Soil Survey

OF THE

SHUSWAP LAKES AREA

BRITISH COLUMBIA

BY

A. B. DAWSON and C. C. KELLEY

INTERIM REPORT

MAP REFERENCE:

SOIL MAP OF THE SHUSWAP LAKES AREA

Scale: 2 inches = 1 Mile

1965

British Columbia Department of Agriculture

KELOWNA, B. C.

August, 1965

Price $1.50

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INTRODUCTION

The soil survey of the Shuswap Lakes Area is the beginning of a pioneer soil survey of the Thompson River valley. An interim report published in mimeograph form in 1960 describes the soils of the Shuswap River drainage from Sugar Lake to Mara Lake (1). In 1963 an interim mimeographed report for the Ashcroft-Savona Area was published (2). In 1964 a mimeographed report describing the soils of the Eagle River valley was published (3). This report covers a section of the Thompson River drainage in the Shuswap Lake Topographic Sheet 82 L/NW. Surveys will eventually be undertaken and reports published that will describe other sections of the South Thompson River valley.

The field work that began in 1961 was subject to other priorities, thus limiting the acreage classified each year. The field sheets consisted of 9 x 9 inch air photos having a scale of two inches to a mile. A map, "Soil Map of the Shuswap Lakes Area", scale two inches to a mile, was prepared. Hand tinted copies of this map are available to government agencies only. Others may obtain uncolored prints at nominal cost from the Department of Agriculture, Victoria, B. C.

This report contains a general description of the area, and descriptions of the soils and their land use. There is also some laboratory analyses of soil samples, and a glossary of technical terms used in the report is appended.

HOW TO USE A SOIL SURVEY REPORT

Most people are interested only in a few sections of the report. If they thus confine their reading much information will be missed. The material is so organized that information which applies everywhere is given in each section. It is necessary to read the whole report at least once before using any one section as a reference.

Farmers living in the area know the soil distinctions on their farms, and on those of some of their neighbors. However, they cannot compare their own soil types and yields of crops with those in other parts of the district or on experimental stations unless the soil survey report and map are used. When such comparisons are possible, new techniques that have proved successful on a given soil type can be applied wherever that soil type occurs.

The nature of the soils on any farm can be determined by locating the farm on the soil map. Each type of soil is shown on the map by a distinctive color and symbol. To find the name of the soil on the map, refer to the map legend, and the soil profile and other information is given in the report.

If a more general idea is wanted, read the soil descriptions that come under the section, "Descriptions of Soils". It will be noted that the soil series are assigned to subgroups whose pedological characteristics are described. For information as to the materials from which the soils were derived, read the section, "Origin of Soil Forming Deposits", and refer to the section, "Soil Mapping and Classification".

Prospective settlers and others are interested in climatic information, and the amount of development within the area. This information is given under "Description of the Area".

The colors on the soil map are used to distinguish the soils from one another, and to show the extent of each soil area. Soil boundaries vary in width, and generally take the form of a mixed zone that varies in width, though shown on the map as a line. Within some soil areas, areas of other soils may occur, that are so intermixed or small that they could not be separated at the scale of mapping used. Such areas are generally mapped as a "complex" of two or more soils.

DESCRIPTION OF THE AREA

LOCATION AND EXTENT

The soil mapped area consists chiefly of the lower elevations in Shuswap Lake Sheet 82 L/NW from 119° 00' westward to 119° 45' north longitude, between 50° 30' and 51° 00' latitude. A small portion at the northeast corner of Vernon Sheet 82 L/SW is included.

The area includes the highland between Shuswap River and Deep Creek, the Salmon River valley from Glenemma to Shuswap Lake, and the west side of the Shuswap Lake valley from Salmon Arm to Chase. The north side of the Shuswap Lake area was surveyed from Anglemont to Adams Lake. The Chase Creek valley and the valleys of Hiuihill and Loakin creeks were included.

The whole classified area occupies 118,162 acres. About 76,322 acres are cultivated and potentially arable, and the remaining are nonarable.

COMMUNITY FACILITIES, POPULATION, TRANSPORTATION, AND COMMUNICATIONS

The Shuswap Lakes have exceptional scenery, and good facilities for boating and sport fishing. Development to meet the requirements of the tourist trade has been rapid since completion of the Rogers Pass Highway in 1962. With about 600 miles of shoreline, the Shuswap Lakes are noteworthy as a recreational area, and visited by thousands of tourists each year.

In this area the main industry is lumbering, with agriculture secondary. Douglas fir, white and Engleman spruce, hemlock, cedar, and white pine are logged in the surrounding forests. The logging companies and sawmills afford employment for a substantial part of the population.

Incorporated as a city in 1912, Salmon Arm was reorganized as a village in 1958. The area is about 640 acres, and the population 1,506 (4). It has a sewerage and a domestic water system. Salmon Arm is the largest business centre in the mapped area, and stimulated by the increase of traffic after the opening of the Rogers Pass Highway. Its future is made even more favorable by large hydro-electric developments to come on the comparatively nearby Columbia River.

The District of Salmon Arm, the general area surrounding the village, was incorporated in 1905, with an area of 41,878 acres and present population of 4,300 (4). It has a domestic water system in conjunction with Salmon Arm village.

School District No. 20 is composed of Salmon Arm village, the district municipality and adjoining rural territory, the total area being 2,347 square miles. This was incorporated in 1946. The total population is 10,900, and the school population 3,030 (4).

The village of Chase is located at the west end of Little Shuswap Lake. This is the only business centre of any size between Salmon Arm and Kamloops. The population of the village and surrounding area is probably around 1,000. In the mapped area, there are a number of post offices and small general stores.

The school population is accommodated in elementary and high schools at Salmon Arm, Chase, and Celista and several elementary schools are located elsewhere. A school bus system serves the area.

Power for the area is supplied by the British Columbia Hydro and Power Authority, from a plant located near Needles on Arrow Lakes. Telephone communication is by the Okanagan Telephone Co. in the Salmon Arm locality and by the British Columbia Telephone Co. around Chase. C.B.C. television is received from satellites of parent stations at Kelowna and Kamloops. Salmon Arm is served with natural gas by the Inland Natural Gas Co.

The area is served by the Shuswap Lake General Hospital at Salmon Arm and the Royal Inland Hospital at Kamloops. There is a government office and forest ranger station at Salmon Arm and a ranger station at Chase. Law enforcement is by the R.C.M.P.

The mapped area has been served by the C.P.R. transcontinental line since its construction in 1885. Trans-Canada Highway No. I parallels the railway from Sicamous to Chase. There are paved secondary roads in the more populous areas, and many others are gravelled. An extensive network of logging roads give access to the surrounding mountains.

Domestic water for Salmon Arm and the eastern section of the municipality is pumped from Shuswap Lake and obtained by gravity from a reservoir on East Canoe Creek. The Chase Water Works District supplies domestic water to the town of Chase. In the rural parts of the mapped area water is obtained from shallow and deep wells, creeks and springs. Tourist resorts, homes and summer cottages along the lake shore get water from the lake. In general, the water is of good quality insofar as its mineral content is concerned, but those using lake or pond water should be sure of its freedom from pollution.

PHYSIOGRAPHY AND DRAINAGE

The mapped area is within the Shuswap Highland. The mountainous sections consist of hills rounded by glaciation and wooded, that do not exceed 5,500 feet elevation. These sections are separated from one another by valleys partly filled with glacial debris and in part occupied by lakes. The result is a scenic region, rich in tourist attractions.

A large part of the area is occupied by the Shuswap Lakes, which form the upper part of the South Thompson Valley. They occupy deep and comparatively narrow valleys, with an aggregate shoreline of about 600 miles.

The main division of the Shuswap Lake consists of two reaches, the first, nearest Little Shuswap Lake, may be called the Southeast Arm.

The second reach is Seymour Arm, from the name of a small, early settlement at its head. Seymour River enters the head of the lake at Seymour.

The second division of the lake is connected with the first by an opening about one-half mile wide. This is Cinnemousun Narrows. To the north this second section is called Anesty Arm and to the southwest, Salmon Arm. The Salmon Arm receives the Salmon River and a stream from White Lake, which lies east of Balmoral. The fourth, or southeastern division of the lake is joined to the Salmon Arm by Sicamous Narrows, caused by the delta of Eagle River. This is the Mara Arm, more commonly called Mara Lake. It receives the Shuswap River at its south end. In addition to those mentioned there are about a dozen small lakes in the area.

The Shuswap River is the main tributary but it flows outside the mapped area and need not be described. Second to it is Salmon River. The Salmon rises outside the mapped area southwest of Westwold, and the soils are classified along about 20 miles of its course. It enters the surveyed area at about 1,540 feet elevation and drops about 20 per mile to Shuswap Lake, where the delta is about two miles wide.

Canoe Creek has headwaters in the Larch Hill Forest Reserve, and enters Shuswap Lake at Canoe. A reservoir on this creek is used as a source for the Salmon Arm Municipal Waterworks. The lower four miles of Canoe Creek is channeled through glacio-lacustrine deposits.

The Adams River, in the northwest corner of the map-area, flows into Shuswap Lake near Squilax. This river, about six miles long, drains Adams Lake and a few creeks that enter its course. The delta of Adams River separates Little Shuswap Lake from the main lake. At its greatest extent the delta is about four miles wide.

Scotch Creek rises in the Shuswap Provincial Forest. One of the larger creeks, it flows in a narrow canyon over most of its length. The delta where it enters the north side of Shuswap Lake opposite Sorrento has a length of about 2½ miles from the lake to its apex, and a width of about 3½ miles.

Chase Creek enters the Thompson Valley from the south on the west side of Chase. The creek, which rises in the Fly Hill Provincial Forest, is restricted to a narrow canyon in its upper part. This widens gradually downstream and the bottom is occupied by a narrow floodplain and the small fans of tributaries. In its lower part the creek is deeply incised where it has carved a channel in bedrock. In the Thompson Valley, from the mouth of the rock gorge, a large fan is spread on which the village of Chase and some small farms are situated. The creek enters the Thompson River near its exit from Little Shuswap Lake.

The South Thompson River occupies a wide valley over a distance of 36 miles between Little Shuswap and Kamloops lakes. The water is clear and warm in summer. At minimum lake levels (1,130 and 1,103 feet respectively) the gradient between the two lakes is nine inches per mile, and at high water (1,141 and 1,129 feet elevation) only four inches per mile.

CLIMATE

The main source of moisture in southern British Columbia is from onshore air movement. Most of it is lost on the western slopes of the coast mountains. This results in a dry climatic shadow over the Interior Plateau. In this region the average precipitation is around 15 inches annually, but there are different degrees of dryness, as it affects plant life, based on elevation. The higher elevations are cooler, there is greater moisture economy, and species of vegetation can grow with relatively less moisture than in the lower and warmer valley bottoms.

East of the plateau there is a secondary increase of precipitation that starts as the Columbia Mountains are approached, and reaches a peak on the west slopes of the Selkirks. Since this flow contributes more moisture in the dormant season than in the one of growth, it must be supposed that the bulk of the precipitation in the secondary area the year around, is supplied directly from onshore air from the Pacific Ocean.

In winter, low-pressure systems cross the country from October to April, and cause cloud-cover and precipitation for most of this period. These systems may come one after another with scarcely a clear day between, and may persist for weeks or even months. Occasionally this pattern is interrupted for a few days to a week or more when continental arctic air covers the region. Such interruptions generally begin with strong winds that clear away the clouds. The low temperatures attained at such times depend on how deep the region is buried within the cold air mass.

Temperature

Temperatures vary inversely with elevations. Unfortunately, there is limited meteorological information at the higher elevations. Table 1 gives the average seasonal temperatures and elevations of stations in the mapped area and nearby, and for comparison, of four stations in the bottom of the Okanagan Valley.

Table 1. -- Average Seasonal Temperatures at Stations in the Thompson, Salmon and Okanagan Valleys.

Station	Elevation Feet	Winter	Spring	Summer	Fall	Annual
		Salmon and Thompson Valleys				
Westwold	2,100	23	44	61	43	43
Falkland	1,500	27	45	64	44	45
Chase	1,165	29	47	65	46	47
Tappen	1,860	27	47	64	49	47
Salmon Arm	1,660	27	47	65	46	46
		Okanagan Valley				
Vernon	1,582	25	46	64	46	45
Kelowna	1,160	29	47	65	47	47
Penticton	1,121	30	48	65	47	48
Oliver	1,008	29	50	68	48	49

Table 2 shows the extreme high and low temperatures and snowfall during periods of record, and indicates the considerable variations that occur. The annual variations for the same stations and a few others are given in appended Tables A to N.

Table 2. -- Extreme Temperatures and Snowfall and Average Snowfall at Salmon and South Thompson Valley Stations.

Station	Number of Years	Temperature, °F		Snowfall (Inches)		
		High	Low	High	Low	Annual
Westwold	1921-63	103	-50	107.3	8.5	36.5
Falkland	1924-30	100	-25	89.7	23.8	45.5
	1959-63			66.2	20.2	
Chase	1953-63	99	-18	49.1	25.7	33.6
Sorrento	1924-63	.	.	88.5	26.3	58.9
Eagle Bay	1924-63	.	.	101.5	26.9	61.2
Tappen	1916-63	106	-28	107.9	21.8	65.4
Salmon Arm	1916-63	106	-31	114.2	17.5	65.5

The winter extreme lows and the frequency of their occurrence are significant in regard to the survival of certain perennial crops, particularly those that stand above the snow, or are caught when the ground is not snow-covered. The winter climate is the governing factor for many varieties of tree fruits, grapes and cane fruits. Before planting, it should be ascertained if the variety to be grown can withstand the winter lows likely to occur. As shown in Table 1, summer temperatures in the Chase-Tappen-Salmon Arm region are only slightly lower than those in the Kelowna-Penticton area of the Okanagan. This indicates that certain annual crops that do well in the middle Okanagan may be tried for commercial production in the Thompson Valley section.

The Frost-Free Period

The dates of the last spring and first fall frosts have a bearing on the type of agriculture that can be undertaken. The frequency of frosts and the places in which they occur depend mainly on latitude, altitude, air drainage, and cloud conditions. Because of the complexity of these factors and others, the frost-free period is irregular. In any locality frost records over a period of years give an estimate of the frost-free season for use as a guide. The dates for stations having frost records are shown in Appendix Table O.

Precipitation

The precipitation pattern for the area is strongly influenced by the onshore movement of air from the Pacific Coast. In winter the incoming low-pressure systems discharge most of their moisture as rain and snow on the western slopes of the Coast Mountains. East of these mountains they cause considerable cloud-cover. In summer there is less cloud and precipitation, and some variation occurs in different parts of the area, due to elevation and other influences.

As the mapped area is approached upstream on the Thompson River, it is noticed that Monte Creek is one of the driest spots in British Columbia, with only about nine inches annual precipitation. Upstream there is a slight increase to Pritchard, and from there a more pronounced effect, changing the natural grassland to forest. At Chase the precipitation has increased to 14.27 inches. There is a steady increase eastward to 21 inches at Salmon Arm, and there are higher values farther east. In the Salmon River valley the increase is from 13.75 inches at Westwold to 17.18 at Falkland, the latter probably being high owing to a limited period of record.

Insofar as agriculture is concerned, effective rainfall is required during the important months for crop growth, regardless of the annual total. These are May, June, July, and August for the kinds of crops grown in the surveyed area. Since the rainfall is applied to soils that have different moisture requirements, the lighter textured ones are marginal or submarginal if there is only sufficient moisture for moderate crops on the heavy soils.

It is therefore of interest to know how much rain falls during the four important months, as this proves the need of supplemental moisture. Such information is given in Appendix Table P. This table indicates the variations from year to year, and averages for the times of record. It appears certain that the amounts shown are insufficient to give the yields of which the soils are capable, and so moisture is a chief limiting factor. Irrigation is required throughout the area.

In the design of irrigation works, important features are the amount of water that should be stored, where storage is required, and the ability of the system to deliver enough water for the crop in the driest month. The amount to store is evaluated by the acreage to be irrigated and any extreme lack of rainfall during a summer month. In the appended tables for all stations, the extreme low for at least one of the summer months is less than a tenth of an inch, which for practical purposes, should be regarded as none at all. The irrigation system must have enough capacity to supply the requirement of each soil type in the driest month, and this is based on the lowest figures on record. This information is given in Appendix Tables A to N.

Cloud and Bright Sunshine

The only station in the mapped area that records sunshine is at Salmon Arm. Although considerable variation occurs for each month, the noteworthy feature is the amount of cloud and lack of sunshine in October, November, December, January, and February. In these months the extreme lows in hours of sunshine are 57, 18, 3, 9, and 29 respectively. At times, however, polar air sweeps the clouds away, bringing clear skies and low temperatures that cause more damage to tree fruits than is the case in the southern Okanagan. By months and years, the sunshine record for Salmon Arm is shown in Appendix Table Q.

AGRICULTURE

Agriculture has undergone slow development since the railway was built in 1885. The population, farm and otherwise, has increased and decreased in response to economic cycles. Homesteads established in the early days were enlarged, remained small or were abandoned. Land clearing in the days of hand methods was slow, but with mechanization has steadily increased.

The size of farm units varies from less than three acres to more than 1,600; the greater percentage being from 10 to 180 acres (8). The range is from small farms with part-time operators to well-managed enterprises. Most farms have nonarable and unimproved potentially arable acreage used for grazing or forestry.

The agriculture is diversified, with beef cattle the main type of livestock. At the time of the survey (1964) dairying in the vicinity of Salmon Arm amounted to about 32 fluid milk producers. In addition, a number of farmers keep milk cows for their own milk, cream and butter. Any excess milk from the larger producers is used in the manufacture of dairy products. Hogs and poultry are produced and there are a few small flocks of sheep. Light horses for riding are becoming popular, and their numbers are increasing.

Hay and pasture occupy the greater acreage. Alfalfa and mixtures of alfalfa and grasses are common for hay. Four to seven tons of hay crops are produced when irrigation and fertilizer are used. Bunker or trench silos store a steadily increasing tonnage of silage. Pastures composed of Ladino clover, wild white and white Dutch clover, orchard and brome grasses, with reed canary grass in poorly drained spots, support beef and dairy stock. After the second hay crop is harvested, any further growth is often pastured.

Cereal crops consist chiefly of coarse grains to feed livestock. Oats are produced mainly as a nurse crop, some winter wheat is grown, and field corn is used for silage. Potatoes are a cash crop in the Salmon River valley and on the Chase flat.

In former years tree fruits occupied a considerable acreage in the Broadview locality east of Salmon Arm and near Sorrento. Severe winters of 1950 and 1955 caused extensive damage, and since then replanting has not been important. In 1960 a total of 598 acres were in production, and the acreage is decreasing. The main acreage is in apples, with minor production of cherries, pears and prunes. The Orchard Survey of 1960 revealed 65 orchard units operated by 56 growers (9).

Strawberry, raspberry and other small fruit acreage is gradually increasing. Marketing of small fruit on the prairies has improved since the Rogers Pass section of the Trans-Canada Highway opened in 1962.

The use of fertilizer has increased in recent years. The fertilizer requirements of different soils and farms should be determined by the crops to be grown, taking into account the past history and performance of the farm. Recommendations in regard to kinds and quantities of nutrients should be obtained from the District Agriculturist, owing to soil variations and past management of the farm.

Irrigation is necessary for most soils in the growing season, inasmuch as rainfall is insufficient to produce the yields of which the soils are capable. In the Salmon River valley water for irrigation is available from the river and tributary creeks to those having water rights. The Broadview locality and Tappen-Sorrento area would require fairly large scale projects to supply irrigation water. On the north side of Shuswap Lake, water is available from tributary creeks and near the shore, from the lake itself. Near Chase the Chase Irrigation District supplies the adjacent flat, and on the north side water is obtained from Nisconlith Lake.

In 1964 most of the water resources were not used to full advantage. Water is applied to a small acreage in comparison with the potentially irrigable area.

Drainage is required in the areas of Gleysolic and Organic soils. Near rivers and creeks annual seepage is related to the height of the freshet. There are high water tables in the delta of the Salmon River near Shuswap Lake. Coarse textured sub-strata permits a fairly free rise and fall of the water table in relation to lake levels, which may vary within 11 feet. Dyking would help improve drainage conditions on the lake side of the Salmon River delta.

Soils subject to seepage from higher elevations occur on the lower fringes of fan aprons and near creeks. Poorly drained depressions also occur. Advice on how to drain poorly drained soils is available from the Soil Survey Branch. High water tables have a marked effect in the early part of the growing season by slowing growth. However, water tables that do not come too close to the surface during the period of high water are beneficial to forage crops, inasmuch as their role is sub-irrigation.

ORIGIN OF SOIL FORMING DEPOSITS

During the last glaciation an ice-sheet covered the whole of the mapped area. It retreated chiefly by down-wasting, leaving a mantle of till on the higher ground and ice in the main valleys after it had gone from the higher elevations (5). At this stage the erosion of the ground moraine and material in the ice formed areas of outwash and glacio-lacustrine deposits, the latter being confined to the valleys. In valley areas where ice persisted, protection against valley filling by outwash and lacustrine deposition was afforded. When this ice melted lake basins were left vacant.

Glacial Lake Thompson occupied the Thompson Valley from an ice-dam in the Thompson and Fraser valleys west of Ashcroft, to the Okanagan, and drained into the Okanagan. This lake had several shore-lines at different elevations when ice occupied the basins of the Shuswap Lakes. At the 1,700 to 1,800 foot level the drainage eastward was probably through the Skimikin Valley from Squilax, into a lake that occupied the area between Sorrento and Tappen.

Glacial Lake Thompson also had a 1,600 foot shoreline in which most of the silt in the South Thompson Valley was deposited (6). These silts covered the entire valley floor to a depth of several hundreds of feet. One or two shorelines below 1,600 feet indicate that the silt deposit was channeled and partly eroded eastward while drainage continued in that direction. During this stage it seems probable that a part of the eroding silt deposit could have fed into ponds or lakes on top of the shrinking ice that occupied the basins of the Shuswap Lakes, thus preserving the ice for a time by a silt cover.

The glacial lake levels in the mapped area were controlled by the level of flow into the Okanagan by way of the Salmon River valley. The water level fell below this divide when further recession opened drainage-ways into the Mara Lake - Shuswap River part of the Okanagan Valley. Well marked raised beaches and other features about 30 feet above present lake level suggest that Shuswap Lakes were higher at some time previous to assumption of the present westward drainage (7).

The till mantle above the glacio-lacustrine deposits is of variable composition, having a textural range from loamy sand to loam or heavier. The stone and gravel content varies within wide limits. Where derived from granite, the till is sandy and may be loose or compact. Where glaciated from finer textured rock formations, it is compact and rich in silt and clay. Inasmuch as the topography of till areas is for the most part rolling and sloping, the derived soils are usually a mixture of components consisting of the till in place in the lower part of the profile, down-hill creep composed chiefly of weathered till, and loess. The soils derived from this material are the Armstrong, Bluespring, Grizzly Hill, Reiswig, Willshore, Cherryville, and Hobson series.

Second in the order of deposition are the deposits of gravelly outwash and slopewash over till. Some of these were formed by outwash on ice with the ground moraine beneath. When the ice melted it let the overlay material down on the till. In other cases slopewash came off steep slopes and spread over till in place. These formations occurred as the ice left the areas in which the deposits are situated. This soil forming overlay on till was classified as the Hillcrest and Spa series.

Morainal gravels are ice-contact deposits. These generally occur as end-morainal outwash left by a retreating glacier, and often they have irregular segments of ice buried in them. When this ice melts the area becomes pitted or kettled outwash, generally sandy and gravelly. Soils derived from this material are the Nahun, Moulton and Onyx series.

Another type of glacial outwash consists of gravelly deposits that formerly filled valley bottoms to level, gently sloping floodplains, but since that time the streams have carved their channels and terraces were thus formed. The terraces were inundated during freshets when the stream channels were shallow, and veneered with a finishing coat of finer texture, ranging from loamy sand to loam, from a few inches to several feet thick. These valley bottom deposits often were floodplains, hence the terraces may slope gently toward the valley sides, and there is also a gentle downstream slope. The mapped soils on these deposits are the Larch Hill, Glenemma and Sauff series.

The sandy glacial outwash that formerly occupied sections of valley bottoms was deposited in the same way as the gravelly deposits described above. The gravelly deposits are more common because gravel is a larger constituent than sand in the till from which both eroded, and a considerable amount of sand is included with the gravels. The sorting out of more or less pure sand was due to the velocity of water flow in different places. The gravels deposited in the faster and the sands in the slower moving water. The sands were carved into terraces in the same way as the gravels.

It was observed that the surface soils of the sandy terraces have fine sandy loam, sandy loam and loamy sand textures. These grade to sand at a foot or more depth. The silt and clay in the topsoil was not derived from disintegration of sand particles. The only other source is from loess or a former finishing veneer due to freshet inundation. The soils that developed on the sandy materials were named Grandview, O'Keefe, Pillar, Banshee, Stepney, Corning, Metcalfe, Shuswap, and Canoe series.

For the purpose of soil classification the glacio-lacustrine silts and clays shall be regarded as two separate formations, probably deposited at different times. The silts are the earliest deposits in the glacial lakes. It is here postualted that they represent a different source of material from the clays, owing to a comparative shortage of clay in the so-called silt deposits, which are largely silts and very fine sands laid down in separate strata.

The silts and very fine sands probably originated as rock flour, sand-papered from many kinds of rock formations over which the ice-sheet moved, and carried by sub-glacial streams to the area below the terminal moraine in Washington, and probably into some areas farther north as the ice-front retreated. The large fans of silty material thus formed below the ice-front were eroded by wind as loess, some being blown north to settle on top of the ice-sheet. As the ice decayed the material was washed down into glacial lakes in the major valleys, to become stratified silts and fine sands. This formation, which does not occur to a comparable extent north of 51° latitude, is the first glacio-lacustrine deposit. It is exposed on the surface in parts of the Thompson Valley between Ashcroft and Salmon Arm and in the Okanagan between Peachland and Okanagan Falls. In the mapped area the soils derived from these silts are the Grier, Heubner, Neskain, Enderby, and Carlin series.

The glacio-lacustrine clays overlie the silt formation from the vicinity of Pritchard to Salmon Arm, and thence in the Okanagan from Enderby to Westbank. In places the clay forms a thin mantle over till. The high clay content of the material, which is stratified and often varved, and its position, suggest a different source of material from that of the silts. In this regard it is postulated that the clay was one of the products of till erosion, the others being the sands and gravels described above.

By the time the ground moraine was exposed and its erosion began, certain sections of the silt deposits were no longer laked, and these were not surfaced with clay. The bulk of the clay need not be a direct product of glaciation, in contrast to the silts, because the country had a soil mantle in pre-glacial time, in which most of the clay occurred. During glaciation this soil mantle became mixed with the till, and finally some of the clay was sorted from it by erosion and deposited in glacial lakes. The soils derived from the glacio-lacustrine clays are the Saltwell, Plaster, Tappen, and Broadview series.

The glacio-lacustrine deposits in the mapped area mark the sites of a number of glacial lakes that occupied parts of the valleys at different stages of ice recession. Most of these are remnants of lake bottom deposits that were larger before the lake basins were vacated by the lowering of the drainage outlets. In some cases the deposits extended over ice in the valley bottoms, and thus delayed the melting of the ice beneath.

In addition to the soils that developed on deposits formed during decay of the ice, there are a number of others derived from more recent deposits that vary in age. The soils also vary from Regosols to Minimal Podzols.

In the course of general down-slope erosion, sandy outwash and slopewash has spread over the margins of glacio-lacustrine deposits. The thickness of the overlay varies. Where it is thin, the heavier textured glacio-lacustrine material beneath may affect the drainage of the top layer, particularly where there is seepage, or when the land is irrigated. Only one soil in the mapped area is derived from this overlay, and it was named the Syphon series.

At the higher elevations, on the tops of knolls and near outcroppings of bedrock, downhill erosion has produced a kind of material defined as shallow colluvium over bedrock. Frost-flaking of the exposed rock has produced many angular fragments, loess and creep of medium texture is mixed in, and the result is a class of material in which the angular stone content varies within wide limits. The Equesis, Pari, Hobbs, and Fowler series were derived from this material.

Post-glacial alluvial-colluvial fans are a common feature of the landscape. They spread at the toe of the slope at the mouths of coulees tributary to any valley serving a watershed. Characteristically, the fan apex contains the coarsest material, which may be very stony. Some fans were rock glaciers in their early stages, and later the stony mass was covered by finer materials. The texture becomes finer and less stony down-slope, until on the larger fans, the lower margin may be fine-textured and stone-free.

On many fans, particularly the larger ones, the topography consists of a gentle downward slope toward the valley centre, with gentle lateral slopes to right and left. The smaller fans may have steeper slopes. In some cases fans may be built in a series of two or more, one above and back of the other. This occurs where the first fan was built at a higher level of drainage. When a lower drainage elevation was established, a coulee was cut through the older fan, and a new one developed lower down. These are called compound fans.

Most fans were built as a series of tumultuous outwashes, usually due to violent rainstorms in their tributary watersheds, when there was lack of vegetative protection. These stage-built fans develop a new runoff stream over the length of each outwash, and deposit a considerable amount of material each time. When a new outwash occurs, the former drainage channel is filled. This process provides for a number of lenses of gravel scattered in the cross-section. Though one or more may convey natural drainage from the coulee, they are not important until the fan is irrigated. Then they tend to concentrate and take off excess irrigation water, causing a seepage area in the lower part of the apron that requires underdrainage.

Many of the fans are quite old and well stabilized, and mature soil profiles have developed. Others periodically receive a coating of outwash and the soils are young. In some cases the fan apron may have spread over semi-impervious material, such as till or glacio-lacustrine clay, and drainage from the coulee above may cause a natural seepage area at the lower fringe of the fan apron. Quite a variety of soils may develop under the above conditions. Those mapped consist of the Grindrod, Schindler, Mowitch, Heubner, Gardom, Bessette, Nisconlith, Gulch, Lumby, White, Broderick, Chum, Moutell, Harper, Adams, Leonard, and Hupel series.

In addition to the glacio-lacustrine deposits there are limited areas of post-glacial lacustrine materials in the Skimikin Valley that occupy kettles in the valley bottom and a small area on the valley side. The material consists of dark colored silts that weathered from basaltic lava on Black Mountain and Mount Hilliam, directly above the area of deposition. This material is stratified. The area on the valley side would have been differentiated as a separate type if larger, owing to a different position. Since it is small, it was included with the material in the kettles. The soil that developed on this parent material is the Skimikin series.

The rivers in the mapped area have laid down first and second bottoms in small segments that could not be separated as to position on the scale of mapping used, and the bottoms were mapped only on the basis of their soil development. Such development is largely Regosolic and Gleysolic, with a few more advanced subgroups on the higher, older, and better drained positions. The soils were separated into the Falkland, Yard, Rumball, Bolean, and Apalmer series, the Mabel Complex, and Gardom, Bessette, Nisconlith, Kosta, Ida, and Wallenstein series.

The organic soils have a muck surface that grades downward to partly decomposed, fibrous peat. The organic deposits are scattered in the ampped area in bogs that vary in size from an acre or two to about 100 acres. They are composed chiefly of the remains of sedges, tules, leaves and wood, and covered generally by swamp forest. Most of the bogs formed in what originally were shallow ponds, flats or gentle slopes supported by continuous seepage. Their characteristic feature is that organic matter has accumulated slightly faster than the rate of decay.

Some of the bogs are partly or entirely underlaid by a stratum of marl, due to the proximity of limestone deposits. In some cases the erosion of calcite from argillite or other rocks contributes limy seepage water, and as a result, the entire organic deposit is to some degree lime saturated. Where underlaid by marl, the agricultural value of the deposit is not as great as where marl does not occur, inasmuch as shrinkage of the organic material after cultivation will eventually turn up the underlying marl. The organic soils were differentiated into the Rabie, Loftus, Santabin, Okanagan, and Waby series.

Around the lake shores there are sandy and gravelly beach deposits far enough above present lake levels to be free from inundation or wave action. These former beaches have a variable vegetative cover of trees and shrubs, and they have become valuable as the sites of summer cottages and tourist camps. The material varies in texture in different areas, and consists chiefly of clean gravels, sands and loamy sands. These deposits were mapped as the Celista series.

SOIL MAPPING AND CLASSIFICATION

Field Methods

The soils were mapped on a reconnaissance scale of two inches to a mile. Air photos were used as field sheets and the classification data were plotted upon them. The information on the air photos was transferred to interim map sheets, to be used later for publication.

Soil profiles were examined by digging holes, examining road cuts and other excavations. The soil profiles were studied to determine the color, texture, structure, consistence, permeability, stoniness, erosion, drainage, and other features. Additional relationships, such as native vegetation and topography, were also examined.

Soil boundaries were established by topographic breaks, bisecting them along roads, and by traverses across fields and through bush. The soil colors were identified by means of the Munsell Color System (10). The soils were classified according to procedures of the National Soil Survey Committee (11).

Soil Classification

Soils develop from soil-forming deposits in response to the local environment. The kind of soil formed depends on the nature of the parent material, the length of time the process has been operative, and the intensity of weathering. The speed of weathering is related to the amount of precipitation, temperature, topography, texture, drainage, vegetation, and other environmental factors. The soil survey identifies the type of soil developed, and separates the different soils by means of a system of soil classification.

The soils of the surveyed area vary in age from early post-glacial to more or less recent deposits only a few hundreds of years old. The older soils are derived from glacial till, glacio-fluvial, glacio-lacustrine, and alluvial fan deposits. These were assigned to the Gray

Forested, Gray Wooded, Acid Brown Wooded, and Podzol soil groups. The younger soil-forming materials, composed of recent overlay on alluvial fans, river and stream, organic and beach deposits were classed as Regosol, Gleysol, Brown Wooded, and Organic soils.

Table 3 shows the relationship of the soil-forming deposits to soil subgroups and soil series. In the mapped area the soils developed under a range of precipitation, which governs the amount of development and the density of vegetative growth. The classification grades from Regosols (least weathered) to Podzols (most weathered). The ground-water soils are the Gleysol and Organic members.

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 soil horizons similar in differentiating characteristics and arrangement in the soil profile, except for the texture at the surface. Areas having variable surface textures, but otherwise the same, are distinguished as subdivisions of a soil series, and called soil types. A soil series having a surface texture that does not vary is also mapped as a soil type. Soil types are distinguished by the name of the series (e.g. Carlin), and the texture of the surface soil (e.g. silt loam), the full name of the soil being Carlin silt loam. The series names are usually the names of lakes, creeks, railway sidings, villages, and other established names in the localities in which the series was originally identified.

A phase of a soil series may also be distinguished, particularly where this has significance to land use. Phases are based on variations that occur within a series, such as topography, depth of profile, stoniness, drainage, and others.

In some cases it is not feasible to separate two or more series. Such areas are mapped as soil complexes. Where two or more soil series have been described separately in the report, the name of the complex consists of the names of the series of which it is composed. Such names are hyphenated (e.g. Carlin-Tappen complex). The name of the series that occupies the major acreage comes first and the other names follow in order. Complexes of as many as four series are mapped, depending on the map scale and/or the intimacy with which the soils are intermingled.

Soil series were assigned to subgroups according to the pedologic development that signifies their genetic relationships. These are shown in Table 3. Descriptions of the main observable characteristics of the subgroups head those of the soil series classed in each subgroup.

Table 3. -- Classification of Soils and Parent Materials in the Shuswap Lakes Area.

Soil Subgroups and Series

Parent Materials	Orthic Regosol	Gleyed Orthic Regosol	Mull Regosol	Rego Gleysol	Carbonated Rego Gleysol	Orthic Regosol to Rego Gleysol	Peaty Rego Gleysol	Peaty Carbonated Rego Gleysol	Rego Humic Gleysol
Glacio-lacustrine Silts	Grier	-	-	-	-	-	-	Heubner	-
Alluvial-Colluvial Fans	Grindrod	-	Schindler	-	Mowitch	-	Gardom	Heubner	Bessette
River and Stream Deposits	Falkland Yard	Rumball	Bolean	Apalmer	-	Mable Complex	Gardom	-	Bessette
Beach Deposits	Celista	-	-	-	-	-	-	-	-

Table 3. -- (Continued)

Soil Subgroups and Series

Parent Materials	Orthic Humic Gleysol	Orthic Black	Orthic Dark Gray	Gleyed Orthic Dark Gray	Orthic Brown Wooded	Degraded Brown Wooded	Orthic Acid Brown Wooded	Orthic Gray Forested	Gleyed Gray Wooded
Glacial Till	-	Armstrong	Bluespring	-	Grizzly Hill	-	-	-	-
Gravelly Outwash or Slopewash over Till	-	-	-	-	-	-	Hillcrest	-	-
Morainal Gravels	-	Nahun	-	-	-	Moulton	-	-	-
Gravelly Stream and Deltaic Terraces	-	-	-	-	Larch Hill	Glenemma	Sauff	-	-
Sandy Stream and Deltaic Terraces	-	Grandview	-	-	O'Keefe	Pillar	Banshee	Stepney	-
Glacio-lacustrine Silts	-	-	Neskain	-	-	-	-	Enderby	-
Shallow Colluvium over Bedrock	-	-	Equesis	-	Pari	-	Hobbs	-	-
Alluvial-Colluvial Fans	Nisconlith	-	Gulch	-	Lumby White	Broderick	-	Chum	-
River and Stream Deposits	Nisconlith	-	-	Kosta	-	-	-	Ida	Wallenstein

Table 3. -- (Continued)

Soil Subgroups and Series

Parent Materials	Orthic Gray Wooded	Dark Gray Wooded	Brunisolic Gray Wooded	Bisequa Gray Wooded	Bisequa Podzol	Minimal Podzol	Gray Wooded Solodized Solonetz	Shallow Muck	Deep Muck	Peat
Glacial Till	Reiswig	Willshore	Cherryville	Hobson	-	-	-	-	-	-
Gravelly Outwash or Slopewash over Till	-	-	-	-	-	Spa	-	-	-	-
Morainal Gravels	-	-	-	-	-	Onyx	-	-	-	-
Sandy Stream and Deltaic Terraces	-	-	Corning	Metcalfe	Canoe	Shuswap	-	-	-	-
Glacio-Lacustrine Silts	Carlin	-	-	-	-	-	-	-	-	-
Glacio-Lacustrine Clay over Till	Saltwell Plaster	-	-	-	-	-	-	-	-	-
Glacio-Lacustrine Clay	Tappen	-	-	-	-	-	Broadview	-	-	-
Sandy Outwash and Slopewash over Glacio-Lacustrine	-	-	Syphon	-	-	-	-	-	-	-
Shallow Colluvium over Bedrock	Fowler	-	-	-	-	-	-	-	-	-
Alluvial-Colluvial Fans	Harper Moutell Adams	-	Leonard	-	-	Hupel	-	-	-	-
Organic Deposits	-	-	-	-	-	-	-	Loftus Rabie	Okanagan Santabin	Waby
Pond Deposits in Outwash and Till	Skimikin	-	-	-	-	-	-	-	-	-

DESCRIPTIONS OF SOILS

REGOSOL SOILS

Regosols are mineral soils that lack observable horizons, or have only a very weakly developed Ah horizon. An L-H horizon less than 12 inches thick may be present.

In the surveyed area the Regosol soils are derived from recently deposited materials, and there is a vegetation of mixed deciduous and coniferous forest. Subgroups found were Orthic Regosol, Orthic Regosol (Calcareous Phase), Gleyed Orthic Regosol, and Mull Regosol (Calcareous Phase).

Orthic Regosol Soils

These are mineral soils having little or no profile development. They lack observable horizons or have weakly developed Ah horizons. Under forest an L-H horizon up to two inches thick may be present. There is no visible evidence of accumulated salts or gley.

In the surveyed area, Orthic Regosols that occur on alluvial-colluvial fans were assigned to the Grindrod series. Those found on the drier, forested alluvial river and stream deposits are the Falkland series. The soils that occur in the more humid forested areas are the Yard series. Regosols were also included with two other subgroups in the Mabel complex. Orthic Regosol beach deposits were assigned to the Celista series.

Orthic Regosol Soils (Calcareous Phase)

These are Orthic Regosols which are calcareous throughout the profile. They occur on glacio-lacustrine materials as the Grier series.

Gleyed Orthic Regosol Soils

The Gleyed subgroup is composed of mineral soils Orthic in the upper part of the profile, but with faint mottling in the C horizons. These soils are represented in the surveyed area by the Rumball series, which is derived from alluvial river and stream deposits. Gleyed Orthic Regosols also occur as undifferentiated parts of the Mabel complex.

Mull Regosol Soils (Calcareous Phase)

This is a subgroup of mineral soils lacking horizon development other than an Ah horizon. Under forest an L-H horizon up to two inches thick may be present. These soils are calcareous throughout the profile. Representatives are the Schindler series on fan deposits, and the Bolean series, which is derived from river and stream deposits.

Orthic Regosol Soils

GRINDROD SERIES

The Grindrod soils are derived from alluvial-colluvial fan deposits scattered in the mapped area at elevations that lie between 1,200 and 2,800 feet. The topography is gently to strongly sloping, the slopes being from three to 15 percent. Hummocky micro-relief is common. These soils were differentiated as follows:

	Arable	Nonarable	
Grindrod gravelly sand	16	-	acres
Grindrod gravelly sand to gravelly loamy sand	114	-	"
Grindrod loamy sand	40	-	"
Grindrod gravelly loamy sand	600	132	"
Grindrod stony, gravelly loamy sand	-	95	"
Grindrod sandy loam	69	62	"
Grindrod gravelly sandy loam	510	16	"
Grindrod stony, gravelly sandy loam	66	121	"
Grindrod gravelly sandy loam to loam	29	-	"
Grindrod sandy loam to fine sandy loam	217	-	"
Grindrod loam	20	-	"
Grindrod loam to gravelly loam	53	-	"
Grindrod-Lumby gravelly sandy loam to gravelly loamy sand complex	-	655	"
	1,734	1,081	acres

The parent materials are poorly sorted, coarse to medium textured fan deposits, located where tributary creeks enter the main valleys. Surface textures are from gravelly sand to loam, and subsoils from gravelly sand to clay loam. Horizons vary as to thickness and gravel and cobble content. In places there are horizons of burned soil, signifying erosion after forest fire. Surface stoniness is from none at all to excessive. The most stony areas are in fan apexes.

The Orthic Regosol Grindrod soils are rapidly to moderately well drained, with areas of seepage near creeks and fan margins. The native vegetation consists of a light cover of birch, maple, saskatoon, willow, aspen and cottonwood, with an undergrowth of wild rose, aralia, twin-flower, yarrow, pinegrass, and scattered weeds. A cultivated profile of the Grindrod sandy loam was described as follows:

Horizon	Depth Inches	Description
Apl	0 - 2	Grayish-brown to dark grayish brown (10YR 4.5/2, dry) or very dark gray (10YR 3/1, moist) sandy loam. Very weak, medium subangular blocky structure. Soft when dry. Very friable when moist. Abundant fine roots. pH 6.2. Gradual boundary:

Horizon	Depth Inches	Description
Ap2	2 - 6	Grayish-brown (10YR 5/2, dry) or very dark grayish brown (10YR 3/2, moist) sandy loam. Very weak, medium subangular blocky structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.8. Abrupt boundary:
C	6 - 9	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown (2.5Y 4/2, moist) fine sandy loam. Moderate medium subangular blocky structure. Slightly hard when dry. Occasional root. pH 7.2. Abrupt boundary:
IIC1	9 -18	Light-gray (2.5Y 7/2, dry) or grayish-brown (2.5Y 5/2, moist) loamy sand. Structureless. Single-grained. Loose. Abundant roots. pH 7.5.
IIC2	18 +	Light-gray (2.5Y 7/2, dry) or grayish-brown (2.5Y 5/2, moist) gravelly sand. Single-grained. Loose. pH 7.4.

Land Use

At the time of the survey (1964) small acreages of the Grindrod soils were planted to forage crops. The majority of the acreage is in light regrowth forest.

These soils are mostly poor to doubtful for agriculture. They are low in organic matter and have low moisture holding capacity, due to variable textures in the profile.

Irrigation is required and is available from some creeks for the production of forage and cereal crops. Additions of organic matter and fertilizers are essential. The suitability for irrigation of the Grindrod soils is shown in Table 4.

FALKLAND SERIES

The Falkland soils occupy fairly extensive areas in the Salmon River valley from Glenemma to Shuswap Lake. Minor areas were found near Tappen, and in the Chase Creek valley. The range of elevation is from 2,100 feet in the Chase Creek valley to 1,145 near Shuswap Lake. Most of the topography is gently undulating, but there is variation from level areas to undulations associated with river oxbows. The soils, all arable, were mapped as follows:

Falkland sand	14 acres
Falkland loamy sand	115 "
Falkland loamy sand to sandy loam	90 "
Falkland sandy loam	492 "
Falkland gravelly sandy loam	18 "
Falkland fine sandy loam	138 "
Falkland-Nisconlith sandy loam to loam complex	160 "
Falkland-Nisconlith sandy loam to silt loam complex	235 "
Falkland loamy sand to sandy loam-Gardom complex	113 "
	1,375 acres

Complexes also occur with the Bolean, Bessette and Rumball series, where the Falkland soils occur as secondary members in areas of undulating topography.

The parent material consists of moderately coarse to coarse textured river and stream alluvium of recent origin. The deposits, which are of variable thickness, are stone-and-gravel free and micaceous. Surface textures range from sandy to fine sandy loam. Textures in the subsoil are loamy sand to fine sandy loam, with horizons of silt loam interspersed. The deposits grade to fine or coarse sand with depth.

Falkland soils are well to moderately well drained and were classed as Orthic Regosols. Most of the acreage is cleared and cultivated. Little native vegetation remains. The evidence indicates that these soils developed under a deciduous forest cover of cottonwood, willow, alder, and related undergrowth associated with river bottoms. A cultivated profile of the Falkland sandy loam was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 4	Dark-gray to dark grayish brown (10YR 4/1.5, dry) or very dark gray to black (10YR 2.5/1, moist) sandy loam. Weak, medium subangular blocky breaking to single-grained structure. Very friable when moist. Abundant roots. pH 7.8. Abrupt boundary:
C	4 -12	Grayish-brown (2.5Y 5/2, dry) or very dark grayish brown (2.5Y 3/2, moist) fine sandy loam. Massive breaking to single-grained structure. Very friable when moist. Occasional roots. pH 7.9. Clear boundary:
IIC1	12 -18	Grayish-brown (2.5Y 5/2, dry) or very dark grayish brown (2.5Y 3/2, moist) silt loam. Weak, medium subangular blocky structure. Very friable when moist. Small pockets of faint mottling. Occasional roots. pH 7.8. Abrupt boundary:

Horizon	Depth Inches	Description
IIIC1	18 -23	Grayish-brown to light olive brown (2.5Y 5/3, dry) or very dark grayish brown (2.5Y 3/2, moist) loamy sand. Weak, fine subangular blocky breaking easily to single-grained structure. Loose. Roots common. pH 8.1. Abrupt boundary:
IIC2	23 -29	Grayish-brown (2.5Y 5/2, dry) or very dark grayish brown (2.5Y 3/2, moist) silt loam. Weak, medium subangular blocky structure. Friable when moist. Small pockets of faint gleying and mottling. Occasional root. Free carbonates along root channels. pH 8.0. Clear boundary:
IIIC2	29 +	Variable textured strata from loamy sand to coarse sand. Single-grained structure. Loose. Occasional root in upper part. pH 8.2.

Land Use

Most of the acreage of Falkland soils is cultivated. The main crops are forage for hay and pasture, cereals and potatoes.

These soils are fair to poor for agriculture. Due to coarse textures within the rooting zone, and the variable depths to sands, they are droughty when dry farmed. Irrigation is necessary and is available in most areas where the soils occur.

In the native state there is a deficiency of organic matter. Crop rotation to improve organic matter status is essential. Additions of fertilizer for agricultural crops are necessary. The classification according to suitability for irrigation is given in Table 4.

YARD SERIES

The Yard series is derived from deposits of Scotch, Onyx and Ross creeks on the north side of Shuswap Lake. The elevations vary between 1,140 and 1,300 feet. The topography is gently to moderately sloping toward Shuswap Lake, with slopes from two to six percent. Abandoned creek channels are common. Where they occur the relief is a series of irregular, short undulations. The Yard soils were mapped as follows:

	Arable	Nonarable	
Yard loamy sand to sandy loam	49	-	acres
Yard loamy sand to gravelly loamy sand	268	23	"
Yard stony loamy sand to gravelly loamy sand	-	52	"

	Arable	Nonarable	
Yard gravelly loamy sand	-	358	acres
Yard sandy loam	402	-	"
Yard sandy loam to loam	263	-	"
Yard sandy loam to fine sandy loam	551	-	"
Yard fine sandy loam	18	-	"
	1,551	433	acres

The Yard soils were derived from parent materials similar to those of the Falkland series, but in more humid locations. There was more leaching and the soils are lower in bases. The parent material is composed of medium to coarse textured, recent deposits of creeks entering Shuswap Lake. Surface and subsoil textures vary from sand to loam; some strata contain gravel. These materials are underlain at various depths by gravel. Areas of stoniness mark exposed bars where the velocity of the stream flow was greater than average.

The Yard soils support a forest of Douglas fir and birch, with scattered maple and cedar. The ground cover is composed of aralia, Oregon grape, princes' pine, thimbleberry, false solomon's seal, and scattered moss. The soils were classified as Orthic Regosols. They are well to moderately well drained. Imperfect drainage occurs adjacent to creeks, and near the shore of Shuswap Lake, where there is an increased growth of deciduous trees and undergrowth. A profile was examined in native forest and described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Coniferous and deciduous forest litter from raw to partially decayed. Roots abundant. pH 6.0. Abrupt boundary:
Ah$\bar{j}$	0 - 3	Brown (10YR 4.5/3, dry) or very dark grayish brown (10YR 3/2, moist) fine sandy loam. Weak, fine subangular blocky structure. Soft when dry. Roots abundant. pH 5.8. Abrupt boundary:
C1	3 -10	Olive (5Y 5/3, dry) or dark grayish brown (2.5Y 4/2, moist) fine sandy loam. Weak to moderate, medium to coarse subangular blocky structure. Slightly hard when dry. Roots abundant. pH 6.4. Clear boundary:
C2	10 -14	Light olive brown (2.5Y 5/4, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) sandy loam. Weak fine to medium subangular blocky structure. Soft when dry. Common roots. pH 6.7. Clear boundary:

Horizon	Depth Inches	Description
C3	14 -20	Light olive brown (2.5Y 5/4, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) loam. Moderate, coarse subangular blocky structure. Hard when dry. Common roots. pH 6.7. Abrupt boundary:
IIC1	20 -22	Light olive brown (2.5Y 5/4, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) coarse sandy loam. Weak fine granular structure. Soft when dry. Common roots. pH 6.7. Clear boundary:
IIC2	22 -27	Light olive brown (2.5Y 5/4, dry) or olive-brown (2.5Y 4/4, moist) sand with a large proportion of ferro-magnesium minerals. Single-grained. Loose. Occasional root. pH 6.7. Irregular boundary:
IIIC	27 +	Varigated clean gravelly sands with a large proportion of ferro-magnesium minerals. Over 50 percent gravels and small cobbles. Loose. pH 6.6.

Land Use

At the time of the survey (1964) only a small acreage of the Yard soils were cleared and cultivated. A few acres of formerly cultivated land is abandoned, and slowly reverting to regrowth forest.

The Yard soils are fair to doubtful soils for agriculture, due to the occurrence of gravel strata at variable depths, and to coarse textures which occur within the rooting zone. The soils are low in organic matter and require additions in an effective crop rotation. Fertilizer and irrigation water, which is available from creeks, are required for agricultural crops.

The soils are periodically logged, and have limited value for grazing. Areas bordering Shuswap Lake have value for summer cabins and resorts. The suitability for irrigation of the Yard series is shown in Table 4.

CELISTA SERIES

This series is composed of soils derived from beaches along the shoreline of Shuswap Lake, at elevations between 1,142 and 1,250 feet. The topography is mostly a gentle slope toward the lake, but in some places it is gently undulating. The soils were mapped as follows:

	Arable	Nonarable	
Celista gravel	-	49	acres
Celista gravel to sand	-	152	"
Celista sand	-	236	"
Celista loamy sand	39	-	"
Celista sand to sandy loam	231	-	"
Celista sandy loam to loamy sand	175	-	"
	445	437	acres

The parent materials are a variable assortment of beach deposits, formed when Shuswap Lake had a higher shoreline than at present. They include clean, angular gravel, with and without cobbly schist, rounded gravel, and various mixtures of sands. In places, the fans of creeks have been reworked by wave action to form sandy beaches. The deposits can be calcareous or non-calcareous, and roughly stratified.

The Celista series supports a light forest cover which varies, depending on locality, from cedar-hemlock to Douglas fir, birch and maple. The ground cover, like the forest cover, varies in composition, and is usually composed of mixtures of falsebox, Oregon grape, wild rose, false solomon's seal, princes' pine, twinflower, and scattered moss. The soils are rapidly drained Orthic Regosols. A profile of the Celista gravel was examined under forest cover and described as follows:

Horizon	Depth Inches	Description
L-F	1 - 0	An accumulation of raw, partially decayed and decayed forest litter. pH 6.0. Abrupt boundary:
C1	0 - 6	Varigated clean sands and water worked flat, schistose gravel up to two inches in diameter. Structureless. Loose. Abundant roots. pH 6.6. Clear boundary:
C2	6 -28	Varigated clean sands and predominantly water worked flat, fine to coarse, schistose gravel. Structureless. Loose. Occasional roots. pH 6.6 in upper half and 6.4 in lower half. Clear boundary:
IIC	28 +	Clean, washed sand. Single-grained. Loose. pH 6.4.

In places a layer of loess up to three or four inches thick occurs beneath the leaf litter in the coarse textured soils.

Land Use

The Celista soils are doubtful for agriculture, due to their coarse textured solum. Their best use is for summer resorts and beach cottages, which are currently popular. The suitability of the soils for irrigation is given in Table 4.

Orthic Regosol Soils (Calcareous Phase)

GRIER SILT LOAM

The Grier silt loam consists of a minor group of soils that occur as small acreages on glacio-lacustrine deposits in the vicinity of Notch Hill, Tappen and on the Broadview highland east of Salmon Arm. The soils are usually associated with run-off channels and seepage areas, with topography that is gently to strongly sloping, with slopes from five to 15 percent. The elevations range from 1,200 to 1,500 feet. A total of 300 acres were mapped as arable, and 18 acres as nonarable. In addition, 38 acres were mapped as a Grier-Carlin silt loam soil complex. The soils occur in association with the Enderby, Carlin, Tappen, and Broaview series.

These soils are derived from stratified, calcareous, glacio-lacustrine deposits which have been subject to exposure of the parent material by erosion, or are calcareous to the surface due to intermittent seepage water. The deposits are high in silt. Textures vary from silt loam to silty clay loam. Surface textures are mainly silt loam, with a minor inclusion of silty clay loam. Gravel and cobbles are absent.

Under natural conditions the soils contain a light forest cover, composed of deciduous trees. Reverted cultivation or pasture supports a vegetation of wild grasses, clover, scattered snowbrush, Canada thistle, and burdock. The soils were classified as Orthic Regosol (Calcareous Phase). They are moderately well drained, with some associated imperfect drainage. A profile was examined in a reverted pasture, used for grazing, and was given the following description:

Horizon	Depth Inches	Description
Ahjk	0 - 5	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown (2.5Y 4/2, moist) silt loam. Moderate, medium granular structure. Slightly hard when dry. Strongly calcareous. Roots abundant. pH 7.9. Conductivity 0.5. Abrupt boundary:

Horizon	Depth Inches	Description
Ck1	5 -16	Light-gray (2.5Y 7/2, dry) or grayish-brown to light brownish gray (2.5Y 5.5/2, moist) silt loam. Moderate medium to coarse subangular blocky structure. Hard when dry. Strongly calcareous. Occasional root. pH 8.4. Conductivity 0.4. Gradual boundary:
Ck2	16 +	Light-gray (2.5Y 7/2, dry) or light brownish gray (2.5Y 6/2, moist) silt loam. Stratified parent material. Hard when dry. Strongly calcareous. Occasional root. pH 8.4. Conductivity 0.3.

Land Use

The Grier soils are used for pasture. In places they are in the process of reverting to native vegetation or couchgrass. They are poor soils for alfalfa, and can only produce fair crops of hay or pasture if planted to forage crops tolerant to high lime and intermittent seepage.

In places run-off water presents a problem and drainage has been provided, or is required for short periods of time. Areas subject to erosion are best kept in native tree growth, or allowed to remain in forage crops.

Additions of organic matter in an effective crop rotation are necessary to up-grade fertility. Organic matter incorporated in the soil tends to dilute the effects of high lime. The soils are rated according to suitability for irrigation in Table 4.

Gleyed Orthic Regosol Soils

RUMBALL SERIES

The main acreage of these soils occur in the last five miles of the Salmon River valley, between Mount Ida and Shuswap Lake. Small acreages occur in the White Creek and Chase Creek valleys. The topography is from level to gently undulating, and elevations lie between 1,150 and 2,750 feet. The Rumball soils and associated complexes, all arable, are as follows:

Rumball sandy loam	79 acres
Rumball loam	29 "
Rumball silt loam	255 "
Rumball-Falkland sandy loam complex	378 "
Rumball-Falkland loam to sandy loam complex	55 "
Rumball-Nisconlith loam complex	55 "

Rumball-Nisconlith sandy loam to loam complex	362 acres
Rumball-Nisconlith sandy loam to silt loam complex	91 "
Rumball-Wallenstein silt loam complex	26 "
	1,330 acres

Complexes were mapped with the Nisconlith and Ida series in gently undulating areas where Rumball soils are secondary members.

The parent material is moderately coarse to moderately fine textured river and stream alluvium. Stones or gravel are absent. Deposits are composed of horizons of variable thickness and texture, formed by a variable velocity of flow. Surface textures range from sandy loam to silt loam, and subsoils are loam, silt loam, clay loam and silty clay loam. In places sandy loam, loamy sand and sand occur interstratified with the heavier textures. The deposits grade to fine or coarse sand with depth.

The imperfectly drained Rumball soils were classed as Gleyed Orthic Regosols. They developed under deciduous tree cover composed of cottonwood, birch, maple, alder, wild rose, and others. A profile of Rumball loam was examined in a cultivated field and described as follows:

Horizon	Depth Inches	Description
Ap	0 - 6	Gray (10YR 5/1, dry) or dark-gray to very dark gray (10YR 3.5/1, moist) loam. Weak, medium subangular blocky structure. Slightly hard when dry. Friable when moist. Abundant roots. pH 5.8. Abrupt boundary:
IICgj	6 -15	Brown to yellowish-brown (10YR 5/3.5, dry) or brown to dark-brown (10YR 4/3, moist) loamy sand. Single-grained structure. A few distinct mottles. Roots common. pH 6.4. Abrupt boundary:
Cg	15 -24	Light-gray (10YR 6/1, dry) or dark-gray (10YR 4/1, moist) silty clay loam. Moderate, fine subangular blocky structure. Common, distinct mottles. Slightly hard when dry. Slightly firm when moist. Roots common. pH 5.6. Abrupt boundary:
Cgj	24 +	Grayish-brown (10YR 5/2, dry) or dark grayish brown (10YR 4/2, moist) sandy clay loam. Massive. Common faint mottles. Slightly hard when dry. Friable when moist. Occasional root in the upper part. pH 6.0.

Land Use

The Rumball are among the better agricultural soils of the map-area. Most of the acreage is cultivated and used for raising cereals, forages for hay and pasture, corn and potatoes. The soils are fairly productive and good yields are obtained.

Irrigation water is applied to a limited acreage in the Salmon River valley, in association with other soil series. Most of the acreage is dry farmed. The imperfect drainage is a source of moisture for crops where irrigation is not used.

In areas where the Rumball soils occur in association with Bessette, Nisconlith and Gardom soils, forage crops of clover-grass mixtures are more suited for forage production than alfalfa-grass mixtures. Organic matter additions and fertilizers are necessary amendments to be included in suitable crop rotations for maximum production. The classification as to suitability for irrigation is given in Table 4.

Mull Regosol Soils (Calcareous Phase)

SCHINDLER SERIES

The soils are derived from alluvial-colluvial fans. Most of the acreage is north of Sunnybrae and in the Canoe Creek valley. Other small areas are scattered through the map-area. The topography ranges from gently to strongly sloping; slopes are from three to 15 percent. Elevations are from 1,150 to 2,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Schindler sandy loam	49	-	acres
Schindler gravelly sandy loam	122	250	"
Schindler gravelly sandy loam to gravelly loamy sand	41	-	"
Schindler loam	205	-	"
	417	250	acres

The 250 acres of nonarable land is excessively stony.

The fan parent material is in part derived from limestone formations, and the soil profile is calcareous. Surface textures are loam and gravelly sandy loam, with inclusions of gravelly loamy sand and sandy loam. The subsoils vary from loam to sand, with and without gravel. Profiles can be composed of horizons of similar texture, or of horizons having variable textures. Stoniness is from none at all to excessive.

