FOREST INSECT SURVEY
RANGER'S ANNUAL REPORT
B. C. COASTAL REGION
1947

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RANGER'S ANNUAL REPORT

OF

BRITISH COLUMBIA COASTAL REGION

1947

FOREST INSECT INVESTIGATION

VICTORIA B. C.

INDEX

INTRODUCTION

The report that follows deals primarily with forest insect survey activities in the coastal region of British Columbia for 1947. It includes in addition statements on personnel and finances for the year. It has been written by the insect rangers themselves and being their first is not entirely uniform with respect to arrangement and sequence of the various parts, a matter that will be more standardized with experience.

During 1947 survey activities were greatly accelerated and placed on a sound organized basis. The motor vessel J. M. Swaine was remodelled and placed in operation as a floating laboratory with laboratory facilities for the feeding and rearing of insect material until such time as it is possible to express it to the insectary. The boat also provides living accommodation for seven men. The survey receiving and recording headquarters continued at Vernon. Although unsatisfactory in many respects the arrangement served the purpose pending the eventual building of a coastal insectary at Victoria.

Additional to survey work various research projects were undertaken. The inclusion of reports of these is impossible in this report however, due to the fact that all technical personnel involved left in late summer to continue University work. Initiated in 1947 was a field study of bacterial and virus disease of the hemlock looper. This

study was centered at Poett Nook on the Alberni Inlet in an abandoned logging camp owned by the B. C. Pulp and Paper Company (later purchased by Bloedel Stewart and Welch Company). Also commenced during the year was a Reforestation Project which in ints planning should be continued indefinitely in the study of insect problems of nurseries and plantations. A study of timber deterioration following severe defoliation by the hemlock looper was continued and expanded on this very practical and vital phase of timber salvage and utilization.

The continued decline of the western hemlock looper was one of the most significant occurrences for the year. Although the main infestation collapsed during 1946 this reduction continued through 1947, there being only two areas of marked activity of the looper, the Upper Nitinat Valley and the Poett Nook region. It was in this latter area that summer field station was established.

The laboratory participated in forest insect instruction at the newly developed B. C. Forest Service Ranger School at Green Timbers. Four full afternoons were devoted to forest insect study and the course of instruction was distributed to the students in mimeographed form for permanent reference.

Post-war personnel problems continued to hamper the work with a shortage of trained men to head projects and their absence during the

winter months when practically all returned to University. This lack of field direction was greatly relieved by a 10-day visit of Dr. Kenneth Graham from Sault Ste. Marie. Arriving June 3rd he assisted the organization of work at Poett Nook where Mr. Mr. G. Thomson was in charge. The absence of winter staff, as previously mentioned, prevented the summarizing and analysis of research projects which will be included in later work as opportunity permits.

REGULAR STAFF 1947

Name	Position No.	Class	Duties
H.A. Richmond	AGR-SSE 310	Agricultural Scientist Gr. 4	April 1 - March 31
D.N. Smith	AGR-SSE 319	Senior Agricultural Assistant	April 1 - March 31
G.R. Wyatt	AGR-SSE 3324	Agricultural Scientist Gr. 2	April 1 - March 31
R.L. Fiddick	AGR-SSE 3186	Insect Ranger Gr. 2	April 1 - March 31
K.T. Hughes	AGR-SSE 3251	Insect Ranger Gr. 2	April 1 - March 31
E.G. Harvey	AGR-SSE 3252	Insect Ranger Gr. 2	April 1 - March 31
H.E. Vey	AGR-SSE 3253	Insect Ranger Gr. 2	April 1 - March 31
M.T. Hughes	AGR-SSE 3254	Insect Ranger Gr. 2	April 1 - March 31
D.W. Taylor	AGR-SSE 3187	Insect Ranger Gr. 1	April 1 - March 31
D.G. Collis	AGR-SSE 3431	Insect Ranger Gr. 1	April 1 - March 31
E.M, Irvine	AGR-SSE 3159	Office Clerk Gr. 1	July 25 - March 31
A.I. Sim	AGR-SSE 3298	Stenographer Gr. 2	April 1 - March 31
W.A. Cleveland	----	Captain "J.M. Swaine"	April 1 - March 31
D.C. McFarlane	----	Captain "J.M. Swaine"	April 1 - August 20 August 20 - March 31

SEASONAL STAFF 1947

E.D.A. Dyer	AGR-SSE 3327	Student Agriculture Range 3	May 5 - Sept. 20
J.M. Kinghorn	AGR-SSE 3328	Student Agriculture Range 3	May 5 - Sept. 23
M.G. Thomson	AGR-SSE 3326	Senior Agricultural Assistant	May 19 - Sept. 13
A.H. Marsh	AGR-SSE 3013	Student Agriculture Range 1	May 2 - Sept. 20
J.M. Gonnason	AGR-SSE 3375	Student Agriculture Range 1	May 12 - August 30
R.G.B. Dickens	----	Extra Labour	June 16 - Sept. 13
W.J. McDonald	----	Extra Labour	May 27 - August 31

VICTORIA FOREST INSECT SURVEY
1947.

Introduction
By R.L. Fiddick, Chief Ranger.

During 1947 the forest insect survey on the coast was extended to many areas never before sampled. This was due partly to an increase in ranger personnel, but mostly to the acquisition of the M/V "J.M. Swaine" which has opened an entire new field for survey work. Areas, which were inaccessible, and remote areas, served only by weekly or fortnightly boat service, can now be visited with a minimum of trouble.

A more comprehensive survey was made of Island and lower mainland areas due to an increase in ranger personnel which allowed two man parties to carry out sampling in remote areas and to make extended survey trips to points far from settlements or roads.

Personnel involved in the survey:

R.L. Fiddick - Ranger

K.T. Hughes - Ranger

E.G. Harvey - Ranger

H.E. Vey - Ranger

M.T. Hughes - Ranger

D.W. Taylor - Ranger

D.G. Collis - Ranger

W.A. Cleveland - "J.M. Swaine" Captain for early part of season.

D.C. McFarlane - "J.M. Swaine" Captain for latter part of season.

A.H. Marsh - Insectary and lab man on boat.

B. Dickens - Cook and deck hand on "Swaine."

Distribution of Personnel

R.L. Fiddick spent some time in each district assisting with the planning and survey work in the district, with the ranger personnel involved. During the early spring and for three weeks in June, two weeks in August - September, he was engaged in tree mortality studies in connection with hemlock looper damage in the Sarita, Klanawa and Caycuse River Valleys. During September and October he was engaged in an egg survey and tree mortality study in the Rainy River and Widgeon Creek Valleys. Late October and early November he accompanied H.A. Richmond aboard the "J.M. Swaine" on an inspection trip to Knight Inlet, Port Hardy and other points for the purpose of planning the first portion of the 1948 survey.

K.T. Hughes began the season in May as engineer ranger aboard the "J.M. Swaine." Previous to this he had assisted in directing alterations to the boat as well as tuning the motor in preparation for the season's work. Ranger Hughes assisted in the survey and acted as engineer on the "Swaine" till the end of June. From the end of June to mid-August he conducted survey work in the upper and mid-Island areas in company with E.G. Harvey. Mid-August he again boarded the "J.M. Swaine" for the Vancouver Island west coast survey. When the boat returned to Victoria he remained at the office to draw maps to accompany the forest insect survey report. He also accompanied the "Swaine" to Knight Inlet on the pre-survey trip in early November. He and H.E. Vey conducted an egg survey in the Upper Nitinat River in October.

E.G. Harvey spent practically the full season on the Vancouver Island survey. He commenced collections in late April in the Victoria area and also made some collections in the Sarita Valley in May while engaged in plot work. ~~In this valley he collected a species of beetle which had never before been seen.~~ He made many valuable contacts with forest rangers and operators along the east coast of Vancouver Island, investigated several reports of infestations and turned in a very fine collection of insects. On September 10th he joined the "Swaine" in Howe Sound to assist in the survey of Howe Sound and Jervis Inlet, remaining aboard until the completion of the egg-survey and tree mortality study at Rainy River. In October and November he conducted an egg survey in the Poett Nook area and Wolfe Creek (Rounds).

H.E. Vey, after returning from the Sarita Valley where he assisted in the plot work in May, conducted survey work in the Duncan area while waiting for the "J.M. Swaine" to begin survey work. At the beginning of June he boarded the "Swaine" ~~to take~~ taking charge of survey work of the vessel. He remained aboard the boat until July 24, when the boat was forced to return to Victoria due to Capt. Cleveland's Illness. From July 24 to August 15 he conducted survey work in the Duncan and Alberni areas, then proceeded to Zeballos to work until the arrival of the "J.M. Swaine" in that area. When the "Swaine" arrived at Zeballos he accompanied the boat on further survey work in the Inlets between Zeballos and the Alberni Inlet and remained on board until the boat arrived in Victoria, September 6. He remained

in the office until October 4 when he and Mr. K. Hughes prepared the Annual Survey Report. Following this he rejoined the "Swaine" in Vancouver to assist in the egg count survey and tree mortality work in Widgeon Creek. He also accompanied the boat to Knight Inlet on the pre-survey trip in the first half of November.

M.T. Hughes. After returning from the tree mortality study in the Sarita River in May, Ranger Hughes proceeded to Vancouver to conduct an extensive survey in the lower mainland areas. While working at a disadvantage by operating alone a good portion of the time he was able to cover a large area and turned in a large number of collections. He received very good cooperation from operators and forest rangers in all districts, thus enabling him to cover more territory. On September 9, he joined the "J.M. Swaine" for a survey of Howe Sound and Jarvis Inlet. He remained aboard the "Swaine" until the completion of the egg survey in the Rainy River area on October 5, when he left to conduct an egg survey in the looper infested areas of the Greater Vancouver Waterboard district.

D.W. Taylor. During the early spring Ranger Taylor assisted with the "J.M. Swaine" overhaul. For practical experience he accompanied ranger Harvey on a survey of the Island areas and assisted in the spruce weevil plot study in the Campbell River district. He carried out survey work in the Alberni district as well, and on June 22 he accompanied H.A. Richmond to Campbell River to join the "J.M. Swaine" to act as engineer ranger in place of

K.T. Hughes. He remained aboard the "Swaine" until July 24 when the "Swaine" returned to Victoria. During the time the "Swaine" was tied up due to the skipper's illness, he accompanied the boat to Vancouver to have the decks re-caulked. In August he accompanied ranger Vey to Zeballos where survey work was carried out until the "Swaine" arrived there August 23. He then accompanied the "Swaine" on the survey of the Inlets between Zeballos and Alberni Inlet. He remained with the boat during September to assist with the survey work in the Howe Sound and Jervis Inlet areas and also took an active part in the egg survey at Rainy River and Widgeon Creek.

D.G. Collis joined the Department as a ranger on July 25 and was assigned to the Vancouver mainland district to assist M.T. Hughes. He remained on the mainland until September 2 when he returned to Victoria. From September 8 - 13 he conducted survey work in the Ladysmith-Yellow Point area and on September 15 he accompanied H.A. Richmond to the Klanawa Valley on an inspection trip. In early October he visited the Vancouver watershed district in company with Mr. M.T. Hughes where an egg survey was made. In mid-October he and ranger Harvey conducted a hemlock looper egg survey in the Poett Nook area.

W.A. Cleveland who was captain of the "J.M. Swaine" until August when illness forced him to leave, contributed largely to the success of the coastal water survey due to his knowledge of local conditions encountered in this type of travel.

D.C. McFarlane who succeeded Capt. Cleveland is an able and efficient captain and takes a keen interest in his work as well as the insect survey as a whole.

A.H. Marsh, a university student took care of insectary work in the laboratory aboard the "Swaine". His work was valuable due to the fact that large numbers of insects were reared in the lab until a mainling point was reached. Being relieved of this tedious job allowed the rangers to spend much more time on actual field work. As well as carry out his insectary work Marsh did spend some time in the field on survey work with the rangers.

B. Dickens a high school student was hired as cook deck hand.

Work Accomplished

Early in 1947 it was hoped to assign the rangers to a definite district, but it was found this would not be possible because rough terrain and inaccessible areas which needed two or more men for a trip necessitated drawing men from another district. Only a small portion of the coastal territory is accessible by road or trail, which means the remainder must be covered by boat.

Areas covered by rangers with motor vehicle transportation were: Vancouver Island, east coast from Victoria north to Salmon River. From Parksville west to Port Alberni and surrounding districts. West coast of Vancouver Island to Jordan River. Field trips were made into many areas of central Vancouver Island and in some cases extended practically to the west coast.

The lower mainland from Howe Sound to Hope in the Fraser Valley was surveyed as thoroughly as time would permit.

The "J.M. Swaine" covered the mainland coast from Howe Sound to Toba Inlet and on Vancouver Island from Salmon River to Beaver Cove thence around the north end of the Island to Quatsino Sound.

It was in this area that Capt. Cleveland was suddenly taken ill and the boat was forced to return to Victoria. This resulted in a month's interruption in the "Swaine's" activities, which seriously affected the area covered by the "Swaine." However, this time was not lost as the personnel immediately began survey work in other areas.

When a new skipper was taken on, August 21, the boat immediately proceeded with the survey of the Vancouver Island west coast between Zeballos and the Alberni Inlet.

Results

During the course of the season the Insect Rangers contacted many of the principal operators on the coastal areas covered and B.C. Forest Service Rangers over widespread areas. For the most part intense interest and enthusiasm for the work was displayed by all persons visited who seemed greatly concerned over the work being done.

A total of 1475 insect survey collections were sent to Vernon totalling 20,775 insects. Of these 315 were made by other cooperators and 1160 by the Insect Ranger personnel.

Complete detail of survey activities together with collections made are set forth in the pages that follow as prepared by the Rangers themselves.

Methods Employed

The size of the timber, rough terrain, and varied timber types do not allow a perfectly uniform method of sampling to be adopted. Various methods of sampling must be used according to the type of area being surveyed. In all cases the beating sheet used is the standard 7' X 9' size, and the method of using a 10 or 12 foot pole and brushing the limbs vigorously from a height of 18 or 20' to the lower branches was employed. In cases of regeneration where the timber is young and not higher than 20 feet this gives a uniform quantitative sample. However, in mature timber, often, only a few of the lower branches can be sampled and this does not give a true picture of insect life in this type of tree. As yet no satisfactory method of sampling in mature stands of timber has been arrived at.

In the case of bark beetle collections the trees were felled and larvae removed at intervals along the length of the trunk, or the beetles were found beneath the bark of trees and debris left on the ground after logging operations.

During the fall, egg counts were made in the hemlock looper infestations at Poett Nook, Wolf Creek and Gordon River, Rainy River, Widgeon Creek, Upper Nitinat and in the Vancouver Waterboard District at Burwell Creek, Seymour Creek, Lost Lake Trail and East Capilano. Methods of egg sampling were similar in all areas. Trees were felled from the centre of the infestation to each edge or as far out from the centre as egg deposits warranted, then 4 moss samples of $\frac{1}{2}$ sq. ft.

each were removed from the trunk at 20' or 30' intervals according to the height of the tree. In the case of a limb sample, 1 lineal foot of moss was removed. For the most part these moss samples were taken to the laboratory for egg counting as it is felt that greater accuracy was obtained under these conditions as against the cold and poor light encountered in the woods.

For the purpose of appraising damage in the heavily defoliated areas, strips were run through the infestation and the trees tallied ½ chain on each side of the strip. Trees are tallied as to species, diameter, defoliation and general condition.

In many areas plots have been established for the purpose of studying tree mortality arising from the looper attack. Much of this work was done by the rangers, but as it is a separate project it will not be discussed under the survey.

Sixty-nine permanent sampling points were established on the lower mainland, but only a few are located on the Island. It was thought that establishing permanent sampling points for the "J.M. Swaine" survey would not be very satisfactory as they would be visited only once every two or three years. Permanent sampling points will be discussed in the main report by the persons concerned.

As for permanent sample plots, the varied timber types and the size of the timber discourages this type of sampling. However, a large number of plots have been established for the purpose of studying defoliation and tree mortality and sampling was carried out

in and around these plots on trees which were suitable.

A large number of B.C. Forest Service growth study plots are scattered throughout the coastal area and we have recorded their data and locations and intend to use them as permanent sampling points wherever possible.

ACTIVITIES OF THE M/V "J.M. SWAINE" 1947

By H.E. Vey.

Survey work conducted from the Motor Vessel "J.M. Swaine" extended from June 1st through to late November. (For daily account of the movements of the boat for the full year see log of travels page 81.) Some interruption developed between July 22 and August 22 due to the illness of the skipper - Captain Cleveland, necessitating his replacement with a younger man - Captain D.C. McFarlane. Despite this the boat covered an immense territory visiting many operations in otherwise inaccessible locations.

In addition to this, extensive tree mortality cruises and egg counts were made in the Rainy River - Port Mellon, hemlock looper infestation, and also that in the Widgeon Creek area.

Further, work was carried on in a pre-survey trip when the "Swaine" visited inlets on the mainland at the Northern end of Vancouver Island; the purpose of which being to lay the ground work for next year's survey operations.

A. AREAS SURVEYED

For the purpose of this report the areas surveyed are discussed under the general headings as follows:

(1) Anderson Bay

(2) Powell River and Powell Lake

(3) Stillwater and Gordon Pasha Lakes

(4) Lund

(5) Malaspina Inlet

(6) Bliss Landing

(7) Toba Inlet

(8) Nimpkish River and Nimpkish Lake

(9) Beaver Cove

(10) Port Alice and Neroutsos Arm

(11) Coal Harbour

(12) Zeballos

(13) Little Zeballos River

(14) Tahsis River

(15) Tlupana Inlet

(16) Muchalat Arm

(17) Shelter Inlet and Megan River

(18) Herbert Arm and Moyeha River

(19) Tofino Inlet

(20) Ucluelet and Kenedy Lake

(21) Howe Sound

(22) Sechelt

(23) Jervis Inlet

(24) Narrows Arm

(25) Salmon Arm

(26) Sechelt Inlet

(1) Anderson Bay

On June 1st the boat visited Anderson Bay on the Southern end of Texada Island. Two days were spent here making collections for the survey.

(a) Timber type, Topography and Method of Approach:

Timber is for the most part hemlock, though there are small numbers of Western white pine interspersed. The country slopes rather rapidly from the beach in a North-westerly direction, and these slopes are heavily wooded. A good logging road leads from the beach North for approximately five miles, and this makes sampling relatively easy.

(b) Sample Points:

Ten sample points were established in this area, and a total of 155 insects collected. The sample points were situated as follows: 4 up a logging side road leading West from the bay and extending for a distance of 2 miles; 6 were made at positions along the main logging road, at distances between five miles and six and one half miles from the beach. In addition to this Dendroctonus and Ips beetles were collected and preserved.

(c) Collections:

No large numbers of any insects of major importance were collected. Dendroctonus Sp. and Ips Sp. beetles were collected in fairly large numbers from pine logs, as well as from standing dying White pines. These trees had apparently been killed by blister rust, but larvae and adults of Dendroctonus Sp. beetles were very active in all pines examined.

(d) Co-operators:

Mr. D. Dougan, co-owner of Dougans logging camp at Anderson Bay was contacted, local information was gained from him, and co-operation in the matter of transportation was willingly given.

(2) Powell Lake and Powell River

The "Swaine" then proceeded to the town of Powell River arriving on June 2nd. Three days were spent in this area, though due to the very great distances to be covered a much longer stop would be advantageous. Overnight fly trips are necessary in order to penetrate to the extreme end of Powell Lake.

(a) Timber Types, Topography, and Method of Approach:

In the vicinity of the town of Powell River there is very little timber, being mostly scrub willow and alder. The timber around Powell Lake is for the most part mature hemlock with second growth fir, alder and hemlock in the logged areas. The terrain is very mountainous, precipitating in most places directly into the lake, this in combination with the great distances to be covered made sampling very difficult. The "Swaine's" dinghy was transported up to the lake, and all sampling was done in this manner. In one position, at Haywire Bay on the lake there is an old logging grade extending inland for several miles, and sampling was found to be relatively easy in this area.

(b) Sample Points:

In all, 14 sample points were established which were as follows: 2 in the town of Powell River where willow and alder was being badly defoliated; 6 along the old logging grade at Haywire Bay, ranging from the beach up the various spurs to 1½ miles from the beach; 2 at Goat Lake situated at the south-east end of Powell Lake; 2 on the South shore of Powell Lake, roughly opposite the Western tip of Goat Island; and 2 on the East shore of Powell Lake approximately 1½ miles South of the road bridge crossing the Southern neck of the lake.

(c) Collections:

i Hemlock looper: Small numbers of hemlock looper larvae were found in the vicinity of Goat Lake. None were found in the Haywire Bay area where they had been reported in 1946.

ii Tent caterpillars: These were found in large numbers throughout Powell River (town). Widespread defoliation was recorded, although very heavy parasitism was also recorded, and this insect is not expected to occur in large numbers in 1948.

iii Willow leaf beetles (Galerucella carbo): Large numbers of this insect were found defoliating the willow in the vicinity of the town of Powell River. Much of the willow was completely defoliated by the combined action of this and the tent caterpillars.

iv Tortricid larvae: These were found in fairly large numbers on alder in all places visited in this area.

No other large collections of any one insect were made; however, numerous insects of minor importance were found, these included small numbers of Eupithecia Sp. larvae and Semiothisa Sp. larvae, cutworms and Neodiprion Sp. larvae.

(d) Co-operators:

A great deal of the success of the survey in this area is due to the B.C. Forest Service Ranger - Mr. W. Black and his assistants. The "Swaine's" dinghy was transported up to Powell Lake by them, and we had the use of their own boat on the trip to Haywire Bay. Information on local conditions was gained and records of 1946 insect collections were perused.

(3) Stillwater and Gordon Pasha Lakes

On June 7th the boat proceeded to Stillwater where the Gordon Pasha Lakes can be reached by logging railway.

(a) Timber Types, Topography and Method of Approach:

i In the Stillwater area the timber is fine healthy second growth fir, hemlock, cedar and alder. The locality is relatively flat, and numerous local roads make sampling easy, and a road from Thunder Bay on the north shore of Jervis Inlet, to Powell River and beyond would make excellent future sampling ground.

ii The Gordon Pasha Lake extends North-easterly from Stillwater and opens a very large area for survey work. The timber on the shore line of the lakes is dead due to flooding caused by a power dam at the head of Lois Lake, the most Southerly of the chain. Behind this is a great deal of second growth timber with smaller amounts of mature timber especially on the North shore of the centre lake in the chain. Here there is a larger amount of fir with mixtures of hemlock and cedar in varying amounts. The landscape is relatively low and rolling, but the great density of the timber makes sampling difficult. The "Swaine's" dinghy was transported up to Lois Lake, and all samples were made at points stopped at with the boat, there being only one logging road. A new procedure was tried with good results. It was decided that due to the great density of timber that a standard method of line sampling might be tried, thus eliminating the wasted time spent looking for suitable and easily accessible sample trees. Starting points were chosen at random and lines run in a fixed direction for 20 chains thereafter. This method seemed quite satisfactory, as it gave representations

in changing timber types and densities, as well as enabling us to cover more territory with reasonable certainty of representative samples from the areas visited. Using this method at different points in a large area would possibly give a complete picture of insect conditions in that area. The lakes are full of drift wood due to the flooding, and snags are encountered everywhere near the shore line, making navigation with an outboard motor hazardous.

(b) Sample Points:

23 sample points were established in this area, although the density of timber makes it impractical to regard them as being permanent in that it would be extremely difficult to find them again.

(c) Collections:

In all 23 different samples were taken, and a total of 106 insects collected.

i Hemlock looper: Larvae were found in small numbers at the head of Gordon Pasha Lake, and also up the river leading from Kartoum Lake into Gordon Pasha Lake, however, no defoliation was noticeable in any of the areas where loopers were found.

ii Hemlock sawfly: These insects were found in small numbers in all of the sample areas.

iii Eupithecia: Small numbers of this minor looper were found in all areas visited. Two specimens of the newly discovered Eupithecia gibsonata were found in the area.

Numerous other insects of minor importance were also collected.

(d) Co-operators:

The Obrien Logging Co. (head office Vancouver, B.C.) was contacted

at Stillwater. Transportation of men and dinghy was arranged with the foreman. The railway is several miles long, and without this valuable assistance survey work on the lakes would have been extremely difficult.

(4) Lund.

On June 11th the "J.M. Swaine" left Stillwater for Lund arriving in the evening of the same day.

(a) Timber Types, Topography, and Method of Approach:

Timber around Lund is not of a very high grade. What little mature timber there is is scrubby, though the second growth is quite dense and healthy. Douglas fir and hemlock predominate, and there is a moderate amount of Western white pine. The topography is relatively flat, and local roads and trails make sampling easy.

(b) Sample Points:

Samples were taken in three different directions in this area.

i 5 points were sampled along the main road from Lund to Powell River, these being spread out over a distance of 2 miles.

ii A local trail was followed leading northwest from Lund to a small fishing village. 8 samples were taken at random up to a distance of 1 mile along the trail.

iii Six samples were taken along the water reservoir road which leads north of Lund for a distance of 1 mile.

(c) Collections:

A total of 19 collections was made with good results. There seems to be very little insect activity in this area, however, some noteworthy species should be mentioned.

i Sawfly - Neodiprion sp. Small numbers of this insect were found in all places visited in this area, but in no instance were they found in large numbers.

ii Geometridae: Small numbers of different types of Geometridae were found in the areas visited. No defoliation was noticeable. On one beating 13 green looper larvae were collected, but subsequent beatings revealed only one larva of the same type. These were tentatively identified as Nepytia larvae, but confirmation beyond Geometridae, has not yet been received from Vernon.

iii Many insects of minor importance were also collected. These included various click beetles and Phalaenidae, as well as 3 tiny banded budworm larvae (Eucordylea sp.) collected from pine.

(d) Co-operators:

The district B.C. Forest Ranger - Mr. W.E. Jansen was contacted. There was no report of any insect damage in the Lund area he said, but reported dying trees on the North shore of Homfray Channel extending around to the Eastern side of Toba Inlet. Mr. Jensen also put forward a very good suggestion - that B.C. Forest Rangers be equipped by our Department with a very light and easily packed beating sheet. In this manner our survey work would be facilitated in that rangers would not find taking insect samples too much work, and thus be encouraged to take more. A good type of sheet could be made of the new plastic materials which are both light and compact.

(5) Malaspina Inlet

From Lund the "Swaine" proceeded to Malaspina Inlet, arriving on June 16th at Penrose Bay. In this area samples were taken in 3 locations and will be discussed under the following headings: A. Penrose Bay; B. Okeover Arm; C. Theodosia Arm.

A. Penrose Bay:

(a) Timber Type, Topography, and Method of Approach:

The timber is very dense and healthy in this area, being mostly strong regeneration hemlock, with smaller amounts of fir and cedar. The hills are low and rolling, and a good government road leads off in the direction of Powell River. Samples were easily collected along this road.

(b) Sample Points:

Six sample points were established over a distance of $2\frac{1}{2}$ miles along the government road from the bay.

(c) Collections:

No insects of major importance were found in this locality, however, a small number of minor insects were recorded; these included 2 Tenthredinidae cocoons, 1 adult Galerucella carbo, and 1 Geometridae larva.

B. Okeover Arm:

(a) Timber Type, Topography, and Method of Approach:

At the head of the arm the timber is dense hemlock, fir, and cedar regeneration with odd patches of dogwood. There is an old skidroad leading up a side-hill on the East shore, and a logging road also leads from the same locality. On the Eastern shore of the arm the country appears somewhat drier, and the regeneration is not so dense, being a

mixture of fir, white pine, and Arbutus. No trails are apparent, but travel, though steep, is not too dificult.

(b) Sample Points:

A total of 8 sample points were established, at points along the skidroad up to approximately 1 mile on the East shore of the Arm.

(c) Collections:

Very few insects were collected in this area, the most noteworthy being those of Eucordylea atripectella in very small numbers. Several click beetles and cutworm larvae were recorded.

C. Theodosia Arm:

(a) Timber Types, Topography, and Method of Approach:

The hills are somewhat higher in this locality and considerably steeper. On the South shore hemlock predominates with old Douglas fir, pine and cedar intermixed, while on the North shore Douglas fir predominates, there is very little hemlock, and Arbutus and White pine are more apparent. Collections were made along the shore line, and inland for ¼ mile, and one sample was made at an elevation of 1200 feet where dead timber which was investigated proved to be fire killed.

(b) Sample Points:

No sample points were set up here, however 7 samples in all were taken at random points.

(c) Collections:

Collections from this area were quite good. A discussion of the more important species follow:

i. On the North shore a patch of dead and dying timber was noticed at approximately 1200 feet elevation. This was investigated and found to

be fire killed. However, larvae of round headed borers were found in some of the dead trees.

ii Hemlock looper: A small number of these larvae were found on both the North and South shores of Theodosia Arm, no defoliation was noticeable and none were found in any of the other sampling points in Malaspina Inlet.

iii Dendroctonus pseudotsugae: A large number of larvae were found in the bark of Douglas fir on the North shore of Theodosia Arm. They were too small to be positively identified as Dendroctonus pseudotsugae but it is practically certain that they were this insect. Very many of the firs in this area were riddled with small round holes although no adult material was found. The trees are all very healthy, and cambium good.

iv Small collections of Neodiprion Sp. Tortricidae, Phalaenidae and various Geometridae as well as 1 larva of Eucordylea atripectella were also made.

(6) Bliss Landing

The "Swaine" arrived at Bliss Landing from Malaspina Inlet on June 20th.

(a) Timber Types, Topography and Method of Approach:

The timber is for the most part regeneration hemlock, cedar and Douglas fir in this area. The terrain is relatively flat, and sampling is made easy by local trails and old logging roads which lead off from the village in an Easterly direction.

(b) Sample Points:

Sample points were selected at random in this area. Only four samples were taken, these being within 1 mile east of the village.

(c) Collections:

Collections were good here and further samples in the future are recommended.

i. Hemlock looper: A small number of loopers was found in this area, averaging 1.5 per beating. No defoliation was noticed.

ii. Hemlock sawfly: Larvae were found in all samples taken, but only in very small numbers. On one tree 32 larvae were collected, but subsequent beatings in the same area revealed only minor numbers.

iii. A small number of minor insects was also collected. These included various Geometridae and one Acantholyda Sp. larva.

(7) Toba Inlet

The next survey area covered by the "Swaine" was Toba Inlet which was commenced on June 23rd. The areas covered were as follows: A. Toba and Klite River Valleys; B. Salmon Bay; C. Homfray Creek; D. Brettle Point.

A. Toba and Klite River Valleys

(a) Timber Types, Topography and Method of Approach:

The country here is very rugged, with steep side hills and narrow valleys. The country at the mouth of the Toba River has been logged for several miles up, and the undergrowth is very heavy salal, salmonberry, huckleberry, etc. The timber is sparse with very little regeneration at the mouth, but becoming quite dense further up, and towards the

junction of the Toba and Klite Rivers. There is a logging road from the mouth of the Toba River which at that time extended for a distance of 5 miles from the mouth. The road was still under construction by the Keahoose Logging Co., and at present probably extends a good deal further. The timber five miles up the Toba River becomes a very dense mature stand, with fine Douglas fir and cedar in process of being logged. The road will eventually extend up the Little Toba River Valley, where it is reported are very fine stands of mature Douglas fir. A logging camp is situated at the North of the main river which may only be approached at high tide in a small boat. The entrance is very difficult to find though it has marker buoys, this is due to the sandy mouth of the river and the consequent numerous mouths and sloughs.

(b) Sample Points:

11 sample points were established along the logging road leading up the Toba River Valley as well as along the Klite River where a gravel road leads up for approximately 1 mile. The sampling points were as follows: 3 between the first and second bridges spanning the Klite River, 5 at distances from 1 mile to $5\frac{1}{2}$ miles from the mouth along the logging road, and 3 up the Klite River up to 1 mile from its junction with the Toba River.

(c) Collections:

A large collection of insects was made in this area, and due to the very high value of the timber in the valley and the presence of hemlock looper, any increase in population should be checked most carefully.

i. Hemlock looper: Here again is slight evidence of looper activity. None were found at the head of the logging road in the mature timber, but in all other beatings some larvae were found. No defoliation was discovered due to looper activity. Also in this area were found a small number of false hemlock looper larvae (Nepytia phantasmaria).

ii. Gall aphids (Adelges cooleyi): Although there is very little spruce in this area, most spruce encountered had been heavily attacked by gall aphids.

iii. Hemlock sawfly: Larvae were found in very small numbers.

iv. Numerous insects of minor importance were also collected in the area, these included Eupithecia Sp. larvae, click beetles, etc., etc.

(d) Co-operators:

The Keahoose Logging Co. (Head Office, Vancouver) operates the logging camp at the head of Toba Inlet. The engineer, Mr. W.S. Forbes showed keen interest, and transportation by Jeep up the logging road was provided.

B. Salmon Bay

From the Toba River the "Swaine" proceeded to Salmon Bay on June 25th.

