A GEOGRAPHICAL STUDY OF VANCOUVER ISLAND

by

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A THESIS SUBMITTED IN PARTIAL FULFILMENT OF

THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS

in the Department

of

Geology and Geography

We accept this thesis as conforming to the

standard required from candidates for the

degree of MASTER OF ARTS

Members of the Department of
Geology and Geography

THE UNIVERSITY OF BRITISH COLUMBIA

APRIL, 1954

ABSTRACT

A GEOGRAPHICAL STUDY OF VANCOUVER ISLAND

Vancouver Island offers varied relief from coastal plains to high mountains in the central portion of the Island. The coastline is broken, especially in the Western Coast, illustrating beautifully the work of glaciers, and thereby providing Vancouver Island with excellent harbours. These inlets also help in the exploitation of the timber resources of the Island. From these mountains spring up rivers that provide electric power for domestic and industrial uses. The southeastern coastal plain, which is highly developed, varies in width from a mile to a few miles. The glacial soils, with favourable topography, are put to intensive use around the area of urban concentrations, to supply the local markets.

Climates differ from one part of the region to another. The Western Coast has an annual rainfall over one hundred inches as compared to about forty inches in the southeast. The northern part of the Island is cloudy, but the south is known for sunshine. Topography, helped by climate, makes Vancouver Island a major forest region and the forest accounts for the prosperity of the region.

Forestry is the main primary occupation on Vancouver Island. Most of the secondary and tertiary industries of the Island depend upon forests for their raw material. Forest products contribute a major portion of the Island's export. Pulp and paper production is expanding rapidly. It is the physical and economic factors that make Vancouver Island one of the leading producers of forest products in Canada.

Agricultural activity is limited to the southeastern part. Specialized crops are the most favoured ones because they bring high revenues. Dairying and poultry are well developed. Dairy accounts for fifty percent of the total value of the farm products. Because of sub-division and the encroachment by the urban expansion on the farm land, farms are becomming smaller and the number of part time farms is increasing.

Fishing is important in some local areas, but processing of fish products is declining. The main fishing regions lie to the north-east and the other is to south and southeast of the Island. In terms of catch, herring leads in quantity, but Salmon is themost valuable.

Mining contributes about nine million dollars annually. Structural materials are the most valuable types of production. Coal mining, which was once prominent, is declining, but the Comox fields might change the picture again. Iron and copper are also mined.

Because of the favourable climate and opportunities for work, the population of Vancouver Island is increasing steadily. The south-eastern part is densely populated. Population consists of many national groups but those of British origin are most numerous.

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INTRODUCTION

Vancouver Island, which bears the name of a great explorer, in other words a geographer, serves as a breakwater to the Lower Mainland of British Columbia and is separated from it by a syncline of the North American Cordillera. With its area of 13,000 square miles, it is the largest island off the Pacific Coast. It varies in width from 50 to 80 miles and is 282 miles long.

The Insular Mountains, with their Northwest-Southeast trend, rise to an elevation of 6,000 to 7,000 feet above sea level in the central part of the Island. Toward the North and South, the high glaciated peaks give way to densely timber ridges, hills, valleys and plateaus, that support the lumber industry of the Island. At the bases of the mountains lie the coastal plains - the most extensive and most favoured by the climate are found on the lee side of the southern mountains. Here climatic and soil conditions are best suited to agricultural production. Though limited in area it is highly developed agriculturally, industrially, economically and culturally.

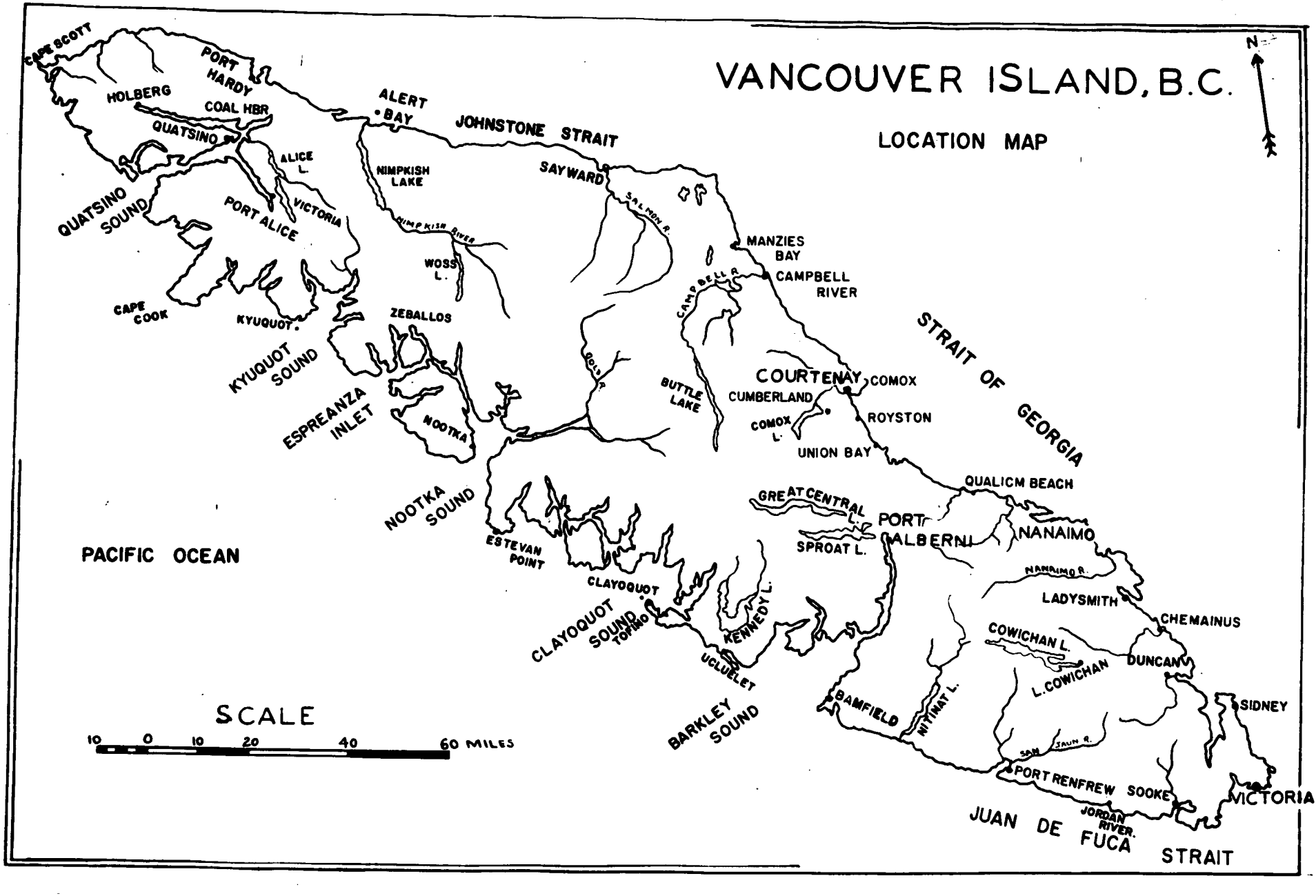
In this systematic study we are going to deal with Vancouver Island in relation to its physical, economic and human factors. In the first part we shall discuss the physical factors and the emphasis will be placed upon their relationship to each other, such as the significance of Vancouver Island rocks to topography, of climate to vegetation, drainage and soils. The second part will treat the relationship of these physical factors to the economic forces and development of natural resources and industries. The third part is devoted to population.

We shall discuss at length, its numbers, the origin of its inhabitants, their distribution and their occupation.

The discussion of these co-related factors constitutes A GEOGRAPHICAL STUDY OF VANCOUVER ISLAND.

Not only the completion of this thesis but also my enjoyment while working at the University of British Columbia is due to the kindness and valuable guidance of my professors of the Department of Geology and Geography, for whom I have the deepest regard. I am especially grateful to Dr. J. Lewis Robinson for directing this thesis with so much helpful and constructive criticism.

My thanks are also due to Dr. Ethel Harris for her enthusiastic interest and encouragement in this work.


VANCOUVER ISLAND, B.C.
LOCATION MAP
N
CAPE SCOTT
PORT HARDY
HOLBERG
COAL HBR
QUATSINO
ALICE L.
VICTORIA
QUATSINO SOUND
PORT ALICE
CAPE COOK
KYUQUOT
KYUQUOT SOUND
ESPREANZA INLET
ZEBALLOS
NOOTKA
NOOTKA SOUND
ESTEVAN POINT
ALERT BAY
JOHNSTONE STRAIT
NIMPKISH LAKE
NIMPKISH RIVER
WOSS L.
SAYWARD
SALMON R.
MANZIES BAY
CAMPBELL RIVER
CAMPBELL R.
ROLLS R.
BUTTLE LAKE
COURTENAY
COMOX
CUMBERLAND
COMOX L.
ROYSTON
UNION BAY
STRAIT OF GEORGIA
QUALICM BEACH
GREAT CENTRAL L.
PORT ALBERNI
SPROAT L.
NANAIMO
NANAIMO R.
LADYSMITH
CHEMAINUS
COWICHAN L.
L. COWICHAN
DUNCAN
SIDNEY
PACIFIC OCEAN
CLAYOQUOT
CLAYOQUOT SOUND
TOFINO
KENNEDY L.
UCLUELET
BARKLEY SOUND
BAMFIELD
NITINAT L.
SAN JUAN R.
PORT RENFREW
SOOKE
JORDAN RIVER
VICTORIA
JUAN DE FUCA STRAIT
SCALE
10 0 10 20 40 60 MILES

I.

Geology of Vancouver Island

The Province of British Columbia is almost entirely within the North American Cordillera and Vancouver Island forms the most Westerly of the longitudinal mountain belts into which the British Columbia portion of the Cordillera may be divided. The physical features of Vancouver Island are closely allied to its geological features and their development may be traced, by studying the fossils in the rock formation, from many millions of years back in geologic time down to the present.

The rocks that form the core of the Vancouver Island mountains are altered sedimentary to volcanic, principally of Permian and Jurassic age and granitic rocks of Early Cretaceous age to Late Jurassic. The granitic rocks occur in many areas within the Vancouver Island mountains, as small batholiths, dykes and other intrusive bodies - as in Saanich Peninsula. Slightly older and more complex granitic rocks are found around the City of Victoria; such are the Wark gabbro-diorite and quartz-diorite gneiss.

Shortly after their formation, the rocks which form the core

of the Vancouver Island Mountains were compressed, folded and vertically uplifted to form a mountain chain. These mountains were subjected, then as today, to the erosive action of weather; so that by Tertiary time (about 15 million years ago) they had already been worn down to a level land surface. After a period of quiescence, the Tertiary peneplain was again uplifted.

Then came the Great Ice age, when the whole of Vancouver Island, except for a few high peaks, was covered with an ice sheet. During this period, a very noticeable change was brought about by the action of the valley glaciers. Perhaps the most striking effect of this glacial erosion was the deepening of the coastal river valleys to form fiords, such as Alberni Canal that characterizes the West Coast. Another important effect of the Ice age was the widespread deposition of glacial matter over the land surface, which is still found in many places, but in modified conditions. After the retreat of the ice sheet the land was uplifted again, rising from a few tens of feet to five hundred or more. Proof of this rising may be seen in such features as the layers of peat and of sea shells near some of the Victoria beaches. (Some geologists think that the land is still rising slowly.)

After the Glacial age, little change in relief is effected by the agents of weathering and denudation.

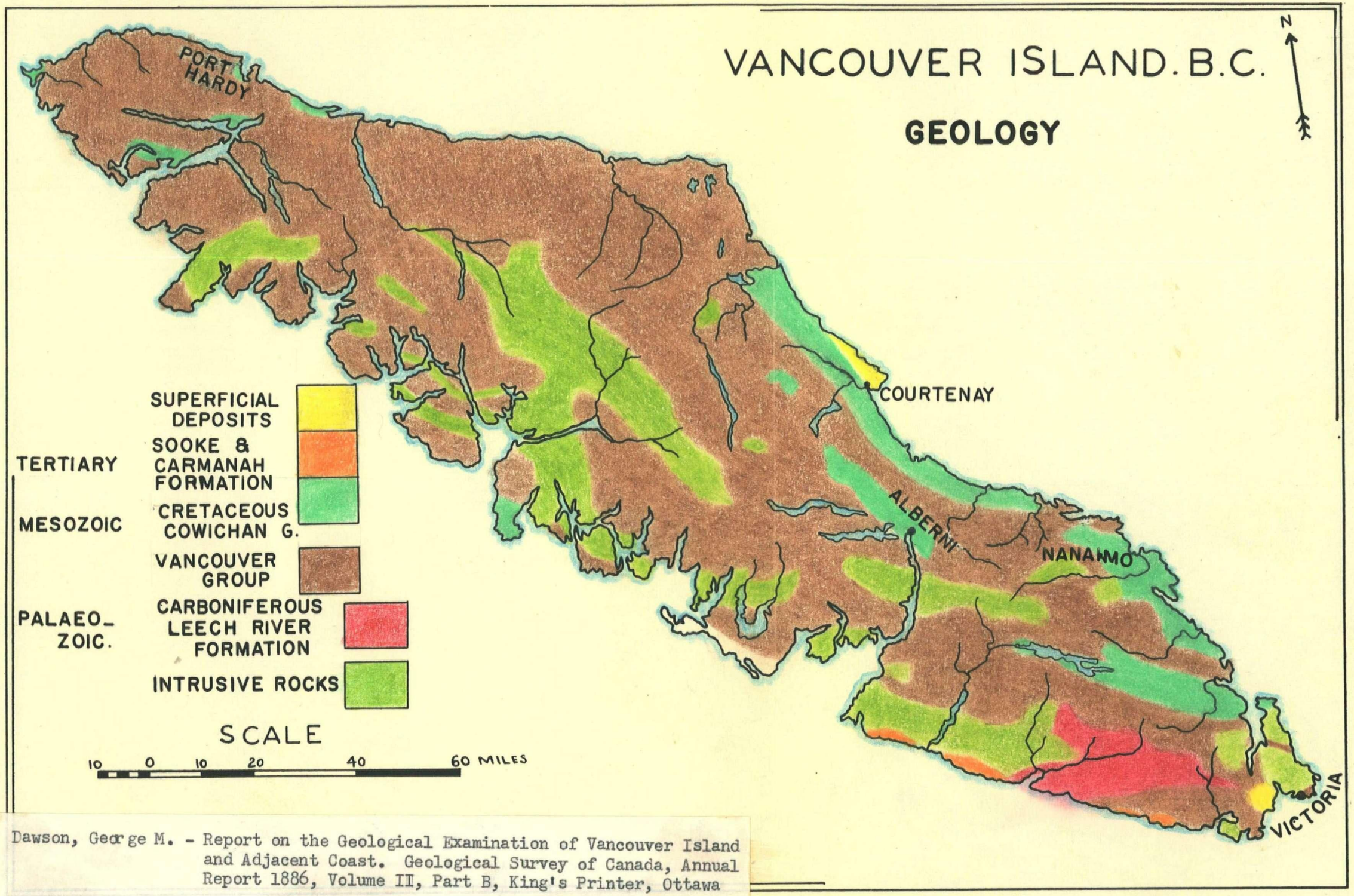
J. S. Stevenson - Vancouver Island Geology, August, 1951, Unpublished.

The following table of formations summarizes the Geology of Vancouver Island:

Table 1. Summary of Formations (1)

Age	Formation	Character
Pleistocene and Recent	Superficial deposits	Glacial till and unconsolidated gravels, sand and clays - mostly stratified
Oligocene-Miocene	Sooke and Carmanah formations	Conglomerates and sandstones
Upper Cretaceous	Cowichan group and Nanaimo formation	Unmetamorphosed conglomerates, sandstone and shales with some coal
Lower Cretaceous and Upper Jurassic	Batholithic and dyke intrusives	Grano-diorite, quartz-diorite, amphibole gabbros, etc.
Triassic and Jurassic	Vancouver group	Andesite, tuffs, tuffaceous-argillites and limestones
Carboniferous	Leech River formation	Slates, slaty schists, quartz and quartz-feldspar schists

(1) C. H. Clapp, Southern Vancouver Island, Memoir No. 13, Geological Survey Branch, Canada Department of Mines, p. 27



Dawson, George M. - Report on the Geological Examination of Vancouver Island and Adjacent Coast. Geological Survey of Canada, Annual Report 1886, Volume II, Part B, King's Printer, Ottawa

Clapp, C. H. - Southern Vancouver Island, Geological Survey of Canada, Memoir 13, King's Printer, Ottawa, 1912

Vancouver Sheet 1928, Map 196A, Geological Survey, Canada

Vancouver Island Rocks

and their

Significance to Topography

This relation of Geology to landform will be evident as we now study the following rock formations:

1. Leech River Formation
2. Vancouver Group
3. Batholithic and dyke intrusions
4. Cowichan and Nanaimo Formation
5. Sooke and Carmanah Formation
6. Superficial deposits

1. Leech River Formation

Originally sedimentary rocks, consisting of shales and shaly sandstones, which lacked resistance to the erosive agents, have been metamorphosed in the Leech River area into slates and quartz-schist - thus making them resistant to eroding action. The Leech River area has therefore remained high, but relatively flat, drift covered and often marshy, with few outcrops.

Another significant fact that emphasizes the relation of Geology to Physiography, is the diversity of the individual beds of this formation. We note that the hard and soft beds are alternately laid down and that wherever weak beds have been subjected to wave action, caves have been formed; for example, near Port San Juan. This type or arrangement of beds is also responsible for waterfalls, rapids, etc.. The rock formation of Devil's Grip Falls proves it conclusively.

Ibid
Dawson, G. M. - Report on the geological examination of northern part of Vancouver Island with adjacent coast, Geological Survey of Canada, Annual Report, 1886.

2. Vancouver Group

The oldest rocks of the Island are those of the Vancouver group; they are also the most widely distributed throughout the Island. The group consists almost entirely of volcanic rocks, chiefly andesites; but contains also many intercalcated beds of tuffaceous argillite and limestone, some of which attain the thickness of 2,000 feet or more.

The Vancouver group includes different types of rocks that vary in resistance to weathering and denudation; but on the whole they are highly resistant, as a result of their volcanic origin and metamorphosis. These highly resistant rocks form the core and bulk of the Vancouver Island Mountains and often stand high in the central part of the Island, with some peaks well over 6,000 feet above sea level. In the South-Eastern part, we find that the weaker rocks of the Vancouver group are limestone, etc., so that the area has lower relief than the central part. The effect of water action on the weaker rocks is well represented, near Victoria, in the Sunken Garden. During the Upper Jurassic period, the rocks of the Vancouver group were greatly deformed, by folding and faulting. Following this deformation, and perhaps during it, they were invaded and partly displaced by batholithic and minor intrusives.

3. Batholithic and Dyke Intrusions

Intrusive in the Leech River slates and Vancouver group, are large masses of plutonic rocks and their accompanying dykes. These rocks are hard and strengthen the core of the mountains.

The gneisses are well exposed, for the greater part, forming

monadnocks, which surmount the lowlands; as for example, Mount Wark in the highland district.

4. Cowichan and Nanaimo Formation

Lying unconformably over the metamorphic and granitic rocks, principally towards the Eastern coast of the Island, is a thick conformable series of fragmental sediments known as the Cowichan group and the Nanaimo formation - of the Cretaceous age. These consist chiefly of conglomerates, sandstone and sandy shale. Near the base of the Nanaimo formation, coal is found.

Comparatively, these rocks are much weaker and more easily worn down than those mentioned above - the proof of which is evident in the Eastern part of the Island, where the low coastal plains, and valleys such as the Cowichan, consist of rock of the Cretaceous age.

5. Sooke and Carmanah Formation

During the erosion cycle, the present Carmanah and Sooke formation was built up along the South-West coast, probably against a submerged mountain's slopes. These sediments, largely conglomerate and sandstone, were deposited under marine conditions and are remnants of a coastal plain, at one time more extensive.

6. Superficial Deposits

Throughout the region, unconsolidated superficial deposits, of Glacial or Recent age, are exceptional occurrences. The original Glacial

till has been modified by various weathering agents. From the point of view of agriculture, these deposits are of great importance and have made a valuable contribution to Vancouver Island economy. They have also modified the original topography.

The distribution of these various rock formations is shown on the map of Vancouver Island.

II.

Physiography of Vancouver Island

The mountains of Vancouver Island are part of a chain, known as the Insular Mountains, extending from the Queen Charlotte Islands on the North, through Vancouver Island and into the Olympic Peninsula. The Vancouver Island range, with its coastal lowlands, constitutes the entire Island, which is 50 to 70 miles in width and 290 miles long.

As regards the relief of Vancouver Island, a few mountains exceed 3,000 feet in elevation; while some, in the central part of the Island, rise above 7,000 feet (as shown on the landform map). These mountains are characterized by both flat-topped summits (effect of glaciation) and ridge-like summits, which illustrate the mature dissection of an uplifted surface, level or nearly level, produced by Tertiary time, through the agency of weathering (discussed under Geology). The uplifted surface just mentioned was subjected to erosion and produced, at the base of the mountains, a new coastal plain that today is the great source of the Island's agricultural economy.

Then came the Great Ice age when the Island was covered, and smothered, except for a few peaks, with a thick ice cap. During this period many depressions, valleys, fiords, etc., were formed. After the retreat of the ice, Vancouver Island had a different look from what it had had before glaciation: mountains were rounded; deep valleys with steep sides and

broad floors were formed; cirques and valley depressions were filled with water to form lakes. The most pronounced and interesting effect of this glaciation was the creation of many fiords on the West coast of the Island.

Certain notable topographic features, the valleys, the coastal plain and other topographic regions, deserve to be studied more carefully.

Valleys

The valleys are of two main types:

a) Transverse - those that are transversal to the underlying rocks. (Their origin is not fully known)

b) Subsequent - those that follow the strike of the underlying rocks (formed by the rapid erosion of weaker formations).

a. The transverse valleys have, in general, two trends: a North-South to Southeast - Southwest trend; while the subsequent valleys, following the strike of the rock, have a Northwest - Southeast trend in the Northern part of the Island and an East-West trend in the Western part. The transverse valleys, on the whole, have steep sides and rounded floors. Showing this effect of glaciation we find Alberni Canal, Nimkish Lake, etc..

b. The subsequent valleys, since they have been developed on wider belts of weak rock, are as a rule wider and more extensive than the transversal. They have gentler side slopes and narrower floors. Good examples of these subsequent valleys are Cowichan Lake, Chemainus and Nanaimo Rivers.

To sum up what has been described in the earlier paragraphs, we

can say that the greater part of Vancouver Island is rugged, with mountains ranging from 3,000 to 7,000 feet above sea level. Most of these mountains are rounded and separated by transverse or subsequent valleys.

Topographical Regions

From the central part of the Island, toward the North and South, the mountains decrease in elevation; their valleys become more extensive and their surface gradually falls off in hills and low ridges, with intervening rolling plateaux. The fringe of the central region (Insular Mountains) is bordered by lowlands of varying width; that is, the coastal plain.

With this background in mind, it is possible to divide Vancouver Island into the following topographical regions:

1. Coastal plain
2. Central region
3. High plains with rolling or undulating plateaux

1. Coastal Plain

All around the central mountains, or, along the coast of Vancouver Island, lies a strip of land that is relatively flat, narrow and underlaid with sedimentary rocks. This coastal region more or less contains the entire population of Vancouver Island. For the matter of convenience this will be dealt with under two headings:

a) Eastern coastal plain (which includes East, North-East and South-East parts of the Island - shown on map)

b) Western coastal plain

a. Eastern Coastal Plain

Once under water, this area stands at an elevation of 100 to 500 feet above sea level and forms the topographically uniform area of agricultural importance. The plain varies in width from 1 to 15 miles. On one side it terminates rather abruptly at the coast in a cliff 30 to 100 feet high (uplift) and on the other side breaks sharply with the Insular Mountains. In the extreme Southern and Northern part of the Island the break is not so abrupt as in the central part.

This Eastern coastal plain is well developed from William's Head to Rocky Bay, with a few exceptional points where it is extremely narrow: near Malahat Hill, South of Ladysmith and Menzies Mountain. From Rocky Bay it is practically absent until we reach Telegraph Cove, where it broadens out again right up to Cape Scott.

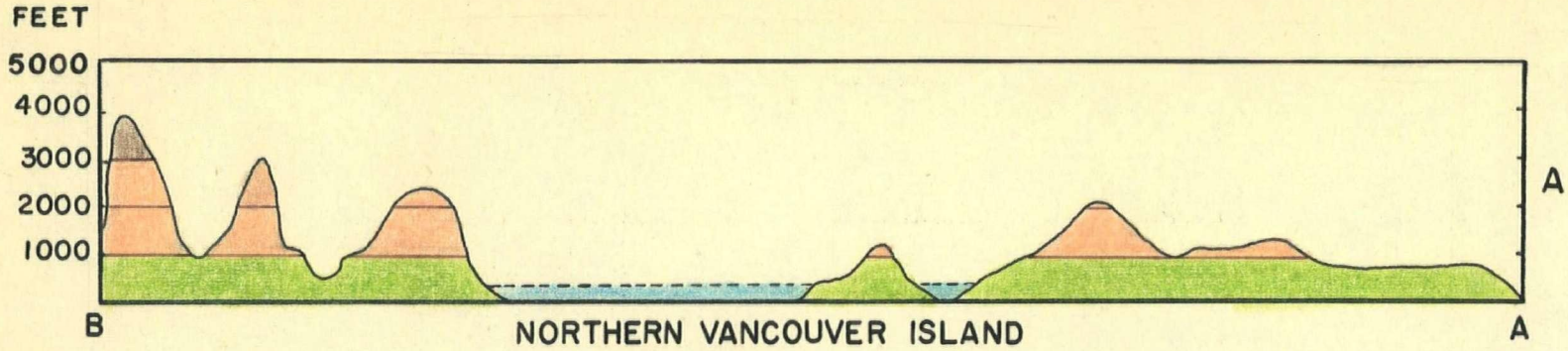
This Eastern coastal plain is visited by important rivers and streams of Vancouver Island, some of which dissect it quite deeply. Marine terraces and beaches are found on this plain up to the height of 300 feet, giving the proof of recent uplift. Other notable landforms found in the area are deltas, both raised and recent, at the mouths of most of the streams and there are a few rounded monadnock hills, like Mount Newton in Saanich District.

In the main, the surface of this Eastern coastal plain is fairly even; but in terms of micro-surface it is rough, with the exception of lacustrine deposits and scattered recent deltas.

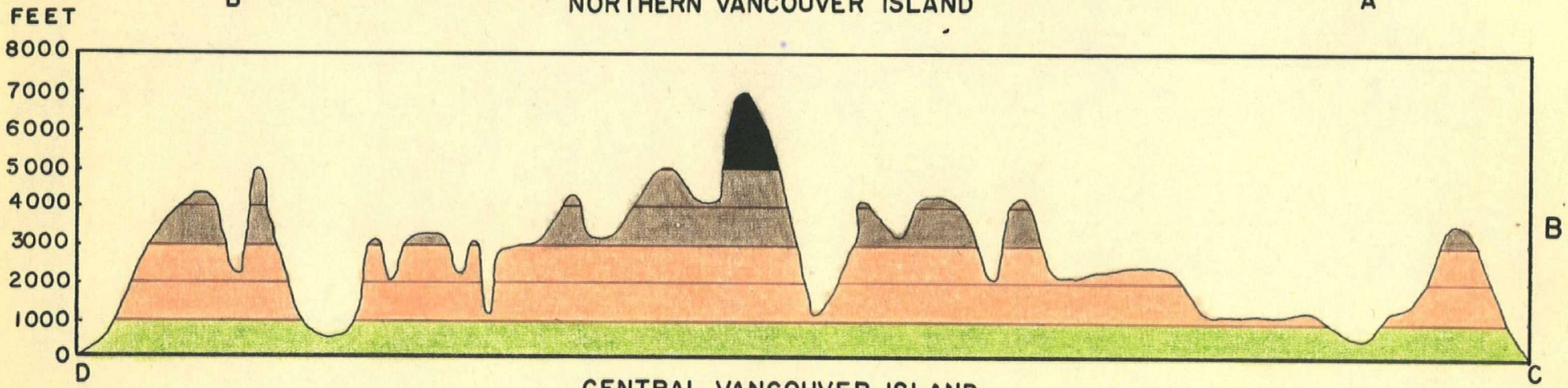
The Eastern coastal plain is the most important part of the Island -

CROSS SECTIONS

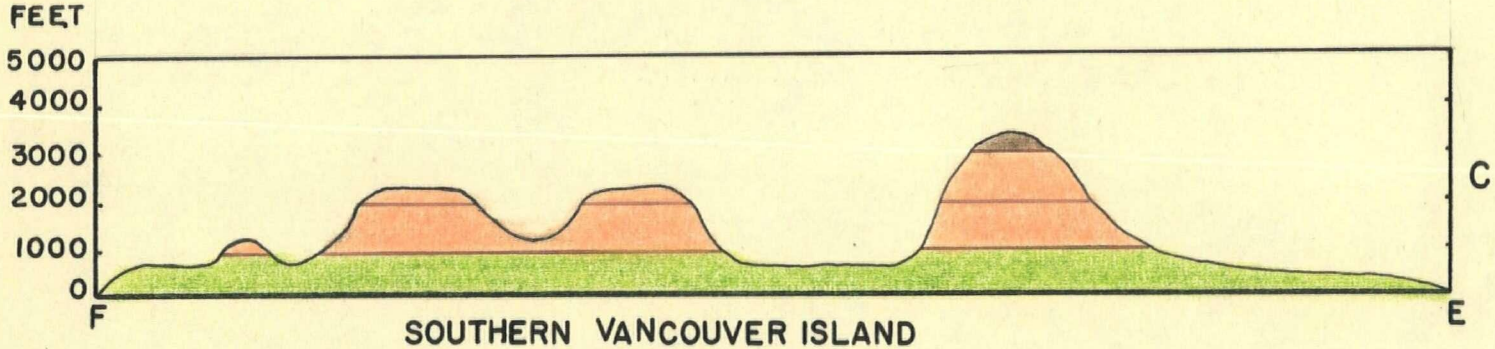
H.S = 1:8 MILE, V·S = 1: 4,000 FEET, V·E = 10·5 TIMES



NORTHERN VANCOUVER ISLAND



CENTRAL VANCOUVER ISLAND



SOUTHERN VANCOUVER ISLAND

agriculturally, socially and politically - especially the southeastern part; as 80 percent. of the total population lives there.

b. Western Coastal Plain

It is a narrow strip of lowland, which seldom exceeds more than two miles in width and occurs at intervals along the West coast. It has a comparatively level surface (uplifted marine platform) with an elevation of about 200 feet and is terminated in the interior by steep cliffs rising to the height of 2,000 feet. At times these cliffs rise abruptly from the sea, thereby interrupting the continuity of these lowland belts. The plain is cut across by many streams and rivers, which are usually short as compared with the eastern rivers.

In terms of economic value, there are few notable stretches of land that could be considered of some value agriculturally such as around Cape Beale, or northwest of Kennedy Lake or in other parts of the district. At present these lands are not all used. The problem is one of isolation and difficulty of transport.

Fishing is most important along the coast.

2. Central Region

(Mountains)

The territory marked on the map as the "central region" forms the main part of the Island - about 60 percent. of the total area. It is encircled by the coastal plain which we have just discussed.

The surface of this region is extremely rugged and broken: lofty

pinnacled peaks and rounded hills, deep ravines and scarped valleys occupy most of the area. Its relief ranges from 1,000 feet to 7,000 feet above sea level (see cross section B). The summits, in the main, have rounded surfaces, which shows the effect of heavy glaciation. Where the mountains, by reason of their height, escaped such action, they are sharply pointed, like Victoria Peak which rises to 7,000 feet; King's and Marble Peaks, both well over 6,000 feet. - They are difficult to ascend.

The mountain ranges are not long and are broken by numerous valleys, large and small (Alberni Canal, Great Central Lake, etc.). This gives the mountains an isolated look, with the result that there is no well-defined water divide. The drainage pattern is fairly complex.

3. High Plains with Rolling or Undulating Topography

They are found in two separate localities: one to the South-West; that is, the Southern part of the Island, and another to the North-West, or northern part. They might be considered as belonging to the central region; but, due to their difference in surface relief, they have been placed in a separate division. These areas have open rolling topography, broken by rounded summits (monadnocks) with an elevation of 3,000 feet. Of these two high plains, the Northern (see cross section A) is more uniform and open than the Southern one (see cross section C); but it is out of the way in respect to transport.

With regard to settlement and agriculture this region is next in importance to the lowlands. It is an area of potential settlement and

could be used for ranching and mixed farming; but at present most of it is under forest cover.

From the mountain divide, rivers flow both Eastward and Westward, wandering hither and thither and following through many lakes; but, on the whole, rivers flowing toward the East are longer and larger than those to the West - as is the case with Campbell and Nimkish Rivers.

In this region the Western coast needs special reference. The shore in general is bold and rocky, with narrow strips of coastal plain that give way to more or less perpendicular cliffs. The notable feature of the West coast is its shore-line, broken by fiord-like indentations, which with their finger-like extensions run for many miles into the heart of the Island. Chief among them are Port San Juan, Barclay, Clayoquot, Nootka, Kyuquot and Quatsino Sounds.

Very little agriculture is possible in this area - only in some valleys - but it is so heavily timbered, except at higher elevations, that it supports the main industrial activity of Vancouver Island, the lumber industry.

III.

Climate

The climate of Vancouver Island is exceptionally mild, with moderate frosts (depending upon the altitude), heavy snow being of rare occurrence. Precipitation is generally high and varies much according to locality. The discussion of Climate will be presented in two divisions:

a) Climatic controls

b) Climatic types and topographic regions

a. Climatic Controls

Before going into the details of the climate of Vancouver Island, one should first consider the climatic controls that influence the climate of the Island. The following diagram shows the relationship between the climatic controls, elements and the resulting weather and climate: (1)

Climatic controls				
1. Latitude 2. Land and water 3. Wind and air pressure 4. Altitude 5. Topography 6. Air masses 7. Ocean currents 8. Storms	Acting upon	Temperature Precipitation and Humidity Air pressure Winds	Produce	Types and varieties of weather and climate

Above are mentioned the general climatic controls and we can see how they influence the climate of Vancouver Island specifically. Any one of these could be a dominant factor in controlling the climate of a

(1) Glen Trewartha

region. We shall now discuss each of these climatic controls in detail.

1. Latitude

Latitude has two main effects upon claimate:

a) Decrease in temperature with the increase in latitude

b) Increase in the length of the summer day (sunshine period) with the increase in latitude

Now, if we apply these to Vancouver Island, we find that, as far as decrease in temperature is concerned, latitude has but little effect upon the temperature - which is shown by the following table:

Table 2. Change of Temperature with Increasing Latitude

Station	Latitude	Altitude	Mean Annual
Clayoquot	49° 09'	25 feet	49° F
Estevan Point	49° 22'	21 feet	48° F
Quatsino	50° 32'	10 feet	47° F

In the case of Vancouver Island the latitudinal effect is overcome by the oceanic influences which surround it. So latitude plays a very minor part in the climate of Vancouver Island.

As regards the second point: The increase in the length of day (sunshine) is greater in the Northern part than in the Southern, - we find the contrary: there is more cloudiness and precipitation in the Northern part of the Island; hence less sunshine. (1)

(1) General Summaries of Hourly Weather Observations at Airway Weather Stations in Canada and Newfoundland, 1945, Part 1, Department of Transport, Meteorological Divisions, Air Service Branch. Issued at Toronto, Canada, 1946.

The following figures justify the above statement:

Table 3. Increase in Cloudiness with Increasing Latitude

Unit = 10th of sky covered	Total No. of hours of low clouds		
Stations (South to North)	Patricia Bay	Comox	Port Hardy
	Latitude 49° 22' N.		
0 - 2	4,701	4,320	2,518
3 - 7	1,588	1,408	1,597
8 - 10	2,387	2,963	4,502
Obscured	--	69	108
Not reported	--	--	35

2. Land and Water

Land controlled (continental) climates are characterized by greater extremes of temperature than ocean controlled (maritime) climates; that is, the diurnal and annual ranges of temperature of maritime climates is less than those of continental climates. To illustrate this fact with regard to Vancouver Island, we have provided the following statistics:

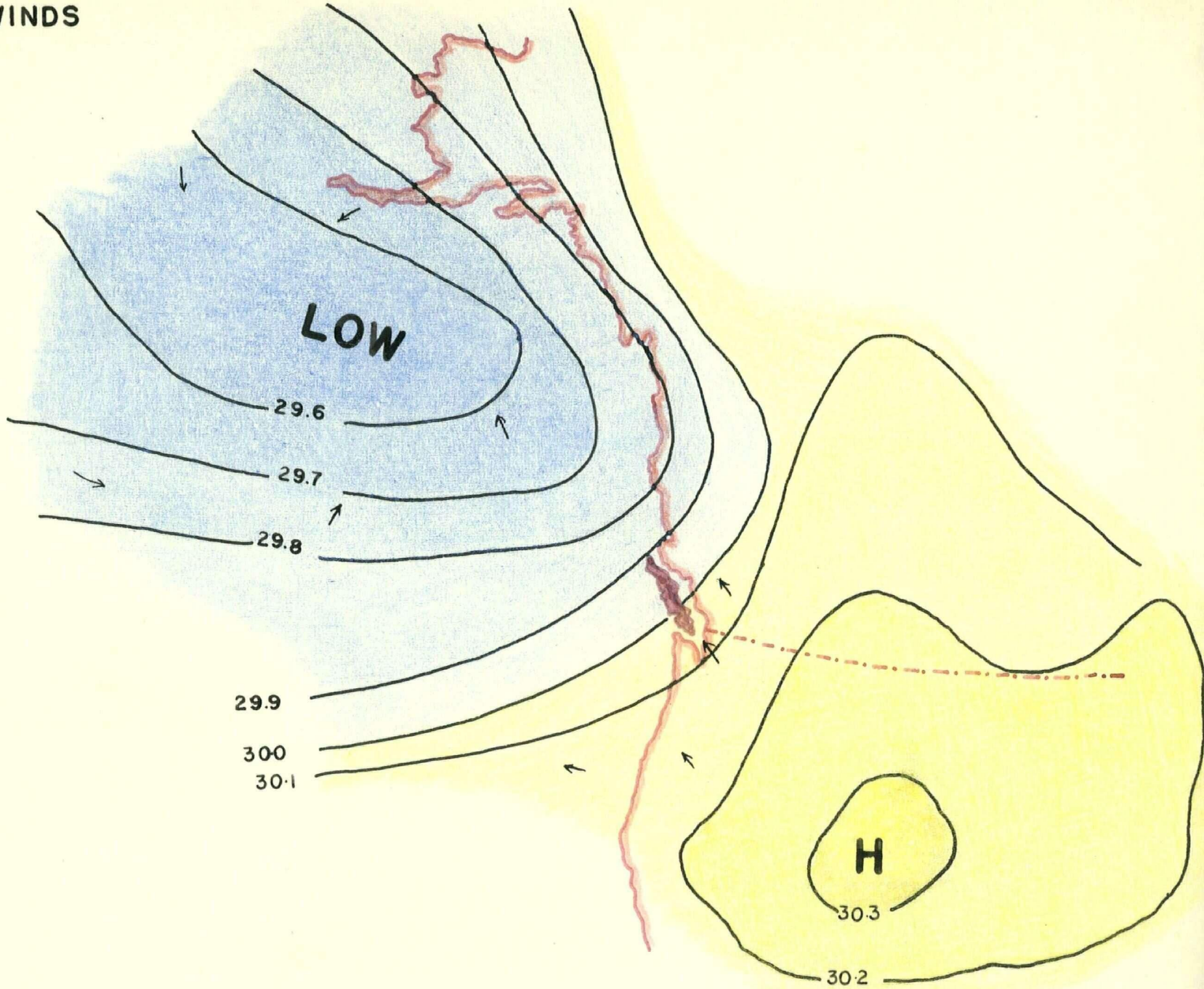
Table 4. Increase in Range of Temperature from Coast to Interior

Station	Mean Jan.	Mean Aug.	Mean Annual
1. Estevan Point	41° F	57° F	16° F
2. Nanaimo	37° F	64° F	27° F
3. Alberni (Lupsikupsi)	30° F	63° F	33° F

So we see, in the micro-study of Vancouver Island, that we do find a difference between the climates of coastal and inland stations;

PRESSURE & WINDS

JANUARY



though, on account of the marine influences, the whole of Vancouver Island is included in the marine type of climate, in the general climatic classification.

3. Wind and Air Pressure

Pressure and winds are fundamental in modifying the weather and climate of a place. Of these two, pressure is the more important; as the winds themselves are affected and controlled by pressure systems.

The semi-permanent pressure systems which control the climate of Vancouver Island are:

a) Aleutian Low

b) Polar Anticyclone

c) Hawaian High

The summer and winter pressure conditions are shown in Figs.

i. Winter Conditions

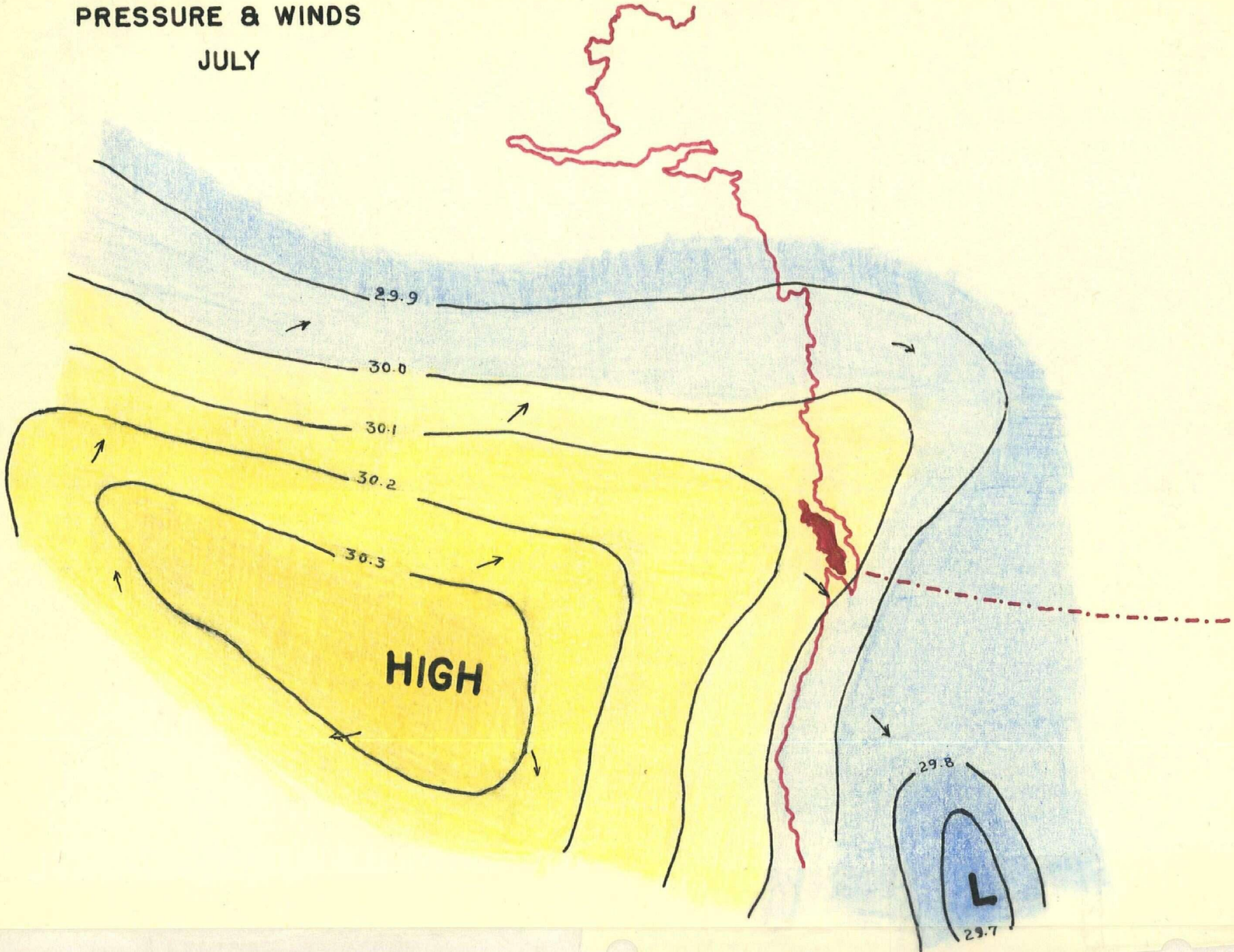
The first two pressure systems listed above exercise their full strength in winter and of these two the Aleutian Low is the more important. It is at its maximum development in winter and influences the whole of the Island. In winter the prevailing winds are Southeasterly and at times are interrupted by the passage of depressions.

ii. Summer Conditions

In summer the Hawaian High is fully developed over the ocean

PRESSURE & WINDS

JULY



and is the dominating factor in the climate of Vancouver Island - pushing the storm track to the North. This is the major cause of low rainfall and high sunshine during the summer months. Its effect is more strongly felt in the south and south-east parts of the Island.

4. Altitude

The effect of altitude upon climate is well recognized: it causes a drop of 3.3° F for every 1,000 feet of ascent. But this altitude control cannot be studied fully as regards Vancouver Island, because of the lack of enough climatic stations at high elevations.

Precipitation responds more closely to altitude than does temperature - which will be quite clear if we compare the two maps of rainfall and landform. On Vancouver Island it ranges from 50 inches at the foot of the mountains to 200 inches on the higher mountain slopes. The amount of precipitation also differs on the windward and leeward slopes of the mountains as indicated by the following table:

Table 5. Precipitation on Windward and Leeward Slopes

	Station	Mean annual		Mean annual
Windward	- Henderson Lake	250.00 inches	Quatsino	95.90 inches
Leeward	- Port Alberni	70.0 inches	Alert Bay	53.49 inches

5. Topography

Topography, as a climate control,

a) Affects wind

b) Increases precipitation

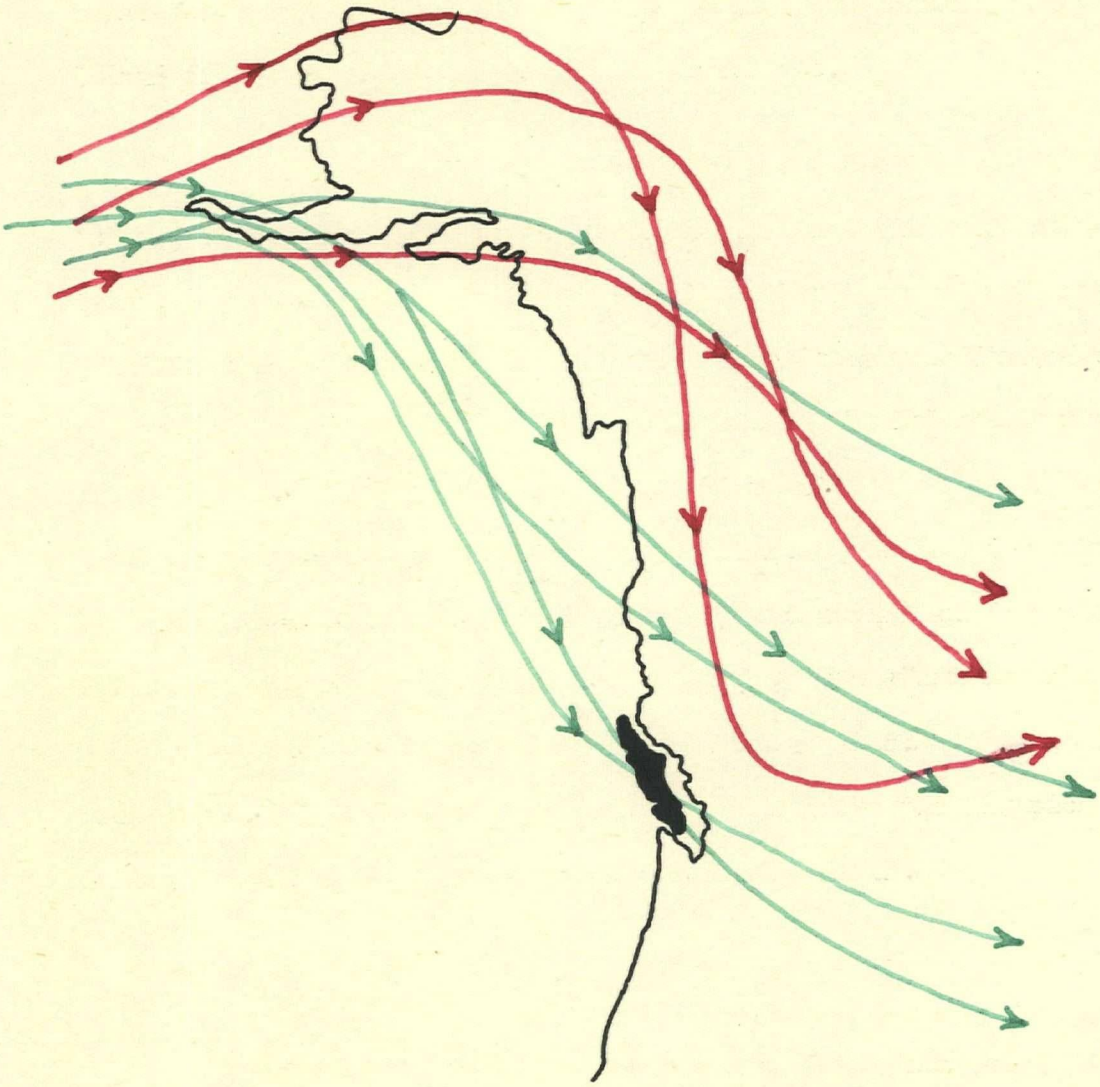
As to transportation, mountain ranges act as a barrier to the movements of air masses, and thereby completely change the climate of an area; for example, the coastal mountains of the mainland protect Vancouver Island from the cold Polar Continental air mass.

Now, considering the topography and the climate of Vancouver Island, we see that the Insular Mountains, with their Northeast-Southwest trend, act as a barrier to the Westerlies; thereby causing heavy precipitation on the windward slopes. There is comparatively less rainfall in the Northern and Southern parts of the Island, due to the lower relief. The Olympic Mountains (United States) exert their influence upon the South-East part of Vancouver Island, by taking the moisture out of the South-West winds, leaving them dry and warm when they visit the Southeastern part of the Island. Topography is again responsible for the noted strong winds at Victoria and San Juan de Fuca. Winds at Victoria are strong. This is due to the wind gap formed by the Olympic Mountains in the South and the Insular Mountains in the North.

6. Air Masses

The changeability of weather of a given area depends upon the different kinds of air masses that visit it. Air masses originate in distant places called source regions and acquire definite characteristics, which are modified as they move from the source regions; but they are still strong enough to show their individuality in the new area they invade.

The Polar Maritime air mass dominates the scene at Vancouver Island almost throughout the year. This Polar Maritime air moves from



WINTER STORM TRACKS

SUMMER STORM TRACKS

the North-East of Asia over the relatively warm surface of the North Pacific Ocean and the warm Aleutian current, both of which modify the air mass, thereby increasing its temperature and its humidity. Heavy precipitation results, especially during the winter season.

7. Ocean Currents

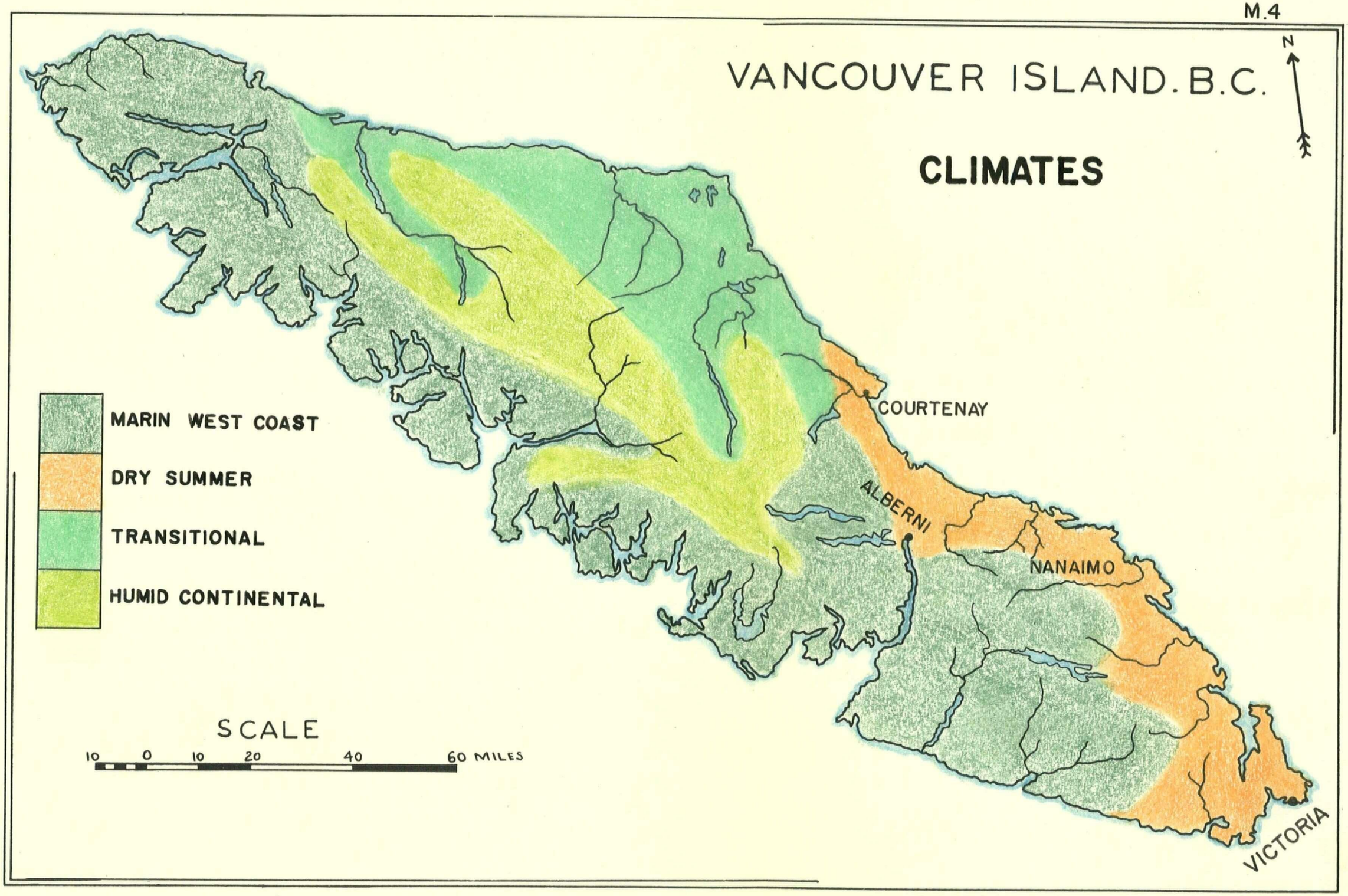
West of Vancouver Island the Pacific Ocean is visited by two strong currents: the West Wind Drift, and the Aleutian Current, which stems from the Kurosimo (Japan) Current. Their influence and effect are discussed in the preceding paragraph.

In summer, winds blow steadily from the North-West along the coast and so the surface water is displaced - resulting in the upwelling of fairly cold water, which precludes precipitation.

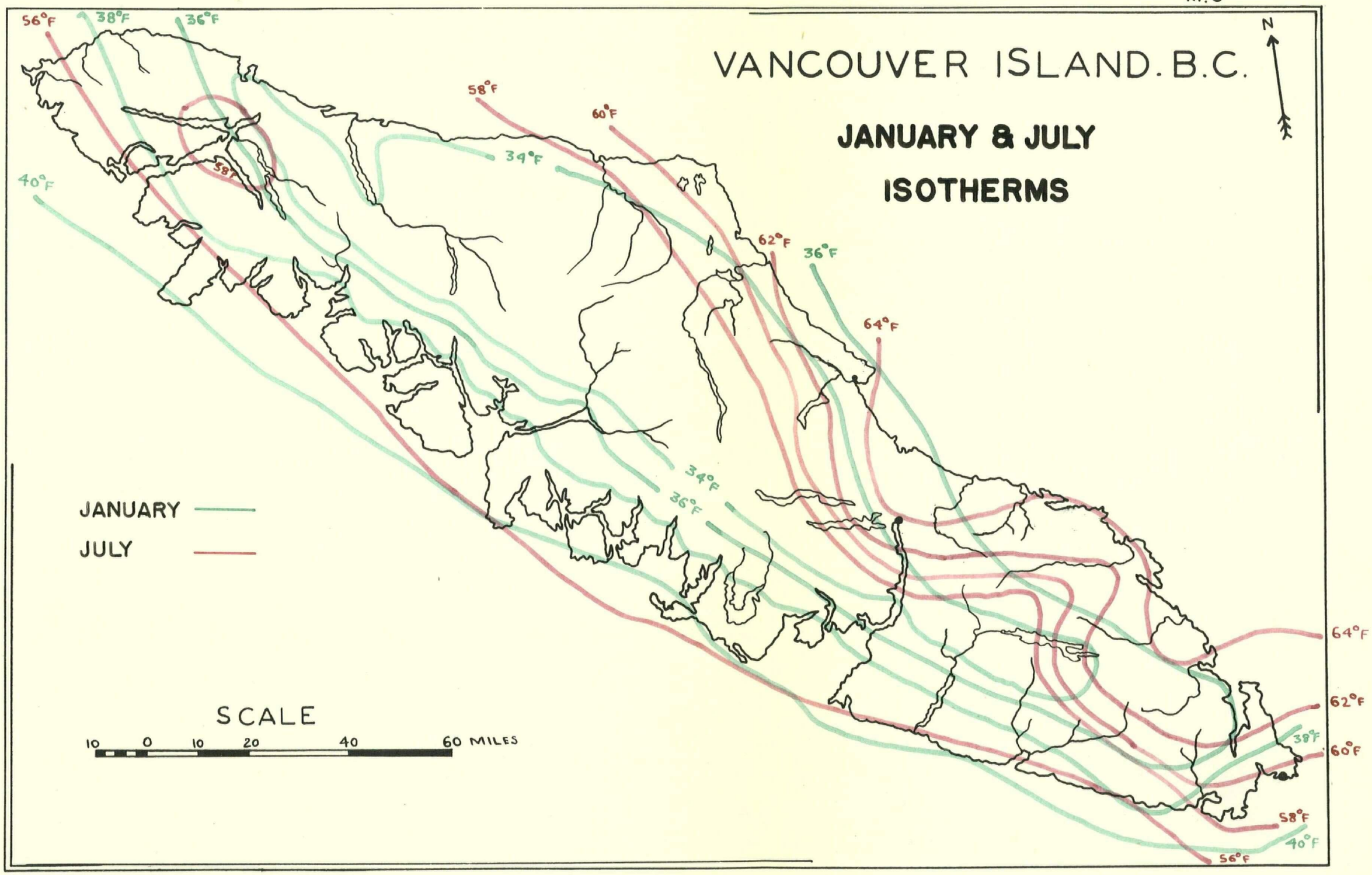
These warm and cold waters play an important part in the climate of Vancouver Island.

8. Storms

Storms, with which we close this study of climatic controls, are very closely related to the pressure systems, which are shown in the accompanying Figs. giving the winter and summer pressure systems and the typical storm tracks of these seasons. In winter, storms visit Vancouver Island frequently, and there lies the reason of the heavy precipitation. On the other hand, in summer - due to the Hawaian High - their path lies farther to the North and North-East of the Island, which accounts for lower rainfall during the summer season.



