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Soil Survey

OF

AGASSIZ AREA

BY

H. A. Luttmerding and P. N. Sprout

Preliminary Report No. 8

OF THE

LOWER FRASER VALLEY SOIL SURVEY

Map Reference:
Soil Map of Agassiz Area
Scale: 1" = 2,000 feet. 1967.

British Columbia Department of Agriculture
KELOWNA, B. C.
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INTRODUCTION

The detailed soil survey of the Agassiz area, begun in 1965 and completed in 1966, was undertaken at the request of the Assessment Commissioner, British Columbia Department of Finance. Its primary purpose was to continue evaluation of Lower Fraser Valley soils in relation to rural land assessment; a secondary objective was a soil map and report suitable for general use.

The survey is the latest in a series started in 1956. To date, interim soil maps and reports for the municipalities of Pitt Meadows, Delta, Surrey, Langley, Matsqui, Sumas, and Chilliwack have been produced.

A map entitled, "Soil Map of Agassiz Area", scale 2,000 feet to an inch, has been prepared. Tinted copies are available to government agencies; others may obtain uncoloured prints from the Department of Agriculture, Victoria.

In addition to soil descriptions and chemical analyses, this report contains general information on agriculture, climate, surficial geology, native vegetation, and social amenities of the area.

HOW TO USE A SOIL SURVEY MAP AND REPORT

A farmer who has lived in a locality for a long time knows the soil variations on his and neighbouring farms. However, unless he can refer to a soil map and report he cannot compare his soils with those on experimental stations and in other parts of the district where, perhaps, higher crop yields than his are reported.

The regional similarities and differences among soils can be studied after a soil map has been made. When comparisons are possible, new techniques proven successful on a soil may be transferred to the same soil elsewhere or to closely related soils, with the least chance of failure.

To determine the kinds of soils on a farm or other land, the area should be located on the soil map. Features such as rivers, lakes, roads, railways, towns, and section numbers are indicated to assist in location. Each kind of soil on the map is identified by a distinctive colour and symbol. To find the name of the soil so marked, refer to the map legend. After the soil name has been determined, refer to the soil survey report for a description of the soil, including its land use.

In studying the soil descriptions note that soils are separated on the basis of their characteristics to a depth of two feet or more, not on surface character alone. Although several soils have similar surfaces, subsoil characteristics may vary greatly.

It is also important to understand that each soil includes a range of properties and that boundaries between soils are not necessarily sharp. Within many soil areas there are spots occupied by other soils which are too small or so intermingled that it is impossible to show them separately on the soil map. Where this occurs the areas are mapped as a "complex" of two or more different soils.

Climatic data and information on schools, churches, highways, railroads, electrical services, water supplies, population, geology, and others is given in the section, "General Description of the Area".

GENERAL DESCRIPTION OF THE AREA

Location and Extent

The Agassiz area is located in the eastern portion of the Lower Fraser Valley. It extends eastward along the valley from Harrison Bay and includes all of Kent Municipality and the valley bottom and lower valley slopes from Popkum to Hope. The surveyed area comprises about 69,588 acres of which 45,600 acres are occupied by Kent Municipality.

History (5, 6, 28)

Harrison Lake was first explored in 1846 by the Hudson's Bay Company when the corporation was seeking a new outlet to the coast from the interior. The Harrison-Douglas route came into prominence in 1858 when Govenor Douglas started to build a roadway from Douglas to Lillooet. This route, using available waterways, was completed in 1861 and for the next few years, was the chief access to the Lilooet and upper Fraser country.

In 1858 the Fraser River was proven navigable to Yale and by 1860 the construction of a road north through the Fraser Canyon was begun. This route, known as the "Cariboo Trail", increased in importance and by 1865 there was a marked decrease in traffic over the Harrison route although it remained open and was used to some extent until the late 1860's.

The first recorded land pre-emption occurred in 1859 on the present site of the Harrison Hot Springs Hotel. First pre-emption in present day Agassiz took place in 1862.

The Agassiz Experimental Farm was started in 1888. It was concerned primarily with horticultural crops including strawberries, raspberries, apples, pears, and a variety of other fruit and ornamental plants. Some forage and cereal crops were also grown. In 1911 a major change in Experimental Farm policy occurred and the farm changed over to livestock. At present a variety of experimental work with livestock, soils, forages, and small fruits is being conducted.

The original settlers in the area came to take up land but, after completion of the Canadian Pacific Railway in 1885, other enterprises provided opportunity. Many found employment in logging, lumbering, producing railway ties, and cutting firewood for the steam engines.

Kent Municipality was incorporated in 1895 with the municipal offices located at Agassiz. Harrison Hot Springs was incorporated as a village in 1949 and Hope as a town in 1929. Agassiz is unincorporated and is part of Kent Municipality.

Community Facilities, Population and Transportation (5, 6)

The Agassiz map area includes the major portion of School District No. 76 and part of School District No. 32. Secondary schools are located in Agassiz and Hope while elementary schools may be found at several locations throughout the area. School bus service is provided for most rural children. Medical and dental services are adequate and modern hospitals are available at Hope, Chilliwack and Mission. Fire protection is supplied by volunteer brigades and law enforcement is provided by the Royal Canadian Mounted Police. Fishing, boating, swimming, hiking, hunting, golfing, and various other recreational outlets are available. Harrison Hot Springs is well known for its tourist and convention facilities.

The main lines of both the Canadian Pacific and Canadian National railways pass through the area and supply satisfactory rail transportation. Good highway routes are provided by Highway Nos. 1 and 7 while a network of secondary roads provide good access to all parts of the valley. Limited access to the mountainous areas is available on logging roads. Bus transportation east and west is satisfactory and airport facilities, including charter services, are supplied at Harrison Hot Springs and Hope. Barge and tug services are available on the Fraser River and Harrison Lake.

Electricity and natural gas are supplied by B. C. Hydro and Power Authority and telephone facilities are provided by the B. C. Telephone Company. Mail facilities are satisfactory with most rural areas receiving daily delivery.

The population of Kent Municipality was 2,194 in 1961 and had increased an estimated 2,250 by 1964. Harrison Hot Springs and Hope had estimated populations of 475 and 3,000 respectively in 1964.

Agassiz and Hope are the main commercial centres in the area and supply most of its commercial needs. More restricted commercial outlets such as those at Harrison Hot Springs, Bridal Falls, Hunter Creek, and Harrison Bay supply automotive services and some grocery requirements. Agricultural service and supply establishments are restricted to Agassiz although several companies located outside the Agassiz area also provide service.

Logging employs the largest number of persons in the area. A large proportion of the logs are boomed on the Fraser River or Harrison Lake and towed to mills downstream or to Metropolitan Vancouver. The area is part of the Harrison Public Sustained Yield Unit and B. C. Forest Service personnel are stationed at Harrison Hot Springs, Hope and Chilliwack.

Agriculture is the leading source of income in Kent Municipality. There were 153 farm operators in 1961 and the farm population totalled 624 persons.

Government institutions contribute substantially to the areal income. An Experimental Farm, operated by the Canada Department of Agriculture, is located at Agassiz. A minimum security prison and Mountain Prison, classified as maximum security, are also located in Kent Municipality.

Hope has a municipally owned water distribution system; the remainder of the area depends primarily on private sources, usually wells which tap the abundant ground water reservoirs in the valley.

Climate (4, 8, 14)

The inshore maritime climate of the area is strongly influenced by the Coast Mountains. Winters are dominated by the large number of low pressure systems which move onshore from the Pacific Ocean producing dull, mild, rainy weather. Except for recharging ground water reservoirs, the high rainfall has little benefit and water tables in many areas are raised sufficiently to cause severe drainage problems. Occasionally, polar air masses drain into the Lower Fraser Valley from the interior of the province and produce heavy falls of snow or freezing rain when the cold interior and damp maritime air meet.

High pressure systems producing warm, sunny weather are common in the summer. Rainfall is sharply curtailed and soil moisture deficiencies frequently develop, particularly during the important crop growing months of July and August. This condition favours the production of early maturing crops and limits yields of those using the full growing season.

Temperature

Examination of appended Table A indicates mean annual temperatures throughout the Lower Fraser Valley are quite uniform although the range in mean monthly temperatures tends to widen with increased distance from tidewater. This trend is also evident in the extreme high and low temperatures recorded. Temperatures occurring in the Agassiz map area are typified by those recorded at Agassiz, Chilliwack and Hope. January with a mean monthly temperature of 32 to 35°F. and July with a mean monthly temperature between 64 and 65°F. are the coldest and hottest months in the area.

Precipitation

Appended Table B gives precipitation data for Chilliwack (Sardis) and can be considered representative of the area. It indicates wide variation in precipitation between months in the same year as well as the same months in different years. Although total annual precipitation is high, only a small portion, frequently less than two inches per month, occurs during the five important crop growing months. The following table indicates the percentage of years during which precipitation was less than two inches per month for several representative Fraser Valley stations:

Station	May	June	July	August	September	Years of Record
Abbotsford (airport)	13%	40%	80%	53%	27%	15
Chilliwack (Sardis)	16%	45%	73%	59%	20%	44
Langley Prairie	23%	31%	77%	38%	31%	13
Aldergrove	23%	31%	61%	46%	31%	13

Since most crops require at least two inches of water per month during the growing season, it is evident that a deficiency exists in many years, particularly during July and August.

Table C indicates that total yearly precipitation tends to increase with increased distance from tidewater. Steveston, near tidewater, has a mean annual precipitation of 39.35 inches while Agassiz, seventy miles inland, received 64.39 inches. Precipitation also tends to increase with closer proximity to the mountains and with increased elevation as shown by data from Alouette Lake with 106.81 inches mean annual precipitation.

Snowfall also increases with increased distance from the ocean and with increased elevation. In the Agassiz area average annual snowfall in the valley ranges from about three feet at Agassiz to five feet at Hope (10 inches snow = 1 inch rain).

Frost-Free Period and Length of Growing Season

The longest frost-free periods and growing seasons in Canada occur in the Pacific Coast area of which the Lower Fraser Valley is part. Appended Table D contains frost data for several stations in the region and indicates the frost-free period in the valley portion of the map area is about 200 days. The length of the growing season is approximately 230 days with 3,375 degree-days, calculated on a base temperature of 42°F..

Sunshine, Cloud and Wind

In winter, when the area is under the influence of frequent low pressure systems, cloud cover and overcast are general. High pressure systems with associated clear, sunny skies are more common during the summer. In the Lower Fraser Valley the annual hours of sunshine vary from 1,922 hours at Vancouver Airport to 1,389 hours at Agassiz. During December, January and February, the average monthly hours of sunshine are 44, 57 and 88 at Vancouver Airport and 35, 45 and 68 at Agassiz.

A large percentage of east and northeast winds occur during the winter months whereas those from the southwest and west are more prevalent during the summer. Wind strength tends to be higher in winter than during the summer. Mean wind speed during January at Agassiz is 10 miles per hour dropping to 5 miles per hour during June and July. Calm days are infrequent and extremely high winds are rare.

Taken as a whole, the climate of the Lower Fraser Valley is well suited for agricultural production. Temperatures are moderate, high winds rare, growing season sunlight hours are adequate, and long frost-free periods and growing seasons prevail. The summer-dry period produces the main restriction. This problem, however, can be overcome by use of irrigation.

Native Vegetation (24)

Most of the Agassiz map area is included in the Pacific Coast Section of the Coast Forest Region. In the mountainous parts of the mapped area, prior to logging, the forest cover was dominated by Douglas fir, western hemlock and western red cedar with the hemlock and cedar predominating on moist slopes and seepage areas. At present, the logged areas support dense deciduous cover dominated by red alder, vine and broadleaf maple interspersed with second-growth Douglas fir and western hemlock.

The alluvial valley bottom originally supported stands of black cottonwood, red alder, broadleaf maple, western white birch as well as western red cedar, Sitka spruce, and grand fir. Most of these stands have been cleared and remnants of the original forest occur only as scattered pockets on Seabird and some other islands.

Above approximately 3,000 feet elevations a transition to the Coastal Subalpine Section of the Subalpine Forest Region occurs. Here mixed stands of amabilis fir, alpine fir and mountain hemlock are usual. Only the upper parts of Mount Woodside, Mount Agassiz and Bear Mountain are included in this section.

Physiography and Drainage (10, 11)

The valley floor and lower valley sides in the area under discussion form the eastern apex of the Fraser Lowland subdivision of the Georgia Depression. The lowland is described as being of depositional origin and triangular in shape. It extends from the delta of the Fraser River eastward to the vicinity of Laidlaw, then south-westward to the coast at Bellingham. It is bounded on the north by the Pacific Ranges of the Coast Mountains and on the southeast by the Skagit Range of the Cascade Mountains, all of which rise abruptly from the lowland.

The relatively flat valley bottom in the map area varies in elevation from about 30 feet at Harrison Bay to approximately 120 feet at Hope. The Fraser River occupies the lowest portion of the valley floor and is the major drainage channel in the area. Cheam, Agassiz and Mountain sloughs drain the valley bottom in the vicinity of Agassiz into the Fraser River while Miami Creek drains northward into Harrison Lake at Harrison Hot Springs. Silverhope, Hunter, Waleach, and Ruby creeks and the Chehalis River as well as several smaller streams originate in the surrounding mountains and flow into the Fraser River. Trout Lake Creek drains Trout and Hicks lakes into Harrison Lake. Harrison River, draining Harrison Lake, joins the Fraser River at Harrison Bay.

Precipitous slopes, some as steep as 90 percent, characterize the valley walls to elevations near 2,500 feet. Above this elevation, topography becomes more subdued and slopes are usually less than 50 percent. The highest elevations in the mapped area are Mount Agassiz, Mount Woodside and Bear Mountain, all of which culminate at elevations between 3,000 and 3,400 feet. The valley bottom in the map area is dominated by the Fraser River floodplain and varies in width from several hundred yards at Flood to several miles in the Agassiz-Chilliwack area.

Several islands are located in the Fraser River; the largest being Seabird and Herrling islands. These islands are relatively stable although many of the smaller ones shift in position during the freshet season. Islands as well as undyked portions in the valley bottom are subject to flooding during spring runoff on the Fraser River.

AGRICULTURE AND SOIL MANAGEMENT

Dairying constitutes the major agricultural enterprise in the Agassiz area and a large portion of the arable land is devoted to the production of pasture and forage crops. Grass-clover mixes are the most popular crop although alfalfa is grown successfully on some of the better drained soils. Substantial acreage is also devoted to the production of silage corn. Oats, usually cut as green feed, is often used as a nurse crop for new hay and pasture seedings; occasionally it is harvested for grain. Small fruits, mainly raspberries, are grown in limited quantities in the vicinity of Agassiz and on Seabird Island, as are beans and canning corn. Some beef cattle and poultry are also produced and a few farmers have diversified their operations by raising some sheep or hogs. A few islands are utilized for cottonwood plantations.

Drainage, irrigation, liming, and fertilization all influence soil productivity. A good combination of these management practices is necessary for optimum crop production.

Drainage

Farmers suffer financial losses due to poor drainage or flooding which kill crops or reduce yields. Poor drainage restricts root growth, in turn reducing plant vigor since the root system is not sufficient to supply the requirements of above ground growth. Poor seed germination, uneven maturity and poor quality result from high water tables; soil aeration and nitrogen availability are reduced. Calcium, nitrogen and perhaps other plant nutrients are leached from the soil by water table fluctuation.

Farm drainage should be planned for rapid removal of water from the rooting zone, but the water table should be maintained at a level that will aid crop growth. Since the rate of water removal is related to the rate of infiltration, it is important to know how fast water will infiltrate each kind of soil. To assess the best height for the water table it is necessary to understand the characteristics of the soil and the requirements of the crops to be grown. Pastures, strawberries and beans, for example, require the water table to be at least two feet deep while for corn, alfalfa, cereals, and raspberries, it should be 30 inches or more below the soil surface.

Most of the valley bottom in the vicinity of Agassiz and Harrison Bay is dyked against flooding by the Fraser River. Some seepage under and through the dykes occurs, however, during higher than average freshets. Periods of heavy rainfall, usually occurring in the winter, cause ponding on parts of the floodplain due to the relatively flat topography and slow permeability of the soils. Stream gradients are small and water movement sluggish causing them to flood during heavy runoff. Inner margins of the floodplain are also subjected to seepage from the surrounding uplands. This seepage is substantial and saturates the affected soils for long periods. Seabird and the other islands in the Fraser River are undyked and susceptible to flooding during the freshet season.

Although several factors contribute to the poor drainage of some of the valley soils, the problem can be reduced by extension of drainage ditches and pumping facilities and greater use of tile drains.

Most of the upland soils are well drained. The few, scattered locations that are poorly drained generally do not warrant reclamation since most cannot be utilized for agriculture.

The Land Clearing Assistance Act, administered by the Provincial Department of Agriculture, provides loans to farmers wishing to install farm drainage. Technical advice on drainage systems and their installation and maintenance is supplied by the Department.

Irrigation

Irrigation is necessary in a summer-dry climate regardless of the amount of the total yearly precipitation. The dry summers are responsible for moisture deficiency during the most important growing months. Pastures, for example, generally provide adequate grazing until the end of June, then decline rapidly during the dry months of July and August.

It is estimated that hay and pasture crops require at least 15 inches of water during the growing season with about 11 inches to be available between July 1 and September 30. The average precipitation at Agassiz from May 1 to September 30 is about 15.2 inches, however, only approximately 7.7 inches occur from July to September inclusive. Though this amount represents a shortage, the deficiency in many years is actually more severe than indicated. For example, in 1965 the total precipitation from May to September inclusive was 9.7 inches with only 5.4 inches occurring from July to September. Such deficiencies should be insured against by provision for irrigation.

Sources of irrigation water are plentiful. The Fraser River constitutes an abundant source. Other sources which can be developed are several streams and sloughs as well as the ground water supplies which exist in the sands and gravels under the floodplain. Wherever sufficient water supplies are available, the cost of an irrigation system is well repaid by increased crop yields.

The Use of Lime and Fertilizers

Lime and fertilizer requirements of different soils and different farms having the same soil should be determined by the crops grown and the past history and performance of the farm. No standard recommendations are possible because of variation in soils, crops grown and management status of the farms. The amounts and kinds of fertilizers to apply for different crops and soils should be determined by soil tests and discussions with local agriculture extension personnel.

During the course of the survey it was observed that a wide range of fertilizers and application rates are used indicating a lack of agreement regarding fertilizer practices among the farmers. Manure is widely used and in many cases is the only nutrition the soils receive. Response to lime is sometimes limited but response to nitrogen is generally good.

Land Clearing and Levelling

Most of the floodplain soils have sand and gravel strata at relatively shallow depths and care should be taken to avoid exposing these course deposits by land levelling. These deposits, being very low in clay and organic matter, have low water and nutrient holding power and will require heavy applications of manure and fertilizer as well as increased irrigation before satisfactory crop growth is again achieved. To avoid this, topsoil should be removed, the underlying material levelled and the topsoil replaced. When done correctly, levelling eliminates wet spots, facilitates cultivation and leads to more uniform crop maturity.

Some acreage suitable for agricultural utilization still is uncleared, particularly on Seabird Island and eastward toward Hope. However, before clearing is undertaken, the expected returns in relation to clearing costs should be considered.

ORIGIN OF SOIL FORMING MATERIALS (9, 10, 11)

The soils in the Agassiz area have developed from unconsolidated geologic deposits of Pleistocene or Recent Age. "Pleistocene" refers to that period in the earth's geological history when large areas of the earth's surface were periodically covered by glaciers thousands of feet thick. This period is estimated to have begun about one million years ago and continued in the Agassiz area to within five to eight thousand years of the present. The term "Recent" refers to the period of time from the end of the Pleistocene to the present. In the map area the depth of the unconsolidated deposits varies from a few feet on parts of the mountains to at least 1,000 feet in the valley bottom.

The area is easily divisible into two units which are referred to as Uplands and Lowlands in this report. The mountainous areas, mostly mantled by soil forming deposits of Pleistocene origin, are considered uplands. The lowlands, comprised of deposits of Recent age, include the valley floor as well as stream and slide deposits along the lower valley sides.

Lowland Soil Forming Deposits

Fraser Floodplain Deposits

The major portion of the lowland soil forming materials have been deposited by the Fraser River. These Recent deposits are composed of silt, sand and clay up to 20 feet thick resting on sand or gravel strata. Usually, however, the gravel and sand are encountered within four feet or less of the surface.

Along parts of the inner margin of the floodplain and in scattered sheltered areas, some vertical accretion occurred by settling of fine textured sediments in quiet, shallow ponds. Most of the floodplain, however, consists of more or less parallel ridges and depressions laid down as meander scrolls, spits and levees. These lateral accretion deposits, trending with the flow of the river, usually occupy the youngest part of the floodplain and, in places, are still in the process of deposition.

Studies indicate the sediments deposited by the Fraser River are composed largely of quartz, feldspar, chlorite, mica, and amphibole with montmorillonoid minerals an important component of the clay fraction.

Swamp Deposits

Swamp deposits, usually two to ten feet thick, occur in scattered locations on the floodplain and consist of accumulations of organic material, mainly reeds and sedge. These deposits occur when the rate of organic decomposition is exceeded by the rate of accumulation. They are very poorly drained due to seepage and runoff from surrounding areas, with surface runoff restricted by the depressional to level topography. Cultivated and partially drained bogs, due to shrinkage, settling and better aeration, tend to be thinner and more highly decomposed than those under natural conditions.

Stream and Slide Deposits

Stream deposits in the map area generally occur as alluvial fans along the valley walls. Swiftly flowing streams issuing from the mountains abruptly decrease in velocity on reaching the floodplain, with a resultant decrease in the amount of sediment able to be carried. The excess is deposited in the area where the change in velocity occurs. Examples of large fan deposits are those of Silverhope, Ruby and Hunter creeks and the Chehalis River.

Slide materials occur along the margin of the valley walls and are most prevalent on the south side of the Fraser River from Bridal Falls to Laidlaw. These materials have moved mainly under the influence of gravity although in some areas stream deposits are also included. Both the slide and stream deposits are dominantly coarse textured.

Upland Soil Forming Deposits

Glacial Till Deposits

Much of the upland is mantled by a variable depth of glacial till deposited during the period when glaciers covered the area. Most of the topography is moderately to steeply sloping, reflecting the topography of the underlying bedrock. Textures are moderately coarse to coarse and consistence varies from very compact in the basal type of till to moderately loose in the ablation type.

Colluvial Deposits

These materials are found on very steep slopes, and are coarse, unstable deposits which are slowly moving downslope under the influence of gravity. They are usually shallow to bedrock and consist of a mixture of bedrock fragments, glacial till and other materials which occur on the slope.

Glacial Outwash Deposits

These deposits occupy only a minor acreage in the map area. They consist of flat to undulating beds of gravels and sands and were deposited by running water issuing from melting glaciers.

Stream and Slide Deposits

These deposits are similar to those described in the foregoing "Lowland Soil Forming Deposits" section. In the upland area, these materials occupy only a minor acreage.

Aeolian Deposits

Most of the upland geologic deposits below about 1,500 feet elevation are capped by a variable depth of silty aeolian material. Where the capping is shallow, windthrow of trees has caused mixing with the underlying deposits.

Several types of bedrock occur in the mountainous portions of the map area. The ridge north of the Experimental Farm, the east slope of Mount Agassiz, and an area in the vicinity of Hicks and Deer lakes consists of Mesozoic and early Tertiary acidic and intermediate intrusive rocks, mainly granodiorite, quartz diorite and granite. Mount Woodside consists dominantly of volcanic rocks, including andesite of Middle Jurassic age. A small unit of clastic sedimentary rocks of Lower Cretaceous age also occur in the Mount Woodside-Mount Agassiz area. Ultrabasic rocks of Mississippian to Lower Cretaceous age occupy a minor unit near the mouth of Ruby Creek. The bedrock in the remainder of the mapped area is dominantly clastic sedimentary rocks of Pennsylvanian and Permian age.

The relationship of the soils to the geological soil forming deposits is shown in Table 1 on pages 14 and 15.

SOIL MAPPING AND CLASSIFICATION

Field Methods

The lowland soils of the Agassiz map area were mapped in detail at a scale of about 1,000 feet to the inch. A mapping scale of 40 chains to the inch was used for the reconnaissance survey of the uplands. Aerial photographs were used to plot the classification data in the field. The soils were classified according to the system of the National Soil Survey Committee of Canada, 1963 and 1965 (20, 21).

Test pits, road cuts and other excavations were used to examine, identify and describe soil profiles, and to sample them for laboratory analysis. The profiles were examined to determine soil texture, structure, consistence, permeability, drainage, colour, horizon sequence, and other observable features. Vegetation, stoniness, topography, agricultural practices and other external features were also noted.

Lowland soil boundaries were found and established by bisecting them on roads and ditches and by traverses across fields. Many upland soil boundaries were determined by air photo interpretation. Soil colours were identified by the use of the Munsell Colour System.

Soil Classification

Soils develop from deposits of geologic origin in response to the environment. The kind of soil formed is governed by climate, texture, mineral composition, topography, drainage, vegetation, and other features of the environment and the soil forming deposit. The objective of the soil survey is to identify the different soils developed and separate them by means of a comprehensive classification system.

The basic mapping unit is the soil series. A soil series consists of a group of related soils derived from similar parent material and having similar profile and drainage characteristics except for variation

Table 1 - Classification of Soil Series and Parent Materials in the Agassiz Area.

Lowland Soils

Parent Materials	Degraded Acid Brown Wooded	Orthic Acid Brown Wooded	Orthic Acid Brown Forest	Orthic Humic Gleysol	Rego Humic Gleysol	Rego Gleysol	Gleyed Deorcic Regosol	Deorcic Regosol	Gleyed Orthic Regosol	Orthic Regosol	Muck
Fraser River floodplain deposits - lateral accretion			Laidlaw		Hjorth Kent	Page Prest	Fairfield	Monroe	Seabird	Grevell	
Fraser River floodplain deposits - vertical accretion				Hatzic		Annis					
Fraser River floodplain deposits over organic deposits					Niven						
Alluvial fan deposits	Chehalis Harrison				Elk					Isar	
Colluvial slide deposits		Cheam									
Reworked slide deposits		Popkum									
Shallow organic deposits											Banford
Deep organic deposits											Gibson

Upland Soils

Parent Materials	Ortstein Podzol	Orthic Podzol	Degraded Acid Brown Wooded	Orthic Acid Brown Wooded	Orthic Concretionary Brown	Orthic Regosol
Ablation glacial till	Woodside	Bear Mountain				
Glacial till deposits mixed with colluvial deposits		Magellan	Weaver			
Aeolian deposits over glacial till or bedrock				Ryder		
Glacial outwash				Columbia		
Aeolian deposits over or mixed with glacial outwash			Garnet	Marble Hill	Abbotsford	
Colluvial deposits over bedrock			Slollicum	Poignant		
Alluvial fan deposits			Harrison			Isar

of surface texture. Where the surface texture is also uniform, the mapping unit is the soil type. Soil series names are usually place names occurring in the locality where the series was originally classified (e.g., Laidlaw). Soil types are distinguished by the series name followed by the surface texture (e.g., Laidlaw loamy sand).

Phases of a soil series or type may also be distinguished. These are variations within a series or type due to topography, stoniness, depth of profile or other features which may affect land use.

In cases where it is not feasible to separate two or more series because of small areas or intimate intermixing of one soil with another, the area is mapped as a complex. Where the individual series which form the complex have been described, the name of the series occupying the major acreage is listed first, the others following in decreasing order.