(a) Timber Types, Topography and Method of Approach:

The Bremm River empties into Salmon Bay. The timber at the mouth of the river is strong healthy regeneration and second growth, a mixture of hemlock, spruce, balsam, fir and cedar. Hemlock predominates, but there is a good stock of fir and balsam as well. At the head of the valley the timber is for the most part mature hemlock with only a sprinkling of balsam, fir and cedar. A good logging road leads up the

valley for a distance of approximately 3½ miles, and transportation is available. The valley is wider than that of the Toba River, the mountains on either side are quite high and precipitous but densely wooded.

(b) Sample Points:

22 sample points were set up in this area. They extend along the logging road from its beginning throughout its entire 3½ mile length.

(c) Collections:

No large populations of any one insect were found with the exception of a small budworm larva - Eucordylea atripectella found on hemlock and fir.

i. Hemlock looper: Here again small numbers of larvae were found, the average being less than one per beating. Only one Nepytia phantasmaria was found.

ii. Hemlock sawfly: A small population of sawfly exists throughout the Bremm River Valley. One beating produced 11 larvae, but subsequent samples produced no more than 2 larvae per collection.

iii Budworm (Eucordylea atripectella:) These larvae were found in abundance in the Salmon Bay area near the mouth of the river. There was no noticeable defoliation, and the insect is so small there would have to be much larger numbers presumably to produce any noticeable damage.

iv. There was also a fairly large collection of insects of minor importance. These included numerous Geometridae, Tenthredinidae, and one specimen of Archips Sp.

(d) Co-operators:

The logging camp at Salmon Bay is another branch of the Keahoose Timber Co. (owners Burns and Jackson, Vancouver.) Transportation was obtained along the logging road.

C. Homfray Creek

From Salmon Bay the "Swaine" proceeded up Homfray Channel which leads into Toba Inlet, stopping at Homfray Creek on June 26th.

(a) Timber Types, Topography and Method of Approach:

The timber is largely hemlock regeneration at the mouth of the creek and mature timber at approximately five miles up the valley. The valley is quite narrow and slopes rapidly up to 1500 feet at five miles. There is a good logging road back to the mature timber.

(b) Sample Points:

11 sample points were established along the logging road up to approximately five miles. 2 points were sampled beyond the end of the road across the creek in a Southerly direction at a distance of approximately 1 mile from the end of the road.

(c) Collections:

No insects of any importance were found in this area. Sawfly larvae were found, but the numbers were relatively small, in all cases not being above 2 or 3 in the beatings where they were found. 1 larva of the Eucordylea atripectella found at Salmon Bay was also found in this area. Numerous other Geometridae and Tenthredinidae were also found.

(d) Co-operators:

There is a small logging camp at the mouth of the creek operated by the International Lumbering Association, (Standard Bank Bldg., Vancouver). The Superintendant - Mr. Carstairs - was very co-operative, giving us advice and assistance in the matter of transportation.

D. Brettle Point

The "J.M. Swaine" then proceeded up Homfray Channel on June 28th, proceeding in a Northerly direction to Brettle Point. The purpose of this trip was to investigate an area of dead and dying timber far up on the hillside on the North east shore of Homfray channel and extending to the Easterly shore of Toba Inlet in the vicinity of Brettle Point. The country is very rugged, and a great deal of difficulty was encountered in getting in to the dead timber. The timber is mostly hemlock, although at the 1000 foot level and beyond hemlock gradually gives way to White pine. The undergrowth is very dense, and mostly salal with patches of impenetrable salmonberry. Regeneration is heavy hemlock on the Eastern slope of Toba Inlet where there has once been an old logging flume.

On arrival at the site of the dead and dying timber it was discovered that these were patches of White pine infected with Blister rust. However, a few samples were taken so that the time would not be entirely wasted. In two samples an average of 13.5 sawfly larvae were collected, but subsequent beatings produced none what-so-ever.

(8) Nimpkish River, and Nimpkish Lake

On July 4th the "J.M. Swaine" arrived at Englewood on Vancouver Island for a survey of the Nimpkish River Valley. Arrangements were made for a party of three men to go in to the valley for several days.

(a) Timber Types, Topography, and Method of Approach:

The Nimpkish River Valley is a vast chain of lakes and smaller rivers which extends South well into the interior of Vancouver Island. The valley is noted for its rich stands of Douglas fir. It is a narrow valley with steep side-hills and rugged mountain peaks, many tributary valleys make it a vast network; a comprehensive survey would necessitate several weeks of intensive work. In all areas visited the timber types are mostly hemlock and Douglas fir. In the Nimpkish Lake area there is a fine crop of hemlock regeneration as well as a moderate amount of spruce. The timber in the Woss Lake area is in the process of being logged and there is very little available sampling material. There are ample transportation facilities. A railway extends from the beach camp at Englewood up to Nimpkish Lake, and boats connect with the main logging railway which terminates on the Southern end of the lake, and extends approximately 20 miles South eastward into the valley. There are also numerous old logging roads and railway grades heading off from the Southern end of Nimpkish Lake.

(b) Sample Points:

Heavy continuous rain hampered operations in this area; However, 33 samples were taken. The standard beating sheet method was used with the exception of gall aphid samples which were cut from spruce trees. In some cases beetles were removed from the bark of trees. Extreme

difficulty was encountered due to the amount of water beaten down on the sheet; many specimens were destroyed by the water, and in a number of cases it was felt the samples were not entirely representative. Further survey work is certainly indicated at a future date, and a suggestion by the Canadian Forest Products Superintendant, Mr. Russell Mills, that an aerial survey be made of the valley is worthy of consideration.

(c) Collections:

Collections were made at the following points: 7 in the vicinity of Anutz Lake situated just South west on Nimpkish Lake; 2 on an old logging grade leading from the South western end of Nimpkish Lake about 2 miles from the end of grade 11 along an old cat. road which leads South east from the end of steel at the Southern end of Nimpkish Lake - these samples extended along the cat. road for a distance of two miles; 6 in the vicinity of "The Pimple" - a mountain on which the B.C. Forest Service Lookout is situated at Woss Lake; and 7 on the various logging spurs situated near the North eastern end of Woss Lake.

i. Spruce gall aphids: Large galls were found in all the regeneration spruce in the Nimpkish Lake area. In a large number of cases damage was estimated at 100% in the new buds with from 50 to 75% in the old foliage.

ii. Miscellaneous beetles: Numerous bark beetles were found in dead and dying logging slash. In some cases they were found in dead white pines which had been killed by blister rust. One cedar sapling in the Nimpkish Lake area was examined which had been recently killed by butt rot; the foliage was still partially green and had not dropped.

From this tree 28 pupae and 16 larvae of Scolytidae were extracted with no difficulty. In the same area a dying White pine produced 13 pupae and 23 larvae of Scolytidae. Ambrosia beetles were found in large numbers in fir peeler logs in transit from the woods to the beach. These logs had been felled the preceding December.

iii. Galerucella carbo: One willow in the Nimpkish Lake area was examined which produced 30 of these larvae. However, in no other instance could any be found.

An interesting report was made by Mr. Russell Mills, Camp Superintendant. During the recent Black headed budworm attack in the Salmon River area he had been on the look-out for its appearance in the Nimpkish River Valley. In the last year of the infestation (1944), Mr. Mills reported that defoliation was noticeably high on the Eastern slopes of the valley. However, no flight of moths was encountered as had been expected, and the following year the defoliation died out. During the survey of this valley no trace of Black headed budworm could be found and no insects of this species were collected.

(d) Co-operators:

The Canadian Forest Products Company operates the logging camps in the Nimpkish River Valley. They were very co-operative and afforded us willing assistance. Mr. Russell Mills, the Superintendant, was especially co-operative as well as Mr. T. Wright, the Forester, and Mr. M. Jorgensen, the Beach-camp Foreman. Mr. Wright accompanied us personally on two days, and arranged that one of his men should be with us every day.

(9) Beaver Cove

From Englewood the "J.M. Swaine" proceeded to Beaver Cove on July 11th.

(a) Timber Types, Topography, and Method of Approach:

The Kokish River drains into Beaver Cove. It is a narrow valley with sharply sloping side-hills. There is a good logging road on the eastern side of the valley which extends Southward approximately 5 miles. Also an old railway grade extends for 2 miles along the Eastern shore of Beaver Cove. Hemlock predominates in this area in the regeneration, although at an elevation of from 1000 to 1500 feet a stand of mature balsam was encountered on the South eastern shore of Beaver Cove. There is a moderate amount of spruce regeneration in the valley bottom near the mouth of the river.

(b) Sample Points:

16 sample points were established in this area which extends from the beginning of the logging road up to a distance of approximately 4 miles. 2 samples of Gall aphid damage were collected in the valley bottom near the mouth of the river.

(c) Collections:

i. Hemlock sawfly: A small population of these larvae were recorded in this area. In no case did the number exceed 19 larvae per beating.

ii. Bark beetles, and Wood borers: Large populations of these insects were found in all logging slash. Some bark on smaller dead trees was riddled with emergence holes and honey-combed with tunnels. This was mostly the work of Pseudohylesinus grandis. 31 larvae of this

species were collected with ease, although this represents only a small percentage of the total number in the tree. Numerous Scolytidae were also found. Larvae of Cerambycidae, Ostomidae and Curculionidae were found in large numbers under the bark on an abandoned log by the roadside.

iii. Spruce gall aphids: Damage to tips in young spruce in the valley bottom was estimated at 100% in many cases.

(d) Co-operators:

The Pacific Mills - head office Vancouver - operates a logging camp here. W. Lloyd, engineer for this company gave us generous assistance in the matter of transportation up their logging road, and expressed the hope that a further, more extensive survey could be made in the near future.

(10) Port Alice and Nereutsos Arm.

On July 13th the "Swaine" left Beaver Cove enroute for Port Alice, arriving on July 15th. The trip around the Northern end of Vancouver Island is a hazardous and slow voyage in open water, and not to be relished by those without "sea-legs."

(a) Timber Types, Topography, and Method of Approach:

Here the country is composed of comparatively low rolling hills. A great deal of logging has been done in the past, and there is a large amount of regeneration. Hemlock predominates - fine healthy young trees, with a small amount of cedar and fir. There is a road from Port Alice to Victoria Lake, which lies approximately 5 miles East. At the head of Nereutsos Arm there is a good logging road which travels approximately 8 miles South.

(b) Sample Points:

4 samples were taken on a small island opposite the town of Port Alice; 5 samples were taken along the opposite shore from Port Alice covering a distance of approximately 2 miles South of the Town: 3 samples were taken along the Eastern shore of the arm down to the head which is approximately 4 miles distant; 1 sample was taken 2 miles inland from the head of Nereutsos Arm along an old logging trestle road; 7 samples were taken along the water intake road which leads to Victoria Lake, these were spread over a distance of approximately 2 miles from the townsite. Little difficulty was encountered as the timber is fairly open growing, the weather was fine and samples are thought to be entirely representitive.

(c) Collections:

i. Hemlock sawfly: Large populations of this insect were encountered in all areas sampled. In some cases a great deal of frass was noted on the beating sheet, and its fall is audible in some instances. Average of all collections was 57.6 larvae, although individual collections ranged as high as 250 larvae. No parasitism has been recorded, and it is thought that this area will bear very close observation for the next few years.

ii. Hemlock looper: Two instances of Lambdina fiscellaria lugubrosa were recorded in the area, although many other unidentified Geometrids were also recorded and may possibly turn out to be the same insect.

iii. Many other insects of minor importance were also collected.

From here the "Swaine" was forced to return to Victoria due to the illness of her skipper W. Cleveland. It was thought inadvisable to leave the boat at Port Alice without a skipper while waiting for a relief man.

(11) Coal Harbour

On the return trip a stop was made at Coal Harbour at the head of Rupert inlet in Quatsino Sound, and a few collections were made in this area.

(a) Timber Types, Topography, and Method of Approach:

The country is relatively flat and given to dense bush and general scrub, having been completely logged off for miles around. Small alders and regeneration hemlock were encountered, and these were sampled. There is a road leading from Coal Harbour across to Port Hardy on the opposite side of Vancouver Island. Also an R.C.A.F. road leads out 1 mile to a water intake. The few samples taken were on these roads within a mile radius.

(b) Sample Points:

Four samples were taken - 2 along the Port Hardy road within 1 mile from the village of Coal Harbour, and 2 near the R.C.A.F. water intake.

(c) Collections:

i. Hemlock sawfly: A relatively small population of these insects was recorded in the area.

ii. Galerucella punctipennis: A large population of these larvae was found feeding on alder in the area, although defoliation was not heavy, being overall only about 10%.

The "Swaine" arrived in Victoria on July 24th, and from there proceeded to New Westminster where her decks were re-caulked, and a few minor repairs were carried out.

During this time H.E. Vey and W. Taylor proceeded to Zeballos via the "S.S. Maquinna" in order that no time should be wasted due to the temporary incapacity of the "Swaine". It was arranged that the "Swaine" should proceed to Zeballos as soon as a new skipper could be found.

(12) Zeballos

(a) Timber Types, Topography, and Method of Approach:

The Zeballos River Valley is a long narrow valley bordered by high jagged peaks on either side. There is a good Government road leading up the valley for a distance of approximately six miles, and from there a cat. trail carries on for several more miles. The river forks at five miles from the mouth, and a good trail travels up the North fork for about 2 miles. The valley has been logged for 3 miles from the mouth of the river. From there, there is a stand of mature hemlock and balsam with hemlock predominating. A fine stand of mature fir is located at the junction of North and South forks of the river.

(b) Sample Points:

17 samples were taken along the Government road ranging from ¼ mile from the townsite to approximately 7 miles from the town; 6 samples were taken along the trail up the Northfork to a distance of 2 miles North of the Ford Bridge; 3 samples were taken across the river near logging

operations ½ mile from the town; one sample was taken on the shore line approximately ½ mile South of the townsite.

(c) Collections:

Collections in this area gave very poor results. No insects of major importance were found. However, numerous insects of minor importance were collected and these included small numbers of Tenthredinidae in all areas, numerous Dyslobus gemmatus and Dyslobus Sp. from hemlock in all areas, slight evidence of Adelges cooleyi in spruce, small numbers of Arctiidae on alder, and a very few Hymenopterous parasite cocoons.

(d) Co-operators:

The Manning Timber Co. of Victoria operates the logging camp in this area, and the trip was made primarily at the request of Mr. A. Kerr, Forester for this company. Mr. L. Harding - Superintendant of the Zeballos camp was contacted, and lodging was obtained at the company hotel.

(3) Little Zeballos River

The Little Zeballos River Valley was also visited while in this area.

(a) Timber Types, Topography and Method of Approach:

It is a small, steep sided and well wooded valley, very close to that of the Zeballos River proper. The timber is a very fine even-age stand of hemlock and Douglas fir approximately 100 years old. A good cat. road winds up the steep valley to mining operations high in the hills. A trail from the Zeballos East shore ascends rapidly by

perpendicular ladders and mountain goat trails to join the mining road at roughly 2 miles distance. The most practical method of making the round trip is to travel by boat to the mouth of the Little Zeballos River, travel up the road to its junction with the trail, and return to Zeballos via the trail. Following the reverse course, though possible would be an extremely arduous chore due to the terrific amount of climbing.

(b) Sample Points:

Samples were taken along the cat. road at random points. Good sampling trees are hard to find due to the density of the mature timber. There appeared to be very little insect activity and heavy rain hampered operations considerably.

(c) Collections:

Only three Eupithecia Sp. larvae were collected in the area, however, due to the extremely wet weather the samples were not considered to be entirely representative.

(14) Tahsis River

On August 23rd the "Swaine" arrived at Zeballos, having picked up a new skipper, and then proceeded up the Tahsis Canal to the Gibson Brothers Mill at Tahsis.

(a) Timber Types, Topography, and Method of Approach:

The timber is good mature hemlock, fir and balsam behind the logging operations which so far have extended approximately 5 miles back from the river mouth. The valley is relatively narrow with sharply rising side-hills on either side. There is a sawmill at the head of the inlet, and from there a good logging road penetrates well

into the mature timber up the river. From here the trail has been surveyed for a road and is passable for many miles in towards the Nimpkish River Valley.

(b) Sample Points:

Sampling conditions are very good as undergrowth is relatively light. 5 sample points were visited in the valley. These were all taken in the mature timber behind logging operations; they covered a distance between $2\frac{1}{2}$ miles to 5 miles from the sawmill.

(c) Collections:

No large numbers of any major insect were collected. In 2 collections an average of 10 Tenthredinidae larvae were collected. A very small number of Semiothisa granitata were found as well as numerous other unimportant insects.

(d) Co-operators:

Mr. Gordon Gibson - co-owner of Gibson's Mill, Tahsis, B.C., was contacted. Information on local conditions was obtained from him, and he personally conducted us to the end of their logging road.

(15) Tlupana Inlet

From Tahsis the "Swaine" then proceeded to Tlupana Inlet on Aug. 26.

(a) Timber Types, Topography, and Method of Approach:

The timber in this area is very dense, mostly hemlock, and though not first class is quite merchantable. The valley floor is relatively wide and flat, and a trail leading from the right bank of the river, though not particularly good due to the great density of timber, is well blazed.

(b) Sample Points:

No sample points were set up in this area as it was not deemed practical. Collections were made at random along the trail for a distance of 1 mile.

(c) Collections:

Collections in this area were very poor. No insects of major importance were found. Among other minor insects found there were a few adults of Dyslobus gemmatus.

(16) Muchalat Arm

From Tlupana Inlet the "Swaine" proceeded to Muchalat Arm where two areas were visited: A. The Gold River, and B. The Burman River.

A. Gold River

The Gold River empties into Muchalat Arm at the head, and it is reported that some very fine timber lies in this valley.

(a) Timber Types, Topography, and Method of Approach:

The Western shore of the river has been logged for a distance of approximately 3 miles and heavy alder regeneration has sprung up. Beyond this as far as was surveyed (2 miles), is a good stand of hemlock and fir. No very valuable timber was seen however. An old logging road leads off from the mouth on the West shore of the river. This travels for a distance of approximately 3 miles, and from here a good well blazed trail carried on. This has apparently been surveyed for further logging operations.

(b) Sample Points:

Samples were taken intermittently along the trail for a distance of

approximately five miles from the mouth. The standard beating sheet method was used with the exception of bark beetle samples which were picked from the bark of recently felled fir trees.

(c) Collections:

i. Dendroctonus pseudotsugae: Young adults and pupae were found in large numbers in recently felled trees throughout the area surveyed. No beetles were found in standing living trees.

ii. No other large collections were recorded. Various Geometridae were collected in very small numbers.

B. Burman River

The Burman River empties into Muchalat Arm into a small tributary inlet on the South shore near the head of the inlet.

(a) Timber Types, Topography, and Method of Approach:

This valley is much wider and the side-hills not so precipitous. Timber is quite good, being for the most part mature hemlock, spruce and cedar. There is a trail leading from the North shore mouth of the river. It is very much overgrown and poorly blazed, but never - the - less is quite passable for approximately 4 miles.

(b) Sample Points:

Collections were made at random points along the trail for roughly 4 miles.

(c) Collections:

i. Hemlock looper: Definite evidence of an old looper infestation in a small area at the river mouth was discovered. Some trees 100% defoliated and dead were recorded, while others which showed distinct evidence of old defoliation but now recovering were noted. Old pupal

skins and 1 dead pupa were discovered to substantiate the evidence, although no living loopers were found. The infestation was judged to have subsided in 1945. The trees affected were in the main hemlock of average D.B.H. approximately 10 - 12 inches.

ii. No other insects of major importance were found, with the exception of a few Semiothisa granitata and other minor insects.

(17) Shelter Inlet and Megan River.

From Muchalat Arm the "Swaine" proceeded to Shelter Inlet and the Megan River which empties into the North western end of the inlet.

(a) Timber Types, Topography, and Method of Approach:

The valley is fairly wide and flat in this area, the timber is fair and quite dense, being a mixture of hemlock, cedar and fir, all mature. 1 mile from the mouth of the river a small amount of spruce and balsam was encountered. There is no trail in this area, but travel is relatively good. In some cases it was necessary to wade the river due to the density of the underbrush.

(b) Sample Points:

4 sample points were visited up the river to a distance of 1 mile, and 2 further samples were taken along the West shore at the head of the inlet.

(c) Collections:

i. Hemlock looper: Old cocoons were found in this area also. No current activity was noticed, and no defoliation or mortality was evident.

ii. Spruce gall aphid: Damage was noted to spruce in the old buds, but no new galls were found.

iii. Sawfly: Old pupal skins of this insect were also collected, but no living insects were encountered, and identifications could not be made.

iv. Small numbers of insects of minor importance included a few specimens of Eupithecia as well as adults of Sciopithes obscurus found on hemlock.

(18) Herbert Arm and Moyeha River

From Shelter Arm the "Swaine" proceeded to the head of Herbert Inlet into which the Moyeha River drains.

(a) Timber Types, Topography, and Method of Approach:

The area is fairly mountainous and trails were found to be very poor, being heavily overgrown. Here the best course was up the river bed, and for the most part involved wading up and down stream. On the East shore there is a good mining road for approximately 1 mile, and samples were made along this also. The timber is for the most part mature hemlock and balsam, with small amounts of spruce in the Moyeha river area, while on the East shore a moderate amount of cedar and Douglas fir was also recorded.

(b) Sample Points:

Six samples were collected on the banks of the river ranging in distance up to approximately 3 miles. In addition 3 samples were taken on the mining road leading from the East shore. These penetrated to the end of the road - a distance of 1 mile.

(c) Collections:

No insects of major importance were recorded in this area. A small number of insects of minor importance were collected; these included

specimens of Semiothisa granitata and a few Tenthredinidae on hemlock.

(19) Tofino Inlet

The "Swaine" then proceeded to Tofino Inlet where further samples were taken on August 31.

(a) Timber Types, Topography, and Method of Approach:

The Tofino Creek valley is fairly wide and passable and a good road leads up the valley for several miles. There is also a small creek at the head of the Inlet - Cooper Creek. A trail leads up this creek to an old mine, but it has become considerably over-grown and is very difficult to follow in places. Timber is poor in these areas, although quite merchantable mature hemlock for the most part.

(b) Sample Points:

Four samples were taken in this area; 2 up the Tofino Creek road for a distance of 1½ miles and 2 up the Copper Creek Trail to a distance of 1½ miles.

(c) Collections:

Collections were very poor here. It was thought that perhaps the advanced stage of the season was partly responsible. No insects worthy of mention were found at all, with the exception of 3 larvae of Caripeta Sp. found in one hemlock collection.

(20) Ucluelet and Kenedy Lake

From Tofino Inlet the "J.M. Swaine" moved South to Ucluelet for survey of that and the Kenedy Lake areas arriving on September 1. She then proceeded to Poett Nook for the purpose of stowing the equipment of the disease station to be removed to Victoria. She then returned to

Ucluelet to resume the survey arriving on September 2.

(a) Timber Types, Topography, and Method of Approach:

The Ucluelet and Kenedy Lake areas are relatively flat, with the lake set in low rolling hills. Timber in the Ucluelet area is very scrubby and worthless. There is a great deal of mature cedar of a very poor quality and this is mixed with second growth hemlock and White pine. In the Kenedy Lake area the timber is good, being mostly mature hemlock, cedar, with odd patches of pine. There is a logging road located at the North eastern end of the Inlet. A road leads 'round from Ucluelet to this, but travelling up to the head by boat is by far the best method. A small boat is necessary for this purpose and the deep water channel (if one exists), is a vague legend with the inhabitants. A road also leads from Ucluelet to the airport at Tofino, and buses and taxis are available.

(b) Sample Points:

2 samples were taken along the Ucluelet - Tofino road up to a distance of 2 miles from Ucluelet. 4 samples were taken along the trail to Kenedy Lake and along the shoreline.

(c) Collections:

Collections in these areas were also very poor. Here again the lateness of the season was thought to be partly responsible for the meagre collections. No insects of any importance were recorded.

(d) Co-operators:

The North Coast Logging Company (head office, Vancouver, B.C.) was contacted at Kenedy Lake. Mr. H. Macquillan, the Superintendant was very co-operative. A truck was put at our disposal, and advice on local conditions was obtained.

The "Swaine" left Ucluelet for Victoria on September 5 arriving in the evening of September 6.

On September 9 the "J.M. Swaine" again left Victoria to assist in the survey of those areas on the lower mainland which are not accessible by road or other means of transportation. The areas thus covered included the following: the Howe Sound area, the Sechelt area, Jervis Inlet, Narrows Arm, Salmon Arm, and Sechelt Inlet.

(21) Howe Sound

In this area the following places were visited:

i. Furry Creek; ii. Britannia Creek; iii. Mill Creek; Henrietta Lake and Cedar Creek at Woodfibre; and iv. McNab Creek.

(a) Timber Types, Topography, and Method of Approach:

Howe Sound is a long narrow inlet with high, sharply rising, well wooded hills on either side. The valleys of the above mentioned creeks are narrow and do not extend more than a few miles back before becoming very precipitous. The stand composition is more or less uniform throughout, being for the most part hemlock, cedar and Douglas fir with hemlock predominating. In some areas a small amount of balsam was encountered, as well as the inevitable alder on old logging operations.

i. At Furry Creek there is a good logging road up both the main river and the South fork, and transportation is available.

ii. At Britannia Creek it is necessary to ascend from the beach via the hoist operated by the Britannia Beach Mining and Smelting Co.; from here there is an electric railway which leads into the townsite. A trail leads from the townsite up to the dam owned by the company.

iii. A road leads back from the townsite of Woodfibre up Mill Creek to the water intake. From here across the pipeline it is possible to travel along an old logging trestle road for several miles. A good road leads up towards Henrietta Lake for several miles along Cedar Creek. A hoist travels up to the main dam - a distance of about ¼ mile. Transportation is available along these roads by the B.C. Pulp and Paper Co. owners of the roads mentioned.

iv. At McNab Creek there is a good logging road from the camp and transportation is available.

(b) Sample Points:

i. At Furry Creek 2 collections were taken 3 miles up the South fork, and 2 up the main creek 1 mile from the mouth.

ii. At Britannia Creek 3 collections were taken from the townsite back towards the dam a distance of 3 miles; 2 were taken near the upper terminus of the electric hoist.

iii. At Mill Creek 4 collections were made up to 3½ miles from the townsite; 1 collection was taken at the West end of Henrietta Lake; 2 collections were taken along Cedar Creek - Lake road up to 3 miles from the townsite.

iv. 4 collections were made at McNab Creek from a distance of 3½ miles back towards the beach.

(c) Collections:

i. Hemlock looper and False hemlock looper: Small numbers of adults were observed on the wing at McNab Creek. One collection of Nepytia phantasmaria was made at Mill Creek.

ii. Hemlock sawfly and Neodiprion Sp.: Small numbers of these were collected at Britannia Creek and also at McNab Creek.

iii. Numerous other insects of minor importance were also collected in this area, these included small numbers of the following insects: Semiothisa granitata, Eupithecia Sp., and numerous Tortricidae found on Silver birch.

(d) Co-operators:

The following co-operators gave valuable advice and assistance to the survey parties. Much of the survey's success is due to their efforts: Mr. T. Osbourne, Osbourne Logging Co., at Furry Creek; Mr. E.P. Brennen, Superintendant of B.C. Pulp and Paper Co., at Woodfibre; the Time office of Britannia Mining and Smelting Co., at Britannia Beach; and the Foreman of Sorg Pulp Co., logging operations at McNab Creek.

(22) Sechelt

The "Swaine" then moved to Sechelt where samples were made at the following places: A. Chapman Creek, and B. Halfmoon Creek.

A. Chapman Creek.

(a) Timber Types, Topography, and Method of Approach:

At Chapman Creek the timber is rather scrubby second growth hemlock, Douglas fir, and a moderate amount of Jack pine. The hills are low rolling. It is reached by a local road leading from the East of Sechelt as far as the water tower and from there easy travel is experienced along the pipe line.

(c) Collections:

Although no insects of major importance were collected, numerous insects of minor importance were recorded: these included 1 larva of Arctiidae, and small numbers of Caripeta Sp. and Tortricidae on hemlock, and small numbers of Tenthredinidae and Geometridae on alder.

B. Halfmoon Creek

(a) Timber Types, Topography, and Method of Approach:

At Halfmoon Creek extensive logging has been done, back to approximately 7½ miles. This area is well stocked with regeneration hemlock. From here at an elevation of 3700 feet, logging is being carried on, the timber is good mature hemlock and Douglas fir. A good road leads up to this timber, and transportation is available from the logging camp.

(b) Sample Points:

Samples were taken in the mature timber at 7½ miles and 7 miles distant from the beach. Collections were also made at ½ mile from the beach in the second growth.

(c) Collections:

In the mature timber very little insect activity was noted. However, a few Geometridae were collected.

Galerucella punctipennis: A very large collection of this pest defoliating alder was discovered. This, and Galerucella carbo were found in large numbers in most of the areas visited throughout the season.

(d) Co-operators:

At Sechelt the B.C. Forest Service Ranger, Mr. R.W. Aylett co-operated with the survey giving advice on local conditions and accessibility.

(23) Jervis Inlet

The following areas were visited and samples taken in Jervis Inlet: A. Skwawka River; B. Deserted River; C. Britain River and D. Vancouver River.

The Jervis Inlet terrain is much more rugged than that of Howe Sound; mountains, though well wooded, are much more precipitous and forbidding, and practical sampling points are much fewer and exceedingly difficult.

A. Skwawka River:

(a) Timber Types, Topography, and Method of Approach:

Timber is predominantly hemlock, with a smaller amount of balsam and Douglas fir. The river is situated at the head of the inlet and a logging camp is located there. A road leads back into the timber, and compass course was followed penetrating deeper into the forest.

(b) Sample Points:

Samples were taken up to 3 miles from the mouth of the river, as well as at the junction of Glacier Creek and Barkshack Creek.

(c) Collections:

Seven collections were sent into Vernon from this area. No insects of major importance were collected. A moderate number of Semiothisa granitata in collections is worthy of mention. Numerous other Geometridae such as Eupithecia were also collected. In one collection on scrub alder 8 larvae and 3 cocoons of Arctiidae were found.

(d) Co-operators:

Mr. Anderson, Superintendant of Anderson Logging Co., Skwawka River was contacted in this area. Transportation and advice was freely given.

B. Deserted River

(a) Timber Types, Topography, and Method of Approach:

Timber is very dense in this area, a mixture of second growth hemlock, Douglas fir, Sitka spruce, and cedar, with hemlock predominating. There is a logging road in the area along which samples were taken.

(b) Sample Points:

8 samples were taken along the logging road up to a distance of $1\frac{1}{2}$ miles from the logging camp.

(c) Collections:

i. Hemlock looper: Adults of Lambdina fiscellaria lugubrosa Hlst. and Nepytia phantasmaria were observed on the wing in this area, but due to the advanced stage of the season no collection of larvae or pupae were made. The population does not seem to be particularly heavy however.

ii. Numerous small collections were also made of the following insects of minor importance: Eupithecia Sp., Semiothisa granitata, Neodiprion Sp. on hemlock; and Tenthredinidae and Archips Sp. on alder. 1 larva of Hemichroa crocea (doubtful) was found on alder - an interesting record if determination is correct.

(d) Co-operators:

Mr. Erickson - Superintendant of the Deserted Bay Logging Co., was contacted in this area. Transportation and advice was received from him.

C. Britain River

(a) Timber Types, Topography, and Method of Approach:

Up to 3 miles from the beach the timber is cut over and burned and a good regeneration is springing up. From there a dense stand of balsam hemlock and cedar (mature) is encountered. A good logging road goes up the valley for several miles and a cruisers trail leads off from the end of it.

(b) Sample Points:

6 samples were taken in the area, ranging from 1 mile up the road to 8½ miles along road and trail.

(c) Collections:

i. Hemlock looper: Here again both Lambdina f. lugubrosa and Nepytia phantasmaria adults were seen on the wing. No larvae or pupae could be collected, however, the season being too far advanced.

ii. In addition to those small numbers of Semiothisa granitata, Eupithecia Sp., Caripeta Sp., and several minor Geometridae were also collected.

(d) Co-operators:

Mr. R. Phelps, assistant Superintendant of the B.C. Forest Products camp at Britain River was contacted. Valuable assistance was obtained in the matter of transportation and advice on local conditions.

D. Vancouver River

(a) Timber Types, Topography, and Method of Approach:

Extensive logging has been done in this area, and the timber is largely second growth. It is very vigorous and close growing being mostly Douglas fir, hemlock and cedar; small amounts of balsam were also en-

countered. The valley is narrow and slopes backward rapidly to high rugged mountains. A logging camp is situated at the mouth of the river and transportation is available.

(b) Sample Points:

Collections were made along the logging road up to a distance of 5 miles, and on both North and South slopes of the valley to an elevation of 1500 feet. Samples were also taken along the shoreline on either side of the river.