Chapman, John D. - The Climate of B.C., Paper presented to the Fifth B.C. Natural Resources Conference, Feb. 1952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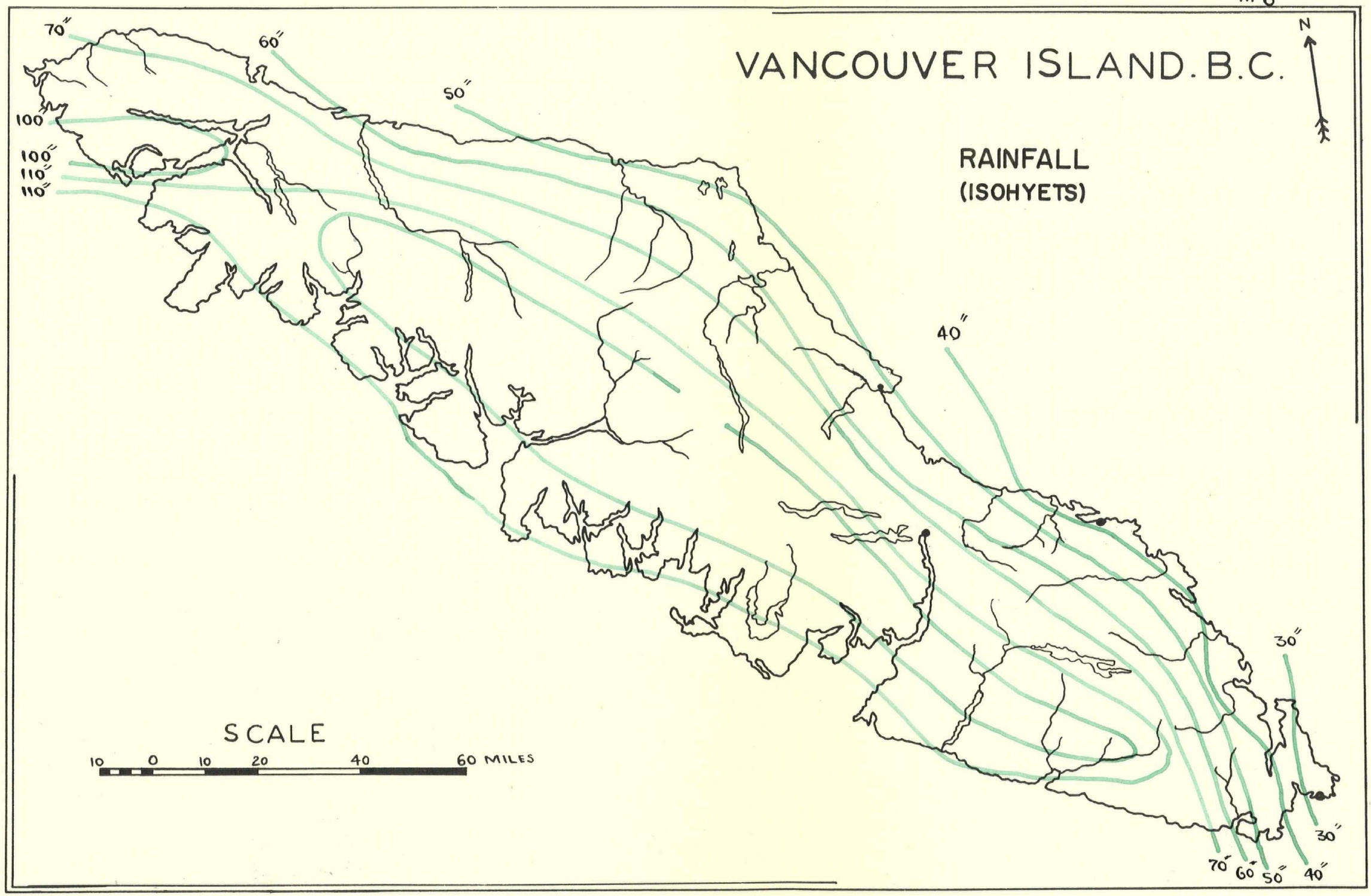
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B. Climatic Types

We have discussed the chief climatic controls that influence the climate of Vancouver Island. They have provided a background to deal with the climate itself. For this purpose, it is possible to divide Vancouver Island into climatic regions, on the basis of their chief climatic characteristics, which correspond to the four following types:

1. Marine West Coast climate
2. Summer Dry climate
3. Transitional climate
4. Humid Continental climate

We shall now apply each of these four type climates to its corresponding Island region and, as far as available data will allow, consider them under the following headings:

a) Temperature
b) Precipitation
c) Humidity
d) Wind

1. Marine West Coast Climate

These mild marine climates are the rule on the West coasts of countries of middle latitude, lying poleward from 40° latitude, North and South. Most of Vancouver Island is favoured with an equable marine climate, as shown in Fig. . A few stations have been selected as representative of the West coast climate and their climatic data tabulated

Table 6. Type 1. MARINE WEST COAST CLIMATE

Station		J	F	M	A	M	J	J	A	S	O	N	D	YEAR	ANNUAL RANGE	ALT.
Quatsino	Temp.	37	38	41	45	50	55	58	59	55	49	43	49	47	22	
	Precip.	11.39	9.46	8.43	6.82	4.30	3.04	2.15	2.95	6.07	11.94	14.16	15.19	95.90		8
Clayoquot	Temp.	41	42	44	47	51	55	58	59	56	51	45	42	49	18	
	ptt	12.94	10.77	10.71	8.07	5.60	3.50	2.70	3.00	6.00	12.09	13.23	15.50	106.11		25
Estevan Pt.	Temp.	40	41	43	46	50	54	56	57	55	50	45	42	48	17	
	ptt	14.08	11.24	10.91	8.28	5.75	3.54	3.48	3.17	5.39	12.38	14.54	16.56	109.32		21

This table indicates the main characteristics of the Marine West Coast type of climate; that is,

a) Small annual range of temperature, with high temperature in winter and low temperature in summer

b) High total precipitation, most of which falls in winter

below: (1)

(1) Climate of British Columbia, 1951, Department of Agriculture, Victoria, B.C.

a. Temperature

The marine West coast regions of Vancouver Island have mild winters and cool summers - as might be expected in a marine type of climate.

Summer temperature ... 56 - 58° F

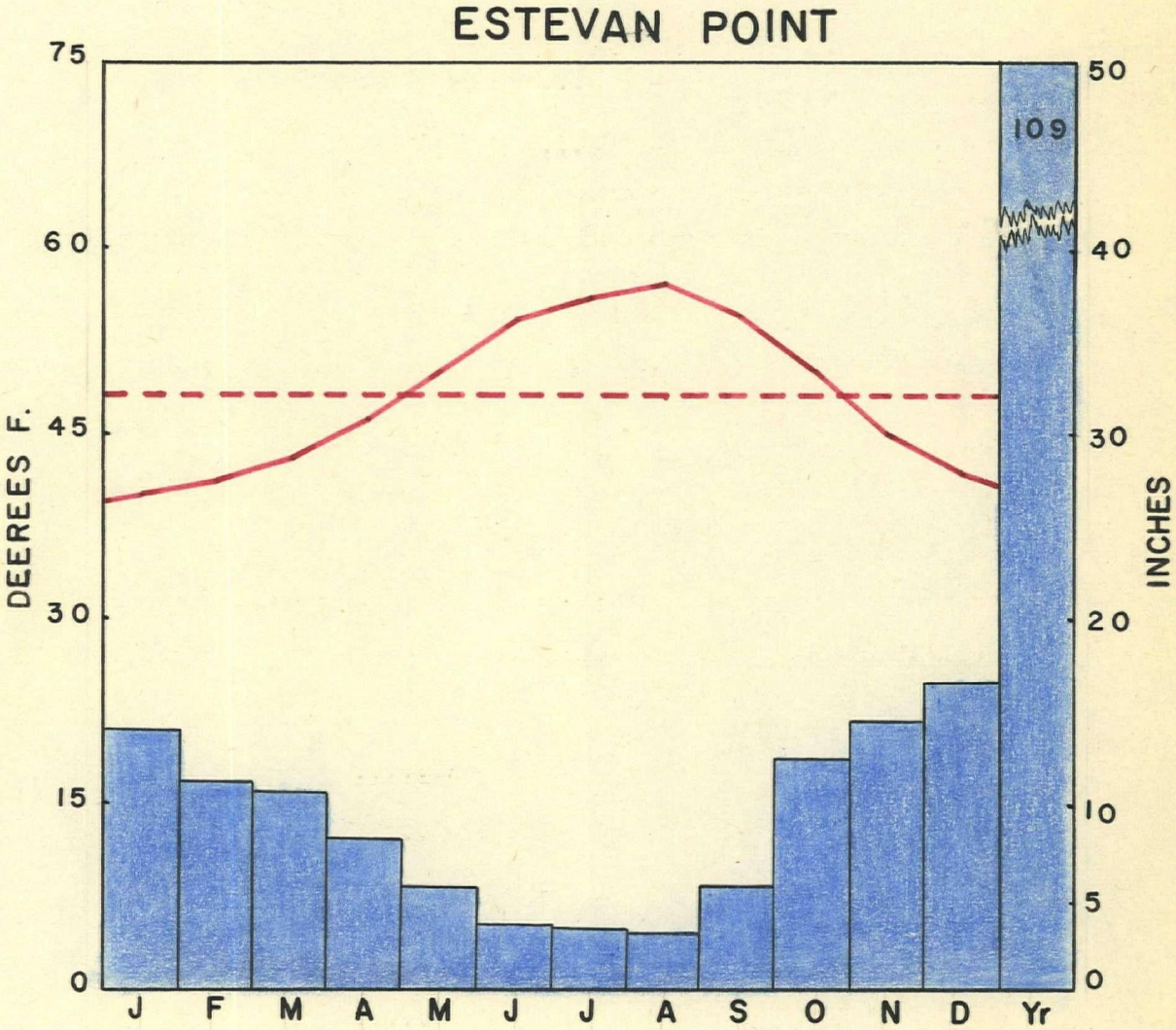
Winter " ... 38 - 40° F

The diurnal and annual ranges of temperatures are small, but vary according to locality; for example, at the mouths of fiords the range is lower than at their heads; it is lower, too, on the windward side of the Insular Mountains than on the leeward. The data below show these two variations in range.

Table 7. Variations in Temperature According to Locality

Location	Station	Mean annual range
West coast		
Mouth of fiord	Ucluelet	20° F
Head of fiord	Alberni	30° F
Insular Mountains		
Windward side	Estevan Point	16° F
Leeward side	Lazo	27° F

August is the warmest month of the year - due to marine influences. Frosts are frequent in winter; nevertheless the growing season is long enough for this latitude - 150 to 250 days. This is the effect of the warm current running parallel to the coast. The upwelling of cold water in summer keeps the summer temperature lower



AVERAGE MONTHLY AND ANNUAL
TEMPERTURE AND PRECIPITATION

as compared to that of the East coast - as is indicated below:

	Mean July	Mean August
East coast - Nanaimo	64° F	64° F
West coast - Estevan Point	56° F	57° F

b. Precipitation

The marine West coast region has adequate rainfall at all seasons, with winter maxima; for example:

	Mean annual
Windward location - Quatsino	95.90 inches
Leeward location - Alert Bay	53.49 inches

In general, precipitation is well over 100 inches; as is indicated by the Rainfall Distribution map. The following table gives rainfall statistics for two representative stations of the West coast:

Table 8. Monthly and Annual Precipitation of West Coast Areas (1)

Station	J	F	M	A	M	J	J	A	S	O	N	D	Annual
Estevan Pt.	14	11.2	11	8.3	5.8	3.5	3.5	3.2	5.4	12.4	14.5	16.6	109.9
Quatsino	11.4	9.5	8.4	6.8	4.3	3.0	2.1	2.9	6.0	11.9	14.2	15.2	95.90

So we see that more than 50 percent. precipitation occurs during the four winter months, November to February; while only 15 percent. falls during the four summer months, May to August - only equal to that of December alone. There is no deficiency of water at any time during the year in the marine West coast regions.

The following factors sum up the causes of the heavy rainfall:

1. Presence of the warm Japan current

(1) Climate of British Columbia, Report for 1951, Department of Agriculture, Victoria, B.C.

2. Meeting of warmed and cooled air masses

3. Prevailing westerly winds

4. Relief of the Island.

Prevailing onshore winds, moist and unstable, accompanied by Easterly moving depressions, are forced by the mountains to ascend, by both frontal and orographic influences; thereby causing the heavy rainfall of the Western coast. A beautiful and impressive example of the influence of topography on precipitation is presented in this Western area at Henderson Lake, where the annual precipitation averages 250 inches - highest recorded on the continent.(1)

This region is marked by a higher percentage of cloudiness, which reduces the amount of sunshine - condition unfavourable to agriculture.

Table 9. Total of Low Clouds at Tofino in 1945 (2)

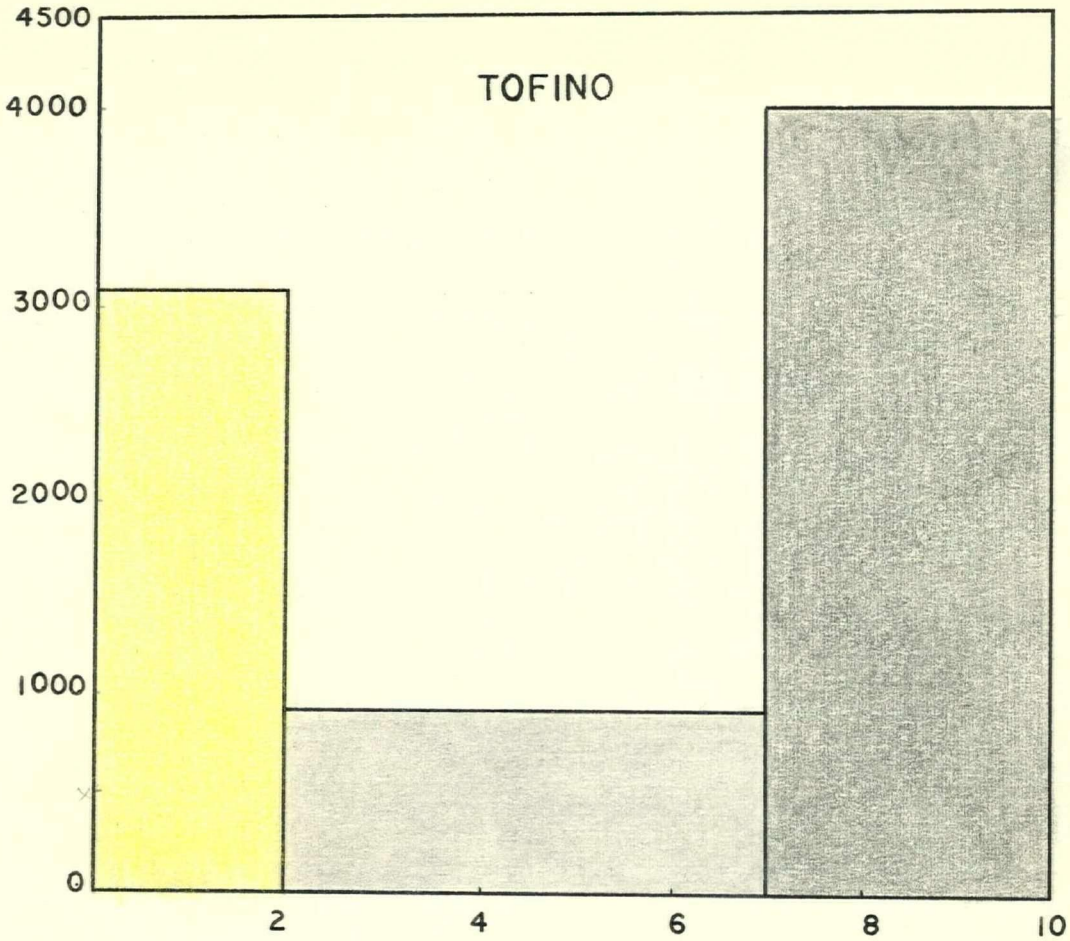
Unit = 10th of sky covered	Total no. of hours of low clouds
0 - 2	3,155
2 - 7	979
8 -10	4,059
Obscured	347
Not reported	220

C. Humidity

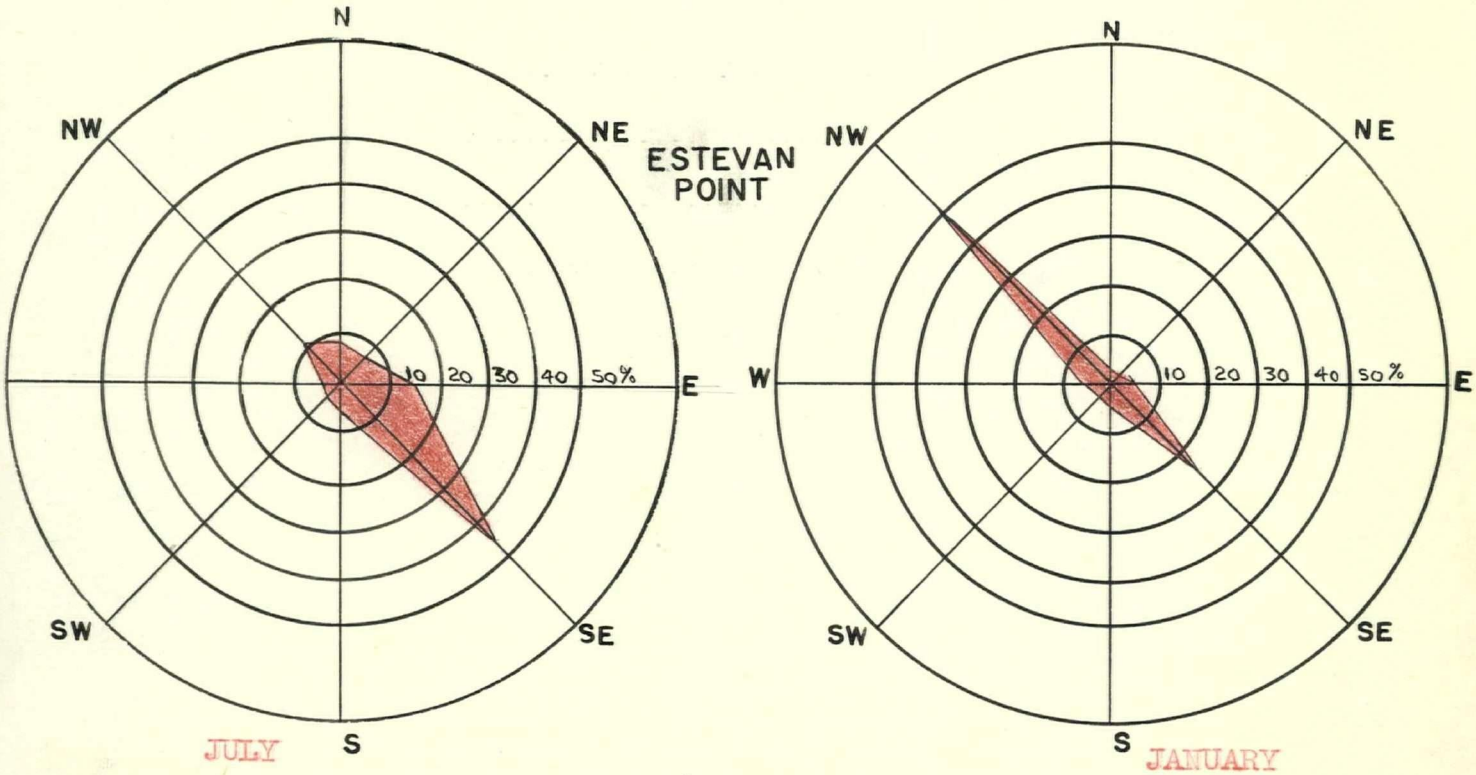
As this Pacific slope of the Island receives abundant precipitation throughout the year, with winter maxima, the relative humidity is high (80 - 85%) especially in winter. This plays an important part in

(1) C. F. Napier Denison, "Remarkably heavy precipitation at Henderson Lake, Vancouver Island." Monthly Weather Review, Vol. 60, no. 12, p. 252

(2) General Summaries, 1945, Part 1, Toronto, 1946



TOTAL LOW CLOUDS IN TENTHS OF SKY COVERED IN HOURS



PERCENTAGE FREQUENCY OF WIND DIRECTION IN JANUARY AND JULY.

preventing forest fires: the higher the humidity, the lesser the chance of fires. In summer the relative humidity decreases - due to less precipitation; but in this part it is still quite high as compared to that of Southeastern Vancouver Island. (1)

Another important effect of the upwelling of cold water in summer along the West coast of the Island is the occurrence of fog of an advective type. When the comparatively warmer air comes in contact with the cold offshore water the result is foggy weather - a fact significant to shipping and fishing.

d. Wind Direction

The following table shows the percentage of wind direction in January and July at Estevan Point, representative of the marine West coast region:

Table 10. Percentage Frequency of Wind Direction (2)

Station	Estevan Point								
Direction	N	NE	E	SE	S	SW	W	NW	calm
January	9	7	14	46	5	3	3	11	2
July	3	2	4	25	4	3	6	51	2

In the interior of Vancouver Island, with increase in altitude (approximately over 4,000 feet) and the consequent decrease in marine influence, this Marine West Coast type of climate gives way to a slightly different one - with cooler, shorter summers.

(1) C. C. Boughner and M. K. Thomas, Climatic Summaries for Selected Meteorological Stations in Canada, Newfoundland and Labrador. Meteorological Division, Department of Transport, Vol. 2, 1948

(2) C. C. Boughner and M. K. Thomas, Climatic Summaries, Vol. 2, 1948

2. Summer Dry Climate

(South-East Vancouver Island)

This region includes the Eastern and Southeastern parts of Vancouver Island (as indicated by orange colour on the map). It lies on the leeside of the Insular and Olympic Mountains. The climate of this region can be well understood from Table 11, showing the averages of

monthly and annual temperatures and precipitation: (1)

Table 11. Type 2. - Summer Dry Climate - Temperature, Precipitation

Station	Temp. Precip.	J	F	M	A	M	J	J	A	S	O	N	D	Year	Alt.
Victoria	T	39	41	44	49	53	57	60	60	57	51	45	41	50	
	P	4.25	3.09	2.24	1.22	0.97	0.88	.46	.64	1.44	2.32	4.15	4.76	26.92	228
Duncan	T	37	40	44	49	44	61	65	65	59	51	43	39	51	
	P	5.71	4.68	3.60	2.13	1.72	1.44	0.95	0.87	1.43	3.82	5.25	7.04	38.64	28
Nanaimo	T	37	39	43	48	54	59	64	64	58	51	43	39	50	
	P	5.3	4.20	2.86	1.92	1.51	1.61	1.00	0.99	1.86	3.50	6.02	6.33	37.23	100

As shown above the main features of a Summer Dry Climate are,

a) Concentration of precipitation in the winter season - summers being nearly dry (Victoria, July .46 inches)

b) Cool to warm summers and mild winters

c) High percentage of sunshine, especially during summer

(1) Climate of British Columbia, 1951, Department of Agriculture, Victoria, B.C.

The above mentioned features, together with a distinct type of vegetation, separate this Summer Dry region from the rest of the Island climatically.

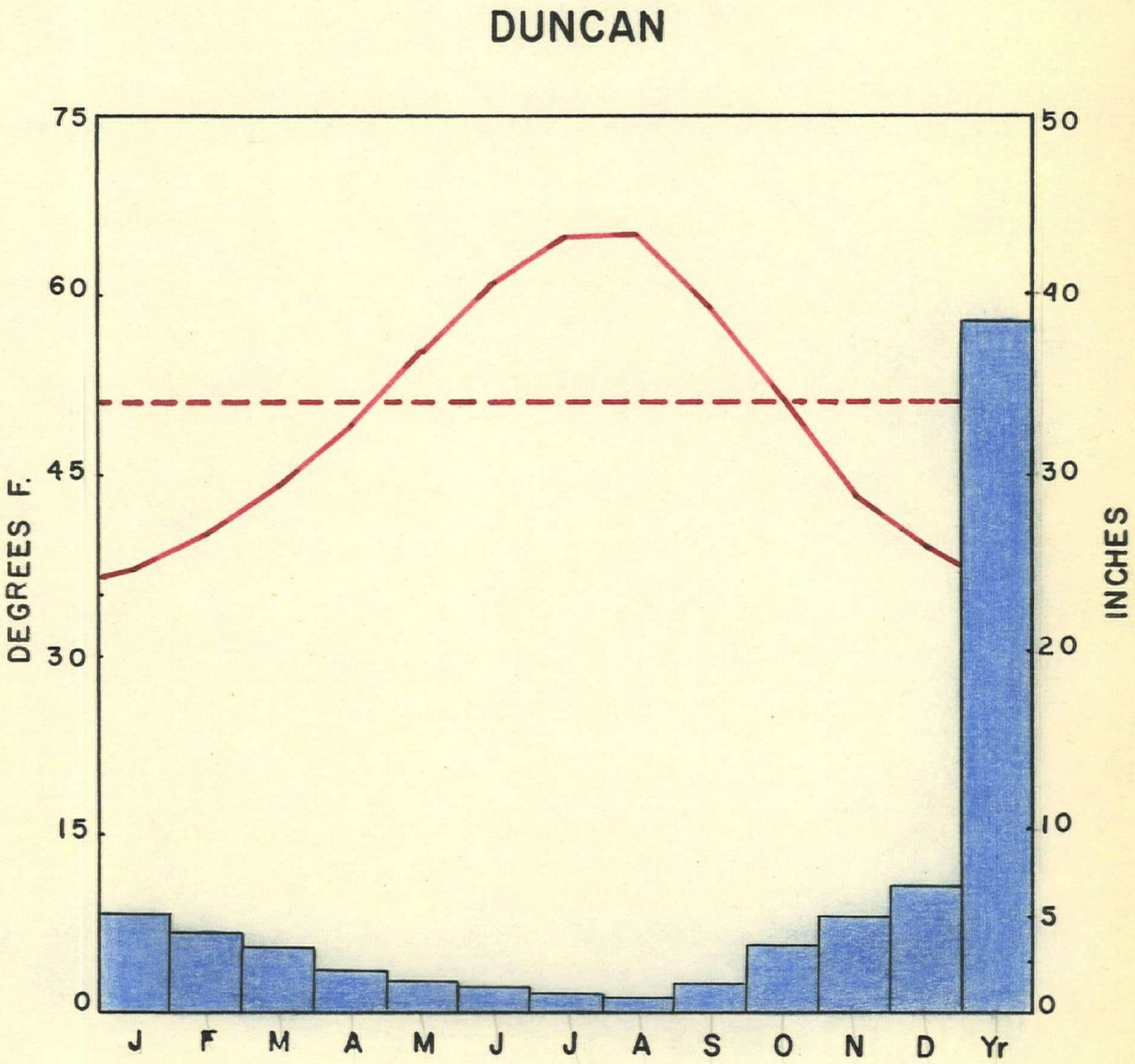
a. Temperature

Winters are unusually mild, with a mean January temperature of 36 - 39° F. Agriculturally, extreme temperatures are more important than the averages in this region. In winter mean minimum nowhere falls below 32° F and the mean extreme lowest not below 20° F.

Summers are cool to warm with a mean July temperature of 60 - 65° F. Mean maximum temperature everywhere exceeds 70° F except at Victoria where it is 69° F. These high summer temperatures along with low precipitation are the cause of drought conditions prevailing in the region during summer - a factor which affects the plant growth, because of water deficiency in the sub-soil.

Along the West coast region, the upwelling of cold water keeps the temperature lower, that is why the Western coast of the Island is cooler in summer as compared to the Summer Dry region which, during the summer months, is under the strong influence of the Hawaiian High. Consequently this latter region experiences high summer temperature, less cloudiness, low rainfall and abundance of sunshine.

Range of Temperature. Because of the leeward position of this region its range of temperature is higher as compared to other climatic regions of Vancouver Island. The annual range of temperature is approximately 25° F. ±



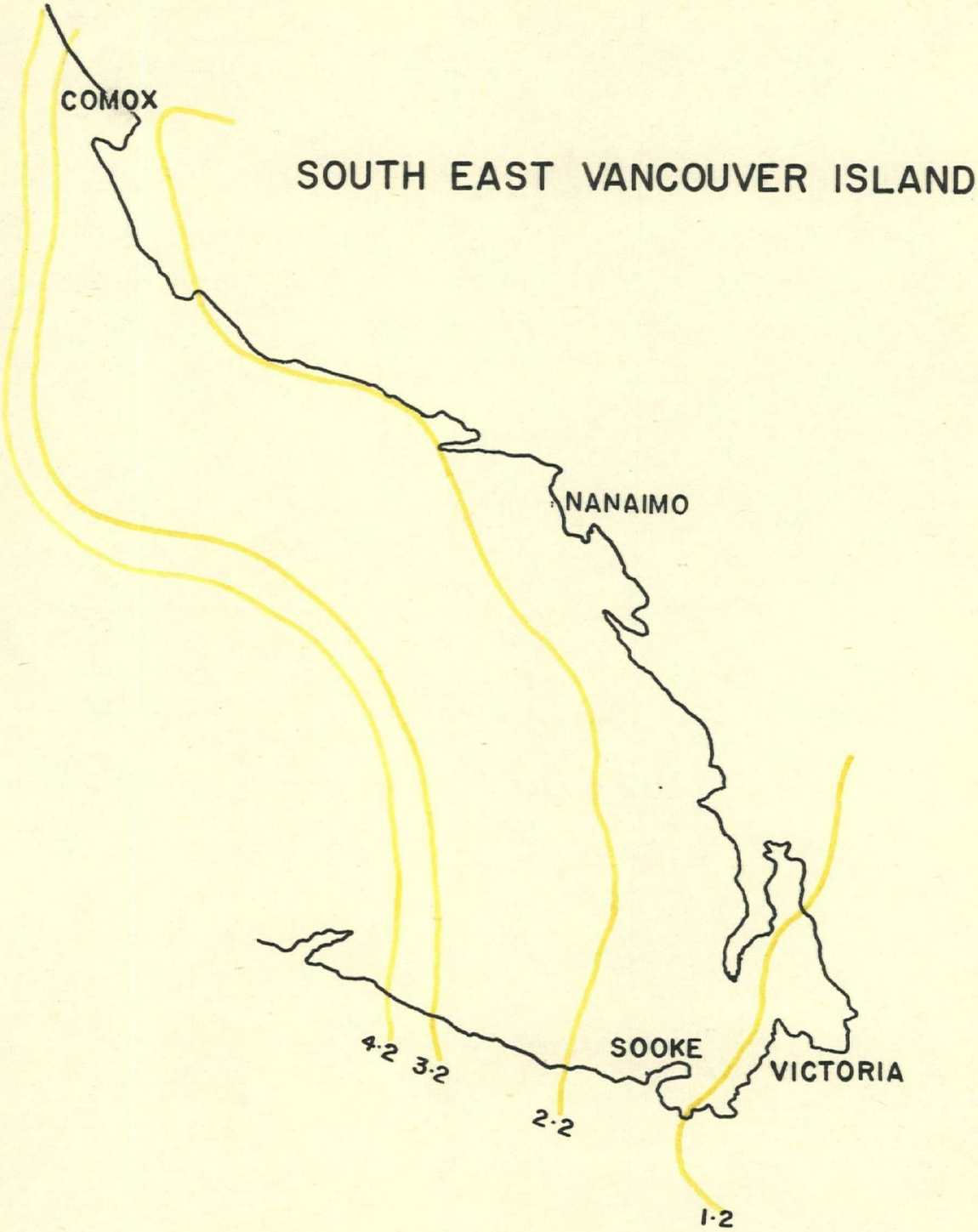
AVERAGE MONTHLY AND ANNUAL
TEMPERATURE AND PRECIPITATION

From the temperature, precipitation and cloudiness conditions, it is apparent that this Summer Dry region should have a longer growing period than elsewhere on the Island. Indeed, the frost-free period exceeds 200 days, except at Sooke, where it is 190 days. It reaches 275 days at Victoria, one of the longest frost-free periods in Canada. This is a very important factor in plant growth. This long growing season, together with favourable topography and soil, makes this region agriculturally of great importance.

b. Precipitation

This Summer Dry region lies on the leeward side of the Insular and Olympic Mountains, and thus experiences low annual rainfall as compared to other climatic regions of Vancouver Island. Precipitation in this area ranges from 26 inches (Victoria) in the South to 55 inches (Courtenay) in the North. Precipitation in this Summer Dry region follows the general pattern of Vancouver Island rainfall, but with a more strongly marked winter maximum and summer minimum than in any other region of the Island.

Certain parts of this Southeastern area have the lowest rainfall in Canada during mid-summer. Fig. shows the July and August isohyetes. In particular, Saanich Peninsula, with a little over an inch of rain, has an acute moisture deficiency in July and August. The rainfall increases toward the North-West, along the East Coast. July and August are the dryest months throughout the region: less than 5 per cent. of the annual precipitation falls during these two months; whereas 75 per cent. falls in the six months' period from October to March. The amount of precipitation in the form of snow is very low: at Victoria it is 13.4 inches and at Nanaimo 24.5 inches.



JULY AND AUGUST ISOHYETS IN INCHES

c. Humidity

In winter, the relative humidity is high, because of the percentage of precipitation and cloudiness during the winter months. In summer, in the afternoon, the relative humidity drops down to 59 - 62 per cent. at Patricia Bay. This low humidity during harvesting time is a favourable factor for agriculture; but it also favours drought conditions already existing on South-East Vancouver Island in summer, due to the lack of precipitation. Furthermore, it increases the chances of fire during the summer. Fires are a very dangerous enemy of forests and Vancouver Island's economy is directly connected with its timber lands.

Table 12. Monthly Humidity Averages - Patricia Bay

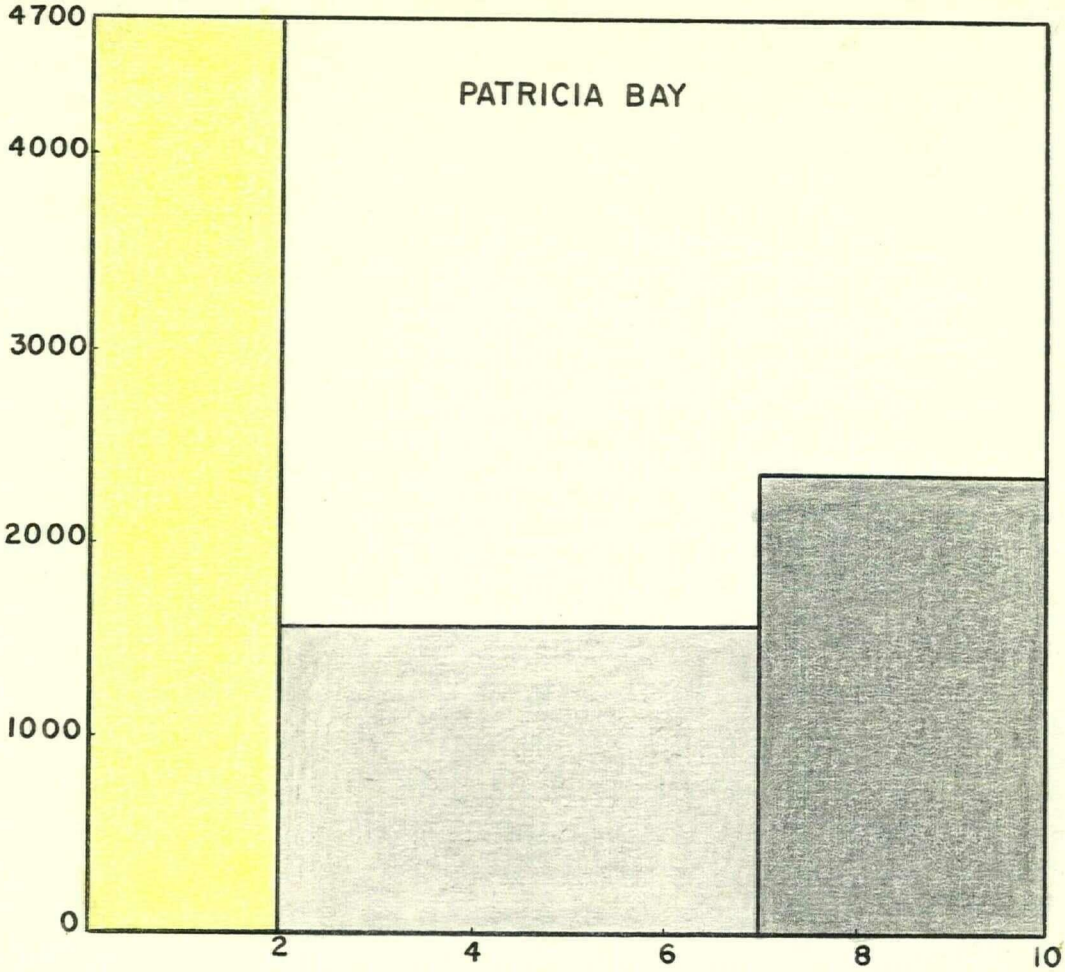
	Jan.	F.	M.	A.	M.	J.	J.	A.	S.	O.	N.	D.
A.M.	91	91	90	90	88	89	91	91	91	93	92	93
P.M.	80	73	65	66	61	62	61	59	64	74	84	86

d. Wind Direction

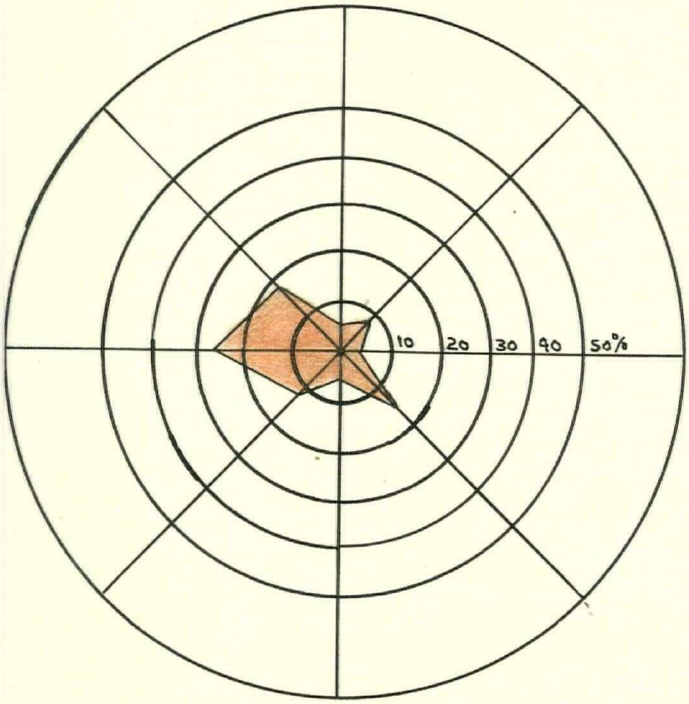
Table 13. Percentage Frequency of Wind Direction

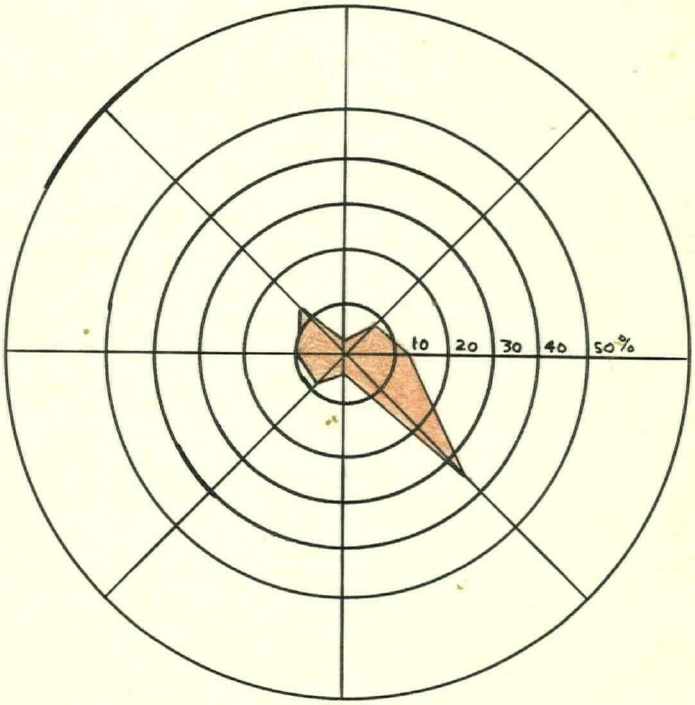
Station		N	NE	E	SE	S	SW	W	NW	Calm
Comox	Jan.	1	1	x	31	6	8	13	21	19
	Jul.	12	4	6	22	7	3	8	33	3
Patricia Bay	Jan.	3	9	2	17	6	13	26	18	4
	Jul.	1	9	11	36	3	9	10	12	9
Victoria	Jan.	30	18	14	11	7	7	11	2	x
	Jul.	4	4	4	2	16	40	29	x	1

The relief around Victoria has a marked influence upon the



TOTAL LOW CLOUDS IN TENTHS OF SKY COVERED IN HOURS





direction and speed of the winds which in Victoria are very strong.

3. Transitional Climate

(East Vancouver Island)

The transitional region includes the Eastern part of Vancouver Island on the leeside of the Northern Insular Mountains. The climate of this region is of a transitional type, as the name suggests, between the Summer Dry and the Marine West Coast climates. The climate of the Southern part of this region resembles the Southeastern and the climate of the Northern part merges into that of the West coast. To indicate this transitional character the following figures are given:

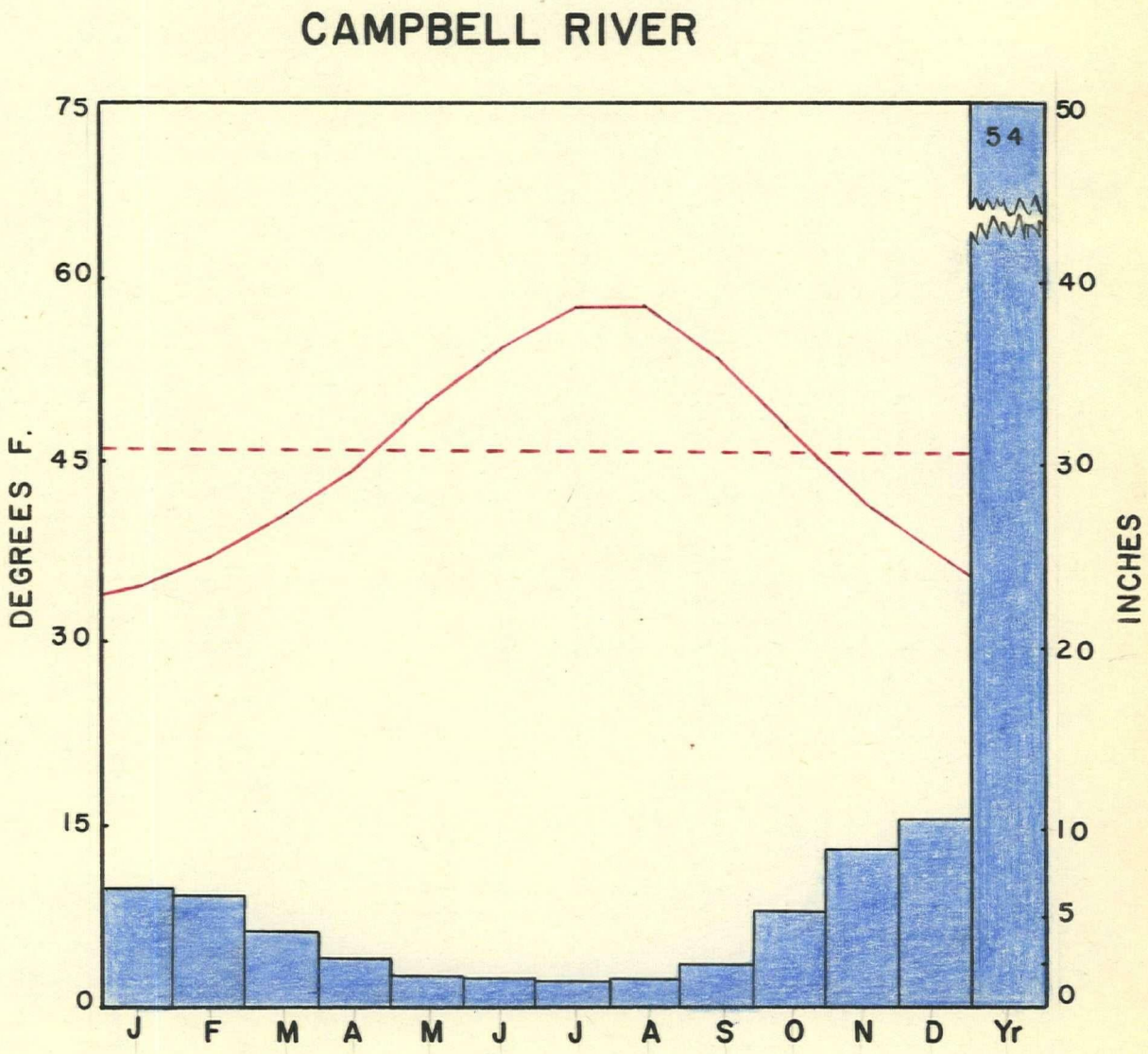
Table 14. Transitional Changes in Temperature and Rainfall

Station	Annual range	Precipitation	Altitude
East to North			
Nanaimo	27° F	37 inches	100 feet
Port Hardy	23° F	70 "	25 "
Quatsino	22° F	95 "	8 "

a. Temperature

Winters are mild, with a mean January temperature of 34 - 38° F, and are due to the marine influences. The summer temperature ranges from 57° F in the North to 60° F in the South.

As compared with the West coast and Southeastern regions, the mean annual temperatures are lower in the Transitional region, because of the absence of a warm current and its position to the North. Summers are less warm than in the Southeastern region which is strongly influenced



AVERAGE MONTHLY AND ANNUAL
TEMPERATURE AND PRECIPITATION
(PORT HARDY) (CAMPBELL RIVER)

by the Hawaiian High during that season; but on the other hand, they are warmer than in the West Coast region which is influenced by the offshore cold water during summer.

The following table indicates these transitional changes:

Table 15. Transitional Winter and Summer Temperatures

	Station	Mean January	Mean July
Transitional	Port Hardy	34° F	57° F
Summer Dry	Victoria	38° F	60° F
Marine West Coast	Estevan Point	40° F	56° F

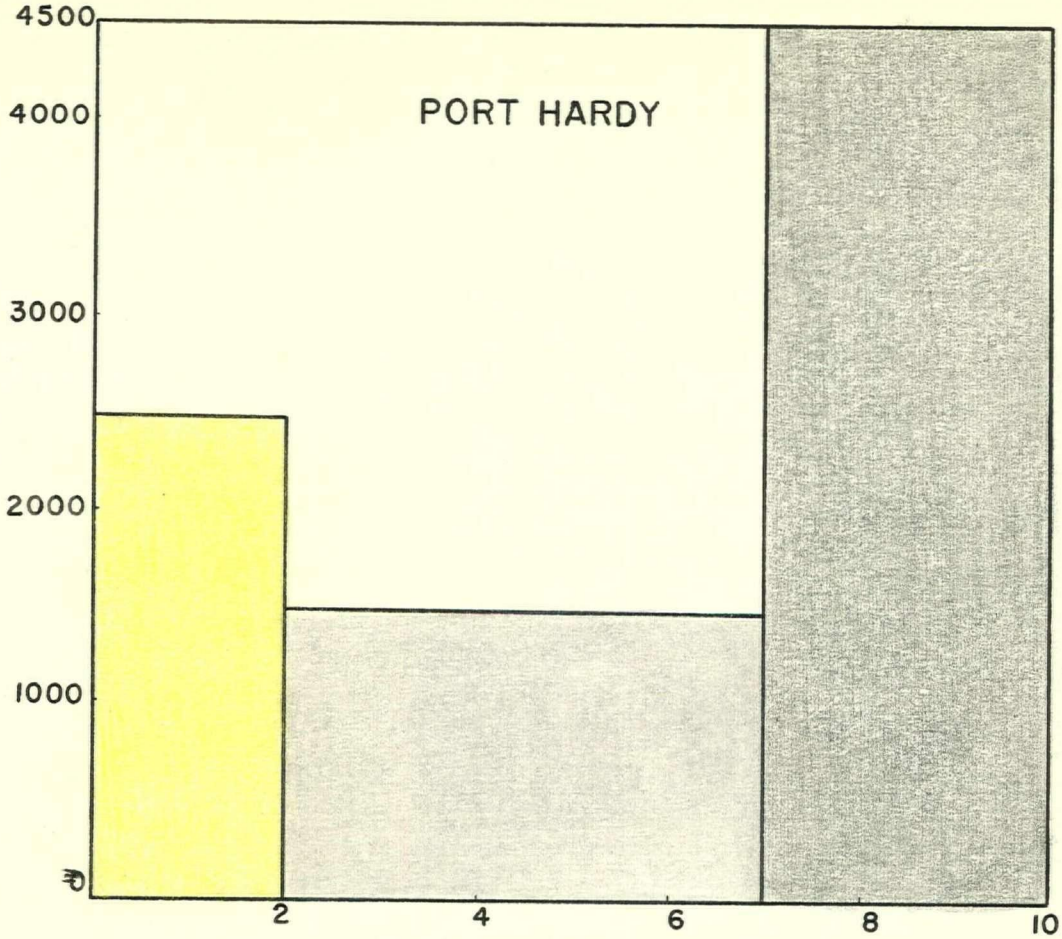
As the winters are mild, the frost-free period is sufficient for plant growth; but frosts are not uncommon in this region during winter. The frost-free period ranges from 150 days in the North to 200 in the South, as this Transitional region is more open to the Northern winds.

b. Precipitation

Precipitation also shows a transitional character. In the Southern part it is about 50 inches; but increases as one proceeds toward the North, where it reaches up to 70 inches - as is the case at Port Hardy. See table below:

Table 16. Transitional Character of Annual Precipitation South to North

Station	Altitude	Precipitation
Comox	75 feet	45.5 inches
Campbell River	50 "	54.0 "
Alert Bay	145 "	54.0 "
Port Hardy	74 "	70.0 "



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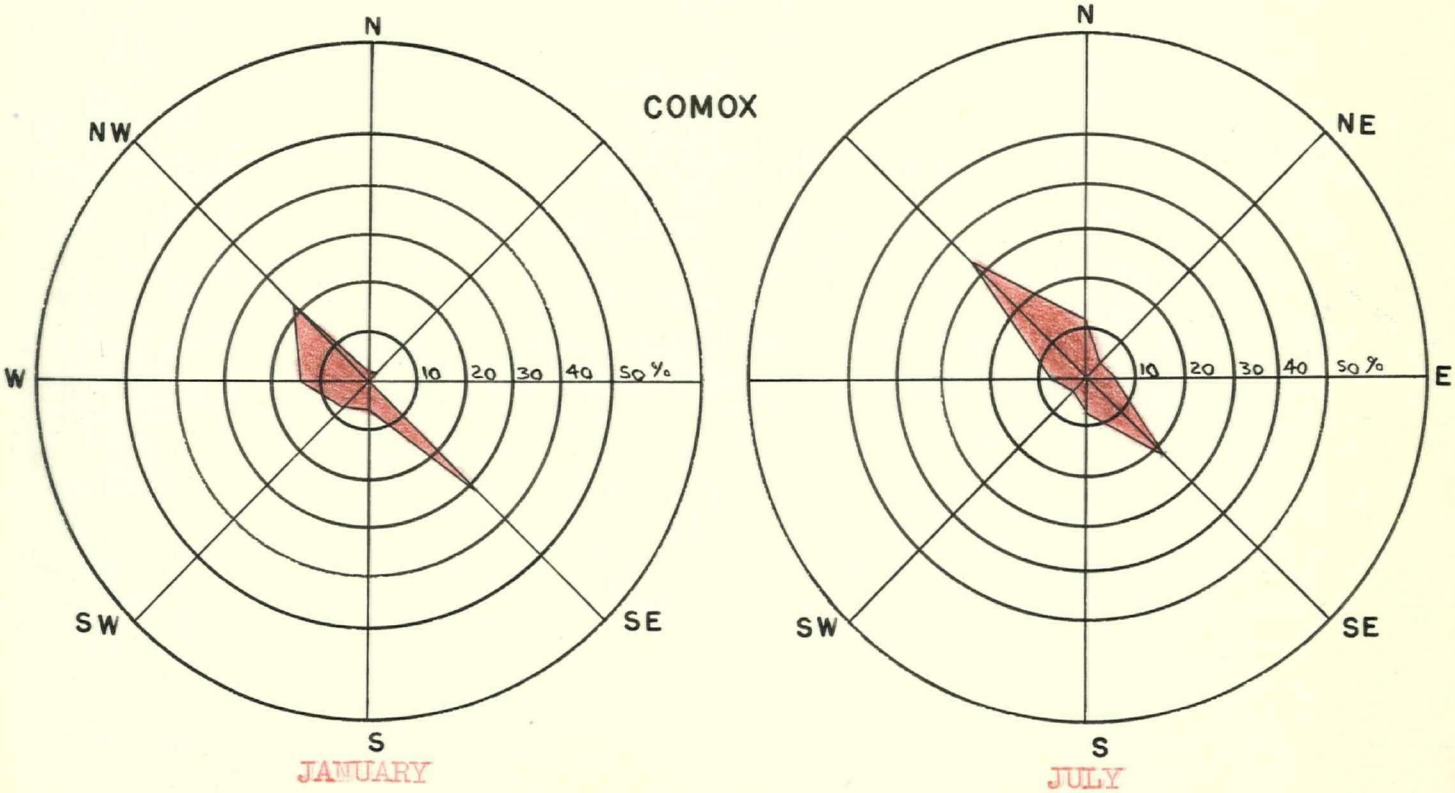


PERCENTAGE FREQUENCY OF WIND DIRECTION IN JANUARY AND JULY

The precipitation is distributed throughout the year, with maxima in winter and minima in summer - which is indicated by the Campbell River precipitation graph. The summer precipitation of this Transitional region is compared with that of other regions in the following table, to show its transitional character.

Table 17. Transitional Summer Precipitation

South to East, North and West

Climatic Type	Station	June	July	August
Summer Dry	Victoria	.88	.46	.64
	Nanaimo	1.61	1.00	.99
Transitional	Campbell River	1.72	1.64	1.68
	Alert Bay	2.11	1.99	2.16
Marine West Coast	Quatsino	3.04	2.15	2.95
	Estevan Point	3.54	3.48	3.17

c. and d. Humidity and Winds

Winds follow the general pressure gradient. They are Southeasterly in winter and Northwesterly in summer, as at Comox (mentioned in Dry Summer region). Humidity is high, especially during the winter and even in summer it is above that of the Southeastern part of the Island.

4. Humid Continental Climate

(Central Vancouver Island)

The central part of Vancouver Island consists of high mountains, ranging from 4,000 to 7,000 feet in elevation. The most important factors regarding the climate of this region are:

a) Decrease in marine influence (not altogether absent

as in the central part of the Province) and

b) Increase in altitude effect.

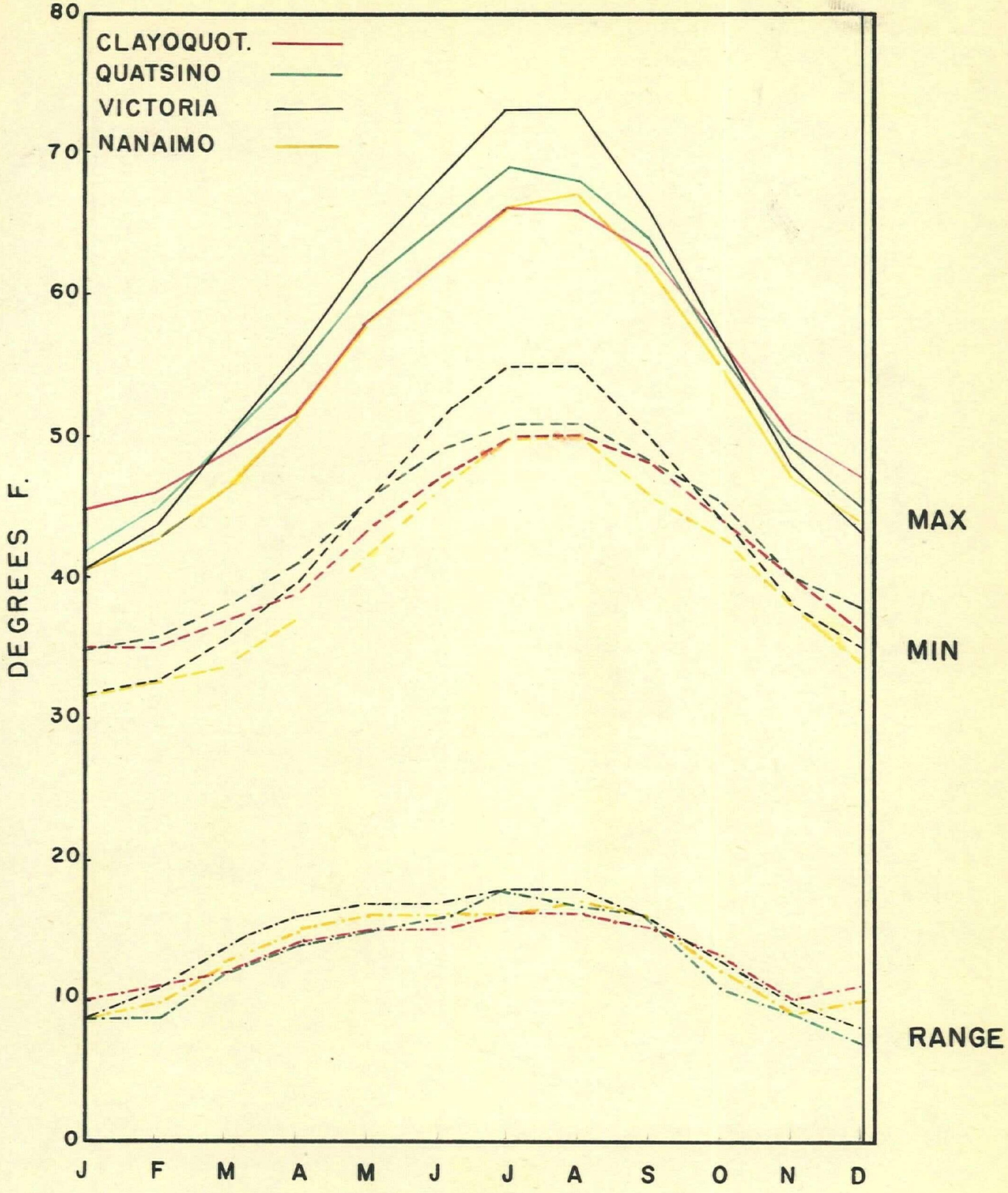
These two factors account for the difference between the climate of the central region and that of other climatic regions of the Island.

a. Temperature

Summers are cool and short, with temperatures ranging from 48 to 52° F. Winters are severe but not as severe as those of the central part of British Columbia. Winter temperatures are 20 - 32° F and it is winter which accounts for the high annual range of temperature. The frost-free period is shorter than on the rest of Vancouver Island: 100 days.

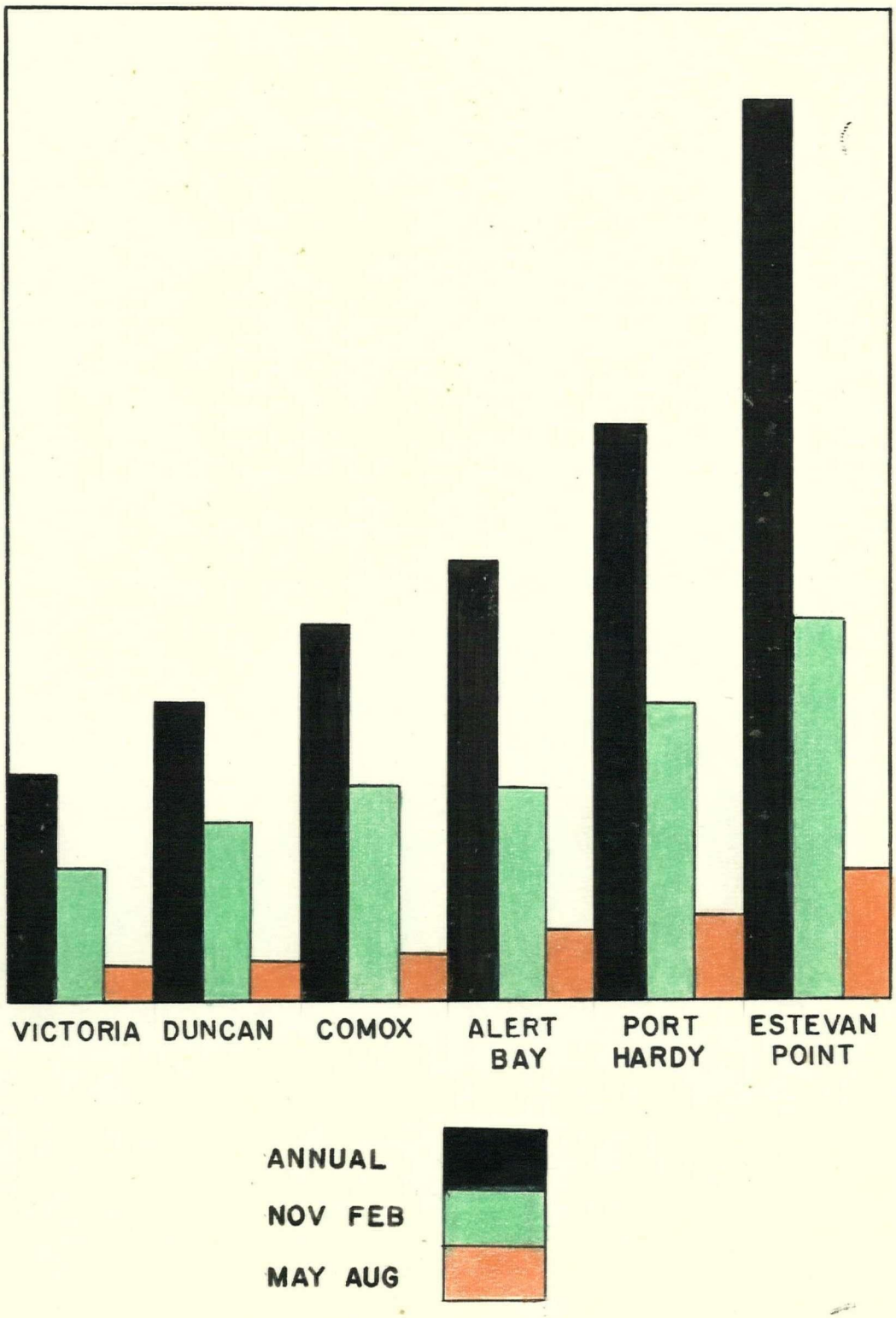
b. Precipitation

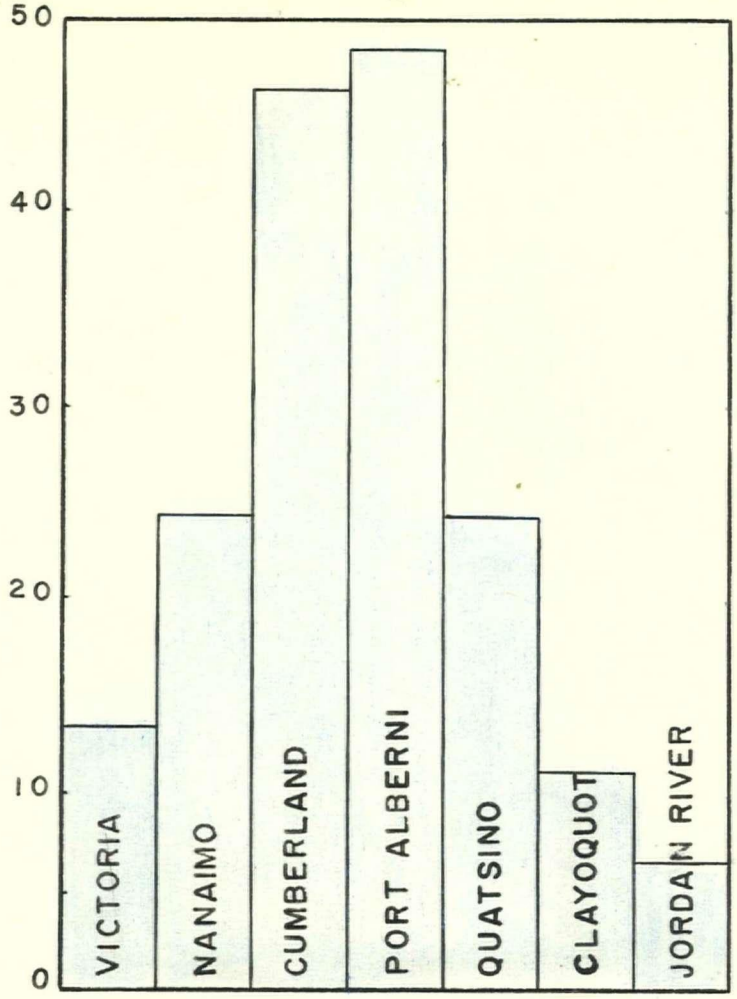
Precipitation is heavy throughout the Humid Cpntinental region, mostly over 100 inches. It is distributed throughout the year, but with a tendency to be more abundant during the winter months. As the region consists of high elevations, the amount of precipitation in the form of snow is much greater than for the rest of the Island. (As none of the climatic stations are situated in this region, exactness in the climatic study is not possible: only the general climatic features of the region are given.)