The Schindler soils were classified as a calcareous phase of the Mull Regosol subgroup. They are moderately well drained. Some imperfect drainage may be associated with seepage from creeks. The soils support a mixed coniferous-deciduous forest of Douglas fir, birch, aspen, maple, and willow. The understory is composed of saskatoon, juniper, filbert, thimbleberry, spiraea, false box, Oregon grape, crooked stem, solomon's seal, soopolallie, ocean spray, princes' pine, and a little moss. A profile was examined under forest and given the following description:

Horizon	Depth Inches	Description
L-H	1 - 0	Mixed coniferous-deciduous litter. Well decomposed in the lower part. Roots abundant. pH 6.1. Abrupt boundary:
Ahk	0 - 3	Dark grayish brown (10YR 4/2, dry) or very dark brown (10YR 2/2, moist) loam. Very weak, very fine granular structure. Soft when dry. Very friable when moist. Precipitated marl which is gravel and small cobble size. Roots abundant. Strong effervescence. pH 7.7. Clear boundary:
Ck1	3 - 7	Grayish-brown (10YR 5/2, dry) or dark grayish brown (10YR 4/2, moist) loam. Very weak, fine granular structure. Soft when dry. Very friable when moist. Precipitated marl of gravel and small cobble size. Roots abundant. Strongly calcareous. pH 7.8. Abrupt boundary:
Ck2	7 -15	Grayish-brown to dark grayish brown (10YR 4.5/2, dry) or dark grayish brown to very dark grayish brown (10YR 3.5/2, moist) loam. Very weak, fine graunular structure. Soft when dry. Very friable when moist. Roots abundant. Strongly calcareous. pH 7.9.
Ck3	15 -21	Grayish-brown (10YR 5/2, dry) or dark grayish brown (10YR 4/2, moist) loam. Very weak, fine granular structure. Soft when dry. Very friable when moist. Roots common. Strongly calcareous. pH 8.0. Abrupt boundary:
Ck4	21 -32	Grayish-brown to brown (10YR 5/2.5, dry) or dark grayish brown to dark-brown (10YR 3.5/2.5, moist) loam. Very weak, fine granular structure. Soft when dry. Very friable when moist. A few angular gravels in the lower part. Roots common to occasional. Strongly calcareous. pH 8.0. Gradual boundary:

Horizon	Depth Inches	Description
Ck5	32 -44	Grayish-brown to dark grayish brown (10YR 4.5/2, dry) or dark-brown (10YR 3/3, moist) loam. Weak moderate subangular blocky structure. Soft to slightly hard when dry. Very friable to friable when moist. A few angular gravels. Occasional root. Strongly calcareous. pH 8.0. Clear boundary:
Ck6	44 +	Pale-brown to brown (10YR 5.5/3, dry) or dark grayish brown to dark-brown (10YR 3.5/2.5, moist) loam. Weak, moderate to coarse subangular blocky structure. Slightly hard when dry. Friable when moist. Common to many angular and rounded gravels and cobbles. Occasional root. Strongly calcareous. pH 8.0.

A gravelly substratum can be found at variable depths below 24 inches.

Land Use

At the time of the survey (1964) part of the acreage of the Schindler soils was cleared and planted to forage crops; most of the acreage was in regrowth forest. Stands of alfalfa deteriorate quickly; production is reduced by too much lime and chlorosis occurs. Where cultivated, lime-tolerant crops and irrigation is required. Organic matter is also required in effective crop rotations to help overcome the effects of excessive lime.

Land clearing on these soils involves the removal of a light regrowth forest. Stone removal may be necessary along boundaries of excessively stony fans. The suitability of the Schindler soils for irrigation is given in Table 4.

BOLEAN SERIES

The Bolean soils were found in the Salmon River valley between Glenemma and Shuswap Lake, and in the valley of White Creek. The topography is from very gently undulating to undulating, and the elevations lie between 1,150 and 1,450 feet. The Bolean soils and associated complexes, all arable, were mapped as follows:

Bolean loam	231 acres
Bolean silt loam	337 "
Bolean silty clay loam	91 "
Bolean silt loam-silty clay loam	210 "
Bolean-Falkland fine sandy loam complex	80 "
Bolean-Falkland loam-fine sandy loam complex	117 "

Bolean-Nisconlith silt loam complex	270 acres
Bolean-Nisconlith silty clay loam complex	173 "
Bolean-Nisconlith clay loam complex	108 "
Bolean-Nisconlith loam (calcareous phase) complex	150 "
Bolean-Nisconlith silt loam (calcareous phase) oomplex	39 "
Bolean-Nisconlith silty clay loam (calcareous phase) complex	74 "
	1,880 acres

The parent material is composed of medium to moderately fine textured river and stream alluvium. The deposits are micaceous and stone-and- gravel free. Surface and subsoil textures are loam, clay loam, silt loam and silty clay loam. Inter-strata of fine sandy loam and sandy loam occur. There are coarse or fine sands at depths. The parent material is high in carbonates and the profiles are calcareous.

The Bolean series is classified as a calcareous phase of the Mull Regosol subgroup. The soils are moderately well drained, and weakly mottled at depths below 12 to 18 inches. The total acreage is cultivated. The native vegetation was deciduous and similar to that of the Falkland and Rumball soils. A profile of Bolean silt loam under cultivation was described as follows:

Horizon	Depth Inches	Description
Apk	0 - 6	Grayish-brown (2.5Y 5/2, dry) or very dark grayish brown (2.5Y 3/2, moist) silt loam. Moderate, medium subangular blocky structure. Slightly hard when dry. Friable when moist. Roots common. pH 7.9. Abrupt boundary:
Ck	6 -12	Light brownish gray (2.5Y 6/2, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) silty clay loam. Moderate, medium subangular blocky structure. Slightly hard when dry. Friable when moist. Roots common. Strongly calcareous. pH 8.3. Clear boundary:
IICgj	12 -19	Grayish-brown to light olive brown (2.5Y 5/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) sandy loam. Weak, subangular blocky structure. Soft when dry. Friable when moist. A few, faint mottles. Occasional roots. Calcareous. pH 8.2. Gradual boundary:
Cgj	19 +	Light-gray to light brownish gray (2.5Y 6.5/2, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) silt loam. Massive. Friable when moist. Common, distinct mottles. Occasional roots in upper part. Calcareous. pH 8.4.

Land Use

The total acreage of Bolean soils is cleared and cultivated. The main crops are forage and cereals for dairy and beef production. Potatoes are grown as a cash crop.

Bolean soils are calcareous throughout and this has an effect on crops and plant nutrient availability. Potato scab thrives in high lime soils, and the potatoes tend to be scabby. A combination of high lime and poor drainage associated with Bolean-Nisconlith soil complexes are not favorable for alfalfa production.

The soils are low in organic matter, which must be built up in effective crop rotations. Organic matter incorporated in the soil helps to overcome the effects of high lime. A limited acreage of these soils is irrigated in the Salmon River valley. Most of the acreage is dry farmed in association with other soil series. The classification according to suitability for irrigation is given in Table 4.

GLEYSOL SOILS

The Gleysols are poorly to very poorly drained soils. They developed under deciduous trees, shrubs and sedges, or they would produce this type of native vegetation if left undisturbed.

Under natural conditions the mineral soil may be overlain by organic horizons less than 12 inches thick, or may have a dark colored mineral Ah horizon up to three inches thick, or both. Cultivated land has a brownish to grayish plow layer, underlain by a gleyed horizon or horizons. The gleyed mineral horizon or horizons are grayish, and may be moderately to very strongly gleyed.

In the surveyed area the Gleysol soils are represented by four subgroups. These are Rego Gleysol, Carbonated Rego Gleysol, Peaty Rego Gleysol and Peaty Carbonated Rego Gleysol soils.

Rego Gleysol Soils

These may have an Ah horizon up to three inches thick, or an L-H horizon of organic matter up to six inches thick, or both. These horizons are underlain by one or more moderately to very strongly gleyed horizons. The representatives in the mapped area are the Apalmer series, and members of the Mabel complex.

Carbonated Rego Gleysol Soils

This subgroup may have an Ah horizon up to three inches thick, or an L-H horizon of organic litter up to six inches thick, or both. The soils have a calcareous surface horizon that grades into one or more calcareous, non-saline C horizons which are moderately to very strongly gleyed. The representative is the Mowitch series.

Peaty Rego Gleysol Soils

The soils are characterized by an L-H horizon from six to 12 inches thick of muck, peat or both. An Ah horizon less than three inches thick may occur beneath the L-H horizon. The L-H horizon is underlain by one or more moderately to very strongly gleyed C horizons. The subgroup is represented in the mapped area by the Gardom series.

Peaty Carbonated Rego Gleysol Soils

These soils are characterized by a calcareous L-H horizon from six to 12 inches thick, composed of muck, peat or both. A calcareous Ah horizon less than three inches thick may be present beneath the L-H horizon. The L-H horizon is underlain by one or more calcareous, non-saline, moderately to very strongly gleyed C horizons. The representative is the Heubner series.

Rego Gleysol Soils

APALMER SERIES

This series occupies a minor acreage near the confluence of the Salmon River and Shuswap Lake. The topography is level to very gently undulating, and the elevation about 1,140 feet. A total of 208 acres were classified, all arable.

The parent material is composed of deltaic sediments of the Salmon River, and low-lying deposits inundated at the time of the freshet. Soil horizons are variable in texture and thickness, due to ponding and the meandering of the river. Surface textures are from silt loam to silty clay. Textures in the subsoil range from sand to clay.

The Rego Gleysol Apalmer series is very poorly drained. A high water table occurs throughout the year. The native vegetation consists of water-tolerant reeds, sedges and mint. A profile was described as follows:

Horizon	Depth Inches	Description
Cg1	0 - 4	Grayish-brown (2.5Y 5/2, dry) or dark greenish gray (5GY 4/1, moist) silty clay loam. Massive structure. Firm when moist. Common raw sedge roots scattered through horizon. pH 5.3. Abrupt boundary:
Cg2	4 - 6	Grayish-brown to dark grayish brown (2.5Y 4.5/2, dry) or dark greenish gray (5GY 4/1, moist) silty clay loam. Massive structure. Firm when moist. Raw and partially decayed sedge roots scattered through horizon. pH 5.3. Abrupt boundary:

Horizon	Depth Inches	Description
Cg3	6 -18	Light-gray (2.5Y 7/2, dry) or dark greenish gray (5GY 4/1, moist) silty clay matrix with common, dark brown (7.5YR 4/4, moist), medium, distinct mottles. Massive structure. Firm when moist. Occasional root. pH 6.4. Abrupt boundary:
IICg1	18 -24	Light brownish gray (2.5Y 6/2, dry) or dark-gray (5Y 4/1, moist) sandy loam matrix with many dark-brown (7.5Y 4/4, moist) coarse, prominent mottles. Massive structure. Water table at 18 inches August 31, 1964. pH 6.4. Clear boundary:
IICg2	24 +	Light brownish gray to grayish-brown (2.5Y 5.5/2, dry) or dark-gray (5Y 4/1, wet) strata of variable thickness that vary in texture from coarse sand to silty clay loam. pH 6.5.

Land Use

Apalmer soils have use for late summer grazing. The nutritive value of the sedge growth is poor. These soils have low value for agriculture, due to their proximity to Shuswap Lake. Reclamation costs would be high, as dyking and drainage by pumping would be necessary. The classification according to suitability for irrigation is given in Table 4.

Carbonated Rego Gleysol Soils

MOWITCH SILT LOAM

This soil type occupies a small acreage on the fan of East Canoe Creek, at elevations between 1,400 and 1,500 feet. The topography is gently sloping. A total of 56 acres were mapped as Mowitch-Schindler silt loam complex, all arable.

The parent material consists of silty fan alluvium, derived from the finer sediments in till, or from erosion of glacio-lacustrine silt. The texture of the surface soil and of the whole solum is chiefly silt loam, with loam inclusions. Lighter textured material, including sandy strata, occurs below 18 inches in depth, and conveys calcareous seepage water. The soil profile is calcareous.

The poorly drained Mowitch silt loam is a Carbonated Rego Gleysol soil. The native vegetation is mostly birch, alder, aspen, cottonwood, and scattered spruce and cedar. The understory is composed of snow-brush, blackberry, thimbleberry, aralia, burdock, nettle, and Canada thistle and redtop in open spaces. A profile under native vegetation was given the following description:

Horizon	Depth Inches	Description
Hk		Very dark brown (10YR 2/2, dry) or black (10YR 2/1, moist) muck. Friable when moist. Roots abundant. Strongly calcareous. pH 7.8. Abrupt boundary:
	0 - $\frac{3}{4}$	White (10YR 8/1, dry) or light-gray (10YR 7/2, moist) volcanic ash. Single-grained. Abundant roots. Abrupt boundary:
Cgk1	$\frac{3}{4}$- 4	Grayish-brown (2.5Y 5/3, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) silt loam. Moderate, medium subangular blocky structure. Firm when moist. A few, fine, medium, distinct mottles. Organic matter filtered into cracks. Abundant roots. Calcareous. pH 8.1. Abrupt boundary:
Cgk2	4 -13	Gray (5Y 6/1, dry) or dark-gray (5Y 4/1, moist) silt loam matrix with dark yellowish brown (10YR 4/4, moist) and dark-brown (7.5YR 4/4, moist) common, distinct mottles. Massive. Sticky and plastic when wet. Occasional roots. Strongly calcareous. pH 8.2. Clear boundary:
Cgk3	13 -18	Olive (5Y 5/3, dry) or dark gray (5Y 4/1, moist) to dark greenish gray (5GY 4/1, moist) silt loam matrix with dark yellowish brown (10YR 4/4, moist) and dark-brown (7.5YR 4/4, moist) common, distinct to prominent mottles. Massive. Sticky and plastic when wet. Occasional roots. Strongly calcareous. pH 8.2. Clear boundary:
IICgk	18 -23	Olive (5Y 5/3, dry) or dark-gray (5Y 4/1, moist) sand, silt loam, and loamy sand strata. Yellowish-brown (10YR 4/4, moist) and dark-brown (7.5YR 4/4, moist) common, distinct mottles. Single-grained and massive structure. Non-sticky and sticky when wet. Non-plastic and plastic when wet. Occasional root. Strongly calcareous. pH 8.2. Clear boundary:

Horizon	Depth Inches	Description
Cgk4	23 +	Pale-olive (5Y 6/4, dry) or dark greenish gray (5GY 4/1, moist) silt loam to silty clay loam matrix with yellowish-brown (10YR 4/4, moist) and dark-brown (7.5YR 4/4, moist) common, distinct to prominent mottles. Massive. Sticky and plastic when wet. Strongly calcareous. pH 8.2. Water table at 36 inches in August, 1964.

Land Use

Only one small area is cultivated and used for hay. This is a poor soil for agriculture. It requires good management and drainage for satisfactory crop returns. Only lime tolerant crops are suitable. The classification of the Mowitch-Schindler soils according to suitability for irrigation is given in Table 4.

Orthic Regosol to Rego Gleysol Soils

MABEL SOIL COMPLEX

These are a group of soils that occupy low terraces of the Salmon and Thompson rivers. There is also a small acreage in the valley of Chase Creek. The general topography is level to gently sloping. In places, stream braids, oxbows and abandoned channels have left short slopes. Elevations are between 1,140 and 1,175 feet in the Salmon and Thompson river valleys, and from 1,900 to 2,700 feet in the Chase Creek valley. A total of 1,344 acres were mapped, of which only 27 are arable.

The parent material consists of coarse to medium textured stream alluvium, with inter-stratification of various thicknesses and textures. The surface soil textures were too variable for differentiation at the scale of mapping used; the variation is from loamy sand to silt loam. The materials become coarser with depth, and overlie coarse sand and gravel.

The Mabel soils are subject to inundation during the annual freshet. Both deposition and erosion occur. There is a high water table when the streams are above normal flow. In the growing season the soils are moderately well, imperfectly and poorly drained in different places. Under these conditions soil development consists of Orthic Regosol, Gleyed Orthic Regosol, and Rego Gleysol. Muck and peat from two to six inches thick occurs in depressions in association with the Rego Gleysol soils.

The complex supports a light to medium growth of cottonwood, willow, birch, maple, alder, red-osier dogwood, chokecherry, elderberry, hawthorn, rose and others, including grasses. A profile under native cover, typical of the Orthic Regosol member, was described as follows:

Horizon	Depth Inches	Description
C	0 - 5	Grayish-brown (2.5Y 5/2, dry) or dark grayish brown (2.5Y 4/2, moist) sandy loam. Weak fine subangular blocky breaking to fine granular structure. Very friable when moist. Abundant roots. pH 6.8. Abrupt boundary:
C-IIC	5 - 9	Grayish-brown (2.5Y 5/2, dry) or dark grayish brown (2.5Y 4/2, moist) lenses of sandy loam, loamy sand and sand. Weak fine subangular blocky, weak fine granular and single-grained structure. Very friable when moist. Common roots. pH 6.9. Abrupt boundary:
IIC-C	9 -12	Light brownish gray (2.5Y 6/2, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) coarse sand with two thin lenses of sandy loam. Occasional faint mottle. Single-grained. Loose. Common roots. pH 7.1. Clear boundary:
Cgj1	12 -16	Grayish-brown (2.5Y 5/2, dry) or dark grayish brown (2.5Y 4/2, moist) sandy loam. A few distinct mottles. Weak, fine granular structure. Very friable when moist. Common roots. pH 7.1. Clear boundary:
IIC	16 -23	Variegated, clean, coarse sand. Single-grained. Loose. Occasional root. pH 6.9. Abrupt boundary:
Cgj2	23 -26	Grayish-brown (2.5Y 5/2, dry) or dark grayish brown (2.5Y 4/2, moist) loamy sand with a few, distinct mottles. Single-grained. Loose. Occasional root. pH 7.3.
IIIC	26 +	Variegated, clean, coarse sand. Assorted gravels and cobbles. pH 7.0.

Land Use

All areas were classed as nonarable, except for 27 acres of fifth class land, because of susceptibility to spring flooding and run-off water. There has been no agricultural development on these soils. Apart from very limited grazing they have little use. Necessary reclamation in the form of dyking, clearing and irrigation is not warranted.

Peaty Rego Gleysol Soils

GARDOM MUCK

The Gardom soils occur in the Salmon River valley, in the valley between Skimiken Lake and Squilax, and on the highland north of Celista. The topography varies from depressional and level to gently undulating and sloping, between elevations of 1,150 and 1,850 feet. The soils were mapped as follows:

	Arable	Nonarable	
Gardom muck	291	-	acres
Gardom complex	103	29	"
Gardom-Loftus complex	-	103	"
Gardom-Okanagan complex	59	-	"
Gardom-Falkland sandy loam complex	42	-	"
Gardom-Mabel complex	-	108	"
Gardom-Nisconlith loam complex	97	-	"
Gardom-Nisconlith silt loam complex	130	-	"
Gardom-Nisconlith silt loam (calcareous phase) complex	75	-	"
	797	240	acres

The Gardom muck is composed of a surface layer of sedge and wood remains from six to 12 inches thick. The muck is underlain by moderately coarse to moderately fine textured river, stream and fan alluvium. There is a high water table and drainage is very poor. The mineral subsoil is dull in color and moderately to very strongly gleyed. In places, between the muck and mineral soil, there is a discontinuous layer of volcanic ash or diatomaceous earth that varies from one to two inches, and in places up to four inches thick. Interstratified horizons of muck and inwashed fan materials occur, which were mapped as Gardom complex.

The Peaty Gleysol Gardom soils developed under a swamp forest of deciduous trees, sedges and other hydrophytic plants. A representative profile was described as follows:

Horizon	Depth Inches	Description
H1	11 - 6	Very dark gray (10YR 3/1, dry) or black (10YR 2/1, moist) muck. Moderate fine granular structure. Friable when moist. Abundant roots. pH 6.9. Clear boundary:
H2	6 - 0	Very dark grayish brown (10YR 3/2, dry) or very dark brown (10YR 2/2, moist) muck. Moderate, fine subangular blocky structure. Friable when moist.

Horizon	Depth Inches	Description
		Abundant roots. pH 6.8. Abrupt boundary:
Cg1	0 - 7	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown (2.5Y 4/2, moist) fine sandy loam. Common, faint mottles. Massive. Friable when moist. Occasional root. pH 7.2. Clear boundary:
Cg2	7 -11	Grayish-brown (2.5Y 5/2, dry) or very dark grayish brown (10YR 3/2, moist) loam. Common faint mottles. Horizon contains two thin lenses of muck. Weak medium subangular blocky structure. Friable when moist. Occasional root. pH 6.8. Clear boundary:
Cg3	11 +	Light-gray to gray (5Y 6/1, dry) or olive-gray (5Y 4/2, moist) silty clay loam. Many distinct mottles. Massive. Plastic when wet. Occasional root in the upper part. pH 7.2.

Land Use

Most of the classified acreage has been cleared and cultivated. The remainder is in native vegetation. The most important reclamation needed on this soil series is drainage. Very little systematic drainage has been undertaken. A few open ditches were seen at the time of the survey (1964).

Gardom soils are used for hay and pasture, with clover, timothy, orchard grass, and reed canary the main crops. Fertilizer applications are essential for cultivated crops. Nearly all cultivated areas show invasion by sedges, and general deterioration of the forage crops. With adequate drainage the Gardom muck could benefit from irrigation. The classification according to suitability for irrigation is given in Table 4.

Peaty Carbonated Rego Gleysol Soils

HEUBNER MUCK

The Heubner muck occurs along East Canoe Creek, and in the vicinity of Notch Hill. The topography is depressional to gently sloping at elevations between 1,300 and 1,700 feet. Micro-undulations occur, due to shrinking and settling after drainage. The Heubner muck and associates were mapped as follows:

	Arable	Nonarable	
Heubner muck	206	-	acres
Heubner-Rabie complex	8	20	"
Heubner-Rabie-Santabin complex	149	-	"
Heubner-Nisconlith silty clay loam (calcareous phase)-Rabie-Santabin complex	83	-	"
Heubner-Bessette sandy loam-Rabie complex	19	-	"
	465	20	acres

These soils consist of a muck layer that varies from six to 12 inches thick resting on fan and lacustrine deposits. Immediately beneath the muck layer, the calcareous subsoil consists of loam, silt loam and clay loam. This is underlain by strata of variable textures that becomes coarser with depth. Near Notch Hill, the muck is underlain by silty clay loam and silty clay of glacio-lacustrine origin. The muck is calcareous; marl containing shells occurs in places between the muck layer and subsoil. Water tables are high and the soils are very poorly drained.

The Peaty Carbonated Rego Gleysol Heubner soils support a swamp forest of deciduous trees, sedges and other hydrophytic plants. A profile was examined under sedge growth, where the muck was underlain by glacio-lacustrine sediments, and described as follows:

Horizon	Depth Inches	Description
Hp	10 - 0	Very dark brown (10YR 2/2, dry) or black (10YR 2/1, moist) muck. Well decomposed. Abundant roots. Calcareous. pH 7.6. Abrupt boundary:
Cgk	0 - 5	Gray (5Y 5/1, dry) or very dark gray (5Y 3/1, moist) silty clay loam. Massive. Muck filtered down cracks into horizon. Occasional root. Strongly calcareous. pH 8.2. Abrupt boundary:
	5 - 6	White (10YR 8/1, dry) or light gray (10YR 7/1, moist) volcanic ash. Calcareous. pH 8.1. Abrupt boundary:
IICca	6 - 9	White (2.5Y 8/2, dry) or light brownish gray (2.5Y 6/2, moist) marl. Thin lense of organic matter in horizon and a few shells. Strongly calcareous. pH 8.0. Abrupt boundary:

Horizon	Depth Inches	Description
IIICg-H	9 -15	A mixture of very dark gray (2.5Y 3/0, and 5Y 3/1, dry) or black (2.5Y 2/0, and 5Y 2/1, moist) lenses of silt loam, clay and organic matter. Very strongly gleyed. Massive. Abundant roots. Calcareous. pH 7.7. Abrupt boundary:
	15 -17	White (2.5Y 8/2, dry) or light brownish gray (10YR 6/2, moist) volcanic ash. pH 8.1.
IVCg	17 +	Black (2.5Y 2/0, moist) clay. Very strongly gleyed. Massive. pH 7.9. Water table in late August, 1964, varies from 18 to 24 inches from the surface.

Land Use

Heubner muck requires drainage to intercept seepage and remove excess water. Drainage observed was through shallow ditches. The small acreage cleared produces an abundant growth of sedges, and in places, the sedges are cut for hay. A few acres have been improved and planted to forage tolerant to a high water table, such as reed canary grass, orchard grass and timothy.

Decomposition of the shallow organic layer occurs fairly soon after drainage. Shrinkage of the organic matter may expose calcareous mineral soil to the surface. Such areas require the incorporation of well decayed muck and other organic litter to improve the soil structure and prevent baking.

Applications of fertilizer are necessary. Only lime-tolerant crops should be grown. With adequate drainage the Heubner muck would benefit from irrigation. The classification according to suitability for irrigation is given in Table 4.

HUMIC GLEYSOL SOILS

These are poorly to very poorly drained soils that develop under deciduous trees, shrubs and sedges, or they would produce this type of vegetation if left undisturbed.

Under natural conditions a dark colored mineral Ah horizon more than three inches thick must be present, or if cultivated, the plow layer is grayish to blackish in color. The underlying horizon or horizons may be moderately to very strongly gleyed. The mineral soil may be overlain by organic horizons less than 12 inches thick. In the surveyed area these soils are represented by Rego and Orthic Humic Gleysol subgroups.

Rego Humic Gleysol Soils

This subgroup is distinguished by a dark colored Ah horizon more than three inches thick, underlain by one or more moderately to very strongly gleyed C horizons. There is no B horizon. An L-H horizon of organic matter up to six inches thick may be present. In the mapped area the representative is the Bessette series.

Orthic Humic Gleysol Soils

These soils are characterized by a dark colored Ah horizon more than three inches thick, underlain by a weakly developed, moderately to strongly gleyed B horizon. One or more moderately to very strongly gleyed C horizons occur beneath the B horizon. An L-H horizon of organic matter up to six inches thick may be present. The only representative is the Nisconlith series.

Rego Humic Gleysol Soils

BESSETTE SERIES

The Bessette soils occur chiefly in the Salmon River valley. Areas of small acreages are located near Notch Hill, on the Celista highland and in the Chase and Chum creek valleys. The topography varies from level to undulating and gently sloping. The range of elevation is from 1,145 to 2,700 feet. The soils, all arable, were mapped as follows:

Bessette loamy sand	54 acres
Bessette sandy loam	142 "
Bessette sandy loam (calcareous phase)	36 "
Bessette gravelly sandy loam	30 "
Bessette-Falkland sandy loam complex	21 "
Bessette sandy loam-Nisconlith loam complex	41 "
Bessette sandy loam-Gardom muck complex	25 "
	349 acres

The parent materials are composed of coarse to moderately coarse textured stream alluvium and fan deposits. There is inter-stratification of different textured horizons at depths, particularly where fans overlap stream deposits. The main surface textures are sandy loam and loamy sand, with included gravelly sandy loam. Subsoils become coarser with depth, grading to coarse sandy and gravelly strata.

The poorly drained Rego Humic Gleysol Bessette soils developed under high water tables. They are separated from the Nisconlith series by coarser texture, and slightly less profile development. The native vegetation consists of cottonwood, aspen, birch, willow, alder, and shrubs. A cultivated Bessette sandy loam profile was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 7	Gray (10YR 5/1, dry) or very dark gray (10YR 3/1, moist) sandy loam. Weak fine to medium subangular blocky structure. Friable when moist. Abundant roots. pH 6.5. Abrupt boundary:
Cg1	7 -16	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) gravelly fine sandy loam. Common faint mottles. Very weak fine subangular blocky structure. Friable when moist. Common roots. pH 6.6. Gradual boundary:
Cg2	16 -24	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown (2.5Y 4/2, moist) gravelly silt loam. Common faint mottles. Very weak fine subangular blocky structure. Friable when moist. Occasional root. pH 6.8. Abrupt boundary:
IICgj	24 +	Coarse sand and fine gravel. A few faint mottles. Single-grained. Loose. pH 7.2.

Land Use

Bessette soils vary from fair to poor for agriculture, depending on profile texture and the level of the water table. Systematic drainage with tiles or open drains is necessary in order that desirable cultivated crops can be grown. Fertilizers should be used for all cultivated crops.

A large percentage of the acreage of Bessette soils is cultivated and growing clover, timothy, reed canary grass, orchard grass, and brome grass for hay and pasture, in support of dairy and beef cattle. Alfalfa is grown in association with other soil series having better soil drainage. Cereal crops such as oats are also grown. Fairly good yields are obtained where seepage water maintains a supply of moisture not too near the surface throughout the growing season. Irrigation may be required for support of the crop when the water table has been lowered below the reach of the plant roots. The classification according to suitability for irrigation is given in Table 4.

Orthic Humic Gleysol Soils

NISCONLITH SERIES

These soils occupy parts of the Salmon River valley, and they also occur near Notch Hill, in the Chase and Chum creek valleys and on the highland north of Celista. The topography varies from depressional and level to undulating and gently sloping. The range of elevation is from 1,145 to 2,750 feet. The Nisconlith soils and associates, all arable, are as follows:

Nisconlith loam	145 acres
Nisconlith loam (calcareous phase)	150 "
Nisconlith loam (diatomaceous earth phase)	89 "
Nisconlith silt loam	382 "
Nisconlith silt loam (calcareous phase)	501 "
Nisconlith silt loam-Nisconlith silt loam (calcareous phase) complex	82 "
Nisconlith silt loam (diatomaceous earth phase)	50 "
Nisconlith silty clay loam (calcareous phase)	156 "
Nisconlith clay loam	297 "
Nisconlith clay loam (calcareous phase)	52 "
Nisconlith clay	61 "
Nisconlith clay (calcareous phase)	20 "
Nisconlith clay (diatomaceous earth phase)	36 "
Nisconlith-Falkland silt loam to fine sandy loam complex	44 "
Nisconlith-Rumball loam to sandy loam complex	61 "
Nisconlith-Bolean silt loam complex	49 "
Nisconlith-Bessette-Gardom complex	49 "
	2,224 acres

The parent materials are medium to fine textured stream and fan alluvium. Interstratification of different textures occur, particularly where fan material overlaps stream deposits. Surface textures vary from loam to clay, and persist to depths of 18 inches or more, before coarser material is encountered. Gravel and cobbles are few or absent. Areas of calcareous phase are limy to the surface. These are areas of evaporation, with a high water table, the water being charged with carbonates, and the whole profile is lime saturated.

The diatomaceous earth phase has a horizon of diatomaceous earth up to six inches thick, within 12 inches of the surface. In places this is mixed in the plow layer. Where the diatomaceous earth is below cultivation, it may affect root and moisture movement, and such areas were separated as a diatomaceous earth phase.

The Orthic Humic Gleysol Nisconlith soils in general have poor drainage, but areas of imperfect drainage occur near boundaries of better drained soils. There is also some variation in soil development. In places the B horizon is not apparent, and the soil is Rego Humic

Gleysol. The native vegetation is composed of cottonwood, aspen, birch, willow, alder, and shrubs. A cultivated profile of Nisconlith loam was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 6	Dark grayish brown (10YR 4/2, dry) or very dark gray to black (10YR 2.5/1, moist) silt loam. Weak medium subangular blocky breaking to fine granular structure. Friable when moist. Abundant roots. pH 7.4. Clear boundary:
Ah	6 -13	Dark grayish brown (10YR 4/2, dry) or very dark gray (10YR 3/1, moist) silt loam. Moderate medium subangular blocky breaking to coarse granular structure. Friable when moist. Common roots. pH 7.6.
Bg	13 -21	Light brownish gray to pale-brown (10YR 6/2.5, dry) or dark grayish brown (10YR 4/2, moist) silt loam. Common prominent mottles. Strong medium blocky structure. Firm when moist. Occasional root. pH 7.3. Clear boundary:
Cg	21 +	Grayish-brown (10YR 5/2, dry) or dark-gray to dark grayish brown (10YR 4/1.5, moist) silt loam. Common distinct mottles. Massive. Firm when moist. Occasional root in the 21 to 30 inch depths. pH 7.5.

A profile of Nisconlith silt loam (diatomaceous earth phase) was examined and the description is as follows:

Horizon	Depth Inches	Description
Ap	0 - 5	Gray (10YR 5/1, dry) or very dark gray (10YR 3/1, moist) silt loam containing some diatomaceous earth. Weak fine subangular blocky breaking to fine granular structure. Friable when moist. Abundant roots. pH 6.7. Clear boundary:
IIC	5 -10	Light-gray (10YR 6.5/1, dry) or gray (10YR 5/1, moist) diatomaceous earth of silt loam texture. Massive but vesicular. Slightly firm when moist. A few faint mottles. Occasional roots. pH 6.8. Abrupt boundary:

Horizon	Depth Inches	Description
Bg	10 -19	Light brownish gray (10YR 6/2, dry) or dark grayish brown (10YR 4/2, moist) silty clay. Common distinct mottles. Moderate medium subangular blocky structure. Firm when moist. Occasional roots. pH 7.5. Clear boundary:
Cg	19 +	Light brownish gray to grayish-brown (10YR 5.5/2, dry) or dark grayish brown (10YR 4/2, moist) silty clay loam. Common distinct mottles. Massive and slightly vesicular. Slightly firm when moist. Occasional root in the 19 to 30 inch depth. pH 7.5.

Land Use

A large percentage of the total acreage is cultivated. These are good to poor soils for agriculture, depending on the drainage. Systematic drainage with tiles or open ditches is necessary for crop production.

With adequate drainage and fertilization, fair to good yields of grass-legume hay and pasture can be grown. The main crops produced for dairy and beef cattle feed are clover, timothy, bromegrass, orchard grass, and reed canary grass. Alfalfa is grown in association with better drained soils. Oats and some barley are also grown.

The subsoil moisture supplied by the water table during the growing season often supports a better crop than a dry-farmed well-drained soil of the same texture. Where drainage is adequate, irrigation may be necessary in dry summers, when the water table drops below the reach of plant roots. The rating of the soils for irrigation is given in Table 4.

BLACK SOILS

The Black soils are well to imperfectly drained. They develop in the most humid part of the natural grassland. They are characterized by an accumulation of organic matter which imparts a very dark grayish brown to black color to the Ah horizon or horizons. An underlying brownish Bm horizon or horizons may or may not occur. The underlying C horizon is calcareous. Transitional AB and BC horizons may or may not be present. In the surveyed area the Black soils are represented by the Orthic subgroup.

Orthic Black Soils

These are characterized by a very dark grayish brown to black Ah horizon or horizons. This is underlain by a pale-brown to yellowish-brown Bm horizon or horizons that has subangular blocky to blocky structure. The underlying C horizon is calcareous. AB and BC transitional horizons may or may not be present. The Orthic Black soils in the mapped area are the Armstrong, Nahun and Grandview series.

ARMSTRONG SERIES

The Armstrong soils occur on south-facing slopes on the north side of the South Thompson River between Chase and Pritchard. The topography varies from rolling to strongly rolling and steeply to extremely steeply sloping. Small undulating to gently rolling areas occur. Elevations lie between 1,500 and 2,500 feet. The soils were differentiated as follows:

	Arable	Nonarable	
Armstrong sandy loam	37	188	acres
Armstrong stony sandy loam	-	380	"
Armstrong loam	-	205	"
Armstrong sandy loam-Equesis stony sandy loam complex	-	201	"
	37	974	acres

The Armstrong series also occurs as a secondary member of soil complexes with the Nahun series.

In moderate topography the Armstrong soil profile is developed from the till that lies beneath. On steep slopes in the surveyed area, the parent material of the soil profile may also be composed of down-slope creep derived from till and loess, and underlain by till at depths from one to five feet.

The till is calcareous, hard and impervious, and composed of a heterogeneous mixture of stones, cobbles, gravel, sand, silt, and clay. Surface textures are sandy loam, stony sandy loam, gravelly sandy loam, and loam. The subsoil textures may be similar or may grade to sandy clay loam and clay loam. Stoniness varies from moderate to excessive.

The Orthic Black Armstrong series is well-drained. The climax vegetation was bunchgrasses, but over-grazing is replacing them by cheatgrass, balsam root, yarrow, and other weeds. In the moister depressions there are a few shrubs, such as snowberry and saskatoon. A profile developed in creep on a steep south-facing slope was given the following description:

Horizon	Depth Inches	Description
Ah1	0 - 6	Dark-brown (10YR 3/3, dry) or black (10YR 2/1, moist) gravelly sandy loam containing a few cobbles. Weak medium subangular blocky breaking to fine granular

Horizon	Depth Inches	Description
		structure. Soft when dry. Very friable when moist. Abundant roots. pH 7.0. Clear boundary:
Ah2	6 -13	Dark grayish brown (10YR 4/2, dry) or very dark brown (10YR 2/2, moist) gravelly sandy loam. Weak medium subangular blocky structure. Soft when dry. Very friable when moist. A few cobbles. Abundant roots. pH 7.2. Clear boundary:
AB	13 -18	Grayish-brown to brown (10YR 5/2.5, dry) or dark-brown (10YR 3.5/3, moist) gravelly sandy loam. Weak medium to fine subangular blocky structure. Soft when dry, very friable when moist. Many angular cobbles. Common roots. pH 7.2. Clear boundary:
Bm	18 -28	Dark yellowish brown (10YR 4/4, dry) or dark-brown (10YR 3/3, moist) gravelly and cobbly sandy loam. Weak medium to fine subangular blocky structure. Soft when dry. Very friable when moist. Occasional root. pH 7.2. Gradual boundary:
BC	28 -33	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 4/4, moist) gravelly and cobbly sandy loam to loamy sand. Very weak fine subangular blocky structure. Soft when dry. Very friable when moist. Occasional root. pH 7.0. Clear boundary:
C-IIC	33 -48	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 4/4, moist) gravelly and cobbly loam with small pockets of fine sand. Moderate medium blocky structure. Soft to slightly hard when dry. Friable when moist. Peds moderately vesicular. pH 7.0. Gradual boundary:
IIC	48 +	Grayish-brown to dark grayish brown (2.5Y 4.5/2, dry) or very dark grayish brown 2.5Y 3/2, moist) gravelly and cobbly sandy clay loam till containing small sand pockets. Hard when dry. pH 7.5.

Land Use

In the mapped area the Armstrong soils were utilized for range at the time of the survey (1964). Most of the acreage has nonarable topography. Two small arable areas are surrounded by rough topography, and should probably remain in the native state. However, their suitability for irrigation is given in Table 4.

NAHUN SERIES

This series is derived from morainal gravel in the form of kames and some outwash. In the mapped area, such deposits occur on the northwest side of the South Thompson River between Chase and the south end of Nisconlith Lake. The topography is strongly to very steeply sloping and strongly rolling where kettles occur. The elevations range from 1,350 to 1,800 feet. The soils were mapped as follows:

	Arable	Nonarable	
Nahun gravelly sandy loam	34	293	acres
Nahun gravelly sandy loam-Armstrong loam complex	171	-	"
Nahun gravelly sandy loam-Neskain silt loam complex	-	87	"
	205	380	acres

The parent material consists of calcareous morainal gravelly deposits, with a finer textured overlay of gravelly sandy loam that varies in thickness from none at all to more than three feet. Beneath the overlay, the deposits vary in composition from well-sorted sand and gravel strata to heterogeneous mixtures of the two containing cobbles and stones. Till may occur in scattered pods of various sizes. There is a variable profile on steep slopes, caused by slopewash or creep. Angular talus is scattered on the surface near rock outcroppings. Calcareous horizons have lime plating on the undersides of cobbles and gravel. Stoniness is from light to excessive.

The Orthic Black Nahun soils are rapidly drained. They developed under bunchgrasses, now largely replaced by cheatgrass, balsam root, yarrow, and other weeds and annual grasses of minor feeding value. Clumps of chokecherry, saskatoon and waxberry occur in areas of greater than average moisture. A Nahun gravelly sandy loam profile on a steep, south-facing slope was described as follows:

Horizon	Depth Inches	Description
Ahl	0 - 7	Very dark grayish brown (10YR 3/2, dry) or black (10YR 2/1, moist) gravelly sandy loam. Weak, medium subangular blocky breaking to medium granular structure. Soft when dry. Very friable when moist. Abundant roots. Cobbles common. pH 6.7. Clear boundary:

Horizon	Depth Inches	Description
Ah2	7 -12	Dark-brown (10YR 3/3, dry) or very dark gray to black (10YR 2.5/2, moist) gravelly sandy loam. Weak medium subangular blocky structure. Soft when dry. Very friable when moist. Abundant roots. Cobbles common. pH 7.0. Clear boundary:
AB	12 -16	Brown to dark-brown (10YR 4/3, dry) or dark-brown (10YR 3/3, moist) gravelly sandy loam. Weak medium to fine subangular blocky breaking to medium granular structure. Soft when dry. Very friable when moist. Common roots. Many cobbles. pH 7.0. Clear boundary:
Bm	16 -26	Yellowish-brown (10YR 5/4, dry) or brown to dark-brown (10YR 4/3, moist) gravelly sandy loam. Weak fine subangular blocky structure. Soft when dry. Very friable when moist. Common roots. Many cobbles. pH 7.0. Clear boundary:
IIBC	26 -42	Brown (10YR 5/3, dry) or dark grayish brown (10YR 4/2, moist) gravelly and cobbly sand. Single-grained. Loose. Abundant roots. pH 7.5. Gradual boundary:
IIC	42 +	Light brownish gray (10YR 6/2, dry) or dark grayish brown (10YR 4/2, moist) gravelly and cobbly sand. Single-grained. Loose. Lime coatings on undersides of gravel and cobbles. Occasional root in the upper part. pH 8.1.

Land Use

In the mapped area land for agriculture must be carefully chosen, owing to shallow solums, stoniness, coarse textures, and rough topography. The acreage was nearly all in the native state at the time of the survey (1964). Only one small area was cultivated. These soils should be regarded as submarginal for dry farming. In the native condition the soils have value for spring and late fall range.

Areas in the better topography, with solums 18 inches or more in depth, would respond to irrigation and produce forage and cereal crops. The rating according to suitability for irrigation is given in Table 4.

GRANDVIEW SERIES

These soils occur in association with the Nahun and Armstrong series on the north side of the South Thompson River west of Chase. The topography varies from gently undulating to rolling, with some moderately to strongly sloping areas. The elevations are between 1,160 and 1,500 feet. The soils, all arable, were mapped as follows:

Grandview sandy loam	379 acres
Grandview sandy loam-Neskain silt loam complex	187 "
	566 acres

The parent material consists of sandy glacial outwash. In the mapped area the sandy outwash was deposited on glacio-lacustrine silts where separated pockets of glacier ice were buried. Melting of the buried ice reshaped the topography by collapse of the overlying sands. This factor and wind erosion created a soil surface where the silts are exposed (Neskain series) or are covered by from one to 10 feet or more of sands (Grandview series). The predominant surface texture is sandy loam, but inclusions of loamy sand and loam occur. The texture coarsens with depth to coarse sand. The underlying sandy parent material and glacio-lacustrine silts are calcareous.

The Orthic Black Grandview series is well drained. The native vegetation was bunchgrasses, now largely replaced by annual grasses and weeds. The soil was examined in a cultivated field growing couch-grass, fescue, and scattered red clover, milkweed, mullein, and dandelion. A Grandview sandy loam profile was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 6	Very dark gray (10YR 3/1, dry) or black (10YR 2/1, moist) sandy loam. Weak medium subangular blocky structure. Soft when dry. Abundant roots. pH 6.5. Abrupt boundary:
Ah	6 -12	Very dark grayish brown (10YR 3/2, dry) or very dark gray to black (10YR 2.5/1, moist) sandy loam. Weak medium subangular blocky structure. Soft when dry. Abundant roots. pH 6.7. Clear boundary:
AB	12 -15	Brown to dark-brown (10YR 4/3, dry) or dark-brown to very dark grayish brown (10YR 3/2.5, moist) sandy loam. Weak, medium subangular blocky structure. Soft when dry. Abundant roots. pH 6.7. Abrupt boundary:

Horizon	Depth Inches	Description
Bm1	15 -20	Yellowish-brown (10YR 5/4, dry) or dark-brown to dark yellowish brown (10YR 3/3.5, moist) sandy loam. Weak medium to coarse subangular blocky structure. Slightly hard when dry. Common roots. pH 6.9. Clear boundary:
Bm2	20 -26	Yellowish-brown or dark-brown to dark yellowish brown (10YR 3/3.5, moist) sandy loam. Weak medium subangular blocky structure. Slightly hard when dry. Common roots. pH 7.0. Clear boundary:
C1	26 -37	Brown (10YR 5/3, dry) or brown to dark-brown (10YR 3.5/3, moist) loamy sand. Single-grained. Loose. Occasional root. pH 7.0. Gradual boundary:
C2	37 -47	Brown (10YR 5/3, dry) or dark-brown to dark yellowish brown (10YR 3/3.5, moist) coarse sandy loam or loamy sand. Single-grained. Loose. Occasional root. pH 7.6. Abrupt boundary:
IIC	47 -51	Light brownish gray (10YR 6/2, dry) or grayish-brown (10YR 5/2, moist) coarse sand. Single-grained. Loose. pH 7.8. Abrupt boundary:
IIICk	51 +	Light-gray to gray (2.5Y 6/2, dry) or gray (2.5Y 5/2, moist) silty clay loam. Stratified. Strongly calcareous. pH 7.8.

Land Use

The entire acreage of the Grandview soils in this map-area are located within an Indian Reserve. Parts of the acreage are in native range or reverted cultivation, which is being used for grazing. Other areas are currently growing forage crops under dryland conditions for hay production. Cultivation and replanting of deteriorated stands of forage crops has been neglected. Reverted areas are over-grazed and invaded by couchgrass and annual weeds.

Under dryland conditions these soils are marginal for most crops, due to their droughtiness. However, with irrigation and fertilizer they are capable of producing cereals, forage crops and vegetables. The soils are very friable and stone-free, which makes them suitable for potatoes, onions, tomatoes, asparagus, and other vegetable crops.

The soils have developed under natural grassland and have a fair amount of organic matter in the surface horizons. The amount is higher than on similar sandy deposits which developed under forest. However, additions of organic matter in crop rotations would improve their moisture holding capacity, especially for the production of shallow rooted crops. The classification according to suitability for irrigation is given in Table 4.

DARK GRAY SOILS

These are well to imperfectly drained soils that developed under open forest with a grass ground cover. Though the soils retain characteristics of grassland, degradation of the Ah horizon is apparent; there is more brownish or grayish color than in normal grassland soils. The Ah horizon may be speckled with bleached sand grains that have lost their organic coatings. In the surveyed area the Dark Gray soils are represented by the Orthic and Gleyed Orthic subgroups.

Orthic Dark Gray Soils

This subgroup often has an L-H horizon of forest litter that overlies Ah or Ahe horizons. The peds in the A horizon may have relatively dark surfaces, but they crush or rub to brownish or grayish colors. The underlying Bm or Btj horizons are brighter in color, and have subangular blocky or blocky structure. The C horizon beneath is calcareous. Transitional AB and BC horizons may or may not occur.

In the surveyed area the Orthic Dark Gray soils are represented by the Bluespring, Neskain, Equesis, and Gulch series.

Gleyed Orthic Dark Gray Soils

The Gleyed subgroup is similar to the Orthic, but mottled in the C horizon. This is due to water table fluctuation that does not rise into the solum. The only representative is the Kosta series.

Orthic Dark Gray Soils

BLUESPRING SERIES

There are small areas of Bluespring soils on south- and-southwest-facing slopes on the south end of a highland between Enderby and Deep Creek, and to the south of Chase. The topography is composed of varied slopes from strongly to very steeply sloping, with rolling and hilly inclusions. The elevations are from 1,500 to 2,400 feet. These soils are in association with the Equesis series and patches of rock outcroppings. A total of 302 acres of a Bluespring-Equesis complex was mapped, all nonarable.

The parent material consists mainly of till, with inclusions of till-like material derived from down-slope creep, which probably contains loess. The surface texture is gravelly sandy loam, with sandy loam inclusions. There is a variable content of cobbles and stones. The parent material is calcareous; a horizon of lime accumulation occurs beneath the solum.

The Orthic Dark Gray Bluespring soils are well-drained. They developed under mixed tree and grass vegetation. The presence of tree litter accelerates degradation of organic matter in the Ah horizon, which accumulates as grasses decay. The resulting degraded Ah horizon is grayer or browner than in the associated grassland soils.

The vegetation is semi-open forest, with grass ground cover. The trees are chiefly ponderosa pine and Douglas fir. Pinegrass is common in the treed areas; bunch and downy bromegrasses survive in the open patches. The shrubs are most common under trees. They consist of waxberry, saskatoon, ocean spray, chokecherry, false box, ceanothus, spirea, and others. Weeds also occur. A profile in creep on a steep southwest-facing slope was described as follows:

Horizon	Depth Inches	Description
Ah1	0 - 6	Dark grayish brown (10YR 4/2, dry) or very dark grayish brown (10YR 3/2, moist) gravelly sandy loam. Weak medium subangular blocky breaking to weak medium granular structure. Soft when dry. Very friable when moist. Many cobbles. Abundant roots. pH 7.2. Clear boundary:
Ah2	6 -11	Brown to dark brown (10YR 4/3, dry) gravelly sandy loam. Very weak medium to fine subangular blocky breaking easily to medium granular structure. Soft when dry. Very friable when moist. Many cobbles. Abundant roots. pH 7.2. Clear boundary:
Bm	11 -20	Yellowish-brown (10YR 5/4, dry) gravelly sandy loam. Moderate medium blocky structure. Slightly hard when dry. Friable to firm when moist. Many cobbles. Roots common. pH 7.2. Clear boundary:
BC	20 -26	Pale-brown (10YR 6/3, dry) gravelly sandy loam. Weak fine subangular blocky structure. Soft when dry. Very friable when moist. Many cobbles. Roots common. pH 8.0. Clear boundary:

Horizon	Depth Inches	Description
Ck	26 -38	Pale-brown (10YR 6/3, dry) gravelly sandy loam. Very weak medium to fine subangular blocky structure. Soft when dry. Very friable when moist. Many cobbles. Abundant roots. Strongly calcareous. pH 8.0. Abrupt boundary:
Ck2	38 +	Pale-brown (10YR 6/3, dry) gravelly sandy loam. Moderate medium blocky structure. Slightly hard when dry. Friable when moist. Slightly compact. Contains pockets of free carbonates. pH 8.2.

Occasional limestone or calcareous schist pebbles occur throughout the profile.

Land Use

The Bluespring soils are nonarable. This is due to topography too rough for cultivation. The soils produce a strong growth of grasses and forbs, suitable for spring and fall range.

NESKAIN SERIES

The Neskain soils are on the north side of the Thompson River, between Chase and Pritchard. The variable topography is from undulating to moderately hilly, with some strong to very steep slopes. Most of the arable acreage is undulating to gently rolling. The range of elevation is from 1,175 to 1,700 feet. The soils were mapped as follows:

	Arable	Nonarable	
Neskain silt loam	588	230	acres
Neskain silty clay loam	29	-	"
Neskain silt loam-Grandview sandy loam complex	-	187	"
Neskain silt loam-Nahun gravelly sandy loam complex	296	109	"
	913	526	acres

The Neskain soils also occur as secondary members of complexes with the Grandview and Nahun series.

The parent material consists of calcareous, glacio-lacustrine silts. They are stratified and stone-free. Between Chase and Nisconlith Creek, sandy and gravelly outwash of the Grandview and Nahun series overlies the silts, leaving the silts exposed in places. Such areas of Neskain soils were mapped as complexes with the Grandview and Nahun series. Shallow and deep kettles of different shapes and sizes in the silts contribute the range of topography. The surface textures are most commonly silt loam, with inclusions of silty clay loam.

The Orthic Dark Gray Neskain soils are moderately well-drained. There are isolated trees and small clumps of ponderosa pine and Douglas fir. The shrubs are saskatoon, hawthorn, snowberry, and wild rose. Aspen and cottonwood occur in the kettles. There are fescues and bunch-grasses in open areas, and pinegrass, lupine and others under the trees. Weeds also occur. A profile was examined in an abandoned field in an Indian Reserve. The topography was a moderate south slope, and the description as follows:

Horizon	Depth Inches	Description
Ap1	0 - 2	Very dark grayish brown (10YR 3/2, dry) or very dark gray (10YR 3/1, moist) silt loam. Weak fine to medium granular structure. Soft when dry. Heavy turf-like grass cover. Very abundant roots. pH 6.9. Abrupt boundary:
Ap2	2 - 7	Dark grayish brown to very dark grayish brown (10YR 3.5/2, dry) or very dark gray (10YR 3/1, moist) silt loam. Weak to moderate, medium subangular blocky structure. Slightly hard when dry. Abundant roots. pH 6.7. Abrupt boundary:
AB	7 -10	Brown (10YR 4.5/3, dry) or dark-brown (10YR 3/3, moist) silt loam or silty clay loam. Weak to moderate, medium subangular blocky structure. Slightly hard when dry. Abundant roots. pH 6.4. Abrupt boundary:
Bm	10 -20	Yellowish-brown (10YR 5/4, dry) or brown to dark-brown (10YR 4/3, moist) silty clay loam. Moderate medium to coarse blocky structure. Hard when dry. Common roots. pH 6.7. Clear boundary:
BC	20 -26	Pale-olive (5Y 6/3, dry) or olive-brown (2.5Y 5/4, moist) silty clay loam. Weak to moderate, medium subangular blocky structure. Slightly hard when dry. Occasional root. pH 7.3. Clear boundary:
Cca	26 -30	Pale-olive (5Y 6/3, dry) or olive (5Y 5/3, moist) silty clay loam. Weak to moderate, medium subangular blocky structure. Firm when moist. Strongly calcareous. pH 8.0. Clear boundary:

Horizon	Depth Inches	Description
Ck	30 +	Pale-yellow (5Y 7/3, dry) or olive (5Y 5/3, moist) silty clay loam. Stratified. Firm when moist. Strongly calcareous. pH 8.5.

Land Use

Most of the acreage of the Neskain soils is in range or abandoned fields used for range. Some areas are cultivated for hay under dry farming. A small acreage is irrigated.

The greater part of the arable acreage is in an Indian Reserve. At the time of the survey (1964), cultivated fields were more or less neglected and the forage crops had deteriorated. Reverted fields were over-grazed and invaded by weeds.

Though the soils could produce most crops suited to the region, yields are limited under dry farming. With irrigation and fertilization high yields of forage, cereals and vegetables are possible. The suitability of the Neskain soils for irrigation is given in Table 4.

EQUESIS SERIES

The Equesis soils occur on areas of the higher land between Chase and Nisconlith Lake, south of Chase, and at the south end of the highland between Enderby and Deep Creek. The topography is steep; slopes are steeply to extremely sloping up to 70 percent or more. The range of elevation is from 1,500 to 2,400 feet. The mapped soils, all non-arable, are as follows:

Equesis stony sandy loam	177 acres
Equesis stony sandy loam-rock outcrop complex	102 "
	279 acres

These soils were also mapped as secondary members of complexes with the Bluespring and Willshore series.

The parent material is composed of creep over bedrock. It takes the form of a thin mantle of weathered till, colluvium, loess, and angular rock fragments mixed together. Outcroppings of bedrock occur. The gravel and stone content is variable. The surface texture is stony sandy loam with gravelly sandy loam inclusions.

The Orthic Dark Gray Equesis soils are rapidly to well-drained. They support a semi-open stand of Douglas fir and ponderosa pine. Shrubs consist of saskatoon, ceanothus, spirea, and others. Bunchgrasses occur in open areas, with pinegrass under the tree cover. Weeds also occur. A profile in a steeply sloping area is as follows:

Horizon	Depth Inches	Description
L-F	1 - 0	Forest litter composed of needles, twigs and cones. Partly decomposed in the lower part. pH 5.8. Abrupt boundary:
Ah1	0 - 7	Dark grayish brown (10YR 4/2, dry) or very dark grayish brown (10YR 3/2, moist) gravelly sandy loam. Weak medium to coarse subangular blocky structure. Soft when dry. Very friable when moist. Sharp and angular gravel and cobbles. Abundant roots. pH 7.6. Clear boundary:
Ah2	7 -12	Brown to dark-brown (10YR 4/3, dry) or dark-brown (10YR 3/3, moist) gravelly sandy loam. Weak medium to coarse blocky structure. Soft to slightly hard when dry. Friable when moist. Sharp and angular gravel and cobbles. Abundant roots. pH 7.6. Clear boundary:
Bm	12 -20	Yellowish-brown (10YR 5/4, dry) or brown to dark-brown (10YR 4/3, moist) gravelly and cobbly sandy loam. Moderate medium blocky structure. Slightly hard when dry. Friable when moist. Sharp and angular gravel and cobbles. Common roots. pH 7.6. Gradual boundary:
IIC	20 +	Shattered schist containing calcite veins. Calcareous coatings on rock.

Land Use

The Equesis soils are nonarable, because of a shallow solum and rough topography. Their main use is for grazing and limited production of timber.

GULCH SERIES

The series is derived from alluvial-colluvial fans on both sides of the Thompson River, between Chase and Pritchard. The topography is very gently to strongly sloping, with the main slope toward the valley centre. The elevations lie between 1,140 and 1,500 feet. The soils were mapped as follows:

	Arable	Nonarable	
Gulch sandy loam to loam	-	38	acres
Gulch gravelly sandy loam	32	-	"
Gulch loam to fine sandy loam	189	-	"

	Arable	Nonarable	
Gulch loam to gravelly sandy loam	157	-	acres
Gulch loam to gravelly loam	145	-	"
Gulch gravelly loam	80	-	"
Gulch loam	17	-	"
	620	38	acres

The parent material consists of poorly sorted, moderately coarse to medium textured fan deposits, eroded chiefly from glacial till by creeks tributary to the Thompson River. The excessive stoniness and coarser textures occur at the apexes of the fans, and become progressively finer down-slope. Loam and coarser textures are at the surface along with light to excessive stoniness. In places the fans overlie silty glacio-lacustrine materials.

The Orthic Dark Gray Gulch soils are well-drained. The native vegetation is composed of clumps of Douglas fir and ponderosa pine, saskatoon, hawthorn, snowberry, rose, bunch and pinegrass. Much of the land is cultivated and reverting. Reverting land contains couchgrass and weeds. A profile in an alfalfa field near Chase was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 7	Dark-gray to dark grayish brown (10YR 4/1.5, dry) or very dark gray (10YR 3/1, moist) fine sandy loam. Weak to moderate coarse granular structure. Soft to slightly hard when dry. Abundant roots. pH 6.8. Abrupt boundary:
Bm	7 -15	Pale-brown (10YR 6/3, dry) or brown to dark-brown (10YR 4/3, moist) fine sandy loam. Weak to moderate subangular blocky structure. Soft to slightly hard when dry. Common roots. pH 7.1. Clear boundary:
BC	15 -22	Grayish-brown to brown (10YR 5.5/3, dry) or dark grayish brown or brown to dark-brown (10YR 4/2.5, moist) fine sandy loam or silt loam. Weak to moderate, medium subangular blocky structure. Slightly hard to soft when dry. Common roots. pH 7.0. Clear boundary:
C1	22 -29	Pale-brown to brown (10YR 5.5/3, dry) or dark-brown (10YR 3.5/3, moist) silt loam. Weak to moderate, medium subangular blocky structure. Slightly hard when dry. Common roots. pH 7.2. Clear boundary:

Horizon	Depth Inches	Description
C2	29 -37	Light brownish gray to grayish-brown (10YR 5/2.5, dry) or dark-brown (10YR 3/3, moist) silt loam. Weak to moderate, medium to coarse subangular blocky structure. Slightly hard when dry. Occasional root. pH 7.1. Clear boundary:
C3	37 -43	Grayish-brown to brown (10YR 5/2.5, dry) or dark-brown (10YR 3/3, moist) loam. Weak medium subangular blocky structure. Slightly hard to soft when dry. Occasional root. pH 7.0. Abrupt boundary:
IIC1	43 -51	Grayish-brown (10YR 5/3, dry) or dark grayish brown (10YR 4/2, moist) gravelly sandy loam. Weak medium subangular blocky structure. Soft when dry. Occasional root. pH 7.0. Clear boundary:
IIC2	51 -56	Light brownish gray to grayish-brown (10YR 5.5/2, dry) or dark grayish brown to very dark grayish brown (10YR 3.5/2, dry) gravelly loamy sand. Weak fine to medium subangular blocky structure. Soft to loose when dry. pH 7.0. Abrupt boundary:
IIIC	56 +	Pale-brown (10YR 6/3, dry) or brown to dark-brown (10YR 4/3, moist) gravelly sand. Single-grained. Loose. pH 7.0.

Land Use

The greater part of the arable acreage is irrigated, and used for the production of forage crops. The remainder is reverted and rangeland.