(c) Collections:

i. Hemlock looper: Here again there was evidence of Lambdina f. lugubrosa and Nepytia phantasmaria. Adults were observed in flight, but no collection of larvae or pupae could be made.

ii. Small numbers of Caripeta Sp., Eupithecia Sp., and Semiothisa Sp., larvae were found on hemlock as well as a very small number of Neodiprion Sp. Numerous Tortricidae were found on alder including one specimen of Archips Sp.

(d) Co-operators:

The B.C. Forest Products operates a camp at Vancouver Bay. The foreman Mr. F. Lidstone was contacted and valuable co-operation was obtained.

(24) Narrows Arm

Two areas were visited in Narrows Arm - A. the valley of the Tzoonie River, at the head of the arm, and B. a valley of a small un-named creek on the South east shore, just South of the actual narrows.

A. Tzoonie River

(a) Timber Types, Topography, and Method of Approach:

Old logging and uncontrolled slash burning have left little timber in the valley up to an elevation of 1500 feet. Beyond this height timber appears quite normal. What timber there is in the valley bottom up to a distance of four miles from the head of the inlet is second growth hemlock, Douglas fir and Sitka spruce with patches of alder. The terrain is very rugged, although a logging road up the river makes sampling easy.

(b) Sample Points:

Samples were taken at the following locations, and collections sent in from each: 4 miles up stream, and two at different locations 1 mile up stream, all on the North slope of the valley.

i. Hemlock looper and False hemlock looper: Small moth flights were observed in the Tzoonie River area. Here again the season was too far advanced to make larval or pupal collections. Further collections in the early summer months would be advisable.

ii. Numerous insects of minor importance were also collected. These included small numbers of such common insects as Caripeta Sp., Phalaenidae, Semiothisa granitata, and Eupithecia Sp.

B. Un-named Creek - Narrows Arm

(a) Timber Types, Topography, and Method of Approach:

The road in this area rises rapidly from the beach, the valley being very small in size. Timber near the beach is lush second growth hemlock-very vigorous. In the timber (mature) at an elevation of 1000 feet to 2800 feet, timber is good Douglas fir, cedar and hemlock. Were it not

for the presence of a good logging road in this area, sampling would be extremely difficult due to the rugged character of the terrain.

(b) Sample Points:

Samples were taken at the 2800 foot level along the road, the 1500 foot level and also at the 1000 foot level.

(c) Collections:

i. Hemlock looper: Small numbers of adults of Lambdina f. lugubrosa and Nepytia phantasmaria were observed in flight in this area. Their numbers would indicate a very small population in 1948.

ii. Numerous minor insects were also found in the area; these included the following in very small numbers: Eupithecia Sp., Semiothisa granitata, Neodiprion Sp. and 1 specimen of Arctiidae on hemlock; also various Geometridae, and 1 Archips Sp. on alder.

(d) Co-operators:

Mr. Moorhead, Superintendant of the Narrows Arm Logging Co. was contacted, and he was very co-operative. Mr. T. Osbourne, owner of this camp was contacted during the survey of 1946, and accorded us every courtesy.

(25) Salmon Arm

From Narrows Arm the "Swaine" proceeded to Salmon Arm where a thorough survey was made of: A. Upper and Lower Clowhom Lake including the Clowhom River and Copper Creek; B. Sechelt Creek; and C. Misery Creek.

A. Upper and Lower Clowhom Lakes, Clowhom River and Copper Creek

(a) Timber Types, Topography, and Method of Approach:

This water system is set in a narrow well wooded valley. Timber is dense and of good quality. For the most part the stand is second growth

Douglas fir with smaller amounts of hemlock and cedar. Access to the valley is easily gained by boat along the lakes, and a good trail leads into the Copper Creek area from a cabin situated on the North side of the creek. An excellent trail leads up the Clowhom River from the lake.

(b) Sample Points:

5 samples were taken in old Lambdina f. lugubrosa areas on the Lower Clowhom Lake; 4 were taken along the shore of the upper lake; and 1 collection was made up the river trail, a distance of approximately 1½ miles. At the request of T. Osbourne, owner of Narrows Arm Logging Company an investigation was made into the Copper Creek area, 2 collections were made, and observations of looper conditions in the area were recorded.

(c) Collections:

i. Hemlock looper: In the Upper and Lower Clowhom Lakes areas as well as the Copper Creek area where a serious outbreak of these insects was recorded in 1946, a marked drop in residual populations was noted. Moth flights were observed to be very light. Only small numbers of 1947 pupal skins could be found, and feeding recorded on 1947 foliage was relatively light.

Apparently the infestation just West of the Copper Creek Valley on the South slope of the Upper Clowhom Lake did not extend into the valley. No damage to second growth was observed.

Mortality recorded was confined to hemlock and this is very patchy. Cedar, Douglas fir, alder and maple have withstood the attack. No trees of these types were observed in a dead or dying condition. The hemlock, however, shows an estimated 50% mortality range with Dominant and Suppressed trees showing the best recovery. Co-dominant and Intermediate

growths in the areas of infestation seem to have the highest mortality range with only a few observed with 1947 foliage. No secondary insect attack was noted on all trees examined.

ii. Hemlock sawfly: Small numbers of larvae were recorded on the Upper Clowhom Lake.

iii. Other insects of minor importance recorded included the following: Small numbers of Eupithecia Sp., Caripeta Sp., and Semiothisa granitata on hemlock and Douglas fir, and numerous Geometridae on alder.

B. Sechelt Creek

(a) Timber Types, Topography, and Method of Approach:

Timber in the beach area and for a distance of two miles up the logging road, has been logged and a vigorous second growth - cedar, hemlock and Douglas fir has sprung up. Beyond this good mature cedar, Douglas fir and hemlock was recorded. The valley slopes rapidly back to an elevation of 2000 feet at 4 miles distance from the beach. A good logging road leads up from the beach, and transportation is available.

(b) Sample Points:

Samples were taken along the road from the campsite up to a distance of 4 miles.

(c) Collections:

i. Hemlock looper: Here again a very small flight of Lambdina f. lugubrosa and Nepytia phantasmaria was recorded. The moths were observed to be almost exclusively male. One Lambdina f. lugubrosa larva was collected.

ii. A very light collection was made in the area, these included among others small numbers of Semiothisa granitata, Eupithecia Sp., and cocoons of Neodiprion tsugae on hemlock, as well as small numbers of Geometridae and Tortricidae (Archips Sp.?) on alder.

(d) Co-operators:

A logging camp owned by Johnson and Sons Logging Co., is operating at Sechelt Creek. Mr. Johnson, owner was contacted and transportation was put at our disposal.

C. Misery Creek

(a) Timber Types, Topography, and Method of Approach:

Timber in the area sampled is not good but very dense; being a mixture of mature and second growth hemlock, cedar and fir. North east of the creek in a small bay there is an old logging cable skid. This was found to be the best method of approach although being precipitous as it is, it is very difficult.

(b) Sample Points:

9 trees were sampled here with very poor results.

(c) Collections:

A very small number of larvae were collected here; these included 2 Eupithecia Sp. larvae, 2 Semiothisa granitata larvae, and one Neodiprion Sp. larva.

(26) Sechelt Inlet

In Sechelt Inlet the following areas were visited: A. Grey Creek; and B. Waugh Creek.

A. Grey Creek

(a) Timber Types, Topography, and Method of Approach:

The Gray Creek Valley slopes back sharply for approximately 3 miles to an elevation of 2000 feet and from there a broad plateau extends back for several miles. The timber on the plateau is good mature Douglas fir, with a mixture of hemlock and cedar. A good logging road leads back to the plateau and transportation is available.

(b) Sample Points:

Samples were taken at four points along the logging road - 1 at $\frac{1}{2}$ mile up the road, 2 at $2\frac{1}{2}$ miles and 1 at 5 miles.

(c) Collections:

i. Hemlock looper: Small moth flights were observed in this area of both Lambdina f. lugubrosa and Nepytia phantasmaria. No defoliation was recorded, and no larvae or pupae were collected, presumably due to the far advanced season.

ii. On alder fairly large numbers of Galerucella punctipennis adults were found as well as numerous Altica (bimarginata?).

iii. Among other minor insects collected the following common insects were found: Small numbers of Semiothisa Sp., and Hellops pernitens on hemlock, and numerous Geometridae and Psylloborus 20 maculata taedata on alder.

(d) Co-operators:

The Lamb Lumber Co., operates a logging camp at Grey Creek. Mr. Lamb, the owner was contacted here, and valuable assistance was obtained.

B. Waugh Creek

(a) Timber Types, Topography, and Method of Approach:

The Waugh Creek Valley is relatively flat, with mostly second growth Douglas fir and hemlock. Alder and dogwood patches were also recorded. A very old and obscure trail leads up the creek on the South side for a short distance, but it is so overgrown that it is practically useless.

(b) Sample Points:

Here, only two sample points were thought worthy of collections. These were taken within a distance of 1 mile from the creek mouth.

(c) Collections:

i. Hemlock looper: Again small numbers of Lambdina f. lugubrosa and Nepytia phantasmaria were observed although no defoliation was noted.

ii. Hemlock sawfly: One instance of Neodiprion tsugae was recorded in this area.

iii. Small numbers of Tenthredinidae, and Semiothisa granitata were recorded on hemlock. One specimen of Arctiidae (doubtful) was also recorded.

B. MORTALITY STUDY AND EGG COUNTS

Extensive work was done on hemlock looper infestation areas. Mortality cruises were run and egg counts made. These are discussed under the following headings:

(1) Rainy River

(2) Widgeon Creek.

(1) Rainy River

From the survey in Sechelt Inlet, the "J.M. Swaine" proceeded to Rainy River and the Port Mellon area, arriving at Port Mellon on October 2. Work in this area has been concerned mostly with egg surveys of the hemlock looper, the mapping of areas of infestation, and the running of sample strips for mortality figures. In connection with the latter, the rangers have run chain-wide strips, in which living, marginal and dead trees have been recorded. In the Port Mellon region 84% of the hemlock on the strips are dead, and 54% of the balsam. The wood - borer population is becoming severe, and of the dead trees 70% of the hemlock and 35% of the balsam was under attack by Ambrosia beetles when examined in October.

That the hemlock looper population has undergone a very marked decline is evident from the egg counts. From a total of 12 square feet of moss samples examined only 28 fresh eggs were found for the entire moss. This averages only a little over two eggs per square foot, as compared to 60 - 80 eggs per square foot during the period of outbreak proportions.

A chart showing actual egg counts of the Port Mellon and McNair Creek (vicinity of Port Mellon infestation) follows:

PORT MELLON AREA

Tree No.	Location	Size of Sample	Weight of Moss	Eggs Found		
				New	Hatched	Dead
1	Rainy River P.S.P. No. 2	Butt- 1/10 sq. ft.	Light	-	13	-
		20' - 1/10 sq. ft.	Light		154	
		50' - 1/10 sq. ft.	Light		31	7
2	Rainy River 40 Ch. on strip	Butt- 1/10 sq. ft.	Heavy	1	3	2
		20' - 1/10 sq. ft.	Medium	1	8	0
		40' - limb	Light	1	18	5
3	"	Butt- 1/10 sq. ft.			125	25
		20' - 1/10 sq. ft.			279	38
		60' - 1/10 sq. ft.		12	57	16
4	"	Butt- 1/10 sq. ft.			54	8
		20' - 1/10 sq. ft.		1	37	9
		60' - 1/10 sq. ft.			135	29
1	McNair Cr.	Butt- 1/10 sq. ft.	Light	-	3	-
		20' - 1/10 sq. ft.	Light	3	41	4
		30' - 1/10 sq. ft.	Light	5	57	4
		50' - 1/10 sq. ft.	Light	3	28	4
2	McNair Cr.	Butt- 1/10 sq. ft.	Medium	-	3	
		10' - 1/10 sq. ft.	Medium	-	9	1
		25' - 1/10 sq. ft.	Light	-	1	5
		60' - 1/10 sq. ft.	Light	-	1	5
3	McNair Cr.	Butt- 1/10 sq. ft.	Heavy	1	6	
		30' - 1/10 sq. ft.	Heavy	-	-	-

(2) Widgeon Creek

From here the "Swaine" proceeded up the Fraser and Pitt Rivers to Widgeon Creek, where further detailed study was made of mortality and residual populations. In this area the infestation was confined for the most part to the North bank of Widgeon Creek in an area approximately three miles from the mouth of the river. Here mortality in the affected area was recorded to be 70%. 82% of the dead timber was under attack by Ambrosia beetles, and a lesser attack by round-headed borers is also under way.

Study of the mortality and secondary insect attack represents an extremely important piece of work. Requests by operators for advice in connection with conditions of the infested stands are becoming very numerous.

C. PRE - SURVEY WORK

After the Widgeon Creek survey the "J.M. Swaine" returned to Victoria, arriving on October 19th.

On October 30, the "Swaine" again left Victoria to start ground work of the 1948 survey, and make preliminary examinations of the territories to be covered. To this end the boat visited inlets on the mainland at the Northern end of Vancouver Island. The majority of the time was spent in Knight Inlet which runs inland for 70 miles. Operators and others were contacted and arrangements completed for survey work to be conducted through that area and points North when the 1948 programme is commenced. It is felt that the time spent is most worth while, because it will enable us to save much time when a crew is on the job

in that area. Due to heavy seas, and bad storms that developed, it was not possible to work further North, which is regrettable in as much as these areas are all new and unfamiliar, and by making preliminary examinations, location of trails, etc., it permits the Survey work to progress without interruption during the busy insect season.

During this voyage a visit was also made to Powell River, where work was done in connection with the wooden storage vats of the Powell River Pulp and Paper Co., which are under attack by Wood - borers. Mr. Richmond had already done considerable work in the early Spring on the wood - borers attacking the vats.

On November 14 the "J.M. Swaine" arrived in Victoria from the foregoing trip.

D. SHIP'S LOG

The following tables give important information regarding the following:

(1) Diary of Operations

(2) Diary of Operational Costs

(3) Diary of Costs of Equipment and Renewals

(4) Summary of Meals and Costs

Cost of Equipment & Renewal M/V "J.M. Swaine" 1947

Date	No. of	Item or Job	Cost	Remarks
		April, 1947		
10	2	3" Paint Brushes	4.80	
"	2	4" " "	6.20	
"	1	Lifeboat Ration Tank	3.50	
21	60	Blue prints	6.48	Machine drawing for Steamship Inspection.
24	1	Blower Packing	.30	
"	3	Purolator Felter Elements	21.00	Fuel Filters
"	12	Manifold Gaskets	.60	
"	3	Water main to tank gaskets	.30	
"	2	Zinc Plugs	3.02	Gray Engine Supplies
"	2	Fuel Line Assys.	1.50	
"	2	Oil cooler gaskets	.40	
"	2	Oil cooler cover gaskets	.60	
"	4	Fresh water outlet packings	.40	
"	4	FH* Filter Elements	12.80	
"	4	C-13 Lubo oil Filter Elements	22.80	
		Total	84.70	
		May, 1947		
8	1	Brush (Hearth Type)	.68	
9	1 qt.	Reg. (Varnish)	1.35	
10	¾	Steel wool	.60	
12	1	Steamship Inspection	15.00	Inspection carried out to Gov't. Regulations.
14	2	Tins of Snap	.43	Hand cleaner.
"	2	" " Simoniz	1.50	For polishing new linoleum .
"	2	Monator Bells	3.84	
"	2	Nubells 2½"	.88	
"	1	Dixie Buzzer	.41	Bell system for emergencies, etc.
"	1	Push Button	.37	
"	1	Toggle Switch	.29	
"	120'	Lead in wire 18 strand	1.20	Bell System.
15	1	Inspection	25.00	Hull & Engine Inspection by Gov't. Inspector.
"		Compass adjusting	15.00	Compass tested and adjusted.
"	2 gal.	Cruiser Grey Paint	9.50	Marine Paint
"	4 "	" White "	19.20	
"	3 qts.	Varnish	4.95	Rosepar Marine Varnish.
"	2 gals	Turpentine	4.98	
16	25'	¼ X 6/24 Galv. W. Rope	2.92	Engine reverse control cable renewal.
"	2	¼" Galv. Thimbles	.16	
"	416	Sheet Brass	2.00	Chafing strip for stairs.
"	15	Condensors (Electrical)	6.75	To eliminate radio interference on
"	2	" "	1.50	electric motor and generators.
19	8	Lubo oil filter elements	45.60	Engine supplies.
24	2	Round files	.80	
"	1	Phone call (Radio phone)	1.30	From ship to Victoria.
26	1	Bosch Nozzle	14.40	
"	5	Bosch Gaskets	.42	Supplies for auxiliary engine.
"		Sales Tax on above	1.18	
27	2 gal.	Grey Paint	12.50	Marine Paint
"	1 Qt.	Green Enamelaid	2.00	" "
"	1 Pt.	Black Eng. Enamel	1.20	
"	1 Qt.	Varnish	2.40	Mendors special yatch varnish.
"	1 Qt.	Aluminum Paint	1.34	Heat resisting for exhaust pipes etc.
"	1 Qt.	White Enamelaid	6.00	Inside work.
"	1	Broom	1.41	
"	5 lbs.	Sol. Soda	.25	Washing Paint work
"	2 btls.	Brasso	1.06	
"	2	2" Paint Brushes	3.70	
"	2	3" " "	6.90	
"	1	2" Brass Hook	.30	
"	1	2½" Paint Brush	3.10	
"	1	2 yd. Blue Ensign	6.00	

Date	No. of	Item or Job	Cost	Remarks
27	6	Deck Chairs	22.50	
"	1	Folding Stool	.80	
28	20 lbs.	Wiping Rags	6.00	For engine room & cleaning, etc.
29	50'	¾" X1¼" Yellow Cedar	2.08	For window screens on lab windows.
"	50'	5/8" Half round fir	.75	
"	2	Picture Frames	1.10	To frame certificates for display.
30	5	Venetian Blinds	25.00	For windows in lab.
31		Docking and painting	150.00	Docking & hull painting Star Shipyards.
"		Hardware	5.20	Gallery utensils.
		Total	$440.51	

June, 1947

3	1	Oil filter base & bracket	24.14	To replace cracked base.
"	3	Gaskets for above		
6	1 piece	1" Galv. pipe threaded	1.15	Modification to sea water toilet.
"	2	1" Bushings	.42	
"	1	Mop handle		
12	1	Friction Tape	.55	
"	4	Light Burles	.60	
"		Brass Screws	.20	
"		Insulated Staples	.40	
"	1	Funnel (small)	.15	
14	1 pt.	Red Paint	.55	
"	1	Radio phone call	3.10	Ship to shore.
16	1	Cast Iron Frying Pan	1.73	
"	1	Sheet Iron Bake Tin	.23	
"	1	Potatoe masher	.49	Galley equipment.
"	1	Cake turner	.63	
"	2	Bannester Brushes	2.86	
"	2	Waste Paper Baskets	.56	
"	1	Aluminum Tea Pot	1.39	
"	3	Soap Dishes	3.24	
19	1	Radio phone call	1.90	Ship to shore.
20	1 Qt.	Boiled linseed oil	.50	
21		Hardware	1.60	Galley utensils.
25	1	Radio phone call	2.50	Ship to shore.
"	1	Shower curtain	6.92	
26	2	Sauce Pans	1.50	Galley Equipment.
27	1	Radio phone call	1.90	Shore to ship.
28	1	Radio phone call	1.00	Ship to shore.
		Total	$60.20	

July, 1947

2	6	Lube oil filter elements	34.20	Engine supplies.
4	2	Old Dutch	.22	Cleanser.
"	2	Soap	.22	Toilet
"	1 qt.	Boiled oil	.50	Mixing red lead.
"	1	Galv. oil can	1.00	Gas container
"	1 gal.	Naptha	.26	
9	1	Radio phone call	1.00	Shore to ship.
21	1	Door mat	1.90	For lab entrance.
"	1	Bleach	.20	For towel washing.
28	2 qts.	Turpentine	1.80	Paint thinner & brush cleaning.
31	2	Generator brushes	3.50	
"		Alterations, extras.	393.83	Extras done by Star Shipyards to comply with Govt. Inspection regulations
	5	Radio phone calls	14.49	Ship to shore.
		Total	$453.21	

		Item of Use	Cost	Remarks
4	2 qts.	Aluminum Paint	3.24	
12	1 gal.	Apexior #3	7.00	For inside water tanks.
19	50 lbs.	#1 Bleached Wiping Rags	14.50	
21	1	Ship's Log Book	.50	
26		Laundry of sheets	.55	
"	1	Radio phone call	1.84	Ship to shore.
"	2	Radio phone calls	3.00	ship to shore.
30		Survey of alterations	6.00	Survey made by measuring surveyor of shipping.
"	1 doz.	Elbow catches	2.95	For lab cupboard doors.
"	2 doz.	781 X 1½" brass cap hooks	.56	
"	1	#1 Robertson Screwdriver	.34	
"	1	#2 Robertson Screwdriver	.34	Engineer room tools.
"	1	#3 Robertson Screwdriver	.34	
"	1	12" Hercules Squeegee	.97	For window cleaning.
"	1/8 gal.	Enamelaid Buff	.86	Funnel Paint
"	1/16 gal.	Engine Enamel Black	.48	
"	1	½" X 360 OWY Artist Brush	.40	
		Total	$43.87	

September, 1947

3	2	Insulation tape	.20	
4	24'	Sash cord	.90	Dinghy Steering.
"	1 pkt.	Caulking cotton	.58	
"		Emery cloth	.16	
"		Brass Wood Screws	2.63	
5	3 gals.	Red Crown gas	.57	Use on dinghy
8	1	Blackman Rotary Pump	34.20	Modification to sump tank pump.
"	3	Wire Brushes	1.30	For rust and varnish removal.
"	1	Paint scraper	.46	
10	1	Parallel Rule 24"	12.00	Captain Fields Special, with degrees marked.
"	1	6" Dividers, brass	1.75	Navigation use.
"		Postage for above	.20	
15	1	Set Stock and Dies ⅛" to 1"	12.25	Required in engine maintenance.
19		Laundry	1.07	11 sheets and 2 towels.
23	6	40 Watt Lamp Bulbs	.62	
30	1	Vertical check valve	4.10	
"	1	Nautical chart	.50	
		Total	$73.49	

October, 1947

1		Galv. bolts & washers	.25	Modifications, pump on sump tank.
"		Galv. union and nipples	1.86	
"		Labour & coil assy.	45.00	Modifications to galley stove.
3	1	Brush seater	.95	Generator brushes.
5	1	55" fan belt	.53	For generator drive.
9	2	Gates Belts	1.48	For refrigerator
"	1	Wheel Puller (#1001)	6.72	
"	1	" " (#1031)	9.75	
"	1	193-F Imperial Flaring Tool	5.10	Tools required.
"	1	212 - Z Hammer	1.15	
"	1	212 - G Hammer	1.20	
10	1	W-35 Grey Bonney tool set	47.75	Required for overhaul and maintenance of engine.
22	1	Galv. 45° Elbow	.47	Mod. to bilge pump outlet.
23	1	1½ tone Winch	73.08	Yale & Towne Pull-Left Winch to raise main engine.
24	1	Oil burner pot assembly	45.00	Mods. to galley stove.
28	9	Radio phone calls	14.26	Ship to shore
		Total	$254.55	

Date	Fuel Gals.	Fuel $	Lube Oil Gals.	Lube Oil $	Repairs Item	Repairs $	Remarks
					April, 1947		
	During Apri. M/V "J.M. Swaino" was tied up at Star Shipyards undergoing extensive alterations. No Operational Costs.						
					May, 1947		
	542	54.74	25	22.25	Overhaul Bosch Injector	6.50	Servicing Auxiliary Engine.
					Total for May = $83.49		
					June, 1947		
2					Lube oil filter base welded	1.75	Base cracked causing oil leak.
20					Labour on switchboard	1.00	Ammeter not functioning correctly.
					Total for June = $2.75		
					July, 1947		
2	407	39.89	34	33.44			
14	170	18.87					
					Total for July = $92.20		
					August, 1947		
20	597	78.21	30	26.70	1 Gal. Apoxior ..	7.00	Material to repair lining of water tank
					Total for August = $111.91		
					September, 1947		
25					Fan motor	3.15	Advised to improve performance.
5	423	52.45	20	17.80			
30					Caulking decks	200.00	Deck seams leaking in several places.
					Total for September = $273.40		
					October, 1947		
29					Reverse Shaft Bearing	14.55	Large ball bearing damaged, was replaced.
					Total for October = $14.55		
					November, 1947		
1							
6	951	115.07	30	27.90			
					Total for November = $142.97		
					December, 1947		
					Gravity lantr.welded ..	3.25	Tank cracked on seam.
15					Servicing 6 injectors	39.44	Main Engine Injectors serviced & repaired where necessary.
					Total for December = $42.69		

Summary of Operational Cost M/V "J.M. Swaino" 1947

During the 9 month period of April to December inclusive the operational costs of M/V "J.M. Swaino" amounted to a total of $757.46. These costs were for fuel oil, lubricating oil, grease and repairs, etc., necessary for the correct operation of the boat. The average cost per month for operation alone = $84.16

DIARY OF OPERATIONS
M.V. J.M. SWAINE January 1947

Date	Hours Run	From	To	Mileage	Remarks
10	1.15	Run in tied to dock.			
25	1.00	Dock	Albert Head & return	8	Warm up run.
Total hrs. 2.15			Total Miles	8	
			February 1947 (Diary of Operations)		
3	1.15	Govt. wharf	Breakwater & return	5	Trip cancelled due to weather.
13	9.50	Victoria	New Westminster	72	To Star Shipyards for alterations.
Total 11.05			Total Miles	77	
			March and April-: Undergoing repairs and alterations.		
			May 1947 (Diary of Operations)		
14	5.30	Star Shipyards	Coal Harbour		
15	8.40	Vancouver	Victoria	39	Run at dock and compass swinging r
21	12.45	Victoria	Bamfield	72	Return to H.Q.
22	.45	Bamfield		85	En route to Poett Nook to site of study camp.
24	1.30	Poett Nook	Poett Nook		
26	12.00	Poett Nook	Bamfield & return	8	Setting up disease study camp.
30	8.00	Victoria	Victoria	16	Supplies.
Total 49:10			Nanaimo	97	Return to H.Q.
				64	Start of season survey.
			Total Miles	377	
			June 1947 (Diary of Operations)		
1	2.50	Nanaimo	Anderson Bay		
2	3.20	Anderson Bay	Powell River	32	Survey
7	2.00	Powell River	Stillwater	31	"
11	3.00	Stillwater	Lund	13	"
14	.40	Lund	Bliss Landing	20	"
16	1.20	Bliss Landing	Penrose Bay	4	"
17	.45	Penrose Bay	Theodosia Arm	11	"
19	2.15	Theodosia Arm	Lund	5	"
20	.50	Lund	Bliss Landing	15	"
20	2.20	Bliss Landing	Quatkiaska Cove	4	"
21	1.00	Quatkiaska Cove	Campbell R. & return.	18	"
22	3.20	Quatkiaska Cove, Campbell R. & Bliss Landing		6	Supplies
23	5.20	Bliss Landing	Head of Toba Inlet	21	Survey
25	1.50	Head of Toba Inlet	Salmon Bay	42	"
26	1.35	Salmon Bay	Carstairs Camp	14	"
28	8.30	Carstairs Camp to Toba Inlet & back. Thence from Carstairs Camp to Toba Inlet and on to Quatkiaska Cove.		18	"
29	10.45	Quatkiaska Cove to Campbell R. & Vancouver		90	"
Total 51:40				94	"
			Total Miles	438	

July 1947 (Diary of Operation)

Date	Hours Run	From	To	Mileage	Remarks
2	4.50	Vancouver	Nanaimo	38	Continuation of survey, to pick up supplies & personnel.
3	3.20	Nanaimo	Bull Pass & Jedidiah Is.	22	Survey
4	8.15	Bull Pass	Bliss Lds. Yuclataw Store Shoal Bay	80	"
5	5.55	Stewart Is.	Beaver Cove	57	"
13	1.25	Beaver Cove	Alert Bay & return.	24	"
13	1.00	Moving Berth & taking on fuel		—	"
14	6.00	Beaver Cove	Bull Harbour	48	"
15	10.25	Bull Harbour	Port Alice	76	"
19	2.50	Port Alice	Coal Harbour	18	"
20	.15	Changed berth		—	"
21	4.15	Coal Harbour	Port Alice & return.	36	"
22	13.30	Coal Harbour	Alert Bay	104	"
23	15.25	Alert Bay	Blubber Bay	113	"
24	13.45	Blubber Bay	Victoria	107	Returned to Victoria due to illness of skipper.
27	8.35	Victoria	New Westminster	73	Star Shipyards to have work carried out.
30	4.40	New Westminster	Vancouver	39	
31	9.30	Vancouver	Victoria	72	Return to base.
otal	113:55		Total Miles	897	

August 1947 (Diary of Operations)

14	.50	Run tied to dock to warm engine			
2	12.00	Victoria	Bamfield	85	Survey
3	13.55	Bamfield	Zeballos	110	"
5	2.10	Zeballos	Tahsis	15	"
6	7.10	Tahsis to Tlupana, Tlupana to Muchalat		48	"
7	1.10	Muchalat	Matchlee Bay	5	"
8	4.00	Matchlee Bay	Nootka	25	"
9	6.00	Nootka	Shelter Inlet	40	"
0	9.30	Shelter Inlet, Herbert Inlet, Wara Bay		31	"
1	3.05	Wara Bay	Deer Bay	18	"
tal	59:50		Total Miles	377	

September 1947 (Diary of Operations)

1	11.20	Deer Bay	Uclulet & Poett Nook	86	Survey
2	3.55	Poett Nook	Uclulet	24	"
2	2.50	Uclulet	Bamfield	18	"
	12.00	Bamfield	Victoria	85	"
	8.45	Victoria	Vancouver	72	"
1	4.05	Vancouver	Britannia Beach	24	"
2	.30	Britannia Beach	Woodfibre	3	"
	4.35	Woodfibre, McNab Creek, Vancouver		31	"
	6.20	Vancouver, Sechelt, Halfmoon Bay		36	"

September 1947 (continued)

Date	Hours Run	From	To	Mileage	Remarks
18	7.50	Halfmoon Bay, Pender Harbour, Head of Jervis		55	Survey
19	1.45	Head of Jervis Inlet	Deserted Bay	12	"
20	1.45	Deserted Bay	Britain River	12	"
21	1.10	Britain River	Vancouver Bay	8	"
22	1.55	Vancouver Bay	Egmont	12	"
23	3.10	(Egmont	Tzoonie River)	21	"
		(Tzoonie River	Osborne Camp)		
24	3.15	Osborne Camp	Clowholm River	17	"
25	.30	Clowholm R.	Sechelt Creek	2	"
26	3.20	Sechelt Creek, Porpoise Bay, Gray Creek		22	"
27)	14.55	Gray Creek, Doriston, Vancouver		86	"
28)					
Total	93:55		Total Miles	626	

October 1947 (Diary of Operations)

2	3.40	Vancouver	Port Mellon	20	"
4	.45	Changed berth		—	"
6	3.25	Port Mellon	Vancouver	20	"
8	5.20	Vancouver	New Westminster	39	"
9	2.30	New Westminster	Pitt Lake (Widgeon Cr.)	15	"
10	3.25	Pitt Lake	New Westminster	15	"
11	.25	Changed berth		—	Repairs at Mercers.
18	8.25	New Westminster	Port Washington	62	Survey
19	3.55	Port Washington	Victoria	30	"
22	.20	Run tied up to dock - after work done on engine.			
29	.20	Warm up check run			
30	9.05	Victoria	Vancouver	72	Survey
20	.10	Changed berth in Victoria.		—	
Total	41:45		Total Miles	273	

November 1947 (Diary of Operations)

1	.30	Oil barge and return.		3	
2	1.10	Ran two miles, ran at dock 30 min.		4	Squeaks developed, so returned to dock to rectify
3	9.20	Vancouver	Powell River	72	Survey
4	2.05	Powell River	Lund	10	"
5	14.20	Lund	Hardy Bay	122	"
6	4.05	Hardy Bay	Bull Harbour	24	"
7	10.35	Bull Harbour, Hardy Bay, Alert Bay, Port Elizabeth		70	"
8	6.30	Port Elizabeth	Head Knight Inlet	58	"
10	8.20	Head Knight Inlet	Lagoon Cove	51	"

November 1947 (continued)

Date	Time	From	To	Miles	Remarks
11	12.40	Lagoon Cove	Deepwater Bay	85	Survey
12	7.00	Deepwater	Stillwater	56	"
13	7.20	Stillwater	Vancouver	57	"
14	9.40	Vancouver	Victoria	72	"
26	1.00	Check over run tied to dock.		—	—
27	9.25	Victoria	New Westminster	73	To Star Shipyards for bottom paint and chart table
Total 104:00			Total Miles	757	

December 1947

The vessel was laid up during December in Mercers (Star) Shipyards, in New Westminster undergoing bottom painting and alterations to deckhouse to incorporate a chart table built in wheelhouse.