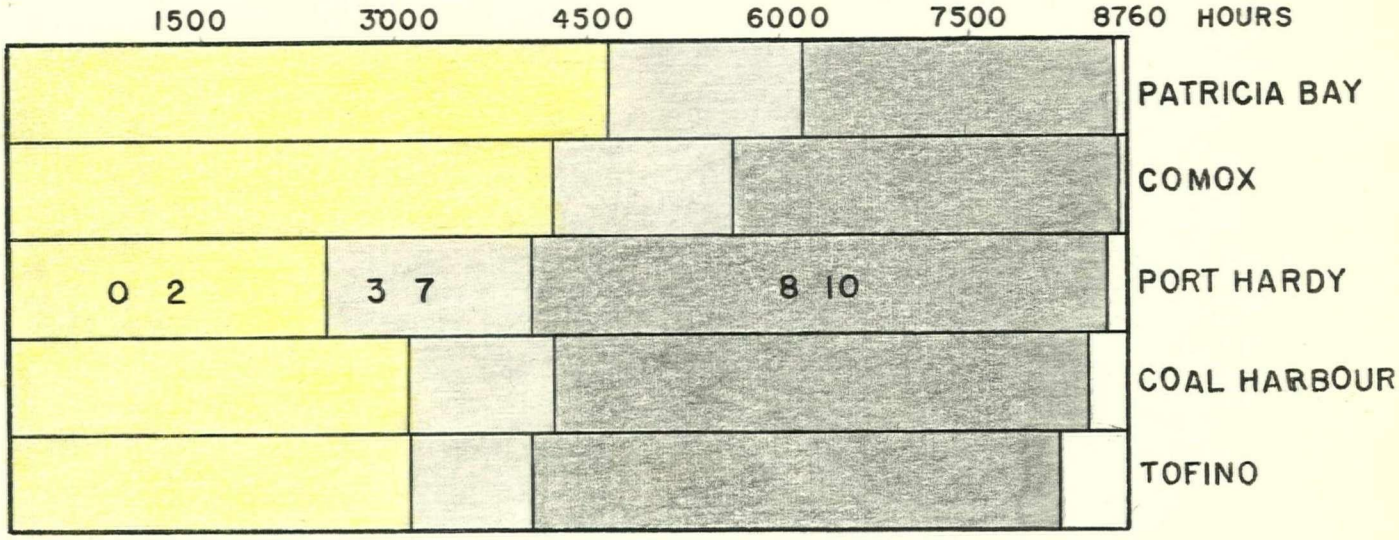
MEAN MONTHL & ANNUAL MAXIMUM, MINIMUM & RANGE OF TEMPERATURES

ANNUAL AND SEASONAL PRECIPITATION





AERAGE ANNUAL SNOWFALL IN INCHES



TOTAL LOW CLOUDS IN TENTHS OF SKY COVERED BY HOURS

IV

Natural Vegetation

Vancouver Island occupies the North central portion of the Pacific coast forest region of North America, regarded as the largest forest area on the continent and the greatest coniferous forest in the world. The principal topographic features of the Island have a general trend: at right angles to the prevailing winds. Warm moisture-laden air currents from across the Japan Current, ascend the Western slopes of the mountains, thereby causing heavy precipitation. The effect of the Japan Current on Vancouver Island is found in its mild temperature and the heavy precipitation - both favourable to tree growth.

The mountainous character of Vancouver Island limits the amount of land suitable for agricultural use; hence by far the greater part of the land is fit only for forest growth. Proof of this is given by the following figures. (1)

Total area of Island	8,020,500	acres	
Productive forest land	4,211,800	"	= 52.51%
Non-productive forest land ...	3,762,000	"	= 46.91%
Agricultural land	46,000	"	= .58%

The natural vegetation of Vancouver Island consists predominantly of coniferous forests. However, deciduous trees are found either in places where the climate is favourable or as part of the secondary growth in logged areas. But in these logged regions, coniferous trees overcome the deciduous growth after a few years.

(1) F. D. Mulholland, Forest Resources of British Columbia, 1937.

The mild temperature and heavy precipitation have enriched Vancouver Island with a luxuriant forest growth, thus making it one of the most densely forested regions of Canada. This does not mean that the size and density of the trees is everywhere uniform. The forests of the Northern region are made up of smaller trees than those of the Southeastern areas where very favourable conditions of topography, climate and soil support Douglas fir and Western cedars of huge dimensions. Furthermore, the percentage of each species changes from region to region. The tree line also varies: it is found at an elevation of 5,000 feet in the South and at 4,000 in the North of Vancouver Island.(1) Amont other species, Mountain hemlock and Alpine fir are found near the upper limit of timber.

In the General Forest Classification of Canada(2) the whole of Vancouver Island falls into coastal forest regions; but for the purposes of detailed study, the Island may be divided into four major subdivisions (shown on the map) according to the types and sizes of the trees - which are the direct result of climate and topography. These subdivisions correspond to the following regional headings:

1. South-Eastern region
2. Central region
3. North-Eastern region
4. Sub-Alpine and Alpine regions

1. South-Eastern Region

The South-Eastern part of Vancouver Island constitutes a region climatically distinct from the rest of the Island. It is characterized by

(1) Canadian Regions, 19 , p. 432

(2) Canadian Regions, 19 , p. 432

Halliday, W. F. D. - Report on Forest Classification of Canada, King's Printer, Ottawa, 1937

Benedict, R. E. - Forest Region Map of Southern British Columbia

summer drought, abundant sunshine, low rainfall (20.40 inches annually) and mild temperatures. Because of this distinct type of climate a number of trees are common to it which do not occur elsewhere on Vancouver Island. Examples of these are the Madrona and Garry oaks which are confined to this region.

The Madrona does not occur in pure stands; but is often found mixed with Douglas fir, Western Red cedar and Western hemlock. Garry oak, on the contrary, tends to form pure stands; but it is also found scattered in the above associations. Other trees indigenous to this region are Red alder (on alluvial soils) while broad-leaved and vine maple have a general distribution. At present most of the area - for example, Saanich Peninsula and the district around Courtenay - is cleared and the land is used for agriculture.

2. Central Region

The Central region covers the greater part of Vancouver Island and has an annual precipitation of over 50 inches, a mean annual temperature of 45° F, with an absence of extremes, a humid atmosphere and a long growing season. The product of this type of climate is heavy forest, of coniferous type, which contains trees of 10 to 15 feet in diameter.

The typical stand in this region consists of Western hemlock and Western Red cedar, together with Douglas fir and scattered Western White pine which are of great commercial value. (The mature stands bear from 10,000 to 100,000 feet, board measure, per acre.)

The Douglas fir, a species of great economic value, thrives on

good quality soils up to about 2,000 feet. At higher elevations, Amabile fir and Mountain hemlock are present, with Alpine fir increasing toward the tree line. Where the forest is dense, the underbrush is not thick; but in the more open and damper areas of lowland and valley the undergrowth is luxuriant. It consists of shrubs, such as salal, salmon berry and huckleberry; varieties of maple and alder and, on poorly drained areas, high broad-leaved ferns and devil's club.

The principal forest cover, as mentioned above, consists of Western cedar, Western hemlock, Douglas fir and White pine. The forest in places is of little value for timber, on account of its elevation, old windfalls, snowslides and forest fires; but a large portion of it is of excellent quality and is the chief natural asset of the region.(1)

3. North-Western Region

The heavy annual precipitation (over 100 inches), lower annual temperatures, a shorter growing season and lesser amount of sunshine are responsible for a forest of inferior quality to that of the Central Region, where the climate is comparatively favourable to forest growth.

The principal associations are Western Red cedar, Western hemlock, Amabile fir and Spike spruce. The forest is dense, although the trees, except in the best situations, are short and defective, so of little economic value as timber; but they are most suitable for pulp. The fairly dense undergrowth consists chiefly of hemlock and cedar bush.

4. Sub-Alpine and Alpine Regions

At the higher elevations, between the merchantable timber line

(1) Forest Protection in Canada, 1913-14 Commission of Conservation, Canada, p. 103

and the cold timber line, that is, in the Sub-Alpine region, there occurs a stunted tree growth composed chiefly of Mountain hemlock, Yellow cypress and Alpine fir, with a mixture, in places, of Red cedar, lodgepot pine or White Bark pine.

The Alpine region, that is, the high zone above tree line, is of the wet type in the insular mountains. The rainfall is heavy. Except at extremely high elevations, plant growth is still possible, but not of commercial value. False heathers, blueberries and allied species abound.

The Sub-Alpine and Alpine types do not carry merchantable timber and from the viewpoint of forest production they are considered as waste lands.

Vegetation has played an important part in the development of Vancouver Island and as a natural resource it will receive due attention under "Forestry".

V

Soils of Vancouver Island

Soils constitute one of the most important factors in the study of the Geography of a region. Compared with the whole volume of the Earth, soils form but a small film, only a few inches to several feet in depth, on the surface; yet they produce nearly the entire food supply of the world.

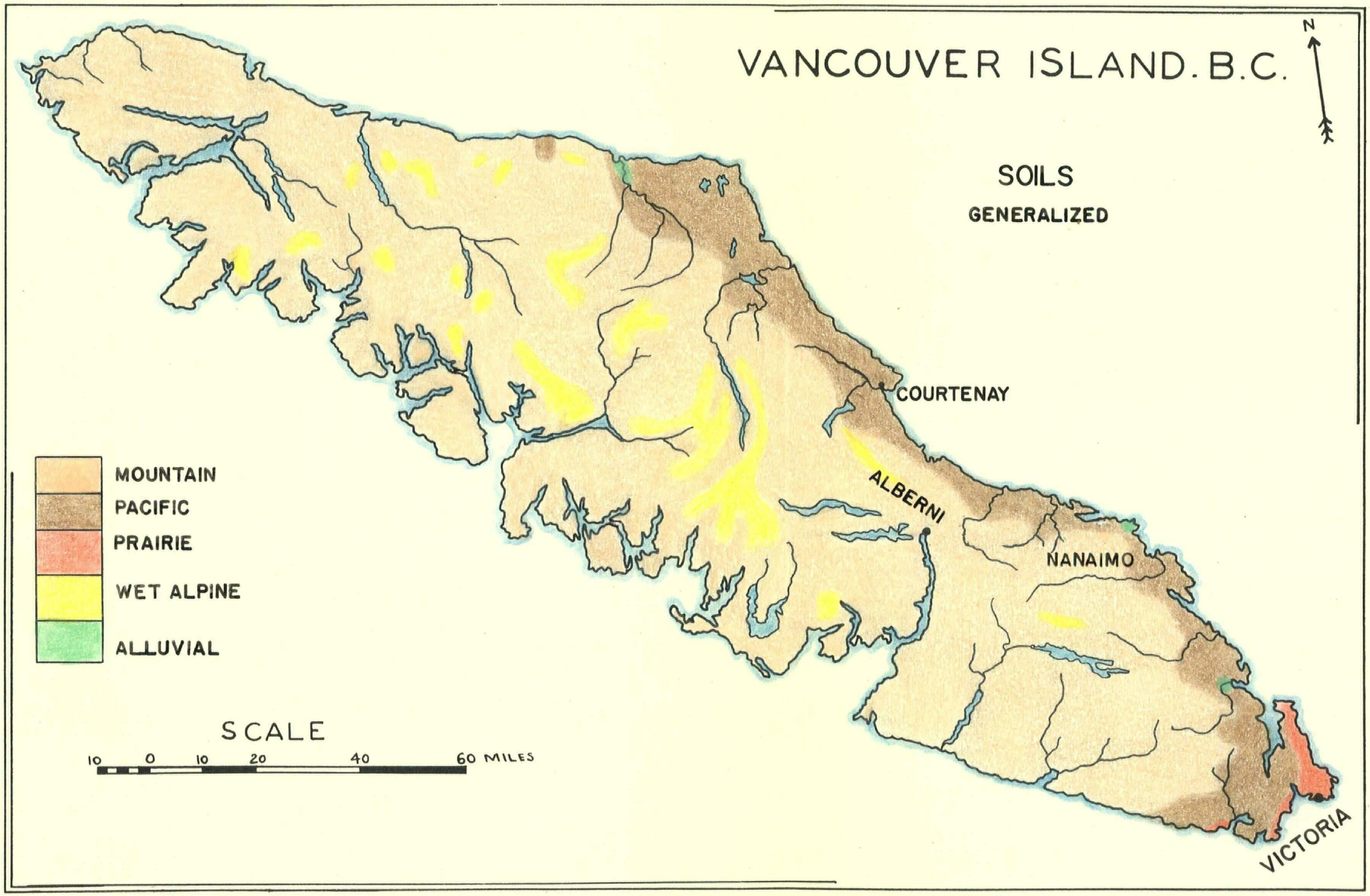
Soil Origins

The origin of the soils of Vancouver Island is associated with two features: first, they are derived from the various rock materials of the Island; second, they have been mixed, transported and deposited through stream and glacial action. Other factors which have played important parts in the development of the soil are the wnvironmental factors: climate, vegetation, relief, drainage, etc. In the thousands of years since glaciation, environmental factors have been at work, changing and modifying the products of glaciation. As a consequence, we now find soils with very different physical and chemical properties developed from the same parent material.

The soils of Vancouver Island have been developed from the following source materials:

a) Glacial till deposits

b) Lacustrine and marine deposits (sediments)



British Columbia - Second Resources Conference, Victoria, B.C. 1949

c) Coarse outwash materials

d) Shales and sandstone (mainly having Glacial till influence)

e) Post-Glacial alluvial bottoms and fans

f) Miscellaneous deposits of varying texture, composition, drainage and origin.

Soil Survey

Since soils are the natural resources upon which agricultural and forest economy are based, a knowledge of them is necessary to provide the basic information for their development. Thus the Soil Survey was conducted in 1944. The revision of the same area is still under way and is in its final stage of completion. But this Soil Survey is limited to a narrow coastal strip and a valley at the head of Alberni Canal, because of the mountainous character of most of the Island. It covers only 600,000 acres of land. The only potential agricultural area which is not surveyed lies in Northern Vancouver Island.

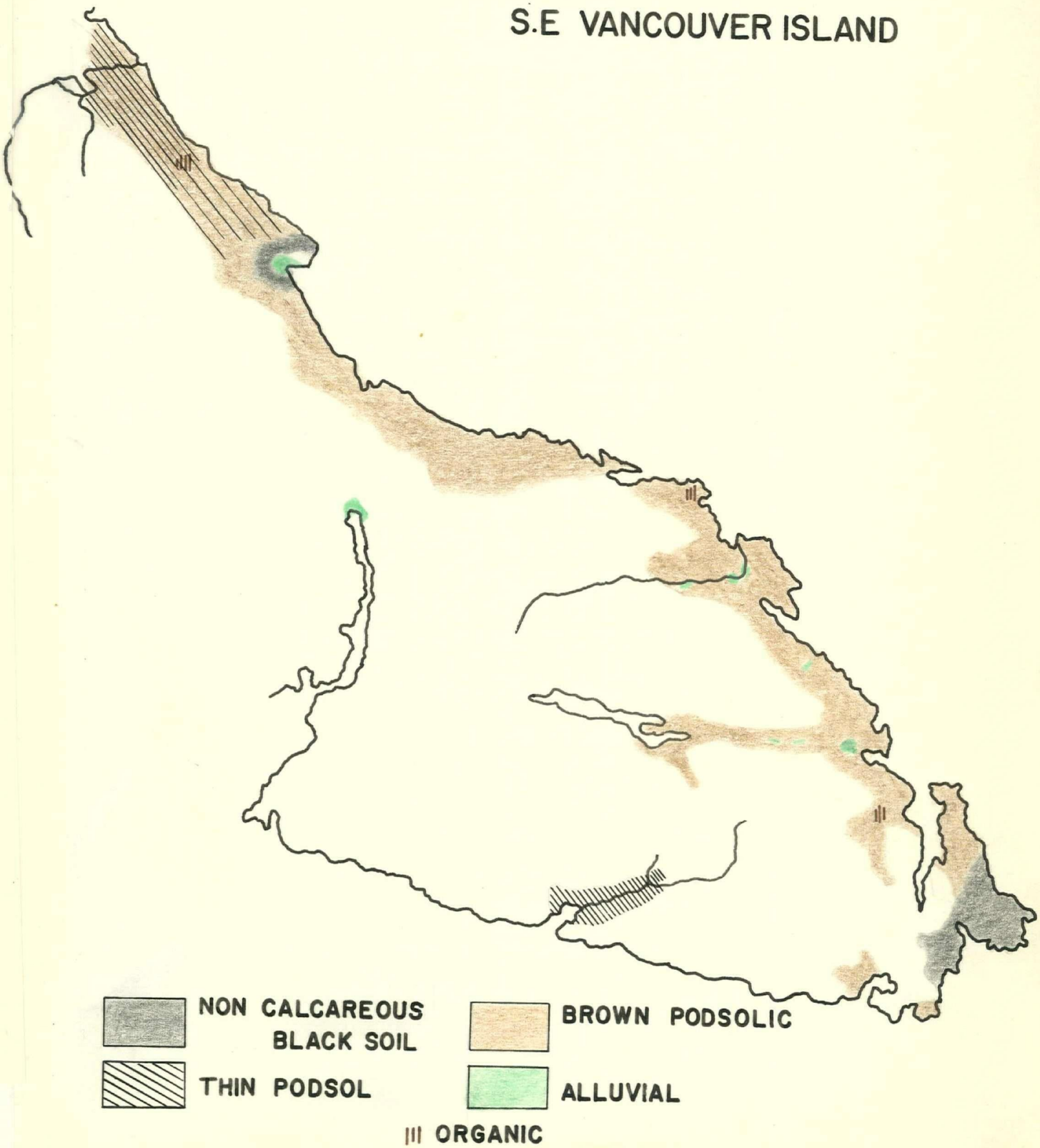
Soil Classification(1)

According to their chemical and physical characteristics, the soils of Vancouver Island fall into the following major soil groups:

1. Non-Calcareous Black
2. Brown Podsolic
3. Thin Podsol
4. Dark Grey Gleisolic
5. Alluvial
6. Bog
7. Lithosolic Black
8. Mountain type
9. Alpine

(1) Modified from the Recent Soil Survey Report (1952)

SOILS OF S.E VANCOUVER ISLAND



Spilsbury, R. H. - Soil Survey of S.E. Portion of Vancouver Island, Victoria, B.C.

1. Non-Calcareous Black Soil

The soils of this group are characterized by dark brown to black surface soil, grading gradually into brownish or yellowish-brown subsoil. These soils are developed either from Glacial till deposits or from coarse outwash material. Different soil series of this group differ in texture and structure (the result of local conditions in which the different series are formed). The texture ranges from gravelly sand loam to loamy.

A profile of soil of the Non-Calcareous Black group follows:

Soil Profile ------- 36 inches

A_0	.....	2 inches
A_1	.....	14 "
B_1	.....	5.5 "
B_2	.....	6.0 "
O	.....	8.5 "

Non-Calcareous Black soils have high organic matter, the result of climate and vegetation (transitional grasses and forest). These soils occur mostly on uplands having rolling moranic topography - as in Saanich Peninsula. In the Courtenay till plain they are confined to very gently undulating bottom lands and the area occupied by them is locally referred to as the "upper meadows". In this area the drainage is poor.

The native vegetation is largely oak-grass association; although mixed stands of conifer and deciduous trees occur, mainly as a second growth.

Distribution. On Southeast Vancouver Island, 20,000 acres of

land belong to the Non-Calcareous Black soil group and nearly all their acreage is found around Victoria and Courtenay.

Use. Soils of this group are suitable for agricultural activity and are very fertile and productive under irrigation. At present, the main use of the soil is for urban and rural housing and specialized enterprises; as for example, dairying and poultry; fruit, strawberries and bulb growing. Around Courtenay, orchard crops, potatoes and dairying are important. On mixed farms, oats, hay and potatoes are also grown.

Problem. These soils have very low water storage capacity and most of the crops suffer from lack of moisture during the dry summer period; but the dry heat favours early maturing crops.(1)

2. Brown Podsolic Soils

These are the most extensively occurring soils in the Southeast part of Vancouver Island; they constitute 60 per cent. of the surveyed area. These soils are characterized by a thin dark brown organic layer and reddish-brown surface soil, grading through a yellowish-brown or whitish-grey subsoil, to the parent material which ranges from porous to compact and cemented.

Brown Podsolic Soil Profile ----- 36 inches

A_0	1 inch
B_2	2 inches
B_3	14 "
C	19 "

Horizon B_2 is the zone of maximum accumulation of sales.

(1) Soil series are not discussed individually; but information regarding them is included in the tables (see end of chapter) under the main soil growth to which they belong.

These Brown Podsolic soils are moderately leached and tend to be lower in basic elements. They contain more of the important basic elements than the Podsols, but are acidic in nature like Podsol soil. Their profile also resembles that of the Podsols: the main difference lies in the leached Horizon A_2 which is comparatively less leached and usually absent; but does occur sometimes. The texture of this soil ranges from fine to rough. The soils have Glacial and lacustrine origin.

Some of the soils in the Fairbridge series of this group contain a modest amount of shot (iron concentrates) overlying the subsoil and are given the name of "shotty" Brown Podsolics. Otherwise they are similar to Brown Podsolics.

The relief where these soils occur ranges from smooth, gently sloping, through undulating and gently rolling to strongly undulating, folling and steeply sloping.

The native vegetation largely consists of coniferous forests, where Douglas fir, pine and hemlock are the predominant species. In places there are very heavy stands of timber of commercial value; but none of the area is logged. Deciduous types of vegetation are also found, but not of any economic value.

Distribution. Out of the 650,000 acres of surveyed area this Brown Podsolic group accounts for 395,000 acres and predominates from the Southern end of the Island to Campbell River, including the area around Alberni.

Use. Most of the land that belongs to this group, or, about 70 per cent. of it, is entirely unsuitable for cultivation. A concentration

of cultivated land is found in Northern Saanich Peninsula, around Alberni, Courtenay and Nanaimo. Berries, tree fruits, dairy products and hay are important in Northern Saanich Peninsula; general farming around Alberni and dairying and mixed farming around Qualicum. The soils of this Podsolic group are valuable for the production of timber and provide a good share of Vancouver Island's annual cut.

Main Problems.

1. Heavy clearing
2. Rock outcrops, conspicuous boulders and stones
3. Drought, to which it is subject in dry summer weather

3. Thin Podsols

The thin Podsol soils of Vancouver Island are derived from Glacial till, marine and outwash deposits, as well as from the Post-Glacial alluvial bottoms and fans; so that the texture differs for different Podsol series according to the source of the material from which they are derived. But all of them reveal the most important features of this soil group; that is, the Podsolized A_2 Horizon. Over this horizon lies the organic layer and underneath is Horizon B which is heavy, due to the presence of colloids that pass down from the upper leached layers. These leached soils are acidic in nature and need plenty of lime to make them fit for agriculture.

Thin Podsol Soil Profile ----- 36 inches

A_0	1.5	inches
A_2	2.5	"
B_2	3.5	"
B_3	5.0	"
C	5.0	"
D	18.5	"

The relief on which Podsol soils are found varies from place to place and ranges from gently rolling to moderately sloping.

Podsols usually develop under a cover of conifers, which is true in the case of Vancouver Island. Most of the soils are under heavy stands of hemlock, cedar, fir, pine and spruce; but there are some soils, for example in San Juan Valley, where thick stands of alders, willows, spruce, together with thick undergrowth are found.

Distribution. On South-East Vancouver Island, 35,000 acres (5.2 per cent. of the surveyed area) are included in this group. It is in the North, around Campbell River and in San Juan Valley, that these soils are commonly met with. Such soils are also found around Nanaimo and Qualicum. Most of them occur over 500 feet.

Use. Agriculture is of slight importance in this area which is covered by forest. In future it will be important for forest growth.

Main Problems:

1. Low fertility due to leaching
2. Lower amount of plant nutrients
3. Heavy clearing
4. Need of liming

4. Dark Grey Gleisolic Soils

These soils include Cowichan clay, Parkesville sandy loam and the Tolmie series which are characterized by uniform dark grey to a blackish surface layer overlying coarsely stratified subsoil; but in the case of the Cowichan clay type it contains well-defined platy structure.

These soils have developed on glacial lake, esturine or marine sediments under poor drainage conditions. Originally developed at low, flat and depressional areas, these soils are found at an elevation of ± 500 feet - due to the general uplift of the land. The texture of these Gleisolic soils ranges from very light loam to clay.

The native vegetation in the case of the Tolmie series is Douglas fir, maple and willow, with occasional oak association; but in the case of the Cowichan series, cedar, hemlock and maple are important. At present most of the area is cleared for agriculture.

Distribution. This soil group includes 6.6 per cent. of the soil of Vancouver Island. It is found in patches all over the Southeastern region, with some concentration in the Southern part, in the Cowichan Valley and around Parkesville.

Use. These stone-free, fine textured soils, when properly drained, are suitable for agriculture. At present they are used quite intensively, on account of their high organic content, lower relief and high fertility. A great variety of crops can be successfully grown on these Gleisolic soils; as for example, forage crops, grain, roots, potatoes; small fruits, vegetables, loganberries; bulbs and seeds - all of which crops are important.

Problem. Poor drainage.

5. Alluvial Soils

These soils do not have the features that characterize the mature soils; as they have not the pure profile, like that of Zonal soils and hence belong to Azonal soils. They are derived chiefly from recent

river and stream deposits and therefore are much younger than the surrounding upland soil. They are found in the low-lying areas when spring floods quite frequently deposit fresh materials. They have medium to heavy texture and drainage conditions; they also vary from good to poor.

Profile of Alluvial Soil

A_1 - 2 inches

C - 3 "

A_1 - 1 inch) Fossilized
)
C - 5 inches) A Horizon

The vegetation is predominantly of the deciduous type, with maple, alder, cottonwood and willow dominating the scene. The ground cover consists of grasses and shrubs.

Distribution. About 6 per cent. of the surveyed soils are classed as alluvial. Out of their total of 42,000 acres, roughly 26,000 acres are under cultivation. Alluvial soils are found in strips along the rivers - to mention a few localities: near Duncan, Alberni, Courtenay and Campbell River.

Use. Alluvial soils are usually level and often very fertile and highly prized for cultivation. Their use includes dairying, mixed farming, potatoes, grains, vegetables, seeds, etc. They are very productive where the water table is not too high.

Main Problems.

1. Water table (drainage)
2. Heavy clearing

6. Bog Soils

The organic soils, too, belong to the Azonal group and include peat, muck and meadows that frequently occur in the poorly drained portion of the forested soils. These soils are rich in humus content.

Distribution. Bog soils are found in patches all over the South-eastern part of the Island. The total acreage of this group is 36,500. The major portion of these soils occur North of Nanaimo, North of Shawnigan Lake and half way between Courtenay and Campbell River.

Use. With proper treatment organic soils may be classed as arable and they are used for hay, potatoes and market gardening.

Main Problem. Drainage.

7. Black Lithosolic Soils

In the case of Vancouver Island these include the Neptune series and have very dark greyish-brown to black surface soil, overlying sand, gravel, cobbles, etc., of coastal beach origin. The characteristic features is the presence of clam and mollusc shells and those of other marine organisms in their surface horizons.

The native vegetation is usually grasses, with a few scattered conifers.

Distribution and Use. These soils occur all along the coast and are used for sea-shore gardening, with very limited cultivation. They provide some open pastures and are used as such; also for camping and as beaches, etc.

8. Mountain Soils

These soils include most of Vancouver Island (as shown on the generalized soil map). Mountain soils are found at higher elevations and are thought to extend upward to the lower limit of the Alpine region. The main features characterizing these soils are a shallow organic surface layer, an acid to strongly acidic nature and a low content of bases and nutrient elements. For the most part these soils occur in coarse textured deposits and on rolling, hilly and mountainous topography. They have high humidity and rainfall and so the area is densely forested with such trees as Western hemlock, spruce and Western Red cedar.

Use. Mountainous soils are used particularly for forestry. In general these soils are too coarse, stony and steep for cultivation. Heavy forest cover and steepness have also limited its value for grazing.

The Northern part of Vancouver Island, which is also included in this group, has different characteristics in terms of vegetation, climate and topography and may be dealt with under a different heading when the Soil Survey is conducted there.

9. Alpine Soils

The region of Alpine soils includes the lands lying above the tree line and on Vancouver Island these are found mostly in the central part, because of its higher elevations. Not much study has been made of this region. Vancouver Island's Alpine soils receive high rainfall and thus plant growth is possible: false heathers, blueberries and allied species are met with.

SOIL SUMMARY (1)

No. 1

Soil group	Soil series	Soil type	Parent material	Topography	Drainage	Vegetation	Land use	Acres
Non-Calcareous Black soils	Cadboro Victoria	Cadboro sandy loam	Glacial till	Upland rolling topography	Well	Oak-grass associations	Urban and specialized enterprises	4,970
	Sandywick Courtenay	Sandywick loam	"	Gently rolling and undulating	Moderately well	Fir, oak and grasses	Forestry and agriculture	1,665
	Esquimalt Victoria	Esquimalt loamy sand Esquimalt gravelly loamy sand	Outwash material "	High undulating terrace and delta position	Excessive	Open stands of Douglas fir, pine, oak and grasses	Urban and special crops	1,005
	Lazo	Lazo loan Lazo sandy soil	" "	Undulating to gently sloping	Moderately well	Grass lands oak types also	Pasture, tree fruits potatoes,etc	8,845
	Merville Courtenay	Merville loam	"	Low topography	Moderately well to imperfect	Grasses and scattered oak	Orchards, dairying and potatoes	3,220
								19,705

(1) R. H. Spillsbury, Soil Survey of the Southeast Portion of Vancouver Island, 1944

Table 19. SOIL SUMMARY (1)

Soil group	Soil series	Soil type	Parent material	Topography	Drainage	Vegetation	Land use	Survey acres
Brown Podsolic	Sproat	Sandy loam	Glacial till		Well	Hemlock, cedar, fir	Forestry	6,690
	Stamp	Loam	" "	Gently to steeply sloping	Moderately well	Douglas fir, pine and hemlock	Forestry	12,835
	Saanichton	Clay loam	Lacustrine and marine deposits	Smooth and gently sloping	Well to moderately well	Douglas fir, with arbutus, maple, etc.	Specialized crops	15,710
	Alberni	Loam	Lacustrine and marine deposits	Smooth to gently undulating	"	Douglas fir, cedar, hemlock	Forestry and agriculture	8,050
	Qualicum	Loamy sand and gravelly loamy sand	Outwash material	Undulating	Well	Fir, pine, alder and hemlock	Berries, vegetables and small fruits	107,067
	Somass	"	"	Gently rolling (rock outcrops)	"	Fir, cedar and hemlock	Forestry	3,165
	Dashwood	Loamy sand	"	Undulating and gently rolling	Moderately well	Fir and hemlock	Forestry	52,855
	Bowser	" "	"	"	Poor	"	Forestry, hay pastures	42,290
	Puntledge		"	Low topography	Moderately well to imperfect	"	Mixed farming, grain, orchards	8,500
	Haslam	Shaley loams	Shales and sand stones	Undulating and gently rolling	Well	Douglas fir, oak and hemlock	Forestry, hay pastures etc.	12,940
"Shotty" Brown Podsolic	Shawnigan	Sandy loams	Glacial till	Upland with valley and steeply sloping	"	Fir, hemlock	Forestry with little agriculture	86,405
	Royston	Loam and stoney loam	" "	Strongly undulating & rolling	"	Douglas fir and hemlock	Forestry (mainly)	20,910
	Fairbridge				Well to moderately well			37,620
								415,037

(1) R. H. Spillsbury, Soil Survey of the South-East portion of Vancouver Island, 1944

Table 20. SOIL SUMMARY (1)

Soil group	Soil series	Soil type	Parent material	Topography	Drainage	Vegetation	Land use	Acres
Thin Podsol	Quinsam	Sandy loam	Glacial till	Rolling	Well	Hemlock, fir and cedar	Forestry	13,785
	Mc Mekey	Loam	Lacustrine and marine	Moderately sloping	Well to moderately well	Hemlock and cedar	"	2,020
	Kye (W. of Courtenay)	Loamy sand	Outwash	Undulating	Well	Fir, hemlock and pine	"	7,305
	Sayward, Campbell and North	Sand loam	"	Sloping and depressions	Poor	Hemlock, fir and pine	"	3,115
	Renfrew	Silt loam	Post-Glacial material	Flat, gently sloping	Well to imperfect	Alder, willow, spruce, hemlock	Potatoes, hay, oats, rye etc.	5,920
	San Juan	Loamy sand	"	Undulating, gently sloping	Well to poor	Spruce, hemlock, willow, alder etc	Forestry	2,570
Dark Grey Gleisolic	Cowichan	Clay and clay loam	Lacustrine, marine	Flat, depressions	Poor to fair	Cedar, hemlock, alder and maple	Market gardening: hay, pastures etc	34,715 13,995
	Parkesville	Sandy loam	Outwash	"	"	Hemlock, fir alder and maple	Urban & various enterprises (ag.)	6,070
	Tolmie	Clay loam	"	Low, flat and depressional	"	Fir, grasses	Special crops	9,390 13,295
Alluvial	Chemainus	Loam, clay loam silt loam etc	Post-Glacial deposits	Low-flat	Well to poor	Maple, alder, willow etc.	Mixed farming	42,750 25,998
	Cassidy	Silt, loamy, gravelly silt	"	Flat to sloping	Fair	Fir, hemlock	Forestry	15,831
Lithosolic Black	Neptune	Gravelly sandy loam	Miscellaneous	Flat to sloping		Grasses and conifers	Pasture and recreational	41,829 9,750
Bog soils	Organic		"	Flat depressional	Poor	Ferns, willows	Waste	36,555
Mountain	Miscellaneous	---	---	Strong relief	Well	Fir, hemlock cedar, spruce etc	Forestry	35,365 (sur) +
							Rock out	1,285
							Erosion	14,780
							Water	5,965
							Made land	775
							Total	223,769

(1) R. H. Spillsbury, Soil Survey of the South-East Portion of Vancouver Island, 1944

VI

Forestry

Both the terrain and the climate of Vancouver Island have made it essentially a forest region. Because of the character of its terrain more than 95 per cent. of the area is under forests, productive or non-productive. The climate, with its marine influences, mild temperature conditions, heavy precipitation and long growing season is extremely favourable to forest growth. This has given the Island mighty trees, many centuries old, with certain stands that exceed 100,000 board feet to the acre. There is a total acreage of about 3.5 million,[1] with a total stand of 90 billion feet of merchantable timber (shown on the adjoining map) which conveys an idea of the extent of the stands in the different parts of the Island.

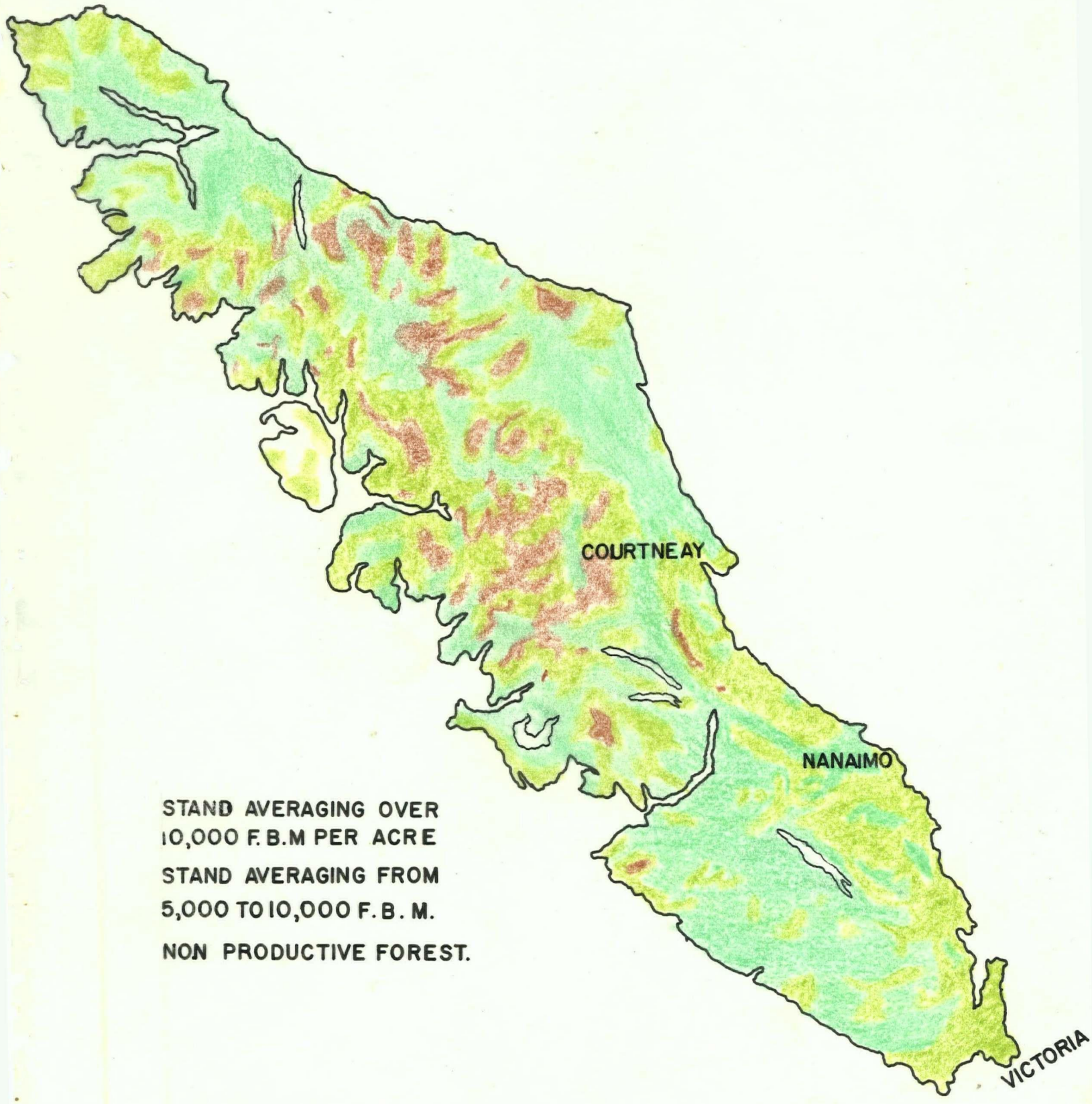
The forest on Vancouver Island consists of many valuable species, such as Douglas fir, hemlock and cedar, and the quality of the timber is known all over the world - where it finds a ready market. The composition of the Island's forest is as follows:

2	Douglas fir	30 per cent.
3	Western Red cedar	22 " "
1	Western hemlock	31 " "
5	Sitka spruce	2 " "
4	Balsam	12 " "
7	White pine	1 " "
6	Yellow cedar	2 " "
		100 per cent.

Thus we see that the most valuable commercial species, Douglas fir,

(1) F. D. Mulholland, Forest Resources of British Columbia, 1937

FOREST STAND TYPES



Western hemlock and Western Red cedar constitute 83 per cent. of the Island's timber resources.

With the exploitation of forest resources, forestry has become of prime importance in the economy of the Island. It is responsible for the employment of 17,869 persons out of the total industrial employment of 24,758. Furthermore, its pay-roll constitutes a high percentage (66 per cent. or 56 million dollars in 1951) of the whole industrial pay-roll of the Island; while the two main branches of its industry, lumbering and pulp and paper milling, produce goods worth 90 million dollars - more than the total income from agriculture and mining combined. All this points out the significance of forestry to the Island economy - in fact Vancouver Island's economy and prosperity are inseparable from those of the forest industry. Another striking fact is that most of the forestry products are for export - as we shall see in dealing with Vancouver Island trade.

A. Forest types

The forests of British Columbia are divided into two main types according to the regions in which they occur:

a) Coast forest region

b) Interior forest region

The forests of Vancouver Island fall under the former type; but, due to climatic and physiographic variations, the Island forests can be subdivided into a few varying types:

1. Douglas fir - cedar
2. Red cedar - hemlock
3. Sitka spruce - hemlock
4. Hemlock - balsam

We shall discuss these types briefly, giving a few specific details of commercial interest.

1. Douglas Fir - Cedar

This type of forest is found in the Southeastern part of the Island and Douglas fir is the most prominent species at the lower elevations. This forest type extends from sea level to 2,000 feet above - occasionally to 3,000 feet on the drier sites. Stands of 10,000 cubic feet per acre occur over large areas with occasional stands up to 50,000 cubic feet on the most favourable sites.

This type of forest generally consists of:

Douglas fir	-	70 per cent.
Cedar	-	17 " "
Hemlock	-	6 " "
Balsam	-	2 " "

The normal yield on an average quality site is approximately 10,000 cubic feet in 100 years.

2. Red Cedar - Hemlock

This forest type occupies the zone immediately to the North, or at a higher elevation than that of the Douglas fir - cedar forest. In terms of commercial value Red cedar is the most important; but the growing popularity of hemlock, for pulp and lumber, makes it a very valuable species too. In this area a typical stand averages 6,000 cubic feet per acre and consists of:

Cedar	-	60 per cent.
Hemlock	-	20 " "
Balsam	-	10 " "
Spruce	-	5 " "
Others	-	5 " "

In this area the yield for a 100 years equals that of the Douglas fir - cedar or, 10,000 cubic feet.

3. Sitka Spruce - Hemlock

Still farther North, Sitka spruce becomes the most important species; though hemlock is generally found in equal and sometimes in greater volume, except in valley bottoms and lower slopes. The average forest consists of:

Sitka spruce	-	30 per cent.
Hemlock	-	30 " "
Balsam, fir and Yellow cedar	-	40 " "

Stands of 5,000 cubic feet occur over large areas.

4. Hemlock - Balsam

This type of forest occupies the more exposed sites and at high altitude. It is the prevailing type around Quatsino Sound and in a general way extends through the belt along the Western slope, just below the sub-alpine type and reaches an elevation of 4,000 feet. It consists usually of:

Hemlock	-	50 per cent.
Balsam	-	23 " "
Red cedar	-	17 " "
Sitka spruce	-	10 " "

Stands of 3,000 to 4,000 cubic feet are quite common.

5. Sub-Alpine Type

Above the Hemlock - balsam type and below the tree line is the Sub-Alpine type, a forest of little or no commercial value. Stunted mountain hemlock, balsam, fir, pine and Sitka spruce etc., occur. Considerable area is treeless and covered with thick moss.

B. Forest Regions

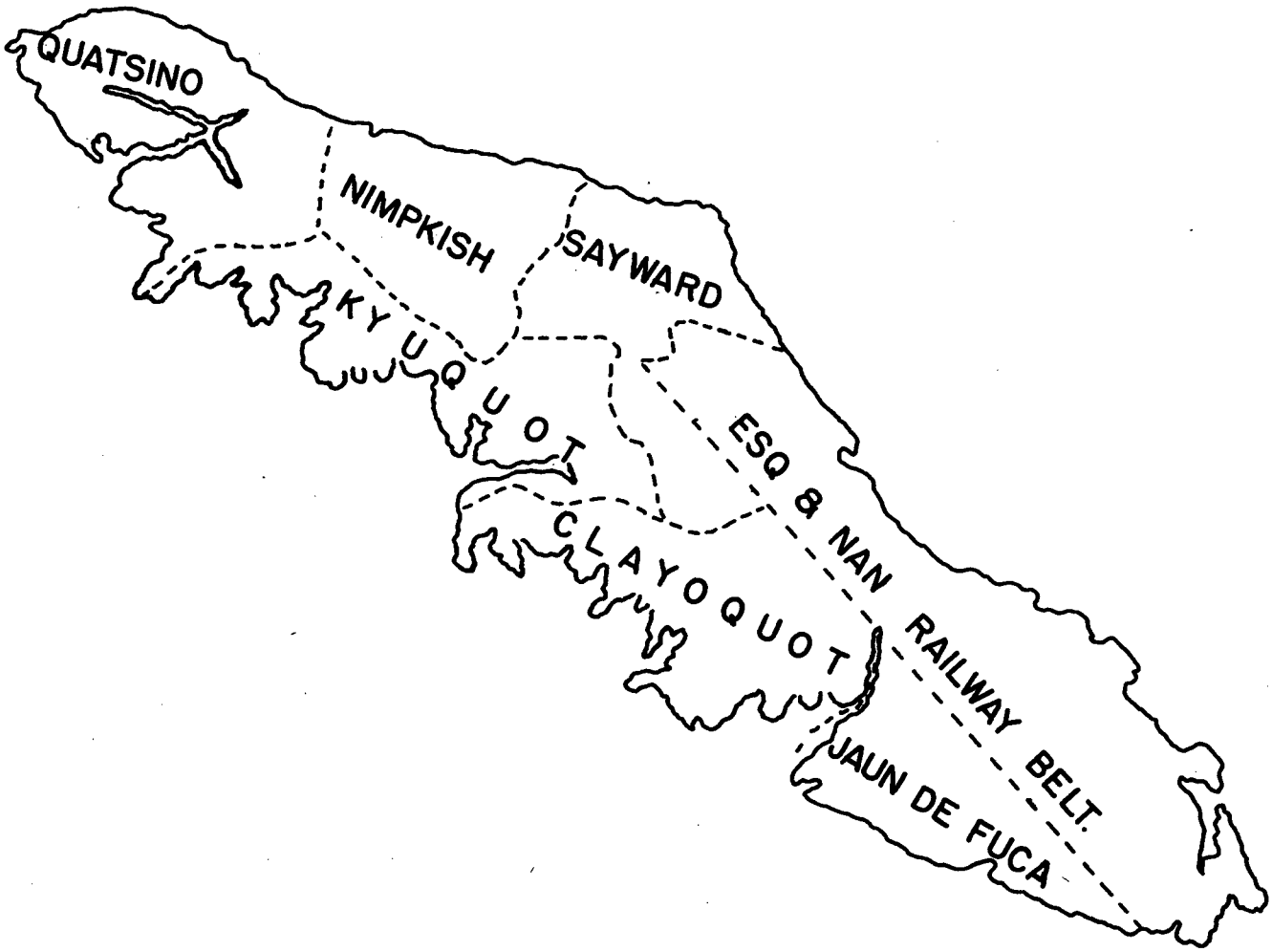
The preceding brief discussion of the various forest types on Vancouver Island gives the general pattern and distribution of the different species. We shall now attempt a more detailed description of the various forest districts, in the following order:

1. Quatsino
2. Nimpkish
3. Kyoquot
4. Sayward
5. Clayoquot
6. Juan de Fuca
7. Esquimalt and Nanaimo

1. Quatsino Forest Region

Location. The Quatsino forest region is the Northernmost forest

VANCOUVER ISLAND
FOREST REGIONS



district on Vancouver Island. It lies North of the Nimpkish and Kyoquot forest regions.

Topography. The Southern boundary of this region is formed by rugged mountains from which a number of ridges run in a Northwesterly direction. Its Northern portion is low-lying and slopes smoothly into the ocean. The arms of Quatsino Sound lie in the form of a rough cross over the middle of the region; thus most of the forest is adjacent to tide water and timber can be easily exploited.

Economic developments. In this region the history and development of logging is associated with those of the pulp industry.

In pre-pulp days there was very little utilization of the forest resources. The social and economic background of the region is one of forestry featured land settlements, with fishing as a preliminary side interest.

Pulp milling. A seventy ton pulp mill was completed in 1918, by the Whalen Pulp and Paper Company, at Port Alice. In 1926 the present British Columbia Pulp and Paper Company took over the plant and have since operated on a schedule of increasing production. The basis of this industry is the abundance of hemlock (pulp type fans) which constitutes 43.41 per cent.[1] of the mature volume of timber in this region.

Power requirements, including those of the saw-mill, the pulp mill and the townsite, are provided for by a power house using hog fuel burners and steam boilers of 300 H.P. capacity.

(1) As at December 31, 1952.

Logging. The first logging in the Quatsino region took place in 1917. In that year ground lead operations were used near Port Alice and at the head of the South-East arm of the Sound. Horse logging was practiced on a number of locations in the early nineteen twenties. Tractor logging was tried in 1929 in the vicinity of Thorpe Point, on the West arm, and now truck logging has been used on a large scale since 1928. From Quatsino region, Douglas fir logs are sent to Vancouver by wooden log barge.

Table 21. Forestry Cover and Inventory in Acres, Quatsino Region[1]

Classification		Crown granted	Timber leases and licences	Vacant Crown lands	Total	%
Productive forest area[2]	Mature					
	1. Accessible	35,940	177,550	211,440	424,930	
	2. Inaccessible	540	3,370	45,990	49,900	
	Total	36,480	180,920	257,430	474,830	45.4
	Immature	11,080	23,220	40,290	74,590	
	Not satisfactorily stocked					
	1. Logged	.....	.....	.....	5,300	
	2. Logged and burned	.....	.....	.....	290	
	3. Burned	.....	.....	.....	30	
	4. Non-commercial	.....	.....	.....	10,390	
	Total				16,010	
Total productive forest land		49,450	207,780	308,160	565,430	54.0
Non-Productive area[3]	1. Barren	.....	.....	.....	54,890	
	2. Scrub, Alpine and rock	.....	.....	.....	398,840	
	3. Swamp and water	.....	.....	.....	26,050	
	4. Cultivated and villages	.....	.....	.....	1,590	
	Total Non-productive area				481,370	46.0
	Grand total				1,046,800	100

(1) Quatsino Forest Region, 1938, Economic Divisions of B.C., Forest Service

(2) Productive forests: considered capable of producing continuous crops of timber suitable for domestic and industrial purposes

(3) Non-productive - of small trees on poorly drained land or at high altitude or subject to other adverse site conditions. They cannot be expected to reach merchantable size; but they help to protect watersheds and conserve water supplies; they provide fuel and building material to natives and travellers in remote areas and they are the habitat of valuable fur-bearing and game animals

Out of 1,046,000 acres in this Quatsino region, 54 per cent. are classed as productive forest land and 46 per cent. as unproductive forest land. But the most outstanding fact in regard to the Quatsino forest industry is that 89.4 per cent. of the total mature timber is accessible, so only 10.4 per cent. is classed as inaccessible.

Table 22. Forest Classification in Acres - Quatsino Region

	Mature timber	Immature	Not satisfactorily stocked	Total
1938	474,830	74,590	16,010	565,430
1952[1]	430,776	21,281	65,000	576,000

The noticeable difference in the above figures is between those of mature timber and the not satisfactorily stocked. The reason is obvious; that is, the speedy economic development of logging and milling. In this region, 84 per cent. of the productive land is covered by virgin timber.

Table 23. Mature Volume by Species as at Dec. 31, 1952[2]

Unit: 1,000 cubic feet

Tree type	Quatsino	Percentage	Vancouver Island percentage
Fir	52,730	1.95	1.65
Cedar	643,790	23.93	12.92
Hemlock	1,167,850	43.41	12.63
Spruce	31,330	1.16	15.2
Balsam	673,000	25.00	16.3
White pine	9,180	.34	4.45
Lodgepole pine	-	-	-
Yellow cedar	69,730	2.59	11.20
Cottonwood	-	-	-
Other deciduous	42,660	1.58	23.19

Thus the most important species in this region are hemlock, balsam and cedar, constituting 43 per cent., 25 per cent. and 24 per cent. respec-

(1) Report of Forest Service, 1952, Department of Lands and Forests, Province of British Columbia, p. 27
(2) Ibid. p. 31

tively of the forest of the Quatsino region. Leaving aside the local composition of the forest, this region accounts for 16 per cent. of the balsam, 15 per cent. of the spruce, and 12 per cent. for each of hemlock and cedar, of the whole of Vancouver Island. The diameter of logs being smaller as compared to that of the southern forest region, they are best suited for the pulp and paper industry.

The estimated capacity for sustained annual yield[1] is as follows:

Present yield, accessible stocked area	- 138,140,000 f.b.m.
Present yield, total stocked area	- 145,260,000 "
Ultimate yield capacity	- 146,150,000 "

Annual utilization.

Average cut 1919-1938	- 35,810,000 f.b.m.
1937 cut	- 62,600,000 "
1938 cut	- 62,940,000 "
Expected future cut	- 120,000,000 "

The Quatsino region as a whole presents an outstanding opportunity for the development of forest industries. The important facts which lend support to this conclusion are:

a) The region already includes an established industry

b) Over 50 per cent. of both the mature and productive forest land is held by the Crown

c) The inherent growth powers of hemlock, together with favoured ecological conditions combine to create highly productive forests

(1) Quatsino Forest Region, 1938 (unpublished) Economic Division, B.C. Forest Service, Vancouver Forest District Office, Vancouver

d) Cut-over areas restock rapidly; so that more than 90 per cent. of all such areas carry thrifty, fully stocked young forests

e) Fire hazard is very low.

All these factors favour permanent forest industries as a source of income in the Quatsino region.

2. Nimpkish Forest Region

This forest covers an area of 875,000 acres in the northern part of Vancouver Island, west of Salmon River. It includes the watersheds of the Nimpkish, Kikish, Tsitika and Adams Rivers.

Topography. Topographically the forest is made up of moderately wide valleys, penetrating deeply into this area from the sea. The bordering hills rise gradually to rocky peaks up to the height of 4 to 6,000 feet. The main topographic features of this region is the Kloanah-Nimpkish drainage. It extends in a general direction northward from the interior for 60 miles, with an elevation of tide water to 1,000 feet. It supports valuable stands of commercial timber.

Forest development. Logging in Nimpkish forest district, on a commercial scale, was commenced in 1917. The work was carried out by the Nimpkish Timber Company which later became the Wood and English Logging Company. Logs were first cut at the southern end of Nimpkish Lake and then taken down the Lake and River to a booming ground at the latter's mouth; but the Company moved this beach camp in 1924 to the present more favourable site on the west bay of Beaver Cove. Timber lying beyond skidding distance from salt water has been transported to tide water by rail, or by a

combination of rafting and rail hauling.

Saw-milling. The Wood and English Saw-Mill Company of Beaver Cove built a saw-mill in 1924. This mill was designed for the manufacture of hemlock lumber, with an auxiliary unit to utilize such waste as pulp chips and hog fuel. The plant is capable of producing 180 measure board feet of lumber, 50 units of pulp chips and 125 units of hog fuel per day. The lumber is usually shipped directly from Englewood to the export market. Hog fuel and pulp chips are loaded on scows and towed to Port Townsend and Powell River respectively.

At Telegraph Bay a small saw-mill manufactures lumber for local and coastal consumption. The mill is capable of producing 15 measure board feet of lumber and 20 thousand shingles per day.

Pulp milling. The Canadian Forest Products Company has a mill at Beaver Cove. It began to operate in the latter part of 1919 with a production of 40 tons per day of sulphate pulp. A saw-mill with a capacity of 100,000 f.b.m. and a shingle mill operated with the pulp mill. In the fall of 1920 the plant was shut down on account of market conditions and has not operated since.

Table 24. Forest Cover, Nimpkish Region[1]

Classification	Acres	Percentage
Productive forest land		
Mature	309,826	35.40
Immature	34,400	3.91
Not satisfactorily stocked	58,000	6.64
Total Productive forest land	402,226	45.95
Non-productive forest land	472,600	54.07
Total	874,826	

(1) Report of Forest Service, 1952, Dept. pf Lands and Forests, Province of British Columbia, p. 27

Though the non-productive forest land exceeds the productive, there is another fact that should not be ignored: in the productive forest land it is the area of mature timber (77 per cent.) that is most conspicuous. This fact leads us to the conclusion that the area is not fully developed; so there is a great future for the forest industry in the Nimpkish regions. Future logging development will center around four large blocks of accessible timber; namely, the fir, cedar and pulp timber of the upper Kloanah drainage and of the Bonanza, Tsitika and Adam drainage units.

Table 25. Mature Volume by Species, Nimpkish Region(1)

Species	Nimpkish Region	Percentage of total	Percentage V.I. total
Fir	257,580	11.23	5.24
Cedar	554,300	23.81	11.13
Hemlock	941,960	40.41	10.14
Spruce	36,920	1.57	17.62
Balsam	442,290	18.99	10.70
White pine	17,910	.76	8.70
Lodgepole pine..	1,990	.07	1.79
Yellow cedar ...	53,700	2.30	8.70
Deciduous trees.	23,670	1.00	12.93
Total.....	2,330,320		

Hemlock (40.41%), cedar (23.81%) and balsam (18.99%) are still the major species in the Nimpkish as in the Quatsino region. The majority of the timber is pulp type forest, so offers great opportunities for the pulp and paper industry. This does not mean that the chances for the lumber industry are less.

3. Kyuoquot Forest Region

The Kyuoquot region is bounded on the North by the Quatsino,

(1) Ibid. p. 31

Nimpkish and Sayward provincial forests; on the East by the watershed draining into Salmon and Campbell Rivers. The southern boundary is marked by the Clayoquot forest region and the western by the Pacific Ocean.

Topography. In general the region is mountainous with many peaks rising to an elevation of more than 5,000 feet. Most of the numerous valleys that make up the region are narrow with steep, rocky slopes. The only low-lying land is a narrow strip facing the Ocean, extending from Friendly Cove to McLean Island.

History of forest industries. Historical records show that the first timber to be utilized and exported from the Island came from this region. In the year 1778, Captain John Mead, on a trading voyage across the Pacific, cut a limited amount of planking and spars from timber at Nootka, for the purpose of export to China. Except for a few small logging operations and shippings of logs by rafts to Vancouver, logging and milling of any importance did not commence until 1928, when a company financed by English capital built a saw-mill at McBride on the north end of Nootka Island. This mill operated for a year and was dismantled. Two small mills in the Zeballos area commenced operations at about the same time, cutting lumber for the local market.

The Gibson mill at Tahsis began to operate in 1946 and the Manning mill at Zeballos in 1948.

Table 26. Forest Cover and Inventory, Kyuoquot Region[1]

Unit: acres

Classification		Crown granted	Timber leases and licences	Vacant Crown land	Total	%
Productive forest area	Mature					
	1. Accessible	14,750	107,020	407,190	528,960	
	2. Inaccessible	6,530	5,390	91,860	97,780	
	Total	15,280	112,410	499,050	626,740	49.2
	Immature	2,920	4,160	33,810	40,890	3.2
	Not satisfactorily stocked					
	1. Logged	200	2,690	2,100	4,950	
	2. Logged and burned		480	600	1,080	
	3. Burned		40	210	250	
	4. Non-commercial	650	690	4,470	5,810	
	Total	19,050	120,470	540,240	679,760	53.35
Total: Productive forests						
Non-productive forest area	1. Cultivated and village				290	
	2. Barren and shrub				579,870	
	3. Swamps and water				14,990	
Total: non-productive forests					595,150	
Grand total					1,274,910	

Although Kyuoquot forest region has steep valleys and high peaks, 53 per cent. is productive forest land - 49 per cent. of which is accessible. Most of this accessible forest lies along the West Coast and its fiords which play an important part in the exploitation of the timber. Without

(1) G. Sullivan, Kyuoquot Forest Region, E.C.O. Division, B.C. Forest Service, 1947-48

these fiords this Kyuoquot region would be almost inaccessible. Again, the percentage of merchantable timber that is accessible is still higher: 84.4 per cent. In general, the inaccessible forest is found on the rock upper slopes and is of low volume and poor quality. All of the immature forest is accessible.

Table 27. Mature Volume by Species as at Dec. 31, 1952[1]

Unit: 1,000 cubic feet

Species	Kyuoquot Region	Percentage of total	Percentage of Vancouver Island
Fir	346,850	8.80	7.05
Cedar	878,560	22.31	17.64
Hemlock	1,645,850	41.80	17.80
Spruce	49,980	1.26	24.83
Balsam	857,090	21.70	20.80
White pine	19,230	.48	9.37
Lodgepole pine	720	-	-
Yellow cedar	85,990	2.18	13.93
Cottonwood	-	-	-
Other deciduous	52,210	1.30	28.59
Total	3,936,480	99.83	

Hemlock is still the major species, as in Quatsino and Nimpkish districts, followed by cedar and balsam. Kyuoquot district contains 25 per cent. of Vancouver Island's mature spruce and 21 per cent. of its balsam.

4. Sayward Forest Region

Mountains on the West, East and North encircle a central portion which may be classified as rolling. It seldom rises over an elevation of 1,500 feet. The Prince of Wales range, the most rugged in the area is

(1) Report of Forest Service, 1952, Dept. of Lands and Forests, Province of British Columbia, p. 31

located between Bear River and Kelsey Bay and rises steeply from Johnston Straits to the elevation of 4,000 feet.[1]

Table 28. Forest Inventory and Cover, Sayward Region[2]

Unit: acres			
Classification		1947	1952
Productive forest land	Mature timber		
	1. Accessible	203,890	287,391
	2. Inaccessible	Nil	
	Total	203,890	287,391
	Immature timber	106,650	49,483
	Not satisfactorily stocked		
	1. Logged	9,480	
	2. Logged and burned	47,730	
	3. Burned	300	
	4. Others	17,430	
	Total	74,940	82,723
Total productive forest land		385,480	423,597
Non-productive and non-forest land	1. Cultivated and village	2,280	
	2. Barren, scrub and Alpine	106,530	
	3. Swamp and water	23,690	
Total non-productive forest land		132,500	453,688
		517,980	887,265

What explains the important fact revealed by this table that all the mature timber, as well as all the immature, is accessible? It is

(1) The boundaries of the Sayward region have been revised since 1947; so there is a marked change in that area.

(2) Report of Forest Service, 1948-1952, Dept. of Lands and Forests, Province of B.C.

because of the favourable topography already mentioned and because Kyuoquot region is under a contour of 1,200 feet.