The differentiated soil series are classed in subgroups according to their pedologic development; all series in one subgroup have similar profiles. The soil subgroups occurring in the Agassiz area lowlands, in sequence from maximum to minimum pedologic development, are Degraded Acid Brown Wooded, Orthic Acid Brown Wooded, Orthic Acid Brown Forest, Orthic Humic Gleysol, Rego Humic Gleysol, Rego Gleysol, Gleyed Deorcic Regosol, Deorcic Regosol, Gleyed Orthic Regosol, Orthic Regosol, and Muck. A similar sequence for the upland soils includes Ortstein Podzol, Orthic Podzol, Degraded Acid Brown Wooded, Orthic Acid Brown Wooded, Orthic Concretionary Brown and Orthic Regosol.

The above sequences of upland and lowland soils, including the geologic materials from which they are derived, are given in Table 1 on pages 14 and 15. Short descriptions of the major characteristics of the pedologic subgroups head more detailed soil descriptions in this report.

DESCRIPTION OF SOILS

Lowland Soils

ACID BROWN WOODED SOILS

These are soils with moderately to strongly acidic sola having no distinct eluvial or illuvial horizons. Light coloured eluvial horizons (Ae) up to one inch thick may be present. No distinct mineral-organic (Ah) horizons occur and the Bf or Bm horizons are characterized by reddish-brown colours which fade with depth. Organic surface (L-H) horizons are present under native conditions. Parent materials usually have low base saturation and translocation of sesquioxides and clay is negligible. Drainage varies from well to imperfect.

The Degraded and Orthic subgroups of Acid Brown Wooded soils were identified on the lowlands of the Agassiz area.

Degraded Acid Brown Wooded Soils

This subgroup consists of well to moderately well drained soils which, under native conditions, are characterized by organic surface L-H horizons, a light coloured, eluviated Ae horizon not more than one inch thick and one or more reddish-brown Bf or Bm horizons. The Harrison and Chehalis series are classified as Degraded Acid Brown Wooded soils.

Harrison Series

The Harrison soils occur in scattered locations throughout the map area between 50 and 150 feet elevations. Topographically, they are usually moderately to steeply sloping with gradients between 5 and 15 percent. Fifty-three acres of Harrison gravelly sandy loam, 226 acres of Harrison sandy loam, 1,128 acres of Harrison series as well as 1,243 acres of several soil complexes dominated by Harrison soils were mapped.

This series has developed from alluvial and occasionally alluvial-colluvial fan deposits originating in the Coast and Cascade mountains. The largest deposits have been laid down by Silverhope, Hunter and Ruby creeks. Most fans have had shallow aeolian deposits mixed into the surface horizons by the action of windthrow and surface textures generally vary from gravelly sandy loam to loam. Cobbles and stones are mixed throughout the profiles but are most abundant in the coarse subsoil.

Drainage is well to rapid and profile development is Degraded Acid Brown Wooded. Thin, discontinuous Ae horizons are general in areas not recently disturbed. In recently logged areas and areas where deciduous vegetation is dominant, the Ae horizon is mostly destroyed. The Bf horizons, however, are well developed. Occasional concretions may occur in the upper solum.

The Harrison series developed under coniferous vegetation dominated by Douglas fir. Most areas have been logged and variable second growth including Douglas fir, vine maple, red alder, cedar, birch, huckleberry, trailing blackberry, wild strawberry, thimbleberry, soapberry, bracken, moss, and others had developed in uncleared areas. A typical profile, located near Ruby Creek, was examined and described as follows:

Horizon	Depth Inches	Description
L-H	½ - 0	Raw to well decomposed mixture of deciduous and coniferous material. Abundant roots in lower part. pH 5.2. Abrupt boundary:
Ae	0 - ¾	Dark-gray (5YR 4/1, moist) or gray to light-gray (5YR 6/1, dry) loam. Weak, fine platy structure. Friable when moist. Abundant roots. pH 5.4. Abrupt boundary:

Horizon	Depth Inches	Description
Bf1	¾- 5	Dark-brown (7.5YR 3/2, moist) or brown to strong-brown (7.5YR 5/5, dry) loam. Weak, fine subangular blocky structure. Friable when moist. Scattered stones and gravels. Occasional fine concretions. Abundant roots. pH 5.6. Gradual boundary:
Bf2	5 -10	Dark-brown to brown (7.5YR 4/2, moist) or dark yellowish brown (10YR 4/4, dry) loam. Weak, fine subangular blocky structure. Friable when moist. Scattered stones and gravels. Occasional fine concretions. Abundant roots. pH 5.6. Gradual boundary:
BIIC	10 -13	Dark-brown to brown (7.5YR 4/2, moist) or yellowish-brown (10YR 5/4, dry) sandy loam. Weak, fine subangular blocky structure breaking to single-grains. Very friable when moist. Common stones and cobbles. Abundant roots. pH 5.6. Clear boundary:
IIC1	13 -19	Gravelly sand of variegated colours. Single-grained. Loose when moist. Stones and cobbles comprise 50 percent of horizon. Weak iron staining around some stones and cobbles. Common roots. pH 5.6. Diffuse boundary:
IIC2	19 +	Gravelly sand of variegated colours. Single-grained. Loose when moist. Stones and cobbles comprise 50 percent of horizon. Weak iron staining around some stones and cobbles. Occasional roots to 30 inches. pH 5.7.

Land Use

Harrison soils have limited agricultural use. Low water holding capacities, stoniness and adverse topography all restrict agricultural utilization. Most areas are as yet uncleared and clearing costs are high due to thick tree growth. Presently cleared areas are mainly used for pasture or building sites. Irrigation is required for good production and, in most cases, irrigation water is readily available from the adjacent streams. In some areas these soils are suitable for small fruits and other crops requiring good drainage.

Chehalis Series

The Chehalis soils are restricted to the west side of the Harrison River and occur at elevations between 50 and 75 feet. Most slopes are gentle with gradients varying from two to five percent. Nine hundred and thirty acres are occupied by the Chehalis series with another 1,106 acres mapped as several soil complexes dominated by Chehalis soils.

The parent material of the Chehalis series consists of coarse, granitic, alluvial fan deposits of the Chehalis River which were eroded from the Coast Mountains. Textures vary from loamy sand or sandy loam in the surface to sand or gravelly sand in the subsoil. Rooting depth and moisture movement through the profile is good although scattered weakly cemented patches occur sporatically. Stones are usually scattered through the profile, increasing in number with depth.

The Chehalis soils are classified as weakly developed Degraded Acid Brown Wooded and frequently grade into the regosolic Isar series. The Ae horizons are intermittant and Bm horizons shallow. These soils are well drained except in scattered, imperfectly drained depressional areas where a water table occurs during periods when the level of the Chehalis River is high.

Native vegetation is coniferous, mainly Douglas fir and cedar. In logged areas a variety of coniferous and deciduous regrowth has developed including red alder, birch, cedar, Douglas fir, huckleberry, bracken, salal, trailing blackberry, and several mosses. A typical profile was examined and described as follows:

Horizon	Depth Inches	Description
L-H	$1\frac{1}{2}$- 0	Mixture of raw to well decomposed deciduous and coniferous material. Abundant roots, mainly in the lower part. pH 5.5. Abrupt boundary:
Ae	0 - $\frac{1}{2}$	Grayish-brown (10YR 5/2, moist) or gray (10YR 5.5/1, dry) loamy sand. Very weak, medium subangular blocky structure. Very friable when moist. Ae varies from none to one inch thick. Abundant roots. pH 5.1. Abrupt boundary:
Bfj	$\frac{1}{2}$- 4	Dark-brown to brown (7.5YR 4/4, moist) or brown (10YR 5/3, dry) loamy sand. Very weak, medium subangular blocky structure. Very friable when moist. Abundant to common roots. pH 5.5. Clear boundary:

Horizon	Depth Inches	Description
BC	4 - 8	Yellowish-brown (10YR 5/5, moist) or pale-brown (10YR 6/3, dry) fine sand or loamy fine sand. Very weak, medium subangular blocky structure. Very friable to loose when moist. Scattered weakly cemented patches. Common roots. pH 5.9. Clear boundary:
C	8 -14	Fine sand of variegated colour. Very weak, medium, psuedo-subangular blocky structure breaking to single-grains. Very friable to loose when moist. Common roots in upper part becoming abundant in the lower part. pH 6.0. Abrupt boundary:
IIC	14 +	Gravelly sand of variegated colour. Single-grained. Loose when moist. Numerous stones and cobbles. Abundant roots in upper three inches. pH 5.7.

Land Use

The major portion of the Chehalis soils are uncleared and support dense deciduous and coniferous second growth. Agricultural suitability is limited due to very low water holding capacity, stoniness and low fertility. Irrigation is required and is available from nearby streams.

Orthic Acid Brown Wooded Soils

Under virgin conditions these soils are characterized by a L-H horizon of forest litter underlain by one or more reddish-brown Bf or Bm horizons whose colour fades with depth. No distinct mineral-organic Ah or eluvial Ae horizons are present. The sola are acidic and usually low in base saturation. Drainage varies from well to moderately well. Two series, Cheam and Popkum, were classified as Orthic Acid Brown Wooded.

Cheam Series (7)

The Cheam soils occur mainly on the south side of the Fraser River from Bridal Falls to Laidlaw between elevations of 50 and 350 feet. Most areas slope steeply to very steeply toward the river and have gradients between 15 and 40 percent. Twenty-one acres of Cheam gravelly loam, 412 acres of Cheam gravelly sandy loam and 850 acres of Cheam series were mapped. In addition, two soil complexes in which Cheam soils occupy the major acreage total 532 acres.

The Cheam series has developed predominantly from colluvial slide and talus material although some minor alluvial-colluvial fan deposits are also included. These deposits, which slumped down the sides of the mountains, are three or more feet deep and usually overlie glacial till or bedrock. They contain a high proportion of angular stones and cobbles. Textures are coarse, gravelly sandy loam and gravelly loamy sand being dominant. Rooting depth and permeability are adequate due to the porous nature of the deposits.

Drainage varies from well to moderately well depending on the depth to the underlying glacial till or bedrock and variable seepage usually occurs along the interface.

Native vegetation, mainly dense coniferous forest, has been logged. Present vegetation consists of a dense mixture of a variety of deciduous and second growth coniferous species. The Cheam series, classified as Orthic Acid Brown Wooded, has moderately well developed Bf horizons. A typical profile in the eastern part of Chilliwack Municipality was described as follows:

Horizon	Depth Inches	Description
FH	$1\frac{1}{2}$- 0	Partly to well decomposed organic litter containing some charcoal and mineral material. Many fine roots. pH 6.5. Abrupt boundary:
Bf	0 - 7	Dark-brown (7.5YR 3/2, moist) gravelly sandy loam. Weak, medium granular structure. Very friable when moist. Common angular gravels and cobbles. Many fine roots. pH 5.7. Gradual boundary:
BC	7 -19	Dark yellowish brown (10YR 4/4, moist) gravelly sandy loam or gravelly loam. Weak, medium subangular blocky breaking to weak, medium granular structure. Very friable when moist. Common angular gravels and cobbles. Common roots. pH 5.8. Gradual boundary:
C1	19 -37	Olive-brown (2.5Y 4/4, moist) gravelly loam with pockets of gravelly sandy loam. Massive. Moderately compact in place becoming friable when disturbed. Moderately vesicular. Common angular gravels and cobbles. Occasional roots. pH 5.9. Gradual boundary:

Horizon	Depth Inches	Description
C2	37 +	Olive-brown (2.5Y 4/4, moist) gravelly loam or gravelly sandy loam. Similar to horizon above, but no vesicules or roots. pH 5.9.

Land Use

Most of the acreage of Cheam soils in the map area is unsuitable for cultivation due to steep topography and stoniness. Small portions are utilized for pasture production but yields are low due to droughtiness and low fertility of the soil. Best agricultural use of the majority of the Cheam soils is for unimproved pasture or building sites. Forest growth appears to be very good.

Popkum Series (7)

The Popkum soils, occupying a very minor acreage, occur mainly in the vicinity of Bridal Falls and Popkum. They occur between 50 and 100 feet elevation, have level to gently undulating topography and are usually closely associated with the Cheam series. Sixty-four acres of Popkum loam and 69 acres of Popkum series were mapped.

These soils have developed from sorted sandy material eroded from colluvial slide deposits. Surface textures vary from sandy loam to loam and grade to sand in the subsoil. This in turn is underlain by slide materials at depths of three feet or more. Scattered stones, cobbles and boulders occur in the surface and throughout the profile. Soil drainage is moderately well, occasionally varying to imperfect in scattered depressions.

The Popkum series developed under heavy coniferous forest and has Orthic Acid Brown Wooded profile development. Most uncleared areas presently support mixed coniferous and deciduous stands consisting of cedar, alder, vine maple, and others. Weak, thin Ah surface horizons have developed in some areas. A typical profile, located in the vicinity of Bridal Falls, was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Moss with decayed leaf litter in lower part. pH 5.5. Abrupt boundary:
Ah	0 - 2	Very dark brown (10YR 2/2, moist) fine sandy loam. Weak, medium granular structure. Very friable when moist. Abundant roots. pH 5.4. Gradual boundary:

Horizon	Depth Inches	Description
Bf	2 -13	Dark yellowish brown (10YR 4/4, moist) sandy loam. Weak, medium subangular blocky breaking to weak, medium granular structure. Very friable when moist. Occasional angular gravels and cobbles. Abundant roots. pH 5.5. Gradual boundary:
Cgj	13 -23	Olive-brown (2.5Y 4/4, moist) loamy sand. Single-grained. Loose when moist. Few to common, fine, faint mottles. Occasional roots. pH 5.7. Gradual boundary:
C	23 +	Dark micaceous sand. Single-grained. Loose when moist. Occasional lenses of gravelly sand. Underlain by slide deposits at depths from three to five feet. pH 5.8.

Land Use

Popkum soils occupy only a scattered, minor acreage in the mapped area, usually closely associated with the Cheam series, resulting in land use frequently being governed by the surrounding Cheam series. Development for agriculture involves expensive clearing due to heavy forest cover.

These soils are fair for agricultural use. Topography and drainage are satisfactory and stones in the surface generally do not hinder cultivation. Moisture holding capacity, however, is low and irrigation should be applied for good yields.

ACID BROWN FOREST SOILS

These are well to imperfectly drained soils with distinct mineral-organic Ah surface horizons underlain by one or more brown to yellowish-brown Bf or Bm horizons whose colour fades with depth. In uncleared areas, organic surface L-H horizons are general and soil profile reaction varies from moderately to strongly acidic.

Only the Orthic subgroup of Acid Brown Forest soils was identified on the lowlands of the Agassiz area.

Orthic Acid Brown Forest Soils

These are well to moderately well drained soils with distinct Ah surface horizons underlain by one or more brown to yellowish-brown Bf or Bm horizons whose colour fades with depth. Organic L-H horizons are general in the surface in uncleared areas. The Laidlaw series was classified as having Orthic Acid Brown Forest profile development.

Laidlaw Series

The Laidlaw series occupies small, scattered acreages throughout the map area between 50 and 100 feet elevation. Most areas are gently to moderately undulating with slopes ranging from three to nine percent. Commonly these soils are mapped in soil complexes, usually with the Grevell or Monroe series. A total of 32 acres of Laidlaw fine sandy loam and 103 acres of Laidlaw series were classified. An additional 789 acres are occupied by several soil complexes in which Laidlaw soils are dominant.

These soils are derived from sandy deposits of the Fraser River and usually occur only on the highest portions of the floodplain. A few minor areas of what appear to be sand dunes are also included. Surface textures are usually sandy loam, fine sandy loam or loam, changing rapidly to sand with depth. Rooting depth and downward water movement is good due to the porous nature of the subsoil. Occasionally weak, scattered patches of cementation occur in the lower portion of the solum. Stones are rare although gravels sometimes occur at depth.

The profiles are well drained. Water tables occur in the solum only during periods when the river level is exceptionally high.

The Laidlaw soils probably developed under mixed deciduous-coniferous forest, now mostly cleared or logged. In uncleared areas, vegetation now consists of vine and broad-leaf maple, alder, thimbleberry, bracken, dogwood, trailing blackberry, and waxberry interspersed with second growth Douglas fir and occasional cedar. These soils have been classified as Orthic Acid Brown Forest and have moderately well developed Ah and Bm horizons. Earthworms are active in the upper solum. A typical profile, located near Laidlaw, was described as follows:

Horizon	Depth Inches	Description
L-H	½- 0	Raw to well decomposed deciduous litter. pH 6.0. Abrupt boundary:
Ah	0 - 3½	Very dark grayish brown (10YR 3/2, moist) fine sandy loam. Weak, fine subangular blocky breaking to weak, medium granular structure. Very friable when moist. Abundant roots. pH 5.6. Clear boundary:
Bm	3½-10	Dark-brown to dark reddish brown (7.5YR 4/4 - 5YR 4/4, moist) loamy fine sand. Weak, fine, subangular structure. Very friable when moist.

Horizon	Depth Inches	Description
		Abundant to common roots. pH 5.7. Gradual boundary:
BC	10 -18	Brown (10YR 4.5/3, moist) medium to fine sand. Weak, medium subangular blocky structure breaking to single-grains. Very friable to loose when moist. Scattered, weakly cemented patches. Common roots. pH 6.0. Diffuse boundary:
C1	18 -24	Dark grayish brown (10YR 4/2, moist) to variable coloured medium to fine sand. Single-grained. Loose when moist. Common to occasional roots. pH 5.9. Diffuse boundary:
C2	24 -34	Medium to fine sand of variegated colour. Single-grained. Loose when moist. Occasional roots. pH 5.5. Diffuse boundary:
C3	34 +	Medium sand of variegated colour. Single-grained. Loose when moist. Occasional roots in upper part. pH 5.6.

Land Use

Low moisture holding capacity is the major limitation of the Laidlaw series and irrigation is required for good crop growth. Topography is generally suitable and no stones are present.

Most cleared areas are presently utilized for hay and pasture production and yields appear low due to moisture deficiency. In scattered areas, small portions of the Laidlaw series are utilized for building sites as well as for small fruits.

HUMIC GLEYSOL SOILS

These are poorly drained soils characterized by a dark coloured surface Ah horizon greater than three inches thick under virgin conditions. When mixed to a depth of six inches the surface horizon contains more than three percent organic matter and is appreciably darker than the underlying horizon. Underlying horizons are strongly gleyed and mottled. Weakly developed eluvial and illuvial horizons may be present. There may be up to 12 inches of consolidated or 18 inches of unconsolidated peat or muck on the surface.

The Orthic Humic and Rego Humic subgroups of the Humic Gleysol great group were identified on the lowlands of the Agassiz map area.

Orthic Humic Gleysol Soils

This subgroup is distinguished by poor drainage, a dark coloured Ah horizon greater than three inches thick and weakly developed eluvial and/or illuvial horizons which are strongly gleyed and mottled. There may be up to 12 inches of consolidated or 18 inches of unconsolidated peat or muck on the surface.

The only Orthic Humic Gleysol soil identified on the lowlands of the Agassiz area is the Hatzic series.

Hatzic Series

The Hatzic series occupies a minor acreage in the map area, mostly between Cemetery and Hopyard mountains. It occurs between 40 and 50 feet elevation and has level to very gently sloping topography with gradients generally less than two percent. Ninety-nine acres of Hatzic silty clay loam and 51 acres of Hatzic-Annis soil complex were mapped.

These soils have developed from heavy textured sediments deposited by the Fraser River in quiet shallow ponds. Silty clay loam or silty clay is the dominant surface texture; underlying horizons are somewhat heavier. Cracks develop in the profile during drying but when wet, the soil expands thereby restricting moisture and root penetration.

Both internal and external drainage is poor due to slow surface runoff and restricted internal moisture movement. The water table is at or near the surface most of the winter and during periods of high water on the Fraser River. Original vegetation, prior to clearing, consisted of sedge, various grasses, hardhack, cedar, willow, and other species tolerant to poor drainage.

The Hatzic series is classified as an Orthic Humic Gleysol. Weakly developed eluvial and illuvial horizons are general and a typical profile was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 5	Very dark gray (10YR 3/1, moist) silty clay loam or silty clay. Moderate, medium to coarse subangular blocky structure. Firm when moist, plastic when wet. Scattered pieces of Aejg material mixed into horizon by cultivation. Abundant roots. pH 5.2. Abrupt boundary:

Horizon	Depth Inches	Description
Aejg	5 - 7	Dark grayish brown (2.5Y 4/2, moist) silty clay. Moderate, fine prismatic breaking to moderate, coarse subangular blocky structure. Very firm when moist, plastic to very plastic when wet. Common, fine, distinct, strong-brown (7.5YR 5/6, moist) mottles. Abundant roots. pH 5.4. Clear boundary.
Bgtj	7 -13	Gray to grayish-brown (5Y 5/1 - 2.5Y 5/2, moist) silty clay or clay. Moderate to strong, medium to coarse prismatic structure. Very firm when moist. Very plastic when wet. Common, medium, prominent, strong-brown (7.5YR 5/6, moist) mottles. Scattered clay flows and clay skins. Abundant to common roots. pH 5.5. Gradual boundary:
BC	13 -16	Dark-gray to gray (5Y 4.5/1, moist) silty clay or clay. Moderate to strong, medium to coarse prismatic structure. Very firm when moist, very plastic when wet. Many, medium, prominent, strong-brown to yellowish-red (7.5YR 5/6 - 5YR 5/8, moist) mottles. Scattered clay flows along walls of cracks. Common roots, mainly along cracks. pH 5.7. Diffuse boundary:
Cg1	16 -24	Gray (2.5Y 5/0, moist) silty clay. Massive. Very firm when moist, very plastic when wet. Many, medium, prominent, strong-brown (7.5YR 5/6, moist) mottles. Vertical cracks four to 10 inches apart. Occasional roots along cracks. pH 5.8. Diffuse boundary:
Cg2	24 +	Gray (2.5Y 5/0, moist) silty clay. Massive. Very firm when moist, very plastic when wet. Many, medium, prominent, yellowish-red to strong-brown (5YR 4/8 - 7.5YR 5/6, moist) mottles. Scattered vertical cracks. At time of sampling (September, 1966), the water table was at 35 inches. pH 6.0.

Land Use

Almost the entire acreage of Hatzic soils have been cleared and are utilized for hay and pasture production. Clover-grass mixtures are used, however the clovers tend to die rapidly due to poor drainage.

Artificial drainage installations are required to remove excess water from the profiles as well as from the soil surface. These soils tend to puddle and should not be cultivated or grazed during periods of wetness. Power requirements are high for cultivation due to the heavy texture.

Rego Humic Gleysol Soils

These soils are characterized by poor drainage and a dark coloured surface Ah horizon underlain by one or more gleyed and mottled Cg horizons. No eluvial or illuvial horizons are present. Up to 12 inches of consolidated or 18 inches of unconsolidated peat and muck may occur on the surface.

The Rego Humic subgroup of Humic Gleysol soils is represented in the lowlands of the Agassiz area by the Hjorth, Kent, Niven, and Elk series.

Hjorth Series (16)

The Hjorth series occupies scattered acreage throughout the lowlands of the map area although the majority is restricted to the central and western portions. It generally occurs between elevations of 35 and 55 feet and has very gently to gently undulating topography with slopes less than five percent. Usually it is depressional to surrounding soils. Fifty-nine acres of Hjorth silty clay loam and 65 acres of Hjorth series were mapped. Numerous soil complexes in which Hjorth soils occupy the dominant acreage total another 987 acres.

The parent material of Hjorth soils is silty lateral accretion deposits of the Fraser River. In the ridge-and-swale topography these soils occupy the swales and lower slopes of the ridges while Kent and Fairfield soils occupy the higher portions. Surface textures range from silt loam to silty clay loam and are underlain by sand and occasionally gravel at a variable depth. Areas where the sands occur at less than 18 inches depth have been mapped as Hjorth:shallow phase. No stones occur in these soils.

These soils are poorly drained. During periods of heavy rainfall ponding frequently occurs and, in undyked areas, flooding often occurs during the freshet season. Native vegetation is mainly deciduous and includes cottonwood, willow, and alder with occasional cedar. The shrub cover is dense and a light ground cover of sedge and moss exists.

Hjorth soils are classified as Rego Humic Gleysols. Profile development is restricted to organic accumulation in the surface and development of gleying and mottling in the subsoil. A typical profile was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 8	Black to very dark brown (10YR 2/1.5, moist) or dark-gray (10YR 4/1, dry) silty clay loam. Moderate, medium subangular blocky structure. Firm when moist. Abundant roots. pH 5.5. Abrupt boundary:
Cg1	8 -15	Brown to dark-brown (10YR 4/3, moist) silty clay loam. Moderate, medium psuedo-subangular blocky structure. Firm when moist. Many, fine, distinct, yellowish-red (5YR 4/6-5/8, moist) mottles. Abundant roots in upper part, common in lower part. pH 5.9. Clear boundary:
Cg2	15 -23	Grayish-brown (2.5Y 5/2, moist) silty clay loam. Massive. Firm when moist. Common, medium, distinct, strong-brown (7.5YR 5/6-5/8, moist) mottles. Occasional roots. pH 6.0. Gradual boundary:
Cg3	23 -37	Grayish-brown (2.5Y 5/2, moist) silty clay loam. Massive. Firm when moist. Many, medium, prominent, yellowish-red (5YR 4/6, moist) mottles. Occasional roots. pH 5.9. Abrupt boundary:
IICg	37 +	Dark-gray (10YR 4/1, moist) fine sandy loam or loamy fine sand. Compact in place, breaking to single-grained when disturbed. Very friable when moist. Many, coarse, distinct, dark reddish brown (5YR 3/3.5, moist) mottles. pH 5.8.

Land Use

Most areas of Hjorth soils are presently cleared and are used for hay and pasture production. Forage yields are fair although the poor drainage tends to kill the legumes. Drainage installations are required to control the high water tables that exist during the winter and freshet season of the Fraser River. Location of drainage outlets may sometimes be difficult since the Hjorth soils are often depressional in relation to the surrounding land. Puddling may occur if these soils are cultivated or grazed when wet.

Organic matter contents are relatively high and most plant nutrients are available in moderate amounts.

Kent Series

The Kent soils are restricted mainly to the central lowlands of the map area and occur between 40 and 55 feet elevation. They are frequently intermingled with the Hjorth series and have very gently to gently undulating topography with slopes between one to five percent. Kent silt loam and Kent:shallow phase occupy 185 and 259 acres, respectively. Three soil complexes dominated by Kent soils occur on another 325 acres.

These soils have developed from lateral accretion deposits of the Fraser River and occupy the intermediate slopes and shallower depressions in the undulating topography. Most surface textures are silt loam, occasionally varying to loam. In the subsoil sand is encountered at variable depths; areas where the sands are less than 18 inches below the surface are classified as Kent:shallow phase. The Kent soils are stone free.

Drainage is moderately poor. Ponding is not usual but high water tables are general in periods of heavy rainfall and during the freshet season of the Fraser River. During a large part of the growing season the water table recedes sufficiently to cause only moderate restriction to most crops.

Kent soils developed under cottonwood, willow, scattered cedar, sedge, various grasses, and other water tolerant species. Almost the entire acreage is now cleared and used for agriculture.