Summary 1947.

From January 1st 1947 to December 31st 1947 the "J.H. Swaine" made 106 ports of call. In doing so it travelled 3,830 nautical miles which took 517:35 hours of running time to accomplish.

Total Mileage for 9 months from April to December Incl. = 3745 Total Hours run for same period = 504:15
The average mileage per month = 416.1 miles.
The average hours run per month = 56 hours 15 minutes.

"Meals Served on M/V J.M. Swaine"

April to December Incl. (1947)

Month	No. of Meals	Cost	(Average Meals Cost .46.67¢)
April	5	$2.33	
May	130	60.66	
June	455	212.35	
July	393	183.31	
August	294	137.21	
September	232	108.16	
October	270	126.01	
November	229	106.87	
December	Nil	Nil	
Total	2008	$937.14	

Total Costs of "M/V J.M. Swaine" (April to Dec. Incl. 1947)

Cost of Equipment, Supplies Alterations and Modifications	=	$1538.90
Operational Costs	-	757.46
Cost of meals served	=	937.14
Total	=	$3233.50
Average Monthly Total	=	$ 359.27

1947 Annual Report, - E.G. Harvey

Forest Insect Survey - Vancouver Island.

The following report deals with that portion of Vancouver Island which is accessible by road. Included are all the areas from Kelsey Bay, Sayward, extending east and south to Victoria. This is a very large territory and so, for the convenience of this report, is divided into its most natural geographical districts, which are dealt with one at a time, starting at the southern tip of the island.

These districts are:-

A Saanich Peninsula

B Goldstream - Sooke

C Shawnigan

D Duncan

E Cowichan Lake

F Gordon River - Caycuse

G Nitinat River

H Sarita River - Poett Nook

I Ladysmith - Nanaimo

J Qualicum

K Alberni

L Courtenay

M Campbell River

N Sayward

1 (a)

The survey work reported here was carried out by the Insect Rangers from the Victoria staff.

The method of sampling was kept as uniform as possible throughout. At each sampling point three trees of about equal foliage were beaten of each kind sampled. The beating sheet used was the standard 7' X 9'. In most cases the insects gathered from the three beatings were sent to Vernon in one sampling can. The only exceptions were when the insects were too numerous, in which case they were divided into more than one can, or when the insects were so scarce that it was necessary to make extra beatings to get a sample at all. In a few cases samples were hand picked. All variations from the three beatings per sample rule will be noted.

The accompanying maps have the sampling points marked on them and will serve to show at a glance the coverage attained during the year.

Districts And Their Descriptions

A. Saanich Peninsula -

That area to the east and north of the Island Highway from Goldstream to Victoria. A large part of Saanich is low land, fairly closely settled. However, scattered throughout the peninsula are to be found small mountains, and on the western side, east of Finlayson Arm from Goldstream to Todd Inlet, is a mountain ridge. These mountains are all well timbered with medium sized and second growth trees. There are only very small logging and wood-cutting operations carried on here. Possibly of more importance in this district are the parks and recreation grounds, of which there are several.

Sample points and dates are as follows:-

(1) Cloake Hill - near the top of the hill, reached by wood-cutter's trail from the end of the road at the northern tip of the peninsula. May 19th.

(2) North Hill - on the western slope, just behind and above the rifle range. May 19th.

(3) John Dean Park - in the park, near the top of Mt. Newton. May 21st.

(4) Mt. Douglas Park - near the road, about half way between the picnic grounds and the look-out. May 21st.

(5) Durant's Road - about three miles S.W. of Todd Inlet, by an old abandoned ranch. This road branches off the old Saanich road near Todd Inlet. May 22nd.

(6) Munn's Road - at the junction with Durant's Road, half way between Langford and Todd Inlet. May 22nd.

(7) Thetis Lake Park - by the road around the north end of the lake. May 23rd.

(8) Mt. Finlayson - by the road which goes over the mountain from Goldstream Park, about one mile from the park. May 26th.

(9) Lakehill - on Mr. Bridgeman's property at the north end of Quadra St. April 21st, May 29th and July 25th.

(10) Cedar Hill / Rd. - in an oak tree covered pasture on top of the hill. May 29th and July 25th.

(11) Mt. Douglas District, - at the north end of Glendenning Road, in a pasture. July 25th.

(12) Uplands District, - opposite the Uplands Golf Club, by Cadboro Bay Road. July 25th.

All the above sampling points were readily reached by road, although the road from Goldstream Park over Mt. Finlayson is very steep, crooked and rough.

The timber types are fairly constant throughout the Saanich Peninsula. The most common tree is the Douglas fir. Mixed with it are Grand fir, cedar, and a variety of broad-leaf trees. Some of the low hills in the southern portion have small stands of pure oak.

Summary:-

Collections from the first eight sample points resulted in 43 samples containing 673 insects being sent to Vernon.

From sample points 9, 10, 11 and 12 there was a large collection, three sample cans from each point of Lambdina somniaria Hlst., sent to Vernon, and one can full from each of the four points to our field laboratory at Poett Nook. These sixteen cans held an average of about 150 looper larvae per can.

The oak looper (Lambdina somniaria Hlst.) was in infestation at sample points 9 and 10 during 1946. Egg collections taken in April showed that they were going to be more numerous in 1947. Later in the year they were found to be in two areas, sample points 11 and 12, where they had not previously been noted. In each of the four areas up to several hundred acres were from 75% to 100% defoliated by September. Sample point number 12 was the smallest area attacked, but is in the edge of an oak stand which covers the most elite residential district around Victoria. Indications are that these loopers are still spreading.

The tent caterpillars, although none were sent in, were noted to be present on broad-leafed trees and bushes throughout the district. They were not nearly as numerous as during 1946 and it was found on examination that nearly all of them were heavily parasitized. There should be very few of them in 1948.

Ants and earwigs, although not enclosed with the samples,

were very numerous on some trees, a few of them being found on practically every tree beaten in the district.

The spruce budworm (Archips fumiferana Clem.) was found at sample points 7 and 8, one larva being found at each point.

The silver spotted tiger moth (Halisidota argentata) was found in small numbers throughout the district.

Sawflies (Neodiprion sp.) larvae were found at nine of the sampling points, to the total of 21 larvae, averaging less than one larva per beating.

No other major insects were found in this district. Of the minor insects click beetles and loopers of many species were the most plentiful but in no place was there an excessive number of any one species.

B. Goldstream - Sooke -

This district takes in that portion of the island which lies to the south of the E. and N. Land Grant Boundary, and south west of the island highway. Like the Saanich Peninsula it contains several farming communities interspersed with low mountains. The logging and wood-cutting operations here are of a small nature now since there are no large stands of virgin timber left in the area. Most of the hills have been selectively logged, leaving only medium and small sized trees.

Sample points and dates are as follows:-

(1) Goldstream - on the west side of the island highway, ¼ mile south of Goldstream Park. April 22nd.

(2) Goldstream - near where the Kapoor road crosses the railway by Goldstream Station. June 6th.

(3) Humpback Road - ½ mile south of the reservoir, between Goldstream and the Sooke Road. May 27th.

(4) Glen Lake - to the west of the lake which is between Langford and the Sooke Road. May 27th.

(5) Colwood - by the road to the lagoon. May 28th.

(6) Metchosen - by the army lookout station on the hill overlooking the quarantine station. May 28th.

(7) Jordan River Road - near the road about nine miles east of Jordan River. May 30th.

This district being fairly well settled has roads which make all parts easily reached by car.

The timber types vary a little, being mainly Douglas fir throughout, mixed with cedar, Grand fir and broad-leafed trees in the southern and eastern parts, and mixed with hemlock, cedar and broad-leafed trees to the north and west.

Summary:-

There were 18 samples containing 214 insects sent in from here. All but two samples were taken by the standard method. These two were hand picked.

The silver spotted tiger moth (Halisidota argentata) was found at sample point number 1, where eleven larvae were picked from small Douglas fir trees by hand, no more than two larvae being found on any one tree.

The spruce budworm (Archips fumiferana Clem.) was found only at sample point number 6, where one larva only was found.

Saw flies (Neodiprion sp.) were found at each of the sampling points in very small numbers. The largest collection was made at sample point number 1, where three larvae were found at one beating.

No other major insects were found, and of the minor insects the majority were click beetles. Geometrids and Tortricids were found in small numbers only.

C. Shawnigan -

That portion of the E. and N. Land Grant bounded by the Saanich Inlet on the east, a line extending from Mill Bay westward, just north of Shawnigan Lake to the western boundary, and by the western and southern boundaries of the grant. The area is quite mountainous, the western half having several elevations exceeding 3000'. In the eastern part are several lakes, some of which form the water supply for the city of Victoria. There are few roads, except in the eastern portion, leaving large areas inaccessible by car. Most of the hills in the eastern part have been selectively logged and are now covered with a vigorous second growth and a few medium sized

trees. In the south west corner of the Grant, in the Muir Creek watershed, a large area has been logged off, and part of this is now covered with young regeneration. The same is true about an area south and west of Sooke Lake, taking in the Kapoor district. Much of the remainder of this district is still heavily timbered.

Sample points and dates are as follows:-

(1) Leechtown - near the railway, south of Leechtown, in the N.W. corner of block 169. July 24th.

(2) Cragg Creek - near the end of the logging road, in block 667. July 24th.

(3) Leech River - by the logging road due west of Macdonald Lake. July 24th.

(4) Kapoor - near the north end of Old Wolf Lake. July 24th.

(5) Shawnigan Lake Road - about 3 miles from the Malahat cut-off. July 28th.

(6) Sooke Lake Road - at points ½ and 1½ miles from Shawnigan Lake intersection. July 28th.

(7) Port Renfrew Road -

a. At a point 1½ miles west of the north end of Shawnigan Lake. July 29th.

b. Wild Deer Creek. July 30th.

c. At a point 5 miles W. of Shawnigan Lake. July 30th.

d. At a point 4 miles W. of Jordan Meadows trail. July 30th.

e. 14½ miles east of western boundary. July 31st.

f. 4½ miles east of western boundary. July 31st.

g. 1 mile east of western boundary. July 31st.

(8) Malahat - one mile south of the Chalet. July 31st.

(9) Island Highway - 2 miles north of Bamberton. May 19th.

The Leechtown area can be reached by two roads, both of which are in very poor condition. One goes from Goldstream, over the mountains, through the Kapoor district. The other branches off the Shawnigan Lake road through the Victoria city watershed along Sooke Lake. They meet near Leechtown where they join a logging road which extends up Leech River and Cragg Creek. The Port Renfrew road runs from the north of Shawnigan Lake west to the end of steel on the San Juan River.

The timber types run heavy to Douglas fir in the eastern parts, mixed with cedar, hemlock, a few Grand fir and broad-leafed trees. In the western parts it changes to hemlock, Douglas fir, cedar, balsam, and a few white pine at the higher levels.

Summary:-

There were 23 samples sent in from this district containing 421 insects. With two exceptions, where the samples were hand picked, the insects were taken by the standard beating method. There were 10 beatings made along the Port Renfrew road which produced no insects.

Hemlock looper (Lambdina fiscellaria lugubrosa Hlst.) There was only one larva of this species found in the district. It was at sample point number 7 g., which is on the edge of the area in the San Juan valley that was infested with these insects previous to 1946.

False, or green hemlock looper (Nepytia phantasmaria.) Only one larva was found, at sample point 7 a.

Altica bimarginata. These leaf beetles were plentiful, both in larval and adult forms, on both alder and willow around sample point 7 b., 40 being gathered at one beating.

Galerucella punctipennis. Over 200 of these leaf beetles were gathered from beating one small alder about six feet high. The alder trees in this neighborhood, sample point number 3, were all heavily defoliated.

The remaining insects found were of minor importance, being mainly click beetles, with no more than one or two to the beating.

D. Duncan -

The area from Shawnigan Lake to Chemainus, and extending up the Cowichan River valley to about half way from Duncan to Lake Cowichan. This valley is quite wide with long slopes leading to the mountains in the background. The lower slopes have been logged off and many of them are now covered with a good stand of regeneration. The upper slopes are still covered with virgin forest

of mature trees and are the scene of several logging operations. The balance of the district around Duncan is taken up with farm lands interspersed with low hills and mountains. These hills have had a lot of logging and wood-cutting done on them but are still pretty well timbered with medium and small second growth trees.

Sample points and dates are as follows:-

(1) Cherry Point - along the road leading to the point. May 22nd.

(2) Cowichan Station - along the road leading west and south from the station to block 22. May 22nd.

(3) Indian Road - along the road from the Indian Reserve to Fairbridge Farm. May 22nd.

(4) Tzuhalem Mt. - on the south west slope near the mouth of Cowichan River. May 20th.

(5) Maple Bay - along the road from Maple Bay to Genoa Bay. May 20th.

(6) Mt. Prevost Road - along the road which goes around Mt. Sicker. May 21st.

All parts of this district can be readily reached by car as there are roads leading into all the timbered areas.

The timber type in this district is Douglas fir, hemlock, cedar, with a few balsam in parts, and a mixture of broad-leafed trees on the lower levels.

Summary:-

There were 22 samples containing 384 insects sent in from this district. All samples were gathered by the standard beating method but one which was hand picked.

The silver spotted tiger moth (Halisidota argentata) was found in small numbers at each of the sampling points. At point number 5 two small Douglas fir trees, about 6' high, had 16 larvae. These small trees showed about 20% to 25% defoliation.

Hemlock looper (Lambdina f. lugubrosa Hlst.) There were only three larvae of this insect found in the district, two at sample point number 2 and one at point number 3.

Tent caterpillars (Malacosoma pluvialis). These insects were very plentiful throughout the Duncan district, but were noted to be heavily parasitized.

The other insects found, all of minor importance, included many species, none of which was found in any numbers.

E. Cowichan Lake -

Includes the upper half of Cowichan River valley and the valleys which drain into Cowichan Lake. Although Lens Creek flows into the San Juan River, it is included in this district since it is reached only from here, by trail from the upper end of Robertson River valley. The valleys and lower mountain slopes have been logged off and many of them are now covered with a good second growth. Robertson River valley, the largest valley in the

district, is now bare as a result of fires after logging was completed, and is now the scene of a large reforestation project. The mountains around the lakes are rather big and abrupt so most of the timber left standing in the district is on the upper slopes of the valleys, where there are several large logging operations in progress. One company, at Honeymoon Bay, hauls its logs in by railway from the Gordon River district, and another at Youbou brings in a large percentage of its logs from the Nitinat district.

Sample points and dates were as follows:-

(1) Cowichan Lake - in the forestry station grounds, near the laboratory. June 17th, 19th and 20th.

(2) Cottonwood Creek-

a. In the green timber about 6 miles up from the mouth of the creek. August 20th.

b. At the forks in the creek about 4 miles up from the mouth of the creek. August 20th.

(3) Lens Creek - in the upper reaches of the creek by our study plots. August 19th.

(4) Mesachie Lake Road - along the road to Lake Cowichan, from ½ to 2 miles east of Mesachie Lake. August 8th.

(5) Lake Cowichan - from 3 to 5 miles east of the village along the road to Duncan. August 8th.

Most of the district can be reached by road, but some parts which have been logged off years ago can only be reached on foot. Such is the case with Cottonwood Creek. The road only goes up the Creek about one mile now. To reach Lens Creek it is necessary to walk about two miles beyond the end of the road up Robertson River.

The timber types on the upper levels are hemlock, Douglas fir, cedar with a few balsam and white pine mixed in. On the lower levels the regeneration is Douglas fir, hemlock cedar with a mixture of broad-leafed trees.

Summary:-

There were 24 sample cans containing 334 insects sent in from this district, besides about 200 larvae of Lambdina f. lugubrosa Hlst. saved for rearing at the Cowichan laboratory and at the field laboratory at Poett Nook. All but 5 of these samples were taken in the standard method. These 5, taken at sample point number 1, averaged about 10 beatings per sample. In this case the beatings were made for the purpose of obtaining hemlock looper larvae for rearing, the other insects only being sent in to Vernon.

Hemlock looper (Lambdina fiscellaria lugubrosa Hlst.) At sample point number 3, on Lens Creek, where these insects were in infestation in 1945 and 1946, defoliating the trees from 50% to 100% and causing some tree mortality, only 4 larvae were found from 12 trees beaten. One larva only was found at point number 2. a. At point number 1 over 200 larvae were gathered. The number

gathered does not mean that these insects were plentiful there. At no time was there more than 7 larvae gathered from any one beating. This location was picked because a few of these insects were present and disease-free larvae were required for rearing purposes.

Hemlock sawfly (Neodiprion tsugae). At sample point 2 a. eleven larvae were found, averaging just over one per beating. This is about 50% of the number collected in the same locality in 1946. At sample point 2. b. four larvae were found and two at point number 1.

Green hemlock looper (Nepytia phantasmaria). There were 71 larvae gathered at sample point number 1, being in a ratio of about one to three of the Lambdina f. lugubrosa Hlst.

Leaf beetles (Altica bimarginata). Larvae of this beetle were found on small alder at sample point number 2. b., one beating producing 20. This particular bush showed about 25% defoliation but other trees and young shoots seemed to be untouched.

No other major insects were found. Of the remaining minor insects found many were click beetles and various species of loopers, found in small numbers only.

F. Gordon River - Caycuse -

This district is bounded by the San Juan River in the south, the Nitinat Lake in the north, and the E. and N. Land Grant boundary on the east. It is a very large territory, practically untouched

except for the Gordon River watershed which has had a large part of it logged off and is now bare. Large scale logging operations are still in progress there. The area is quite mountainous with many slopes and valleys densely covered with large mature trees.

Sample points and dates are as follows:-

(1) Gordon River - in T.L. 5754. June 3rd.

(2) Gordon River - in T.L. 5781. June 3rd, Oct. 29.

(3) Wolf Creek - in T.L. 5779 and T.L. 5761. June 4, Oct. 29th.

(4) Caycuse River -

a. by study plot number 1. July 5th.

b. by study plot number 4. July 6th.

c. by study plot number 7. July 6th.

d. by study plot number 8. July 6th.

e. by study plot number 6. July 7th.

f. by study plot number 5. July 7th.

g. by study plots number 2 and 3. July 7th.

h. Caycuse River fork, at trail crossing below the end of steel. July 8th.

This district is practically devoid of road. The only way to get into it is by logging railway or on foot. The Gordon River area is reached by rail from Honeymoon Bay on Cowichan Lake to Rounds where the logging camp is located. To get to the Caycuse River it is necessary to go to Camp 6 by boat from Youbou and thence up Towincut Creek and over the mountain by logging

railway to the end of steel. From there a trail leads through the forest to a cabin about two miles in.

The timber types vary in proportions, but are mainly hemlock, balsam, cedar, Douglas fir, with a few spruce in low areas and broad-leaf trees near the rivers.

Summary:-

There were 15 sample cans containing 297 insects sent in to Vernon. Two of these were hand picked. The sample taken at point 4. d. was from 4 beatings and the one from point 4. g. from 5 beatings.

Hemlock Looper (Lambdina f. lugubrosa Hlst.)

These insects, very active in this district during the past few years, practically disappeared during 1947. In the Caycuse, where they were feeding so thickly that one beating would produce hundreds of larvae in 1946, only 129 larvae were found - an average of 5 per beating. These were taken at the sample points as follows:- Point 4. a. 3 larvae.

"	4. b.	22	"
"	c.	52	"
"	d.	4	"
"	e.	28	"
"	f.	14	"
"	g.	1	"
"	h.	5	"

The following, a report written in June covering the survey work done in the Gordon River, is quoted - " In response to a letter from Mr. C.C. Ternan, Chief Forester for Western Forest Industries Ltd., stating that he had had a report of hemlock loopers being in T.L. 5754 and T.L. 5755, we, D.W. Taylor and E.G. Harvey, contacted the superintendent Jack Frost, at Rounds on June 2nd, 1947. He and two engineers there, Tom Graves and Clyde MacDonald, were all of the opinion that Mr. Ternan had received the wrong timber lease numbers. Our investigations bore out this opinion as the above leases are at an elevation of over 1800' and we were unable to find any hemlock looper larvae there.

They asked if we would look at T.L. 5761 and T.L. 5779, which we did. T.L. 5779 straddles Wolf (or Loup) Creek at an elevation of from 800' to 1000'. In this area we found hemlock looper - as many as 63 at one beating from two small hemlock trees. As it was raining and the loopers were very small and the dead needles, moss, etc., plentiful, we may have missed some. The old foliage on the trees in this area varied in defoliation from 50% to 100%, so the looper must have been very plentiful in 1946. Bark beetles were starting to attack some of the balsam trees. Some looper larvae were present in T.L. 5761 also, but this lease is at an elevation from 1000' to 1500' and the damage here is not so noticeable.

We also found hemlock looper, up to 17 at a beating in T.L. 5781, on the Gordon River. However, this lease is being logged at present."

Sample points number 2 and 3 were checked for eggs in October and indications are that there will be practically no hemlock looper there in 1948.

G. Nitinat River:-

This district takes in the complete drainage system of the Nitinat River, which extends from just south of Mt. Arrowsmith to Nitinat Lake. Block 51A, due west of Cowichan Lake, has been about half logged off, and is at present the scene of large scale logging operations. Most of the remainder of the district is still virgin forest. Some of the most valuable stands of mature trees on the island are to be found here.

Sample points and dates are as follows:-

(1) Francis Lake - In block 177, along the railway, south of the end of the lake. August 27th.

(2) Little Nitinat River - In block 158, about 3 miles down the river from the end of steel. August 27th.

(3) Upper Nitinat River - Along the trail -

a. At the source of the river on the trail from Cameron River. El. 2150'. July 16th.

b. El. 1900', between the summit and the trail to Nanaimo

Lakes. July 17th.

c. El. 1200', north of the trail to Nanaimo Lakes. July 17th.

d. El. 850', junction with Nanaimo Lakes trail. July 17th.

e. In block 145. July 18th.

f. In block 140. July 18th.

g. In block 139, near the cabin. July 19th, Oct. 15th.

h. In block 138. July 19th, Oct. 15th.

(4) Parker Creek - in block 51 A, just south of Tuck Lake. July 20th.

(5) Lower Nitinat River -

a. Along the trail in block 51B to Sap Creek. July 20th.

b. By study plot 13. August 5th.

c. Between study plots 5 and 10. August 6th.

d. On trail one mile down from camp site for our 1946 field station. August 6th.

e. Between study plots 8 and 9. August 6th.

f. By old C.N. grade crossing of Nitinat River. Aug. 6th.

g. By study plot 7. August 6th.

h. By field station camp site. August 6th.

i. By study plot 3. August 7th.

This large district has no roads in it but there is a logging railway leading into block 51A from Youbou. From here there are trails leading up and down the river for its entire length. A branch trail leads in from Fourth Nanaimo Lake to the Upper Nitinat and the main trail goes on over the summit and down the Cameron River, joining an old road about one mile south of the Alberni highway, which joins up with the highway on the summit. The Little Nitinat is reached via Franklin River, from where a railway goes to Francis Lake. There is a trail leading from the present end of steel down the river to its junction with the main Nitinat River.

The timber types run heavy to hemlock. large stands being almost pure. There are, however, some stands of Douglas fir here second to none on the island. On the flats near the river there are a few large spruce. Scattered throughout are cedar with a sprinkling of balsam in some parts. Maple and alder are to be found along the river banks.

Summary:-

There were 25 sample cans containing 533 insects sent in from this district. Two samples were hand picked. The samples taken from point number 5 averaged only 2 beatings per sample. The balance were all standard. At sample point number 2 five beatings out of nine produced no insects at all.

Hemlock Looper (Lambdina f. lugubrosa Hlst.)

This insect, which did so much damage in this district during the past few years, was definitely on the decline in 1947. Egg counts made in October indicate that they will be very scarce here in 1948. In July the beatings at sample point 5. a. produced an average of 27 larvae per beating. Two weeks later beatings in the same area averaged only 7 larvae. At sample points number 1 and 2 there were no larvae found, although the trees had been defoliated from 50% to 100% during 1945 and 1946. Larvae were found throughout the entire length of the Nitinat River, with one only larva at the headwaters, sample point 3. a., increasing in numbers down the river to sample point 3. g. where 69 larvae were found at a single beating. This was the heaviest population found in the district, and this is the place at which egg counts were made in October.

Green Hemlock Looper (Nepytia phantasmaria Stkr.)

There were 29 larvae of this looper found in the district, with the hemlock looper, but at no place were more than 3 larvae found at one beating.

The few remaining insects found were of minor importance.

H. Sarita River - Poett Nook.

This district includes that area west of Coleman Creek and the Little Nitinat River on the south side of the Alberni Inlet, north of Nitinat Lake. It contains one of the largest virgin forests on the island. The entire district, covered with

comparatively low rolling mountains, is heavily timbered with large and medium sized mature trees.

Sample points and dates are as follows:-

(1) Sarita River - by the study plots from two miles to four miles up from the river mouth. May 1st to 10th.

(2) Poett Nook - throughout the study area just west of the Nook. May 21st to August 25th. Oct. 16th.

(3) Frederick Lake - by the study plots. May 21st to Aug. 25th.

(4) Pachena Lake - by the study plots - May 21st to Aug. 25th.

(5) Rosseau Lake - by the study plots between the lake and south fork of Sarita River. May 21st to Aug. 25th.

(6) Klanawa River - June 9th to 21st and Sept. 9th to 17th.

Although this district is not accessible by road, it can be reached by boat from Port Alberni, daily service to Poett Nook having been recently inaugurated. The Klanawa River area is very inaccessible, it being necessary to travel by rail from Franklin River to the end of steel by Coleman Creek, thence on foot by a poor trail for a distance of about fifteen miles; or to fly in to a small lake near the mouth of the river and go by foot from there, without a trail, some five or six miles to the river.

The timber types are predominantly hemlock throughout, with some sites running heavy to Douglas fir and some on the river banks to spruce. There is a mixture of cedar throughout, with balsam and a few white pine in some areas.

Summary:-

There were 15 sample cans sent in containing 258 insects. Besides these there were about 6140 hemlock looper larvae collected in 60 separate collections requiring several beatings each. Most of these were retained at the field laboratory at Poett Nook, but several hundred larvae were sent to the laboratories at Cowichan Lake and Sault St. Marie for rearing and study purposes.

Hemlock looper (Lambdina f. lugubrosa Hlst.)

The most active looper population on the island during 1947 was at sample point number 2. This department maintained a field laboratory in the area all summer and the members of the laboratory were responsible for most of the survey collections made at points 2, 3, 4 and 5. Before the summer was over disease had practically wiped out the looper in this area and egg counts made in October indicate that they will be very scarce in 1948.

The other areas visited, points number 1 and 6, were visited mainly for tree mortality study, since they were about the heaviest defoliated areas resulting from the previous year's feeding. The killing has been so bad that at present Bloedel Stewart and Welch are building their largest logging camp at Christie Bay with the aim of salvaging stricken timber from these areas.

Of the other insects found in the district, all of minor importance, only one is worthy of mention. A collection of 18 Chrysomelids, hand picked from alder at point number 1, proved to be an entirely new species. Some of these beetles were sent to Ottawa and, so far have not been named.

I. Ladysmith - Nanaimo-

This district includes all the territory from Chemainus north to Wellington and west to the headwaters of the Nanaimo River. It contains several mountains with elevations exceeding 4000', but long gentle slopes, well timbered to the top, make this an important logging area, and several large companies have operations here. Many of the lower slopes have been logged off and some of them are now covered with second growth.

Sample points and dates are as follows:-

(1) Fourth Nanaimo Lake - above the river, crossing in block 68, near trail to the lake. July 29th.

(2) Englishman River - in block 64, headwaters of south fork, reached from Second Nanaimo Lake. July 29th.

(3) Second Nanaimo Lake - at the west end of the lake, where road branches. July 29th.

(4) First Nanaimo Lake -

a. east of the lake, in block 10. July 29th.

b. north of the camp, in block 8. July 29th.

(5) Nanaimo - in the city. June 15th.

(6) Nanaimo Lakes Road - in block 202, about half way between Nanaimo and First Lake. July 31st.

(7) Ladysmith. - In workings of Comox Lumber Co.

a. In block 670. July 30th.

b. In block 710. July 30th.

c. In block 59. July 30th.

d. In block 5. July 30th.

e. In block 1. July 30th.

f. On Coronation Mountain. Sept. 9th.

(8) Cassidy - west of the airport, along stretch of old road where highway has been re-routed. July 31st.

(9) Chipman Creek - in block 342. Sept. 9th.

(10) Chemainus River - in block 2. Sept. 9th.

(11) Cedar - at end of road near Dodd Narrows. Sept. 12th.

(12) Quennell Lake - along the road on the north and east sides of lake. Sept. 8th.

(13) White Rabbit Road - near the mine. Sept. 10th.

(14) Extension - at end of the road to the west of Extension. Sept. 10th.

(15) Jump Creek - just below the reservoir. Sept. 11th.

(16) Jump Lake - between the lake and the junction of Jump Creek and Dunsmuir Creek. Sept. 11th.

The above sample points are nearly all reached by roads, many of which are private logging roads. The Chemainus River area is accessible by logging railway.

The timber types in this district are Douglas fir, mixed to varying degrees with hemlock, cedar and balsam, with a few white pine at higher elevations.

Summary:-

There were 30 sample cans sent in from here containing 257 insects. There were no insects found at points 15 and 16. One sample was hand picked, at point number 5, and one sample at point number 7. d. was collected from one beating. At point 7. a. five beatings out of six were negative.

Hemlock looper (Lambdina f. lugubrosa Hlst.) There were only 2 larvae of this insect found in this district, at points number 4. a. and 7. a.

Green hemlock looper (Nepytia phantasmaria Stkr.) There were 5 larvae found here, 4 at point number 1 and 1 at point number 4. a.

Altica bimarginata. At point 7. d. the alder were defoliated from 50% to 100% over a large area. One beating produced about 350 larvae.

Satin moth (Stilpnotia salicis). At point number 5 in Nanaimo, the silver poplar used as shade trees, were noted to be about 75% defoliated, and on examination were found to be heavily infested with satin moth larvae. Collection returns

showed that most of the larvae were parasitized.

Sawflies (Neodiprion sp.) There were 7 larvae found at one beating at point number 2, but none were located anywhere else in the district.

The remaining insects, all of minor importance, were found in very small numbers only.

J. Qualicum -

In this district we include the territory from Wellington to Bowser, and inland to the headwaters of the rivers draining into this area. The coastal area is composed of low mountains separated by farming communities. Farther inland long wooded slopes lead to high mountains in the background. Reserves and parks are an important feature of this district.

Sample points and dates are as follows:-

(1) Horne Lake - near branch in the road ¼ mile east of the lake. Aug. 15th.

(2) Little Qualicum Falls Park - in the park. August 23rd.

(3) Englishman's River Falls Park - in the park. Aug. 22nd.

(4) Hilliers - in block 8, on a logging road due south of Hilliers. Aug. 22nd.

(5) Nanoose Bay - in B.C. Forest Service plot number 212. June 18th.

(6) Cameron Lake - by the road near the east end of the lake. June 20th.

(7) Cameron River -

a. N.W. corner of block 81, due west of Mt. Arrowsmith. July 15th.

b. S.E. corner of block 81, by the forks in the river. July 15th.

c. At the summit, on the trail to the Nitinat valley. July 16th.

(8) Cathedral Grove - in the forest reserve. June 20th.

The areas sampled can all be reached by road except those under number 7, which are reached by trail. At the summit of the Alberni highway an old logging road branches off to the south and drops down over the hill to the banks of the Cameron River, a distance of about one mile. Here the road ends where it enters the green timber, and continues on as a trail to the headwaters of the river.

The timber types are mainly Douglas fir, hemlock and cedar on the lower slopes changing to hemlock, Douglas fir, cedar, mixed with a few lodge-pole and white pine further inland.

Summary:-

There were 19 sample cans containing 153 insects sent in from this district. All collections were made by the standard method. At each of the sample points 7 a., b., and c., two out of three beatings were negative.

Leaf beetles (Calerucella carbo). At sample point number 2 the small willow trees were noted to be heavily defoliated, and a large collection of adult beetles of this species was made.

Of the remaining insects found, none were of major importance, and in no case were there any large numbers of any one species found.

K. Alberni -

The Alberni district takes in all the territory draining into the north end of the Alberni Inlet. This is quite a large section of the central part of the island. It includes a fair sized farming community, high mountain ranges, and the vast drainage system of the Stamp and Somass Rivers. Very large areas have been logged off and many of them are now covered with vigorous regeneration, much of it planted. The largest logging companies in B.C. have operations in this district.

Sample points and dates are as follows:-

(1) McCoy Lake Road -

a. by B.C.F.S. plot number 211. June 18th.

b. by B.C.F.S. plot number 74. June 19th.

c. by B.C.F.S. plots number 86 and 127. June 19th.

