14.45	0.69	0.53	29.71	26.4	100.0

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
66/346																
347																
348													4.15	49.82	46.03	4.38
349																
350													1.51	30.45	68.04	20.4
351																
352													0.20	38.21	61.59	12.7
353																

LOCATION: 125° 34'W/54° 12'N

Profile Description:

SOIL NAME: Pinkut

PARENT MATERIAL: Colluvium over till

ELEVATION: 2600 feet

CLASSIFICATION: Degraded Eutric Brunisol

DRAINAGE: Well drained

SLOPE & ASPECT: S 44%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LF	1½-1							Leaves and twigs
H	1-0							Decomposed plant remains
Bm1	0-6	10YR5/3 D 3.5/3 M	Gravelly sandy loam	Moderate fine to medium granular	Very friable	Abundant		
Bm2	6-11	10YR5.5/3.5 D 3/4 M	Gravelly sandy loam	Moderate fine to medium granular	Very friable	Abundant		
Aej	11-17	10YR6/3 D 4/3 M	Gravelly loam to gravelly sandy loam	Moderate fine subangular blocky	Friable	Abundant		
AB1	17-25	10YR6.5/3 D 4.5/3 M	Gravelly loam to gravelly sandy loam	Moderate fine subangular blocky	Friable	Abundant		
AB2	25-34	10YR6.5/3 D 4.5/3 M	Gravelly loam to loam	Moderate fine to medium subangular blocky	Firm	Common		
Btj	34-45	10YR5.5/3 D 3.5/4 M	Gravelly loam to loam	Moderate fine to medium subangular blocky	Firm	Common		
IIC	45-56	Variegated	Gravelly loamy sand	Structureless	Hard (weakly cemented)	Occasional		
IIIC	56+	10YR5/3 D 3.5/3 M	Gravelly loam till	Pseudoplaty	Extremely hard			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	OM %	N %	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
68/612	LF	1½-1	13.64	6.2	5.84	105.8	1.994	30.79	68.18	8.81	0.06	3.35	80.40	137.8	58.34
613	H	1-0	2.30	6.7	5.99	114.3	1.110	59.76	47.31	5.37	0.03	1.38	54.09	73.66	73.43
614	Bm1	0-6	1.01	6.5	5.98	1.98	0.058	19.83	4.55	0.96	0.01	0.57	6.09	10.16	59.94
615	Bm2	6-11	1.11	6.3	5.57	1.36	0.043	18.37	3.67	0.95	0.03	0.50	5.15	9.62	53.53
616	Aej	11-17	1.21	6.5	5.76	0.62	0.026	13.85	4.76	1.27	0.03	0.46	6.52	9.99	65.27
617	AB1	17-25	1.32	6.5	5.84	0.56	0.023	13.91	5.61	1.46	0.04	0.36	7.47	10.71	69.75
618	AB2	25-34	2.46	6.5	5.70				6.72	1.99	0.05	0.37	9.13	11.89	76.79
619	Btj	34-45	1.83	6.4	5.57				7.99	2.42	0.08	0.44	10.93	14.70	74.35
620	IIC	45-56	0.60	6.3	6.17				3.77	1.01	0.04	0.15	4.97	7.12	69.80
621	IIIC	56+	0.70	6.4	6.06										

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
68/612					50.0	100	30.68	14.21	182.3							
613					27.3	138.1	9.21	22.25	184.1							
614	0.56	0.43			180.3	377.8		11.11	61.87							
615	0.61	0.42			161.8	366		10.36	75.83							
616					55.7	121.4		12.90	61.49							
617					12.2	50.7		15.20	48.63							
618					4.6	49.7	3.07	27.66	54.82							
619					3.0	76.4	1.27	29.02	56.01							
620	0.64	0.46			5.2	42.8		18.11	48.54							
621					2.5	100.7	0.50	25.18	53.87							

Profile Description:

LOCATION: 124° 13'W/54° 26'N

SOIL NAME: Pope

CLASSIFICATION: Orthic Eutric Brunisol

PARENT MATERIAL: Shallow glacial till and/or colluvium overlying basic bedrock

DRAINAGE: Rapid

ELEVATION: 2700 feet

SLOPE & ASPECT: W 25%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	2-0					Abundant		Raw to decomposed litter
Bm1	0-7	7.5YR5/5 D 4/4 M	Gravelly sandy loam	Weak fine to medium granular	Soft	Abundant		
Bm2	7-14	7.5YR5/5 D 4/4 M	Gravelly loam	Weak fine to medium subangular blocky	Soft	Abundant		
Cca-R	14-20	10YR5/3 D 4.5/3 M	Gravelly sandy loam intermixed with calcareous bedrock		Soft	Occasional		
R	20+		Calcareous bedrock			Occasional in fractures		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
68/461	L-H	2-0	11.11	6.4	6.10	83.11	1.294	37.26	58.33	11.26	0.03	18.89	87.51	105.6	82.81
462	Bm1	0-7	5.26	6.7	6.60	3.78	0.087	25.21	11.72	2.63	0.03	0.26	14.64	19.48	75.15
463	Bm2	7-14	2.35	6.8	7.37	2.82	0.073	22.41	11.14	2.95	0.03	0.21	14.33	15.76	90.93
464	Cca-R	14-20	1.32	7.6	8.04	2.32	0.084	16.02							

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
68/461					51.11	107.7		15.83									
462	0.72	0.40			92.63	189.4	4.47	24.21									
463	0.70	0.43			46.06	81.88	5.63	32.24									
464	0.27	0.19			24.11	49.65	19.50	39.51									

Profile Description:

LOCATION: 124° 06'W/54° 05'N

SOIL NAME: Prairiedale

CLASSIFICATION: Dark Gray Luvisol

PARENT MATERIAL: Lacustrine silts

DRAINAGE: Well drained

ELEVATION: 2250 feet

SLOPE & ASPECT: Level

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
Ap	0-5	10YR4/2.5 D 3/2 M	Silt loam	Strong medium to fine granular	Soft	Abundant		
Ae	5-9½	10YR7/2 D 5/3 M	Silt loam	Strong fine to medium platy	Slightly hard	Common		
Bt1	9½-17	10YR6/3 D 4/3 M	Silt loam	Strong fine to medium angular blocky	Hard to very hard	Common		Clay films
Bt2	17-24	10YR7/3 D 5/3 M	Silt loam to silty clay loam	Moderate fine angular blocky	Hard	Occasional		Clay films
C	24-30	10YR7/2 D 5.5/3 M	Silt loam	Stratified	Very friable	Occasional		
Ck1	30-38	10YR7/2 D 5.5/3 M	Silt loam	Stratified	Very friable	Occasional		Slight efferv. with HCL
Ck2	38+	10YR7/2 D 5.5/3 M	Silty clay loam	Stratified	Friable	Occasional		Slight efferv. with HCL

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/334	Ap	0-5	3.30	5.4	5.6	61.9	0.29	12.5	14.10	3.41	0.22	0.22	17.95	24.29	73.9
335	Ae	5-9½	1.94	6.6	5.7	0.7	0.05	8.5	5.40	2.75	0.11	0.10	8.36	10.40	80.4
336	Bt1	9½-17	3.09	6.4	5.4	0.7			8.56	6.18	0.25	8.20	15.19	21.29	71.3
337	Bt2	17-24	2.77	7.5	6.6				9.76	7.19	0.44	0.23	17.62	19.12	92.2
338	C	24-30	2.14	8.2	7.0				8.68	6.36	0.44	0.19	15.67	15.42	100
339	Ck1	30-38	1.94	8.3	7.0				12.33	6.22	0.33	0.19	19.07	13.56	100
340	Ck2	38+	2.04	8.3	7.0				13.98	6.02	0.41	0.22	20.63	12.86	

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/334					27	98	3.8	22.2	75.7							
335					4	163	2.0	13.8	51.0				2.72	85.05	12.23	0.15
336					2	201	14.3	29.1	60.6				1.44	74.96	23.60	8.64
337					2	363	14.0	31.3	66.0					74.52	25.48	12.02
338					1	136	5.0	31.2	67.4				0.51	79.45	20.04	1.33
339					1	135	11.5	30.6	76.5							
340					2	>300	20.5	26.5	72.7					70.60	29.40	12.62

Profile Description:

LOCATION: 125° 28'W/54° 14'N

SOIL NAME: Ramsey

CLASSIFICATION: Orthic Humo-Ferric Podzol

PARENT MATERIAL: Gravelly glaciofluvial deposits

DRAINAGE: Rapidly drained

ELEVATION: 3700 feet

SLOPE & ASPECT: S 9%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LH	2-0							Forest litter
Ae	0-4	10YR6/2 D 5/2 M	Gravelly loamy sand	Moderate medium granular	Soft	Abundant		
Bfh	4-8	7.5YR5/6 D 5YR4/4 M	Gravelly loamy sand	Moderate medium granular	Soft	Abundant		
Bf	8-16	10YR5/6 D 7.5YR4/4 M	Gravelly sand	Weak medium granular	Loose	Abundant		
IIC	16+	Variegated	Sandy gravel	Single-grained	Loose	Common to Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exchangeable Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/232	LH	2-0	12.36	5.0	4.76	103.4	1.598	37.54	37.53	5.28	0.09	1.62	44.52	92.90	47.92
233	Ae	0-4	1.21	4.6	4.28	2.76	0.056	28.63	2.43	0.56	0.06	0.12	3.17	10.96	28.92
234	Bfh	4-8	3.84	4.8	4.36	5.50	0.052	61.38	0.31	0.16	0.05	0.21	0.73	24.82	2.94
235	Bf	8-16	1.62	5.3	4.79	1.63	0.041	23.00	0.51	0.10	0.05	0.11	0.77	8.37	9.20
236	IIC	16+	0.70	5.4	5.16		0.040		0.70	0.15	0.03	0.06	0.94	3.79	24.80

LAB. NO.	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn			Percent Sand	Silt	Total Clay	Fine Clay
69/232					33.82	54.49	17.5	8.71	151.6								
233					26.72	49.59	1.27	5.82	30.87								
234					158.8	230.5	11.68	16.10	59.71								
235					64.53	139.2	3.30	15.50	55.13								
236					20.74	387.7	1.26	14.35	37.76								

LOCATION: 124° 17'W/54° 21'N

Profile Description:

SOIL NAME: Roaring

PARENT MATERIAL: Esker (complex) deposits

ELEVATION: 2600 feet

CLASSIFICATION: Orthic Dystric Brunisol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: S 25%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LH	½-0							Forest litter
Ah	0-1	10YR4/2 D 3/2 M	Gravelly loamy sand	Weak medium granular	Soft	Abundant		
Bm	1-6	10YR5/3 D 3/3.5 M	Gravelly loamy sand	Weak fine subangular blocky	Soft	Abundant		
C1	6-14	Variegated	Gravelly sand	Single-grained	Loose	Abundant		
C2	14+	Variegated	Gravel and sand	Single-grained	Loose	Abundant		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/281	LH	½-0	9.89	6.2	5.4	68.24	3.11	30.2	56.37	7.25	0.12	3.43	67.17	78.02	86.1
282	Ah	0-1	1.52	6.5	5.5	4.86	1.61	17.5	8.22	1.37	0.03	1.34	10.96	14.54	74.3
283	Bm	1-6	1.52	6.0	5.1	2.43	0.104	13.6	4.37	0.51	0.04	0.58	5.50	10.62	51.8
284	C1	6-14	1.21	6.4	5.9				4.45	0.51	0.03	0.38	5.37	9.13	58.8
285	C2	14+	1.11	6.3	5.8				3.74	0.56	0.05	0.37	4.72	7.08	66.7

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/281					68.7	134.6		15.4	178.6								
282					111.7	573.6	5.1	12.7	137.0								
283	0.57	0.30			154.8	>500	8.8	14.2	129.4								
284	0.70	0.51			58.7	288.4	1.3	14.2	70.8								
285	0.54	0.22			22.7	48.5	1.3	17.9	59.4								

Profile Description:

LOCATION: 126° 50'W/54° 55'N

SOIL NAME: Saunders

PARENT MATERIAL: Basal till

ELEVATION: 4500 feet

CLASSIFICATION: Bisequa Humo-Ferric Podzol

DRAINAGE: Well drained

SLOPE & ASPECT: SE 26%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LH	1-0							Raw to decomposed plant remains
Ae	0-2	10YR7/2 D 7.5YR6/2 M	Sandy loam to loam	Strong fine to medium granular	Very friable	Abundant		
Bfh	2-7	10YR5/5 D 5YR4/4 M	Sandy loam to loam	Strong fine to medium granular	Very friable	Abundant		
Bf	7-13	10YR5.5/4 D 7.5YR5/6 M	Gravelly sandy loam to gravelly loam	Moderate fine to medium granular	Very friable	Common		
AB	13-22	10YR6/3 D 4.5/3 M	Gravelly loam	Moderate fine subangular to angular blocky	Friable	Common		
Bt1	22-30	10YR6/3 D 4/3 M	Gravelly loam	Moderate fine to medium angular blocky	Firm	Occasional		Clay films
Bt2	30-41	10YR6/3 D 4/3 M	Gravelly loam	Moderate fine to medium angular blocky	Firm	Occasional		Clay films
C	41+	10YR6/2.5 D 5Y5.5/1 M	Gravelly loam	Pseudoplaty	Firm			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M. $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/333	LH	1-0	14.42	5.0	4.95	113.5	1.483	44.40	35.01	4.65	0.27	5.38	45.31	83.78	54.08					125.8	143.6	4.0	8.30	76.66								
334	Ae	0-2	2.67	5.0	3.60	3.72	0.140	15.40	2.26	0.46	0.10	0.25	3.07	20.63	14.88					8.73	15.40	1.25	7.70	39.01								
335	Bfh	2-7	5.04	5.1	3.88	7.03	0.210	19.71	2.21	0.27	0.13	0.12	2.73	29.05	9.40	2.33	1.04			14.71	28.47	5.00	19.70	115.5					28.02	41.16	30.82	13.09
336	Bf	7-13	3.74	5.3	4.05		0.119		1.04	0.16	0.07	0.11	1.38	18.47	7.47	3.07	1.02			18.67	45.13	5.00	25.16	132.2								
337	AB	13-22	2.99	5.8	4.18				0.82	0.15	0.07	0.13	1.17	15.19	7.70					13.49	60.25	2.25	30.12	150.6					37.66	28.71	33.63	17.34
338	Bt1	22-30	2.25	5.5	4.00				0.82	0.28	0.06	0.13	1.29	12.79	10.09					45.50	100.2	2.50	33.74	136.7					35.66	30.05	34.29	18.13
339	Bt2	30-41	2.04	5.4	3.93				1.22	0.37	0.11	0.14	1.84	11.62	15.83					55.61	127.5		34.44	127.5					36.03	29.94	34.03	18.06
340	C	41+	1.94	5.3	3.98				1.33	0.40	0.06	0.14	1.93	9.95	19.40	0.62	0.57			48.42	133.5		35.93	207.7					40.89	29.00	30.11	14.32