The Gulch series is marginal to submarginal for dry farming, but with irrigation and fertilization a variety of crops can be produced. For cultivation the amount of stone removal that must be undertaken varies from place to place. The rating of these soils according to suitability for irrigation is given in Table 4.

Gleyed Orthic Dark Gray Soils

KOSTA SERIES

This series occupies alluvial terraces of the Thompson River between Squilax and Pritchard. The topography is very gently sloping, gently undulating and undulating. Elevations are between 1,145 and 1,160 feet. The total acreage, all arable, was mapped as follows:

Kosta sandy loam	79 acres
Kosta sandy loam to silt loam	100 "
Kosta fine sandy loam	90 "
Kosta loam to fine sandy loam	254 "
Kosta silt loam	411 "
Kosta silty clay loam to silt loam	266 "
Kosta silty clay loam	32 "
	1,232 acres

The parent material is derived from glacio-lacustrine and tributary stream deposits, reworked by the Thompson River. Surface textures range from sandy loam to silty clay loam; silt loam is the most common. Sandy strata occur at depths. Gravel and cobbles are absent.

These soils occupy river terraces situated above the flood level. At depths there is a water table that rises and falls with river levels. Mottled subsoils occur, due to the imperfect drainage. Well-drained conditions also occur.

The Gleyed Orthic Dark Gray Kosta series has, in some areas, a higher organic content in the surface horizon than other Dark Gray soils, owing to imperfect drainage. These soils are either under cultivation or reverting, but evidence indicates a native vegetation similar to the Grandview and Neskain series. An imperfectly drained silty clay loam profile in an old alfalfa field near Shuswap was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 7	Gray to dark-gray (10YR 4.5/1, dry) or very dark gray (10YR 3/1, moist) silty clay loam. Moderate medium subangular blocky structure. Slightly hard when dry. Abundant roots. pH 6.6. Abrupt boundary:
Bm	7 -16	Very pale brown to pale-brown (10YR 6.5/3, dry) or grayish-brown (2.5Y 5/2, moist) silty clay loam. Moderate medium to coarse subangular blocky structure. Slightly hard to hard when dry. Common roots. pH 7.1. Clear boundary:

Horizon	Depth Inches	Description
Cgj	16 -22	Very pale brown (10YR 7/3, dry) or grayish-brown to brown (10YR 5/2.5, moist) silt loam. A few, faint mottles. Moderate to strong, coarse subangular to blocky structure. Hard to very hard when dry. Common roots. Calcareous. pH 8.0. Clear boundary:
Cg1	22 -28	Very pale brown (10YR 7/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) silt loam. Common, distinct mottles. Moderate coarse subangular blocky to blocky structure. Hard to very hard when dry. Occasional root. Calcareous. pH 8.3. Clear boundary:
Cg2	28 -33	Light-gray (2.5Y 7/2, dry) or pale-brown to brown (10YR 5.5/3, moist) silt loam or very fine sandy loam. Common, distinct mottles. Weak to moderate medium subangular blocky structure. Slightly hard when dry. Occasional root. Calcareous. pH 8.3. Clear boundary composed of a thin, discontinuous lens of volcanic ash:
IICg1	33 -41	Light-gray (2.5Y 7/2, dry) or pale-brown to brown (10YR 5.5/3, moist) loamy sand. Common, distinct mottles. Weak to moderate, fine to medium subangular blocky structure. Slighty hard to soft when dry. Occasional root. pH 7.8. Clear boundary:
IICg2	41 -48	Light-gray (2.5Y 7/2, dry) or grayish-brown (2.5Y 5/2, moist) loamy sand. Common, distinct mottles. Weak fine subangular blocky structure. Soft when dry. Occasional root. pH 7.4. Clear boundary:
IIICg	48 +	Brownish-yellow (10YR 6/6, dry) or yellowish-brown (10YR 5/6, moist) sand. Common, faint mottles. Single-grained. Loose. pH 7.4.

Land Use

The Kosta soils are under cultivation or in neglected fields formerly cultivated. Where neglected the hay crops are poor, but when well managed and irrigated, good yields of hay and cereals are produced. Commercial vegetables are grown near Shuswap.

The soils have a fair supply of organic matter in the plow layer, and are not susceptible to crusting or baking. They require fertilizer when cropped. Under dry farming the crops are restricted in dry weather, but reasonably good yields can be expected. When irrigated they are well suited for the production of crops suited to the region. Irrigation water is available from the nearby Thompson River. The suitability of the soils for irrigation is given in Table 4.

BROWN WOODED SOILS

These are well to imperfectly drained soils that developed under forest or mixed forest and grass. An L-H horizon is usually present. Distinct eluvial and illuvial horizons are lacking. Higher color may occur in the upper part of the mineral solum than in the lower part. The parent material is usually calcareous.

In the surveyed area the Brown Wooded soils are represented by the Orthic and Degraded subgroups.

Orthic Brown Wooded Soils

The Orthic Brown Wooded soils in the mapped area have an L-H horizon at the surface. This is underlain by grayish-brown, pale-brown, brown or yellowish-brown Bf or Bm horizons that do not show evidence of eluviation or illuviation. A transitional BC horizon may or may not occur. The C horizon is usually calcareous.

There are six representatives in the surveyed area. These are the Grizzly Hill, Larch Hill, O'Keefe, Pari, Lumby, and White series.

Degraded Brown Wooded Soils

These soils have a thin layer of forest litter on the surface. This is underlain by light brownish gray to dark grayish brown, pale-brown to brown mineral horizons, beneath which are weakly developed illuvial horizons that show some clay accumulation. A transitional BC horizon may or may not occur. The C horizon is calcareous.

This subgroup is represented by the Moulton, Glenemma, Pillar, and Broderick series.

Orthic Brown Wooded Soils

GRIZZLY HILL SERIES

In the surveyed area these soils are located near Blind Bay and White Lake, and on west-facing slopes east of White Creek. The topography is strongly to very steeply sloping, with rolling to strongly rolling inclusions. The elevations lie between 1,500 and 2,100 feet. The soils were mapped as follows:

	Arable	Nonarable	
Grizzly Hill sandy loam	53	-	acres
Grizzly Hill gravelly sandy loam	40	49	"
Grizzly Hill gravelly sandy loam-gravelly loam	229	-	"
Grizzly Hill gravelly loam	278	320	"
Grizzly Hill stony loam-sandy loam	-	66	"
Grizzly Hill gravelly loam-Pari gravelly sandy loam complex	227	-	"
Grizzly Hill gravelly loam-Carlin silt loam complex	-	50	"
Grizzly Hill-Cherryville gravelly sandy loam-gravelly loam-rock outcrop complex	-	744	"
Grizzly Hill-Cherryville-Carlin complex	-	109	"
	827	1,338	acres

The parent material is composed of till or down-slope creep derived from till and loess. The hard, compact, calcareous glacial till that underlies the solum is medium to moderately coarse textured. Surface and subsoils are mainly gravelly sandy loam and gravelly loam with sandy loam inclusions. Surface stoniness is moderate to excessive; gravel, cobbles, stones and boulders are scattered through the solum. Outcroppings of calcareous bedrock occur in places.

The Orthic Brown Wooded Grizzly Hill series is well-drained. The regrowth forest is composed chiefly of Douglas fir, birch, aspen, maple, willow, cottonwood, and cedar. The shrubs are Oregon grape, false box, soopalallie and others, and there are a number of forbs. White clover and redtop occur on logging roads and in open areas. A profile north of Balmoral was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	A mixed litter of coniferous needles and deciduous leaves. Roots abundant. pH 6.9.
Bfh	0 - 4	Brown (7.5YR 5/4, dry) or dark brown (7.5YR 3/2, moist) loam. Weak, fine subangular blocky crushing to fine granular structure. Soft when dry. Very friable when moist. Occasional angular gravels and cobbles, some of which are limestone. Roots abundant. pH 6.3. Abrupt boundary:
Bf	4 -12	Yellowish-brown (10YR 5/4, dry) or dark-brown (7.5YR 4/4 - 3/2, moist) loam. Weak, fine to medium subangular blocky structure. Soft when dry. Friable when moist. Occasional angular gravels and cobbles, some of which are calcareous. Scattered stones. Roots abundant. pH 6.3. Clear boundary:

Horizon	Depth Inches	Description
BC	12 -20	Grayish-brown to light olive brown (2.5Y 5/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) loam. Moderate medium to coarse subangular blocky structure. Slightly hard when dry. Occasional angular gravels and cobbles, some of which are calcareous. Scattered stones. Roots common. pH 7.0. Clear boundary:
Cca	20 -27	Light brownish gray (2.5Y 6/2, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) loam. Moderate, coarse subangular blocky structure. Hard when dry. Common angular gravels, cobbles and scattered stones. Occasional root. Strongly calcareous. pH 7.9. Clear boundary:
Ck1	27 -36	Light-gray (2.5Y 7/2, dry) or olive-gray (5Y 5/2, moist) loam. Massive till with evident pressure lamina. Very hard when dry. Common angular gravels, cobbles and scattered stones. An occasional root which terminates in this horizon. Strongly calcareous. pH 8.2. Gradual boundary:
Ck2	36 +	Light-gray (2.5Y 7/2, dry) or olive-gray (5Y 5/2, moist loam. Massive till with pressure lamina. Very hard to extremely hard when dry. Common angular gravels, cobbles and scattered stones. Strongly calcareous. pH 8.2.

Land Use

Most of the acreage of this series was in the native state at the time of the survey (1964). The forest is periodically logged, and the land used for grazing. Small scattered clearings have been dry-farmed for hay and some winter wheat. Since the crops are dependent chiefly on snowmelt moisture and rain, the yields are poor.

The Grizzly Hill soils are of doubtful value for agriculture, owing to rough topography, and the high cost of removing the forest and stones. Additional requirements for cultivation would be improvement of the low organic matter content, and fertilization. The rating of these soils for irrigation is in Table 4.

LARCH HILL SERIES

These soils occur near East Canoe Creek, between Tappen, Sorrento and Notch Hill, in the side valleys between Phillips Lake and Chase Creek, and on the north side of Shuswap Lake between Adams Lake and Scotch Creek. The topography varies from level and gently undulating terraces to steeply sloping and strongly rolling areas. Very steeply and extremely sloping topography is associated with gullies and terrace bluffs. The range of elevation is from 1,160 to about 2,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Larch Hill gravelly loamy sand	38	79	acres
Larch Hill sandy loam	196	-	"
Larch Hill gravelly sandy loam	536	122	"
Larch Hill gravelly sandy loam to gravelly loamy sand complex	99	34	"
Larch Hill stony loam	-	33	"
Larch Hill-Sauff gravelly sandy loam complex	82	139	"
Larch Hill-Enderby silt loam-Carlin gravelly silt loam complex	-	263	"
Larch Hill gravelly sandy loam-Carlin gravelly silt loam complex	336	-	"
	1,287	670	acres

The parent material is composed of gravelly glacial outwash in the form of stream and deltaic terraces. Minor areas of kames, associated with steep topography near valley sides, were included. The materials consist of thick calcareous gravel and gravelly sands, with a capping of finer texture from six to 20 inches thick. The main surface texture is gravelly sandy loam, with gravelly loamy sand and sandy loam inclusions. Stoniness is from moderate to excessive at the surface. Lime coatings occur on the undersides of gravel and cobbles within 24 inches depth.

The Orthic Brown Wooded Larch Hill soils are rapidly drained. Genetic development was retarded by limestone gravel and cobbles. This kept the base saturation percentage moderately high. In some parts of the mapped area, soils of medium base saturation have a calcareous gravelly stratum from 24 to 42 inches from the surface, and were classified as an Acid Brown Wooded-Brown Wooded intergrade Sauff-Larch Hill complex.

The native forest consists of Douglas fir, with scattered cedar, lodgepole pine, willow and maple. The shrubs are spirea, false box, saskatoon, waxberry, kinnikinnick, and others. There is a ground cover of pinegrass and forbs. A profile under forest was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Coniferous forest litter, well humified in the lower part. Common fine roots in the F and H layers. pH 5.8.
Bm1	0 - 5	Brown (10YR 5/3, dry) or dark-brown (10YR 3/3, moist) gravelly sandy loam. Very weak medium subangular blocky breaking easily to weak fine granular structure. Soft when dry. Very friable when moist. Abundant roots. An occasional cobble. pH 6.2. Clear boundary:
Bm2	5 -10	Brown to yellowish-brown (10YR 5/3.5, dry) or brown to dark-brown (10YR 4/3, moist) gravelly sandy loam. Very weak medium subangular blocky breaking easily to weak fine granular structure. Soft when dry. Very friable when moist. Abundant roots. An occasional cobble and limestone gravel. pH 6.4. Clear boundary:
Bm3	10 -17	Brown to dark-brown (10YR 4/3, dry) or dark grayish brown to very dark grayish brown (10YR 3.5/2, moist) gravelly sandy loam. Moderate medium to coarse blocky structure. Slightly hard when dry. Friable when moist. Common roots. An occasional cobble. Common limestone gravel. pH 6.6. Clear change:
IICk	17 -40	Pale-brown (10YR 6/3, dry) or dark grayish brown (10YR 4/2, moist) gravelly and cobbly sand. Very weak medium to coarse subangular blocky structure breaking easily to single grains. Soft to loose when dry. Loose when moist. Roots common to abundant. Lime coatings on undersides of gravels and cobbles, some of which are limestone. pH 7.8 at 17-29", pH 8.2 at 29-40". Clear change:
IICca	40 +	Gravelly and cobbly sand of variegated colors. Single-grained. Loose. Continuous lime coatings on gravel and cobbles. pH 8.4.

Land Use

A few small areas are cultivated near East Canoe Creek, and hay is grown with poor results. Elsewhere the land use is forestry and range. These are limited use soils, due to coarse textures, shallow solums over gravel, stoniness and unfavorable topography in places.

Where the topography and solum are favorable for cultivation, care should be taken to disturb the solum as little as possible during land clearing, to avoid bringing the gravelly substratum to the surface. When cleared, the soils are submarginal for dry farming, but would produce under irrigation. Organic matter and fertilizers are necessary for crop growth. Farming should be confined to forage crops, except in the deepest solums. The rating as to suitability for irrigation is given in Table 4.

O'KEEFE SERIES

This series occurs in the mapped area on the north side of the Shuswap Lakes between the north end of Nisconlith Lake and Scotch Creek. The topography consists of level to very gently undulating terraces with inclusions of strong slopes. Steeply to extremely sloping topography occurs on the sides of terrace bluffs and gullies. The elevations are from 1,600 to 2,000 feet. The O'Keefe soils, all arable, were mapped as follows:

O'Keefe loamy sandy to sandy loam	114 acres
O'Keefe sandy loam	87 "
O'Keefe sandy loam-Bluespring loam complex	113 "
	314 acres

The O'Keefe soils were also mapped as minor members of complexes with the Banshee and Corning series.

The parent material consists of the coarser grades of sand in the form of sandy stream and deltaic terraces. There is a surface capping of sandy loam to loamy sand, usually less than 18 inches thick, underlain by coarse sand. Where the surface capping is deeper, and the sands finer, Bt horizons occur and the soils were mapped as the Brunisolic Gray Wooded Corning series. In places, scattered gravel may be found in the solum, but in general the parent material is gravel-and- stone-free. Lime occurs beneath the solum in the coarser grades of sand. Gravelly strata occur at depths.

The Orthic Brown Wooded O'Keefe soils are rapidly drained. These soils have a moderately high to medium base saturation percentage. This is due to the limited precipitation, and composition of the sands within the solum. In more humid areas, similar parent material produces the Orthic Acid Brown Wooded Banshee series, which has a medium to low base saturation percentage, due to more intense leaching. Certain areas of the O'Keefe and Banshee soils were mapped as an intergrade between the Orthic Brown Wooded and Orthic Acid Brown Wooded subgroups. They have medium base saturation percentage and were called the Banshee-O'Keefe complex.

The O'Keefe soils support a semi-open cover of scattered Douglas fir, and a light understory of false box, solomon's seal, twinflower and pinegrass. A typical profile was described as follows:

Horizon	Depth Inches	Description
L-F	1 - 0	Forest litter composed of undecomposed needles. pH 5.4.
Ah	0 - ½	Very dark grayish brown (10YR 3/2, dry) or very dark brown (10YR 2/2, moist) loamy sand. Very weak subangular blocky structure. Friable when moist. Abundant fine roots. pH 6.4. Abrupt change:
Bf1	½- 6	Dark yellowish brown (10YR 4/4, dry) or dark yellowish brown (10YR 3/4, moist) loamy sand. Very weak subangular blocky structure. Friable when moist. Abundant roots. pH 7.0. Gradual change:
Bf2	6 -12	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 4/4, moist) fine sand. Very weak subangular blocky structure. Friable to loose when moist. Occasional root. pH 6.9. Gradual change:
C1	12 -21	Light yellowish brown (10YR 6/4, dry) or brown (10YR 5/3, moist) medium sand. Single-grained. Loose. Occasional root. pH 7.1. Gradual change:
C2	21 +	Pale-brown (10YR 6/3, dry) or brown (10YR 5/3, moist) medium sand. Single-grained. Loose. Occasional root. pH 7.1.

Land Use

Most of the acreage was in the native state at the time of the survey (1964). Utilization is for range and timber. These soils have low moisture holding capacity due to their porosity. They are incapable of producing good crops with natural precipitation under dry farming, but they would produce well under irrigation.

When cleared and cultivated, additions of organic matter are required to improve moisture holding capacity and retention of plant nutrients. Hay and pasture crops, cereals and vegetables could be produced with irrigation and fertilization. The rating of the O'Keefe soils according to suitability for irrigation is given in Table 4.

PARI SERIES

The Pari series occurs in the vicinity of White Lake. The topography varies from gently rolling to moderately hilly. Elevations lie between 1,500 and 2,000 feet. The soils, all nonarable, were mapped as follows:

Pari-Rock Outcrop complex	87 acres
Pari-Grizzly Hill-Rock Outcrop complex	568 "
	655 acres

The parent material consists of a thin mantle of soil derived from shallow till, creep and loess mixed with angular rock fragments. The mantle is from one to three feet thick. It overlies the bedrock of the Sicamous Formation, which is a mixture of impure, platy limestone and sericitic, calcareous schist (12). The bedrock is susceptible to frost action, by which it is flaked into angular fragments of many sizes. The rock debris may or may not be on the surface. Surface textures vary from gravelly sandy loam to gravelly loam.

The Orthic Brown Wooded Pari series is well to rapidly drained. The natural vegetation is composed of a subclimax forest having a high content of cedar mixed with Douglas fir, and scattered birch, alder, maple and yew. Ground cover is lacking under cedar; under other trees there are false box, Oregon grape, twinflower and some pinegrass. A profile under forest was given the following description:

Horizon	Depth Inches	Description
L-H	1 - 0	Regrowth forest litter composed of partially decayed leaves and needles. pH 6.4. Abrupt boundary:
Bfh	0 - 3	Brown (7.5YR 5/4, dry) or dark-brown (7.5YR 3/2, moist) gravelly sandy loam. Weak to very weak fine subangular blocky structure. Very friable when moist. Scattered schistosic gravels. Abundant roots. pH 6.1. Clear boundary:
Bf	3 - 9	Yellowish-brown (10YR 5/4, dry) or brown to dark-brown (7.5YR 4/4, moist) gravelly sandy loam. Weak fine subangular blocky structure. Very friable when moist. Scattered schistosic gravels. Abundant roots. pH 6.2. Clear boundary:
BC	9 -17	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 4/4, moist) loam. Weak fine to medium subangular blocky structure. Very friable when moist. Calcareous in pockets. Scattered schistosic gravels. Abundant roots. pH 6.5. Gradual boundary:

Horizon	Depth Inches	Description
IIC	17 +	Calcareous schistosic bedrock shattered into stone and cobble size with loam in the cracks and crevises. Root mat ends abruptly on contact with rock. Slightly to strongly calcareous. pH of loam in crevises is 7.3.

Land Use

Practically all of the acreage of Pari soils is in forest which is periodically logged and used for grazing. A very small acreage has been cleared in association with Grizzly Hill soils, and planted to forage crops.

The Pari soils are unsuitable for agriculture due to their droughty, shallow solum over bedrock and rough topography. Their best use is grazing and periodic logging of the very limited forest.

LUMBY SERIES

The Lumby soils occur in scattered areas along the sides of the Salmon River valley, to the west of Gleneden and east of Canoe. The fan topography is smoothly sloping, steepest near the apexes, and more gently toward the fan aprons. Slopes, from gentle to steep, are from three to 30 percent. The range of elevation is from 1,200 to 2,100 feet. The soils were mapped as follows:

	Arable	Nonarable	
Lumby loamy sand	15	-	acres
Lumby loamy sand-sandy loam	95	-	"
Lumby sandy loam	628	-	"
Lumby gravelly sandy loam	606	76	"
Lumby stony gravelly sandy loam	-	66	"
Lumby sandy loam-gravelly sandy loam	96	-	"
Lumby gravelly sandy loam-sandy loam	318	-	"
Lumby-Grindrod sandy loam-gravelly sandy loam complex	15	-	"
Lumby-Grindrod gravelly sandy loam-sandy loam complex	-	14	"
Lumby gravelly sandy loam-Broderick silt loam complex	85	-	"
	1,858	156	acres

The parent material consists of poorly sorted, moderately coarse to coarse textured fan deposits eroded out of glacial till. The surface textures are loamy sand to gravelly sandy loam, becoming coarser with depths. Excessively stony areas occupy the fan apexes. In the lower parts of the fan aprons, stoniness varies from none at all to excessive within the limits of outwash stream channels. The fans generally overlie other parent materials at depths.

The Orthic Brown Wooded Lumby soils are well-drained. The natural vegetation is composed of light stands of aspen, willow and alder, scattered ponderosa pine and Douglas fir, and saskatoon, wild rose, pinegrass and bunchgrasses. A profile of the sandy loam, representative of the series, was described as follows:

Horizon	Depth Inches	Description
Ah	0 - 1	Dark grayish brown (10YR 4/2, dry) or very dark grayish brown (10YR 3/2, moist) sandy loam. Weak fine granular structure. Soft when dry. Abundant roots. pH 7.2. Clear change:
AB	1 - 3	Grayish-brown (10YR 5/2, dry) or dark-gray (10YR 4/1, moist) sandy loam. Weak medium subangular blocky structure. Soft when dry. Common roots. pH 7.2. Gradual change:
Bm	3 - 6	Dark-brown (10YR 4/3, dry) or dark yellowish brown (10YR 3.5/4, moist) fine sandy loam. Moderate medium subangular blocky structure. Slightly hard when dry. Abundant roots. pH 7.6. Abrupt change:
BC	6 -14	Brown (10YR 5/3, dry) or brown to dark-brown (10YR 4/3, moist) sandy loam. Very weak subangular blocky structure. Slightly hard when dry. Occasional roots. pH 7.6. Clear change:
C	14 -18	Grayish-brown (10YR 5/2, dry) or brown (10YR 5/3, moist) sandy loam. Moderate medium subangular blocky structure. Soft when dry. Occasional roots. pH 7.4. Abrupt change:
IIC	18 +	Grayish-brown (10YR 5/2, dry) or brown (10YR 5/3, moist) loamy fine sand. Very weak subangular blocky structure. Soft to loose when dry. Occasional roots. pH 7.4.

Land Use

Most of the acreage of the Lumby soils was in native forest at the time of the survey (1964), and used for grazing and timber. Small, scattered areas were cultivated for hay. The greater part of the acreage is in the poor to doubtful category for agriculture, owing to coarse textures, stoniness and some steeply sloping topography. The soils are submarginal for dry farming, but would respond to irrigation.

The forest cover and stones are expensive to clear. Excessively stony acreage should be left in the native state. Water is available for irrigation from some of the creeks that pass through the fans. The rating of these soils for irrigation is given in Table 4.

WHITE SERIES

This soil series occurs on calcareous, alluvial-colluvial fans on the east side of White Creek and in the vicinity of Adams Lake. The topography varies from moderately to strongly sloping; slopes are from eight to 15 percent. The elevations range from 1,350 to 2,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
White gravelly loamy sand	-	32	acres
White gravelly loamy sand-gravelly sandy loam	-	180	"
White gravelly sandy loam	117	-	"
White loam	8	-	"
	125	212	acres

The parent material was eroded from till and bedrock high in limestone, and deposited as fans. The soil textures grade from gravelly loamy sand to gravelly sandy loam, with loam inclusions on lower parts of fan aprons. Calcareous gravel, cobbles and stones are scattered on the surface, and through the solum in moderate to excessive quantities.

The soils developed on fans similar in composition to the Broderick and Schindler series, but the fans have been longer in stability and a deeper soil profile has been developed.

The Orthic Brown Wooded White soils are well-drained. They support a moderately dense forest of Douglas fir, with scattered maple, birch and willow. The other growth consists chiefly of false box, Oregon grape, ocean spray, kinnikinnick, and pinegrass. A profile under forest between White Creek and Bastion Mountain was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Mixed coniferous and deciduous forest litter. pH 6.0.

Horizon	Depth Inches	Description
Bfh	0 - 6	Dark yellowish brown (10YR 4/4, dry) or dark-brown (7.5YR 3/2, moist) gravelly sandy loam to gravelly loam. Very weak fine to medium subangular blocky breaking to fine granular structure. Soft when dry, very friable when moist. Occasional limestone gravel. Roots abundant. pH 7.1. Clear boundary:
Bm	6 -11	Brown to yellowish-brown (10YR 5/3.5, dry) or dark yellowish brown (10YR 3/4, moist) gravelly sandy loam to gravelly loam. Very weak fine to medium subangular blocky breaking to fine granular structure. Soft when dry. Very friable when moist. Scattered limestone gravel. Roots abundant. pH 7.4. Clear boundary:
BC	11 -20	Grayish-brown to brown (10YR 5/2.5, dry) or dark-brown (10YR 3/3, moist) gravelly sandy loam. Very fine granular structure. Soft when dry. Very friable when moist. Scattered limestone gravel and cobbles. Abundant roots. Calcareous. pH 7.9. Gradual boundary:
Ck	20 -30	Grayish-brown to dark grayish brown (10YR 4.5/2, dry) or dark-brown to very dark grayish brown (10YR 3/2.5, moist) gravelly sandy loam. Very weak fine granular structure. Slightly hard when dry. Friable when moist. Scattered limestone gravel and cobbles. Common roots with a root mat at 29 to 30 inch depth. Strongly calcareous. pH 7.9. Clear boundary:
IICk	30 +	Intermixed olive-gray (5Y 5/2, dry) and light-gray (5Y 7/1, dry) or dark olive gray (5Y 3/2, moist) and olive-gray (5Y 4/2, moist) strongly cemented, gravelly sand. Massive structure. Extremely hard when dry. Extremely firm when moist. Strongly calcareous. pH 8.2.

Land Use

One small area was cleared as a farmstead and another abandoned at the time of the survey (1964). The balance of the acreage was in forest, with timber and range the only utilization.

The arable acreage is submarginal for dry farming, due to the coarse textured solum and lime content. When the soils are cleared, care should be taken to avoid bringing the calcareous subsoil to the surface. With irrigation, increased organic matter and fertilization, the soils would produce hay and pasture crops. The ratings according to suitability for irrigation are given in Table 4.

Degraded Brown Wooded Soils

MOULTON SERIES

This is a minor group of soils that occur in one large area south of Nisconlith Lake. The topography is kettled, and strongly rolling to moderately hilly. Elevations lie between 1,500 and 2,000 feet. The total area mapped of 654 acres is all nonarable.

The parent material consists of calcareous morainal gravel deposits, with a finer textured capping from less than a foot to three feet or more thick. The deposits are composed of a variable mixture of deeply kettled sands and gravel. Till occurs in the mass as buried, irregular pods of different thicknesses. At depths beneath the solum, there are calcareous horizons and lime plating on the undersides of gravel. Surface stoniness is from slight to excessive. Surface textures are sandy loam and gravelly sandy loam.

The Degraded Brown Wooded Moulton soils are rapidly drained. Minor Brown Wooded and Gray Forested development occurs. The natural vegetation is mainly Douglas fir and a light understory of wild rose, huckleberry, Oregon grape, vine maple, and scattered patches of pine-grass. A sandy loam profile under native vegetation was given the following description:

Horizon	Depth Inches	Description
L-H	1 - 0	Forest litter composed of twigs, needles, and leaves. pH 6.1.
Ae1	0 - 6	Pale-brown to brown (10YR 5.5/3, dry) or dark grayish brown (10YR 4/2, moist) sandy loam. Weak fine subangular blocky structure. Soft when dry. Abundant roots. pH 6.7. Clear boundary:
Ae2	6 -11	Brown (10YR 5/3, dry) or brown to dark-brown (10YR 4/3, moist) sandy loam. Weak fine subangular blocky structure. Soft when dry. Abundant roots. pH 6.9. Clear boundary:

Horizon	Depth Inches	Description
AB	11 -18	Light yellowish brown to dark yellowish brown (10YR 5.5/4, dry) or dark yellowish brown (10YR 4/4, moist) sandy loam. Weak to moderate, fine to medium subangular blocky structure. Slightly hard when dry. Occasional gravel. Abundant roots. pH 7.2. Clear boundary:
Btj	18 -25	Light yellowish brown to dark yellowish brown (10YR 5.5/4, dry) or dark yellowish brown (10YR 4/4, moist) sandy loam. Moderate medium subangular blocky structure. Slightly hard to hard when dry. Occasional gravel. Common roots. pH 7.2. Clear boundary:
IICca	25 -34	Brown (10YR 5/3, dry) or olive-brown (2.5Y 4/4, moist) gravelly loamy sand or gravelly sandy loam. Weak fine to medium subangular blocky structure. Lime plating on undersides of gravel. Common roots. pH 7.2. Clear boundary:
IICk1	34 -41	Grayish-brown (10YR 5/2, dry) or dark-brown to dark yellowish brown (10YR 4/3.5, moist) gravelly loamy sand. Single-grained. Loose. Occasional root. Calcareous. pH 8.0. Clear boundary:
IICk2	41 +	Variable composition of gravelly loamy sand, gravelly sand and coarse sand. Single-grained. Loose. Strongly calcareous. pH 8.1.

Land Use

The Moulton soils are nonarable due to extremely rough topography and are only suitable for livestock grazing and periodic logging.

GLENEMMA SERIES

In the surveyed area the Glenemma soils occur on high outwash terraces, between Glenemma and Spa Creek in the southern part of the Salmon River valley. The topography is rolling and steeply sloping, some of which is due to kettles, and to dissection by Fowler and Spa creeks. The elevations range from 1,600 to 1,825 feet. The soils were mapped as follows:

	Arable	Nonarable	
Glenemma gravelly loamy sand	31	-	acres
Glenemma gravelly sandy loam	981	-	"
Glenemma stony gravelly sandy loam	476	-	"
Glenemma-Pillar gravelly sandy loam-loamy sand complex	675	-	"
Glenemma-Stepney gravelly sandy loam-loamy sand complex	-	212	"
	2,163	212	acres

The parent material consists of gravelly glacial outwash surfaced with a finer textured overlay from six to 20 inches thick. At depths some of the gravelly deposits are underlain by glacio-lacustrine silts. The main surface texture is gravelly sandy loam, which varies to gravelly loamy sand. In places the Glenemma soils overlap sandy glacial outwash to form a mixture. Such areas were mapped as complexes with the Pillar and Stepney series. Stoniness varies from slight to an excessively stony surface associated with thin overlay.

The Degraded Brown Wooded Glenemma series is rapidly drained. The soils developed under relatively dry conditions, and the forest is a medium open stand of ponderosa pine and Douglas fir. The undergrowth consists of ceanothus, balsam root, fleabane, dogbane, and pinegrass, and bunchgrasses on south-exposed slopes. A representative profile under natural vegetation was described as follows:

Horizon	Depth Inches	Description
L-F	½- 0	Mixture of coniferous forest litter and grass. Only slightly decomposed in lower part. pH 4.8.
Ah	0 - 2	Dark-gray (10YR 4/1, dry) or black (10YR 2/1, moist) gravelly sandy loam. Weak fine platy breaking to moderate fine granular structure. Slightly hard when dry, friable when moist. Abundant roots. pH 6.8. Abrupt boundary:
Aej	2 -11	Dark grayish brown (10YR 4/2, dry) or dark-brown (10YR 3/3, moist) gravelly sandy loam. Weak medium subangular blocky structure. Soft when dry. Very friable when moist. An occasional cobble. Common roots. pH 6.8. Clear boundary:
Btj	11 -21	Brown to dark-brown (10YR 4/3, dry), dark-brown (10YR 3/3, moist) gravelly sandy loam. Moderate medium blocky structure. Hard when dry. Friable when moist. Common cobbles. Common roots. pH 6.8. Clear boundary:

Horizon	Depth Inches	Description
IIBC	21 -29	Dark grayish brown to brown (10YR 4/2.5, dry) or dark-brown (10YR 3/3, moist) gravelly and cobbly loamy sand. Very weak subangular blocky structure breaking to single grains. Loose. Roots common. pH 6.8. Gradual boundary:
IICca	29 +	Gravelly and cobbly coarse sand of variegated colors. Single-grained. Loose. Gravel and cobbles lime plated on undersides. pH 7.8.

Land Use

There were a few small fields and a small acreage cultivated and irrigated in association with the Stepney and Enderby soils at the time of the survey (1964). The balance of the arable acreage was in the native state.

The Glenemma soils are submarginal for dry farming, owing to coarse textures and open subsoils. With irrigation the areas having the deeper solums would produce hay, pasture and other crops that do not require tillage. Organic matter should be increased and fertilizers used. In the natural state the soils have value for early spring range. Their suitability for irrigation is given in Table 4.

PILLAR SERIES

The Pillar soils occupy high outwash terraces on both sides of the Salmon River valley, mainly south of Wall Creek. Near Wall Creek they cover dry southwest-facing slopes on the east side of the valley. In the Thompson Valley they are on both sides of the river in Indian Reserve southwest of Chase.

The topography is rolling to moderately hilly and strongly to very steeply sloping. In places the rough surface is caused by kettles and in others by erosion. The elevations are between 1,300 and 1,750 feet. The soils were mapped as follows:

	Arable	Nonarable	
Pillar loamy sand	155	-	acres
Pillar sandy loam	861	-	"
Pillar-Stepney sandy loam complex	163	-	"
Pillar-Stepney loamy sand-sandy loam complex	630	-	"
Pillar-Stepney sandy loam-loamy sand complex	795	311	"
Pillar sandy loam-Enderby silt loam complex	119	-	"
Pillar-Stepney-Enderby complex	1,204	1,222	"
	3,927	1,533	acres

The parent material is sandy glacial outwash in the form of terraces, generally underlain at depths by glacio-lacustrine silts. The sands are in the coarser grades; sandy loam and loamy sand are the common surface textures. Gravel and cobbles are few to none at all. The Pillar soils are associated with the Gray Forested Stepney series on sandy parent material and with the Gray Forested Enderby series which occurs where the underlying silts are exposed. Between Glenemma and Spa Creek, the Pillar soils are in places intermixed with gravelly outwash and were mapped as a Glenemma-Pillar complex.

The Degraded Brown Wooded Pillar series is rapidly drained. In relatively dry conditions the vegetative growth is a medium to open stand of ponderosa pine and scattered Douglas fir, with an understory of ceanothus, dogbane, kinnikinnick and pinegrass. Bunchgrasses occur on south-facing slopes. A profile in native cover was described as follows:

Horizon	Depth Inches	Description
L	$\frac{1}{2}$- 0	Organic litter composed of fresh ponderosa pine needles and pinegrass. Some charcoal. pH 4.2.
Ah	0 - 2	Dark grayish brown (10YR 4/2, dry) or very dark brown (10YR 2/2, moist) loamy sand. Very weak fine granular structure. Soft when dry. Very friable when moist. Roots common. pH 6.8. Abrupt boundary:
Ae	2 - 7	Grayish-brown to brown (10YR 5/2.5, dry) or dark grayish brown to very dark grayish brown (10YR 3.5/2, moist) loamy sand. Very weak medium subangular blocky structure. Soft when dry. Very friable when moist. Roots common. pH 7.2. Abrupt boundary:
AB	7 -13	Brown (10YR 5/3, dry) or dark-brown (10YR 3/3, moist) loamy sand. Weak medium subangular blocky structure. Slightly hard when dry. Very friable when moist. Roots common. pH 7.2. Clear boundary:
Btj	13 -18	Brown (10YR 5/3, dry) or dark-brown (10YR 3/3, moist) sand. Weak medium subangular blocky structure. Slightly hard when dry. Very friable when moist. An occasional root and gravel. pH 7.0. Abrupt change:
BC	18 -23	Brown (10YR 5/3, dry) or dark-brown (10YR 3/3, moist) coarse sand. Very weak medium subangular blocky structure. Very friable to loose. An occasional root and gravel. pH 7.0. Clear boundary:

Horizon	Depth Inches	Description
C	23 +	Pale-brown (10YR 6/3, dry) or dark grayish brown to brown (10YR 4/2.5, moist) coarse sand. Single-grained. Loose. An occasional root to 40 inches. Sands moderately micaceous. pH 7.0.

Land Use

Most of the acreage of the Pillar soils is in the natural state. A few fields have been cultivated and abandoned. A small acreage is irrigated in association with the Stepney and Enderby soils. The Pillar soils are submarginal for dry farming, owing to coarse textures and low moisture holding capacity. With irrigation forage and other crops could be produced. The needs of the soil are organic matter and fertilizers. Their rating according to suitability for irrigation is given in Table 4.

BRODERICK SERIES

The Broderick soils occur on east-facing slopes east of White Creek and west of Sorrento. The topography varies from gently to strongly sloping; slopes are from four to 15 percent. The elevations lie between 1,200 and 1,700 feet. The Broderick series was mapped as follows:

	Arable	Nonarable	
Broderick gravelly loam	153	337	acres
Broderick silt loam	188	-	"
Broderick-Carlin-Enderby complex	60	-	"
Broderick-Tappen-Carlin complex	127	-	"
	528	337	acres

Erosion following forest fires at the higher elevations was responsible for the alluvial-colluvial fans from which these soils are derived. The fan material consists chiefly of eroded, calcareous glacial till containing limestone gravel and cobbles. The fans overlie glacio-lacustrine deposits, which themselves have been eroded in places. Soil textures vary from gravelly loam to silt loam. Stoniness, mostly flaggy limestone, is excessive in the apexes, grading to none at all in the fan aprons.

The Degraded Brown Wooded Broderick soils are well-drained. The vegetative cover is composed of young Douglas fir, cedar, birch and maple, and an undergrowth of false box, princes' pine, waxberry, Oregon grape, spirea, and patches of thin moss. A profile under forest was described as follows:

Horizon	Depth Inches	Description
L-F	¾- 0	Mainly coniferous litter which grades through partially to well decomposed material in lower ¼ inch. pH 6.7.
Aej	0 - 3	Grayish-brown (10YR 5/2, dry) or very dark grayish brown (10YR 3/2, moist) silt loam. Moderate fine platy structure. Slightly hard when dry. Friable when moist. A few scattered gravels, mostly calcareous. Roots abundant. pH 6.7. Clear boundary:
Btj	3 - 9	Dark grayish brown (10YR 4/2, dry) or very dark brown to very dark gray (10YR 2.5/1.5, moist) silt loam. Moderate to coarse subangular blocky structure. Slightly hard when dry. Friable when moist. A few scattered gravels, mostly calcareous. Roots common. pH 7.0. Abrupt boundary:
BCk	9 -16	Olive-gray (5Y 5/2, dry) or olive-gray to dark olive gray (5Y 3.5/2, moist) silt loam. Weak medium subangular blocky structure. Soft to slightly hard when dry. Very friable to friable when moist. A few scattered gravels, mostly calcareous. An occasional flaggy limestone cobble. Common roots. Calcareous. pH 8.0. Clear boundary:
Ck1	16 -36	Light olive gray (5Y 6/2, dry) or olive-gray (5Y 4/2, moist) silt loam. Moderate medium blocky structure. Slightly hard when dry. Friable when moist. A few silt loam lime cemented nodules. A few scattered gravels, mostly calcareous. An occasional flaggy limestone cobble. Common to occasional roots. Strongly calcareous. pH 8.2. Gradual boundary:
Ck2	36 +	Light olive gray (5Y 6/2, dry) or olive-gray (5Y 4/2, moist) silt loam. Moderate medium blocky structure. Slightly hard when dry. Friable when moist. A few silt loam lime cemented nodules. A few scattered gravels, mostly calcareous. An occasional flaggy limestone cobble. Strongly calcareous. Free calcium carbonate on the edges of peds. pH 8.4.

Land Use

The Broderick silt loam and the complexes were in part cultivated and in forage crops at the time of the survey (1964). The balance of the acreage was in forest. The arable areas are fair to doubtful for agriculture, depending on the topography, stoniness and content of lime. Areas high in lime are more droughty than soils of normal lime content, and cause lime induced chlorosis to lime-sensitive plants.

The soils are deficient in organic matter. They require fertilization and irrigation for satisfactory yields of forage crops. The present forest has little value for timber, and grazing is scanty. The rating of the arable Broderick soils, as to their suitability for irrigation, is given in Table 4.

ACID BROWN WOODED SOILS

This group is composed of well to imperfectly drained soils that developed under forest. An L-H horizon of forest litter is present on the surface and the underlying mineral soil shows no distinct evidence of eluvial and illuvial horizons. The upper part of the solum is characterized by yellowish-brown, dark yellowish brown, dark-brown or strong-brown colors that fade with depth. A transitional BC horizon may or may not occur. The parent material is usually of low base saturation, or may have calcareous strata at depths. The Orthic subgroup was the only one found in the surveyed area.

Orthic Acid Brown Wooded Soils

This subgroup has the same general description as that given above. The representatives in the mapped area are the Hillcrest, Sauff, Banshee, and Hobbs series.

HILLCREST SERIES

This is a minor series. It occurs on the highland south of Salmon Arm. The topography is from steeply sloping to strongly rolling. The elevations lie between 1,450 and 2,200 feet. The following soils were mapped:

	Arable	Nonarable	
Hillcrest gravelly sandy loam	32	-	acres
Hillcrest-Cherryville complex	-	212	"
Hillcrest-Moutell complex	-	55	"
	32	267	acres

Small, scattered areas of Hillcrest soils occur in association with the Sauff and Cherryville series. The small scale of mapping did not permit their differentiation.

The parent material is composed of gravelly glacial outwash and gravelly slopewash over till. It is loose, porous and generally less than four feet thick over the till. The till is similar to that from which the Cherryville series is derived. The main surface texture is gravelly sandy loam, moderately to excessively stony.

The Orthic Acid Brown Wooded Hillcrest series is well to rapidly drained. The forest is composed chiefly of medium stands of Douglas fir, and scattered cedar, maple and birch. The light undergrowth consists of false box, princes' pine, Oregon grape, twinflower, and scattered pinegrass. A profile under forest was described as follows:

Horizon	Depth Inches	Description
L-F	1 - 0	Mixed deciduous and coniferous forest litter.
Bfh	0 - 6	Brown (10YR 5/3, dry) or dark yellowish brown (10YR 4/4, moist) gravelly sandy loam. Weak fine subangular blocky breaking to fine granular structure. Friable when moist. Scattered cobbles. Abundant roots. pH 6.5. Abrupt boundary:
Bf	6 -12	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 4/4, moist) gravelly sandy loam. Weak medium subangular blocky breaking to fine granular structure. Friable when moist. Scattered cobbles. Abundant roots. pH 6.5. Abrupt boundary:
BC	12 -17	Pale-brown (10YR 6/3, dry) or brown (10YR 5/3, moist) gravelly sandy loam. Weak fine to medium subangular blocky structure. Firm when moist. Scattered cobbles. Abundant roots. pH 6.6. Clear boundary:
IIC	17 -30	Pale-brown (10YR 6/3, dry) or brown to dark-brown (10YR 4/3, moist) gravelly loamy sand. Weak fine to medium subangular blocky structure. Very friable when moist. Soft when dry. Scattered cobbles. Occasional roots. pH 6.9. Clear boundary:
IIIC	30 +	Light olive gray (5Y 6/2, dry) or gray (5Y 5/1, moist) gravelly loam till. Strong, medium pseudo-blocky structure. Very firm when moist. Very hard when dry. An occasional cobble. pH 7.5.

Land Use

With the exception of 32 acres, the Hillcrest soils are non-arable due to coarse texture, shallow droughty solums and adverse topography.

The soils are best utilized in the native state as a source of timber and for grazing.

The rating according to suitability for irrigation is given in Table 4.

SAUFF SERIES

The soils of this series occur in most localities of the mapped area, excepting the Salmon River valley. There is a wide range of topography from very gently sloping and gently undulating terraces to areas that are steeply sloping and strongly rolling. Very steep to extremely steep slopes are on gully sides and terrace bluffs. The range of elevation is from 1,160 to 2,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Sauff gravelly loamy sand	148	56	acres
Sauff gravelly sandy loam	653	130	"
Sauff gravelly sandy loam (deep phase)	38	-	"
Sauff gravelly sandy loam-gravelly loamy sand	100	-	"
Sauff sandy loam	152	80	"
Sauff-Shuswap gravelly loamy sand-sandy loam complex	69	26	"
Sauff-Larch Hill gravelly sandy loam-gravelly loamy sand complex	355	626	"
Sauff-Larch Hill gravelly sandy loam-sandy loam complex	137	-	"
Sauff-Larch Hill gravelly sandy loam complex	2,267	442	"
Sauff-Larch Hill sandy loam complex	662	19	"
Sauff-Larch Hill gravelly loam complex	30	-	"
Sauff gravelly sandy loam-Stepney sandy loam complex	-	152	"
Sauff gravelly sandy loam-Shuswap sandy loam complex	156	89	"
Sauff gravelly sandy loam-Metcalfe loam complex	203	-	"
Sauff gravelly sandy loam (deep phase)-Shuswap sandy loam complex	251	-	"
Sauff gravelly sandy loam (deep phase)-Skimikin silt loam complex	239	-	"
Sauff-Shuswap-Canoe complex	-	54	"
Sauff-O'Keefe-Corning complex	-	770	"
Sauff-Larch Hill-Corning complex	108	-	"
Sauff-Larch Hill-Chum complex	364	-	"
Sauff-Larch Hill-Carlin complex	-	42	"
	5,932	2,486	acres

The parent material is composed of thick deposits of stratified gravel and gravelly sands, deposited as glacial stream and deltaic terraces. Minor areas of morainal gravel also occur. These deposits are overlain by a finer textured capping from six to 20 inches thick. Where the capping is more than 20 inches deep, the soils were mapped as a deep phase. The common surface texture is gravelly sandy loam; variations of sandy loam, loamy sand and gravelly loamy sand are included. Surface stoniness varies from moderately to excessively stony, the stones being most abundant in the areas of thin overlay.

In addition to being mapped separately, the Sauff soils were classified as complexes with the sandy outwash of the Shuswap, Canoe, Metcalfe, Banshee, Corning, and Stepney series. Other complexes were with the Skimikin, Carlin and Chum series. A large acreage was also mapped as a Sauff-Larch Hill intergrade having calcareous gravelly strata at depths from 24 to 42 inches.

The Orthic Acid Brown Wooded Sauff soils are rapidly drained. The forest cover is composed of a moderate to heavy stand of Douglas fir, lodgepole pine, birch, maple, and an occasional aspen. The undergrowth consists of Oregon grape, spirea, ceanothus, princes' pine, and twinflower. A profile of gravelly sandy loam, under forest, on a gravelly terrace southeast of Salmon Arm, was given the following description:

Horizon	Depth Inches	Description
L-F	$\frac{3}{4}$- 0	Mixed deciduous and coniferous forest litter and some moss. Abundant white mycelia. Common fine roots in the F layer. pH 5.0.
Bfh	0 - 3	Pale-brown (10YR 6/3, dry) or dark-brown (10YR 3.5/3, moist) gravelly sandy loam. Very weak medium subangular blocky easily breaking to weak fine granular structure. Soft when dry. Very friable when moist. Scattered cobbles. Abundant roots. pH 6.6. Abrupt boundary:
Bf	3 - 9	Light yellowish brown (10YR 6/4, dry) or brown to dark-brown (10YR 4/3, moist) gravelly sandy loam. Very weak medium subangular blocky breaking easily to weak fine granular structure. Soft when dry. Very friable when moist. Scattered cobbles. Abundant roots. pH 6.5. Abrupt boundary:
IIBC	9 -18	Pale-brown (10YR 6/3, dry) or olive-brown (2.5Y 4/4, moist) cobbly and gravelly sand. Weak medium to coarse subangular blocky breaking to weak medium granular structure. Slightly hard when dry. Friable when moist. Abundant roots. pH 6.5. Clear boundary:

Horizon	Depth Inches	Description
IIC	18 +	Light-gray to light brownish gray (2.5Y 6.5/2, dry) or dark grayish brown (2.5Y 4/2, moist) cobbly and gravelly sand. Single-grained. Loose. An occasional root. pH 6.5.

Land Use

A few small acreages have been cleared and planted to forage crops. Crops grown were usually light. The balance of the Sauff soils were under forest at the time of the survey (1964).

These are limited use soils, owing to coarse texture, shallow solums over gravelly substrata, stoniness, and in places, rough topography. The forest is expensive to clear on the better topography. When clearing, care must be taken not to bring the substrata to the surface. Stone removal is light to heavy. Clean cultivation is difficult in places and not justifiable in others.

The soils are submarginal without irrigation. When irrigated they are best suited for the production of hay and pasture. Organic matter and plant nutrients are deficient. Fertilization is required for crops. The soils are rated according to suitability for irrigation in Table 4.

BANSHEE SERIES

These soils occur on benches above the Adams River, and in the Hiuihill Creek valley. The topography varies from gently sloping and gently undulating terraces to areas that are gently to strongly rolling, and strongly to steeply sloping. The elevations are between 1,600 and 2,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Banshee-O'Keefe loamy sand complex	137	-	acres
Banshee-O'Keefe loamy sand to sandy loam complex	302	129	"
Banshee-O'Keefe sandy loam complex	226	-	"
Banshee-O'Keefe-Corning complex	82	143	
	747	272	acres

The parent material consists of coarse textured, gravel-free, sandy glacial outwash in the form of terrace and deltaic deposits. A surface capping of sandy loam to loamy sand, usually less than 18 inches thick, is underlain by coarse sands that are calcareous at depths. In areas having more than 18 inch solums, Bt horizons have developed, and the soils were mapped as a complex with the Corning series.

Under natural conditions the Banshee soils support a forest of Douglas fir and lodgepole pine. The light undergrowth is composed mainly of false box, and scattered Oregon grape, aralia, princes' pine, rose, twisted stock, and pinegrass.

The Orthic Acid Brown Wooded Banshee soils are rapidly drained. In the more humid areas these soils have medium to low base saturation percentage. The Orthic Brown Wooded O'Keefe series, which occupy drier locations on the same parent material, have a medium to moderately high base saturation percentage. In this map-area the Banshee soils have a medium base saturation percentage. Thus, they are an intergrade with the O'Keefe soils. A profile of the Banshee-O'Keefe intergrade on a level terrace, north of Adams River Bridge, was described as follows:

Horizon	Depth Inches	Description
L-H	½- 0	Coniferous litter composed of needles and twigs. Abundant roots. pH 5.5.
Bfh	0 - 3	Yellowish-brown (10YR 5/6, dry) or dark yellowish brown (10YR 3/4, moist) loamy sand. Very weak fine granular structure. Very friable when moist. Abundant roots. pH 5.9. Abrupt boundary:
Bf1	3 -10	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 3.5/4, moist) loamy sand. Very weak fine subangular blocky breaking to fine granular structure. Very friable when moist. Abundant roots. pH 6.5. Clear boundary:
Bf2	10 -17	Yellowish-brown (10YR 5/4, dry) or dark-brown (10YR 3.5/3, moist) sand. Single-grained. Loose. Common roots. pH 6.7. Gradual boundary:
Bf3	17 -24	Yellowish-brown (10YR 5/4, dry) or brown to dark-brown (10YR 4/3, moist) sand. Single-grained. Loose. Occasional roots. pH 6.7. Abrupt boundary:
IIC	24 -36	Yellowish-brown (10YR 5/4, dry) or brown to dark-brown (10YR 4/3, moist) coarse sand. Single-grained. Loose. Scattered gravels. Occasional root. pH 6.7. Abrupt boundary:
IIIC	36 -47	Brown (10YR 5/3, dry) or brown to dark-brown (10YR 4/3, moist) coarse sand. Single-grained. Loose. pH 6.9. Abrupt boundary:

Horizon	Depth Inches	Description
IVC	47 -53	Brown (10YR 5/3, dry) or brown to dark-brown (10YR 4/3, moist) very coarse sand. Single-grained. Loose. pH 6.9. Clear boundary:
VC	53 -63	Pinkish-gray (7.5YR 7/2, dry and moist) clean very coarse sand. Single-grained. Loose. pH 7.2. Abrupt boundary:
VICK	63 +	Light-gray (7.5YR 7/0, dry and moist) clean, calcareous, very coarse sand. Single-grained. Loose. Scattered gravel becoming more abundant with depth. Lime coatings on undersides of gravels. pH 7.8.

Land Use

The total acreage of the Banshee soils was in native forest at the time of the survey (1964). These are poor to doubtful soils for dry farming, because of a sandy solum having low moisture holding capacity. In their natural condition they are deficient in organic matter and other plant nutrients. Under irrigation, hay, pasture, cereals, and vegetables could be produced when the land is fertilized. The soils are rated according to their suitability for irrigation in Table 4.

HOBBS SERIES

This series occurs south of Gardom Lake, on the east slopes of Mount Hilliam, and southeast of Chase. The topography varies from steeply and extremely sloping to strongly rolling and hilly. The range of elevation is from about 1,800 to 2,700 feet. The soils are nonarable and were mapped as the following complexes:

Hobbs-Cherryville complex	758 acres
Hobbs-Reiswig complex	64 "
Hobbs-Rock Outcrop complex	56 "
	878 acres

The Hobbs series also occurs as secondary members of complexes with the Cherryville and Saltwell series.

The parent material is composed of a thin mantle derived from slopewash or creep, shallow till and loess mixed with various sizes and amounts of angular rock fragments. The mantle over bedrock is usually less than three feet thick. Deposits of till are in close association. Talus rock is scattered on the surface near bedrock outcroppings. The surface textures are a variable mixture of stony and gravelly loam, sandy loam and loamy sand.

The Orthic Acid Brown Wooded Hobbs soils are well to rapidly drained. They support a light forest of coniferous trees on dry slopes. The light ground cover is similar in composition to other soils with which the Hobbs series is associated. A profile was given the following description:

Horizon	Depth Inches	Description
L-F	$\frac{3}{4}$- 0	Coniferous forest litter composed of needles and twigs. pH 5.9.
Bf	0 -10	Brown (10YR 5/3, dry) or brown to dark-brown (7.5YR 4/3, moist) gravelly sandy loam. Weak medium subangular blocky structure. Soft when dry. Common angular gravel and cobbles. Common roots. pH 6.3.
BC	10 -20	Brown (10YR 5/3, dry) or yellowish-brown (10YR 5/4, moist) gravelly sandy loam. Weak medium subangular blocky structure. Soft when dry. Many angular gravel and cobbles. Occasional roots. pH 6.4.
IIC	20 +	Shattered bedrock with soil filtered into cracks and crevices. Root mat ends abruptly on contact with bedrock.

Land Use

The Hobbs soils are nonarable due to their shallow, droughty solum and steep topography. They are suitable for limited logging and livestock grazing.

GRAY FORESTED SOILS

This group of soils developed under forest, with well to imperfectly drained conditions. A thin L-H horizon of forest litter covers the surface, and this is underlain by light colored, eluvial Ae horizons. There are illuvial horizons beneath, which may contain small concentrations of clay in isolated peds, tongues or pockets, or small accumulations of clay and/or iron in bands or lamellae, instead of a continuous Bt horizon. Light colored eluvial material is often interspersed with darker illuvial material to form horizons consisting of pockets of A and B horizon materials. A transitional BC horizon occurs. Usually, the parent material is highly base saturated; free lime may or may not occur. The Orthic subgroup was the only one found in the surveyed area.

Orthic Gray Forested Soils

The description of this subgroup is the same as the general one above. There are four representatives in the mapped area. These are the Stepney, Enderby, Chum, and Ida series.

STEPNEY SERIES

The Stepney series occupies high terraces in the Salmon River valley, and small areas occur in the Skimikin and Chase creek valleys and are scattered elsewhere. The topography varies from level and gently undulating to rolling and strongly to very steeply sloping. The range of elevation is from 1,325 to 3,000 feet. Stepney soils in the Salmon River valley on high terraces are vulnerable to erosion. Areas dissected by gullies were mapped as a rough broken phase. The soils were classified as follows:

	Arable	Nonarable	
Stepney sand	30	-	acres
Stepney loamy sand	48	-	"
Stepney sandy loam-loamy sand	29	-	"
Stepney sandy loam-gravelly sandy loam	68	-	"
Stepney sandy loam	979	67	"
Stepney fine sandy loam	196	-	"
Stepney-Pillar sandy loam-loamy sand complex	-	208	"
Stepney sandy loam-Larch Hill gravelly sandy loam complex	34	-	"
Stepney sandy loam-Enderby silt loam complex	7	-	"
Stepney-Canoe-Carlin complex	38	-	"
Stepney-Carlin-Tappen complex	-	277	"
Stepney-Enderby-Carlin complex	-	88	"
	1,429	640	acres

The parent material consists of sandy glacial outwash in the form of terraces, the upper two to three feet being finer textured than that below. Gravel and cobbles are generally absent; some are found near boundaries with stony soils. The main surface texture is sandy loam, with minor variations to sand, loamy sand and fine sandy loam. The deposits of sand may or may not be underlain at depths by glacio-lacustrine silts. In eroded areas the underlying silts are exposed in places, and the Stepney soils were mapped as complexes with soils derived from the silts, namely Enderby, Carlin and Tappen series. Complexes were also mapped with the Pillar, Canoe and Larch Hill series.

The Orthic Gray Forested Stepney soils are well-drained. They appear to have insufficient clay for development of Bt horizons. The translocated clay is dispersed in pockets and thin bands. The forest consists of a moderate stand of Douglas fir, ponderosa and lodgepole pine and scattered aspen and willow. The undergrowth varies in density. It is composed mainly of saskatoon, kinnikinnick, ceanothus, spirea, dogbane, fleabane, and pinegrass. A profile on a Salmon River valley terrace was described as follows:

Horizon	Depth Inches	Description
L-F	1 - 0	Organic litter consisting mainly of Douglas fir needles and pinegrass. Slightly decomposed in the lower part. pH 5.0.
Ae1	0 - 2	Grayish-brown (10YR 5/2, dry) or very dark grayish brown (10YR 3/2, moist) sandy loam. Weak fine granular structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.6. Abrupt boundary:
Ae2	2 - 7	Light brownish gray (10YR 6/2, dry) or dark grayish brown (10YR 4/2, moist) coarse sandy loam. Weak medium subangular blocky structure. Soft to slightly hard when dry. Friable when moist. Peds moderately vesicular. Roots common. Occasional pocket of B material. pH 6.8. Clear boundary:
Ae3	7 -12	Light brownish gray to pale-brown (10YR 6/2.5, dry) or dark grayish brown (10YR 4/2, moist) coarse sandy loam. Moderate medium blocky structure. Slightly hard when dry. Friable when moist. Roots common. pH 6.8. Clear boundary:
AB	12 -20	Pale-brown (10YR 6/3, dry) or dark grayish brown (10YR 4/2.5, moist) sandy loam. Moderate medium blocky structure. Hard to very hard when dry. Friable when moist. Horizon is mostly bleached Ae material with localized pockets showing clay accumulation. Compact in place. Occasional roots. pH 6.8. Clear boundary:
BA	20 -29	Pale-brown (10YR 6/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) sandy loam. Moderate coarse to medium blocky structure. Hard to very hard when dry. Friable when moist. Horizon contains localized pockets showing clay accumulation and bleached Ae material. Compact in place. Occasional roots. pH 7.0. Gradual boundary:
BC	29 -36	Light brownish gray to pale-brown (10YR 6/2.5, dry) or dark grayish brown (10YR 4/2, moist) loamy sand. A few, faint mottles. Massive breaking to single-grained structure. Hard when dry. Very friable when moist. pH 7.2. Gradual boundary:

Horizon	Depth Inches	Description
IIC	36 +	Medium sand of variegated colors. Single-grained. Loose. pH 8.1.

Land Use

The moderate to semi-open forest produces timber and a good growth of pinegrass and herbs that afford fair grazing. Cultivation is restricted to the most suitable topography. The soils are submarginal for dry farming; where this is done the yields are low. Small acreages are irrigated to produce forage and cereal crops and potatoes.

Effective crop rotations are necessary to increase the organic matter content of the soil, and fertilizers should be used. The soils are most suitable for forage crops. They were rated according to suitability for irrigation in Table 4.

ENDERBY SERIES

Soils of this series occupy narrow areas that flank the sides of the Salmon River valley. They also occur in the Broadview locality, between Tappen and Sorrento, south of Nisconlith Lake and in the lower Chase and Chum creek valleys.