(2) Sproat Lake area -

a. by B.C.F.S. plot number 76. June 20th, Aug. 12th.

b. at eastern end of lake. June 20th.

c. in block 86, south side of lake. Aug. 14th.

(3) Taylor River - in block 74. Aug. 14th.

(4) Alberni area -

a. Roger's Creek - near the rifle range. Aug. 13th.

b. On main highway in the new forest planted by Alberni Pacific Lumber Co. June 20th.

c. Near Bainbridge Lake, in block 82. Aug. 13th.

(5) China Creek - in block 268, near the gate on the road to the reservoir. Aug. 12th.

(6) Stamp River - near the gravel pit in block 208, just east of Great Central Lake. Aug. 13th.

(7) Stamp Falls Park - in the park. June 26th.

(8) Ash River - by A.P.L. Camp number 1. June 26th.

(9) Elsie Lake - on the north side of the lake by the logging railway. June 27th.

(10) Macktush Creek - on the mountain between Macktush and Cous Creeks. Aug. 29th.

All of the above sampling points are easily reached by road, logging railway or boat. Points number 2.c. and number 3 are reached by boat, which can be obtained at Klitsa Lodge on Sproat Lake. Sample point number 9 is accessible only by railway from A.P.L. Camp number 1 at Ash River. Point number 10 was reached by boat from Port Alberni to Mr. Welch's landing, from where a trail leads up the mountain.

The timber types in the mature stands are mainly hemlock, Douglas fir, cedar with some balsam and spruce and at higher

elevations white pine. In the areas of regeneration the timber type runs to Douglas fir, hemlock, cedar, with a mixture of broad-leaf trees.

Summary:-

There were 38 sample cans sent in from this district containing 407 insects. At point number 5 beatings on 5 Douglas fir trees were all negative and two samples were hand picked. One sample was hand picked at point 2. b. At point 4.a. it was necessary to beat 5 Douglas fir trees to get any insects. Beatings here on hemlock were negative. One sample from this point was hand picked from willow. All remaining samples were taken by the standard method.

Hemlock looper (Lambdina f. lugubrosa Hlst.) There were very few larvae of this insect found in this district. The most at any one sampling point was 3 at point 1. b. Two larvae were found at each of the following points - 2 b., 2 c., 3 and 10. Those taken at point number 10 were of interest, as they were taken at an elevation of about 3000' at the end of August. The finding of these larvae tended to bear out the suspicion that trees, dead along the banks of Macktush Creek as noted from the air, were the result of hemlock looper attack.

Green hemlock looper, (Nepytia phantasmaria Stkr.) There were 50 larvae of this insect found in this district, 23 of them being at point 2 b., the remainder in small numbers from throughout the district.

Galerucella carbo. Larvae and adults of this Chrysomelid were found to be quite plentiful on willow at points 3, 4. a., and 5, where the trees were heavily defoliated.

Altica bimarginata. This Chrysomelid was plentiful at point 6, where the alder was defoliated. They were found in small numbers also at point 2 b.

L. Courtenay -

This district takes in the territory draining into Georgia Strait between Bowser and Oyster Bay. It is an area of long sloping hills and valleys leading to very high mountains, some exceeding 6000' elevation, in the background. The flats at the bottom of these slopes contain a growing farming community. Much of this district has been logged off and many of the lower slopes are now covered with second growth.

Sample points and dates are as follows:

(1) Comox Lake - at east end of the lake on the side hill west of the road. June 10th.

(2) Forbidden Plateau Road - about 1 mile below the lodge, in regeneration. June 14th.

(3) Courtenay - in the city park. June 15th.

All points sampled were readily reached by road. There are many old logging roads in the district leading through the areas of regeneration.

The timber type is mainly Douglas fir, hemlock, cedar with a few balsam and white pine at the higher elevations.

Summary:-

There were 10 sample cans sent in from here containing 174 insects. One sample was hand picked at point number 3. The balance were taken by the standard method.

Hemlock looper (Lambdina f. lugubrosa Hlst.) Only one larva was found in this district at point number 1.

Hemlock sawfly (Neodiprion tsugae) at sample point number 2 nine larvae were found at one beating, but none were found anywhere else.

Neodiprion sp. Six larvae were found at one beating at point number 1.

Spruce budworm (Archips fumiferana). One only larva was found at point number 1.

Galerucella carbo. This Chrysomelid was found in large numbers at point number 1, where the willow were 75% to 100% defoliated.

Satin moth (Stilpnotia salicis). The silver poplar trees in the city park at Courtenay, sample point number 3, were noted to be from 50% to 75% defoliated and one beating produced 55 larvae of this insect.

M. Campbell River -

This district extends from Oyster Bay to Menzies Bay on the coast and inland to include the vast drainage system of Campbell River. It is an area of wide mountain slopes and benches containing many lakes, with very high mountains in the

background. Most of the lower areas have been logged and burned until they are bare except for the sections which have been planted by the B.C. Forest Service. The stands of virgin timber still standing in this district are to be found in the upper reaches of the river and its tributaries.

Sample points and dates are as follows:-

(1) Echo Lake - near the spruce study plots by the logging camp. June 13th.

(2) Upper Campbell Lake - near the end of the road at N.E. end of lake. July 3rd.

(3) Gooseneck Lake - near the junction of the road to Upper Quinsam Lake and Upper Campbell Lake road. July 3rd.

(4) Elk Falls Park - in the park. July 3rd.

(5) Campbell Lake - near gravel pit, between road and Loveland Lake. July 4th.

(6) Mohun Lake - near end of logging railway on west side of the lake. July 4th.

(7) Campbell River - in the Forestry nursery. July 5th.

This district, having been extensively logged, has roads and railroads all through it. All the above sampling points are readily accessible by road.

The timber types are mainly Douglas fir, hemlock and cedar. In some parts of the re-forested areas there have been patches planted of spruce and pine, but these are of an experimental nature.

Summary: -

There were 13 sample cans containing 143 insects sent in from here. All samples were taken by the standard method.

Hemlock looper (Lambdina f. lugubrosa Hlst.) There were only 2 larvae of this insect found in the district, both at sample point number 2.

Sawfly (Neodiprion sp.). One larva was found at point number 2, while three were found at point number 4. At point number 6 there were 8 larvae found, some of which were thought to be Neodiprion tsugae.

Adelges cooleyi. At sample point number 1 the trees in the plantation of spruce were all very heavily attacked, every limb having several gall formations.

Most of the remaining insects found were various species of click beetles and others of minor importance.

N. Sayward -

The district, extending from Menzies Bay to Kelsey Bay, takes in the drainage system of the Salmon River. There are a few rugged mountains scattered throughout the district, and many well timbered slopes and valleys.

Sample points and dates are as follows:-

(1) Salmon River -

a. West of Brewster Lake, in T.L. 4695, reached from Bloedel Stewart and Welch Camp 5, by rail and trail. July 5th.

b. In L839, at the end of steel, track K., Salmon River Logging Co. July 8th.

(2) Memckay River - in L847, near the high bridge. July 8th.

(3) Sayward - along the road between Sayward and White River. July 9th.

(4) White River - in T.L. 3233, west of the river crossing, two miles beyond end of new road. July 9th.

(5) Kelsey Bay - in T.L. 9725, one mile beyond power dam, west of the camp. July 9th.

(6) Rock Bay Road - near the forks in the Sayward, Campbell River road. July 10th.

(7) Roberts Lake - near the south end of the lake. July 10th.

The road runs to Kelsey Bay. From there it is necessary to travel by logging railway to the timbered parts of Salmon River.

The timber types vary from hemlock, balsam, cedar to hemlock, cedar, spruce, with a few Douglas fir in the mature stands. The regeneration, especially that which has been planted, runs heavy to Douglas fir with hemlock and cedar.

Summary:-

There were 16 sample cans sent in containing 193 insects. All but three samples, which were hand picked, were gathered by the standard method. Besides these there was a collection of 18 weevil-attacked spruce tips taken to our laboratory at Cowichan Lake.

Hemlock looper (**Lambdina f. lugubrosa** Hlst.) Two larvae only were found in this district at point number 3.

Hemlock sawfly (Neodiprion tsugae). Larvae of this insect were found at four points. - 4 at point 1. b., 34 at point 1. c.,

6 at point 2. and 16 at point 3. At point 1.c. 32 larvae were found at one beating.

Sawflies (Neodiprion sp.) There were 16 larvae of sawflies other than the N. tsugae species, the largest number, 7, being found at point 1. c.

Green hemlock looper (Nepytia phantasmaria Stkr.) Four larvae were found in this district, all at point 1. c.

Adelges cooleyi - at sample point number 3 the spruce were found to have a few galls on each tree.

Spruce weevil (Pissodes sitchensis). These insects were very prevalent at sample point number 3. Many of the trees which had been attacked in previous years, and since grown several leaders, were found to have more than one leader heavily attacked. A collection of 18 infested leaders taken to our Cowichan Lake laboratory had by August 18th produced 146 adult weevils. In the same time only 6 adult parasite wasps emerged, so it may be assumed that the spruce trees in this district will again be heavily infested in 1948. At sample point number 6 several infested spruce leaders were sent to Vernon. Their returns showed that there was only one adult emerged. The balance were heavily parasitized with Dipterous maggots.

Black headed budworm (Acleris variana). There were no larvae of this insect found in the district, although sample points number 4 and 5 were in the timber killed by recent infestation. The Salmon River Logging Co. is constructing a

road into this area, at point number 4, with the aim of salvaging this killed timber.

Personnel Contacted

Jack Mottishaw, Chief Forester - Bloedel Stewart and Welch Company, Port Alberni.

Ted Young, Forester, Bloedel Stewart and Welch Co., Port Alberni.

Chas. Dunham, Chief Engineer, Bloedel Stewart and Welch Co., Port Alberni.

Mr. Percy, Superintendent, C.P.S. Lumber Co., Jordan River.

Mr. Scroggie, Personnel Mgr., Western Forest Industries Ltd., Honeymoon Bay.

Jack Frost, Superintendent, Western Forest Industries Ltd., Rounds.

Tom Groves, Engineer, Western Forest Industries Ltd. Rounds.

Oscar Olson, Asst. Superintendent, Western Forest Industries, Rounds.

Bill Backman, Engineer, Bloedel Stewart and Welch Camp 5, Brewster Lake.

Mr. Robertson, Superintendent, Salmon River Log Co., Kelsey Bay.

M.J. Cliffe, Superintendent, Comox Logging Co., Ladysmith.

Mr. Shaesgreen, Mgr., Comox Logging Co. Ladysmith.

Mr. Banks, Superintendent, Bloedel Stewart and Welch Co. Poett Nook.

Mr. C.C. Ternan, Chief Forester, Alaska Pine, Rounds.

The above mentioned men were all very co-operative and helpful, often going out of their way to provide accommodation for us.

FOREST INSECT SURVEY
ANNUAL REPORT, 1947

Lower Mainland Coast District, B.C.

Prepared by M.T. Hughes

INTRODUCTION

The following report deals with the Forest Insect Survey conducted on the Lower Mainland Coast of B.C., roughly defined as to boundary as being west of the Cascade Ridge to tide water and north from the U.S.A. - Canadian border to Howe Sound. Included in this district are the Fraser River Valley, as far as Hope, with its tributary drainage systems of the Chilliwack River, Jones and Silver Creeks on the south, Harrison, Chehalis, Stave, Pitt, and Coquitlam Rivers on the north; Burrard Inlet, Howe Sound, the Squamish-Cheakamus Valley, the Upper Lillooet River Valley and Lillooet Lake.

In the course of furthering and making a more systematic survey, approximately five thousand miles were travelled by car, as well as an unestimated number travelled by water, rail, and foot. One hundred and seventy two permanent sample points were established and four hundred and six insect collections forwarded to the Vernon Laboratory for identification. Collections were made in all areas previously surveyed in 1946 and numerous other areas for the first time. The collections and sample points were varied, where ever possible, in an effort to cover all possible trends of Forest Insect life resulting from aspect, slope, timber type and elevation differences. The majority of insect collections were obtained by the beating method using a 7' X 9' sheet and each collection contained insects from

beatings of one, two or three trees of the same species. Any variation from this method of collection will be noted on occurence.

The district supports extensive logging and associated industries carried on by both large and small operators whose co-operation and interest to the survey were excellent. Considerable assistance and co-operation was extended by the B.C. Forest Service District Office at Vancouver and local Ranger Stations throughout the district in furnishing a reliable channel for correspondence and, from time to time, information and transportation.

For the convenience in reporting results, description, timber type of varying areas, methods of travel, and accessibility in conducting survey work, the district will be divided into thirteen smaller areas.

(1) Fraser South
(2) Chilliwack Area
(3) Hope Area
(4) Burrard Inlet
(5) Pitt River and Lake
(6) Stave Lake and River
(7) Chehalis River and Lake
(8) Harrison Lake
(9) Greater Vancouver Water Board
(10) Indian River
(11) Howe Sound
(12) Squamish - Cheakamus Valley
(13) Upper Lillooet River

Each area will be discussed under the following headings:-

(A) Description of Area

(B) Timber Types and economic importance

(C) Route Travelled

(D) Sample Points (dates, methods permanent points, and collections sent to Vernon.)

(E) Insect Conditions

(i) Insects of Major Economic Importance

(ii) Insects of Minor Economic Importance

(F) Persons Contacted

(G) Summary Comparison of '46 and '47 Survey.

(1) FRASER SOUTH

(A) Description of Area:

The Fraser South area, surveyed on May 26th to 29th, inclusive, includes the predominantly farming and pastoral land divisions of Delta, Surrey, Langley, Matsqui and Sumas which lies between the south bank of the Fraser River and the U.S.A. - Canadian border. There are no acute variations in topography having a general elevation from 100' to 400' with a relatively neutral aspect and slope.

(B) Timber Types and Economic Importance:

While there are no large tracts of commercial timber, there are, however, many fine wood lots, shelter belts, and sizeable growths which at the present time maintain numerous small portable mills cutting both coniferous and deciduous woods. The majority of the stands are naturally seeded second growth and regeneration. Douglas fir, cedar, hemlock, maple, alder and cottonwood being the principal commercial species with Douglas fir, cedar, maple and cottonwood predominating in abundance and growth. Lodgepole pine, Western white pine and willow are also present but tend to be scrubby in development.

Fuel cutting and sawing of lumber for local markets are the main outlets for the majority of the logging operations while a number of stands form park reserves and sylvan landscaping for tourist resorts.

(C) Route Travelled:

This area is completely accessible by car with good primary and secondary roads. The following outlined route gives reasonable coverage and readily accessible and comparative sample points.

South on the Peace Arch Highway to Beach Rd., west on Beach Rd., to Johnston Rd., north on Johnston Rd., to the Trans-Canada Highway, east on the Trans-Canada Highway to Langley Prairie, south on Berry Rd., to Henderson Rd., east on Henderson Rd., to Livingstone Rd., north on Livingstone to Springbrooke, south on Livingstone Rd., thence east on the Trans-Canada Highway to Aldergrove. North on the Aldergrove-Bellingham Highway to the Fraser River and south to the U.S. border, thence east on the Trans-Canada Highway to Aberdeen, north on Breadner Rd., to the Fraser River and south on Aberdeen Rd., to the U.S. border, thence east on the Trans-Canada Highway to Abbotsford and Kilgard and north on the Sumas Mt. Rd.

(D) Sample Points:

15 permanent sample points were established and 32 collections made throughout the area from the following host trees.

Host	Number Collections	Number of Insects
Douglas fir	11	96
Cedar	9	48
Hemlock	7	32
Western white pine	1	1
Lodgepole pine	1	Nil
Alder	2	19
Willow	1	? (galls)
	32	196

The date, location, timber type and host trees of permanent sample points are as follows.

District of Surrey — May 26th

FS- 1. Location:- Junction of Peace Arch Highway and Coast Meridian Rd.

Type:- Close growing second growth Douglas fir, red cedar, hemlock, maple and willow with sparse ground cover of brachen and salmonberry.

Host:- 3 collections; Douglas fir, red cedar and hemlock hosts.

FS- 2. Location:- Ocean Park, junction of North Bluff Rd., and Stevenson Rd.

Type:- Close growing second growth Douglas fir, red cedar, maple and willow with sparse ground cover of brachen and huckleberry.

Host:- 2 collections; Douglas fir and red cedar hosts.

FS- 3. Location:- One mile north of Whiterock on Johnston Rd.

Type:- Close growing stand of second growth red cedar, Douglas fir and willow

Host:- 1 collection; Douglas fir host.

FS- 4. Location:- Junction of Johnston and Brown Roads.

Type:- Close growing vigorous second growth Douglas fir, and red cedar stand with ground cover of vine maple, blackberry and brachen.

Host:- 2 collections; Douglas fir and red cedar hosts.

FS- 5. Location:- Three miles north of Whiterock on Johnston Rd.

Type:- Scrub lodgepole pine shelter belt.

Host:- 1 collection; lodgepole pine host.

FS- 6. Location:- Junction of Johnston Rd. and Trans-Canada Highway.

Type:- Open stand of second growth Douglas fir, and hemlock.

Host:- 1 collection; Douglas fir host.

District of Langley May 27th

FS- 7. Location:- One mile south on Berry Rd.

Type:- Open stand of second growth Douglas fir, red cedar, hemlock, lodgepole pine, white pine and willow with a ground cover of Oregon grape, brachen, huckleberry and salal.

Host:- 4 collections; Douglas fir, hemlock, white pine and red cedar hosts.

FS- 8. Location:- Junction of Berry Rd. and Henderson Rd.

Type:- Shelter Belt of second growth Douglas fir, hemlock, red cedar, and a few alder.

Host:- 4 collections; Douglas fir, hemlock, red cedar and alder hosts.

FS- 9. Location:- One mile north on Livingstone Rd. from Henderson Rd.

Type:- Open stand of second growth Douglas fir, red cedar and alder with sparse brachen ground cover.

Host:- 3 collections; Douglas fir, red cedar and alder hosts.

FS-10. Location:- Junction of Livingstone and Springbrooke Roads.

Type:- Open stand of second growth red cedar and hemlock with slight brachen ground cover.

Host:- 2 collections; Hemlock and red cedar hosts.

FS- 11. Location:- 3 miles north of U.S. border on Aldergrove-Bellingham Highway.

Type:- Close vigorous second growth stand of Douglas fir, maple, alder and cottonwood with ground cover of brachen.

Host:- 1 collection; Douglas fir host.

FS- 12. Location:- 4 miles north of Trans-Canada Highway on Aldergrove Bellingham Highway.

Type:- Second growth hemlock and maple with ground cover of thimbleberry and brachen.

Host:- 1 collection: hemlock host.

District of Matsqui May 28th

FS- 13. Location:- 2 miles south on Aberdeen Road.

Type:- Open vigorous second growth Douglas fir with slight bracken ground cover.

Host:- 1 collection; Douglas fir.

FS- 14. Location:- North from Trans-Canada Highway to end of Breadner Rd.

Type:- Close growing maturing second growth Douglas fir, red cedar, and maple with ground cover of bracken sword fern and scented leaf.

Host:- 2 collections; Douglas fir and red cedar hosts.

District of Sumas:

FS- 15. Location:- Junction of Olde Yale Rd., and Trans-Canada Highway

Type:- Second growth and regeneration Douglas fir and alder with sparse bracken ground cover.

Host:- 1 collection; Douglas fir host.

FS- 16. Location:- 3 miles north on Sumas Mountain from Kilgard.

Type:- Close growing vigorous second growth of hemlock, Douglas fir and red cedar having a moderate ground cover of salmonberry, thimbleberry and bracken.

Host:- 4 collections; hemlock and red cedar hosts.

(E) Insect Conditions:

Insect populations were in apparently normal limits with no defoliation or damage being recorded in this area other than slight skeletonizing of alder leaves by Altica ambiens on scrub alder growth

at the junction of Berry Road and Henderson Road in the Langley district.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. Eleven early instar larvae were collected from all species of coniferous hosts sampled.

Number of Larvae	Place	Permanent Sample Point	Host
2	Langley District	FS-7	Douglas fir
3	Sumas District	FS-15	Douglas fir
5	Sumas District	FS-16	Cedar
1	Sumas District	FS-16	Hemlock

Nepytia canosaria Wlk. Six larvae throughout the area from Douglas fir and hemlock hosts.

Number of Larvae	Place	Permanent Sample Point	Host
5	Langley District	FS-7	Douglas fir
1	Sumas Mountain	FS-16	Hemlock

Neodiprion tsugae Midd. 15 larvae from hemlock hosts.

Number of Larvae	Place	Permanent Sample Point	Host
3	Langley District	FS-8	Hemlock
12	Langley District	FS-12	Hemlock

(ii) Insects of Minor Economic Importance

Neodiprion sp. 15 larvae from hemlock and Douglas fir hosts.

Number of Larvae	Place	Permanent Sample Point	Host
6	Surrey District	FS-4	Douglas fir
6	Langley District	FS-7	Douglas fir
3	Langley District	FS-10	Hemlock

Eupithecia gibsonata. 30 larvae in late instar stages from cedar hosts throughout the area.

Number of Larvae	Place	Permanent Sample Point	Host
1	Ocean Park	FS-2	Cedar
4	Langley District	FS-7	Cedar
2	Langley District	FS-9	Cedar
16	Matsqui District	FS-14	Cedar
3	Sumas Mountain	FS-16	Cedar

(F) Persons Contacted:

Nil.

(G) Summary Comparison of '46 and '47 Survey

No samples or collections were made in this area during the 1946 survey.

(2) CHILLIWACK AREA

(A) Description of Area

The Chilliwack area, surveyed May 30th, 31st and June 3rd to 6th, includes the remaining alluvial agricultural lands at the east end of the Fraser Valley and the mountainous section west of Bridal Falls between the South Bank of the Fraser and the 49th parallel. The mountainous area rises rapidly from the valley bottom, to the south and east of the municipality of Chilliwack, from an elevation of 200' to 4000' or 5000' peaks of the Cheam Range. The Chilliwack-Vedder River Valley, including Cultus Lake, Lithumitsom and Tamihi Creeks, draining the south slopes of the Cheam Range, flows west, joining the Fraser River by the Vedder Canal a few miles west of Chilliwack. This is the only other drainage system in the area forming a steeply sloping narrow valley east of Vedder Crossing for 25 miles to Chilliwack Lake at 2080'.

(B) Timber Types and Economic Importance

The agricultural lands are extensively cultivated with little or no important timber growths other than shelter belts. With the exception of the high peaks and a few cultivated valleys, timber, of varying growths, both coniferous and deciduous, completely cover the mountain slopes. The remaining virgin timber stands other than the park reserve area at Cultus Lake are found at fifteen hundred feet elevations or higher on the valley slopes where previous logging operations cut stands at the lower levels. These stands, generally, are a combination of Douglas fir, cedar, hemlock and balsam with the

predominating species varying with location and elevation.

Extensive logging operations have been carried on in the past, particularly in the lower Chilliwack River, Cultus Lake and Rosedale areas, and at present numerous smaller operations are cutting both virgin and second growth timber from the mountain slopes. The virgin growth supports the majority of commercial logging, supplying good quality logs to local and nearby sawmills. There is, however, some cutting of maturing second growth of both coniferous and deciduous species for saw logs and fuel. Cottonwood with maple and alder predominate the second growth on old logging sites in the location of Cultus Lake, Chilliwack River, Chilliwack Mountain and the alluvial flats adjoining the foothills.

(C) Route Travelled:

All sample points are readily accessible by car through the use of maintained and logging roads. Using Chilliwack as the starting point the following are direct routes to the various areas sampled.

a. Cultus Lake; Cultus Lake Road.

b. Chilliwack River; Cultus Lake Road to Vedder Crossing, thence along old wagon road on the north bank, crossing the river six miles up stream to old logging railway grade.

Note:

The upper reaches of the railway grade are unused and greatly in need of repair, being practically impassable and dangerous two miles above Tamihi Creek.

c. Elk Mountain; Ryder Lake Road to the B.C. Forest Service Lookout cut-off.

d. Vedder Mountain; Cultus Lake Road to Vedder Crossing, thence along Vedder Mountain Road to Belrose Station, B.C. Electric Railway, thence up logging behind station.

e. Chilliwack Mountain; West on the Trans-Canada Highway to Chilliwack Mountain Road.

f. Rosedale Mountain; East on the Trans-Canada Highway to Bridal Falls, thence up B.C. Coast Logging Co. Road.

(D) Sample Points;

19 permanent sample points were established throughout the area and 49 collections forwarded for identification from the following host trees.

Host	Number of Collections	Number of Insects
Western hemlock	17	194
Red cedar	17	70
Douglas fir	4	30
Alder	4	43
Cottonwood	3	91
Maple	2	2 (1 neg.)
Balsam fir	1	8
Sitka spruce	1	7
Willow	1	?
	50	443

Variation from the usual beating method of collection occurred in 2 cottonwood and the willow collections.

Cottonwood; Chilliwack River and Chilliwack Mountain, leaves with gall formations were hand picked.

Willow; Elk Mountain, sections of the infested trunk were cut from the trees.

The date, location, timber type and host trees of permanent sample points are as follows.

Cultus Lake May 30

CA- 1. Location:- East slope, 3 miles up old logging road at 2nd Fish Hatchery

Type:- Slow growing, sturdy virgin stand of cedar, hemlock and Douglas fir with sparse ground cover of sword fern . Aspect - westerly, Slope - 25%, Elevation - 2000'

Host:- 3 collections; cedar, hemlock and alder.

CA- 2. Location:- East Slope, 1 mile up old logging road at 2nd Fish Hatchery

Type:- Regeneration growth of Douglas fir, cedar and hemlock overtopped at present by maple, alder and seed trees with a ground cover of salmonberry, thimbleberry, brachen and sword fern.

Aspect and Slope - neutral Elevation - 450'

Host:- 1 collection; hemlock host.

Cultus Lake May 31st

CA- 3. Location:- South end of Cultus Lake

Type:- Sturdy, maturing stand of cottonwood, maple and alder with cedar and hemlock understory and sparse moss ground cover.

Aspect and Slope - neutral Elevation - 200'

CA- 4. Location:- West slope, 1 mile up old logging road north of Cultus River bridge.

Type:- Old logging site with maple, cottonwood, alder, hemlock and cedar growth. Former timber type Douglas fir and cedar

Aspect - east Slope - 5% Elevation - 550'

Host:- 3 collections; cedar, hemlock and alder hosts.

CA- 5. Location:- North end of Cultus Lake in Park reserve area.

Type:- Mature close growing stand of Douglas fir and cedar overstory with cedar, hemlock and deciduous understory. Moderate ground cover of thimbleberry, blueberry, brachen and blackberry.

Aspect - easterly Slope - 5% Elevation - 250'.

Host:- 2 collections; cedar and hemlock hosts.

Chilliwack River Valley June 4th

CA- 6. Location:- 9 miles up old Railway Grade from Vedder Crossing.

Type:- Old logging site with a second growth predominantly deciduous in species. Overstory of maple, cotton-

wood, hemlock, cedar and alder with understory of alder willow hemlock and cedar with a ground cover of thimbleberry, salmonberry and vine maple.

Aspect and Slope - neutral Elevation 400'

Host:- 5 collections; maple, hemlock, cottonwood, alder and cedar hosts.

CA- 7. Location:- 6 miles up old railway grade from Vedder Crossing.

Type:- Second Growth hemlock, cedar and cottonwood with few wolf Douglas fir. Ground cover sparse, salmonberry and fern.

Aspect - North easterly Slope - 15% Elevation - 800'

Host:- 3 collections; hemlock, cedar and cottonwood hosts.

Elk Mountain June 6th

CA- 8. Location:- B.C. Forest Service Lookout.

Type:- Vigorous, young close growing second growth Douglas fir, hemlock and cedar with a few maple and alder. Sparse ground cover of thimbleberry and brachen.

Aspect - North-west to south. Slope - 10%

Elevation 2200'

Host:- 3 collections; Douglas fir, hemlock and cedar hosts.

CA- 9. Location:- 1 mile below B.C. Forest Service Lookout on old logging road.

Type:- Sturdy second growth Douglas fir with cedar, maple, alder and willow understory.

Aspect - southerly Slope - 5% Elevation - 1000'

Host:- 3 collections; Douglas fir, cedar and willow.

Chilliwack Mountain June 5th

CA-10. Location:- End of road on south slope of Chilliwack Mt.

Type:- Mixed second and virgin growth stand of Douglas fir, cedar, hemlock and occasional Sitka spruce with maple and cottonwood predominating on the river flat.

Aspect - South Slope - 20 deg. Elevation - 400'.

Host:- 4 collections; Douglas fir, cedar, Sitka spruce and cottonwood hosts.

CA- 11. Location:- 1½ miles up Summit road north slope of Chilliwack Mt.

Type:- Mixed second growth and virgin Douglas fir, cedar, hemlock, maple and alder.

Aspect - North Slope - 15 deg. Elevation 400'.

Host:- 4 collections; cedar, hemlock maple and alder.

CA- 12. Location:- 2 miles up Summit Road north slope of Chilliwack Mt.

Type:- Mixed second and virgin growth Douglas fir, cedar, hemlock, maple and alder.

Aspect - North. Slope - 15 deg. Elevation - 1000'.

Host:- 2 collections; cedar and hemlock hosts.

Vedder Mountain June 7th

CA- 13. Location:- 4 2/5 miles up logging road above Belrose Station.

Type:- Maturing second growth hemlock, Douglas fir and cedar stand on old forest fire site. Ground cover

moderate salmonberry, thimbleberry, brachen, sword fern and devil's club.

Aspect and Slope - neutral. Elevation 1800'.

Host:- 2 collections; cedar and hemlock hosts.

CA- 14. Location:- 3 2/5 miles up logging road above Belrose Station.

Type:- Maturing second growth Douglas fir, cedar, hemlock, maple and alder with sparse ground cover of brachen, thimbleberry and salmonberry.

Aspect - northerly. Slope - 15 deg. Elevation - 1000'

Host:- 2 collections; hemlock and cedar hosts.

CA- 15. Location:- 2 2/5 miles up logging road above Belrose Station.

Type:- Maturing second growth Douglas fir, cedar, hemlock, maple and alder with sparse ground cover of brachen, thimbleberry and salmonberry.

Aspect - Northerly. Slope - 15 deg. Elevation - 600'

Host:- 3 collections; hemlock, cedar and alder hosts.

Rosedale Mountain June 3rd

CA- 16. Location:- ½ mile up B.C. Coast Logging Co. road.

Type:- Vigorous, close growing second growth maple, hemlock, and cedar with thimbleberry, brachen and wild current ground cover.

Aspect - westerly. Slope - 28%. Elevation - 800'

Host:- 2 collections; cedar and hemlock hosts.

CA- 17. Location:- 4 miles up B.C. Coast Logging Road.

Type:- Slow growing virgin growth of Balsam, hemlock and few Douglas fir and cedar overstory with balsam and hemlock suppressed understory. Ground cover of sparse sword fern and moss.

Aspect - northerly. Slope - 28%. Elevation - 4000'

Host:- 2 collections; Balsam and hemlock hosts.

CA- 18. Location:- 2 miles up B.C. Coast Logging Co. road.

Type:- Immature hemlock and cedar stand with suppressed hemlock and cedar understory. Understory thimble-berry, sword fern and hemlock regeneration.

Aspect - Northerly. Slope -28%. Elevation - 3000'

Host:- 2 collections; cedar and hemlock hosts.

CA- 19. Location:- ¾ miles up B.C. Coast Logging Co. Road.

Type:- Regeneration growth of Douglas fir, cedar, hemlock and maple, vigorous close growing. Ground cover nil,

Aspect - Westerly. Slope - 20%. Elevation - 1500'

Host:- 3 collections; Douglas fir, cedar and hemlock hosts.

(E) Insect Conditions

While no serious outbreak of insect populations was recorded in this area it must be noted that where ever cottonwood was abundant the lower foliage consistantly showed the presence of a gall forming Aphididae at the base of the leaf mid-rib. The Vernon Laboratory was unable to specifically identify this Aphididae as to genus or species.

The cottonwood as well as the alder in the Chilliwack River Valley showed some skeletonizing of foliage by relatively high Chrysomela sp. populations.

Scrub willow growth at 1000' on Elk Mt. was heavily infested with Sternochaeta lapathi. Trees with a diameter greater than one inch showed presence of attack on the trunk from the ground to the upper branches. Samples cut from these trees were perforated with larval galleries and complete mortality was apparent. Other deciduous species growing amongst infested willow remained untouched. Decaying stumps showed evidence of previous attack.

(i) Insects of Major Importance;

Lambdina fiscellaria lugubrosa Hlst. 16 larvae collected from points listed below shows the presences of an endemic population throughout the district.