Profile Description:

LOCATION: 124° 52'W/54° 27'N

SOIL NAME: Shass

CLASSIFICATION: ~~Alpine~~ Dystric Brunisol (Alpine Environment)

PARENT MATERIAL: Shallow deposits overlying bedrock

DRAINAGE: Well drained

ELEVATION: 5100 feet

SLOPE & ASPECT: SW 11%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
Ah1	0-3	10YR4/2 D 3/2 M	Loam	Moderate medium granular	Very friable	Abundant		
Ah2	3-5	10YR5/2 D 4/1 M	Loam	Weak fine subangular blocky	Very friable	Abundant		
Bm1	5-8	10YR4/4 D 3/3 M	Stony loam	Moderate fine subangular blocky	Very friable	Abundant		
Bm2	8-12	10YR5/6 D 4/4 M	Stony loam	Weak to moderate fine subangular blocky	Very friable	Common		
BC	12-15	2.5Y5/4 D 4/4 M	Gravelly loam	Weak fine subangular blocky	Friable	Common		
C1	15-21	2.5Y5/5 D 4/4 M	Gravelly loam	Structureless	Friable	Occasional		
C2	21-30	2.5Y5/5 D 4/4 M	Gravelly loam	Structureless	Friable	Occasional		
R	30+				Firm	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/399	Ah1	0-3	4.28	5.0	3.9	12.1	0.36	19.7	0.47	0.21	0.5	0.16	0.89	34.14	2.6
400	Ah2	3-5	2.88	5.0	4.2	7.7	0.22	20.7	0.31	0.08	0.02	0.07	0.48	21.89	2.2
401	Bm1	5-8	6.16	5.3	4.5	7.9	0.25	18.6	0.42	0.11	0.02	0.07	0.62	33.00	1.9
402	Bm2	8-12	5.15	5.4	4.5	5.7	0.17	19.3	0.42	0.10	0.02	0.04	0.58	17.31	3.4
403	BC	12-15	3.41	5.7	4.6				0.41	0.05	0.01	0.04	0.51	14.14	3.6
404	C1	15-21	2.99	5.7	4.8										
405	C2	21-30	2.04	5.9	4.9										

LAB. NO.	HORIZON	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/399	Ah1					4	8	28.7	15.1	44.1								
400	Ah2	0.51	0.51			6	13	19.3	11.3	16.5								
401	Bm1	1.42	1.23			5	14	19.9	27.1	74.8								
402	Bm2	1.07	1.37			5	18	17.1	33.1	76.2								
403	BC	0.76	1.16			10	35	14.2	38.3	81.4								
404	C1	0.58	1.01			21	51	11.6	41.7	77.2								
405	C2					34	71	9.0	51.5	65.6								

LOCATION: 126° 50'W/54° 55'N

Profile Description:

SOIL NAME: Skins

PARENT MATERIAL: Shallow colluvium overlying bedrock

ELEVATION: 4200 feet

CLASSIFICATION: Orthic Humo-Ferric Podzol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: SW 72%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	2-0							Raw to decomposed forest litter
Ae	0-1	10YR6/2 D	Gravelly sandy loam	Strong fine granular	Very friable	Abundant		
Bfh	1-8	10YR6/3 D 7.5YR5/6 M	Gravelly sandy loam	Strong fine to medium granular	Very friable	Common		
C1	8-19	10YR6/3 D 4/2.5 M	Gravelly loam	Weak to moderate medium granular	Very friable	Common		
C2	19-26	10YR5/2 D 4.5/2 M	Gravelly loam	Weak to moderate medium granular	Very friable	Occasional		
R	26+		- disintegrating schists -					

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/341	L-H	2-0	13.38	4.5	4.12	106.5	1.742	35.48	25.40	4.54	0.28	1.93	32.15	91.89	34.99					35.15	48.41	51.00	10.77	34.01								
342	Bfh	1½-8	2.77	5.0	4.01	6.21	0.211	17.07	1.75	0.72	0.08	0.09	2.64	16.23	16.27					10.79	24.05	1.00	26.21	668.0								
343	C1	8-19	2.67	5.9	4.82	3.06	0.122	14.55	3.39	1.28	0.07	0.09	4.83	13.37	36.13					6.16	14.78	2.50	35.42	1501.								
344	C2	19-26	4.28	6.1	5.17				10.64	3.62	0.10	0.14	14.50	27.26	53.19					5.21	13.04	0.25	97.76	1987.								

Profile Description:

LOCATION: 125° 39'W/54° 28'N

SOIL NAME: Slug

PARENT MATERIAL: Alluvial fan deposits

ELEVATION: 2400 feet

CLASSIFICATION: Orthic Dystric Brunisol

DRAINAGE: Rapidly drained

SLOPE & ASPECT: S 6%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LH	½-0							Needles and twigs
Bm1	0-3	5YR5/3 D 3/3 M	Loam to sandy loam	Moderate fine to medium granular	Very friable	Abundant		
Bm2	3-6	5YR5.5/3 D 3.5/3 M	Loam to sandy loam	Moderate fine to medium granular	Very friable	Abundant		
BC	6-12	10YR6/3.5 D 3.5/3 M	Sandy loam	Weak fine subangular blocky	Very friable	Abundant		
C1	12-15	10YR6/2.5 D 5/2 M	Gravelly loamy sand	Single-grained	Loose	Abundant		
C2	15-24	10YR6/2.5 D 5/2 M	Loamy sand to gravelly loamy sand	Weak fine subangular blocky	Loose	Common		
IIC	24+	Variegated	Gravel and sand	Single-grained	Loose	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
68/466	L-H	½-0	10.62	4.9	4.41	92.05	1.159	46.07	27.66	7.06	0.12	26.27	61.11	94.23	64.85
467	Bm	0-3	2.25	5.5	4.86	2.17	0.067	18.81	3.46	1.41	0.02	0.55	5.44	14.42	37.73
468	Bm2	3-6	2.04	5.8	5.14	1.41	0.042	19.52	3.96	0.83	0.02	0.38	5.19	12.28	42.26
469	BC	6-12	1.21	6.0	5.57	0.81	0.022	21.36	4.55	0.89	0.03	0.31	5.78	9.59	60.27
470	C1	12-15	1.01	6.3	5.63	0.73	0.025	16.80	4.93	0.82	0.03	0.25	6.03	8.80	68.52
471	C2	15-24	1.01	6.5	5.92				5.18	0.82	0.03	0.21	6.24	8.75	71.31
472	IIC	24+	0.81	6.6	6.32										

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
68/466						84.51	33.19										
467	0.72	0.55			322.0	>400	3.83	13.55	95.86								
468	0.54	0.53			285.7	>400	2.30	18.62	79.08								
469					93.11	170	2.28	21.00	60.73								
470	0.3[illegible]	0.27			34.34	74.24	4.29	22.22	56.82								
471					18.48	59.60	1.52	21.97	52.27								
472					9.78	34.17	2.27	22.18	53.68								

Profile Description:

LOCATION: 126° 04'W/54° 02'N

SOIL NAME: Snodgrass

CLASSIFICATION: Orthic Dark Gray

PARENT MATERIAL: Kame

DRAINAGE: Rapidly drained

ELEVATION: 2700 feet

SLOPE & ASPECT: SW 9%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
Ah	0-4	10YR3.5/2 D 2.5/1 M	Gravelly sandy loam	Strong fine to medium granular	Soft	Abundant		
Ahe	4-7	10YR4/2 D 3/1.5 M	Gravelly sandy loam	Strong fine to medium granular	Soft	Abundant		
Bm	7-11	10YR4.5/3 D 7.5YR3.5/2 M	Gravelly loamy sand	Moderate fine to medium sub-angular blocky	Soft	Abundant		
BC	11-16	10YR5.5/3 D 4/3 M	Stony loamy sand	Moderate fine to medium sub-angular blocky	Soft	Abundant		
C	16-23	10YR6/3 D 3/3.5 M	Stony loamy sand	Single-grained	Soft	Common		
IIC	23+		Gravel and sand mixed with stones	Very weakly cemented	Slightly hard	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/281	Ah	0-4	4.06	6.5	6.08	11.34	0.569	11.56	22.79	2.45	0.07	0.88	26.19	28.20	92.87
282	Ahe	4-7	3.20	6.2	5.76	6.98	0.363	11.15	12.90	1.36	0.03	0.56	14.85	20.04	74.10
283	Bm	7-11	2.67	5.9	5.35	4.06	0.197	11.94	5.16	0.84	0.05	0.31	6.36	13.26	47.96
284	BC	11-16	1.83	6.0	5.53	2.05	0.103	11.52	4.58	0.79	0.05	0.29	5.71	9.58	59.60
285	C	16-23	1.94	6.0	5.50				5.61	0.87	0.05	0.24	6.77	9.80	69.05
286	IIC	23+	1.32	6.2	5.95				5.10	0.76	0.07	0.06	5.99	7.32	81.83

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn			PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/281					38.92	124.3	3.90	28.62	318.6								
282					32.71	63.47	4.89	22.19	296.7								
283					61.09	118.0	4.88	20.53	183.5								
284					52.95	101.3	2.29	24.95	100.5								
285					35.78	82.06	5.10	29.31	85.37								
286					6.89	92.20	2.53	26.60	287.5								

LOCATION: 125° 03'W/54° 05'N

SOIL NAME: Stellako

CLASSIFICATION: Gleyed Orthic Regosol

PARENT MATERIAL: Floodplain deposits

DRAINAGE: Imperfectly drained

Profile Description:

ELEVATION: 2250 feet

SLOPE & ASPECT: NE 5%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LF	2-0							Leaves, twigs; some partly decomposed
Cgj1	0-5	10YR5/3 D 3.5/3 M	Silt loam	Structureless	Slightly hard	Abundant	Many fine prominent 5YR4/4 D	
Cgj2	5-12	10YR5/3 D 3.5/3 M	Silt loam	Structureless	Slightly hard	Common	Many fine prominent 5YR4/4 D	
Cgj3	12-19	10YR5/3 D 4/3 M	Silt loam	Structureless	Slightly hard	Common	Many fine prominent 5YR4/4 D	
Cgj4	19-25	10YR5/4 D 4/3 M	Silt loam	Structureless	Very friable	Common	Many fine prominent 5YR4/4 D	
Cg1	25+	10YR5/4 D 4/3 M	Silt loam to fine sandy loam	Structureless	Very friable	Occasional	Many fine prominent 5YR3/4 M	

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/314	L-F	1-0	12.87	6.8	5.75	84.57	1.792	27.83	54.63	25.87	0.32	6.55	87.37	93.66	93.28					174.9	243.8	58.0	13.83	177.7							
315	Cgj1	0-5	1.62	5.9	5.22	1.77	0.063	16.29	5.11	3.96	0.15	0.49	9.71	12.40	78.31					2.74	136.1	0.75	17.78	52.08							
316	Cgj2	5-12	1.83	6.2	5.52	1.21			5.60	5.35	0.22	0.18	11.35	12.94	87.71					1.83	132.3	0.75	17.82	52.19							
317	Cgj3	12-19	1.75	6.5	5.81															2.03	150.5	2.25	18.06	55.95							
318	Cgj4	19-25	1.62	7.1	6.40															2.03	144.3	1.25	15.24	49.29							
319	Cg1	25+	1.52	7.5	6.70															1.09	151.2	4.75	15.99	52.03							

LOCATION: 124° 05'W/54° 01'N

SOIL NAME: Stellako

CLASSIFICATION: Rego Humic Gleysol

PARENT MATERIAL: Floodplain deposits

DRAINAGE: Poorly drained

Profile Description:

ELEVATION: 2200 feet

SLOPE & ASPECT: E 4%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
Om	4-0	5Y2/2 M				Abundant		
Ah-Om	0-4	5Y3/1 M	Silt loam	Massive	Non sticky	Abundant		
Cg1	4-10	5Y3.5/1 M	Silt loam to silty clay loam	Massive	Sticky	Common	Few medium distinct 5YR4/3 M	
Cg2	10-20	5Y5/1.5 M	Silt loam	Massive	Plastic	Occasional	Many fine distinct 5YR4/4 M	
Cg3	20+	5Y5/1 M	Silt loam	Massive	Plastic	Occasional		

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
67/435	Om	4-0	12.36	6.5		49.9	1.70	17.1	56.18	15.51	2.02	0.38	74.09	87.11	85.0
436	Ah-Om	0-4	9.29	6.7		29.9	1.24	13.8	42.62	17.70	1.62	0.24	62.18	33.42	100
437	Cg1	4-10	4.71	7.6		3.1	0.10	17.0	27.49	9.79	0.88	0.16	38.32	34.46	100
438	Cg2	10-20	3.41	7.6					19.13	7.34	0.74	0.20	27.41	24.31	100
439	Cg3	20+	2.77	7.6											

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
67/435					7	21		37.9	48.9							
436					4	30	34.5	47.0	51.9							
437					3	141	16.5	16.8	57.6							
438					7	217	6.5	15.8	54.3							
439					13	270	4.0	20.6	64.2							