The 1952 figures are the latest for this region; but for the purpose of comparison we shall use the 1928 and 1947 Survey figures since the area of the productive forest mentioned is nearly the same. In 1928, the merchantable timber was estimated to cover 274,900 acres, carrying 12,207,020 m. of board feet. The revised inventory of 1947 indicates a reduction of 6,387,500 m. of board feet in 19 years, which clearly indicates that the cut was more than the growth. This problem of over-cutting needs careful attention.

In 1928 it was felt that the Sayward forest was being heavily over-cut and the new inventory clearly demonstrates this fact. Another conclusion drawn from the 1928 Survey was that the allowable cut from the Sayward forest could have been 147 m. board feet per year on a continuous production basis. The excessive cut over the intervening years has seriously reduced the allowable cut; so that, as of 1948, the allowable cut cannot be more than 106 m. board feet. Present consumption exceeds productive capacity by about 20 per cent. This situation is common to all of the forest. The danger of over-cutting was pointed out 20 years ago and the longer the delay in adjustment, the more serious are the obstacles to reaching an equilibrium between the rate of harvest and the productive capacity. This is an important point to be remembered by those responsible for the future of the industry.

Table 29. Mature Volume by Species, Sayward, as at Dec, 31, 1952[1]

Unit: 1,000 cubic feet

Species	Sayward forest region	Percentage	% to total V.I. figures
Fir	448,220	23.76	9.06
Cedar	323,180	16.40	6.56
Hemlock	712,050	36.89	7.69
Spruce	8,570	.57	-
Balsam	312,580	16.40	7.66
White pine	24,100	1.25	-
Lodgepole pine	1,600	.08	9.65
Yellow cedar	95,410	4.94	15.4
Cottonwood	-	-	-
Total	1,929,790	100.30	

Though hemlock dominates in this region, too, the interesting point is that fir, far behind in proportion to other species in the regions discussed, is second to hemlock in the Sayward area. This indicates the transition of the forest, chiefly due to reasons of climatic altitude, to the Fir type found to the South.

5. Clayoquot Forest Region

The Clayoquot region is bounded on the North by the high land of the drainage emptying into Muchalet Arm, Buttle and Comox Lakes; on the East by the Esquimalt and Nanaimo land grant boundary; on the South by Alberni Inlet and the Imperial Eagle Channel; on the West by the Pacific Ocean.

Topography. Except for a strip of low lying land along the shore, varying in width from 1 to 5 miles and extending North from the mouth of Alberni Inlet to Nootka Sound, the region is mountainous with numerous

(1) Ibid. p. 31

narrow, steep-sided valleys.

History of the forest industries. The Alberni Canal was one of the earliest utilized inlets of Vancouver Island and undoubtedly ships' spars were cut along the foreshore. In 1861 the "Anderson Mill", at Alberni, cut its first lumber and there were born the present flourishing forest industries of Port Alberni. Development was slower on the exposed West Coast and it was not until 1875 that a small mill was operated near Ucluelet. Then in 1905 the Sutton Timber and Trading Company established a saw and shingle mill at Mosquito Harbour, which stopped operations in 1907. In 1925 the mill was largely rebuilt, only to be discontinued in 1943. Finally in 1945, the first large scale logging operation in the western portion of the Clayoquot region got under way at Ucluelet.

In the eastern portion of the region, around Geeat Central and Sproat Lakes, logging and milling became established in the late nineteen twenties.

Table 30. Forest Cover and Inventory, Clayoquot Region[1]

Classification by ownership, in acres	Crown granted	Timber leases and licences	Vacant Crown lands	Total	%
A. Productive forest area					
Mature timber					
1. Accessible	16,060	141,430	320,440	477,930	
2. Inaccessible	-	5,010	54,010	59,290	
Total	16,060	146,440	374,450	537,220	43.90
Immature timber	1,250	4,410	10,440	16,100	1.31
Not satisfactorily stocked					
1. Logged	510	2,800	3,040	6,350	
2. Logged and burned	350	3,430	6,110	9,890	
3. Burned	-	310	260	570	
4. Non-commercial	1,580	940	4,690	7,210	
Total	2,440	7,480	14,100	24,020	1.95
Total productive forest land	19,750	158,600	398,990	577,340	47.16
B. Non-productive forest cover					
1. Cultivated and village				1,810	
2. Barren and scrub				583,040	
3. Swamp and water				62,730	
Total				647,580	52.86
Grand total				1,224,920	

(1) G. Sullivan, Report on Clayoquot Region, 1945-46, Economic Division, B.C. Forest Service, R. 82

Forest Inventory of Clayoquot Region as at December 31, 1952

Table 31. Mature Volume by Species[1]

Unit: 1,000 cubic feet

Species	Clayoquot region	Percentage	Vancouver Is.	%
Fir	290,520	7.14	4,936,136	5.86
Cedar	940,060	29.12	4,969,881	18.90
Hemlock	1,219,340	37.76	9,269,597	13.18
Spruce	39,230	1.22	207,890	18.90
Balsam	597,500	18.52	4,116,274	14.50
White pine	18,230	5.65	206,200	9.05
Lodgepole pine	30	-	16,597	-
Yellow cedar	100,750	3.12	617,330	16.38
Cottonwood	-	-	140	-
Other deciduous	22,780	.71	183,150	12.45
Total	3,228,440		24,523,195	

Of the total of 537,220 acres of merchantable timber, 477,930 (88.9%) are considered accessible and 59,290 (11.1%) inaccessible.

The heavy outcrops of rock on the upper mountain slopes and at the headwaters of many creeks and rivers account for most of the inaccessible timber.

All of the 16,100 acres of immature timber are considered accessible.

Up to the present time, in the Clayoquot region, practically the only type utilized has been the Douglas fir. Logging has not developed on a large scale in the western portion of the region and the area of cut-over land is small. The district around Sproat and Great Central Lakes is fully exploited and might be experiencing over-cutting.

(1) Report of Forest Service, 1952. Dept. of Lands and Forests, Province of British Columbia, p. 31

6. Juan de Fuca Forest Region

Location. On the East it is bounded by the Esquimalt and Nanaimo Railway Grant Land boundary; on the North by the Alberni Canal and the Imperial Eagle Channel and on the West by the Pacific Ocean and the Straits of Juan de Fuca.

Topography. In general the region is mountainous; but it seldom rises above 3,500 feet in elevation. It has numerous narrow and steep-sided valleys covered with timber. Many of the rivers and streams run through rocky canyons.

It is noteworthy that the heavy stands of merchantable timber occur at the higher elevations.

Development of forest industries. Logging did not develop on a large scale until 1935, when a number of large logging companies commenced cutting in this region. Sawlogs comprise the chief forest product and the lumber mills located at Port Alberni, Cowichan Lake and Victoria take most of the cut. In addition, pulp logs are shipped out by deep sea log rafts to a pulp mill on Puget Sound.

Table 32. Forest Cover and Inventory, Juan de Fuca Region[1]

Classification	Acres	%
Productive forest		
1. Mature	506,542	62.35
2. Immature	62,600	7.60
3. Not satisfactorily stocked	90,100	11.10
Total productive forest	665,260	81.05
Non-productive forest	147,200	18.96
Grand total	812,465	

(1) Ibid. p. 27

In this forest region of Juan de Fuca, the percentage of productive forest land is very high as compared to the non-productive in this and the other forest regions of the Island, except the Esquimalt and Nanaimo Railway Land Grant region.

Table 33. Forest Inventory, Juan de Fuca, Dec. 31, 1952[1]

Mature volume by species. Unit: 1,000 cubic feet			
Species	Juan de Fuca region	% of total	% Vancouver Island
Fir	301,706	9.6	6.16
Cedar	791,631	25.19	15.0
Hemlock	1,246,107	39.6	13.5
Spruce	39,430	1.25	
Balsam	629,464	20.03	15.1
White pine	17,030	.54	8.25
Lodgepole pine	467	-	2.81
Yellow cedar	82,360	2.60	13.3
Cottonwood	90	-	64.25
Other deciduous	33,180	1.05	18.1
Total	3,141,665	99.86	

Now, let us see if the forests of this region are experiencing over or under cutting, by comparing figures, that is, of the annual sustained yield and of the annual cut. The latest figures available are of 1941.[2]

Estimated capacity of sustained annual yield:

a) Present capacity for accessible, stocked area - 160,500,000 f.b.m.

b) Present capacity for total stocked area - 164,740,000 f.b.m.

c) Ultimate capacity for all productive forest land - 200,850,000 f.b.m.

(1) Ibid. p. 31

(2) G. Sullivan, Economic Division, B.C. Forest Service, 1942, R. 81

Present utilization and depletion:

a) Average annual cut, 1936-41	-	200,000 m.b.m.
b) Average annual depletion of mature forest due to fire, 1937-41	-	800 m.b.m.
Total:		200,800 m.b.m.

7. Esquimalt and Nanaimo Land Grant Region

The Esquimalt and Nanaimo Land Grant forest region is bounded roughly on the South by a line running from the head of Saanich Inlet to the mouth of Muir Creek; on the West by a line from Muir Creek to Crown Mountain; on the North by the 50th parallel of latitude and on the East by the East Coast.

Topography. In general the region is mountainous. Along the East Coast is a comparatively flat area under 500 feet, ranging in width up to 8 miles. At the head of the Alberni Canal is another comparatively flat area, broken by the Somass, Stamp and Ash Rivers. From Cowichan Lake southwards the mountains are mostly rolling and wooded to the tops with an average maximum elevation of about 3,000 feet. The roughest area is north-west of Comox Lake, the Forbidden Plateau region, containing mountains of 7,000 feet in elevation.

History. The Esquimalt and Nanaimo Railway Grant Land was given to the Railway Company by the Dominion Government on April 21, 1887. The grant was made "in aid of the construction of a railway from Esquimalt to Nanaimo on Vancouver Island, B.C., and of a telegraph line along the line of said railway, besides the subsidiary in money ($750 million)."

Present utilization. As early as 1854, the Hudson Bay Company was operating a small mill at Nanaimo.[1] From 1861 to 1864 a large mill operated with a capacity of 50 m.b.m. per day. The mill was closed down later, in 1864, because all accessible timber had been used. It is interesting to note that now modern logging has changed our idea of what is accessible timber: at present there are two mills at Port Alberni, where in 1864 all the accessible timber was supposed to be exhausted.

In 1936 the estimated daily output of the operating sawmills was 2,319 m.b.m. of lumber and, in the same year, the estimated daily shingle mill output was 297 million shingles. The estimated annual log export (1927-36) was 121,300 m.b.m. and of the volume 64.6 per cent. was Douglas fir.

Table 34. Forest Cover and Inventory, E. and N. Ry. Grant Land[2]

Classification	Acres	Percentage
Productive forest land		
1. Mature	780,600	38.05
2. Immature	562,000	27.30
3. Not satisfactorily restocked	360,230	17.50
Total productive forest land	1,702,830	82.85
Non-productive forest land	354,020	17.16
Total	2,056,850	

This region has the highest percentage of productive forest land as compared to the other forest regions. This is due to favourable topography. The percentage of immature timber is also high; as the stands of this area have been worked more extensively and for a longer period of time.

(1) W. Kaye Lamb, Historical Notes. Early Lumbering on Vancouver Island.

(2) Report of Forest Service, 1952, Dept. of Lands and Forests, Province of British Columbia, p. 27

Table 35. Inventory of Mature Volume by Species as at Dec. 31, 1952[1]

Unit: 1,000 cubic feet

Species	E & N Railway Grant Land	Percentage of the total	Percentage of Van. Is.total
Fir	3,236,530	44.60	65.6
Cedar	837,760	11.55	18.82
Hemlock	2,336,640	32.20	25.2
Spruce	2,630	.03	1.26
Balsam	604,150	8.28	14.6
White pine	100,520	1.38	49.1
Lodgepole pine	11,990	.16	72.4
Yellow cedar	129,390	1.78	20.9
Cottonwood	50	-	35.72
Other deciduous	4,570	.06	2.5
Total	7,264,230		

Fir is the most dominant species and constitutes 44.60 per cent. of the volume of mature timber in this area; but the most striking fact indicated above is that this area contains 65.6 per cent. of the mature fir and 49 per cent. of the mature white pine of Vancouver Island.

Estimated capacity for sustained annual yield in the Esquimalt and Nanaimo Grant Land Region:[2]

Present capacity	=	219,400 m.b.m.
Regulated capacity	=	323,000 m.b.m.
Present utilization:		
Average annual cut, 1927-36	=	700,000 m.b.m.
Average depletion of mature timber due to fire, 1919-36	=	50,000 m.b.m.
Total:		750,000

So we see that the cut is more than double the annual regulated

(1) Ibid. p. 31

(2) E. and N. Railway Forest Region, Economic Division, B.C. Forest Service


MATURE VOLUME BY SPECIES
(Th. Cu. Ft.)
MILLION
9·0
7·5
6·0
4·5
3·0
1·5
0
HEMLOCK
CEDAR
FIR
BALSAM
YELLOW CEDAR
SPRUCE
WHITE PINE
DECIDUOUS TREES

capacity and three times that of the sustained yield (1936). This is a very serious factor and so there is great need to regulate the cut to the sustained yield.

C. Forest Distribution

We shall treat forest distribution under two headings:

1. Major species
2. Productive land

1. Major forest species

Different parts of Vancouver Island experience different physical conditions which determine in one way or another the type of vegetation. Thus forest composition on the Island is not everywhere uniform. Because of favourable conditions, certain species form the major part of the forest in one place and lose their importance in another.

The following table gives the distribution of the various important species:

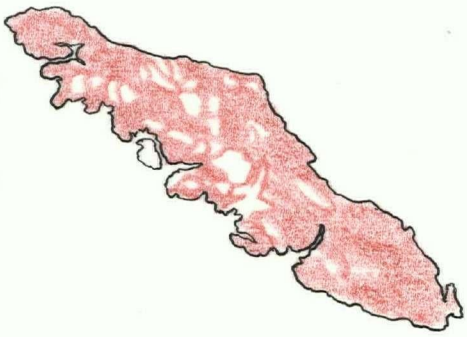
Table 30. Distribution of Major Species, Vancouver Island (1952)[1]

Percentages of mature volume by forest regions

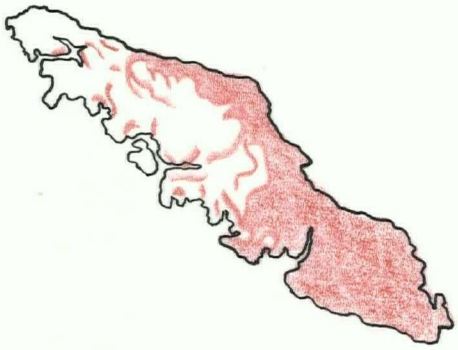
Species	E & N Ry Land Grant	Sayward	Nimpkish	Quatsino	Kyuoquot	Clayoquot	de Fuca	Total
Fir	65.60	9.06	5.24	1.65	7.04	5.86	6.16	100.61
Cedar	16.82	6.56	11.13	12.92	17.64	18.90	15.90	99.87
Hemlock	25.20	7.69	10.14	12.63	17.80	13.18	13.50	100.14
Spruce	1.26	4.12	17.62	15.20	24.83	18.90	18.98	100.91
Balsam	14.60	7.66	10.70	16.30	20.80	14.50	15.10	99.66
White pine	49.10		8.70	4.45	9.32	9.05	8.25	100.57
Lodgepole pine	72.40	9.65		-	-	-		
Yellow cedar	20.90	15.40	8.70	11.20	13.93	16.38	13.30	99.81
Cottonwood	35.72	-	-	-	-	-	64.25	99.97
Other deciuous	2.50	2.23	12.93	23.19	28.59	12.45	18.10	99.99

(1) Report of Forest Service, 1952, Dept. of Lands and Forests, Province of British Columbia, p. 31

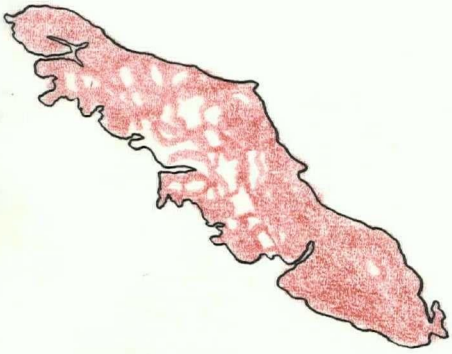
DISTRIBUTION
OF SPECIES



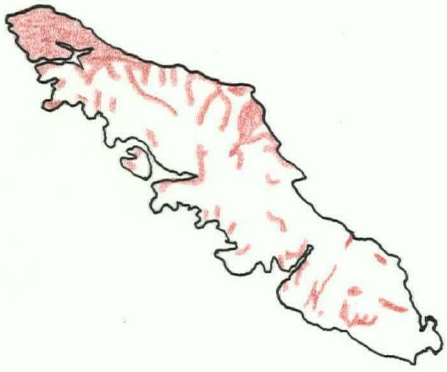
WESTERN HEMLOCK



DOUGLOUS FIR



WESTERN RED CEDAR



SITKA SPRUCE

Because of the abundance of sunshine in the southeastern region a greater percentage of Douglas fir is found. Altitude also controls the distribution of Douglas fir: it seldom occurs above 3,000 feet. The Marine West Coast climate favours balsam and spruce; but hemlock and cedar need more favourable sites.

2. Productive Forest Land

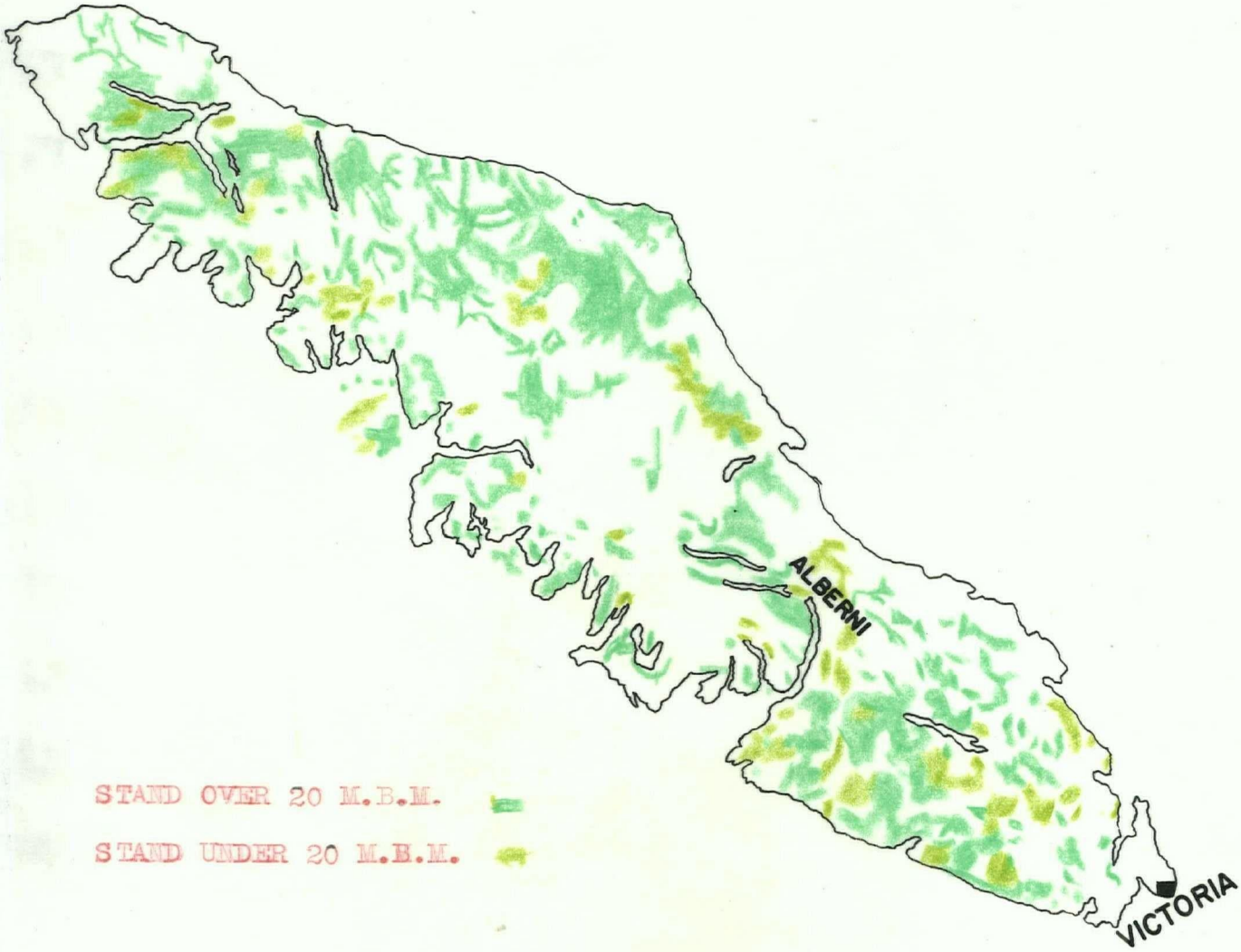
Though the flat, even, low lying areas of Vancouver Island are suitable for forest growth, other economic developments compete for the use of the land - especially in the South-East of the Island. When they are cleared, these areas tend to come under cultivation or urban utilization; while land with high altitude is unsuitable for productive forest growth - that is why the Island's best timber lies between 500 to 3,500 feet avove sea level. Slope, climate, drainage and soils are other dominant factors in determining the distribution and extent of forest growth.

Out of the total productive forest acreage of 4,982,000 on Vancouver Island, the Esquimalt and Nanaimo Railway belt constitutes 34.1 per cent.; the other forest regions rate as follows:

	Productive forest acreage	% Vancouver Island total
Quatsino	576,000	11.4
Sayward	423,000	8.2
Kyuoquot	647,000	13.0
Clayoquot	580,000	11.5
Juan de Fuca	665,000	13.5

As productive land is the first concern of the forest industry, these compared figures are useful.

MERCHANTABLE TIMBER

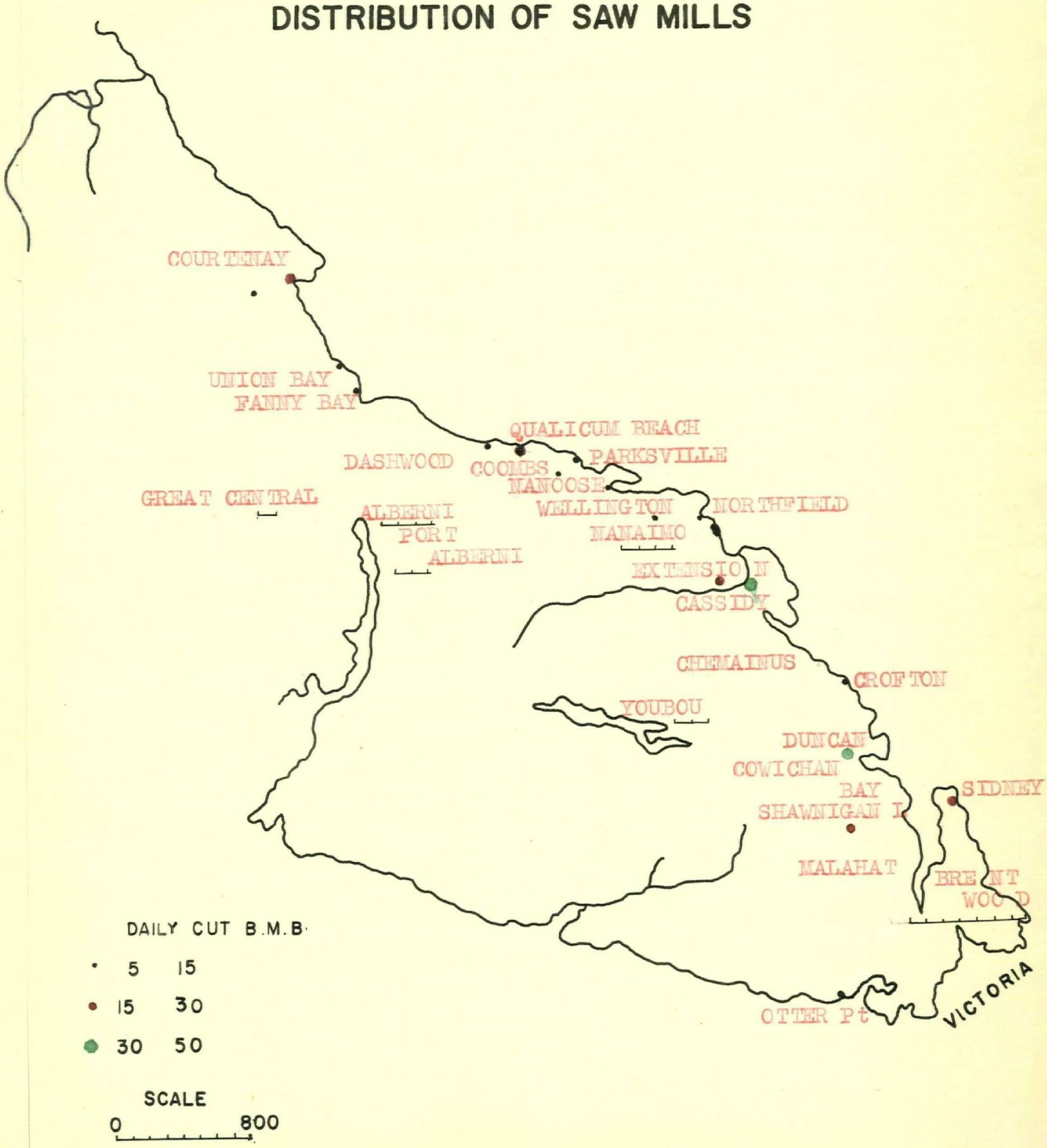


D. Forest Inventory

For the proper utilization of a given resource an inventory is necessary. Thus one was taken, in 1937, of the forests of British Columbia, when they were still distributed according to drainage basins. Again, in the early nineteen fifties a second inventory was made - this time according to a redistribution of the forests according to regions. Naturally, the two sets of figures do not coincide; but they do not differ greatly; since the drainage basins were used as the criteria in the formation of the new regions.

However, for the sake of comparison we cannot depend upon the actual figures of these two different inventories; the best we can do is to compare their percentage figures - as they have been tabulated on the following page.

DISTRIBUTION OF SAW MILLS



FOREST CLASSIFICATION

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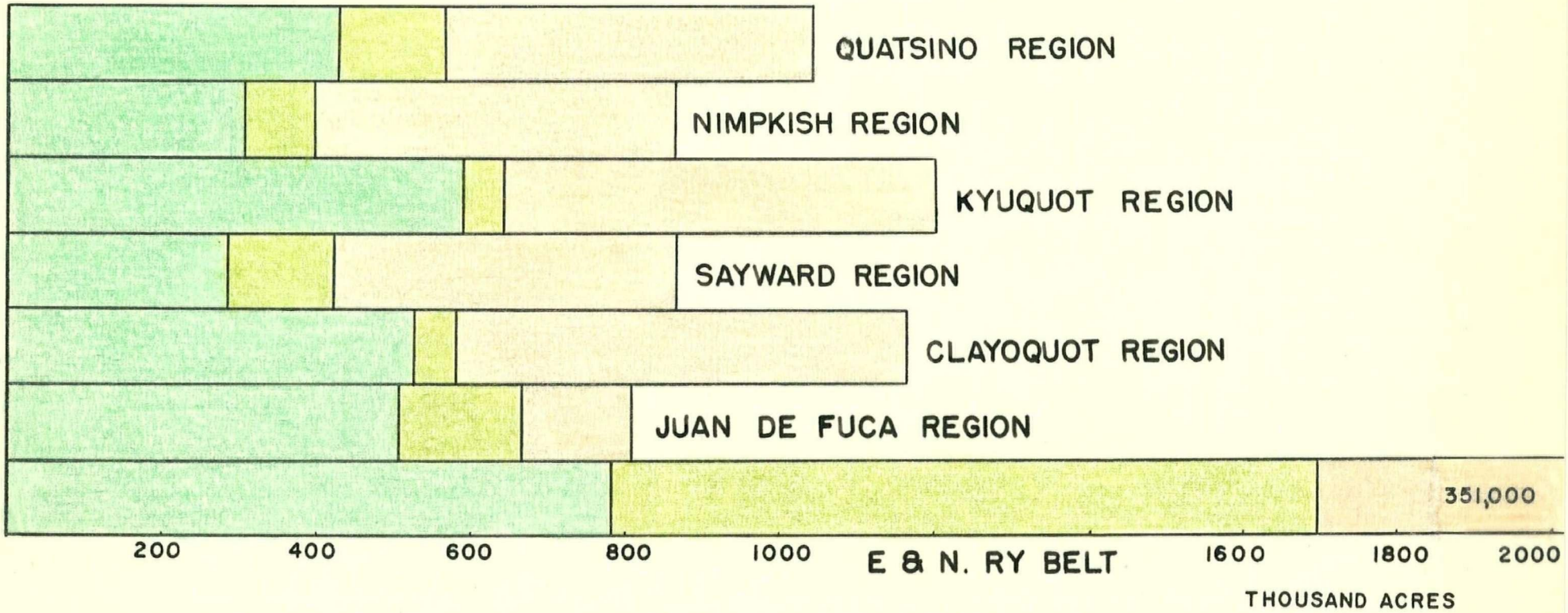


PRODUCTIVE FOREST LAND

MATURE

IMMATURE & NOT RESTOCKED

NON PRODUCTIVE FOREST LAND

Table 37. Comparison of Percentage Figures of the Forest Inventories of 1937-52

	Year	Mature	Immature	Not restocked	Total productive forest	Non-productive
Cape Scot-Hardy Bay and Quatsino	1937	54.10	1.80	1.85	57.75	42.26
Quatsino	1952	41.00	6.75	6.17	53.92	46.09
Bonanza-Adams, Kloaneh-Nimpkish	1937	37.85	3.82	2.00	43.67	56.35
Nimpkish	1952	35.40	3.91	6.64	45.95	54.07
Kyuoquot	1937	27.40	1.17	-	28.57	71.44
Kyuoquot	1952	49.50	3.04	1.25	53.79	46.20
Clayoquot, Tofino, Great Central-Sproat Lakes and Alberni-Barclay	1937	42.55	.80	2.40	45.75	54.26
Clayoquot	1952	45.20	1.37	2.88	49.45	50.55
Alberni-Bamfield, Nitinat and San Juan-Jordan River	1937	65.50	2.71	2.51	70.72	29.27
Juan de Fuca	1952	62.35	7.60	11.10	81.05	18.96
Sayward-Comox	1937	39.20	6.91	5.96	52.07	47.92
Sayward	1952	32.50	5.66	9.88	48.04	51.95
Finlayson Arm, Cowichan-Koksilah, Chemainus River, Nanaimo, Nanoose, Cameron-Horn Lakes, Comox Lake & Sooke	1937	43.90	14.97	9.55	68.35	31.64
E & N. Railway Belt	1952	38.05	27.30	17.50	82.85	

Table 38. Comparison of Acreage Figures of Forest Inventories, as in 1937 and at Dec. 31, 1952
Classification by Drainage Basins in 1937; by Forest Regions in 1952

	Year	Mature	Immature	Not restocked satisfactorily	Total productive forest	Non-productive forest	Total
Cape Scot-Hardy Bay and Quatsino	1937	568,300	19,000	19,500	606,800	442,700	1,049,500
Quatsino	1952	430,776	71,281	65,000	576,000	475,360	1,051,360
Bonanza-Adams and Kloaneh-Nimpkish	1937	334,500	33,900	17,600	386,000	501,000	887,000
Nimpkish	1952	309,826	34,400	58,000	402,000	472,600	874,600
Kyuoquot, Tasis-Tlupana and Muchalat	1937	329,100	14,000	-	343,000	856,200	1,199,200
Kyuoquot	1952	596,000	36,600	15,000	647,500	557,500	1,205,000
Clayoquot, Tofino, Great Central-Sproat Lakes and Alberni-Barclay	1937	527,100	10,000	30,000	567,300	673,000	1,240,300
Clayoquot	1952	530,800	16,000	33,600	580,500	595,000	1,175,500
Alberni-Bamfield, Nitinat and San Juan-Jordan River	1937	610,000	25,200	23,100	678,100	253,200	931,300
Juan de Fuca	1952	506,542	62,600	90,100	665,260	147,200	812,465
Sayward-Comox	1937	432,000	75,100	65,500	572,600	523,800	1,095,400
Sayward	1952	287,391	49,483	86,723	423,597	453,688	876,285

Table 39. Comparison of Acreage Figures of Forest Inventories of 1937 and 1951[1]

1. Drainage basin 2. Forest Region	Year	Mature	Immature	Not restocked	Total ductive forest	Non-productive	Total
1. Finlayson Arm, Cowichan-Koksilah, Chemainus River, Nanaimo, Nanoose, Cameron-Horne Lakes, Comox Lake and Sooke	1937	627,700	216,200	137,400	981,800	459,600	1,468,200
2. E. & N. Railway belt	1951	780,600	562,000	360,230	1,702,830	354,020	2,056,850
Total		3,428,700	393,400	293,100	4,131,600	3,709,500	7,841,100
Total		3,441,935	832,364	708,653	4,982,952	3,054,368	8,037,320
Percentage	1937	43.70	5.05	3.20	51.95	47.40	99.35
	1951	42.80	10.30	8.80	61.90	38.00	99.90

(1) D. F. Mulholland, Forest Resources of B.C., 1937 Report of Forest Service, 1952, Dept. of Lands and Forests, Province of B.C., p. 27

Table 40. Summary of Forest Industry - 1950[1]

	Establishments	Employees	Salaries and wages	Cost of and electricity	Cost of materials	Gross value of products
A. Primary forest industry						
Logging	292	10,000	26,800,000	---	---	---
B. Second forest industry						
1. Saw-mills	162	6,288	16,807,000	457,752	36,896,000	71,484,000
2. Pulp and paper industry[2]	4	1,034	3,377,000	983,000	7,084,400	19,932,000
C. Tertiary forest industries						
1. Sash, door & planing mills	17	291	682,000	24,370	1,833,000	2,804,000
2. Furniture	28	186	351,000	17,300	392,000	1,044,000
3. Printing and publishing	12	484	1,357,000	27,700	556,000	2,870,000
4. Printing and book-binding	14	109	252,600	7,000	167,000	517,000
5. Boat building	18	94	180,000	5,800	118,000	380,000
6. Miscellaneous wood production	6	14	23,400	1,120	42,000	87,000
7. Plywood and veneers	1	---	---	---	---	---
8. Boxes, bags & papers	1	---	---	---	---	---
9. Roofing paper	1	---	---	---	---	---
10. Miscellaneous paper goods	1	---	---	---	---	---
Total:	557	18,560	49,837,000	1,524,042	47,088,000	99,118,000

(1) Principal Statistics of the Manufacturing Industries of Div. No. 5, 1950 Bureau of Economics and Statistics, Dept. of Trade and Industry, Victoria, B.C.

(2) Elk Falls Mill not included

E. Forest Utilization

Forest utilization is concerned with the broad group of industries that include the hewing down of timber in the forest and the transforming of it into the many utilitarian shapes and forms required by the modern standard of living. Thus they provide the raw material for saw-mills, pulp and paper mills and for the still wider range of tertiary industries that take the products of these basic industries and convert them into more highly manufactured goods, such as veneers and plywood, sashes and doors, furniture and all the vast range of products that require wood in any form.

We shall now discuss the forest industries of Vancouver Island under the following headings:

I. Primary

II. Secondary

III. Tertiary

I. Primary Forest Industry

Wood Operations

Logging is the major activity of the Vancouver Island forest industry and it is always expanding, as is indicated by the following table:

Table 41. Primary Forest Operations, Vancouver Island[1]

Years -	1949	1950	1951
No. of logging camps	221	292	326
No. of employees	7,630	10,000	10,826
Salaries and wages	$18,652,200	26,800,000	33,064,988

(1) Bureau of Economics and Statistics, Victoria, B.C.

In 1951, there were 326 logging camps, with 10,826 men on the pay-roll. This is double the number of men employed in milling operations; so we see that it is the logging, not the milling, industry that is the more important on Vancouver Island; although the lumber industry is important; and further, the mills supply the tertiary industries with material.

In connection with operations in the woods it must be born in mind that their primary object is to supply raw material to saw and pulp mills; but they also furnish products for export: logs are exported to the Mainland and to the United States; pulpwood and bolts, fuel, poles, railway ties, mining timber, rail fences and other primary products are finished in the woods, either for local use or for exportation, though they cannot be considered as "manufactured". There are also a number of minor forest products such as Christmas trees, balsam gum, resin and cascara that go to swell the total production figures.

Nearly all of the cut is soft wood, chiefly Douglas fir, western hemlock and western red cedar; the hard wood, largely maple and alder, is used in furniture manufacturing. Most of the cut goes into the production of sawn lumber for export; while a considerable proportion is used locally for building purposes in the form of sashes and doors, shingles, boxes and furniture.

Logging is important all over the Island and is responsible for 59 per cent. of the total pay-roll of the Island's forest industries. The future of this industry is promising; but better management of the forests is needed.

II. Secondary Forest Industries

The secondary industries of Vancouver Island will be discussed under the following headings:

1. Lumber
2. Pulp and paper
3. Plywood

1. Lumber Industry

The lumber industry has been the most important economic activity on Vancouver Island since its settlement. The first saw-mill was built by the Hudson Bay Company, at Victoria, in 1849; this was followed by a steam saw-mill at Albert Head, near Victoria, in 1953-54. In 1860 a relatively large saw-mill was constructed at Port Alberni, The lumber from this mill was shipped to China, Australia, South America and New Zealand. Another impetus to saw-milling was given with the construction of the transcontinental railroad in 1880. The opening of the Panama Canal is yet another landmark in the history of the lumber industry. Since then Vancouver Island lumber finds a market in the Prairie Provinces, in eastern Canada, the eastern States, the United Kingdom and other European countries.

The manufacture of sawn lumber comes second in importance among the industries depending on the forest as their primary source. The important factors in its successful operation are:

a) A large supply of high quality timber
b) A future supply of timber in a "controlled" area
c) Modern, efficient mills
d) Integrated marketing and shipping facilities
e) Ample capital

If we apply these factors to the lumber industry of Vancouver Island we find that it is well suited to the operation of saw-mills; as it has plenty of raw material and accessible markets in the United States and the Orient. As far as capital is concerned, it has ~~been~~ attracted - and can still be if necessary - by the abundance of timber, its high quality and its accessibility by way of lakes and fiords.

The total number of saw-mills in 1950 was 162. They had approximately 6,000 employees whose salaries and wages amounted to 13.3 million dollars. The gross value of production was placed at 71.5 million dollars.

The extent of the lumber industry is indicated by the following significant figures of 1950, from the statistics of Division No. 5[1]

Establishments.....	162	
Employees	6,288	
Salaries and wages	16,807,276	dollars
Cost of fuel and electricity	457,752	"
Cost of materials	36,896,993	"
Gross value of products	71,484,705	"

If we subtract the amount of major items of expenditure from the gross value of saw-mill products we are left with a profit of 17 million dollars - more than the combined value of mining and agricultural production. Raw material (logs) accounts for 65.5 per cent. of the cost and salaries and wages are responsible for 31.4 per cent. Excluding logging employment, that of the saw-mills amounts to 50 per cent. of the total industrial employment on Vancouver Island. This single economic and human factor conveys to us

(1) Principal Statistics of the Manufacturing Industries of Div. No. 5, 1950, Bureau of Economics and Statistics, Dept. of Trade and Industry, Victoria, B.C.

an idea of the importance of the Island's lumber industry. In addition, planing mills, sash and door, furniture and miscellaneous wood factories employ a few hundred more.

The distribution of saw-mills on the Island is guided by the following factors:

1. Easy access to timber
2. Presence of the ocean or other bodies of water over which logs can be brought to the mill
3. Transportation facilities on land or water, including shipping to foreign markets
4. Nearness to settlements (though in some cases settlement has followed the establishment of a lumber industry)
5. Nearness to consuming centers.

Eastern and southeastern Vancouver Island, where 99 per cent. of the total population is found, are well served by transportation and offer more of these facilities than the other parts of the Island; thus many of the saw-mills are located there.

A summary of the important saw-mills of the Island is given below:

Table 42. Major Saw-Mills Operating on Vancouver Island - 1951[1]

Name of Operators	Location	Estimated daily capacity M.B.M. (one 8 hr. shift)	Remarks
B.C. Forest Products Ltd.	Youbou (Cowichan Div.)	200	
Western Forest Industries	Honeymoon Bay	200	
MacMillan & Bloedel Ltd.	Chemainus	300	
"	Alberni	250	
"	Port Alberni	175	
"	Great Central Lake	100	
B.C. Forest Products Ltd.	Victoria	150	Two shifts
Hillcrest Lumber Co. Ltd.	Mesachi Lake	150	
Tahsis Co. Ltd.	Tahsis	150	
Moore-Whittington Lumber Co. Ltd.	Victoria	140	Included Harbour and P.W.Sawmills Ltd.
Parks Logging Co.	Nanaimo	125	Swedish Gang
Crowe, Gonnason Co. Ltd.	Victoria	54	Saws, 2 shifts
Eureka Saw-mill Co. Ltd.	Nanaimo	60	
Hudson Lumber Co. Ltd.	Victoria	75	
Tahsis Co. Ltd.	Port Alberni	50	Per 8 hr. shift, working 2 shifts
Manning Lumber Products	Victoria	50	
	Total	2,205	

There were nearly 160 saw-mills, large and small, operating during the year 1951. Out of these, 16 had an estimated daily capacity of 2,205 m.b.m. and other major saw-mills a daily capacity of 1,486 m.b.m. An important point is that there are approximately 130 saw-mills which have an estimated daily capacity of 20 m.b.m. or under, and 90 per cent. of these 130 have a capacity of under 5 m.b.m.

So we can conclude that there are two distinct types of saw-mills, that is, large scale and small scale. Large scale mills, such as those at Alberni, Port Alberni, Great Central and Mesachi Lakes and Tahsis are located near the raw material, away from the great urban centers, but well connected

(1) Sawmill Summary, Vancouver District (1951), Vancouver Forest District Office, Vancouver

with transportation facilities. Nearly all the production is exported. Small scale mills are scattered all along the east and south-east coasts, to meet the local demand, and some of these either saw for the bigger companies or sell their lumber to them. There are a few portable mills whose entire output is used to supply the pioneer settlements. Big companies like MacMillan & Bloedel Ltd., and the B.C. Forest Products Ltd., have their own logging camps and are responsible for most of the Island's cut. Their influence is felt in the matter and they have a voice as well in controlling the price of logs and lumber.

We conclude by saying that the lumber industry of Vancouver Island is as profitable as are its promises for expansion. It contributes to the Island the greater part of the latter's income. Most of its products are exported to various countries of the world, among which the United States and the United Kingdom are the greatest buyers.

2. Pulp and Paper Industry

Leaving aside logging, pulp and paper production ranks second to lumbering on Vancouver Island. In 1950, there were four pulp and paper operations with 1,050 employees - six times less than the number of workers in saw-mills. Salaries and wages amounted to 3.4 million dollars and the gross value of products was 20 million dollars. Since then there has been a great expansion in the existing plants of the MacMillan & Bloedel Company Ltd., at Port Alberni and Harmac and also at the Elk Falls Mill on Duncan Bay which came into existence in 1952. With this growth, production has doubled since 1952. MacMillan & Bloedel's mill at Harmac, the world's second largest bleached sulphate mill, had more than doubled its output by mid-year, 1953; that is, from 285 tons daily to over 600. There is a definite trend on the Island towards the rapid expansion of this brand of

forestry.

A great deal of study is involved in finding the best location for a mill. There must be practically unlimited supplies of fresh, clear water. There must be adequate power, either from water development, through purchases of electricity, or from some economical fuel for the production of steam. Consideration must be given to the location of deep sea shipping, supply scows and rail barges. Raw materials, such as sulphur and limestone, must be available. Naturally, a sufficient forest area is a primary necessity.

Vancouver Island, with its huge resource of timber, adequate water power and abundant fresh water supply, is a strategic place for the manufacture of pulp and paper and its products. Perhaps no other industry has utilized the natural resources of the region and developed them to such an extent as has the paper industry: it has used the wood, its water for power, its rock for beater rolls, its limestone for the sulphate process and its clay for fillers, and has developed various skills to build up one of the most extensive and indispensable industries to be found in Vancouver Island's industrial economy.

History. A healthy and valuable contribution to the forestry of Vancouver Island is the pulp and paper industry, the extensive growth of which has taken place during the past ten years. It was Vancouver Island that started pulp and paper production in British Columbia. The first pulp mill was built at Port Alberni in 1894; but owing to the inexperience of the operators and lack of funds, the mill closed down after only six months' operation. That was the unhappy beginning of Vancouver Island's prosperous pulp and paper industry.

Distribution.

Port Alice Mill. 1917. A bleached sulphate mill, with a daily capacity of 85 tons, was built in 1917-18 at Port Alice on Quatsino Sound, in a densely wooded area. It was the Colonial Pulp and Paper Company that began to operate it; but in 1926 the ownership was passed on to the British Columbia Pulp and Paper Company and now the Abitibi Power and Paper Company has recently purchased the controlling interest.

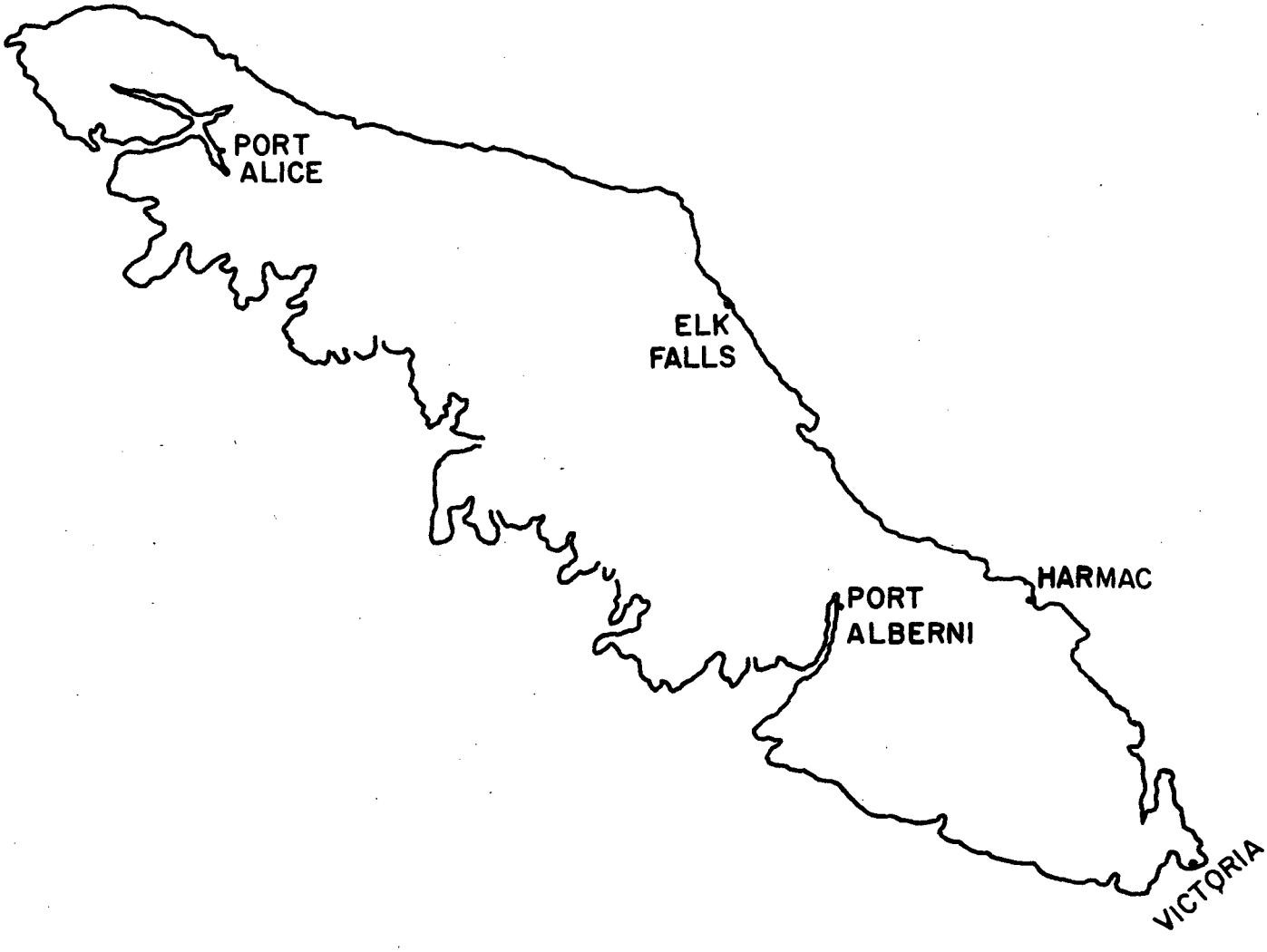
After 1926, the Port Alice Mill underwent modernization and expansion, increasing the daily tonnage of cellulose to 200 tons. The entire output today goes to the Viscoll and Acetate Rayon Industries, thus leaving the field of paper pulp.

Beaver Cove Lumber and Pulp Company Ltd. These operators ran one of the small mills that had but a brief existence. It operated at a daily capacity of 30 tons of kraft pulp, until about December, 1921, when it was closed down.

Sidney Roofing and Paper Company Ltd. (1912). In 1912, this Company built a plant at Sydney, which burned in 1919, to be rebuilt later on the present site at Victoria. It is primarily concerned with the production of roofing and building papers, but does produce newsprint paper in an effort to help supply the heavy demand for that commodity.

MacMillan & Bloedel Company (1947-1950) Ltd. In 1947, the Bloedel, Stewart & Welch Company built a pulp mill at Port Alberni - this time at about a half mile from the site of the historic mill of 1894. The original grinder stones from the old mill of Somas River were used here to erect a monument. The sole production of this plant is unbleached kraft

DISTRIBUTION OF PULP & PAPER MILLS



pulp which consists of two grades: (a) the ordinary standard board stock suitable for unbleached paper and paper board; (b) a special grade for making bleached paper. (No bleaching is done by the plant.)

The proportion of wood used is Douglas fir, 30 per cent.; cedar, 5 per cent. and a mixture of hemlock, spruce and balsam, 65 per cent. The quantity produced in 1951 was 210 air dry tons of pulp per day. New equipment installed will increase the production without any major expansion of the unit.

Power for this huge plant is purchased from the British Columbia Power Commission with a generating station at Campbell River.

Harmac Pulp Mill, 1949-50. This is another new mill owned by MacMillan & Bloedel Limited that was built in 1949 at Harmac near Nanaimo. In June, 1950, Harmac began its production of unbleached kraft pulp. In April, 1951, the first sulphate bleached pulp plant in North America began to operate and since that time Harmac bleached sulphate pulp has been distributed throughout the world. The mill's daily capacity in 1950 was 250 tons. The plant's extension program began to be carried out in 1951 and when completed the daily capacity will be 600 tons of high quality bleached pulp.

Electric power is purchased from the B.C. Power Commission's generating plant at Campbell River. MacMillan & Bloedel can operate their pulp mill advantageously and economically, because they have access to the waste wood and chips from their own saw-mills and plywood plants and to low grade and salvaged logs from their own camps. Most of the wood used is from timber grown on the east coast of the Island on territory within 5 miles of

Nanaimo.

Elk Falls Company, 1952. This Company, incorporated by the Pacific Mills and Canadian Western Lumber Company, built a new groundwood pulp mill at Duncan Bay, near Campbell River. It commenced production in September, 1952, with a daily output of about 320 tons of newsprint. This mill is designed to operate on sawmill waste and relogged material until 1979, when the Company's forest will produce trees of cutting size. In 1953, the Crown Zellerbach Corporation purchased the Canadian Western Lumber Company.

Markets. The major part of the pulp is exported to the east coast ofthe United States and other quantities to England. Shipments are made to various foreign countries, including Mexico and South America.

Though an old industry, pulp and paper production is still a new one on Vancouver Island and is expanding rapidly. The most important period of expansion began with the establishment of the pulp mill at Port Alberni, in 1947. Further increase in Vancouver Island's production has been forecase with announced plans of a sulphate pulp mill for the Elk Falls Company, on the present Company's site. In addition announcements have been made that pulp mills will be built on the southern extremity of Vancouver Island. The future of this industry is bright; as it takes the maximum advantage of the forest resources and the forest waste is minimum. It also uses the so-called saw-mill waste.

Foresighted industrialists have focussed their eyes on Vancouver Island with its possibilities for future development of the pulp and paper industry. This is reflected in the recent announcement (referred to above) of the new mill projects and the mill expansion already completed.

3. Plywood Industry

The plywood industry is young and the only establishment on Vancouver Island is at Port Alberni; but the demand for its products is extensive and varied.

This industry utilizes high-grade logs and Douglas fir is considered the first choice. With the diminishing supply of large Douglas fir logs, this industry will face a problem. One of the coast manufacturers, Mr. Bene, said in his address to the Forest Products Research Society that the old timber will be cut out in the next 25 years, and some plywood plants will be forced to look for face material other than Douglas fir, within 10 years' time.(1) This means that some solution must be found to the problem of using other species. Among the soft woods, hemlock and cedar are possible substitutes for Douglas fir. If these proved successful there would be no immediate danger for the future of plywood production. But the problem would not be wholly solved; since, as has been said above, the old timber will be cut out in the next 25 years.

III. Tertiary Forest Industries

Wood and Paper Using Industries

Saw-mills and pulp and paper mills draw their material from the primary forest industry in the form of logs and wood pulp. In their turn they produce sawn logs, other saw-mill products and pulp and paper. Finally part of their output is used by the tertiary forest industries for further manufacturing. Some of the products of these tertiary industries are made entirely out of wood; in others wood is the most important component; in still others wood is necessary, but it forms only a small portion of the

(1) J. Bene, Substitutes for the British Columbia plywood industry, B.C. Lumberman, August, 1950

products.

The nature and extent of such secondary industries is shown in the table below.

Table 43. Summary of Tertiary Forest Industries. 1950[1]

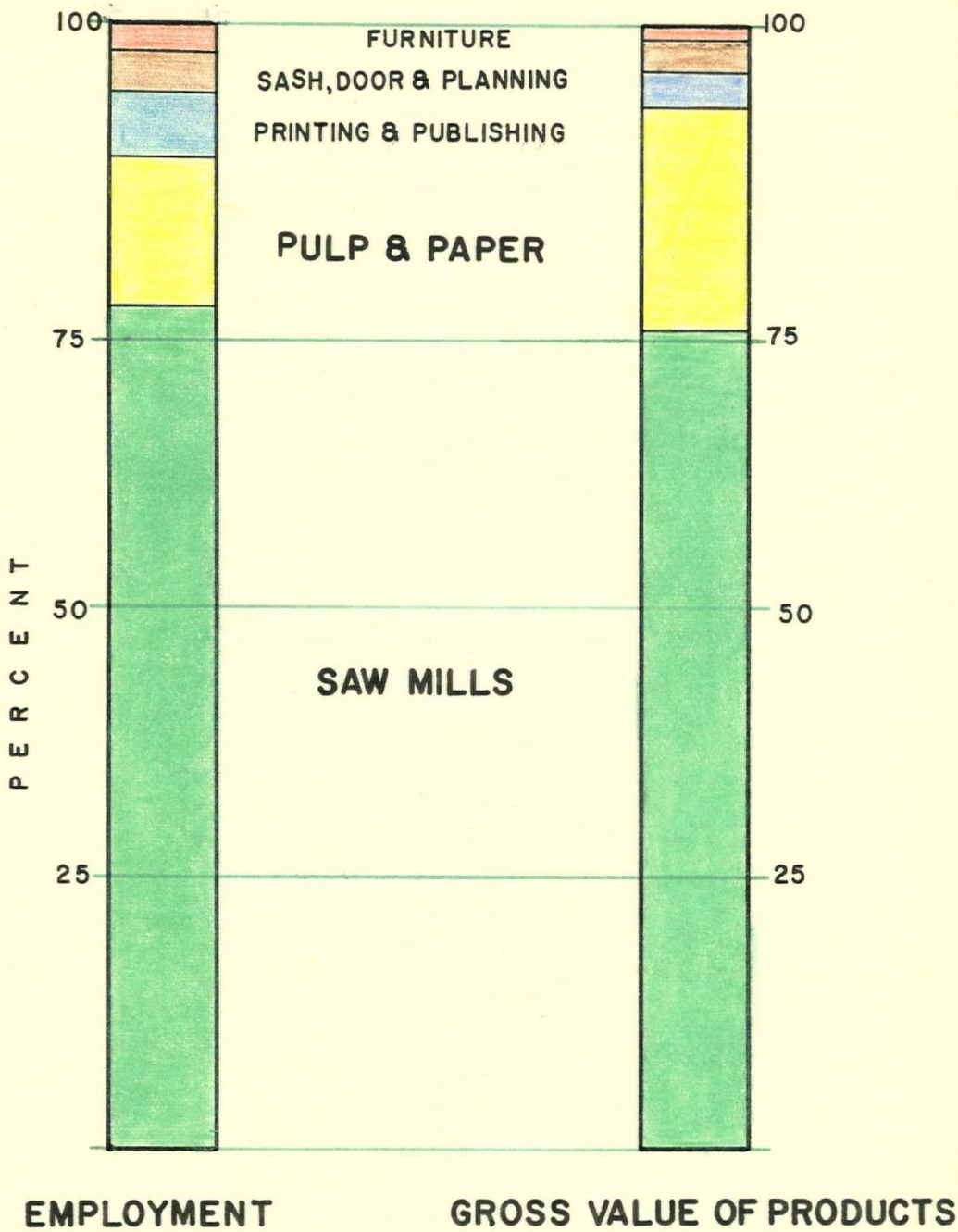
Industry	No. of Establishments	No. of employees	Salaries and wages	Gross value of products
Planing, sash and door	17	291	682,822	2,804,000
Printing and publishing	12	484	1,356,000	2,896,000
Printing and book-binding	14	109	259,000	517,000
Ship and boat building	23	690	2,017,000	4,350,000
Furniture	28	186	351,000	1,044,000
Roofing paper	1			
Box and paper bags	1			
Broom and brush	1			
Total	99	1,760	4,665,022	11,611,000

These tertiary forest industries are important to the economy of Vancouver Island; since they employ 1,760 workers, 400 more than the mining industry. The gross value of their production exceeds that of mining by 2,000 dollars and is double that of agriculture; but in the matter of employment, the opposite is true. The relative economic values of these industries is apparent.

Primary industries always support secondary and tertiary activities. This is true for Vancouver Island and, as long as its primary forest industries exist its tertiary forest activities will probably flourish. At present, besides supplying the local demand, they produce for external trade and the greater part of their production is exported. Tertiary forest enterprises bring in a net revenue of 3 million dollars.

(1) Principal Statistics of the Manufacturing Industries of Div. No. 5, 1950. Bureau of Economics & Statistics, Victoria.

FOREST INDUSTRIES



F. Forest as a Source of Income to the Farmer

A number of farms are termed "part-time" farms. Their owners cannot depend solely on their income from farming, so many have another source of revenue. Forestry is the most convenient; because farmers can engage in it without leaving their farms.

Besides this, farmers supplement their income by exploiting the timber on their own land. In 1950 the value of such forest products was 270,940 dollars.

This came from the following sources:

Item	Dollars
Fuel wood	34,602
Pulpwood	1,527
Fence posts	5,008
Logs for lumber, veneers, bolts and ties	215,046
Pit props	2,660
Telephone and telegraph poles	3,999
Other forest products	8,098

G. Integration for Utilization

The evolution of the forest industry has reached such an advanced stage that today it may be said that we are living in an age of integrated forest industries.

A hundred years ago only top grade timber was logged: it was economically infeasible to cut low grade timber. An enormous logging waste was left in the woods and billions of board feet of mill leftovers were disposed of by burners. Later, production costs increased; highly competitive markets and wood substitutes forced operators to improve logging and manufacturing methods and redesign mills in order to increase the efficiency of

production. These were the stages that marked the first advance toward today's integration.

With the development of the pulp and paper industry, the second phase of integration became evident. The millions of board feet which were burned before are now utilized by this industry. Indeed the pulp and paper mills have contributed much toward integration, because of their ability to use many of the culls, broken logs, small trees and saw-mill and plywood trimmings.

The third phase in integration is marked by the development of the plywood industry which is a comparatively recent addition to forestry on the Island. Today three well-defined secondary forest industries, lumbering, pulp and paper milling and the manufacture of plywood form an integrated secondary industry.

The merging of a number of the larger units in the forest industries (e.g. MacMillan & Bloedel Ltd., The Crown-Zellerbach Corporation and the Canadian Western Lumber Company) have contributed to better utilization of the raw material: logs are now properly sorted and distributed to the different units; they can be graded for plywood, large saw-mills, gang saw-mills, pulp and various secondary forest-manufactures. Douglas fir peeled logs are favoured for plywood plants, medium logs for lumber mills and small ones for pulpwood.

A very good example of integration for utilization are the organized operations of MacMillan & Bloedel. This Company has quite a few logging camps from which the logs of highest quality are sent to the plywood plant at Port Alberni; hog logs to their saw-mills and small ones to their

pulp mill at Port Alberni. The Company's two sulphate mills are based entirely on the utilization of waste. The basic sources of material for these relatively new plants are pulp chips recovered from slabs and edgings from the saw-mills, plus some plywood waste. This development has permitted the use of lower quality logs in the saw-mills. Additional pulpwood requirements are obtained from so-called logging waste - logs containing a high percentage of rot or too small for economical sawing.

Integration for utilization creates a more secure forest economy: it assures more permanent plant operations, permanent payrolls and permanent forests. Thus integration is not only important but a future necessity for the forest industry which is the backbone of Vancouver Island's economy.

H. Effect of War on the Forest Industries

The war emphasized the vital importance of forest products in national defence. The problem of lumber and pulp supply was critical and they were in effect rationed; civilian use of them was restricted to a great extent and it was only with great difficulty that the lumber industry was able to meet the urgent requirements of the war agencies, both at home and abroad. The drain on our forests was substantial; but in general the development of the forest resources of Vancouver Island and British Columbia followed a normal course during the war years. No inaccessible or extensive low grade tracts of timber were exploited; although some additional roads were built that otherwise might not have been for several years. The principal factors in limiting the expansion of output were the scarcity and inefficiency of man power, together with difficulties in securing equipment for highly mechanized operations conducted in our forests. The output was increased, but mostly in the then existing plants. The techno-

logical program was also stimulated in such fields as the production of plywood, special aeroplane stocks, battery separators and pulp and paper.