No. of Larvae	Location	Permanent Sample Point	Host
1	Cultus Lake	CA-1	Cedar
1	Cultus Lake	CA-1	Hemlock
1	Chilliwack River	CA-6	Cedar
5	Vedder Mountain	CA-14	Hemlock
2	Vedder Mountain	CA-15	Hemlock
1	Rosedale Mountain	CA-16	Hemlock
2	Rosedale Mountain	CA-19	Hemlock
2	Rosedale Mountain	CA-19	Douglas Fir
1	Rosedale Mountain	CA-19	Cedar

Nepytia phantasmaria Stkr. 19 early instar larvae were collected from hemlock and Douglas fir hosts at Cultus Lake and Elk Mt. at the following sample points.

No.of Larvae	Location	Permanent Sample Point	Host
7	Cultus Lake	CA-3	Hemlock
8	Cultus Lake	CA-5	Hemlock
3	Elk Mountain	CA-8	Hemlock
1	Elk Mountain	CA-9	Douglas Fir

Neodiprion tsugae Midd. Of the 59 larvae collected throughout the area at the points listed below all beatings showed relatively low populations to be present with the exception of 35 larvae collected from one beating on a hemlock host at 3000' at Rosedale Mountain.

No. of Larvae	Location	Permanent Sample Point	Host
8	Cultus Lake	CA-1	Hemlock
3	Cultus Lake	CA-2	Hemlock
7	Cultus Lake	CA-3	Hemlock
3	Vedder Mountain	CA-13	Hemlock
1	Rosedale Mountain	CA-16	Hemlock
35	Rosedale Mountain	CA-18	Hemlock
2	Rosedale Mountain	CA-19	Hemlock

Acleris variana Fern. The collection point shown below was the only location where larvae of this insect pest were obtained.

No. of Larvae	Location	Permanent Sample Point	Host
2	Elk Mountain	CA-8	Douglas Fir

Notophus antiqua badia Hy. Ed.

No. of Larvae	Location	Permanent Sample Point	Host
1	Chilliwack Mountain	CA-10	Douglas Fir

Hemichroa crocea Fourc.

No. of Larvae	Location	Permanent Sample Point	Host
18	Cultus Lake	CA-4	Alder

(ii) Insects of Minor Importance

Eupithecia gibsonata. 46 late instar larvae were collected from cedar hosts in all sections of the area sampled. While 1 larva was obtained from a hemlock host cedar appears to be preferred and with the exception of 4 collections larvae of this Geometrid were obtained from all cedar beatings. The elevation variation of these collections ranged from 400' to 3000'.

No. of Larvae	Location	Permanent Sample Point	Host
2	Cultus Lake	CA-1	Cedar
8	Cultus Lake	CA-3	Cedar
3	Chilliwack River	CA-6	Cedar

Eupithecia gibsonata (continued)

No. of Larvae	Location	Permanent Sample Point	Host
2	Elk Mountain	CA-8	Cedar
14	Elk Mountain	CA-9	Cedar
2	Chilliwack Mountain	CA-10	Cedar
1	Chilliwack Mountain	CA-11	Cedar
1	Chilliwack Mountain	CA-12	Cedar
2	Vedder Mountain	CA-13	Cedar
4	Vedder Mountain	CA-14	Cedar
1	Vedder Mountain	CA-14	Hemlock
1	Vedder Mountain	CA-15	Cedar
1	Rosedale Mountain	CA-18	Cedar
5	Rosedale Mountain	CA-19	Cedar

Neodiprion sp. 13 larvae of this species were collected from the sample points listed below.

No. of Larvae	Location	Permanent Sample Point	Host
1	Cultus Lake	CA-2	Hemlock
2	Cultus Lake	CA-3	Hemlock
1	Cultus Lake	CA-4	Hemlock
1	Chilliwack River	CA-7	Hemlock
5	Chilliwack Mountain	CA-12	Hemlock
1	Chilliwack Mountain	CA-10	Sitka spruce
2	Vedder Mountain	CA-14	Hemlock

Galerucella punctipennis. Adults were collected from skeletonized foliage at the following points.

No. of Larvae	Location	Permanent Sample Point	Host
5	Cultus Lake	CA-1	Alder
1	Vedder Mountain	CA-15	Alder

Chrysomela sp. High localized populations were causing skeletonizing of alder and cottonwood foliage at the following points.

No. of Larvae	Location	Permanent Sample Point	Host
5	Chilliwack River	CA-6	Alder
41	Chilliwack River	CA-6	Cottonwood

(F) Personnel Contacted

J.A. Mahood, Ranger, B.C. Forest Service, Chilliwack, B.C.

H. Barker, Assistant Ranger, B.C. Forest Service, Chilliwack, B.C.

H.C. Bancroft, Assistant Ranger B.C. Forest Service, Chilliwack, B.C.

Ranger Mahood is both co-operative and helpful and the forwarding of ten collections to Vernon shows active interest in insect conditions of his forest area.

(G) Summary Comparison of '46 and '47 Survey

During the reconnaissance survey carried in 1946 one collection was forwarded to the Vernon Laboratory from this area. The collection, made on September 15th, at the south end of Cultus Lake contained insect species from two hemlock hosts. Other beatings, one respectively, on Douglas fir, cedar and hemlock were negative. Specimens collected

were not of major importance and lateness of the season offers little information for comparison. The beating site is permanent sample point CA-3 in 1947.

(3) HOPE AREA

(A) Description of Area

This area includes the south slopes of the Fraser River Valley east of Rosedale between the south bank of the river and the U.S.A. - Canadian border and the forested area in the vicinity of Hope, B.C.

The general topography of the area is steep-sided mountain ranges rising to 7000' or 8000' peaks with narrow valleyed mountainous streams. The Silver Creek, however, emptying into the Fraser just west of Hope, forms a relatively wide timbered valley extending over a low divide to the Skagit River draining southward across the border. Jones Creek Valley, while narrow and steepsided as it joins the Fraser River, widens southward along the east margin of Jones Lake.

(B) Timber Types and Economic Importance

Due to the rugged nature of the country much of the original timber still remains but with present day logging methods, accessibility is increased and numerous small operators are logging the mountain slopes, particularly, in the vicinity of Hope. In the two principal valleys, the Silver Creek-Skagit River and the Jones Creek and the lake, large cutting operations are in progress.

In the Silver Creek - Skagit River valley a combination logging and clearing operation is in progress which is associated with the construction of the future Seattle, U.S.A. water and power supply. The Silver-Skagit Logging Co. operates two camps in the Canadian timber limits cutting virgin stands of Douglas fir, cedar, hemlock and balsam.

These stands are patchy and growth ages vary considerably, which is possible due to recurrant fires in the valley. The growth of western white pine is quite prevalent in this valley but is scrubby and is of no commercial value at the present time.

The Jones Creek Logging Co., subsidy to Alaska Pine Ltd., hold extensive limits and operate a large camp in the creek and lake valley. Sturdy, naturally seeded second growth and regeneration covers the valley slopes immediately adjoining the Fraser River extending up the valley to more recent cutting sites. This regeneration and second growth is a mixed hemlock, balsam, Douglas fir, cedar, alder, maple and willow with hemlock predominating. The present site of logging operations along the south east slopes of Jones Lake, the unlogged virgin growth at the foot of the lake and remaining shore margins are predominately hemlock, cedar and balsam fir with sections having a high percentage Douglas fir.

(C) Route Travelled

By the use of maintained and logging roads all sample points were accessible by car.

(a) Silver Creek and Skagit River: East on the Trans-Canada Highway to Silver-Skagit Logging Co. road at the west end of Silver Creek bridge and south along this road to the U.S.A. border. Company passes are necessary to travel on this road and can be obtained at Camp No. 2 from Supt. Scleekizen. In view of the fact that extremely large trucks operate on this road, information as to the operation schedule is adviseable or the conduction of the

survey on a non-working day (Saturday or Sunday).

(b) Kawkawa Lake: East from Hope on the Kawkawa Lake Road running on the north and south margins of the lake.

(c) Jones Creek and Lake: Trans-Canada Highway to Jones Creek Logging Co. on the south side of the highway at the junction of Jones Creek and the Fraser River. The logging road up the valley is very precipitous and a closed road to all but company vehicles, however, the company readily supplies transportation.

(D) Sample Points

10 permanent sample points were established in this area and 19 collections forwarded to Vernon from the following host trees.

Host	Number of Collections	Number of Insects
Hemlock	9	146
Douglas fir	4	55
Cedar	2	9
Balsam fir	2	11
Alder	1	4
Willow	1	2
	19	227

Variations from the regular beating methods of collection were made when collecting ambrosia beetles in the slash at Maimen Creek in the Silver Creek Valley and when making collections from willow hosts at Kawkawa Lake.

The date, location, timber type and host trees of permanent sample points are as follows.

Silver Creek and Skagit River June 2nd

HA-1 Location:- Junction of Silver Cr. and Maimen Cr., west slope of Silver Cr. Valley.

Type:- Hemlock, cedar and balsam pole stand with hemlock and cedar understory and sparse ground cover of moss and fern.

Aspect - north. Slope - 10 deg. Elevation - 1800'

Host:- 1 collection; cedar host (beating at this point on 2 hemlock and balsam hosts were negative.)

HA-2 Location:- East slope at the south end of Silver Lake.

Type: Pole Stand of Douglas fir, cedar, hemlock, and alder, close growing with sparse ground cover of moss and sword fern.

Aspect - west. Slope - 10%. Elevation - 1100'.

Host:- 2 collections; 3 hemlock and alder hosts.

July 13th

HA-3 Location:- Skagit River Valley at the U.S.A. border, 38 miles south of the Fraser River.

Type: Douglas fir, western white pine and hemlock pole stand with hemlock and cedar understory and sparse ground cover of hunchberry, chinaberry, oregon grape, salal, sword fern and moss.

Aspect - slope - Neutral. Elevation - 1400'.

Host:- 3 Douglas Fir.

HA-4 Location:- Skagit River Valley, 5 miles north of U.S.A. border and 33 miles south of the Fraser River.

Type:- Young growth of Douglas fir, and western white pine, close growing, with sparse salal and sword fern ground cover.

Aspect - south east. Slope - 2% Elevation - 1666'

Host:- 1 collection; 3 Douglas fir hosts.

HA-5 Location:- Skagit River Valley, 10 miles north of U.S.A. border and 28 miles south of the Fraser River.

Type:- Virgin growth of Douglas fir with western white pine and hemlock understory and sparse salal ground cover.

Aspect & Slope - Neutral. Elevation - 1700'.

Host:- 1 collection; 3 hemlock hosts.

HA-6 Location:- Silver Creek Valley, 15 miles from U.S.A. border and 22 miles south from Fraser River.

Type:- Vigorous close growing Douglas fir regeneration.

Aspect - west. Slope - 30%. Elevation - 1800'

Host:- 3 Douglas Fir.

July 14th

HA-7 Location:- 2 miles up trail in creek valley joining Silver Creek Valley four miles up logging road.

Type:- Mature, virgin growth of Douglas fir, hemlock, cedar and balsam with hemlock, cedar and balsam understory and sparse, scatter ground cover of salal, huckleberry bunchberry and moss.

Aspect - north to northwest. Slope - 20%

Elevation - 2500'.

Host:- 1 collection, 3 hemlock hosts.

Kawkawa Lake July 14th

HA- 8 Location:- South end of Kawkawa Lake.

Type:- Second growth mixed stand of Douglas fir, maple, alder, willow and wolf Douglas fir with patchy ground cover of thimbleberry, huckleberry, cranberry, blackberry, bracken and sword fern.

Aspect - northwest. Slope - 20%. Elevation - 1500'.

Host:- 2 collections: 3 Douglas fir and willow hosts.

Jones Creek and Lake July 15th

HA- 9 Location:- North end of Jones Lake in fishing resort property.

Type:- Mature virgin stand of hemlock, cedar and balsam with sparse huckleberry and moss ground cover.

Aspect and Slope - neutral. Elevation - 2055'.

Host:- 1 collection; 2 hemlock hosts.

HA-10 Location:- 4 miles up logging road on east slope of Jones Creek Valley.

Type:- Second growth balsam and hemlock with patchy fireweed, thimble berry, bracken and moss ground cover.

Aspect - southwest. Slope - 20%. Elevation - 1850'

Host:- 1 collection; 3 hemlock hosts.

Two collections were made in virgin growth hemlock and balsam four miles up the east shore of Jones Lake at the present site of logging operations.

(E) Insect Conditions

A relatively high endemic population of Neodiprion tsugae Midd. larvae were found to be present in the Jones Creek and Lake Valley, particularly in the virgin hemlock and balsam growths at the south end and along the east margin of the lake. Slight defoliation was apparent on individual trees at the south end of the lake over a small area, it was confined chiefly to the terminals of the branches and leader growth and no where exceeded 5%. Beatings made in this section gave an average collection of 33 larvae.

The scrub willow in the vicinity of Hope along the margins of the Trans-Canada highway and at Kawkawa Lake was suffering from Cryptorhynchus lapathi attack. Approximately 50% of the growth showed evidence of larval penetration.

The survey of this area in early June was discontinued because of the absence of larvae at this time. This is probably due to a retarded season caused by the high mountain peaks which dominate the valleys. The areas in Silver Creek valley sampled in June giving negative results or occasional larvae and adult Coleoptera were re-sampled in mid-July and good larval collections were obtained.

No other abnormal forest insect conditions were noted in the area at the time of the survey.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. Small numbers of larvae were collected in all sections sampled in the area at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
4	Silver Lake	HA-2	Hemlock
1	Skagit River	HA-5	Hemlock
3	Silver Creek	HA-7	Hemlock
1	Kawkawa Lake	HA-8	Douglas fir
2	Jones Lake	-----	Hemlock
1	Jones Lake	-----	Balsam
3	Jones Creek	HA-10	Hemlock

Nepytia canosaria Wlk. A small number of larvae were collected at the following points in this area.

Number of Larvae	Place	Permanent Sample Point	Host
2	Skagit River	HA-3	Hemlock
1	Skagit River	HA-4	Douglas fir
4	Kawkawa Lake	HA-8	Douglas fir

Neodiprion tsugae Midd. The points of collection of larvae are shown in the following list.

Number of Larvae	Place	Permanent Sample Point	Host
25	Jones Lake	-----	Hemlock
1	Jones Lake	-----	Balsam

Neodiprion tsugae Midd. (continued)

Number of Larvae	Place	Permanent Sample Point	Host
66	Jones Lake	HA-9	Hemlock
10	Jones Creek	HA-10	Hemlock

Acleris variana Fern. Larvae were collected at the points listed.

Number of Larvae	Place	Permanent Sample Point	Host
1	Silver Lake	HA-2	Hemlock
1	Silver Creek	HA-7	Hemlock

Trypodendron sp. Larvae and adults of this species of ambrosia beetle were collected from balsam and hemlock slash in the Silver Creek at sample point HA-1.

(ii) Insects of Minor Economic Importance

Neodiprion sp. Distribution of the larvae of this sawfly were as follows:

Number of Larvae	Place	Permanent Sample Point	Host
1	Silver Creek	HA-7	Hemlock
1	Kawkawa Lake	HA-8	Douglas fir
1	Jones Creek	HA-10	Hemlock

(F) Persons Contacted

F. Scleekizen Supt. Silver-Skagit Logging Co. Silver Creek.

J. Humpheries Eng. Silver-Skagit Logging Co. Silver Creek

F. Hoy Cruiser Silver-Skagit Logging Co. Silver Creek

Supt. Scleekizen, though skeptical as to good or useful information gained by the survey, is none-the-less co-operative and was agreeable with the suggestion of forwarding insect collections to the Vernon Laboratory. Cruiser Hoy undertook to make collections while carrying out company cruises.

(G) Comparison Summary of '46 and '47 Survey

The 5 beatings made at the south end of Silver Lake, the only section sampled in this area in 1946, were negative. Beatings made in this locality in 1947 showed the presence of Lambdina fiscellaria lugubrosa Hlst. and Acleris variana Fern., larvae on hemlock hosts.

(4) BURRARD INLET

(A) Description of Area:

This area includes all the timber sections adjoining the residential and industrial areas of Greater Vancouver, surrounding municipalities and summer resorts along the shores of Burrard Inlet that can be reached by car. Excluded from this area is the Greater Vancouver Water Board Districts of Capilano and Seymour Creeks, which will be reported separately. The area extends along the North Shore, east from Whytecliff and Horseshoe Bay to Woodlands including Hollyburn Ridge, Lower Capilano, Lynn Creek, Grouse Mountain, Seymour Mountain Park, Deep Cove and Woodlands; along the south shore from Stanley Park to Ioco including Port Moody and Lake Buntzen. In general the topography is mountainous ridges rising sharply from the shore line of the Inlet particularly along the north shore and in the vicinity of Lake Buntzen.

(B) Timber Type and Economic Importance

The majority of the virgin timber of this area has been cut, other than that held in park reserves and in the higher slopes where previous logging operations considered inaccessible, mixed stands of Douglas fir, cedar, hemlock and balsam with cedar and Douglas fir dominating in the lower slopes, and hemlock, balsam and yellow cedar at higher levels. The second growth in many sections is well developed and maintain most of the logging operations which are chiefly the cutting of cedar poles, Douglas fir piling, and supplying small logs to portable saw-mills; some fuel cutting is also carried on, as well

as the making of shakes and shingle bolts. The heavy deciduous growths of alder, maple and willow on old logging sites are gradually being replaced by cedar, hemlock, Douglas fir and balsam.

(C) Route Travelled:

By using the Lions' Gate Bridge as a centre point, the following routes can be taken to various sample points:

(a) Whytecliff, Hollyburn Ridge and Horseshoe Bay: East on Marine Drive from the north end of the bridge;

(b) Capilano Highlands: West from the north end of bridge to Capilano Road;

(c) Grouse Mountain: West from north end of bridge to Grand Boulevard, thence along Lynn Valley road to Grouse Mountain Road, Lonsdale Ave., to end of Prospect Mountain Road;

(d) Lynn Creek: West from north end of bridge to Grand Boulevard, thence along Lynn Valley Road;

(e) Seymour Mountain: Park and Woodlands: West from north of bridge to Keith Road, thence along Seymour Park and Woodlands Road;

(f) Deep Cove: West from north end of bridge to end of Dollarton Road;

(g) Stanley Park: South end of bridge;

(h) Port Moody: East on Hastings St., Vancouver, to Barnet Road.

(i) Ioco and Lake Buntzen: East on Barnet Road from Port Moody to Ioco Road, along Ioco Road to Lake Buntzen Road.

(D) Sample Points:

Sixty-one collections were made as well as six negative beatings and twenty-six (26) permanent sample points established in this area.

Host	Number Collections	Number of Insects
Hemlock	27	245 plus.
Cedar	17	58
Douglas Fir	12	61
Balsam Fir	2	12
Mountain Hemlock	1	4
Sitka Spruce	1	20
Willow	1	13
	61	413

One collection of cedar, hemlock and Douglas fir respectively was made by cutting sections from logs infested with ambrosia beetles or bark beetles.

Sample points and host tree where negative beatings occurred are listed below:

Host	Location	
Cedar	Permanent Sample	Bl-4, British Properties.
Cedar	Permanent Sample	Bl-8, junction Grouse Mt. Rd. and Valley Road.
Cedar	Permanent Sample	Bl-10, and B.C.M. Trail.
Cedar	Permanent Sample	Bl-11, ½ mile B.C.M. Trail.
Douglas Fir	Permanent Sample	Bl-7, Grouse Mt. toll-gate.
Hemlock	Permanent Sample	Bl-11, ½ mile B.C.M. Trail.

The date, location, timber type and host trees of permanent sample points are as follows:-

Whytecliff, Horseshoe Bay, and Hollyburn Ridge --- June 11th

Bl - 1. Location:- Whytecliff, Block 1 and 4.

Type:- Virgin stand of cedar, hemlock, grand fir, maple and alder overstory with cedar and hemlock understory and sword fern, huckleberry, salal and salmonberry ground cover.

Aspect and slope - neutral. Elevation 50'.

Host:- Two collections; cedar and hemlock hosts.

Bl - 2. Location:- Horseshoe Bay, end of P.G.E. Railway Grade.

Type:- Close growing, second growth Douglas fir and cedar overstory with understory of cedar, hemlock, maple and a few alder and cedar regeneration, several fern and huckleberry ground cover.

Aspect - east. Slope - 22 degrees. Elevation 400'.

Hosts:- Two collections; cedar and hemlock hosts.

Bl - 3. Location:- Block 6 New Westminster Land District.

Lot 405 Hollyburn Ridge subdivision.

Type:- Vigorous close growing small pole stand of cedar and Douglas fir.

Aspect - south. Slope 18 degrees. Elevation 350'.

Host:- Three collections; Douglas fir and cedar hosts.

Bl - 4. Location:- Along trail at northeast corner of Millstream Road, British Properties.

Type:- Vigorous close growing regeneration growth on old logging site, of hemlock, cedar, Douglas fir with alder and willow at road edge. Ground cover of salal, bracken, bunchberry and huckleberry.
Aspect - south. Slope - 2. Elevation - 2000'.

Host:- Four collections; hemlock, Douglas fir, cedar, and willow hosts.

Grouse Mountain June 12th and 13th.

Bl - 5. Location:- Grouse Mountain Road at Mosquito Creek Bridge.

Type:- Close Growing virgin stand of balsam fir, hemlock, mountain hemlock, and cedar similar understory and light ground cover of blueberry and salmonberry.
Aspect - southwesterly. Slope - 5. Elevation - 3500'.

Host:- Four collections; Balsam fir, cedar, mountain hemlock and hemlock.

Bl - 6. Location:- Grouse Mountain Road two miles below Mosquito Creek bridge.

Type:- Vigorous regeneration growth of cedar, hemlock and Douglas fir with ground cover of blackberry, salmonberry and bracken.
Aspect - south. Slope - 15%. Elevation 2900'.

Host:- Three collections; cedar, Douglas fir and hemlock hosts.

Bl - 7. Location:- Tollgate, Grouse Mt. Road.

Type:- Close vigorous regeneration growth of hemlock, cedar and Douglas fir with few alder.

Aspect - south. Slope, nil. Elevation - 2000'.

Host:- Three collections; hemlock, cedar and Douglas fir.

Bl - 8. Location:- Junction of Grouse Mountain road and Valley road.

Type:- Young close growing second growth of cedar, hemlock and alder.

Aspect and Slope - neutral. Elevation - 900'.

Host:- Two collections; hemlock and cedar hosts.

Bl - 9. Location:- Post "F.I.I. Sample Point" one mile from Mosquito Creek. Intake on Capilano trail S.20 degrees West from store at lower end of Grouse mountain trail.

Type:- Second growth, moderately open pole stand of Douglas fir, hemlock, cedar and a few alder, overstory with hemlock; Douglas fir understory. Ground cover of salal and regeneration hemlock.

Aspect and slope - neutral. Elevation - 500'.

Host:- Three collections; Douglas fir, cedar and hemlock hosts.

Bl - 10. Location:- End of lower Grouse Mountain trail. Post "F.II. Sample Point" B.C.M. trail.

Type:- Close vigorous second growth Douglas, hemlock and cedar, with ground cover of salal, regeneration, and huckleberry.

Aspect - southwest. Slope 20 degrees. Elevation 1550'.

Host:- Two collections; hemlock and cedar hosts.

Bl - 11. Location:- Half-mile up lower Grouse Mountain Trail. Post "F.I.I. Sample Point." B.C.M. Trail.

Type:- Close vigorous second growth Douglas fir, cedar and hemlock overstory with understory of hemlock, cedar and Douglas fir.

Host:- Three collections; hemlock, cedar and Douglas fir hosts.

Deep Cove and Woodlands June 14th

Bl - 12. Location:- Slope at the end of Dollarton road.

Type:- Small pole stand of hemlock, cedar, Douglas fir, with few alder and maple overstory, and understory of hemlock, cedar, alder and dogwood. Ground cover of salal and bracken.

Aspect - south. Slope 20%. Elevation 150'.

Host:- Two collections; hemlock and cedar hosts.

Bl - 13. Location:- Two miles west on Dollarton Road from Deep Cove.

Type:- Second growth of hemlock, cedar, maple and alder with similar understory and vine maple, and ground cover of blackberry, salmonberry, huckleberry and sword fern.

Aspect - southwest. Slope - 5%. Elevation - 50'.

Host:- Two collections; hemlock and cedar hosts.

B1 - 14. Location:- Three miles on Woodlands Road from Keith Road.

Type:- Small second growth poles of Douglas fir, cedar, hemlock and alder, with hemlock, cedar, alder and Douglas fir understory, and salal, bracken and hemlock regeneration ground cover in open areas.

Aspect - south. Slope - 8%. Elevation 1000'.

Host:- Three collections; hemlock, cedar and Douglas fir hosts.

B1 - 15. Location:- North Vancouver Gun Club Range, Keith Road.

Type:- Second growth poles of hemlock, cedar and alder, open growing with understory of hemlock and willow, and ground cover of thimbleberry, salmonberry and bracken.

Aspect - east. Slope - neutral. Elevation - 400'.

Host:- One collection - hemlock host.

Lake Buntzen June 17th.

B1 - 16. Location:- Square stake two miles up Lake Buntzen Trail.

Type:- Second growth Douglas fir and alder, overstory, with Douglas fir, hemlock, cedar and alder understory. Ground cover salal, salmonberry, bracken and regeneration.

Aspect - south. Slope 15%. Elevation - 700'.

Host:- Three collections; Douglas fir, hemlock and cedar host.

Bl - 17. Location:- Square stake one mile up Lake Buntzen Trail.

Type:- Second growth Douglas fir, cedar, hemlock and alder, with sparse ground cover of salal, huckleberry and bracken.

Aspect - southeast. Slope - 15%. Elevation - 600'.

Host:- Three collections; hemlock, Douglas fir and cedar.

Bl - 18. Location:- End of road to Lake Buntzen.

Type:- Cedar, hemlock and Douglas fir pole stand, with ground cover in the open of salmonberry, bracken and salal.

Aspect - north. Slope - 5%. Elevation - 500'.

Host:- Two collections; hemlock and cedar hosts.

Stanley Park July 2nd and 4th

Bl - 19. Location:- Second Beach.

Type:- Mature cedar, hemlock and Douglas fir overstory with hemlock, cedar and Douglas fir understory.

Aspect and Slope - neutral. Elevation - 50'.

Host:- One collection; hemlock host.

Bl - 20. Location:- Brockton Point.

Type:- Mature Douglas fir and cedar overstory, with hemlock, cedar, Douglas fir and spruce, close growing.

Aspect and Slope - Neutral. Elevation - 50'.

Host:- One collection; Douglas fir.

Bl - 21. Location:- Third Beach.

Type:- Mature Douglas fir, cedar, spruce and hemlock overstory, with cedar and hemlock understory.

Host:- One collection; hemlock host.

Bl - 22. Location:- Beaver Lake.

Type:- Cedar, hemlock and Douglas fir overstory, and understory of hemlock, alder and vine maple, with medium stand density.

Aspect and Slope - neutral. Elevation - 120'.

Host:- Two collections; hemlock host.

Lynn Creek July 3rd

Bl - 23. Location:- Second Intake North Vancouver Waterworks.

Type:- Second growth hemlock, balsam, cedar, Sitka spruce and alder, with Douglas fir wolf trees and spruce ground cover.

Host:- Two collections; Sitka spruce and hemlock, hosts.

Bl - 24. Location:- Old mill-site above second intake.

Type:- Second growth hemlock and balsam and cedar stand with alder on creek margins. Sparse ground cover.

Host:- Two collections; balsam and hemlock hosts.

Bl - 25. Location:- First intake North Vancouver water supply.

Type:- Second growth hemlock, cedar, alder and maple close growing stand with spruce ground cover.

Host:- Two collections; hemlock and cedar hosts.

Port Moody September 8th.

B1 - 26. Location:- Wooded area west of Ioco Road intersection.

Type:- Second growth hemlock, Douglas fir, cedar, alder and maple, with ground cover of salmonberry, bracken, huckleberry and blackberry.

Aspect - north. Slope - 5%. Elevation - 200'.

Host:- One collection; Hemlock host.

(E) Insect Conditions

Insect conditions were apparently within normal limits throughout the area and no dangerously large collections were obtained at any sampling point.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. 54 larvae were collected throughout the area at the following sample points.

Number of Larvae	Place	Permanent Sample Point	Host
1	Grouse Mountain	B1-9	Hemlock
7	Deep Cove	B1-12	Hemlock
11	Deep Cove	B1-12	Cedar
3	Dollarton Road	B1-13	Hemlock
4	Dollarton Road	B1-13	Cedar
1	Woodlands Road	B1-14	Hemlock
2	Woodlands Road	B1-14	Cedar
1	Woodlands Road	B1-14	Douglas Fir
2	North Vancouver Gun Club	B1-15	Hemlock

Lambdina fiscellaria lugubrosa Hlst. (continued)

Number of Larvae	Place	Permanent Sample Point	Host
2	Wild Acres Ranch	------	Douglas Fir
1	Lake Buntzen	Bl-16	Douglas Fir
1	Lake Buntzen	Bl-17	Hemlock
2	Stanley Park	Bl-19	Hemlock
1	Stanley Park	Bl-20	Douglas Fir
2	Stanley Park	Bl-21	Hemlock
2	Stanley Park	Bl-22	Hemlock
1	Lynn Creek	Bl-23	Hemlock
1	Lynn Creek	Bl-24	Balsam Fir
3	Lynn Creek	Bl-24	Hemlock
4	Lynn Creek	Bl-25	Hemlock
2	Lynn Creek	Bl-25	Cedar

Nepytia canosaria Wlk. A total of 18 larvae were collected throughout the area at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
3	Deep Cove	Bl-12	Hemlock
1	Woodlands	Bl-14	Douglas Fir
3	Lake Buntzen	Bl-17	Douglas Fir
1	Lake Buntzen	Bl-18	Douglas Fir
4	Stanley Park	Bl-19	Hemlock
2	Stanley Park	Bl-20	Douglas Fir
4	Stanley Park	Bl-22	Hemlock

Neodiprion tsugae Midd. Of the 71 larvae collected throughout the area 69 were obtained from beatings at Lynn Creek, where a relatively high endemic population appears to exist.

Number of Larvae	Place	Permanent Sample Point	Host
1	Dollarton Road	Bl-13	Hemlock
1	Stanley Park	Bl-22	Hemlock
12	Lynn Creek	Bl-23	Sitka Spruce
26	Lynn Creek	Bl-23	Hemlock
2	Lynn Creek	Bl-24	Hemlock
29	Lynn Creek	Bl-25	Hemlock

Acleris variana Fern. One larva of this insect was found at Lake Buntzen on a Douglas fir host at Permanent Sample Point Bl-17.

Ambrosia beetles. Freshly cut hemlock and cedar poles were heavily infested by Trypodendron sp., in the former, and Gnathatrichus sp., in the latter, at the end of Phillips Road in the lower Capilano Creek sub-division of Capilan Heights.

(ii) Insects of Minor Economic Importance

Neodiprion sp. This species of sawfly was also found at Lynn Creek, 9 on a Sitka spruce host at Bl-23 and 2 on a balsam fir host at Bl-24.

Pikonema dimmockii Cress. 4 larvae of this sawfly were collected from Sitka spruce host at Bl-23 in the Lynn Creek Valley.

Dendroctonus pseudotsugae Hopk. 2 adults were obtained from a Douglas fir log at Bl-3 on Hollyburn Ridge.

Malacosoma pluvialis Dyar. Larvae of this insect were obtained at permanent sample point B1-4 on Hollyburn Ridge from a willow host. Eupithecia gibsonata 8 late instar larvae were collected at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
1	Lake Buntzen	B1-17	Cedar
3	Lake Buntzen	B1-18	Cedar
3	Grouse Mountain	B1-6	Cedar
1	Grouse Mountain	B1-7	Cedar

(F) Persons Contacted

G.G. Armytage, Ranger B.C. Forest Service, Vancouver, B.C.

B.R. Brown, Assistant Ranger, B.C. Forest Service, North Vancouver.

J.R. Barrett, Assistant Ranger, B.C. Forest Service, North Vancouver.

Ranger Armytage is ready and willing to assist the insect survey when ever possible. He and his staff forwarded 11 insect collections to the Vernon laboratory.

(G) Summary Comparison of '46 and '47 Survey

At Stanley Park, the only section sampled in the area in 1946, endemic populations of Lambdina fiscellaria lugubrosa Hlst., showed a decline in numbers while that of Nepytia canosaria Wlk., remained relatively stationary. The following comparison is made between the average number of larvae per beating from 12 beatings made in 1946 and 1947 at, approximately, the same locations and similar hosts, as follows:

Species	Number of Larvae per Average Beating 1946	1947
Lambdina f. lugubrosa Hlst.	3.25	.77
Nepytia canosaria Wlk.	1.17	1.21

(5) PITT RIVER

(A) Description of Area

This area includes, the Lower Coquitlam River, which is beyond the boundary of the Coquitlam watershed catechism and the entire Pitt River drainage system with its principal tributaries Widgeon Creek and Alouette River of the Lower Pitt River and Corbold Creek of the Upper Pitt. This area is roughly defined as north of the Fraser River and west of the east boundary of the Maple Ridge municipality to Port Coquitlam.