Profile Description:

LOCATION: 125° 28'W/53° 50'N

SOIL NAME: Tatin

CLASSIFICATION: Degraded Dystric Brunisol

PARENT MATERIAL: Colluvium over till

DRAINAGE: Well drained

ELEVATION: 3800 feet

SLOPE & ASPECT: NE 17%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0							Forest litter
Ae	0-½	10YR6/1 D 5/1 M	Sandy loam	Moderate medium subangular blocky	Soft	Abundant		
Bm1	½-2½	10YR5/3.5 D 7.5YR4/4 M	Sandy loam	Moderate medium subangular blocky	Very friable	Abundant		
Bm2	2½-11	10YR6/3 D 4/3 M	Sandy loam	Moderate medium subangular blocky	Friable	Common		
Bm_1	11-17	10YR7/2.5 D 5.5/2 M	Gravelly sandy loam	Weak fine subangular blocky	Friable	Common		
Bm_2	17-25	10YR7/2.5 D 5.5/2 M	Gravelly sandy loam	Weak fine subangular blocky	Friable	Occasional		
Bm_3	25-38	10YR7/2.5 D 5.5/2 M	Gravelly sandy loam	Weak fine subangular blocky	Friable	Occasional		
Btj	38-46	10YR7/2 D 5/2.5 M	Gravelly sandy loam to gravelly loam	Moderate fine subangular blocky	Firm	Occasional		
IIC	46+	10YR7/2 D 5.5/2 M	Gravelly loam till	Pseudoplaty	Firm			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
68/519	L-H	1-0													
520	Ae	0-½													
521	Bm1	½-2½	2.77	4.5	3.93	5.22	0.124	24.44	1.39	0.32	0.10	0.62	2.43	22.05	11.02
522	Bm2	2½-11	1.73	5.4	4.80	2.47	0.047	30.43	3.44	0.52	0.10	0.76	4.82	11.85	40.68
523	Bm_1	11-17	1.32	6.0	5.24	0.53	0.020	15.15	4.11	0.70	0.11	0.89	5.81	9.17	63.36
524	Bm_2	17-25	1.01	6.1	5.79	0.53	0.015	20.67	4.29	0.70	0.15	1.01	6.15	8.76	70.21
525	Bm_3	25-38	1.11	6.2	5.97				3.98	0.89	0.16	0.95	5.98	8.36	71.53
526	Btj	38-46	1.11	6.0	5.91				5.19	1.46	0.21	1.11	7.97	9.74	81.83
527	IIC	46+	1.32	6.2	5.98										

LAB. NO.	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
68/519																
520																
521					>200	>400	20									
522					183.1	295										
523					13.4	29.4										
524					6.7	27.3										
525					3.0	35.9	0.75									
526					3.0	58.6										
527					3.8	103.3										

Profile Description:

LOCATION: 124° 29'W/54° 16'N

SOIL NAME: Twain

CLASSIFICATION: Bisequa Humo-Ferric Podzol

PARENT MATERIAL: Basal till

DRAINAGE: Well drained

ELEVATION: 3500 feet

SLOPE & ASPECT: NE 15%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L	3-2							Needles and twigs
FH	2-0					Abundant		Decomposed and semi-decomposed litter
Ae	0-2	10YR6/2 D 4/2 M	Sandy loam	Moderate to strong medium granular	Soft	Abundant		
Bf1	2-7	10YR5/4 D 7.5YR4/4 M	Silt loam	Moderate to strong medium granular	Soft	Common		
Bf2	7-12	10YR6/3.5 D 4/4 M	Silt loam	Moderate fine to medium subangular blocky	Soft	Common		
AB	12-19	10YR7/2 D 4.5/3 M	Silt loam	Strong fine to medium angular and subangular blocky	Friable	Common		Few clay skins in pores
Bt1	19-26	10YR7/2.5 D 3/3.5 M	Gravelly silt loam	Strong medium angular blocky	Firm	Occasional		Common clay skins
Bt2	26-32	10YR7/2.5 D 3/3.5 M	Gravelly silty clay loam	Strong medium angular blocky	Firm	Occasional		Many clay skins
BC	32-42	10YR7/2 D 4/2.5 M	Gravelly loam	Pseudoplaty	Firm	Occasional		Some clay skins
C1	42-49	10YR6/2 D 4/3 M	Gravelly sandy loam to gravelly loam	Single-grained	Friable			
C2	49+	10YR7/2 D 4/2.5 M	Gravelly loam to gravelly sandy loam		Very firm			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Ca	Mg	Na	K	SUM	CEC	Sat. %
									EXCHANGEABLE BASES M.E. 100G.						
69/322	L	3-2	12.11	4.5	3.85	116.8	1.252	54.12	11.59	4.04	0.09	2.24	17.96	84.60	21.23
323	FH	2-0	11.11	4.4	3.66	103.9	1.270	47.48	11.49	3.38	0.12	1.60	16.59	79.55	20.85
324	Ae	0-2	1.52	5.5	4.63	2.32	0.078	17.28	5.58	0.81	0.06	0.28	6.73	12.13	55.48
325	Bf1	2-7	3.20	6.1	5.06	2.60	0.096	16.02	2.58	0.57	0.07	0.30	3.52	14.80	23.78
326	Bf2	7-12	2.35	6.1	4.98	1.38	0.074	10.82	1.33	0.46	0.05	0.28	2.12	10.20	20.78
327	AB	12-19	1.94	6.1	4.79	0.47	0.032	8.53	6.63	2.40	0.09	0.30	9.42	13.17	71.53
328	Bt1	19-26	1.94	6.3	5.30				8.36	3.03	0.10	0.29	11.78	12.80	92.03
329	Bt2	26-32	2.25	6.6	5.58				10.23	3.74	0.18	0.31	14.46	14.56	99.31
330	BC	32-42	1.62	6.7	5.71				8.33	3.10	0.12	0.24	11.79	11.83	99.66
331	C1	42-49	1.01	6.8	5.80				4.75	1.82	0.13	0.17	6.87	7.49	91.72

LAB. NO.	HORIZON	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	PPM P2	PPM S	PPM Cu	PPM Zn	PPM B	PPM Mn			PERCENT SAND	PERCENT SILT	PERCENT TOTAL CLAY	PERCENT FINE CLAY
69/322	L					47.09	67.8	35.0	4.48	51.57								
323	FH					42.22	56.1	27.0	4.72	53.61								
324	Ae					82.23	147.2		5.84	41.88								
325	Bf1	0.91	1.20			126.4	288.9	0.25	11.09	113.5					27.36	56.68	15.96	
326	Bf2	0.65	0.88			45.03	106.4	2.50	12.79	101.0								
327	AB					15.29	185.5		22.94	58.62					17.02	64.25	18.73	3.67
328	Bt1					7.14	279.3		25.74	58.62					20.29	57.60	22.11	7.60
329	Bt2					4.50	337.4		28.37	65.44					19.49	52.46	28.05	15.44
330	BC					4.27	284.5		20.83	53.35								
331	C1	0.16	0.10			4.65	176.7		13.6	46.66								

LOCATION: 125° 31'W/54° 14'N

Profile Description:

SOIL NAME: Twain

PARENT MATERIAL: Basal till

ELEVATION: 3800 feet

CLASSIFICATION: Humic Eluviated Gleysol

DRAINAGE: Poorly drained

SLOPE & ASPECT: S 4%

HORIZON	DEPTH IN – CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
LF	6-5							
Oh	5-0					Abundant		
Ah	0-4	10YR3/1 M	Silty loam	Moderate medium granular	Very friable	Abundant		
Ahe	4-8	10YR3.5/2 M	Silty loam	Moderate fine platy	Friable	Common		
Aeg1	8-12	2.5Y5/2 M	Gravelly loam	Massive	Very firm	Occasional	Few fine distinct 2.5Y5/4 M	
Aeg2	12-18	5Y4.5/1 M	Gravelly loam	Massive	Very firm	Occasional	Common medium prominent 7.5YR5/6M	
Btg	18-24	5Y4/1 M	Gravelly clay loam	Massive	Very plastic			
Cg1	24-34	2.5Y4.5/2 M	Gravelly clay loam	Massive	Plastic		Common medium prominent 10YR5/6 M	
Cg2	34+	2.5Y4.5/2 M	Gravelly clay loam	Massive	Plastic		Common medium prominent 10YR5/6 M	

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %
69/305	LF	6-5	11.61	5.8	5.19	46.82	0.878	30.93	32.37	7.21	0.30	2.08	41.96	40.01	100
306	Oh	5-0	8.93	5.6	4.95	32.17	0.680	27.44	25.49	7.04	0.35	0.85	33.73	74.67	45.17
307	Ah	0-4	6.72	5.1	4.51	11.27	0.373	17.43	11.53	2.42	0.12	0.70	14.77	51.01	28.96
308	Ahe	4-8	4.93	5.3	4.44	7.82	0.220	20.61	7.66	2.10	0.13	0.23	10.12	34.85	29.04
309	Aeg1	8-12	1.32	5.5	4.88	1.06	0.035	17.34	2.43	0.56	0.06	0.07	3.12	6.80	45.88
310	Aeg2	12-18	1.83	6.4	5.72		0.029		5.60	1.47	0.07	0.12	7.26	8.86	81.94
311	Btg	18-24	2.35	6.8	6.49				11.77	3.32	0.11	0.27	15.47	15.25	100
312	Cg1	24-34	2.46	6.7	6.42										
313	Cg2	34+	2.46	6.8	6.43										

LAB. NO.	HORIZON	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
69/305	LF					39.06	56.36	41.00	35.99	93.47							
306	Oh					15.25	24.18	11.00	33.77	88.51							
307	Ah					4.27	8.11	11.50	61.36	146.7							
308	Ahe					3.69	18.78	7.25	35.94	107.5							
309	Aeg1					1.52	97.27	2.50	11.91	51.93				53.45	36.5	10.02	1.89
310	Aeg2					1.02	115.06	2.50	14.26	50.92							
311	Btg					1.02	142.27	0.25	31.47	64.48				40.71	31.3	27.96	15.90
312	Cg1					1.02	154.71		37.14	63.53							
313	Cg2					2.05	169.06		37.14	64.55				42.08	30.3	27.57	17.94

LOCATION: 123° 58'W/54° 03'N

Profile Description:

SOIL NAME: Vanderhoof

PARENT MATERIAL: Glaciolacustrine clay deposits

ELEVATION: 2300 feet

CLASSIFICATION: Orthic Gray Luvisol

DRAINAGE: Well to moderately well

SLOPE & ASPECT: SW 4%

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
L-H	1-0					Abundant		Forest litter
Ae	0-3	10YR6/2 D 5/2 M	Silty clay loam	Massive medium to coarse platy	Slightly hard	Abundant		
AB	3-5	10YR6/2 D 5/2 M	Silty clay loam	Moderate coarse platy	Hard	Abundant		
BA	5-8	10YR6/2 D 5/3 M	Silty clay	Strong coarse columnar	Hard	Common		
Bt1	8-15	10YR4/3 D 3/4 M	Silty clay	Strong coarse prismatic	Hard	Common		Many clay films
Bt2	15-20	10YR4/3 D 3/4 M	Silty clay	Strong coarse prismatic	Hard	Along structure interfaces		Many clay films
BC	20-29	10YR5/3 D 3/3 M	Silty clay	Moderate fine to medium angular blocky breaking vertically in lower part to medium laminations	Hard	Occasional along structure interfaces		Few clay films along structure interfaces, root channels and between laminations
C	29+	10YR5/2-4/3D 4/3-3/3M	Silty clay	Stratified	Hard			

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	EXCHANGEABLE BASES M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	OXALATE % Fe	OXALATE % Al	PYROPHOS % Fe	PYROPHOS % Al	PPM P1	P2	S	Cu	Zn	B	Mn		PERCENT SAND	SILT	TOTAL CLAY	FINE CLAY
66/316	L-H	1-0	13.38	6.6	6.5	66.03	1.82	41.6	51.02	18.82	0.75	3.46	73.35	101.9	71.96					128.6											
68/424	Ae	0-3	2.88	6.2	5.6	4.03	0.172	13.60	7.59	4.83	0.13	0.77	13.32	20.40	65.29					165.5		1.03						4.71	62.68	32.61	1.95
68/425	AB	3-5	1.94	6.0	5.5	1.18	0.072	9.44	4.21	3.82	0.13	0.35	8.51	12.37	68.80					40.78											
66/318	BA	5-8	2.67	6.0	5.4	1.19	0.06	15.3	5.60	1.70	0.20	0.46	13.96	18.12	77.02					7.6		5.1						0.98	50.06	48.96	11.95
319	Bt1	8-15	3.25	6.2		0.97	0.05	14.3	7.01	11.05	0.35	0.44	18.85	22.82	82.60					3.0		4.6						0.88	44.75	54.37	15.41
320	Bt2	15-20	3.30	6.8	6.2	0.83	0.05	16.6	7.23	12.19	0.52	0.39	20.33	25.53	74.63					2.3		6.7						0.67	45.68	53.65	14.56
321	BC	20-29	3.36	7.8	6.9				7.21	14.06	0.91	0.34	22.52	26.10	86.28					1.9		7.8						0.31	46.90	52.79	13.24
322	C	29+	2.83	8.0	7.4				8.53	14.19	1.10	0.31	23.12	23.24	99.48					1.2		9.0						0.21	52.02	47.77	11.86

Profile Description:

LOCATION: 124° 26'W/54° 01'N

SOIL NAME: Vanderhoof

CLASSIFICATION: Orthic Gleysol

PARENT MATERIAL: Lacustrine clays

DRAINAGE: Poorly drained

ELEVATION: 2400 feet

SLOPE & ASPECT: In depression

HORIZON	DEPTH IN - CM.	COLOR DRY D MOIST M	TEXTURE	STRUCTURE	CONSISTENCE	ROOTS	MOTTLES	OTHER
Om1	11-6					Abundant		
Om2	6-0					Abundant		
Aejg1	0-6	5Y4.5/1 M	Silty clay	Weak medium subangular blocky	Friable	Common		
Aejg2	6-11	2.5Y5/2 M	Silty clay	Moderate medium subangular blocky	Firm	Common		
Bg1	11-18	2.5Y4.5/2 M	Silty clay	Moderate medium to coarse angular blocky	Firm	Occasional	Many medium prominent 7.5YR4/4 M	
Bg2	18-23	2.5Y4.5/2 M	Silty clay	Moderate medium to coarse angular blocky	Firm	Occasional	Many medium prominent 7.5YR4/4 M	
Cg1	23+	2.5Y4.5/2 M	Silty clay loam to silty clay	Stratified	Firm		Common medium prominent 10YR4/4 M	

Laboratory Analyses

LAB. NO.	HORIZON	DEPTH	MOIST %	PH 1:1 H_2O	PH 0.01M $CaCl_2$	% OM	% N	C/N	Exchangeable Bases M.E. 100G. Ca	Mg	Na	K	SUM	CEC	Sat. %	Oxalate % Fe	Oxalate % Al	Pyrophos % Fe	Pyrophos % Al	PPM P1	P2	S	Cu	Zn	B	Mn		Percent SAND	SILT	TOTAL CLAY	FINE CLAY
67/364	Om1	11-6	22.85	6.6	6.0	99.0	2.46	23.3	213.7	30.22	0.71	1.42	246.1	264.1	93.5					52	42		20.06	11.7							
365	Om2	6-0	21.95	6.4	6.0	84.1	2.46	19.8	173.1	23.78	0.44	0.54	197.9	225.3	87.8					67	55		50.6	11.6							
366	Aejg1	0-6	2.46	7.2	6.4	1.4	0.09	9.3	22.3	6.15	0.18	0.51	29.18	34.02	85.8					>600	>600	20.5	14.9	76.8					52.65	47.35	13.08
367	Aejg2	6-11	3.30	7.6	6.7	0.7	0.05	7.2	18.2	5.53	0.20	0.42	24.43	26.24	93.1					>600	>600	27.1	25.3	79.3					52.50	47.50	11.83
368	Bg1	11-18	2.88	7.9	7.0				23.25	4.68	0.27	0.31	28.51	20.32	100					>600	>600	95.2	32.9	79.0					56.40	43.60	12.65
369	Bg2	18-23	2.77	8.0	7.0				28.16	5.50	0.31	0.31	34.28	22.71	100					>600	>600		33.4	80.9					60.00	40.00	10.75
370	Cg1	23+	3.09	8.0	7.1				27.42	4.23	0.36	0.27	32.28	19.59	100					>600	>600	95.4	60.3	114.7					60.83	39.62	11.16

Glossary

ablation (glacial till) - Materials deposited directly by ice with some modification and transportation by glacial melt water.

acid soil - A soil having a pH of less than 7.0.

aeolian - Material laid down by wind.

alluvium - A general term for all deposits of modern rivers and streams.

association, soil - A sequence of soils of about the same age, derived from similar parent material, and occuring under similar climatic conditions but having different characteristics due to variations in relief and in drainage.

available nutrient - That portion of any element or compound in the soil that can be readily absorbed and assimilated by growing plants.

available water (soil moisture) - The portion of water in a soil that can be readily absorbed by plant roots, considered by most workers to be that water held in the soil against a pressure of up to approximately 15 bars.

bearing capacity - The average load per unit area required to produce failure by rupture of a supporting soil mass.

bedrock - The solid rock underlying soils and the regolith or exposed at the surface.

bisequa - Two sequa in one soil; that is, two sequences of an eluvial horizon and its related illuvial horizon.

bog - Permanently wet land with low bearing strength.

boulders - Stones which are larger than 24 inches in diameter.

breccia - A rock composed of coarse angular fragments cemented together.

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

capability class - (Soil) - A rating that indicates the general suitability of a soil. It is a grouping of subclasses that have the same relative degree of limitation of hazard. The limitation or hazard becomes progressively greater from Class 1 to Class 7.

capability subclass - (Soil) - This is a grouping of soils with similar kinds of limitations and hazards. It provides information on the kind of conservation problem or limitation. The class and subclass together provide information about the degree and kind of limitation for broad land use planning and for the assessment of conservation needs.

category - Any one of the ranks of the system of soil classification in which soils are grouped on the basis of their characteristics.

cation (base) - exchange capacity - The sum of total exchangeable cations that a soil can absorb. Expressed in miliequivalents per 100 grams of soil.

cemented-indurated:- having a hard, brittle consistency because the particles are held together by cementing substances such as humus, calcium carbonate, or the oxides of silicon, iron, and aluminum. The hardness and brittleness persist even when wet.

classification, soil - The systematic arrangement of soils into categories and classes 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. The three highest categories of the Canadian system are as follows:

1. Chernozemic Order

Great Group	Subgroup	Subgroup Modifier
11 Brown	1101 Orthic Brown	2 Grumic
	1102 Rego Brown	5 Saline
	1103 Calcareous Brown	6 Carbonate
	1104 Eluviated Brown	8 Gleyed
	1105 Solonetzic Brown	9 Lithic
	1106 Solodic Brown	
12 Dark Brown	1201 Orthic Dark Brown	2 Grumic
	1202 Rego Dark Brown	5 Saline
	1203 Calcareous Dark Brown	6 Carbonated
	1204 Eluviated Dark Brown	8 Gleyed
	1205 Solonetzic Dark Brown	9 Lithic
	1206 Solodic Dark Brown	
13 Black	1301 Orthic Black	2 Grumic
	1302 Rego Black	5 Saline
	1303 Calcareous Black	6 Carbonated
	1304 Eluviated Black	8 Gleyed
	1305 Solonetzic Black	9 Lithic
	1306 Solodic Black	

Year? Is this the same class # as they were mapped by? What about Alpine subgroup on legend

14	Dark Gray	1401	Orthic Dark Gray	2	Grumic
		1402	Rego Dark Gray	5	Saline
		1403	Calcareous Dark Gray	6	Carbonated
		1405	Solonetzic Dark Gray	8	Gleyed
		1406	Solodic Dark Gray	9	Lithic

2. Solonetzic Order

21	Solonetz	2101	Brown Solonetz	8	Gleyed
		2102	Dark Brown Solonetz	9	Lithic
		2103	Black Solonetz		
		2104	Gray Solonetz		
		2105	Alkaline Solonetz		
22	Solodized Solonetz	2201	Brown Solodized Solonetz	8	Gleyed
		2202	Dark Brown Solodized Solonetz	9	Lithic
		2203	Black Solodized Solonetz		
		2204	Gray Solodized Solonetz		
23	Solod	2301	Brown Solod	8	Gleyed
		2302	Dark Brown Solod	9	Lithic
		2303	Black Solod		
		2304	Gray Solod		

3. Luvisolic Order

31	Gray Brown Luvisol	3101	Orthic Gray Brown Luvisol	8	Gleyed
		3102	Brunisolic Gray Brown Luvisol	9	Lithic
		3103	Podzolic Gray Brown Luvisol		
32	Gray Luvisol	3201	Orthic Gray Luvisol	3	Turbic
		3202	Dark Gray Luvisol	7	Cryic
		3203	Brunisolic Gray Luvisol	8	Gleyed
		3204	Podzolic Gray Luvisol	9	Lithic
		3205	Solodic Gray Luvisol		
		3206	Solodic Dark Gray Luvisol		

4. Podzolic Order

41	Humic Podzol	4101	Orthic Humic Podzol	8	Gleyed
		4102	Ortstein Humic Podzol	9	Lithic
		4103	Placic Humic Podzol		
		4104	Duric Humic Podzol		
		4105	Fragic Humic Podzol		
42	Ferro-Humic Podzol	4201	Orthic Ferro-Humic Podzol	8	Gleyed
		4202	Ortstein Ferro-Humic Podzol	9	Lithic
		4203	Placic Ferro-Humic Podzol		
		4204	Duric Ferro-Humic Podzol		
		4205	Fragic Ferro-Humic Podzol		
		4206	Luvisolic Ferro-Humic Podzol (Bisequa)		
		4207	Sombric Ferro-Humic Podzol		
43	Humo-Ferric Podzol	4301	Orthic Humo-Ferric Podzol	3	Turbic
		4302	Ortstein Humo-Ferric Podzol	7	Cryic
		4303	Placic Humo-Ferric Podzol	8	Gleyed
		4304	Duric Humo-Ferric Podzol	9	Lithic
		4305	Fragic Humo-Ferric Podzol		
		4306	Luvisolic Humo-Ferric Podzol (Bisequa)		
		4307	Sombric Humo-Ferric Podzol		

5. Brunisolic Order

51	Melanic Brunisol	5101	Orthic Melanic Brunisol	1	Andic
		5102	Degraded Melanic Brunisol	3	Turbic
				7	Cryic
				8	Gleyed
				9	Lithic
52	Eutric Brunisol	5201	Orthic Eutric Brunisol	1	Andic
		5202	Degraded Eutric Brunisol	3	Turbic
				7	Cryic
				8	Gleyed
				9	Lithic

53	Sombric Brunisol	5301	Orthic Sombric Brunisol	1	Andic
		5302	Degraded Sombric Brunisol	3	Turbic
				7	Cryic
				8	Gleyed
				9	Lithic
54	Dystric Brunisol	5401	Orthic Dystric Brunisol	1	Andic
		5402	Degraded Dystric Brunisol	3	Turbic
				7	Cryic
				8	Gleyed
				9	Lithic
6. Regosolic Order					
61	Regosol	6101	Orthic Regosol	3	Turbic
		6102	Cumulic Regosol	5	Saline
				7	Cryic
				8	Gleyed
				9	Lithic
7. Gleysolic Order					
71	Humic Gleysol	7101	Orthic Humic Gleysol	3	Turbic
		7102	Rego Humic Gleysol	4	Placic
		7103	Fera Humic Gleysol	5	Saline
				6	Carbonated
				7	Cryic
				9	Lithic
72	Gleysol	7201	Orthic Gleysol	3	Turbic
		7202	Rego Gleysol	4	Placic
		7203	Fera Gleysol	5	Saline
				6	Carbonated
				7	Cryic
				9	Lithic
73	Luvic Gleysol	7301	Orthic Luvic Gleysol	7	Cryic
		7302	Humic Luvic Gleysol	9	Lithic
		7303	Fera Luvic Gleysol		
8. Organic Order		6			
81	Fibrisol	8101	Fenno-Fibrisol		
		8102	Silvo-Fibrisol		
		8103	Sphagno-Fibrisol		
		8104	Mesic Fibrisol		
		8105	Humic Fibrisol		
		8106	Limno Fibrisol		
		8107	Cumulo Fibrisol		
		8108	Terric Fibrisol		
		8109	Terric Mesic Fibrisol		
		8110	Terric Humic Fibrisol		
		8111	Cryic Fibrisol		
		8112	Hydric Fibrisol		
		8113	Lithic Fibrisol		
82	Mesisol	8201	Typic Mesisol		
		8202	Fibric Mesisol		
		8203	Humic Mesisol		
		8204	Limno Mesisol		
		8205	Cumulo Mesisol		
		8206	Terric Mesisol		
		8207	Terric Fibric Mesisol		
		8208	Terric Humic Mesisol		
		8209	Cryic Mesisol		
		8210	Hydric Mesisol		
		8211	Lithic Mesisol		
83	Humisol	8301	Typic Humisol		
		8302	Fibric Humisol		
		8303	Mesic Humisol		
		8304	Limno Humisol		
		8305	Cumulo Humisol		
		8306	Terric Humisol		
		8307	Terric Fibric Humisol		
		8308	Terric Mesic Humisol		
		8309	Cryic Humisol		
		8310	Lithic Humisol		
		8311	Lithic Humisol		
84	Folisol	8401	Typic Folisol		
		8402	Lithic Folisol		

clay - As a soil separate, the mineral soil particle less than 0.002 mm in diameter; usually consisting largely of clay minerals. As a soil textural class, soil materials that contain 40 or more percent clay, less than 45% sand and less than 40% silt.

climax - A plant community of the most advanced type capable of development under, and in dynamic equilibrium with, the prevailing environment.

coarse fragments - Rock or mineral particles more than 2mm in diameter.

cobbles - Rock fragments 3 to 10 inches in diameter.

colluvium - A deposit of rock fragments and soil material deposited usually at the base of steep slopes as a result of gravitational action.

color - Soil solors are compared with a Munsell color chart. The Munsell system specifies the relative degrees of the three simple variables of color; hue, value and chroma. For example: 10 YR 6/4 means a hue of 10 YR, a value of 6, and a chroma of 4.

complex (soil complex) - A mapping unit used in detailed and reconnaisance soil surveys where two or more defined soil units are so intimately intermixed geographically that it is impractical, because of the scale used, to separate them.

compaction - The packing together of soil particles by forces exerted at the soil surface resulting in increased soil density.

consistence (soil) - The mutual attraction of the particles in a soil mass, or their resistance to separation or deformation. It is described in terms such as loose, soft, friable, firm, hard, sticky, plastic, or cemented.

contour (line) - Line on the map showing height above sea level.

creep - Slow mass movement of soil and soil material down relatively steep slopes primarily under the influence of gravity, but facilitated by saturation with water and by alternate freezing and thawing.

crevasse fillings - Ridges or hummocks formed from glacial sediments deposited by water in the cracks and crevasses of the ice.

crust - A surface layer on soils, ranging in thickness from a few millimeters to perhaps as much as an inch, that is much more compact, hard and brittle, when dry, than the material immediately beneath it.

degradation - The changing of soil to a more highly leached and more highly weathered condition, usually accompanied by morphological changes such as the development of an eluviated, light colored A (Ae) horizon.

delta - A fan shaped area formed by deposition of successive layers of debris brought down from the land and spread out on the bottom of a basin at the mouth of the stream as it enters a lake or sea.

deposit - Material left in a new position by a neutral transporting agent such as water, wind, ice, gravity or by activity of man.

disintegration - See weathering.