The Kent soils are classified as Rego Humic Gleysols. Profile development is restricted to organic matter accumulation in the surface and gleying and mottling in the subsoil. A typical profile of Kent: shallow phase, located in a hay field northeast of the intersection of Sutherland Road and Highway No. 7, was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 7	Very dark gray to very dark grayish brown (10YR 3/1.5, moist) or grayish-brown (10YR 3/2, dry) heavy silt loam. Moderate, medium subangular blocky structure. Firm when moist. Scattered pieces of Cgl material mixed in by cultivation. Abundant roots. pH 4.9. Abrupt boundary:
Cgl	7 -12	Grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) silt loam. Moderate, medium to coarse psuedo-subangular blocky structure. Firm when moist. Common to many, medium, prominent, yellowish-red (5YR 4.5/6, moist) mottles. Abundant to common roots. pH 5.6. Clear boundary:

Horizon	Depth Inches	Description
Cg2	12 -17	Grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) silt loam. Moderate, medium to coarse, psuedo-subangular blocky structure. Firm when moist. Common, medium, prominent, yellowish-red (5YR 4.5/6, moist) mottles. Common roots. pH 5.7. Abrupt boundary:
IICg1	17 -24	Dark grayish brown (2.5Y 4/2, moist) medium sand. Weak, medium, psuedo-subangular blocky structure breaking to single-grains. Loose when moist. Common, medium, distinct, strong-brown (7.5Y 5/6, moist) mottles. Common roots. pH 6.0. Gradual boundary:
IICg2	24 -32	Dark coloured, micaceous, medium sand. Single-grained. Loose when moist. Occasional roots. pH 6.0. Diffuse boundary:
IICg3	32 +	Dark coloured, micaceous, coarse sand. Single-grained. Loose when moist. Water table level was at 40 inches at time of sampling (August, 1966). pH 5.7.

Land Use

Almost the complete acreage of Kent soils is cleared and utilized for agriculture. The most common crops are grass-legume mixes used for pasture and hay. Substantial amounts of silage corn is also grown.

During most of the growing season the water table is sufficiently low to cause only slight to moderate restriction to crop growth. Indeed, during some very dry summers, moisture deficiencies may develop. Perennial crops, especially legumes, suffer due to high water tables in the winter.

Kent soils are friable, have relatively high organic matter contents and most plant nutrients are available in moderate amounts.

Niven Series (25)

The Niven series occupies a very minor acreage in the map area, mostly in the vicinity of Cheam Lake. Topographically, it is depressional to very gently sloping with slopes less than two percent. Fifty-eight acres were mapped as Niven series.

Niven soils have developed from medium textured mineral sediments which overlie organic deposits for depths of 10 to 30 inches. The mineral material settled out of stagnant water which covered the organic deposits or was washed in by streams. Surface textures are generally silt loam, occasionally varying to silty clay loam. The underlying organic materials, usually two or more feet thick, consist of partially to well decomposed sedge and woody peat.

Niven soils are poorly to very poorly drained and occupy depressional or seepage areas. They are classified as Rego Humic Gleysols although small areas of Rego Gleysols are also included. Native vegetation includes hardhack, sedge, skunk cabbage, cedar, alder, cottonwood, and various grasses. A typical profile was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 6	Dark-gray to gray (10YR 4/1-5/1, dry) or very dark gray (10YR 3/1, moist) silty clay loam. Weak, medium subangular blocky structure. Friable when moist. Roots common. pH 5.5. Abrupt boundary:
CgF	6 -16	Interstratified peat and silt. The mineral soil gleyed and mottled. Organic matter in thin layers between layers of silt. Firm when moist. Occasional roots. pH 5.8. Clear boundary:
Cg	16 -20	Gray to grayish-brown (10YR 5/1-5/2, moist) silt loam. Common, coarse, prominent mottles. Massive. Firm when moist. pH 6.0. Abrupt boundary:
F	20 +	Partly decomposed brown to dark-brown peat. pH 5.8.

Land Use

Most of the Niven soils are uncleared at the present time; cleared areas are used for hay and pasture. The major agricultural limitation of these soils is poor drainage which restricts or kills legumes in the sward and prohibits growth of plants susceptible to "wet feet".

Artificial drainage is required although care should be taken to avoid over draining to protect against undue shrinkage and settling of the underlying organic deposits.

Elk Series (7)

Elk soils occupy scattered, small areas mainly in the eastern portion of the lowlands between 50 and 150 feet elevations. Most areas are gently to very gently sloping with gradients below five percent. Commonly the Elk soils are closely associated with the regosolic Isar or brunisolic Chehalis series. The Elk series occupies 318 acres while Elk-Chehalis and Elk-Isar soil complexes encompass another 478 acres.

The Elk series has developed from medium textured alluvial fan deposits and is usually found on the lower fan aprons. Surface textures, mostly loam or silt loam and occasionally fine sandy loam, grade into roughly stratified gravels and sands at depths of 15 inches or more. Scattered sandy lenses may be present in the upper profile and scattered stones sometimes occur on the surface and through the profile.

These soils are subject to seepage from higher elevations, particularly during periods of heavy rainfall, and are poorly drained. They are classified as Rego Humic Gleysols and have well developed Ah surface horizons underlain by gleyed and mottled mineral material. Native vegetation is swamp forest and includes cedar, cottonwood, sedge, hardhack, and others.

A typical cultivated profile was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 8	Very dark brown (10YR 2/2, moist) silt loam. Weak, medium to coarse subangular blocky breaking to granular structure. Friable when moist. Numerous roots. pH 5.8. Gradual boundary:
Ah	8 -14	Very dark grayish brown (10YR 3/2, moist) silt loam. Weak to moderate, medium blocky structure. Friable when moist. Faint mottles in the lower part. Numerous roots. pH 5.6. Gradual boundary:
Cg	14 -22	Very dark gray (10YR 3/1, moist) loam or fine sandy loam. Massive. Friable when moist. Common, faint mottles. Common roots. pH 5.7. Clear boundary:
IICg	22 +	Alternating strata consisting of gravelly sand, fine sandy loam and gravel. Seepage occurs along coarse textured layers. pH 5.7.

Land Use

Where cleared the Elk soils are utilized for hay and pasture production although poor drainage restricts yields and destroys the legumes in the sward. Artificial drainage is required to control the seepage from higher portions of the fans and adjacent streams.

Elk soils are friable, moderately fertile and have good topography. Supplemental irrigation is beneficial during the latter portions of dry summers. Occasionally, stones and cobbles interfere with cultivation.

GLEYSOL SOILS

These poorly to very poorly drained soils may have a dark coloured Ah surface horizon less than three inches thick under virgin conditions; when cultivated the plow layer (Ap) is gray to light grayish brown in colour. Underlying horizons are strongly gleyed and mottled and may exhibit weakly developed eluvial and illuvial characteristics. Up to 18 inches of unconsolidated or 12 inches of consolidated peat or muck may occur on the surface. Only the Rego Gleysol subgroup of Gleysol soils was identified in the lowlands of the map area.

Rego Gleysol Soils

These soils may have a dark coloured Ah surface horizon not more than three inches thick and, when cultivated, the plow layer (Ap) is light in colour. Underlying Cg horizons are strongly gleyed and mottled and show no eluvial or illuvial characteristics. Up to 12 inches of consolidated or 18 inches of unconsolidated peat or muck may be present on the surface. The Page, Prest and Annis series are classified as Rego Gleysols in the lowlands.

Page Series

Page soils occupy scattered depressional areas throughout the lowlands between elevations of 35 and 75 feet. Usually they are very gently to gently sloping with gradients below four percent. The major acreage of Page soils are mapped in soil complexes, usually in conjunction with the Fairfield, Seabird or Prest series. Fifty-seven acres of Page silty clay loam and 148 acres of Page series were classified. In addition, several soil complexes in which Page soils occupy the major acreage total 1,026 acres.

The parent material of the Page series consists of lateral accretion floodplain deposits of the Fraser River. These deposits have undulating topography and the Page soils occupy intermediate slopes and shallow depressions - a topographic position similar to that occupied by the Hjorth series. Surface textures vary from silt loam to silty clay loam. Subsoil textures are similar, occasionally varying to lighter or heavier textured strata, while at depth, medium to fine sands are encountered. Where the depth to the sands is less than 18 inches; the soil is mapped as Page:shallow phase.

The Page series is poorly drained. In the winter the profile is saturated and sometimes covered with shallow water. During the growing season, however, and especially after high water on the Fraser River, the surface horizon is usually free of excess moisture.

Page soils are classified as Rego Gleysols. Profile development is restricted to a slight accumulation of organic matter in the surface horizon with gleying and mottling in the subsoil. Native vegetation includes cottonwood, willow, skunk cabbage, sedge, various grasses, occasional cedar, and other moisture tolerant species. A typical profile, supporting mainly native grasses and located outside the dyke in the Harrison Bay area, was described as follows:

Horizon	Depth Inches	Description
Ah	0 - 2	Very dark brown to black (10YR 2/1.5, moist) silty clay loam. Weak, fine granular structure. Friable to firm when moist, slightly plastic when wet. Abundant roots. pH 5.1. Abrupt boundary:
Cg1	2 - 9	Olive-gray to grayish-brown (5Y 5/2 - 2.5Y 5/2, moist) silty clay loam. Moderate, medium psuedo-subangular blocky structure. Firm when moist, plastic when wet. Common, medium, prominent, yellowish-red (5YR 5/8, moist) mottles. Abundant to common roots. pH 5.5. Gradual boundary:
Cg2	9 -16	Olive-gray (5Y 5/2, moist) silty clay loam. Moderate, medium psuedo-subangular blocky structure. Firm when moist, plastic when wet. Common to many, medium, prominent, yellowish-red (5YR 5/8, moist) mottles. Common roots. pH 5.6. Gradual boundary:
Cg3	16 -35	Olive-gray (5Y 4.5/2, moist) silty clay loam. Massive. Firm when moist, plastic when wet. Many, medium, prominent, yellowish-red to strong-brown (5YR 4/8 - 7.5YR 5/6, moist) mottles. Common roots in upper part, occasional in lower part. pH 6.1. Gradual boundary:

Horizon	Depth Inches	Description
Cg & IICg	35 -41	Olive-gray (5Y 4/2, moist) weakly stratified coarse silt and fine sand. Friable when moist. Many, medium, prominent, reddish-brown to yellowish-red (5YR 4/5, moist) mottles. Occasional roots. pH 6.2. Gradual boundary:
IICgl	41 +	Olive-gray (5Y 4/2, moist) loam or very fine sandy loam. Friable when moist. Many, medium, prominent, yellowish-brown to yellowish-red (5YR 4/5, moist) mottles. Water table at 50 inches at time of sampling (September, 1965). pH 6.1.

Land Use

Cleared areas of Page soils are mainly utilized for pasture and hay production; scattered areas are also used for silage corn. Yields are generally satisfactory although legumes soon die due to poor drainage. Because Page soils usually occur in association with other soils of varying drainage, they are unsuited for crops requiring uniform maturity. Excess moisture and heavy texture tend to delay spring cultivation, and puddling may occur if these soils are cultivated or grazed when wet. Water holding capacities are high and only during very dry summers is irrigation necessary.

Drainage installations are required to control the water table during the winter months and freshet season of the Fraser River. Outlets are sometimes difficult to locate because the Page soils are frequently lower than the surrounding land.

Prest Series

The Prest series occupies scattered, small depressions in the lowland area between elevations of 30 and 60 feet. Seventy-three acres of Prest series were mapped with an additional 75 acres classified in two soil complexes dominated by Prest soils.

Prest soils have developed in the lowest depressional areas of the lateral accretion deposits of the Fraser River. Surface and subsoil textures range from silty clay loam to silty clay with sands usually encountered at depth. Two or three inches of peat or muck sometimes occur on the soil surface.

Drainage is very poor. Flooding is common during the Fraser River's freshet stage or after heavy rainfall and the water table is at or near the soil surface most of the year.

The Prest series is classified as a Rego Gleysol. Profile development is restricted to very strong gleying and occasional organic accumulation on the surface. Native vegetation consists mainly of reeds, sedge, watercress, reed canarygrass, scattered cottonwood, and willow as well as other species tolerant to very poor drainage. A typical profile, located at the southwestern end of the Agassiz Valley was described as follows:

Horizon	Depth Inches	Description
Cg1	0 - 8	Dark-gray to dark greenish gray (5Y 4/1 - 5GY 4/1, moist) silty clay loam or silty clay. Massive. Firm when moist, slightly plastic when wet. Few to common, medium, prominent, strong-brown (7.5YR 5/6, moist) mottles. Abundant roots. pH 6.3. Gradual boundary:
Cg2	8 -18	Dark-gray (5Y 4/1, moist) silty clay. Massive. Very firm when moist, plastic when wet. Common, medium, prominent, reddish-brown to yellowish-red (5YR 4/5, moist) mottles. Common to occasional roots. pH 6.1. Gradual boundary:
Cg3	18 -25	Dark-gray to gray (5Y 4.5/1, moist) silt loam or silty clay loam. Massive. Firm when moist, sticky when wet. Many, medium, prominent, dark-brown to yellowish-red (7.5YR 4/4 - 5YR 4/6, moist) mottles. Occasional roots. pH 5.2. Gradual boundary:
Cg4	25 +	Dark-gray to gray (5Y 4.5/1, moist) silt loam or silty clay loam. Massive. Sticky when wet. Many, medium, prominent, dark-brown to yellowish-red (7.5YR 4/4 - 5YR 4/6, moist) mottles. pH 6.3.

Land Use

Areas of Prest soils are frequently nonarable because of the high water table. Installation of drains greatly increases the suitability of these soils for forage and hay crops but the small areas in question and the difficulty of locating outlets often does not warrant the cost. In such cases, reed canarygrass or other water tolerant crops should be planted to provide permanent pasture. Small depressions may cometimes be partially filled by levelling the surrounding soils.

Annis Series (7)

Annis soils occupy small, scattered areas throughout the lowlands between 30 and 55 feet elevation. The topography is level to very gently undulating and often is depressional in relation to the surrounding land. Ninety-five acres of Annis series were mapped with an additional 191 acres classified as three soil complexes in which Annis soils occupy the major acreage.

Six to twelve inches of well decomposed organic material overlying silty clay loam to silty clay textured floodplain deposits forms the parent material of these soils. Sand is usually encountered at depth. Annis soils often form a transition zone between mineral and organic soils. Surface textures are muck.

Drainage is very poor. Flooding frequently occurs after heavy rainfall and the water table is near the surface most of the year. The depressional nature of the Annis areas causes them to act as catchment basins for runoff from higher land. Water percolation and rooting depth is severely restricted by the heavy, massive nature of the subsoils.

Annis soils are classified as Rego Gleysols. Profile development is restricted to organic accumulation on the surface and strong gleying in the subsoil. Native vegetation consists of cedar, willow, sedge, reeds, hardhack, and other hydrophtic species. A typical cultivated profile was described as follows:

Horizon	Depth Inches	Description
Hp	9 - 0	Well decomposed black (10YR 2/1, moist) muck. Weak, granular structure. Friable when moist. Numerous fine roots. pH 5.2. Abrupt boundary:
Cg1	0 - 7	Dark-gray (10YR 4/1, moist) silty clay loam. Massive. Firm when moist, sticky when wet. Few to common, distinct, brownish-yellow (10YR 6/6, moist) mottles. Occasional roots. pH 6.3. Clear boundary:
Cg2	7 -36	Gray (2.5Y 5/0, moist) silty clay loam. Massive. Firm when moist, sticky when wet. Few to common, prominent, yellowish-red (5YR 5/6, moist) mottles. A few, widely spaced vertical cracks. pH 6.3. Abrupt boundary:
Cg3	36 +	Bluish-gray silty clay. Massive. Very firm when moist, sticky and plastic when wet. pH 7.0.

Land Use

A large portion of Annis soils are presently utilized for hay and pasture production. Although these soils are friable and fertile, yields generally are not good due to the poor drainage which destroys the legumes and some of the domestic grasses. Sedge content in the sward is generally high.

These soils require drainage although some areas may be difficult to drain because of their depressional nature and the massive subsoil. Where drainage is not feasible water tolerant crops such as reed canary-grass should be planted.

REGOSOL SOILS

These are well and imperfectly drained soils that lack discernible horizons or in which development is limited to slight organic accumulation in the surface (Ah). These soils are usually found on recent geologic deposits. The Gleyed Deorcic, Deorcic, Gleyed Orthic, and Orthic Regosol subgroups of Regosol soils were identified on the lowlands of the Agassiz map area.

Gleyed Deorcic Regosol Soils

Gleyed Deorcic Regosol soils have developed under imperfect drainage conditions and profile development is restricted to organic accumulation in the surface (Ah) horizon and weak mottling and gleying in the subsoil. These soils are represented by the Fairfield series on the Agassiz area lowlands.

Fairfield Series

The Fairfield series, one of the major soils in the lowland area, occurs between elevations of 40 and 80 feet and has topography varying from very gently to moderately undulating. Gradients range from two to eight percent. It is frequently mapped in complexes with the Monroe and Page series. One hundred acres of Fairfield silt loam, 264 acres of Fairfield silty clay loam and 121 acres of Fairfield series were classified. An additional 5,645 acres are occupied by numerous soil complexes in which Fairfield soils form the major acreage.

This series, located on the Fraser River floodplain, has developed from lateral accretion deposits of the river. In the ridge-and-swale topography, it occupies the intermediate slopes and lower ridges. Surface textures, usually silt loam or silty clay loam, occasionally vary to loam. Similar textures continue downward in the profile until the underlying sands are encountered. Where the coarse subsoil occurs within 18 inches of the soil surface, a shallow phase of the Fairfield series is mapped. Water permeability is moderate and root penetration is good. Casts and other evidence of earthworm activity is common.

Drainage is imperfect with mottling usually occurring within 12 inches of the soil surface. A water table is present in the solum during the freshet stage of the Fraser River and undyked areas are subject to flooding and seepage during above average runoff. After heavy rain a temporary water table also exists, often perched above a compacted strata which occurs immediately above the underlying sand.

Fairfield soils are classified as Gleyed Degrcic Regosols. Profile development is restricted to a slight organic accumulation in the surface and mottling in the subsoil. Buried, old surfaces occasionally occur at various depths. Uncleared areas support deciduous vegetation consisting of cottonwood, vine and broadleaf maple, alder, hazelnut, birch, waxberry, thimbleberry, stinging nettles, sword fern, and others, as well as scattered cedar. A Fairfield:shallow phase profile under tree cover and located near the western end of Seabird Island was described as follows:

Horizon	Depth Inches	Description
LF	½- 0	Raw to partly decomposed deciduous litter and moss. pH 5.5. Abrupt boundary:
Ah	0 - 5	Very dark brown (10YR 3/1, moist) silt loam or silty clay loam. Moderate, fine to medium subangular blocky breaking to moderate, medium granular structure. Friable when moist. Casts and other evidence of earthworm activity. Abundant roots. pH 5.8. Clear boundary:
Cgj	5 -10	Grayish-brown to yellowish-brown (2.5Y 5/2 - 10YR 5/4, moist) silt loam or silty clay loam. Moderate, medium psuedo-subangular blocky structure. Firm when moist. Few, medium, faint to distinct, strong-brown to dark yellowish brown (7.5YR 5/6 - 10YR 4/4, moist) mottles. Abundant to common roots. pH 6.1. Gradual boundary:
Cg	10 -14	Grayish-brown (2.5Y 5/2, moist) silt loam. Moderate, medium psuedo-subangular blocky structure. Firm when moist. Many, medium, distinct, dark-brown to brown (10YR 4/3 - 7.5YR 4/4, moist) mottles. Common to occasional roots. pH 5.8. Abrupt boundary:

Horizon	Depth Inches	Description
IICg1	14 -22	Medium to fine sand of variegated colours. Weak, coarse psuedo-subangular blocky structure breaking to single-grains. Very friable to loose when moist. Few, coarse, distinct mottles. Occasional roots. pH 6.2. Diffuse boundary:
IICg2	22 +	Medium to fine sand of variegated colours. Single-grained. Few, very faint mottles. Loose when moist. pH 6.1.

Another Fairfield soil profile located in a hay field southeast of the junction of Cameron and Limbert roads was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 9	Very dark grayish brown (10YR 3/2, moist) silty clay loam. Moderate, medium subangular blocky breaking to moderate, fine subangular blocky structure. Friable to firm when moist. Casts and other evidence of earthworm activity. Abundant roots. pH 6.1. Abrupt boundary:
Cgj1	9 -15	Dark-brown to brown (10YR 4/3, moist) silty clay loam. Moderate, medium psuedo-subangular blocky structure. Friable to firm when moist. Common, fine, faint to distinct, yellowish-red to dark-brown (5YR 4/6 - 7.5YR 4/4, moist) mottles. Evidence of earthworm activity. Abundant to common roots. pH 6.3. Gradual boundary:
Cgj2	15 -21	Dark-brown to brown (10YR 4/3, moist) silty clay loam. Moderate, medium psuedo-subangular blocky structure. Friable to firm when moist. Common, medium, distinct, reddish-brown (5YR 4/4, moist) mottles. Evidence of earthworm activity. Common roots. pH 6.3. Abrupt boundary:
Ab	21 -23	Very dark gray (10YR 3/1, moist) silty clay loam. Moderate, medium subangular blocky structure. Friable to firm when moist. Evidence of earthworm activity. Common roots. pH 6.2. Abrupt boundary:

Horizon	Depth Inches	Description
Cgj3	23 -31	Yellowish-brown to dark yellowish brown (10YR 4.5/4, moist) silty clay loam. Moderate, medium psuedo-subangular blocky structure. Firm when moist. Common, medium, distinct, reddish-brown to dark reddish brown (5YR 3.5/4, moist) mottles. Scattered evidence of earthworms in upper part. Occasional roots. pH 6.4. Gradual boundary:
Cgj4	31 +	Dark yellowish brown (10YR 4/4, moist) silty clay loam. Moderate, medium psuedo-subangular blocky structure. Firm when moist. Many, medium to coarse, prominent, dark reddish brown to yellowish-red (5YR 3/4-4/8, moist) mottles. Occasional roots. pH 6.3.

Land Use

Fairfield soils are among the best in the map area and good production of a wide range of crops is possible. Uncleared acreage occurs only on some of the islands; the remainder has been cleared and is used primarily for hay, pasture and silage corn production.

Tile drainage is not required for these imperfectly drained soils. Poor drainage conditions exist for only short periods and do not greatly restrict crop growth. Fertility is generally good and cultivation easy. During dry summers these soils, particularly the shallow phase, respond to irrigation although their drought resistance is high.

On some islands, the Fairfield soils are utilized for cottonwood plantations.

Deorcic Regosol Soils

These are well to moderately well drained soils with profile development restricted to slight organic accumulation in the surface (Ah) horizon. Deorcic Regosol soils are found in the lowlands of the map area and are represented by the Monroe series.

Monroe Series

The Monroe soils occupy substantial acreages in the map area between elevations of 40 and 90 feet. Most areas vary from very gently to moderately undulating with slopes to nine percent. Commonly, the Monroe soils are closely association with the Fairfield and Grevell series. One hundred and thirty-seven acres of Monroe loam, 361 acres of Monroe silt loam, 59 acres of Monroe silt loam shallow phase, 38 acres of Monroe series and 408 acres of Monroe:shallow phase were differentiated. An additional 7,078 acres of numerous soil complexes in which Monroe soils dominate were mapped.

These soils have developed from point bar, meander scroll and other lateral accretion deposits of the Fraser River and occupy the tops and upper slopes in the ridge-and-swale topography. Surface textures, usually silt loam or loam, occasionally vary to fine sandy loam or silty clay loam. At depth, sand or gravelly sand is encountered. Where these coarse underlying materials occur within 18 inches of the surface, the soil is mapped as Monroe:shallow phase. Monroe soils are friable and have good permeability and rooting depth. Earthworm activity is evident in most areas.

Monroe soils are moderately well to well drained and mottling begins two or more feet below the soil surface. During uncommonly high water on the Fraser River a water table occurs in the solum in some areas and undyked areas may flood for short periods.

Profile development is generally confined to accumulation of organic matter in the surface horizon and this series is classified as a Deorcic Regosol. In a few scattered areas, the soil profiles are tending towards weak Acid Brown Wooded or Acid Brown Forested development. The development, however, is not sufficient to warrant separation.

Much of the native vegetation is deciduous and consists of, among others, vine and big leaf maple, hazelnut, birch, alder, and cottonwood with an understory of trailing blackberry, thimbleberry, stinging nettles, waxberry, bracken, and moss. Scattered Douglas fir, cedar and Sitka spruce also occur. An undisturbed profile, located near the center of Seabird Island, was described as follows:

Horizon	Depth Inches	Description
L	2 - 1½	Undecomposed deciduous litter. pH 5.9. Abrupt boundary:
H	1½- 0	Black to very dark brown (10YR 2/1.5, moist) well decomposed organic matter. Weak, fine granular structure. Very friable when moist. Abundant roots. pH 5.9. Abrupt boundary:
Ah	0 - 4	Very dark grayish brown (10YR 3/2, moist) silt loam. Weak, fine subangular blocky structure. Friable when moist. Abundant roots. pH 6.0. Gradual boundary:
C1	4 -10	Dark grayish brown (10YR 4/2, moist) silt loam. Weak to moderate, medium psuedo-

Horizon	Depth Inches	Description
		subangular blocky structure. Friable when moist. Common roots. pH 5.8. Diffuse boundary:
C2	10 -18	Dark grayish brown to brown (10YR 4/2.5, moist) silt loam or very fine sandy loam. Weak to moderate, medium psuedo-subangular blocky structure. Friable when moist. Common roots. pH 5.4. Diffuse boundary:
C3	18 -27	Dark grayish brown to brown (10YR 4/2.5, moist) silt loam. Weak to moderate, medium psuedo-subangular blocky structure. Few, fine, faint mottles. Friable when moist. Common roots. pH 5.4. Diffuse boundary:
Cgj1	27 -36	Yellowish-brown (10YR 5/4, moist) silt loam or silty clay loam. Moderate, medium to coarse psuedo-subangular blocky structure. Friable to firm when moist. Common, medium, faint mottles. Common to occasional roots. pH 5.5. Diffuse boundary:
Cgj2	36 +	Dark yellowish brown (10YR 4/4, moist) silt loam or silty clay loam. Moderate, medium to coarse psuedo-subangular blocky structure. Firm when moist. Many, medium, distinct, dark-brown to reddish-brown (7.5YR 4/4 - 5YR 4/4, moist) mottles. Occasional roots. pH 5.5.

A Monroe:shallow phase profile under deciduous cover and located near the junction of McDonald and Tranmer roads was described as follows:

Horizon	Depth Inches	Description
Ah	0 - 5	Very dark brown (10YR 2/2, moist) silt loam. Weak, medium subangular blocky breaking to weak, fine to medium granular structure. Friable when moist. Casts and other evidence of earthworm activity. Abundant roots. pH 6.0. Clear boundary:
C1	5 -11	Dark grayish brown to brown (10YR 4/2.5, moist) silt loam. Weak, fine to medium

Horizon	Depth Inches	Description
		psuedo-subangular blocky structure. Friable when moist. Evidence of earthworm activity. Abundant to common roots. pH 6.2. Gradual boundary:
C2	11 -17	Brown to dark-brown (10YR 4/3, moist) silt loam. Weak, fine to medium psuedo-subangular blocky structure. Friable when moist. Moderately compact in lower part. Common roots. pH 5.9. Clear boundary:
IIC1	17 -23	Dark grayish brown (10YR 4/2, moist) fine sand. Very weak, fine psuedo-subangular blocky structure breaking to single-grains. Loose to very friable when moist. Common to occasional roots. pH 6.1. Gradual boundary:
IIC2	23 +	Dark grayish brown (10YR 4/2, moist) loamy fine sand. Very weak, fine psuedo-subangular blocky structure. Very friable when moist. Occasional roots. pH 6.0.