The southern section of this area, immediately adjoining the Fraser River, is low lying meadow, dyked against flooding and is extensively cultivated or pasture land. Northward, up the valleys mountainous topography predominates, rising sharply from the meadow in the vicinity of Coquitlam River and Pitt Lake but more gradually in rolling hills in the eastern section, rising sharply at the foot of Alouette Lake into rugged mountainous terrain.

(B) Timber Types and Economic Importance

Apart from shelter belts, there is little or no important timbered areas on the alluvial meadows. Much of the adjoining foot hills and mountain valleys have been logged, leaving the majority of prime virgin stands on the upper slopes and 'till the present time, the less accessible sections. Regeneration and second growth is vigorous and covers most areas previously logged.

There are numerous small logging operations and portable sawmills cutting maturing second growth and small remaining virgin growths in the foothills, as well as some salvage operations in the vicinity of Coquitlam Mountain and Alouette Lake, using cedar for shakes and shingles. The principal operators cutting virgin tracts are B.C. Forest Products in the Upper Pitt River Valley and The Maple Ridge Logging Co., at the north east end of Alouette Lake.

Regeneration and second growth are mainly composed of mixed stands of hemlock, cedar, Douglas fir, balsam, alder and maple with the first three species being predominant, particularly the hemlock. Virgin timber growths contain Douglas fir, cedar, hemlock, balsam and Sitka spruce with individual species dominating on varying sites. Generally, Douglas fir, cedar and hemlock predominate the lower elevations with hemlock, balsam and cedar at the higher slopes. Heavy deciduous growth occurs along the margin of the lower lying meadows, particularly cottonwood and alder. Cottonwood, as well as, Sitka spruce are relatively abundant in the virgin growths on the flats adjoining the river in the Upper Pitt River Valley.

(C) Route Travelled

Travel in this area is by car, boat and trail which will necessitate individually outlined routes to specific sample sections as follows:

(a) Coquitlam River, west bank: Pipeline Road from Port Coquitlam.

east bank: From Port Coquitlam to park reserve at the end of Oxford Road.

(b) Coquitlam Mountain: From Port Coquitlam along Coast Meridian Road, thence up right fork of old logging road to Block 'B' T.B. 38.

Note:- This old logging road is in poor condition at the higher levels.

Lower levels of the mountain are covered by using Quarry Road.

(c) Widgeon Creek: Car to Pitt River Bridge on the Lougheed Highway then by power boat up Pitt River to Widgeon Slough, thence by rowboat up stream to the end of navigable water.

(d) Pitt Lake & Upper Pitt River: Power boat from Pitt River Bridge to Alvin at the head of Pitt Lake and logging truck, courtesy B.C. Forest Products on logging roads in the Upper Pitt River and Corbold Creek Valleys. Beyond the logging road in the Upper Pitt River Valley a good trail extends into the Garibaldi Park reserve.

(e) Loon Lake, U.B.C. Forest Reserve & Maple Ridge Park: From Haney east along the Dewdeny Truck road to Maple Ridge Park road. Along Maple Ridge Park road to Andrew Mark's farm, permission to go further must be

obtained from Mr. Mark. (See Section (F))

(f) Alouette River & Lake; Dewdney Trunk Road to Alco Road, along Alco Road to South end of Alouette Lake. The Maple Ridge Logging Co. will give passage on Alco Road and water transportation to camp at the north end of the lake. (See Section (F)).

(D) Sample Points:

A total of 55 collections were forwarded to the Vernon laboratory from this area and 26 permanent sample points were established. The following list gives the number of collections for various species of host and the total number of insect specimens obtained.

Host	Number of Collections	Number of Insects
Hemlock	33	418
Cedar	6	20
Douglas Fir	6	44
Sitka spruce	3	10+
Balsam fir	2	13
Mountain hemlock	1	3
Alder	2	23
Willow	2	68+
	55	599+

Variations from the usual beating method of collection occured in obtaining Ambrosia beetle specimens from hemlock logs at Coquitlam River, gall forming Aphididae on the Sitka spruce at Pitt River and Cryptochynchus lapathi larvae from willow at Coquitlam River.

The date, location, timber type and host trees of permanent sample points are as follows:

Coquitlam River June 19th

PR- 1. Location:- End of Oxford Road, Jacob's Auto Camp, east bank of Coquitlam River.

Type:- Second growth, maturing stand of Douglas fir, hemlock and cedar overstory and hemlock, cedar, Douglas fir, cottonwood, alder and scrub willow understory with open area ground cover of sword fern, salmonberry and salal.

Aspect and Slope - neutral. Elevation - 100'.

Host:- 4 collections; hemlock Douglas fir, cedar and willow hosts.

July 22nd

PR- 2. Location:- 5 miles up pipeline road on west bank of Coquitlam River.

Type:- Vigorous regeneration of almost pure alder.

Aspect and Slope - neutral. Elevation - 100'.

Host:- 1 collection; alder host.

PR- 3. Location:- 2.5 miles up Pipeline Road on west bank of Coquitlam River.

Type:- Sturdy regeneration of Douglas fir, hemlock and cedar with ground cover of blackberry, salmonberry and salal.

Aspect & Slope - neutral. Elevation - 100'.

Host:- 2 collections; Douglas fir and hemlock hosts.

Coquitlam Mountain June 19th

PR- 4. Location:- Southwest corner Block 'B' T.B. 32.

Type:- Virgin stand of balsam, hemlock and cedar overstory with balsam and hemlock understory and ground cover of salmonberry, brachen and thimbleberry in the open.

Aspect - southwest. Slope - 10 deg. Elevation - 2500'.

Host:- 2 collections; balsam and hemlock hosts.

PR- 5. Location:- 4 miles up Coast Meridian Road and old logging road.

Type:- Regeneration growth of hemlock, Douglas fir, cedar and alder with open area ground cover of salmonberry, thimbleberry, brachen, blackberry and salal.

Aspect - west. Slope - 10 deg. Elevation - 1200'.

Host:- 2 collections; hemlock and Douglas fir hosts.

PR- 6. Location:- End of Quarry Road, south west corner of T.S. No. ?

Type:- Second growth, maturing Douglas fir, hemlock and cedar with understory of hemlock, cedar Douglas fir, maple and alder. Ground cover, in open, of salmonberry, blackberry, brachen and salal.

Aspect - east. Slope - 5deg. Elevation - 500'.

Host:- 3 collections; hemlock, Douglas fir and cedar hosts.

Loon Lake June 21st

PR- 7. Location:- End of Loon Lake Road at Loon Lake.

Type:- Second growth stand of hemlock, cedar, Douglas fir and balsam with hemlock and cedar understory and sparse ground cover of salal, huckleberry, sword fern and regeneration.

Aspect and Slope - neutral. Elevation - 1100'.

Host:- 2 collections; hemlock and cedar hosts.

PR- 8. Location:- Loon Lake Road at U.B.C. Forest Reserve sign.

Type:- Second growth Douglas fir, hemlock and cedar with hemlock, cedar, Douglas fir, maple and alder understory and ground cover of salmonberry, salal, brachen and blackberry.

Aspect and Slope - neutral. Elevation - 500'.

Host:- 1 collection; hemlock host.

Alouette Lake June 23rd

PR- 9. Location:- Maple Ridge Logging Co. Camp north east end of Alouette Lake.

Type:- Vigorous close growing Douglas fir, hemlock and cedar regeneration with blueberry, salmonberry, salal, thimbleberry, vinemaple, sword fern and hemlock regeneration.

Aspect - southwest. Slope - 20%. Elevation - 700'.

Host:- 3 collections; hemlock, cedar and Douglas fir hosts.

June 24th

PR- 10. Location:- End of Maple Ridge Logging Co. Road approximately 2 miles north east of Campsite.

Type:- Virgin stand of hemlock, cedar, Douglas fir and balsam with an understory of hemlock, and cedar and sparse ground cover of sword fern, bunchberry and salal.

Aspect - northwest. Slope - 20 deg. Elevation - 1700', to 2000'.

Host:- 5 collections; hemlock, cedar, balsam, and Douglas fir hosts.

PR- 11. Location:- Southeast end of Alouette Lake.

Type:- Regeneration growth of cedar, hemlock, Douglas fir, maple and alder with salmonberry, salal, sword fern, blueberry, thimbleberry, bunchberry and regeneration.

Aspect - south. Slope - 10 deg. Elevation - 700'.

Host:- 2 collections; cedar and hemlock hosts.

Maple Ridge Park July 22nd

PR- 12. Location:- Maple Ridge Park.

Type:- Virgin growth of cedar, Sitka spruce, hemlock and Douglas fir with sparse ground cover of huckleberry, sword fern, and salal and scrub willow growth along river bank.

Aspect and Slope, neutral. Elevation - 300'.

Host:- 1 collection; willow host.

Pitt Lake July 23rd

PR- 13. Location:- Bridalfalls, west side of Pitt Lake. Old campsite.

Type:- Sturdy regeneration hemlock and cedar with some alder and willow and a ground cover of salmonberry, sword fern, blackberry and hemlock regeneration.

Aspect - east. Slope - 10 deg. Elevation- 500'.

Host:- 1 collection; 3 hemlock hosts.

Upper Pitt River July 23rd

PR- 14. Location:- Campsite, B.C. Forest Products Ltd.

Type:- Alder, cottonwood, Sitka spruce and hemlock with ground cover of salmonberry, thimbleberry, brachen, huckleberry and sword fern. Mixed stand of wolf, second growth and regeneration.

Aspect and Slope - neutral. Elevation - 500'.

Host:- 3 collections; Sitka spruce, alder and hemlock hosts.

PR- 15. Location:- Trail up Pitt River from end of logging road, traverse station 'T 36-70'. Blazed Sitka spruce "F.I.I. Perm. Sample Point, 24-VII-47"

Type:- Virgin stand of Douglas fir, cedar, hemlock, balsam, Sitka spruce with understory of hemlock, cedar and spruce and sparse ground cover of moss, vinemaple, huckleberry and blueberry.

Aspect - west. Slope - 20%. Elevation - 500'.

Host:- 1 collection; 3 hemlock hosts.

PR- 16. Location:- 12 miles north of Pitt Lake on Upper Pitt River trail. Blazed hemlock "F.I.I. Perm. Sample Point, 24-VII-47".

Type:- Cedar, hemlock, balsam and Douglas fir stand of virgin timber with an understory of cedar and hemlock and sparse ground cover of moss, huckleberry, sword fern, bunchberry and devil's club. Aspect - west. Slope - 10%. Elevation - 700'.

Host:- 1 collection; 3 hemlock hosts.

PR- 17. Location:- Upper Pitt River trail, 14 miles above lake. Blazed hemlock "F.I.I. Perm. Sample Point, 24-VII-47".

Type:- Hemlock, cedar, Douglas fir overstory with hemlock, Sitka spruce and cedar understory stand of virgin growth with sparse ground cover bunchberry, blackberry, sword fern and moss. Aspect - northwest. Slope - 10%. Elevation - 800'.

Host:- 1 collection; 3 hemlock hosts.

Corbold Creek July 25th

PR- 18. Location:- Northeast margin of L.995, Corbold Creek Valley.

Type:- Mature virgin stand of cedar, hemlock, Douglas fir and balsam with an understory of hemlock and balsam and a moderately sparse ground cover of bunchberry, sword fern, blueberry and moss. Aspect - southwest. Slope - 30%. Elevation - 1200'.

Host:- 1 collection; 3 hemlock hosts.

PR- 19. Location:- North side of bridge crossing Corbold Creek 4 miles up logging road.

Type:- Second growth hemlock and balsam at creek margin with devil's club, huckleberry, salmonberry, thimbleberry, bunchberry and moss ground cover. Aspect and Slope - neutral. Elevation - 1000'.

Host:- 1 collection; 3 hemlock hosts.

PR- 20. Location:- 1 mile up Corbold Creek valley above junction with Pitt River. Old homestead site.

Type:- Virgin stand of cedar, hemlock and Douglas fir with hemlock, balsam and yew understory and ground cover of salal, blueberry, huckleberry, bunchberry and moss. Aspect - southwest. Slope - 30%. Elevation - 900'.

Host:- 1 collection; 3 hemlock hosts.

PR- 21. Location:- Firebreak, STL 10986 P.

Type:- Mature open growth of cedar, hemlock with hemlock understory and devil's club, deer fern, sword fern and brachen ground cover. Aspect - north. Slope - 30%. Elevation - 1000'.

Host:- 1 collection; 3 hemlock hosts.

PR- 22. Location:- Northeast corner of STL 10986 P, Corbold Creek Valley.

Type:- Balsam understory with sparse fern and devil's club ground cover. Aspect - west. Slope - 20%. Elevation - 2500'.

Host:- 1 collection; 3 hemlock hosts.

PR- 23. Location:- North east corner of L. 2573, Corbold Creek Valley.

Type:- Virgin growth of cedar, Douglas fir and hemlock with deer fern, devil's club, salmonberry and bunchberry.

Aspect - north. Slope - 28%. Elevation - 1000'.

Host:- 1 collection; 3 hemlock hosts.

Widgeon Creek July 30th and August 1st

PR- 24. Location:- 4 miles upstream at the edge of uncut timber.

Type:- Virgin growth of cedar and hemlock with hemlock and alder understory and salmonberry, huckleberry, blueberry, devil's club and moss.

Aspect and Slope - neutral. Elevation - 500'.

Host:- 1 collection; 3 hemlock hosts.

PR- 25. Location:- Junction of Silver Creek and Widgeon Creek.

Type:- Virgin hemlock and balsam stand with an understory of balsam, hemlock and cedar, with a ground cover of blueberry, salal, sword fern, bunchberry and moss.

Aspect and Slope - neutral. Elevation - 700'.

Host:- 1 collection; 3 hemlock hosts.

PR- 26. Location:- T.B. 99 Widgeon Creek Valley.

Type:- Dense regeneration growth of hemlock, spruce and alder with sparse salmonberry, brachen and blueberry ground cover.

Aspect & Slope - neutral. Elevation - 250'.

Host:- 1 collection; 3 hemlock hosts.

(E) Insect Conditions

Apart from heavy localized attack by Galerucella carbo Lec. on scrub willow growth in the vicinity of the Maple Ridge park at the Alouette River, Forest Insect conditions appeared normal throughout the area.

However, an estimated 1500 acres, in the upper Widgeon Creek Valley, was found to be heavily defoliated and much of the timber in a dead or dying condition. While no insect outbreak was recorded this year, a residual population of Lambdina fiscellaria lugubrosa Hlst. averaging 13 larvae to a beating, seems to indicate the damage was caused by previous attacks of this insect and that natural controls have overcome the outbreak and brought the larval population to its present endemic level.

Defoliation is almost entirely confined to the hemlock growth which forms the predominate species on the eastern slope but gives way to cedar and balsam fir along the western valley slope. Heavy defoliation extended north along the valley from the north margin of T.B. 425 for a distance of four miles and up the valley slopes for 20 chains reaching an elevation from 1400' to 1500'.

Very few hemlock showing 75% or higher defoliation had put forth '47 foliage and while the cambium generally showed no marked discoloration it was noticeably drier than that found on healthy growth.

Balsam fir showed defoliation up to 25% in some localities but appeared healthy and vigorous at the time of examination. Cedar showed little or no evidence of attack.

(i) Insects of Major Economic Importance:

Lambdina fiscellaria lugubrosa Hlst.

The presence of an endemic population throughout the area is indicated by the total to 174 larvae collected from points listed below.

No. of Larvae	Place	Permanent Sample Point	Host
5	Coquitlam River	PR-1	Hemlock
1	Coquitlam River	PR-1	Douglas fir
1	Coquitlam River	PR-1	Cedar
5	Coquitlam River	PR-2	Hemlock
1	Coquitlam River	PR-2	Douglas fir
2	Coquitlam Mountain	PR-5	Hemlock
3	Coquitlam Mountain	PR-6	Hemlock
2	Loon Lake	PR-7	Cedar
4	Loon Lake	PR-7	Hemlock
6	U.B.C. Forest Reserve	PR-8	Hemlock
8	Alouette River	----	Hemlock
6	Alouette River	----	Hemlock
2	Alouette Lake	PR-10	Douglas fir
12	Alouette Lake	PR-10	Hemlock
5	Alouette Lake	PR-10	Cedar
1	Alouette Lake	PR-10	Balsam fir

Lambdina fiscellaria lugubrosa Hlst. (continued)

No. of Larvae	Place	Permanent Sample Point	Host
2	Alouette Lake	PR-11	Hemlock
2	Upper Pitt River	PR-16	Hemlock
2	Corbold Creek	PR-18	Hemlock
1	Corbold Creek	PR-21	Hemlock
75	Widgeon Creek	PR-24	Hemlock
10	Widgeon Creek	PR-25	Hemlock
16	Widgeon Creek	PR-26	Hemlock

Nepytia canosaria Wlk.

A total of 29 larvae were collected at the following sample points:

No. of Larvae	Place	Permanent Sample Point	Host
2	Coquitlam River	PR-1	Hemlock
1	Coquitlam River	PR-1	Douglas fir
2	Coquitlam River	PR-2	Douglas fir
6	Coquitlam River	PR-2	Hemlock
1	Coquitlam Mountain	PR-6	Hemlock
1	Coquitlam Mountain	PR-6	Douglas fir
2	Alouette Lake	PR-9	Hemlock
5	Alouette Lake	PR-11	Hemlock
2	Pitt Lake	PR-13	Hemlock
1	Upper Pitt River	PR-14	Sitka spruce

Nepytia canosaria Wlk. (continued)

No. of Larvae	Place	Permanent Sample Point	Host
2	Upper Pitt River	PR-17	Hemlock
4	Corbold Creek	PR-18	Hemlock

Neodiprion tsugae Midd.

Small numbers of larvae were collected throughout the area with only one point showing a relatively high population.

No. of Larvae	Place	Permanent Sample Point	Host
1	Coquitlam Mountain	PR-4	Mountain hemlock
2	Coquitlam Mountain	PR-6	Hemlock
3	Alouette Lake	PR-10	Hemlock
4	Alouette Lake	PR-10	Balsam
1	Alouette Lake	PR-10	Douglas fir
1	Alouette Lake	PR-11	Hemlock
1	Upper Pitt River	PR-14	Sitka spruce
1	Corbold Creek	PR-18	Hemlock
42	Corbold Creek	PR-19	Hemlock
6	Widgeon Creek	PR-24	Hemlock

Notolophus antiqua badia.

One larvae of this insect was collected at Corbold Creek from a hemlock host at permanent sample point number PR-21.

Ambrosia beetles.

Heavy attack on felled and bucked hemlock logs by Trypodendron conifrons and Gnathotrichus retusus species was recorded on the east bank of the Coquitlam River at permanent sample point PR-1.

(ii) Insects of Minor Economic Importance

Cryptorhynchus lapathi.

Scrub willow at permanent sample point PR-1 on the east bank of the Coquitlam River was suffering from a heavy attack by this insect.

Galerucella carbo.

68 larvae were collected from foliage of scrub willow showing 50% to 100% defoliation at permanent sample point PR-12 at Maple Ridge Park on the Alouette River.

Eupithecia gibsonata.

2 larvae of this geometridae were collected at the points show below.

No. of larvae	Place	Permanent Sample Point	Host
1	Loon Lake	PR-7	Cedar
1	Alouette Lake	PR-10	Cedar

Pineus pinifoliae.

Numerous large galls caused by this Aphididae were found on the Sitka spruce in the Upper Pitt River Valley.

Adelges cooleyii Gill.

Attack by this aphididae was apparent on the Sitka spruce in the Upper Pitt River Valley.

(F) Personnel Contacted

Bud Wagner, Assistant Ranger, B.C. Forest Service, Haney, B.C.

Berry Taylor, Patrolman, B.C. Forest Service, Pitt River Bridge.

Andrew Mark, Caretaker, U.B.C. Forest Reserve, Loon Lake Road.

J. Edwards, Manager, Maple Ridge Logging Co., Haney, B.C.

C. Jacobs, Owner, Jacobs' Auto Camp, End of Oxford Road, Port Coquitlam.

H. Blackstock, Supt. B.C. Forest Products Camp, Upper Pitt River.

J. Crickmay, Chief Engineer, B.C. Forest Products Ltd., Vancouver, B.C.

Assistant Ranger Wagner, is very co-operative and hopitable with a keen personal interest in forest insect conditions and the collection of specimens.

Patrolman Taylor, obligingly supplied transportation to and from Widgeon Creek.

Andrew Mark, while fussy is co-operative and his permission is necessary before going up U.B.C. Forest Reserve road to Loon Lake. A keen forest protectionist.

J. Edwards, greatly interested in the work of the survey and willingly assists with transportation along the Alco Road and to the head of Alouette Lake.

C. Jacobs. The seventy five acres of his Auto Camp furnish a suitable site for permanent sampling.

Supt. Blackstock is a progressive woods boss and interested and co-operative in the work of the survey.

(G) Summary Comparison of '46 and '47 Survey

The Upper Pitt River, including Corbold Creek, the south end of Alouette Lake and the Loon Lake U.B.C. Forest Reserve were the only section surveyed in 1946. The table below gives the number of larvae of the more important insect species per average beating for these sections in '46 and '47.

(i) Upper Pitt River & Corbold Creek

Name	1946	1947
Number of beatings	17	30
Lambdina fiscellaria lugubrosa Hlst.	1.4	.1
Nepytia canosaria Wlk.	.3	.2
Neodiprion tsugae Midd.	.2	1.4
Notolophus antiqua badia	.1	.03

(ii) Alouette Lake (south end)

Name	1946	1947
Number of beatings	4	4
Lambdina fiscellaria lugubrosa Hlst.	.2	.5
Nepytia canosaria Wlk.	Nil	1.25
Neodiprion tsugae	Nil	.25

(iii) Loon Lake, U.B.C. Forest Reserve

Name	1946	1947
Number of Beatings	4	7
Lambdina fiscellaria lugubrosa Hlst.	Nil	1.6

6. STAVE LAKE AREA

(A) Description of Area:

Included in the area, extending from Ruskin east along the north Fraser Valley to Deroche, are Stave Lake and River, McConnell Creek, Davis Lake and Steelhead. The southern section of this area, immediately adjoining the Fraser River is rolling alluvial land with occasional rock outcrops and is extensively cultivated. Northward the topography becomes mountainous, rising sharply along the shores of Stave Lake and the McConnell Creek Valley.

(B) Timber Types and Economic Importance:

Much of the rolling bench land of the southern section of this area, where cultivation is not carried on, supports sturdy, vigorous growing second growth and regeneration of hemlock, Douglas fir, cedar, maple, alder and scrub willow. To the north along the margins of Stave Lake, particularly, at the upper end, good growths of virgin hemlock, cedar and Douglas fir are found, as well as virgin growths of cedar, hemlock and balsam fir in the McConnell Creek Valley.

The second growth supports numerous small logging and portable sawmills as does the virgin timber at Stave Lake. The Cameron Logging Company is at present cutting and milling the accessible virgin growths of the McConnell Creek Valley.

An extensive salvage operation is being carried out in the water killed cedar of the lower Stave Lake area which is marketed chiefly as shingles.

The value of the timber growth of the Stave Lake and River Valley is increased because of the two large Hydro-electric power generating plants situated in and using the water of this drainage system.

(C) Route Travelled:

All sections sampled in this area were accessible by car with the exception of the shores of Stave Lake, which necessitates water transportation. The following outlined routes are to specific sample points.

(a) Stave Lake: Dewdney Trunk Road to Stave Falls, B.C. Electric dam site. Thence by boat to Stave Lake and Upper River.

Note:- This is a treacherous, squally lake and care should be taken when using a small boat.

(b) Ruskin Damsite: Lougheed Highway to Ruskin, thence north on Ruskin Road to the B.C. Electric Dam.

(c) Steelhead: East from Stave Falls on the Dewney Trunk Road.

(d) McConnell Creek: East on the Lougheed Highway to Deroche, thence north on the McConnell Road from Deroche, thence up Cameron Logging Co. Road.

(e) Davis Lake: Continue north on McConnell Creek Road from Cameron Logging Co. Road to private road of Mr. Smith, continuing with permission to Davis Lake.

(D) Sample Points:

8 permanent sample points were established in this area and 12 collections forwarded to the Vernon laboratory for identification from the following host trees.

Host	Number of Collections	Number of Insects
Hemlock	12	167
Douglas Fir	1	11
Cedar	1	5
Total	12	183

The date, location, timber, type and host trees of permanent sample points are as follows:

Stave Lake — June 27th

SL-1. Location:- Alligator Point, ½ way up east shore of Stave Lake.

Type:- Virgin growth of Douglas fir, hemlock and cedar with understory of hemlock, cedar and Douglas fir and salmonberry, thimbleberry, blackberry, bracken and swordfern ground cover.

Aspect:- West. Slope - 15%. Elevation - 5000'.

Host:- 3 collections; Douglas fir, hemlock and cedar hosts.

July 18th

SL- 2. Location: Junction of Foam Creek and Stave Lake, west shore ex-T.L. 150.

Type:- Second growth hemlock, cedar, maple and alder with thick brachen, blackberry and blueberry ground cover.

Aspect - east. Slope - 5%. Elevation - 660'.

Host: 1 collection; 3 hemlock hosts.

SL-4. Location:- North east end of Stave Lake.

Type: Second growth hemlock, cedar and Douglas fir with

dense hemlock understory.

Aspect - west. Slope - 10%. Elevation - 600'.

Host:- 1 collection, 3 hemlock hosts.

SL-5. Location:- Stave Falls, south east end of Stave Lake.

Type:- Second growth hemlock with hemlock, willow, maple and alder understory and sparse ground cover.

Aspect - south east. Slope - 10%. Elevation - 600'.

Host:- 1 collection; 3 hemlock hosts.

Stave River July 18th

SL-6. Location:- B.C. Electric dam site at Ruskin falls.

Type:- Vigorous close second growth hemlock, maple, alder and cedar with sparse blackberry, salmonberry and brachen ground cover.

Aspect - South east. Slope - 10%. Elevation - 600'.

Host:- 1 collection; 3 hemlock hosts.

Steelhead July 18th

SL-7. Location:- 1½ miles north on road from General Store.

Type:- Vigorous, close growing regeneration hemlock, Douglas fir, cedar, alder, maple and willow, conifers overcoming the deciduous growth, with blackberry, and brachen ground cover in the open.

Aspect & Slope - neutral. Elevation - 900'.

Host:- 1 collection; 3 hemlock hosts.

Davis Lake July 19th

SL-8. Location:- B.C. Forest Service experimental plots No.'s 213 and 214.

Type:- Second growth hemlock and Douglas fir with hemlock understory and ground cover of sparse blueberry, brachen, deerfern, swordfern, regeneration and moss. Aspect & Slope - neutral. Elevation - 800'.

Host:- 1 collection; 3 hemlock hosts.

One collection was made in the McConnell Creek Valley in T.S. X19051 from 5 hemlock hosts. Due to the fact that the Cameron Logging Co., is logging this section no permanent sample point was established.

(E) Insect Conditions

Insect conditions appear normal throughout the area with no dangerously large populations being recorded. It was noted, however, that ornamental willows in the residential sections of Mission municipality showed defoliation by chrysomellidae attack.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. 50 larvae were collected throughout the area from 23 beatings on hemlock, Douglas fir and cedar hosts at the following sample points:

No. of Larvae	Place	Permanent Sample Point	Host
2	Stave Lake	SL-1	Douglas fir
1	Stave Lake	SL-1	Hemlock
2	Stave Lake	SL-1	Cedar

Lambdina fiscellaria lugubrosa (continued)

No. of Larvae	Place	Permanent Sample Point	Host
1	Stave Lake	SL-2	Hemlock
9	Stave Lake	SL-3	Hemlock
23	Stave Lake	SL-4	Hemlock
4	Stave Lake	SL-5	Hemlock
2	Steelhead	SL-7	Hemlock
6	Davis Lake	SL-8	Hemlock

Nepytia canosaria Wlk. 32 larvae were collected from Douglas fir and hemlock hosts as follows:

Number of Larvae	Place	Permanent Sample Point	Host
1	Stave Lake	SL-1	Douglas fir
4	Stave Lake	SL-4	Hemlock
3	Stave Lake	SL-5	Hemlock
14	Stave River	SL-6	Hemlock
4	Steelhead	SL-7	Hemlock
3	McConnell Creek	---	Hemlock
3	Davis Lake	SL-8	Hemlock

Neodiprion tsugae Midd. Larvae of this sawfly were obtained at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
1	Stave Lake	SL-1	Douglas fir
3	Stave River	SL-6	Hemlock

Notolophus antiqua badia. 2 specimens of this pest were obtained at the sample points shown below.

Number of Larvae	Place	Permanent Sample Point	Host
1	Stave Lake	SL-5	Hemlock
1	McConnell Creek		Hemlock

Hemerocampa pseudotsugata McD. One specimen was obtained at permanent sample point SL-4 at Stave Lake from a hemlock host.

(ii) Insects of Minor Economic Importance

Eupithecia gibsonata. 3 larvae were obtained from a cedar host at permanent sample point SL-1 at Stave Lake.

Neodiprion sp. 1 larvae of this sawfly was obtained at Glacier Creek, Stave Lake, permanent sample point SL-3 from a hemlock host.

(F) Personnel Contacted

E.J. Calvert, Ranger, B.C. Forest Service, Mission, B.C.

N.B. Scott, Asst' Ranger, B.C. Forest Service, Mission, B.C.

H.E. Jackman, Patrolman, B.C. Forest Service, Mission, B.C.

Mr. Henshaw, Supt. B.C. Electric Power House, Stave Falls, B.C.

Capt. Kilso, Capt. B.C. Electric M/V. "Ruskin" Stave Falls, B.C.

Ranger Calvert and his staff are both co-operative and helpful. Their interest in insect conditions is demonstrated by the total of 27 collections forwarded to the Vernon laboratory. Supt. Henshaw placed the M/V "Ruskin" at the disposal of the Department in 1946, but pressure of work this season made this courtesy impossible. Both he and Capt. Kilso are willingly helpful.

(G) Summary Comparison of '46 and '47 Survey

Accurate comparison is difficult because of the wide variation between the time of the surveys, that of 1946 was made on Sept. 9th, while the 1947 survey was conducted on June 27th and July 18th.

Stave Lake and McConnell Creek were the only sections sampled during 1946 with 12 beatings being made along the margin of the east shore of Stave Lake. These beatings showed the presence of an endemic population of Nepytia canosaria Wlk. and observed Lambdina fiscellaria lugubrosa Hlst. adults on the wing, also indicated the presence of this insect in the area.

The 12 beatings made along the lake shore in 1947 again showed the presence of these geometridae as well as Neodiprion tsugae Midd. Notolophus antiqua badia and Hemerocampa pseudotsugata McD. larvae in small numbers, which were not recorded in 1946.

McConnell Creek, site of Acleris variana Fern. outbreak in 1940 showed little evidence of the attack other than the occasional top-killed tree in 1946 with no insects of major importance being obtained in 5 beatings made in the valley. The absence of Acleris variana Fern. larvae was again noted in 1947. A few larvae of

Nepytia canosaria Wlk. were obtained in 5 beatings. This was the only insect recorded of major importance.

(7) CHEHALIS RIVER AREA

(A) Description of Area

This area includes all the terrain drained by the Chehalis River and its tributaries. The Chehalis River enters the Harrison River about mid-way between Harrison Lake and Harrison Bay on the Fraser River. Rising in the rugged mountainous country to the north, it flows from statlu Lake through a fairly wide timbered valley to Chehalis Lake. This rocky steep-sided lake, which is seven miles long, drains into the main Chehalis River flowing through a nine mile canyon to the Harrison River. The country adjoining the canyon edge is rolling, mountainous, timber covered slopes with Statlu Creek Valley running to the north west five miles below the lake and Maisal Creek extending to the north east. Apart from the alluvial flat at the mouth of the valley, mountainous topography dominates the area.

(B) Timber Types and Economic Importance

Extensive logging has been carried on in this area for a number of years and at the present time Canadian Forest Products Ltd., operate two camps in the valley and control the timber licenses of the remaining marketable virgin growths.

The remaining virgin stands extend up the valley north from Chehalis Lake and south along the east slope of Maisal Creek. The upper Statlu Valley contains a large stand of high grade virgin growths, which at the present time are being logged. These growths are chiefly cedar, Douglas, hemlock and balsam with patchy growths

of white pine. Much of the white pine shows blister rust attack but its scrubby nature makes it of little commercial importance.

Close, vigorous regeneration from natural seeding covers the southern valley on old logging sites and extends northward to the more recently cut areas. Hemlock predominates this growth with cedar, Douglas fir, maple, alder, willow and birch forming the remaining stand composition.

The milling of loggers-tops, short and broken logs in the slash of recently cut areas is being carried on by two small portable mills as a salvage operation and supply lumber for local markets of nearby communities.