After the war the strain on forestry relaxed: expansion resumed and once more met the home demand for constructional supplies and that of markets abroad, where post-war construction was also taking place.

I. Settlement and Forestry

Forestry, in addition to supplying the demand, has benefitted Vancouver Island through its influence on settlement. Wherever mills are located they bring prosperity to the local communities through large payrolls. The machinery of the mill has turned the wheel of progress in these communities. The prosperous condition of towns like Cowichan Lake, Alberni, Campbell River is the result: the mills are their principal source of maintenance, their life-blood.

The mill is more or less permanent and must have continual attention and supplies of raw material. Here one can live in a rural setting with all the amenities of city life. Educational facilities are provided and forestry has aided in developing power sites and, by protecting its own timber from fire, is safe-guarding adjacent lands as well. It helps transport companies by supplying much business to railroad and water transportation by shipping to and from the mills.

Thus forest industries have helped a great deal in the establishment of settlements - in fact most of the Island's settlements have followed the establishment of forest operations.

J. Place of Forestry in the Industrial Economy of Vancouver Island

We will surely assign first place in the industrial economy of Vancouver Island to the forestry industries, if we remember that their pay-roll is 43.3 per cent, of the total industrial pay-roll of the Island. This percentage differs greatly, however, from one part of the Island to another - a statement that will be confirmed by the following table giving the distribution of forestry establishment with their respective payrolls as compared to the total industrial pay-rolls of their areas.

Table 44. Distribution of forestry plants with pay-roll percentages, 1951 (1)

Name of area		No. of operations	Payroll of forest industries	Total industrial payroll of area	% Total Ind. Payroll
Alberni	area	47	7,460,709	10,467,105	71.0
Aleet Bay	"	85	5,317,631	5,928,747	90.0
Campbell River	"	99	5,064,702	5,623,905	90.5
Chemainus	"	3	1,419,956	1,697,720	83.5
Courtenay	"	35	1,198,416	2,425,970	49.5
Cumberland	"	21	665,817	2,406,541	27.7
Duncan	"	83	1,987,740	4,523,743	44.0
Ladysmith	"	10	1,225,553	1,833,343	76.5
Lake Cowichan	"	21	4,600,742	4,833,343	95.2
Nanaimo	"	42	1,878,144	8,448,265	22.2
Parkesville-Qualicum Beach	"	46	1,590,365	2,110,688	75.0
Quatsino	"	17	2,789,431	3,305,350	84.5
Saanich-Sydney	"	12	59,269	1,205,876	5.0
Sooke-Port Renfrew	"	45	2,528,017	2,850,764	88.8
Tofino-Kyuoquot	"	8	1,928,222	2,275,090	85.0
Greater Victoria	"	30	2,814,655	38,648,505	7.3
	Total	604	42,529,369	98,349,300	

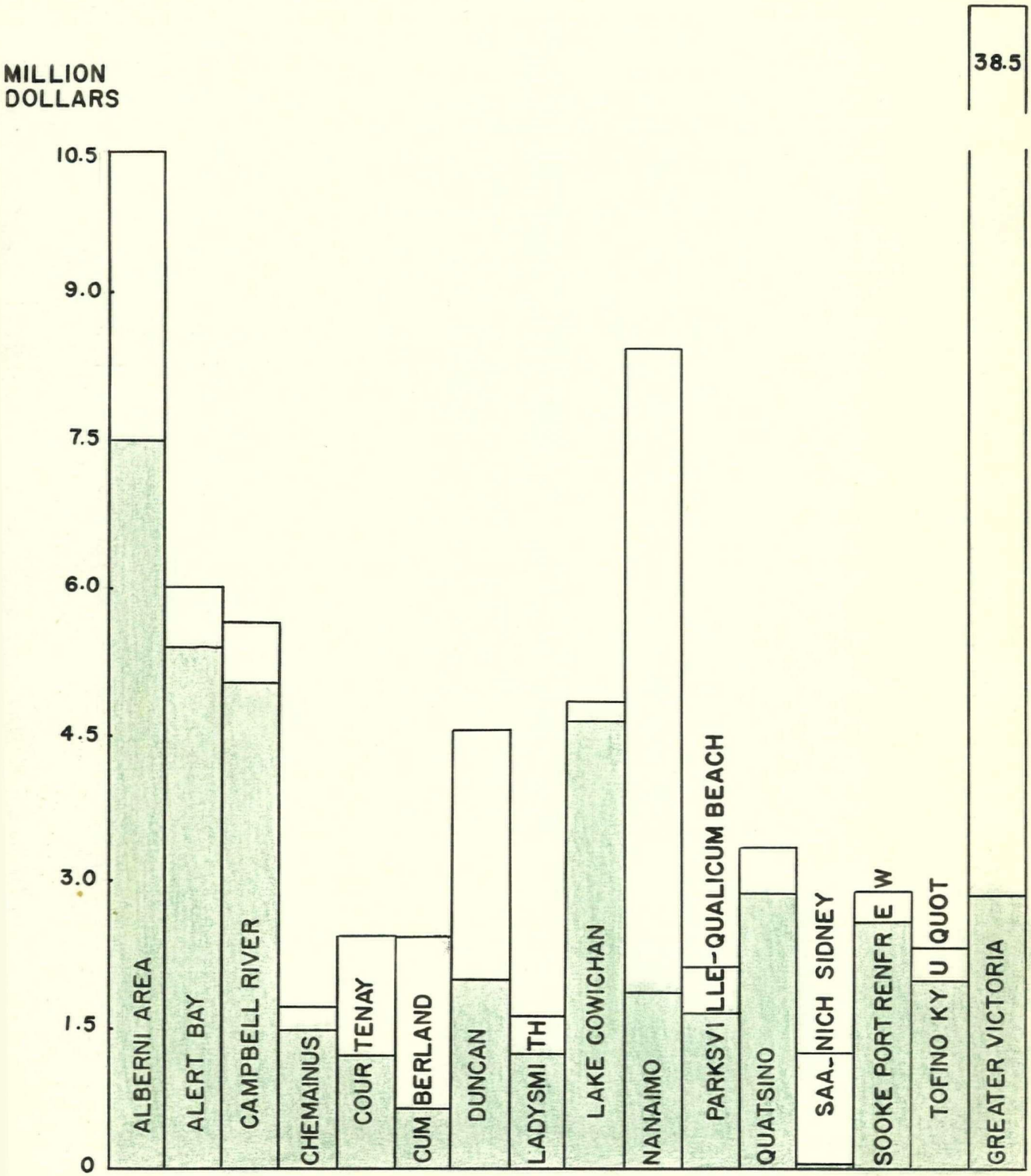
We see how the Island's economy depends upon the forest industry, especially in districts remote from the centers of population, where the pay-rolls of 10 out of 16 of the industrial areas range from 71 to 90 per cent. of the total industrial pay-rolls.

(1) Regional Industrial Index, 1951, Regional Development Division, Dept. of Trade and Industry, Victoria, B.C.

FOREST INDUSTRY & TOTAL INDUSTRIAL

PAY ROLL

(BY AREAS)



Now we shall consider these areas individually.

Alberni area. Here there are 259 business and industrial establishments; but all are secondary to the forestry group of 47 which accounts for 71 per cent. of the total industrial pay-roll of Alberni area.

Alert Bay area. This is primarily a logging region and is controlled by the forest industry which is responsible for 90 per cent. of the total industrial pay-roll. Next come fish canning and processing which claim only 6 per cent. of the total pay-roll.

Campbell River area. This includes the heavy timber of the Sayward forest region and consequently is an important logging area. Out of the 165 industrial establishments forestry controls 99 and 90.5 per cent. of the total pay-roll. On account of its relief this area, with the exception of minor tracts, will always remain a forest land.

Chemainus area. Although, out of 36 industrial establishments, forestry has only 3, it contributes to the total industrial pay-roll 83.5 per cent. The MacMillan & Bloedel saw-mill at Chemainus is one of the largest plants in the British Commonwealth and is responsible for swinging the scales in favour of forestry. Above all, this area is of a mountainous nature and entirely suitable for forest growth. There is no question of competition from other industries.

Courtenay area. In the matter of industrial establishments, trade leads; but even here forestry is the greatest source of income - with a pay-roll amounting to 49.5 per cent. of the total. The drop in percentage is due to the presence of economic activities like agriculture which thrives on the productive black soils of the region. Dairy and

poultry farming are well established.

Cumberland area. Here it is not forestry but mining that leads as a source of income. Mining is responsible for 55.0 per cent. of the industrial pay-roll; whereas forestry's share is only 27.7 per cent. Among forestry activities logging is the chief.

Duncan area. Forestry is the main occupation and within this group saw-milling is more important than logging. Around Duncan, on alluvial land, farming is practiced. Forestry accounts for 44.0 per cent. of the industrial pay-roll. Duncan is one of the Island's urban centers and a tourist attraction.

Ladysmith area. Because of the relief, forestry is the main industry and extensive logging operations are the basis of its economy. Though there are only 10 forestry establishments, their pay-roll amounts to 76.5 per cent. of the total industrial pay-roll. There is practically no competition from other primary industries.

Lake Cowichan. Because of the great timber resources and their accessibility, extensive logging and saw-mill operations have provided the basis of economy in this area for the past fifty years. Even today forestry contributes 95.2 per cent. of the total industrial pay-roll; as compared to forestry other activities are of quite minor importance.

Nanaimo area. Though the forestry pay-roll still leads, mining, certain manufacturing industries and the service group are close rivals.

	Pay-roll
Forestry	1,878,144
Mining	1,446,670
Manufacturing	1,141,975
Service	1,372,229

Farming is also practiced along the Millstream and around East Wellington.

Parkesville-Qualicum Beach area. Out of 122 establishments, forestry counts 46 and 75 per cent. of the total industrial pay-roll. Land is suitable for forest growth and the area's economy is supported by logging operations.

Quatsino area. Far from population centers, pulp milling, logging and fishing form the basis of this region's economy. Out of 38 establishments forestry includes 17 with a pay-roll percentage of 84.5.

Saanich-Sydney area. Here forestry is responsible for 5.5 per cent. of the total industrial pay-roll. Because of the land suitable for agriculture, the nearness of the market and other factors, dairy and poultry, small fruit and vegetable production is more important than forestry, which has only 4 small establishments.

Sooke-Port Renfrew and Tofino-Kyuoquot areas. Large scale logging operations are practiced throughout the area; that is why the percentage of the pay-roll is so high - 88 and 85 per cent. respectively. Fishing is next in importance. The land is altogether unfit for agriculture.

Greater Victoria. In this region, as one might expect, trade, other manufacturing, the service group and construction lead in the matter of pay-roll. Out of the total of 1,588 industrial establishments forestry includes only 30 and its pay-roll is only 7.3 per cent. of the total.

To sum up we may say that forest industries are the main occupation and source of income on Vancouver Island. Their importance is diminished only in Greater Victoria, Saanich-Sydney, Nanaimo and Cumberland areas, because of agricultural or mining developments. The farther we go

from urban centers the more extensive are logging operations. In the urban centers it is a variety of manufacturing that makes forestry there a secondary occupation.

In the foregoing pages we have discussed the forest resources; their development and geographical distribution; their economic status and found that the timber resources of Vancouver Island, though vast, are not inexhaustible and therefore conservation, and better management and utilization are necessary. The Government and certain industrialists fully realize this and there is a definite trend to make forest economy a permanent one.

Logging is second to none of the other forest industries; but when the virgin forests give out the most intelligent compensations for this source of timber must be found in order that this primary industry may continue to cope with the expanding lumber, pulp and tertiary industries. In proportion as these develop, in the economic pattern of the Island itself, the export of logs will decrease. The infant Island industry of plywood will face a serious problem when the large size Douglas firs, product of long centuries, have been exhausted; but the varied uses to which plywood and pulpwood also are put answer for their increasing demand.

Forestry is indeed the chief source at present of the Island's prosperity; but the future is always uncertain: we must put sound forestry into the woods or expect an early, continued or progressively accelerating decline in our forest industry and income, on which depends, in such a large measure, the livelihood of the Island people. One hope is in the forest operators themselves: the merging of big companies and the integration of

saw-milling, plywood and pulp manufacturing, effected over the past few years, will help greatly to achieve a highly efficient and economic use of forest resources and equalize the effects of market fluctuation.

VII

Agriculture

We are now to consider agriculture in its Vancouver Island setting with its geographic controls: the physical features that indicate the choice of farming types; the human factors that compete with the farmers for the use of the arable land and on the market dictate the size of the herds and the crops.

Agriculture on the Island will now be presented under the following major headings:

A. Geographic factors and agriculture

B. Present day agriculture

C. Livestock

D. Crops

E. Value of agricultural products

F. Agricultural limitations

A. Geographic factors and agriculture

To determine the scope and limitations of the agricultural development of a region, it is necessary to discuss the physical factors affecting agriculture - thus providing the background to study the agricultural possibilities. Of these physical factors the most important are:

1. Topography
2. Drainage
3. Climate
4. Vegetation
5. Soil

They have already been treated in Part I; we shall now discuss them briefly with respect to agriculture.

1. Topography

Strong relief is the major factor limiting the scope of agricultural development on Vancouver Island. Agriculture is thus restricted to limited areas; that is, the coastal plains and a few interior valleys (shown on the Land Classification map).

The topography of the agriculturally suitable areas consists of undulating to rolling uplands, with some level terraces and a few flat coastal plains and delta land. The south-east coastal plain varies in width from 1 to 10 miles. Most of the area, on account of its rolling topography, is suitable for mixed farming and livestock raising. The relief of high levels is so rugged that not a single farm is found above an altitude of 500 feet.

2. Drainage

Good drainage is indispensable to successful farming. On the Island one finds excessively drained terraces, adequately drained slopes, poorly or under drained flats, deltas and swamps in nearly every section. For profitable agriculture on excessively drained soils, irrigation is necessary during the summer months and in poorly drained areas artificial drainage must be practiced. So before choosing land for agricultural purposes, the drainage conditions should be examined and given due consideration.

3. Climate

Climate, though less important than topography, is still a vital

factor in determining the scope of agriculture in a given region for it determines the choice of crop and farming methods. For instance the mild, Summer Dry climate of the South-East of Vancouver Island inspired the idea of growing bulbs.

Two outstanding climatic features affecting agriculture are:

a) Length of the frost-free period

b) Summer rainfall

a) Length of the Frost-free period

The following statistics show the length of the frost-free period, as recorded at selected stations on Vancouver Island:

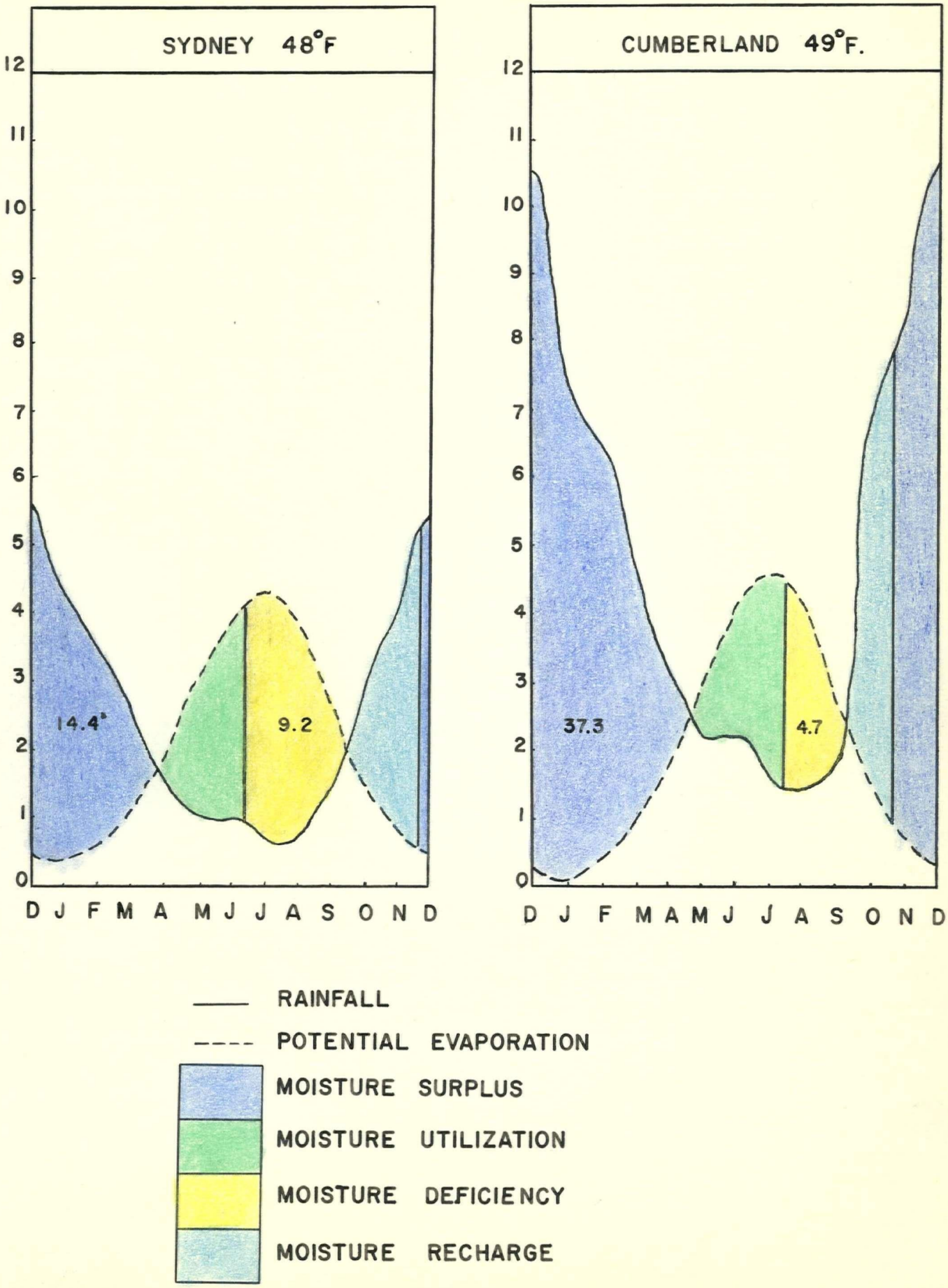
	32° F or above
Sooke	190 days
Victoria	229 "
Cowichan Bay	229 "
Nanaimo	217 "
Vananda	203 "
Cumberland	154 "
Cape Lazo	192 "
Alert Bay	224 "
Bull Harbour	224 "
Cape Scott	197 "
Quatsino	209 "
Alberni (Sproat Lake)	151 "
Estevan Point	227 "
Pachena Point	197 "

The above figures show that the growing season on Vancouver Island is long enough for the successful development of agriculture.

b) The Summer Rainfall

We have seen that the summer season is dry especially in the southeastern part of the Island. If we consult the charts showing water conditions of the soil at Sidney and Cumberland we see that the summer

SOIL MOISTURE STORAGE (4 INCHES)



rainfall deficiency decreases as we move toward the North. Drought is the main problem of agriculture especially during the late summer months and makes irrigation necessary for successful farming.

The topographically suitable areas have a favourable climate for agricultural development, with long summers and a long growing season, relatively high summer temperatures and an abundance of sunshine - all of which favours the early ripening of crops and the stimulating climate encourages the farmer to work and its mildness allows him to be in the fields almost the year round.

4. Vegetation

Vegetation plays its own role in the development of agriculture. Most of Vancouver Island is heavily forested. This regulates the water flow, hence checks floods and water erosion; it provides the soil with much needed organic matter in humus, a factor very favourable for agricultural development. Soils of the southeastern part which have grass association vegetation contain more humus than soils in the North under coniferous growth.

5. Soil

No other natural feature influences the farmer's plans so specifically as does soil. Soil indicates the type of crop or farming or the kind of livestock best suited to a given terrain. The farmer may one day afford to transform his soil artifically and make it more porous, more penetrable to water than nature has, even with her upheavals; he may neutralize acids or alkalis in the land and enrich it with "wonder" fertilizers; but he must still consult the texture, structure and

composition of the original tilth, if he is to obtain the maximum of results. The soils of Vancouver Island are the result of glacial deposits and the environment in which they have developed. They present a very complex pattern owing to variations, structure and composition and the influence of topography and drainage.

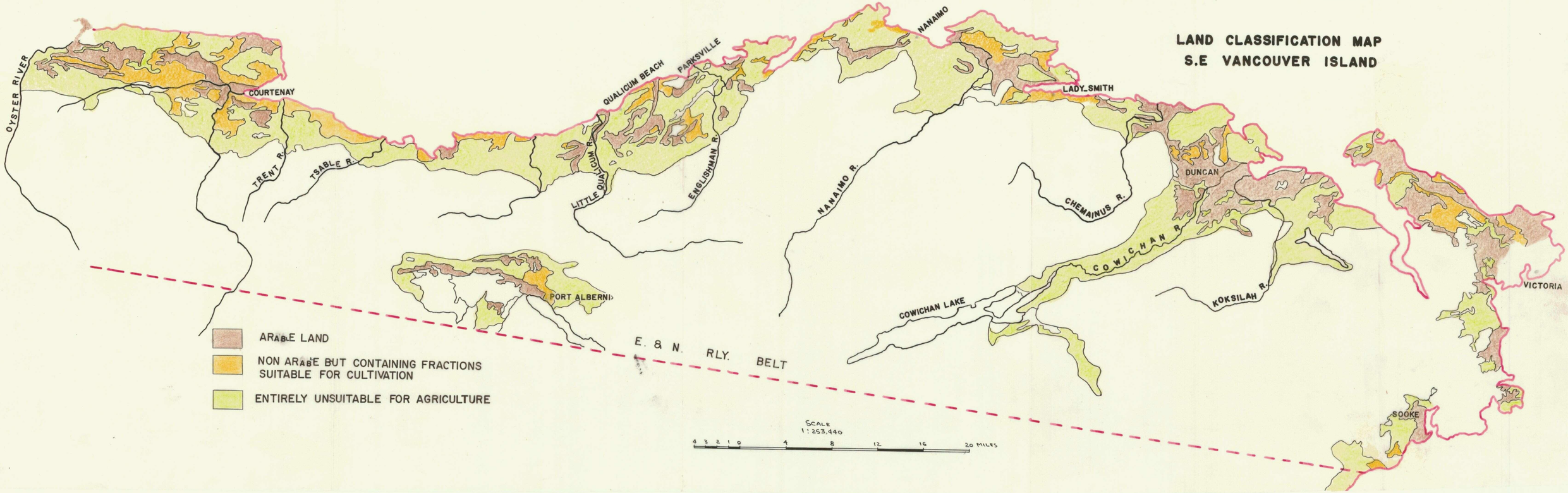
For the purpose of agriculture, soils are classified roughly below.

Table 45. Soils Classified According to Arability, Vancouver Island (1)

Area	Arable	Non-arable with arable	Non-arable	Culti-vated	Urban
1. Salmon River Valley	7,750	530	7,250	970	
2. Menzies Bay to Oyster River	16,534	10,225	43,267	630	
3. Oyster River to Trent River	22,737	21,698	51,182	16,150	880
4. Trent River to Little Qualicum R.	3,750	11,779	37,607	1,630	
5. Little Qualicum R. to Nanoose Bay	9,748	7,189	44,167	5,610	
6. Alberni Basin	6,394	9,933	29,460	3,765	750
7. Nanoose Bay to Ladysmith	11,566	11,625	51,419	13,560	740
8. Ladysmith to Shawnigan L.	32,843	5,874	67,374	24,660	795
9. Upper Cowichan Valley	2,257	441	22,184	325	
10. Saanich Peninsula to Sooke	38,820	10,755	29,125	20,000	12,000
Total	152,399	90,049	383,035	87,300	15,165

Approximately 57 per cent. of the arable land is under cultivation or partly improved. There are possibly 20,000 acres of new land suitable for settlement. Since most of the farms have wood lots of uncleared but potentially

(1) R. H. Spillsbury, Soil Survey of the Southeast Portion of Vancouver Island, 1944


LAND CLASSIFICATION MAP
S.E VANCOUVER ISLAND
OYSTER RIVER
COURTENAY
TRENT R.
TSABLE R.
QUALICUM BEACH
PARKSVILLE
LITTLE QUALICUM R.
ENGLISHMAN R.
NANAIMO
NANAIMO R.
LADY SMITH
CHEMAINUS R.
DUNCAN
COWICHAN R.
COWICHAN LAKE
KOKSILAH R.
VICTORIA
SOOKE
PORT ALBERNI
E. & N. RLY. BELT
ARABLE LAND
NON ARABLE BUT CONTAINING FRACTIONS SUITABLE FOR CULTIVATION
ENTIRELY UNSUITABLE FOR AGRICULTURE
SCALE
1:253,440
4 3 2 1 0 4 8 12 16 20 MILES

arable terrain, they could provide perhaps another 20,000 acres for farming and still more for livestock raising.

So we may say that not all the arable land is cultivated. Though the soil is acidic it is improved by lime and much of the garming land is very fertile. Thus there are favourable land conditions to attract settlers and scope for the future development of agriculture to cope with the growth in population.

B. Present Day Agriculture

The settlement of Vancouver Island[1] dates back to 1845 when James Douglas established Fort Camosun for the Hudson Bay Company on the present site of Victoria. The Company cleared land and imported stock and by 1847 had 300 acres under cultivation. Then came the development of coal mines at Nanaimo, the completion of the Esquimalt and Nanaimo Railway and since the turn of the century, the rapid expansion of logging and lumbering.

The expansion in agriculture on Vancouver Island has paralleled that of coal mining and the lumber industries - not forgetting the growth of the residential areas centering in the City of Victoria - with the result that today agricultural production is largely sustained by the local market.

Present-day agriculture on the Island is presented under the following headings:

1. Farming districts
2. Types of farming
3. Farm types

(1) A. Shortt and A. C. Doughty, Canada and the Provinces, Edinburgh University Press

1. Farming Districts

The chief farming areas are nine in number:

1. Saanich	5. Nanaimo
2. Metchosin	6. Nanoose
3. Sooke	7. Alberni
4. Cowichan	8. Comox

9. Sayward

1. Saanich Peninsula. Situated to the North of Victoria it is 3 to 6 miles wide and 22 miles long and is well suited to mixed farming, dairying and poultry raising. It has important orchards and small fruit farms. The famous strawberry growing area of Gordon Head and Keating are here. A great advantage is its proximity to Victoria's marketing centers.

2. Metchosin, Esquimalt, Colwood and Happy Valley districts. These lie to the West and South-West of Victoria and have a substantial acreage of land suitable for general farming, including dairying and sheep raising. Small fruits, especially strawberries, are an important product and on lighter soils poultry farms are found.

3. Sooke. This district is about 20 miles to the South-West of Victoria, situated on both sides of Sooke Harbour. It has some of the oldest farms on the Island. Its important activities are mixed and small fruit farming; poultry and livestock raising and market-gardening.

4. Cowichan. The Cowichan Valley is about 25 miles long and lies between Chemainus and Shawnigan Lake. Small fruit growing is increas-

ing; seed production is proving profitable and the crops of corn and clover are usually heavy; poultry and dairy farming flourish.

5. Nanaimo. This district also includes the farming areas of Ladysmith, Cedar and Wellington. Except at Cedar small holdings are the rule. All sorts of grain, small fruits, market garden crops and poultry are important.

6. Nanoose. This district includes settlements at Parkesville, Errington, Coombs and Qualicum. Heavy clearing and light soils have made agricultural development slow but dairying, small fruit and poultry farming are successful.

7. Alberni. This district, 4 miles wide and 15 long, is drained by several rivers into the Alberni Canal. Mixed farming and fruit growing do well.

8. Comox. This district includes Courtenay, Sandwick, Merville and Cumberland and is one of the largest stretches of good arable land in the Island. The region is 7 miles wide and about 40 long and of a rolling-bench character, with one part heavily timbered. Dairying is important and there is a creamery at Courtenay. The Melville area is well suited for its mixed farming, poultry and small fruits. Other pursuits are oat, root and forage crop raising.

9. Sayward. The district has approximately 40,000 acres of good farming land in the valley of the Salmon River. The soils are clay loam and silt which are well adapted to mixed farming. There are large areas of logged land awaiting development - which is slow due to lack of communication and transportation.

Farm use of acreage on Vancouver Island is decreasing. Since 1931 there has been a drop of 100,000 acres. There is an explanation. The first farmers paid little attention, when choosing the land, to the nature and productivity of the soil; but after working the land for a while, found it unprofitable. Some of them resumed work on their abandoned farms when prices for farm products rose during the war; but, when the war pressure on dairying, poultry and other products was over, these poor soils could not compete with better ones and were again abandoned.

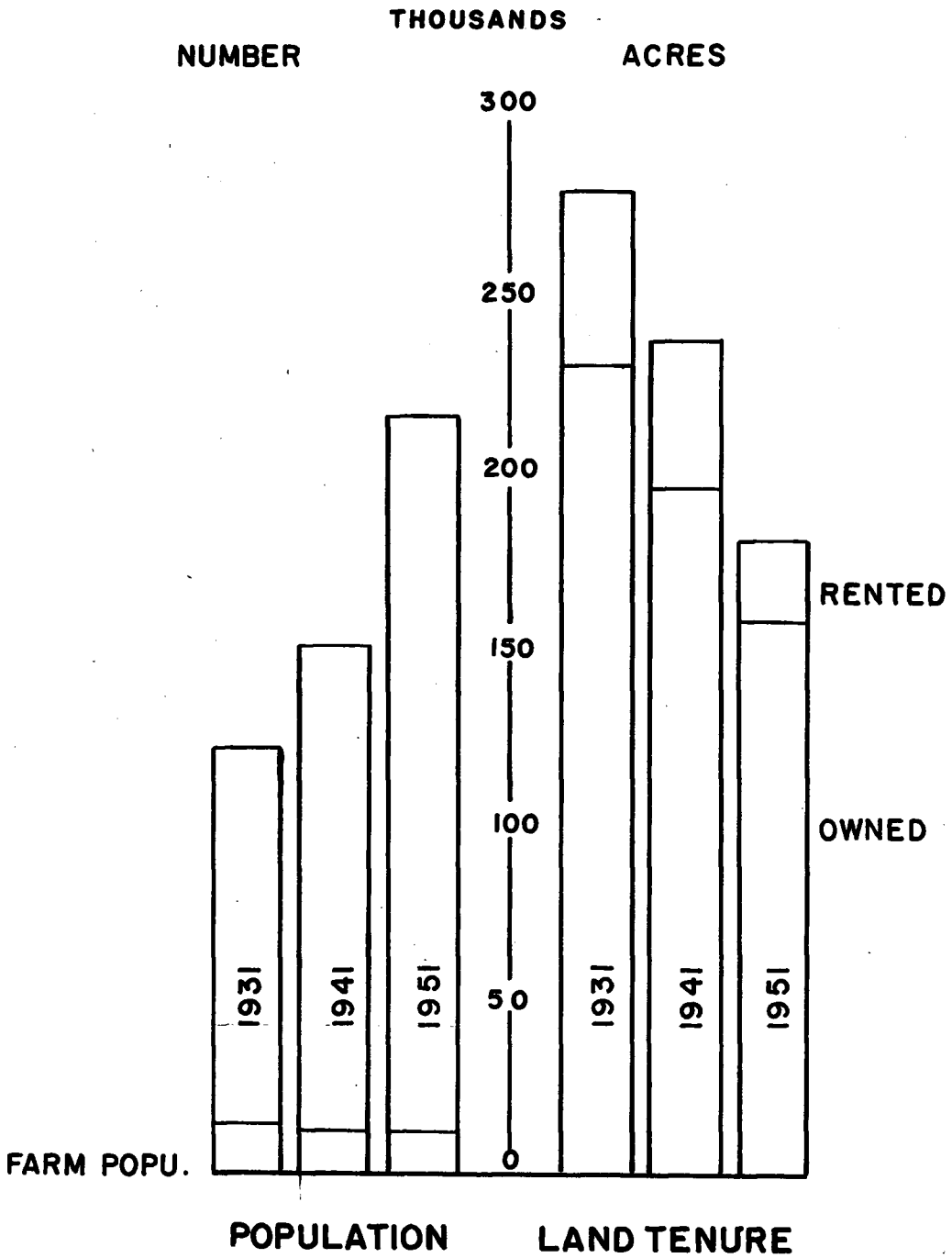
The extent to which agriculture has lost in acreage is indicated by the following table:

Table 46. Acreages Compared by Ownership, Vancouver Island[1]

Total area	Vancouver Island 8,451,840			British Columbia 229,938,560		
Occupied land	1931	1941	1951	1930	1941	1951
Total	282,012	238,637	182,755	3,541,541	4,033,570	4,702,275
Owned	230,202	194,610	156,818	2,829,247	3,235,233	3,714,231
Rented	51,810	38,027	25,937	712,294	798,337	988,043

We note that only 2.1 per cent. of the total area of the Island is under cultivation. The above table also indicates that in 1951, on Vancouver Island, 85.8 per cent. of the occupied farms were operated by the owners, as compared with 79 per cent. in British Columbia. This is due to the fact that most of the farms are small so that many farmers can afford to own their land.

(1) Census of Canada, 1931, Vol. VIII, Agriculture, p. 739; 1941 Agriculture, p. 20; 1951, Vol. VI, Part 2, p. 16-1


THOUSANDS
NUMBER
ACRES
300
250
200
150
100
50
0
RENTED
OWNED
1931
1941
1951
1931
1941
1951
FARM POPU.
POPULATION
LAND TENURE

The small scale of farms is indicated below:

Table 47. Classifications of Farms by Acreage[1]

	1931	1941	1951
Total No. of occupied farms	4,051	2,773	2,739
Farms under 50 acres	2,760	1,669	2,044[2]
Farms from 51-200 "	1,054	915	549[3]
Over 200 "	147	189	146[4]

So there is only a small percentage of the farms with an area of over 200 acres and about 60 per cent. with an area of under 50 acres. The small scale of farms is due to the nature of the land and the tendency to produce specialized products which demand intensive culture, greater skill and attention. It is evident that, in general, the farmer himself can operate a specialized farm more efficiently and effectively provided it is not too large.

After discussing the decrease in farm acreage on the Island let us now find how many people live on the farms.

Table 48. Comparison of Farm and Total Population[5]

	1931	1941	1951
Total population	120,933	150,407	215,003
Farm population	14,877	12,267	12,252

(1) Ibid. Vol. VIII, p. 739; 1941, Agriculture, p. 20; Vol. VI, Part 2, p.15-2

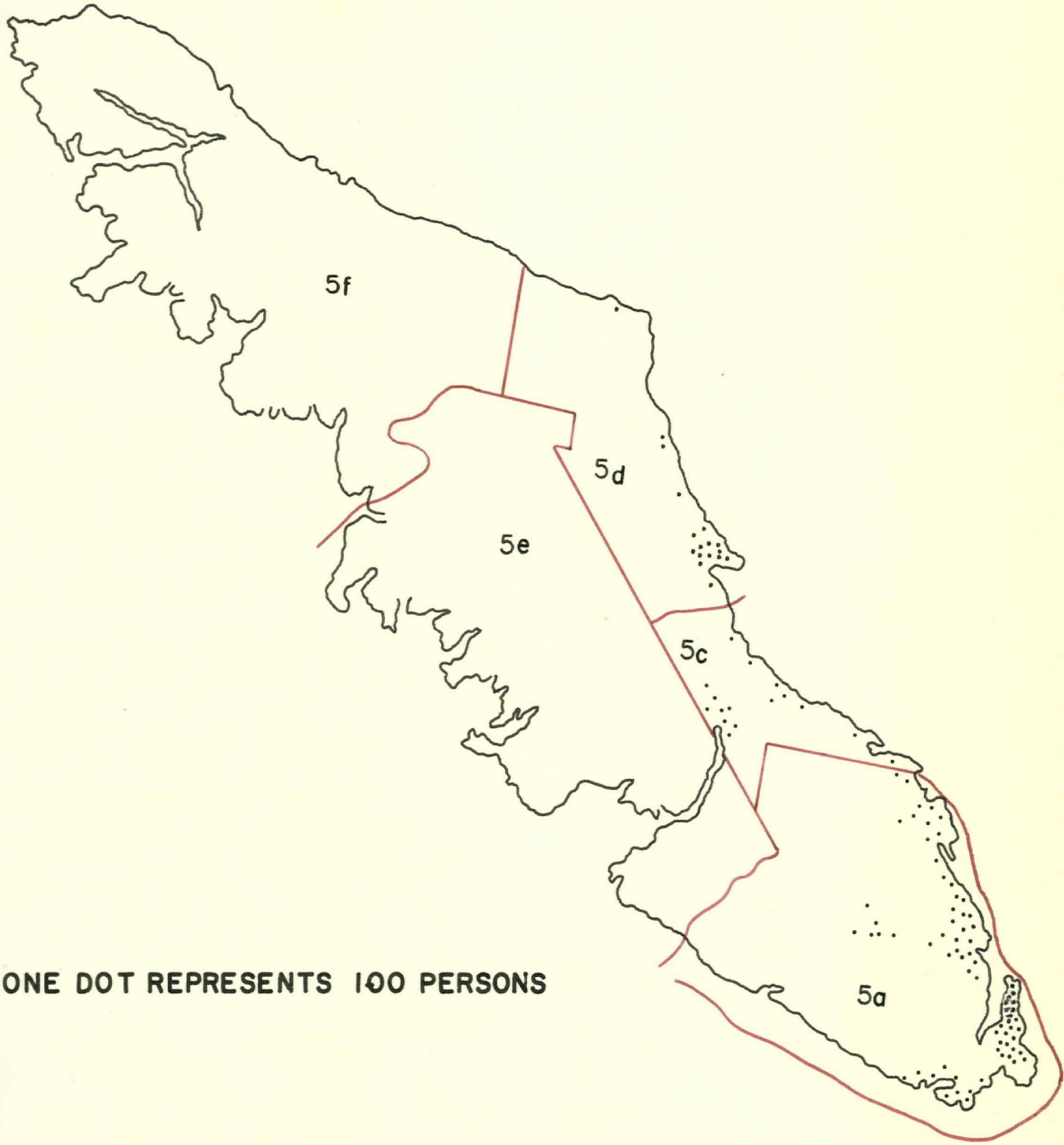
(2) Farms under 70 acres

(3) Farms of from 70 to 240 acres

(4) Farms of over 240 acres

(5) Census of Canada, Agriculture, Vol. VIII, p. 739; 1941, Agriculture, p. 22; Vol. VI, Part 2, p. 15-1

DISTRIBUTION OF FARM POPULATION



ONE DOT REPRESENTS 100 PERSONS

As the farm acreage has decreased, so has the farm population - things which go together in normal circumstances. In 1931 the farm population was 12.5 per cent. of the total for the Island; but this figure has dropped to 8 per cent. in 1951. On the other hand the total population is increasing, because of the healthy climate and the economic development of the Island.

Finally we must classify by acreage the occupied land, according to the use of the improved terrain and the natural conditions of the unimproved.

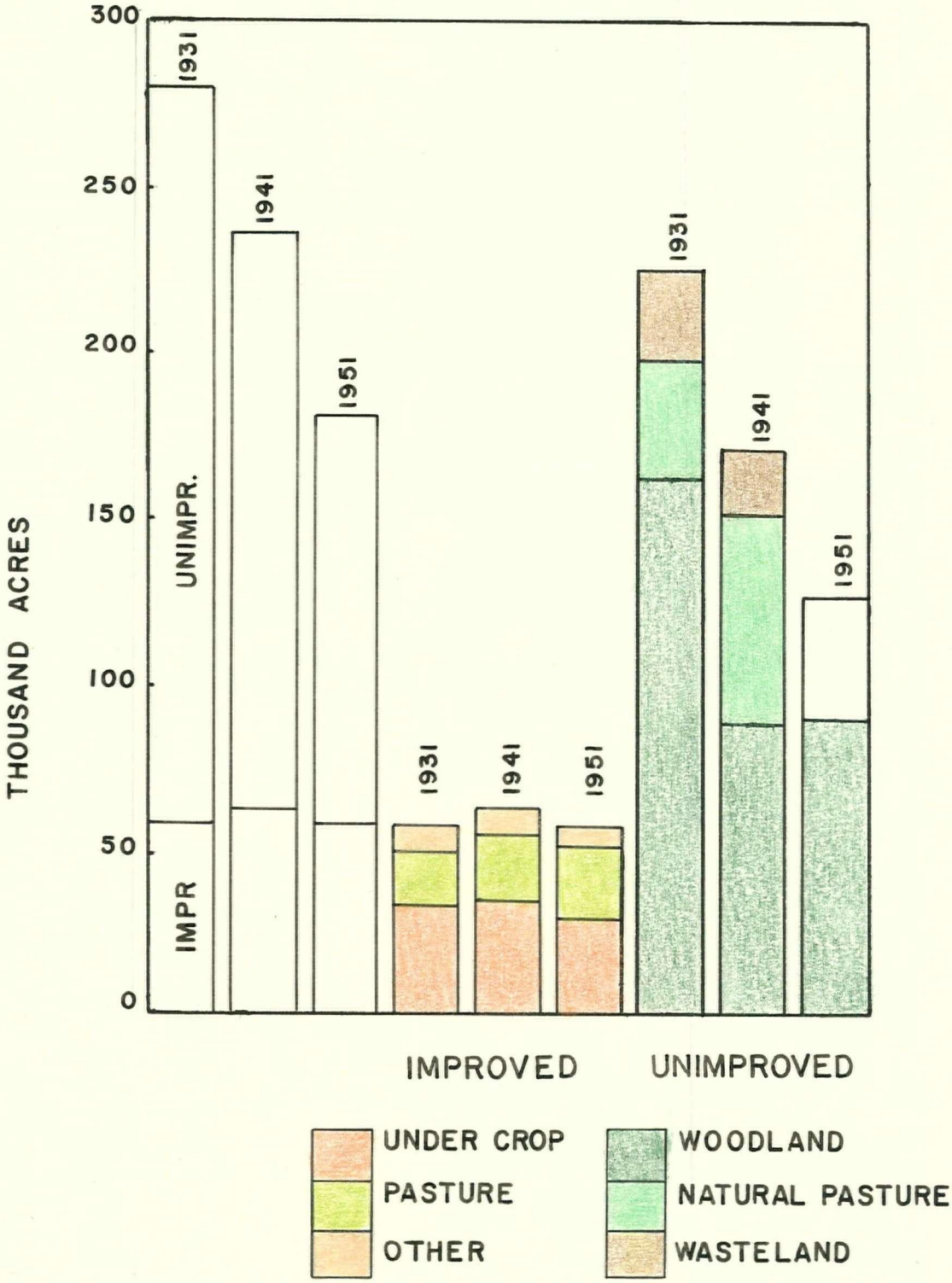
Table 49. Use and Conditions of Occupied Land[1]

	Vancouver Island			B.C.
	1930	1941	1951	1951
A. Improved Land	56,880	61,410	56,785	1,147,776
Under crops	32,799	33,413	28,163	672,448
Pasture	15,638	20,740	23,230	343,195
Fallow	1,213	1,424	921	70,318
	-	5,833	4,471	61,815
B. Unimproved Land	225,132	171,227	125,970	3,554,438
Woodland	161,088	87,039	88,187	1,156,349
Natural pasture	36,711	63,897)	37,783	2,397,949
Waste land	27,333	20,291)		

The noticeable point in this table is the decrease in crop acreage on the Island and the increase in pasture land, due to the increase in dairying and livestock raising which now produce more than 50 per cent. of the total value of farm products. In 1941 they were responsible for $2,400,000 worth of products out of the total value of $4,128,000 of all farm products.

(1) Ibid, 1931, Vol. VIII, p. 739; 1941, Agriculture, p. 22; 1951, Vol. VI, Part 2, p. 16-1

CONDITIONS OF OCCUPIED LAND



Most of the area under crops is used for fodder crops (figures will be discussed later).

In the case of unimproved land there is comparatively more area under woodland than there was in 1941.

2. Types of Farming

Since agriculture on Vancouver Island is largely dependent on the home market it must supply the demand for a large variety of food stuffs. This has led to the predominance of mixed farming, with special emphasis on dairying, poultry and small fruit production. Many farms have small flocks of poultry, sheep and beef cattle. Cropland is largely devoted to the raising of feed for the farmer's own livestock. Potatoes are one of the main cash crops.

In the vicinity of Victoria, more specialized crop and poultry farms are found. Market vegetables are limited to truck gardens. Other specialized crops are green-house tomatoes and bulbs.

3. Farm Types

From the economic point of view Vancouver Island farms are classified below according to their annual returns. They fall into three types:

Type	Number of farms (1)	Approximate % of total no. of farms
A. Commercial - farms with an income from products of over $250	1,457	50%
B. Small scale - farms with an income from products under $250	940	30%
C. Part time - farms with a non-farm income that exceeds the farm returns	599	20%

(1) Census of Canada, 1951, Vol. VI, Part 2. Economic Classification of farms, p. xv

Part time farms have great significance in agricultural activities on the Island and their number is increasing - for the following reasons:

a) Subdivision of the farms

b) Higher wage rates in the lumber industry which attract the farmer

c) Lack of income during initial stage of farming which makes the farmer take part time work in a city or mill

d) Tendency of city worker to live a few miles out of town on his own farm of a few acres and to work it after hours.

Each of the above farm types, classified according to income, is subdivided, using as a basis the source or sources of the farmer's revenue; that is, according to the products that bring in 50 per cent. or more of the farmer's gross income. These sub-types are:

a) Grain and hay (forage and seeds) farm

b) Potatoes and other roots farm

c) Dairy (whole milk, butter or cream) farm

d) Poultry (and egg) farm

e) Livestock (including fur-bearing animals) farm

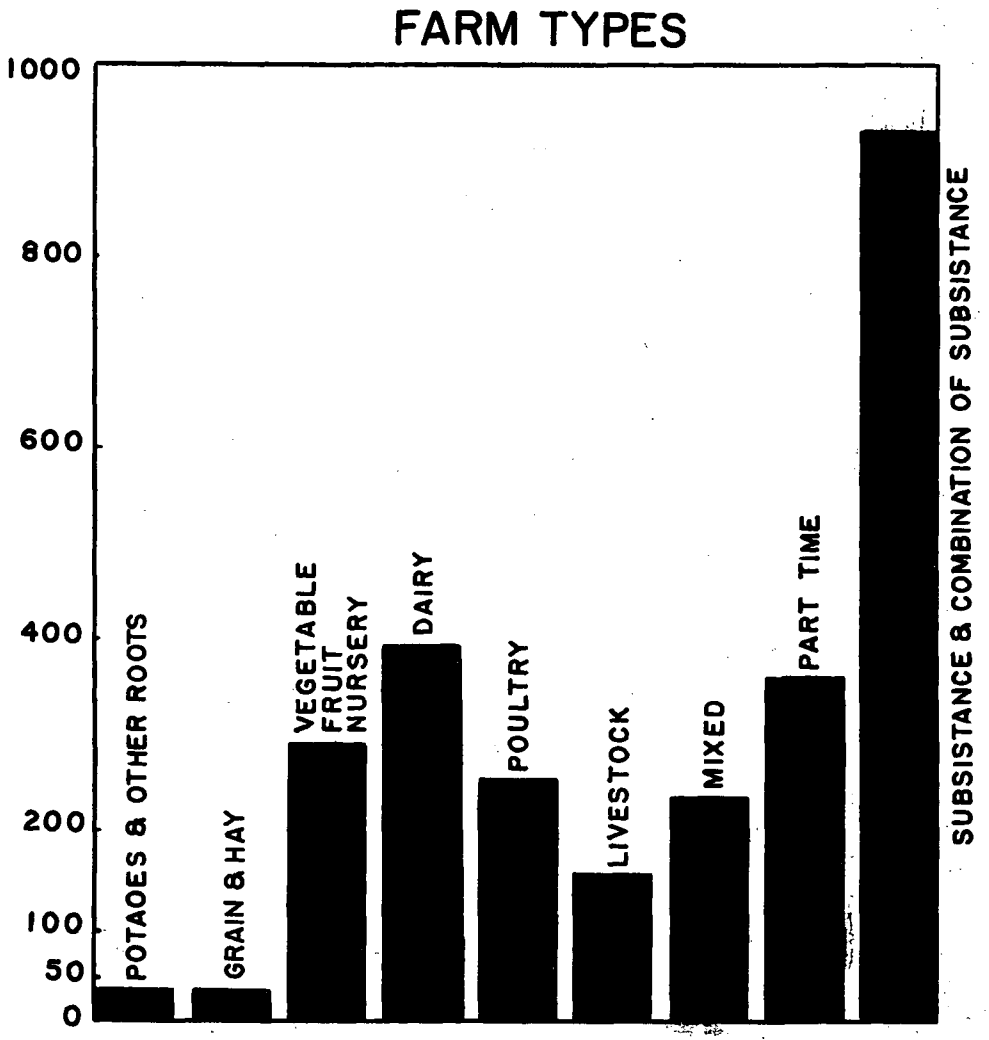
f) Mixed farm

g) Part time farm

h) Subsistence farm (50% or more of products consumed by farmer's family)

i) Combination subsistence farm (products consumed on farm and other main product or products which, combined, represent 50% or more of gross farm income).

Tabulated below we find the number of farms of each sub-type


FARM TYPES
1000
800
600
400
200
100
50
0
POTAOES & OTHER ROOTS
GRAIN & HAY
VEGETABLE
FRUIT
NURSERY
DAIRY
POULTRY
LIVESTOCK
MIXED
PART TIME
SUBSISTANCE & COMBINATION OF SUBSISTANCE

and percentage figures:

Table 50. Classification of Farm Types, Vancouver Island (1)

Farm type	Number of farms	Percentage of total number of farms on V.I.
Grain and hay	37	1.35
Potatoes and other roots	38	1.40
Vegetables, fruit and nursery stock	291	10.45
Dairy	396	14.20
Poultry	256	9.20
Livestock	154	5.60
Mixed	236	8.50
Part time	360	12.90
Subsistence and combination of subsistence	931	33.50

So we see that subsistence and combination of subsistence farms are the major types because of the subdivision of farms and the tendency of city workers to bring up their families in rural surroundings, as mentioned above. Next comes the dairy type of farm, then the vegetable farm and the small fruit and poultry farm, the development of which is determined by the demand of the ever expanding urban centers.

In the matter of acreage, hay leads; but as it is largely consumed on the farm as feed for the livestock the grain figure is very low. A very large part of the improved land is used for fodder crops.

C. Livestock

Rolling or gently sloping topography provides excellent pasture for livestock; the mild climate makes grazing possible all the year round;

urban centers and logging camps are ready to take most of the supply of livestock; while, 40 miles over the water, the mainland market is waiting to buy the surplus production of meat. Vancouver City and the Lower Mainland import every year several million dollars worth of meat from the Prairie Provinces.

The importance of livestock farming can be judged from the single fact that its products constitute over 50 per cent. of the total value of farm products of the Island. Compare the following table:

Table 51. Comparison of Values; Livestock and Total Products (1)

Year	Value of farm products		Value of livestock on farms	Value of stock sold & slaughtered	Value of animal products
	B.C.	Van. Is.			
1931	36,408,347	5,023,600	1,950,332	538,575	2,077,747
1941	36,974,138	4,128,419	1,606,046	432,875	2,011,201 (2)
1951	-	-	4,457,846	-	-

The value of livestock on farms in 1951 according to this table is nearly 3 times what it was in 1941 - not because of an increase in the number of livestock but to the rise in price. A cow worth 60 dollars in 1931 and 50 dollars in 1941 is valued at 180 dollars in 1951.

Let us now consider the increase or decrease in the total number of each kind of livestock, in its relation to the total rise or fall in their value. Figures for two different decades are given below:

(1) Census of Canada, 1931, 1941, 1951

(2) Includes hides sold

Table 52. Inventory of Vancouver Island Livestock[1]

Livestock	1931 Number	1931 Value $	1941 Number	1941 Value $	1951 Number	1951 Value $
		1,950,332		1,606,046		4,451,800
Cattle	16,887	977,256	18,028	919,559	16,211	2,866,000
Sheep	31,028	231,576	19,102	142,953	11,362	301,956
Swine	6,021	67,350	6,104	62,827	4,347	221,144
Horses	2,359	289,373	2,246	213,687	1,068	86,635
Goats	2,155	25,788	678	6,772	735	33,075
Poultry	787,281	351,017	376,277	253,624	---	---
Hens and Chickens	764,161	314,308	355,088	226,149	393,043	571,296
Turkeys	9,131	14,812	12,473	19,041	69,544	350,502
Geese	1,441	2,136	732	1,270	3,418	14,663
Ducks	7,146	4,725	6,356	4,595	4,448	7,873
Other poultry	5,402	15,036	1,628	2,569	569	---
Bees	(2) 646	7,222	589	5,844	246	4,752

Livestock farms can be subdivided into the following:

1. Dairy farms
2. Poultry farms
3. Livestock farms or ranches

On Vancouver Island the first two are important as specialized types of farms; ranching is not important as most of the livestock belongs to dairy or mixed farms. In the few pages that follow we shall discuss

(1) Census of Canada, 1931, Vol. VIII, p.753; 1941 Agriculture, p. 40; 1951, Vol. VI, Part 2, p. 21-1

(2) Number of hives

them separately.

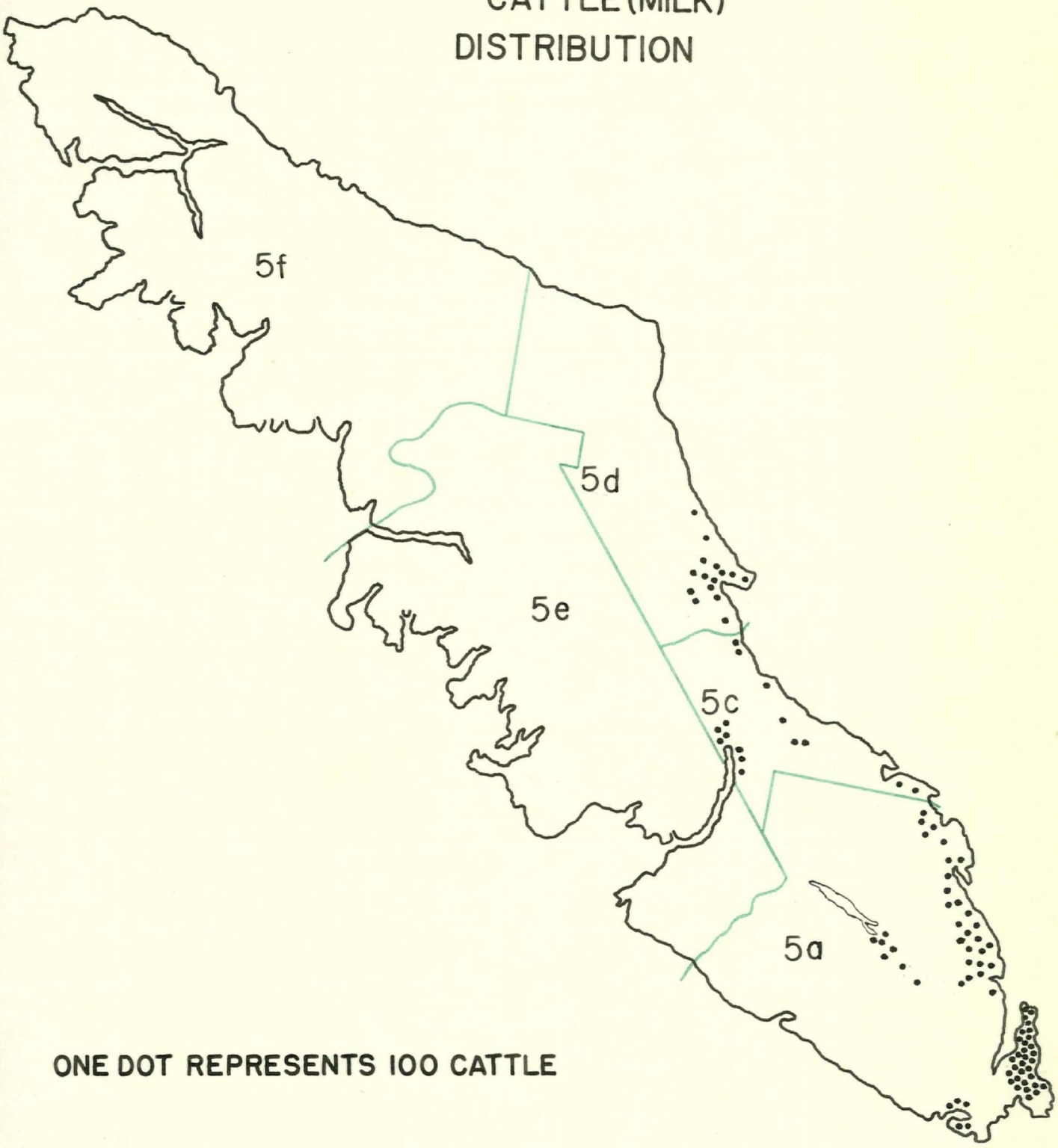
1. Dairy Farms

Dairying is a specialized type of activity in livestock raising and that is why dairy farms are called "specialized" farms, a term so often used on Vancouver Island.

Dairying is the most important agricultural pursuit on the Island. In 1941 the value of the milk produced was 1,560,000 dollars, almost 37 per cent. of the total value of all farm products and 62.5 per cent. of the total value of animal products. In 1951 there were 16,200 cattle out of which 10,800 were milch cows and out of these, in the same year, 8,000 were milked. This shows that beef cattle are less important than the dairy type.

Vancouver Island is particularly adapted for winter dairying on account of the mildness of the climate, and many excellent herds of dairy cattle are found on the eastern and south-eastern parts of Vancouver Island. Saanich, in 1941, had 2,500 milked cows out of the total for the Island of 9,682; while the whole southern subdivision had 5,900 milked cows, which was over 50 per cent. of the total for the Island. Dairying, though still a vital industry, is not increasing owing to the encroachment upon dairy lands subjected to subdivision. With the advent of numerous growers of small fruits, poultrymen and expansion of urban development, dairy farms have been forced to use land that is farther away from urban centers - to establish their farms in districts like Comox - Courtenay. On Vancouver Island three creameries make butter, cheese and ice-cream - mostly for the local market. By-products of creameries are used for livestock feed. The principal cows in the area are Jerseys, though Holsteins are also favourites. The annual yield from a good cow is approximately 500 gallons of milk.

CATTLE (MILK) DISTRIBUTION



ONE DOT REPRESENTS 100 CATTLE

Dairy farms are well distributed over the whole southeastern region to meet the demand of local settlements, with concentration around Victoria to supply the city with fresh milk. Vancouver Island is not self-sufficient, however, and receives daily shipment of fresh milk from the mainland.

The actual location of the farm is influenced by the quality of pasture, competition with other enterprises, availability of feed and nearness of market. The Island does not produce enough fodder for its livestock and must import from the Mainland.

The cultivated area of the average dairy farm is devoted to crops in the following proportions:

Crop	Percentage[1]
Grain	28.10
Hay	59.42
Silage	8.08
Roots	1.94
Potatoes	2.46
Total	100.00

So we see that most of the dairy farm area is used for fodder crops. Root crops are also important thanks to the abundant supply of favourable manure from the dairy farm.

(1) Annual Report 1945

Table 53. Inventory of Dairy Products, Vancouver Island

	1931	1941[1]
Value of total animal production	2,077,747	2,400,000
Value of total amount of milk produced	1,204,000	1,557,000

	Unit	1931	1941
Total number of cows milked	head	8,410	9,232
" amount of milk produced	lbs.	50,975,077	59,378,000
" " " " sold fresh	"	19,333,428	29,000,000
" " " " consumed on farm[2]	"		11,280,000
" " " cream sold	gals.	11,446	1,305,000
" " " butter made	lbs.	251,000	200,000
" " " cheese "	"	6,838	980
Amt. of milk sold for manufacture	"		1,017,000

Thus we see an increase in the number of milked cows and in the total milk production. This latter has increased by about 9,000,000 lbs. The increase in 1941 may be due to the presence of a military camp on the Island. Another noticeable point is the consumption of milk: most of the milk produced is sold fresh to the urban market - that is to creameries and only a fraction of it is used for other purposes. This is due to the increase in population and to the fact that there is no substitute for fresh milk, as there is for butter which has a cheaper substitute in margarine.

To conclude, one may say that conditions for dairying are still very promising for further expansion.