Land Use

Monroe soils are among the best in the map area and most cleared acreage is used for hay and pasture. Some parts are also utilized for silage corn and small fruit, mainly respberries. These soils, due to undulating relief, are not well suited for peas and other crops requiring uniform maturity.

Monroe soils are friable, have good rooting depth and are relatively easy to cultivate. Water holding capacities are moderate and irrigation, especially on the shallow phase, is required for good crop production.

If land levelling is undertaken, care should be taken to avoid exposing the underlying sands by removing the surface soil, levelling the subsoil and returning the surface to its original position.

Gleyed Orthic Regosol Soils

These imperfectly drained soils are weakly gleyed or mottled in the subsoil. A thin, weak surface Ahj horizon may be present. They are usually associated with recent geologic deposits. The only soil in the lowlands classified as a Gleyed Orthic Regosol is the Seabird series.

Seabird Series

The Seabird series, occupying a relatively minor acreage, occurs between 35 and 75 feet elevations. The topography varies from very gently to gently undulating with slopes to five percent. This series is frequently closely associated with the Grevell soils which occur at slightly higher elevations. Ninety acres of Seabird series and another 731 acres of three soil complexes dominated by Seabird soils were classified.

Seabird soils have developed from recently deposited lateral accretion sediments of the Fraser River and are usually found on the islands in the river or along the outer margins of the river floodplain. Surface and subsurface textures are coarse, usually loamy sand or sand although silty bands sometimes occur at various depths in the profile.

These soils are imperfectly drained. High water tables and some flooding during the freshet season are common. Perching of a temporary water table above the silty strata also occurs. Soil reactions are generally neutral reflecting the effect of the slightly alkaline Fraser River water.

Seabird soils are classified as Gleyed Orthic Regosols. Profile development is restricted to mottling and gleying in the subsoil and occasionally weak Ah development in the surface. The native vegetation is mostly deciduous and a profile located southeast of Agassiz near the Fraser River, under a moderate cover of cottonwood, and willow with trailing blackberry, stinging nettles and various grasses, was described as follows:

Horizon	Depth Inches	Description
C1	0 - 4	Very dark grayish brown (2.5Y 3/2, moist) medium to fine sand. Single-grained. Loose when moist. Common roots. pH 6.9. Clear boundary:
Cgj1	4 - 9	Very dark grayish brown (2.5Y 3/2, moist) loamy sand or loamy fine sand. Weak, medium psuedo-subangular blocky structure, breaking to single-grains. Very friable to loose when moist. Few, medium, faint mottles. Common roots. pH 7.3. Clear boundary:
Cgj2	9 -14	Very dark grayish brown (2.5Y 3/2, moist) loamy fine sand. Weak, medium psuedo-subangular blocky structure. Very friable when moist. Common, medium, distinct, dark reddish brown to strong-brown (5YR 3/4 - 7.5YR 4/4, moist) mottles. Common to occa-

Horizon	Depth Inches	Description
		sional roots. pH 7.5. Abrupt boundary:
IICgj1	14 -22	Olive-gray to dark grayish brown (2.5Y 4/2 - 5Y 4/2, moist) silt loam or silty clay loam. Moderate, coarse psuedo-subangular blocky structure. Firm when moist. Common, medium, prominent, dark reddish brown to reddish-brown (5YR 3.5/4, moist) mottles, mainly along root channels. Occasional roots. pH 7.2. Clear boundary:
IICgj2	22 -28	Dark grayish brown (2.5Y 4/2, moist) silt loam. Moderate, medium psuedo-subangular blocky structure. Friable when moist. Common to many, medium, distinct brown to dark-brown (7.5YR 4/4, moist) mottles. Occasional roots. pH 7.1. Clear boundary:
Cgj3	28 +	Dark grayish brown (2.5Y 4/2, moist) fine sand. Slightly firm in place, breaking to single-grains when disturbed. Loose when moist. Few, medium, faint mottles. Occasional roots in upper part. pH 7.2.

Land Use

Most of the Seabird soils are located on the islands in the river or outside the dykes and are uncleared. Scattered cleared areas are presently used for hay and pasture production. On some of the islands portions of Seabird soils are utilized for cottonwood plantations.

These soils are susceptible to high water tables and flooding during the freshet season but after high water in the spring, the water table recedes and the soil becomes droughty. Moisture holding capacity is low.

Orthic Regosol Soils

Orthic Regosol soils are well to moderately well drained and lack any horizon development other than a thin or very weak Ahj surface horizon. Generally they occur on recent geologic deposits. In the lowland area, they are represented by the Grevell and Isar series.

Grevell Series

This series occupies substantial acreage in the lowland area, between 30 and 90 feet elevation, particularly on the various islands and along the outer margins of the floodplain. The usual topography is gently sloping and undulating with gradients to five percent. Frequently the Grevell series is closely associated with the Seabird and Monroe soils. Ninety-one acres of Grevell gravel, 180 acres of Grevell sand, 36 acres of Grevelly loamy sand, and 573 acres of Grevell series were differentiated. An additional 1,648 acres are included in several soil complexes dominated by Grevell soils.

These soils have developed from recent lateral accretion deposits of the Fraser River. Surface textures vary from gravelly sand to sandy loam although loamy sand is most common. The subsoil is sand or gravelly sand, sometimes containing occasional finer textured bands. Rooting depth and moisture permeability is good.

The Grevell series is well to rapidly drained. Only during the freshet stage of the Fraser River is there a water table in the solum and a few scattered areas sometimes flood for short periods.

Profile development is restricted to a weak Ahj surface horizon and these soils are classified as Orthic Regosols. Soil reaction varies from neutral near the river to weakly acid at some distance from the river.

Many areas are still uncleared. An undisturbed profile, located near the center of Seabird Island under a mixture of vine and big leaf maple, cottonwood, hazelnut, birch, bracken, stinging nettle, thimbleberry, salmonberry, waxberry, and other deciduous vegetation together with occasional cedar and Douglas fir, was described as follows:

Horizon	Depth Inches	Description
L-H	$1\frac{1}{2}$ - 0	Raw to well decomposed mixture of leaves, twigs and other deciduous material. pH 5.9. Abrupt boundary:
Ahj	0 - $1\frac{1}{2}$	Very dark grayish brown (10YR 3/2, moist) sandy loam. Weak, fine subangular blocky structure. Very friable when moist. Abundant roots. pH 5.9. Abrupt boundary:
C1	$1\frac{1}{2}$ - 4	Brown to dark-brown (10YR 4/3, moist) sandy loam or loamy sand. Weak, fine psuedo-subangular blocky structure. Very friable when moist. Abundant to common roots. pH 5.5. Diffuse boundary:

Horizon	Depth Inches	Description
C2	4 -11	Dark grayish brown (2.5Y 4/2, moist) fine sand. Single-grained. Loose when moist. Common to occasional roots. pH 6.0. Diffuse boundary:
C3	11 +	Dark grayish brown (2.5Y 4/2, moist) fine sand. Slightly firm in place, breaking to single-grains when disturbed. Few, fine, faint mottles and occasional, thin silt loam bands below 30 inches. Occasional roots. pH 6.2.

Land Use

Large portions of Grevell soils are presently uncleared. Cleared areas are utilized mainly for hay and pasture. On some islands, cottonwood plantations occupy a minor acreage. Because of the coarse textures, the moisture holding and exchange capacities are low, and manuring, fertilizing and irrigation are required for satisfactory crop production.

Isar Series

Although this series occupies scattered areas throughout the map area, the largest acreages occur east from Popkum and west of the Harrison River. Elevations range from 40 to 200 feet and topography varies from gently to steeply sloping with gradients up to 40 percent. One thousand and sixty-three acres of Isar series and 1,222 acres of Isar soils mapped as soil types were differentiated. In addition, 611 acres of Isar-Elk and 1,218 acres of Isar-Harrison soil complexes were also mapped.

These soils have developed from relatively recent alluvial and occasionally alluvial-colluvial fan deposits eroded from the Cascade and Coast mountains. Surface and subsurface textures vary from sandy loam to gravelly sand and sand and are sometimes weakly stratified. Cobbles and stones frequently occupy a large part of the solum. Fan apexes are steeper and coarser textured than the fan aprons which sometimes have a thin, finer textured capping mantling the coarse underlay.

Isar soils are well to rapidly drained. Profile development is negligible except for thin, weak Ahj surface horizons in some locations and these soils are classified as Orthic Regosols. In a few, small areas, development is tending towards that exhibited by the Chehalis series. Original vegetation was mainly coniferous but logged areas are presently dominated by a variety of deciduous species. A typical profile, located near Hope and supporting second growth Douglas fir, vine maple, dogwood, birch, huckleberry, Oregon grape, salal, bracken, and others was described as follows:

Horizon	Depth Inches	Description
LF	1 - 0	Raw to partially decomposed mixture of needles, leaves, twigs, and moss. pH 5.2. Abrupt boundary:
C1	0 - 7	Dark grayish brown (10YR 4/2, moist) or brown (10YR 5/3, dry) loamy fine sand. Weak, medium subangular blocky structure breaking to single-grains. Very friable when moist. Abundant roots. pH 5.7. Clear boundary:
C2	7 -14	Brown to dark-brown (10YR 4/3, moist) or light yellowish brown (10YR 6/4, dry) gravelly sand. Single-grained. Loose when moist. Abundant roots. pH 5.7. Diffuse boundary:
C3	14 -24	Gravelly coarse sand of variegated colour. Single-grained. Loose when moist. About 50 percent of horizon composed of cobbles and stones. Abundant to common roots. pH 5.7. Diffuse boundary:
C4	24 +	Gravelly coarse sand of variegated colour. Single-grained. Loose when moist. Over 50 percent of horizon composed of stones and cobbles. Occasional roots.

Land Use

Most acreages of Isar soils are uncleared. Many areas are unsuitable for agriculture due to steep topography and stoniness and are best left for forest or unimproved pasture. Arable areas are poor for agriculture because of low moisture holding capacity and stoniness and, at best, should be used only for hay and pasture crops.

In the Hope area particularly, Isar soils are utilized as building sites and in some other areas are used as a source of gravel and fill.

ORGANIC SOILS

These are soils which contain 30 percent or more organic matter and have a depth of at least 12 inches of consolidated or 18 inches of unconsolidated organic material. They are very poorly drained and the water table is at or near the surface for substantial parts of the year.

The wet environment has delayed decomposition of the organic matter so that the rate of accumulation has been faster than the rate of decay. Remains of sedges, reeds, wood, and moss are the chief components of the organic material. The degree of decomposition is variable, ranging from well decomposed muck in which individual plant remains are unrecognizable to raw peat in which individual components are easily identified.

Muck soils are the only organic soils occurring in the lowlands of the Agassiz map area.

Muck Soils

These are very poorly drained soils which have well decomposed surface horizons. Subsurface organic horizons may be at various stages of decomposition and the underlying mineral strata are extremely gleyed. Shallow mucks consist of 12 to 24 inches of organic material while deep mucks have organic accumulation exceeding 24 inches. Banford muck, a shallow muck, and Gibson muck, a deep muck, were differentiated on the lowlands of the map area.

Banford Muck

Banford muck occurs in scattered areas on the Fraser floodplain between 40 and 70 feet elevations. Topographically it varies from depressional to very gently sloping with slopes below two percent. Usually this soil is associated with the Annis series or Gibson muck with no topographic or other distinguishing surface features. Separations are based on differences in the depth of the organic deposit. Sixty-eight acres of Banford muck, 81 acres of Banford-Gibson soil complex and 18 acres of Banford-Hjorth soil complex were differentiated.

Banford muck has developed from accumulations of sedges, reeds and other organic material, 12 to 24 inches deep, which overlie heavy textured Fraser floodplain sediments. The surface horizon is well decomposed while subsurface organic horizons are usually intermediate in decomposition. The heavy textured mineral subsoil is strongly gleyed. Soil reaction is generally moderately to strongly acidic.

The Banford soil developed under very poorly drained conditions. The water table is at or near the soil surface for most of the year, with runoff and seepage from surrounding higher land contributing large amounts of water.

The Banford soil, classified as a Shallow Muck, developed under swamp vegetation consisting of sedges, reeds, hardhack, sweet gale, skunk cabbage, various grasses, scattered willow, cottonwood, cedar, and bog birch. A typical profile located on Agassiz Experimental Farm No. 2 was described as follows:

Horizon	Depth Inches	Description
Hp	14 - 6	Very dark brown to black (10YR 2/1.5, moist) muck. Weak, medium subangular blocky breaking to weak, medium granular structure. Friable when moist. Abundant roots. pH 5.4. Clear boundary:
H	6 - 0	Very dark grayish brown (10YR 3/2, moist) muck containing a few, thin, very dark grayish brown (2.5Y 3/2, moist) silty clay loam bands. Massive. Friable when moist. Common roots. pH 3.6. Clear boundary:
Ah	0 - 5	Very dark grayish brown (10YR 3/2, moist) silty clay loam. Massive. Slightly plastic when wet. Common roots. pH 5.4. Clear boundary:
Cg1	5 -12	Dark-gray (5Y 4/1, moist) silty clay loam. Massive. Few, coarse, prominent, strong-brown to dark-brown (7.5YR 5/6-4/4, moist) mottles, mainly along old root channels. Sticky and plastic when wet. Common to occasional roots. pH 5.3. Gradual boundary:
Cg2	12 -19	Dark-gray to dark olive gray (5Y 4/1-3/2, moist) silty clay. Massive. Few, coarse, prominent, strong-brown to dark-brown (7.5YR 5/6-4/4, moist) mottles, mainly along old root channels. Sticky and plastic when wet. Occasional old roots. pH 5.3. Abrupt boundary:
Ab	19 -22	Black (5Y 2/1, moist) silty clay loam. Massive. Sticky and plastic when wet. Occasional old roots. pH 5.2. Abrupt boundary:
Cg3	22 +	Gray to dark-gray (5Y 4.5/1, moist) silty clay. Massive. Few, medium, prominent, yellowish-red (5YR 4/8, moist) mottles, mainly along old root channels. Sticky and plastic when wet. Occasional old roots. pH 5.3.

Land Use

This soil is similar in use to Gibson muck. Refer to land use section under Gibson muck on page 54.

Gibson Muck

Gibson muck occupies several areas on the lowlands between 45 and 70 feet elevations. The topography is slightly depressional to very gently sloping with gradients below two percent. A total of 443 acres of Gibson muck and 249 acres of Gibson-Banford soil complex were classified.

These soils have developed from organic accumulations of sedges, reeds, mosses, and other organic material which exceed 24 inches in depth and overlie heavy textured floodplain sediments. The surface horizons are well to moderately well decomposed while underlying horizons are at various stages of decomposition. The mineral subsoil is strongly gleyed. Profile reaction is moderately to extremely acidic.

Drainage is very poor and the water table is at or near the surface for large parts of the year. Runoff and seepage from higher surrounding areas and seepage from the Fraser River during its freshet stage cause the high water table conditions.

Gibson muck is classified as a Deep Muck with the organic material usually between two and six feet in depth. Native vegetation is swamp forest consisting of scattered cedar, hemlock, bog birch, hardhack, sweet gale, sedge, skunk cabbage, various grasses, and other hydrophytic species. A typical uncultivated profile, located near the north end of Sutherland Road, was described as follows:

Horizon	Depth Inches	Description
H	57 -53	Black (2.5Y 2/0, moist) well decomposed muck. Weak, fine granular structure. Friable to very friable when moist. Abundant roots. pH 3.9. Clear boundary:
FH1	53 -49	Dark reddish brown (5YR 3/2.5, moist) moderately well decomposed peaty muck. Compacted in layers. Hard when dry, very firm when moist. Abundant roots. pH 3.7. Gradual boundary:
FH2	49 -39	Dark reddish brown (5YR 3/3, moist) moderately decomposed peaty muck. Compacted in layers. Very firm when moist. Common roots. pH 3.5. Diffuse boundary:
FH3	39 -32	Dark reddish brown (5YR 2/2, moist) moderately decomposed peaty muck. Compacted in layers.

Horizon	Depth Inches	Description
		Very firm when moist. Occasional roots. pH 5.4. Clear boundary:
LF	32 -21	Reddish-brown to yellowish-red (5YR 5/4-4/6, moist) slightly decomposed peat. Massive. Consists mainly of moss remains. Occasional roots in upper part. pH 3.7. Gradual boundary:
FI	21 - 8	Dark-brown (7.5YR 3/2 - 10YR 3/3, moist) slightly decomposed peat. Massive. Consists mainly of moss remains. pH 3.1. Clear boundary:
H	8 - 0	Black (10YR 2/1 - 2.5Y 2/0, moist) well decomposed muck. Massive. pH 3.6. Abrupt boundary:
Cg	0 +	Greenish-gray to dark greenish gray (5GY 4.5/1, moist) silty clay. Massive. Plastic when wet. Few, fine, faint mottles. pH 4.7.

Land Use

Those areas of Gibson muck which have been reclaimed are presently used for hay and pasture production. Sedge content of the forage is usually high and the feed value low. If well managed these soils are highly productive, especially for such specialized crops as blueberries and vegetables.

Seepage from higher areas can often be reduced by installation of intercepting tile lines and ditches. Tile lines or open ditches are satisfactory for drainage within the bog; however, the water table should not be lowered more than is required for good crop growth. Over draining causes excessive subsidence of the organic deposits and often results in droughty conditions during the latter part of the growing season. A water control system which permits progressive lowering of the water table as the growing season progresses is the most satisfactory.

Upland Soils

PODZOL SOILS

Podzol soils are well to imperfectly drained mineral soils which have developed under mixed and coniferous forest vegetation. Under virgin conditions they are characterized by organic surface horizons

(L-H), a light coloured eluviated horizon (Ae) more than one inch thick and one or more illuvial horizons (Bfh and/or Bf) of high chroma in which organic matter and sesquioxides are the main accumulation products. Generally clay translocation and accumulation is not significant. Base saturation is low and the solum is moderately to strongly acidic.

Major development processes involve the accumulation of organic surface layers, the formation and translocation of organo-sesquioxide complexes and their deposition and accumulation in the B horizon, and the decomposition of the clay minerals in the Ae horizon.

The Ortstein Podzol and Orthic Podzol subgroups of Podzol soils were differentiated on the uplands of the Agassiz area.

Ortstein Podzol Soils

These are moderately well to imperfectly drained soils characterized by organic surface horizons (L-H), a light coloured eluviated (Ae) horizon and cemented Bfhc or Bfc horizons of high chroma. The cemented horizons may be discontinuous of interrupted and often lie immediately below the Ae horizon. The Woodside series is classified as Ortstein Podzol.

Woodside Series

In the Agassiz area, the Woodside soils are restricted to Woodside and Agassiz mountains above 2,400 feet elevations. Most areas are stongly to very steeply sloping and undulating with gradients between 10 and 40 percent. Fifty-four acres of Woodside series and an additional 1,814 acres of two soil complexes dominated by Woodside soils were differentiated.

Ablation till, overlying very compact basal till or bedrock, is the parent material of the Woodside soils. In very steep areas some colluvial materials are also included. Surface textures are coarse, gravelly sandy loam or sandy loam being the most common, and subsoil textures grade to gravelly loamy sand. Profiles are extremely stony with an estimated 70 percent of the subsoil consisting of stones and cobbles.

Woodside soils are classified as Ortstein Podzols. The Ae horizons vary in depth from one to four inches depending on severity of churning by windthrow and the Bf horizons are strongly cemented. Depth to the cemented horizons varies from six to 20 inches. Drainage is moderately well varying to imperfect in a few depressional areas and a temporary water table tends to perch above the cemented horiøons. A well developed root mat has developed abowe the cemented horizon, which severely restricts rooting depth.

Native vegetation consists of hemlock and balsam fir understoried by members of the vaccinium species, scattered alder and moss. A typical profile, located on the west side of Agassiz Mountain, was described as follows:

Horizon	Depth Inches	Description
L	2 - 1½	Undecomposed needles, twigs and moss. pH 4.2. Abrupt boundary:
FH	1½- 0	Black (10YR 2/1, moist) partially to well decomposed coniferous litter and moss. Abundant roots. pH 3.7. Abrupt boundary:
Ae	0 - 2	Dark-gray (10YR 4/1, moist) or light-gray (10YR 7/1.5, dry) sandy loam or loam. Weak, medium subangular blocky structure. Friable when moist. Abundant roots. pH 3.9. Abrupt boundary:
Bfh	2 - 5	Yellowish-red to dark reddish brown (5YR 4/6-3/4, moist) or strong-brown (7.5YR 5/6, dry) sandy loam or gravelly sandy loam. Moderate to weak, medium subangular blocky structure. Friable to firm when moist. Abundant roots. pH 5.1. Clear boundary:
Bf	5 -12	Dark-brown to strong-brown (7.5YR 4.5/5, moist) or brownish-yellow (10YR 6/7, dry) gravelly sandy loam or gravelly loamy sand. Moderate to weak, medium subangular blocky structure. Friable when moist. Abundant roots. pH 5.8. Gradual boundary:
Bfgj	12 -16	Yellowish-brown (10YR 5/4, moist) or light yellowish brown (10YR 6/4, dry) gravelly loamy sand. Moderate, medium subangular blocky structure. Scattered weakly cemented patches. Friable to firm when moist. Common, medium, distinct, dark-brown to reddish-brown (7.5YR 4/4 - 5YR 4/4, moist) mottles. Abundant roots, usually in root mat. pH 5.7. Clear boundary:
Bfcgj	16 -38	Yellowish-brown (10YR 5/7, moist) gravelly loamy sand. Very strongly cemented. Extremely firm when moist. Scattered, fine mottles. Approximately 70 percent of horizon occupied by stones and cobbles. Occasional fine roots in upper part. pH 5.6. Diffuse boundary:

Horizon	Depth Inches	Description
CB	36 -68	Olive-gray to brown (5Y 5/2 - 10YR 5/3, moist) gravelly loamy sand. Strongly cemented. Extremely firm when moist. Scattered fine mottles and occasional patches of gley. Approximately 70 percent of horizon occupied by stones and cobbles. pH 5.7. Diffuse boundary:
Cgj	68 +	Grayish-brown to olive-gray (2.5Y 5/2 - 5Y 5/2, moist) gravelly loamy sand. Very firm when moist. Seventy percent or more of horizon occupied by stones and cobbles. Common, medium, distinct, dark-brown to reddish-brown (7.5YR 4/4 - 5YR 4/4, moist) mottles. pH 5.6.

Land Use

None of the Woodside soils are suited for arable agriculture due to steepness and stoniness. They are also extremely limited for unimproved pasture since there is no palatable ground cover and most forest growth is coniferous offering little browse.

These soils appear fair for forest production although growth is restricted due to poor rooting depth and moisture deficiencies in the summer.

Orthic Podzol Soils

These are well or moderately well drained soils characterized by organic surface horizons (L-H), light coloured, eluvial (Ae) horizons more than one inch thick and friable Bfh and Bf horizons of high chroma.

Orthic Podzols are represented by the Bear Mountain and Magellan series on the uplands of the Agassiz area.

Bear Mountain Series

The Bear Mountain series occupies a restricted area in the vicinity of Bear Mountain above 2,500 feet elevation. The topography is strongly to steeply sloping and undulating with gradients mostly between 10 and 30 percent. A total of 882 acres of Bear Mountain series and 304 acres of Bear Mountain-Rock Outcrop soil complex were classified.

This series has developed from ablation and/or kame deposits arranged in subparallel ridges which trend northwest-southwest. Surface textures are usually sandy loam or gravelly sandy loam and change to gravelly sand or gravelly loamy sand at depth. Stones are common throughout the profiles. Moisture permeability and root penetration is good and is not appreciably restricted by the occurrence of occasional weakly cemented patches. At depth, compact basal till or bedrock is encountered.

Bear Mountain soils are well drained, although a few moderately well or imperfectly drained depressions may be included in the mapping units. Profile development is typical of Orthic Podzols with the Ae horizon generally one to two inches thick and the Bf horizons well developed. Native vegetation is dominantly hemlock and balsam fir with a ground cover of moss. A profile located in a logged area near the top of Bear Mountain and supporting alder, yarrow, fireweed, scattered young fir and others, was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Mixture of raw to well decomposed coniferous litter, moss and charcoal. Abundant roots. pH 4.1. Abrupt boundary:
Ae	0 - 1	Dark-gray to dark reddish gray (5YR 4/1.5, moist) or gray to light-gray (10YR 6/1, dry) sandy loam or loam. Weak, fine subangular blocky structure. Very friable when moist. Abundant roots. pH 4.6. Abrupt boundary:
Bfh	1 - 4	Dark reddish brown (5YR 3/4, moist) or reddish-brown (5YR 4/4, dry) sandy loam. Weak to moderate, fine subangular blocky structure. Friable when moist. Scattered weakly cemented patches. Approximately 40 percent of horizon consists of stones and cobbles. Abundant roots. pH 5.0. Clear boundary:
Bf1	4 -11	Dark-brown to yellowish-red (7.5YR 4/4 - 5YR 4/6, moist) or reddish-yellow to yellowish-red (7.5YR 5.5/6, dry) gravelly loamy sand. Weak, fine subangular blocky structure. Friable when moist. Approximately 40 percent stones and cobbles. Scattered, weakly cemented patches. Abundant roots. pH 5.4. Gradual boundary:
Bf2	11 -21	Strong-brown (7.5YR 5/6, moist) or reddish-yellow (7.5YR 6.5/6, dry) gravelly sand or gravelly loamy sand. Weak, fine subangular blocky structure breaking to single-grains. Loose when moist. Approximately 40 percent stones and cobbles. Few, weakly cemented patches. Common roots. pH 5.8. Diffuse boundary:

Horizon	Depth Inches	Description
BC	21 -31	Yellowish-brown (10YR 5/8, moist) or very pale brown (10YR 7/4, dry) gravelly sand. Single-grained. Loose when moist. Few, weakly cemented patches. Few, fine, faint mottles. Occasional roots. pH 5.9. Diffuse boundary:
C1	31 -56	Gravelly sand of variegated colour. Single-grained. Loose when moist. Occasional roots in upper part. pH 6.0. Diffuse boundary:
C2	56 +	Medium to coarse sand and fine gravel of variegated colour. Single-grained. Loose when moist. pH 6.1.

Land Use

Because of adverse topography and excessive stoniness, none of the Bear Mountain soils are suitable for arable agriculture. Use for unimproved pasture is extremely limited since most of the vegetation is unsuited for grazing or browse; temporary grazing is available after logging.

These are moderately good forestry soils. However, due to low moisture holding capacities, they tend to be droughty during the summer.

Magellan Series

The Magellan soils occur between elevations of 1,200 and 2,500 feet in the uplands of the map area and are steeply to very steeply sloping with gradients between 15 and 50 percent. One hundred and forty-nine acres of Magellan series were mapped. An additional 2,588 acres were included in three soil complexes dominated by Magellan soils.

These soils have developed from a mixture of glacial till and colluvium. Usually a very shallow layer (less than 6 inches) of aeolian material covers the soil or has been incorporated into the upper portion of the profile. Surface textures are generally sandy loam, gravelly sandy loam or gravelly loam grading rapidly to gravelly sand loam with depth. Stones and cobbles are numerous throughout the profile. Rooting depth is somewhat restricted by the compact basal till or bedrock which usually occurs within 30 inches of the soil surface. Moisture permeability is good in the solum but is severely restricted by the nearby impervious subsoil deposits. Scattered moderately cemented patches also occur in some profiles.

The Magellan soils are moderately well drained, occasionally varying to imperfectly drained in depressions. Variable amounts of seepage flows above the compact, subsurface materials where a perched, temporary water table occurs as indicated by mottling and gleying.