The topography varies from gently to very steeply sloping, and from undulating to strongly rolling and moderately hilly. The elevations lie between 1,200 and 2,000 feet. The high, narrow benches flanking the Salmon River valley are vulnerable to erosion and dissected by gullies. The soils were mapped as follows:

	Arable	Nonarable	
Enderby silt loam	1,043	1,108	acres
Enderby-Carlin silt loam complex	-	165	"
Enderby-Tappen silt loam complex	175	336	"
Enderby-Grier silt loam complex	84	-	"
Enderby-Stepney silt loam to sandy loam complex	582	509	"
Enderby-Syphon loam to silt loam complex	71	-	"
Enderby silt loam-Reiswig gravelly loam complex	-	97	"
Enderby-Stepney-Reiswig complex	-	95	"
	1,955	2,310	acres

The parent material consists of silty glacio-lacustrine deposits that are stratified, and contain a high percentage of silt and very fine sand. The deposits are of considerable thickness. The general surface texture is silt loam, with fine sandy loam and loam inclusions. The parent material is alkaline; calcareous horizons occur at from 24 to 48 inch depths.

The Enderby soils were mapped in complexes with the Carlin, Tappen and Grier series where erosion has removed the overlying material and exposed the silts. They were also mapped in complexes with the Stepney, Syphon and Reiswig series.

The Orthic Gray Forested Enderby soils are well-drained. There is insufficient clay in the parent material to permit the formation of distinct Bt horizons. Clay accumulation occurs only in pockets, nodular forms and thin bands.

There is a medium forest of Douglas fir, and scattered cedar, lodgepole pine, aspen, willow, and alder. The undergrowth is composed of saskatoon, snowbrush, soopolallie, spirea, kinnikinnick, twisted stalk, dogbane, and pinegrass. A typical profile was described as follows:

Horizon	Depth Inches	Description
Ae	0 - 6	Light-gray to light brownish gray (10YR 6/1.5, dry) or very dark grayish brown (10YR 3/2, moist) silt loam. Weak medium subangular blocky structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.2. Clear boundary:
AB1	6 -11	Light brownish gray (10YR 6/2, dry) or dark grayish brown (10YR 4/2, moist) silt loam. Moderate medium blocky structure. Hard when dry. Friable when moist. Horizon composed mainly of Ae material with pockets and thin layers of Bt material. Roots common. pH 6.8. Clear boundary:
AB2	11 -16	Pale-brown (10YR 6/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) silt loam. Strong coarse blocky structure. Very hard when dry. Friable when moist. Horizon mainly Ae material but with more numerous pockets and thin layers of Bt material as compared to above horizon. Occasional roots. pH 6.8. Clear boundary:
Bm	16 -23	Light brownish gray to light yellowish brown (2.5Y 6/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) silt loam. Moderate medium blocky structure. Hard when dry. Friable when moist. Some iron staining. An occasional nodular form containing colloids. Occasiona roots. pH 7.2. Clear boundary:

Horizon	Depth Inches	Description
BC	23 -32	Grayish-brown to light olive brown (2.5Y 5/3, dry) or dark grayish brown (2.5Y 4/2, moist) fine sandy loam. Weak medium subangular blocky structure. Soft when dry. Very friable when moist. Roots common. pH 7.8. Clear but irregular boundary:
Ck1	32 -40	Light brownish gray (2.5Y 6/2, dry) or grayish-brown (2.5Y 5/2, moist) silt loam. Massive to weakly stratified. Hard when dry. Friable when moist. Occasional roots. pH 8.8. Gradual boundary:
Ck2	40 +	Light brownish gray to light yellowish brown (2.5Y 6/3, dry) or dark grayish brown (2.5Y 4/2, moist) stratified fine sandy loam to silt loam. Hard when dry. Friable when moist. Occasional roots in upper part. pH 8.6.

Land Use

Nonarable areas with rough topography are utilized for range and forestry. Areas with suitable topography are slowly being cleared for agriculture. Dry farming gives only fair yields of cereals and forage. Irrigation is practiced on Yankee Flats, and good yields of cereals, alfalfa and potatoes are obtained. Some tree fruit is grown on these soils in the Broadview locality.

The Enderby soils have very suitable textures for irrigated agriculture. They require organic matter to improve soil structure. The soils are vulnerable to erosion. All crops should be fertilized. The suitability of these soils for irrigation is given in Table 4.

CHUM SERIES

The Chum series is derived from alluvial-colluvial fans in the Chase, Chum and Skimikin creek valleys, and from deltaic deposits of Onyx and Scotch creeks. The topography is from gently to steeply sloping; the steep slopes are near the fan apexes. Undulating topography caused by creek meandering occurs. The elevations lie between 1,150 and 3,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Chum gravelly sandy loam	848	714	acres
Chum sandy loam	244	-	"
Chum sandy loam to gravelly sandy loam	87	-	"
Chum sandy loam to loam	99	-	"

	Arable	Nonarable	
Chum loam	51	-	acres
Chum loam to clay loam	53	-	"
Chum-Adams fine sandy loam to loam complex	529	-	"
Chum-Adams fine sandy loam to silt loam complex	402	-	"
Chum-Stepney sandy loam complex	24	-	"
	2,337	714	acres

The parent material is composed of moderately coarse to medium textured sandy and gravelly deposits of creeks, some of which are inactive; others are intermittent or flow continuously. The fans were built by a succession of outwashes, which left the coarse materials at the apexes and graded them successively finer toward the fan aprons. Gravel may or may not occur in the solum. The main surface textures are gravelly sandy loam, sandy loam and loam. Minor inclusions of clay loam occur. Stoniness varies from none at all to excessive. The Chum soils on the deltaic deposits of Scotch and Onyx creeks were mapped as complexes with the Adams series, and they are underlain by gravel at depths.

The Orthic Gray Forested Chum soils are well-drained. The parent material is in part granitic, low in ferro-magnesium minerals, and lacks sufficient clay to form distinctive Bt horizons. Clay accumulation occurs in pockets and thin bands in the lower part of the solum.

The forest cover consists chiefly of Douglas fir, with scattered cedar, birch and alder. The understory is composed of rose, thimbleberry, Oregon grape, bunchberry, princes' pine, twinflower, clover, strawberry, and scattered patches of pinegrass. A profile, under forest, near Phillips Lake was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Mixed coniferous-deciduous needle litter. Decayed in the lower part. Abundant roots. pH 5.5.
Ae1	0 - 6	Light brownish gray (2.5Y 6/2, dry) or grayish-brown (2.5Y 5/2, moist) sandy loam. Weak fine to medium subangular blocky breaking to fine granular structure. Soft when dry. Very friable when moist. Roots abundant. pH 5.5. Abrupt boundary:
Ae2	6 -13	Light brownish gray (2.5Y 6/2, dry) or grayish-brown (2.5Y 5/2, moist) sandy loam. Weak medium to coarse subangular blocky breaking to fine granular structure. A faint clay band at 11 inches depth. Soft when dry. Very friable when moist. Roots common. pH 6.1. Abrupt irregular boundary consisting of a clay band $\frac{1}{4}$ inch thick:

Horizon	Depth Inches	Description
AB	13 -20	Light brownish gray (2.5Y 6/2, dry) or grayish-brown (2.5Y 5/2, moist) sandy loam. Weak to moderate coarse subangular blocky structure. Thin faint discontinuous clay bands. Slightly hard when dry. Very friable to friable when moist. Common roots. pH 6.8. Clear boundary:
BA	20 -26	Light olive brown (2.5Y 5/4, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) sandy loam matrix with olive-brown (2.5Y 4/4, dry) or dark grayish brown (2.5Y 4/2, moist) loam. Clay flows in pockets, and two irregular clay bands ½ to 2 inches in thickness. Moderate coarse to very coarse subangular and angular blocky structure. Slightly hard to hard when dry. Friable to firm when moist. Occasional roots. pH 6.7. Clear boundary:
BC	26 -32	Light olive brown (2.5Y 5/4, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) sandy loam. Weak fine to medium subangular blocky breaking to fine granular structure. Soft to slightly hard when dry. Very friable to friable when moist. Occasional roots. pH 7.0. Abrupt boundary:
CK	32 +	Light olive brown (2.5Y 5/4, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) sandy loam. Massive, crushing to fine granular structure. Slightly hard when dry. Very friable to friable when moist. Calcareous. pH 8.0.

Land Use

At the time of the survey (1964) small areas of Chum soils were cultivated for forage crops. Most of the acreage is used for forestry. The soils are marginal for dry farming, owing to coarse textures and low moisture holding capacity. With irrigation, the addition of organic matter and fertilization, good crops could be produced.

Inasmuch as these soils occupy the drier forested areas, land clearing is comparatively light. Stone removal is from light to heavy, depending on the position of a given acreage on a fan. When cultivated the soils are most suitable for hay and pasture. Their rating according to suitability for irrigation is given in Table 4.

IDA SERIES

The main areas of the Ida soils are in the Salmon River valley about three miles south of Shuswap Lake. There is also a small acreage in the Chase Creek valley. The topography, gently undulating to undulating, was formed by stream meanders. The soils, all arable, were mapped as follows:

Ida fine sandy loam	5 acres
Ida loam	51 "
Ida silt loam	68 "
Ida-Rumball silt loam-sandy loam complex	738 "
	862 acres

In undulating topography the Ida series occupies the higher positions and the Rumball soils the lower ones.

The parent material is composed of medium textured alluvium deposited by the Salmon River and Chase Creek. The deposits are micaceous and stone- and- gravel-free. Surface textures vary from fine sandy loam to silt loam. There are coarser textured strata below 18 to 24 inch depths.

The Orthic Gray Forested Ida soils are moderately well to well-drained. The total acreage is cultivated; little native vegetation remains. However, the soils developed under deciduous forest, mainly cottonwood, aspen, willow, alder, and associated undergrowth. A cultivated profile near Mount Ida Community Hall was described as follows:

Horizon	Depth Inches	Description
Ap	0 - 6	Grayish-brown (2.5Y 5/2, dry) or very dark grayish brown (10YR 3/2, moist) loam. Weak medium subangular blocky structure. Friable when moist. Common roots. pH 6.7. Clear boundary:
AB	6 -11	Grayish-brown (2.5Y 5/2, dry) or dark grayish brown (2.5Y 4/2, moist) silt loam. Moderate coarse subangular blocky structure. Hard when dry. Occasional roots. pH 7.3. Gradual boundary:
BC	18 -21	Pale-olive (5Y 6/3, dry) or olive-brown (2.5Y 4/4, moist) sandy loam. Very weak medium subangular blocky structure. Soft when dry. A few faint mottles. Occasional roots. pH 7.5. Gradual boundary:

Horizon	Depth Inches	Description
IICg	21 -31	Pale-olive (5Y 6/3, dry) or olive-brown (2.5Y 4/4, moist) loamy fine sand. Massive structure. Slightly hard when dry. Common distinct mottles. Occasional roots. pH 7.6. Abrupt boundary:
IICgj	31 +	Pale-olive (5Y 6/3, dry) or olive-brown (2.5Y 4/4, moist) loamy sand. Single-grained structure. Loose. A few faint mottles. An occasional root. pH 7.8.

Land Use

The Ida soils are all under cultivation, and produce cereals and forage crops. These are fair to good soils; they have fair moisture holding capacity and are suitable for dry farming. However, irrigation water is available and required in the latter part of the growing season, particularly in dry summers.

The soils are deficient in organic matter. With fertilization they would produce most climatically suited crops. The Ida soils are rated according to suitability for irrigation in Table 4.

GRAY WOODED SOILS

This group consists of well to imperfectly drained soils that developed on calcareous parent materials under forest. The soils are characterized by an L-H horizon of forest litter, underlain by a light colored Ae horizon or horizons of eluviation. This in turn is underlain by a Bt horizon or horizons of clay accumulation. The parent material beneath, the C, Ck or Cca horizon, is highly base saturated or calcareous. Transitional AB and BC horizons may or may not occur. The subgroups found in the surveyed area are Orthic, Gleyed, Dark Gray, Brunisolic, and Bisequa Gray Wooded soils.

Orthic Gray Wooded Soils

These have an L-H horizon underlain by light colored and eluviated Ae horizon or horizons. There is an illuvial Bt horizon or horizons beneath, having clay accumulation and subangular blocky or blocky structure. The underlying parent material is highly base saturated or calcareous. AB and BC horizons may or may not be present. The cultivated surface is light colored.

In the mapped area this subgroup is represented by 10 soils as follows:- Reiswig, Carlin, Saltwell, Plaster, Tappen, Moutell, Harper, Adams, Fowler, and Skimikin series.

Gleyed Gray Wooded Soils

This subgroup is similar to the Orthic, except for faint mottling and gleying in the solum and parent material. Such mottling is due to temporary water saturation at the time of the snow-melt or freshet. The only representative is the Wallenstein series.

Dark Gray Wooded Soils

The Dark Gray Wooded soils are similar to the Orthic subgroup, except for a chernozemic-like, dark colored Ah or Ahe surface horizon from two to four inches thick. When cultivated, the surface is darker than the Orthic subgroup but lighter than the Black soils. The only representative is the Willshore series.

Brunisolic Gray Wooded Soils

These soils differ from the Orthic in that the upper part of the Ae horizon is more brightly colored. Generally, this grades into the normal light colored Ae horizon that overlies AB, BA and Bt horizons. This subgroup is represented in the surveyed area by the Cherryville, Corning, Syphon, and Leonard series.

Bisequa Gray Wooded Soils

These are similar to the Orthic subgroup, except for a sequence of podzolized Ae, Bfh and/or Bf horizons that develop in the upper part of the normal Gray Wooded Ae horizon. The Bfh and/or Bf horizons have distinctive bright colors. The representatives are the Hobson and Metcalfe series.

Orthic Gray Wooded Soils

REISWIG SERIES

The Reiswig soils occur on west-facing slopes of the Salmon River valley, lower north-facing slopes of Mount Ida, and in the Chase, Chum and Skimikin creek valleys. The topography varies from gently rolling to moderately hilly, and moderately to extremely sloping. The elevations are between 1,700 and 3,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Reiswig gravelly sandy loam	30	473	acres
Reiswig stony sandy loam	226	-	"
Reiswig sandy loam	616	205	"
Reiswig sandy loam to gravelly sandy loam	1,253	-	"
Reiswig gravelly sandy loam to gravelly loam	-	546	"
Reiswig sandy loam to loam	-	735	"

	Arable	Nonarable	
Reiswig gravelly loam	519	540	aores
Reiswig loam to gravelly loam	46	90	"
Reiswig loam	-	54	"
Reiswig sandy loam-Carlin silt loam complex	-	303	"
Reiswig gravelly loam-Stepney sandy loam complex	47	-	"
Reiswig loam-Stepney loamy sand complex	-	103	"
Reiswig-Fowler complex	-	419	"
Reiswig-Hobbs-Rock Outcrop complex	64	724	"
	2,801	4,192	acres

The parent material consists of glacial till of moderately coarse to fine texture. The unweathered till is calcareous, laminated, compact and impervious to water, and derived from a range of rocks, from granite to basaltic lava. Where derived from granite the color and textures are light. Till eroded from lava is darker in color and has heavier textures. The surface textures are sandy loam, gravelly sandy loam, loam and gravelly loam. Subsoils include clay loam, gravelly clay loam and gravelly light clay in addition to textures similar to the surface. The gravel, cobble and stone content varies. Stoniness is from slight to excessive.

The Orthic Gray Wooded Reiswig soils are well-drained. There is a light forest of Douglas fir, ponderosa pine and scattered cedar and birch. Numerous shrubs occur, including saskatoon, waxberry, kinnikinnick, vine maple, ocean spray, spirea, timber sedge, and false box. Pinegrass is abundant. A profile on a steep, west-facing slope of Mount Ida was described as follows:

Horizon	Depth Inches	Description
L-H	1½- 0	Coniferous forest litter of needles, twigs and wood. Humified and dark colored in lower part. pH 6.2.
Ae1	0 - 4	Light brownish gray (10YR 6/2, dry) or dark grayish brown to brown (10YR 4/2.5, moist) fine sandy loam. Very weak medium subangular blocky breaking easily to fine granular structure. Soft when dry. Very friable when moist. Abundant roots. Gravels common. A few cobbles. pH 6.5. Clear boundary:
Ae2	4 -12	Grayish-brown (10YR 5/2, dry) or dark brown to (10YR 3.5/3, moist) gravelly loam. Moderate medium subangular blocky structure. Slightly hard when dry. Very friable when moist. Abundant roots. Common cobbles. pH 6.6. Gradual boundary:

Horizon	Depth Inches	Description
AB	12 -19	Brown (10YR 4.5/3, dry) or brown (7.5YR 4.5/2, moist) gravelly clay loam. Moderate fine blocky structure. Slightly hard when dry. Friable when moist. Peds are degrading and have light brownish gray (10YR 6/2, dry) coatings with pockets of similar colored material between the peds. Abundant roots. Many cobbles. pH 6.5. Gradual boundary:
Bt1	19 -25	Brown to yellowish-brown (10YR 5/3.5, dry) or dark grayish brown to dark-brown (10YR 4/2.5, moist) gravelly clay. Strong fine blocky structure. Hard when dry. Slightly firm when moist. Abundant roots. Many cobbles. pH 6.8. Gradual boundary:
Bt2	25 -39	Brown (10YR 5/3, dry) or dark grayish brown (10YR 4/2, moist) gravelly clay. Strong medium blocky structure. Hard when dry. Slightly firm when moist. Roots common. Many cobbles. pH 7.0. Clear boundary:
BC	39 -48	Brown (10YR 5/3, dry) or dark grayish brown (10YR 4/2, moist) gravelly clay loam. Moderate medium blocky structure. Hard when dry. Friable when moist. Roots common. Many cobbles. pH 7.4. Gradual boundary:
Ck	48 -61	Brown (10YR 5/3, dry) or dark grayish brown (10YR 4/2, moist) gravelly clay loam. Moderate fine to medium blocky structure. Hard when dry. Friable when moist. Many cobbles. An occasional root. pH 7.4. Gradual boundary:
Ck	61 +	Brown (10YR 5/3, dry) or grayish-brown to dark grayish brown (10YR 4.5/2, moist) gravelly clay loam till. Compact in place but breaks out into moderate fine to medium pseudo-blocky structure. Hard when dry. Friable when moist. A very occasional root in the upper part. Many cobbles. pH 7.4.

Land Use

Small acreages were dry farmed for forage at the time of the survey (1964). Over two-thirds of the total acreage classified is too steep and stony for agriculture, and is best utilized for range and forestry. In the better topography the soils have fair to good moisture holding capacity, and under dry farming cereals and forage can be produced. Irrigation water is unavailable in most areas.

Clearing costs for removing the forest cover are high. The amount of stones and topography generally determines whether or not any area should be cleared and cultivated. Organic matter and fertilization are necessary for cropping. The soils are rated according to their suitability for irrigation in Table 4.

CARLIN SERIES

These soils occur mainly in the Salmon Arm, Notch Hill and Tappen localities. There are minor areas in the Chase and Chum creek valleys, and west of Chase on the north side of the Thompson River. The topography varies from level and very gently undulating to steeply sloping and strongly rolling. The range of elevation is from 1,200 to 1,800 feet, except for an area in the upper Chase Creek valley at 2,800 feet. The soils were mapped as follows:

	Arable	Nonarable	
Carlin loam	27	-	acres
Carlin gravelly silt loam	810	-	"
Carlin silt loam	1,500	177	"
Carlin silty clay loam	-	247	"
Carlin-Enderby loam to silt loam complex	1,125	-	"
Carlin-Enderby gravelly silt loam to silt loam complex	570	-	"
Carlin-Enderby silt loam complex	1,525	937	"
Carlin-Tappen silt loam complex	135	-	"
Carlin gravelly silt loam-Rock Outcrop complex	36	-	"
Carlin silt loam-Canoe sandy loam complex	37	-	"
Carlin silt loam-Stepney sandy loam complex	19	-	"
Carlin silt loam-Reiswig sandy loam complex	-	194	"
Carlin gravelly silt loam-Reiswig gravelly loam complex	36	-	"
Carlin silty clay loam-Reiswig clay loam complex	117	-	"
Carlin silt loam-Syphon sandy loam complex	141	-	"
Carlin-Enderby-Stepney complex	498	-	"
Carlin-Enderby-Tappen complex	-	226	"
	6,576	1,781	acres

The parent materials are calcareous, stratified, silty, glacio-lacustrine deposits similar to those from which the Enderby soils are derived. However, the deposits contain more clay in the upper part, and in places, this appears to be the remains of a thicker clay deposit that originally capped the silts. This extra clay in the solum results in the formation of a Bt horizon. As the clay overlay thickens the Carlin series grades to the Tappen series.

On the Broadview area northeast of Salmon Arm, gravel and cobbles were found in the upper six to 12 inches of the soil. This may be due to ice-rafting and lodgement on a shoreline of a temporary glacial lake. Complexes were mapped with the Canoe and Stepney series where sand underlies or overlies the silts. Complexes with the Reiswig soils were found where silts were deposited on till, and erosion has formed a complex pattern. Such areas usually have gravel and cobbles from slopewash at the surface. Surface textures of the Carlin soils consist mainly of silt loam, with loam, gravelly silt loam, and silty clay loam inclusions. The textures are mixed near boundaries with coarser textured soils.

The Orthic Gray Wooded Carlin soils are well-drained. There is a moderate to heavy forest of Douglas fir, lodgepole pine, cedar, white pine, birch, and maple. Common shrubs are false box, waxberry, Oregon grape, and spirea. There are scattered patches of moss and little pinegrass. A profile in the Broadview area northeast of Salmon Arm was described as follows:

Horizon	Depth Inches	Description
L-H	1½- 0	Mixed coniferous and deciduous forest litter. Abundant roots in the F and H layers. pH 6.3.
Ae	0 - 4	Light-gray to light brownish gray (10YR 6.5/2, dry) or dark grayish brown (10YR 4/2, moist) silt loam. Weak medium platy structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.2. Abrupt boundary:
AB	4 - 6	Light-gray to light brownish gray (10YR 6.5/2, dry) or dark grayish brown (10YR 4/2, moist) silt loam. Moderate medium to coarse blocky structure. Soft to slightly hard when dry. Friable when moist. Colloid remnants inside of peds. Roots abundant. pH 6.4. Abrupt boundary:
Bt	6 -15	Pale-brown to grayish-brown (10YR 6/3 - 5/2, dry) or dark grayish brown (10YR 4/2, moist) silty clay loam. Strong medium to coarse blocky structure. Hard when dry. Firm when moist. Abundant roots. pH 5.8. Clear boundary:
BC	15 -20	Pale-olive (5Y 6/3, dry) or olive (5Y 5/3, moist) silty clay loam or silt loam. Moderate medium blocky structure with the ped interiors showing evidence of original stratification. Slightly hard to hard when dry. Friable when moist. Some

Horizon	Depth Inches	Description
		organic staining on ped faces. Roots common. pH 5.9. Clear boundary:
CB	20 -30	Pale-yellow to pale-olive (5Y 6.5/3, dry) or olive-brown (2.5Y 4/4, moist) silt loam consisting mainly of broken stratifications. Hard when dry. Friable when moist. Roots common to occasional. Some organic staining on stratification planes. pH 6.8. Clear boundary:
Ck1	30 -39	Pale-olive (5Y 6/3, dry) or olive-gray (5Y 5/2, moist) stratified silt loam. Hard to very hard when dry. Firm when moist. Carbonates present along most stratification planes. Occasional roots. pH 8.2. Gradual boundary:
Ck2	39 +	Pale-yellow (5Y 7/3, dry) or light olive gray to olive-gray (5Y 5.5/2, moist) stratified silt loam. Hard to very hard when dry. Firm when moist. Carbonates restricted to occasional vertical crack or stratification plane. pH 8.4.

Land Use

A large acreage of Carlin soils has been cleared for the production of hay, pasture, cereals, tree fruits, and small fruits. The balance is in forest.

Most of the surviving productive orchards in the Sorrento and Salmon Arm localities are on Carlin soils or complexes. Dry farmed orchard production is low, but the fruit is of good quality. The soils are mostly dry farmed, and fair yields are obtained. Irrigation is required for maximum production but water is currently unavailable for a large part of the acreage.

The soils are susceptible to erosion. Clean cultivation should be avoided on the steeper slopes, where strip cropping, or permanent forage crops should be grown. Additions of organic matter and fertilizers are required. The soils are suitable for hay, pasture, alfalfa, cereals, vegetables, and small fruits. They are rated according to suitability for irrigation in Table 4.

SALTWELL SERIES

This series occurs on the sides of the Spallumcheen Valley between Armstrong and Grindrod. In this map-area, it occurs in one area as a complex with the Hobbs series. The topography is steeply to very steeply sloping, at elevations between 1,400 and 1,850 feet. A total of 413 acres were mapped, all nonarable.

The parent material consists of a mixture of stony glacio-lacustrine sediments and glacial till. The upper two to three feet of the profile is generally heavier textured than the underlying till. Profile textures vary from loam to clay, and the till beneath is sandy loam to loam. The composition of the topography and profile suggest that till originally underlaid a part of the Plaster series that eroded. During erosion the parent material of the Plaster series mixed with weathered till, leaving a mixed profile from which the Saltwell series developed. The average surface texture is loam, with clay loam inclusions. Scattered gravel, cobbles and stones occur. Shallow Hobbs soils, that overlie bedrock, and have Acid Brown Wooded soil development, were mapped as a Saltwell-Hobbs complex.

The Orthic Gray Wooded Saltwell series is well-drained. There is a medium dense forest of Douglas fir, containing larch and a few spruce. The shrub layer is fairly heavy. A profile on a road cut three miles north of Armstrong, without litter on the surface, was described as follows:

Horizon	Depth Inches	Description
Ae	0 - 7	Brown (10YR 5/3, moist) loam. Strong, medium blocky structure. Friable when moist. Peds bleached and vesicular. Occasional gravels and cobbles. Abundant roots. pH 6.7. Clear boundary:
AB	7 -12	Brown to dark-brown (10YR 4/3, moist) loam. Strong medium blocky structure. Friable to firm when moist. Some bleaching on faces of peds. Scattered gravels and cobbles. Common roots. pH 7.2. Clear boundary:
Bt	12 -20	Dark grayish brown (2.5Y 4/2, moist) clay loam. Strong medium blocky structure. Firm when moist. Scattered gravels and cobbles. pH 7.5. Clear boundary:
BC	20 -26	Very dark grayish brown (2.5Y 3/2, moist) clay loam. Massive to weak medium blocky structure. Firm when moist. Occasional roots. Scattered gravels and cobbles. pH 7.3. Gradual boundary:

Horizon	Depth Inches	Description
C	26 +	Dark grayish brown (2.5Y 4/2, moist) loam till. Laminated structure. Very firm when moist. Dark coatings on cleavage planes. pH 6.6.

Land Use

The Saltwell soils in this map-area are all in native forest and support a good growth of trees for timber. The soils are nonarable due to steep topography. Their only agricultural value is for forested range.

PLASTER SERIES

The Plaster soils were found chiefly on the north side of Shuswap Lake, between Celista and Anglemont. There is also a small area north-west of Enderby. Other areas, too small for separation at the scale of mapping, occur where glacio-lacustrine and till soils are associated. The topography is gently to strongly rolling, and moderately to steeply sloping, with minor inclusions of very steeply sloping land. The range of elevation is from 1,400 to 1,700 feet. The soils were mapped as follows:

	Arable	Nonarable	
Plaster clay loam	17	-	acres
Plaster clay loam to clay	386	415	"
Plaster silty clay loam to clay	259	-	"
Plaster clay	31	-	"
Plaster clay loam to clay-Hobson stony loam complex	87	-	"
Plaster clay loam to clay-Grier silt loam complex	59	-	"
Plaster clay loam to clay-Rock Outcrop complex	-	16	"
Plaster-Tappen clay loam to clay complex	156	-	"
Plaster-Tappen silty clay loam to clay complex	129	-	"
Plaster-Saltwell complex	109	295	"
	1,233	726	

The parent materials consist of moderately fine to fine textured glacio-lacustrine sediments that overlie a rolling glacial till deposit. The sediments vary from two to six feet in depth over the till. They are calcareous, stratified, and in places thickened by erosion or slumping. The surface and subsoil textures are clay loam, silty clay loam, silty clay, and clay. The Plaster soils are at higher elevations than those mapped as the Broadview series, and are intermixed with the Tappen series. The association with the Tappen soils is often inseparable and is only differentiated in rolling topography by the depth to till.

Associated soils derived from till were mapped as the Hobson series. Steeply to very steeply sloping topography has a moderate stone content, probably derived from ice rafting or reworking of till, and inclusions of Saltwell soils.

The Orthic Gray Wooded Plaster series is moderately well drained. The forest cover consists of Douglas fir, lodgepole pine, cedar, birch, and maple of moderate density. A profile under forest was given the following description:

Horizon	Depth Inches	Description
L-H	1 - 0	Coniferous and deciduous forest litter. Abundant fine roots. pH 6.8.
Ae	0 - 3	Light brownish gray (10YR 6/2, dry) or dark grayish brown (10YR 4/2, moist) clay. Coarse platy structure. Vesicular. Firm when moist. Scattered roots. pH 6.9. Abrupt boundary:
AB	3 -10	Grayish-brown (10YR 5/2, dry) or dark grayish brown (10YR 4/2, moist) clay. Strong fine to medium blocky structure. Firm to very firm when moist. Occasional roots. pH 7.0. Clear boundary:
Bt	10 -29	Grayish-brown (10YR 5/2, dry) or dark grayish brown (10YR 4/2, moist) heavy clay. Coarse prismatic breaking to blocky structure. Firm to very firm when moist. Roots restricted to vertical cracks in prismatic structure. pH 6.7. Clear boundary:
C	29 +	Light olive gray (5Y 6/2, dry) or olive-brown (2.5Y 4/4, moist) stratified lacustrine clay. pH 6.7.

Textures of the stratified materials between the Bt horizon and the impervious till can vary from silt loam to clay.

Land Use

A part of the acreage of the Plaster soils is cultivated and the balance is in forest having little value for range. The soils are dry farmed for hay, with results that depend on management. They have fine textures and good moisture-holding capacity, but would benefit from irrigation.

When clearing, care should be taken to avoid bringing the Bt horizon to the surface. Incorporation of organic matter in the form of green manure and crop residues is required to improve the structure of the surface soil. The soils are suitable for hay, pasture and cereals. Fertilizers should be used. The ratings according to suitability for irrigation are given in Table 4.

TAPPEN SERIES

This series occurs in Salmon Arm Municipality, in the Tappen-Notch Hill-White Lake areas, near Eagle Bay, and north of Celista. There is also a small acreage in the Chase Creek valley. The topography varies from gently undulating and very gently sloping to strongly sloping and rolling. A minor inclusion of nonarable, steeply sloping topography also occurs. Elevations are between 1,300 and 1,700 feet. The following soils were mapped:

	Arable	Nonarable	
Tappen loam to silt loam	68	-	acres
Tappen silty clay loam	520	126	"
Tappen-Carlin silt loam complex	1,340	-	"
Tappen silty clay loam-Carlin silt loam complex	1,626	-	"
Tappen-Broadview silty clay loam to silty clay complex	366	-	"
Tappen-Plaster silty clay loam to clay complex	162	-	"
Tappen-Carlin-Enderby complex	171	-	"
Tappen-Pari-Rock Outcrop complex	596	-	"
	4,849	126	acres

The Tappen soils are derived from calcareous, stratified, glacio-lacustrine clay, underlain by glacio-lacustrine silts. The clay overlay varies in thickness, depending on the erosion that has occurred. The Tappen soils were mapped as an intermediate subgroup between the Carlin and Broadview series. Where the clay capping over silt is thin, and the soils have silt loam or silty clay loam Bt horizons and blocky structure, they were mapped as the Carlin series. Where there is a thick capping of clay and the Bt horizon is dense, heavy clay with coarse prismatic structure, they were assigned to the Broadview series.

The surface textures of the Tappen soils vary from silt loam to clay; minor inclusions of loam occur near boundaries with other soils. A complex occurs with the Plaster series in association with a glacial till underlay. Near White Lake the Tappen soils are derived from shallow to deep sediments overlying calcareous bedrock, and were mapped as a complex with the Pari series and rock outcroppings.

The Orthic Gray Wooded Tappen soils are moderately well-drained. There is a moderate forest of Douglas fir, lodgepole pine, cedar, birch, and maple. The undergrowth is largely saskatoon, spirea, Oregon grape, false box, snowberry, twinflower, and scattered patches of pinegrass. A profile in forest, about two miles northwest of Tappen school, was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Mixed deciduous and coniferous forest litter. Roots common. pH 6.5.
Ae	0 - 2½	Light-gray (10YR 7/1, dry) or grayish brown to dark grayish brown (10YR 4.5/2, moist) silt loam. Weak fine platy structure. Soft when dry. Friable when moist. Roots common. pH 6.1. Abrupt boundary:
AB	2½- 4½	Light-gray (10YR 7/1, dry) or grayish-brown (10YR 5/2, moist) silty clay loam. Moderate coarse subangular blocky structure arranged in curved aggregates capping the underlying columns. Hard when dry. Firm when moist. Peds are vesicular and contain small remnants of Bt material. Roots common. pH 6.3. Abrupt boundary:
Bt1	4½-10	Light-gray (10YR 7/2, dry) or grayish-brown to dark grayish brown (10YR 4.5/2, moist) clay. Strong medium columnar breaking easily to strong medium blocky structure. Very hard when dry. Firm when moist. Columns have thin lighter colored coating on sides, and thicker coating on tops. Roots common in the cleavages. pH 6.4. Clear boundary:
Bt2	10 -20	Light brownish gray to grayish-brown (10YR 5.5/2, dry or dark grayish brown to very dark grayish brown (2.5Y 3.5/2, moist) clay. Strong medium prismatic breaking to strong coarse blocky structure. Very hard when dry. Firm when moist. An occasional root in vertical cleavages. Prisms have clay coatings. pH 6.1. Clear boundary:
BC	20 -24	Brown (10YR 4.5/3, dry) or olive-brown (2.5Y 4/4, moist) silty clay. Moderate medium blocky structure. Very hard when dry. Firm when moist. Peds have thin clay coatings. A few vertical cracks containing an occasional root extend into this horizon. pH 6.2. Clear boundary:

Horizon	Depth Inches	Description
Ck1	24 -40	Pale-brown to brown (10YR 5.5/3, dry) or olive-brown (2.5Y 4/4, moist) silty clay loam consisting mainly of broken stratification. Hard when dry. Friable when moist. Brownish coatings and some clay on cleavage planes. Occasional roots. pH 6.3. Diffuse boundary:
Ck2	40 +	White (10YR 8/1, dry) or gray (10YR 6/1, moist) stratified parent material, the strata ranging from silt loam to clay loam. pH 6.8.

Land Use

The Tappen series is one of the best for agriculture in the surveyed area. The acreage is in part cultivated for forage and cereals, and partly in forest having limited grazing value.

These soils are suitable for dry farming, if well managed, and organic matter and fertilizers are used. Cultivation should be undertaken under optimum moisture conditions, in order to avoid baking or crusting. The soils have good moisture-holding capacity but they would benefit from irrigation. Their rating as to suitability for irrigation is given in Table 4.

FOWLER SERIES

The Fowler soils are confined to the southern portion of the upland between Enderby and Deep Creek. The topography is strongly rolling to steeply sloping at elevations between 1,700 and 2,100 feet. A total of 26 acres were mapped as a Fowler-Reiswig complex, all nonarable. The Fowler series also occurs as a secondary member of a Reiswig-Fowler complex, which is nonarable.

The parent material consists of shallow colluvium over bedrock. The soils are best developed on basaltic lavas. The colluvium is from a few inches to about three feet deep, and most of it is very stony. The surface textures range from gravelly loam to gravelly sandy loam.

The Orthic Gray Wooded Fowler soils are rapidly to well-drained. Recently logged (1964) the remaining tree growth consists of scattered Douglas fir, ponderosa pine and willows. Spirea and pinegrass occur in the undergrowth. A profile was described as follows:

Horizon	Depth Inches	Description
L-H	1½- 0	Forest litter of needles, twigs, leaves and pinegrass. pH 5.8.

Horizon	Depth Inches	Description
Ae	0 - 3	Grayish-brown (10YR 5/2, dry) stony and gravelly loam. Weak medium subangular blocky breaking to fine granular structure. Very friable when moist. Abundant roots. pH 7.1. Clear boundary:
AB	3 - 6	Brown (7.5YR 5/2, dry) stony and gravelly loam. Moderate fine subangular blocky structure. Friable when moist. Abundant roots. pH 7.1. Clear boundary:
Bt	6 -14	Reddish-gray to dark reddish gray (5YR 4.5/2, dry) stony and gravelly clay loam. Moderate medium blocky structure. Friable when moist. Abundant roots on ped faces. pH 6.9. Abrupt boundary:
IIC	14 +	Shattered bedrock. Abundant roots along cleavage faces in upper part.

Land Use

All areas mapped as Fowler-Reiswig complex or Reiswig-Fowler complex are nonarable. They are only suitable for very limited grazing, and have limited value for tree growth.

MOUTELL SERIES

These soils are mainly in the vicinity of Black Mountain and Mount Hillian, and in the Hiuihill Creek valley. A minor acreage occurs near Canoe Creek and on the north slope of Mount Ida. The topography is gently to steeply sloping, and the elevations are between 1,200 and 2,200 feet. The soils were mapped as follows:

	Arable	Nonarable	
Moutell gravelly sandy loam	106	471	acres
Moutell sandy loam	103	-	"
Moutell gravelly loam	263	-	"
Moutell loam	108	-	"
Moutell silt loam	81	-	"
	661	471	acres

In addition to the above, this series also occurs as a secondary member of the Hupel-Moutell complex.

The calcareous parent material consists of poorly sorted fan deposits formed where tributary creeks enter main valleys. The soils are derived from dark colored materials high in ferro-magnesium minerals. Lighter colored materials were mapped in the Canoe Creek and Mount Ida areas. The surface textures vary from gravelly sandy loam to silt loam, the sorting toward finer textures being downslope on the fans. The subsoil textures vary from gravelly sand to clay loam. Surface stoniness varies from excessive at fan apexes and sometimes over a whole fan, to none at all in the lower parts of fan aprons.

The Hupel-Moutell complex occupies compound fans, where secondary erosion and deposition occurs. Minimal Podzols and Gray Wooded soil development are intermingled in these areas and were not differentiated on the scale of mapping used.

The Gray Wooded Moutell soils are well-drained. The forest is medium to moderately dense, mostly young Douglas fir, cedar, white pine, birch, and maple. The sparse undergrowth is largely composed of princes' pine, aralia, Oregon grape, moss, pinegrass, and white Dutch clover in open areas. A profile on a north slope near Notch Hill was described as follows:

Horizon	Depth Inches	Description
L-H	½- 0	Coniferous forest litter. pH 5.8.
Ae	0 - 5	Gray (5Y 3.5/1, moist) gravelly sandy loam. Very weak fine subangular blocky structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.3. Clear boundary:
Bt	5 -16	Very dark gray (5Y 3.5/1, dry) or black (5Y 2/1, moist) loam or clay loam. Moderate coarse subangular blocky structure. Faint evidence of clay flows in a very dark gray matrix. Hard when dry. Firm when moist. Abundant roots. pH 6.5. Clear boundary:
IICk1	16 -22	Dark-gray (5Y 4.5/1, dry) or very dark gray (5Y 3.5/1, moist) gravelly sand. Single-grained. Loose. Scattered angular gravels and cobbles. Strongly calcareous. Common roots. pH 7.4.
Ck1	22 -25	Olive-gray (5Y 4/2, dry) or dark olive gray (5Y 3/2, moist) loam. Massive. Slightly hard when dry. Friable when moist. Strongly calcareous. Common roots. pH 7.4. Clear boundary:

Horizon	Depth Inches	Description
Ck2	25 -29	Gray (5Y 5.5/1, dry) or very dark gray (5Y 3.5/1, moist) sandy loam. Soft when dry. Very friable when moist. Strongly calcareous. Common roots. pH 7.7.
IICk2	29 +	Very dark gray (5Y 3.5/1, dry) or black (5Y 2/1, moist) gravelly sand. Loose. Mixed rounded and angular gravel. Scattered small cobbles. Strongly calcareous. pH 7.8.

Land Use

Small acreages with better topography are cultivated for hay and pasture. The remainder is used for grazing and forestry. The Moutell soils are marginal for agriculture. Their desirability for farming depends on the profile texture and stoniness. The moisture holding capacity varies with texture and depth to the coarse substrata.

Organic matter additions and fertilization are necessary, and the soils would benefit from irrigation. The ratings according to suitability for irrigation are given in Table 4.

HARPER SERIES

This series occupies a comparatively small acreage in the dryer forested areas. It is found mostly on north slopes on the south side of the Thompson River between Shuswap and Pritchard. Small areas occur near Nisconlith Lake and in the lower part of the Chase Creek valley. The topography is moderately to steeply sloping. Elevations lie between 1,200 and 2,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Harper gravelly sandy loam	-	25	acres
Harper sandy loam	417	-	"
Harper sandy loam to loam	-	211	"
Harper loam	83	-	"
	500	236	acres

The parent material consists of roughly stratified, poorly sorted fan deposits, composed chiefly of eroded glacial till. The fan strata contain variable amounts of gravels, cobbles and stones. Surface stoniness ranges from none at all to excessive. Surface textures include gravelly sandy loam, sandy loam and loam. These are materials similar to those from which the Chum soils are derived, but enough clay is present for a Bt horizon to develop.

The Orthic Gray Wooded Harper soils are well-drained. There is a light forest of Douglas fir, lodgepole pine, and hawthorn. The undergrowth is composed of snowberry, Oregon grape, rose, and pinegrass. A profile southwest of Shuswap was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Mixed coniferous and deciduous forest litter. pH 5.4.
Ae	0 -10	Light brownish gray (10YR 6/2, dry) or dark grayish brown (10YR 4/2, moist) sandy loam. Weak to moderate subangular blocky structure. Slightly hard when dry. Scattered gravel. Abundant roots. pH 6.4. Abrupt boundary:
AB	10 -20	Light brownish gray to grayish-brown (2.5Y 5.5/2, dry) or light olive brown to olive-brown (2.5Y 4.5/4, moist) gravelly sandy loam. Occasional faint clay coating on peds. Moderate, medium to coarse blocky to subangular blocky structure. Hard when dry. Scattered gravel. Occasional cobble. Common roots. pH 6.7. Clear boundary:
Bt	20 -27	Light brownish gray to grayish-brown (2.5Y 5.5/2, dry) or light olive brown to olive-brown (2.5Y 4.5/4, moist) gravelly sandy loam. Clay coatings on peds unevenly distributed in horizon. Moderate medium to coarse blocky to subangular blocky structure. Hard when dry. Scattered gravel. Occasional cobble. Occasional roots. pH 6.7. Clear boundary:
Btj	27 -33	Light brownish gray to grayish-brown (2.5Y 5.5/2, dry) or light olive brown to olive-brown (2.5Y 4.5/4, moist) gravelly sandy loam with faint clay coatings on peds. Moderate, medium to coarse subangular blocky structure. Hard when dry. Scattered gravel. Occasional cobble. Occasional roots. pH 6.8. Clear boundary:
BC	33 -39	Pale-brown to brown (10YR 5.5/3, dry) or dark yellowish brown (10YR 4/4, moist) gravelly sandy loam. Moderate medium subangular blocky structure. Hard when dry. Scattered gravel. Occasional cobble. Occasional roots. pH 7.0. Clear boundary:

Horizon	Depth Inches	Description
C	39 -48	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (5Y 4/4, moist) gravelly loamy sand. Moderate medium pseudo-subangular blocky structure. Hard when dry. Scattered gravel. An occasional root. pH 7.4. Abrupt boundary:
Ck	48 +	Pale-brown (10YR 6/3, dry) or dark grayish brown (10YR 4/2, moist) loamy sand. Single-grained. Scattered gravel. Calcareous. pH 8.0.

Land Use

At the time of the survey (1964), two small areas were reverting that had been cleared. The balance was in forest. These are marginal soils for dry farming, owing to coarse textures and low moisture-holding capacity. They require irrigation, which is available from the Thompson River and tributary creeks. Stone removal varies from light to heavy amounts.

When cleared, cultivated and irrigated, the soils are suitable for the production of hay and pasture. They require organic matter and fertilizers. Their ratings according to suitability for irrigation are given in Table 4.

ADAMS SERIES

The Adams series occurs on the deltas of Adams River and Scotch Creek and on the fan of Chase Creek. The over-all topography consists of a gentle slope toward the valley centre. Gently undulating to undulating topography produced by stream meanders also occurs. The range of elevation is from 1,150 to 1,200 feet. One soil type, Adams silt loam, was differentiated. The total area is 444 acres, all arable. This series also occurs as the secondary member of a complex with the Chum series on the Scotch Creek delta.

The parent material is medium textured. The deposits occupy the lower and finer textured parts of the deltaic areas. The surface soils are mainly silt loam, with minor inclusions of fine sandy loam and loam. They are underlain by coarser material; gravel occurs at depths. The parent materials are stone- and- gravel-free, except near boundaries with the nearby Sauff-Larch Hill complex.

The Orthic Gray Wooded Adams silt loam is moderately well drained; there is some imperfect drainage near the shores of Shuswap and Little Shuswap lakes. The forest cover consists of Douglas fir, lodgepole pine and scattered birch and maple. The undergrowth is composed of saskatoon, Oregon grape, snowberry, rose, false box, and pinegrass.

A profile on the Adams River delta was described as follows:

Horizon	Depth Inches	Description
L-F	½- 0	Thin coniferous and deciduous litter. pH 5.4.
Ae	0 - 2	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown (2.5Y 4/2, moist) silt loam. Weak medium platy structure. Soft when dry. Abundant roots. pH 6.2. Abrupt boundary:
AB	2 - 5	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown (2.5Y 4/2, moist) silt loam. Moderate medium subangular blocky structure. Slightly hard when dry. Abundant roots. pH 6.2. Abrupt boundary:
Bt	5 -12	Yellowish-brown (10YR 5/4, dry) or brown to dark-brown (10YR 4/3, dry) silty clay loam with distinct clay flows on the peds. Strong, coarse to very coarse blocky structure. Hard when dry. Abundant roots. pH 6.4. Clear boundary:
BC	12 -18	Pale-olive (5Y 6/4, dry) or olive (5Y 5/3, moist) silt loam or silty clay loam. Moderate, coarse blocky and subangular blocky structure. Slightly hard to hard when dry. Common roots. pH 7.1. Irregular abrupt boundary:
Cca	18 -25	Pale-olive (5Y 6/3, dry) or olive (5Y 5/4, moist) silt loam. Moderate coarse subangular blocky structure. Hard when dry. Strongly calcareous. Common roots. pH 8.0. Abrupt boundary:
IICk	25 -30	Pale-olive (5Y 6/4, dry) or light olive brown (2.5Y 5/4, moist) sandy loam. Weak fine to medium subangular blocky breaking to fine granular structure. Soft when dry. Strongly calcareous. Occasional roots. pH 8.1. Abrupt boundary:
Ck	30 -35	Pale-olive to olive (5Y 5.5/4, dry) or light olive brown to olive-brown (2.5Y 4.5/4, moist) silty clay loam. Massive. Hard when dry. Strongly calcareous. Occasional roots. pH 8.4. Clear boundary:

Horizon	Depth Inches	Description
C$\bar{g}$jk	35 -40	Pale-olive (5Y 6/3, dry) or light olive brown (2.5Y 5/4, moist) silty clay loam. A few fine faint mottles. Massive. Slightly hard when dry. Calcareous. Occasional roots. pH 8.4. Clear boundary:
IIC$\bar{g}$jk	40 +	A series of stratified horizons of variable textures from silt loam to fine sand, with a few fine faint mottles. pH to 60 inches plus varies from 8.4 to 8.6.

Land Use

Small areas were cleared and producing hay by dry farming, and with fair results, at the time of the survey (1964). The Adams silt loam is suitable for hay, pasture, cereals, vegetables, and small fruits, particularly when irrigated. Irrigation water is available from the nearby lakes. Organic matter and fertilization are necessary for good crop production. This soil type is rated as to suitability for irrigation in Table 4.

SKIMIKIN SERIES

This series occupies a small acreage near Skimikin Lake. The topography is gently undulating to very gently sloping. An area associated with glacial till is gently rolling and strongly sloping. The range of elevation is from 1,800 to 2,400 feet. A total of 198 acres of Skimikin silt loam and 35 acres of silty clay loam were mapped, all arable. These soils also occur as secondary members of a complex with the Sauff series.

The parent material consists of post-glacial lacustrine silts eroded from basaltic lava on Black Mountain and Mount Hilliam. The material filled kettles in glacial outwash in the Skimikin Valley, and along the north side of the valley it was deposited on glacial till. The material is calcareous, stratified, and dark colored. Surface and subsoil textures are silt loam and silty clay loam; the silt loam being most common. Gravels and scattered cobbles occur near the boundaries of Sauff soils and in areas of slopewash.

The Orthic Gray Wooded Skimikin soils are well-drained. The forest cover is chiefly Douglas fir, with scattered cedar, spruce and birch. The undergrowth includes western yew, filbert, rose, thimbleberry, sarsaparilla, Oregon grape, bunchberry, and twinflower. A profile was described as follows:

Horizon	Depth Inches	Description
L-H	½- 0	Coniferous forest litter composed of needles and twigs. pH 6.0. Abrupt boundary:
Ae	0 - 5	Light olive gray (5Y 6/2, dry) or olive-gray (5Y 4/2, moist) silt loam. Weak to moderate, thin platy structure. Slightly hard when dry. Friable when moist. Roots abundant. pH 6.2. Clear boundary:
AB	5 - 8	Olive-gray to light olive gray (5Y 5.5/2, dry) or dark olive gray (5Y 3/2, moist) silt loam. Moderate, medium blocky structure. Slightly hard when dry. Firm when moist. Roots abundant. pH 6.4. Clear boundary:
Bt	8 -14	Olive-gray (5Y 4/2, dry) or very dark gray to black (5Y 2.5/1, moist) silty clay loam. Strong, coarse blocky structure. Hard when dry. Firm when moist. Common roots. pH 6.7. Clear boundary:
BC	14 -17	Olive-gray (5Y 4.5/2, dry) or dark olive gray to black (5Y 2.5/2, moist) silt loam. Moderate, medium to coarse blocky structure. Slightly hard to hard when dry. Friable to firm when moist. Occasional roots. pH 7.2. Clear boundary:
C	17 -21	Olive-gray (5Y 5/2, dry) or dark olive gray to black (5Y 2.5/2, moist) silt loam. Massive structure. Slightly hard to hard when dry. Friable to firm when moist. Occasional roots. Calcareous. pH 7.8.
Cca	21 -25	Olive-gray (5Y 4/2, dry) or black (5Y 2/1, moist) silt loam. Massive structure. Hard when dry. Friable to firm when moist. Occasional roots. Strongly calcareous. pH 7.8.
Ck	25 +	Olive-gray (5Y 5/2, dry) or dark olive gray (5Y 3/2, moist) silt loam. Thin stratifications. Slightly hard when dry. Friable to firm when moist. Occasional roots. Strongly calcareous. pH 8.0.

Land Use

At the time of the survey (1964), all the acreage of the Skimikin soils was in recently logged forest, except for a small area in alfalfa. The area associated with glacial outwash has favorable topography, and when cleared and cultivated, would produce forage crops. The soils are deficient in organic matter and require fertilization and irrigation. They are classified according to suitability for irrigation in Table 4.

Gleyed Gray Wooded Soils

WALLENSTEIN SERIES

The soils of this series occupy a comparatively small acreage in the lower seven miles of the Salmon River valley. The topography varies from level to gently undulating, at elevations between 1,150 and 1,180 feet. The soils, all arable, were mapped as follows:

Wallenstein silty clay loam	374 acres
Wallenstein clay loam	97 "
	471 acres

The parent material is moderately fine to fine textured river alluvium that becomes coarser below depths of about two feet. Surface and subsoil textures are mainly silty clay loam and clay loam. Silt loam and clay textures also occur in the subsoil. Gravels and cobbles are absent.

The Gleyed Gray Wooded Wallenstein series is imperfectly drained. The soils have developed under cottonwood, birch, alder, aspen, and scattered willows. The series is nearly all cultivated and little native vegetation remains. An uncultivated profile was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Deciduous forest litter.
Ae	0 - 4	Light-gray to gray (5Y 6/1, dry) or olive-gray (5Y 4/2, moist) silty clay loam. Moderate coarse platy structure. Hard when dry. Friable when moist. Common roots. pH 6.9. Clear change:
AB	4 - 6	Light brownish gray (2.5Y 6/2, dry) or olive-gray (5Y 4.5/2, moist) silty clay loam. Moderate medium subangular blocky structure. Hard when dry. Slightly firm when moist. Common roots. pH 6.8. Clear boundary:

Horizon	Depth Inches	Description
Btgj	6 -15	Light brownish gray (2.5Y 6/2, dry) or olive-gray (5Y 4/2, moist) clay. Common faint mottles. Weak macro-prismatic breaking to coarse blocky structure. Very hard when dry. Firm when moist. Occasional roots. pH 6.8. Clear boundary:
BCg	15 -23	Light brownish gray to grayish-brown (2.5Y 5.5/2, dry) or olive-gray (5Y 4/2, moist) silty clay loam. Common distinct mottles. Weak medium subangular blocky structure. Friable when moist. Common roots. pH 7.2. Clear boundary:
Cg	23 -31	Light brownish gray (2.5Y 6/2, dry) or olive-gray to olive (5Y 4/2.5, moist) silt loam. Common distinct mottles. Weak medium subangular blocky structure. Friable when moist. Common roots. pH 7.4. Abrupt boundary:
IICg	31 +	Light brownish gray to light yellowish brown (2.5Y 6/3, dry) or olive-gray to olive (5Y 4/2.5, moist) sandy loam. Common distinct mottles. Weak medium subangular blocky structure. Very friable when moist. Occasional roots in the upper part. pH 7.4.

Land Use

These are good soils for agriculture and nearly all the acreage is cultivated. Hay and pasture crops are produced, but the soils are not well suited for alfalfa, owing to imperfect drainage. Little under-drainage is required. The extra groundwater moisture satisfies crop needs well into the growing season. Some irrigation is required during late summer.

Incorporation of organic matter, and fertilizers are necessary for crop production. The suitability of these soils for irrigation is given in Table 4.

Dark Gray Wooded Soils

WILLSHORE SERIES

These soils occur on the southern part of the upland between Enderby and Deep Creek on south and southwest slopes. The topography is steeply to very steeply sloping, and the elevations range from

1,800 to 2,800 feet. A total of 109 acres was mapped as a Willshore-Equesis complex, all nonarable.

The parent material is composed of gravelly and stony sandy loam to loam glacial till. Downslope creep is common, and the solum generally consists of colluvium having the same texture as the till. The mapped areas are in association with outcroppings of bedrock.

The Dark Gray Wooded Willshore series is well-drained. These soils occur in the transition between grassland and forest. The semi-open forest consists of Douglas fir, ponderosa pine and scattered willows, with undercover of spirea, waxberry, false box, and pinegrass. In open areas there are bunchgrasses, downy brome and others. A profile on a steep southwest slope was described as follows:

Horizon	Depth Inches	Description
Ah	0 - 2½	Brown to dark-brown (10YR 4/3, dry) sandy loam. Fine granular structure. Very friable when moist. Abundant fine roots. Abrupt boundary:
Aeh	2½- 5	Brown (10YR 5/3, dry) gravelly and stony sandy loam. Moderate weak subangular blocky breaking to fine granular structure. Friable when moist. Abundant fine roots. Abrupt boundary:
AB	5 -13	Brown to yellowish-brown (10YR 5/3.5, dry) stony sandy loam. Moderate medium subangular blocky structure. Friable when moist. Scattered roots. Clear boundary:
Bt	13 -23	Yellowish-brown (10YR 5/4, dry) stony loam. Moderate medium blocky structure. Friable to firm when moist. Scattered roots. Clear boundary:
BC	23 -28	Pale-brown (10YR 6/3, dry) stony sandy loam. Moderate medium blocky structure. Friable to firm when moist. Occasional roots. Clear boundary:
C	28 +	Pale-brown (10YR 6/3, dry) stony sandy loam till. Pseudo-blocky structure. Compact. Firm when moist. Pockets of free carbonates.

Land Use

The total acreage of Willshore soils are nonarable due to steep topography. The soils produce a good growth of grasses that makes them suitable for grazing. Tree growth is slow; the value for forestry is limited.

Brunisolic Gray Wooded Soils

CHERRYVILLE SERIES

These soils occupy a considerable acreage of upland, chiefly between Enderby and Deep Creek and on the north side of the Skimikin Creek valley. There are small areas along the valley side south of East Canoe Creek, near the height of land in north Broadview and near Notch Hill. The topography varies from undulating to hilly and from gently to extremely sloping. The range of elevation is from 1,600 to 2,800 feet. The soils were mapped as follows:

	Arable	Nonarable	
Cherryville gravelly loamy sand	-	19	acres
Cherryville stony gravelly sandy loam	237	46	"
Cherryville gravelly sandy loam	583	3,554	"
Cherryville gravelly sandy loam to gravelly loam	-	38	"
Cherryville sandy loam	317	203	"
Cherryville gravelly loam	-	80	"
Cherryville loam	46	-	"
Cherryville gravelly sandy loam-Carlin gravelly silt loam complex	50	-	"
Cherryville-Hobbs complex	-	1,248	"
Cherryville-Reiswig complex	47	92	"
Cherryville-Carlin-Stepney complex	384	-	"
Cherryville-Stepney-Carlin complex	116	-	"
Cherryville-Hobbs-Rock outcrop complex	-	750	"
	1,780	6,030	acres

The parent material consists of moderately coarse to fine textured glacial till, having a variable content of boulders, stones, cobbles, gravel, sand, silt, and clay. The unweathered till is hard, compact, often laminated, and calcareous or highly base-saturated. Colluvial creep derived from till occurs on the steeper slopes to depths of from one to five feet. Surface textures are mainly gravelly sandy loam and gravelly loam, with inclusions of gravelly loamy sand, sandy loam and loam. The subsoils are similar, with inclusions of gravelly clay loam, clay loam, sandy clay loam, and sandy clay. Surface stoniness is from slight to excessive.

The Brunisolic Gray Wooded Cherryville soils are well-drained. There is a medium to heavy forest of Douglas fir, lodgepole pine, cedar and scattered maple and birch. The undercover is largely wax-berry, Oregon grape, rose, false box, and others. Pinegrass is patchy and there is also a thin, patchy moss cover. A profile was described as follows:

Horizon	Depth Inches	Description
L-H	$\frac{3}{4}$- 0	Coniferous forest litter and moss. Decomposed in lower part, with abundant fine roots in the F and H layers. pH 5.7.
Ae1 (Bf)	0 - 9	Brown (10YR 5/3, dry) or dark yellowish brown to strong brown (10YR 4/4 to 7.5YR 4/4, moist) gravelly sandy loam or gravelly loam. Moderate medium to coarse subangular blocky structure. Slightly hard when dry. Friable when moist. Common cobbles. Common roots. pH 6.2. Clear boundary:
Ae2	9 -13	Light-gray to light brownish gray (10YR 6.5/2, dry) or grayish brown (10YR 5/2, moist) gravelly sandy loam or gravelly loam. Moderate medium to coarse blocky structure. Slightly hard when dry. Friable when moist. Many cobbles which form an ill-defined stoneline. Common roots. pH 6.2. Clear boundary:
AB	13 -19	Light olive gray (5Y 6/3, dry) or olive-gray (5Y 4/2, moist) gravelly sandy loam or gravelly loam. Strong medium to coarse blocky structure. Peds have light brownish gray (10YR 6/2, dry) vesicular coatings and similar colored pockets between peds. Hard to very hard when dry. Firm when moist. Common cobbles. Occasional roots. pH 6.4. Clear boundary:
Bt	19 -28	Olive (5Y 5/3, dry) or dark grayish brown (2.5Y 4/2, moist) gravelly loam. Strong medium blocky structure. Extremely hard when dry. Very firm when moist. Structure may be caused by laminations inherited from parent material. The clay coatings are confined to the surface planes of the peds; the interiors of the peds appear to be unaltered parent material. Common cobbles. Occasional roots. pH 6.4. Diffuse boundary:
Btj	28 -35	Pale-olive (5Y 6/3, dry) or olive-gray (5Y 4.5/2, moist) gravelly loam. Strong medium blocky structure which may result from inherited laminations as in Bt horizon. Extremely hard when dry. Very firm when moist. Clay coatings thinner than in Bt, and absent in places. Common cobbles. Occasional roots. pH 7.5. Clear boundary:

Horizon	Depth Inches	Description
Ck	35 +	Light olive gray (5Y 6/2, dry) or gray (5Y 5/1, moist) gravelly sandy loam to gravelly loam till. Strong medium pseudo-blocky structure which appears to be formed by pressure lamina. Extremely hard when dry. Very firm when moist. Cobbles common. Some free carbonates in cleavages. pH 8.2.