drainage - (1) The rapidity and extent of the removal of water from the soil by runoff and flow through the soil. (2) As a condition of the soil, it refers to the frequency and duration of period when the soil is free from saturation.

drumlin - An elongated or oval hill of glacial drift, commonly glacial till, deposited by glacier ice with its long axis parallel to the direction of ice movement.

dryland farming - The practice of crop production in low rainfall areas without irrigation.

dunes - Wind built ridges and hills of sand formed in the same manner as snowdrifts. They are formed by some obstruction such as a bush, boulder, fence or other obstacle which causes an eddy or otherwise thwarts the sand-laden wind. Once begun, the dunes themselves offer further resistance and they grow to form various shapes.

ecology - The study of organisms in relation to their environment.

edaphic - (1) Of or pertaining to the soil. (2) Resulting from or influenced by factors inherent in the soil or other substrate, rather than by climatic factors.

eluvial horizon - A soil horizon that has been formed by the process of eluviation.

eluviation - The removal of soil material in suspension or in solution from a layer or layers of soil.

end moraine - (also known as terminal moraine) A ridgelike accumulation of drift built chiefly along the terminal margin of a valley glacier or by the margin of an ice sheet. It is mainly the result of deposition by ice or deformation by ice thrust, or both.

erosion - The wearing away of the land surface by running water, wind, ice or other geological agents.

esker - A winding ridge of irregularly stratified sand, gravel and cobbles laid down under the ice by a rapidly flowing glacial stream.

evapotranspiration - The combined loss of water from a given area, and during a specified period of time, by evaporation from the soil surface and transpiration from plants.

fan - Level to steeply sloping (0-50% slope) fan-like form occurring where a stream runs onto a level plain or meets a slower stream.

fertility, soil - The status of a soil with respect to the amount and availability to plants of elements necessary for plant growth.

flood plain - The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

fluted - Level to gently irregular topography (0-25% slope) marked by shallow, straight parallel troughts.

frost action - Freezing and thawing of moisture in materials and the resultant effects on these materials and on structures of which they are a part or with which they are in contact.

frost heave - The raising of a surface due to the accumulation of ice in the underlying soil.

fluvial deposits - Materials laid down by recent streams and rivers.

genetic - Resulting or produced by soil-forming processes.

glacial drift - Embraces all rock material transported by glacier ice, glacial meltwater, and rafted by icebergs. This term includes till, stratified drift and scattered rock fragments.

glacial till - Unsorted and unstratified materials deposited by glacial ice.

glacio-fluvial deposits - Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice.

gleyed, gleysolic (soil) - An imperfectly and poorly drained soil in which the material has been modified by reduction or alternating reduction and oxidation. These soils have low chromas and/or prominent mottling in some horizons.

gravel - Rock fragments 2 mm to 3 inches in diameter.

ground water - That portion of the total precipitation which at any particular time is either passing through or standing in the soil and in the underlying strata.

habitat - The natural environment of an organism.

horizon (soil) - A layer in the soil profile approximately parallel to the land surface with more or less well-defined characteristics that have been produced through the operation of soil forming processes.

Organic horizons - Are found in organic soils and usually at the surface of mineral soils or at any depth beneath the surface in buried soils or overlying geologic deposits. They contain more than 30 percent organic matter (17% org. c). Two groups of these layers are recognized:

O - An organic layer developed mainly from mosses, rushes; and woody materials.

Of - Fibric layer, an organic layer which is the least decomposed of all the organic soil materials. It has large amounts of well-preserved fiber that is readily identifiable as to botanical origin.

Om - Mesic layer, an organic layer which is intermediate in decomposition between the less decomposed fibric and the more decomposed humic materials. This material has intermediate values for fiber content bulk density and water contents. The material is partly altered both physically and biochemically.

Oh - Humic layer, an organic layer which is the most decomposed of all the organic soil materials. It has least amount of plant fiber, the highest bulk density values and the lowest saturated water content. This material is relatively stable having undergone considerable change from the fibric state primarily because of oxidation and humification.

L-F-H- These are organic layers developed primarily from leaves, twigs, woody materials and a minor component of mosses.

L - An organic layer characterized by the accumulation of organic matter in which the original structures are easily discernible.

F - An organic layer characterized by the accumulation of partly decomposed organic matter. The original structures are discernible with difficulty. Fungi mycelia are often present.

H - An organic layer characterized by an accumulation of decomposed matter in which the original structures are indiscernible.

Mineral horizons and layers - Mineral horizons are those that contain less organic matter (org. c) than that specified for organic horizons.

A - A mineral horizon or horizons formed at or near the surface in the zone of removal of materials in solution and suspension and/or maximum accumulation of organic matter. Included are: (1) horizons in which organic matter has accumulated as a result of biologic activity (Ah); (2) horizons that have been eluviated of clay, iron, aluminum, and/or organic matter (Ae); (3) horizons having characteristics of (1) and (2) above but transitional to underlying B or C (AB or A and B); (4) horizons markedly disturbed by cultivation or pasture (Ap).

B – A mineral horizon or horizons characterized by one or more of the following: (1) an enrichment in silicate clay, iron, aluminum or humus, alone or in combination (Bt, Bf, Bfh, and Bh); (2) an alteration by hydrolysis, reduction or oxidation to give a change in colour or structure from horizons above and/or below and does not meet the requirements of (1) and (2) above (Bm, Bmg).

C – A mineral horizon or horizons comparatively unaffected by the pedogenic processes operative in A and B, excepting (1) the process of gleying, and (2) the accumulation of calcium and magnesium carbonates and more soluble salts (Cca, Csa, Cg and C).

R – Underlying consolidated bedrock, such as granite, sandstone, limestone, etc. The boundary between the R layer and any overlying unconsolidated material is called a lithic contact.

Lower case suffixes

b – Buried soil horizon.

c – A cemented (irreversible) pedogenic horizon.

ca – A horizon with secondary carbonate enrichment where the concentration of lime exceeds that present in the unenriched parent material. It is more than four inches thick and if it has a Ca CO3 equivalent of less than 15 percent it should have at least 5 percent more CaCO3 equivalent, it should have 1/3 more CaCO3 equivalent than IC.

cc – Cemented (irreversible) pedogenic concretions.

e – A horizon characterized by removal of clay, iron, aluminum or organic matter alone or in combination. It is higher in colour value by one or more units when dry than an underlying B horizon.

f – A horizon enriched with hydrated iron. It usually has a chroma of three or more. The criteria for an f horizon (excepting Bgf) are that the oxalate-extractable Fe and Al exceeds that of the IC horizon by 0.8 percent or more (Fe + Al) 0.8% and the ratio of organic matter to oxalate-extractable iron is less than 20. The horizons are differentiated on the basis of organic matter content into: Bf, less than 5 percent organic matter; Bfh, 5 to 10 percent organic matter; Bhf, more than 10 percent organic matter.

g – A horizon characterized by gray colours and/or prominent mottling indicative of permanent or periodic intense reduction. Chromas of the matrix are generally one or less.

h – A horizon enriched with organic matter. When used with A alone, it refers to the accumulation of organic matter and must contain less than 30 percent organic matter. It must show one Munsell unit of value darker than the horizon immediately below or have one percent more organic matter than the IC. When used with A and e it refers to an Ah horizon which has been degraded as evidenced, under natural conditions, by streaks and splotches and often by platy structure.

j – Used as a modifier of e, g, n, and t to devote an expression of, but failure to meet the specified limits to the suffix it modifies.

k – Presence of carbonate as indicated by visible effervescence with dilute HCl.

m – A horizon slightly altered by hydrolysis, oxidation or solution, or all of them to give a change in colour or structure or both. The suffix is used with B to denote a B horizon that is greater in chroma by one or more units than the parent material or that has granular, blocky or prismatic material or that has granular, blocky or prismatic structure without evidence of strong gleying and has (Fe + Al) 0.8%. It may not be used under an Ae horizon but may be used under an Aej horizon. This suffix can be used as Bm or Bmgj.

p – A layer disturbed by man's activities, i.e. by cultivation and/or pasturing. To be used only with A.

s – A horizon with salts including gypsum which may be detected as crystals or veins, or as surface crusts of salt crystals, or by distressed crop growth, or by the presence of salt tolerant plants.

sa – A horizon with secondary enrichment of salts more soluble than calcium and magnesium carbonates where the concentration of salts exceeds that present in the unenriched parent material. The horizon is four inches or more thick. The conductivity of the saturation extract must be at least 4 mmhos/cm and must exceed that of the C horizon by at least one-third.

t – A horizon enriched with silicate clay. It is used with B alone (Bt, Btg, etc.).

hummocky – Hilly, uneven landscape resulting from deep seated soil movement usually of a rotational nature.

illuvial horizon – A soil layer or horizon in which material carried from an overlying layer has been precipitated from solution or deposited from suspension. The layer of accumulation of silicate clay, iron and aluminum hydrons oxides and/or organic matter.

irrigation – The artificial application of water to the soil for the benefit of growing crops.

kame – An irregular ridge or hill of stratified glacial drift.

kettle – Distinctive terrain depressions associated mostly with glaciofluvial deposits.

lacustrine deposit – Material deposited in lake water and later exposed either by lowering the water level or by uplifting of the land.

landform – Structural configuration of the topography as a result of past and present geological activity.

landscape – All the natural features such as fields, hills, forests, water, etc., which distinguish one part of the earth's surface from another part.

leaching – The removal of materials in solution from the soil. See eluviation.

liquid limit (upper plastic limit) - (1) The water content corresponding to an arbitrary limit between the liquid and plastic states of consistency of a soil. (2) The water content at which a pat of soil, cut by a groove of standard dimensions, will flow together for a distance of 12 mm under the impact of 25 blows in a standard liquid limit apparatus.

loess - Material transported and deposited by wind and consisting of predominantly silt-sized particles.

marine - Materials deposited in salt or brackish water, variable textures.

mapping unit - Any delineated area shown on a soil map that is identified by a symbol.

mottles - Spots or blotches of different color or shades of color interspersed with the dominant color. They are described in order of abundance (few, common, many), size (fine, medium, coarse) and contrast (faint, distinct, prominent). Mottling in soils indicates poor aeration and lack of good drainage.

outwash - Sediments "washed out" by flowing water beyond the glacier and laid down in thin foreset beds as stratified drift. Particle size may range from boulders to silt.

parent material - The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of a soil is developed by pedogenic processes.

pedology - Those aspects of soil sciences involving the constitution, distribution, genesis and classification of soils.

percolation, soil water - The downward movement of water through the soil.

permeability - The ease with which water and air pass through a bulk mass of soil or a layer of soil.

pH, soil - The negative logarithm of the hydrogen-ion activity, indicating the intensity of acidity or alkalinity of a soil.

plastic limit - (1) The water content corresponding to an arbitrary limit between the plastic and the semisolid states. (2) Water content at which a soil will just begin to crumble when rolled into a thread approximately 3 mm in diameter.

plasticity index - The numerical difference between the liquid and the plastic limit. The plasticity index gives the range of moisture contents within which a soil exhibits plastic properties.

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

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 are: extremely acid, <4.5; very strongly acid, 4.5-5.0; strongly acid, 5.1-5.5; moderately acid, 5.6-6.0; slightly acid, 6.1-6.5; neutral 6.6-7.3; slightly alkaline, 7.3-7.8; moderately alkaline, 7.9-8.4; strongly alkaline, 8.5-9.1; and very strongly alkaline, >9.1.

sand - A soil particle between 0.05 and 2.0 mm in diameter.

seepage - The escape of water downward through the soil. (2) The emergence of water from the soil along an extensive line of surface in contrast to a spring where the water emerges from a local spot.

series, soil - The second category (II) in the Canadian Classification system. This is the basic unit of soil classification consisting of soils which are essentially alike in all major profile characteristics except the texture of the surface.

silt - A soil separate consisting of particles between 0.05 and 0.002 mm in equivalent diameter.

site - (1) In ecology, an area described or defined by its biotic, climatic and soil conditions as related to its capacity to produce vegetation. (2) An area sufficiently uniform in biotic, climatic, and soil conditions to produce a particular vegetation.

slickens - Fine-textured materials separated in placer mining and in ore-mill operations.

soil - The unconsolidated mineral material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. Soil has been subjected to and influenced by genetic and environmental factors of: parent material, climate (including moisture and temperature effect), macro and macro-organisms, and topography, all acting over period of time.

soil genesis - The mode of origin of the soil with special reference to the processes or soil-forming factors responsible for the development of the solum, or true soil, from the unconsolidated parent material.

soil structure - The combination or arrangement of primary soil particles into secondary soil particles, units or peds, which are separated from a adjoining aggregates by surface of weakness. Aggregates differ in grade (distinctness) of development. Grade is described as structureless (no observable aggregation or no definite orderly arrangement: amorphous if coherent, single-grained if noncoherent), weak, moderate, and strong. The aggregates vary in class (size) and are described as fine, medium, coarse, and very coarse. The size classes vary according to the type (shape) of structure. The types of structure mentioned in this report are:

Granular - having more or less rounded aggregates without smooth faces and edges.
Platy - having thin, plate-like aggregates with faces mostly horizontal.
Blocky - having blocklike aggregates with sharp, angular corners.
Subangular blocky - having blocklike aggregates with rounded and flattened faces and rounded corners.

By convention an aggregate is described in the order of grade, class, and type, e.g. strong, medium, blocky and moderate, coarse, granular. In the parent material of soils the material with structural shapes may be designated as pseudoblocky, pseudoplaty, etc. In stratified materials a bed is a unit layer distinctly separate from other layers and is one or more cm thick, but a lamina is similar layer less than 1 cm thick.

soil survey - The systematic examination, description, classification, and mapping of soils in an area.

soil texture - The relative proportions of the various soil separates in a soil as described by the classes of soil texture.