(1) Census of Canada 1931, Vol. VIII, Agriculture, p. 735; Ibid 1941, Agriculture, p. 44

(2) Includes all milk fed to livestock

2. Poultry

Poultry, another specialized branch of livestock production, is making strides on the Island. There were at one time 376,277 fowls, mainly chickens, ducks and turkeys, with a total value of $254,000. This sum constituted about 16% of the total value of livestock. Poultry is multiplying: turkeys alone increased in number, between 1941 and 1951, by 57,000. This trend to multiply may be attributed to the mild winters and long sunny summers of the Island: fowls may be kept under most natural conditions; for instance, no special buildings or lights or other artificial devices are needed for turkeys, as elsewhere in Canada; so that breeders can have early stock for sale before that from other Provinces has come on the market. New dairying business, especially in the Comox area, also explains this increase - which is well indicated in the table below:

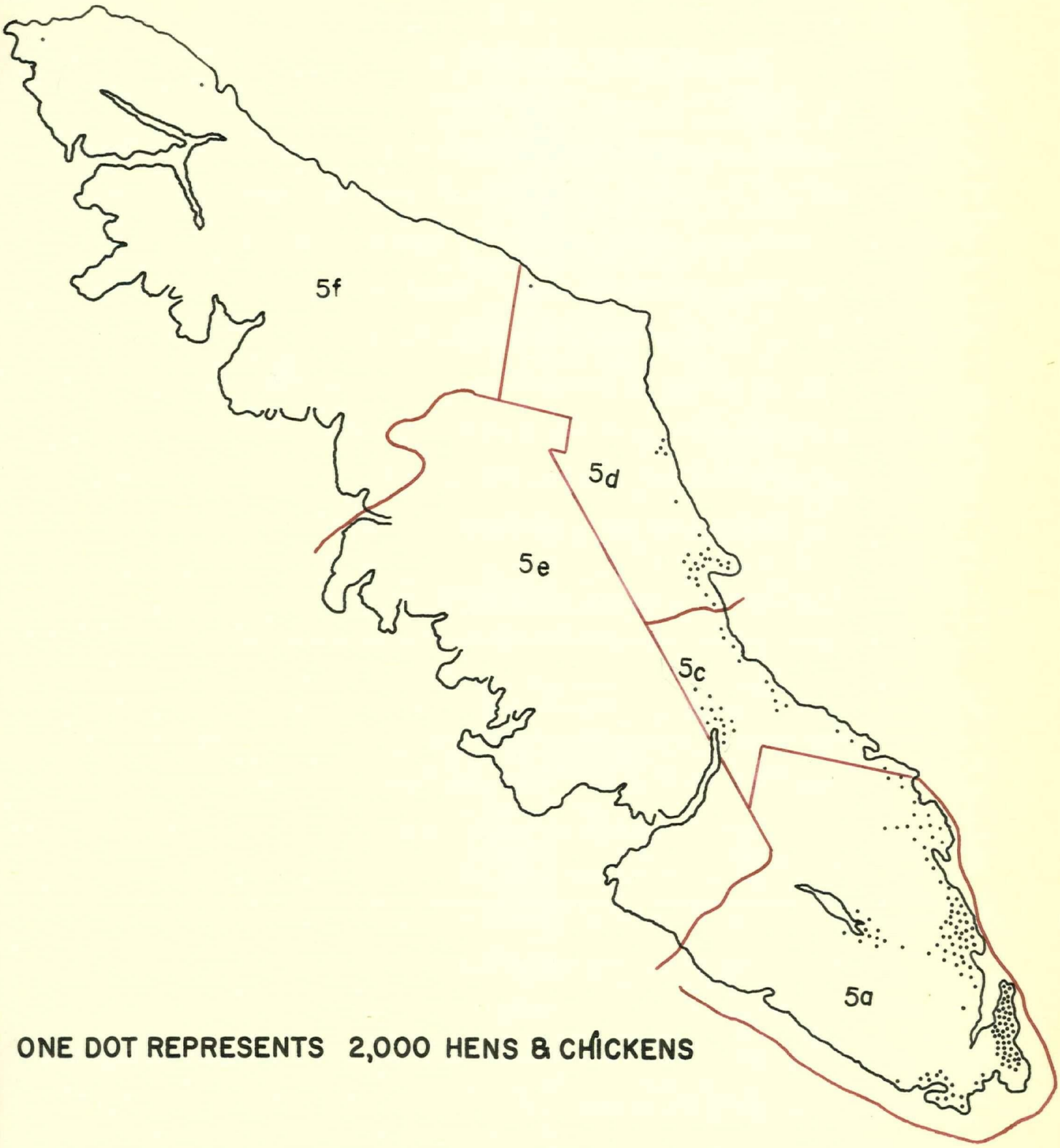
Table 54. Inventory of Stock on Poultry Farms, Vancouver Island(1)

Item	1931		1941		1951	
	Number	Value	Number	Value	Number	Value
All stock	787,000	351,000	376,000	253,000	470,917	943,400
Hens and chickens	764,000	314,000	355,000	266,000	393,000	571,000
Turkeys	9,000	15,000	12,000	19,000	69,500	350,000
Ducks	7,000	5,000	6,300	4,500	4,448	7,800
Geese	1,400	2,100	700	1,200	3,400	14,600
Other fowl	5,400	15,000	1,600	2,500	549	-

The poultry industry was better established in 1931 than in 1941 as is indicated by the above table. After this drop it picked up again in 1951 and the figures are quite promising. Between 1931 and 1941 when poultry declined, dairying prospered and we find more milking cows in 1941 than in

(1) Census of Canada, 1931, Vol. VIII (Agric.) p. 753; 1941, Agriculture, p. 40; 1951, Vol. VI, Part 2, p. 21-1

DISTRIBUTION OF HENS & CHICKENS



ONE DOT REPRESENTS 2,000 HENS & CHICKENS

1931. It was the war that encouraged dairying and it also gave an impetus to poultry in its later years. The outstanding fact in the table is the tremendous increase in turkeys since 1941.

Poultry farms cover only a few acres and are generally located on poorer or non-arable soils. Stoney sand and loamy sand are well suited to fowl; since they are well drained and provide "gril" - an essential part of poultry diet.

Poultry farming is now an attractive venture financially, thanks again to higher prices, especially for a young Islander who is ready to work, to use the most thrifty and scientific feed. The greatest advantage is that it can be started with a small capital and brings quick returns.

Most of the income in poultry farming comes from the sale of eggs. The revenue in 1941 was as follows:

Egg production.(1)

Year	No. of dozen	Value
1941	2,110,000	440,000

Market. There is enough home demand for all the poultry products; but as the stock is of high quality, some eggs for hatching are exported to other parts of the Province.

Conclusions. Vancouver Island offers good opportunities for poultry raising along with other mixed farming such as dairying on a small scale and the growing of small fruits; but flocks demand constant attention. The income from poultry varies considerably with changing prices and markets.

(1) Ibid, 1941, Agriculture, p. 44

Bee-keeping

Bee-keeping has been carried on for about 70 years on Vancouver Island and it is usually looked after by the women. It is a source of side money to the farmer.

The data below indicate the trend in production of this industry:

	1914	1931	1941	1951
Number of hives	185	646	589	264
Crop reported in lbs.	7,900			
Total value	-	7,222	5,844	4,752

We may conclude from these figures that the production and income from bee culture is decreasing. We see a steep decline between 1941 and 1951 in the number of hives, but only a small decrease in the total value of production - the explanation of which is found in the rise in price of honey.

The decrease in the number of hives could be attributed to:

a) Lack of skilled labour to handle the honey

b) The diverting of the farmer's effort to other specialized crops

3. Livestock

(Excluding Poultry and Dairy Cattle)

Out of a total of 2,773 farms on Vancouver Island only 154, or 5 per cent., were classed in 1940 as livestock farms; that is, ranches depending almost totally on their revenue from livestock and its products. The proportion of beef cattle and other animals is still small and yet the

conditions for raising livestock are unusually good: a long grazing season, abundant watering most of the year, suitable land for growing fodder and a good local market. When conditions are so favourable why are so few farms primarily engaged in livestock raising?

The answer is perhaps found in the following:

a) Limited range: a livestock farm needs a large ranch to feed its animals. About 3 to 5 acres are required to feed a single sheep; thus a good deal of land is necessary to support a large flock.

b) Vancouver Island agriculture is governed by the domestic market which demands a diversity of products. Mixed farms cater to this diversity and mixed farms cannot raise mutton, pork or beef on an extensive scale.

c) Specialized types of farming, such as dairying, poultry raising and truck gardening bring more revenue per acre than livestock raising.

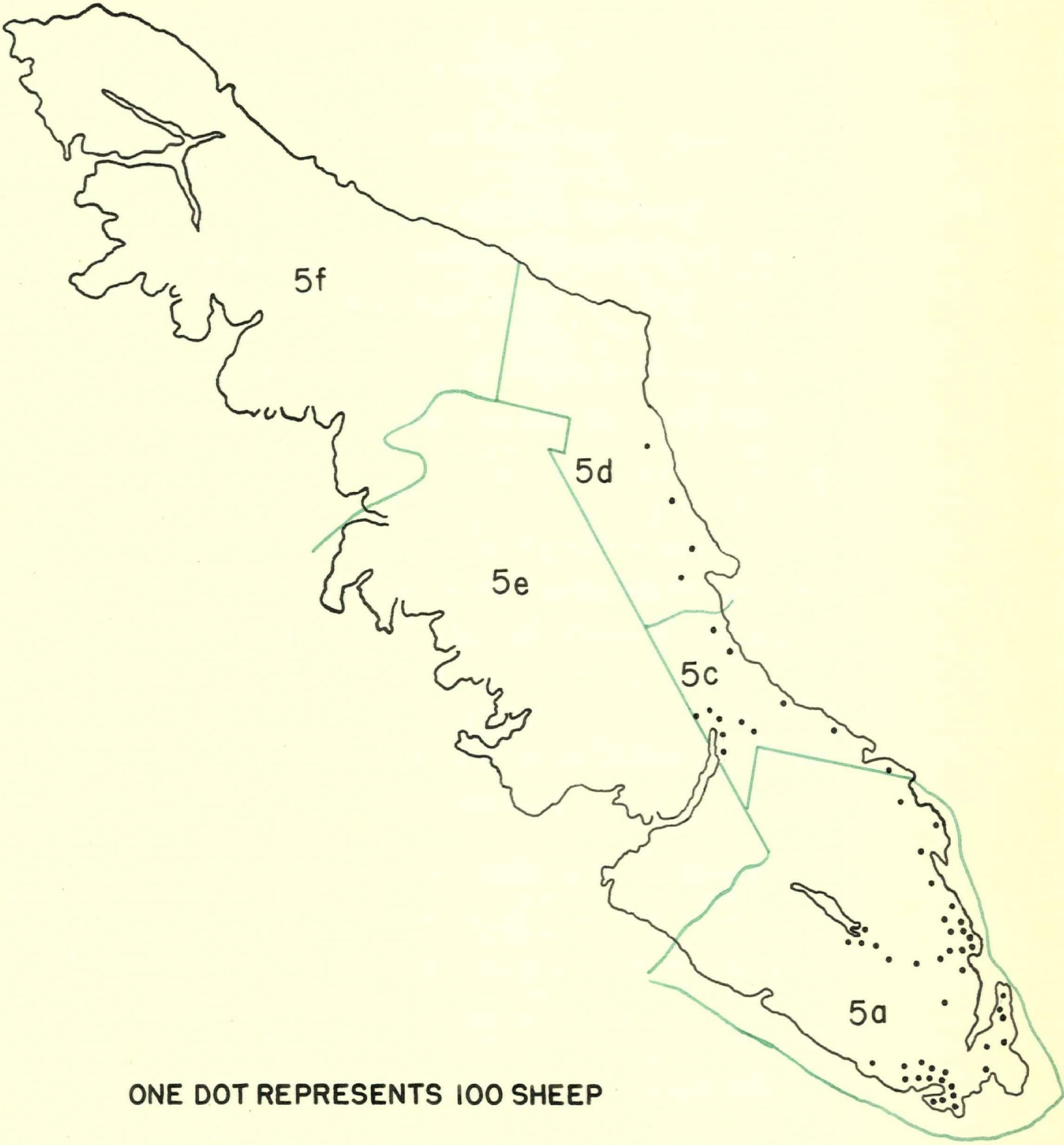
d) The dry summer season in the southeastern part of the Island offers a problem to livestock owners.

The main advantages of using land for livestock is that rough dry terrain unfit for cultivation may be utilized and sheep, which constitute 50 per cent. of the livestock, need only a limited amount of hay during winter; for they can graze throughout the year.

Livestock farms are found in the outlying districts of Metchosin, Sooke, Alberni and Cowichan Lakes.

Considering both the handicaps and the advantages, it is quite

DISTRIBUTION OF SHEEP



ONE DOT REPRESENTS 100 SHEEP

possible that livestock raising will at least meet the local demand; since in 1950 farmers exported 300 hogs to Vancouver. (There is no export of beef).

The following table gives the extent to which livestock raising has developed:

Table 55. Inventory of Livestock, Vancouver Island

	B.C. 1951	1941	1951
Total value of livestock (1)		4,457,840	
Horses:			
Total number	36,054	2,246	1,068
Total value	2,856,484	213,687	86,635
Beef cattle:			
Total number	228,319	4,000	5,200
Total value	---	200,000	900,000
Swine:			
Total number	49,441	6,104	4,947
Total value	3,083,265	62,827	221,144
Sheep:			
Total number	67,474		11,362
Total value	1,781,500		301,956
Goats:			
Total number	3,210		735
Total value	144,450		33,075

Fur farming is another type of livestock specialized farming practiced on Vancouver Island. About 50 fur farms are found scattered on the Saanich Peninsula. On the Island, uniformity of temperature and the moist atmosphere produce a better quality pelt. Availability of fish feed is another important consideration.

(1) Includes dairy cattle and poultry stock

D. Crops

The study of crops will be presented under the following headings:

1. Field crops
2. Fruit
3. Vegetables
4. Nursery stock
5. Greenhouse products
6. Bulbs

1. Field Crops

In 1941, out of 61,000 acres of improved land on Vancouver Island there were 31,000 under field crops. Although at present they cover 50 per cent. of the total improved acreage, they form only 24.4 per cent. of the total value of the Island's farm products. It is because 70 per cent. of the field crop acreage is under fodder crop, consumed very often by the farmer's own livestock; thus in many cases a fodder crop is not a cash crop.

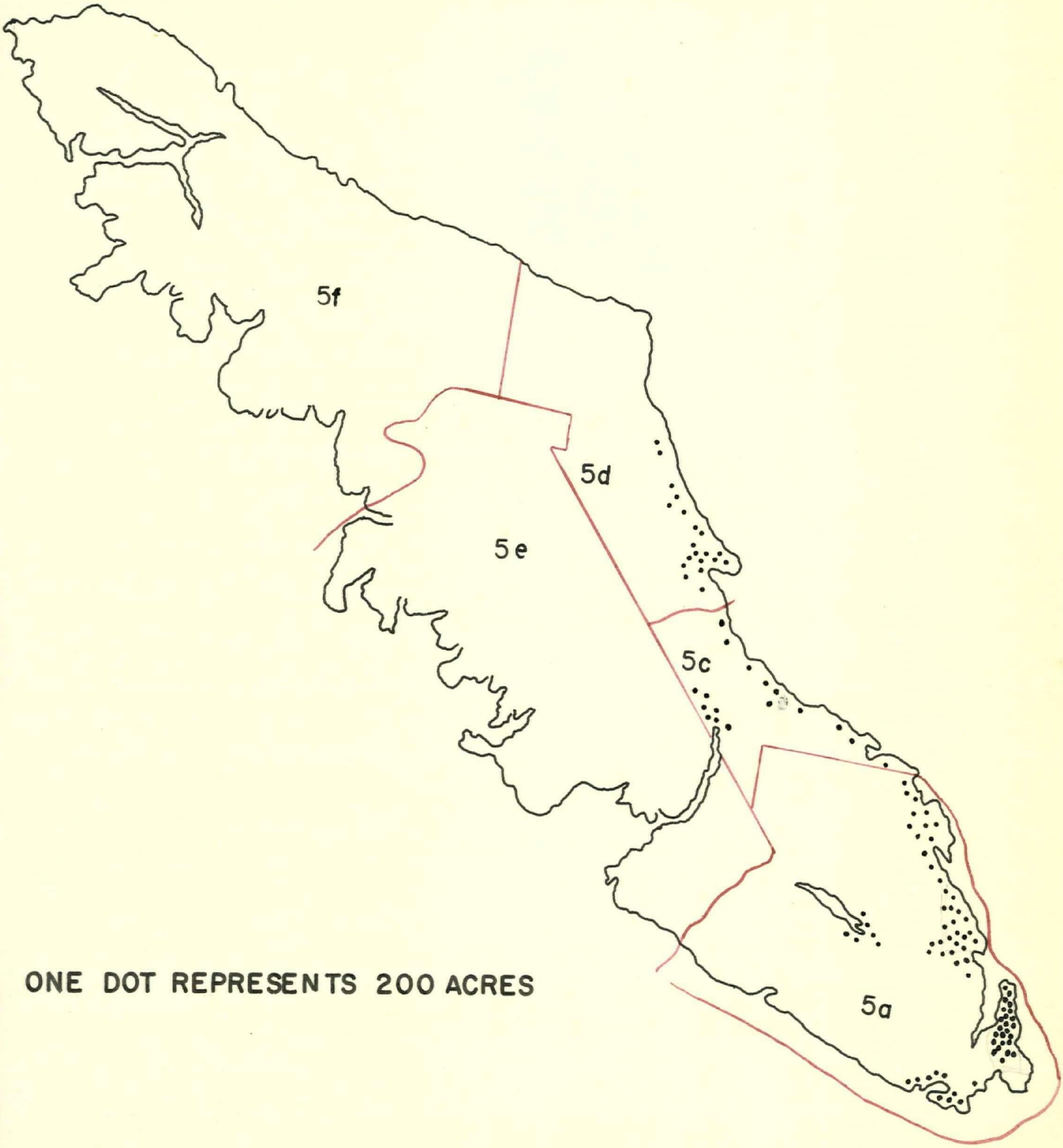
The predominance of fodder crops is indicated in the following table:

Table 56. Compared Acreage of Field Crops, Vancouver Island(1)

	1931	1941	1951	Crops of 1940 sold or to be sold
Total field crops	27,567	30,067	25,002	179,002
Grain - acreage	6,631	7,156	4,880	19,839
%	24	23.7	20	
Fodder - acreage	18,807	20,995	18,471	
%	68.4	70	74	
Potatoes and other roots - acreage	2,129	1,915	1,119	159,168
%	7.6	6.3	4.5	

(1) Census of Canada, 1931, Vol. VIII, p. 846-747; 1941, Agriculture, p. 30; 1951, Vol. VI, Part 2, p. 17-1

DISTRIBUTION OF FIELD CROPS ACREAGE



ONE DOT REPRESENTS 200 ACRES

From these figures we can conclude that the percentage of fodder crop acreage, as compared with the total field crop acreage, is increasing - which tallies well with the increase in dairying. However the field crops do not satisfy the Island's demand for fodder: although they cover, as we have seen, 50% of the improved land, feed has still to be imported from the Prairies.

Among the field crops, the major cash crops are roots and potatoes. But again, roots are used as supplementary fodder and during the last few years their output has decreased rapidly. For this decline the shortage of farm hands and the high cost of labour are largely responsible. Seed potatoes are the predominant potato crop.

Field crops will now be discussed under the headings which follow:

a) Grain

b) Fodder

c) Potatoes and other roots

a. Grain Crops

On Vancouver Island the cereal grain crops are of little importance. Oats form the main crop and occupy 3,214 acres out of the 4,880 acres under grain crops (1951). The second major crop is wheat which covers 1,039 acres. The entire grain production does not satisfy the local demand.

The relative importance of the various grain crops is indicated by the table which follows:

Table 57. Grain and Seed Acreage and Production[1]

	1931		1941		1951
	Acres	Bushels	Acres	Bushels	Acres
All field crops	27,567	-	30,067	-	25,002
Oats	4,343	167,380	4,824	183,507	3,214
Wheat	1,592	38,913	1,472	34,588	1,039
Barley	311	8,674	451	10,060	274
Peas	175	4,201	146	1,802	44
Mixed grain	133	2,961	203	8,000	220
Corn	36	701	16	277	15
Rye	29	330	44	1,070	
Beans	12	198	-	1	1
All grass seed	2	16	10	250	

Though the acreage of peas has decreased since 1941, there is an increased interest in the growing of peas for the frozen food market on Vancouver Island. We see from the table above that only a small quantity of grain enters commerce: most of it is consumed on the farm by the livestock and the family.

b. Fodder Crops

The fodder crops, as seen above, are the most important branch of farming: they occupy 74% of the total field crop acreage as well. Even so, we have noted that some fodder must be imported from the Prairies.

Let us look at the figures below which deal with fodder compared to all field crops:

(1) Census of Canada, 1931, Vol. VIII, p. 747; 1941 Agriculture, p. 32; 1951, Vol. VI, Part 2, p. 174

Table 58. Acreage and Production of Fodder Crops[1]

	1931		1941		1951
	Acreage	Production	Acreage	Production	Acreage
All field crops	27,567	-	30,067	-	25,002
All fodder "	18,807	-	20,995	-	18,471
[2]Hay (cultivated)	11,620	19,071	16,131	27,025	14,197
Hay (marsh)	-	908	-	787	-
Corn for fodder	291	2,751	488	5,778	319
Grain cut for hay	6,334	11,727	4,144	7,807	4,475
Other fodder	498	1,331	232	1,063	-

There is a point worth retaining after studying this table: although the total acreage decreased both for fodder crops and field crops between 1941 and 1951, still the percentage of fodder crops acreage increased, relatively to the acreage of field crops.

In the future the acreage will increase as more land is brought under cultivation. Conditions favour more fodder crops; so we hope that farmers will satisfy the demand and increasingly encourage the breeding of livestock with abundant fodder.

On the whole, pastures are well adapted to the needs of the Island livestock - except in summer in certain dry areas like those of the Southeast where drought dries up the grass in June, July and most of August; thus many dairymen must look for extra fodder. The yield of hay on Vancouver Island is about 1½ tons per acre and the quality is good. Pastures turn green again in

(1) Census of Canada, 1931, Vol. VIII, p. 749; 1941, Agriculture, p. 30; 1951, Vol. VI, Part 2.

(2) Includes alfalfa, clovers and all cultivated grasses

the late summer and the long open fall offers the stock good grazing. Pasture and rotation grazing are now receiving serious attention on Vancouver Island and form the basis of dairying.

Hybrid corn is becoming important and is known as a high yielding forage. In 1940 only 10 per cent. of the total tonnage of feed crops entered trade; so as far as the market is concerned it should not worry the producer: there is a very large market on the Island and an even larger on the Mainland.

c. Potatoes and Root Crops

Potatoes naturally outrival all other vegetables on Vancouver Island in production and in value of output which is 30 per cent. of the total value of the Island's field crops. Its predominance is indicated by the following data:

	Acreage	Production (cwt.)	Value
Potatoes	1,047	136,540	318,138
Turnips, swedes and mangolds	96	18,661	35,456

These figures establish emphatically the supremacy of our staple vegetable, the potato.

Potato and root production is a bi-product, as it were, of dairying; for most of their acreage is found on dairy farms, because of the availability of cheap manure. Saanich Peninsula and Courtenay regions are important growers of potatoes.

2. Fruit Growing

This is another specialized branch of modern agriculture that has prospered on the Island. In 1951 there were 1,466 acres under fruit cultivation and the value of the production was 335,000 dollars. The climatic, soil and market conditions are well suited for fruit growing. The small size of the farms is another favourable factor; as fruit receives the farmer's personal care.

Fruit growing is divided into two branches:

a) Tree fruit

b) Small fruit

On Vancouver Island the production of small fruits is more successful and profitable than that of tree fruits; nevertheless there are a number of excellent varieties of apples, pears, plums and cherries. Almost every farm has some fruit trees; but the number of orchards is decreasing. The far greater importance of small fruits is indicated by the following figures:

Table 59. Compared Value of Production of Small and Tree Fruits

	1941		1951	
	Value of production	% of value of all fruit	Value	Percentage (1)
Small fruits	94,950	62.5	281,012	78
Acreage	395		586	
Tree fruits	57,341	37.5	74,229	22
Acreage	-		-	

(1) Census of Canada, 1941, (Agric.) p. 36 and 38; 1941, Vol. VI, Part 2, p. 20-1

Thus we see a strong tendancy toward expansion in small fruits; while tree fruits lag far behind. In 1951, for instance, the tree fruit percentage of the total value of fruit production was 22 per cent., as against 78 per cent. for small fruits.

a. Tree Fruits

Fruit orchards are found as a pleasant addition to suburban and country gardens and almost every farm has a few fruit trees at least. There are some commercial orchards near Victoria, in the Saanich Peninsula and the district of Courtenay; but their number is growing smaller; apples, plums and pears are grown in small orchards and some of them are canned: cherries do reasonably well: because of the cool nights, maturation is slow, producing a fleshy cherry of good eating quality. But tree fruit production needs stimulating.

The fruit tree population of Vancouver Island has been classed according to species, in the following table, with the number of trees of each species and, where data permit, their orchard acreage.

Table 60. Fruit Trees According to Number and Acreage[1]

	1931	1941	1951
Total value of production	109,104	57,341	74,229
Total acreage	-	-	880
Apples			
All trees	79,500	26,120	24,860
Acreage	-	453	486
Pears			
All trees	12,300	3,485	4,120
Acreage	-	50	88
Peaches			
All trees	1,900	914	529
Acreage	-	2	23
Plums			
All trees	12,900	3,928	3,761
Acreage	-	51	97
Cherries			
All trees	14,900	5,505	5,448
Acreage	-	76	123
Other trees	-	6,026	-
Acreage	-	11	63

We note on this table a decline of tree fruits from a rather prosperous production in 1931 to that of 1941. But during the last decade this steep drop is absent - in fact tree fruit acreage had increased; though there is a slight decrease in the number of trees, because of better orchard planning. On the Island there is very little chance of expansion in tree fruit growing, because of market conditions: competition

(1) Census of Canada, 1931, Vol. VIII (Agric.) p. 751; 1941, Agric., p. 36; 1951, Vol. VI, Part 2, p. 20-1

is very high both on the national and international markets. The Okanagan Valley and the Eastern Provinces of Canada have more advantageous market conditions. Foreign markets, which used to import British Columbia apples and other fruits in large quantities, now import only small amounts, on account of the dollar shortage.

Below we have the geographical distribution of orchard acreage in 1941.

Vancouver Island Orchard Acreage total ... 650[1]

Acreage is distributed as follows:

1.	Vancouver Island South	417
	District Municipalities	
	Esquimalt	-
	North Cowichan	39
	Oak Bay	-
	Saanich	234
	Unorganized parts	114
	Salt Spring Island	100
2.	Vancouver Island East Coast and South	50
	" " East Coast, North	56
	" " West	5
	" " North	1

So we see that the main concentration is in the southern part of the Island, especially in the Saanich Peninsula.

b. Small fruits

If we name the main conditions requisite to the success of small

(1) Census of Canada, 1941 (Agric.) p. 61

fruits, we shall find them all on Vancouver Island. The soil is fertile and well-drained, the frostless season long and summer precipitation low. Due to the limited amount of arable land we find the necessary small scale farm where the farmer can give careful attention to his berries. These bring him in a larger revenue than field crops. Individual farms on Vancouver Island are usually from 3 to 15 acres. Labour that must be easily obtainable during the short harvwsting season of small fruits is supplied in sufficient numbers of women and school children in the holiday months. Small fruits are perishable and must have quick and ready transportation and accessible markets. These are easily reached by Island berry farmers and processing plants also; if by chance the fruit cannot be sold when fresh.

Most of the small fruits are loganberries and strawberries.

Distribution. Strawberries are grown on the gently to strongly sloping, well-drained, sandy loam soils and loganberries, raspberries and blackberries favour more level areas and bottom lands, with more moisture and more fertile soils. The Tolmie soils are best suited to the latter berries. Strawberry growing is established the most successfully in the South. Loganberries, blackberries, raspberries and gooseberries are also produced commercially. Farther to the North in the districts of Duncan, Nanaimo, Parkesville, Comox and Merville, conditions are suitable for the production of small fruits but there is not an extensive development.

The extent and trend of small fruit farming is indicated by the following table.

Table 61. Production of Small Fruits, Vancouver Island[1]

Item	1931	1941	1951
Total value	180,306	94,950	281,012
Total acreage	685	1940 - 386 1941 - 400	586
Grapes	Unit = lb.		
Production	16,466	54,832	-
Acreage	-	7	14
Strawberries			
Production	560,548	520,666	
Acreage	-	1940 - 131 1941 - 135	256
Raspberries			
Production	65,440	68,680	
Acreage	-	1940 - 33 1941 - 37	48
Blackberries			
Production	49,950	32,800	
Acreage	-	10	
Currants			
Production	31,570	10,975	
Acreage	-	8	
Loganberries			
Production	821,936	672,000	268 acres
Acreage	-	201	
Gooseberries			
Production	40,900	5,250	
Acreage	-	2	
Other fruit			
Production	-	1,725	
Acreage		1	

It is quite obvious from this table that small fruit farms were well established during the thirties, but suffered a setback from 685, in 1931, to 386 in 1941. A revival came and the acreage under small fruits had increased to 586 by 1951. The quality is high of these berries and their flavour liked by both local and foreign consumers.

(1) Census of Canada, 1931, Vol. VIII (Agric.) p. 751; 1941, (Agric.) p. 38; 1951, Vol. VI, Part 2, p. 20-2

Drawbacks. The major drawbacks to fruit growing on Vancouver Island are the mildness of the climate and the excessive moisture in winter, both of which favour the spread of fungus diseases. But now with increased scientific knowledge these diseases can be easily checked - though this adds to the cost of production.

Hindrances to successful small fruit farming come from market instability and especially from competition with other fruits, especially tree fruit, of rival areas.

Conclusion. The production of small fruits will increase and that of tree fruits will decrease, unless foreign export trade revives. As population increases, small fruit culture will extend to the eastern part of Vancouver Island. The subdivision of farms will also favour small fruit growing.

3. Vegetables

(Truck Farm Products)

South-East Vancouver Island and the Fraser Valley are the two chief vegetable growing areas of British Columbia. The reason is the concentration of the Province's population in these regions and their suitability in soils and the mildness of the climate which makes work possible in the fields all the year round. Vegetables need intensive farming and much labour; therefore the Island's small scale farms near urban centers are admirably adapted to their culture and sale.

Truck farming is usually done in low lying areas; peat soils, with good drainage, are best suited to their use; since they are rich

in organic matter and have the requisite high capacity for holding moisture.

Below we have a table indicating the extent and value of theoutput of truck farms:

Table 62. Value and Production of Fresh Vegetables, Vancouver Island, 1950[1]

		FRESH		MANUFACTURED	
Kind of vegetable	Unit	Production	Value	Production	Value
Tomatoes					
a. Outdoor	Tons	260	20,800	-	-
b. Greenhouse	Lbs.	134,375	470,300	-	-
Lettuce					
a. Outdoor	50 lbs.	17,000	34,000	-	-
b. Greenhouse	25 lbs.	250	500	-	-
Cucumbers					
a. Outdoor	Tons	20	2,400	-	-
b. Greenhouse	25 lbs.	11,500	45,740	-	-
Celery	Tons	210	16,800	-	-
Onions	"	225	11,250	-	-
Cabbage	"	450	27,000	-	-
Asparagus	"	15	6,000	-	-
Beans	"	90	14,400	Lbs. 95,600	6,214
Beets	"	400	24,000	-	-
Carrots	"	650	39,000	-	-
Cauliflower	"	300	24,000	-	-
Corn	"	200	24,000	Lbs. 15,000	1,350
Parsnips	"	180	12,600	Lbs. 69,793	1,047
Peas	"	300	60,000	Lbs.303,000	24,452
Potatoes	"	11,200	392,000	-	-
Spinach	"	115	13,800	Lbs. 16,357	818
Squash and Pumpkin	"	265	15,900	-	-
Turnips	"	350	15,750	-	-
Others	"	300	42,000	-	-
Total value			1,312,449		29,881

From the table we gather that vegetables constitute approximately 18 per cent. of the total farm revenue of the Island and that tomatoes and potatoes are the major contribution, as they are responsible for 37.7 and 30 per cent. respectively of the vegetable revenue of the Island, about 40

(1) Regional Industrial Index of British Columbia, 1952 Edition, Department of Trade and Industry, Victoria, B.C., p. 211

per cent. of which is derived from greenhouse products. Nearly all of the 96 per cent. of the total tomato production is grown in greenhouses.

Market. The various centers of population at Victoria, Nanaimo, Cumberland, Alberni and Courtenay, etc., provide a ready market for fresh and canned vegetables.

4. Nursery Stock

A considerable development of nursery stock on the Island is again due to favourable physical conditions and nearness to market. Nurseries supply most of the tree and berry fruit stock used by local growers. Below we have data on the value of the nursery output in late years.

Value of nursery products, 1950 ..... $334,952[1]
Area " " " , 1951 ..... 420 acres

Highly trained management and labour account, as a rule, for the prosperity of Vancouver Island's nurseries.

5. Green House Products

Certain vegetables need a more or less uniform temperature and must be grown under glass cover when outdoor conditions are unfavourable. Tomatoes, lettuce, cucumbers, mushrooms - and even rhubarb - are thus protected on the Island where less fuel is required to heat greenhouses than elsewhere. The 1951 Green House Survey shows that Vancouver Island stands first under Green Houses in the Province - as the following table proves:

(1) Census of Canada, 1951, Vol. VI, Part 2, p. 20-1

Table 63. Green Houses of Vancouver Island, 1951[1]

District	No. of growers	No. of houses	Acres in square feet
Vancouver Island	218	864	2,432,505
Lower Mainland	263	733	1,758,357
British Columbia	555	1,822	4,596,292

According to this table, something less than half the greenhouses of the Province were on the Island, in 1951, and something over half the greenhouse land.

6. Bulbs

The choice of Vancouver Island for an offshoot of the famous Holland bulb industry indicates that the cool summers, adequate precipitation and the moderating influence of the sea furnish excellent conditions for growing and curing bulbs.

Gordon Head on Vancouver Island may be called the cradle of the bulb industry. Now there is a tendency to spread out to Saanich and northward to the Cowichan Valley, about 40 miles from Victoria.

Expansion during the war. The stimulus to bulb growing was caused by the firm market and good prices resulting from a shortage of bulbs in war time. All this resulted in a substantial expansion of the bulb industry. Let us look at the figures for the immediate post-war years:

Table 64. Bulb Production on Vancouver Island, 1945-7[2]

Item	1945	1946	1947
	NUMBER OF BULBS		
Narcissi	7,518,000	8,260,000	9,880,000
Tulips	8,544,000	9,360,000	10,100,000
Iris	4,161,000	5,050,000	5,597,000
Hyacinths	51,000	75,000	72,000
Total:	20,274,000	22,745,000	25,646,000

(1) Annual Report, Department of Agriculture, Victoria, B.C., 1951

(2) Ibid., 1947, p. R-64

So we see there was a steady increase in the production of bulbs that raised the industry to a higher scale of development. British Columbia now produces about 90 per cent. of Canadian bulbs - the major portion of them on Vancouver Island.

The bulb industry of British Columbia is national in character and the 300 acres devoted to it could not be utilized for other purposes without loss to Canada.

Market. There is a huge Canadian market for the bulbs of superior quality, as grown on the Island. A modern air transport has helped the growers to cut blooms of narcissi and tulips. To satisfy the demand for these home grown bulbs, their production would have to be expanded to 3 or 4 times its present size; hence, as far as market is concerned, it offers the greatest possibilities of expansion.

Price of Land and Cost of Clearing. On Vancouver Island all the potentially arable land is under dense forest - a great hindrance to agricultural development; because of the heavy clearing: the price of the raw land is very low as compared to the cost of clearing it. The figures below are eloquent:

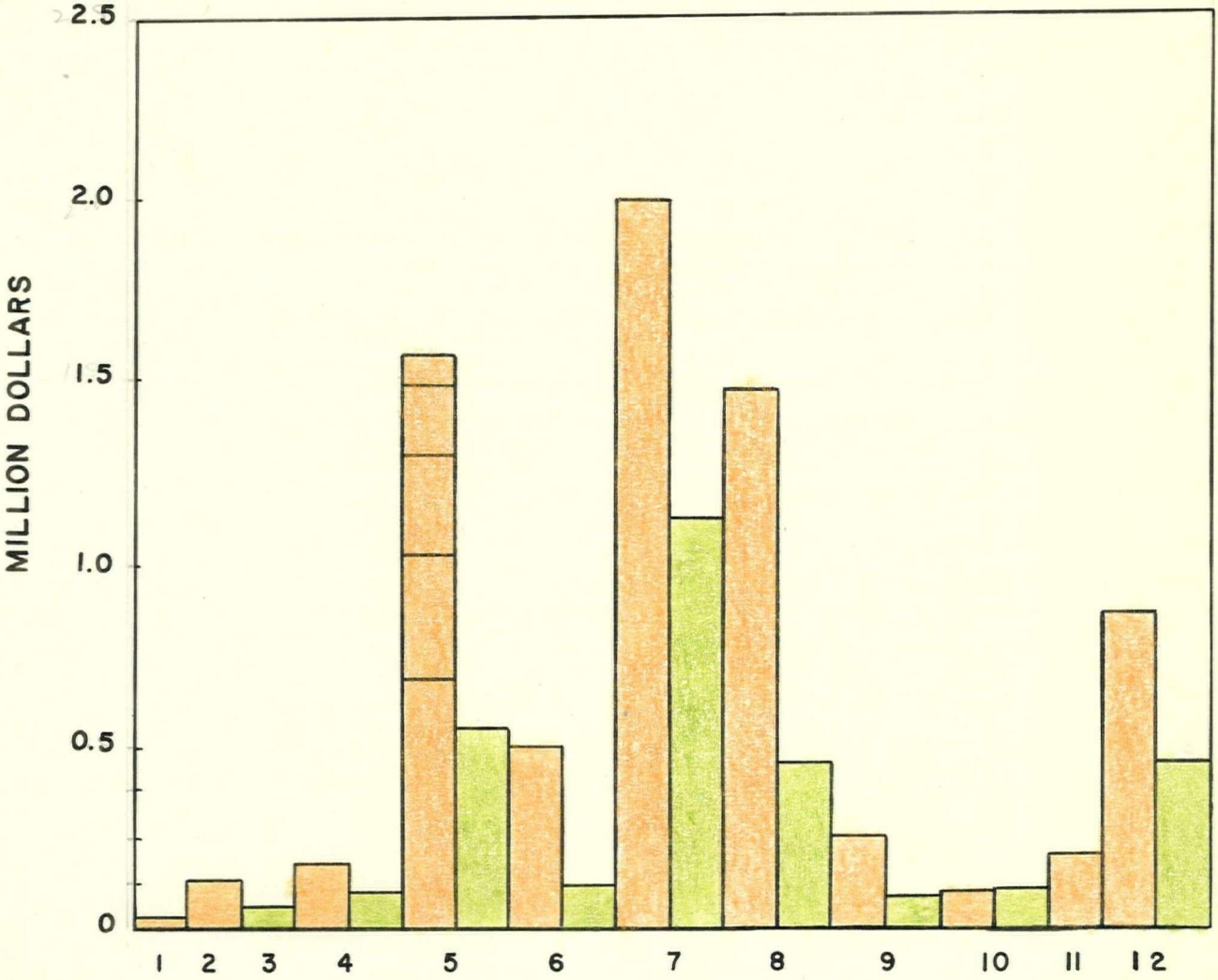
Average Price per Acre of Land[1]

	Uncleared land	Improved land	Cost of clearing
Duncan office area	25.00	100.00	250.00
Courtenay office	20.00	200.00	250 - 300

(1) Report by District Agricultural Office, Duncan and Courtenay, B.C., 1950 (unpublished)

GROSS FARM REVENUES

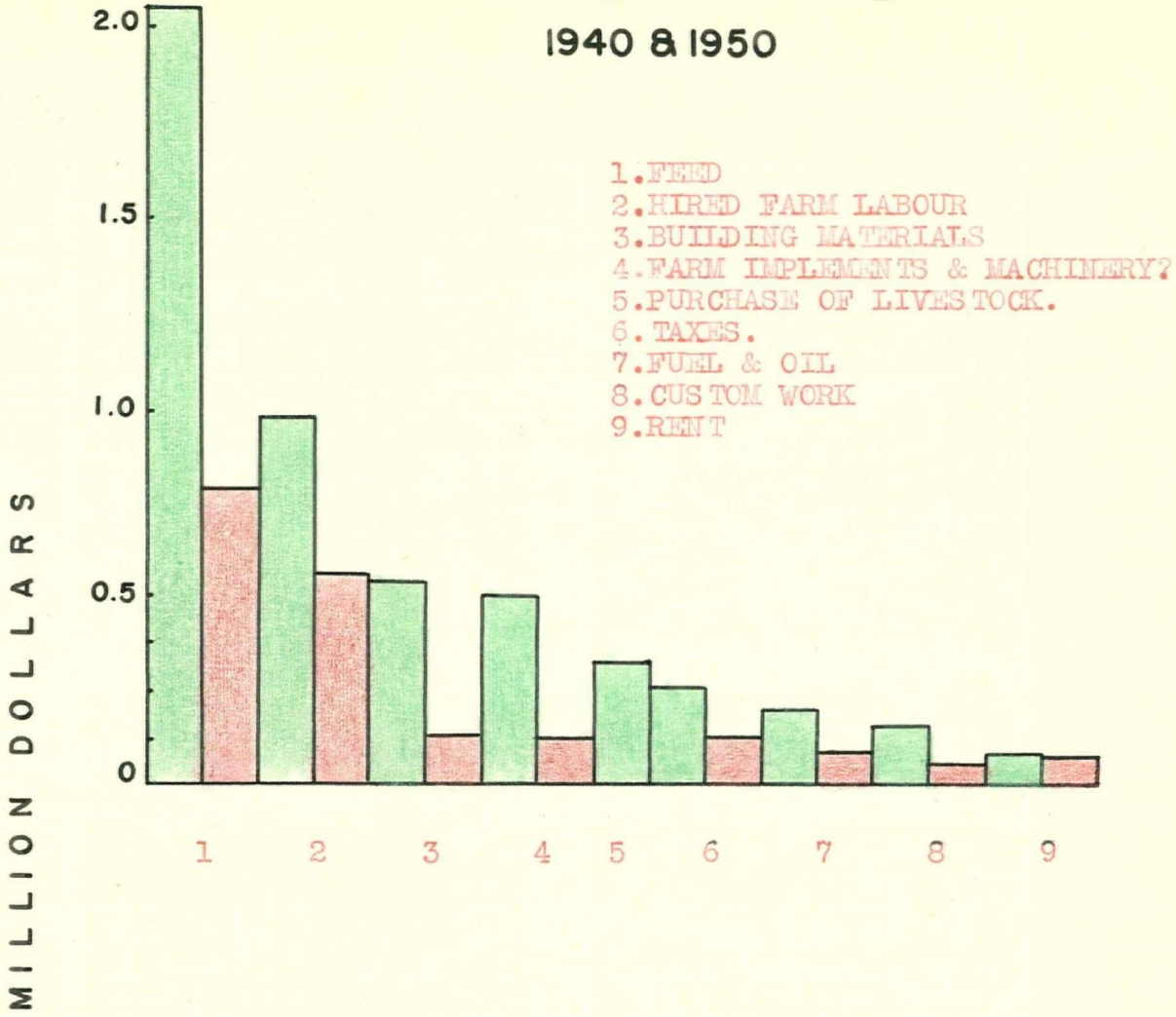
1940 & 1950.



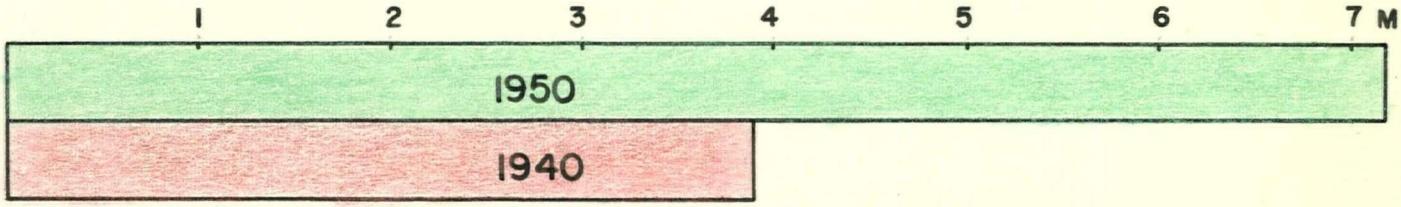
1. GRAINS
2. HAY& FORAGE
3. HAY & GRAINS
4. POTATOE
5. VEGETABLES, SMALL FRUITS, NURSERY, & GREEN HOUSE PRO.
6. CATTLE
7. DAIRY
8. POULTRY
9. SWINE
10. HORSES & SHEEP WOOL
11. FOREST PRODUCTS.
12. PRODUCTS COSUMED ON FARMS

FARM EXPENDITURE

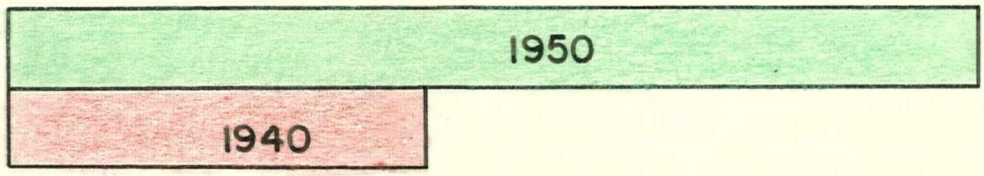
1940 & 1950



TOTAL REVENUE



TOTAL EXPENDITURE



The average cost in 1949 of clearing, piling and levelling in Parkesville, Coombes and William districts, with government bulldozers, was 68 dollars per acre. This was the cost after the preliminary work of slashing, burning and blowing up stumps had been done. Timber of marketable value was of sufficient value to pay for the preliminary work. In these cases the cost of clearing was considerably reduced.

F. Agricultural Limitations

The most important physical limitations to agricultural development on Vancouver Island are the hilly nature of the Island; the absence of extensive tracts of well-watered pastures; the presence of swamps and waste lands, combined with occasional drought in summer. Heavy clearing is another handicap. All these prevent rapid agricultural growth.

Again, agriculture finds itself in competition with highly remunerative uses of land for industrial or urban expansion. Of the non-agricultural uses, housing is perhaps the greatest competitor, followed by the utilization of land for industrial and business purposes.

The agricultural capabilities of Vancouver Island are good. On selected land, large farms do well; but on account of the scattered conditions of the land, its broken nature and the scantiness of the soil, these larger ones are few: more than 60 per cent. of the farms are under 50 acres. Small farms are not only common, but are easier to work more effectively and more efficiently. Mixed farms and part-time farms are best adapted to the Island's needs and promise to remain prevailing types and perhaps increase in number; for they answer to the trend of specialized production - of small fruits, dairy and poultry provisions and Holland bulbs.

The great limitation is thelack of land. The arable land is limited in quantity; yet all the occupied farm land is not cleared and stretches of potential grazing land or cropland lie here and there, especially in the North. The land for agricultural use can thus perhaps be tripled, giving ample scope to reasonable expansion to cope with growing settlement.

An increasing population and the desire of urban workers to raise their families in rural surroundings indicate that the movement to subdivide farms adjacent to towns and cities will continue and probably accelerate. These small holdings will not be used for commercial milk production, but to supply the family needs with perhaps some surplus for the market. They will create new part-time farms and give the part-time farmer a chance to work in city factories, when heretofore he has worked usually in lumber mills and mines.

As for production, the value of the livestock output leads, with 55 per cent. of the total farm production - thanks to the major contribution of poultry farms and dairying. The latter is the most important single agricultural pursuit. Fodder crops lead the field crops, while small fruit exceeds greatly the output of tree fruit.

Though fodder is imported from the Prairies, there is some export, too, of vegetables. And yet the farms are first of all concerned with local markets. Only intensive farming on a highly scientific basis will give Vancouver Island a noteworthy overflow for export trade.

VIII

Fishing Industry

In the surrounding waters of Vancouver Island there is a relatively permanent and vast source of sea-food and merchantable fish - from oysters to whales. Physical factors of the land, the heavy rainfall, high mountains with their snow and timbered slopes, insure the steady flow of the Island's innumerable streams and provide plenty of fresh water runs for fish and excellent spawning grounds. The irregular western coast-line has many bays and inlets full of herring, needlefish and shrimps to feed the larger species. The Japan Current strikes near the fiftieth parallel, branches off toward the North and leaves a settled drift to warm the marine pastures of the fish. Down below, 50 to 100 miles offshore and 20 to 200 fathoms deep, another geographic feature, the Plateaux, like the Banks off Canada's Atlantic sea-board, provide an excellent breeding ground for edible varieties.

Thus geographic features play an all-important role in Vancouver Island fisheries.

The Vancouver Island and Mainland fishing division, or District No. 3, is the most important of British Columbia. It produces 41.3 per cent. of the total provincial salmon catch, 45 per cent. of the herring and 51 per cent. of the total cod. The value of the catch from this district was, in 1951, 15 million dollars and the Island's production value around 7 million. The chief contributors are the salmon and herring fisheries. Other species, such as halibut, cod, flounders and skate are available, but are little developed compared to the possibilities. Fishing and trapping on Vancouver Island give employment to 1,180 persons; it is not the number but the source that is most significant. Of the

total employment, 76 per cent. is rural and only 24 per cent. urban. This fact signifies that it is not the fish processing, but the actual fishing (catch) that counts on the Island. That is why the rural settlements supply most of the employment. Most of the fishermen have another side business during the idle months or they treat fishing as their side business. This other part time work is often lumbering or farming.

Sooke. Fishing operations are organized from various stations all along the West and East Coasts near Sooke and East Sooke. Then there are five salmon traps, the catch from which is transferred to Vancouver. This is an ideal position for traps because of physiographic conditions. During the period of the fish run, many west coast fish pass through the Straits of Juan de Fuca toward the Fraser River. The importance of this salmon catch was next to that of Subdivision 12, the leading producer of salmon.

Port Alberni. This is another central port from which a large fishing fleet operates. The lumber, pulp and plywood industries are well established in this area; but fishing, though secondary, does a good share of business. Along Alberni Inlet there are a few herring reduction plants; but much of the catch is transferred to Bamfield.

Tofino - Kyuoquot. In this area Ucluelet is the port of another large fishing fleet. Commercial fishermen are engaged mainly in trolling and seineing operations. Herring reduction plants operate at Nootka, Port Alberni and Ceepeecee. A crab cannery operated at Tofino and during 1951 put up 400 cases of choice crab meat. The settlement is thus entirely dependent upon fishing activity.

Quatsino. This area practices fishing along with forestry.

Fishing since 1948 has been almost confined to whaling. The reduction plant at Coal Harbour processed 340 whales in 1950 worth 3 to 4 thousand dollars apiece.

Queen Charlotte and Johnstone Straits. These lead the rest of the Subdivision in the matter of fish catch. Ideal fishing conditions exist here, because of the physiographic conditions and the presence of the large river mouths of the Mainland and Vancouver Island, toward which, the fish run for spawning. Fishermen wait for them to pass through these narrow straits and catch enough to make this region the leading producer.

Campbell River and Alert Bay. A 300,000 dollar breakwater was recently constructed at Campbell River to provide safe anchorage for the fleet of seine boats and other craft. In this area there is a herring reduction plant and a shell-fish plant that operates near Alert Bay. There is also a dry-salting plant located at Read Island.

Sidney Harbour. This is another chief fishing base: it has about 100 fishing boats. Quite a few fishermen in this area are part-time farmers; thus the two occupations supplement each other. These fishermen depend mostly upon the fish which spawn in the Fraser River. The catch is sent to Vancouver and Victoria for processing.

Ladysmith. Here oyster culture is progressing and several foreshore leases for this purpose have been obtained. This is a new field but untested yet. It does not provide enough background to predict its future.

Now we shall discuss the fishing industry under the following

headings:

A. Salmon fishing

B. Herring fishing

C. Halibut fishing

D. Cod fishing

E. Other canneries

F. Fish oil and meal

G. Whaling and whole reduction

A. Salmon Fishing

It was to exploit the salmon of western waters that the Pacific Coast fishing industry was first established. The salmon industry has made British Columbia the greatest producer of fish in the Dominion. The salmon itself is perhaps the most exciting fish in the world: a fish of grace and beauty, strong and swift and bold. Under natural conditions they multiply abundantly; they grow to great size and their flesh is rich and delicate. Their return to the fresh water to spawn brings the wealth of the sea within reach of the waiting land dwellers.

In District No. 3, with which we are concerned, the importance of salmon is quite obvious: it represents 41.3 per cent. of the total salmon output of the Province. In this District salmon is second to herring in terms of catch; but in terms of value the salmon catch is five times as great.

The discussion of this species will be presented under the following headings:

1. Salmon species
2. Catch of species
3. Salmon canning industry.

1. Salmon Species

District No. 3 has five species of salmon which all belong to a single race, but differ a good deal in size, in habits, in the time of their return to fresh water and in commercial value. They are:

a) Sockeye
b) Pink
c) Chum
d) Coho
e) Spring

a. Sockeye Salmon

In 1951, the sockeye salmon catch was 47,000 hundred weight out of the total salmon catch of 814,000, or 7.5 per cent. and therefore occupied fifth place in terms of catch. But one should not forget that it is the sockeye that is most famous commercially; because its flesh is very red, very rich in oil, and holds both colour and flavour under all conditions of storage. Throughout its life it feeds entirely on shrimps and other small, hard-shelled creatures, instead of on small fish as other salmon usually do.

Sockeyes usually spawn in small tributary streams above lakes. Whey they are 3 to 4 inches long they swim down to sea. For the next 2 or 3 years they live and grow in salt water. At four years of age most

of the sockeyes weigh five to seven pounds and are ready to return to their rivers and spawn. The great migration comes down on both sides of Vancouver Island to the Fraser and other rivers. Canadian and American fishermen await their coming, out by the banks and along the straits and in the river itself. The sockeye salmon spends 1 year in fresh water lakes, 3 in salt water, spawn and die. This 4 year life cycle sets the pattern for the other sockeye runs.

b. Pink Salmon

Pink salmon are the simplest in habit and the least variable: they run in great numbers in alternate years. In District No. 3, in 1951, the catch was 242,000 hundred weight, or next in size to chums. They seldom go very far from salt water to spawn and always spawn when they are two years old. Most mature pinks weigh from four to five pounds and few grow to as much as ten pounds.

c. Chum Salmon

In catch the chum leads the other salmon species, with pinks as a close rival. In 1951 the catch was 30 per cent. of the total number of salmon caught. The chum is the last of the Pacific salmon to run to the rivers, going up to spawn in late October or November. Like the coho, the chum usually weights between 8 and 15 pounds. Most chums of the region are 3 or 4 years old at spawning time.

d. Coho Salmon

They constitute roughly 20 per cent. of the total salmon catch. In 1951 the catch of cohoes was 171,700 hundred weight - next to the chum

and pink catches. The value of the catch in the same year was 3.6 million dollars, more than that of any other single salmon species in District 3. The coho has a simple and consistant life history: 1 year in streams and 2 in salt water. They feed on shrimps at first, but later turn sharply to herrings and needlefish and make rapid growth. They weigh from 10 to 15 pounds when they return to spawn. The coho is a silvery fish, swift and bold and a magnificient jumper. That is why it is fished for sport.

e. Spring Salmon

As regards catch and its value, their position is fourth among salmon species. In 1951 the catch was 63,000 hundred weight, with a value of 1.4 million dollars (approximately).

The spring salmon are the largest of the salmon species with a complicated life history. Their age of spawning varies in the same river, not to speak of some that spawn after 4 years of sea feeding, weigh from 20 to 25 pounds and with 5 years of sea feeding, commonly average 40 pounds, with individual weight of 60.

The life cycle of these salmon plays an important part in the catch of the respective species and that is why few lines have been written about their life cycle.

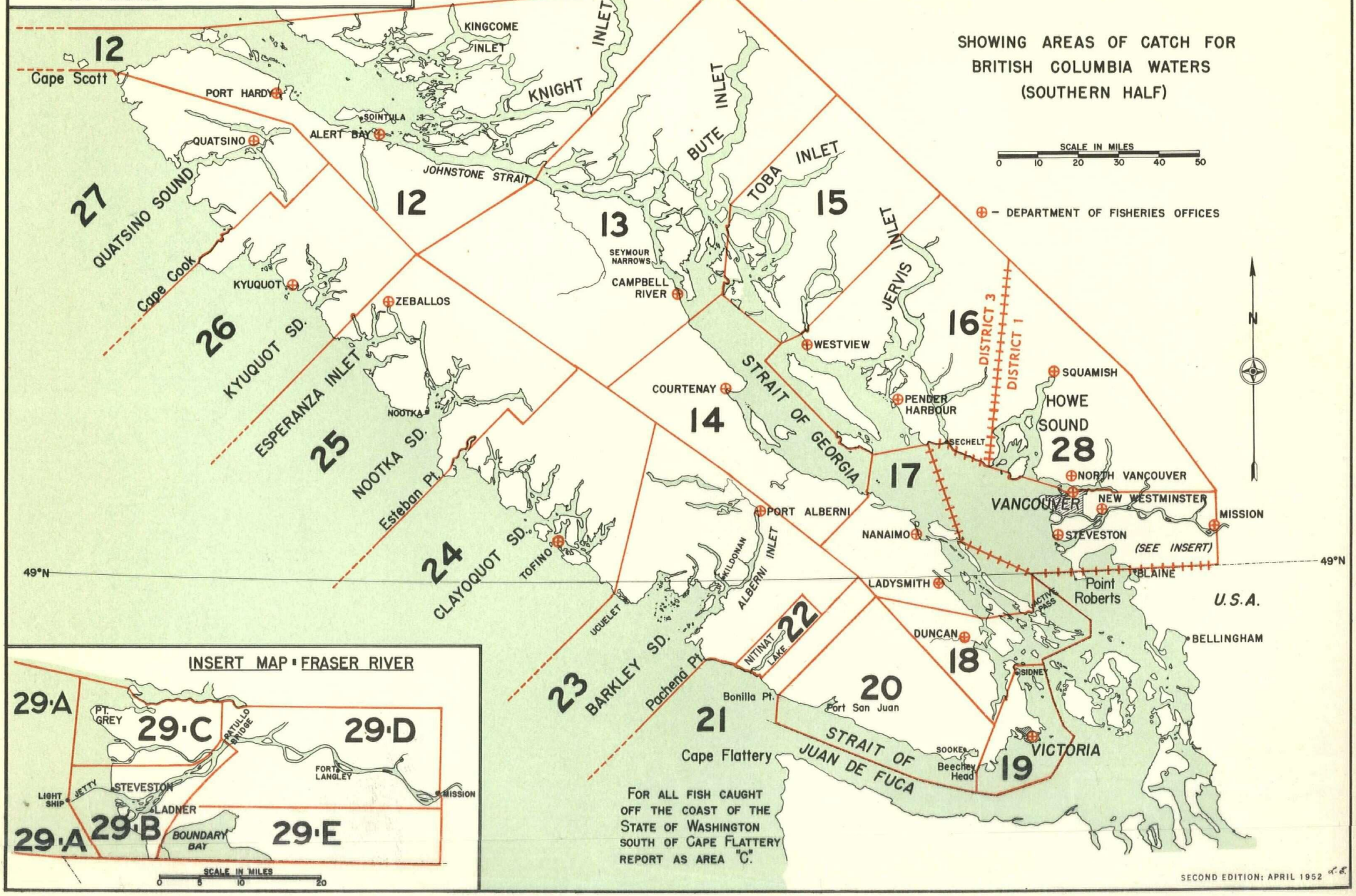
DEPARTMENT OF FISHERIES

STATISTICAL MAP

SHOWING AREAS OF CATCH FOR BRITISH COLUMBIA WATERS (SOUTHERN HALF)

READ CAREFULLY

1. PIN UP IN WHEELHOUSE.
2. WHEN DELIVERING YOUR CATCH, GIVE TALLY MAN THE MAP NUMBER, OR NUMBERS SHOWING THE AREA IN WHICH YOUR FISH WERE CAUGHT.
3. ACCURATE CATCH REPORTS WILL HELP PRESERVE YOUR FISHERIES.



SECOND EDITION: APRIL 1952

Table 66. Summary of Salmon Catch Statistics for Various Areas of District No. 3, 1951[1]

No. of Area of District No. 3	12	13	14	15	16	17	18	19
Species								
Coho	57,679	11,000	3,300	1,700	2,500	2,800	500	150
Sockeye	15,400	3,100	-	-	74	50	150	-
Pink	76,000	31,000	340	500	7,100	1,660	2,900	150
Chum	112,000	87,700	13,100	1,550	9,700	12,550	6,800	42
Red spring	2,700	1,500	550	280	800	500	90	16
White spring	1,500	1,500	356	180	1,270	250	63	15
Steel Head	120	27	-	-	-	-	-	-
Jack	90	96	20	-	23	75	-	-
Total	265,489	135,923	17,666	4,210	21,467	17,885	10,503	373

(1) British Columbia Catch Statistics, 1951, Department of Fisheries of Canada, Pacific Area

Table 67. Summary of Salmon Catch Statistics for the Various Areas of District No. 3, 1951[1]

No. of Area of District No. 3	20	21	22	23	24	25	26	27
Species								
Coho	20,610	5,500	600	8,400	14,400	9,900	15,400	15,000
Sockeye	18,000	900	165	4,000	2,800	67	75	120
Pink	104,200	16,400	35	500	461	483	650	450
Chum	950	150	3,400	9,300	2,100	8,900	2,200	17,000
Red spring	3,800	1,500	106	16,400	13,250	5,800	2,900	2,000
White spring	1,050	230	-	2,500	1,118	621	262	160
Steel Head	151	-	-	124	-	-	2	2
Jack	360	60	-	15	-	2	1	-
Total	149,121	24,740	4,306	41,339	34,129	25,773	21,490	34,732

(1) Ibid.

Of the total catch of 810,000 hundred weight, 58.5 per cent. is credited to Eastern Subdivision of Vancouver Island and the Mainland District and 41.5 per cent. to Western Subdivision. In this region, area No. 12 is the most important, as it alone constitutes 32.8 per cent. of the total district catch of salmon. Next to it in importance are areas No. 20 and No. 13, contributing respectively 18.4 and 17.3 per cent. to the catch. It is in these areas that fishing could be done more effectively and efficiently for physiographic reasons.

3. Salmon Canning Industry

When white men first came to the Pacific Coast, they saw the abundance of salmon, but were faced with the problem of transporting such perishable merchandise to distant markets. In the early years some salmon were salted and shipped; but the first canneries began to operate after 1866.

Salmon find a market not only fresh but when preserved in different ways: canned, frozen and mildly cured. Among these, canned salmon is the most common. Practically all of the sockeye and pink salmon catch is canned and the same is true of chums, springs and cohoes: though they also are canned they find a market otherwise than in cans, in the fresh fish and frozen fish trades or mildly cured; hence the canned pack of these species is not necessarily indicative of the size of the catch or of the run. The table on the following page shows the canned salmon pack from 1943-51 for the different species of salmon.