The Magellan series is classified as an Orthic Podzol. The Ae horizons are usually one to three inches thick (except where recent windthrow has occurred) and the Bfh and Bf horizons are well developed.

Native vegetation is mainly hemlock, cedar, Douglas fir, with some balsam fir at the higher elevations and is understoried by huckleberry and other shrubs. A variable moss cover occurs on the soil surface.

Land Use

None of the Magellan soils are suitable for arable agriculture due to adverse topography and excessive stoniness. Since the vegetation growing on these soils is mainly unsuitable for browse or grazing, they also have little use for unimproved pasture.

Forest growth is good although during dry summers some moisture deficiencies occur due to the low moisture holding capacities of the soil.

ACID BROWN WOODED SOILS

See page 16 of this report for a generalized description of Acid Brown Wooded soils.

The Degraded and Orthic subgroups of Acid Brown Wooded soils were encountered on the uplands of the Agassiz area.

Degraded Acid Brown Wooded Soils

Refer to page 17 of this report for a generalized description of Degraded Acid Brown Wooded soils. On the uplands, the Weaver, Garnet, Slollicum, and Harrison series were differentiated as members of this subgroup.

Weaver Series

The Weaver soils occupy a substantial acreage on the uplands of the map area, usually between elevations of 300 and 1,200 feet. The topography varies from steeply to very steeply sloping and rolling; most slopes are between 15 and 40 percent. A total of 1,267 acres of Weaver soils were differentiated in addition to 6,244 acres of several soil complexes dominated by Weaver soils.

Weaver soils have developed from a mixture of weathered basal till, aeolian material and colluvium which have been mixed through windthrow action and soil creep. At depths of usually less than 30 inches, hard, compact basal till and occasionally bedrock is encountered. Stones, cobbles and boulders are common in the surface and throughout the profile. Surface textures are generally loam but range from sandy loam to silt loam and grade to gravelly sandy loam and gravelly loamy sand in the subsoil. Rooting depth and moisture permeability is good through the solum but decreases abruptly when the underlying basal till is reached, and a moderate root mat is often present in this zone.

These soils are moderately well drained with seepage occurring along the interface between the solum and the underlying basal till. They are classified as Degraded Acid Brown Wooded and contain a thin, discontinuous Ae horizon underlain by Bfj horizons. In the map area the Weaver soils occupy an intermediate position between the Orthic Acid Brown Wooded Ryder soils and the Orthic Podzol Magellan soils.

Native vegetation is mainly Douglas fir, hemlock and scattered cedar. Large areas have been logged and are presently supporting second growth Douglas fir and hemlock together with big leaf and vine maple, alder, bracken, and various shrubs. A typical profile, located at about 900 feet elevation on the south slope of Mount Woodside was described as follows:

Horizon	Depth Inches	Description
L-H	2 - 0	Mixture of raw to well decomposed deciduous and coniferous litter. Abundant roots in the lower portion. pH 4.7. Abrupt boundary:
Aej	0 - ½	Reddish-gray to dark reddish gray (5YR 4.5/2, moist) or brown (10YR 5/3, dry) loam. Weak, medium to fine subangular blocky structure. Friable when moist. Abundant roots. pH 4.5. Abrupt boundary:
Bfj1	½ - 7	Dark reddish brown to reddish-brown (5YR 3.5/4, moist) or yellowish-brown (10YR 5/4, dry) loam. Weak, medium, subangular blocky structure. Friable when moist. Scattered fine shot. About 30 percent of horizon occupied by stones and cobbles. Abundant roots. pH 5.5. Clear boundary:
Bfj2	7 -17	Dark-brown to brown (7.5YR 4/4, moist) or light yellowish brown (10YR 6/4, dry) sandy loam or loam. Weak, medium subangular blocky structure. Friable when moist. Scattered, fine shot. About 30 percent of horizon occupied by stones and cobbles. Abundant

Horizon	Depth Inches	Description
		roots. pH 5.7. Gradual boundary:
BIIC	17 -21	Yellowish-brown (10YR 5/4, moist) or light yellowish brown to very pale brown (10YR 6.5/4, dry) gravelly sandy loam. Moderate, medium to coarse subangular blocky structure. Firm when moist. Common stones and cobbles. Few, fine, faint mottles. Abundant roots. pH 5.7. Gradual boundary:
IICgj	21 -34	Grayish-brown (10YR 5/2, moist) gravelly loamy sand. Strong, coarse psuedo-subangular blocky structure. Very firm when moist. Few, medium, faint to distinct mottles. Common roots. pH 5.7. Abrupt boundary:
IIC	34 +	Grayish-brown to brown (10YR 5/2.5, moist) gravelly loamy sand. Strong, coarse psuedo-subangular blocky structure. Very firm when moist. Few, fine, faint mottles. Occasional roots in upper part. pH 5.7.

Land Use

None of the Weaver soils are considered suitable for arable agriculture due to adverse topography and stoniness. A few logged areas have limited use for temporary browse.

Forest growth is good although moderate moisture deficiencies may occur during dry summers.

Garnet Series

Garnet soils are restricted to the vicinity of Deer Lake and Ruby Creek between 400 to 600 feet elevations. Topography is variable, ranging from gently to steeply sloping and undulating with slopes between four and 25 percent. A total of 1,396 acres of Garnet series was differentiated.

Parent material of the Garnet soils consists of aeolian material overlying gravelly glacial outwash and occasionally stream deposits. The overlay, usually silt loam or loam texture, varies from 12 to 30 inches in depth with the shallower areas occurring on the steeper slopes. Scattered gravels, stones and cobbles occur throughout most profiles but are more common in areas where the aeolian overlay is shallow. Windthrow is largely responsible for mixing the coarse subsoil constituents into the solum. Rooting depth and moisture movement through the solum is good although patches of weak cementation occur in the gravelly subsoil.

Garnet soils are well to moderately well drained. A discontinuous Ae horizon, generally less than one inch thick, and well developed Bf horizons are general and the soils are classified as Degraded Acid Brown Wooded. Native vegetation, now mostly logged, was Douglas fir, hemlock and cedar. Present growth is a mixture of alder, vine maple, dogwood, and other deciduous species together with second growth coniders. The Marble Hill soils, except for the absence of a thin Ae horizon, have profiles similar to the Garnet series. Refer to page 68 for the Marble Hill soil profile description.

Land Use

None of the Garnet soils are presently utilized for agriculture although the more gently sloping areas are potentially arable. These are friable, easily cultivated soils which become droughty during the summer and require supplemental irrigation for good crop production. Logged areas unsuitable for cultivation have some temporary browse and grazing value. Forest growth is heavy with resultant high clearing and development costs.

Forest growth is very good, the main restriction being moisture deficiencies during dry summers.

Slollicum Series

The Slollicum series occupies substantial acreage in the uplands of the map area between elevations of 1,000 and 2,500 feet. Topography is very steeply to extremely sloping; most gradients are between 50 and 90 percent. A total of 4,254 acres of three soil complexes in which Slollicum soils occupy the dominant acreage were mapped.

The Slollicum soils have developed from unstable, coarse textured colluvial deposits into which a shallow aeolian overlay has been mixed by windthrow and soil creep. Textures, both surface and subsurface, are coarse and vary from gravelly sandy loam to gravelly loamy sand. Profiles are extremely stony and bedrock usually occurs within 36 inches of the soil surface. Rooting depth and moisture permeability is good until the underlying bedrock is reached then decreases abruptly as evidenced by the development of a root mat and occasional weak gleying and mottling. Roots are present in the fractures and cracks in the bedrock.

Most profiles are well drained although seepage occurs above and through the upper part of the fractured bedrock. The Ae horizon development, ranging from none to one and one-half inches, is dependent on the stability of the slope as is the formation of well developed Bf horizons.

These Degraded Acid Brown Wooded soils developed under Douglas fir, cedar and hemlock vegetation, now mostly logged. A typical profile, located at about 2,300 feet elevation on the east side of Harrison Lake and supporting small hemlock and Douglas fir, fireweed, willow, birch, alder, big leaf maple, thimbleberry, false azalea, vaccinium species, moss, and other regrowth vegetation, was described as follows:

Horizon	Depth Inches	Description
L-H	2 - 0	Mixture of raw to well decomposed coniferous, deciduous and moss material. Abundant roots in lower part. pH 4.6. Abrupt boundary:
Ae & Bhf	0 - 1½	Reddish-brown (5YR 4/3, moist) or reddish-brown (5YR 5/3, dry) gravelly sandy loam. Weak, medium subangular blocky structure. Friable when moist. The Ae horizon varies from none to one and one-half inches in depth. Abundant roots. pH 5.3. Abrupt to clear boundary:
Bhf	1½- 8	Dark reddish brown to yellowish-red (5YR 3.5/5, moist) or strong-brown (7.5YR 5/6, dry) gravelly sandy loam. Weak, medium subangular blocky structure. Friable when moist. Stones and cobbles occupy about 40 percent of horizon. Abundant roots. pH 5.5. Clear boundary:
Bfj1	8 -17.	Yellowish-red to reddish-yellow (5YR 4/6-6/8, moist) or reddish-yellow (7.5YR 6/6, dry) gravelly sandy loam or gravelly loam. Weak, medium subangular blocky structure. Friable when moist. Stones and cobbles occupy about 40 percent of horizon. Abundant roots. pH 5.5. Diffuse boundary:
Bfj2	17 -29	Yellowish-brown (10YR 5/6, moist) or yellow to brownish-yellow (10YR 6.5/6, dry) gravelly loam. Weak, medium subangular blocky structure. Friable when moist. Stones and cobbles occupy about 50 percent of horizon. Abundant roots. pH 5.5. Diffuse boundary:
Bfj3	29 -36	Brown to dark-brown (7.5YR 4/4, moist) or brownish-yellow to yellowish-brown (10YR 5.5/6, dry) gravelly sandy loam. Weak, medium subangular blocky structure. Friable when moist. Stones and cobbles occupy 50 to 60 percent of horizon. Moderately well developed

Horizon	Depth Inches	Description
		root mat in lower part. Abundant roots. pH 5.6. Clear boundary:
R	36 +	Highly fractured bedrock. Common roots along fractures in upper part.

Land Use

None of the Slollicum soils are suitable for agricultural use due to steep topography and stoniness. Forest growth, however, is fair due to downslope moisture seepage.

Harrison Series

Harrison soils occupy a minor acreage on the uplands of the map area. For a description of the Harrison soils, see page 17 of this report.

Land Use

On the uplands, the Harrison soils are generally unsuitable for agriculture due to steep topography, stoniness and low moisture holding capacity. Forest growth is fair to good.

Orthic Acid Brown Wooded Soils

For a generalized description of Orthic Acid Brown Wooded soils, refer to page 20 in the lowland soils section of this report.

The Ryder, Columbia, Marble Hill, and Poignant series are classified as Orthic Acid Brown Wooded in the uplands of the map area.

Ryder Series

Ryder soils are mainly restricted to the upland northeast of the Agassiz experimental farm and occur between 75 and 1,000 feet elevations. The topography is strongly to very steeply sloping and rolling with most gradients between 10 and 40 percent. One hundred and six acres of the Ryder series and an additional 2,646 acres of three soil complexes in which Ryder soils are dominant were classified.

The parent material of the Ryder series consists of silty aeolian material which overlies glacial till or bedrock. Surface textures are usually silt loam; subsoil textures are similar but sometimes vary to loam. The underlying glacial till, when present, is usually gravelly sandy loam in texture. Generally the depth of the aeolian overlay is three or more feet. In the few areas where the aeolian overlay is less than 18 inches, a shallow phase is mapped. Occasionally stones and gravels occur in the profile having been incorporated by windthrow from the underlying glacial till or from scattered rock outcrops. Roots and moisture penetration is good.

The Ryder series is well to moderately well drained and is classified as Orthic Acid Brown Wooded. In a few areas a weak Ah horizon is developing, mainly due to the dense deciduous cover which has developed since the original coniferous vegetation was logged. Earthworm activity is evident in the upper portions of some profiles.

A typical profile, located along the new power line east of Agassiz, and supporting Douglas fir, vine and big leaf maple, stinging nettle, deer fern, bracken, alder, thimbleberry, salmonberry, trailing blackberry, and various others, was described as follows:

Horizon	Depth Inches	Description
Ah	0 - 1½	Very dark grayish brown to dark-brown (10YR 3/2.5, moist) or dark yellowish brown (10YR 4/3, dry) silt loam. Weak, fine subangular blocky breaking to weak, fine granular structure. Friable when moist. Evidence of earthworm activity. Abundant roots. pH 6.0. Abrupt boundary:
Bf1	1½- 7	Dark reddish brown (5YR 3/4, moist) or brown (7.5YR 5/4, dry) silt loam. Weak, fine subangular blocky structure. Friable when moist. Scattered, fine, soft shot. Evidence of earthworm activity. Abundant roots. pH 6.2. Gradual boundary:
Bf2	7 -17	Reddish-brown to dark-brown (5YR 4/4 - 7.5YR 4/4, moist) or yellowish-brown (10YR 5/4, dry) silt loam. Weak, fine subangular blocky structure. Friable when moist. Abundant to common roots. pH 6.4. Gradual boundary:
BC	17 -22	Dark-brown (7.5YR 4/4 - 10YR 4/3, moist) or light yellowish-brown (10YR 6/4, dry) loam. Weak, fine subangular blocky structure. Friable when moist. Few, fine, faint mottles. Common roots. pH 6.4. Diffuse boundary:
Cgj1	22 -50	Dark grayish brown to dark-brown (10YR 4/2.5, moist) loam. Massive. Friable when moist. Few to common, fine, faint dark yellowish brown (10YR 4/4, moist) mottles. Common

Horizon	Depth Inches	Description
		roots. pH 6.1. Diffuse boundary:
Cgj2	50 -80	Dark-brown to brown (10YR 4/3, moist) loam or very fine sandy loam. Massive. Friable when moist. Few to common, fine, faint dark-brown (7.5YR 4/2, moist) mottles. Common roots in upper part, occasional in lower part. pH 6.7. Abrupt boundary:
R	80 +	Partially weathered granitic bedrock.

Land Use

Because of adverse topography, most of the Ryder soils are unsuitable for arable agriculture but do have some use as permanent grazing and browse. In a few scattered areas, the topography is sufficiently level for occasional cultivations and could be utilized for pasture and hay production. High clearing costs and small areas, however, may not warrant reclamation. Ryder soils are friable and easily cultivated but become droughty during dry summers.

Columbia Series (7)

Columbia soils are mainly restricted to a small area in the vicinity of Hope and occur between 100 and 300 feet elevations. Topographically they are moderately sloping and undulating with gradients between six and 10 percent. One hundred and sixty-three acres of Columbia gravelly loam and 46 acres of Columbia series were differentiated.

These soils have developed from gravelly and sandy, stratified glacial outwash deposits. A very thin veneer of aeolian material may be present in some areas and has been mixed into the surface by windthrow action. Surface textures are generally sandy loam or gravelly sandy loam grading to gravelly sand in the subsoil. Stones are common in both the surface and the subsoil. Root and moisture penetration is good.

Drainage of these soils is well to rapid although weak cementation sometimes occurs in the lower solum and upper parent material. Profile development is Orthic Acid Brown Wooded and the Bf horizons are well defined. In a few areas weak Aej horizons occur and scattered concretions are sometimes present in the upper solum.

Most of the original coniferous forest has been logged and present vegetation consists of second growth Douglas fir, hemlock, alder, vine maple, and cascara with an understory of bracken, salal, thimbleberry, and others. A typical profile was described as follows:

Horizon	Depth Inches	Description
L-H	2 - 0	Raw to well decomposed mixture of coniferous and deciduous litter. pH 5.2. Abrupt boundary:
Bf1	0 - 7	Dark reddish brown (5YR 3/4, moist) sandy loam. Weak, medium subangular blocky structure. Friable when moist. Scattered, soft concretions. Scattered gravels and cobbles. Abundant roots. pH 5.5. Gradual boundary:
Bf2	7 -17	Dark yellowish brown (10YR 4/3.5, moist) sandy loam. Weak, medium subangular blocky structure. Friable when moist. Scattered, soft concretions. Scattered gravels and cobbles. Abundant roots. pH 5.8. Abrupt boundary:
IIC	17 +	Variable coloured gravelly sand containing pockets of loamy sand. Numerous cobbles and stones. Occasional roots in the upper part. pH 5.6.

Land Use

Almost the entire acreage of Columbia soils in the map area are presently uncleared. Use for agriculture is limited due to adverse topography, stoniness and low water holding capacity. If reclaimed, irrigation should be used to prevent drought during the summer months.

Marble Hill Series (7)

Marble Hill soils occupy a very minor acreage in the Agassiz map area between 50 and 200 feet elevations. Topographically they are gently sloping with gradients from two to five percent. Two hundred and fifty-three acres of the Marble Hill series were mapped.

Parent material of the Marble Hill soils is silty aeolian deposits, generally greater than 18 inches deep, which overlie gravelly and sandy glacial outwash deposits. Surface textures, either loam or silt loam, remain constant downward in the profiles until the coarse underlay is encountered. Occasional stones and gravels which occur in the solum are due to uprooting of trees. Root penetration and moisture permeability are good.

These soils are well drained and are classified as Orthic Acid Brown Wooded. The Bf horizons are well developed and scattered soft to hard concretions occur in the upper part of the solum. Original vegetation was coniferous but has mostly been logged. Regrowth consists of a mixture of Douglas fir, hemlock, cedar, vine maple, alder, dogwood, salal, bracken, moss, and others. A typical profile was described as follows:

Horizon	Depth Inches	Description
L-H	½- 0	Raw to well decomposed mixture of deciduous and coniferous material. Abrupt boundary:
Bf1	0 - 6	Dark yellowish brown (10YR 4/4, moist) silt loam. Weak, medium subangular blocky structure. Friable when moist. Scattered, soft to hard concretions. Abundant roots. pH 5.8. Gradual boundary:
Bf2	6 -20	Yellowish-brown (10YR 5/4, moist) silt loam. Weak, medium subangular blocky structure. Friable when moist. Scattered, soft to hard concretions. Occasional gravels or stones in the lower part. Abundant roots. pH 5.6. Clear boundary:
BIIC	20 -26	Brown to yellowish-brown (10YR 5/3.5, moist) gravelly sandy loam. Weak, medium subangular blocky structure breaking to single-grains. Very friable when moist. Occasional roots. pH 5.6. Gradual boundary:
IIC	26 +	Brown (10YR 5/3, moist) gravelly loamy sand. Single-grained. Loose when moist. pH 5.6.

Land Use

The major proportion of Marble Hill soils are uncleared; some is being utilized for building sites. These are friable, easily cultivated soils which warm early in the spring and are well suited for small fruits or vegetables. They become droughty towards the latter part of the growing season and irrigation should be provided during these periods.

Poignant Series (25)

Poignant soils occupy a substantial acreage in the uplands of the map area between 100 and 1,500 feet elevation. They are very steeply to extremely sloping with gradients generally over 50 and commonly ranging to 90 percent. A total of 4,208 acres were classified as three soil complexes in which Poignant soils are dominant.

These soils have developed on steep, unstable slopes. The colluvial parent material includes aeolian and minor glacial till deposits and rock fragments which have been mixed by soil creep and windthrow. Surface textures vary from gravelly sandy loam to loam and generally become coarser with depth. Stone content is very high, occupying 50 to 80 percent of the soil volume and range in size from gravel to over three feet in diameter. Bedrock is usually encountered within three feet of the surface and frequently outcrops. Moisture and root penetration is good due to the porous nature of the solum and the highly fractured bedrock.

Drainage ranges from well to moderately well and varies with the depth of the solum and the amount of seepage from higher elevations. While these soils are nearly neutral in reaction, the base saturation is low. They have been classified as Orthic Acid Brown Wooded. The degree of development of the Bf horizons is dependent on the stability of the slope, but most slopes are sufficiently stable to produce Bf or Bfj horizons. The mapping units contain inclusions of regosolic soils where active movement has destroyed any Bf development.

The original vegetation was mainly coniferous and has mostly been removed by logging. Present vegetation consists of alder, vine maple, willow, thimbleberry, dogwood, second growth Douglas fir and hemlock as well as a variety of other species. A typical profile, located on the west side of Harrison Lake at about 500 feet elevation, was described as follows:

Horizon	Depth Inches	Description
L	2½- 2	Undecomposed litter, mainly deciduous. pH 6.3. Abrupt boundary:
HF	2 - 0	Black to dark reddish brown (5YR 2/1.5, moist) well to partially decomposed organic material containing some mineral soil. Very friable when moist. Abundant roots. pH 6.4. Abrupt to clear boundary:
Bf1	0 - 7	Dark reddish brown (5YR 3/4, moist) or reddish-brown (5YR 4/4, dry) gravelly sandy loam to sandy loam. Weak, medium to fine subangular blocky structure. Friable when moist. About 50 percent of horizon composed of cobbles and stones. Abundant roots. pH 6.7. Diffuse boundary:
Bf2	7 -19	Yellowish-red (5YR 4/7, moist) or yellowish-red (5YR 5/7, dry) gravelly sandy loam or sandy loam. Weak, medium to fine subangular

Horizon	Depth Inches	Description
		blocky structure. Friable when moist. About 60 percent or horizon composed of cobbles and stones. Abundant roots. pH 6.7. Clear boundary:
BIIC	19 -34	Reddish-brown (5YR 4/4, moist) or strong-brown (7.5YR 5/6, dry) gravelly sand or gravelly loamy sand. Weak, fine, subangular blocky structure. Very friable when moist. About 70 percent of horizon composed of cobbles and stones. Abundant roots. pH 6.8. Clear boundary:
IIC	34 -60	Variable gravelly sand weathered from highly fractured bedrock. Very hard to loose depending on stage of weathering. About 80 percent of horizon composed of partially weathered to unweathered bedrock. Abundant roots in upper part along cracks. pH 6.8. Gradual boundary:
R	60 +	Unweathered highly fractured bedrock.

Land Use

The Poignant soils are unsuitable for arable agriculture due to extreme topography and stoniness although some areas provide limited browse. In many places they are also poor for forests due to shallowness to bedrock and low moisture holding capacity.

CONCRETIONARY BROWN SOILS

These are well to imperfectly drained soils with thin organic surface (L-H) horizons underlain by one or more brown to reddish-brown (Bfcc) horizons containing many concretions and having acid sola. The original vegetation is dominantly coniferous. Only the Orthic Concretionary Brown subgroup of Concretionary Brown soils was differentiated on the uplands of the Agassiz area.

Orthic Concretionary Brown Soils

This well to moderately well drained subgroup has an organic (L-H) surface horizon (under natural conditions) which is underlain by one or more brown or reddish-brown (Bfcc) horizons containing numerous, hard concretions. The Abbotsford series was the only soil differentiated as Orthic Concretionary Brown.

Abbotsford Series

Abbotsford soils occupy about 161 acres east of Mountain Prison between 60 and 125 feet elevation. The topography is gently to moderately sloping and undulating with slopes up to seven percent.

The parent material of the Abbotsford soils is shallow aeolian deposits overlying stratified gravelly and sandy glacial outwash. In places, gravels, sand and stones from the underlying deposits have been mixed into the solum by uprooted trees and land clearing. Loam and silt loam are the common surface textures although variation to gravelly loam and sandy loam also occurs. The coarse underlay is usually encountered at depths between 12 and 18 inches. Root penetration and moisture permeability are good.

The Abbotsford series is classified as Orthic Concretionary Brown. Numerous, hard, concretions are found in the upper part of the well developed Bf horizons and the profiles are moderately acid. Drainage is well to rapid although slight restriction sometimes occurs due to weak cementation in the coarse underlay.

The native vegetation was dominantly coniferous which has mostly been logged. A typical profile, supporting alder, dogwood, birch, second growth Douglas fir, thimbleberry, bracken, salal, trailing blackberry, and huckleberry, was described as follows:

Horizon	Depth Inches	Description
LF	2 - 0	Raw to partially decomposed litter, mainly deciduous. Occasional roots in lower part. pH 5.1. Abrupt boundary:
Bfhcc	0 - 5	Dark reddish brown (5YR 3/4, moist) loam or gravelly loam. Weak, fine subangular blocky structure. Very friable when moist. Numerous hard concretions. Abundant roots. pH 5.0. Clear to gradual boundary:
Bfcc	5 -10	Yellowish-red to dark-brown (5YR 4/6 - 7.5YR 4/4, moist) gravelly loam or gravelly sandy loam. Weak, fine subangular blocky structure. Very friable when moist. Numerous, hard concretions. Abundant roots. pH 5.3. Gradual boundary:
Bm	10 -15	Reddish-brown (5YR 4/4, moist) gravelly sandy loam. Weak, fine subangular blocky structure. Very friable when moist. Scattered, fine concretions. Abundant roots. pH 5.4. Clear boundary:

Horizon	Depth Inches	Description
IICB	15 -23	Strong-brown (7.5YR 5/6, moist) to variegated gravelly sand or gravelly loamy sand. Firm in place, breaking to single-grains when disturbed. Loose when moist. Abundant to common roots. pH 5.6. Diffuse boundary:
IIC	23 +	Gravelly sand of variegated colour. Firm in place, breaking to single-grains when disturbed. Loose when moist. Weak iron staining around some gravels. Occasional roots in upper part. pH 6.2.

Land Use

Most of the Abbotsford soil area is presently uncleared. The cleared portion is used for hay and pasture production although the droughty nature of these soils restricts yields.

Abbotsford soils are well suited for small fruits and vegetables since they warm early in the spring, are well drained, friable and have relatively smooth topography. They have low moisture holding capacity, however, and during most years require irrigation for satisfactory production.

REGOSOL SOILS

For a generalized description of Regosol soils refer to page 39 in the lowland soils section of this report. On the uplands of the Agassiz area, only the Orthic subgroup of Regosol soils was differentiated.

Orthic Regosol Soils

A generalized description of Orthic Regosol soils is given on page 47 of this report. The Isar series is the only Orthic Regosol differentiated in the uplands of the area.

Isar Series

A restricted acreage of Isar soil occurs on the uplands of the map area between 500 and 1,000 feet elevation. For a detailed description of these soils refer to page 49 in the lowland soils section of this report.

Land Use

Adverse topography and stoniness make the Isar soils unsuitable for arable agriculture on the uplands of the map area although some areas may produce small amounts of browse.

MISCELLANOUS LAND TYPES

Recent Alluvium

This land type consists of gravel and sand bars, spits, and other deposits which occur in the river channels and along its margins and is covered by water except when the river is low. Generally there is no covering vegetation. Gravel and stony gravel are the dominant textures although occasionally a thin mantle of fine sand or silt occurs on the surface. The shape and size of these areas may change yearly through erosion and redeposition by the Fraser River.

A total of 3,934 acres were mapped as this land type. In a few areas these deposits are utilized for gravel and fill.

Rock Outcrop

On the uplands of the Agassiz map area there is a substantial acreage of exposed bedrock. A total of 2,453 acres were classified as complexes in which rock outcrops occupy the dominant acreage.

Gravel Pits

Several gravel pits occur in the map area and total 51 acres. They are operated either by private firms, Kent Municipality or the British Columbia Department of Highways.

Urban Areas

Agassiz, Harrison Hot Springs, Mountain Prison, as well as several other urban areas collectively encompass approximately 475 acres.

Sloughs

Meander channels on the floodplain of the Fraser River were identified as sloughs. They contain water most of the year, and are often utilized as sources of irrigation water. Six hundred and seventy-four acres were differentiated as sloughs.

Marl

Seventy acres were differentiated as marl in the vicinity of Cheam Lake. A large part of the marl underlies a variable depth of semi-decomposed peat.