For convenience, soil textures are grouped together into five classes as follows:

Coarse textured - sands, loamy sand, loamy fine sand
Moderately coarse textured - loamy very fine sand, sandy loam, fine sandy loam
Medium textured - very fine sandy loam, loam, silt loam, silt, sandy clay loam (light)
Moderately fine-textured - clay loam, silty clay loam, sandy clay loam (heavy)
Fine-textured - sandy clay, silty clay, clay

solum - The upper horizons of a soil in which the parent material has been modified and within which most plant roots are confined. It consists usually of A and B horizons.

stones - Rock fragments 10 inches in diameter if rounded, and 15 inches along the greater axis if flat.

stoniness - The relative proportion of stones in or on the soil.

talus - Fragments of rock and other soil material accumulated by gravity at the foot of cliffs on steep slopes.

terrace - A level, usually narrow, plain bordering a river, lake, or the sea. Rivers sometimes are bordered by a number of terraces at different levels.

till - See glacial till.

topography - The shape of the ground surface such as hills, mountains or plains. The soil slopes may be smooth or irregular. The slope classes used in this report are defined as follows:

depressional or nearly level	0 to 0.5
very gently sloping or gently undulating	0.5+ to 2
gently sloping or undulating	2+ to 5
moderately sloping or gently rolling	5+ to 9
strongly sloping or moderately rolling	9+ to 15
steeply sloping or strongly rolling	15+ to 30
very steeply sloping or hilly	30+ to 60
extremely sloping or very hilly	over 60

tuff - Volcanic ash usually more or less stratified and in various states of consolidation.

unified soil classification system (Engineering) - A classification system based on the identification of soils according to their particle size, gradation, plasticity index and liquid limit.

varve - A distinct band representing the annual deposit in sedimentary materials regardless of origin and usually consisting of two layers, one thick light colored layer of silt and fine sand laid down in the spring and summer, and the other a thin, dark colored layer of clay laid down in the fall and winter.

water table - The upper limit of the part of the soil or underlying rock material that is wholly saturated with water.

water holding capacity - The ability of a soil to hold water. The water-holding capacity of sandy soils is usually considered to be low, while that of clayey soils is high. It is often expressed in inches of water per foot depth of soil.

weathering - The physical and chemical disintegration, alteration and decomposition of rocks and minerals at or near the earth's surface by atmospheric agents.

Table 12 APPENDIX

Correlations of Soils in Present
and Previous Soil Survey Reports

Present Report	Previous Report
	Soil Survey of th Quesnel Francois Lake and Bulkley-Terrace Areas
Soil Associations	Soil Series
Barrett	Barrett (in part) Chilako (in part)
Berman	Vanderhoof (in part)
Driftwood	Driftwood
Fort St. James	Fort St. James
Mapes	Mapes Braeside (in part)
Nithi	Braeside (in part)
Nechako	Nechako
Organics	Shallow muck; peat
Pineview	Pineview; Vanderhoof (in part)
Prairiedale	Prairiedale
Slug	Alluvial (in part)
Stellako	Alluvial (in part)
Vanderhoof	Vanderhoof (in part)
Alix Barrett Baline Cluculz Cobb Colony Crystal Dahl Decker Dragon Kluk Knewstubb Morice Oona Ormond Peta Pinkut Pope Ramsey Saunders Shass Skins Snodgrass Tatin Twain	Rough Mountainous Land, Eroded Land and Land not surveyed

Table 13 Acreages of Soil Associations

Association	Acres
Alix	
AX 1	20,279
AX 2	22,015
AX 1 - complex	39,100
AX 2 - complex	47,117
Total Alix	128,511 (3.56%)
Barrett	
BA 1	151,756
BA 1 - complex	150,734
BA 2	194,804
BA 2 - complex	65,212
BA 3	74,860
BA 3 - complex	91,565
BA 4	138,571
BA 4 - complex	50,427
BA 5	2,772
BA 5 - complex	532
BA 6	1,551
BA 6 - complex	3,434
BA 7	42,981
BA 7 - complex	33,712
Total Barrett	1,002,911 (27.80%)
Berman	
BN 1	29,458
BN 1 - complex	30,096
BN 2	13,861
BN 2 - complex	1,826
BN 3	2,708
BN 3 - complex	1,192
BN 4	1,859
BN 5	1,109
BN 5 - complex	910
BN 6	859
BN 7	7,192
BN 7 - complex	603
Total Berman	91,673 (2.54%)
Cluculz	
C 2	48
Total Cluculz	48
Cobb	
CB 1	5,590
CB 1 - complex	11,364
CB 2	17,388
CB 2 - complex	67,902
Total Cobb	102,244 (2.83%)
Colony	
CY	507
CY - SL_1	68
Total Colony	575 (0.02%)
Crystal	
CR 1	18,496
CR 1 - complex	42,352
CR 2	29,385
CR 2 - complex	89,344
CR 3	5,477
CR 3 - complex	13,670
Total Crystal	198,724
Dahl	
DL 1	4,124
DL 1 - complex	39,327
DL 2	2,652
DL 2 - complex	10,233
DL 3	5,557
DL 3 - complex	17,083
Total Dahl	78,976 (2.19%)
Decker	
DR 1	2,757
DR 1 - complex	19,428
DR 2	4,611
DR 2 - complex	20,382
Total Decker	47,178 (1.31%)
Deserters	
D 1	4,724
D 1 - complex	31,365
D 2	35,030
D 2 - complex	51,966
D 3	37,716
D 3 - complex	87,057
D 4	104,180
D 4 - complex	63,170
D 5	29,892
D 5 - complex	27,646
D 6	4,811
D 6 - complex	2,164
Total Deserters	479,721 (13.30%)
Dragon	
DN 1	3,152
DN 1 - complex	33,167
DN 2	5,612
DN 2 - complex	39,741
Total Dragon	81,672 (2.26%)
Driftwood	
DD 1	1,012
DD 1 - complex	3,432
DD 2	22,596
DD 2 - complex	4,335
DD 3	2,984
Total Driftwood	34,359 (0.95%)
Fort St. James	
FJ	58,279
FJ - complex	387
Total Fort St. James	58,666 (1.63%)
Kluk	
KK 1	2,482
KK 1 - complex	4,384
KK 2	1,839
Total Kluk	8,705
Knewstubb	
KB	22,832
KB - complex	14,288
Total Knewstubb	37,120 (1.03%)
Mapes	
MS 1	5,744
MS 1 - complex	4,912
MS 2	5,731
MS 2 - complex	11,077
Total Mapes	27,464 (0.76%)
Mine Pits & Slickens	663 (0.02%)
Morice	
M 1	3,260
M 1 - complex	3,274
Total Morice	6,534 (0.18%)
Nechako	
N 1	2,056
N 1 - complex	1,386
N 2	1,830
N 2 - complex	2,532
N 3 - complex	1,968
Total Nechako	9,772 (0.27%)
Nithi	
NT 1	355
NT 1 - complex	1,917
NT 2	602
NT 2 - complex	5,832
Total Nithi	8,706 (0.24%)

Table 13 (cont'd) Acreages of Soil Associations

Association	Acres
Oona	
ON 1	9,274
ON 1 - complex	55,932
ON 2	17,623
ON 2 - complex	57,077
Total Oona	139,906 (3.88%)
Organics	
O 1	11,902
O 1 - complex	7,032
O 2	33,228
O 2 - complex	10,525
Total Organics	62,687 (1.74%)
Ormond	
OD 1	12,469
OD 1 - complex	58,287
OD 2	12,680
OD 2 - complex	7,013
OD 3	4,971
OD 3 - complex	20,678
Total Ormond	116,098 (3.22%)
Peta	
PA 1	359
PA 1 - complex	1,297
PA 2 - complex	1,690
Total Peta	3,346 (0.09%)
Pineview	
P 2	29,813
P 2 - BA 1	40
P 5	786
Total Pineview	30,639 (0.85%)
Pinkut	
PT 1	1,132
PT 1 - complex	1,112
PT 2	1,386
PT 2 - complex	8,121
PT 3	436
PT 3 - complex	10,958
Total Pinkut	23,145 (0.64%)
Pope	
PP	558
PP - complex	6,395
Total Pope	6,953

Association	Acres
Prairiedale	
PR 1	287
PR 2	6,516
Total Prairiedale	6,803 (0.19%)
Ramsey	
R 1	4,098
R 1 - complex	27,547
R 2 - complex	4,312
Total Ramsey	35,957 (1.00%)
Roaring	
RG 1	3,276
RG 2	13,279
Total Roaring	16,555 (0.46%)
Rock Outcrop	
RO - SS1	1,246
Total Rock Outcrop	1,246 (0.03%)
Saunders	
SD 1	666
SD 1 - complex	8,838
SD 2	6,336
SD 2 - complex	4,976
SD 3	1,596
SD 3 - complex	2,660
Total Saunders	25,072 (0.69%)
Shass	
SS 2 - SD 2	663
Total Shass	663 (0.02%)
Skins	
SK 1	3,075
SK 1 - complex	26,754
Total Skins	29,829 (0.83%)
Slug	
SG 1	2,398
SG 1 - complex	316
SG 2	4,609
SG 2 - complex	4,535
Total Slug	11,858 (0.33%)
Snodgrass	
SO 1	44
SO 1 - complex	2,638
Total Snodgrass	2,682

Association	Acres
Stellako	
SL 1	1,615
SL 1 - complex	7,089
SL 2	7,067
SL 2 - complex	11,042
SL 3	488
SL 3 - complex	2,152
Total Stellako	29,453 (0.82%)
Tatin	
TT 1	2,080
TT 1 - complex	946
TT 4	767
TT 4 - complex	8,718
Total Tatin	12,511 (0.35%)
Twain	
TW 1	2,028
TW 1 - complex	16,508
TW 2	6,239
TW 2 - complex	18,144
TW 3	16,460
TW 3 - complex	22,371
TW 4	39,712
TW 4 - complex	70,236
TW 5	24,788
TW 5 - complex	16,510
TW 6	7,124
TW 6 - complex	288
Total Twain	240,408 (6.66%)
Vanderhoof	
V 1	37,809
V 1 - complex	30,372
V 2	28,401
V 2 - complex	25,233
V 3	1,539
V 3 - complex	4,329
V 4	1,580
V 5	1,456
Total Vanderhoof	130,719 (3.62%)
Total Land	3,330,752 (92.33%)
Water	276,646 (7.67%)
Grand Total	3,607,398

LEGEND
(for the Nechako-Francois Lake Area)
93K/SE - SW; 93 F/NE-NW

Soil Association	Map Symbol	Dominant Subgroup	Significant Subgroup Inclusions	Drainage	Parent Material	Vegetation Type	Site Type
Alix	AX1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Rapid	Gravelly glacio-fluvial deposits (outwash, valley trains, deltas) with coarse to moderately coarse surface layer texture (s,ls,sl), flat to undulating and rolling with the elevation range 2200 - 3500 feet.	Lodgepole pine - peavine - bastard toadflax - cushion moss; Lodgepole pine-highbush cranberry-pink peavine	Lodgepole pine moss, lodgepole pine - lichen
	AX2	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Rapid			
Babine	BE	Orthic Gray Luvisol		Moderately good	Clayey glacio-lacustrine deposits with moderately fine textured surface horizon (sicl), overlying till at $1\frac{1}{2}$ to $2\frac{1}{2}$ feet depth. Rolling to steeply sloping; elevation between 2350 and 2700 ft.	Spruce-highbush - cranberry - sarsaparilla - pink wintergreen	
			Gleyed Orthic Gray Luvisol	Imperfect			
Barrett	BA1	Orthic Gray Luvisol		Moderately good	Thick basal till deposits comprising mostly extensive rolling to undulating till plain and drumlinized till plain in lesser extent. Medium to moderately fine textures (l,cl) with modifications of moderately coarse textured surface (sl) layer Generally gravelly and slightly to moderately stony to cobbly with hard to extremely hard consistence. Slow permeability due to the compactness and texture of the till. Elevation range between 2500 and 3500 feet.	Spirea - peavine - aster-twinflower; Trembling aspen-peavine-bastard toadflax-cushion moss (BA1 only) Spruce-highbush cranberry-bunch berry-moss; Lodge pole pine-highbush cranberry-pink peavine (BA2-4)	Moss-twin-flower; Moss;Bunch-berry-moss; Aspen-aster-peavine;Alder blueberry-moss
	BA2	Orthic Gray Luvisol		Moderately good			
			Gleyed Orthic Gray Luvisol	Imperfect			
	BA3	Orthic Gray Luvisol	Brunisolic Gray Luvisol	Moderately good			
	BA4	Orthic Gray Luvisol	Brunisolic Gray Luvisol	Moderately good			
			Gleyed Subgroups	Imperfect			
	BA5	Gleyed Orthic Gray Luvisol		Imperfect		Spruce-highbush cranberry-bunchberry moss; Alpine fir - blueberry-oakfern - feather moss; Trembling aspen-saskatoon bluejoint-coltsfoot; Spruce-highbush cran-	Aspen-spruce highbush cranberry-coltsfoot; Equisetum; Bunchberry-moss-horsetail Bunchberry-moss-oakfern
			Orthic Gray Luvisol	Moderately good			

						berry-sarsaparilla pink wintergreen	
	BA6	Gleysolics		Poor		As BA5	
			Gleyed Orthic Gray Luvisol	Imperfect			
			Orthic Gray Luvisol	Moderately good			
	BA7	Orthic Gray Luvisol	Dark Gray Luvisol	Moderately good		Trembling aspen-rose-bluejoint	
Berman	BN1	Orthic Gray Luvisol		Good	Silty glacio-lacustrine deposits of medium to moderately fine (sil,sicl) texture. The silts are varved and more than 100 feet thick in places. Permeability is moderate to slow. Lime is leached out of the soil profile and upper layer of parent material, except in moist and wet low lying areas. Level to undulating and rolling lacustrine plain with steep dissected slopes along some river valleys. The elevation of the main body of silts is between 2200 and 2500 feet.	Spruce-highbush cranberry-bunchberry moss; Lodgepole pine peavine-bastard toad-flax-cushion moss; Spirea-peavine-aster-twinflower	Aspen-aster-peavine
	BN2	Orthic Gray Luvisol		Good			
			Gleyed Orthic Gray Luvisol	Imperfect			
	BN3	Orthic Gray Luvisol		Good		Spruce-highbush cranberry-bunchberry moss; spruce-high-bush-cranberry-sarsa-parilla- Showy aster	Aspen-aster-peavine
			Gleyed Orthic Gray Luvisol	Imperfect			
			Gleysolics	Poor			
	BN4	Gleyed Orthic Gray Luvisol		Imperfect		As BN5	
			Orthic Gray Luvisol	Good			
			Gleysolics	Poor		Spruce-highbush cranberry-bunchberry moss; Trembling aspen saskatoon-bluejoint coltsfoot	Spruce-aspen-highbush cra berry-colts-foot; Redozie dogwood-high bush cranberr
	BN5	Gleysolics		Poor			
			Gleyed Orthic Gray Luvisol	Imperfect			
	BN6	Gleysolics		Poor		As BN5	
			Orthic Gray Luvisol	Good			
			Gleyed Orthic Gray Luvisol	Imperfect			
	BN7	Orthic Gray Luvisol	Dark Gray Luvisol	Good		As BN1	As BN1
Cluculz	CZ	Degraded Dystric Brunisol	Orthic Humo-Ferric Podzol	Good	Colluvium, detritus and till overlying ultra-basic bedrock. Moderately coarse to medium (sl,l) textured. Shallow deposits (up to 5 feet) on extremely steep mountain slopes at 3500 to 4000 feet elevation	Lodgepole pine-dwarf blueberry-hairy-cap moss-lichen; Lodgepole peavine-bastard toad-flax-cushion moss	
			Lithic Subgroups	Rapid to Good			