Land Use

Only a small acreage has been cleared for agriculture. Most of the acreage mapped is nonarable, due to steep, rough topography or excessive stoniness. The soils are mainly used for forestry and have limited value for forested range.

The arable areas of the Cherryville soils are marginal for dry farming. Irrigation water is difficult to obtain and the soils are all dry farmed. The main crop is hay, with a few acres of orchard in the north Broadview area.

The soils are expensive to clear of forest and removal of stones is required prior to cultivation. When cleared, they are deficient in organic matter and require fertilizers. They are rated according to suitability for irrigation in Table 4.

CORNING SERIES

This series occupies small areas on terraces of the Adams River, and extends into the Hiuihill and Loakin creek valleys. The topography varies from undulating to rolling and moderately sloping. The soils occur with other series on steeply to very steeply sloping topography adjacent to Adams River and Hiuihill Creek. The range of elevation is from 1,500 to 2,000 feet. The soils, all arable, were mapped as follows:

Corning sandy loam	81 acres
Corning loam	112 "
	193 acres

This series was also mapped as the third member in the Banshee-O'Keefe, Sauff-O'Keefe and Sauff-Larch Hill complexes.

The parent material consists of thick sandy terrace and deltaic deposits that have a finer textured capping from two to four feet thick. The capping contains more fine sand, silt and clay than the sands below. Surface and subsoil textures are sandy loam, fine sandy loam and loam. In places an occasional cobble or gravel are found near soil boundaries with other series. Coarse, gravelly strata occur at depth.

The Brunisolic Gray Wooded Corning series is well-drained. The Bt horizon takes the form of thin bands and horizons of clay accumulation in the deeper and finer textured subsoil which separates this series from the Banshee and O'Keefe series. The forest consists of a medium stand of Douglas fir, lodgepole pine, and scattered cedar, maple, and birch. The undergrowth is composed mainly of rose, false box, sarsaparilla, Oregon grape, princes' pine, twisted stock, twin-flower, and scattered patches of moss. A profile on a terrace north of the Adams River bridge was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Coniferous and deciduous forest litter. pH 5.6.
Ae1(Bf1)	0 - 5	Brown to dark-brown (7.5YR 4/2, dry) or dark-brown (7.5YR 3/2, moist) sandy loam. Very weak fine subangular blocky structure. Very friable when moist. Abundant roots. pH 6.2. Abrupt boundary:
Ae2(Bf2)	5 -12	Brown (7.5Y 5/4, dry) or brown to dark-brown (7.5YR 4/4, moist) sandy loam. Weak fine to medium subangular blocky structure. Friable when moist. Abundant roots. pH 6.0. Clear boundary:
AB1	12 -20	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown sandy loam. Very thin clay bands with an occasional clay coating. Weak medium subangular blocky structure. Friable when moist. Common roots. pH 6.6. Clear boundary:
AB2	20 -26	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 4/4, moist) sandy loam. Pockets and nodules of clay accumulation increasing towards the bottom of horizon. Weak to moderate, medium to coarse subangular blocky and blocky structure. Firm when moist. Common roots. pH 6.6. Irregular abrupt boundary:
Bt	26 -27	Dark yellowish brown (10YR 4/4, dry, or 10YR 3/4, moist) sandy loam to loam band with thick clay coatings. Varies in thickness from ½ to 1¼ inches. Strong medium blocky structure. Hard when dry. Occasional roots. pH 6.6. Irregular abrupt boundary:

Horizon	Depth Inches	Description
Ae	27 -30	Pale-brown (10YR 6/3, dry) or grayish-brown (2.5Y 5/2, moist) sandy loam. Varies in thickness from two to five inches. Moderate, medium to coarse subangular blocky structure. Hard when dry. Occasional roots. pH 6.5. Irregular abrupt boundary:
Bt	30 -32	Dark yellowish brown (10YR 4/4, dry, or 10YR 3/4, moist) sandy loam to loam band with clay coatings. Varies in thickness from 1 to 2¼ inches. Strong medium blocky structure. Hard when dry. Occasional roots. pH 6.2. Irregular abrupt boundary:
BC	32 -40	Yellowish-brown (10YR 5/4, dry) or dark yellowish brown (10YR 4/4, moist) fine sand with faint clay coatings scattered through the horizon. Single-grained. Occasional roots. pH 6.8. Abrupt boundary:
C	40 -56	Brown to yellowish-brown (10YR 5/3.5, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) medium to coarse sand with three irregular bands of clay accumulation from 1/16 to ¼ inch thick. Single-grained. Loose. pH 6.9. Abrupt boundary:
IIC	56 -77	Variegated very coarse sand. Single-grained. Loose. pH 7.0.
IIICca	77 +	Variegated very coarse sand and fine gravel. Lime coatings on the undersides of gravel. Loose. pH 8.3.

Land Use

The Corning soils were in forest at the time of the survey (1964). Aside from forestry they were utilized for limited forested range. Though they have fair moisture holding capacity, they are marginal for dry farming due to limited rainfall. The organic matter content is low, and fertilizers would be required for crop production.

The areas that occur with the better topography, when cultivated, irrigated and well managed, are suitable for vegetables, small fruits, forage and pasture crops. The soils are rated according to their suitability for irrigation in Table 4.

SYPHON SERIES

In the mapped area the Syphon soils occupy a comparatively small acreage from Gleneden northward to the Skimikin Valley. The topography is gently to steeply sloping and elevations are from 1,300 to 1,600 feet. The soils were mapped as follows:

	Arable	Nonarable	
Syphon sandy loam	268	-	acres
Syphon-Sauff complex	89		"
Syphon sandy loam-Carlin silt loam complex	53	-	"
Syphon-Enderby-Rock Outcrop complex	-	230	"
	410	230	acres

In addition the series occurs as a secondary member in complexes with the Spa, Enderby and Carlin series.

The parent material consists of a thin mantle of sandy outwash or slopewash that overlies glacio-lacustrine deposits. The sandy overlay is from 10 to 36 inches thick. The main surface texture is sandy loam with inclusions of fine sandy loam. Scattered gravel may occur in the overlay near soil boundaries. Cobbles and stones are generally absent.

The Brunisolic Gray Wooded Syphon soils are moderately well to well-drained, depending on the thickness of the overlay. A thin incipient Aej horizon was occasionally found in places. The soils support a medium to heavy stand of Douglas fir, cedar and scattered spruce and aspen. The undergrowth is mainly false box, princes' pine, kinnikinnick, and twinflower. A profile in the Gleneden area was described as follows:

Horizon	Depth Inches	Description
L-H	2 - 0	Mainly coniferous forest litter. Common fine roots present in the F and H layers. pH 5.3.
(Aej)		Discontinuous, and when present less than ½ inch thick.
Ael(Bf)	0 -10	Pale-brown (10YR 6/3, dry) or brown to dark-brown (10YR 4/3, moist) sandy loam. Weak fine subangular blocky structure. Soft when dry. Very friable when moist. Roots common. pH 6.5. Gradual boundary:

Horizon	Depth Inches	Description
Ae2	10 -19	Light brownish gray (10YR 6/2, dry) or dark grayish brown (10YR 4/2, moist) fine sandy loam. Very weak fine subangular blocky structure. Soft when dry. Very friable when moist. Occasional roots. pH 6.5. Gradual boundary:
AB	19 -27	Light brownish gray to pale-brown (10YR 6/2.5, dry) or dark grayish brown (10YR 4/2, moist) silt loam. Moderate medium subangular blocky structure. Slightly hard when dry. Friable when moist. Occasional roots. pH 6.2. Gradual boundary:
IIBt	27 -36	Light brownish gray to light yellowish brown (2.5Y 6/3, dry) or olive-brown (2.5Y 4/4, moist) silty clay. Weak fine prismatic structure. Very firm when moist. Occasional roots. pH 6.2. Gradual boundary:
IIC	36 +	Light brownish gray to light yellowish brown (2.5Y 6/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) stratified silty clay. The strata are thin, and firm when moist. pH 6.5.

Land Use

A small acreage was cultivated at the time of the survey (1964), which produced forage crops. These soils support a good forest cover and grazing is fairly limited. They are deficient in organic matter and require fertilization and irrigation when farmed. With irrigation seepage spots may occur where the soil mantle is thin over the glacio-lacustrine sediments. The rating according to suitability for irrigation is given in Table 4.

LEONARD SERIES

The Leonard series occurs chiefly in the Skimikin Creek valley. Scattered areas were found in the Hiuihill Creek valley, north of Celista and at the lower elevations on the north slope of Mount Ida. The gently to steeply sloping topography lies at elevations between 1,200 and 2,100 feet. The soils were mapped as follows:

	Arable	Nonarable	
Leonard gravelly sandy loam	329	149	acres
Leonard sandy loam	243	-	"
Leonard sandy loam to loam	304	-	"
Leonard loam	35	-	"
Leonard loam to clay loam	24	-	"
Leonard gravelly sandy loam-Stepney sandy loam complex	16	-	"
Leonard sandy loam-Sauff gravelly sandy loam complex	15	-	"
	966	149	acres

The parent material is composed of medium to moderately coarse textured fan deposits that eroded chiefly from glacial till, and occupy areas where creeks enter the main valleys. Surface textures vary from gravelly sandy loam to loam, with minor inclusions of clay loam. The texture of soil horizons may vary or be fairly uniform. Stoniness varies from excessive at fan apexes to none at all on the aprons. Complexes were mapped with the Sauff and Stepney series where the fans had eroded through gravelly or sandy outwash.

The Brunisolic Gray Wooded Leonard soils are well-drained. They support a medium-dense forest of Douglas fir, lodgepole pine, cedar, white pine, spruce, birch, and maple. The light undercover is mainly false box, thimbleberry, Oregon grape, twinflower, bunchberry, and patches of moss and pinegrass. A profile in the Skimikin Creek valley on a moderate north slope was described as follows:

Horizon	Depth Inches	Description
L-F	½- 0	Coniferous forest litter composed of needles and twigs. pH 5.9.
Ae1(Bf)	0 -10	Yellowish-brown (7.5YR 5/4, dry) or dark yellowish brown (7.5YR 4/4, moist) sandy loam. Very weak fine subangular blocky breaking to fine granular structure. Very friable when moist. Abundant roots. pH 6.2. Abrupt boundary:
Ae2	10 -17	Pale-brown (10YR 6/3, dry) or yellowish-brown (10YR 5/4, moist) sandy loam. Weak fine to medium subangular blocky structure. Soft when dry. Very friable when moist. Common roots. pH 6.4. Abrupt irregular thin band less than ¼ inch in thickness with clay coatings:

Horizon	Depth Inches	Description
AB1	17 -24	Very pale brown to light yellowish brown (10YR 6.5/4, dry) or yellowish-brown (10YR 5/4, moist) sandy loam. Moderate medium subangular blocky structure. Slightly hard when dry. Friable when moist. Occasional roots. pH 6.5. Abrupt irregular thin band less than ¼ inch in thickness with clay coatings:
AB2	24 -29	Very pale brown to light yellowish brown (10YR 6.5/4, dry) or dark yellowish brown (10YR 4/4, moist) sandy loam. Moderate medium subangular blocky structure. Slightly hard when dry. Friable when moist. Occasional roots. pH 6.5. Abrupt irregular thin band less than ¼ inch in thickness with clay coatings:
BA	29 -41	Light yellowish brown (10YR 6/4, dry) or yellowish-brown (10YR 5/6, moist) coarse sandy loam. Several irregular thin bands with clay coatings. Clay coatings on peds unevenly distributed through the horizon. Weak fine to medium subangular blocky structure. Soft to slightly hard when dry. Very friable when moist. pH 6.5. Clear boundary:
Bt	41 -44	Dark yellowish brown (10YR 4/4, dry and moist) sandy loam to loam. Numerous clay coatings on peds. Moderate medium to coarse subangular blocky structure. Hard when dry. Firm when moist. pH 6.8. Clear boundary:
IIC	44 +	Yellowish-brown (10YR 5/8) gravelly sand. Single-grained. Loose. pH 7.0.

Land Use

Two small areas were cleared, abandoned and reverting. The remainder of the area was in recently logged native forest (1964) and used for forested range. The soils have low to moderate moisture-holding capacity, depending on the profile textures, and they are low in organic matter. They are marginal for dry farming and require fertilization and irrigation for the production of forage and cereal crops. Their rating as to suitability for irrigation is given in Table 4.

Bisequa Gray Wooded Soils

HOBSON SERIES

These soils occur on the north side of Shuswap Lake, north of Colista, between Hlina and Ross creeks. The topography varies from moderately to very steeply sloping, and from gently rolling to moderately hilly. The elevations lie between 1,500 and 2,000 feet. The soils were mapped as follows:

	Arable	Nonarable	
Hobson gravelly sandy loam	532	-	acres
Hobson sandy loam	190	-	"
Hobson gravelly loam	64	-	"
Hobson stony loam	1,109	924	"
Hobson loam	235	-	"
Hobson stony loam--Sauff gravelly sandy loam complex	-	40	"
Hobson loam-Onyx gravelly sandy loam complex	-	106	"
	2,130	1,070	acres

The parent material is derived from moderately coarse to fine textured glacial till. The till is a heterogeneous mixture of boulders, stones, cobbles, gravel, sand, silt, and clay. The unweathered till is hard, compact, laminated and calcareous or highly base saturated. The steeper slopes are covered by creep derived from till. Surface textures are mainly loam, with included gravelly sandy loam and sandy loam. Subsoils are similar to the surface textures, but also include gravelly clay loam, clay loam, sandy clay loam, and sandy clay. Surface stoniness is from moderate to excessive.

Morainal gravels from two to six feet thick occur in places in the western part of the area. These were included in the Hobson-Onyx complex or vice versa where extensive enough to be mapped. Where the till is in association with gravelly deltaic outwash the soils were mapped as the Hobson-Sauff complex.

The Bisequa Gray Wooded Hobson soils are well-drained. They support a heavy tree cover of cedar, hemlock, white pine, Douglas fir, birch, and maple. The undergrowth is composed of soopolallie, princes' pine, queen's cup, twinflower, false box, and bracken. A profile under forest was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Mixed deciduous and coniferous forest litter. Abundant roots. pH 5.6.

Horizon	Depth Inches	Description
Aej	0 - ½	Light-gray (2.5Y 7/2, dry) or light brownish gray (2.5Y 6/2, moist) sandy loam. Varies from nil to one inch in thickness. Single-grained. Loose when moist. Abundant roots. Irregular abrupt boundary:
Bfh	½- 6	Strong-brown (7.5YR 5/6, dry) or dark-brown (7.5YR 4/4, moist) loam. Weak, fine subangular blocky structure. Very friable when moist. Scattered gravel. Roots abundant. pH 6.6. Abrupt boundary:
Bf	6 - 9	Brown (10YR 5/3, dry) or yellowish-brown (10YR 5/4, moist) loam. Weak, fine to medium subangular blocky structure. Friable when moist. Scattered gravel. Roots abundant. pH 6.4. Clear boundary:
C	9 -17	Light yellowish brown (2.5Y 6/4, dry) or light olive brown (2.5Y 5/4, moist) clay loam. Moderate, medium to coarse subangular blocky structure. Hard when dry. Occasional gravel, cobble and a boulder. Roots common. pH 6.3. Gradual boundary:
AB	17 -23	Light olive brown (2.5Y 5/4, dry) or olive-brown (2.5Y 4/4, moist) clay loam to sandy clay. Strong, coarse blocky structure. Faint clay coatings on some peds. Very hard when dry. Occasional gravel, cobble and a boulder. Roots common. pH 6.3. Gradual boundary:
Bt	23 -31	Dark grayish brown (2.5Y 4/2, dry) or very dark grayish brown (2.5Y 3/2, moist) clay loam to sandy clay. Strong, coarse blocky structure. Clay coatings dispersed through horizon. Very hard when dry. Occasional gravel, cobble and stone. Occasional roots. pH 6.9. Gradual boundary:
BC	31 -39	Olive-brown (2.5Y 4/4, dry) or dark grayish brown (2.5Y 4/2, moist) clay loam. Strong coarse blocky structure. Very faint clay coatings in upper part. Occasional gravel, cobble and stone. Very hard when dry. Occasional roots. pH 6.9. Gradual boundary:

Horizon	Depth Inches	Description
C	39 -48	Light olive brown (2.5Y 5/4, dry) or grayish-brown (2.5Y 5/2, moist) clay loam. Massive structure with faint evidence of pseudo-platy structure. An occasional gravel, cobble and stone which extends into horizon below. Very hard when dry. Calcareous in small pockets. pH 7.1. Diffuse boundary:
Ck	48 +	Olive (5Y 4/3, dry) or olive-gray (5Y 4/2, moist) clay loam till. Strong pseudo-blocky breaking to pseudo-platy structure. Very hard when dry. Occasional gravel, cobble and stone. Calcareous. pH 8.2.

Land Use

Several small areas were cleared and growing hay at the time of the survey (1964). They were reverting to wild pasture. Most of the acreage is in thick, regrowth forest of limited grazing value.

The forest is expensive to clear, and clearing is warranted only on good topography with low stone content. The soils are marginal for agriculture without irrigation and fertilization. Moisture-holding capacity is good. Water is available in some areas from creeks. The classification according to suitability for irrigation is given in Table 4.

METCALFE SERIES

This is a minor series. It occurs in the southeast part of the Salmon Arm District Municipality and near Gleneden. The topography is gently to moderately sloping, and elevations are between 1,600 and 1,800 feet. Two arable soil types were mapped as follows:

Metcalfe sandy loam	30 acres
Metcalfe loam	42 "
	72 acres

These soils were also mapped as secondary members of a complex with the Shuswap series. A small additional acreage associated with the Canoe series was not separated, due to the small map scale.

The parent material consists of deep, sandy outwash that has a finer textured capping from two to four feet thick. In places there are glacio-lacustrine silt strata at depths. The soils occupy large kettles and small, abandoned stream channels. They were deposited during erosion of the sandy outwash. The surface textures are sandy loam, fine sandy loam and loam. Subsoils are similar, with clay loam inclusions. The Bt horizon development in the finer textured subsoil separates the Metcalfe from the Shuswap and Canoe series.

The Bisequa Gray Wooded Metcalfe soils are moderately well-drained. The vegetation is similar to that of the Canoe series. It is composed of lodgepole pine with regrowth cedar, white pine, Douglas fir, and scattered birch, maple and aspen. The undergrowth is chiefly soopolallie, false box, princes' pine, kinnikinnick, spirea, bracken, pinegrass, and wild clover in open areas. A profile was given the following description:

Horizon	Depth Inches	Description
L-F	½- 0	Thin organic litter composed of needles, leaves, ferns, grass, and charcoal. Only slightly decomposed in the lower part. pH 5.8.
Aej	0 - 1	Light brownish gray (10YR 6/2, dry) or very dark grayish brown (10YR 3/2, moist) fine sandy loam. Weak fine to medium subangular blocky structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.5. Abrupt boundary:
Bf1	1 - 6	Light yellowish brown (10YR 6/4, dry) or dark yellowish brown (10YR 4/4, moist) fine sandy loam or loam. Weak fine to medium subangular blocky structure. Soft to slightly hard when dry. Friable when moist. Roots common. pH 6.4. Abrupt boundary:
Bf2	6 - 8	Pale-brown (10YR 6/3, dry) or dark grayish brown to dark-brown (10YR 4/2.5, moist) loam. Weak medium to coarse subangular blocky structure. Soft to slightly hard when dry. Friable when moist. Roots common. pH 6.5. Abrupt boundary:
C	8 -11	Light brownish gray to pale-brown (10YR 6/2.5, dry) or dark grayish brown (10YR 4/2, moist) loam. Moderate medium to coarse blocky structure. Slightly hard when dry. Friable when moist. Peds are moderately vesicular. An occasional root. pH 6.6. Abrupt boundary:
AB1	11 -18	Pale-olive (5Y 6/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) loam or clay loam. Moderate coarse blocky structure. Hard when dry. Firm when moist. Occasional roots. pH 6.5. Abrupt boundary:

Horizon	Depth Inches	Description
AB2	18 -23	Pale-olive (5Y 6/3, dry) or dark grayish brown to olive-brown (2.5Y 4/3, moist) loam. Weak to moderate medium blocky structure. Slightly hard to hard when dry. Friable when moist. pH 6.5. Abrupt boundary:
Bt	23 -31	Olive-brown (2.5Y 4/4, dry) or very dark grayish brown to olive-brown (2.5Y 3/3, moist) clay loam. Moderate coarse blocky structure. Hard when dry. Very firm when moist. pH 6.4. Clear boundary:
IICgj	31 +	Light olive brown (2.5Y 5/4, dry) or olive-brown (2.5Y 4/4, moist) gravelly sand with loamy sand and sandy loam lenses. Common faint mottling. Single-grained. Loose. pH 6.6.

Land Use

The Metcalfe soils were all in the native state at the time of the survey (1964). Regeneration of the forest cover has been slow, and as yet, they have little value for timber. However, the soils support a ground cover which provides grazing.

Metcalfe soils have fair moisture holding capacity and are marginal for agriculture without irrigation. With irrigation, fertilizer and organic matter additions, the soils are suited to the production of forage and pasture crops, cereals, vegetables, and small fruits. The rating according to suitability for irrigation is listed in Table 4.

PODZOL SOILS

These soils are rapidly to imperfectly drained. They developed under forest in the more humid sections of the mapped area. They are characterized by a layer of forest litter (L-H) on the surface, underlain by a thin, light colored eluviated Ae horizon, beneath which are bright colored Bfh and/or Bf horizons that contain organic matter and sesquioxides as the main accumulations. The parent material is non-calcareous or material from which lime has been leached. Bisequa and Minimal Podzol subgroups were found in the surveyed area.

Bisequa Podzol Soils

This subgroup has an organic L-H horizon on the surface. It is underlain by an Ae, Bfh, Bf, and C horizon sequence that developed in the Ae horizon of a Gray Wooded soil profile. The Bf and Bt horizons are generally separated by a lighter colored remnant of the former

Gray Wooded Ae horizon. This is regarded as the C horizon of the Bisequa Podzol profile. The representative is the Canoe Series.

Minimal Podzol Soils

The Minimal Podzol has an L-H horizon of forest litter on the surface. Beneath the organic horizon is a light colored Ae horizon less than an inch thick. This may be patchy or continuous. The Ae horizon is underlain by friable, brighter colored, illuvial Bfh and/or Bf horizons, more than eight inches thick, that contain accumulated organic matter and sesquioxides. The solum has a moderately low to low base saturation, and is slightly to strongly acid. The parent material is non-calcareous or the lime has been leached out at the top of the C horizon. The representatives are the Spa, Onyx, Shuswap, and Hupel series.

Bisequa Podzol Soils

CANOE SERIES

This series is located chiefly in the southeast part of Salmon Arm District Municipality. Minor areas were found near Notch Hill and Tappen. The topography varies from gently sloping and gently undulating to steeply sloping and strongly rolling. Elevations are between 1,500 and 1,900 feet. The soils were mapped as follows:

	Arable	Nonarable	
Canoe sandy loam	222	-	acres
Canoe gravelly sandy loam	29	-	"
Canoe fine sandy loam	1,717	254	"
Canoe-Shuswap loamy sand to sandy loam complex	267	-	"
Canoe-Shuswap sandy loam complex	73	-	"
Canoe-Shuswap fine sandy loam to loamy sand complex	82	-	"
Canoe-Shuswap fine sandy loam to sandy loam complex	202	-	"
Canoe-Enderby fine sandy loam to silt loam complex	41	-	"
Canoe-Enderby-Carlin complex	-	137	"
Canoe-Sauff-Shuswap complex	143	-	"
Canoe-Larch Hill sandy loam to gravelly sandy loam complex	43	-	"
	2,819	391	acres

The parent material consists of sandy glacial outwash generally underlain by glacio-lacustrine deposits. The two to four feet nearest the surface contains more silt and clay than the coarser textured material beneath. The underlying sands may be stratified below five feet depth. Surface and subsoil textures are mainly fine sandy loam with sandy loam inclusions. Loamy sand, gravelly sandy loam, and coarse silt loam occur near soil boundaries and in complexes. Gravel and cobbles are generally absent.

The Canoe series was mapped in complexes with the Shuswap series, which also developed on sandy outwash. A gradual gradation from one to the other occurs. The Canoe series was distinguished by a thicker overlay, finer sands and thin bands of clay accumulation (Bt) in the solum. Some Metcalfe soils occur within the acreages mapped as Canoe series. There are complexes with the Enderby and Carlin series where the parent material was eroded and the development occurs on sandy and silty deposits. There are other complexes with the Sauff and Larch Hill series in areas of gravelly terraces and deltaic deposits.

The well to moderately well drained Canoe soils were assigned to the Bisequa Podzol subgroup. Minor Bisequa Gray Wooded soil development occurs. The forest consists of moderate to heavy stands of cedar, hemlock, Douglas fir, white pine, and scattered birch and maple. The undergrowth is mostly false box, thimbleberry, princes' pine, spirea, queen's cup, bunchberry, sarsaparilla, pinegrass, and moss. A profile two miles southeast of Salmon Arm was described as follows:

Horizon	Depth Inches	Description
L-F	1 - 0	Coniferous forest litter, slightly decomposed in the lower part. The F layer contains mycelium and abundant fine roots. pH 5.6.
Ae	0 - 1	White to light-gray (10YR 7.5/2, dry) or grayish-brown (10YR 5/2, moist) fine sandy loam. Weak fine granular structure. Soft when dry. Very friable when moist. Abundant roots. pH 5.9. Abrupt boundary:
Bf1	1 - 7	Dark yellowish brown (10YR 4/4, dry) or dark-brown (7.5YR 4/4, moist) fine sandy loam. Weak medium subangular blocky easily breaking to weak medium granular structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.2. Abrupt boundary:
Bf2	7 -11	Pale-brown (10YR 6/3, dry) or brown to dark-brown (10YR 4/3, moist) fine sandy loam. Weak medium subangular blocky structure. Soft to slightly hard when dry. Very friable when moist. Common roots. pH 5.9. Clear boundary:

Horizon	Depth Inches	Description
C	11 -19	Pale-brown to very pale brown (10YR 6.5/3, dry) or brown (10YR 5/3, moist) fine sandy loam. Weak medium blocky structure. Slightly hard when dry. Friable when moist. Roots common. pH 6.0. Clear boundary:
AB	19 -24	Horizon consists partly of pale-brown (10YR 6/3, dry) or brown (10YR 5/3, moist) fine sandy loam Ae with brown to dark-brown (10YR 4/3, dry) or dark yellowish brown (10YR 4/4, moist) loam Bt material occurring as localized pockets and thin bands that branch in all directions. Moderate medium to coarse blocky structure. Slightly hard to hard when dry. Friable to firm when moist. Occasional roots. pH 6.4. Gradual boundary:
$Bt\overline{gj}$	24 -41	Horizon consists predominantly of brown (10YR 5/3, dry) or light olive brown (2.5Y 5/4, moist) loamy fine sand Bgj with brown to dark-brown (10YR 4/3, dry) or dark yellowish brown (10YR 4/4, moist) sandy loam Bt material occurring as localized pockets and thin bands. Weak, medium subangular blocky structure. Slightly hard when dry. Friable when moist. Bgj portion contains common faint mottles. Occasional roots. pH 6.6. Clear boundary:
BCgj	41 -52	Brown (10YR 5/3, dry) or light olive brown (2.5Y 5/4, moist) loamy fine sand to sandy loam with common faint dark yellowish brown (10YR 4/4, moist) mottling. Massive. Soft when dry. Very friable when moist. Occasional roots ending in this horizon. pH 6.8. Clear boundary:
C	52 +	Light brownish gray (2.5Y 6/2, dry) or olive-brown (2.5Y 4/4, moist) loamy fine sand. Faintly stratified, the stratification becoming pronounced with depth. Soft when dry. Very friable when moist. pH 6.9 to 7.1 to 72 inches.

Land Use

These are good soils for forestry, and have little value for range. A fairly large acreage has been cleared and cultivated. Several areas at one time planted to orchard have been abandoned. Other cleared land is used for forage and small fruits, mainly strawberries. Early maturing small fruits do well, but the yield of forage under dry farming is only fair, due to inadequate rainfall.

The Canoe soils erode easily. Clean cultivated crops should not be produced on rolling topography. The soils have moderate moisture-holding capacity; clay bands in the solum restrict drainage. Their deficiency of organic matter may be overcome by green manure crops. They require irrigation and fertilization for maximum production. Their rating according to suitability for irrigation is given in Table 4.

Minimal Podzol Soils

SPA SERIES

The Spa soils occur on north-facing slopes of the main valley west of Tappen. The topography is strongly to very steeply sloping, and elevations are between 1,500 and 2,000 feet. The soils were mapped as a Spa-Syphon-Enderby complex, of which there are 308 acres, all nonarable.

The parent material consists of gravelly, sandy slopewash that overlies glacial till. The depth to the calcareous till varies between three and six feet. In places the coarse textured slopewash is covered by a thin layer of finer texture, probably derived from loess. This is often absent, probably due to erosion. Surface and subsoil textures vary from gravelly sand to fine sandy loam. There is a variable amount of gravel and cobbles in the profile and on the surface.

The Minimal Podzol Spa soils are well to rapidly drained. The Ae horizon varies from incipient to one inch thick. It does not occur where tree uprooting or erosion has disturbed the surface. There is a heavy forest of Douglas fir, cedar, hemlock, and scattered birch and maple. The well-shaded undergrowth varies from none at all to inclusions of queen's cup, false box, bunchberry, twinflower, and moss. The profile is as follows:

Horizon	Depth Inches	Description
L	2 - 1	Fresh litter of moss, needles, twigs, and bark. pH 5.4.
F-H	1 - 0	Partly to well decomposed organic litter containing abundant fine roots. pH 5.2.
Aej	0 - 1	Light brownish gray (10YR 6/2, dry) or gray (10YR 5/1, moist) sandy loam. Weak fine granular structure. Soft when dry. Very friable when moist. Common roots. Common gravel. pH 4.6. Abrupt boundary:

Horizon	Depth Inches	Description
Bfh	1 -11	Light yellowish brown (10YR 6/4, dry) or dark yellowish brown (10YR 4/4, moist) fine sandy loam. Very weak medium subangular blocky breaking to weak fine granular structure. Soft when dry. Very friable when moist. Abundant roots. Gravelly. pH 6.0. Abrupt boundary:
IIC1	11 -16	Light brownish gray to pale-brown (10YR 6/2.5, dry) gravelly sand. Single-grained. Loose. Common cobbles. Occasional roots. pH 5.7. Gradual boundary:
IIC2	16 +	Gravelly sand of variegated colors containing some iron staining. Single-grained. Loose. Occasional roots in the upper part. Many cobbles. pH 6.5.
IIIC		Brown to dark-brown (7.5YR 4/2, moist) loam textured till. Depth variable, but generally between three and six feet.

Land Use

Spa soils are unsuitable for agriculture, due to steep slopes and coarse textures. However, they support a coniferous forest that has value as a source of timber.

ONYX SERIES

These soils are derived from morainal gravel deposits on the north side of Shuswap Lake. Onyx Creek flows through the main acreage. There are small areas northwest of Celista and near Skmana Lake. The topography varies from gently rolling to moderately and steeply sloping. Elevations range between 1,600 and 2,200 feet. Deeply kettled, strongly rolling to hilly areas occur. The soils were mapped as follows:

	Arable	Nonarable	
Onyx gravelly loamy sand	257	11	acres
Onyx gravelly loamy sand to gravelly sandy loam	19	773	"
Onyx gravelly sandy loam	168	396	"
Onyx gravelly loamy sand to gravelly sandy loam-Hobson stony loam complex	84	-	"
	528	1,180	acres

The parent material consists of coarse textured, poorly sorted morainal gravel deposits derived mainly from schists. Minor gravelly deltaic deposits of similar composition were included. The deposits have a finer textured capping from six to 18 inches thick. Surface textures are chiefly gravelly loamy sand and gravelly coarse sandy loam. Sandy loam and some fine sandy loam, probably derived from loess, occurs on kettle bottoms and sides. Surface stoniness varies from very stony to excessive, with gravel and cobbles predominating. The up-rooting of trees brings the gravelly and cobbly substratum to the surface. There are, in places, kames from two to six feet deep over till, intermixed with the Hobson series. Where such areas could be separated, they are mapped as an Onyx-Hobson complex or vice versa, depending on the predominant acreage.

The Minimal Podzol Onyx soils are rapidly drained. Where not destroyed by fire, the forest consists chiefly of thick cedar and hemlock, with scattered birch. The undergrowth is composed mostly of small cedar and hemlock, false box, queen's cup, thimbleberry, princes' pine, bracken, wild white clover, and scattered patches of moss. A profile was described between two kettles in undisturbed forest as follows:

Horizon	Depth Inches	Description
L-F	$(2\frac{1}{2}$-1)-0	Coniferous forest litter. Scattered moss. Roots abundant. Variable thickness of moss and litter. pH 5.6.
Ae	0 - $\frac{1}{2}$	Light-gray (10YR 7/2, dry) or light brownish gray (10YR 6/2, moist) sandy loam. Single-grained. Loose. Roots abundant. Horizon varies from none at all to one inch in depth depending on the amount of disruption due to tree throws. Abrupt boundary:
Bfh	$\frac{1}{2}$- 7	Yellowish-brown (10YR 5/4, dry) or dark-brown (7.5YR 4/4, moist) gravelly sandy loam. Very weak subangular blocky structure. Very friable when moist. Scattered schistosic gravel. Roots abundant. pH 6.0. Clear boundary:
Bf	7 -11	Light-brown (10YR 6/4, dry) or dark-brown (10YR 4/3, moist) loam. Weak fine to medium subangular blocky structure. Friable when moist. Scattered schistosic gravel and an occasional cobble. Roots abundant. pH 5.7. Gradual boundary:

Horizon	Depth Inches	Description
IIC1	11 -24	Variegated gravelly sand with a high concentration of ferro-magnesium minerals. Structureless. Loose. Numerous angular gravels and cobbles derived from schists. Roots common. pH 5.4. Gradual boundary:
IIC2	24 +	Variegated gravelly sand with a high concentration of ferro-magnesium minerals. Structureless. Loose. Gravels and cobbles derived from schists make up over 50% of horizon. Occasional roots. pH 5.3.

Land Use

A few acres of the Onyx soils were cleared and producing forage for hay at the time of the survey (1964). The remainder of the acreage was in native forest recently logged.

The soils are submarginal for dry farming due to their shallow solum, coarse textures and stoniness. With irrigation, the soils are rated as doubtful for agriculture. Their best use is a limited source of timber and forested range. When cleared and cultivated they are only suitable for forage crops; poor yields can be expected. The soils are rated according to suitability for irrigation in Table 4.

SHUSWAP SERIES

These soils occur southeast of Salmon Arm and near Broadview and Tappen. The topography varies from gently undulating to rolling, and gently to strongly sloping. Elevations lie between 1,600 and 2,000 feet. Erosion is responsible for rough topography where the soils occur on high terraces on the valley sides. The soils, all arable, were mapped as follows:

Shuswap loamy sand	339 acres
Shuswap sandy loam to loamy sand	188 "
Shuswap-Metcalfe sandy loam to fine sandy loam complex	225 "
Shuswap-Larch Hill loamy sand to gravelly sandy loam complex	8 "
	760 acres

The parent material consists of coarse textured sandy glacial outwash, capped by finer sands usually less than 18 inches thick. Where the overlay is deeper and the finer textured sands occur, Bt horizons develop and the soils were mapped as Metcalfe and Canoe series. Surface textures are loamy sand and sandy loam, generally free of gravel and stones. Scattered gravel and cobbles occur near boundaries of the Larch Hill and Sauff soils or those derived from glacial till.

The Minimal Podzol Shuswap soils are rapidly drained. An Ae horizon up to an inch thick is generally present, though it may be incipient or missing in places, due to up-rooting of trees or logging. The soils developed under a heavy forest of Douglas fir, hemlock, lodgepole pine, birch, and yew. The scanty undergrowth is composed mostly of false box, princes' pine, and patches of moss. A representative profile near the southeast corner of Salmon Arm Municipality was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Coniferous forest litter and moss. Mycelium and fine roots present in the F and H layers. pH 5.6.
Aej	0 - $\frac{3}{4}$	Gray (10YR 5.5/1, dry) or dark gray (10YR 4/1, moist) sandy loam to loamy sand. Weak very fine granular structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.2. Abrupt boundary:
Bf1	$\frac{3}{4}$- $3\frac{1}{2}$	Pale-brown (10YR 6/3, dry) or brown to dark-brown (10YR 4/3, moist) loamy sand. Very weak fine granular structure. Soft when dry. Very friable when moist. Abundant roots. pH 6.6. Abrupt boundary:
Bf2	$3\frac{1}{2}$-12	Light yellowish brown (10YR 6/4, dry) or dark yellowish brown (10YR 4/4, moist) loamy sand. Very weak fine to medium subangular blocky breaking easily to very weak fine granular structure. Soft when dry. Very friable when moist. Common roots. pH 6.8. Clear boundary:
BC	12 -27	Light olive brown (2.5Y 5/4, dry) or olive-brown (2.5Y 4/4, moist) medium sand containing two very thin (1/16 inch) sinuous bands of clay and/or iron. Weak fine to medium subangular blocky breaking to single-grained structure. Slightly hard when dry. Friable when moist. Occasional roots. pH 6.5. Gradual boundary:
C	27 +	Brown (10YR 5/3, dry) or dark-brown (10YR 3/3, moist) coarse sand. Single-grained. Loose. pH 6.8.

Land Use

The Shuswap soils support a heavy forest valuable for timber, but there is little forest range for livestock. A few small areas were cleared, with hay and strawberries the main crops at the time of the survey (1964). The soils have low moisture-holding capacity and are marginal for dry farming. They are not recommended for agriculture unless irrigated. Fair yields are obtainable with irrigation and fertilization. The soils are rated according to suitability for irrigation in Table 4.

HUPEL SERIES

The Hupel series occupy scattered areas in the Salmon River valley, near Notch Hill and on the highland north of Celista. The topography is from gently to steeply sloping. The elevations range from 1,200 to 2,100 feet. The soils were mapped as follows:

	Arable	Nonarable	
Hupel stony gravelly loamy sand	-	102	acres
Hupel gravelly loamy sand	111	21	"
Hupel gravelly sandy loam	148	114	"
Hupel sandy loam	249	26	"
Hupel loam	118	-	"
Hupel-Moutell gravelly loam complex	434	-	"
	1,060	263	acres

The parent material consists of poorly sorted, coarse to medium textured fan deposits derived from the erosion of glacial till. The fans occur where tributary creeks enter the main valleys. Surface textures range from gravelly loamy sand to gravelly loam. Subsoils are similar, but they include sand and gravelly sand. Excessive stoniness and coarse textures are found on the upper parts of the fans. From there the finer textures are progressively free of stones and gravel down-slope. The profile horizons vary as to texture and content of gravel and stones. In places the fans overlie river alluvium, and glacio-lacustrine and other deposits. A complex with the Moutell series was mapped on compound fans.

The Minimal Podzol Hupel soils are rapidly drained. The forest consists of a medium growth of Douglas fir, spruce, cedar, lodgepole pine, and scattered willow, maple and birch. The undergrowth is composed mostly of kinnikinnick, false box, spirea, twinflower, and scattered patches of pinegrass. A profile on a fan west of Mount Ida Community Hall was described as follows:

Horizon	Depth Inches	Description
L-H	1 - 0	Coniferous forest litter composed of needles and twigs.
Aej	0 - 1	Light brownish gray (10YR 6/2, dry) or grayish-brown (10YR 5/2, moist) sandy loam. Weak fine granular structure. Very friable when moist. Abundant roots. pH 6.5. Abrupt boundary:
Bf	1 -10	Yellowish-brown (10YR 5/6, dry) or dark yellowish brown (10YR 4/4, moist) loamy sand. Very weak subangular blocky structure. Very friable when moist. Common roots. pH 6.5. Gradual boundary:
BfC	10 -15	Brown (10YR 5/3, dry) or yellowish-brown (10YR 5/4, moist) gravelly loamy sand. Single-grained. Loose. Occasional roots. pH 6.4. Gradual boundary:
C	15 +	Grayish-brown (10YR 5/2, dry) or dark grayish brown (10YR 4/2, moist) cobbly and gravelly sand. Single-grained. Loose. Occasional roots. pH 6.2.

Land Use

The Hupel soils were pratically all under native forest at the time of the survey (1964). The forest has limited use for grazing and is logged periodically.

The soils are submarginal for agriculture when dry farmed. Most of the acreage is poor to doubtful for agriculture, due to coarse textures, stoniness and steeply sloping topography. Areas requiring heavy clearing of stones are best left in native forest. Where the expense of clearing warrants their development, the soils would produce forage crops with irrigation and additions of fertilizer. They are rated according to suitability for irrigation in Table 4.

SOLODIZED SOLONETZ SOILS

These are well to imperfectly drained soils that developed under forest. There is an L-H horizon at the surface, underlain by a well developed, light colored Ae horizon. The Bnt horizon beneath has a strongly expressed columnar structure. The columns are hard to very hard, and have a light colored capping. The parent material is calcareous, of alkaline reaction and frequently saline (Cca, Ck, Cks).

Transitional AB and BC horizons occur. In the surveyed area these soils are represented by the Gray Wooded Solodized Solonetz subgroup.

Gray Wooded Solodized Solonetz Soils

An L-H horizon of forest litter is at the surface. This is underlain by a light colored Ae horizon that has platy structure. The Bnt horizon or horizons beneath is very hard, has coarse to very coarse columnar structure, and makes an abrupt textural break from the friable Ae horizon. Generally, the Bnt horizon has a light colored capping. It has lighter colored coatings on the sides of the peds, and contains more than 50 percent of exchangeable sodium plus magnesium. Thin AB and thick BC horizons occur. The underlying parent material is calcareous, and moderately alkaline but not saline. These soils are represented in the mapped area by the Broadview series.

BROADVIEW SERIES

The Broadview soils occur in Salmon Arm District Municipality, in the Tappen-Sorrento-White Lake area, near Eagle Bay and north of Celista. The topography is very gently to gently sloping and gently undulating to undulating. In places there is moderately sloping to gently rolling topography, probably due to erosion. The range of elevation is from 1,200 to 1,450 feet. The soils were mapped as follows:

	Arable	Nonarable	
Broadview clay	2,049	-	acres
Broadview-Tappen silty clay loam to clay complex	2,919	-	"
Broadview-Tappen-Carlin complex	436	67	"
	5,404	67	acres

These soils also occur as the secondary member of a complex with the Tappen series.

The parent material consists of glacio-lacustrine heavy clay, which is stratified, varved and calcareous. This clay is underlain by the parent material from which the Carlin and Enderby series are derived.

Where erosion occurred, the clay stratum has been partly or completely removed. The resulting soils were mapped as complexes. The soil profile derived from the Broadview parent material has a thin, friable Ae horizon underlain by heavy textured, thick Bnt horizons that have columnar and prismatic structure. The Bnt horizons are dense, firm and hard and restrict downward movement of water.

The Gray Wooded Solodized Solonetz Broadview soils are moderately well-drained under dry farming conditions. The forest is composed of Douglas fir, cedar, lodgepole pine, scattered white pine, birch, and maple. The undergrowth is light to moderate. It includes false box, Oregon grape, spirea, thimbleberry, twisted stock, solomon's seal, twinflower, and scattered patches of moss and pinegrass. A profile on a north, gentle slope near Canoe was described as follows:

Horizon	Depth Inches	Description
L-F	2 - 1	Composed mainly of moss and coniferous forest litter. Abundant roots. pH 5.9.
H	1 - 0	Well decomposed and finely divided organic remains containing abundant roots. pH 6.0.
Ae	0 - 2½	Light-gray (10YR 7/1, dry) or dark grayish brown (2.5Y 4/2, moist) silt loam. Weak fine platy breaking to fine granular structure. Soft when dry. Very friable when moist. Abundant roots. pH 5.5. Abrupt boundary:
AB	2½- 3½	Light-gray (10YR 7/1, dry) or light brownish gray to grayish-brown (2.5Y 5.5/2, moist) silty clay loam. Moderate coarse blocky structure which occurs in curved aggregates capping the underlying columns. Slightly hard when dry. Friable to firm when moist. Small remnants of Bt material within the peds. Abundant roots. pH 6.0. Abrupt boundary:
Bnt1	3½- 8	Gray (10YR 6/1, dry) or grayish-brown to dark grayish brown (2.5Y 4.5/2, moist) heavy clay. Strong coarse columnar breaking to coarse blocky structure. Very hard when dry. Very firm when moist. Columns have a thin lighter colored coating on the sides, and a thicker coating on the tops. Roots common in the vertical cleavages and occasional to none elsewhere. pH 5.5. Clear boundary:
Bnt2	8 -17	Light brownish gray to grayish-brown (2.5Y 5.5/2, dry) or dark grayish brown to very dark grayish brown (2.5Y 3.5/2, moist) heavy clay. Strong coarse to very coarse prismatic breaking with difficulty to coarse and very coarse blocky structure. Very hard when dry. Very firm when moist. Prisms have clay coatings. An occasional oblique slickenside occurs in the lower part. Roots com-

Horizon	Depth Inches	Description
		mon to occasional in the vertical cracks. 8-12" - pH 5.8; 12-17" - pH 6.6. Gradual boundary:
Bnt3	17 -27	Grayish-brown (2.5Y 5/2, dry) or very dark grayish brown (2.5Y 3/2, moist) heavy clay. Strong medium to coarse prismatic breaking to coarse blocky structure. Most of the horizontal cleavages forming the blocky structure is caused by continuous oblique slickensided faces occurring at intervals of 1 to 3" throughout the horizon. Prisms have clay coatings, Very firm when moist. Roots common to occasional in the vertical cracks. pH 7.2. Gradual boundary:
BC1	27 -36	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown to very dark grayish brown (2.5Y 3.5/2, moist) clay. Strong medium to coarse blocky structure. Firm when moist. An occasional oblique slickenside. Roots common to occasional. pH 7.7. Gradual boundary:
BC2	36 -43	Light brownish gray (2.5Y 6/2, dry) or dark grayish brown (2.5Y 4/2, moist) heavy clay. Moderate medium to coarse blocky structure. Firm when moist. Interior of peds retain evidence of original stratifications. Occasional roots. pH 8.1. Clear boundary:
Ck1	43 -60	Light brownish gray (2.5Y 6/2, dry) or grayish-brown (2.5Y 5/2, moist) stratified heavy clay to clay. Friable when moist. Free carbonates occur along the strata, in pockets and in concretionary forms. Occasional roots. pH 8.3. Diffuse boundary:
Ck2	60 +	Light-gray to light brownish gray (2.5Y 6.5/2, dry) or grayish-brown (2.5Y 5/2, moist) stratified clay. Firm when moist. Occasional small pockets of carbonates. pH 8.4.

Land Use

This is one of the better soils in the surveyed area. A large acreage of the Broadview soils is under cultivation, with the remainder in native vegetation.

The Broadview soils are suitable for dry farming. They are productive and well suited to the production of cereals and forage crops, especially alfalfa. Practically all of the acreage can be cultivated.

Fertilizers are being used and are required for all agricultural crops. Organic matter incorporation in effective crop rotations is required to improve the physical structure of the soils, especailly in the plow layer.

The soils are difficult to clear as the Bnt horizons are brought to the surface with the removal of stumps. Additional land levelling and filling in of stump-holes is required after clearing. Plowing when the soils are dry and hard makes subsequent seed bed preparation difficult. Baking and crusting of the surface after seeding often causes poor germination.

The soils have a high moisture holding capacity, but would benefit from irrigation in dry summers. When irrigated, water should be applied slowly for penetration in order to prevent puddling. At the time of the survey (1964), only a small acreage could be irrigated from creeks. The soils are classified according to suitability for irrigation in Table 4.

ORGANIC SOILS

These soils occur in very poorly drained areas, where a high water table favors accumulation of organic matter. They contain more than 30 percent organic matter, and must be more than 12 inches thick. They are derived from the litter of coniferous and deciduous trees, and of hydrophytic plants such as hardhack, tules, rushes, horsetail, sedges, and mosses. The damp environment delays decomposition of organic matter; the rate of accumulation is greater than that of decay. The state of decomposition varies from well decomposed muck, in which plant remains cannot be identified, to raw, fibrous peat, in which they are identifiable.

Muck Soils

The Muck soils are composed of organic matter that is well decomposed, or with slightly less decomposition in the lower part than at the surface. The deposits are underlain by strongly to very strongly gleyed mineral soil material. They are mapped according to the thickness of the organic layer. Deposits from 12 to 24 inches thick over mineral subsoils were classed as Shallow Muck. Those deeper than 24 inches were differentiated as Deep Muck. Loftus Muck represents the shallow and Okanagan Muck the deep phase in the surveyed area.

Muck Soils (Calcareous Phase)

These are similar in composition to the Muck Soils above, but with an underlay of marl between the organic deposit and the mineral subsoil. This is generally caused by input of calcareous seepage water, and may affect the reaction of the muck to the surface. Shallow Muck (Calcareous Phase) is represented by Rabie Muck, and Deep Muck (Calcareous Phase) by Santabin Muck.

Peat Soils

The Peat is composed of raw, fibrous organic matter throughout. The deposits have an acid reaction, and are underlain by strongly to very strongly gleyed mineral soil at depths below 24 inches. In the surveyed area the representative is Waby Peat.

Shallow Muck Soils

LOFTUS MUCK

Loftus Muck occurs in the White, Chum and Skimikin creek valleys. There is an additional acreage on the north side of Shuswap Lake, near Onyx and Hlina creeks. The topography varies from level to very gently sloping and very gently to gently undulating. The elevations lie between 1,150 and 1,950 feet. The soils, all arable, were mapped as follows:

Loftus Muck	164 acres
Loftus-Gardom Muck	142 "
	308 acres

In addition the Loftus Muck is a secondary member of complexes with Gardom and Okanagan Muck.

The parent material consists of organic matter from 12 to 24 inches thick. The organic layer overlies strongly to very strongly gleyed mineral soils derived from an assortment of parent materials. The muck is composed of sedge, tule, rush, moss, and wood remains and is well decomposed. Thin mineral soil strata, brought in by erosion, may or may not occur. In places a thin layer of volcanic ash occurs in the profile.

The Loftus Muck is very poorly drained. It occurs in depressions and at the base of seepage slopes, and generally there is a high water table. The vegetation varies in different bogs. Some are sedge meadows, others produce moss, tules, hardhack, willows, alder, and small cottonwood. Some bogs have a light forest cover consisting chiefly of cedar and cottonwood. A cultivated profile was given the following description:

Horizon	Depth Inches	Description
Hp	22 -15	Very dark brown to black (10YR 2/1.5, moist) muck. Well decomposed. Friable when moist. Abundant roots. pH 6.0. Clear boundary:
H1	15 - 9	Very dark grayish brown to dark-brown (10YR 3/2.5, moist) muck. Well decomposed and slightly compact. Friable when moist. Abundant roots. pH 5.5. Abrupt boundary:
	9 - 7	Light-gray (10YR 7/1, dry) or gray (10YR 5/1, moist) volcanic ash. Occasional roots. pH 6.0. Abrupt boundary:
H2	7 - 3	Very dark brown (10YR 2/2, moist) peaty muck. Partially decomposed. Friable when moist. Occasional roots. pH 6.0. Abrupt boundary:
H3	3 - 0	Very dark brown to black (10YR 2/1.5, moist) muck. Well decomposed. Friable when moist. An occasional root. pH 6.2. Abrupt boundary:
Cg1	0 - 9	Gray to dark-gray (10YR 4.5/1, moist) silt loam. Massive. Strongly gleyed. pH 6.6.
Cg2	9 +	Dark-gray (5Y 4/1, moist) fine sandy loam. Massive. Strongly to very strongly gleyed. pH 6.2.

Land Use

At the time of the survey (1964) a few small areas of Loftus Muck were reclaimed and producing crops that tolerate high water tables, such as reed canary and other grasses used for hay and pasture. The remainder of the acreage was in native growth.

Systematic drainage with a controlled water table is required for agricultural use. Seepage from higher ground can often be picked up by cutoff drainage bottomed on the underlying mineral soil. The height at which the water table is maintained governs crop growth and also the rate at which the organic matter decays.

For forage crops and others, the soil requires fertilization. With adequate drainage these soils may also require irrigation. Their suitability for irrigation is given in Table 4.

Deep Muck Soils

OKANAGAN MUCK

This soil type occurs in the Chum and Skimikin creek valleys, and on the north side of Shuswap Lake in the Hiuihill and Hlina creek valleys and near Onyx Creek. The topography varies from level to gently sloping and very gently to gently undulating. Elevations vary from 1,700 to 2,450 feet. The Okanagan Muck occupies 749 acres, of which 49 are nonarable. It was also mapped as a minor member of complexes with the Gardom and Loftus Muck.

The parent material consists of an organic layer more than 24 inches thick that overlies strongly to very strongly gleyed mineral subsoils at depths. The organic matter is composed chiefly of sedge, tule, rush, moss, and wood remains of coniferous and deciduous trees. The surface material is well decomposed. This grades at depths to partly decomposed and raw organic matter in the form of mucky peat, peaty muck and raw peat.

The Okanagan Muck developed under very poor drainage in depressions, at the base of slopes and fans where seepage occurs. The native vegetation is variable. On some areas there is willow, alder, cottonwood, and scattered cedar. Sedge, rush, horsetail, moss, and other hydrophtic plants occur. A profile in the Hlina Creek valley was described as follows:

Horizon	Depth Inches	Description
Hp	36 -30	Black (10YR 2/1, moist) muck. Well decomposed. Friable when moist. Roots abundant. pH 5.9. Clear boundary:
H	30 -24	Very dark brown to black (10YR 2/1.5, moist) muck. Well decomposed. Friable when moist. Roots abundant. pH 6.1. Clear boundary:
H-F	24 -12	Very dark brown (10YR 2/2, moist) muck. Plant remains visible in some layers with others well decomposed. Occasional roots. pH 6.1.
F	12 - 0	Very dark brown (10YR 2/2, moist) peat. Plant remains recognizable and layered. pH 5.1.

Water table 18 inches from the surface in late August, 1964.

Land Use

A small acreage is cultivated for hay and pasture. A few reclaimed and abandoned areas are reverting. The balance is in native vegetation, which has poor grazing value.

At the time of the survey (1964), drainage was chiefly by open ditches. With systematic drainage, the soils are suitable for forage crops tolerant of a high water table, and also for vegetables. Fertilizers are required for all crops. With adequate drainage, irrigation may be necessary. The rating of the Okanagan Muck according to suitability for irrigation is given in Table 4.

Shallow Muck Soils (Calcareous Phase)

RABIE MUCK

This type of muck occurs in the White Creek valley and in depressions near Notch Hill. There are minor areas that were mapped as complexes with the Santabin series in the Canoe Creek valley, near Gleneden and west of Chum Lake. The topography is mainly level to very gently undulating, with inclusions very gently sloping and gently undulating. The range of elevation is from 1,300 to 1,850 feet. The soil areas, all arable, were mapped as follows:

Rabie Muck	88 acres
Rabie Muck-Nisconlith silt loam (Calcareous Phase) complex	46 "
	134 acres

The parent material, vegetation and drainage of the Rabie Muck is similar to that of the Loftus Muck, except that the Rabie Muck is subject to calcareous seepage water and is underlain by marl. The calcareous seepage saturates the muck; the profile is neutral to moderately alkaline. Strongly to very strongly gleyed mineral soil lies at 12 to 24 inches from the surface. A profile was examined in a field of sedges that was at one time cultivated. The description is as follows:

Horizon	Depth Inches	Description
Hp	20 -14	Very dark brown (10YR 2/2, moist) muck. Well decomposed. Friable when moist. Abundant roots. pH 7.8. Abrupt boundary:

Horizon	Depth Inches	Description
H1	14 - 8	Very dark brown (10YR 2/2, moist) muck. Well decomposed. Friable when moist. Some scattered wood remnants. Abundant roots. pH 7.0. Abrupt boundary:
	8 - 7	White (10YR 8/1, dry) or light-gray (10YR 7/1, moist) volcanic ash. Occasional roots. pH 7.7. Abrupt boundary:
H2	7 - 0	Very dark brown to black (10YR 2/1.5, moist) muck. Friable when moist. Occasional roots. pH 7.2. Abrupt boundary:
	0 - 4	Light-gray (10YR 7/2, dry) or pale-brown (10YR 6/3, moist) diatomaceous earth with calcareous shells in the upper inch. Calcareous. pH 8.0. Clear boundary:
Cca	4 -10	Very pale brown (10YR 7/3, dry) or pale-brown (10YR 6/3, moist) marl with numerous calcareous shells. A thin lens of organic matter in the horizon. Strongly calcareous. pH 8.0. Clear boundary:
IICgk-H	10 -14	Lenses of pale-brown (10YR 6/3, moist) dark and very dark gray (2.5Y 3/1, moist) silty clay. Strongly calcareous and very strongly gleyed. pH 7.8. Clear boundary:
IICgk	14 +	Very dark gray (2.5Y 3/1, moist) silty clay. Massive. Very strongly gleyed. Calcareous. pH 7.6.

Water table 15 inches from the surface in late August, 1964.

Land Use

A small acreage is producing forage crops. The balance is in swamp forest or heavy sedge growth. Systematic drainage having provision to keep the water table at a controlled depth is required for these soils. In shallow muck soils, seepage can be removed by open ditches or tile drains bottomed on the underlying mineral soil.

The Rabie Muck is suitable for the production of lime-tolerant hay, pasture or vegetables when drained. Fertilizers are required. With adequate drainage the soil may require irrigation. The suitability rating for irrigation of Rabie Muck is given in Table 4.

Deep Muck Soils (Calcareous Phase)

SANTABIN MUCK

The Santabin Muck occurs near White and Chum lakes, and in depressions near Notch Hill. Minor areas were mapped as a complex with the Rabie Muck in the Canoe Creek valley. The topography is mainly level to very gently undulating, with very gently sloping and gently undulating inclusions. The elevations lie between 1,300 and 1,850 feet. The soils, all arable, were mapped as follows:

Santabin Muck	144 acres
Santabin-Rabie Muck complex	55 "
	199 acres

The parent material, vegetation and drainage are similar to Okanagan Muck. This type is distinguished by being subject to calcareous seepage, and an underlay of marl. The profile is neutral to mildly alkaline. Strongly to very strongly gleyed mineral soil material lies beneath at depths below 24 inches. A profile in a reverted field near Notch Hill, covered by sedge growth, was described as follows:

Horizon	Depth Inches	Description
Hp	40 -33	Very dark brown to black (10YR 2/1.5, moist) muck. Well decomposed. Friable when moist. Roots abundant. pH 7.3.
H1	33 -25	Very dark brown to black (10YR 2/1.5, moist) muck. Well decomposed. Friable when moist. Roots abundant. pH 6.7. Abrupt boundary:
	25 -24	White (10YR 8/1, dry) or light-gray (10YR 7/1, moist) volcanic ash. Very friable when moist. Occasional roots. pH 7.3. Abrupt boundary:
H2	24 -11	Very dark brown (10YR 2/2, moist) muck. Well decomposed. Friable when moist. pH 6.5. Abrupt boundary:
IICca-H	11 - 8	Pale-brown (10YR 6/3, moist) marl with lenses of very dark grayish brown (10YR 3/2, moist) organic matter. Numerous calcareous shells. Calcareous. pH 7.4. Clear boundary:

Horizon	Depth Inches	Description
F	8 - 0	Very dark brown (10YR 2/2, moist) mucky peat. Partially decayed and partially identifiable plant remains in layers. An oscasional calcareous shell in the upper part. pH 6.6.
F-L	0 -	Dark-brown to very dark brown (10YR 2.5/2.5, moist) raw stratified peat. pH 6.4.

Land Use

A small acreage of Santabin Muck was cultivated for hay and pasture at the time of the survey (1964). The rest of the acreage was in native cover that varies from sedges to trees. Drainage of the cultivated land was confined to open ditches. Systematic drainage and a controlled water table are essential for agricultural use. Fertilizers are necessary for crop production. Irrigation may be required after adequate drainage. This soil type is rated according to suitability for irrigation in Table 4.

Peat Soils

WABY PEAT

The Waby Peat occupies small areas on the north side of Shuswap Lake in the Hlina Creek valley and east of Onyx Creek. The topography is very gently to gently sloping, and elevations lie between 1,600 and 1,700 feet. The series, all nonarable, amounts to 106 acres.

The parent material consists of an accumulation of raw organic matter more than 24 inches thick, which overlies very strongly gleyed mineral soil. The peat deposits are composed chiefly of the remains of rushes, sedges, tules, mosses, and tree litter.