Table 68. Canned Salmon Pack of District No. 3 (Vancouver Island and Adjacent Mainland) 1943 - 1951 inclusive (1)

	Millions of pounds						
	Sockeye	Springs	Steel Head	Cohoes	Pinks	Chums	All varieties, canned and credited - Vancouver Island, District No.3
1943	7.185	2.937	74	73.846	130.825	132.843	347.710
1944	5.288	3.068	165	79.813	49.092	56.029	193.459
1945	5.988	2.323	128	104.528	242.590	136.742	492.281
1946	35.381	2.283	151	29.983	6.809	190.313	264.922
1947	14.543	4.942	99	76.684	355.992	98.679	552.940
1948	9.981	6.622	227	109.939	43.574	147.227	317.575
1949	19.486	6.361	151	98.958	361.783	51.629	538.370
1950	13.806	3.343	127	72.871	132.616	125.833	347.996
1951	22.107	3.133	114	151.325	303.102	105.458	585.240

(1) Annual Report, Provincial Department of Fisheries, 1951

The number of salmon canneries on Vancouver Island has been decreasing and it is true of British Columbia as a whole. Since the beginning of the war, because of the shortage of labour, particularly of technical help, canneries have been forced to consolidate. Of recent years, there has been a tendency for salmon canners to concentrate the salmon pack in 4 canneries. The transporting of raw fish to greater distances is now possible with the aid of refrigeration. High cost of production during the war, and more liberal use of ice during the canning season, together with modern machinery in the canneries have made it possible for the operators to keep down production cost. The practice of consolidating continued during the post war period and each year fewer canneries have operated; until there are none now on Vancouver Island. All the catch from Vancouver Island waters is shipped to the Mainland or to the United States.

Now, the cost of processing salmon can be partly reduced by the above methods; but the price of canned salmon will not be greatly affected - it is the price of raw fish that constitutes the large proportion of canned salmon prices.

So we note that the geographical factors, that is, the supply of labour, better transportation and technical advancement all combine to determine the future of the salmon industry.

B. Herring Fishing

In order to discuss herring fishing, as it yields in popularity to the salmon and struggles for its due place on the foreign market, it

will be presented under three headings:

1. Herring catch
2. Herring canning industries
3. Dry-salt herring

1. Herring catch

On the basis of the catch, herring leads salmon in District No. 3. In 1951, 1.6 million hundred weight of herring were landed on Vancouver Island and adjacent Mainland districts, as compared to 810,000 hundred weight of salmon. But in terms of value, herring constituted only 1.6 per cent. of the total value of fish caught in District No. 3, as compared to 75, percentage of the salmon catch.

That herring fishing flourishes in the district is clear when we note that it produces 50 per cent. of the total British Columbia catch. In order to conserve this branch of the industry, quotas are established along the east coast of the Island. The principal herring areas are indicated in the following table:

Table 69. Areas of Herring Fishing Industry, District No. 3

No. of area of District No. 3		% of total
18	55.6	34.7
23	34.2	21.3
17	24.6	15.3
13	23.0	14.3
25	14.1	8.8
Others	8.4	5.6

This table indicates that areas 17 and 18 (South East Coast of

Vancouver Island) furnish 50 per cent. of the total catch of District No. 3 followed by areas 23 and 24 (West Coast of Vancouver Island) which bring in 21.3 and 8.8 per cent. respectively of the herring catch.

2. Herring Canning Industries

Herring has been canned for a number of years on the Island; but the actual pack has never been large, due to the limited market for canned herring. In 1939, however, on the outbreak of war, the demand for a high protein food stimulated herring canning. The continued need of Britain for high protein food at low cost resulted in maintaining the industry at a high level. There were 5 herring canneries on the Island in 1946. But, in 1948 the number was reduced to one and now there is no herring cannery on the Island. At present, they are utilized in reduction plants for the manufacture of fish meal and oil. So we see that herring is an emergency source of food of great value.

3. Dry-Salt Herring

Before the war, herring were dry-salted and shipped in quite large quantities to China. This activity ceased with the war demand for canned herring, but has revived again since 1947 as a means of supplying food to the Orient. In 1950, 2,183 tons of dry-salt herring were produced, all of which were shipped to the Orient. It is quite clear that during normal times dry-salting will continue and utilize most of the herring catch. But it is very hard to predict whether the herring-salteries will again reach anything like their former proportions as long as conditions are unsettled in China.

C. Halibut Fishing

Halibut fishing on the Pacific Coast is regulated by the International Fisheries Commission, under a treaty between Canada and the United States. Halibut fishing is conducted in the deep sea and shared by the nationals of two countries. The total catch landed in 1951 was 18,000 hundredweight, only 9% of the total Canadian Pacific catch. The distribution of the catch by areas is shown in the following table:

Table 70. Distribution of Halibut Catch by Areas

No. of Area of District No. 3	Hundredweight	% of total
12	9,962	54.4
23	2,393	13.2
26	2,330	12.6
27	1,574	7.9
24	1,162	6.6
Others	971	4.8
Total	18,392	

Halibut constitute only a small fraction of the total fish value in District No. 3 and are used for extracting oil and fish meal. On Vancouver Island the halibut industry is connected principally with Alert Bay, Campbell River and Port Alberni.

D. Cod Fishing

The total landings of cod (Ling, black cod, grey cod and red and rock cod) were valued in 1951 at a little over half a million dollars, third in rank as far as catch and value are concerned, in the fishing industry of Vancouver Island and adjacent Mainland. In this District No. 3,

Ling and grey cod furnish 86 per cent. of the total catch and of the two Ling cod contributes 54 per cent. and grey cod 32. Cod also are reduced to meal and oil.

E. Other Canneries

Two other canning industries are worthy of mention. They offer us the following sea-food:

1. Pilchards
2. Shell-fish

1. Pilchard Canneries

This industry was centered on the West Coast of the Island and it was there that most of the pilchard catch was conducted. The bulk of the pilchard catch was reduced to meal and oil; but during the war it was canned to cope with the emergency demand. There has been no pilchard industry for several years because of the failure of the pilchard run.

2. Shell-Fish Canneries

These plants put up clams, crabs, oysters, abalone and other shell-fish. In 1946, there was only one shell-fish cannery on Vancouver Island; in 1948 the number was doubled and the two produced 662 cases of canned shell-fish.

F. Fish Oil and Meal

Previous to the war fish oil and meal industries formed an important branch of Vancouver Island fisheries. Pilchard and herring

have been the main species used. Because of the increased demand for natural vitamins, especially during the war, other species have been found to yield oils with high vitamin content. Dogfish, dogfish and codfish livers and canning waste are all utilized for the production of fish and fish liver oils, much of which is sold as medicinal oil. In addition to medicinal oil, fish oils find an outlet in many manufacturing processes, such as the making of soap, paint, linoleum, while large quantities are sold for the feeding of poultry and livestock.

Since there has been no pil chard fishing in this district for several years, pilchards as a source of meal and oil should be omitted; but since the war herring are used principally for reduction.

G. Whaling and Whale Reduction

Long before the coming of the white man whaling was practiced along our coast. Nootka Indian folklore is savoured with tales of courageous braves pitting their skill against the huge animal. About 50 years ago, commercial whaling set up a rendering plant at Cachalot on Kyuoquot Sound. Since then whaling has been conducted intermittently. Its present activity began in 1948 and produced 224 tons of meat meal and 186,424 imperial gallons of oil. Today, British Columbia Packers operate an up-to-date, mechanized station at Coal Harbour, with an average catch of 3 to 4 hundred whales (314 in 1950), worth 3 to 4 thousand dollars apiece.

CANNERIES, REDUCTION AND FISH HANDLING PLANTS

- REDUCTION PLANT
- CANNERY
- FISH HANDLING PLANT

Table 71. Vancouver Island Fish Cannery Statistics[1]

Type of licence	1946 No. of licences	1946 No. of cases packed	1948 No. of licences	1948 No. of cases packed	1950 Mo. of licences	1950 No. of cases packed
Herring	5	214,680	1	18,257		Tons - 2,183[2]
Salmon	5	162,889	3	50,209		42,125
Shell-fish	1	750	2	662		366
Pilchard	5	4,359				

(1) Regional Industrial Index of B.C.

(2) Herring dry-salteries

Table 72. Vancouver Island Fish Reduction Statistics[1]

(Units = tons (of meal), imperial oil gallons)

Type of licence	No. of licences	Production	No. of licences	Production	No. of licences	Production
Fish offal	3	meal - 140 tons oil - 29,312 gals.	1	oil - 7,985 gals.		1,100 gals.
Fish liver	1	oil - 13,200 gals				
Herring	6	meal - 4,888 tons oil - 289,690 gals.	8[2]	meal - 10,463 tons oil-1,000,972 gals.		meal - 7,419 tons oil - 768,343 gals
Herring dry-salted	6	4,871 cured tons				
Herring pickled	1	383 barrels				
Pilchards	6	meal - 699 tons oil - 81,831 gals.				
Salmon tierced	1	468 tierces		71 tierces		
Whale				Bone meal - 119 tons Bone meat meal 324 " Oil - 186,424 gals.		whales killed - 314

(1) Regional Industrial Index

(2) 7 in operation

Table 73. Summary of Catch Statistics for District No. 3 and B.C.

Species	District No. 3	British Columbia	% of B.C. catch	Landed value
Salmon	hundredweight			Dollars
Red spring	52,295	87,408	59.9	1,266,000
White spring	11,145	26,458	41.3	160,300
Steel Head	458	4,082	11.2	82,600
Coho	171,713	322,106	54.4	3,620,000
Sockeye	47,203	298,155	15.8	1,155,000
Chum	287,299	632,816	45.4	2,720,000
Pink	242,297	600,016	40.3	2,340,000
Jack	756	2,706	28.0	6,100
Total salmon	813,766	1,973,847	41.3	11,350,000
Herring	1,597,929	3,654,324	44.9	2,540,000
Halibut	18,393	202,141	9.1	286,000
Sole	26,344	101,228	26.1	142,000
Ling cod	41,296	47,456	87.0	339,000
Black cod	3,466	18,966	18.4	63,970
Grey cod	24,380	52,669	46.3	102,000
Red and rock cod	4,380	9,375	51.5	18,910
Flounders	1,499	4,683	32.0	429
Skate	954	1,175	86.2	3,040
Smelt	20	1,694	-	-
Oulachon	-	4,113	-	-
Tuna	1,895	1,895	100.0	33,162
Anchovie	-	-		-
Other fish	4,317	4,863	88.9	27,300
Clams	30,279	43,647	69.5	96,700
Abalone	133	133	100.0	1,330
Crab	611	18,110	3.3	5,880
Shrimp and prawns	614	5,453	11.25	13,890
Oysters - U.S. gals.	22,787	58,952	38.6	89,500
Total	2,593,510	6,204,885		15,103,111

We may conclude by saying that the fisheries of Vancouver Island owe much to the physical factors that have contributed to the wealth in fish. The conservation of this store is a problem that gravely concerns the Government. It is closely studying the catch and other problems.

In some areas it has restricted the catch of certain fish. The Department of Fisheries has many offices on the West and East Coasts of the Island to record observations and suggest future plans for the exploitation of fish, in order to make it a permanent industry.

Fishing is one of the important primary industries of Vancouver Island. Properly regulated and controlled it can be made to pay dividends to generations as yet unborn. On the other hand, a short sighted policy will redice this valuable asset to the point of economic extinction within a very short space of time.

With the present attention given to this industry, it will remain a permanent source of income to Vancouver Island.

IX

Mining

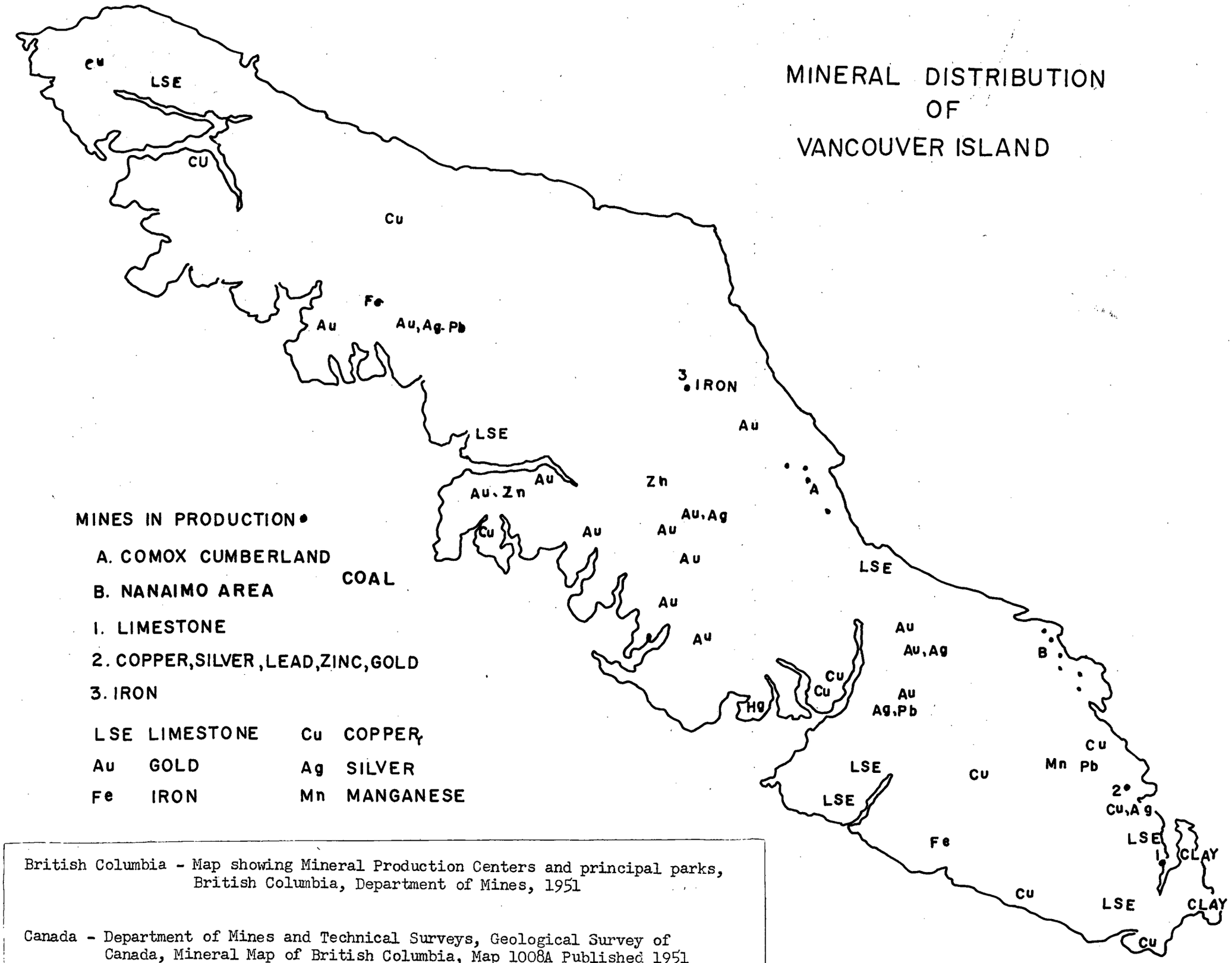
Geology, which determines the presence or absence of minerals, has favoured Vancouver Island with a variety of ore deposits. The Island's mountains consist mainly of grano-diorite, with many belts and remnants of pre-existing formations, through which the grano-diorite was intruded. These remnants were greatly altered during the mountain building process and became mineralized by the aqueous and gaseous emanations from the grano-diorite body.

Mining on Vancouver Island dates from 1935, when fur traders opened coal deposits at Squamish; but the first extensive underground operations were undertaken at Nanaimo, where mining was begun in 1852. Two large and nine small mines furnish the present supply of coal from the Nanaimo and Comox coal fields.

The placer-gpld deposits were founded and worked on Leach River as early as 1864. This was followed by the development of lode mineral mining.

There are five mining divisions of Vancouver Island and presently three of them are important: the Alberni, Nanaimo and Victoria mining divisions. The total amount of mineral wealth of the Island is far from being known; but it is believed that there are fairly large deposits of certain minerals which we shall discuss in the following pages under the headings:

MINERAL DISTRIBUTION OF VANCOUVER ISLAND



MINES IN PRODUCTION

A. COMOX CUMBERLAND
B. NANAIMO AREA
COAL

1. LIMESTONE
2. COPPER, SILVER, LEAD, ZINC, GOLD
3. IRON

LSE	LIMESTONE	Cu	COPPER
Au	GOLD	Ag	SILVER
Fe	IRON	Mn	MANGANESE

British Columbia - Map showing Mineral Production Centers and principal parks, British Columbia, Department of Mines, 1951

Canada - Department of Mines and Technical Surveys, Geological Survey of Canada, Mineral Map of British Columbia, Map 1008A Published 1951

A. Coal

B. Iron

C. Lode metals

D. Structural minerals

E. Trends and future of mining

A. Coal

Coal has been, and is, the main mineral product of Vancouver Island. The present production comes from the Nanaimo-Wellington and Comox fields. The Comox field is now the principal source of coal; but a moderate output is still coming from the Nanaimo-Wellington field.

The Nanaimo-Wellington coal field, which for a long time was the major producer, has shown for some years a marked decrease in production. This decline will continue, as the large workable deposits in the coal field are almost exhausted. Mining employment has also declined: at the end of 1950 there were 250 miners as compared to 432 five years previously.(1) However, the Bright mine at Cassidy has been equipped for production and in 1950 yielded about 40,000 tons of coal; thus making up for part of the decrease in production of the Nanaimo field.

Statistics below indicate the decline in the coal output of Vancouver Island as compared to the figures for the whole of British Columbia.

Coal Production(2)

Year	Vancouver Island	British Columbia
1939	803,414 tons	1,655,217 tons
1949	603,298 "	1,917,296 "
1951	396,684 "	1,574,362 "

(1) Regional Industrial Index of B.C., 1952 Ed., Regional Development Div., Dept. of Trade and Industry, p. 245

(2) Annual Reports, Dept. of Mines, 1939, 1949, 1951, Victoria, B.C.

So we see that there has been a continuous decrease in coal production on Vancouver Island. (In 1939 it produced 48.5 per cent. of the total provincial output; but this percentage decreased to 31.5 in 1949; then rapidly to 25 per cent. in 1951). This was due to the exhaustion of the best seams of the major coal producing area, that is the Nanaimo-Wellington field.

The individual outputs of the chief collieries and mines are given in the table that follows:

Table 74. Principal Mines and their Gross Production, 1951 (1)

Colliery and Mine	Gross output tons	Days Worked	Total No. of Employees
Comox Colliery (No. 8 Mine)	214,060	249	400
Table River Colliery	120,568	239	152
South Wellington Mine No. 10	155,772	250	107
Bright Mine	40,041	250	57
Chambers Mine	1,667	170	4
Loudon Mine	1,050	209	5
Lewis Mine	813	197	2
Deer Home Mine	314	71	2
Wellington Mine (Carruthers)	596	192	2
Stronach Mine	1,806	228	7
Furnace Portal Mine	359	39	2
Cassidy Mine	1,876	216	5
Vancouver Island	538,922	2,310	745
British Columbia	1,813,384	4,006	1,913
Percent of B.C. output	29.7	55.1	39.0

In 1951, the gross output of the different Vancouver Island collieries 539,000 tons.(2) The total sale amounted to 391,687 tons and 1,572 tons were put in stocks. Of the amount sold,

(1) Department of Mines, Province of B.C. Annual Report, 1951, pp. A-247

(2) Ibid. Report of 1951, pp. A-247. Of this amount, 142,463 tons or 26.4 per cent. was lost in preparation for market and 3,425 tons or 0.6 per cent. was used by the operating companies as fuel, etc.

330,039 tons were bought in Canada
2,975 " " " " the U.S.A.
58,673 " " " " other foreign countries

These figures indicate that nearly 90 per cent. of the outpit is consumed by our home market.

Coal mining has played its part in the settlement of Vancouver Island. As early as 1853 there were 125 settlers at Nanaimo, mostly engaged in the production of coal. Since then, mining has been, with forestry a major economic activity in this area. Though the production has decreased, it still provides employment for 750 miners. Comox coal field has taken the lead: today it employs 500 men in its two active coal mines. Out of the total mining employment of almost 1,300, coal mining accounts for 750 (59%). The presence of coal on Vancouver Island was one of the main causes which led to the development of the Esquimalt and Nanaimo Railway. Before the development of water power it was the main source of power on the Island. So it was the coal that gave the first impetus to Vancouver Island industry. It now produces more than enough coal for the home market and the surplus is exported to the Mainland, the United States and other foreign countries.

B. Iron

Iron ore deposits have been known for many years to occur in various locations on Vancouver Island and geological literature contains very many references to them. The following table gives estimated minable iron ore deposits.

MAGNETITE DEPOSIT, IRON HILL, QUINSAM LAKE

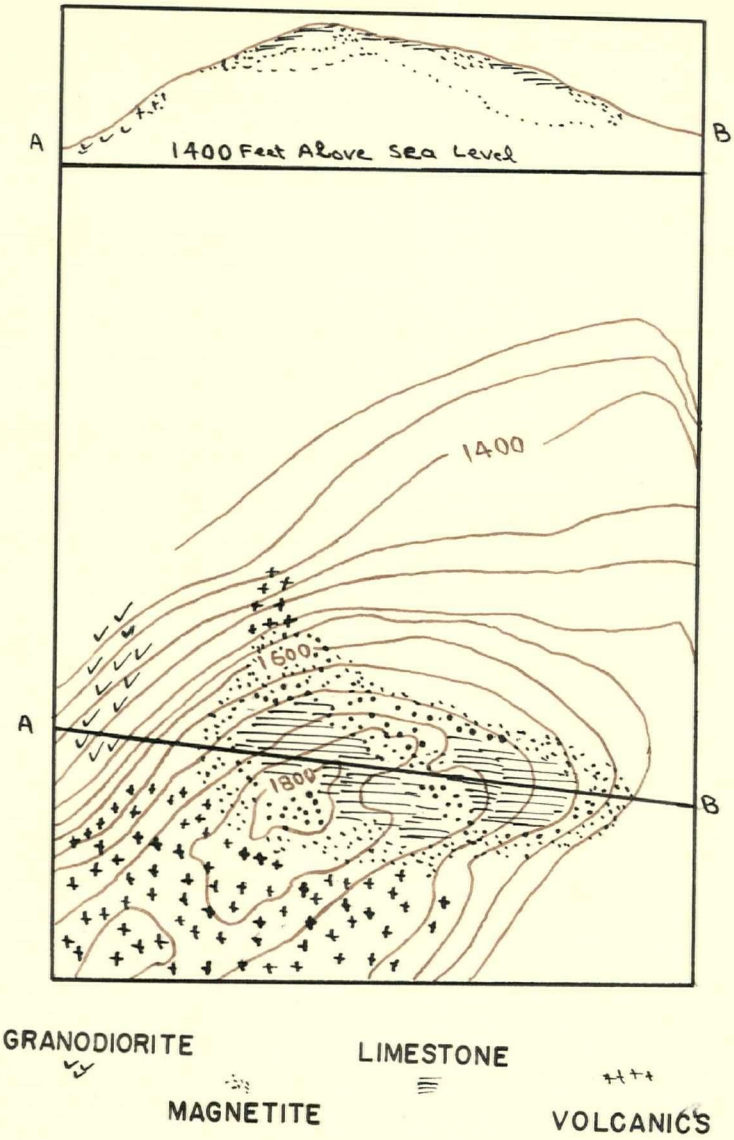


Table 75. Estimate of Minable Iron Ore, Vancouver Island (1)

Locality of Deposit	Kind of ore	Tonnage certainly present (1)	Tonnage probably present includes 1 (2)	Tonnage possibly present includes 1 & 2
Iron River	Magnetite	-	-	400,000
Iron Hill	"	-	-	1,700,000
Conqueror Claim	"	8,000	24,000	-
Sirdar Claim	"	10,000	19,825	96,000
Little Bobs - Boden Powell	"	37,300	99,000	250,000
Sarita River	"	5,400	30,000	-
Glengarry-Stormont Claim	"	8,500	60,000	170,000
Princess Iron Claim	Limonite			2,000,000
Total		69,200	232,825	4,616,000

Iron River. The iron ore occurrence lies on the west side of Iron River, about one and a half miles from its mouth. In all, the magnetite is exposed on the summit of this hill over an area averaging about 10 feet in width and having a length of 100 feet.

Iron Hill (Quinsam Lake). Iron Hill rises from the east shore of Upper Quinsam Lake and is nearly 24 miles by road from Campbell River. Iron Hill deposits lie within the limits of Esquimalt and Nanaimo Railway. Approximately 2,000,000 dollars has been spent on the construction of a mill, wharf and road; 150 men are employed and theproduction is expected to render 80,000 tons of concentrated ore per month. This presently is the most valuable site and the ore is currently mined. The first shipment of 9,435 long tons of iron ore was made by September 1, 1931.

(1) Young, C. A. and Uglow, W. L. - The Iron Ores of Canada, Vol. 1. B.C. - Yukon. Department of Mines, Geological Survey, Ottawa, 1926.

In 1951, Vancouver Island produced 113,500 tons with a total value of 790,000 dollars. The Island's production is of magnetite and is shipped mostly to Japan. There is no iron and steel industry on the Island to use its own production.

Most of these deposits are commercially of little value; so instead of a detailed description of the claims, a classification of the deposits from a commercial point of view is given below:

a. Deposits of the Province of B.C.

Iron Hill - Upper Quinsam Lake

Iron River

Stormont, Glengarry, Nootka Sound

b. Deposits of doubtful promise

Conqueror - Bugaboo Creek

David - " "

Sirdar - " "

Little Bobs - Baden Powell

Sarita - Barclay Sound

Limonite - Quatsino Sound

c. Deposits of no value

Elijah - Bugaboo Creek

General French - " "

General Warren - " "

General White - " "

Gordon River Deposit - Gordon River

Crown Prince, No. 5 - Barclay Sound

There are many others of this category; so it is hard to say

anything definite about iron ore deposits or predict the future of the iron mining industry; as there is no accurate estimate of the iron present in Vancouver Island rocks. Most of the iron deposits are not of sufficient extent to be worked economically.

No doubt there are adequate coal deposits on the Island; but there is a shortage of coke, necessary for iron and steel manufacturing. Another problem is ore: though there is an indication of iron deposits at various places on the Island, there is no actual estimate of the size of the seams. Industrialists are not sure whether they can compete on the market with the big producers.

C. Lode Metal Production

This discussion will fall into sibdivisions corresponding to the predominating lode metals:

1. Copper
2. Gold
3. Silver, lead and zinc

1. Copper

This metal was first discovered at East Sooke in 1863, and between 1915 and 1918, ore yielding 177,613 pounds of copper was shipped from this point. Since 1950, diamond drillings have been undertaken at many places on the Island. It is the rise in the price of copper that has given a fresh impetus to copper mining on Vancouver Island. Copper prices have doubled since 1946 (now 20 cents per pound) whereas the cost of production remains nearly the same. Twin J property at Mount Sicker has resumed

production of copper and zinc concentrates. In 1951, it produced 86,773 pounds of copper.[1] The mine operated the whole year round, giving employment to 45 men. Another property that has begun copper mining is the Blue Grouse on Cowichan Lake. Production began last year and the copper concentrates are sent to Tacoma.

Copper deposits are indicated by the mineral map of Vancouver Island.

2. Gold

Placer-gold mining was the chief enterprise during the eighteen sixties. Since 1950, not a single ounce of gold has been produced by placer mining; but there is an important historical fact in connection with this type of mining; that is, its influence led to the union of the Vancouver Island and Mainland Colonies. Now it is lode mining that produces the Island's gold. The output has not been steady; because it is guided by the price of gold. The output has decreased from 56,022 ounces in 1939 to 5,108 ounces in 1951. Out of these 5,108 ounces, 4,265 are produced at Vananda. Other producers are:

Property	Location of Mine	Production 1951[2]
Privateer	Zeballos	460 oz.
Spud Valley	"	67 oz.
Twin J	Sicker Mt. (Duncan)	316 oz.

Gold production from Zeballos Camp (which was the major producer of gold on the Island) amounted to 287,811 ounces from 1934 to 1948. The chief mines included Privateer and Spud Valley. Increasing cost of pro-

(1) Annual Report, 1951. Ministry of Mines, Province of British Columbia, p. A-43

(2) Ibid., p.

duction forced these mines to close and by the end of 1948, Privateer, the last to operate, ceased working. Activity was resumed, however, in these two mines, in 1951, and gold concentrates were shipped from them to the smelter at Tacoma. The gold recovered is shipped to the Royal Mint.

3. Silver, Lead and Zinc

The following were important silver producing mines in 1951:

Silver, Lead and Zinc Mines of Vancouver Island, 1951[1]

Property	Location of Mine	Production (in ounces)		
		Silver	Lead	Zinc
Privateer	Zeballos	172	-	-
Spud Valley	Zeballos	19	-	-
Twin J	Mt. Sicker (near Duncan)	15,554	85,757 lbs.	713,954 lbs.
	Total	15,745	85,757	713,954

These are produced as by-products of either gold or of copper.

D. Structural Minerals

A great variety of materials used in building or construction materials are produced in Vancouver Island. Products such as these are usually used close to the point of origin. Their production is dependent on the local market and consequently has increased greatly in recent years with the urban expansion.

(1) Annual Report, 1951, Ministry of Mines, Province of B.C., Victoria, B.C.

Table 76. Production of Structural Minerals, 1950 and 1951. By Mining Divisions (1)

Division		Cement	Lime and Limestone	Building Stone	Crushed Rock	Sand and Gravel	Brick	Structural Tile, Drain tile and Sewer pipe	Pottery
		D O L L A R S							
Alberni	1950	-	-	-	-	28,428	-	-	-
	1951	-	-	-	-	61,392	-	-	-
Nanaimo	1950	-	1,029,448	144,000	1,772	120,668	74,750	-	-
	1951	-	1,131,600	252,000	730	-	-	-	-
Victoria	1950	3,088,000	11,650	-	1,732	579,496	11,220	105,000	5,860
	1951	3,312,000	-	-	-	430,734	-	85,000	4,695
Total	1950	3,088,000	1,041,098	144,000	3,504	728,592	85,970	105,000	5,860
	1951	3,312,000	1,131,630	252,000	730	591,909	-	85,000	4,695

(1) Minister of Mines, Province of British Columbia, Annual Report, 1951, pp. A-28

Portland cement is manufactured at Bamberton on Saanich Inlet, from limestone barged from Texada Island. Gypsum from Windermere supplies part of the raw materials. A 2 million dollar expansion program was commenced in 1951 to increase annual production from 1,350,000 to 2,000,000 barrels. In 1950 the limestone and cement production was 181,900 tons. It is a source of British Columbia's cement supply.

Brick, tile and flower pots are made from clay near Victoria. Surface clay is mined by gas shovel and transported by truck to storage bins. The clay pit is operated from March until November, and the plant all year. Winter rainfall is responsible for this break in operations. Total clay mined in 1951 amounted to 5,500 tons.

Limestone

The presence of limestone is widespread on the Island, which is quite clear from the map. Bamberton quarry supplies limestone to the cement plant. The number of men employed in 1951 was 19, and during the same year 201,000 tons of rock were quarried at Bamberton. Limestone produced at Vananda and Blubber Bay (Texada Island), also supplies the need of Vancouver Island industries. The local quarries produce 140,000 tons of limestone and Blubber Bay limestone is quarried to produce pulp rock for paper mills, 177,000 tons for agricultural and industrial uses and for rock dusting in coal mines.

Sand and Gravel

There are extensive deposits of sand and gravel on Vancouver Island suitable for building and construction purposes. Two important operations are at Saanich and Albert Head in the south-eastern part of

Vancouver Island. Saanich Washing & Screening plant has a capacity of 30 tons per hour and approximately 75,000 tons of gravel were produced in 1951. It gave employment to 12 men. Albert Head plant produces gravel and plaster sand and in 1951, 189,233 cubic yards of material were excavated. Here ease in quarrying and availability of water cut the costs to a minimum. Nearness to the urban center is another favourable factor.

So we see that there is an abundance of structural material and production can be increased with the increase in demand for them, in case of urban expansion or other constructional work.

E. Trend and Future of Mining

The present trend in the production of various important minerals is indicated in the table on the last page. It shows that the coal production has decreased greatly. In 1951 it was about 400,000 tons - one-half of the 1939 production. But now, Comox field is coming up and unless more mines are opened production will be comparatively lower than what it used to be. As for the future, it is believed there are enough coal reserves on the Island for reasonable future demands; so that there is no need for fear of exhaustion in the near future; but these reserves are not unlimited and there is no exact figure for the estimated reserves of coal.

Gold lode. Production has fallen down tremendously since 1939. Nearly all the mines ceased production in 1948. Production increased in 1951. But gold production fluctuates with economic conditions prevailing in the world. The future of gold mining is uncertain.

Silver, copper, lead and zinc. The table indicates that the production of these minerals is increasing, and increasing rapidly. One of the reasons is their demand in industry and for the production of war materials. Though there is a drop in the price of lead, zinc and silver, the price of copper shows an increase and on Vancouver Island other metals are produced as bi-products of copper. The future of these minerals, if not bright, seems to be quite good as Vancouver Island has rich deposits of their ore.

Iron. There are quite a few deposits on the Island and one of these is now exploited. But it is hard to speak about the future as most of the deposits are small and there is no correct estimate of the ore deposits. But if British Columbia establishes a steel industry, Vancouver Island will contribute its share of metal.

Structural minerals. With the expansion of urban development, the production of these materials has increased tremendously. Cement is the most important as out of the total value of 5 million dollars, 3 million come from cement production and it supplies the needs of the whole Province. The future of these materials depends upon the local market and is very bright as there are adequate deposits on the Island.

The mining industry is a complicated one as the mineral resources are concealed below the earth's crust, discovery and delimitation of mineral resources are expensive and require so much time that the total resources cannot be estimated. Prices received for the products, cost of labour, mining and metallurgical techniques change from time to time; so that mineralization that might be considered valuable at one time, may be

regarded as waste at another. The production of gold and copper on Vancouver Island have shown distinctly the effect of these economic forces.

Table 77. Value of Mineral Production, Vancouver Island, 1951

Commodity	Value $
Gold placer - oz.	-
Gold lode - oz.	188,200
Copper	189,555
Lead	12,916
Silver	27,074
Zinc	120,765
Coal (2,000 lbs.)	2,578,446
Structural materials	5,377,629
Miscellaneous	931,857
Total	9,426,472

X

Manufacturing

Considerable manufacturing is done on Vancouver Island and opportunities are offered for increased development thanks to the abundance of natural resources and other favourable factors listed below:

1. Adequate supply of power (water power and coal)
2. Climate that permits year round uninterrupted operation
3. Suitable locations with regard to trade and commerce
4. Excellent harbours, open throughout the year
5. Good transportation facilities (water and land)
6. Good banking and labour conditions
7. Steady expansion of population and market
8. Steady growth of basic industries

Let us now divide our subject into:

A. Distribution of industries

B. Manufacturing

A. Distribution of Industries

The geographical distribution of industries and employment on Vancouver Island is well shown in the following table. Now, if we analyze that table we find that the industries of the Island can be divided into two types, urban industries and rural. It is the urban

group that dominates and always has.

Table 78. Distribution and Growth of Industrial Establishments

	1940	1941	1942	1943	1944	1945	1948	1949	1950
Alberni	4	3	4	4	5	5	19	11	11
Courtenay	6	8	8	7	6	8	12	7	10
Cumberland	4	4	4	3	3	3	4	4	4
Duncan	11	12	13	14	12	14	27	24	29
Nanaimo	14	21	20	23	24	26	29	24	27
Victoria	142	142	150	143	150	163	191	204	201
Ladysmith	-	3	-	3	-	4	4	4	3
Port Alberni	-	9	8	9	10	14	19	23	23
Campbell River	-	-	-	-	-	-	9	5	4
Comox	-	-	-	-	-	-	4	-	-
Qualicum Beach	-	-	-	-	-	-	3	-	-
Tofino	-	-	-	-	-	-	3	-	-
Total urban	191	202	209	206	213	238	332	320	331
Total Rural	82	80	69	71	81	103	150	134	148
Grand total	273	282	278	277	294	341	482	454	479

This table indicates that the expansion of the urban group is steady as compared to the growth of rural industries. This proves that industries tend to concentrate near urban centers, because of eacy access to market, shipping and railway transportation facilities and labour.

The industries of Victoria, the chief urban and manufacturing center, number 201 (1950) or 60 per cent. of the total Island industries. The impetus that was given to Victoria in the pioneer days has carried it steadily forward for over a century, until it has developed into an important industrial center, with industries ranging from simple lumbering to the more complicated manufacture of mining tools and appliances.

The next most active centers are Duncan, Nanaimo and Port

Alberni; but they are far behind Victoria in industrial development. It is the south-eastern part of the Island that is industrially developed; the wild remote North and West, though rich in raw materials, are practically undeveloped as far as secondary and tertiary industries are concerned.

The war brought new industries to the Vancouver Island, both in the urban and rural areas. There was, however, a tendency to establish big mills at the source of raw material. This is still a marked trend, because manufactured articles are more easily transported than are raw materials.

The conversion of war plants to factories for peaceful purposes was carried out with marked success. Present conditions indicate that the industrialization and establishment of secondary industries that took place during war time will remain a permanent part of the Island economy.

How did the war affect labour? The following table reveals the fluctuation in industrial employment between 1940 and 1950 inclusive:

Table 79. Distribution of Rural and Urban Employment, 1940-50

	1940	1941	1942	1943	1944	1945	1948	1949	1950
Alberni	139	32	38	37	48	47	43	55	61
Courtenay	38	55	53	35	37	52	28	69	54
Cumberland	25	29	31	14	18	23	11	49	41
Campbell River	-	-	-	-	-	-	18	24	34
Comox	-	-	-	-	-	-	7	-	-
Duncan	417	452	405	171	59	79	46	223	197
Nanaimo	105	232	267	263	385	483	460	405	519
Ladysmith	-	15	-	29	-	25	9	17	13
Port Alberni	-	917	1,083	1,141	1,016	1,097	2,363	1,755	2,010
Qualicum Beach	-	-	-	-	-	-	28	-	-
Tofino	-	-	-	-	-	-	28	-	-
Victoria	2,755	3,557	5,245	-	-	-	4,375	4,224	4,223
Total Urban	4,224	5,289	7,135	7,376	6,759	6,832	7,416	7,170	7,681
Total Rural	3,287	4,057	5,510	6,655	6,436	6,201	4,972	4,336	4,955
Grand Total	7,511	9,346	12,645	14,031	13,195	13,033	12,388	11,506	12,636

Once again in terms of industrial employment Victoria takes the lead with more than 50 per cent. of the total urban employment.

B. Manufacturing

Manufacturing on Vancouver Island began, as we have seen, with the building of a lumber mill in 1860 - a simple beginning of industrial activities which have now reached the complex stage of modern manufacturing yet are still linked so closely with the primary products - timber, minerals, fish and farm produce - that in most cases they are merely extensions of the primary industries. This fact is illustrated by the following table:

Table 80. Statistics of Secondary and Tertiary Industries of Vancouver Island, 1949-50[1]

	Establishments		Employees		Salaries	Wages	Gross value of Products	
	1949	1950	1949	1950	1949	1950	1949	1950
Sawmills	140	162	5,057	6,288	13,354,837	16,807,276	50,435,699	71,484,705
Pulp and paper mills	3	4	923	1,034	2,703,354	3,377,487	12,530.905	19,932,323
Fish processing plants	16	16	447	390	1,042,863	986,008	5,213,535	5,123,787
Shipyards	6	6	650	595	1,903,437	1,837,433	4,162,045	3,972,730
Bakeries	55	54	514	492	986,864	1,000,054	3,248,774	3,257,448
Dairies (butter and cheese)	6	5	311	239	559,295	526,286	2,880,014	2,874,555
Printing and publishing	11	12	464	485	1,282,430	1,356,668	2,707,304	2,869,778
Sash, door and planing mills	16	17	371	291	945,019	682,022	3,912,874	2,804,279
Machine shops	19	15	207	181	480,370	472,318	1,047,978	1,083,025
Furniture factories	22	28	203	186	337,495	351,449	849,321	1,044,683
Prepared stock & poultry feed	6	6	42	40	73,336	79,184	741,734	850,885
Wines	3	3	29	32	65,800	70,603	732,115	813,136
Aerated waters	4	5	40	57	86,261	114,067	402,331	578,748
Printing and book binding	13	14	104	109	243,710	259,624	490,409	517,148
Boat building	17	18	90	94	151,448	180,361	336,979	380,225
Fruit & vegetable preparation	6	6	32	32	25,666	29,419	204,095	246,255
Brick and tile	3	4	51	50	109,859	109,736	189,246	197,111
Confectionery	10	10	55	43	65,640	53,680	182,701	137,305
Miscellaneous food preparation	4	3	24	20	26,534	28,247	100,077	123,302
Brass and copper products	4	4	24	24	48,952	52,411	81,730	96,038
Miscellaneous wood products	6	6	13	14	23,717	23,415	80,839	87,374
Batteries	-	3	-	13		33,490	-	64,998
Publishing of periodicals	23	20	11	16	17,522	20,526	74,733	64,343
Cement	5	5	15	17	24,100	27,560	56,000	62,234
All other manufacturing	50	53	1,588	1,834	3,792,726	4,671,095	16,658,870	21,181,212
Totals	454	479	11,506	12,636	28,890,709	33,150,419	110,503,470	139,847,627

(1) Dominion Bureau of Statistics Annual Report, Geographical Distribution of the Manufacturing Industries, 1949 and 1950.

Manufacturing on Vancouver Island must now be considered according to the main industries:

1. Forest manufacturing industries
2. Agricultural manufacturing industries
3. Fish processing
4. Secondary mining industries
5. Miscellaneous manufacturing

1. Forest Manufacturing Industries

Forest industries, primary, secondary and tertiary lead all others, with 55 per cent. of the total establishments; 67.8 per cent. of the total employment and 70.8 per cent. of the total gross value of industrial products. These industries have already been discussed under forestry; we shall merely add a detail concerning one of the tertiary forest activities: there are 46 establishments on the Island for printing and publishing and book-binding. We must remember that Victoria, as capital of the Province, may be expected to publish copiously.

2. Agricultural Manufacturing

These manufacturers which convert the different farm products into more usable forms rank second as an individual group. The following table gives an interesting summary of their statistics:

Table 81. Nature and Extent of Agricultural Industries, 1950

Type of establishment	No. of establishments	No. of employees	Gross value of products
Butter and cheese	54	492	3,257,448
Bread, other bakery products	5	239	2,874,555
Prepared stock and poultry feed	6	40	850,885
Wines	3	32	813,136
Fruit and vegetable preparations	6	32	246,255
Sausages and coverings	2	-	-
Other dairy products	1	-	-
Biscuits	2	-	-
Breweries	2	-	-
Miscellaneous foods	3	20	123,302
Total	84	855	11,165,581
Total of all industries	479	12,636	139,847,627

Agricultural manufactures amounted in 1950 to 8 per cent. of the total industrial output; 6.7 per cent. of the employment and 17.5 of the total gross value of industrial products. This agricultural group provides the primary needs of animals and human beings. Agricultural manufactures, many of them highly perishable, must have easy access to the consuming centers. It is preferable to produce butter and cheese in the urban centers where refrigeration equipment and market facilities are available. Those are the two main factors that control the location of agricultural manufactures.

3. Fish Processing

This industrial group is third in rank, though the value of the products is about half of that of the agricultural industries.

Fish processing	Establishments	Employees	Value of products
	16	390	5,123,787

The above 16 establishments constitute 3.3 per cent. of the total on Vancouver Island; their employees, 3 per cent. of the total employment and the value of their output is 4.4 per cent. of the total industrial value. For reasons mentioned under Fisheries fish processing on the Island is declining. There are no salmon canneries at present and the catch is processed on the Mainland or shipped to the United States. The reduction of fish to meal and oil is doing well, however, and the resources in fish seem to constitute a promise of future revival of fish processing.

4. Secondary Mining Industries

Industries using mining products as their raw material have not reached a remarkable development, as most of the mineral wealth is exported to the Mainland or to other countries. Still there are quite a few industries, but of small scale. The following table gives a summary of their statistics for 1950:

Table 82. Extent and Nature of Secondary Mining Industries, 1950

Classification	Establishments	Employees	Gross value of production
Brass and copper products	4	24	197,111
Brick and tile	4	50	96,038
Cement products	5	17	62,234
Iron castings	2	-	-
Primary iron and steel	1	-	-
Sheet metal products	2	-	-
Wire and wire goods	1	-	-
Jewellery and silverware	2	-	-
Glass products	1	-	-
Non-ferous metal products	1	-	-
Lime	1	-	-
Stone products	1	-	-
Coke and gas products	1	-	-
Total	26	91	355,383
All industrial total	479	12,636	139,847,627

So we see that these industries are varied, but provide employment to a small number only and the gross value of their products is negligible as compared to the total. The reason for this is that the mineral production of Vancouver Island is not enough to supply the demand of big operations and cater to a competitive market. The small scale operations are not economical because of high cost of labour and machinery. So instead of having its own steel industry, Vancouver Island ships its iron mainly to Japan.

For brick and tile there is an abundance of raw material; but this industry only supplies Vancouver Island at present. The Mainland has sufficient bricks and tiles for its own use and these products are too bulky to compete as exports with the brick and tile production of foreign local factories.

Forestry being the most productive by far of these secondary activities, it dims the chances of others to outrival it. Again, the lesser manufacturies are there to meet the local demands; while forestry produces mainly for export.

5. Miscellaneous Manufacturing(1)

Most of the remaining manufacturies are either the outcome or the extension of those mentioned already; but of more complex nature.

(1) No table is given, as almost all the products concerned are found on preceding tables

This group has 13.5 per cent. of the total industrial establishments; 14 per cent. of the total employment and 11.3 of the gross value of all products. So it stands third among forest industries in terms of these percentages. In the economic development and expansion of a region such industries are bound to flourish, especially in proportion as the primary industries that feed them prosper themselves. Their number is at present increasing on Vancouver Island.

The natural resources which are the backbone of the industrial and economic development are extensive on Vancouver Island. They have already been discussed. There is considerable scope for industrial development. In addition, if there is any need of raw material, not available at home, it can easily be imported thanks to the unique situation of Vancouver Island.

XI

Power

For the exploitation and development of the natural resources of a region, the availability of cheap power is essential. It is energy that determines the pace of industrialization. A region rich in raw materials, but poor in sources of power, has to import energy in one form or another. Vancouver Island is very fortunate in this respect: to develop its abundance of raw materials it has an adequate supply of water power, coal and wood.

The subject of Power on Vancouver Island will now be presented under three headings:

A. Availability of power sources

B. Development of power

C. Disposition of power

A. Availability of Power

The general location of the major fuel and power resources of the Island are given in the following table:

Table 83. British Columbia Fuel and Power Resources by District[1]

District	Coal	Wood as fuel	Water Power
Vancouver Island	1%	33%	2%
Vancouver Lower Mainland		18%	34%
South Central	2%	11%	20%
Southeastern	87%	9%	5%
Northeastern	4%	7%	26.6%
Central and Northeastern	6%	22%	13%
	100%	100%	100%

(1) Second Resources Conference, Feb., 1949, Victoria, B.C.

Since lumber is the leading industry, it has 33 per cent. of the wood fuel of the whole Province; but it is hydro-electricity that is the most important source of power on Vancouver Island. The list of power sources on the Island are:

1. Water
2. Coal
3. Oil and gas
4. Wood
5. Human and animal power

1. Water Power

Water power development depends upon a combination of various factors, chief of which are stream flow and topography. The nature of Vancouver Island terrain offers many sites suitable for the development of hydro-electricity. Some of these sites, such as Campbell River and Jordan River, have been utilized and others, because of the distance from urban and industrial centers or for other economic reasons, are regarded as potential sites. There is enough precipitation on the Island to supply water to its streams; but there is a drawback in its seasonal nature. The following figures show the ratio of maximum and minimum flow of Campbell River and indicate its effect upon the stream's flow:

	Maximum flow	Minimum flow	Ratio[1] Maximum Minimum
Campbell River	26,000	164	158/1

This seasonal precipitation necessitates the construction of dams to regulate the stream flow. It means extra costs. The presence of

many lakes (effect of glaciation) lessen this problem: they serve as storage basins.

In addition to these factors, hydro-electric development is guided by economic factors; among them, proximity to a market for the electric current and coal, or some other source of cheap power are important. In the case of Vancouver Island, coal and oil have been used either to supply heat, a field where electricity has not been an important competitor, or to supply locomotive force for ships and trains, where electricity is not practicable. In general, the field of coal and that of electricity from water power do not overlap.

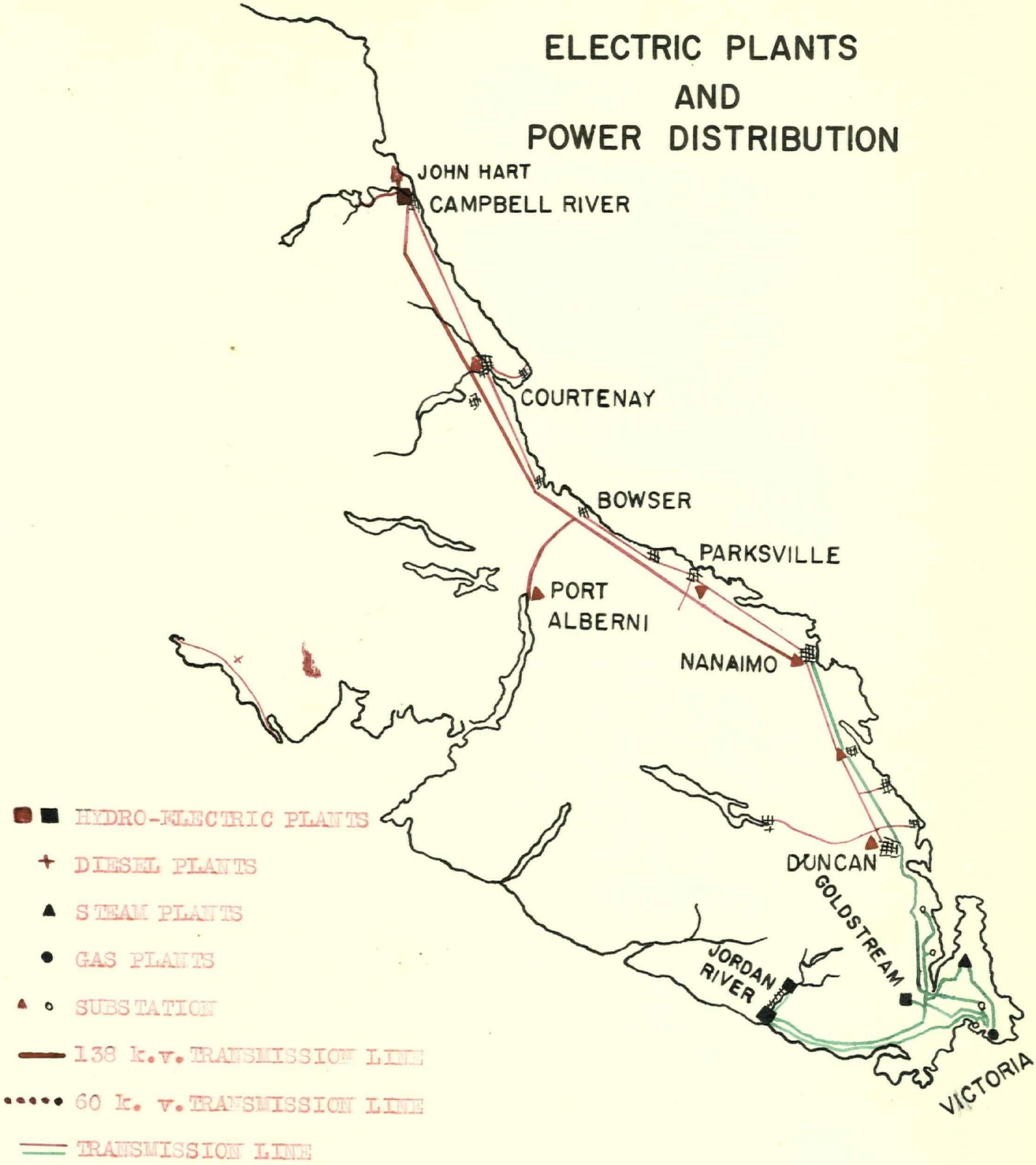
Developed Water Power Sites (1) and (2)

	Horse power	Location (nearest town)
Campbell River	168,000	Campbell River
Jordan River	39,250 (1948)	Victoria
Duntledge River	12,000	Cumberland
Goldstream	3,500	Victoria
Total Vancouver Island	222,750	

On the Island, hydro-electricity is the chief source of energy for lighting and power for industrial establishments; it constitutes 90 per cent. of the total electric energy produced. The remaining 10 per cent. is provided by Diesel and steam plants.

(1) Eighth Annual Report, 1953, B.C. Power Commission, Victoria, B.C.

(2) Second Resources Conference, Feb., 1949, Victoria, B.C.



British Columbia Power Commission Eighth Annual Report, 1953

Regional Industrial Index of British Columbia, Edition 1952.

Undeveloped Water Power Sites[1]

Site	Horse power	Nearest population area
Ash River	26,000	Alberni
Great Central Lake	20,000	"
Nimpkish River	60,000	Alert Bay
Nanaimo Lake	20,000	Nanaimo
Victoria Lake	43,000	Port Alice and Coal Harbour
	169,000	

The potential supply of electricity is the result of geographic factors; but how much will be actually produced is determined by engineering and economic factors. Some of these sites, such as Ash and Nanaimo Rivers and Great Central Lake, lie close to urban centers, a factor that favours their development more than that of the others; but the presence of a pulp mill at Port Alice will encourage the development of Victoria Lake water power, though this site is remote from population centers.

Diesel and Steam Electric Plants

Though water power is the chief source of electricity on the Island, there are some plants that use Diesel, or coal or wood for the production of electricity. The following shows the location of such plants on Vancouver Island:

Plant location[2]	Type	Horse power	Owned by
Brentwood	Steam	16,700	B.C. Electric Railway
Chemainus	Steam	5,430	McMillan
Alert Bay	Diesel	1,070	B.C. Power Commission
Ucluelet-Tofino	Diesel	537	B.C. Power Commission

(1) Ibid.

(2) Hillcrest Lumber Company has a Diesel-electric stand-by-plant.

2. Coal

Coal production on Vancouver Island is 400,000 tons annually, but with the exception of railways and steamships very little is used as a source of power. Most of the Vancouver Island coal is exported, either to the Mainland or to the United States.

The Brentwood steam plant on Saanich Peninsula, together with the Jordan River and Goldstream hydro-electric plants, supply the needs of the southeastern part of Vancouver Island; Chemainus furnishes power to the MacMillan Bloedel Company at Chemainus; two other plants serve the isolated settlements of Alert Bay and vicinity and Ucluelet and Tofino.

3. Oil

Logging camps and isolated sawmills have Diesel engines for their local use, to supply lighting and power. Oil is also used as a source of power in logging camps and for other machinery, such as tractors, trucks and busses. Coal and oil are used as well for heating houses. Oil is an import on Vancouver Island.

4. Wood as Fuel

Because of the forests and the highly developed lumber industry, the Island has plenty of wood suitable for fuel and heating purposes. Some of the large pulp and paper mills use waste from sawmills and logging camps to produce steam; but the most common use of this type of wood is for domestic purposes, such as cooking and heating.

5. Human and Animal Power

Human power, though losing its importance as a source of energy in this modern age of machinery, should not be neglected. It is the labour force that makes use of the electric power, and on Vancouver Island 82,000 workmen are included in this group.

Horses that used to be the mainstay of agriculture and logging have also lost ground to machinery. This does not mean that they are altogether absent from Vancouver Island: some of the truck farmers still use them for ploughing.

B. Development of Power

Power development on the Island seems adequate for the present industrial development; but, to cope with industrial expansion, more of the potential sites will be developed. If it happens that industrial and residential expansion increase the need for power beyond what the Island can produce, additional energy can be transmitted from the Mainland under water.

C. Disposition of Power

The development of power from the different resources leads to its utilization for residential, commercial and industrial purposes. Nearly all its electrical energy is supplied to Vancouver Island by the B.C. Power Commission, or the B.C. Electric Railway Company. The B.C. Power Commission serves the area North of Duncan, but also sells a large portion of power to the B.C. Electric Company which serves Victoria and the southern part of the Island.

The two tables which follow will convey to us an idea of how Vancouvwr Island utilizes its developed power, generated by:

a) B.C. Electric Company

b) B.C. Power Commission

a. Utilization of the electric power generated by the B.C. Electric Railway Company plants (Jordon River, Goldstream and Brentwood) by service groups in kilowatt hours.

Table 84. Utilization of Power from B.C. Electric Co., 1950[1]

Area	Domestic services	Commercial services	Industrial services	Total No. of k.w.h.
Duncan	675	112	8	795
Saanich-Sidney	1,826	215	25	2,066
Sooke-Port Renfrew	2,599	294	25	2,918
Greater Vancouver	29,258	4,241	682	34,131
Total	34,358 86%	4,862 12%	740 2%	39,910

b. Utilization of the electric power generated by the B.C. Power Commission plants (John Hart, Alert Bay and Ucluelet-Tofino) by services in k.w.h.

Table 85. Utilization of Power from B.C. Power Commission, 1953[2]

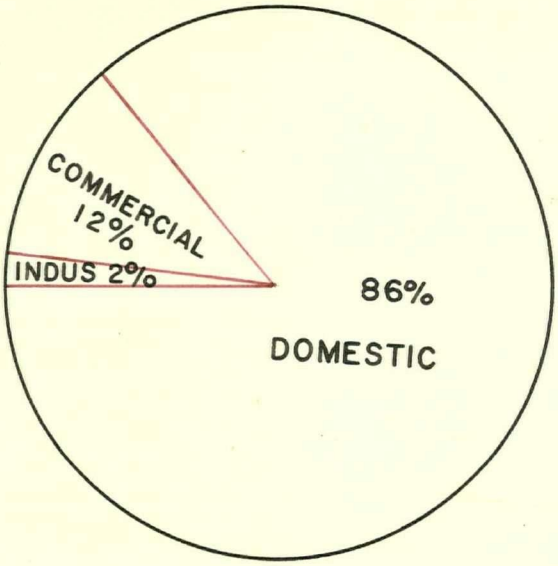
Area	Residential service	Commercial service	Power service	Street light service	Total	Revenue per KWH
Alberni	9,160,934	4,408,326	3,406,880	245,605	17,221,745	2.2
Alert Bay	823,970	707,367	294,580	43,438	1,899,355	2.9
Campbell River	3,192,802	2,165,247	1,748,917	74,000	7,180,966	2.3
Comox Valley	5,688,534	2,969,044	652,776	214,100	9,524,454	2.7
L. Cowichan	680,446	380,192	364,652	45,448	1,470,738	3.6
Nanaimo-Duncan	27,959,758	14,253,130	11,946,301	893,660	55,052,849	2.3
Ucluelet-Tofino	394,638	192,842	702,820	26,962	1,317,262	2.6
	47,897,082 51.1%	25,076,148 26.9%	19,116,926 20.4%	1,543,213 1.6%	93,667,369 100%	

(1) B.C. Regional Industrial Index, 1952, Dept. of Trade and Industry, Victoria, B.C.

(2) B.C. Power Commission, Eighth Annual Report, 1953

DISPOSITION OF POWER

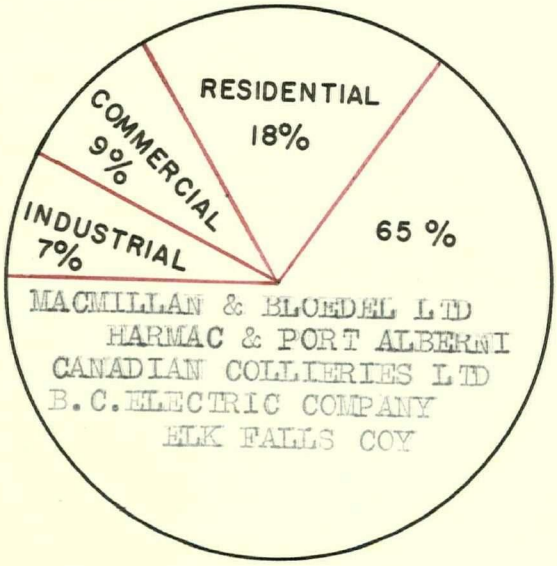
BY SERVICES



A

A. BRITISH COLUMBIA ELECTRIC CO, PLANTS

B. BRITISH COLUMBIA POWER COMMISSION PLANTS



B

Thus we see that, in the southern part of the Island, domestic services are the chief consumers of electricity. The City of Victoria is responsible for as high as 86% of the total consumption in this southern area. It is but natural that in urban centers the commercial establishments, rather than the industrial, should be favoured, as data for southern Vancouver Island clearly indicate; for we note that commercial services account for 12 per cent. of the power utilization as compared to only 2 per cent. used by the industrial services. With the John Hart power development, there is a noticeable trend on the part of industrials to leave the urban centers and establish plants near the source of their raw materials. The Elk Falls and the Harmac pulp and paper mills offer good examples of this tendency.

Besides the distribution of 93.6 million k.w.h., as indicated in Table 85, the B.C. Power Commission sells power to the following companies:

B.C. Electric Railway Co.	109,827,000	k.w.h.[1]
MacMillan-Bloedel Co. (Harmac)	50,309,000	"
" " " (Alberni)	31,933,000	"
Elk Falls Paper Mills	91,829,000	"
Canadian Collieries Ltd.	1,516,000	"
Total:	285,414,000	"

Out of this 285 million kilowatt hours, 176 million are consumed North of Duncan and the rest goes to the southern area. Leaving aside B.C. Electric figures, the remaining four companies consume 65 per cent. of the utilized power supplied by the B.C. Power Commission. This means that 72 per cent. of the energy in the northern part of the Island is used for industrial purposes; 18 per cent. for domestic services and 9.3% for commercial.

(1) Ibid.

This is because of the industrial development taking place first and was then followed by the development of residential and commercial centers.

The availability of electric power from the above mentioned sources has greatly aided economic development. Through its utilization of these natural resources this power is responsible for transforming southeastern Vancouver Island into the highly industrialized region that it is today. The low cost of power has stimulated the pulp and paper industry. Since 1947, following the development of electric energy, the pulp and paper industry has known a tremendous expansion.

The widespread distribution of power throughout the Island has led to the dispersion of industries: for industrialists now tend to leave urban centers in order to establish their plants near the source of their basic material. This would be impractical but for the long distance transmission of electric energy: it is far easier and more economical to transmit power for the use of establishments transplanted to the proximity of their raw materials, than it is to bring raw materials to hydro-electric plants. The location of many large mills, like those at Alberni, Harmac and Chemainus are determined by the nearness to resources rather than by the presence of a hydro-electric plant; for in the present age, power can be easily transmitted from one place to another within a reasonable distance.