Cobb	CB1	Orthic Humo-Ferric Podzol	Bisequa Humo-Ferric Podzol	Good	Ablation till deposits covering extensive areas of kettled and hummocky relief. Moderately coarse to coarse texture (sl,ls) gravelly, cobbly and stony. The thickness of deposits is variable, mostly 5 to 8 feet, above basal till. Stratified silty or sandy lenses are common. Elevations range between 3000 and 4000 feet.	Lodgepole pine-peavine-bastard toadflax-cushion moss; Lodgepole pine-highbush cranberry-pink peavine	Blueberry-moss-twin-flower
	CB2	Orthic Humo-Ferric Podzol	Gleyed Orthic Humo-Ferric Podzol	Good Imperfect			
Colony	CY	Orthic Regosol		Good	Recent beach deposits, coarse to very coarse (s,ls, cos,gr) mostly shallow, up to 5 feet thick.	Spruce-highbush cranberry-bunchberry moss; Trembling aspen-black twinberry-rose-cowparsnip; Spirea-peavine aster-twinflower	Sarsaparilla-red-ozier dogwood
			Gleyed Orthic Regosol	Imperfect			
Crystal	CR1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Good	Ablation till deposits covering extensive areas of kettled and hummocky relief. Moderately coarse to coarse texture (sl,ls) gravelly, cobbly and stony. Variable deposit thickness, mostly 5 to 8 feet above basal till. Stratified silty or sandy lenses are common. Elevation range from 2600 to 3500 feet.	Lodgepole pine-peavine-bastard toadflax-cushion moss; Lodgepole pine-dwarf blueberry hairy-cap moss-lichen; Lodgepole pine-highbush cranberry-pink peavine	Kinnikinnick-moss-lichen; Blueberry-moss-twin-flower
	CR2	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Good			
	CR3	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Good			
			Gleyed Subgroups	Imperfect			
Dahl	DL1	Orthic Dystric Brunisol		Rapid to Good	Colluvium, detritus and till overlying acidic bedrock of different formations and various geological ages. Coarse to medium (ls,sl,l) shallow deposits (up to 5 feet) rapidly to moderately permeable; spread over steep hills to extremely steep mountains at elevations from 2200 to 3500 feet	Spirea-peavine - aster-twinflower; Lodgepole pine-dwarf blueberry-hairy-cap moss-lichen; variable with depth of soil; Bluegrass-trembling aspen.	Saskatoon-grass; Saskatoon-choke cherry-grass
			Lithic Regosol	Rapid			
			Lithic Dark Gray	Rapid			
	DL2	Lithic Regosol		Rapid			
		Lithic Dark Gray		Rapid			
			Orthic Dystric Brunisol	Rapid to Good			
	DL3	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Rapid to Good			
			Lithic Subgroups	Rapid			

Decker	DR1	Degraded Dystric Brunisol	Orthic Humo-Ferric Podzol	Good to Rapid	Colluvium, detritus and till overlying acidic bedrock of different formations and various geological ages. Coarse to medium (ls,sl,l) shallow deposits (up to 5 feet) rapidly to moderately permeable; spread over steep ridges and extremely steep mountains at elevations from 3000 to 4000 ft.	Lodgepole pine-dwarf blueberry-hairy-cap moss-lichen; Lodgepole pine-highbush cranberry-pink peavine	Alder-moss-Blueberry-moss
			Lithic Subgroups	Rapid			
	DR2	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Good to Rapid			
			Lithic Subgroups	Rapid		As DR1	
Deserters	D1	Brunisolic Gray Luvisol		Moderately good	Thick basal till deposits comprising rolling to strogly sloping till plain, or shallower deposits covering drumlinized till plain and steep to very steep mountain slopes. Medium to moderately fine texture (l, cl) with moderately coarse textured (sl) surface. Generally gravelly and slightly to moderately stony or cobbly with hard to extremely hard consistence. Slow permeability due to the compactness and texture of the till; elevation range between 3000 and 4000 feet.	Spruce-highbush cranberry-bunchberry moss; Spruce-arnica-queen's cup-feather moss	Spruce-alpine fir-alder-moss
	D2	Brunisolic Gray Luvisol		Moderately good			
			Gleyed Brunisolic Gray Luvisol	Imperfect			
	D3	Brunisolic Gray Luvisol	Orthic Gray Luvisol	Moderately good		As D1	
	D4	Brunisolic Gray Luvisol	Orthic Gray Luvisol	Moderately good		As D1	
			Gleyed Subgroups	Imperfect			
	D5	Brunisolic Gray Luvisol	Bisequa Humo-Ferric Podzol	Moderately good		Spruce-highbush cranberry-oakfern-cow parsnip; Alpine fir-blueberry-dwarf rubus-feather moss	Devil's club
			Gleyed Subgroups	Imperfect			
	D6	Gleyed Brunisolic Gray Luvisol		Imperfect			
			Brunisolic Gray Luvisol	Moderately good			
			Gleysolics	Poor			
Dragon	DN1	Orthic Humo-Ferric Podzol	Lithic Humo-Ferric Podzol	Good to Rapid	Colluvium, detritus and till overlying acidic bedrock of different formations and various geological ages. Coarse to medium (ls,sl,l) shallow deposits (up to 5 feet) rapidly to moderately permeable; spread over steep to extremely steep mountain slopes and rocky ridges from 3500 to 4500 feet in elevation	Lodgepole pine-dwarf blueberry-hairy-cap moss-lichen; Spruce-highbush cranberry-oakfern-cow parsnip; Alpine fir-blueberry-false hellebore-liverwort	Blueberry-moss-twinflower; Spruce-alpine fir-blueberry-moss
	DN2	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol	Good to Rapid			
			Lithic Subgroups	Rapid			

Driftwood	DD1	Dark Gray Luvisol		Moderately good	Thick basal till deposits on rolling to undulating till plain and shallow till on some steep elongated south slopes. Medium to moderately fine textures (l,cl) gravelly and moderately stony; hard to extremely hard, compact, slowly permeable; elevation range 2500 to 3500 feet.	Spirea-peavine-aster-twinflower: Trembling aspen-black twinberry-rose-cow parsnip; Trembling aspen-rose-bluejoint.	Cultivated; Aspen-saskatoon Aspen-cow parsnip dry
	DD2	Dark Gray Luvisol	Orthic Gray Luvisol	Moderately good			
	DD3	Dark Gray Luvisol	Orthic Gray Luvisol	Moderately good			
			Gleyed Subgroups	Imperfect			
Fort St. James	FJ	Orthic Gray Luvisol		Moderately good	Clayey glacio-lacustrine deposits (over 80 percent clay) extremely compact and almost impermeable. Flat to undulating; elevation 2250 to 2600 feet.	Trembling aspen-saskatoon-bluejoint-coltsfoot	Douglas spire Highbush cranberry-black twinberry-Douglas spirea;Bunchberry-moss-cow parsnip
			Gleyed Orthic Gray Luvisol	Imperfect			
Kluk	KK1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Rapid	Coarse gravelly and sandy glacial beach deposits overlying glacial till at 2 to 5 feet depth; elevation range 2500 to 2700 feet.	Spirea-peavine-aster-twinflower	Moss-twinflower
	KK2	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Rapid			
Knewstubb	KB	Degraded Dystric Brunisol	Degraded Eutric Brunisol	Good	Medium textured (fsl,sil) glacio-lacustrine deposits; pitted, hummocky relief; moderately to strongly rolling; elevation range 2500 to 3200 feet.	Variable; Lodgepole pine-peavine-bastard toadflax-cushion moss; Spirea-peavine-aster-twinflower	Variable
Mapes	MS1	Orthic Dystric Brunisol	Orthic Regosol	Rapid to Good	Sandy valley train or deltaic deposits of coarse to moderately coarse texture (s,ls,sl); partly modified by wind; undulating to moderately rolling; elevation range between 2200 and 2500 feet.	Lodgepole pine-pea vine-bastard toad flax-cushion moss; Lodgepole pine-highbush cranberry-pink peavine	Pinegrass-velvet leaved blueberry-kinnikinnick;Moss - twinflower
	MS2	Orthic Regosol	Orthic Dystric Brunisol	Rapid to Good			

Morice	M1	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Rapid	Gravelly and sandy kames and kame terraces of coarse to moderately coarse surface texture (s,ls,sl); hummocky, rolling to very steeply sloping; elevation range from 2500 to 3500 ft.	Spruce-arnica-queen's cup-feather moss; Lodgepole pine-highbush cranberry-pink peavine	
Nechako	N1	Orthic Gray Luvisol		Good	Alluvial deposits of medium texture (sil,vfsl) underlain by fine to medium sands at 2 to 4 feet depth. Level and undulating to moderately sloping higher river terraces above present floodplain; elevation range between 2100 and 2500 feet.	Lodgepole pine-peavine-bastard toadflax-cushion moss; Trembling aspen-rose-bluejoint	
	N2	Orthic Gray Luvisol		Good			
			Gleyed Orthic Gray Luvisol	Imperfect			
	N3	Gleyed Orthic Gray Luvisol		Imperfect		Spruce-highbush cranberry-bunchberry-moss	Redozier dogwood-sarsapar illa
			Orthic Gray Luvisol	Good			
Nithi	NT1	Degraded Dystric Brunisol	Degraded Eutric Brunisol	Good to Rapid	Sandy outwash and valley train deposits of medium to moderately coarse surface texture (sil,fsl) underlain by sands at 2 to 3 feet depth. Level, undulating to gently rolling with elevation range between 2200 and 2500 feet.	Lodgepole pine-peavine-bastard toadflax-cushion moss	Kinnikinnick-moss-lichen; Moss-bunchber ry
	NT2	Degraded Eutric Brunisol	Degraded Dystric Brunisol	Good to Rapid		Spruce-highbush cranberry-bunchberry-moss	Redozier dog-wood-sarsaparilla
			Orthic Gray Luvisol	Good			
Oona	ON1	Orthic Humo-Ferric Podzol	Lithic Humo-Ferric Podzol	Good to Rapid	Colluvium, detritus and till overlying basic bedrock of different formations and various geological ages. Coarse to medium (ls,sl,l) shallow deposits (up to 5 feet thick), rapidly to moderately permeable, spread over steep ridges and extremely steep mountains at elevations from 3000 to 4500 feet.	Lodgepole pine-dwarf blueberry-hairy-cap moss-lichen; variable with depth; Alpine fir-blueberry-false hellebore-liverwort	Blueberry-moss-twin flower
	ON2	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol	Good to Rapid			
			Lithic Subgroups	Rapid			

Organics	O1	Mesisol (great group)	Fibrisol (great group)	Very Poor	Organic deposits raw and in different stages of decomposition, permanently water saturated, more than two feet deep, filling low, water accumulating positions.	Black spruce-horsetail-peat moss	Sedge; Sedge-peat moss; Spruce-peat moss
	O2	Fibrisol (great group)	Mesisol (great group)	Very Poor			
Ormond	OD1	Orthic Dystric Brunisol		Rapid to Good	Colluvium, detritus and till overlying basic rock of different formations and various geological ages. Coarse to medium textured (ls,sl,l) shallow deposits (up to 5 feet thick) rapidly to moderately permeable; spread over steep hills to extremely steep mountains at elevations of 2200 to 3500 feet.	Lodgepole pine-dwarf blueberry-hairy-cap moss-lichen; Trembling aspen-rose-blue joint	Variable with soil depth; Saskatoon-chokecherry-grass
			Lithic Regosol or Lithic Dark Gray	Rapid			
	OD2	Lithic Regosol or Lithic Dark Gray		Rapid			
			Orthic Dystric Brunisol	Rapid to Good			
	OD3	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Rapid to Good		As in OD1	
			Lithic Subgroups	Rapid			
Peta	PA1	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Rapid	Sandy glacio-fluvial deposits (outwash) of coarse to moderately coarse texture (ls,s,sl) and rapid permeability; undulating to moderately rolling; elevation 2600 to 3200 feet.	Lodgepole pine-peavine-bastard toadflax-cushion moss; Lodgepole pine-highbush cranberry-pink peavine	Kinnikinnick-moss-lichen; Moss-bunch berry
	PA2	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Rapid			
Pineview	P1	Orthic Gray Luvisol		Moderately good	Clayey glacio-lacustrine deposits of fine and very fine texture (c,heavy c); very slow permeability, very to extremely compact. Undulating to strongly rolling; elevation 2200 to 2600 feet.	Trembling aspen-saskatoon-bluejoint-coltsfoot	Bunchberry-moss-cow pars nip; Highbush cranberry-black twinber ry-Douglas' spirea
	P2	Orthic Gray Luvisol		Moderately good			
			Gleyed Orthic Gray Luvisol	Imperfect			
	P5	Gleysolics		Poor		Trembling aspen-saskatoon-bluejoint-coltsfoot	Douglas' spirea
			Gleyed Orthic Gray Luvisol	Imperfect			