The very poorly drained Waby Peat is located in areas of seepage. The living vegetation consists of cedar, willows, alder, birch, cottonwood, hardhack, scattered devil's club, skunk cabbage, and others. A profile in a wet location was described as follows:

Horizon	Depth Inches	Description
H1	42 -30	Dark-brown (10YR 3/3, moist) fibrous peat. Very slightly decomposed. Wet. pH 6.5.

Horizon	Depth Inches	Description
H2	30 - 0-	Dark reddish brown (5YR 3/3, moist) mucky peat. Plant remains recognizable and some layering evident. Some scattered wood remains. Very wet. pH 6.2.

Water table at 12 inches in late August, 1964.

Land Use

The Waby Peat acreage was all under native cover at the time of the survey (1964). Both drainage and clearing of vegetation would be required in preparation for agriculture. Under the natural conditions the Waby Peat has limited use.

MISCELLANEOUS LAND TYPES

Bluffs

Two acres of extremely sloping bluffs in glacio-lacustrine deposits occur east of Tappen and northeast of Pritchard. They occupy 199 acres.

Creeks

The acreage mapped as creeks occupies 843 acres. It includes steep sides and watercourses of Hlina, Onyx, Celistown, Chum, Tappen, and Loakin creeks.

Gravel Pits

Two gravel pits in the vicinity of Sorrento and Magna Bay occupy 17 acres. They are in calcareous, gravelly deltaic deposits near Shuswap Lake.

Lakes

Chum, Phillips, Fleming, Skimikin, Santabin, and Loftus lakes occupy 267 acres.

Marl

Four marl deposits, from seven to 80 acres in size, occupy 128 acres. They occur east of Canoe Creek, south of Salmon Arm, on the north slope of Mount Ida, and near the east end of White Lake. The marl is associated with still active calcareous seepage. The marl accumulations are at various depths, and the areas are generally covered by light deciduous and cedar growth.

Ponds

Nine shallow ponds in the mapped area occupy 64 acres. The ponds vary in size from five to 14 acres.

Resort and Industrial Areas

An area of 23 acres is a sawmill site. There are 29 acres devoted to a resort area. These two areas are on the south shore of Adams Lake.

Rough Mountainous Land

Near Eagle Bay an area of 160 acres of Rough Mountainous Land was mapped. This heavily forested area has very steeply to extremely sloping topography.

Rock Outcrops

These are scattered throughout the surveyed area. There is a small acreage in complexes with soils. The Rock Outcrop and soil associations, all nonarable, were mapped as follows:

Rock outcrop	1,631	acres
Rock outcrop-Shuswap sandy loam complex	22	"
Rock outcrop-Enderby silt loam complex	229	"
Rock outcrop-Carlin gravelly silt loam complex	17	"
Rock outcrop-Hobbs-Reiswig complex	198	"
Rock outcrop-Reiswig-Grindrod complex	75	"
Rock outcrop-Reiswig-Stepney complex	46	"
	2,218	acres

The rock outcrops are either devoid of vegetation or support scanty tree growth. A light ground cover grows from cracks and crevices where colluvium, loess and moss can accumulate. The arable soils that occur in complexes with rock outcroppings are described elsewhere in this report.

Swamps

There are 311 acres of Swamps. These are in the Hiuihill Creek valley, near Skmana, Nisconlith, Chum, and Phillips lakes. The water table is at or near the surface, and the vegetation varies from a thin stand of willows to cedar. Hydrophytic plants also occur.

CLASSIFICATION ACCORDING TO SUITABILITY FOR IRRIGATION

Table 4 lists the soils according to suitability for irrigation. Class I to IV soils are recommended for agriculture. Class V is not recommended. In the Shuswap Lakes map area, Class V is best left in the native state or used for a non-agricultural purpose.

The method of classification according to suitability for irrigation is outlined elsewhere (22). Short definitions of the irrigable land classes are as follows:

CLASS I SOILS

These are the soils most suitable for irrigation. This class includes deep, uniform, well-drained soils of medium to fine texture, such as fine sandy loam, loam, silt loam, and silty clay loam. Class I soils have desirable structure and other profile features, with little or no deduction for alkali, adverse topography or stoniness. Soils of this class are capable of producing most commercial crops that can be grown under prevailing climatic conditions.

CLASS II SOILS

These are good irrigation soils. Class II includes well-drained sandy loam and soils of medium to fine textures with little or no deduction for alkali, but moderate deductions for adverse topography, stoniness, and impeded drainage. Soils of this class are capable of producing most of the commercial crops that can be grown on Class I soils, but are given a lower classification because of less uniformity.

CLASS III SOILS

Class III are fair irrigation soils. It includes soils of similar textures to those of Class I and II. There is little or no deduction for alkali, but moderate to high deductions for adverse topography, stoniness, and impeded drainage, etc. Moderately well-drained heavy clays and comparatively stone-free gravelly river terraces and channel deposits are included. Soils of this class are less suited to irrigation than those of Class II and have a more limited range of crop adaptation.

CLASS IV SOILS

These are poor irrigation soils. This class includes soils of limited use as a result of thin solums, heavy concentrations of gravel and/or stones, adverse topography, alkalinity, poor drainage, etc. They are restricted to fewer crops than Classes I to III, and generally to those which form a more or less permanent cover.

CLASS V SOILS

This class includes soils of doubtful suitability for irrigation. Such soils are characterized by coarse and shallow solums, rough or steep topography, extreme stoniness, etc. They have very limited use. They are restricted to crops that form a more or less permanent cover or native forest.

Table 4: -- Classification of Soils in the Shuswap Lakes Area According to Suitability for Irrigation.

Soils	Irrigable Land Classes in Acres						
	1st	2nd	3rd	4th	5th	Na*	Total
Adams silt loam	-	444	-	-	-	-	444
Apalmer silt loam	-	-	-	-	208	-	208
Armstrong St.S.L.	-	-	-	-	-	380	380
Armstrong sandy loam	-	-	-	-	37	188	225
Armstrong loam	-	-	-	-	-	205	205
Armstrong S.L.-Equesis St.S.L. complex	-	-	-	-	-	201	201
Banshee-O'Keefe L.S.	-	-	-	137	-	-	137
Banshee-O'Keefe L.S. -S.L. complex	-	-	-	302	-	129	431
Banshee-O'Keefe S.L. complex	-	-	-	144	82	-	226
Banshee-O'Keefe-Corning complex	-	-	-	-	82	143	225
Bessette loamy sand	-	-	-	54	-	-	54
Bessette sandy loam	-	-	41	101	-	-	142
Bessette G.S.L.	-	-	-	16	14	-	30
Bessette S.L. (Calcareous Phase)	-	-	17	-	19	-	36
Bessette-Falkland S.L. complex	-	-	-	21	-	-	21
Bessette S.L.-Nisconlith loam complex	-	-	41	-	-	-	41
Bessette S.L.-Gardom muck complex	-	-	-	25	-	-	25
Bluestring-Equesis complex	-	-	-	-	-	302	302

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Bolean loam	-	30	201	-	-	-	231
Bolean silt loam	-	298	39	-	-	-	337
Bolean silty clay loam	-	-	91	-	-	-	91
Bolean silt loam-silty clay loam	-	-	210	-	-	-	210
Bolean-Falkland F.S.L. complex	-	-	80	-	-	-	80
Bolean-Falkland loam-F.S.L. complex	-	-	117	-	-	-	117
Bolean-Nisconlith silt loam complex	-	270	-	-	-	-	270
Bolean-Nisconlith silty clay loam complex	-	173	-	-	-	-	173
Bolean-Nisconlith clay loam complex	-	-	108	-	-	-	108
Bolean-Nisconlith loam (Calcareous Phase) complex	-	18	132	-	-	-	150
Bolean-Nisconlith silt loam (Calcareous Phase) complex	-	39	-	-	-	-	39
Bolean-Nisconlith silty clay loam (Calcareous Phase) complex	-	-	74	-	-	-	74
Broadview clay	-	124	1,681	244	-	-	2,049
Broadview-Tappen silty clay-clay complex	-	393	2,526	-	-	-	2,919
Broadview-Tappen-Carlin complex	-	-	119	-	317	67	503
Broderick gravelly loam	-	-	-	153	-	337	490
Broderick silt loam	-	-	-	-	188	-	188
Broderick-Carlin-Enderby complex	-	-	-	-	60	-	60
Broderick-Tappen-Carlin complex	-	-	127	-	-	-	127

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Canoe sandy loam	-	18	96	89	19	-	222
Canoe G.S.L.	-	-	-	-	29	-	29
Canoe F.S.L.	-	312	174	1,231	-	254	1,971
Canoe-Shuswap L.S.-S.L. complex	-	-	-	-	267	-	267
Canoe-Shuswap S.L. complex	-	-	-	73	-	-	73
Canoe-Shuswap F.S.L.-L.S. complex	-	-	-	-	82	-	82
Canoe-Shuswap F.S.L.-S.L. complex	-	-	19	49	134	-	202
Canoe-Enderby F.S.L.-silt loam complex	-	-	15	-	26	-	41
Canoe-Enderby-Carlin complex	-	-	-	-	-	137	137
Canoe-Sauff-Shuswap complex	-	-	-	-	143	-	143
Canoe-Larch Hill S.L.-G.S.L. complex	-	-	-	43	-	-	43
Carlin loam	-	-	27	-	-	-	27
Carlin Grav. silt loam	-	98	350	362	-	-	810
Carlin silt loam	185	305	368	495	147	177	1,677
Carlin silty clay loam	-	-	-	-	-	247	247
Carlin-Enderby loam-silt loam complex	-	-	-	1,125	-	-	1,125
Carlin-Enderby gravelly silt loam-silt loam complex	-	-	-	456	114	-	570
Carlin-Enderby silt loam complex	-	-	605	480	440	937	2,462
Carlin-Tappen silt loam complex	-	-	34	101	-	-	135
Carlin gravelly silt loam-Rock Outcrop complex	-	-	-	36	-	-	36
Carlin silt loam-Canoe S.L. complex	-	-	37	-	-	-	37
Carlin silt loam-Stepney S.L. complex	-	-	-	19	-	-	19
Carlin silt loam-Reiswig S.L. complex	-	-	-	-	-	194	194
Carlin gravelly silt loam-Reiswig gravelly loam complex	-	-	-	36	-	-	36

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Carlin silty clay loam-Reiswig clay loam complex	-	-	-	-	117	-	117
Carlin silt loam-Syphon S.L. complex	-	-	-	-	141	-	141
Carlin-Enderby-Stepney complex	-	-	-	-	498	-	498
Carlin-Enderby-Tappen complex	-	-	-	-	-	226	226
Celista gravel	-	-	-	-	-	49	49
Celista gravel-sand	-	-	-	-	-	152	152
Celista sand	-	-	-	-	-	236	236
Celista loamy sand	-	-	-	-	39	-	39
Celista sand-S.L.	-	-	-	-	231	-	231
Celista S.L.-L.S.	-	-	-	-	175	-	175
Cherryville G.L.S.	-	-	-	-	-	19	19
Cherryville stony gravelly sandy loam	-	-	-	-	237	46	283
Cherryville G.S.L.	-	-	9	150	424	3,554	4,137
Cherryville G.S.L.-gravelly loam	-	-	-	-	-	38	38
Cherryville S.L.	-	-	-	215	102	203	520
Cherryville gravelly loam	-	-	-	-	-	80	80
Cherryville loam	-	-	-	46	-	-	46
Cherryville G.S.L.-Carlin gravelly silt loam complex	-	-	50	-	-	-	50
Cherryville-Hobbs complex	-	-	-	-	-	1,248	1,248
Cherryville-Reiswig complex	-	-	-	-	47	92	139
Cherryville-Carlin-Stepney complex	-	-	269	115	-	-	384
Cherryville-Stepney-Carlin complex	-	-	-	-	116	-	116
Cherryville-Hobbs-Rock Outcrop complex	-	-	-	-	-	750	750

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres						
	1st	2nd	3rd	4th	5th	Na*	Total
Chum G.S.L.	-	-	38	200	610	714	1,562
Chum sandy loam	-	-	59	90	95	-	244
Chum S.L-G.S.L.	-	-	-	-	87	-	87
Chum S.L.-loam	-	-	99	-	-	-	99
Chum loam	-	-	51	-	-	-	51
Chum loam-clay loam	-	53	-	-	-	-	53
Chum-Adams F.S.L.-loam complex	-	-	529	-	-	-	529
Chum-Adams F.S.L.-silt loam complex	-	-	402	-	-	-	402
Chum-Stepney sandy loam complex	-	-	-	24	-	-	24
Corning sandy loam	-	-	-	81	-	-	81
Corning loam	-	-	-	112	-	-	112
Enderby silt loam	-	-	332	567	144	1,108	2,151
Enderby-Carlin silt loam complex	-	-	-	-	-	165	165
Enderby-Tappen silt loam complex	-	-	-	-	175	336	511
Enderby-Grier silt loam complex	-	-	-	21	63	-	84
Enderby-Stepney silt loam-S.L. complex	-	-	-	84	498	509	1,091
Enderby-Syphon loam-silt loam complex	-	-	-	71	-	-	71
Enderby silt loam-Reiswig gravelly loam complex	-	-	-	-	-	97	97
Enderby-Stepney-Reiswig complex	-	-	-	-	-	95	95
Equesis St.S.L.	-	-	-	-	-	177	177
Equesis St.S.L.-Rock Outcrop complex	-	-	-	-	-	102	102
Falkland sand	-	-	-	-	14	-	14
Falkland loamy sand	-	-	-	115	-	-	115
Falkland L.S.-S.L.	-	-	-	90	-	-	90
Falkland sandy loam	-	-	242	250	-	-	492
Falkland G.S.L.	-	-	-	8	10	-	18
Falkland F.S.L.	-	-	138	-	-	-	138
Falkland-Nisconlith S.L.-loam complex	-	-	75	45	40	-	160
Falkland-Nisconlith S.L.-silt loam complex	-	-	-	235	-	-	235
Falkland L.S.-S.L.-Gardom complex	-	-	-	113	-	-	113

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Fowler-Reiswig complex	-	-	-	-	-	26	26
Gardom Muck	-	-	-	235	56	-	291
Gardom complex	-	-	-	103	-	29	132
Gardom-Loftus complex	-	-	-	-	-	103	103
Gardom-Okanagan complex	-	-	-	59	-	-	59
Gardom-Falkland sandy loam complex	-	-	-	-	42	-	42
Gardom-Mabel complex	-	-	-	-	-	108	108
Gardom-Nisconlith loam complex	-	-	-	-	97	-	97
Gardom-Nisconlith silt loam complex	-	-	63	46	21	-	130
Gardom-Nisconlith silt loam (Calcareous Phase) complex	-	-	-	-	75	-	75
Glenemma G.L.S.	-	-	-	-	31	-	31
Glenemma G.S.L.	-	-	-	49	932	-	981
Glenemma St.G.S.L.	-	-	-	-	476	-	476
Glenemma-Pillar G.S.L.-L.S. complex	-	-	-	-	675	-	675
Glenemma-Stepney G.S.L.-L.S. complex	-	-	-	-	-	212	212
Grandview sandy loam	-	-	71	263	45	-	379
Grandview S.L.-Neskain silt loam complex	-	-	99	88	-	-	187
Grier silt loam	-	-	13	112	67	18	210
Grier series	-	-	86	22	-	-	108
Grier-Carlin silt loam complex	-	-	-	38	-	-	38
Grindrod gravelly sand	-	-	-	-	16	-	16
Grindrod gravelly sand-G.L.S.	-	-	-	-	114	-	114
Grindrod loamy sand	-	-	-	-	40	-	40
Grindrod G.L.S.	-	-	-	40	560	132	732
Grindrod St.G.L.S.	-	-	-	-	-	95	95
Grindrod sandy loam	-	-	-	10	59	62	131
Grindrod G.S.L.	-	-	-	-	510	16	526
Grindrod St.G.S.L.	-	-	-	-	66	121	187
Grindrod G.S.L.-loam	-	-	-	-	29	-	29

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres						
	1st	2nd	3rd	4th	5th	Na*	Total
Grindrod S.L.-F.S.L.	-	-	217	-	-	-	217
Grindrod loam	-	-	-	20	-	-	20
Grindrod loam-gravelly loam	-	-	-	-	53	-	53
Grindrod-Lumby G.S.L.-G.L.S. complex	-	-	-	-	-	655	655
Grizzly Hill S.L.	-	-	-	38	15	-	53
Grizzly Hill G.S.L.	-	-	-	-	40	49	89
Grizzly Hill G.S.L.-gravelly loam	-	-	-	-	229	-	229
Grizzly Hill gravelly loam	-	-	-	-	278	320	598
Grizzly Hill stony loam-S.L.	-	-	-	-	-	66	66
Grizzly Hill gravelly loam-Pari G.S.L. complex	-	-	-	-	227	-	227
Grizzly Hill gravelly loam-Carlin silt loam complex	-	-	-	-	-	50	50
Grizzly Hill-Cherryville G.S.L.-gravelly loam-Rock Outcrop complex	-	-	-	-	-	744	744
Grizzly Hill-Cherryville-Carlin complex	-	-	-	-	-	109	109
Gulch S.L.-loam	-	-	-	-	-	38	38
Gulch G.S.L.	-	-	-	-	32	-	32
Gulch gravelly loam	-	-	-	-	80	-	80
Gulch loam-F.S.L.	-	189	-	-	-	-	189
Gulch loam-G.S.L.	-	-	157	-	-	-	157
Gulch loam-gravelly loam	-	-	-	145	-	-	145
Gulch loam	-	-	-	17	-	-	17
Harper G.S.L.	-	-	-	-	-	25	25
Harper sandy loam	-	-	-	-	417	-	417
Harper S.L.-loam	-	-	-	-	-	211	211
Harper loam	-	-	-	83	-	-	83

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Heubner Muck	-	-	32	47	127	-	206
Heubner-Rabie complex	-	-	-	-	8	20	28
Heubner-Rabie-Santabin complex	-	-	-	18	131	-	149
Heubner-Nisconlith silty clay loam (Calcareous Phase)-Rabie-Santabin complex	-	-	-	-	83	-	83
Heubner-Bessette S.L. -Rabie complex	-	-	-	-	19	-	19
Hillcrest G.S.L.	-	-	-	-	32	-	32
Hillcrest-Cherryville complex	-	-	-	-	-	212	212
Hillcrest-Moutell complex	-	-	-	-	-	55	55
Hobbs-Cherryville complex	-	-	-	-	-	758	758
Hobbs-Reiswig complex	-	-	-	-	-	64	64
Hobbs-Rock Outcrop complex	-	-	-	-	-	56	56
Hobson G.S.L.	-	-	-	-	532	-	532
Hobson sandy loam	-	-	-	190	-	-	190
Hobson gravelly loam	-	-	-	-	64	-	64
Hobson stony loam	-	-	-	35	1,074	924	2,033
Hobson loam	-	-	87	-	148	-	235
Hobson stony loam-Sauff G.S.L. complex	-	-	-	-	-	40	40
Hobson loam-Onyx G.S.L. complex	-	-	-	-	-	106	106
Hupel St.G.L.S.	-	-	-	-	-	102	102
Hupel G.L.S.	-	-	-	-	111	21	132
Hupel G.S.L.	-	-	-	-	148	114	262
Hupel sandy loam	-	-	-	208	41	26	275
Hupel loam	-	-	-	84	34	-	118
Hupel-Moutell gravelly loam complex	-	-	-	434	-	-	434
Ida F.S.L.	-	-	-	5	-	-	5
Ida loam	-	-	51	-	-	-	51
Ida silt loam	-	38	30	-	-	-	68
Ida-Rumball silt loam-S.L. complex	-	738	-	-	-	-	738

Table 4 (Continued)

Soils	Irrigable Land Classes in Areas 1st	2nd	3rd	4th	5th	Na*	Total
Kosta sandy loam	-	-	50	29	-	-	79
Kosta S.L.-silt loam	-	-	100	-	-	-	100
Kosta F.S.L.	-	68	22	-	-	-	90
Kosta loam-F.S.L.	-	254	-	-	-	-	254
Kosta silt loam	97	182	132	-	-	-	411
Kosta silty clay loam-silt loam	266	-	-	-	-	-	266
Kosta silty clay loam	-	-	32	-	-	-	32
Larch Hill G.L.S.	-	-	-	-	38	79	117
Larch Hill S.L.	-	-	-	43	153	-	196
Larch Hill G.S.L.	-	-	-	197	339	122	658
Larch Hill G.S.L.-G.L.S. complex	-	-	-	99	-	34	133
Larch Hill stony loam	-	-	-	-	-	33	33
Larch Hill-Sauff G.S.L. complex	-	-	-	53	29	139	221
Larch Hill-Enderby silt loam-Carlin gravelly silt loam complex	-	-	-	-	-	263	263
Larch Hill G.S.L.-Carlin gravelly silt loam complex	-	-	-	-	336	-	336
Leonard G.S.L.	-	-	-	159	170	149	478
Leonard sandy loam	-	-	169	74	-	-	243
Leonard S.L.-loam	-	-	304	-	-	-	304
Leonard loam	-	-	-	-	35	-	35
Leonard loam-clay loam	-	-	24	-	-	-	24
Leonard G.S.L.-Stepney S.L. complex	-	-	-	16	-	-	16
Leonard S.L.-Sauff G.S.L. complex	-	-	-	15	-	-	15
Loftus Muck	-	-	-	33	131	-	164
Loftus-Gardom Muck complex	-	-	-	-	142	-	142

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Lumby loamy sand	-	-	-	-	15	-	15
Lumby L.S.-S.L.	-	-	-	-	95	-	95
Lumby sandy loam	-	-	15	613	-	-	628
Lumby G.S.L.	-	-	-	308	298	76	682
Lumby St.G.S.L.	-	-	-	-	-	66	66
Lumby S.L.-G.S.L.	-	-	-	96	-	-	96
Lumby G.S.L.-S.L.	-	-	-	149	169	-	318
Lumby-Grindrod S.L.-G.S.L. complex	-	-	-	15	-	-	15
Lumby-Grindrod G.S.L.-S.L. complex	-	-	-	-	-	14	14
Lumby G.S.L.-Broderick silt loam complex	-	85	-	-	-	-	85
Mabel complex	-	-	-	-	27	1,344	1,371
Metcalfe S.L.	-	-	-	30	-	-	30
Metcalfe loam	-	42	-	-	-	-	42
Moulton S.L.-G.S.L.	-	-	-	-	-	654	654
Moutell G.S.L.	-	-	-	82	24	471	577
Moutell sandy loam	-	-	-	-	103	-	103
Moutell gravelly loam	-	-	58	100	105	-	263
Moutell loam	-	55	53	-	-	-	108
Moutell silt loam	-	81	-	-	-	-	81
Mowitch silt loam-Schindler loam complex	-	-	-	-	56	-	56
Nahun G.S.L.	-	-	-	-	34	293	327
Nahun G.S.L.-Armstrong loam complex	-	-	-	-	171	-	171
Nahun G.S.L.-Neskain silt loam complex	-	-	-	-	-	87	87
Neskain silt loam	96	-	327	-	165	230	818
Neskain silty clay loam	-	-	-	29	-	-	29
Neskain silt loam-Grandview S.L. complex	-	-	296	-	-	109	405
Neskain silt loam-Nahun G.S.L. complex	-	-	-	-	-	187	187

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres						
	1st	2nd	3rd	4th	5th	Na*	Total
Nisconlith loam	-	78	32	16	19	-	145
Nisconlith loam (Calcareous Phase)	-	-	28	117	5	-	150
Nisconlith loam (Diatomaceous Phase)	-	89	-	-	-	-	89
Nisconlith silt loam	-	69	220	54	39	-	382
Nisconlith silt loam (Calcareous Phase)	-	87	400	14	-	-	501
Nisconlith silt loam-Nisconlith silt loam (Calcareous Phase) complex	-	-	49	-	33	-	82
Nisconlith silt loam (Diatomaceous Phase)	-	50	-	-	-	-	50
Nisconlith silty clay loam (Calcareous Phase)	-	127	-	-	29	-	156
Nisconlith clay loam	-	297	-	-	-	-	297
Nisconlith clay loam (Calcareous Phase)	-	52	-	-	-	-	52
Nisconlith clay	-	19	-	24	18	-	61
Nisconlith clay (Calcareous Phase)	-	-	20	-	-	-	20
Nisconlith clay (Diatomaceous Phase)	-	36	-	-	-	-	36
Nisconlith-Falkland silt loam-F.S.L. complex	-	-	-	44	-	-	44
Nisconlith-Rumball loam-S.L. complex	-	-	-	61	-	-	61
Nisconlith-Bolean silt loam complex	-	-	49	-	-	-	49
Nisconlith-Bessette-Gardom complex	-	-	-	49	-	-	49
Okanagan Muck	-	-	-	-	700	49	749
O'Keefe L.S.-S.L.	-	-	-	-	114	-	114
O'Keefe sandy loam	-	-	-	41	46	-	87
O'Keefe S.L.-Bluespring loam complex	-	-	-	-	113	-	113

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres						
	1st	2nd	3rd	4th	5th	Na*	Total
Onyx G.L.S.	-	-	-	-	257	11	268
Onyx G.L.S.-G.S.L.	-	-	-	-	19	773	792
Onyx G.S.L.	-	-	-	48	120	396	564
Onyx G.L.S.-G.S.L.-Hobson stony loam complex	-	-	-	-	84	-	84
Pari-Rock Outcrop complex	-	-	-	-	-	87	87
Pari-Grizzly Hill-Rock Outcrop complex	-	-	-	-	-	568	568
Pillar loamy sand	-	-	-	-	155	-	155
Pillar sandy loam	-	-	-	223	638	-	861
Pillar-Stepney S.L. complex	-	-	-	163	-	-	163
Pillar-Stepney L.S.-S.L. complex	-	-	-	46	584	-	630
Pillar-Stepney S.L.-L.S. complex	-	-	-	460	335	311	1,106
Pillar S.L.-Enderby silt loam complex	-	-	-	-	119	-	119
Pillar-Stepney-Enderby complex	-	-	-	-	1,204	1,222	2,426
Plaster clay loam	-	-	-	17	-	-	17
Plaster clay loam-clay	-	-	-	67	319	415	801
Plaster silty clay loam-clay	-	-	-	259	-	-	259
Plaster clay	-	-	13	18	-	-	31
Plaster clay loam-clay-Hobson stony loam complex	-	-	-	-	87	-	87
Plaster clay loam-clay-Grier silt loam complex	-	-	-	59	-	-	59
Plaster clay loam-clay-Rock Outcrop complex	-	-	-	-	-	16	16
Plaster-Tappen clay loam-clay complex	-	-	-	-	156	-	156
Plaster-Tappen silty clay loam-clay complex	-	-	-	97	32	-	129
Plaster-Saltwell complex	-	-	-	-	109	295	404

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Rabie Muck	-	-	18	59	11	-	88
Rabie Muck-Nisconlith silt loam complex	-	-	46	-	-	-	46
Reiswig G.S.L.	-	-	19	-	11	473	503
Reiswig St.S.L.	-	-	-	-	226	-	226
Reiswig sandy loam	-	-	-	575	41	205	821
Reiswig S.L.-G.S.L.	-	-	-	1,253	-	-	1,253
Reiswig G.S.L.-gravelly loam	-	-	-	-	-	546	546
Reiswig S.L.-loam	-	-	-	-	-	735	735
Reiswig gravelly loam	-	-	-	149	370	540	1,059
Reiswig loam-gravelly loam	-	-	-	-	46	90	136
Reiswig loam	-	-	-	-	-	54	54
Reiswig S.L.-Carlin silt loam complex	-	-	-	-	-	303	303
Reiswig gravelly loam-Stepney S.L. complex	-	-	-	38	9	-	47
Reiswig loam-Stepney L.S. complex	-	-	-	-	-	103	103
Reiswig-Fowler complex	-	-	-	-	-	419	419
Reiswig-Hobbs-Rock Outcrop complex	-	-	-	-	64	724	788
Rumball sandy loam	-	-	42	13	24	-	79
Rumball loam	-	-	21	8	-	-	29
Rumball silt loam	-	-	246	9	-	-	255
Rumball-Falkland S.L. complex	-	-	-	337	41	-	378
Rumball-Falkland loam-S.L. complex	-	-	55	-	-	-	55
Rumball-Nisconlith loam complex	-	-	55	-	-	-	55
Rumball-Nisconlith S.L.-loam complex	-	-	362	-	-	-	362
Rumball-Nisconlith S.L.-silt loam complex	-	-	-	92	-	-	92
Rumball-Wallenstein silt loam complex	-	-	26	-	-	-	26
Santabin Muck	-	-	-	144	-	-	144
Santabin-Rabie Muck complex	-	-	-	55	-	-	55

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Saltwell-Hobbs complex	-	-	-	-	-	413	413
Sauff G.L.S.	-	-	-	-	148	58	206
Sauff G.S.L.	-	-	32	106	515	130	783
Sauff G.S.L. (Deep Phase)	-	-	-	38	-	-	38
Sauff G.S.L.-G.L.S.	-	-	-	62	38	-	100
Sauff sandy loam	-	-	-	63	89	80	232
Sauff-Shuswap G.L.S. -S.L. complex	-	-	-	-	69	26	95
Sauff-Larch Hill G.S.L.-G.L.S. complex	-	-	-	-	355	626	981
Sauff-Larch Hill G.S.L.-S.L. complex	-	-	-	-	137	-	137
Sauff-Larch Hill G.S.L. complex	-	-	-	555	1,712	442	2,709
Sauff-Larch Hill S.L. complex	-	-	-	617	45	19	681
Sauff-Larch Hill gravelly loam complex	-	-	-	30	-	-	30
Sauff G.S.L.-Stepney S.L. complex	-	-	-	-	-	152	152
Sauff G.S.L.-Shuswap S.L. complex	-	-	-	-	156	89	245
Sauff G.S.L.-Metcalfe loam complex	-	-	203	-	-	-	203
Sauff G.S.L. (Deep Phase)-Shuswap S.L. complex	-	-	-	251	-	-	251
Sauff G.S.L. (Deep Phase)-Skimikin silt loam complex	-	-	239	-	-	-	239
Sauff-Shuswap-Canoe complex	-	-	-	-	-	54	54
Sauff-O'Keefe-Corning complex	-	-	-	-	-	770	770
Sauff-Larch Hill-Corning complex	-	-	-	-	108	-	108
Sauff-Larch Hill-Chum complex	-	-	-	-	364	-	364
Sauff-Larch Hill-Carlin complex	-	-	-	-	-	42	42

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres						
	1st	2nd	3rd	4th	5th	Na*	Total
Schindler sandy loam	-	-	19	25	4	-	48
Schindler G.S.L.	-	-	-	21	101	250	372
Schindler G.S.L.-G.L.S.	-	-	-	-	41	-	41
Schindler loam	-	-	79	127	-	-	206
Shuswap loamy sand	-	-	-	333	6	-	339
Shuswap S.L.-L.S.	-	-	-	188	-	-	188
Shuswap-Metcalfe S.L.-F.S.L. complex	-	-	-	225	-	-	225
Shuswap-Larch Hill L.S.-G.S.L. complex	-	-	-	-	8	-	8
Skimikin silt loam	-	-	43	-	155	-	198
Skimikin silty clay loam	-	35	-	-	-	-	35
Spa-Syphon-Enderby complex	-	-	-	-	-	308	308
Stepney sand	-	-	-	-	30	-	30
Stepney loamy sand	-	-	-	15	33	-	48
Stepney S.L.-L.S.	-	-	-	29	-	-	29
Stepney S.L.-G.S.L.	-	-	-	-	68	-	68
Stepney sandy loam	-	-	309	310	360	67	1,046
Stepney F.S.L.	-	-	-	196	-	-	196
Stepney-Pillar S.L.-L.S. complex	-	-	-	-	-	208	208
Stepney S.L.-Larch Hill G.S.L. complex	-	-	-	-	34	-	34
Stepney S.L.-Enderby silt loam complex	-	-	-	7	-	-	7
Stepney-Canoe-Carlin complex	-	-	-	-	38	-	38
Stepney-Carlin-Tappen complex	-	-	-	-	-	277	277
Stepney-Enderby-Carlin complex	-	-	-	-	-	88	88
Syphon sandy loam	-	-	146	76	46	-	268
Syphon-Sauff loamy sand complex	-	-	-	89	-	-	89
Syphon S.L.-Carlin silt loam complex	-	-	-	53	-	-	53
Syphon-Enderby-Rock Outcrop complex	-	-	-	-	-	230	230

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Tappen loam-silt loam	-	-	68	-	-	-	68
Tappen silty clay loam	-	68	367	52	33	126	646
Tappen-Carlin silt loam complex	-	495	645	200	-	-	1,340
Tappen silty clay loam-Carlin silt loam complex	-	-	461	1,165	-	-	1,626
Tappen-Broadview silty clay loam-silty clay complex	-	-	-	366	-	-	366
Tappen-Plaster silty clay loam-clay complex	-	-	-	162	-	-	162
Tappen-Carlin-Enderby complex	-	-	-	171	-	-	171
Tappen-Pari-Rock Outcrop complex	-	-	-	-	596	-	596
Waby Peat	-	-	-	-	-	106	106
Wallenstein silty clay loam	-	374	-	-	-	-	374
Wallenstein clay loam	-	97	-	-	-	-	97
White G.L.S.	-	-	-	-	-	32	32
White G.L.S.-G.S.L.	-	-	-	-	-	180	180
White G.S.L.	-	-	-	106	11	-	117
White loam	-	-	8	-	-	-	8
Willshore-Equesis complex	-	-	-	-	-	109	109
Yard L.S.-S.L.	-	-	-	49	-	-	49
Yard L.S.-G.L.S.	-	-	-	-	268	23	291
Yard St.L.S.-G.L.S.	-	-	-	-	-	52	52
Yard G.L.S.	-	-	-	-	-	358	358
Yard sandy loam	-	-	-	402	-	-	402
Yard S.L.-loam	-	-	-	263	-	-	263
Yard S.L.-F.S.L.	-	-	-	551	-	-	551
Yard F.S.L.	-	-	-	18	-	-	18
Miscellaneous Areas:-							
Bluffs	-	-	-	-	-	199	199
Creeks	-	-	-	-	-	843	843
Gravel Pits	-	-	-	-	-	17	17
Lakes	-	-	-	-	-	267	267
Marl	-	-	-	-	-	128	128

Table 4 (Continued)

Soils	Irrigable Land Classes in Acres 1st	2nd	3rd	4th	5th	Na*	Total
Ponds	-	-	-	-	-	64	64
Resorts-Industrial areas	-	-	-	-	-	52	52
Rough Mountainous Land	-	-	-	-	-	160	160
Rock Outcrop	-	-	-	-	-	1,631	1,631
Rock Outcrop-Shuswap S.L. complex	-	-	-	-	-	22	22
Rock Outcrop-Carlin G.S.L. complex	-	-	-	-	-	17	17
Rock Outcrop-Enderby silt loam complex	-	-	-	-	-	229	229
Rock Outcrop-Hobbs-Reiswig complex	-	-	-	-	-	198	198
Rock Outcrop-Reiswig-Grindrod complex	-	-	-	-	-	75	75
Rock Outcrop-Reiswig-Stepney complex	-	-	-	-	-	46	46
Swamps	-	-	-	-	-	311	311
Total	644	6,280	16,430	24,483	28,485	41,840	118,162

*Na: Nonarable Land, S.L.: Sandy Loam, G.S.L.: Gravelly Sandy Loam, St.S.L.: Stony Sandy Loam, St.G.S.L.: Stony Gravelly Sand Loam, L.S.: Loamy Sand, G.L.S.: Gravelly Loamy Sand, St.L.S.: Stony Loamy Sand, St.G.L.S.: Stony Gravelly Loamy Sand, F.S.L.: Fine Sandy Loam.

CHEMICAL PROPERTIES OF THE SOILS

Some studies were made as to the chemical properties of the soils, and these are given in Table 5. In this connection, it will be understood that the fertility status of individual farms varies according to past management, and that the number of analyses in Table 5 is too limited to use as a basis for fertilizer recommendations.

When an ideal balance of plant nutrients and organic matter has been achieved in the cultivated layer of well-drained soils, optimum plant growth can be expected if there is adequate moisture. Properties of the soil profile, such as depth, texture, structure, consistency, and reaction, are also important. These largely determine the efficiency of available moisture use, and crop adaptation. The parent material, or C horizon, is in some cases important as a source of plant food (Sulphur is available in the parent material of the Broadview series), and in others it affects soil drainage.

Soil Reaction

The degree of soil reaction is expressed as pH. Plants vary in their ability to flourish at different pH values; pH often influences nutrient availability.

In the surveyed area, soil reactions are related to the common occurrence of lime in the parent materials. To a greater or lesser degree, the lime has been leached downward in the soil profiles, depending on the amount of precipitation in different places. In profiles of forested soils, the lime has moved downward, and there is a mildly acid reaction near the surface. The displaced lime accumulates in the lower horizons, and there is a consequent increase of pH. In areas of low precipitation the soils have a neutral to slightly alkaline reaction in the surface horizons. Soils in seepage areas generally have a higher lime content, introduced by incoming water, and the reaction is mildly alkaline. The significant values of pH are as follows:

	pH
Extremely alkaline	Above 10.0
Strongly alkaline	9.0 - 10.0
Moderately alkaline	8.0 - 9.0
Mildly alkaline	7.3 - 8.0
Neutral	6.5 - 7.3
Slightly acid	6.0 - 6.5
Moderately acid	5.5 - 6.0
Strongly acid	4.5 - 5.5
Extremely acid	Below 4.5

Nitrogen

Large quantities of nitrogen are required by plants, so efficient management includes an adequate nitrogen supply. The ultimate source is the atmosphere, but gaseous nitrogen must be fixed by bacteria before it can be utilized by the higher plants. Efficient use of nitrogen by the farmer involves prevention of soil erosion, application of manures and crop residues, the introduction of nitrogen fixing bacteria by soil inoculation, and the use of nitrogen fertilizers.

Because soil nitrogen is derived from several sources, the estimation of its status by chemical tests is difficult. Response to nitrogen fertilizer depends on previous cultural practice and the weather in any growing season. Analytical values for total nitrogen serve as a guide as to the nitrogen supplying power of a given soil. In this regard the following levels may be used:

Very low	Below 0.10	percent
Low	0.10 - 0.25	"
Medium	0.25 - 0.40	"
High	Over 0.40	"

Nitrogen content is associated with the level of organic matter in the soil. In newly reclaimed soils the accumulated forest litter contributes, but due to the high carbon/nitrogen ratio and the thin layer of litter, this contribution is not very important. Much more nitrogen is required in forest soils when they are cultivated.

Phosphorus

Phosphorus is present in all living tissue. It concentrates chiefly in the younger parts of plants, and in the seed. Growth becomes slow and maturity is delayed in a plant when available soil phosphorus is inadequate. Most of the phosphorus in the soil exists in forms that are fixed and unavailable to the plant.

Available phosphorus is derived from the weathering of soil minerals and decompsotion of organic matter. Micro-organisms convert organic phorphorus to inorganic forms that are available. When phosphorus is applied as fertilizer it does not move from the point of application. Therefore, such fertilizer application should be placed near the roots to ensure that it will supply the growing plant.

The apatite minerals are the sources of most of the soil phosphorus. As weathering proceeds, these forms slowly convert into more stable adsorbed forms of phosphorus. In mature soils of humid climates acid conditions prevail and most of the phosphorus exists as iron and aluminum phosphates. In young soils that have calcareous parent materials and in the calcareous soils of dry climates, calcium phosphate predominates.

Iron and aluminum phosphates are least soluble at pH 4.0. As pH increases solubility is also increased. Calcium phosphates begin to form around pH 6.0. Their solubility decreases as the reaction approaches pH 7.5; the greatest availability is in the range from pH 6.5 to 7.0. As pH increases from pH 7.5 to 8.5, there is a decrease of availability.

When phosphorus is applied as fertilizer, it changes to forms similar to those present in the soil. Iron, aluminum and calcium combine with the water-soluble phosphates of fertilizer and thus convert them to less soluble forms. This effect, called fixation, may reduce the efficiency of added phosphorus to different extents in different soils. Such differences of efficiency result from differences of the pH of the soils.

In Table 5, two different values for phosphorus are given. The P_2 form is an indication of reserve supply. The P_1 form is a measurement of phosphorus available to plants. The following values may be used as a guide to estimate the levels of available phosphorus in soils:

Very low	Less than 5 parts per million
Low	5 - 10 " " "
Medium	10 - 20 " " "
High	Over 30 " " "

The supply of available phosphorus in surface horizons of the Brunisolic and Podzolic soils of the surveyed area is adequate. But many of the Regosols, Gleysols and Chernozemic soils show phosphorus deficiency. This finding is supported by plant analyses and field experiments with alfalfa confirm the need of phosphorus, when the level of available phosphorus is below 25 parts per million by the P_1 method of analysis.

Sulphur

Sulphur is derived by micro-organisms from organic matter and oxidized to sulphates, the form in which it is used by plants. Other sources are soil minerals, sulphur in rain, and as sulphur dioxide in the atmosphere which can be absorbed by plant leaves. In some cases sulphur is supplied by irrigation water to the extent of supplying crops with their total requirements. Certain fertilizers contain sulphur. Where sulphur is deficient in the soil, the application of this element has produced increases of yield at one time attributed to phosphatic fertilizer.

Sulphur deficiency in plants is similar in effect to nitrogen deficiency. The plants are stunted, with leaves pale-green to yellow in color. Sulphur deficiency can show up if nitrogen levels are too high.

In Table 5 data for available sulphur is presented. The results were obtained by extraction with ammonium acetate. Research on soils of the map-area and the Thompson and Okanagan valleys indicate that alfalfa requires soil test values of less than 16 pounds per acre (8 parts per million) by ammonium acetate extraction to show yield increase from sulphur application. 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	4
Low	2 - 6	4 - 12
Moderate	6 - 10	12 - 20
Moderately high	10 - 20	20 - 40
High	20 plus	40 plus

The distribution of sulphur in the soils of the surveyed area is related to soil development, texture and content of organic matter.

Since sulphur is easily leached from the surface horizons of the Brunisolic and Podzolic soils, they are deficient of this element. Sulphur may accumulate in the lower horizons of heavy textured soils. Comparatively high amounts were found in the Gleysolic and Organic soils, and moderate amounts in the Chernozemic soils.

Field experiments on light textured, forested soils of the surveyed area indicate that applications of 30 to 50 pounds of sulphur per acre considerably increases the yields of alfalfa.

Cation Exchange Capacity

The process of interchange between cations in exchangeable form and in solution is known as cation exchange. The cation exchange capacity represents the total number of exchangeable cations. This is expressed as milli-equivalents per 100 grams of oven-dry soil, and can range from almost none to over 100.

The main sources of cation exchange capacities are organic matter and clay minerals. In peat, muck and mineral soils high in organic matter, the high cation exchange capacity is attributable to the organic matter. In soils with low organic matter the exchange capacities are found mainly in the mineral fraction.

The cation exchange capacity of the mineral fraction depends upon the area of surface of the particles and the nature of the surface. The smaller particles have a greater surface area per unit of weight and a larger cation exchange capacity than the larger ones. Because most of the cation exchange capacity in the mineral portion of the soil is in the clay fraction, the clay content is of importance. The clay fractions contain a number of minerals, the conduct of which may differ.

According to Grim (18) the exchange capacity in milli-equivalents per 100 grams of oven-dry clay is three to 15 for kaolinite, 10 to 40 for illite and chlorite, and 80 to 150 for montmorillonite. Thus, identification of the clay minerals permits better understanding of the cation exchange capacity of a soil and its fertility potential.

Since the cation exchange capacity depends on the content of organic matter and clay in a soil, and this varies from horizon to horizon, the exchange capacities of different soil horizons are of interest. It is also possible to study the cation exchange capacities of different soil series, families, subgroups, and groups, and sort out the differences that occur. The data in Table 5 show cation exchange capacities of soils in the surveyed area. The following values may be used as a guide to the relative levels of the cation exchange capacities of soils:

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

Exchangeable Cations

The principal exchangeable cations, or exchangeable bases, are in terms of the relative quantities of calcium, magnesium, potassium, sodium, aluminium, and hydrogen. The amounts vary from soil to soil, depending on inherited characteristics and past management of cultivated soils. In humid regions, where soils are acid, hydrogen and aluminium are the dominant cations. In arid and semi-arid areas the soils are neutral to alkaline, are highly base saturated, and calcium and magnesium are the dominant cations.

Primary minerals and silicate clays are the two main sources of non-exchangeable bases. The rate of their release to exchangeable forms is directly proportional to the intensity of weathering. Soils in regions of maximum weathering lose the supply of non-exchangeable bases faster than those in drier climates. Soil acidity indicates that the non-exchangeable bases are not being released fast enough to keep the exchangeable bases in equilibrium. Thus the percentage base saturation indicates the relationship between loss of exchangeable bases and their replacement from the non-exchangeable storage.

Though the majority of the soils in the surveyed area are well supplied with available potassium, some of the lighter textured ones appear to be potassium deficient. It was found that continuous cropping depletes the potassium supply. The Brunisolic and Podzolic soils are the least base saturated, but most of them are not too low to affect crop production. The following values of available potassium may be used as a guide for forage crops:

	Milli-equivalents per 100 grams	Pounds per acre
Low	Less than 0.1	78
Moderate	0.1 - 0.2	78 - 156
Moderately high	0.2 - 0.3	156 - 235
High	Over 0.3	Over 235

The exchangeable sodium content of the mapped soils is not high enough to cause unfavorable conditions. Exchangeable magnesium varies from 0.13 to 33.88 milli-equivalents per 100 grams of oven-dry soil, the latter being in the B horizon of the Solodized Solonetz Broadview series. As a rule, magnesium should be maintained in the cultivated layer above 0.8 m.e./100 grams of soil for most crops.

All of the mapped soils have an adequate supply of calcium. A few are lime saturated, and were mapped as calcareous phases. As such, they require special management.

Methods of Analyses

The soil reaction was determined by a method described by Peach (21). Soil organic matter was obtained by the wet combustion method also described by Peach (21). Total nitrogen was determined by the method described by Atkinson et al (13), modified by use of selenium as a catalyst as suggested by Bremner (16). Available phosphorus was obtained by the method described by Laverty (19). Sulphur was determined by the method described by Bardley et al (14).

Analysis for exchangeable cations and exchange capacity were undertaken by the method described by Peach (21). Cation exchange capacity was determined on the ammonium acetate extract. Versenate titration was used to determine calcium plus magnesium, using Erichrome Black T as an indicator, and calcium alone using Calcon as the indicator. Analyses for potassium and sodium were obtained by using a Beckman B flame spectrophotometer.

Table 5: -- Chemical Analyses of 61 Soil Profiles in the Shuswap Lakes Area.

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Adams silt loam - Orthic Gray Wooded Soil															
L-H	½- 0	5.4*	82.9	1.49	32.2	-	-	-	-	-	-	-	-	-	-
Ae	0 - 2	6.2	5.0	0.14	20.0	53	-	2.0	10.40	0.90	0.80	Tr.	12.10	19.20	63.0
AB	2 - 5	6.2	2.1	0.08	15.0	27	-	2.5	7.00	1.50	0.60	0.10	9.20	13.50	68.1
Bt	5 -12	6.4	1.2	0.06	14.0	28	-	1.5	10.20	2.90	0.60	0.10	13.80	17.30	79.8
BC	12 -18	7.1	0.4	0.03	7.9	33	-	2.5	8.60	1.50	0.10	0.10	10.30	12.30	83.7
Apalmer silty clay loam - Rego Gleysol Soil															
Cg1	0 - 4	5.3*	7.4	0.34	12.9	6	-	28.0	-	-	-	-	-	-	-
Cg2	4 - 6	5.3*	25.1	1.21	12.0	11	-	116.0	-	-	-	-	-	-	-
Cg3	6 -18	5.3*	2.5	0.13	11.7	3	-	45.0	-	-	-	-	-	-	-
Armstrong gravelly sandy loam - Orthic Black Soil															
Ah1	0 - 6	7.0	2.6	0.11	14.3	44	198	3.0	9.46	0.43	0.94	0.05	10.88	11.16	97.5
Ah2	6 -13	7.2	1.9	0.08	13.7	44	151	0.5	8.26	0.41	0.88	0.05	9.60	10.34	92.8
AB	13 -18	7.2	1.0	0.05	14.0	42	101	0.0	5.77	0.47	0.70	0.05	6.99	7.48	93.4
Bm	18 -28	7.2	0.6	0.04	9.8	36	84	0.5	4.09	0.25	0.49	0.10	4.93	6.12	80.6
BC	28 -33	7.1	0.5	0.02	12.6	24	59	0.5	3.83	0.36	-	0.05	-	4.51	-
C-IIC	33 -48	7.1	0.1	0.02	3.5	9	67	0.5	5.42	9.44	0.42	0.05	6.33	6.30	100.0
IIC	48 +	7.5	0.1	0.02	2.3	6	152	1.0	-	-	-	-	-	8.35	-
Banshee-O'Keefe sandy loam - Orthic Acid Brown Wooded - Orthic Brown Wooded Intergrade															
L-H	½- 0	5.5*	78.0	1.15	39.4	-	-	-	-	-	-	-	-	-	-
Bfh	0 - 3	5.9	3.4	0.09	21.6	157	-	7.5	3.90	0.60	0.20	Tr.	4.70	11.30	41.0
Bf1	3 -10	6.5	1.0	0.05	11.4	123	-	5.5	2.40	0.30	0.10	Tr.	2.80	6.00	46.7
Bf2	10 -17	6.7	0.9	0.03	17.7	31	-	2.5	1.90	0.20	0.20	Tr.	2.20	3.70	59.5
Bf3	17 -24	6.7	0.6	0.02	17.4	6	-	3.5	2.00	0.20	0.10	Tr.	2.30	3.10	74.2

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Bessette sandy loam - Rego Humic Gleysol Soil															
Ap	0 - 7	6.5	7.1	0.27	15.4	14	288	12.1	18.19	1.86	0.36	0.26	20.67	29.48	70.0
Cg1	7 -16	6.6	0.8	0.04	12.2	15	118	1.5	10.98	2.67	0.38	0.13	14.16	19.03	74.4
Cg2	16 -24	6.8	0.6	0.03	10.6	13	112	2.8	16.48	3.38	0.49	0.17	20.52	23.87	85.9
IICgj	24 +	7.3	0.3	0.02	-	11	70	4.8	6.56	1.48	0.18	0.11	8.33	14.27	58.4
Bluespring gravelly sandy loam - Orthic Dark Gray Soil															
Ah1	0 - 6	7.2	2.2	0.08	15.2	10	25	0.5	9.67	0.13	0.81	0.08	10.69	12.46	85.8
Ah2	6 -11	7.2	1.5	0.06	15.7	9	24	2.2	7.56	0.51	0.62	0.06	8.75	10.41	84.1
Bm	11 -20	7.3	0.4	0.03	8.9	7	48	0.5	3.90	0.26	0.30	0.06	4.52	5.11	88.5
BC	20 -26	8.0	0.4	0.02	11.9	4	31	1.5	-	-	-	-	-	3.88	-
Ck1	26 -38	8.0	1.1	0.04	14.8	8	29	9.6	-	-	-	-	-	5.54	-
Ck2	38 +	8.3	0.2	0.01	8.0	1	5	29.1	-	-	-	-	-	2.85	-
Bolean silt loam - Mull Regosol Soil															
Apk	0 - 6	7.9	3.0	0.12	15.3	24	85	46.7	20.30	2.58	0.84	0.25	23.97	15.62	100.0
Ck	6 -12	8.3	0.5	0.03	11.0	12	63	12.1	11.09	4.51	0.90	0.42	16.92	13.63	100.0
IICgj	12 -19	8.2	0.4	0.03	8.7	6	56	20.0	10.54	3.65	0.62	0.42	15.23	10.21	100.0
Cgj	19 +	8.5	0.4	0.02	9.4	16	44	00.0	21.42	1.71	0.31	0.56	24.00	6.41	100.0
Broadview clay - Gray Wooded Solodized Solonetz Soil															
L-F	2 - 1	5.9*	98.2	1.12	48.0	-	-	-	-	-	-	-	-	-	-
H	1 - 0	6.0*	82.0	1.36	35.0	-	-	-	-	-	-	-	-	-	-
Ae	0 - 2½	5.5	3.4	0.12	16.7	55	91	2.1	3.18	2.72	0.35	0.21	6.46	13.07	49.4
AB	2½- 3½	6.0	1.0	0.07	8.4	44	71	6.2	3.53	4.69	0.51	0.34	9.07	13.39	67.7
Bnt1	3½- 8	5.5	2.0	0.11	10.7	40	101	27.2	8.86	20.24	1.15	1.00	30.25	39.49	76.7
Bnt2	8 -12	5.8	1.8	0.09	11.9	24	100	8.9	11.92	28.49	1.93	1.59	43.93	51.56	85.2
	12 -17	6.6	1.7	0.08	12.2	22	101	16.8	11.98	29.77	1.53	2.04	45.32	54.44	83.2
Bnt3	17 -27	7.2	1.5	0.08	11.5	19	133	105.0	12.04	33.88	1.48	2.85	50.25	52.71	95.3
BC1	27 -36	7.7	0.7	0.05	8.8	11	273	195.0	8.56	29.32	1.34	2.87	42.09	42.35	99.1

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Broadview clay - Gray Wooded Solodized Solonetz Soil (continued)															
BC2	36 -43	8.1	0.6	0.05	7.5	8	271	253.0	-	-	-	-	-	36.60	-
Ck1	43 -50	8.3	0.7	0.05	7.9	4	15	244.0	-	-	-	-	-	31.72	-
	50 -60	8.3	0.6	0.06	5.8	5	9	225.0	-	-	-	-	-	29.35	-
Ck2	60 +	8.4	0.3	0.04	4.9	7	56	233.0	-	-	-	-	-	29.87	-
Broderick silt loam - Degraded Brown Wooded Soil															
L-F	¾ - 0	6.7*	79.6	1.30	35.4	-	-	-	-	-	-	-	-	-	-
Aej	0 - 3	6.7	2.8	0.11	14.2	51	91	6.0	10.66	0.94	0.90	0.07	12.57	17.63	70.7
Btj	3 - 9	7.0	2.1	0.11	10.8	53	114	2.8	16.70	0.60	0.77	0.07	18.14	18.48	98.2
BCk	9 -16	8.0	2.6	0.11	14.1	20	-	11.6	-	-	-	-	-	10.37	100.0
Ck1	16 -36	8.2	1.7	0.07	10.1	-	-	10.6	-	-	-	-	-	5.45	100.0
Ck2	36 +	8.4	0.7	0.07	6.5	-	-	12.3	-	-	-	-	-	3.91	100.0
Canoe fine sandy loam - Bisequa Podzol Soil															
L-F	1 - 0	5.6*	80.5	1.27	36.8	-	-	-	-	-	-	-	-	-	-
Ae	0 - 1	5.9	5.8	0.11	30.5	120	216	5.1	6.61	0.60	0.62	0.11	7.94	15.00	52.9
Bf1	1 - 7	6.2	1.3	0.04	19.0	187	265	4.1	2.38	0.79	0.52	0.10	3.79	13.29	28.5
Bf2	7 -11	5.9	0.4	0.02	12.5	21	45	1.0	3.00	0.65	0.30	0.10	4.05	6.76	59.9
C	11 -19	6.0	0.3	0.02	9.7	10	46	0.5	3.30	0.87	0.10	0.10	4.37	5.90	74.1
AB	19 -24	6.4	0.3	0.01	13.2	9	83	0.5	4.89	1.77	0.13	0.09	6.88	8.42	81.7
Btgj	24 -31	6.6	0.1	0.01	13.5	7	91	0.5	3.30	1.26	0.18	0.08	4.72	5.38	80.3
	31 -41	6.8	0.1	0.01	13.5	8	90	1.0	3.50	1.38	0.09	0.08	5.05	5.89	85.7
BCgj	41 -52	6.8	0.1	0.01	13.5	3	123	1.0	3.46	1.35	0.09	0.07	4.97	6.01	82.7
C1	52 -72	6.9	0.1	0.01	13.5	4	116	0.5	3.20	1.52	0.07	0.04	4.83	5.47	88.3
C2	72 +	7.1	0.1	0.01	20.0	3	143	1.0	3.16	1.27	0.07	0.09	4.59	3.69	100.0

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Carlin silt loam - Orthic Gray Wooded Soil															
L-H	1½- 0	6.3*	81.2	1.47	32.2	-	-	-	-	-	-	-	-	-	-
Ae	0 - 4	6.2	1.8	0.09	11.5	102	223	5.8	7.56	1.24	0.45	0.14	9.39	13.06	71.9
AB	4 - 6	6.4	1.1	0.05	11.7	42	67	4.2	7.74	2.34	0.54	0.14	10.76	12.86	83.7
Bt	6 -15	5.8	0.6	0.05	6.8	41	128	8.7	10.63	5.52	0.70	0.16	17.01	19.61	86.7
BC1	15 -20	5.9	0.6	0.05	7.0	51	265	4.9	10.48	5.65	0.50	0.19	16.82	19.59	85.9
BC2	20 -30	6.8	0.5	0.04	8.2	29	275	3.5	10.84	4.82	0.34	0.17	16.17	13.63	100.0
Ck1	30 -39	8.2	0.5	0.03	9.1	20	118	3.4	-	-	-	-	-	12.13	-
Ck2	39 +	8.4	0.2	0.03	3.3	19	39	2.0	-	-	-	-	-	11.71	-
Cherryville gravelly sandy loam - Brunisolic Gray Wooded Soil															
L-H	¾- 0	5.7*	62.1	1.00	30.6	-	-	-	-	-	-	-	-	-	-
Ae1(Bf)	0 - 9	6.2	1.6	0.06	14.6	71	117	1.7	4.46	1.18	0.33	0.17	6.14	11.24	39.7
Ae2	9 -13	6.3	0.6	0.04	10.3	20	33	1.7	2.69	0.45	0.18	0.15	3.47	6.13	56.6
AB	13 -19	6.4	0.4	0.02	10.4	13	33	1.0	3.77	0.46	0.19	0.15	4.57	6.52	70.1
Bt1	19 -28	6.4	0.4	0.02	9.8	14	85	1.5	5.27	0.72	0.21	0.16	6.36	8.69	73.2
Btj	28 -35	7.5	0.4	0.02	9.8	7	82	1.5	-	-	-	-	-	9.01	-
Ck	35 +	8.2	0.4	0.02	10.8	4	21	13.6	-	-	-	-	-	6.73	-
Chum sandy loam - Orthic Gray Forested Soil															
L-H	1 - 0	5.5*	73.9	1.19	36.1	-	-	-	-	-	-	-	-	-	-
Ae1	0 - 6	5.5	1.2	0.05	14.5	84	116	-	2.64	0.68	0.14	0.10	3.56	7.27	49.0
Ae2	6 -13	6.1	0.1	0.03	-	-	-	-	2.90	0.76	0.30	0.06	4.02	5.14	78.2
AB	13 -20	6.8	0.1	-	-	-	-	-	3.16	0.56	0.19	0.06	3.97	4.60	86.3
BA	20 -26	6.7	0.1	-	-	-	-	-	6.78	0.59	0.41	0.11	7.89	9.71	81.3
BC	26 -32	7.0	0.1	-	-	-	-	-	5.06	0.21	0.21	0.11	5.59	5.71	97.9
Ck1	32 -40	8.0	-	-	-	-	-	-	-	-	-	-	-	3.88	100.0
Ck2	40 -48	8.1	-	-	-	-	-	-	-	-	-	-	-	3.66	100.0