Swamp

Several small areas, totalling 177 acres, were differentiated as swamp. They occur in depressions, receive seepage and runoff from high ground and usually contain water for most of the year.

Airport

Hope airport occupies about 95 acres.

Lakes

Deer, Hicks and several smaller lakes collectively occupy about 484 acres.

Table 2 - Map Symbols and Acreages of the Different Soils and Miscellaneous Areas.

Soils	Map Symbol	Acres	Total
Abbotsford series	AD	161	161
Annis series	AN	95	
Annis-Banford soil complex	AN-BD	107	
Annis-Fairfield:shallow phase soil complex	AN-F:sp	35	
Annis-Hatzic soil complex	AN-HZ	49	286
Banford muck	BD	68	
Banford-Gibson soil complex	BD-GN	81	
Banford-Hjorth soil complex	BD-HJ	18	167
Bear Mountain series	BM	882	
Bear Mountain-Rock Outcrop soil complex	BM-RO	304	1,186
Cheam series	CM	850	
Cheam gravelly sandy loam	CMgsl	412	
Cheam gravelly loam	CMgl	21	
Cheam-Isar soil complex	CM-IS	418	
Cheam-Popkum soil complex	CM-PO	114	1,815
Chehalis series	CS	930	
Chehalis-Elk soil complex	CS-EK	118	
Chehalis-Harrison soil complex	CS-HR	533	
Chehalis-Isar soil complex	CS-IS	455	2,036
Columbia series	CL	46	
Columbia gravelly loam	CLgl	163	209
Elk series	EK	318	
Elk-Chehalis soil complex	EK-CS	164	
Elk-Isar soil complex	EK-IS	314	796

Soils	Map Symbol	Acres	Total
Fairfield series	F	121	
Fairfield silt loam	Fsil	100	
Fairfield silty clay loam	Fsicl	264	
Fairfield-Fairfield:shallow phase soil complex	F-F:sp	468	
Fairfield-Grevell soil complex	F-G	69	
Fairfield-Hjorth soil complex	F-HJ	141	
Fairfield-Kent soil complex	F-KT	202	
Fairfield-Monroe soil complex	F-M	440	
Fairfield-Monroe:shallow phase soil complex	F-M:sp	157	
Fairfield-Page soil complex	F-PE	662	
Fairfield-Hjorth-Annis soil complex	F-HJ-AN	108	
Fairfield-Kent-Hjorth soil complex	F-KT-HJ	331	
Fairfield-Monroe-Page soil complex	F-M-PE	361	
Fairfield-Monroe-Fairfield:shallow phase soil complex	F-M-F:sp	88	
Fairfield-Monroe:shallow phase-Fairfield:shallow phase soil complex	F-M:sp-F:sp	61	
Fairfield-Page-Prest soil complex	F-PE-PR	41	
Fairfield-Page-Seabird soil complex	F-PE-SB	59	
Fairfield:shallow phase	F:sp	327	
Fairfield:shallow phase-Fairfield soil complex	F:sp-F	125	
Fairfield:shallow phase-Grevell soil complex	F:sp-G	212	
Fairfield:shallow phase-Hjorth soil complex	F:sp-HJ	207	
Fairfield:shallow phase-Kent soil complex	F:sp-KT	103	
Fairfield:shallow phase-Monroe:shallow phase soil complex	F:sp-M:sp	324	
Fairfield:shallow phase-Page soil complex	F:sp-PE	193	
Fairfield:shallow phase-Page:shallow phase soil complex	F:sp-PE:sp	68	
Fairfield:shallow phase-Seabird soil complex	F:sp-SB	117	
Fairfield:shallow phase-Fairfield-Grevell soil complex	F:sp-F-G	41	
Fairfield:shallow phase-Fairfield-Kent soil complex	F:sp-F-KT	124	
Fairfield:shallow phase-Fairfield-Monroe:shallow phase soil complex	F:sp-F-M:sp	100	
Fairfield:shallow phase-Grevell-Seabird soil complex	F:sp-G-SB	103	
Fairfield:shallow phase-Monroe-Fairfield soil complex	F:sp-M-F	73	

Soils	Map Symbol	Acres	Total
Fairfield:shallow phase-Monroe:shallow phase-Grevell soil complex	F:sp-M:sp-G	121	
Fairfield:shallow phase-Monroe:shallow phase-Page soil complex	F:sp-M:sp-PE	82	
Fairfield:shallow phase-Page-Grevell soil complex	F:sp-PE-G	74	
Fairfield:shallow phase-Seabird-Page soil complex	F:sp-SB-PE	63	6,130
Garnet series	GT	1,396	1,396
Gibson muck	GN	443	
Gibson-Banford soil complex	GN-BD	249	692
Grevell series	G	573	
Grevell gravel	Gg	91	
Grevell sand	Gs	180	
Grevell loamy sand	Gls	36	
Grevell-Fairfield soil complex	G-F	32	
Grevell-Fairfield:shallow phase soil complex	G-F:sp	202	
Grevell-Laidlaw soil complex	G-LL	46	
Grevell-Monroe:shallow phase soil complex	G-M:sp	130	
Grevell-Page:shallow phase soil complex	G-PE:sp	40	
Grevell-Seabird soil complex	G-SB	1,072	
Grevell-Seabird-Monroe:shallow phase soil complex	G-SB-M:sp	80	
Grevell-Seabird-Page soil complex	G-SB-PE	46	2,528
Harrison series	HR	1,128	
Harrison gravelly sandy loam	HRgsl	53	
Harrison sandy loam	HRsl	226	
Harrison-Cheam soil complex	HR-CM	85	
Harrison-Chehalis soil complex	HR-CS	63	
Harrison-Elk soil complex	HR-EK	146	
Harrison-Isar soil complex	HR-IS	949	2,650
Hatzic silty clay loam	HZsicl	99	
Hatzic-Annis soil complex	HZ-AN	51	150
Hjorth series	HJ	65	
Hjorth silty clay loam	HJsicl	59	
Hjorth-Annis soil complex	HJ-AN	135	
Hjorth-Fairfield soil complex	HJ-F	90	
Hjorth-Fairfield:shallow phase soil complex	HJ-F:sp	75	
Hjorth-Gibson soil complex	HJ-GN	129	
Hjorth-Hjorth:shallow phase soil complex	HJ-HJ:sp	175	
Hjorth-Page soil complex	HJ-PE	40	
Hjorth:shallow phase-Monroe:shallow phase soil complex	HJ:sp-M:sp	29	
Hjorth-Annis-Fairfield soil complex	HJ-AN-F	210	
Hjorth-Annis-Hatzic soil complex	HJ-AN-HZ	104	1,111

Soils	Map Symbol	Acres	Total
Isar series	IS	1,063	
Isar gravelly sand	ISgs	288	
Isar sand	ISs	497	
Isar loamy sand	ISls	156	
Isar gravelly sandy loam	ISgsl	62	
Isar sandy loam	ISsl	96	
Isar gravelly loam	ISgl	48	
Isar-Chehalis soil complex	IS-CS	75	
Isar-Elk soil complex	IS-EK	611	
Isar-Harrison soil complex	IS-HR	1,218	4,114
Kent silt loam	KTsil	185	
Kent:shallow phase	KT:sp	259	
Kent-Hjorth soil complex	KT-HJ	116	
Kent-Kent:shallow phase soil complex	KT-KT:sp	163	
Kent-Kent:shallow phase-Hjorth soil complex	KT-KT:sp-HJ	46	769
Laidlaw series	LL	103	
Laidlaw fine sandy loam	LLfsl	32	
Laidlaw-Monroe soil complex	LL-M	85	
Laidlaw-Monroe:shallow phase soil complex	LL-M:sp	471	
Laidlaw-Monroe:shallow phase-Grevell soil complex	LL-M:sp-G	174	
Laidlaw-Page-Prest soil complex	LL-PE-PR	59	924
Magellan series	MA	149	
Magellan-Rock Outcrop soil complex	MA-RO	343	
Magellan-Weaver-Rock Outcrop soil complex	MA-WV-RO	1,942	
Magellan-Woodside-Rock Outcrop soil complex	MA-WD-RO	303	2,737
Marble Hill series	MH	253	253
Monroe series	M	38	
Monroe loam	Ml	137	
Monroe silt loam	Msil	361	
Monroe:shallow phase	M:sp	467	
Monroe-Fairfield soil complex	M-F	1,624	
Monroe-Laidlaw soil complex	M-LL	112	
Monroe-Monroe:shallow phase soil complex	M-M:sp	511	
Monroe:shallow phase-Fairfield soil complex	M:sp-F	540	
Monroe:shallow phase-Fairfield:shallow phase soil complex	M:sp-F:sp	1,144	
Monroe:shallow phase-Grevell soil complex	M:sp-G	561	
Monroe:shallow phase-Laidlaw soil complex	M:sp-LL	144	

Soils	Map Symbol	Acres	Total
Monroe:shallow phase-Monroe soil complex	M:sp-M	409	
Monroe:shallow phase-Page:shallow phase soil complex	M:sp-PE:sp	64	
Monroe-Fairfield-Monroe:shallow phase soil complex	M-F-M:sp	273	
Monroe-Fairfield-Page soil complex	M-F-PE	158	
Monroe-Monroe:shallow phase-Fairfield soil complex	M-M:sp-F	114	
Monroe-Monroe:shallow phase-Fairfield :shallow phase soil complex	M-M:sp-F:sp	52	
Monroe:shallow phase-Fairfield:shallow phase-Fairfield soil complex	M:sp-F:sp-F	210	
Monroe:shallow phase-Fairfield:shallow phase-Grevells soil complex	M:sp-F:sp-G	233	
Monroe:shallow phase-Fairfield-Hjorth soil complex	M:sp-F-HJ	62	
Monroe:shallow phase-Fairfield-Page soil complex	M:sp-F-PE	119	
Monroe:shallow phase-Fairfield:shallow phase-Page soil complex	M:sp-F:sp-PE	93	
Monroe:shallow phase-Fairfield:shallow phase-Page:shallow phase soil complex	M:sp-F:sp-PE:sp	103	
Monroe:shallow phase-Fairfield:shallow phase-Seabird soil complex	M:sp-F:sp-SB	45	
Monroe:shallow phase-Monroe-Fairfield soil complex	M:sp-M-F	164	
Monroe:shallow phase-Monroe-Grevell soil complex	M:sp-M-G	343	8,081
Niven series	NN	58	58
Page series	PE	148	
Page silty clay loam	PEsicl	57	
Page-Annis soil complex	PE-AN	18	
Page-Fairfield soil complex	PE-F	278	
Page-Fairfield:shallow phase soil complex	PE-F:sp	32	
Page-Prest soil complex	PE-PR	204	
Page:shallow phase-Fairfield:shallow phase soil complex	PE:sp-F:sp	100	
Page:shallow phase-Page soil complex	PE:sp-PE	59	
Page:shallow phase-Prest soil complex	PE:sp-PR	81	
Page:shallow phase-Prest:shallow phase soil complex	PE:sp-PR:sp	34	
Page:shallow phase-Seabird soil complex	PE:sp-SB	163	
Page-Fairfield-Seabird soil complex	PE-F-SB	57	1,231
Poignant-Ryder soil complex	PT-RD	7	
Poignant-Rock Outcrop soil complex	PT-RO	3,103	
Poignant-Weaver-Rock Outcrop soil complex	PT-WV-RO	1,098	4,208

Soils	Map Symbol	Acres	Total
Popkum series	PO	69	
Popkum loam	POl	64	133
Prest series	PR	73	
Prest-Hjorth soil complex	PR-HJ	16	
Prest-Seabird-Fairfield:shallow phase soil complex	PR-SB-F:sp	59	148
Ryder series	RD	106	
Ryder-Rock Outcrop soil complex	RD-RO	149	
Ryder-Ryder:shallow phase soil complex	RD-RD:sp	2,340	
Ryder-Ryder:shallow phase-Poignant soil complex	RD-RD:sp-PT	157	2,752
Seabird series	SB	90	
Seabird-Grevell soil complex	SB-G	581	
Seabird-Monroe:shallow phase soil complex	SB-M:sp	21	
Seabird-Page:shallow phase soil complex	SB-PE:sp	129	821
Slollicum-Rock Outcrop soil complex	SO-RO	3,216	
Slollicum-Weaver soil complex	SO-WV	299	
Slollicum-Weaver-Rock Outcrop soil complex	SO-WV-RO	739	4,254
Weaver series	WV	1,267	
Weaver-Bear Mountain soil complex	WV-BM	208	
Weaver-Rock Outcrop soil complex	WV-RO	2,327	
Weaver-Magellan-Rock Outcrop soil complex	WV-MA-RO	417	
Weaver-Rock Outcrop-Poignant soil complex	WV-RO-PT	654	
Weaver-Slollicum-Rock Outcrop soil complex	WV-SO-RO	2,638	7,511
Woodside series	WD	54	
Woodside-Magellan soil complex	WD-MA	192	
Woodside-Magellan-Rock Outcrop soil complex	WD-MA-RO	1,622	1,868
Miscellaneous Land Types			
Airport		95	
Gravel Pits	GP	51	
Lakes		484	
Marl		70	
Recent Alluvium	RA	3,934	
Urban Areas		475	
Rock Outcrop-Magellan series complex	RO-MA	314	
Rock Outcrop-Weaver series complex	RO-WV	149	
Rock Outcrop-Weaver series-Poignant series complex	RO-WV-PT	1,990	
Sloughs		674	
Swamps	SW	177	8,413
TOTAL		69,588	69,588

Table 3 - Approximate Acreage of Various Soil Parent Materials in the Agassiz Area.

Parent Materials	Acres	Total
Lowlands		
Fraser River floodplain deposits - lateral accretion	21,743	
Fraser River floodplain deposits - vertical accretion	436	
Fraser River floodplain deposits over organic deposits	58	
Alluvial fan deposits	9,596	
Colluvial slide deposits	1,815	
Reworked slide deposits	133	
Organic deposits	859	34,515
Uplands		
Glacial till - ablation	3,054	
Glacial till mixed with colluvial deposits	10,248	
Aeolian deposits over glacial till or bedrock	2,752	
Glacial outwash	209	
Aeolian deposits over or mixed with glacial outwash	1,810	
Colluvial deposits over bedrock	8,462	26,535
Miscellaneous Land Types	8,413	8,413
TOTAL	69,588	69,588

Table 4 - Approximate Acreage of the Great Soil Groups in the Agassiz Area.

Great Soil Group	Acres
Lowlands	
Acid Brown Forest	924
Acid Brown Wooded	6,634
Gleysol	1,665
Humic Gleysol	2,884
Organic	859
Podzol	21,674
Uplands	
Acid Brown Wooded	20,583
Concretionary Brown	161
Podzol	5,791
Miscellaneous Land Types	8,413
TOTAL	69,588

CHEMICAL ANALYSES AND THEIR INTERPRETATION

Chemical analyses of selected Agassiz area soil profiles are given in Tables 5 and 6. The analyses provide helpful soil classification information and serve as a general guide to their fertility and management. They are not intended to serve as a basis for specific fertilizer recommendations for any soils on individual farms.

Methods of Analyses

The pH of mineral soils was measured by a glass electrode using a 1:1 suspension of soil in water. For organic soils a 1:5 soil-water suspension was used. Soil organic matter was determined by the wet combustion method, as described by Peach (22). Total nitrogen was determined by the Kjeldahl method described by Atkinson et al (1) and modified by the use of selenium as a catalyst as suggested by Bremner (3). Laverty's (15) procedure, modified by John (12) was used to determine available phosphorus. Total exchange capacity was determined using the method described by Peach (22) and exchangeable cations were determined on the ammonium acetate extract using an atomic adsorption spectrophotometer. Iron and aluminum were determined by the procedure outlined by McKeague and Day (19) while sulphur was determined by the method of Bardsley and Lancaster (2).

Soil Reaction

Soil reaction or pH, defined as the negative logarithm of hydrogen ion activity in solution, is expressed in values from almost zero to fourteen. Seven represents neutrality and decreasing values below seven express increasing acidity. Increasing values above seven represent increasing intensities of alkalinity Mineral soils in the Agassiz area vary from pH 5.0 to 7.5 while the organic soils and most of the organic litters above mineral soils vary from about pH 3.2 to 5.

Plants vary in their ability to grow at different pH values. Although no single factor may be responsible for limiting growth, nutrient availability to various plants at different pH values has significance. For example, in alkaline soils of the semi-arid and arid regions, or when soils are overlimed, growth may be limited by low availability of iron, manganese and zinc. In some acid soils, on the other hand, manganese, iron and aluminum may be solubilized to the extent of being toxic to many plants.

In the Lower Fraser Valley, pH alone cannot be used to estimate the amount and frequency of liming. Experimental evidence indicates liming is only necessary to maintain pH 4.8 to 5.0 in soils containing 15 percent or more organic matter. For most agricultural crops grown on soils developed from deposits of the Fraser and Vedder rivers and the reclaimed soils of Sumas Lake as well as other soils with 10 to 15 percent organic matter, an upper liming limit of pH 6.? appears sufficient. All other soils with less than 10 percent organic matter should be limed to an upper pH limit of 6.4. Less lime per application is required on coarse textured soils with low cation exchange capacities than on heavy soils with higher exchange capacities to raise the pH a similar amount.

Fraser River alluvium, at the time of deposition, is neutral to basic in reaction as evidenced by the pH values of the very young Grevell and Seabird soils. Monroe, Hatzic and other floodplain soils developed from older deposits are slightly to moderately acidic, mainly due to the downward leaching of calcium, magnesium and other basic ions. Upland soils are strongly leached and have moderately to strongly acidic sola. It also appears that pH values tend to decrease with increasing contents of organic matter.

Some soil borne plant diseases can be controlled by variation of pH since the disease organisms survive only in a relatively narrow pH range.

Nitrogen

Nitrogen is used in large amounts by plants and is easily lost by leaching. Soil organic matter and commercial fertilizers are the major nitrogen sources although small amounts are washed from the atmosphere by rain.

Under favourable conditions, micro-organisms play an important role in the provision of nitrogen to plants. The ammonifying and nitrifying bacteria convert nitrogen in organic matter and from the atmosphere into forms available for plant uptake.

The nitrogen content of Fraser Valley soils depends on the organic matter content. In many cases, organic matter accumulation resulted from poor drainage which retarded decomposition. Unless conditions are changed by improved soil drainage and other cultural practises, the release of nitrogen from soils of high organic matter content cannot be expected to be appreciably higher than for soils of lower organic content but which are better drained.

Only under favourable soil and climatic conditions can total nitrogen values aid in estimating the nitrogen supplying power of the soil. For this purpose, the following levels may serve as a guide:

Very low	- less than 0.10 percent
Low	- 0.10 to 0.25 percent
Medium	- 0.25 to 0.40 percent
High	- greater than 0.50 percent

Organic Matter

Soil organic matter content is related to precipitation, drainage, vegetation, temperature, and other factors. It can vary from less than one percent in mineral soils to 100 percent in organic ones. In cultivated mineral soils, organic matter maintenance is of major importance.

Organic matter effects the chemical, physical and biological properties of the soil. Large portions of soil nitrogen, phosphorus and sulphur are held in organic combinations unavailable for growing plants until released by the activity of soil micro-organisms. Satisfactory organic matter content insures good micro-organism populations which, in turn, release plant nutrients from the organic matter.

Good organic matter content in soils also makes them less susceptible to crusting, more friable, better aerated and more resistant to erosion. Moisture holding and cation exchange capacities are also increased.

In the Agassiz area, the Humic Gleysol soils are moderate to high in organic matter content while the Gleysol soils are low to moderate. The well drained Regosolic, Brunisolic and Podzolic soils are low to moderate in organic matter content and can be rapidly depleted. On the cultivated Regosolic and Brunisolic soils green manure crops and barnyard manure are required to maintain an adequate organic matter content.

Phosphorus

Phosphorus is a major, essential element for crop growth. Most occurs in the soil in forms not immediately available for growing plants; rather it is held in varying forms of organic and inorganic compounds. Plants utilize only inorganic forms of phosphorus and organic forms must be mineralized by micro-organisms before plant uptake is possible.

Phosphate fertilizers do not move far from the point of application, therefore applications should be placed near the roots to ensure that it will supply the growing plant. Top-dress applications are satisfactory for crops having abundant feeding roots near the surface but for deeper rooted crops, the best results are obtained by drilling the fertilizer with the seed.

Results from two methods of phosphorus analysis are given in this report. The P1 method, considered an index of phosphate availability, extracts the available absorbed forms of iron and aluminum phosphate. The P2 method extracts the foregoing forms as well as the relatively unavailable acid soluble calcium phosphates. Ratios between P2 and P1 values are useful in delineating soils high in calcium phosphate.

In the Agassiz area, the soils formed from floodplain deposits have rather low P1 and high P2 values indicating most of the phosphates exist in the calcium forms. Generally plant responses can be expected from addition of phosphate fertilizers. In contrast, most of the upland soils and some of the Bruisolic lowland soils have rather high P1 values expressing a high content of iron and aluminum phosphates. Where immediate phosphate availability is concerned, the well drained upland soils are relatively high.

Though plants vary in their demand, the following table serves as a general guide to available phosphorus in soils, based on the P1 analytical method:

Very low	- less than 5 parts per million
Low	- 5-10 parts per million
Moderate	- 10-20 parts per million
Moderately high	- 20-30 parts per million
High	- greater than 30 parts per million

Iron and Aluminum

The upland soils as well as the Brunisolic lowland soils contain significantly larger amounts of oxalate extractable iron and aluminum than do the younger Gleysolic and Regosolic soils. This difference is one of the criteria for the classification of the soils into different soil groups. The amounts of iron available to plants in all the soils in the Agassiz area are sufficient for good plant growth.

Cation Exchange Capacity

The ability of soils to hold exchangeable cations is termed the cation exchange capacity and is expressed as milli-equivalents of cations required to neutralize the negative charge of 100 grams of soil at pH 7. Depending on the content of organic matter and the type and content of clay minerals, the exchange capacities range from practically zero to over 100 milli-equivalents per 100 grams of soil. The following values may be used as a guide to the relative levels of the exchange capacities of soils:

	Milli-equivalents per 100 grams of soil
Very low	less than 5
Low	5 - 10
Medium	10 - 20
High	greater than 20

Very high cation exchange capacities occur in the heavy textured soils and those when high organic matter contents. The chemical analyses of soils from the Agassiz map area indicate a decrease in exchange capacity with coarser textures and/or decrease in organic matter content. Most of the soils in the area, at least in the surface horizons, have moderately high to high cation exchange capacities.

Exchangeable Cations

Hydrogen, aluminum, calcium, magnesium, potassium, and sodium are the most abundant exchangeable cations. Their proportions vary from soil to soil depending on soil characteristics and past management practises.

Hydrogen and aluminum predominate in acid soils while calcium and magnesium are the most common cations in near neutral soils. Strongly alkaline soils contain large proportions of exchangeable sodium in addition to calcium and magnesium. Exchangeable calcium and magnesium, removed by crops and lost by leaching, are usually replaced by hydrogen and leads to a gradual decrease in pH.

Exchangeable potassium, as with other cations, is in equilibrium with the fixed forms in the soils. This equilibrium is disturbed when plants remove the exchangeable forms and, to re-establish the equilibrium, some fixed potassium is released. The maintenance of an adequate supply depends upon the reserve and the rate of release. As a guide the following levels of exchangeable potassium may be used.

Very low	- less than 30 parts per million*
Low	- 30-60 parts per million
Moderate	- 61-90 parts per million
Moderately high	- 91-120 parts per million
High	- greater than 120 parts per million

The chemical analyses indicate wide variations between soils in the map area with respect to the amount of exchangeable cations present. The upland soils are mostly very low in exchangeable cations and base saturation percentages. Most lowland soils are relatively well supplied with calcium and magnesium although the potassium content is variable. Sodium, toxic when present in high amounts, is present at a low safe level in all soils.

Sulphur

Sulphur, a minor but essential element for plant growth, is generally present in moderate amounts in the lowland soils and in moderate to high amounts in the upland soils.

The following values may be used as a guide to the relative requirements of available sulphur for plant growth:

	Parts per Million	Pounds per Acre
Very low	less than 2	less than 4
Low	2 - 6	4 - 12
Moderate	6 - 10	12 - 20
Moderately high	10 - 20	20 - 40
High	greater than 20	greater than 40

Chemical analyses of composite surface samples from some cultivated soils are given in Table 7. These indicate similarities that occur within soil series and emphasize variations due to individual farm management.

*To obtain parts per million of potassium from Tables 5, 6 and 7, multiply the value given in the tables by 391.

The fertility status of soils vary from farm to farm and field to field. It is advisabla to sample fields with different soils and cultural practices separately for soil testing in order to determine to most economical application rates of fertilizer.

Table 5 - Chemical Analyses of Selected Lowland Soil Profiles in the Agassiz Area.