Pinkut	PT1	Orthic Dystric Brunisol	Degraded Eutric Brunisol	Good	Shallow colluvial deposits (less than 5 feet thick) of moderately coarse, medium and coarse texture (sl, l,ls) overlying glacial till on very steep to extremely steep slopes; elevation 2500 to 3500 feet.	Spirea-peavine-aster-twinflower; Trembling aspen-rose-bluejoint	Aspen-peavine aster;Saskatoon-choke cherry
	PT2	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Good			
	PT3	Degraded Eutric Brunisol	Orthic Dystric Brunisol	Good		As in PT1	
			Orthic Gray Luvisol	Good			
Pope	PP	Orthic Eutric Brunisol	Orthic Dystric Brunisol	Good to Rapid	Colluvium, detritus and till overlying calcareous rock. Moderately coarse to medium textured (sl,l) shallow deposits (up to 5 feet thick), covering steep to extremely steep slopes; elevation 2200 to 4000 ft.	Spirea-peavine-aster-twinflower	Aster-twin flower
			Lithic Subgroups	Rapid			
Prairiedale	PR1	Dark Gray Luvisol	Orthic Gray Luvisol	Good	Silty glacio-lacustrine deposits of medium to moderately fine texture (sil, sicl); thick, varved silts; moderately permeable; on level to undulating plain; elevation 2200 to 2300 ft.	Trembling aspen-rose-bluejoint; Bluegrass-trembling aspen; cultivated	
	PR2	Dark Gray Luvisol	Orthic Gray Luvisol	Good			
			Gleyed Subgroups	Imperfect			
Ramsey	R1	Orthic Humo-Ferric Podzol		Rapid	Gravelly glacio-fluvial deposits (outwash, valley trains) with coarse to moderately coarse surface texture (ls,s,sl); flat to rolling; elevation 3000 to 4000 feet.	Spirea-peavine aster-twinflower; Lodgepole pine-common moss	Alpine fir-moss
	R2	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol	Rapid			
Roaring	RG1	Degraded Dystric Brunisol	Orthic Dystric Brunisol	Rapid	Glacio-fluvial esker and crevasse filling deposits with coarse to moderately coarse surface texture (s, ls,sl); interstratified sands, gravel, sometimes cobbles and silts. Narrow ridges with very steep and extremely steep slopes; elevation 2400 to 3500 ft.	Spirea-peavine aster-twinflower; Lodgepole pine-highbush cranberry-pink peavine	Spruce-moss; Douglas-fir-peavine-bastard toadflax-moss
			Orthic Regosol	Rapid			
	RG2	Orthic Dystric Brunisol	Degraded Dystric Brunisol	Rapid			
			Orthic Regosol	Rapid			

ock Outcrop	RO				Bare rocky ridges or mountain sides.	Lodgepole pine-dwarf blueberry-hairy-cap moss-lichen	Variable pioneer
aunders	SD1	Bisequa Humo-Ferric Podzol	Orthic Humo-Ferric Podzol	Good	Basal till deposits of medium and sometimes moderately fine texture (l,cl) with moderately coarse texture (sl) at the surface. Very hard and compact, very slowly permeable. Gravelly and sometimes cobbly or stony till covering steep to extremely steep mountain slopes and undulating to rolling high plateaus above 4000 to 4500 feet elevation	Alpine fir-blueberry-dwarf rubus-feather moss	
			Gleyed Subgroups	Imperfect			
	SD2	Gleyed Orthic Regosol		Imperfect		Krummholz-false hellebore-valerian	
			Orthic Humo-Ferric Podzol	Good			
			Gleysolics	Poor			
	SD3	Gleysolics		Poor		Krummholz-false hellebore-valerian	
			Orthic Humo-Ferric Podzol	Good			
			Gleyed Orthic Regosol	Imperfect			
lass	SS1	Alpine Dystric Brunisol		Moderately good	Colluvium, detritus and till overlying diorite acidic rock. Moderately coarse to medium textured (sl,l) shallow deposits (up to 5 feet thick), excessively stony in places, covering moderate slopes to extremely steep mountains above 5000 feet elevation	Alpine fescue-lichen; Krummholz-false hellebore-valerian	Alpine grass-lichen; Alpine heather
			Gleyed Alpine Dystric Brunisol	Imperfect			
			Lithic Subgroups	Good			
	SS2	Gleyed Alpine Dystric Brunisol		Imperfect		Alpine fescue-lichen; Krummholz-false hellebore-valerian	
			Alpine Dystric Brunisol	Moderately good			
			Lithic Subgroups	Good			
ins	SK1	Orthic Humo-Ferric Podzol		Good	Colluvium, detritus and till overlying acidic or basic rock of different formations. Moderately coarse to medium and sometimes coarse textured (sl,l,ls) shallow deposits (up to 5 feet thick) covering steep to extremely steep mountain ridges above 4000 to 4500 feet elevation.	Krummholz-false hellebore-valerian; Alpine fir-blueberry-false hellebore-liverwort	
			Gleyed Orthic Humo-Ferric Podzol	Imperfect			
			Lithic Subgroups	Good to Rapid			

Slug	SG1	Orthic Dystric Brunisol	Orthic Regosol	Rapid to Good	Gravelly and sandy alluvial fan deposits with coarse to moderately coarse surface texture (ls, sl); unsorted to well sorted, in places very stony; gently to moderately, sometimes strongly sloping; 2300 to 3000 feet in elevation.	Trembling aspen-black twinberry-rose-cow parsnip; Lodgepole pine-common moss; Trembling aspen-saskatoon-bluejoint-coltsfoot	Aster-peavine
	SG2	Orthic Dystric Brunisol	Orthic Regosol	Rapid to Good			
			Gleyed Subgroups	Imperfect			
Snodgrass	SO1	Orthic Dark Gray	Rego Dark Gray	Rapid to Good	Gravelly and sandy kames and kame terraces of coarse to moderately coarse surface textures (ls,s,sl); rolling to steeply sloping; 2500 to 3500 feet in elevation.	Bluegrass-aspen; Spirea-peavine -aster-twinflower; Lodgepole pine-highbush cranberry -pink peavine	Spruce-moss; Douglas-fir-peavine-bastard toadflax-moss
			Orthic Regosol	Rapid to Good			
Stellako	SL1	Gleyed Orthic Regosol		Imperfect	Fluvial (alluvial) deposits along major streams of variable texture, from very coarse to medium and fine, nearly level to undulating and moderately sloping; 2100 to 3000 feet in elevation.	Trembling aspen-saskatoon-bluejoint-coltsfoot; Spruce-highbush cranberry-bunchberry-moss; Trembling aspen-rose-bluejoint; Alpine fir-blueberry-oakfern-feather moss	Cottonwood-redozier dog wood; Willow; Horsetail-oakfern
			Orthic Regosol	Good to Rapid			
			Gleysolics	Poor			
	SL2	Gleysolics		Poor			
			Gleyed Orthic Regosol	Imperfect			
			Orthic Regosol	Good to Rapid			
	SL3	Orthic Regosol		Good to Rapid		Trembling aspen-saskatoon-bluejoint-coltsfoot; Trembling aspen-rose-bluejoint; Trembling aspen-black twinberry-rose- cow parsnip	
			Gleyed Orthic Regosol	Imperfect			

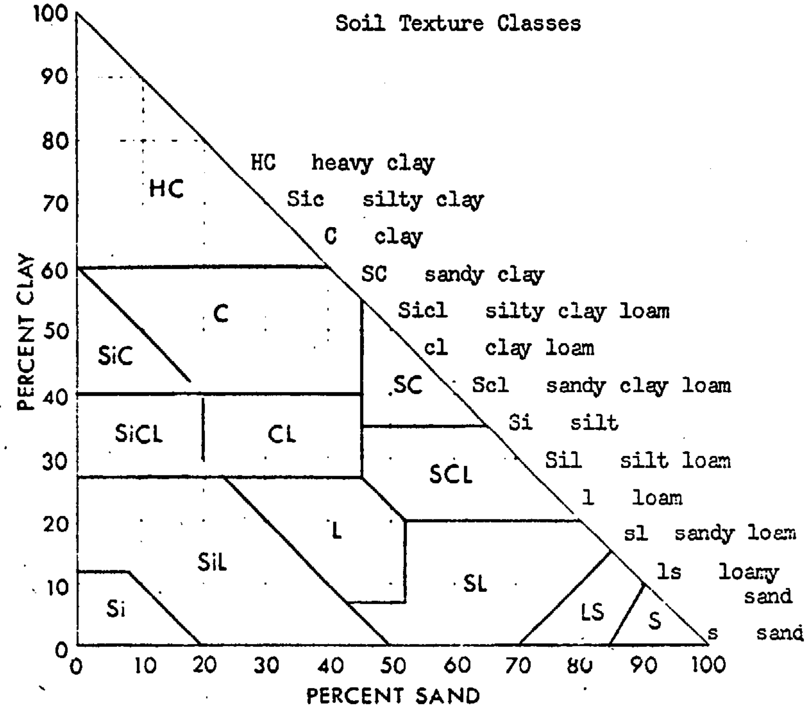
Tatin	TT1	Bisequa Humo-Ferric Podzol	Orthic Humo-Ferric Podzol	Good	Shallow colluvial deposits (less than 5 feet thick) of moderately coarse to moderately fine texture (sl, l,cl) overlying glacial till on very steep to extremely steep slopes at an elevation of 3000 to 4000 feet.	Spruce-highbush cranberry-oakfern-cow parsnip; Alpine fir-blueberry-dwarf rubus-feather moss	Alpine fir-blueberry-wintergreen-feather moss; Bunchberry-moss
			Gleyed Subgroups	Imperfect			
	TT4	Orthic Humo-Ferric Podzol	Degraded Dystric Brunisol	Good			
			Brunisolic Gray Luvisol	Good			
Twain	TW1	Bisequa Humo-Ferric Podzol		Moderately good	Thick basal till deposits comprising rolling to strongly sloping till plain or shallower deposits covering steep to extremely steep mountain slopes. Medium to moderately fine texture (l,cl) with moderately or medium coarse, textured surface (sl,l); gravelly to moderately stony or cobbly; hard to very hard; very compact and slowly permeable, elevation range 3500 to 4500 feet.	Spruce-highbush cranberry-oakfern-cow parsnip; Alpine fir-blueberry-oak fern-feather moss; Alpine fir-blueberry-dwarf rubus-feather moss; Spruce arnica-queen's cup-feather moss	Alpine fir-blueberry-wintergreen-feather moss; Alpine fir-blueberry-oak fern-moss; Rhododendron-bunchberry-moss
	TW2	Bisequa Humo-Ferric Podzol		Moderately good			
			Orthic Humo-Ferric Podzol	Good			
	TW3	Biseque Humo-Ferric Podzol	Brunisolic Gray Luvisol	Moderately good			
	TW4	Bisequa Humo-Ferric Podzol	Brunisolic Gray Luvisol	Moderately good			
			Gleyed Subgroups	Imperfect			
	TW5	Bisequa Humo-Ferric Podzol		Moderately good		As in TW1	
			Gleyed Bisequa Humo-Ferric Podzol	Imperfect			
			Gleysolics	Poor			
	TW6	Gleyed Bisequa Humo-Ferric Podzol	Bisequa Humo-Ferric Podzol	Moderately good		As in TW1	
			Gleysolics	Poor			
Vanderhoof	V1	Orthic Gray Luvisol		Good	Clayey glacio-lacustrine deposits with moderately fine surface texture (si cl); varved and more than 200 feet thick in places; slow to very slow permeability; compact; level to undulating and strongly rolling where the shallow lacustrine deposit conforms to the underlying till, elevation range 2200 to 2500 feet.	Spirea-peavine-aster-twinflower; Lodgepole pine-peavine-bastard toadflax-cushion moss; Lodgepole pine-highbush cranberry-pink peavine	
	V2	Orthic Gray Luvisol		Good			
			Gleyed Orthic Gray Luvisol	Imperfect			
	V3	Orthic Gray Luvisol		Good		Spirea-peavine-aster-twinflower; Spruce-highbush cranberry-sarsaparilla-pink wintergreen	
	V4	Gleyed Orthic Gray Luvisol		Imperfect		Spruce-highbush-cranberry-bunchberry-moss	Spruce-aspen highbush cranberry-coltsfoot
			Orthic Gray Luvisol	Good			
			Gleysolics	Poor			
	V5	Gleysolics		Poor		Spruce-highbush-cranberry-bunchberry-moss	
			Gleyed Orthic Gray Luvisol	Imperfect			

LANDFORM SYMBOLING SYSTEM

GENERAL ORIGIN of LANDFORM (Used alone or with Pattern of Landform Suffix)		PATTERN OF LANDFORM (Used as suffix with General Origin of Landform Symbol)			
A	Ablation Till	b	beach	f	fan
C	Colluvium	c	channelled	u	fluted
F	Fluvial (alluvial)	a	delta	h	hummocky
G	Glacio-fluvial	d	drumlin(ized)	m	kame
L	Lacustrine	n	dune(d)	k	kettle
O	Organic	v	dissected eroded	t	terrace
R	Bedrock			s	steepland
T	Basal Till	e	esker or crevasse filling		

TOPOGRAPHIC CLASSES

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



. Soil textural classes. Percentages of clay and sand in the main textural classes of soils; the remainder of each class is silt.

EXAMPLE OF MAP SYMBOL

7 3
BA1 – AX2 ← Complex of two associations in the proportion 7:3
Tu-Gt:df

Tu-Gt → Fluted till & Glacio fluvial terrace

df → gently to strongly rolling topography