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Corning sandy loam - Brunisolic Gray Wooded Soil															
L-H	1 - 0	5.6*	76.1	1.37	31.8	-	-	-	-	-	-	-	-	-	-
Ae1(Bf1)	0 - 5	6.2	2.1	0.06	19.8	234	-	5.5	3.80	0.40	0.50	Tr.	4.70	10.60	44.3
Ae2(Bf2)	5 -12	6.0	0.5	0.03	9.0	27	-	3.5	2.40	0.60	0.30	0.10	3.40	5.10	66.7
AB1	12 -20	6.6	0.2	0.02	6.5	12	-	2.5	2.70	0.60	0.10	0.10	3.50	4.50	77.8
AB2	20 -26	6.6	-	-	-	9	-	2.0	2.50	0.40	0.10	Tr.	3.00	3.80	78.9
Bt	26 -27	6.6	-	-	-	14	-	3.0	4.30	1.20	0.20	0.10	5.80	7.30	79.5
Ae	27 -30	6.5	-	-	-	8	-	1.0	-	-	-	-	-	-	-
Bt	30 -32	6.2	-	-	-	8	-	4.5	4.70	1.70	0.10	0.10	6.60	9.00	73.3
BC	32 -40	6.8	-	-	-	5	-	3.0	2.00	0.50	Tr.	Tr.	2.50	2.90	86.2
Enderby silt loam - Orthic Gray Forested Soil															
L-H	1½- 0	5.6*	67.7	1.09	36.0	-	-	-	-	-	-	-	-	-	-
Ae	0 - 6	6.3	2.6	0.04	35.1	30	56	0.0	6.92	1.80	0.09	0.89	9.70	14.66	66.2
AB1	6 -11	6.8	1.1	0.04	14.7	35	65	0.0	8.74	3.46	0.09	0.81	13.10	16.32	80.3
AB2	11 -16	6.9	0.7	0.03	14.8	38	111	0.5	9.52	4.08	0.62	0.08	14.30	15.90	89.9
Bm	16 -23	7.2	0.6	0.03	11.6	55	284	0.0	9.23	2.53	0.14	0.19	12.09	13.12	91.4
BC	23 -32	7.9	0.6	0.02	16.6	41	199	0.7	8.79	3.18	0.20	0.10	12.27	12.96	94.7
Ck1	32 -40	8.8	1.6	0.07	14.4	12	255	0.5	-	-	-	-	-	11.69	-
Ck2	40 +	8.6	0.6	0.02	16.6	8	129	0.5	-	-	-	-	-	9.19	-
Equesis gravelly sandy loam - Orthic Dark Gray Soil															
L-F	1 - 0	5.8*	64.7	0.82	46.0	-	-	-	-	-	-	-	-	-	-
Ah1	0 - 7	7.6	2.9	0.11	14.7	44	93	3.1	16.17	0.29	2.64	0.15	19.25	22.61	85.1
Ah2	7 -12	7.6	1.7	0.07	14.3	14	29	3.6	14.30	0.38	1.17	0.15	16.00	19.41	82.4
Bm	12 -20	7.6	0.9	0.06	9.0	9	20	2.1	-	-	-	-	-	9.67	-
IIC	20 +	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Falkland sandy loam - Orthic Regosol Soil															
Ap	0 - 4	7.8	4.6	0.16	16.7	57	244	14.6	25.23	1.16	2.10	0.08	28.57	20.34	100.0
C	4 -12	7.9	1.6	0.07	14.1	25	158	2.1	16.74	2.17	1.34	0.06	20.31	17.74	100.0
IIC1	12 -18	7.9	2.7	0.11	14.1	5	102	4.6	23.42	3.85	1.84	0.09	29.20	25.66	100.0
IIIC1	18 -23	8.1	1.4	0.05	14.6	4	117	2.8	12.30	2.59	1.47	0.06	16.42	15.74	100.0
IIC2	23 -29	8.0	2.8	0.13	12.3	3	84	13.6	22.78	6.39	1.33	0.09	30.59	25.57	100.0
IIIC2	29 +	8.3	0.6	0.03	11.4	9	68	2.0	5.96	2.62	0.55	0.09	9.22	8.57	100.0
Fowler gravelly loam - Orthic Gray Wooded Soil															
L-H	1½- 0	5.8*	88.2	1.48	34.5	-	-	-	-	-	-	-	-	-	-
Ae	0 - 3	7.1	2.9	0.10	16.1	99	210	1.7	15.95	2.66	2.31	0.15	21.07	28.38	74.2
AB	3 - 6	7.1	2.7	0.09	17.0	49	81	1.2	16.44	3.44	1.21	0.16	21.25	28.26	75.2
Bt	6 -14	6.9	1.7	0.06	15.8	49	86	1.7	16.80	4.54	0.57	0.24	22.15	28.93	76.6
IIC	14 +	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gardom muck - Peaty Rego Gleysol Soil															
H1	11 - 6	6.9*	53.4	1.89	16.5	8	50	5.2	78.87	11.62	0.40	0.19	91.08	101.61	89.6
H2	6 - 0	6.9*	44.6	1.55	16.7	6	46	26.6	65.60	9.45	0.47	0.21	75.73	92.24	82.1
Cg1	0 - 7	7.3	1.4	0.04	18.4	4	168	3.7	19.88	3.12	0.18	0.27	23.45	22.39	100.0
Cg2	7 -11	6.8	16.3	0.51	18.6	5	75	10.9	38.38	6.69	0.35	0.32	45.74	58.56	78.1
Cg3	11 +	7.2	2.3	0.04	24.6	3	170	10.0	24.41	5.16	0.22	0.35	30.14	23.48	100.0
Glenemma gravelly sandy loam - Degraded Brown Wooded Soil															
L-F	½- 0	4.8*	100.0	1.03	56.5	-	-	-	-	-	-	-	-	-	-
Ah	0 - 2	6.9	5.6	0.17	18.8	31	74	4.2	18.61	2.72	1.33	0.15	22.81	27.94	81.6
Aej	2 -11	6.9	1.4	0.07	12.7	33	71	2.8	14.08	2.41	0.94	0.16	17.59	22.39	79.6
Btj	11 -21	6.9	0.6	0.04	20.0	20	170	2.8	15.20	2.17	0.66	0.16	18.19	21.58	84.3
IIBC	21 -29	6.9	0.6	0.03	13.4	18	173	2.0	15.15	2.32	0.59	0.16	18.22	20.73	87.9
IICca	29 +	7.9	0.3	0.01	16.9	9	99	8.0	15.35	1.99	0.56	0.16	18.06	17.15	100.0

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Grandview sandy loam - Orthic Black Soil															
Ap	0 - 6	6.5	4.5	0.19	13.3	79	-	-	14.60	1.70	0.90	0.10	17.30	21.20	81.6
Ah	6 -12	6.7	1.9	0.18	11.6	26	-	-	14.70	1.40	0.80	0.20	17.10	17.40	98.3
AB	12 -15	6.7	1.7	0.09	10.7	23	-	-	10.60	1.50	0.70	0.30	13.10	12.10	100.0
Bm1	15 -20	6.9	0.9	0.06	8.3	15	-	-	7.10	3.10	0.60	0.10	10.90	10.40	100.0
Bm2	20 -26	7.0	0.5	0.04	7.3	11	-	-	6.20	3.40	0.50	0.50	10.60	8.50	100.0
Grindrod sandy loam - Orthic Regosol Soil															
Ap1	0 - 2	6.3	5.1	0.15	19.9	51	127	5.2	8.78	0.55	0.32	0.06	9.71	14.18	68.5
Ap2	2 - 6	6.8	2.9	0.07	23.1	142	243	2.4	10.75	0.48	0.24	0.06	11.53	14.07	82.0
C	6 - 9	7.2	1.1	0.04	16.3	19	80	2.4	11.68	-	0.20	0.06	11.91	12.61	94.7
IIC1	9 -18	7.5	0.6	0.02	21.2	7	29	2.4	7.07	0.73	0.09	0.06	7.95	8.15	97.6
IIC2	18 +	7.5	0.3	0.01	21.8	4	26	3.1	3.42	0.85	0.05	0.05	4.37	4.42	98.9
Grizzly Hill loam - Orthic Brown Wooded Soil															
L-H	1 - 0	6.9*	65.3	1.75	21.6	-	-	-	-	-	-	-	-	-	-
Bfh	0 - 4	6.8	2.8	0.09	17.8	5	-	4.5	9.90	1.40	1.40	Tr.	12.70	16.90	75.1
Bf	4 -12	6.3	1.9	0.05	21.8	4	-	6.0	8.90	1.30	0.90	0.10	11.20	15.40	72.7
BC	12 -20	7.0	1.2	0.04	17.5	3	-	2.5	11.20	0.50	0.30	0.10	12.10	13.50	89.6
Gulch fine sandy loam - Orthic Dark Gray Soil															
Ap	0 - 7	6.8	3.7	0.15	14.1	3	-	4.5	11.90	1.20	0.30	0.10	13.50	16.10	83.9
Bm	7 -15	7.1	0.6	0.04	8.8	14	-	1.5	8.20	0.70	0.20	0.10	9.20	10.30	89.3
BC	15 -22	7.0	0.8	0.04	11.6	18	-	2.5	9.20	0.70	0.20	0.10	10.20	11.80	86.4
C1	22 -29	7.2	-	-	-	18	-	2.5	12.00	1.10	0.20	0.10	13.40	15.70	85.4
C2	29 -37	7.1	-	-	-	12	-	3.0	-	-	-	-	-	-	-
C3	37 -43	7.0	-	-	-	11	-	2.0	-	-	-	-	-	-	-

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Harper sandy loam - Orthic Gray Wooded Soil															
L-H	1 - 0	5.4*	50.2	0.73	37.3	-	-	-	-	-	-	-	-	-	-
Ae	0 -10	6.4	1.0	0.04	13.6	45	-	2.5	4.80	0.80	0.60	Tr.	6.20	8.00	77.5
AB	10 -20	6.7	0.3	0.01	16.2	37	-	2.5	3.70	0.10	0.40	Tr.	4.20	4.10	100.0
Bt	20 -27	6.7	0.3	0.03	5.4	39	-	4.0	3.60	0.60	0.30	Tr.	4.50	5.40	83.3
Btj	27 -33	6.8	-	-	-	45	-	1.5	-	-	-	-	-	-	-
BC	33 -39	7.0	-	-	-	36	-	2.5	-	-	-	-	-	-	-
C	39 -48	7.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Ck	48 +	8.0	-	-	-	-	-	-	-	-	-	-	-	-	-
Heubner muck - Peaty Calcareous Rego Gleysol Soil															
Hp	10 - 0	7.6*	66.1	2.64	14.5	2	-	>100.0	-	-	-	-	-	-	-
Cgk	0 - 5	8.2	2.8	-	19.5	2	-	>100.0	-	-	-	-	-	-	-
	5 - 6	8.1	-	-	-	-	-	-	-	-	-	-	-	-	-
IICa	6 - 9	8.0	8.4	0.29	16.8	-	-	-	-	-	-	-	-	-	-
IIICgH	9 -15	7.7	11.0	0.41	15.4	2	-	-	-	-	-	-	-	-	-
	15 -17	8.1	-	-	-	-	-	-	-	-	-	-	-	-	-
IVCg	17 +	7.9	4.0	0.09	25.2	3	-	-	-	-	-	-	-	-	-
Hobson loam - Bisequa Gray Wooded Soil															
L-H	1 - 0	5.6*	89.2	1.33	38.9	-	-	-	-	-	-	-	-	-	-
Bfh	1 - 6	6.6	3.0	0.07	23.8	83	-	4.0	5.00	0.60	0.40	0.10	6.10	18.00	33.8
Bf	6 - 9	6.4	0.7	0.03	13.3	31	-	5.0	2.50	0.40	0.20	Tr.	3.10	5.30	58.2
C	9 -17	6.3	0.3	0.03	5.4	5	-	3.5	2.40	0.50	0.10	Tr.	3.00	4.50	66.6
AB	17 -23	6.3	-	-	-	7	-	3.5	-	-	-	-	-	-	-
Bt	23 -31	6.5	-	-	-	4	-	2.5	-	-	-	-	-	-	-
BC	31 -39	6.9	-	-	-	1	-	3.5	-	-	-	-	-	-	-
C	39 -48	7.1	-	-	-	1	-	-	-	-	-	-	-	-	-
Ck	48 +	8.2	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Hupel loamy sand - Minimal Podzol Soil															
L-H	1 - 0	5.0*	91.1	1.15	45.9	-	95	-	-	-	-	-	-	-	-
Aej	0 - 1	6.5	3.1	0.07	26.7	110	31	-	4.67	0.55	0.46	0.04	5.72	13.73	41.7
Bf	1 -10	6.5	1.1	0.04	18.6	76	264	-	1.67	0.77	0.31	0.04	2.79	9.98	28.1
Bfc	10 -15	6.4	0.4	0.02	13.9	36	64	-	1.26	1.04	0.24	0.06	2.60	5.51	47.2
C	15 +	6.2	0.3	0.01	15.2	13	18	-	1.52	0.76	0.15	0.05	2.45	3.02	82.1
Ida loam - Orthic Gray Forested Soil															
Ap	0 - 6	6.7	3.7	0.11	15.1	46	224	4.1	14.97	1.77	0.45	0.09	17.28	20.75	83.3
AB	6 -11	7.0	2.5	0.10	14.7	48	216	3.4	13.10	3.22	0.34	0.11	16.77	21.57	77.8
BA	11 -18	7.3	0.8	0.04	12.2	39	234	3.6	10.07	2.80	0.26	0.11	13.24	15.47	85.5
BC	18 -21	7.5	0.5	0.02	14.4	24	183	44.0	8.88	1.11	0.18	0.14	10.31	10.06	100.0
IICg	21 -31	7.6	0.4	0.02	13.3	21	143	205.0	-	-	-	-	-	8.84	-
IICgj	31 +	7.8	0.4	0.01	20.6	15	100	191.0	5.49	2.23	0.11	0.29	8.12	6.19	100.0
Kosta silty clay loam - Gleyed Orthic Dark Gray Soil															
Ah	0 - 7	6.6	4.9	0.22	13.1	-	-	1.5	14.80	1.90	0.50	0.10	17.30	20.60	84.0
Bm	7 -16	7.1	0.8	0.05	9.7	26	-	3.0	12.50	1.50	0.20	0.20	14.40	16.80	85.7
Cgj	16 -22	8.0	0.4	0.03	9.2	21	-	1.5	10.60	2.20	0.10	0.80	13.70	14.80	92.6
Cg1	22 -28	8.3	-	-	-	6	-	7.0	-	-	-	-	-	-	-
Cg2	28 -33	8.3	-	-	-	5	-	6.0	-	-	-	-	-	-	-
Larch Hill gravelly sandy loam - Orthic Brown Wooded Soil															
L-F	1 - 0	5.8*	81.9	1.40	34.0	-	-	-	-	-	-	-	-	-	-
Bm1	0 - 5	6.2	2.7	0.06	24.0	126	264	7.9	4.65	0.66	0.70	0.07	6.08	12.17	50.0
Bm2	5 -10	6.4	1.2	0.04	19.0	91	144	7.2	3.62	0.39	0.39	0.15	4.55	9.69	47.0
Bm3	10 -17	6.7	0.7	0.02	19.3	44	46	2.7	4.90	0.47	0.23	0.15	5.75	8.04	71.5
IICk1	17 -29	7.8	0.4	0.01	22.7	16	48	-	6.72	0.08	0.14	0.11	7.05	7.82	90.0
IICk2	29 -40	8.2	0.2	0.01	8.7	-	-	10.0	7.08	0.07	0.09	0.13	7.37	3.95	100.0
IICca	40 +	8.5	0.2	0.02	6.8	7	12	11.3	-	-	-	-	-	2.60	100.0

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Leonard sandy loam - Brunisolic Gray Wooded Soil															
L-F	½- 0	5.9*	51.5	-	-	-	-	-	-	-	-	-	-	-	-
Ae(Bf)	0 -10	6.2	1.9	-	-	168	375	-	4.84	0.74	0.39	0.15	6.12	11.12	55.0
Ae2	10 -17	6.4	0.5	-	-	9	20	-	2.35	0.34	0.13	0.13	2.95	3.64	81.1
AB1	17 -24	6.5	0.5	-	-	5	21	-	3.50	0.54	0.16	0.13	4.33	3.59	100.0
AB2	24 -29	6.5	0.5	-	-	6	12	-	2.95	0.44	0.08	0.22	3.69	4.01	92.0
BA	29 -41	6.5	0.5	-	-	3	11	-	3.03	0.37	0.15	0.11	3.66	4.36	84.0
Bt	41 -44	6.8	1.1	-	-	4	16	-	5.41	0.48	0.16	0.11	6.16	6.87	89.7
IIC	44 +	7.0	0.8	-	-	4	14	-	4.04	0.52	0.11	0.11	4.77	5.51	86.6
Loftus muck - Shallow Muck Soil															
Hp	22 -15	6.0*	63.3	2.22	16.5	12	22	168.0	79.87	8.70	0.15	0.76	89.48	135.43	66.0
H1	15 - 9	5.5*	60.8	2.17	16.3	4	4	151.0	60.45	9.93	0.09	1.00	71.47	102.27	69.9
	9 - 7	6.0	3.8	0.11	17.7	15	91	123.0	4.53	1.27	0.05	0.20	6.05	9.32	64.9
H2	7 - 3	6.0*	66.7	2.39	16.2	3	4	40.0	75.60	22.12	0.13	1.14	97.99	169.89	57.7
H3	3 - 0	6.2*	33.3	1.01	19.2	5	13	181.9	44.62	20.83	0.15	0.48	66.08	94.75	69.7
Cg1	0 - 9	6.6	2.4	0.12	11.4	5	161	122.4	10.30	5.63	0.32	0.31	16.56	20.84	79.5
Cg2	9 +	6.2	4.3	0.13	19.2	27	96	285.4	12.07	4.77	0.15	0.39	17.35	17.35	100.0
Lumby sandy loam - Orthic Brown Wooded Soil															
Ah	0 - 1	7.2	10.6	-	-	60	117	-	-	-	-	-	-	-	-
AB	1 - 3	7.2	2.7	0.08	18.8	101	143	-	8.62	1.44	1.69	0.05	11.80	13.21	89.3
Bm	3 - 6	7.6	1.0	0.04	13.8	109	151	-	7.21	1.38	1.46	0.04	10.09	11.22	89.9
BC	6 -14	7.6	0.5	0.03	12.8	59	119	-	7.50	1.41	0.44	0.06	9.41	10.39	90.6
C	14 -18	7.4	0.3	0.01	12.5	47	110	-	5.36	1.47	0.30	0.08	7.21	7.77	92.8
IIC	18 +	7.4	0.3	0.01	12.5	38	143	-	6.14	0.56	0.29	0.09	7.08	7.48	94.7

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Mabel complex - Orthic Regosol to Rego Gleysol Soils															
C1	0 - 5	6.8	2.0	0.10	11.2	6	-	4.0	9.80	2.00	0.40	0.10	12.30	14.20	86.6
C2	5 - 9	6.9	1.4	0.06	13.3	5	-	3.5	9.20	1.60	0.20	0.10	11.10	12.20	91.0
IIC1	9 -12	7.1	0.5	0.03	10.0	3	-	6.0	5.70	0.90	0.10	0.10	6.80	7.50	91.0
Cgj1	12 -16	7.1	-	-	-	4	-	5.5	7.10	1.70	0.10	0.10	9.00	10.50	85.7
Metcalfe fine sandy loam - Bisequa Gray Wooded Soil															
L-F	½- 0	5.8*	65.6	1.16	32.9	-	-	-	-	-	-	-	-	-	-
Aej	0 - 1	6.5	3.6	0.10	21.4	219	319	4.2	6.17	0.35	0.59	0.09	7.20	11.75	61.3
Bf1	1 - 6	6.4	1.9	0.06	17.3	140	287	4.9	3.40	0.13	0.40	0.09	4.02	15.74	25.5
Bf2	6 - 8	6.5	0.4	0.02	9.5	24	60	4.1	1.62	0.62	0.10	0.08	2.42	4.53	53.4
C	8 -11	6.6	0.4	0.01	14.3	8	49	2.0	-	-	-	-	-	3.66	-
AB1	11 -18	6.5	0.2	0.02	6.4	7	44	2.7	2.22	0.66	0.10	0.11	3.09	3.85	80.3
AB2	18 -23	6.5	0.3	0.01	18.6	6	56	2.7	2.70	0.69	0.10	0.03	3.52	4.60	76.5
Bt	23 -31	6.4	0.4	0.02	13.3	10	54	5.6	6.12	1.52	0.31	0.06	8.01	11.29	71.0
IICgj	31 +	6.6	0.2	0.01	10.1	5	28	2.0	2.55	0.58	0.05	0.08	3.26	4.04	80.7
Moutell gravelly sandy loam - Orthic Gray Wooded Soil															
L-H	½- 0	5.0	70.5	1.26	32.5	-	-	-	-	-	-	-	-	-	-
Ae	0 - 5	6.3	2.0	0.07	17.9	-	-	-	7.45	0.46	0.82	0.08	8.81	16.44	53.6
Bt	5 -16	6.5	1.6	0.07	13.7	-	-	-	21.61	2.43	0.97	0.11	25.12	29.89	84.0
IICk1	16 -22	7.4	1.0	0.05	12.3	-	-	-	19.34	-	0.47	0.10	-	16.15	100.0
Ck1	22 -25	7.4	1.6	0.07	13.2	-	-	-	-	-	-	-	-	24.76	-
Ck2	25 -29	7.7	1.4	0.06	12.9	-	-	-	-	-	-	-	-	19.79	-
IICk2	29 +	7.8	1.2	0.05	14.6	-	-	-	-	-	-	-	-	12.09	-
Mowitch silt loam - Carbonated Rego Gleysol Soil															
Hk	3 - 0	7.8*	41.3	1.55	15.4	-	-	-	-	-	-	-	-	-	-
Cgk1	0 - 4	8.1	3.2	0.12	14.8	6	-	13.0	-	-	-	-	-	-	-
Cgk2	4 -13	8.2	0.7	-	-	3	-	36.5	-	-	-	-	-	-	-
Cgk3	13 -18	8.2	-	-	-	2	-	26.0	-	-	-	-	-	-	-

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Nahun gravelly sandy loam - Orthic Black Soil															
Ah1	0 - 7	6.7	2.9	0.12	14.6	15	65	-	9.53	0.30	0.76	0.04	10.63	11.79	90.2
Ah2	7 -12	7.0	2.1	0.11	12.0	17	45	-	8.47	0.18	0.61	0.05	9.31	10.58	88.0
AB	12 -16	7.0	1.3	0.07	11.1	18	41	-	6.14	0.20	0.61	0.05	7.00	8.17	85.7
Bm	16 -26	7.1	0.6	0.04	14.9	9	28	-	4.49	0.15	0.29	0.05	4.98	5.46	91.2
IIBC	26 -42	7.5	0.5	0.02	12.4	7	23	-	-	-	-	-	-	4.24	-
IICca	42 +	8.1	0.3	0.02	9.6	3	17	-	-	-	-	-	-	3.82	-
Neskain silt loam - Orthic Dark Gray Soil															
Ap1	0 - 2	6.9	13.8	0.58	13.3	23	-	10.5	21.50	5.00	2.40	0.10	29.00	35.90	80.8
Ap2	2 - 7	6.7	8.3	0.38	12.6	18	-	5.5	19.00	2.90	1.70	0.10	23.70	30.80	76.9
AB	7 -10	6.4	2.9	0.16	10.4	10	-	2.5	12.00	2.30	1.20	0.10	15.60	20.90	74.6
Bm1	10 -15	6.7	1.6	0.09	10.3	4	-	1.5	12.20	3.10	0.90	0.10	16.30	19.40	84.0
Bm2	15 -20	6.7	1.2	0.08	8.8	2	-	1.5	12.00	3.60	0.70	0.10	16.40	19.90	82.4
BC	20 -26	7.3	1.3	0.08	9.6	1	-	4.5	16.40	3.00	0.40	0.10	19.9	16.30	100.0
Nisconlith loam - Orthic Humic Gleysol Soil															
Ap	0 - 6	7.4	14.9	0.53	16.2	23	182	46.8	42.98	2.12	0.34	0.25	45.69	53.59	85.3
Ah	6 -13	7.6	8.5	0.33	15.0	24	189	16.6	37.69	2.66	0.30	0.23	40.88	44.15	92.6
Bg	13 -21	7.3	0.9	0.06	9.1	6	98	7.5	31.29	5.07	0.53	0.23	37.12	39.76	93.4
Nisconlith silt loam (Diatomaceous Phase) - Orthic Humic Gleysol Soil															
Ah	0 - 5	6.3	22.1	0.88	14.6	45	180	16.0	40.15	7.00	0.58	0.17	47.90	66.47	70.6
IIC	5 -10	6.9	2.1	0.10	11.8	39	290	6.4	19.42	5.14	0.27	0.38	25.21	36.21	69.6
Bg	10 -19	7.5	1.1	0.01	-	53	289	9.5	22.36	5.72	0.27	0.44	28.79	33.83	85.1
Cg	19 +	7.5	0.5	0.03	8.8	46	257	29.7	19.77	5.04	0.24	0.49	25.54	29.20	87.5

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Okanagan muck - Deep Muck Soil															
Hp	36 -30	5.9*	100.0	4.00	15.1	8	-	>100.0	-	-	-	-	-	-	-
H	30 -24	6.1*	100.0	3.58	16.6	5	-	>100.0	-	-	-	-	-	-	-
H-F	24 -12	6.1*	99.5	2.76	20.9	3	-	>200.0	-	-	-	-	-	-	-
F	12 - 0	5.1*	66.5	1.80	21.4	-	-	-	-	-	-	-	-	-	-
Onyx gravelly sandy loam - Minimal Podzol Soil															
L-H	½- 0	5.6*	60.6	0.92	38.4	-	-	-	-	-	-	-	-	-	-
Bfh	0 - 7	6.0	5.1	0.12	25.5	76	-	6.5	2.90	0.50	0.20	0.10	3.70	21.90	16.9
Bf	7 -11	5.7	-	-	-	38	-	5.5	1.90	0.60	0.20	Tr.	2.70	6.50	41.5
Pari gravelly sandy loam - Orthic Brown Wooded Soil															
L-H	1 - 0	6.4*	44.3	0.77	33.5	-	-	-	-	-	-	-	-	-	-
Bfh	0 - 3	6.1	3.4	0.10	19.8	-	-	-	6.90	0.40	0.49	0.10	7.89	21.78	36.2
Bf	3 - 9	6.2	1.8	0.02	14.6	-	-	-	11.56	0.37	0.58	0.18	12.69	21.01	60.4
BC	9 -17	6.5	1.6	0.06	16.0	-	-	-	15.40	0.44	0.55	0.13	16.52	21.53	76.7
IIC	17 +	7.3	1.5	0.06	14.7	-	-	-	-	-	-	-	-	17.86	-
Pillar loamy sand - Degraded Brown Wooded Soil															
L-H	½- 0	4.2*	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah	0 - 2	6.9	2.2	0.06	22.5	62	111	2.7	4.84	0.96	0.79	0.13	6.72	9.05	74.3
Ae	2 - 7	7.2	0.9	0.03	18.9	14	43	0.5	4.14	0.64	0.35	0.13	5.26	6.76	77.8
AB	7 -13	7.2	0.4	0.02	14.7	20	49	0.5	3.03	0.79	0.30	0.13	4.25	5.28	80.5
Btj	13 -18	7.0	0.4	0.02	13.9	21	58	0.5	3.15	0.67	0.23	0.13	4.18	5.56	75.2
BC	18 -23	7.0	0.4	0.02	13.9	15	62	1.5	2.54	0.69	0.15	0.13	3.51	3.83	91.7
C	23 +	7.0	0.3	0.02	10.5	12	64	1.5	2.58	0.52	0.09	0.13	3.32	4.23	78.5

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Rabie muck - Shallow Muck Soil															
Hp	20 -14	7.8*	80.2	3.45	13.5	3	-	>200.0	-	-	-	-	-	-	-
H1	14 - 8	7.0*	66.0	2.63	14.9	3	-	>200.0	-	-	-	-	-	-	-
	8 - 7	7.7	-	-	-	-	-	-	-	-	-	-	-	-	-
H2	7 - 0	7.2*	80.0	2.91	15.9	2	-	>100.0	-	-	-	-	-	-	-
Reiswig gravelly loam - Orthic Gray Wooded Soil															
L-H	1½- 0	6.3*	62.3	1.00	36.2	-	-	-	-	-	-	-	-	92.41	-
Ae1	0 - 4	6.5	3.2	0.08	21.9	94	173	1.5	11.03	1.57	1.82	0.16	14.58	19.32	75.5
Ae2	4 -12	6.6	1.1	0.05	13.7	65	99	1.0	9.71	1.17	0.92	0.18	11.98	15.84	75.6
AB	12 -19	6.5	0.9	0.04	11.9	58	99	1.0	12.79	2.28	0.87	0.19	16.13	20.66	78.1
Bt1	19 -25	6.8	0.9	0.03	15.1	68	144	1.5	15.19	3.45	0.88	0.19	19.71	24.02	82.1
Bt2	25 -39	7.0	0.6	0.03	11.6	47	247	0.5	17.32	4.96	0.60	0.25	23.13	25.52	90.6
BC	39 -48	7.5	0.4	0.03	8.5	24	246	0.5	-	-	-	-	-	18.01	-
Ck1	48 -61	7.4	0.4	0.03	6.5	17	266	0.5	16.37	5.05	0.32	0.35	22.09	23.95	92.2
Ck2	61 -74+	7.4	0.2	0.03	4.7	13	246	1.0	14.54	4.71	0.36	0.36	19.97	23.11	86.4
Rumball loam - Gleyed Orthic Regosol Soil															
Ap	0 - 6	5.9	2.1	0.08	14.9	15	134	1.5	9.08	1.70	0.28	0.11	11.17	15.43	72.4
IICgj	6 -15	6.5	0.4	0.02	13.2	11	80	1.5	2.58	2.01	0.14	0.09	4.82	6.48	74.4
Cg	15 -24	5.6	0.7	0.04	9.1	9	147	8.9	18.45	5.41	0.37	0.35	24.58	33.57	73.2
Cgj	24 +	6.0	0.4	0.03	9.1	11	122	10.8	11.03	3.57	0.19	0.27	15.06	19.15	78.6
Santabin muck - Deep Muck Soil															
Hp	40 -33	7.3*	100.0	3.04	19.5	4	-	>100.0	-	-	-	-	-	-	-
H1	33 -25	6.7*	90.6	3.04	17.3	4	-	>200.0	-	-	-	-	-	-	-
	25 -24	7.3	-	-	-	-	-	-	-	-	-	-	-	-	-
H2	24 -11	6.5*	100.0	2.80	21.5	3	-	-	-	-	-	-	-	-	-
IICcg-H	11 - 8	7.4*	58.0	1.58	21.2	-	-	-	-	-	-	-	-	-	-
F	8 - 0	6.6*	91.8	3.03	17.6	-	-	-	-	-	-	-	-	-	-
F-L	0 -	6.4*	100.0	2.98	21.4	-	-	-	-	-	-	-	-	-	-

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Sauff gravelly sandy loam - Orthic Acid Brown Wooded Soil															
L-F	$\frac{3}{4}$ - 0	5.0*	80.7	1.24	37.6	-	-	-	-	-	-	-	-	-	-
Bfh	0 - 3	6.6	4.0	0.12	20.0	73	259	5.7	4.28	0.47	0.74	0.21	5.70	21.74	26.4
Bf	3 - 9	6.5	2.1	0.08	14.5	40	110	4.3	4.27	0.23	0.47	0.23	5.20	19.73	26.4
IIBC	9 -18	6.5	1.8	-	-	8	13	2.0	4.49	0.15	0.18	0.11	4.93	7.62	64.7
IIC	18 +	6.5	1.8	-	-	5	16	4.1	4.97	0.75	0.16	0.11	5.99	8.06	74.3
Schindler loam - Mull Regosol Soil															
L-H	1 - 0	6.1*	98.0	1.86	30.5	-	-	-	-	-	-	-	-	-	-
Ahk	0 - 3	7.7	10.3	1.37	16.3	8	10	5.1		Calcium	Saturated			23.46	100.0
Ck1	3 - 7	7.8	6.6	0.23	16.5	-	-	5.6		"	"			15.54	100.0
Ck2	7 -15	7.9	6.0	0.21	16.7	-	-	10.5		"	"			15.79	100.0
Ck3	15 -21	8.0	4.3	0.16	15.7	-	-	3.9		"	"			12.65	100.0
Ck4	21 -32	8.0	4.0	0.16	15.1	-	-	9.0		"	"			14.24	100.0
Ck5	32 -44	8.0	3.2	0.13	14.2	-	-	9.0		"	"			11.92	100.0
Ck6	44 +	8.0	0.4	-	-	-	-	9.7		"	"			14.32	100.0
Shuswap loamy sand - Minimal Podzol Soil															
L-H	1 - 0	5.6*	55.5	0.85	37.7	55	94	-	-	-	-	-	-	-	-
Aej	0 - 1	6.2	3.0	0.07	27.0	134	172	1.0	4.81	0.81	0.30	0.08	6.00	12.37	48.5
Bf1	1 - $3\frac{1}{2}$	6.6	2.4	0.06	22.9	241	276	1.4	4.10	0.43	0.46	0.08	5.07	14.41	35.2
Bf2	$3\frac{1}{2}$-12	6.8	2.5	-	-	76	144	2.5	2.98	0.38	0.42	0.08	3.86	10.40	37.1
BC	12 -27	6.5	0.2	-	-	7	21	4.2	2.83	0.44	0.20	0.11	3.58	5.25	68.2
C	27 -48+	6.8	0.2	-	-	5	24	2.2	3.03	0.88	0.13	0.06	4.10	4.95	82.8

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
Skimiken silt loam - Orthic Gray Wooded Soil															
L-H	½- 0	6.0*	100.0	1.57	31.6	-	-	-	-	-	-	-	-	-	-
Ae	0 - 5	6.2	2.2	0.08	15.5	-	-	-	8.36	1.11	0.75	0.10	10.32	15.93	64.8
AB	5 - 8	6.4	1.3	0.06	12.4	-	-	-	11.53	1.55	0.93	0.09	14.10	20.10	70.2
Bt	8 -14	6.7	1.0	0.06	11.0	-	-	-	12.74	2.41	0.97	0.09	16.21	15.62	100.0
BC	14 -17	7.2	0.9	0.04	12.7	-	-	-	-	-	-	-	-	15.36	-
C	17 -21	7.8	0.9	0.04	12.6	-	-	-	-	-	-	-	-	10.52	-
Cca	21 -25	7.8	1.2	0.05	14.6	-	-	-	-	-	-	-	-	13.41	-
Ck	25 +	8.0	1.5	0.04	16.7	-	-	-	-	-	-	-	-	12.54	-
Spa fine sandy loam - Minimal Podzol Soil															
L	2 - 1	5.4*	83.0	1.39	34.6	-	-	-	-	-	-	-	-	-	-
F-H	1 - 0	5.2*	87.8	1.45	35.1	-	-	-	-	-	-	-	-	-	-
Aej	0 - 1	4.7	4.9	0.13	22.0	30	47	8.6	3.22	0.53	0.21	0.09	4.05	13.96	29.0
Bfh	1 -11	6.0	5.0	0.14	21.3	59	249	4.3	5.45	0.41	0.52	0.09	6.47	24.27	26.7
IIC1	11 -16	5.7	0.8	0.03	17.2	51	90	2.7	5.28	0.50	0.44	0.05	6.27	9.64	65.0
IIC2	16 +	6.5	0.6	0.01	24.9	18	61	6.3	5.50	0.66	0.34	0.05	6.55	7.75	87.9
Stepney sandy loam - Orthic Gray Forested Soil															
L-F	1 - 0	5.0*	85.7	1.21	41.1	-	-	-	-	-	-	-	-	-	-
Ae1	0 - 2	6.6	2.5	0.08	17.4	23	43	2.0	7.74	1.83	0.99	0.11	10.67	14.10	75.7
Ae2	2 - 7	6.8	1.0	0.04	14.1	17	32	0.5	7.59	0.71	0.74	0.14	9.14	11.65	78.5
Ae3	7 -12	6.8	0.7	0.04	10.3	23	50	1.0	7.25	1.57	0.67	0.15	9.64	11.86	81.3
AB	12 -20	6.8	0.4	0.02	9.7	49	113	1.5	7.32	2.12	0.66	0.11	10.21	11.90	85.8
BA	20 -29	7.0	0.3	0.02	8.5	30	172	2.7	7.25	1.99	0.54	0.10	9.88	12.83	77.0
BC	29 -36	7.2	0.4	0.02	13.7	22	184	10.7	7.78	1.89	0.25	0.11	10.03	11.61	86.4
IIC	36 +	8.1	0.3	0.01	13.7	7	67	12.8	7.47	0.61	0.20	0.10	8.28	6.96	100.0

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams						Base Saturation %
									Ca	Mg	K	Na	Total	Cation Exchange Capacity	
Syphon sandy loam - Brunisolic Gray Wooded Soil															
L-H	2 - 0	5.3*	89.3	1.40	37.0	-	-	-	-	-	-	-	-	-	-
Ae1(Bf)	¼-10	6.5	3.1	0.05	35.5	175	265	-	3.48	0.87	0.59	0.06	5.00	13.75	36.4
Ae2	10 -19	6.5	0.3	0.01	13.4	8	36	-	2.11	0.60	0.19	0.05	2.95	3.86	74.4
AB	19 -27	6.3	0.3	0.02	7.4	11	74	-	7.40	4.43	0.50	0.09	12.42	15.26	81.4
IIBt	27 -36	6.2	0.4	0.03	7.7	15	117	-	16.14	9.59	0.94	0.18	26.85	32.53	82.5
IIC	36 +	6.5	0.5	0.03	10.6	14	156	-	20.59	13.69	1.15	0.23	35.66	42.66	83.6
Tappen silty clay loam - Gray Wooded Solod Soil															
L-H	1 - 0	6.5*	89.1	1.55	33.3	-	-	-	-	-	-	-	-	-	-
Ae	0 - 2½	6.1	1.5	0.07	12.6	93	264	1.0	7.90	1.46	0.89	0.06	10.31	14.11	73.1
AB	2½- 4½	6.3	1.2	0.06	10.9	67	108	1.0	7.76	1.52	0.81	0.08	10.17	13.86	73.4
Bt1	4½-10	6.4	0.9	0.05	9.8	43	82	0.5	12.14	3.66	1.05	0.08	16.93	21.05	80.4
Bt2	10 -20	6.1	0.9	0.04	11.7	37	152	2.0	20.21	6.96	1.39	0.11	28.67	33.77	84.9
BC	20 -24	6.2	0.4	0.03	7.5	64	136	1.0	15.56	5.71	0.87	0.09	22.23	24.06	92.4
Ck1	24 -40	6.3	0.4	0.03	7.3	25	269	1.0	19.38	6.79	0.70	0.14	27.01	30.08	89.8
Ck2	40 +	6.8	0.4	0.03	7.3	15	328	2.8	15.80	3.97	0.41	0.16	20.34	22.09	92.1
Wallenstein silty clay loam - Gleyed Gray Wooded Soil															
Ae	0 - 4	7.0	3.6	0.14	15.2	43	286	16.7	13.88	2.88	0.73	0.21	17.70	23.75	74.5
AB	4 - 6	6.9	1.7	0.08	12.3	38	255	1.5	15.16	3.58	0.56	0.35	19.65	23.54	83.4
Btgj	6 -15	6.8	0.5	0.05	6.4	39	258	1.5	18.51	5.38	0.66	0.91	25.45	31.47	80.9
BCg	15 -23	7.2	0.5	0.04	7.3	34	217	1.0	14.50	4.04	0.33	1.17	20.04	22.05	90.9
Cg	23 -31	7.4	0.5	0.03	8.9	18	174	0.5	14.68	2.68	0.31	1.51	19.18	22.90	83.8
IICg	31 +	7.5	0.2	0.02	7.5	13	98	0.5	5.43	2.93	0.15	0.66	9.17	9.97	91.5

Table 5 (Continued)

Horizon	Depth Inches	pH 1:1	Organic Matter %	Total Nitrogen %	C-N Ratio	P_1 p.p.m.	P_2 p.p.m.	S p.p.m.	Exchangeable Cations and Exchange Capacity m.e./100 grams: Ca	Mg	K	Na	Total	Cation Exchange Capacity	Base Saturation %
White gravelly sandy loam - Orthic Brown Wooded Soil															
L-H	1 - 0	6.0*	92.6	1.58	34.1	-	-	-	-	-	-	-	-	-	-
Bfh	0 - 6	7.1	4.9	0.13	22.3	64	146	-	17.05	0.67	1.22	0.06	19.00	18.17	100.0
Bm	6 -11	7.4	2.7	0.07	21.4	25	59	-	-	-	-	-	-	19.53	-
BC	11 -20	7.9	2.5	0.09	16.6	22	-	-	-	-	-	-	-	16.84	-
Ck	20 -30	7.9	6.4	0.18	25.7	13	18	-	-	-	-	-	-	11.49	-
IICk	30 +	8.2	0.7	0.03	14.0	25	-	-	-	-	-	-	-	2.00	-
Yard fine sandy loam - Orthic Regosol Soil															
L-H	1 - 0	6.0*	-	0.65	-	-	-	-	-	-	-	-	-	-	-
Ahj	0 - 3	5.8	2.2	0.07	17.8	76	-	4.0	4.80	0.60	0.10	Tr.	5.50	9.30	59.1
C1	3 -10	6.4	0.9	0.04	12.8	36	-	4.5	4.10	0.40	0.10	Tr.	4.60	6.20	74.2
C2	10 -14	6.7	0.6	0.02	17.7	18	-	2.5	3.40	0.40	0.10	Tr.	3.90	4.80	81.3

* 1:5 soil-water ratio
> Greater than
Tr. Trace

THE FERTILITY STATUS OF SELECTED SOILS

Composite samples were tested from farms on agriculturally important soils, and the results are shown in Table 6. These indicate similarities that occur within soil types, and emphasize variations due to individual farm management.

The Broadview series, which is derived from glacio-lacustrine sediments, is high in available phosphorus and potassium. By tracing the cropping history of each farm, however, it was found that the phosphorus and potassium values were lowered by cropping over a 25 year period.

The phosphorus, potassium and sulphur values of Regosolic and Gleysolic soils that developed on recent river and stream deposits, namely, Rumball, Bolean, Falkland, and Nisconlith series, are generally low. The analyses also indicate that the values vary, chiefly through the addition of manures and fertilizers. It is noteworthy that in places, the values have been raised higher than an economic return level, indicating wasteful or excessive use of fertilizers.

Since the fertility status of the soils can vary from farm to farm and from field to field, as shown in Table 6, it appears advisable to sample fields that have different soils or cultural practices separately for soil tests, in order to determine the most economical applications of fertilizers.

Table 6: -- The Fertility Status of Composite Soil Samples from Surface Soils of Six Farms.

Farm No.	Soils	Field No.	pH	P_1 p.p.m.	P_2 p.p.m.	K m.e./100 gm.	S p.p.m.
1.	Rumball series	1.	7.6	17.0	137.0	0.29	1.5
		2.	7.8	78.0	147.0	0.26	2.1
		3.	7.7	11.5	192.0	0.34	2.3
		4.	6.7	52.5	131.0	0.20	1.0
		5.	7.8	32.7	196.0	0.52	7.2
		6.	7.7	118.0	188.0	0.52	2.0
		7.	7.6	168.0	210.0	0.42	0.5
2.	Rumball series	1.	7.5	66.0	69.0	0.22	0.5
		2.	7.1	25.3	78.0	0.34	11.1
		3.	7.4	35.9	91.3	0.28	1.2
		4.	7.1	52.5	142.0	0.34	1.5
		5.	7.4	23.0	165.0	0.37	1.2
		6.	6.9	30.0	196.0	0.52	1.4

Tabe 6 (Continued)

Farm No.	Soils	Field No.	pH	P_1 p.p.m.	P_2 p.p.m.	K m.e./100 gm.	S p.p.m.
3.	Bolean series	1.	7.8	38.0	102.5	1.22	140.0
		2.	7.5	9.0	59.0	0.52	3.5
	Falkland-Bolean complex	3.	7.2	22.0	78.0	0.47	1.2
		4.	7.2	17.0	64.0	0.38	1.0
	Bolean series	5.	7.9	26.7	75.0	1.19	26.8
		6.	8.0	14.5	56.3	0.75	119.0
		7.	8.0	16.3	82.0	0.52	203.0
		8.	7.6	6.0	57.0	0.51	1.5
		9.	6.9	36.5	90.3	0.47	1.0
		10.	6.9	21.0	105.0	0.37	2.8
4.	Nisconlith series	1.	6.2	70.0	121.0	1.03	8.0
		2.	6.6	68.0	111.0	0.66	3.3
		3.	6.8	221.0	360.0	0.70	12.3
		4.	6.6	157.0	287.0	0.62	8.0
5.	Tappen series	1.	7.0	49.5	86.5	0.45	19.0
		2.	6.9	18.5	41.5	0.37	3.5
6.	Broadview series	1.	6.5	76.0	140.0	1.10	8.9
		2.	6.3	97.5	175.0	1.19	16.9
		3.	6.0	38.7	74.0	0.81	8.6
		4.	6.4	66.0	130.0	0.97	12.4
		5.	6.4	98.7	171.0	1.01	10.8
		6.	6.2	52.5	124.0	1.01	19.0
		7.	5.9	52.5	102.5	0.80	30.6
		8.	6.3	27.3	74.0	0.90	9.3
		9.	6.3	76.0	157.5	0.71	7.2
		10.	5.9	43.0	81.0	0.70	10.4
		11.	6.0	45.0	97.5	0.72	14.0
		12.	6.3	48.0	102.5	0.88	8.0
		13.	6.4	95.0	167.5	1.02	17.4
		14.	6.3	90.0	162.5	0.89	15.0
		15.	6.1	92.5	162.5	1.11	23.7
		16.	6.6	87.5	146.0	0.98	8.6

P_1 - Available phosphorus by the Bray method.
P_2 - Acid soluble phosphorus by the Bray method.
K - Available potassium.
S - Sulphur.
p.p.m. - Parts per million.
m.e./100 gm. - Milli-equivalents per hundred grams soil.

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APPENDIX

Table A: WESTWOLD-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 2,100 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1921	.	.	.	.	1.03	1.99	0.48	0.94	0.80	0.29	1.35	0.95	.	.	.	.
1922	1.25	1.15	1.47	0.99	0.64	0.35	0.32	1.07	1.79	2.19	0.69	1.74	13.65	43.5	94	-27
1923	0.85	0.65	0.93	1.27	1.29	3.26	1.33	1.43	0.53	1.03	1.27	2.28	16.12	34.0	95	-30
1924	2.70	0.49	0.51	0.59	0.50	2.46	1.06	1.52	1.20	0.94	0.87	4.01	16.85	62.0	99	-32
1925	2.23	0.79	0.56	0.85	1.09	1.28	0.42	0.92	0.63	0.92	0.36	2.23	12.28	38.3	98	-11
1926	2.22	0.69	0.47	0.61	1.84	1.34	0.27	1.68	1.52	1.43	1.14	1.67	14.88	30.7	99	-13
1927	1.60	0.72	1.10	0.40	1.83	2.15	1.74	2.60	2.32	2.65	3.24	2.50	22.85*	66.6	96	-36
1928	1.70	0.19	1.01	1.21	1.15	2.06	1.15	0.18*	0.33	0.91	0.96	0.10*	10.95	19.7	97	-14
1929	2.45	0.17*	1.16	0.89	1.50	2.32	0.37	0.59	1.01	1.67	0.92	2.29	15.34	50.0	99	-35
1930	0.85	1.74	1.08	0.83	1.69	1.54	0.06	0.73	0.56	1.82	1.06	0.26	12.22	27.0	98	-30
1931	0.58	0.90	1.64	0.51	0.91	1.20	0.59	0.42	1.78	1.18	1.35	3.17	14.23	47.7	100	-13
1932	1.25	0.74	2.62*	1.12	0.97	1.09	1.15	1.31	1.06	1.14	2.84	0.99	16.28	30.5	94	-30
1933	1.10	1.53	1.94	0.62	1.69	1.76	0.74	0.71	2.25	3.04*	1.36	2.54	19.28	53.7	97	-15
1934	0.72	0.45	2.20	0.56	1.88	1.06	1.19	0.65	1.83	0.96	0.86	1.98	14.34	25.4	99	- 6
1935	2.10	0.53	1.64	0.33	1.01	3.32	3.00*	1.31	0.57	1.73	0.94	0.65	17.18	43.7	92	-37
1936	1.52	1.82	0.91	0.74	0.98	2.37	0.39	1.91	0.96	0.39	0.54	2.05	14.58	52.5	97	-35
1937	3.30*	3.62*	0.83	1.01	1.07	1.68	0.73	1.42	0.79	0.89	3.53*	1.34	20.21	107.3*	91	-29
1938	0.75	1.45	0.40	0.18	0.50	1.73	0.46	2.14	0.90	1.42	0.94	4.23*	15.10	.	.	.
1939	2.67	0.82	0.53	0.35	1.48	3.60	0.71	0.19	1.20	1.65	0.77	1.15	15.12	.	.	.
1940	0.97	1.89	1.27	1.53*	1.86	0.73	1.35	0.24	0.83	1.19	1.67	.	.	.	.	.
1941	.	.	0.17*	0.55	1.79	3.00	2.27	1.58	2.08	0.95	0.43	0.84	.	.	103*	.
1942	0.11*	0.26	0.29	1.00	2.41*	1.61	2.95	0.44	0.32	0.77	0.45	1.45	12.06	.	97	-10
1943	1.07	0.68	0.37	0.39	0.91	1.58	0.03*	1.59	0.36	1.94	0.16*	0.85	9.93	.	92	-35
1944	0.36	1.12	0.46	0.79	1.62	1.35	1.24	2.29	2.21	0.48	1.06	0.81	13.79	.	97	-10
1945	1.63	0.68	0.40	0.77	0.41	1.60	0.89	0.69	1.66	2.75	0.82	0.71	13.01	.	93	- 3
1946	1.53	0.58	0.21	0.62	1.06	1.92	0.57	1.35	0.68	1.54	1.35	0.89	12.30	.	93	-19
1947	0.83	0.78	0.53	0.23	0.27	2.54	1.06	0.95	0.91	1.63	1.24	0.90	11.87	.	90	-20
1948	0.29	1.12	0.36	2.15	1.55	1.47	2.32	2.44	1.42	0.53	1.58	0.93	16.16	.	90	-23
1949	1.32	1.35	0.85	0.35	1.12	1.24	1.25	1.01	0.67	0.89	0.49	2.30	12.84	.	91	-34
1950	0.62	0.49	0.68	0.87	0.65	0.29*	1.67	0.53	0.25	0.92	1.08	1.86	9.91	.	96	-50*
1951	1.19	2.53	0.97	0.30	0.55	0.78	0.97	0.66	0.64	1.59	0.44	2.33	12.95	.	92	-38
1952	1.27	1.00	0.67	0.17	0.51	1.31	0.69	0.30	0.11*	0.18*	0.35	0.53	7.09*	.	94	-35
1953	0.95	1.26	0.35	1.30	0.83	3.70*	1.05	1.08	0.41	0.83	0.67	1.91	14.34	.	96	- 1*
1954	2.70	0.54	0.28	0.71	0.92	1.31	1.28	3.11*	1.01	0.39	1.12	0.52	13.89	.	89*	-38
1955	0.91	0.77	0.62	0.45	0.95	1.35	1.84	0.30	1.03	0.93	1.57	1.31	12.03	.	94	-29

Table A (Continued)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1956	1.56	1.58	0.53	0.54	0.64	1.75	0.38	1.21	1.35	0.74	0.46	2.83	13.57	53.1	95	-29
1957	1.82	0.56	0.38	0.33	0.97	1.19	0.60	2.10	0.26	0.94	0.88	0.49	10.52	49.7	93	-39
1958	1.06	0.77	0.41	0.89	0.39	1.59	0.53	0.40	2.27	1.29	1.36	1.40	12.36	10.4	97	-10
1959	1.41	1.05	0.44	0.21	2.32	1.64	1.00	1.33	2.73*	1.60	1.77	0.42	15.92	32.9	97	-23
1960	1.22	0.36	0.36	0.11*	1.74	0.73	0.34	2.04	0.84	0.77	0.79	1.00	10.30	29.4	99	-15
1961	0.63	0.82	0.40	0.77	1.41	1.35	1.92	1.04	1.05	1.37	1.15	1.97	13.88	26.9	97	-13
1962	1.78	0.41	0.27	1.09	1.28	0.66	1.98	1.19	0.54	1.27	0.98	0.67	12.12	46.8	90	-30
1963	0.63	0.70	0.95	1.15	0.16*	1.09	2.60	1.45	1.43	0.49	1.16	1.54	13.35	8.5*	91	-28
High	3.30	3.62	2.62	1.53	2.41	3.70	3.00	3.11	2.73	3.04	3.53	4.23	22.85	107.3	103	- 1
Low	0.11	0.17	0.17	0.11	0.16	0.29	0.03	0.18	0.11	0.18	0.16	0.10	7.09	8.5	89	-50
Average	1.27	1.08	0.78	0.66	1.13	1.68	1.11	1.19	1.11	1.18	1.10	1.46	13.75**	36.5**	43	

*Record missing
**Thirty-year standard period average - 1931-60

Table B: FALKLAND-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES) AT 1,929 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow
1924	3.26	0.56	0.78	0.87	0.57	2.15	0.61	2.21	0.87	1.39	1.78	5.40*	20.45	89.7
1925	3.78*	1.63	1.28	0.84	0.98	1.58	0.66	1.05	0.57	1.51	0.59	2.72	17.19	75.0
1926	2.98	1.58	0.55*	0.81	1.12	1.77	0.44	3.15	1.69	1.88	2.01	1.25	19.23	51.4
1927	2.12	1.50	1.55*	0.58	2.39*	0.73*	2.09*	2.90*	2.48*	2.30*	3.26*	3.54	25.44*	82.4
1928	2.35	0.34	1.05	2.28*	0.91	2.92*	1.21	0.24	0.24*	1.04*	0.74	0.90	14.22	45.6
1929	1.45	0.35*	1.33	0.80	1.25	1.99	0.00*	0.56	1.02	1.17	0.25*	2.85	13.02	45.0
1930	0.65*	1.83*	1.00	0.36*	0.25*	1.39	0.20	0.22*	0.76	1.86	0.61	0.38*	9.51*	23.8
High	3.78	1.83	1.55	2.28	2.39	2.92	2.09	2.90	2.48	2.30	3.26	5.40	25.44	89.7
Low	0.65	0.35	0.55	0.36	0.25	0.73	0.00	0.22	0.24	1.04	0.25	0.38	9.51	23.8

Table C: FALKLAND-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,500 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1959	.	.	.	0.30*	2.37	2.17*	0.58	1.22*	3.50*	2.39*	2.42*	0.69*	.	.	.	.
1960	1.55	1.43	0.84	1.20	3.03*	0.96	0.04*	2.01*	1.01	0.76	1.90	1.90	16.63	53.3	100*	-10
1961	0.98*	2.00*	1.35*	1.38	2.25	1.35	1.01	1.36	0.70*	1.47	1.37*	3.41*	18.63*	41.6	98	1*
1962	1.98*	0.71*	0.74*	1.13	0.71	0.76*	1.29*	1.52	1.08	1.75	1.58	0.75	14.00*	66.2*	94*	-25*
1963	1.51	0.95	1.25	1.66*	0.67*	1.28	1.20	1.94	0.90	0.40*	1.84	2.15	15.75	20.2*	95	-17
High	1.98	2.00	1.35	1.66	3.03	2.17	1.29	2.01	3.50	2.39	2.42	3.41	18.63	66.2	100	1
Low	0.98	0.71	0.74	0.30	0.67	0.76	0.04	1.22	0.70	0.40	1.37	0.69	14.00	20.2	94	-25
Average	1.51	1.27	1.05	1.42	1.81	1.30	0.82	1.61	1.44	1.35	1.82	1.78	17.18**	45.5**		

. Record missing
**1959-63

Table D: GLENEMMA-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,350 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1916	0.30*	2.64*	1.52	1.54	1.37	2.13	3.23*	0.77*	0.70	0.87	2.84	4.55	22.46*	65.7	98	-28*
1917	3.25	1.05	2.51	4.55*	2.89*	4.11*	0.72	1.35	1.25	.	.	.	.	.	94	-20
1921	.	0.35*	1.35	0.76	0.96	1.73	0.30	1.21	1.47	0.74*	3.39*	0.54*	.	.	95	-16
1922	2.13	1.00	2.55*	1.23	1.92	0.08*	0.49	0.97	2.09*	2.71*	0.95*	2.42	18.54	52.0	99	-15*
1923	1.60	0.60	0.10*	0.90	1.80	3.55	0.10*	0.90	0.10*	1.30	1.54	1.60	14.09*	35.2*	92*	-18
1924	3.50*	1.76	0.40	0.68*	0.30*	1.92	0.59	2.10*	0.57	1.04	1.44	4.92*	19.22	84.7*	102*	-21
High	3.50	2.64	2.55	4.55	2.89	4.11	3.23	2.10	2.09	2.71	3.39	4.92	22.46	84.7	102	-15
Low	0.30	0.35	0.10	0.68	0.30	0.08	0.10	0.77	0.10	0.74	0.95	0.54	14.09	35.2	92	-28

Table E: MONTE CREEK-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,514 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1916	0.95	1.15*	0.46*	0.46	1.08	1.87	1.33*	0.28*	0.40	0.13*	1.34*	0.53	9.98	32.8*	95*	-33*
1917	0.49	0.35	0.40	0.46	2.08*	0.38	0.00*	0.94	0.31	0.34	0.00*	1.87	7.62*	25.7	96	-30
1918	0.72	0.28	0.25	0.20	1.24	0.29	0.92	2.41*	0.29*	1.08	0.94	1.06	9.68	9.4	101	-21*
1922	1.25	0.65	0.32	1.52*	0.34	0.21*	0.73	1.19	1.36*	1.41*	0.27	0.21*	9.46	24.2	96	-24
1923	0.47*	0.30	0.22	0.05*	1.15	2.56*	0.93	1.21	0.46	0.57	0.64	1.24	9.80	20.0	96	-21*
1924	1.35*	0.03*	0.10*	0.15	0.30	2.05	1.05	0.70	0.63	0.58	0.20	4.00*	11.14*	4.0*	104*	-27
High	1.35	1.15	0.46	1.52	2.08	2.56	1.33	2.41	1.36	1.41	1.34	4.00	11.14	32.8	104	-21
Low	0.47	0.03	0.10	0.05	0.30	0.21	0.00	0.28	0.29	0.13	0.00	0.21	7.62	4.0	95	-33

Table F: CHASE-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,160 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1953	1.51	1.74*	0.58	0.93	0.98	3.57*	0.71	1.26	0.64*	1.02	1.47	1.92	16.33	.	92*	3*
1954	1.48	0.37*	0.47	.	1.39	.	.	.	.	.	.	.	.	.	.	.
1957	.	.	.	.	.	.	.	.	.	1.06	1.41	1.15	.	.	.	.
1958	2.33*	1.52	0.70	1.37	0.59	1.40	1.14	0.44*	1.19	1.33	1.99	2.11*	16.11	32.7	97	2
1959	1.92	1.55	1.05*	0.16*	1.60	1.17	0.61	2.78*	3.57*	1.80*	2.11*	0.42*	18.74*	49.1*	97	-10
1960	.	.	0.30*	0.37	2.11*	1.35	0.37*	2.14	1.12	1.01	1.40	1.76	.	.	98	- 2
1961	0.35*	1.45	0.79	1.39	1.02	1.53	0.53	0.51	1.51	1.65	2.10	1.95	14.78	25.7*	99*	5
1962	1.83	.	0.35	0.83	1.06	0.88	0.89	1.08	1.05	.	0.76*	1.42	.	.	94	-18*
1963	1.16	0.88	0.96	2.08*	0.12*	0.87*	1.29*	1.03	1.31	0.19*	1.38	1.36	12.63*	.	97	-11
High	2.33	1.74	1.05	2.08	2.11	3.57	1.29	2.78	3.57	1.80	2.11	2.11	18.74	49.1	99	3
Low	0.35	0.37	0.30	0.16	0.12	0.87	0.37	0.44	0.64	0.19	0.76	0.42	12.63	25.7	92	-18
Average	1.51	1.25	0.65	1.02	1.04	1.60	0.78	1.22	1.34	1.07	1.41	1.38	14.27**	33.6**	47**	

. Record missing
**8 years

Table G: SORRENTO-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES ($^{\circ}$F), AT 1,280 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1924	1.94	1.01	1.25	0.93	1.39	1.96	1.28	1.16	1.22	1.46	1.65	2.37	17.62	55.5	95	-19
1925	2.07	1.09	1.23	0.93	1.35	1.87	1.18	1.16	1.17	1.47	1.61	2.50	17.63	56.0	91	- 1
1926	2.13	1.08	1.18	0.93	1.43	1.78	1.09	1.17	1.28	1.53	1.62	2.57	17.79	41.5	96	- 4
1927	1.50	0.90	0.62	0.55	1.46	1.51	1.50	2.08	1.25	2.43	2.14	2.25	18.19	48.0	.	.
1928	2.09	1.03	1.19	0.95	1.41	1.82	1.15	1.18	1.21	1.62	1.65	2.52	17.82	36.0	.	.
1929	1.60	1.00	1.44	1.22	1.63	2.83	0.71	1.21	1.31	1.87	0.90	1.90	17.62	41.4	.	.
1930	1.61	2.40	1.21	0.87	0.97	1.22	0.55	0.40	1.00	2.66	1.50	1.65	16.04	47.4	.	.
1931	2.15	1.35	0.74	0.86	0.85	2.73	0.25*	0.75	1.87	1.63	1.12	2.60	16.90	35.7	.	.
1932	1.96	1.95	2.96	2.09	1.55	1.05	1.12	1.00	1.29	2.48	3.44	1.78	22.67	61.0	.	.
1933	2.42	1.80	2.15	0.20*	2.00	1.78	0.82	1.05	2.25	4.26*	2.03	2.90	23.66	72.5	.	.
1934	2.75	0.50	1.35	0.57	1.44	1.08	0.70	0.70	3.20	0.92	1.90	3.80	18.91	59.0	.	.
1935	3.80	1.45	0.70	0.45	0.93	1.25	4.37	1.47	1.05	1.90	1.40	1.57	20.34	60.0	.	.
1936	2.45	1.40	2.30	0.73	1.13	1.74	0.95	0.70	2.08	0.80	0.81	2.65	17.74	75.0	.	.
1937	2.50	2.60*	1.39	2.40	1.00	2.38	1.39	1.33	0.43	1.25	2.66	1.82	19.25	88.5*	.	.
1938	0.95	1.55	0.85	0.59	0.41	1.43	0.93	1.36	1.25	1.67	2.26	3.45	16.70	.	.	.
1939	2.85	1.72	0.93	0.20*	1.58	2.63	1.01	0.25	1.09	3.01	1.08	2.48	18.83	.	.	.
1940	1.88	2.05	3.20*	0.98	2.10	0.27*	2.29	0.34	0.81	2.17	2.64	2.00	20.73	.	.	.
1941	1.23	1.08	1.10	0.67	1.67	2.27	1.36	1.57	3.49	1.56	1.50	1.43	18.93	.	.	.
1942	0.33*	0.52	0.74	1.20	3.30*	1.59	4.56*	1.34	0.88	1.57	1.88	2.30	20.21	.	.	.
1943	2.77	0.83	0.28*	0.78	0.85	2.18	1.07	1.20	0.46	2.72	0.49*	2.44	16.07	.	.	.
1944	0.81	1.77	0.62	1.40	1.27	1.93	1.46	1.08	3.01	1.40	2.82	0.96	18.53	.	.	.
1945	3.19	1.30	1.14	1.38	0.89	1.45	1.06	0.67	2.02	3.04	2.52	1.53	20.19	.	.	.
1946	2.79	1.62	0.62	0.95	0.91	3.08	0.96	1.32	1.13	1.04	1.10	1.75	17.27	.	.	.
1947	1.73	2.35	1.08	0.77	0.75	2.70	1.67	0.99	0.97	2.08	1.80	2.21	19.10	.	.	.
1948	0.90	2.45	0.85	2.52	2.45	0.42	2.07	3.27*	1.61	0.98	3.57	1.85	22.94	.	.	.
1949	1.18	2.41	1.12	1.28	1.14	1.48	1.23	0.93	0.84	2.05	1.22	3.35	18.23	.	.	.
1950	1.45	1.91	1.34	1.44	0.97	0.81	1.09	1.04	0.49	1.84	2.35	2.85	17.58	.	.	.
1951	4.28*	2.47	1.98	0.31	1.32	0.69	1.26	0.74	1.38	3.71	1.65	3.28	23.07	.	.	.
1952	2.46	2.07	1.06	0.39	1.14	2.29	0.92	0.54	0.24*	0.41*	0.50	1.60	13.62*	.	.	.
1953	2.27	1.64	0.99	1.06	1.53	4.38*	0.62	1.55	0.71	1.50	2.34	2.52	21.11	.	.	.
1954	2.89	0.92	1.14	1.16	1.83	2.13	2.40	2.61	1.35	0.72	2.53	1.62	21.30	.	.	.
1955	2.05	1.36	1.27	0.90	1.47	3.58	3.52	0.08*	1.15	1.96	3.82*	4.14*	25.30*	.	.	.
1956	3.40	1.65	1.25	1.05	0.81	3.39	1.28	2.36	1.10	2.25	0.95	3.84	23.33	87.3	.	.
1957	2.48	1.33	1.18	0.65	1.53	2.81	1.52	1.94	0.52	0.90	0.88	1.77	17.51	80.0	.	.
1958	3.67	2.07	1.21	1.58	0.84	2.46	0.58	1.10	1.50	1.32	1.70	3.01	21.04	35.1	.	.
1959	2.84	1.89	1.47	0.45	1.54	1.39	1.01	3.21	4.47*	2.89	2.19	0.49*	23.84	68.6	.	.