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity - m.e./100 grams					
									Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
Annis muck - Rego Gleysol														
Hp	9 - 0	mu	5.2	-	2.06	-	16.0	-	28.70	3.26	0.25	0.16	84.4	38.3
Cg1	0 - 7	sicl	6.3	3.5	0.19	10.5	30.0	-	18.44	3.16	0.15	0.29	28.0	79.2
Cg2	7 -36	sicl	6.3	0.5	0.04	5.9	20.0	-	14.39	6.82	0.15	0.25	24.2	89.5
Cg3	36 +	sic	7.0	1.5	0.08	11.0	19.0	-	19.50	5.09	0.16	0.30	25.4	98.5
Banford muck - Shallow Muck														
Hp	14 - 6	mu	5.4	38.8	1.37	16.5	7.0	19.0	33.74	3.50	0.28	0.23	72.4	52.2
H	6 - 0	mu	3.6	100.0	1.57	38.8	7.5	8.0	-	-	-	-	-	-
Ah	0 - 5	sicl	5.4	20.7	0.72	16.7	1.0	32.0	20.75	2.50	0.12	0.16	43.5	54.1
Cg1	5 -12	sicl	5.3	5.7	0.20	16.6	1.0	46.5	12.31	2.07	0.10	0.13	24.2	60.3
Cg2	12 -19	sic	5.3	3.2	0.12	16.0	1.0	73.0	13.85	3.08	0.20	0.15	24.8	69.8
Ab	19 -22	sicl	5.2	11.8	0.31	16.0	1.0	8.0	23.51	4.91	0.16	0.15	53.8	53.4
Cg3	22 +	sic	5.3	-	-	-	0.5	10.5	16.06	4.12	0.20	0.15	35.0	58.6
Cheam gravelly sandy loam - Orthic Acid Brown Wooded														
FH	1½- 0	mu	6.5	-	-	-	-	-	-	-	-	-	-	-
Bf	0 - 7	gsl	5.7	2.4	0.10	14.7	15.0	-	1.50	0.97	0.57	0.09	13.9	22.5
BC	7 -19	gsl-gl	5.8	1.6	0.08	11.7	18.0	-	1.09	0.60	0.55	-	9.6	23.5
C1	19 -37	gl	5.9	1.8	0.06	17.4	32.0	-	1.50	1.23	0.23	0.10	8.8	34.7
C2	37 +	gl-gsl	5.9	0.8	0.02	11.6	21.0	-	3.07	0.51	0.50	-	11.7	34.8
Chehalis loamy sand - Degraded Acid Brown Wooded														
L-H	1½- 0	pt	5.5	48.3	0.79	35.2	49.5	93.0	20.05	3.90	1.23	0.10	70.5	35.9
Ae	0 - ½	ls	5.1	2.5	0.06	24.7	34.0	37.0	1.95	0.45	0.09	0.03	7.8	32.1
Bfj	½- 4	ls	5.5	2.5	0.05	27.6	169.5	362.5	0.47	0.04	0.07	0.05	9.4	6.7
BC	4 - 8	lfs	5.9	1.8	0.06	18.7	52.0	119.0	0.67	0.04	0.06	0.05	7.2	11.4
C	8 -14	fs	6.0	0.9	0.03	35.0	25.0	52.0	0.54	0.04	0.07	0.03	4.3	16.0
IIC	14 +	gs	5.7	-	-	-	21.5	37.2	-	-	-	-	-	-

Table 5 - continued

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity - m.e./100 grams: Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
Elk silt loam - Rego Humic Gleysol														
Ap	0 - 8	sil	5.8	7.5	0.34	13.0	78.0	-	13.50	1.52	0.14	0.18	30.9	49.7
Ah	8 -14	sil	5.6	7.7	0.36	12.5	50.0	-	13.22	0.91	0.14	0.21	34.9	41.9
Cg	14 -22	l-fsl	5.7	1.9	0.11	9.9	21.0	-	6.69	0.60	0.05	0.18	14.6	51.4
IICg	22 +	gs	5.7	1.4	0.08	10.6	24.0	-	4.63	1.09	0.05	0.16	18.6	31.8
Fairfield silty clay loam - Gleyed Deorcic Regosol														
Ap	0 - 9	sicl	6.1	3.9	0.19	11.5	6.5	79.0	12.13	2.04	0.13	0.10	21.6	66.7
Cgj1	9 -15	sicl	6.3	1.5	0.08	10.6	10.5	89.0	9.39	1.48	0.10	0.09	16.2	68.3
Cgj2	15 -21	sicl	6.3	1.0	0.06	9.6	2.5	106.0	10.59	1.47	0.18	0.11	17.1	72.1
Ab	21 -23	sicl	6.2	3.9	0.15	14.7	4.5	21.5	13.61	1.22	0.14	0.13	24.7	61.2
Cgj3	23 -31	sicl	6.4	1.2	0.07	10.6	33.0	52.0	8.35	1.08	0.09	0.10	17.5	54.9
Cgj4	31 +	sicl	6.3	-	-	-	5.5	16.0	9.26	1.40	0.13	0.09	15.1	72.2
Fairfield silt loam:shallow phase - Gleyed Deorcic Regosol														
LF	½ - 0	pt	5.5	38.6	0.90	24.9	-	-	-	-	-	-	-	-
Ah	0 - 5	sil-sicl	5.8	11.0	0.33	19.1	59.0	145.0	19.33	2.59	0.37	0.09	37.1	60.3
Cgj	5 -10	sil-sicl	6.1	1.8	0.08	13.5	57.0	155.0	9.31	1.19	0.29	0.08	15.8	68.9
Cg	10 -14	sil	5.8	1.5	0.06	14.2	10.0	71.0	6.64	0.83	0.19	0.08	12.8	60.4
IICg1	14 -22	fs	6.2	-	-	-	9.5	27.0	1.76	0.21	0.09	0.05	4.0	53.0
IICg2	22 +	fs	6.1	-	-	-	7.0	29.5	2.26	0.15	0.10	0.05	3.6	72.0
Gibson muck - Deep Muck														
H	57 -53	mu	3.9	100.0	2.23	26.5	19.0	20.5	28.83	5.17	0.24	0.15	146.1	23.5
FH1	53 -49	mu	3.7	100.0	1.85	32.1	3.5	6.0	27.24	3.47	0.13	0.15	137.0	22.6
FH2	49 -39	mu	3.5	100.0	1.71	33.2	5.5	8.5	28.40	3.88	0.09	0.16	144.6	22.5
FH3	39 -32	mu	5.4	57.1	0.84	39.3	2.0	40.0	22.38	2.84	0.12	0.16	55.1	46.3
LF	32 -21	pt	3.7	98.4	2.39	23.8	3.0	5.0	15.72	1.11	0.04	0.17	96.7	17.7
FL	21 - 8	pt	3.1	85.5	1.96	26.0	1.5	8.0	20.49	4.59	0.03	0.10	82.9	30.4
H	8 - 0	mu	3.6	35.4	0.84	24.6	11.0	33.5	24.83	6.40	0.09	0.10	77.7	40.4
Cg	0 +	sic	4.7	2.4	0.09	16.0	3.5	14.0	14.19	2.83	0.19	0.11	27.4	63.1

Table 5 - continued

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity - m.e./100 grams: Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
Grevell sandy loam - Orthic Regosol														
L-H	1½- 0	pt	5.9	69.2	1.75	39.5	-	34.0	-	-	-	-	-	-
Ahj	0 - 1½	sl	5.9	4.7	0.19	13.9	5.0	40.5	9.08	2.49	0.25	0.13	18.5	64.6
C1	1½- 4	sl-ls	5.5	1.1	0.06	10.1	2.5	57.5	3.07	1.44	0.10	0.11	8.9	52.8
C2	4 -11	fs	6.0	0.6	0.02	17.8	3.0	42.5	2.02	0.90	0.09	0.10	4.6	67.5
C3	11 +	fs	6.2	0.3	0.02	9.0	3.0	63.5	3.34	0.89	0.15	0.09	6.1	73.8
Harrison loam - Degraded Acid Brown Wooded														
L-H	½- 0	pt	5.2	43.6	0.80	30.9	119.0	218.0	12.66	3.10	1.22	0.12	72.0	23.7
Ae	0 - ¾	l	5.4	7.4	0.12	34.9	57.5	105.0	0.41	0.41	0.09	0.03	13.0	7.2
Bf1	¾- 5	l	5.6	4.0	0.11	21.2	184.0	427.0	0.42	0.09	0.06	0.03	16.6	3.6
Bf2	5 -10	l	5.6	2.7	0.08	18.4	48.0	163.0	0.20	0.04	0.04	0.02	15.9	1.9
BIIC	10 -13	sl	5.6	2.1	0.10	12.8	45.5	154.0	0.27	0.04	0.04	0.02	8.2	4.5
IIC1	13 -19	gs	5.6	-	-	-	50.0	118.0	-	-	-	-	-	-
IIC2	19 +	gs	5.7	-	-	-	48.0	96.0	-	-	-	-	-	-
Hatzic silty clay loam - Orthic Humic Gleysol														
Ap	0 - 5	sicl-sic	5.2	11.2	0.54	12.1	12.5	50.0	8.77	1.47	0.11	0.10	39.8	26.3
Aejg	5 - 7	sic	5.4	3.7	0.21	17.7	15.5	49.0	9.26	2.46	0.11	0.09	31.4	37.9
Bgtj	7 -13	sic-c	5.5	1.8	0.11	9.3	8.0	44.5	4.62	3.46	0.09	0.05	28.7	28.6
BC	13 -16	sic-c	5.7	1.3	0.09	9.1	9.0	44.0	5.04	4.51	0.09	0.13	28.9	33.8
Cg1	16 -24	sic	5.8	-	-	-	3.5	7.5	14.95	5.81	0.10	0.13	33.3	63.1
Cg2	24 +	sic	6.0	-	-	-	-	9.0	14.94	6.53	0.10	0.13	29.6	73.4
Hjorth silty clay loam - Rego Humic Gleysol														
Ap	0 - 8	sicl	5.5	9.2	0.38	14.0	14.0	38.0	4.38	2.07	0.40	0.11	33.3	20.9
Cg1	8 -15	sicl	5.9	2.6	0.14	11.3	10.0	21.0	4.75	1.68	0.09	0.15	21.2	31.5
Cg2	15 -23	sicl	6.0	0.7	0.05	8.3	24.5	42.0	4.67	1.32	0.05	0.09	11.6	52.9
Cg3	23 -37	sicl	5.9	-	-	-	18.5	33.0	4.32	1.18	0.05	0.10	10.6	53.3
IICg	37 +	fsl-lfs	5.8	-	-	-	-	-	-	-	-	-	-	-

Table 5 - continued

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
									Exchangeable Cations and Exchange Capacity - m.e./100 grams					
Isar loamy fine sand - Orthic Regosol														
LF	1 - 0	pt	5.2	67.1	0.86	45.6	81.9	139.0	23.54	3.85	2.37	0.12	89.7	33.3
C1	0 - 7	lfs	5.7	3.2	0.07	26.4	315.5	588.5	1.27	0.23	0.11	0.03	11.7	14.0
C2	7 -14	gs	5.7	1.3	0.03	23.9	273.5	424.0	0.29	0.04	0.07	0.02	5.8	7.3
C3	14 -24	gs	5.7	-	-	-	106.0	167.5	0.16	0.02	0.05	0.02	3.5	7.1
Kent silt loam:shallow phase - Rego Humic Gleysol														
Ap	0 - 7	sil	4.9	7.3	0.31	13.7	6.0	15.5	3.02	0.58	0.08	0.05	28.3	13.2
Cg1	7 -12	sil	5.6	1.8	0.08	11.8	21.5	40.0	3.32	0.81	0.03	0.05	16.7	25.2
Cg2	12 -17	sil	5.7	0.6	0.04	9.4	20.0	43.0	4.62	1.16	0.03	0.05	12.0	48.9
IICg1	17 -24	s	6.0	-	-	-	65.0	104.5	-	-	-	-	-	-
IICg2	24 -32	s	6.0	-	-	-	61.5	110.0	-	-	-	-	-	-
IICg3	32 +	s	5.7	-	-	-	38.0	84.0	-	-	-	-	-	-
Laidlaw fine sandy loam - Orthic Acid Brown Forest														
L-H	½ - 0	pt	6.0	71.6	1.61	25.8	-	104.0	-	-	-	-	-	-
Ah	0 - 3½	fsl	5.6	6.6	0.23	16.9	38.5	47.0	6.29	1.59	0.24	0.09	16.8	48.9
Bm	3½-10	lfs	5.7	1.6	0.06	16.0	> 100.0	138.0	1.61	0.44	0.10	0.10	9.0	24.9
BC	10 -18	s	6.0	0.6	0.02	14.5	> 100.0	152.0	0.97	0.18	0.11	0.08	4.8	27.9
C1	18 -24	s	5.9	0.3	0.02	13.6	30.0	62.0	1.25	0.15	0.11	0.08	3.6	44.5
C2	24 -34	s	5.5	-	-	-	14.5	46.5	1.22	0.17	0.08	0.09	3.7	42.8
Monroe silt loam - Deorcic Regosol														
L	2 - 1½	pt	5.9	83.7	1.78	27.4	-	66.0	-	-	-	-	-	-
H	1½ - 0	mu	5.9	44.1	1.24	20.7	20.5	42.5	-	-	-	-	-	-
Ah	0 - 4	sil	6.0	2.0	0.10	11.7	46.5	146.0	7.61	1.18	0.34	0.09	14.8	62.5
C1	4 -10	sil	5.8	1.0	0.05	12.0	17.7	119.0	5.20	1.27	0.33	0.06	10.9	62.9
C2	10 -18	sil-vfsl	5.4	0.6	0.04	8.3	12.0	107.0	4.41	1.17	0.25	0.08	11.0	53.7
C3	18 -27	sil	5.4	-	-	-	10.5	128.0	6.03	1.32	0.20	0.10	11.9	64.5
Cgj1	27 -36	sil-sicl	5.5	-	-	-	10.0	111.0	6.77	1.16	0.15	0.10	13.0	63.2
Cgj2	36 +	sil-sicl	5.5	-	-	-	10.0	77.5	8.05	2.15	0.15	0.13	17.0	61.6

Table 5 - continued

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity - m.e./100 grams					
									Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
Monroe silt loam: shallow phase - Deorcic Regosol														
Ah	0 - 5	sil	6.0	8.8	0.32	15.7	6.5	58.5	15.98	3.34	0.51	0.10	27.6	72.2
C1	5 -11	sil	6.2	1.8	0.09	12.1	6.0	74.0	7.26	1.43	0.28	0.06	12.9	70.2
C2	11 -17	sil	5.9	1.7	0.08	13.0	5.5	92.5	6.28	1.35	0.18	0.08	12.7	62.1
IIC1	17 -23	fs	6.1	0.4	0.02	11.2	14.5	72.5	3.22	0.64	0.13	0.06	6.2	66.0
IIC2	23 +	lfs	6.0	-	-	-	24.5	78.5	3.96	0.28	0.16	0.05	6.7	66.3
Page silty clay loam - Rego Gleysol														
Ah	0 - 2	sicl	5.1	18.1	0.71	14.7	12.0	44.0	11.84	3.95	0.62	0.17	43.9	37.8
Cg1	2 - 9	sicl	5.5	1.4	0.08	10.5	4.5	105.0	7.91	1.65	0.15	0.15	16.3	60.5
Cg2	9 -16	sicl	5.6	0.8	0.05	8.9	4.5	46.5	8.27	2.30	0.17	0.13	15.2	71.6
Cg3	16 -35	sicl	6.1	0.4	0.03	7.3	3.5	122.0	7.55	2.40	0.13	0.12	12.9	79.1
Cg3 & IICg1	35 -41	l-sil	6.2	-	-	-	3.0	120.0	5.82	1.44	0.09	0.13	10.0	75.0
IICg1	41 +	l-vfsl	6.1	-	-	-	4.4	96.0	5.33	1.33	0.08	0.13	9.1	75.9
Prest silty clay loam - Rego Gleysol														
Cg1	0 - 8	sicl	6.3	0.6	0.04	10.1	2.0	138.0	7.19	2.13	0.18	0.10	12.0	79.7
Cg2	8 -18	sic	6.1	0.8	0.05	9.3	2.5	171.0	10.53	3.57	0.35	0.13	17.9	81.4
Cg3	18 -25	sil-sicl	5.2	0.7	0.09	4.5	4.5	106.0	6.69	2.31	0.34	0.10	15.7	60.2
Cg4	25 +	sil-sicl	6.3	0.7	0.04	13.1	1.5	126.0	7.25	2.72	0.13	0.11	12.2	83.7
Seabird loamy sand - Gleyed Orthic Regosol														
C1	0 - 4	s	6.9	0.4	0.02	10.8	11.0	93.0	4.47	0.79	0.25	0.06	6.1	91.6
Cgj1	4 - 9	ls-lfs	7.3	0.6	0.02	13.9	2.5	117.0	6.12	1.46	0.26	0.08	7.9	100.0
Cgj2	9 -14	lfs	7.5	0.9	0.04	13.8	2.5	66.5	12.59	1.29	0.28	0.08	10.6	100.0
IICgj1	14 -22	sil	7.2	-	-	-	4.0	71.5	15.99	1.30	0.21	0.10	19.7	89.3
IICgj2	22 -28	sil	7.1	-	-	-	1.0	70.0	12.05	1.16	0.16	0.10	15.4	87.6
Cgj3	28 +	s	7.2	-	-	-	3.5	67.5	4.50	0.46	0.08	0.06	5.9	86.4

+ Greater than.

Table 6 - Chemical Analyses of Selected Upland Soil Profiles in the Agassiz Area.

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity - m.e./100 grams Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
Abbotsford loam - Orthic Concretionary Brown														
LF	2 - 0	pt	5.1	52.8	0.85	36.3	-	100.0	-	-	-	-	-	-
Bfhcc	0 - 5	l	5.0	5.9	0.14	25.0	>100.0	>200.0	0.48	0.10	0.16	0.11	15.5	5.5
Bfcc	5 -10	l-gl	5.3	3.4	0.11	16.7	33.0	75.0	0.21	0.06	0.06	0.08	14.8	2.8
Bm	10 -15	gsl	5.4	4.0	0.09	26.0	18.0	50.0	0.21	-	0.06	0.09	12.0	3.0
IICB	15 -23	gls	5.6	0.6	-	-	45.5	82.0	0.26	-	Tr.	0.06	3.9	8.6
IIC	23 +	gs	6.2	-	-	-	72.5	109.0	0.26	-	Tr.	0.05	2.6	12.0
Bear Mountain sandy loam - Orthic Podzol														
L-H	1 - 0	pt	5.1	36.5	0.55	37.9	38.0	-	5.40	1.46	0.41	0.11	61.2	12.0
Ae	0 - 1	sl-l	4.6	2.4	0.06	22.4	9.0	-	1.01	0.30	0.10	0.07	11.1	13.3
Bfh	1 - 4	sl	5.0	6.2	0.12	31.4	45.5	-	0.46	0.10	0.09	0.03	27.4	3.9
Bf1	4 -11	gls	5.4	3.5	0.07	30.7	33.5	-	0.25	0.04	0.07	0.03	18.0	2.2
Bf2	11 -21	gs-gls	5.8	1.2	0.04	17.7	23.0	-	0.32	0.05	0.06	0.03	12.7	3.6
BC	21 -31	gs	5.9	0.9	0.02	22.9	32.5	-	0.20	0.02	0.06	0.03	6.2	5.0
C1	31 -56	gs	6.0	-	-	-	92.5	-	-	-	-	-	-	-
C2	56 +	s	6.1	-	-	-	90.5	-	-	-	-	-	-	-
Columbia sandy loam - Orthic Acid Brown Wooded														
L-H	2 - 0	pt	5.2	-	-	-	-	-	-	-	-	-	-	-
Bf1	0 - 7	sl	5.5	4.7	0.19	14.1	42.0	-	0.32	0.07	0.09	0.05	21.1	2.4
Bf2	7 -17	sl	5.8	3.2	0.13	14.5	13.0	-	0.10	0.07	0.04	0.05	21.4	1.2
IIC	17 +	gs	5.6	1.8	0.08	13.5	57.0	-	0.27	0.08	0.04	0.05	13.9	4.0
Poignant gravelly sandy loam - Orthic Acid Brown Wooded														
L	2½ - 2	pt	6.3	44.3	0.71	36.2	117.0	-	23.39	2.84	1.51	0.10	84.6	32.9
HF	2 - 0	mu	6.4	36.8	0.56	37.9	66.0	-	25.68	2.72	1.12	0.10	72.1	41.1
Bf1	0 - 7	gsl-sl	6.7	3.8	0.11	20.9	315.5	-	5.69	0.55	0.05	0.07	12.5	50.9
Bf2	7 -19	gsl-sl	6.7	2.9	0.09	19.9	143.0	-	4.44	0.31	0.06	0.09	13.9	35.3
BIIB	19 -34	gs-gls	6.8	0.9	0.06	8.4	105.5	-	3.11	0.24	0.10	0.07	11.5	30.6
IIC	34 -60	gs	6.8	-	-	-	22.0	-	-	-	-	-	-	-

Table 6 - continued

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity - m.e./100 grams: Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
Ryder silt loam - Orthic Acid Brown Wooded														
Ah	0 - 1½	sil	6.0	8.0	0.25	18.5	204.0	-	8.41	1.56	0.08	0.03	23.3	43.3
Bf1	1½- 7	sil	6.2	2.7	0.10	16.2	223.0	-	-	0.63	0.09	0.03	14.0	-
Bf2	7 -17	sil	6.4	1.5	0.60	15.0	105.0	-	2.16	0.31	0.09	0.03	9.6	26.9
BC	17 -22	l	6.4	0.6	-	-	52.0	-	2.47	0.46	0.09	0.05	7.1	43.3
Cgj1	22 -50	l	6.1	-	-	-	13.0	-	3.52	0.84	0.08	0.05	7.2	63.9
Cgj2	50 -80	l-vfsl	6.7	-	-	-	13.5	-	5.04	1.64	0.06	0.06	8.2	80.5
Slollicum gravelly sandy loam - Degraded Acid Brown Wooded														
L-H	2 - 0	pt	4.6	51.8	0.84	36.8	34.5	-	4.76	0.90	0.93	0.11	81.5	8.2
Ae & Bhf	0 - 1½	gsl	5.3	10.9	0.20	30.9	55.0	-	1.99	0.32	0.08	0.06	30.9	11.2
Bfh	1½- 8	gsl	5.5	8.2	0.19	25.4	18.0	-	2.67	0.57	0.11	0.04	30.2	11.3
Bfj1	8 -17	gsl-gl	5.5	3.9	0.09	25.4	14.0	-	0.22	0.05	0.09	0.03	20.2	1.9
Bfj2	17 -29	gl	5.5	1.3	0.03	24.7	12.5	-	0.11	0.04	0.05	0.02	16.1	1.4
Bfj3	29 -36	gsl	5.6	-	-	-	13.0	-	-	-	-	-	-	-
Weaver loam - Degraded Acid Brown Wooded														
L-H	2 - 0	pt	4.7	83.8	1.29	38.2	56.5	-	21.35	5.08	1.95	0.16	119.2	23.9
Aej	0 - ½	l	4.5	6.5	0.12	32.2	65.0	-	0.80	0.14	0.10	0.03	19.6	5.5
Bfj1	½- 7	l	5.5	4.7	0.10	26.4	55.0	-	1.13	0.24	0.09	0.07	16.8	9.1
Bfj2	7 -17	sl-l	5.7	3.1	0.08	22.3	16.0	-	0.46	0.09	0.10	0.03	13.5	5.0
BIIC	17 -21	gsl	5.7	1.5	0.04	23.4	8.5	-	0.21	0.04	0.05	0.03	10.1	3.3
IICgj	21 -34	gls	5.7	-	-	-	34.5	-	0.11	0.02	0.04	0.03	8.4	2.4
IIC	34 +	gls	5.7	-	-	-	46.0	-	0.13	0.02	0.05	0.07	11.5	2.4

Table 6 - continued

Horizon	Depth Inches	Texture	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity - m.e./100 grams					
									Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %
Woodside sandy loam - Ortstein Podzol														
L	2 - 1½	pt	4.2	94.7	1.22	45.2	37.0	-	9.46	2.45	2.57	0.16	108.2	13.5
FH	1½ - 0	mu	3.7	100.0	1.17	51.4	34.5	-	5.17	1.25	0.62	0.24	102.1	7.1
Ae	0 - 2	sl-l	3.9	4.0	0.07	32.5	6.5	-	0.18	0.10	0.10	0.03	13.3	3.1
Bfh	2 - 5	sl-gsl	5.1	6.1	0.13	27.5	9.0	-	0.12	0.10	0.11	0.03	32.3	1.1
Bf	5 -12	gsl-gls	5.8	2.9	0.06	26.7	3.5	-	0.12	0.10	0.10	0.03	19.0	1.8
Bfgj	12 -16	gls	5.7	2.5	0.05	28.2	15.5	-	0.11	0.06	0.10	0.03	13.7	2.2
Bfcgj	16 -38	gls	5.6	2.5	0.06	25.5	16.5	-	0.09	0.02	0.08	0.02	15.8	1.3
CB	38 -68	gls	5.7	1.3	0.04	19.8	22.5	-	0.10	0.08	0.08	0.03	9.0	3.2
Cgj	68 >	gls	5.6	-	-	-	57.5	-	0.12	0.02	0.06	0.03	4.9	4.7

> Greater than.

Table 7 - Chemical Analyses of Selected Composite Surface Samples of the Agassiz Area.

Sample Number	pH	Organic Matter %	Total N %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Cation Exchange Capacity	Base Saturation %	Available S p.p.m.
Fairfield Series - Gleyed Deorcic Regosol													
1	6.1	4.9	0.24	11.7	30.0	-	17.46	3.70	0.07	0.09	21.8	97.7	11.3
2	6.0	6.0	0.25	14.1	37.5	-	10.71	2.72	0.39	0.08	28.7	48.5	19.0
3	6.1	5.0	0.24	12.3	42.0	-	16.53	6.51	0.30	0.05	28.5	62.0	11.0
4	5.7	3.6	0.19	10.7	3.5	-	7.25	2.62	0.30	0.08	18.6	55.2	3.5
Grevell Series - Orthic Regosol													
1	6.1	2.4	0.10	13.9	7.5	-	9.60	3.97	0.35	0.05	11.7	100.0	3.5
2	5.6	2.5	0.12	12.0	3.5	-	7.95	3.65	0.25	0.06	12.1	98.2	4.8
Hatzic Series - Orthic Humic Gleysol													
1	5.7	6.3	0.54	13.7	40.0	-	12.72	3.74	0.07	0.11	26.2	63.6	9.5
Hjorth Series - Rego Humic Gleysol													
1	5.5	4.6	0.23	11.5	3.5	-	8.38	2.68	0.04	0.08	22.4	50.2	5.0
Kent Series - Rego Humic Gleysol													
1	6.0	7.1	0.33	12.7	15.5	-	16.96	2.71	0.22	0.11	29.6	67.6	15.8
2	5.5	6.3	0.25	14.7	37.5	-	10.50	0.34	0.33	0.06	29.3	38.3	10.8
Monroe Series - Deorcic Regosol													
1	5.7	4.4	0.21	12.1	32.0	-	8.07	3.03	0.07	0.08	20.1	56.0	9.0
2	6.1	2.8	0.14	11.7	4.5	-	11.04	4.36	0.07	0.07	15.0	97.3	3.8
3	5.8	6.6	0.26	9.1	38.5	-	14.01	2.73	0.34	0.08	26.0	66.1	11.5
4	6.1	3.3	0.16	12.0	5.0	-	13.31	3.66	0.15	0.07	16.3	100.0	4.5

Table 8 - Iron and Sulphur Analyses for Selected Profiles in the Agassiz Area.