The wide distribution of electric power has also benefitted the residents of small towns and villages by making available the same conveniences of household electric appliances as are enjoyed in the large towns and cities.

XII

Transport and Communication

Since the time when primitive peoples communicated by means of smoke signals or with big drums; by human runners or animal steeds, the means of transportation and communication have greatly changed. Modern men use water power, wood, coal, gas and Diesel oil - faster, more efficient and comfortable. Means of transportation and communication are, besides, infinitely more important today. Once settlements were isolated and self-sufficient; but modern people are very interdependent; hence means of transportation and communication are an essential part of their economy.

Before discussing the actual means of transport on Vancouver Island, we must first emphasize the influence of physiography - in this case relief - on the location and direction of road systems and railways, obliged to follow the contours of valleys or the line of coastal plains. More than 95 per cent. of the population itself is found within 10 miles of the Ocean or the Gulf - well served by sea, road and railway transport. Settlement and transport are very much inter-related and the program of one depends upon the program of the other. The broken nature of the coast favours coastal service - indispensable to an island's trade and commerce. Finally the fiord-like pattern of the inlets makes timber accessible for transportation to manufacturing centers. This irregularity of the coast-line ranks next to relief in aiding the development of the coal and timber resources. And the presence of coal and timber resources guide the location of settlements and transportation routes? Once the resources are developed, they provide enough business to attract the transportation


VANCOUVER ISLAND. B.C.
N
TRANSPORTATION
PORT HARDY
COAL HBR
PORT ALICE
SAYWARD
CAMPBELL RIVER
ZEBALLOS
NOOTKA
COURTENAY
PARKSVILLE
NANAIMO
PORT ALBERNI
TOFINO
BAMFIELD
DUNCAN
SIDNEY
SOOKE
VICTORIA
RAILWAY
SINGLE TRACKS
LOGGING TRACKS
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ROADS
MAIN HIGHWAYS
PROPOSED HIGHWAYS
LOCAL ROADS
COASTAL SERVICE
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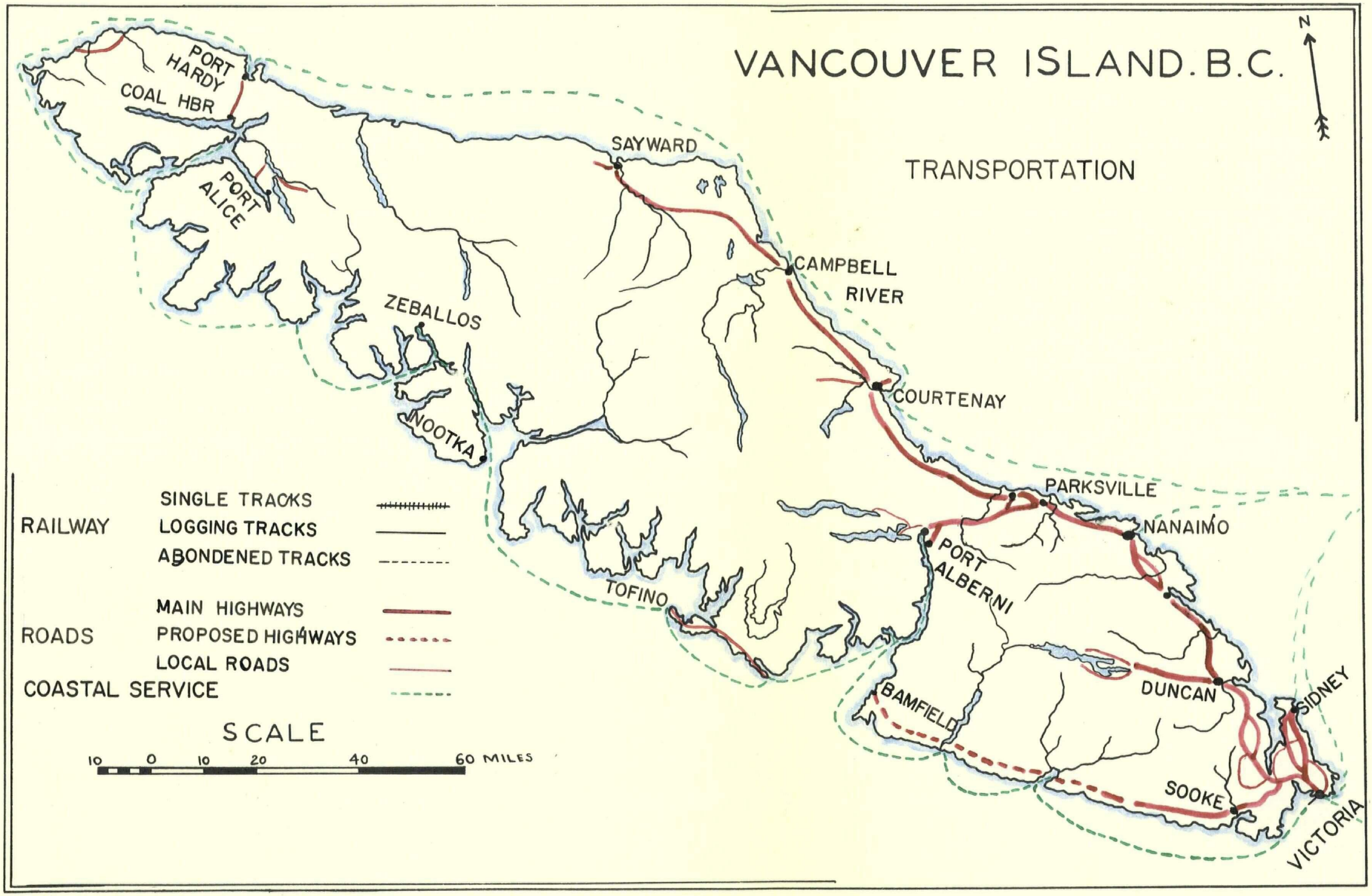
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LOCAL ROADS
COASTAL SERVICE
SCALE
10 0 10 20 40 60 MILES

lines.

The subject of Transportation and Communication falls naturally into the following divisions:

1. Waterways
2. Highways
3. Railways
4. Airways

1. Waterways

The transportation and communication pattern of Vancouver Island has developed from sea routes. The Hudson Bay Company's vessels, and later, inter-coastal shipping formed the first connections between Victoria and outlying parts of the region. The Island today has very good sea trade with the Mainland, the United States, the Orient and other parts of the world.

Vancouver Island may be reached from the Mainland by crossing the Straits of Georgia in boats operated by the Canadian Pacific Railway, the Puget Sound Navigation and Union Steamship Companies. The Canadian Pacific Steamships operate a twice daily ship between Vancouver and Nanaimo. Less frequent coastal service connects Victoria and Vancouver with the sparsely populated settlements on the East and West Coasts of the Island. The West Coast's isolated settlements depend entirely for their supplies on the coastal service ships. The Puget-Sound Navigation Company operates a car and passenger service between Victoria and Port Angelus (U.S.A.). Sidney in summer months has ferry connections with Anacortes (U.S.A.) and Steveston, B.C.

There is a daily scheduled barge service for railroad cars and large trucks from Nanaimo to Vancouver.

2. Highways

In the pioneer days, travel was by horse and wagon and followed valley and coastal plain along roads that were hardly more than trails. Today visitors to Vancouver Island are warm in their praise of the remarkable roads that traverse the East Coast for a distance of 224 miles from Victoria to Kelsey Bay. The densely populated, highly developed southeastern part of the Island is also well served by roads.

On Vancouver Island roads, the open mileage, excluding that of cities and towns, totals 1,950 miles, including 26 paved, 312 miles with a bituminous coat, 1,200 miles of gravel and 412 of ordinary earth roads. The Island Highway from Victoria to Campbell River, with a branch to Port Alberni, is paved for several miles and a great part of the remainder has a bituminous coat. Trunk highways that extend from Victoria to Sidney are paved throughout and highways reach Sooke and Jordan River.

Branch roads run from Duncan to Cowichan Lake; from Courtenay to Cumberland and Comox; from Campbell River to Forbes Landing and Upper Campbell Lakes; from Parkesville to Alberni and Port Alberni and from the latter points to Sproat and Great Central Lakes.

Motor bus service runs on regular schedule, from Victoria to all points as far as Nanaimo and from Nanaimo to Alberni and Campbell River. Very efficient truck service is also operating in the southeastern part of the Island, from and to all important points.

These roads have been of great value in reaching remote areas and have served not only to get out large loads of timber, but have also stimulated the tourist trade by providing easy access to various wildernesses of superb scenery.

3. Railways

Railroads follow the road patterns and run parallel to them. To encourage settlement and exploitation of the natural resources of the Island the Esquimalt and Nanaimo Railway was constructed. This railway offering passenger and freight service, extends from Victoria to Courtenay (140 miles). A branch line from Duncan extends to Cowichan Lake (freight only) and a second branch line from Parkesville goes to Port Alberni - thus bringing the total mileage of this railway up to 210 miles. The Canadian National Railways operate 97 miles with services from Victoria, through Metchosin and Sooke to Cowichan Lake. This line, though it maintains a passenger car, is primarily for freight. Besides these lines, there are some logging operations which have a private track for a few miles, some of which are shown on the map.

4. Airways

Vancouver Island is also well served by the most modern means of transport. Trans-Canada Air Line maintains a daily service between Victoria and other Canadian cities and Seattle. The Patricia Bay airport near Sidney has a suitable tract of flat land, away from the urban concentration. A favourable site for an adjacent seaplane base was also a determining factor in its choice. A chartered plane service is also available to all points on Vancouver Island with its base at Patricia Bay and from the seaplane base at View Royal in Esquimalt, Port Alberni,

Sproat Lake and Campbell River.

Other points on the Island where scheduled air service is available are Nanaimo, Comox, Port Hardy, Cassidy, Tofino and Nootka.

Transportation has never been a problem on Vancouver Island, especially in the southeastern part. Even the remote settlements along the coast are easily reached by the coastal service. Bus service is excellent and connects all the important population and industrial centers of the South-East of the Island.

All the settlements as far as Courtenay and Port Alberni are connected by rail; the daily service with the Mainland is very complete and efficient; deep sea lines link Victoria with foreign lands. For hunting and fishing enthusiasts who wish to visit the more inaccessible islands and lakes, water and air taxi is available from all larger centers.

XIII

Trade

Because of the distribution of natural resources, the various regions of the earth can each produce some commodities advantageously; others with difficulty, and still others not at all. Thus a particular region specializes in the production of goods for which it is best suited and imports the commodities of those for whom conditions are less favourable. In the case of Vancouver Island, because of its vast resources of timber and other physical and economic factors, lumbering can be done more efficiently, effectively and economically than any other production, such as agriculture. Thus Vancouver Island specializes in wood products which constitute three-quarters of its foreign exports.

Now let us see where we can sell Vancouver Island's industrial products. There are three distinct markets for Island goods:

1. Local
2. Mainland (coastwise trade)
3. Foreign (foreign trade)

1. Local Market

The scope, size and nature of such markets in a given region are determined by the size and state of its population and whether the numbers are decreasing or increasing. It is true of Vancouver Island where an expanding population represents an expanding market. The local market is the most stable of the three and its needs are looked after first. Any surplus goes to the Mainland or foreign markets. The following table

will give some idea of the Island's home market:

Table 86. Summary of Retail Merchandise Trade, 1941, Vancouver Island[1]

Market	Population	No. of Stores	Sales 1941 $	Employment and wage facts: Full time employees: Male	Female	Salaries and wages
Vancouver Island	150,407	2,100	61,896,900	3,307	1,881	5,540,500
Victoria	44,068	1,210	36,761,400	1,206	1,399	3,813,000
Alberni	1,807	28	510,000	21	8	30,000
Courtenay	1,737	70	2,579,000	153	34	218,000
Duncan	2,189	98	2,510,000	155	39	223,500
Ladysmith	1,706	40	753,000	36	9	45,000
Nanaimo	6,635	176	5,858,000	310	158	485,500
Port Alberni	4,584	97	2,340,000	127	51	184,000
Remaining parts	87,681	701	10,583,000	404	183	541,300

This table indicates that Victoria is the main center of trade and commerce, as it has the largest population, number of stores and employees. Not only its own residents, but people from other centers come to the capital on week-ends for shopping on account of the greater variety of goods. Smaller centers provide day to day necessities of life.

2. Mainland Market

(Coastwise trade)

Just across the Straits of Georgia lies the Mainland of British Columbia, a huge market that can consume anything that Vancouver Island can produce, except forest products. But even there, Vancouver Island does supply some logs and pulpwood to the Mainland mills. There is a considerable local trade between Victoria and other Island ports and between the Island and the Mainland. The following table gives the extent of the coastwise trade:

(1) British Columbia as a market, Dept. of Trade & Industry, Bureau of Economics & Statistics

FOREIGN & COASTWISE TRADE

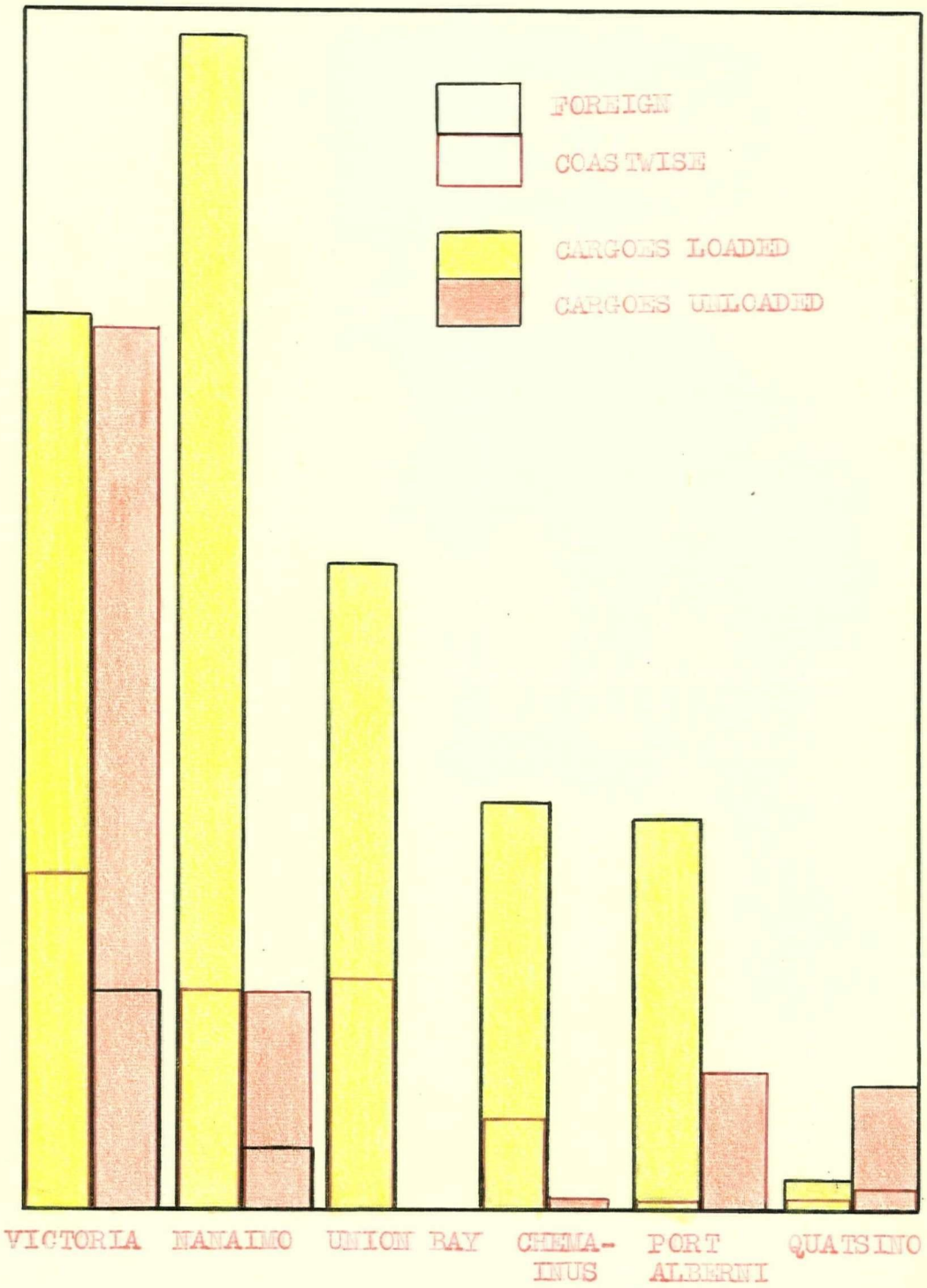


Table 87. Cargoes Loaded and Unloaded in Coastwise Service, 1951 (1)

	LOADED		UNLOADED	
	Total No. of tons	Chief commodity	Total No. of tons	Chief commodity
Bamfield	3,516	Fish (2,842)	3,691	Petroleum oil & products (1,120)
Chemainus	54,926	Logs, posts, etc (33,840)	4,532	Logs, posts, etc., (1,475)
Port Alberni	3,931	Lumber, Timber (322)	78,218	Petroleum oil & products (13,400)
Port Hardy	1,056	Logs, posts, etc (44)	5,376	Petroleum oil & products (1,403)
Quatsino	7,000	Wood pulp (5,282)	11,324	Petroleum oil & products (5,726)
Ucluelet	91,832	Logs, posts, etc (86,538)	10,096	Petroleum oil & products (3,200)
Union Bay	136,329	Coal (136,329)	-	-
Nanaimo	129,600	Coal (46,700)	128,970	Petroleum oil & products (40,762)
Victoria	196,332	Logs, posts, etc (57,354)	515,101	Petroleum oil & products
Total	631,552		757,308	

Thus logs, timber, lumber and coal are the major commodities that are loaded at Vancouver Island ports for coastwise markets and petroleum oil and other petroleum products are the chief unloaded ones. Most of the merchandise that Vancouver Island imports comes from other Provinces of Canada, through the port of Vancouver.

(1) Shipping Report, 1952, Section 111, Dept. of Canada

3. Foreign Markets

This brings us to the subdivision of Foreign Markets from the point of view of selling and buying, under the headings:

a) Exports

b) Imports

a. Exports

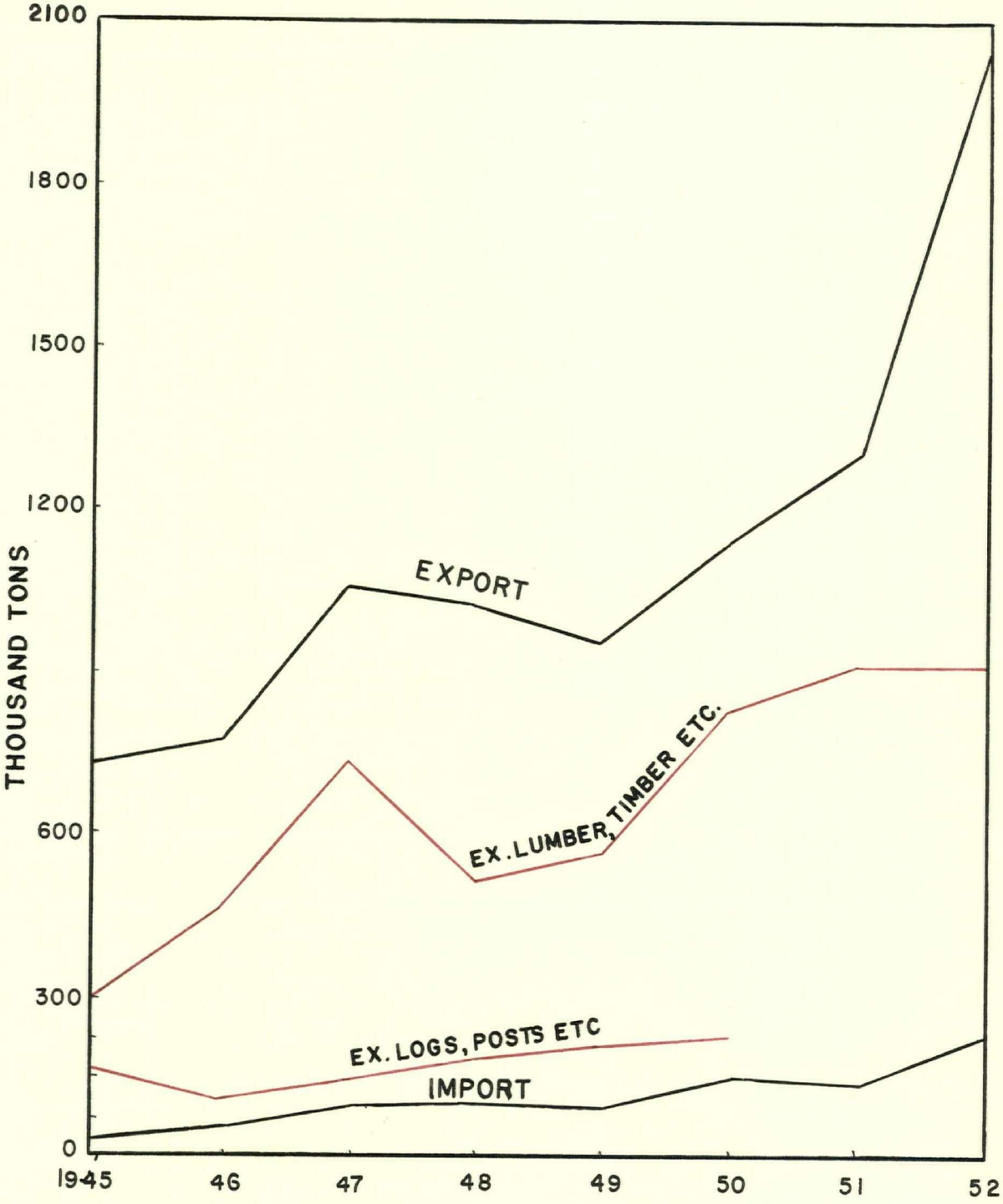
These markets are of a complex nature as they are subjected to different economic and social factors in different parts of the world; hence most unstable of the three types of market. However, Vancouver Island's lumber, because of its quality, is known all over the world and finds a market in many ways. The chief buyers of the Island's products are the United Kingdom and the United States; less important buyers are other countries of the world. Since devaluation, the dollar shortage has been reflected in the loss of the United Kingdom market for lumber, salmon, etc. Now it is the United States that handles most of the Island's trade. The following table shows the nature and extent of Vancouver Island's foreign trade.

Table 88. Cargoes Loaded for Foreign Countries, 1951 (1)

Unit = ton Cargo	Chemainus	Port Alberni	Union Bay	Nanaimo	Victoria	Total	Percentage	
Lumber, timber, boxes, crates	239,184	216,025	-	85,107	334,615	794,965	39.0	
Logs, posts, poles, pit props, piling	790	-	-	120,605	107,397	228,792	10.7	
Wood pulp, pulp screening	25	9,700	-	12,005	-	40,000*		*Quatsino-18,300 tons
Pulpwood, pulp chips	-	-	-	-	58,078	58,078		
Plywood	-	1,055	-	-	-	1,055		
Newsprint paper	-	-	27,209	300	-	27,509		
Firewood, hog fuel	-	-	-	930	-	930		
Other manufactured wood products	3,242	-	-	1,038	-	4,280		
Iron ore	-	-	311,463	448,266	-	759,729	37.3	
Coal	-	-	31,864	11,994	-	43,858		
Coke	-	-	-	1,985	-	1,985		
Copper ore and concentrates	-	-	-	-	448	448		
Other metallic ores & concentrates	-	-	2,800	-	-	2,800		
Scrap iron and steel	-	-	-	-	598	598		
Sand, gravel and crushed stone	-	-	-	-	540	540		
Corn	-	-	-	-	4,763	4,763		
Fish oil	-	-	-	-	880	1,110*		*Ucluelet-230 tons
Fish - fresh, frozen and cured	566	-	-	646	2,664	3,876		
All other freight	-	-	-	657	59,463	60,120*		*Includes 58,000 tons of fertilizers of all kinds
	243,807	226,780	373,463	664,248	521,535	2,035,436		

(1) Ibid.

FOREIGN TRADE



It is the extractive industries that constitute the bulk of the foreign exports: logs and iron ore account for 48 per cent. of the total exports of the Island. Among the manufactured goods, lumber, timber, box and crate products show significant figures, amounting to 39.0 per cent. of the foreign exports, thus making it the leading individual group among the exports. From this table we may conclude that the primary source, that is, forests are responsible for more than 60 per cent. of Vancouver Island's exports. Because of the absence of an iron and steel industry in British Columbia, nearly all the Island's iron ore is shipped to Japan.

b. Imports

The following table lists the cargoes imported from other countries:

Table 89. Cargoes Unloaded from Foreign Countries at Vancouver Islant Ports, 1951 (1)

Unit = ton Cargo	Quatsino	Nanaimo	Victoria	*1: Others	Total	Percentage
General		406	89,833	-	90,239	38.3
Petroleum oils and petroleum products	52,194	6,918	8,808	6,436	74,356	31.6
Chemicals and chemical prod.	9,000	19,439	4,978	-	33,417	14.2
Other petroleum & coal prod.	-	-	8,899	-	8,899	3.8
Sulphur	7,925	-	-	-	7,925	3.36
Cement	-	4,619	264	-	4,883	3.08
Iron and steel	820	-	1,280	-	2,100	.9
Castings and machinery	-	-	558	-	558	
Logs, posts, poles, etc.	-	1,800	327	-	2,327	.9
Fruits, fresh	-	-	491	-	491	
Eggs, butter, cheese	-	-	450	-	450	
Canned food products	-	-	534	-	534	
All other freight	-	534	6,963	300	7,797*2	3.3
Total	69,939	33,907	124,471	6,736	235,053	

*1. Includes Chemainus, Port Alberni and Union Bay

*2. Includes Grains, other agricultural products, coal, other mine products, wood pulp, scrap iron and steel, agricultural implements, etc.

(1) Shipping Report, 1952, Section 111

Petroleum oil and its products are by far the major imports. Most of the oil is used by the Diesel plants at Alert Bay, Port Alice and Ucluelet-Tofino to supply light and power to isolated industrial plants, such as the pulp mill at Port Alice and the fish cannery at Tofino. Petroleum oil constitutes 30 per cent. of the total foreign imports. Another 18 per cent. consists of chemicals and chemical products and sulphur, mainly used by the pulp and paper mills. The percentage of other commodities is very small in comparison to those just mentioned. The forest industry consumes the major portion of the foreign imports. But it is not the imports that are significant; it is the volume of exports: the volume of foreign imports constitutes only 11.5 per cent. as compared to the total volume of exports.

In the preceding pages we have discussed the nature and extent of our foreign trade. Let us now consider the value of the exports and imports of Vancouver Island. The following table shows the value of the exports and imports, by selected ports, for 1950 and 1951:

Table 90. Value of Exports and Imports by Selected Ports, Vancouver Island 1950-1

	Nanaimo		Port Alberni		Victoria	
	1950	1951	1950	1951	1950	1951
Imports						
Dutiable	163,035	889,121	33,961	175,442	6,692,819	10,524,712
Free	152,543	228,753	50,252	58,867	6,553,322	7,846,403
Duty collected	30,677	152,413	7,474	29,741	2,167,499	3,131,082
Exports	24,553,019	24,431,816	5,575,249	17,781,181	18,361,248	27,978,983

Vancouver Island has a favourable trade balance, as in 1951 the value of exports through Victoria, Nanaimo and Port Alberni was 70 million

dollars against 20 million of imports; that is, 3.5 times that of imports. Furthermore, duty collected in the same year was over 3 million dollars, nearly half the value of the agricultural production. All this adds to the prosperity of Vancouver Island. From the above table we can conclude that the Island's foreign trade is increasing, a fact which gives us faith in the future expansion of the Island's industries. The economic developments of a region can be judged by its trade and without doubt Vancouver Island belongs to this class. Even in regard to the future one can say with some certainty that Vancouver Island, with its timber, minerals (coal, iron, copper) and fish will enjoy a prosperous economy and trade.

XIV

Population

Three nations have made their contribution to the discovery and geographical knowledge of the Northwestern Coast of America: Spain, Russia and Great Britain. Spain began to explore it as early as 1528;* next came Russia, discovering Behring Strait in 1647 and reaching the coast of the British Columbia of today in 1741. The United States exhibited their interest in this region very late: their first geographical discovery was in 1792, when already the Spaniards, Perez, Hecata and Quadra, between 1774 and 1779, had taken possession of the Nootka Sound country for Spain. At that time there was no sign of European occupation in this vicinity.

The arrival of Captain James Cook at Nootka, in 1775, where he exchanged brass and iron for skins of bear, fox and otter, etc., has changed the whole history of the North-West Coast. But before we add more historical data to this study of the Island population, let us name the several aspects of the subject which we propose to treat:

A. History and exploration

B. Early settlement

C. Present Population

D. Occupation and industries of the "Labour Force"

E. Present settlements

* Sir Francis Drake in 1579, on his famous circumnavigation, sailed up to the Oregon Coast and refitted in California, named by him New Albion. Drake may have reached the coast of Vancouver Island but this is doubtful; Cf. Capt. R. P. Bishop "Drake's Course in the North Pacific". The B.C. Historical Quarterly, July, 1939, pp. 151-182

A. History and Exploration

Nootka continued to be the center of interest and dispute on Vancouver Island. Following Cook, Captain Hanna, in 1785, made a successful round trip between China and Nootka. In 1786, at least eight vessels were in quest of the sea otter. In 1788 Martinez and Haro visited the Russian settlement in Alaska and learned that theRussians were planning a trading post on Nootka Sound. Spain decided to forestall the Russian advance and in May, 1789, Martinez and Haro arrived at Nootka. They seized the "Iphegenia" (English vessel); but released her later. It marked the beginning of the struggle between Spain and England for supremacy in the Pacific. On June 24, 1789, the Spaniards formally took possession of Nootka. Now, violent measures were adopted by the Spaniards and directed against the British traders at Nootka, the news of which reached Madrid and London and culminated in the Nootka Convention of 1790.

By the terms of settlement that followed this disturbance, Spain was to restore all property seized and England was neither to navigate nor fish within ten leagues of any spot occupied by Spaniards; elsewhere navigation along the north-west Coast should be free to both powers and in execution of these terms, commissioners appointed on either side were to meet at Nootka. George Vancouver* was commissioned to act for England and Don Juan Francesco de la Bodega y Quadra for Spain. George Vancouver appeared upon the coast in the sloop of war, "Discovery" with the armed tender "Chatham", in April, 1792, the month following the departure of Bodega y Quadra from San Blas with three ships. Captain Vancouver met Valdes and Galiano (last Spaniards to visit the Southeast Coast of

* He had served as midshipman with Captain Cook during his 2nd and 3rd voyages.

Vancouver Island) off Vancouver Harbour and proceeded with them to survey the waters of Georgia Straits.

B. Early Settlement

The first white men who came to Vancouver Island were not settlers but fur-traders and coal-miners and their primary object was trade. Following the visit of Captain George Vancouver to Southeastern Vancouver Island and the "Nootka Convention", signed in 1795, no white settlement took place for some 50 years.

The Oregon boundary dispute was responsible for the replacement of Fort Vancouver by a new trading post farther North in undisputed territory. Consequently James Douglas, chief factor of the Hudson Bay Company, visited and examined the southern end of the Island with a view to establishing a Company fort that would be self-supporting. He discarded the better harbours of Sooke and Esquimalt for that of Victoria, or "Camosack" (Indian name).

The life of the outpost centered around the Hudson Bay Company post until 1849, when Vancouver Island was made a Crown Colony and declared open for colonization.

It was only when men became interested in soil with a view to subduing, improving and permanently cultivating it for their own benefit that settlement in the true sense of the word began. The first bona fida settlement for several years, under the Crown grant, and independent of the Hudson Bay Company, was made in 1849 by W. C. Grant. The "Harpooner" arrived in June, 1849[1] with 21 settlers and all their belongings. All the expenses were paid by Mr. Grant. After a careful examination of the

(1) Finlayson, History, Vol. J, MS, 48

country, hechose the most favourable spot available, Sooke Harbour.

In 1850, Norman Morrison arrived bringing 80 immigrants, and in June, 1851, the "Tory" came into the port with 120 hired labourers.

By the end of 1853, besides the 17,000[1] natives there were on the Island, men, women and children, white and mixed, numbering 450 persons, 300 of whom were on land between Victoria and Sooke, 125 at Nanaimo and the rest at Fort Rupert. Up to this time 19,807 acres in all had been applied for under the grant, 10,172 being claimed by the Hudson Bay Company, 2,374 by the Puget Sound Company and the remainder by private persons.[2] 973 unoccupied acres were claimed by absentees.

The Hudson Bay Company soon ceased to be the only business concern and a commercial district grew up. At that time the only sea port in British Columbia, the settlement became the outfitting center for miners and adventurers, who flocked in from the gold fields of California and Australia en route to the mines. It was estimated that within a few weeks over 20,000 had arrived. When the Fraser River Rush had subsided there developed the Caribou excitement of the sixties. All this resulted in Fort Victoria being incorporated as the City of Victoria in 1862.

There were newspapers published in 1858. The Daily Colonist of today is the descendant of the British Colonist of 1858.

Another impetus was given to the settlement and development of the Island in 1868 when Victoria was chosen as the capital of British Columbia. The period of rapid expansion for Southeastern Vancouver Island

(1) Adopting Crout's estimate. See also Rattary, Vol. 1, 8

(2) 16 settlers occupied 1,696 acres, etc.

ended after the first Canadian Pacific train arrived at Vancouver in 1886. Victoria's commercial domination was lost to Vancouver. The Esquimalt-Nanaimo Railroad was opened in the same year and helped in the establishment of settlements to the North and the exploitation of the forest and the mineral resources of that area. The railway was later extended to Alberni. In 1894 a railway was built linking Victoria and Sidney. It aided the agricultural and industrial expansion of Saanich Peninsula, but ceased to operate in 1919.

C. Present Population

As we study Present Population certain of its aspects will be treated under the following headings:

1. Growth of population
2. Distribution
3. Density
4. Composition

1. Growth of Population

The population of Vancouver Island is 215,000 (1951) and has shown a steady increase since 1881. The table showing the growth of population from 1881 to 1951 is given below. The average annual increase is around 3,295 persons; although for some decades it is less and for others greater, due to many factors, local or from abroad.

Table 91. Increase in Population of Vancouver Island by Decades (1881-1951)

	1881	1891	1901	1911	1921	1931	1941	1951
Vancouver Island	17,292	35,744	50,886	81,241	108,792	120,933	150,407	215,003
Lower Mainland	7,939	41,507	53,641	183,108	256,579	397,857	449,376	
British Columbia	49,459	98,173	168,657	392,480	524,582	694,263	817,861	1,163,210

If we compare the 1881 population figures with those of the Lower Mainland division, we note that Vancouver Island had more than double the population of the Lower Mainland; but that after that date it was the latter that took the lead over the Island. In fact the increase in the Lower Mainland was rapid, the reason for which lies in the construction of the Canadian Pacific Railway, completed in 1886 and which opened a new era for the development of the Mainland and Vancouver Island. On Vancouver Island the rate of increase is again more rapid during the periods 1931 to 1941 and 1941 to 1951. This increase in 1931 to 1941 was due mostly to the presence of service men and technical personnel during World War II but also to the rapid expansion of wartime industries. During the 1941 to 1951 decade (including the post-war period) the increase was the highest ever recorded for one decade in the history of Vancouver Island; that is, 65,000 persons. This could be attributed to the natural increase, migration from other parts of Canada, notably the Prairie Provinces, immigration from Europe and the return of the men from the war. Quite a number of people in their old age come to Vancouver Island attracted by the equable climate and the ideal living conditions in the southern part. A considerable number of them have taken small holdings around the urban centers and have practiced specialized agriculture, poultry or dairying on a small scale. On the other hand the expansion of the industries has continued and the war time industries

have adjusted themselves to peace time production. In future this growth will continue, but not at the rate of the 1941-1951 increase - unless some extraordinary circumstance occurs.

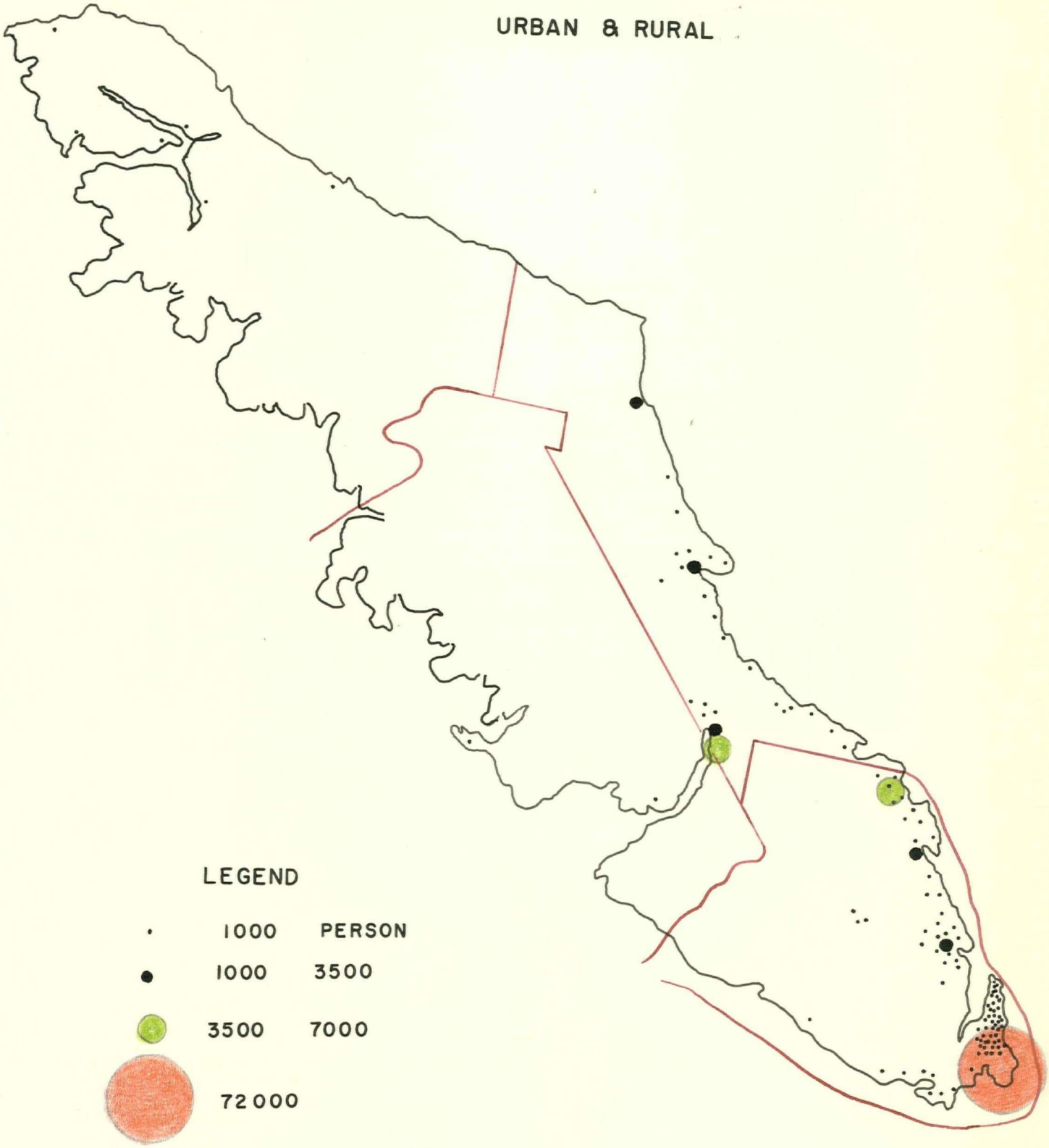
2. Distribution of Population

There are many factors on which depends the distribution of population on the Island. The most important of these controls are topography and landform, climate and accessibility. Population has followed the general rule of settlement, that is, the most favourable areas are settled first and form the core of the population. On Vancouver Island it was the southeastern area that was settled first and from there the population spread to the northern valleys and the coastal plains. Even today, out of the total population of 215,003, southern Vancouver Island (subdivision) has 159,587 inhabitants, or 74.4 per cent. of the total Island population. The City of Victoria alone is responsible for 23.6 per cent. of the total population of the Island. The lowland areas, like Victoria - Saanich, the coastal plains, especially those of the East Coast and the valleys are generally well populated as compared to the central, western and northern parts, which are very sparsely populated.

In the southeastern part which is heavily populated, the soil is fertile and agriculture is an important occupation. In this part of Vancouver Island, Victoria, because of its hinterland, with abundance of natural resources and on account of its own favourable location, has developed into an important industrial center. It is here that the secondary and tertiary industries of the Island are concentrated, thereby giving employment to a great many people. So it is quite logical that a

POPULATION DISTRIBUTION

URBAN & RURAL



greater number of people live in and around Victoria and the surrounding districts. There are some other centers of population which are growing rapidly, namely Nanaimo, Port Alberni, Duncan and Courtenay. They serve as transportation, collecting and distributing centers for the surrounding areas. As compared to Victoria they are very small but they do represent the activities of Victoria.

For the purpose of statistics, Vancouver Island is divided into five divisions and only one out of these is subdivided (Vancouver Island South). It is densely populated. The geographical distribution of the population is shown on the map on the following page.

3. Density of Population

The population of Vancouver Island is distributed unevenly, as indicated by the map. Generally speaking, the southern and eastern parts of the Island are heavily populated as they contain 90 per cent. of the total population; the central part is very sparsely settled (logging and mining camps) and some parts are even uninhabited; while the northern and western coasts have only a few isolated settlements, depending upon the lumbering and fishing industries along the coast. The density of population on Vancouver Island is 16.28 persons per square mile, or about 5 times that of British Columbia. Another fact indicated by the table is the increase in the density of population, both on the Island and in British Columbia; though the percentage increase is higher in the case of Vancouver Island by a negligable amount.

DENSITY OF POPULATION
1951

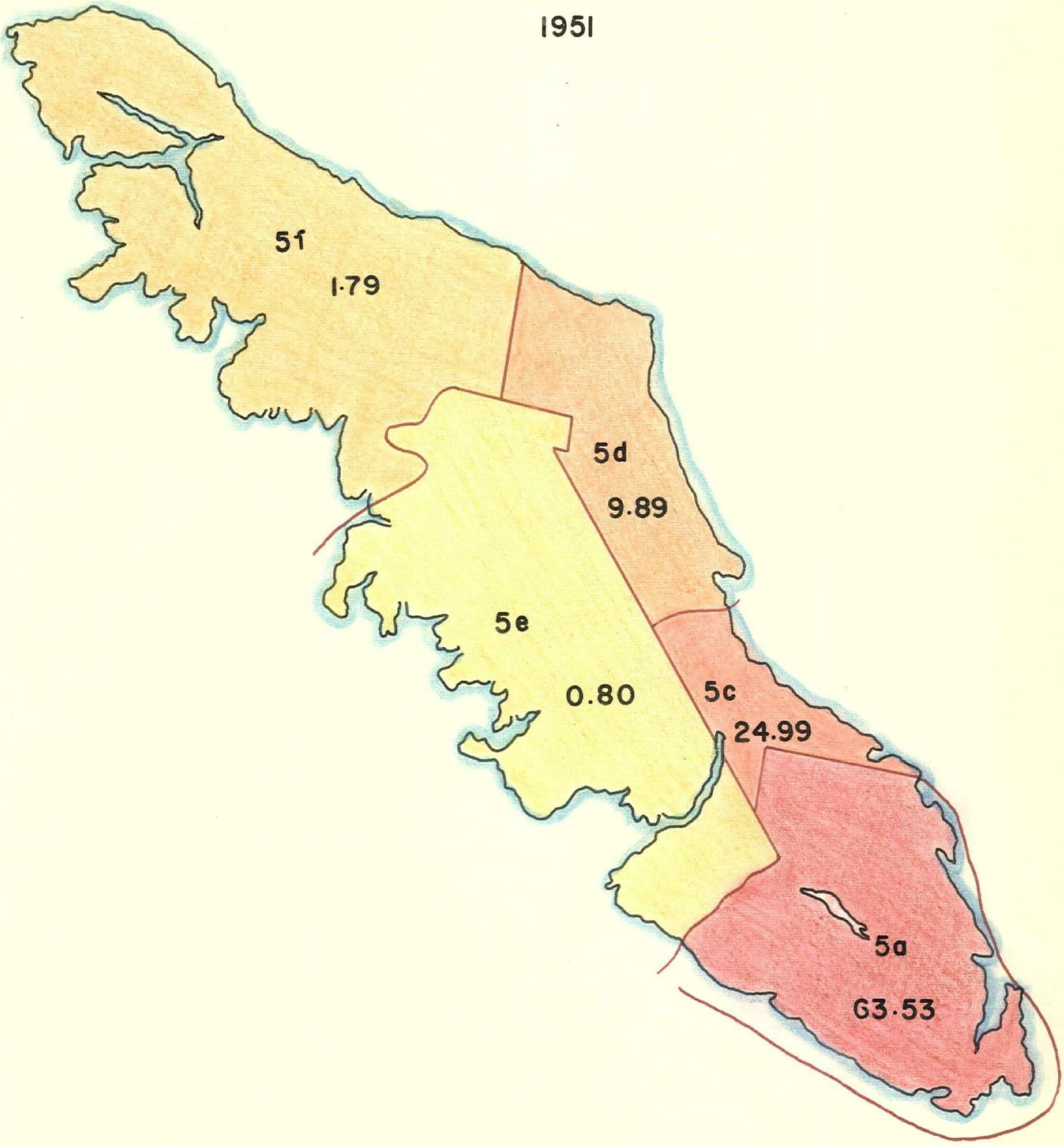


Table 92. Area and Density of Population of Vancouver Island, B.C.

Region	Land area in Sq. miles	1931 Population	1931 Density	1941 Population	1941 Density	1951 Population	1951 Density
Vancouver Island	13,206	120,933	9.16	150,407	11.39	215,003	16.28
British Columbia	359,279	694,263	1.93	817,861	2.28	1,163,210	3.24

Now if we calculate the rural and urban density of population, we shall see that there is a great difference between the two - so much so that they differ by thousands. The following table shows the average density of population of some of the urban centers in 1951.

Table 93. Average Density of Population of Selected Towns and Cities

City or Town	Land area in sq. miles	Population	Density
Victoria	7.25	51,331	70.80
Courtenay	1.31	2,553	13.49
Duncan	0.78	2,784	35.69
Nanaimo	1.22	7,136	58.98
Port Alberni	3.06	7,845	25.64
Total	13.62	71,709	

Thus Victoria has the highest density of population on Vancouver Island and the average densities of these 5 cities is 42.12 which is very high as compared with the percentage of 16.28 of Vancouver Island per square mile. If we consider an area of 1,000 square miles that was surveyed in 1944 in the southeastern part of the Island, we find that the agricultural districts have a density of population of approximately 90 per cent. per square mile, a figure much lower than that of the urban density and higher than the density of population of Vancouver Island as a whole.

4. Composition

As elsewhere in Canada, the population of Vancouver Island is composed of people of different origin, almost all of them European, with a few thousand Asiatics and native Indians. This is the result of immigration from old countries to a new country like Canada. Here are some figures showing the number of the immigrant population of Vancouver Island, by period of immigration:

	Before 1911	1911-20	1921-30	1931-40	1941-45	1946-51 (1)	Total
Vancouver Island	24,014	18,377	12,454	2,613	1,015	7,658	66,137

The next table shows the population classed according to origin:

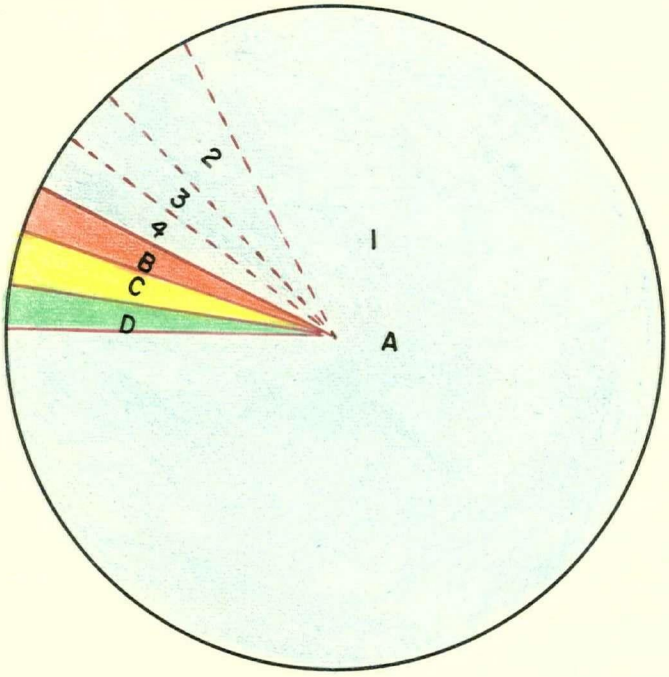
Table 94. Population by Origin of Vancouver Island, 1951

Origin	Number	Per-cent	Origin	Number	Per-cent	Origin	Number	Per-cent
British Isles	161,964	75.4	Finish	1,655	.77	Chinese	3,748	1.74
Scandinavian	9,671	4.50	Russian	1,389	.65	Japanese	126	.058
French	6,260	2.91	Czechoslovac	846	.39	Others	1,024	.47
German	5,641	2.62	Austrian	784	.36	Native Indian & Eskimos	5,626	2.62
Netherland	2,884	1.34	Hungarian	425	.19			
Ukranian	2,020	.94	Jewish	158	.07	Others not stated	4,790	2.23
Polish	1,861	.86	Others	2,354	1.49			
Italian	1,777	.83						

People from the British Isles constitute 3/4 of the total population and out of their national group, the English comprise the greatest number, followed by the Scottish and Irish. This region has an equable climate with many characteristics of that of the British Isles plus a greater number of sunshine hours. This is the major reason why so many people from the British Isles stock and those who have lived elsewhere in Canada prefer to come to

(1) Five months only in 1951.

POPULATION BY ORIGIN, 1951.



EUROPEAN	A 93%	BRITISH ISLES	1.
ASIATIC	B 2.2%	SCANDINAVIAN	2.
NATIVE	C 2.6%	FRENCH	3.
OTHER	D 2.2%	GERMANS	4.

this part of Canada, and they do come, especially Canadians in old age. The second major group, though far less in number than the English group, is of Scandinavian origin. It forms only 4.5 per cent. of the Island's population. People of this origin are attracted by the Island's forest resources and other factors. Forestry is very well developed in these Scandinavian countries and so they have a natural tendency toward the occupation. Next to the people of Scandinavian stock are those of Chinese origin who fit very well into the Island economy. They first came during the gold rush, principally through California.

Each of these groups contributes to the social and cultural life of Vancouver Island. From these different cultures Canadian culture is itself evolving, taking the best from each of the others. Art is the major contribution of these various cultures from different parts of the world.

D. Occupation and Industries of the "Labour Force"

In order to estimate the strength and efficiency of the labour force, it is first necessary to study the age groups of the population of an area. Below is the simplified table showing three important age groups of the various parts of the Island:

Table 95. Population by Specified Age Groups, 1951

		Group 1. Under 14 years		Group 2. 15-54 years		Group 3. 55 years +	
	Total	Number	% of total	Number	% of total	Number	% of total
Subdivision A	159,587	37,666	23.3	82,414	51.7	39,507	25.0
Subdivision C	23,496	7,101	31.0	12,793	54.0	3,602	15.0
Subdivision D	17,204	5,120	29.8	9,183	53.4	2,901	16.8
Subdivision E	2,777	966	35.4	1,461	52.3	350	12.3
Subdivision F	7,803	1,886	24.2	4,903	62.9	1,014	12.9
Vancouver Island	210,867	52,739	25.0	110,754	52.5	47,374	22.5

Vancouver Island has a population of 210,876, out of which 25.0 per cent. are under the age of 14 years (young to work); 52.5 per cent. between the ages of 15 and 54 and 22.5 per cent. are over 55 years (old to work). Now, if we study the distribution of age groups in the various subdivisions of the Island, we see that in the southern part there is a higher percentage of older people as compared to the other parts of the Island. This region provides all the amenities of life, plus a better climate (number of hours of sunshine is greater than in any part of the Island. This beautiful city of Victoria, which attracts older people, is in this southern area and that is still another attraction. In Region C (South-East Coast), there is a marked decrease in the percentage of older people and an increase in that of Groups 1 and 2. This is due to the nature of the occupations and industries of this south-east region. Lumbering, logging and farming are the major activities and they require strong young people to work on the heavy jobs. So that is why the older group is smaller. Most of those who live there move south to Victoria or the surrounding districts in their old age. Subdivision D follows the same pattern. In subdivision E (West Coast) the percentage of Group 1 is the highest as compared with those of other subdivisions. This could be attributed to the fact that some of the boys of working age, after spending their childhood in this region with their parents, move to cities in the eastern part of the Island and there lower the percentage of Group 2. The other noteworthy fact about this region is that it has the lowest percentage of Group 3. The settlements in this region are isolated and the living conditions not as good as in the south-eastern part of the Island; that is why the older people move to the more favourable southeastern region. Subdivision F (North Vancouver Island) with its isolated settlements (fishing, logging camps and other industrial

centers) has the highest percentage of Group 2. The older group, for the reason mentioned above, is small,

Group 2 (15-54 years) which constitutes 52.5 per cent. of the Island's population is the largest single group. But, due to various reasons, all the members of this group are not included in the labour force. In number this labour force is 82,161, of which 35.9 per cent. comes from rural areas and 64.1 from urban. This labour force constitutes 41 per cent. of the total Vancouver Island population; the rest of the population is either too young or too old or unable to work through some disability. Out of industry groups, services form the major group, engaging 30.9 per cent. of the Island's population. Next in importance are the forestry, and trade groups, with 14.2 and 13.0 per cent. respectively. Table No. 96 shows the industries and occupations of the Vancouver Island labour force in detail, with their respective percentages.

Table 96. Labour Force (14 years of age and over), by Industry Groups for Vancouver Island (Div. No. 5), 1951.

	All industries	%	Agriculture	%	Forestry & Logging	%	Fishing & Trapping	%	Mining & Quarrying	%	Manufacturing	%	Electricity, Gas & Water	%	Construction	%	Transportation & Communication	%	Trade	%	Finance	%	Service*	%
British Columbia	444,352		27,659	6.22	24,911	5.64	4,836	1.08	11,442	2.57	90,709	20.2	4,779	1.08	30,721	6.92	35,793	8.07	70,585	15.90	14,585	3.28	134,969	30.7
Rural	127,576	30.0	23,211	84.0	18,694	75.00	2,411	49.9	7,714	67.6	27,272	35.2	937	19.6	8,496	27.7	8,092	22.7	9,661	13.9	1,192	8.2	23,140	17.0
Non-farms	81,242		2,272		16,496		2,272		7,273		22,612		812		6,735		7,065		7,841		983		19,199	
Urban	316,776	70.0	4,448	16.0	6,217	25.00	2,425	50.1	3,728	32.4	63,437	64.8	3,842	80.4	22,225	72.3	27,701	77.3	60,924	86.1	13,393	91.8	111,829	83.0
Vancouver Island	82,161		2,785	3.38	11,669	14.2	1,180	1.47	1,343	1.63	15,111	18.7	945	1.15	5,291	6.44	5,159	6.27	10,788	13.0	2,414	2.93	25,394	30.9
Rural	28,557	35.9	1,704	61.1	8,496	72.6	910	76.0	1,014	75.4	6,000	39.7	213	22.5	1,783	33.9	1,440	27.9	2,231	20.2	315	12.8	3,944	15.5
Non-farms	25,191		275		7,913		867		979		642		202		1,575		1,342		2,031		286		3,602	
Urban	53,594	64.1	1,081	38.9	2,173	27.4	270	24.0	329	24.6	9,111	60.3	732	27.5	3,508	66.1	3,719	72.1	8,558	79.8	2,099	87.2	21,450	84.5

Occupation Groups

		Agriculture	%	Other Primary	%	Manufacturing	%	Construction	%	Transport & Communication	%	Trade and Finance	%	Services	%	Clerical	%	Labourers	%	Proprietors & Managerial	%	Professional	%
Vancouver Island	82,161	3,157	3.84	8,678	10.55	11,420	13.80	5,597	6.58	7,259	8.84	5,413	6.48	13,256	16.00	8,087	9.83	5,620	6.84	6,606	8.03	6,029	7.35
Rural	28,567	1,761	56.00	6,878	79.40	4,202	36.80	1,914	34.10	2,880	39.60	1,122	20.70	2,292	17.60	1,188	14.40	2,401	42.70	2,087	31.70	1,336	22.20
Urban	53,994	1,390	44.00	1,800	20.60	7,218	63.20	3,683	65.90	4,359	60.40	4,291	79.30	10,964	82.90	6,899	85.60	3,219	57.30	4,529	68.30	4,693	77.80

1. Excludes a few persons seeking work, who have never been employed

* Includes "Community", "Government", "Recreation", "Business and "Personal Service" Groups.

E. Present Settlements

Geographic factors, that is, favourable location and equable climate; topography and landform; transportation and communication; raw material and hinterland, etc., have played an important role in the development and expansion of the settlements as they are today. Some of the earliest ones have developed into cities like Victoria and others of the South-East; on the other hand some have remained small villages, with a population of a couple of hundred, like Nootka and Tofino Village of the West Coast, though it was there that the first white settlements were established. People settle there where living conditions are best. Since the earliest times many settlements have sprung up all over the Island, according to the need and growth of population. Most of them are still growing, favoured by the economic and industrial developments of their areas. The table given below summarizes the statistics of the present settlements, with their population and main source of income.

Table 97. Settlements Classified by Source of Income and Prosperity

Name		Population	Main Source of Income	Prosperity depends upon
Victoria	city	51,331	Industrial and Governmental	Shipping
Port Alberni	"	7,845	Lumbering	Lumbering
Nanaimo	"	7,196	Coal mining and lumbering	Shipping
Alberni	"	3,323	Lumbering	Lumbering
Courtenay	"	2,553	Logging, Agriculture & fishing	Logging, Agriculture & fishing
Duncan	"	2,784	Logging (Dairy & poultry)	Logging
Cumberland	"	971	Mining and Agriculture	Mining
Ladysmith	"	2,094	Lumbering and Dairying	Lumbering
Campbell River,	town	1,986	Tourist, fishing and logging	Logging & tourist
Parkesville	"	882	Logging and tourist	Logging
Qualicum Beach	"	771	Tourist	Tourist
Comox	"	714	Logging, Fishing and tourist	Logging & Fishing
Lake Cowichan	village	1,628	Lumbering	Lumbering
Chemainus	"	1,625	Lumbering	Lumbering
Union Bay	"		Mining	Mining
Royaston	"		Logging	Logging
Fanny Bay	"		Lumbering	Lumbering
Bevan	"		Mining	Mining
Merville	"		Logging and Agriculture	Logging & Agrit.
Sandwicke	"		Agriculture and logging	Agrit. & logging
Coombes	"		Logging and Agriculture	Logging & Agrit.
Hilliers	"		Logging and Agriculture	Logging & Agrit.
Districts:				
Esquimalt			Naval Base and urban area	Logging
North Cowichan			Logging and Dairy	Logging & farming
Oak Bay			Urban area	
Saanich			Farming (Dairy, Fruit and vegt)	Dairying

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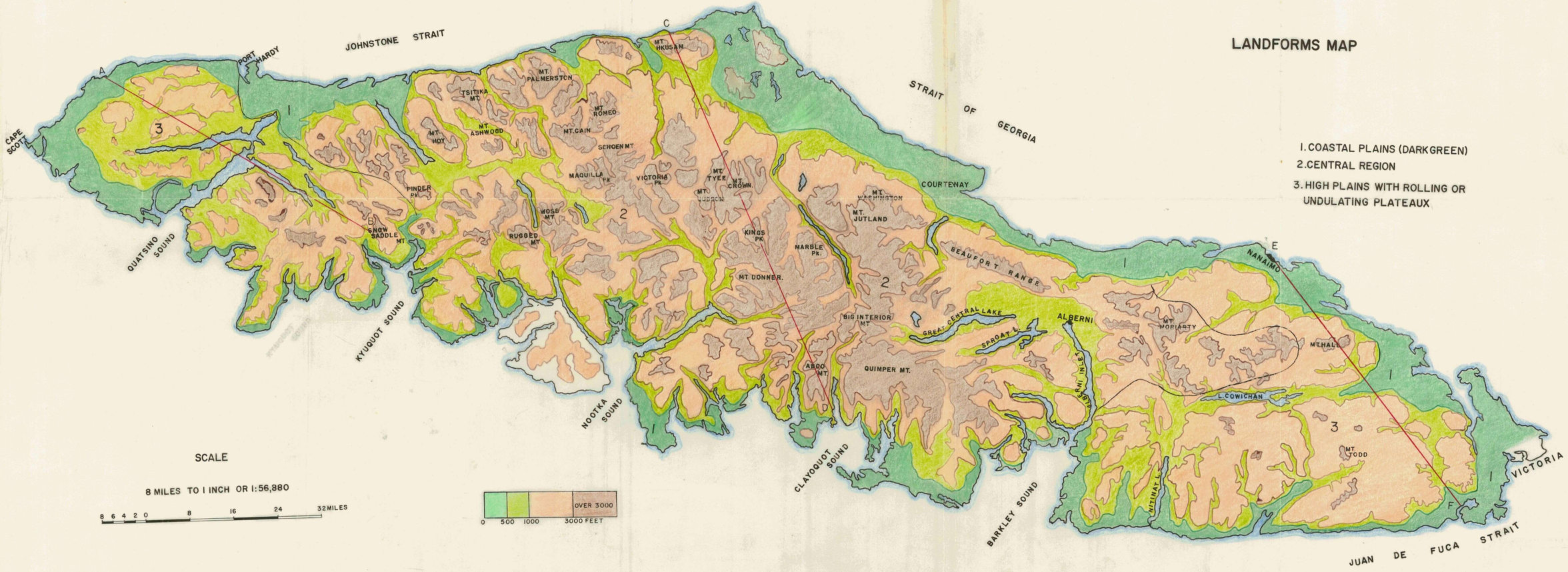
LANDFORMS MAP



1. COASTAL PLAINS (DARK GREEN)
2. CENTRAL REGION
3. HIGH PLAINS WITH ROLLING OR UNDULATING PLATEAUX