Table G (Continued)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1960	2.42	1.40	0.57	0.62	2.79	1.41	0.33	3.02	1.59	1.47	1.75	2.57	19.94	45.6	.	.
1961	1.19	2.10	1.24	2.32	1.35	2.24	1.79	1.40	1.55	1.78	1.80	2.89	21.65	63.8	.	.
1962	1.93	0.35*	0.76	1.40	1.18	0.83	2.51	1.96	1.90	1.42	1.44	1.91	17.59	60.9	.	.
1963	1.22	1.31	1.28	2.78*	0.39*	1.47	1.64	1.51	1.17	0.69	1.72	2.29	17.47	26.3*	.	.
High	4.28	2.60	3.20	2.78	3.30	4.38	4.56	3.27	4.47	4.26	3.82	4.14	25.30	88.5	.	.
Low	0.33	0.35	0.28	0.20	0.39	0.27	0.25	0.08	0.24	0.41	0.49	0.49	13.62	26.3	.	.
Average	2.30	1.65	1.25	0.99	1.40	1.96	1.46	1.32	1.47	1.85	1.90	2.35	19.90**	58.9**		

. Record missing
**Thirty-year standard period average - 1931-60

Table H: EAGLE BAY-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), AT 1,200 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow
1924	2.80	1.09	0.54	0.31	0.42	2.05	0.99	2.48	2.18	1.36	2.03	3.15	19.40	57.7
1925	2.75	2.23	1.29	0.66	0.93	1.23	0.18	1.90	1.08	2.08	1.23	3.28	18.84	53.4
1926	2.12	1.04	0.37*	1.22	1.58	0.48	0.11	1.28	3.85	2.65	1.77	3.22	19.79	49.2
1927	3.32	1.03	1.26	0.81	1.34	2.48	1.41	3.30	2.28	2.42	2.50	3.16	25.31	95.4
1928	1.42	0.43	1.86	1.80	1.30	2.97	0.55	0.42	0.56	1.91	1.82	1.04	16.08*	26.9*
1929	1.93	0.68	1.59	1.17	0.95	1.99	0.49	1.51	1.12	2.26	0.79	1.90	16.38	46.9
1930	1.30	3.37	0.93	0.96	1.76	1.22	0.24	0.55	1.70	3.24	1.86	1.25	18.38	73.8
1931	2.57	1.86	1.20	0.64	0.41*	3.43	0.81	0.23	2.50	1.80	3.73	2.15	21.33	63.7
1932	2.30	2.47	2.14	2.03	1.27	1.48	0.86	1.12	1.08	1.85	3.68	2.72	23.00	73.7
1933	2.50	1.60	1.74	0.43	1.52	1.71	0.79	0.75	2.60	3.06	1.28	3.55	21.53	86.0
1934	2.08	0.50	1.37	0.40	0.90	1.00	1.02	0.37	3.00	0.67	0.71	4.32*	16.34	54.0
1935	6.05	1.70	1.58	0.72	1.17	3.03	4.15	0.70	0.97	2.53	2.60	1.63	26.83	101.5*
1936	2.66	2.25	2.23	1.34	0.93	2.22	1.42	1.57	1.50	0.87	1.11	3.40	21.50	85.5
1937	3.40	2.90	1.23	2.29	1.14	2.24	1.72	1.40	0.73	1.79	1.55	2.76	23.15	90.9
1938	1.55	1.67	1.16	0.68	0.57	1.06	0.58	1.50	1.58	1.59	2.64	4.01	18.59	.
1939	3.22	1.60	0.75	0.11*	1.96	2.42	0.78	0.26	0.66	2.57	1.11	2.68	18.22	.
1940	1.45	2.55	3.80*	1.33	1.86	0.37	2.14	0.50	1.35	2.01	2.45	2.57	22.38	.
1941	2.57	1.17	1.19	1.37	1.79	2.19	1.48	1.77	5.19*	1.89	0.93	1.46	23.00	.
1942	0.89*	0.21*	0.74	1.19	4.42*	1.92	4.74*	1.62	0.61	2.14	2.24	3.75	24.47	.
1943	2.95	0.95	0.47	1.33	1.17	2.71	1.48	1.06	0.64	2.82	1.35	2.51	19.44	.
1944	1.17	1.42	1.09	2.13	1.54	0.69	1.40	1.83	3.68	2.33	3.09	1.45	21.82	.

Table H (Continued)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow
1945	3.14	1.21	1.25	1.47	1.07	0.78	1.08	0.63	2.41	3.60	2.68	2.50	21.82	.
1946	4.02	2.16	0.82	1.81	0.98	3.08	0.67	1.31	0.61	2.16	1.66	2.41	21.69	.
1947	2.55	2.82	1.53	1.66	0.95	2.98	2.58	2.13	1.02	2.73	1.81	2.86	25.62	.
1948	1.01	3.60*	0.66	3.72*	2.99	0.51	2.20	3.23	1.60	1.20	4.40*	2.30	27.42*	.
1949	1.30	2.80	1.09	1.15	1.95	1.22	1.28	0.94	1.14	2.24	1.38	3.56	20.05	.
1950	2.30	1.90	2.30	1.44	1.18	1.12	0.76	1.31	0.38	2.29	1.79	3.10	19.87	.
1951	3.93	2.62	1.27	0.49	1.43	0.34*	1.68	1.28	1.38	4.03*	1.74	3.00	23.19	.
1952	3.27	1.81	1.59	0.90	1.05	3.97*	1.23	0.87	0.10*	0.52*	0.38*	2.42	18.11	.
1953	3.36	2.10	1.17	1.61	0.85	3.13	0.72	2.04	0.85	2.33	2.70	3.73	24.59	.
1954	3.10	0.55	1.95	0.84	3.03	2.62	1.91	3.64*	2.37	0.87	3.49	2.62	26.99	.
1955	1.43	1.84	1.11	0.53	1.12	1.74	3.10	0.16*	1.30	1.73	3.57	3.60	21.23	.
1956	3.74	1.49	1.22	0.93	0.49	3.24	1.99	2.15	1.64	2.54	1.06	3.98	24.47	77.7
1957	2.53	0.90	1.36	0.67	1.34	3.27	1.14	1.69	0.68	1.19	1.30	2.63	18.70	75.1
1958	4.87*	2.23	1.38	2.19	1.52	2.41	0.55	1.00	2.29	1.86	2.71	3.32	26.33	31.7
1959	3.04	2.04	1.96	0.51	1.93	1.49	0.91	3.09	4.91	3.05	2.71	0.85*	26.49	72.4
1960	3.86	1.61	0.49	0.82	3.27	1.22	0.03*	3.38	1.97	1.96	1.75	1.92	22.28	57.0
1961	0.98	1.97	1.47	2.01	1.85	1.61	1.11	1.67	1.87	2.18	2.97	2.85	22.54	45.4
1962	2.17	0.80	1.12	1.26	1.54	1.55	2.17	2.32	2.01	1.75	1.99	3.05	21.73	58.8
1963	1.74	1.84	1.47	3.15	0.46	1.83	2.33	1.10	1.52	0.87	2.49	2.36	21.16	28.0
High	4.87	3.60	3.80	3.72	4.42	3.97	4.74	3.64	5.19	4.03	4.40	4.32	27.42	101.5
Low	0.89	0.21	0.37	0.11	0.41	0.34	0.03	0.16	0.10	0.52	0.38	0.85	16.08	26.9
Average	2.76	1.82	1.39	1.22	1.53	1.99	1.51	1.45	1.69	2.07	2.12	2.79	22.34**	61.2**

. Record missing
**Thirty-year standard period average - 1931-60

Table I: TAPPEN-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,450 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1916	2.06	1.86	1.92	1.55	1.92	1.90	3.83	0.76	0.59	0.34*	1.51	2.40	20.64	70.8	97	-23
1917	2.38	1.60	1.73	1.70	2.14	2.78	0.28	1.93	1.58	1.86	1.03	5.04*	24.05	107.9*	101	-20
1918	4.37	2.06	0.78	0.70	1.10	0.66	1.13	2.43	0.14*	2.70	1.81	1.86	19.76	.	100	-12
1919	1.04	2.15	0.87	0.85	1.41	1.00	0.62	0.41	2.43	1.36	2.36	1.95	16.45	57.8	106*	-12
1920	2.42	0.42*	1.28	0.92	1.00	2.50	0.45	1.92	3.04	4.28*	3.36	2.32	24.91	44.6	99	- 4
1921	3.20	1.24	1.18	1.18	1.12	1.36	0.38	1.01	2.16	1.69	3.99	2.33	20.84	77.5	94	-14
1922	3.00	2.25	2.28	1.81	1.11	0.32	0.39	1.44	2.28	2.53	0.96	4.83	23.20	91.5	96	-15
1923	2.99	1.48	1.35	1.12	1.63	2.14	1.23	1.17	1.63	1.97	2.30	2.82	21.83	67.5	93	-18
1924	3.92	1.30	0.29*	0.48	0.44	2.44	0.86	2.13	1.36	1.12	2.27	3.93	20.54	69.0	106*	-22
1925	4.50	2.26	1.11	0.88	0.87	1.32	0.33	1.06	0.68	1.62	1.55	3.90	20.08	73.0	103	4
1926	3.44	1.33	0.63	1.18	2.21	0.83	0.47	1.50	2.04	2.48	1.98	4.09	22.18	49.0	102	- 6
1927	3.60	1.93	0.83	0.92	2.24	1.29	1.62	2.50	2.02	1.99	3.15	3.63	25.72*	101.9	100	-20
1928	2.13	0.61	1.55	1.75	0.85	2.90	0.85	0.23	0.29	1.58	1.31	1.44	15.49	38.1	97	- 5
1929	2.03	0.62	1.77	1.24	0.67	2.73	0.89	1.22	1.41	1.90	0.85	2.76	18.09	54.3	97	-18
1930	1.58	2.48	1.26	1.38	1.56	1.24	0.05*	0.41	1.16	2.71	1.81	1.23	16.87	63.6	101	-13
1931	2.69	1.22	1.07	0.55	0.77	2.55	0.35	0.49	1.88	1.83	2.24	3.28	18.92	70.5	100	2
1932	2.23	2.08	2.27	2.22	1.28	1.27	0.81	1.31	0.95	2.22	4.14*	2.28	23.06	66.1	96	-15
1933	2.90	1.86	2.32	0.36	1.39	1.80	0.87	0.70	2.43	4.01	1.68	3.40	23.72	91.3	97	-14
1934	2.13	0.74	1.88	0.80	1.59	1.47	0.96	0.64	3.01	1.15	2.57	3.86	20.80	57.4	101	- 9
1935	4.93*	1.50	1.01	0.77	1.09	1.75	4.29	1.05	0.80	1.88	1.47	1.52	22.06	76.1	91	-28*
1936	3.22	2.25	1.21	0.59	1.39	1.99	1.17	0.86	1.85	0.86	0.54	2.94	18.87	87.9	96	-26
1937	.	2.24	1.17	2.26	1.07	2.14	2.23	1.50	0.60	0.68	4.09	2.63	.	93.1	93	.
1938	1.78	2.01	1.32	0.61	0.56	1.30	0.74	1.07	1.17	1.27	2.61	4.42	18.86	.	.	.
1939	3.18	1.75	1.07	0.14*	1.42	2.44	0.59	0.12*	1.01	2.31	0.86	3.91	18.80	.	.	.
1940	1.96	2.13	2.85*	1.18	2.10	0.37	1.82	0.36	1.15	1.67	2.40	2.57	20.56	.	.	.
1941	1.88	1.37	0.90	0.80	2.48	2.28	1.05	1.92	4.32	1.25	1.33	2.28	21.86	.	.	.
1942	0.66	0.43	0.44	1.09	3.81*	2.21	4.36*	1.08	1.24	1.81	1.97	3.61	22.71	.	105	3
1943	3.63	1.43	0.72	0.82	1.25	2.12	1.15	0.86	0.42	2.73	0.78	2.51	18.42	.	98	2
1944	1.31	2.30	1.16	2.72*	1.38	1.19	0.69	1.63	3.04	1.99	2.95	1.64	22.00	.	95	-24
1945	4.17	1.75	1.66	1.76	0.78	1.41	0.77	0.52	2.06	3.34	3.25	2.55	24.02	.	104	0
1946	4.05	2.48	0.72	1.29	1.16	2.99	0.68	1.60	0.80	1.55	2.14	2.27	21.73	.	99	3
1947	2.31	2.52	1.09	1.05	0.94	2.85	2.20	1.21	1.06	3.32	2.22	2.15	22.92	.	94	- 1
1951	2.91	2.64	2.36	0.67	1.42	0.51	1.76	0.93	1.40	3.62	1.81	4.36	24.39	.	96	-19
1952	2.51	1.88	1.05	1.23	1.08	2.64	1.10	0.41	0.14*	0.45	0.42*	2.45	15.36*	.	93	-18
1953	2.11	2.63	0.88	1.49	0.85	4.02	0.82	2.25	0.70	1.44	2.43	2.79	22.41	.	93	-22
1954	3.28	1.11	2.53	1.35	2.59	2.68	1.66	3.41*	0.85	0.51	3.48	0.73	24.18	.	91	3
1955	1.90	1.03	1.01	0.39	1.16	2.29	2.32	0.14	0.97	1.77	3.43	3.86	20.27	.	85*	-18

Table I (Continued)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1956	3.06	1.45	1.49	0.61	0.77	2.96	1.43	1.86	0.99	2.08	1.49	2.51	20.70	72.6	95	-17
1957	2.97	1.14	1.74	0.87	2.21	4.18*	0.78	1.65	0.26	1.24	1.24	1.59	19.87	75.6	87	-27
1958	2.69	3.07*	1.48	2.28	1.19	1.46	0.67	0.47	2.33	1.32	1.69	1.99	20.64	34.6	95	5
1959	2.55	1.23	0.90	0.37	2.03	1.85	0.99	2.43	5.08*	2.27	2.22	1.03*	22.95	46.9	94	-13
1960	1.68	.	0.73	1.05	3.15	1.46	0.12	3.31	1.06	.	.	1.78	.	.	96	- 8
1961	0.90*	1.87	1.14	2.57	1.94	.	2.20	0.95	1.52	1.88	.	3.00	.	34.7	95	8*
1962	.	.	.	.	.	.	.	1.51	1.79	2.26	1.91	1.75	.	.	.	.
1963	1.36	1.14	1.42	2.91	0.35*	1.82	1.74	1.13	1.15	0.44	2.72	2.90	19.08	21.8*	94	-10
High	4.93	3.07	2.85	2.72	3.81	4.18	4.36	3.41	5.08	4.28	4.14	5.04	25.72	107.9	106	8
Low	0.90	0.42	0.29	0.14	0.35	0.32	0.05	0.12	0.14	0.34	0.42	1.03	15.36	21.8	85	-28
Average	2.64	1.78	1.37	1.09	1.49	2.03	1.32	1.24	1.49	1.85	2.07	2.67	21.04**	65.4**		

. Record missing
**Thirty-year standard period average - 1931-60

Table J: SALMON ARM (1)-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURE (°F), AT 1,660 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1916	0.85	2.28	1.55	0.76	1.09	1.90	2.87	1.00	0.32	0.19*	1.57	2.28	16.66	54.75	94	-31*
1917	3.68	1.55	1.55	2.36	1.09	1.72	0.07	1.30	1.41	1.41	1.08	3.66	20.88	114.25*	95	-31*
1918	6.50*	1.85	0.44	0.35	0.62	1.46	0.79	2.81	0.21	2.56	2.07	1.80	21.46	106.50	99	-14
1919	2.05	2.30	1.70	0.85	1.06	0.64	0.70	0.47	1.55	1.51	3.11	2.81	18.75	90.00	101	-17
1920	2.43	0.45	1.75	1.63	1.12	2.78	0.38	1.32	2.63	2.81	2.40	2.87	22.57	52.25	101	-11
1921	3.13	2.20	0.80	0.86	1.06	1.75	0.36	0.85	1.26	1.40	3.38	1.47	18.52	86.75	94	-12
1922	2.55	2.15	1.97	1.14	0.71	0.06*	0.29	1.52	2.04	2.65	0.60	3.19	18.87	83.75	98	-11
1923	3.02	1.10	1.14	0.80	2.20	5.02*	0.77	1.29	0.78	1.00	1.60	3.35	22.07	82.00	94	-13
1924	2.86	0.98	0.26	0.28	0.28*	0.96	0.85	2.14	1.63	1.16	2.11	3.61	17.12	65.25	103	-16
1925	4.37	2.11	0.61	0.49	0.66	0.92	0.37	1.10	0.41	0.85	0.65	3.04	15.58	91.35	99	3
1926	3.22	0.91	0.22*	0.40	1.13	0.58	0.06*	0.76	0.99	0.89	1.52	2.67	13.35	53.40	104	- 5
1927	2.03	1.40	0.55	0.47	2.10	0.98	1.42	2.71	2.22	1.68	3.10	2.42	21.08	73.90	98	-20
1928	1.20	0.45	1.76	1.38	0.75	2.14	0.34	0.26	0.05*	0.76	1.45	1.07	11.61*	22.50	101	- 8
1929	1.20	0.10*	0.92	1.86	0.96	3.23	0.57	1.34	1.27	1.54	0.86	2.49	16.34	40.00	98	-18
1930	1.50	2.36	0.91	1.15	2.03	1.46	0.23	0.70	0.90	2.87	2.01	0.79*	16.91	62.70	100	-15

Table J (Continued)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1931	2.01	0.80	1.19	0.88	0.76	2.90	0.29	0.41	1.84	1.85	2.52	2.76	18.21	58.10	101	1
1932	1.92	1.45	2.38	2.11	1.24	1.32	1.02	1.16	0.79	2.25	3.30	2.15	21.09	68.50	98	-17
1933	1.65	1.30	2.35	0.29	1.52	1.32	0.96	0.62	2.07	4.00	1.45	3.06	20.59	86.30	100	-15
1934	1.78	0.26	2.24	0.47	1.13	0.51	1.11	0.45	3.48	1.40	2.92	3.06	18.81	54.80	103	- 4
1935	3.75	1.13	1.12	0.77	1.35	1.71	4.29	0.49	1.01	1.86	1.47	1.85	20.80	68.00	99	-25
1936	4.32	2.63	2.31	2.05	1.10	2.27	0.50	0.91	1.95	0.59	0.66	3.99	23.19	101.90	100	-20
1937	2.42	3.75*	0.72	2.83	1.17	2.44	1.55	1.16	0.43	0.95	4.45*	2.57	24.44	107.50	97	-11
1938	1.73	2.25	0.78	0.42	0.55	1.73	1.45	1.05	1.49	1.27	1.83	4.47	19.02	.	.	.
1939	2.93	1.53	0.94	0.16*	1.66	3.43	0.48	0.23	1.01	1.83	0.87	4.06	19.13	.	.	.
1940	2.08	2.97	4.44*	0.74	2.16	0.58	1.19	0.42	0.53	2.22	1.69	2.34	21.36	.	.	.
1941	1.47	1.95	0.42	0.51	2.83	3.35	1.81	1.26	3.55	1.25	1.70	1.88	21.98	.	106*	6
1942	0.43*	0.41	0.32	1.02	3.08	1.90	4.84*	1.15	0.87	1.67	0.45	0.95	17.09	.	100	- 1
1943	1.76	0.43	0.65	0.83	1.09	1.94	1.11	0.89	0.35	2.75	0.78	2.25	14.83	.	94	-26
1944	1.57	2.25	1.06	1.50	1.33	1.08	1.00	1.96	2.53	1.38	2.85	1.31	19.82	.	102	4
1945	3.68	1.67	1.12	1.42	0.60	1.31	1.54	1.02	1.93	3.33	3.12	2.69	23.43	.	98	0
1946	4.45	2.02	0.84	1.23	1.37	2.60	0.45	1.28	1.43	1.74	3.00	2.06	22.47	.	98	- 3
1947	2.37	1.47	1.21	1.24	1.30	2.78	1.94	1.23	0.82	3.80	2.11	2.42	22.69	.	92	-15
1948	1.10	2.85	1.26	2.85*	3.91*	0.78	2.41	2.71	1.51	1.26	2.69	2.15	25.48*	.	95	- 5
1949	0.87	3.45	1.05	0.71	1.83	1.96	1.55	1.29	0.68	1.90	1.08	3.63	20.00	.	94	-13
1950	1.65	1.73	1.55	1.46	1.26	0.63	1.47	0.67	0.39	3.08	2.45	3.09	19.43	.	97	-30
1951	2.88	2.97	2.24	0.62	0.83	0.36	1.45	1.25	1.27	3.80	1.80	4.57*	24.04	.	93	-18
1952	2.45	0.97	0.61	0.89	0.81	2.35	0.67	0.17*	0.33	0.29	0.39*	4.18	14.11	.	95	-16
1953	1.69	1.78	1.17	1.83	0.65	4.42	0.97	3.45*	0.76	1.31	2.13	2.65	22.81	.	92	- 2
1954	3.68	1.13	1.64	1.10	2.78	1.75	1.95	3.42	0.84	0.65	4.24	1.83	25.04	.	89*	-14
1955	1.95	1.45	1.08	0.45	1.40	1.61	2.20	0.44	0.93	2.25	2.95	3.26	19.97	.	94	-15
1956	3.06	0.91	1.34	0.37	0.52	2.64	1.24	1.92	1.15	2.29	2.56	3.73	21.73	92.40	97	-17
1957	2.31	1.04	2.26	1.01	1.63	3.79	1.02	3.26	0.40	1.34	1.41	1.60	21.07	92.10	90	-21
1958	3.57	3.39	1.49	2.05	1.12	1.82	0.62	0.82	2.54	1.50	2.52	2.52	23.96	47.80	98	7*
1959	2.54	1.61	0.80	0.54	1.77	2.53	1.01	2.26	5.04*	2.48	1.70	0.88	23.16	56.60	99	-15
1960	2.53	2.06	0.68	1.14	2.89	1.38	0.13	2.87	1.22	1.37	1.66	2.07	20.00	46.60	98	- 5
1961	0.91	2.34	1.44	1.38	1.82	1.76	3.15	1.44	1.20	2.87	1.28	2.44	22.03	45.80	99	6
1962	2.34	0.27	0.85	1.27	1.17	1.35	1.34	1.82	1.29	1.93	1.81	1.22	16.66	58.10	99	-10
1963	1.07	0.93	1.72	2.75	0.61	1.53	1.34	1.60	1.34	0.77	2.73	2.00	18.39	17.50*	94	-10
High	6.50	3.75	4.44	2.85	3.91	5.02	4.84	3.45	5.04	4.00	4.45	4.57	25.48	114.25	106	7
Low	0.43	0.10	0.22	0.16	0.28	0.06	0.06	0.17	0.05	0.19	0.39	0.79	11.61	17.50	89	-31
Average	2.35	1.79	1.38	1.12	1.52	1.97	1.41	1.34	1.44	1.92	2.09	2.67	21.00**	65.50**		

. Record missing
**Thirty-year standard period average - 1931-60

Table K: SALMON ARM (2)-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,300 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1952	3.08	1.54	1.04	1.27	0.78	2.96	1.04	0.33*	0.43	0.17*	0.52*	2.40	15.56*	.	96	-22
1953	2.22	1.85	0.93	1.96	0.66*	3.84*	1.29	3.08	0.92	1.67	2.40	3.02	23.84	.	92	4
1954	3.57	1.00	1.63	0.88	2.42	1.71	2.41	4.41*	1.17	0.78	4.81*	1.94	26.73*	.	90*	-21
1955	2.09	1.27	1.69	0.72	1.34	2.04	2.51	0.34	0.98	2.60	3.08	4.10*	22.76	.	95	-20
1956	3.41	1.46	1.82	0.58*	0.78	3.02	0.94	1.94	1.09	2.75	1.56	4.01	23.36	88.1	99*	-20
1957	3.06	1.08	1.93*	0.93	1.78	2.73	1.16	2.52	0.31*	1.03	1.23	2.59	20.35	91.6*	90*	-29*
1958	4.77*	3.34*	1.46	2.54*	1.05	2.39	0.54	0.64	1.90	1.28	2.36	3.16	25.43	43.5	96	5*
1959	3.13	1.39	1.12	0.58*	1.84	2.04	1.01	1.48	4.58*	2.88*	2.28	0.98*	23.31	59.9	98	-15
1960	2.66	1.71	0.91*	1.17	2.71*	1.34*	0.50*	2.65	1.25	1.54	1.57	2.24	20.25	51.1	97	- 8
1961	0.96*	2.18	1.77	2.23	1.90	1.61	2.54*	1.55	0.99	2.37	1.44	3.26	22.80	50.0	98	4
1962	2.17	0.28*	1.17	1.07	0.78	1.55	1.37	1.99	1.55	1.93	1.59	1.19	16.64	66.4	96	-18
1963	1.16	1.05	1.45	2.30	0.51	1.54	1.15	1.88	1.11	0.47	2.72	2.29	17.63	24.1*	97	-15
High	4.77	3.34	1.93	2.54	2.71	3.84	2.54	4.41	4.58	2.88	4.81	4.10	26.73	91.6	99	5
Low	0.96	0.28	0.91	0.58	0.66	1.34	0.50	0.33	0.31	0.17	0.52	0.98	15.56	24.1	90	-29
Average	3.14	1.74	1.54	1.12	1.42	2.09	1.25	1.81	1.27	1.92	2.18	2.83	22.31**	66.3**	45**	

. Record missing
**11 years

Table L: CANOE POINT-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES) (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow
1916	2.82	1.83	2.83*	1.68	1.69	2.24	4.15*	1.20	1.37	0.23*	1.72	2.32	23.63	66.0
1917	2.91	1.22	1.05	1.91*	2.76*	2.40*	0.40*	2.13	2.63	2.61	0.66*	5.50*	26.18*	101.0*
1918	3.07*	2.97*	0.71*	0.46*	1.54	1.78	1.08	2.62*	0.46*	3.56*	2.20	1.84*	22.29	56.0*
1919	1.54*	1.62	0.84	1.17	1.27	0.64*	0.43	0.44*	2.08	2.02	4.52*	2.04	18.61*	63.7
1920	.	0.52*	1.72	1.60	0.82*	1.90	0.93	1.88	2.87*	0.23	1.72	2.32	23.63	.
High	3.07	2.97	2.83	1.91	2.76	2.40	4.15	2.62	2.87	3.56	4.52	5.50	26.18	101.0
Low	1.54	0.52	0.71	0.46	0.82	0.64	0.40	0.44	0.46	0.23	0.66	1.84	18.61	56.0

Table M: ENDERBY-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,1800 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1916	0.85*	2.10	1.30	0.87	0.94	1.86	3.13*	1.22	0.74	0.20*	1.18	1.97	16.36	52.0	95*	-32*
1917	2.65	1.15	1.74	2.48*	2.10*	2.31	0.63	0.99	1.79	1.90	0.68	5.80*	24.22*	109.7*	96	-31
1918	4.06*	2.17	1.13	0.28	0.98	1.17	0.94	2.76*	0.23*	2.56*	1.67	2.03	19.98	69.2	99	-21
1919	1.46	2.51*	1.07	0.65	1.21	0.69	1.21	0.71*	1.69	1.58	1.87	1.63	16.28	69.2	100	-24
1920	2.58	0.44*	2.09*	1.94	0.72	2.30	0.64	0.73	2.12*	2.47	1.46	1.78	19.27	45.2	97	-15
1921	1.57	0.71	0.88	1.22	0.55*	2.58	0.40	1.17	1.75	0.81	2.80*	1.48*	15.92	42.2	96	-15
1922	2.23	2.17	1.56	0.97	0.80	0.16*	0.35	1.99	2.00	2.50	0.69	2.02	17.44	66.5	97	-21
1923	1.72	1.10	1.12	0.81	1.83	4.22*	1.33	0.86	0.84	1.16	1.16	2.18	18.33	55.7	96	-20
1924	2.28	0.69	0.44	0.39	1.24	1.78	1.09	2.39	1.15	0.92	1.34	4.45	18.76	70.5	101	-27
1925	3.82	1.08	1.20	0.75	1.24	0.91	1.64	1.30	0.50	0.57	0.41*	2.33	15.75	60.2	102	- 7
1926	2.30	0.54	0.38	0.67	1.78	0.69	0.09*	1.70	1.78	2.25	1.49	1.87	15.54*	37.0*	104*	- 2*
1927	2.40	0.50	0.16*	0.08*	1.52	0.63	1.28	.	.	.	.	.	.	.	.	.
1928	2.48	1.47	1.08	0.94	1.33	1.98	1.25	1.26	1.39	1.49	2.02	2.40	19.09	.	.	.
High	4.06	2.51	2.09	2.48	2.10	4.22	3.13	2.76	2.12	2.56	2.80	5.80	24.22	109.7	104	- 2
Low	0.85	0.44	0.16	0.08	0.55	0.16	0.09	0.71	0.23	0.20	0.41	1.48	15.54	37.0	95	-32

Table N: ARMSTRONG-MONTHLY AND ANNUAL PRECIPITATION AND ANNUAL SNOW (INCHES), EXTREME HIGH AND LOW TEMPERATURES (°F), AT 1,187 FEET ELEVATION (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1916	1.00	1.94	0.95	0.95	0.86	1.90	3.82	0.91	0.72	0.12	1.32	0.85	15.34	38.0	91	-33
1917	1.88	0.93	0.79	2.09	1.97	1.96	0.33	0.77	1.67	1.35	0.32	4.30	18.36	64.7	94	-27
1918	2.65	1.22	0.70	0.34	1.07	1.46	1.28	2.69	0.49	2.23	1.70	1.87	17.70	37.5	96	-23
1919	1.35	1.57	0.85	0.83	0.90	0.73	0.37	0.76	1.21	2.04	2.18	1.35	14.14	53.5	100	-26
1920	1.51	0.32	1.37	1.50	0.41	2.66	0.35	1.01	2.96	3.14	3.04	1.70	19.97	21.0	98	-11
1921	1.85	0.85	1.64	1.11	0.50	2.46	0.37	0.99	1.37	0.93	3.16	0.98	16.21	38.8	94	-15
1922	1.59	1.90	1.75	0.74	0.75	0.17	0.21	1.29	1.89	2.23	0.47	1.67	14.66	55.4	97	-20
1923	1.77	0.50	0.77	0.51	1.67	4.15*	1.28	1.79	0.77	1.23	1.01	1.37	16.82	34.0	91	-17
1924	2.64	0.56	0.45	0.18	0.12*	1.59	0.40	1.80	0.71	1.15	1.21	4.33	15.14	67.0	98	-26
1925	2.90	0.92	0.73	0.71	1.26	1.03	1.22	0.84	0.37	1.17	0.61	3.15	14.91	61.0	96	- 4
1926	2.60	1.23	0.37	1.01	1.77	1.35	0.39	1.61	2.11	1.92	2.08	2.42	18.86	42.0	103	- 4
1927	2.39	0.95	0.57	0.53	1.42	1.27	1.52	1.97	2.79	1.90	2.89	2.29	20.49	61.2	99	-26
1928	2.38	0.22	1.81	1.95	1.02	2.72	0.49	0.32	0.44	1.21	0.85	0.78	14.19	24.0	96	-15
1929	1.50	0.30	1.20	1.06	1.30	3.86	0.14	2.67	1.78	1.66	0.87	2.08	18.42	38.5	100	-26

Table N (Continued)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	Snow	High	Low
1930	1.15	2.06	0.78	0.97	1.43	0.81	0.04*	0.47	0.37	1.93	1.16	0.40*	11.57	37.5	100	-22
1931	0.55	0.36	1.20	0.56	1.01	3.76	0.42	0.44	1.82	1.91	.	.	.	.	98	.
1932	.	.	.	1.75	0.94	1.08	0.80	1.70	0.91	1.60	2.43	5.80*	.	.	90*	.
1933	1.42	1.26	1.42	0.46	0.81	1.37	1.29	0.31	2.26	4.07*	1.40	3.64	19.71	79.1	93	-24
1934	1.78	0.18*	1.69	0.32	1.54	0.79	0.78	0.41	2.75	1.24	1.94	2.61	16.03	42.2	100	- 5
1935	2.43	1.26	1.59	0.52	1.27	2.10	3.38	1.04	0.73	1.92	1.30	1.15	18.69	53.3	97	-38
1936	2.86	2.26	0.99	0.98	0.87	2.32	0.94	0.78	1.92	0.52	0.33	2.90	17.68	70.4	102	-38
1937	3.53	2.43	0.12*	1.56	0.57	2.33	0.89	0.68	0.23	0.46	4.79*	1.98	19.57	101.1*	96	-34
1938	1.10	0.84	0.43	0.14	0.18	0.56	0.59	0.99	1.67	1.22	1.10	3.73	12.55	.	.	.
1939	1.65	1.35	0.46	0.11*	1.42	2.10	1.03	0.00*	0.48	1.62	0.64	2.12	12.99	.	.	.
1940	1.32	1.02	1.86*	0.51	0.93	0.25	1.21	1.19	0.44	0.89	2.64	1.41	13.67	.	.	.
1941	1.82	1.13	0.55	0.40	3.97*	2.74	0.58	1.36	3.54*	1.95	1.34	1.41	20.79	.	105*	- 4
1942	0.23*	0.38	0.47	0.92	3.65	2.17	4.89*	1.29	0.27	1.69	0.64	2.63	19.23	.	102	- 5
1943	1.31	0.85	0.28	0.48	1.07	0.88	0.81	1.51	0.56	2.52	0.32	1.80	12.39	.	97	-39
1944	0.92	1.75	0.35	1.05	0.57	0.30	0.97	1.19	1.74	0.97	2.59	1.75	14.15	.	103	-12
1945	1.60	1.67	0.20	0.68	0.76	0.12	1.11	0.05	2.10	3.32	1.22	1.85	14.68	.	99	- 5
1946	2.99	1.03	0.88	0.72	0.78	2.53	.	0.46	0.59	1.75	3.00	1.63	16.36	.	99	-10
1947	1.53	1.48	0.84	0.45	0.23	3.41	1.98	0.27	1.16	2.64	2.00	2.97	18.96	.	95	-16
1948	0.25	2.80*	1.15	2.77*	2.40	1.43	1.91	3.77*	1.16	1.59	1.14	2.18	22.55*	.	100	-17
1949	1.15	2.75	0.87	1.16	1.26	1.27	2.06	0.94	0.99	1.26	0.82	3.68	18.21	.	97	-27
1950	0.65	1.21	1.26	1.16	1.18	0.24	0.93	0.77	1.06	1.50	1.74	4.54	16.24	.	98	-44*
1951	1.22	2.58	1.57	0.41	0.75	0.02*	1.57	0.70	0.81	3.17	0.76	4.97	18.53	.	97	-38
1952	1.60	1.36	0.93	0.76	1.10	2.01	0.56	0.30	0.22*	0.16	0.22*	1.37	10.59*	.	99	-31
1953	1.90	2.43	0.53	1.70	0.55	3.51	0.67	2.03	0.99	1.00	1.90	2.88	20.09	.	98	5*
1954	4.17*	0.59	0.38	0.27	1.72	2.53	1.47	1.75	1.55	0.08*	.	0.88	.	.	91	-31
1955	0.87	0.79	0.28	0.11*	0.61	1.24	2.27	0.17	1.53	1.34	2.70	3.21	15.12	.	99	-21
1956	1.90	1.38	1.35	0.27	0.69	2.65	0.54	1.16	1.94	1.76	1.01	3.34	17.99	66.1	99	-27
1957	3.41	1.10	1.72	0.63	1.20	2.10	0.75	2.43	0.65	.	0.73	1.10	.	85.5	92	-31
1958	2.92	1.75	0.97	1.44	1.41	2.20	0.38	0.59	1.76	1.80	2.25	2.94	20.41	.	99	- 4
1959	2.95	1.47	1.22	0.53	2.20	1.77	0.39	2.01	3.28	2.05	2.28	0.91	21.06	74.1	99	-19
1960	2.53	1.47	0.66	0.73	3.12	0.75	0.07	2.08	1.23	0.89	1.62	1.91	17.06	56.2	103	-12
1961	0.69	1.83	0.91	1.38	1.85	1.76	1.48	2.31	1.06	1.55	1.74	3.26	19.82	44.0	101	1
1962	2.43	0.66	0.95	0.68	0.92	0.80	1.19	1.74	1.64	1.45	1.61	0.87	14.94	72.9	96	-20
1963	1.03	0.82	1.22	1.95	0.57	1.48	1.35	1.86	1.26	0.94	1.87	1.94	16.29	16.2*	96	-19
High	4.17	2.80	1.86	2.77	3.97	4.15	4.89	3.77	3.54	4.07	4.79	5.80	22.55	101.1	105	5
Low	0.23	0.18	0.12	0.11	0.12	0.02	0.04	0.00	0.22	0.08	0.22	0.40	10.59	16.2	90	-44
Average	1.81	1.41	0.87	0.79	1.29	1.68	1.17	1.08	1.34	1.56	1.55	2.38	16.93**	53.0**	44**	

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**Thirty-year standard period average - 1931-60

Table O: SPRING AND FALL FROSTS AND DURATION OF FROST-FREE PERIODS (26).

Station	Last Frost in Spring			First Frost in Fall			Frost-free Days	Number of Years	Elevation Feet
	Mean	Earliest	Latest	Mean	Earliest	Latest			
Westwold	June 2	May 12	July 3	Sept. 8	Aug. 15	Oct. 7	98	26	2,125
Glenemma	May 12	March 5	June 23	Sept. 5	July 31	Sept. 23	116	7	1,480
Monte Creek (Ducks)	May 23	May 7	June 13	Sept. 16	Aug. 31	Oct. 28	116	11	1,156
Tappen	May 11	April 15	June 3	Sept. 29	Sept. 10	Nov. 12	141	33	1,450
Salmon Arm	May 6	April 7	June 3	Oct. 5	Sept. 10	Nov. 3	153	35	1,600

Table P: RAINFALL DURING MAY, JUNE, JULY, AND AUGUST IN INCHES AT NINE SALMON AND THOMPSON VALLEY STATIONS FOR THE PERIODS SHOWN.

Year	Westwold	Falkland	Glenemma	Monte Creek	Chase	Sorrento	Eagle Bay	Tappen	Salmon Arm
1916			7.50	4.56				8.41	6.86
1917			9.07	3.40				7.13	4.18
1918				4.86				5.32	5.68
1919								3.44	2.87
1920								5.87	5.60
1921	4.44		4.20					3.87	4.02
1922	2.38		3.46	2.47				3.26	2.58
1923	7.31		6.35	5.85				6.17	9.28
1924	5.54	5.54	4.91	4.10		5.97	5.94	5.87	4.23
1925	3.71	4.27				5.56	4.24	3.58	3.05
1926	5.13	6.48				5.47	3.45	5.01	2.53
1927	8.32	8.11				6.55	8.53	7.65	7.21
1928	4.54	5.28				5.56	5.24	4.83	3.49
1929	4.78	3.80				6.38	4.94	5.51	6.10
1930	4.02	2.06				3.14	3.77	3.26	4.42
1931	2.70					4.58	4.88	4.16	4.36
1932	4.52					4.72	4.73	4.67	4.74
1933	4.90					5.65	4.77	4.76	4.42
1934	4.78					3.92	3.29	4.66	3.20
1935	8.64					8.02	9.05	8.18	7.84
1936	5.65					4.52	6.14	5.41	4.69
1937	4.90					6.10	6.50	6.94	6.32
1938	4.83					4.13	3.71	3.67	4.78
1939	5.98					5.47	5.42	4.57	5.80
1940	4.18					5.00	4.87	4.65	4.35
1941	8.64					6.87	7.23	7.73	9.25
1942	7.41					10.79	12.70	11.46	10.97
1943	4.11					5.30	5.85	5.38	5.03
1944	6.50					5.74	5.46	4.89	5.37
1945	3.59					4.07	3.53	3.48	4.47
1946	4.90					6.27	6.04	6.43	5.70
1947	4.82					6.11	8.64	7.20	7.25
1948	7.78					8.21	8.93		9.81
1949	4.62					4.78	5.39		6.63
1950	3.14					3.91	4.37		4.03
1951	2.96					4.01	4.73	4.62	3.89
1952	2.81					4.89	7.12	5.23	4.00
1953	6.66				6.52	8.08	6.74	7.94	9.49
1954	6.62					8.97	11.20	10.34	9.90
1955	4.44					8.65	6.12	5.91	5.65
1956	3.98					7.84	7.87	7.02	6.32
1957	4.85					7.80	7.44	8.82	9.70
1958	2.91				3.57	4.98	5.48	3.79	4.38
1959	6.29	6.34			6.16	7.15	7.42	7.30	7.57
1960	4.85	6.04			5.97	7.55	7.90	8.04	7.27
1961	5.72	5.97			3.59	6.78	6.24		8.17
1962	5.11	4.28			3.91	6.48	7.58		5.68
1963	5.30	5.09			3.31	5.01	5.72	5.04	5.08
Average	5.10	5.27	5.91	4.20	4.72	6.02	6.23	5.85	5.80

Table Q: SALMON ARM-HOURS OF BRIGHT SUNSHINE (17).

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1914	31	57	122	163	261	201	294	299	122	121	29	23	1,723
1915	41	52	158	195	210	224	262	319*	159	117	56	43	1,836
1916	93*	96	94	165	206	214	233	302	200	173*	76*	33	1,885
1917	39	64	121	171	209	201	366	311	188	135	58	32	1,895
1918	26	66	105	252*	224	287	272	223	282*	97	51	37	1,922
1919	29	53	122	193	207	265	329	272	207	87	35	51	1,850
1920	36	130*	102	152	206	221	346	279	164	97	44	23	1,800
1921	44	83	111	173	297	220	328	248	136	115	40	53*	1,848
1922	50	95	132	185	218	291	256	222	181	104	47	39	1,820
1923	49	105	154	236	200	212	320	276	234	141	43	37	2,007*
1924	52	94	136	147	303	272	299	231	199	93	60	49	1,935
1925	40	56	118	191	271	254	320	183	172	137	64	12	1,818
1926	9*	52	199*	228	199	293	293	182	155	98	31	20	1,760
1927	28	55	117	179	200	245	293	261	132	76	21	34	1,641
1928	25	88	119	150	190	203	282	297	205	119	45	13	1,736
1929	41	99	124	190	270	206	328	291	178	118	48	15	1,908
1930	89	89	166	161	185	207	347*	275	180	85	21	21	1,827
1931	30	36	95	157	224	181	333	262	114	119	30	18	1,597
1932	42	56	94	157	241	280	239	234	177	105	26	51	1,702
1933	34	57	116	199	195	231	331	303	102	105	21	20	1,713
1934	34	92	117	235	252	296	301	310	129	68	33	12	1,878
1935	32	58	87	181	230	205	242	220	215	95	39	20	1,624
1936	12	86	100	153	199	222	330	274	158	131	37	31	1,734
1937	75	58	139	91	243	232	299	179	230	111	25	35	1,715
1938	30	77	111	166	226	258	326	215	198	132	34	17	1,890
1939	26	83	100	189	199	180	291	292	191	97	42	24	1,716
1940	45	36	116	136	235	268	253	252	219	94	49	22	1,725
1941	22	89	168	222	199	224	332	224	100*	67	60	26	1,733
1942	37	68	134	178	150	219	249	272	225	119	22	12	1,682
1943	35	87	138	142	212	241	304	223	230	79	42	28	1,761
1944	48	79	137	172	230	237	296	235	179	98	30	16	1,755
1945	26	64	106	150	268	200	315	293	157	108	26	7	1,720
1946	22	54	106	109*	298*	177	296	304	177	109	42	.	1,692
1947	13	74	167	168	262	192	314	251	201	90	20	14	1,766
1948	40	54	125	126	195	266	250	165*	162	124	25	.	.
1949	.	59	167	170	249	228	256	245	221	104	42	31	1,772

Table Q (Continued)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1950	56	55	105	146	203	287	306	278	273	80	55	12	1,856
1951	50	68	107	268	242	260	340	265	203	89	45	32	1,969
1952	31	43	71*	163	241	192	296	251	201	121	.	12	.
1953	17	59	113	133	211	126*	230	231	164	78	31	19	1,412*
1954	16	38	128	128	215	177	259	207	139	93	35	16	1,452
1955	12	50	111	145	149	195	220*	317	206	84	64	17	1,569
1956	27	50	105	220	278	149	328	275	187	57*	20	6	1,701
1957	50	73	92	151	244	173	233	223	171	83	33	3*	1,529
1958	11	28	132	146	297	225	331	274	137	99	33	3*	1,716
1959	20	58	95	200	187	185	314	209	102	64	30	7	1,472
1960	15	66	119	179	144*	180	343	192	162	65	20	4	1,489
1961	18	29*	83	152	205	315*	293	273	152	65	42	11	1,637
1962	17	72	102	137	187	226	271	186	171	74	18*	5	1,465
1963	29	44	77	112	264	201	217	266	178	67	26	10	1,491
High	93	130	199	252	298	315	347	319	282	173	76	53	2,007
Low	9	29	71	109	144	126	220	165	100	57	18	3	1,412

.Record missing

GLOSSARY

Alluvium - All materials moved and deposited by running water.

Acre-foot - The amount of irrigation water required to cover an acre to a depth of one foot.

Alluvial fan - A fan-shaped deposit of outwash at the toe of a slope where a tributary enters a main valley.

Available plant nutrients - Nutrients in the soil in condition to be taken up by plant roots.

Boulders - Fragments of rock over two feet in diameter.

Calcareous - Material containing free calcium carbonate. It effervesces when treated with dilute hydrochloric acid. When the effervescence is strong to violent, the material is strongly calcareous.

Cobbles - Fragments of rock from three to 10 inches in diameter.

Colluvium - Poorly sorted material which accumulates at the base of steep slopes through the influence of gravity.

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

Consistence - The mutual attraction of particles in a soil mass and their resistance to separation or deformation. It is described as loose, very friable, friable, firm, very firm, soft, slightly hard, hard or very hard.

Creep - Mass movement of soil or soil material down slopes primarily by gravity, but helped by saturation with water and alternate freezing and thawing.

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

Delta terraces - Deposits of streams in temporary glacial lakes. When the drainage cycle eroded to present levels they were left as high terrace-like deposits at the mouths of tributary valleys, which terminate abruptly where they enter a main valley that contained a lake.

Dry farming - Farming without irrigation, particularly in areas where rainfall in the growing season is not adequate for optimum crop production.

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

Erosion - The wearing away of the land surface by running water, wind or other forces. It includes sheet, rill and gully erosion of soils.

Eolian deposits - Wind deposited sediments, such as loess and dune sand.

<u>Farm delivery requirement</u> - The amount of irrigation water required by a given soil type during an irrigation season, expressed in acre-inches or acre-feet. Sometimes referred to as the duty of water.

<u>Floodplain</u> - A river deposit subject to overflow. A floodplain is characterized by a series of lateral accretions near the river channel, and a gentle down-slope to a generally swamped inner margin. Fossil floodplains are chiefly floodplain remnants beyond the reach of high water.

<u>Glacial till</u> - An unsorted, generally unconsolidated, heterogeneous mixture of stones, gravel, sand, silt, and clay produced by glaciers and deposited during recession of the ice-front.

<u>Glacio-lacustrine deposits</u> - Material carried by melt-water and deposited in temporary glacial lakes.

<u>Gley</u> - A soil process in which the material has been modified by a reduction process brought about by saturation with water for long periods in the presence of organic matter. The soils are described as being weakly, moderately, strongly or very strongly gleyed.

<u>Gravel</u> - Rock fragments from two millimeters to three inches in diameter.

<u>Horizon</u> - A layer in the soil profile approximately parallel to the land surface with more or less well-defined characteristics produced through the operation of soil-forming processes. The soil horizons are as follows:

<u>Organic horizons</u>

L - A layer of organic matter in which the plant remains can be identified.

F - A layer of partly decomposed organic matter. The plant remains can be identified, but with difficulty.

H - A layer of well decomposed organic matter. The plant remains cannot be identified.

<u>Master mineral horizons</u>

A - A mineral soil horizon or horizons formed at or near the surface in the zone of maximum removal of materials in solution and suspension and/or maximum accumulation of organic matter. It includes (1) horizons in which organic matter has accumulated as a result of biological activity (Ah), (2) horizons that have been eluviated of clay, iron, aluminium and/or organic matter (Ae), (3) horizons dominated by (1) and (2) above but transitional to underlying B or C (AB or A and B), (4) horizons markedly disturbed by cultivation or pasturing (Ap).

B - As used in this report, a mineral soil horizon or horizons characterized by one or more of the following (1) an enrichment of silicate clay, iron and aluminium (Bt, Bf) and (2) an alteration by hydrolysis or oxidation to give a change of color or structure, but does not meet the requirement of (1) above (Bm).

C - A mineral horizon or horizons comparatively unaffected by pedogenic processes operative in A and B, excepting the process of gleying (Cg), and the accumulation of magnesium carbonate and more soluble salts (Cca, Ck, Cs).

Lower case suffixes

c - A cemented (irreversible) pedogenic horizon.

ca - A horizon with secondary carbonate enrichment.

cc - Cemented (irreversible) pedogenic concretions.

e - A horizon characterized by removal of clay, iron, aluminium or organic matter. Usually lighter in color than the layer below.

f - A horizon enriched with iron. Usually browner or redder in color than the horizon above or below.

g - A horizon characterized by chemical reduction and gray colors; often mottled (gley).

h - A horizon enriched with organic matter.

j - A horizon whose characteristics are weakly expressed (juvenile).

k - A horizon in which the presence of carbonates is indicated by visible effervescence with dilute acid.

m - A horizon slightly altered by hydrolysis and/or solution to give a change of color and/or structure.

n - A horizon with distinctive morphological and physical characteristics as shown by coatings on the surface of the peds and characterized by prismatic or columnar structure, and hard to very hard consistency when dry. It contains more than 12 per cent exchangeable sodium or more than 50 per cent exchangeable sodium plus magnesium.

p - A layer disturbed by man's activities; i.e., by cultivation or pasturing. Used only with the A horizon.

t - A horizon enriched with silicate clay.

Additional terms

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

(2) Horizon subdivisions are shown with figures as suffixes (Ap1, Ap2, etc.).

(3) If more than one lower case suffix is required and if only one is a weak expression, then the "j" is linked to the suffix with a bar; i.e., $Ah\overline{ej}$.

Horizon boundary - The vertical width or thickness between soil horizon boundaries is defined as follows:

Abrupt - Less than one inch wide.

Clear - From one to two inches wide.

Gradual - From $2\frac{1}{2}$ to five inches wide.

Diffuse - More than five inches wide.

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

Ice-rafted - Stones or other material transported and deposited by floating ice.

Illuvial horizon - A horizon that has received material in solution from some other part of the soil profile.

Kame - A more or less conical or irregular knoll, hummock or terrace-like deposit, usually composed of sand and/or gravel, originally deposited in irregular channels along the margin of a valley glacier, or in a crevasse in the ice.

Kettle - A depression formed in outwash by collapse of the surface after the melting of buried ice. Kettles vary in size. Some are dry; others contain ponds or swamps.

Leaching - The removal of constituents from the soil by percolating water.

Lime-plated - Precipitated calcium carbonate on gravel, cobbles and stones or other soil material.

Loess - Materials having a silty to very fine sand texture produced by glaciers as rock flour, and distributed by the wind.

Marginal soils - Soils of doubtful value for a given purpose.

Meander - One of a series of loop-like bends in the course of a river.

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

Muck - Fairly well decomposed organic soil, often containing a high proportion of mineral material.

Orthic - A term that identifies the normal or central concept of a Great Soil Group. Other subgroups are departures from the Orthic.

Outwash - All materials washed out of melting glacier ice and deposited by melt-water streams.

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

Peat - Undecomposed to partly decomposed organic material with recognizable plant remains. Peat accumulates in bogs and seepage areas under very moist conditions.

Peds - An individual natural soil aggregate.

pH - A logarithmic designation of the relative acidity or alkalinity of soils or other materials. The range of pH is as follows:

Extremely acid	< pH 4.5
Very strongly acid	pH 4.5 to 5.0
Strongly acid	pH 5.1 to 5.5
Medium acid	pH 5.6 to 6.0
Slightly acid	pH 6.1 to 6.5
Neutral	pH 6.6 to 7.3
Mildly alkaline	pH 7.4 to 7.8
Moderately alkaline	pH 7.9 to 8.4
Strongly alkaline	pH 8.5 to 9.0

Plant nutrients - The elements taken in by the plant, essential to its growth, and used by it in the elaboration of its food and tissue. These include nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, zinc, boron, copper, manganese, and perhaps others obtained from the soil; and carbon, hydrogen and oxygen obtained chiefly from air and water.

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

Rapidly drained - Soil moisture seldom exceeds field capacity in any horizon except immediately after additions of water. Soils are free of mottling throughout the profile.

Well-drained - Soil moisture in excess of field capacity does not remain in any horizon for a large part of the growing season. Soils are free of mottling in the A and B horizons, but may be mottled in the C horizon or below depths of several feet.

Moderately well drained - Soil moisture in excess of field capacity remains for a small but significant part of the growing season. The soils are mottled in the B and C horizons. The Ae horizon may be slightly mottled in fine textured soils or in medium textured soils that have a slowly permeable layer beneath the solum. In grassland soils the B and C horizons may be faintly mottled and the A horizon is thick and dark.

Imperfectly drained - Soil moisture in excess of field capacity remains in subsurface horizons for significant periods during the year. In grassland soils, mottling usually occurs immediately below the A horizon.

Poorly drained - Soil moisture in excess of field capacity remains in all horizons for a large part of the year. In poorly drained grassland soils there is generally a thickened mucky surface horizon underlain by yellowish to bluish subsoil with or without mottling.

Very poorly drained - Free water remains at or within 12 inches of the surface most of the growing season. In grassland soils very poor drainage is generally accompanied by a thin, mucky surface horizon underlain by yellowish to bluish subsoil with or without mottling.

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

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

Soil structure - The morphological aggregates in which soil particles are arranged. The following types of soil structure are mentioned in this report:

Granular - More or less rounded, with no smooth faces and edges.

Platy - Thin, horizontal plates; the horizontal axis is longer than the vertical one.

Subangular blocky - Block-like aggregates with rounded corners. The horizontal and vertical axes are about the same length.

Blocky - Block-like aggregates with sharp, angular corners.

Columnar - Large aggregates with the vertical axis longer than the horizontal. The vertical edges near the top of the columns are not sharp. The columns may be flat-topped, round-topped or irregular.

Prismatic - Large aggregates with the vertical axis longer than the horizontal. The vertical faces are well defined and the edges are sharp.

Single-grained - Each grain by itself, as in sand.

Massive - A cohesive mass of soil, with no observable aggregation of particles.

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

Stoniness - The classes of stoniness as defined in this report and on the soil map are as follows:

Stones 0 - Non-stony land.

Stones 1 - Slightly stony land - some stones which offer only slight to no hindrance to cultivation.

Stones 2 - Moderately stony land - enough stones to cause some interference with cultivation.

Stones 3 - Very stony land - sufficient stones to constitute a serious handicap to cultivation. Some clearing required.

Stones 4 - Exceedingly stony land - sufficient stones to prevent cultivation until considerable clearing is done.

Stones 5 - Excessively stony land - too stony to permit any cultivation (boulder or stone pavement).

Stratified - Composed or arranged in strata or layers. The term is applied to water-sorted geological materials from which soils are derived.

Stream braiding - In shallow water a stream loaded with fine sediments may choke its channel with deposits, then overflow and cut new channels. When repeated this process is called braiding.

Submarginal soils - Soils that are unsuitable for a given purpose.

Talus - Rock fragments and soil material accumulated at the foot of a cliff or steep slope, chiefly by gravity.

Terrace - A relatively flat, horizontal or gently inclined plain. Terraces are usually long and narrow along valley sides, with a steep slope to the river on one side, and to another terrace or valley side on the other.

Texture - Soil texture is based on the amount of sand, silt and clay a soil may have. Sand consists of particles ranging in size from 2.0 to 0.05 mm, silt from 0.05 to 0.002 mm, and clay is composed of all particles smaller than 0.002 mm.

Texture groupings - Soil textures are classified in five classes as follows:

Coarse textured soils - sands, loamy sands.

Moderately coarse textured soils - sandy loam, fine sandy loam.

Medium textured soils - very fine sandy loam, loam, silt loam, silt.

Moderately fine textured soils - clay loam, sandy clay loam, silty clay loam.

Fine textured soils - sandy clay, silty clay, clay.

Topography - The following topographic classes and slope percentages have been used:

Simple topography (single slopes; regular surfaces)

	Symbol	Percent Slope
Depressional to level	A	0 to 0.5
Very gently sloping	B	0.5 to 2
Gently sloping	C	2 to 5
Moderately sloping	D	6 to 9
Strongly sloping	E	10 to 15
Steeply sloping	F	16 to 30
Very steeply sloping	G	31 to 60
Extremely sloping	H	Over 60

Complex topography (multiple slopes; irregular surfaces)

Very gently undulating	a	0 to 0.5
Gently undulating	b	0.5 to 2
Undulating	c	2 to 5
Gently rolling	d	6 to 9
Rolling	e	10 to 15
Strongly rolling	f	16 to 30
Moderately hilly	g	31 to 60
Hilly	h	Over 60

Water table - The upper limit of that part of the soil profile or underlying material that is wholly saturated with water.

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