Horizon	Depth Inches	Texture	Oxalate Extraction Fe %	Al %	Available S p.p.m.
Lowland					
Chehalis loamy sand - Degraded Acid Brown Wooded					
L-H	1½- 0	pt	-	-	-
Ae	0 - ½	ls	0.42	0.94	5.8
Bfj	½- 4	ls	0.22	0.79	10.8
BC	4 - 8	lfs	0.30	0.86	9.5
C	8 -14	fs	-	0.77	10.8
IIC	14 +	gs	-	0.44	2.5
Harrison loam - Degraded Acid Brown Wooded					
L-H	½- 0	pt	-	-	-
Ae	0 - ¾	l	0.28	0.16	4.5
Bf1	¾- 5	l	0.98	1.18	9.3
Bf2	5 -10	l	0.68	1.08	11.5
BIIC	10 -13	sl	0.16	0.38	12.0
IIC1	13 -19	gs	0.16	0.80	9.0
IIC2	19 +	gs	0.70	1.44	5.5
Hatzic silty clay loam - Orthic Humic Gleysol					
Ap	0 - 5	sicl-sic	-	-	15.3
Aejg	5 - 7	sic	-	-	9.5
Bgtj	7 -13	sic-c	-	-	6.0
BC	13 -16	sic-c	-	-	6.5
Cg1	16 -24	sic	-	-	7.0
Cg2	24 +	sic	-	-	6.0
Isar loamy fine sand - Orthic Regosol					
LF	1 - 0	pt	-	-	-
C1	0 - 7	lfs	-	-	6.0
C2	7 -14	gs	-	-	4.0
C3	14 -24	gs	-	-	6.3
Kent silt loam:shallow phase - Rego Humic Gleysol					
Ap	0 - 7	sil	-	-	10.0
Cg1	7 -12	sil	-	-	8.0
Cg2	12 -17	sil	-	-	5.5
IICg1	17 -24	s	-	-	4.8
IICg2	24 -32	s	-	-	4.0
IICg3	32 +	s	-	-	4.8

Table 8 - continued

Horizon	Depth Inches	Texture	Oxalate Extraction Fe %	Oxalate Extraction Al %	Available S p.p.m.
Laidlaw fine sandy loam - Orthic Acid Brown Forest					
L-H	½- 0	pt	-	-	-
Ah	0 - 3½	fsl	0.38	0.12	-
Bm	3½-10	lfs	0.40	0.28	-
BC	10 -18	s	0.36	0.30	-
C1	18 -24	s	0.24	0.24	-
C2	24 -34	s	0.26	0.20	-
Upland					
Abbotsford loam - Orthic Concretionary Brown					
LF	2 - 0	pt	-	-	-
Bfhcc	0 - 5	l	0.38	1.40	-
Bfcc	5 -10	l-gl	0.52	1.48	-
Bm	10 -15	gsl	-	-	-
IICB	15 -23	gls	0.28	0.76	-
IIC	23 +	gs	0.34	0.48	-
Bear Mountain sandy loam - Orthic Podzol					
L-H	1 - 0	pt	-	-	-
Ae	0 - 1	sl-l	0.10	0.04	5.3
Bfh	1 - 4	sl	1.76	1.15	15.5
Bf1	4 -11	gls	1.28	1.52	15.0
Bf2	11 -21	gs-gls	0.78	1.48	20.3
BC	21 -31	gs	0.50	1.08	22.3
C1	31 -56	gs	0.48	0.58	15.0
C2	56 +	s	0.32	0.40	20.0
Poignant gravelly sandy loam - Orthic Acid Brown Wooded					
L	2½- 2	pt	-	-	-
HF	2 - 0	mu	-	-	-
Bf1	0 - 7	gsl-sl	1.44	1.22	5.0
Bf2	7 -19	gsl-sl	1.56	1.02	4.0
BIIB	19 -34	gs-gls	0.98	1.28	4.5
IIC	34 -60	gs	0.32	0.44	3.3
Ryder silt loam - Orthic Acid Brown Wooded					
Ah	0 - 1½	sil	1.00	0.55	16.0
Bf1	1½- 7	sil	1.20	0.84	3.8
Bf2	7 -17	sil	1.32	0.96	7.8
BC	17 -22	l	0.88	0.24	7.0
Cgj1	22 -50	l	0.68	0.35	5.8
Cgj2	50 -80	l-vfsl	0.73	0.08	3.3

Table 8 - continued

Horizon	Depth Inches	Texture	Oxalate Extraction Fe %	Oxalate Extraction Al %	Available S p.p.m.
Slollicum gravelly sandy loam - Degraded Acid Brown Wooded					
L-H	2 - 0	pt	-	-	-
Ae & Bhf	0 - 1½	gsl	2.72	1.12	17.0
Bfh	1½- 8	gsl	1.32	2.24	26.5
Bfj1	8 -17	gsl-gl	1.44	1.56	42.5
Bfj2	17 -29	gl	2.64	0.90	58.0
Bfj3	29 -36	gsl	2.30	0.87	94.5
Weaver loam - Degraded Acid Brown Wooded					
L-H	2 - 0	pt	-	-	-
Aej	0 - ½	l	0.68	0.30	16.0
Bfj1	½- 7	l	0.98	0.87	10.0
Bfj2	7 -17	sl-l	0.74	1.29	17.8
BIIC	17 -21	gsl	0.32	1.15	25.8
IICgj	21 -34	gls	0.28	1.06	17.5
IIC	34 +	gls	0.28	1.08	12.5
Woodside sandy loam -Ortstein Podzol					
L	2 - 1½	pt	-	-	-
FH	1½- 0	mu	-	-	-
Ae	0 - 2	sl-l	0.10	0.08	5.5
Bfh	2 - 5	sl-gsl	2.34	2.82	42.3
Bf	5 -12	gsl-gls	0.98	2.36	71.0
Bfgj	12 -16	gls	1.00	1.96	47.5
Bfcgj	16 -38	gls	1.09	2.24	57.3
CB	38 -68	gls	0.82	1.40	36.8
Cgj	68 +	gls	0.60	0.96	38.5

REFERENCES

1. Atkinson, H. J., G. R. Giles, A. J. MacLean, and J. R. Wright. Chemical Methods of Soil Analysis. Canada Department of Agriculture, Science Service, Chemistry Division, Ottawa. 1958.

2. Bardsley, C. E., and J. D. Lancaster. Determination of reserve sulphur and soluble sulphates in soils. Soil Science of America Proceedings, Vol. 24, No. 4. 1960.

3. Bremner, J. M. Determination of nitrogen in the soil by the Kjeldahl method. Journal of Agricultural Science, Vol. 55, No. 1. 1960.

4. British Columbia Department of Agriculture. Climate of British Columbia. Annual Reports, 1916-65.

5. British Columbia Department of Industrial Development, Trade and Commerce. Regional Index of British Columbia. Bureau of Economics and Statistics. Queen's Printer, Victoria, B. C. January, 1966.

6. British Columbia Department of Municipal Affairs. Municipal Statistics, 1965. Queen's Printer, Victoria, B. C. 1966.

7. Comar, V. K., P. N. Sprout, and C. C. Kelley. Soil Survey of Chilliwack Map-Area. British Columbia Department of Agriculture, Kelowna, B. C. Preliminary Report No. 4. 1962.

8. Connor, A. J. The Frost-Free Season in British Columbia. Canada Department of Transport. Meteorological Division, Toronto, Ontario. 1949.

9. Department of Mines and Technical Surveys, Geological Survey of Canada. Geology of Victoria-Vancouver Map-Sheet. Scale 1" = 8 miles. Map 1069A. 1959.

10. Halstead, E. C. Ground-Water Resources of Sumas, Chilliwack, and Kent Municipalities, British Columbia. Department of Mines and Technical Surveys, Geological Survey of Canada, Paper 60-29. Queen's Printer, Ottawa. 1960.

11. Holland, S. S. Landforms of British Columbia. A Physiographic Outline. Bulletin #48. British Columbia Department of Mines and Petroleum Resources. Queen's Printer, Victoria. 1964.

12. John, M. K. Soil Analysis Procedure in Use in Kelowna Determination of Available Phosphorus. British Columbia Department of Agriculture, Kelowna. 1963.

13. Kelley, C. C., and R. H. Spilsbury. Soil Survey of the Lower Fraser Valley. Publication 650. Canada Department of Agriculture, Ottawa. 1939. (out of print)

14. Kendrew, W. G., and D. Kerr. The Climate of British Columbia and the Yukon Territory. Queen's Printer, Ottawa. 1955.

15. Laverty, J. C. The Illinois Method (Bray No. 1) for Determing Available Phosphorus in Soils. Department of Agronomy, College of Agriculture, University of Illinois, Urbana, Ill. 1961.

16. Luttmerding, H. A., and P. N. Sprout. Soil Survey of Langley Municipality and Barnston Island. British Columbia Department of Agriculture, Kelowna. Preliminary Report No. 7. 1966.

17. Lyons, C. P. Trees, Shrubs and Flowers to Know in British Columbia. 2nd Edition. J. M. Dent and Sons (Canada) Ltd., Vancouver. 1959.

18. Mackintosh, E. E., and E. H. Gardner. A Mineralogical and Chemical Study of Lower Fraser Valley Alluvial Sediments. Canadian Journal of Soil Science, Vol. 46, pp. 37-45. 1966.

19. McKeague, J. A., and J. H. Day. Dithionite - and oxalate - extractable Fe and Al as aids in differentiating various classes of soils. Canadian Journal of Soil Science, Vol. 46, No. 1. 1966.

20. National Soil Survey Committee of Canada. Report of the Fifth Meeting of the National Soil Survey Committee. Winnipeg, Manitoba. 1963.

21. National Soil Survey Committee of Canada. Report of the Sixth Meeting of the National Soil Survey Committee. Quebec City, P.Q. 1965.

22. Peach, M., L. T. Alexander, L. A. Dean, and J. F. Reed. Methods of Soil Analysis for Soil Fertility Investigation. U.S.D.A. Circular No. 757. Wasington, D. C. 1957.

23. Research Branch, Canada Department of Agriculture. Guide to the Experimental Farm, Agassiz, B. C.

24. Rowe, J. S. Forest Regions of Canada. Bulletin 123, Forestry Branch, Department of Northern Affairs and Natural Resources. Queen's Printer, Ottawa. 1959.

25. Runka, G. G., and C. C. Kelley. Soil Survey of Matsqui Municipality and Sumas Mountain. British Columbia Department of Agriculture, Kelowna. Preliminary Report No. 6. 1964.

26. Soil Science Workshop. Report of 3rd Meeting. University of British Columbia, Vancouver. 1965.

27. United States Department of Agriculture. Soil Survey Manual. U. S. Department of Agriculture Handbook No. 18. U. S. Government Printing Office, Washington, D. C. 1951.

28. Woods, J. J. The Agassiz-Harrison Valley, History and Development. Peninsula Printing Co. Ltd., Sidney, B. C. 1958.

APPENDIX

Table A - Average Monthly, Annual Mean and Extreme Temperatures Recorded at Several Fraser Valley Stations.

Degrees Fahrenheit

Station	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	High	Low	Years of Record
Agassiz (C.D.A.)	35	39	43	50	56	60	64	64	60	52	43	38	50	103	-13	74
Abbotsford (Airport)	34	39	42	48	54	58	62	62	58	50	42	38	49	100	- 6	21
Chilliwack	35	40	42	49	55	60	64	63	60	52	43	38	50	100	- 3	16
Haney (U.B.C. Forest)	34	38	40	46	53	58	62	62	57	49	40	37	48	99	2	20
Hope (Town)	32	38	42	49	56	60	65	65	60	51	41	35	50	104	- 9	28
Mission	36	40	43	49	55	59	64	63	59	52	43	39	50	100	- 2	13
New Westminster	36	39	43	50	56	60	64	64	59	51	43	39	51	99	- 2	78
Stave Falls	36	38	42	49	55	60	64	64	59	51	42	38	50	104	-16	56
Steveston	36	38	42	48	54	59	62	62	57	50	42	39	49	92	- 5	69
Vancouver (Airport)	36	40	43	49	54	59	64	63	58	50	43	39	50	92	0	28

Table B - Monthly and Annual Precipitation Data for Chilliwack (Sardis) for the Period 1916-1965.

Inches

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1916	4.85	7.95	11.35*	4.35	3.78	1.79	4.43*	0.58	1.56	1.76**	7.21	6.09	55.70
1917	9.10	7.08	5.08	5.51	1.40	5.41	0.80	1.14	2.51	5.35	7.63	19.49*	70.50
1918	9.61	8.33	7.62	1.17**	3.09	0.73	1.99	3.70	0.33*	10.18	6.64	12.05	65.44
1919	8.63	5.75	6.37	5.45	5.29	1.17	0.40	0.57	2.43	3.64	11.60	10.59	61.89
1920	12.99	2.12**	7.15	3.21	3.30	4.60	0.64	1.50	10.52*	9.88	5.72	8.70	70.33
1921	10.05	8.87	4.95	3.94	2.18	5.15	0.57	2.62	8.24	11.38	9.69	8.66	76.30
1922	3.81	3.29	4.88	4.55	3.41	1.20	0.03	3.27	5.29	8.68	3.36	13.09	54.86
1923	12.02	5.41	5.34	2.06	4.80	1.99	1.25	0.34	4.22	3.67	6.48	12.03	59.61
1924	8.36	5.98	4.97	3.60	3.57	2.80	1.54	1.99	4.13	6.44	9.34	8.84	61.56
1925	11.70	5.92	5.34	2.44	3.46	0.62	0.69	1.86	0.70	3.21	5.25	8.77	49.96
1926	6.60	5.44	1.55**	3.54	6.27	0.73	0.25	3.08	3.28	6.69	7.05	9.16	53.64
1927	7.45	5.16	7.25	2.84	3.05	0.70	0.71	3.21	5.27	9.10	9.57	5.54	59.85
1928	8.39	5.99	4.92	3.55	3.21	2.71	1.42	1.91	4.00	6.54	8.87	8.82	60.30
1929	2.66	2.23	4.94	2.74	4.48	2.99	0.56	0.68	1.85	4.11	2.69	7.10	37.03**
1930	3.82	10.60	4.68	3.86	4.67	2.92	0.09	0.01**	4.23	6.80	4.49	4.43	50.60
1931	9.88	6.53	8.88	4.31	3.11	4.74	0.56	0.06	7.32	3.61	10.17	7.17	66.34
1932	7.49	12.18	9.08	4.39	1.24	3.17	3.54	0.85	2.17	8.76	14.06	7.16	74.09
1933	8.43	4.86	6.40	1.36	4.07	1.93	2.15	0.57	9.46	12.41	5.60	16.27	73.55
1934	10.46	3.34	8.41	2.81	6.05	0.60	2.39	1.08	2.58	7.41	7.06	8.17	60.36
1940	3.90	8.55	7.54	3.99	3.51	0.90	1.81	1.83	2.03	7.81	4.95	7.54	54.36
1941	6.44	3.56	2.63	2.44	4.55	2.79	0.68	3.93	9.18	7.73	7.67	8.41	60.01
1942	2.32**	2.58	5.17	2.93	2.57	4.76	1.72	0.37	1.55	4.10	7.94	10.28	46.29
1943	6.04	5.25	7.36	5.18	3.90	2.20	2.86	2.37	2.93	5.82	3.02	6.90	53.83
1944	6.72	3.56	3.55	2.43	2.75	1.95	2.10	2.26	4.35	5.38	6.64	3.44**	45.13
1945	10.02	5.34	9.08	4.78	2.92	1.13	0.66	1.27	5.05	13.80*	10.24	7.08	71.37
1946	8.47	7.26	7.22	5.54	0.58**	4.68	1.40	0.95	1.47	5.12	5.77	9.84	58.30
1947	10.61	5.54	4.40	3.96	0.87	3.63	1.66	0.38	2.21	12.48	4.68	13.31	63.73
1948	5.79	9.49	3.81	3.05	4.25	1.65	3.11	4.80	3.16	5.31	11.50	7.54	63.46
1950	M	M	M	7.90	4.46	1.52	1.58	2.67	1.83	7.28	10.13	14.60	-
1951	11.43	16.13*	5.83	1.21	3.70	1.23	0.10	1.14	3.07	9.15	5.62	7.12	65.73
1952	7.22	4.19	6.22	3.63	3.78	3.62	0.99	1.19	1.26	2.49	1.99**	7.06	43.64
1953	21.67*	4.93	5.78	5.15	3.76	4.60	1.52	1.55	7.78	10.04	12.07	15.54	94.39*
1954	16.27	8.16	3.39	6.80	2.47	4.04	1.12	4.29	3.97	5.12	18.00*	9.73	83.36

Table B - continued

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1955	6.37	8.53	6.19	6.87	8.59*	4.28	3.06	0.28	2.73	12.63	13.64	10.81	83.98
1956	8.02	7.78	8.25	1.36	4.54	6.88*	0.51	1.97	8.52	13.01	4.78	16.63	82.25
1957	5.32	6.81	7.67	2.44	1.59	2.89	3.16	5.58*	1.10	3.49	5.87	7.86	53.78
1958	12.43	7.96	3.40	6.28	1.32	0.67	0.42	1.93	4.30	10.04	12.44	13.39	74.58
1959	12.67	6.42	10.68	11.12*	3.85	4.07	2.34	3.05	8.97	8.14	11.04	9.72	92.07
1960	8.13	5.76	7.04	5.92	7.99	2.43	Tr.**	4.08	2.95	8.54	8.51	7.61	68.96
1961	10.96	15.74	6.81	5.13	4.74	0.84	0.49	2.97	3.71	9.94	7.02	10.43	78.78
1962	11.28	4.04	7.32	5.44	3.33	2.90	2.10	5.25	4.65	3.97	11.71	9.74	71.73
1963	3.58	6.47	3.39	5.13	1.82	1.77	3.44	0.35	2.33	8.91	15.36	11.49	64.04
1964	8.87	6.76	5.88	4.61	3.60	3.11	1.53	2.32	4.02	7.88	8.50	9.84	66.92
1965	10.65	12.16	1.94	3.45	4.10	0.50**	0.47	3.01	2.15	7.31	7.07	11.35	64.16

M - Missing
Tr. - Trace
*Highest
**Lowest

Table C - Average Monthly, Yearly and Growing Season Precipitation for Several Fraser Valley Stations.

Inches

Station	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Snow-fall*	Total	Growing Season (May-Sept.)	Years of Record
Abbotsford (Airport)	7.80	6.84	5.68	4.00	2.99	2.46	1.42	2.06	3.20	6.45	7.70	8.25	29.9	58.85	12.13	21
Agassiz (C.D.A.)	8.27	6.58	6.17	4.45	3.24	3.21	1.89	2.06	3.82	7.41	7.74	9.55	33.0	64.39	14.22	T.Y.S.**
Aldergrove	8.34	6.87	5.50	4.11	3.08	2.89	1.70	2.55	3.73	6.63	9.31	9.60	39.2	64.31	14.05	13
Alouette Lake	14.48	11.45	11.09	7.49	5.66	4.98	3.17	3.12	5.80	11.04	12.62	15.91	35.5	106.81	28.13	T.Y.S.
Chilliwack	8.87	6.76	5.88	4.61	3.60	3.11	1.53	2.32	4.02	7.88	8.50	9.84	33.4	66.92	14.58	T.Y.S.
Hope (Town)	8.49	7.09	5.53	4.41	2.59	2.12	1.32	1.85	3.77	7.00	8.38	9.98	55.3	62.53	11.65	28
New Westminster	8.43	6.18	5.80	3.66	2.84	2.73	1.50	1.78	3.28	6.57	7.51	9.30	27.5	59.58	12.13	T.Y.S.
Steveston	5.61	3.99	3.43	2.24	1.75	1.91	1.10	1.29	2.18	4.34	5.29	6.22	15.7	39.35	8.23	T.Y.S.

* 10 inches snow = 1 inch rain
** Thirty year standard period average, 1931-60

Table D - Spring and Fall Frosts and Duration of Frost-Free Period for Several Fraser Valley Stations.

Station	Last Frost in Spring			First Frost in Autumn			Average Frost-Free Period (Days)	Years of Record	Elevation (Feet)
	Mean	Earliest	Latest	Mean	Earliest	Latest			
Steveston	April 15	March 7	May 19	Oct. 19	Sept. 23	Nov. 18	187	50	6
Vancouver	March 31	Dec. 31	April 30	Nov. 5	Sept. 23	Dec. 5	219	45	10
Stave Falls	April 10	Feb. 23	May 8	Oct. 26	Sept. 22	Nov. 23	199	37	245
Abbotsford (Matsqui)	April 25	March 22	May 31	Oct. 20	Sept. 11	Nov. 19	178	24	30
North Nicomen (Loch Erroch)	April 17	March 9	May 15	Oct. 29	Sept. 23	Dec. 5	195	34	59
Chilliwack	April 20	March 13	May 24	Oct. 21	Sept. 24	Dec. 8	184	32	21
Agassiz	April 14	Feb. 25	May 24	Oct. 29	Sept. 8	Dec. 24	198	50	52
Hope (Little Mountain)	April 11	March 9	May 15	Oct. 31	Sept. 23	Dec. 4	203	37	580

GLOSSARY

Aeolian deposits - Geological materials of sand, silt and clay size which are transported and deposited by wind action.

Alluvium - All materials moved and deposited by flowing water, e.g., sand bars in and along the Fraser River. Soils derived from alluvium are called alluvial soils.

Available plant nutrients - Nutrients in the soil which are present in a condition suitable for uptake by plant roots.

Base saturation percentage - The percentage of the total cation exchange capacity of the soil which is satisfied by cations other than hydrogen.

Boulder - Fragment of rock two or more feet in diameter.

Cation exchange capacity - The adsorptive capacity of soil for cations or the amount of cations that can be adsorbed by a stated quantity of soil, usually expressed as milli-equivalent per 100 grams of soil.

Cobble - A fragment of rock three to ten inches in diameter.

Colluvium - Poorly sorted material accumulated at the base or on steep slopes which has moved or is moving under the influence of gravity, frost action or soil creep.

Concretions - Hard concentrations of soil cemented by certain chemical compounds into aggregates or nodules of various shapes and sizes.

Consistence - The mutual attraction of particles in a soil mass or their resistance to separation or deformation.

Delta - An alluvial deposit at or near the mouth of a river or stream, more or less triangular in shape.

Dune - A ridge or mound of sand deposited by wind action.

Eluvial horizon - A light coloured mineral horizon from which material has been removed in solution or water suspension.

Floodplain - An alluvial river or stream deposit which may be subject to overflow. It is characterized by a series of lateral accretions near the river channel and a gentle downslope to a swampy inner margin.

Friable - A term referring to a moist soil aggregate easily crushed between the fingers but which coheres when pressed together.

Glacial outwash - All material eroded from glaciers by meltwater which is sorted and deposited beyond the ice front.

Glacial till - An unsorted, unconsolidated, heterogeneous mixture of stones, gravel, sand, silt, and clay deposited by glaciers.

Gley - A process in which soil material is modified by chemical reduction brought about by saturation with water for long periods in the presence of organic matter.

Gravel - Rounded or subrounded rock fragments up to three inches in diameter.

Horizon - A layer in the soil profile approximately parallel to the land surface with more or less well defined characteristics produced by the soil forming processes. Horizon boundaries are described as abrupt if less than one inch, clear if from one to two and one-half inches, gradual if two and one-half to five inches, and diffuse if more than five inches in depth.

Horizon nomenclature - Capital and lower case letter used to designate and describe soil horizons. Those used in this report are as follows:

Organic Horizons (contain 30% or more organic matter)

L - An undecomposed organic layer in which the original organic components are easily discernible.
F - A partly decomposed organic layer in which the original organic components are discernible with difficulty.
H - A well decomposed organic layer in which the original organic components are undiscernible.

Master Mineral Horizons

A - A mineral horizon or horizons formed at or near the soil surface in the zone of maximum removal of materials in solution or suspension and/or maximum in situ accumulation of organic matter. They may be (1) horizons characterized by organic matter accumulation (Ah); (2) horizons eluviated of clay, iron, aluminum and/or organic matter (Ae); (3) horizons dominated by (1) and (2) but transitional to underlying B or C horizons (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) enrichment in silicate clay, iron, aluminum and/or illuvial organic matter (Bt, Bf, Bh, Bfh); (2) alteration by hydrolysis, reduction or oxidation to give a change in colour and/or structure but does not meet the requirements in (1) (Bm, Bg).
C - A mineral horizon or horizons comparatively unaffected by the pedogenic processes operative in A and B excepting the process of gleying (Cg).
R - Underlying consolidated bedrock.

Lower case suffixes

- b - A buried soil horizon.
- c - A cemented (irreversible) pedogenic horizon.
- cc - Cemented (irreversible) pedogenic concretions.
- e - A horizon characterized by removal of clay, iron, aluminum or organic matter alone or in combination and are lighter in colour than the underlying B horizon. It is used only with A.
- f - A horizon enriched with hydrated iron and redder in colour than horizons above or below.
- g - A horizon characterized by gray colours and/or prominent mottling indicative of permanent or periodic intense reduction. It may be used with A, B or C horizons.
- h - A horizon enriched with organic matter.
- j - A horizon whose characteristics are weakly expressed. It must be used with some other suffix, and is placed to the right and adjacent to the suffix it modifies.
- m - A horizon slightly altered by hydrolysis, oxidation and/or solution to give a change in colour and/or structure.
- p - A layer disturbed by mans activities, i.e., cultivation and/or pasturing. It is used only with A.
- t - A horizon enriched with silicate clay. It is used only with B horizons.

Additional terms

(1) - Lithologic changes are indicated by Roman numeral prefixes (II, III, with I assumed).

(2) - Horizon subdivisions are denoted by numbers used as suffixes, i.e., Ap1, Ap2.

(3) - If more than one lower case suffix is required, they are recorded in order of dominance, i.e., Bfc, Bfh.

Humus - The well decomposed, more or less stable part of the soil organic matter.

Illuvial horizon - A horizon in which material leached from other parts of the profile has accumulated.

Impervious material - Materials resistant to penetration by water, roots and air.

Lateral accretions - Floodplain deposits in which fine sands and silts are deposited horizontally near river margins by drifting along the bottom during freshet overflow.

Leaching - Removal of soluble constituents from the soil by percolating water.

Levee - A natural embankment along a river channel on a floodplain.

Loess - Silty and very fine sand material moved and deposited by the wind.

Mottled - Irregular spots or streaks of different colour in soils which indicate chemical oxidation and reduction caused by a fluctuating water table.

Muck - Fairly well to well decomposed organic soil containing 30 or more percent organic matter.

Orthic - A term used to define the subgroup of soils considered to be the central concept of a great soil group. Other subgroups are departures from the Orthic.

Parent material - The unconsolidated geologic deposit from which the solum of a soil develops.

Peat - Raw to partly decomposed organic material which accumulated under very wet conditions.

Percolation - Downward movement of water through the soil.

Permeability - The quality or state of a soil or soil horizon which permits passage of water and air to all parts of the mass.

pH - A logarithmic designation of the relative acidity or alkalinity of soil or other materials.

Plant nutrients - The elements taken in by a plant which are essential to its growth and used by it in the elaboration of its food and tissue.

Plastic - Capable of being molded or modelled without rupture when wet.

Porosity - That part of the total soil volume not occupied by soil particles.

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

Soil drainage - The frequency and duration of periods when the soil is free of water saturation. The following drainage classes are used in this report:

Rapidly drained - Soil moisture seldom exceeds field capacity in any horizon except immediately after water additions.
Well drained - Soil moisture in excess of field capacity does not remain in any horizon for a significant part of the year.
Moderately well drained - Soil moisture in excess of field capacity remains for a small but significant period of the year.
Imperfectly drained - Soil moisture in excess of field capacity remains in subsurface horizons for moderately long periods during the year.
Poorly drained - Soil moisture in excess of field capacity remains in all horizons for a large part of the year.

Very poorly drained - Free water remains at or within 12 inches of the soil surface for most of the year.

Soil groups - Soils with similar characteristics which reflect the influence of the environment.

Soil structure - The morphological aggregates into which individual soil particles are arranged. The following structure descriptions are used in this report:

Platy - Thin, horizontal plates; the horizontal axis is longer than the vertical.
Prismatic - Large aggregates with vertical axes longer than the horizontal and with well defined surfaces and edges.
Blocky - Block-like aggregates; the vertical and horizontal axes are about the same length, usually with sharp edges.
Subangular blocky - Block-like aggregates; the vertical and horizontal axes are about the same length with subrounded edges.
Granular - More or less rounded aggregates with an absence of smooth faces and edges.
Massive - A cohesive soil mass with no observable aggregation of soil particles.
Single-grain - A loose, incoherent mass of individual particles, as in sand.

Solum - That part of the soil profile above the parent material in which soil development is taking place. The A and B horizons.

Stones - Rock fragments greater than 10 inches but less than two feet in diameter.

Stratified - Composed or arranged in strata or layers.

Texture - The composition of the soil based on the amount of sand, silt and clay present. Sand consists of particles ranging in size from 2.0 to 0.5 mm., silt from 0.5 to 0.002 mm., while clay consists of all particles less than 0.002 mm. in diameter.

Topography - The surface features, or a description of the surface features, of a place. The following classes were used to denote topography in this report:

	% Slope
Depressional to level	0 - 0.5
Very gently sloping and/or gently undulating	0.5- 2
Gently sloping and/or undulating	2 - 5
Moderately sloping and/or gently rolling	6 - 9
Strongly sloping and/or rolling	10 -15
Steeply sloping and/or strongly rolling	16 -30
Very steeply sloping and/or hilly	30 -60
Extremely sloping	Over 60

Vertical accretion - Sediments that settle from stagnant ponds which develop on the floodplain during the freshet season.

Water holding capacity - The amount of water held by the soil after excess water has drained away due to gravity.

Water table - The upper limit in the soil or underlying material which is saturated by water.

Weathering - The physical and chemical disintegration and decomposition of rocks and minerals.

Windthrow - The falling of trees caused by the wind resulting in the roots being uprooted.