(C) Route Travelled

The logging road running north from the booming grounds at Harrison Bay makes coverage by car possible up the main Chehalis Valley as far as Chehalis Lake and up the Statlu Creek Valley.

Poor game trails extend into the Maisal creek section and northward along the lake shore. The use of a boat offers the best means of coverage for the lake area. With 12 logging trucks operating on the single track canyon road caution should be used in proceeding against loaded traffic. Contact with the dispatcher at the upper valley camp can be made from the camp site at Harrison Bay before proceeding on the company road.

(D) Sample Points

5 permanent sample points were established in this area and 8 collections forwarded to Vernon from the following host trees.

Host	Number of Collections	Number of Insects
Hemlock	7	118
Cedar	1	4
	8	122

Variation from the usual beating method of collection occured when making ambrosia beetle collections from cedar logs in the Chehalis Valley.

The date, location, timber type and host trees of permanent sample points are as follows.

Chehalis River Valley July 16th & 17th

CR-1 Location:- 7 miles up logging road at Canadian Forest Products Camp.

Type:- Hemlock regeneration with maple, alder, willow, birch and wolf Douglas fir in a patchy stand with fireweed, thimbleberry, brachen and huckleberry in the open.

Aspect - east. Slope - 10%. Elevation - 700'.

Host:- 1 collection; 3 hemlock hosts.

CR-2 Location:- Chehalis River Valley, end of "Switchback" logging road, T.B. 302.

Type:- Virgin growth of cedar, hemlock and Douglas fir with an understory of hemlock, balsam and cedar and sparse ground cover of huckleberry, salal, bunchberry and moss. Aspect - south. Slope - 20%. Elevation - 2200'.

Host:- 2 collections; 3 hemlock and cedar hosts.

CR-3 Location:- West slope of Chehalis Lake, 1 mile north of T.B.521.

Type:- Mature stand of hemlock, cedar, and Douglas fir with hemlock understory and sparse huckleberry and moss ground cover.

Aspect - east. Slope - 28%. Elevation - 1060'.

Host:- 1 collection; 3 hemlock hosts.

CR-4 Location:- East Chehalis River Valley between lake and Maisal Creek T.B. 302.

Type:- Mature cedar, hemlock and Douglas fir with hemlock and cedar understory and ground cover of salal, blueberry, salmonberry, hemlock regeneration and devil's club.

Aspect - west. Slope - 10%. Elevation - 1080'.

Host:- 1 collection; 3 hemlock hosts.

CR-5 Location:- 3 miles up logging road from booming grounds camp.

Type:- Well developed regeneration growth of hemlock, cedar, and balsam with wolf Douglas fir. Close growing and sparse ground cover.

Aspect and Slope - neutral. Elevation - 500'.

Host:- 1 collection; 3 hemlock hosts.

Statlu Creek July 16th

2 collections were made in the Statlu Creek Valley from hemlock hosts in the virgin stands of Douglas fir, cedar, hemlock and balsam four miles up the south fork and at the junction of the north and south forks. Due to present logging operations in this section no permanent sample points were established.

(E) Insect Conditions

No evidence of outbreak or abnormally large insect populations were found in this area.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. 13 larvae were collected in this area at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
12	Chehalis Lake	CR-3	Hemlock
1	Chehalis River	CR-5	Hemlock

Nepytia canosaria Wlk. 27 larvae were collected from hemlock hosts at the points shown below:

Number of Larvae	Place	Permanent Sample Point	Host
8	Chehalis River	CR-1	Hemlock
6	Chehalis Lake	CR-3	Hemlock
7	Chehalis River	CR-4	Hemlock
6	Chehalis River	CR-5	Hemlock

Neodiprion tsugae Midd. 21 larvae of this sawfly were collected in varying numbers at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
1	Chehalis River	CR-1	Hemlock
11	South Statlu Creek	----	Hemlock
8	Junction of North & South Statlu Creek	----	Hemlock
1	Chehalis Lake	CR-3	Hemlock

Acleris variana Fern. 1 larvae of this budworm was found on a hemlock host 4 miles upstream in the south Statlu Creek Valley.

Ambrosia beetles. Adults and larvae were found in freshly cut cedar logs at the end of the "Switchback logging road, T.B. 302, permanent sample point number CR-2.

(ii) Insects of Minor Economic Importance

Neodiprion sp. Larvae of this sawfly were distributed as follows.

Number of Larvae	Place	Permanent Sample Point	Host
1	Chehalis River	CR-1	Hemlock
5	Chehalis Lake	CR-3	Hemlock
10	Junction of North & South Statlu Creeks	----	Hemlock

Altica bimarginata Say. Larvae of this chrysomellidae were collected at permanent sample point CR-1 in the Chehalis River Valley. The collection was made from hemlock growing in mixed stand of hemlock, willow, maple and alder.

(F) Persons Contacted

R.L. Johnson, Supt., Canadian Forest Products Ltd., Chehalis River. Supt. Johnson is both interested and co-operative with the work of the survey.

(G) Comparison Summary of '46 and '47 Survey

Four beatings, made in the unburned slash of T.B. 302 in 1946, showed a relatively high endemic population of Lambdina fiscellaria lugubrosa Hlst. larvae to be present in the area. This population, however, was heavily parasitized; of the 53 larvae collected 44 showed evidence of parasite attack. A small number of Nepytia canosaria Wlk. larvae and pupae were also collected and male Lambdina fiscellaria lububrosa Hlst. adults were noted on the wing.

Larvae of these geometridae were again collected in smaller numbers during the 1947 survey but no parasitic attack was observed.

Neodiprion tsugae Midd. and Acleris variana Fern. larvae unrecorded in 1946 were obtained in small numbers in 1947.

(8) HARRISON LAKE

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(A) Description of Area

This area, surveyed on July 6th to 11th, includes the municipality of Agassiz, Harrison River and Harrison Lake, extending north from Harrison Bay on the Fraser River to the Lower Lillooet River and Fire Creek at the head of Harrison Lake.

With the exception of a small low lying area at the foot of Harrison Lake south to Harrison Bay the topography is mountainous with timbered slopes rising rapidly from the lake shore, particularly at the north end of the lake. Narrow steep-sided valleys traverse the marginal ridges along both the east and west shores of Harrison Lake. Bear, Cogburn, Silver and Stokke Creek Valleys along the east shore and Twenty Mile, Tretheway, and Tipella Creek along the west shore being the largest of these east-west tributaries.

(B) Timber Type and Economic Importance

The more accessible slopes of the lake margin have been logged with only light, predominantly deciduous, regeneration. There is, however, Douglas fir, hemlock, cedar and balsam stands of mature virgin growth of high commercial value, located, mainly, in the valleys extending to the east and west from the lake shore. These stands maintain the principal logging operations at the present time supplying saw logs to Harrison Mills at Harrison Bay or the large mills of the Lower Fraser Valley. The cutting of cedar for shingle-bolts is being carried on in the lower Silver Creek Valley.

Patchy growths of almost pure white pine are prevalent throughout the area developing to good commercial stands in the vicinity of Fire Creek and the Lower Lillooet River.

South of Harrison Lake in the vicinity of Agassiz and Harrison River where no land cultivation is being carried on, mixed growths maple, alder, birch, willow, lodgepole pine and Douglas fir regeneration and second growth support a few small logging operations, portable sawmills, and fuel cutting but principally forms sylvan landscaping for the various tourist resorts in and around Harrison Hot Springs.

(C) Route Travelled

The section of the area north east of Harrison Bay to Harrison Hot Springs including Agassiz is coverable by car but northward up the Harrison Lake valley water transportation is necessary.

(a) Agassiz Lougheed Highway

(b) Agassiz Mountain Lougheed Highway to Harrison Hot Springs road, along Harrison Hot Spring Road to Agassiz Mountain Road.

(c) Harrison Lake Shore: By hired power from Paul Raake's Boathouse at Harrison Hot Springs along the east shore of the lake, stopping at Echo Island, Bear Creek, Cogburn Creek and Silver Creek; thence to Tipella at the head and south along the west shore to Doctor's Point and Long Island.

(D) Sample Points

Only 3 permanent sample points were established in this area due to the fact that the majority of the 24 collections were made in sections where logging operations were being carried on. However, in view of the fact that most of the logging operations will spend

some 5 to 10 years at these sites, continued sampling in these sections will be possible with only the actual points of sampling being varied as cutting progresses up the valleys.

The following list shows the number of collections per host tree and the total number of insects obtained.

Host	Number of Collections	Number of Insects
Hemlock	9	100
Douglas fir	4	46
Balsam fir	1	3
Cedar	1	10
Lodgepole pine	1	7
White Pine	1	5
Alder	3	76
Willow	2	145
Birch	2	188
	24	580

The date, location, timber type and host trees of permanent sample points are as follows.

Agassiz Mountain July 6th

HL- 1. Location:- South east slope of Agassiz Mountain at the end of old logging road.

Type:- Mixed second growth, predominantly deciduous, of maple, alder, birch, willow, lodgepole pine, Douglas fir and wolf Douglas fir. Close growing with sparse ground cover.

Aspect - South west. Slope - 10%. Elevation - 500'.

Host:- 5 collections; Douglas fir, Lodgepole pine, willow and birch hosts.

Echo Island July 7th

HL- 2. Location:- ½ way up west side of Echo Island, Harrison Lake.

Type:- Second growth Douglas fir with Douglas fir, Lodgepole pine and hemlock regeneration understory with a ground cover of salal, brachen, blackberry and moss.

Aspect - west. Slope - 20%. Elevation - 300'.

Host:- 1 collection; 3 Douglas fir hosts.

Long Island July 11th

HL- 3. Location:- Small bay on the west shore at the south end of Long Island, Harrison Lake.

Type:- Second growth, hemlock, cedar, Douglas fir and alder with hemlock, cedar and alder understory and moderate ground cover of salal, elderberry, salmonberry, swordfern, blackberry and moss.

Aspect - North. Slope - 5%. Elevation - 500'.

Other sample points where collections were made are as follows.

Cogburn Creek July 8th

Six collections were made in the main Cogburn Creek Valley and in the east fork valley growths adjoining the Clarke Brothers Timber Company logging road at elevations of 450', 800', 1400', 2600' and 2900'.

Silver Creek July 9th

Five collections were made in the lower valley of Silver Creek at points 2½, and 3 miles up stream and at the junction of Hornet and Silver Creeks.

Tipella July 10th

Five collections were made at the north end of Harrison Lake in the Lower Lillooet River Valley, 2, 2½ and 3 miles up stream and at the junction of Fire Creek and the Lillooet River.

(D) Insect Conditions

Insect population, generally, appeared to be within normal limits throughout the area with only localized damage being recorded at one or two points.

Defoliation of willow and birch growths on the south east slope of Agassiz mountain was being caused by a local abundance of Hyphantria textor Harr. larvae.

Pitch masses were apparant on practically all the scrub lodgepole pine at Agassiz Mountain. Larvae causing these masses were identified by the Vernon Laboratory as those of Vespamium sequoia.

A light attack of Cryptorhynchus lapathi was also noted on the scrub willows at Agassiz Mountain.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. 16 larvae were collected from beatings made at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
12	Cogburn Creek	———	Hemlock & Cedar
1	Silver Creek	-----	Hemlock
1	Lillooet River	-----	Hemlock
2	Long Island	HL- 3	Hemlock

Nepytia canosaria Wlk. Larvae of this geometridae were collected at the following points.

Number of Larvae	Place	Permanent Sample Point	Host
3	Agassiz Mountain	HL-1	Douglas fir
1	Echo Island	HL-2	Douglas fir
3	Cogburn Creek	----	Hemlock
6	Silver Creek	----	Hemlock
3	Lillooet River	----	Hemlock and white pine.

Neodiprion tsugae Midd. Two larvae of this sawfly were collected from hemlock in the Cogburn Creek Valley and 2 from a hemlock host at the junction of Fire Creek and the Lower Lillooet River.

Aclaris variana Fern. The presence of this insect in the Cogburn creek valley was noted by the collection of 5 larvae from hemlock and balsam hosts at an elevation of 2900'.

(ii) Insects of Minor Economic Importance

Altica bimarginata Say. Numerous larvae, pupae and adults of this chrysomellidae were collected from alder beatings 3½ miles up the Lillooet River Valley.

(F) Persons Contacted

R. Little, Ranger, B.C. Forest Service, Agassiz, B.C.

M. Lonneburg, Asst. Ranger, B.C. Forest Service, Harrison Hot Springs, B.C.

H. Clarke, Supt. & Partner, Clarke Bros. Timber Co. Cogburn Creek.

R. Roberts, Supt. Harrison Mills Logging Camp, Silver Creek.

R. South, Supt. Canadian Forest Products Camp, Tipella, B.C.

Ranger Little and his staff are helpful and co-operative.

H. Clarke and R. Roberts were both accommodating and interested in the work of the survey.

R. South, while accommodating, showed little interest in the work of the survey.

(G) Summary Comparison of '46 and '47 Survey

The only section visited in 1946 was the Silver Creek Valley where dying timber of some three years standing was examined, revealing a combined attack of blister rust and Dendroctonus monticolae Hopk. on scrubby white pine, along the east side of valley north of Hornet Creek. This area was unchanged in 1947.

1 collection, made at the junction of Hornet and Silver Creeks in 1946, contained Nepytia canosaria Wlk. larvae. Larvae of this geometridae were again noted at this point, as well as Lambdina fiscellaria lugubrosa Hlst. larvae in 1947.

(9) GREATER VANCOUVER WATER BOARD

(A) Description of Area:

The Greater Vancouver Water Board occupy and control the drainage basins of Seymour Creek, Capilano Creek, and Coquitlam Lake and Upper River.

Both Seymour and Capilano Creeks valley extend northward from the north shore of Burrard Inlet and lay adjoining for the greater part of the valley course. Each valley terminates in a narrow rocky canyon as it enters the low slope of the north shore of Burrard Inlet. Above these canyons northward to creek sources from the Water Board catechisms.

Seymour Creek, with the exception of a narrow valley bottom flat extending from the canyon northward to the Balancing Reservoir, is a steep-sided narrow valley with the valley margin mountain slopes rising sharply from the creek bed. Another flat occurs some five miles north of the Balancing Basin. The principal tributaries of this creek are Lost Lake with it joining a creek 5 miles above the canyon to the east; Burwell Creek, with its source Burwell Lake and tributary Cathedral Creek, joining Seymour Creek just north of the Balancing Reservoir to at the west; and the source of Seymour Creek, Loch Lomond, at an elevation of 3600'.

The Capilano Valley is similar to that of Seymour Creek but relatively wider and less precipitous at the southern end. Its principal tributaries are Sisters Creek to northwest, one mile above the intake station and Palisade Creek with its source of Rodger's and Palisade lakes joining the east Capilano four miles above the junction of east and west Capilano Creeks.

Coquitlam lake and the Upper River catchment is situated north of Port Coquitlam in the west north shore drainage of the Fraser River. With the exception of these small flats the general terrain is mountainous rising rapidly from the lake shore and river valley. The flats occur at the north end of the lake extending a short distance up the river valley, at the south end of the lake extending westward and eastward.

(B) Timber Type and Economic Importance

The necessity of adequate and healthy vigorous timber growth within the confine of a watershed place a high value on both the second growth and virgin timber stands in this area.

In the Seymour Creek Valley naturally seeded mixed stand of second growth hemlock, balsam, cedar, Douglas fir, alder, maple and willow, with the coniferous species predominating, extends from the south boundary of the catchment along the west slope of the valley to the Balancing Reservoir. Above this point virgin growth of cedar, hemlock, balsam, Douglas fir and Sitka spruce with alder in the creek bottom extend up the valley to the creek source at Loch Lomond. Approximately 5 miles above balancing reservoir a large area of blow-down occurs over some few miles of valley bottom but naturally seeded regeneration is making good growth in the area. Along the west slope between this area of blow-down and Burwell Creek the stand is open growing and contains numerous broken snags. A plantation of Douglas fir has been set out in a more recently logged area on the south west slope of Dog Mountain.

Extensive logging operations have been carried out in the Capilano Valley with only patchy second growth or regeneration. Heavy deciduous growth, mainly alder, at present predominates this growth except in the south end of the valley where a good hemlock, Douglas fir and cedar pole stand exists. The logged area extends northward up the main creek for five miles and from this point up the west Capilano valley another three miles. Sisters Creek valley extending westward from the main valley, has also been cut over. The remaining virgin timber stands in the east valley, Palisade Creek, and the upper west valley are chiefly hemlock, cedar and balsam growth with individual species predominating in difficult localities. Red cedar gives way to yellow cedar at the higher elevation where mountain hemlock growth are also present.

In the Coquitlam lake and Upper River hemlock, cedar, balsam and Douglas fir stands with varying species dominating. Although no cutting has been done in this area other than that necessary for the dam and tunnel construction these growths appear relatively young in age.

(C) Route Travelled

The ready assistance of W. Angus, chief forest ranger and field sanitation superintendent of the Water Board, greatly facilitates travel in this area. The use of conveniently located ranger cabins makes the carrying of food the only essential when covering the trails in the area.

The following are outlined routes to the various sampled areas:

Seymour Catchment

Seymour Creek:- Pipeline road to the Balancing Reservoir, thence by G.V.W.B. back to cabin at the north end of Balancing Reservoir. From the cabin by poor, heavily over grown trail extending up the valley for five miles.

Burwell Creek and Lake and Cathedral Creek:- Trail from the balancing reservoir cabin.

Lost Lake:- Trail one mile south of Balancing Reservoir on the Pipeline Road.

Dog Mountain:- Seymour Mountain Park Road to car park; thence by trail extending from road ending.

Capilano Catchment

Capilano Creek:- Pipeline Road to intake station, thence by trail on old railway grade to creek forks five miles up stream.

West Capilano:- Old railway grade to northwest across tressel and extend trail from forks.

East Capilano and Palisade Cr. :- Old railway grade to north east and extend trail to Palisade Lake.

Sister Creek:- Old railway grade from intake for one mile thence up creek bottom. There is no trail in this valley, but creek bed offers fair travelling if water is low.

Loch Lomond:- Union Steamships to Britannia beach thence by skip to 2200 foot level of Britannia Mine. Through mine tunnel to the top of the Victoria shaft, thence by good mountain trail to Loch Lomond.

Note:- Permission for travel in mine and mill workings of the Britannia Beach Minning and Smelting Co., is necessary and easily obtained at the time keeper's office at the end of the pier.

Coquitlam Catchment

Coquitlam Lake and River:- Coquitlam River Road to pipeline road, thence to road end at Coquitlam Lake dam. From this point the use of a boat gives good coverage of the lake shore and access to the upper river valley. There is no trail in the river valley.

The following list give the location of cabins in the G.V.W.B. area:

Seymour Creek:-

2 room cabin, north end of Balancing Reservoir. No blankets or provisions.

Log Cabin, Burwell Lake. No blankets or provisions.

Log Cabin, 5 miles north from Balancing Reservoir on Seymour Creek trail difficult to locate as trail is over-grown. Cabin is in poor repair.

Capilano Creek

Log Cabin
(5 mile cabin):- 5 miles above intake at Creek forks. Poor, few supplies.

Shake Cabin
(7 mile cabin) :- 2 miles above 5 mile cabin on East Capilano trail. Comfortable. Few supplies.

Log Cabin:- Rodger's Lake, end of Palisade Creek trail. Comfortable, radio-telephone, supplies.

Loch Lomond

New Log Cabin:- 2 miles from Victoria mine shaft on trail to Loch Lomond. Just inside Water Board area. Comfortable, radio-telephone, supplies.

Log Cabin: End of Loch Lomond trail, at Loch Lomond. Comfortable, supplies.

(D) Sample Points:

38 permanent sample points were established throughout this area and 60 collections forwarded to the Vernon Laboratory from the following list of host trees.

Host	No. of Collections	No. of Insects
Hemlock	43	1903
Balsam fir	11	234
Mountain hemlock	2	56
Sitka spruce	2	143
Alder	1	18
Willow	1	9
	60	2393

In obtaining collections of bark beetles from a balsam host and ambrosia beetles from a hemlock a variation from the beating method of collection occurred.

The date, location, timber type and host trees of the permanent sample points are as follows:-

Seymour Creek Catchment August 8th

WB- 1. Location:- Creek bottom flat at Seymour Creek crossing the Lost Lake trail.

Type:- Virgin stand of balsam, hemlock, Douglas fir, with an understory of Sitka spruce and alder. Close growing with a ground cover of salmonberry, vinemaple, Devils Club and sword fern. Aspect and Slope - Neutral. Elevation 550'.

Host:- 2 collections: hemlock and Sitka spruce hosts.

(3 collections were also made at this point on May 23rd, 2 from hemlock and 1 from Sitka spruce hosts)

WB- 2. Location:- 1 mile on Lost Lake trail at crossing of creek draining Lost lake and trail. Blazed hemlock on south side of creek "FII Perm. Sample Point 8 - VIII - 47"

Type:- Close growing virgin stand of hemlock cedar and balsam with hemlock and balsam understory and a ground cover of Salmonberry, blueberry, huckleberry, brachen, swordfern, deer fern and moss. Aspect - West. Slope 5%. Elevation 450'.

Host:- 1 collection: 2 hemlock hosts.

(Beating on hemlock and balsam hosts were made on May 23rd those on the balsam were negative.)

August 9th

WB- 3. Location:- Burwell Lake at end of Burwell Creek Trail.

Type:- Virgin growth of Mountain hemlock, yellow cedar, and balsam open growing with moderate salmonberry and blueberry ground cover.

Aspect and slope - Neutral. Elevation 2900'.

Host:- 1 collection - 3 Mountain hemlock host.

WB- 4. Location:- 3 miles up Burwell Creek trail, flat below falls. Blazed hemlock "FII Perm. Sample Point' 9- VIII-47"

Type:- Virgin growth of Mountain hemlock, balsam and yellow cedar, close growing with salmonberry, swordfern, blueberry and bunchberry ground cover.

Aspect and slope - Neutral. Elevation 2500'.

Host:- 1 collection: 3 balsam fir hosts.

WB- 5. Location:- Burwell Creek trail at Cathedral Creek crossing west side of Cathedral Creek.

Type:- Virgin close ground stand of red cedar, hemlock, balsam overstory, with understory of hemlock, balsam and alder in creek bottom. Ground cover of blueberry, bunchberry, Devils Club, swordfern, deerfern and moss.

Aspect - south. Slope 10%. Elevation 1760'.

Host:- 1 collection; 3 hemlock hosts.

August 10th.

WB- 6. Location:- Sample strip due south running 8 chains from junction of Cathedral and Burwell Creeks on south side of Burwell Creek. Blazed hemlock "FII Sample Strip Due South".

Type:- Moderately close growing virgin stand of hemlock and balsam overstory and hemlock, balsam understory. Ground cover of blueberry, Divils Club, and swordfern. Aspect - North East. Slope 20%. Elevation 2000-2250'.

Host:- 1 collection: 2 hemlock hosts.

August 11th.

WB- 7. Location:- Seymour Creek trail, 1 mile above Balancing Basin Cabin. Blazed Balsam "FII Perm. Sample Point 11-VIII - 47".

Type:- Virgin growth of hemlock and balsam with balsam hemlock and alder understory and ground cover of Devils Club, brachen, salmonberry, blueberry, elderberry and hemlock-balsam regeneration. Aspect and Slope - Neutral. Elevation - 750'. Defoliation - hemlock 50% '46 foliage - Nil '47. balsam 25% '46 foliage - Nil '47.

Host:- 1 collection: 2 hemlock hosts.

WB- 8. Location:- Seymour Creek trail 2 miles above Balancing Basin Cabin. Blazed hemlock "FII Perm. Sample Point" II - VIII - 47"

Type:- Virgin growth of hemlock and balsam with balsam, hemlock and alder understory and ground cover of Devils Club, brachen, salmonberry, blueberry, elderberry and hemlock-balsam regeneration.

Aspect - East. Slope - 10%. Elevation 740'.

Defoliation:- Hemlock 25% '46 foliage 10% '47.

Balsam 25% '46 foliage 10% '47.

Host:- 1 collection: 2 hemlock hosts.

WB- 9. Location:- Seymour Creek trail 3 miles above Balancing Basin cabin. Blazed hemlock "FII Perm. Sample Point 11-VIII - 47".

Type:- Mature virgin growth of balsam fir, hemlock and Sitka spruce with ground cover of blueberry, devils club, and hemlock and balsam regeneration with understory of hemlock and balsam.

Aspect and slope - Neutral. Elevation 750'.

Defoliation:- Hemlock 50% '46 foliage Nil 1947.

Balsam 50% '46 foliage Nil 1947.

Sitka Spruce 50% '46 foliage Nil 1947.

Host:- 1 collection: 2 hemlock hosts.

WB- 10. Location:- Seymour Creek trail, 4 miles above Balancing Basin Cabin. Blazed hemlock "FII Perm. Sample Point 11 - VIII - 47".

Type:- Mature virgin growth hemlock and balsam with balsam hemlock understory and a ground cover of elderberry, blueberry, moss and balsam-hemlock regeneration.

Aspect and Slope - Neutral. Elevation 850'.

Defoliation:- Hemlock 35% '46 foliage 5% '47.

Balsam 35% '46 foliage 5% '47.

Host:- 1 collection: 2 hemlock hosts.

WB- 11. Location:- Seymour Creek trail, 5 miles above Balancing Basin cabin, at south margin of blow-down area.

Type:- Mature, virgin growth of Sitka spruce, hemlock and balsam with balsam-hemlock understory and ground cover of devils club, blueberry, brachen, and hemlock-balsam regeneration.

Aspect and slope - Neutral. Elevation - 825'.

Defoliation:- Hemlock 25% '46 foliage Nil '47.

Balsam 25% '46 foliage Nil '47.

Sitka spruce 25% '46 foliage Nil '47.

Host:- 1 collection: 2 balsam fir hosts.

August 12th

WB- 12. Location:- Trail to Loch Lomond at old Fairwest Mining Camp. North fork of Furry Creek

Type:- Virgin stand of hemlock, balsam with few yellow cedar close growing with ground cover of blueberry, salmonberry, thimbleberry, fireweed, swordfern and moss.

Aspect - east. Slope 10%. Elevation 2600'.

Host:- 2 collections: 3 hemlock and 2 balsam fir hosts.

August 3rd

WB- 13. Location:- Loch Lomond, Head of Seymour Creek Valley.

Type:- Virgin stand, patchy growth, of hemlock, balsam fir, Mountain hemlock and yellow cedar with blueberry and salmonberry ground cover.

Aspect - south east. Slope 30%. Elevation 3600'.

Host:- 3 collections:- 7 balsam fir and 4 Mountain hemlock hosts.

WB- 14. Location:- Loch Lomond trail 6½ miles east of Fairwest Camp. Blazed hemlock "FII Perm Sample Point 13-VIII-47"

Type:- Mature virgin stand of 80% hemlock with balsam and yellow cedar and an understory of hemlock and balsam with a ground cover of devils club, salmonberry, thimbleberry, wanberry, bunchberry, brachen and moss.

Aspect - South. Slope 20%. Elevation 2600'.

Host:- 1 collection; 2 hemlock hosts.

WB- 15. Location:- Loch Lomond trail, 3½ miles east of Fairwest Camp.Blazed hemlock "FII Perm Sample Point 13-VIII-47"

Type:- Mature virgin stand of hemlock, 80%, balsam and yellow cedar, close growing with sparse ground cover of blueberry, salmonberry, devils club and hemlock and balsam regeneration.

Aspect - south east. Slope 20%. Elevation 2500'.

Host:- 1 collection: 2 hemlock hosts.

WB- 16. Location:- Loch Lomond trail, northwest boundary of G.V.W.B. Corner Post No. 30, site of new Patrolman's cabin.

Type:- Mature virgin stand of hemlock and balsam fir with hemlock-balsam understory and ground cover of blueberry, salmonberry, moss and hemlock-balsam regeneration.

Host:- 1 collection; 2 hemlock hosts.

Capilano Catchment August 15th

WB- 17. Location:- Sisters Creek, ½ mile up stream from trail crossing.

Type:- Regeneration and second growth stand of alder, hemlock and cedar with a ground cover of salmonberry, huckleberry, elderberry and willow.

Aspect and Slope - Neutral. Elevation 600'.

Host:- 1 collection: 3 hemlock hosts.

WB- 18. Location:- Sisters Creek, 1½ miles up stream from trail crossing. Large tributary at this point.

Type:- as for W.B. - 17.

Host:- 1 collection: 3 alder hosts.

WB- 19. Location:- Sisters Creek, 3 miles up stream from trail crossing.

Type:- As for W.B. - 17.

Host:- 1 collection: 3 hemlock hosts.

Seymour Catchment August 16th

WB- 20. Location:- Lower Pipeline Road, Seymour Creek Valley.

Type:- Second growth hemlock, balsam, cedar, alder, willow and Douglas fir close growing and vigorous with sparse ground cover of blueberry, brachen and moss.

Aspect- neutral. Slope - neutral. Elevation 600'.

Host:- 1 collection: 3 hemlock hosts.

(Beatings were made at 1st Barrier, Canyon Bridge 1st Intake)

WB- 21. Location:- South end of Balancing Reservoir.

Type:- Mixed stand of virgin and second growth hemlock (80%) balsam, cedar and Douglas fir. Close growing with salmonberry, brachen, devils club, blueberry and moss in open.

Aspect and Slope - neutral. Elevation 645'.

Host:- 1 collection; 3 hemlock hosts.

WB- 22. Location:- Upper Pipeline Road Seymour Creek Valley.

Type:- Virgin and second growth hemlock, balsam fir, cedar and Douglas fir. Vigorous and close growing with salmonberry, blueberry Devils Club, brachen and moss in open areas.

Aspect and Slope - neutral. Elevation 850'.

Host:- 1 collection: 3 hemlock hosts.

(beatings were made from Barrier to hill above 1st intake)

August 17th

WB- 23. Location:- Dog Mountain trail 1 mile from lower G.V.W.B., Patrolman Cabin.

Type:- Second growth stand of close growing hemlock and balsam with hemlock and balsam understory and ground cover of blueberry, deerfern, huckleberry and moss.

Aspect - southwest. Slope 20%. Elevation 2000'.

Host:- 1 collection: 3 hemlock hosts.

WB- 24. Location:- Dog Mountain trail 2 miles from lower G.V.W.B. Patrolman's Cabin.

Type:- Mature virgin growth of balsam, fir, hemlock and yellow cedar, vigorous, close growing with hemlock and balsam understory and a ground cover of blueberry, bunchberry and moss.

Aspect - southwest. Slope 30%. Elevation 2900'.

Host:- 1 collection: 3 hemlock hosts.

WB- 25. Location:- End of Dog Mountain trail, site of upper G.V.W.B. cabin.

Type:- Mature virgin growth of hemlock, balsam, mountain hemlock, and yellow cedar, moderately open growing with sparse blueberry ground cover.

Aspect - southwest. Slope 10%. Elevation 4100'.

Host:- 1 collection: 5 hemlock hosts.

Capilano Catchment August 18th

WB- 26. Location:- Capilano Creek trail at tressel crossing two miles above intake station.

Type:- Second growth alder with hemlock, cedar and Douglas fir regeneration and ground cover of salmonberry, blueberry and brachen.

Aspect - Neutral. Slope - Neutral. Elevation 800'.

Host:- Beating on 3 hemlock hosts were neg.

WB- 27. Location:- Capilano Creek trail at junction of east and west forks, 5 miles cabin.

Type:- As for WB- 26.

Host:- Beating on 3 hemlock hosts were neg.

WB- 28. Location:- 3 miles north of forks on West Capilano trail.

Type:- Well developed regeneration hemlock and balsam growth with scrub willow and a ground cover of wild current, salmonberry, blueberry, bunchberry and brachen. Aspect and Slope - neutral. Elevation 900'.

Host:- 2 collections; 3 hemlock hosts and scrub willow hosts.

August 19th

WB- 29. Location:- East Capilano Creek trail to Palisade lake 7 mile cabin.

Type:- Mature virgin growth of cedar, hemlock and balsam with an understory of hemlock and balsam and sparse ground cover of salmonberry, blueberry, swordfern, deerfern and moss. Aspect - west. Slope 30%. Elevation 1650'.

Host:- 1 collection; 3 hemlock hosts.

WB- 30. Location:- East Capilano Creek trail to Palisade Lake 2 miles above 7 mile cabin.

Type:- As for WB- 29.

Host:- 1 collection; 3 hemlock hosts.

WB- 31. Location:- Rodgers Lake at G.V.W.B. Patrolman Cabin end of Palisade Creek trail.

Type:- Virgin growth hemlock, mountain hemlock, balsam fir and yellow cedar slow growing with ground cover of

blueberry, salal, swordfern and moss.

Aspect - south. Slope - 20%. Elevation 1880.

Host:- 1 collection; 3 hemlock hosts.

Coquitlam Catchment August 20th

WB- 32. Location:- Coquitlam Lake Southwest end ½ mile from shore line on old tunnel road.

Type:- Mixed stand of mature virgin and regeneration growth with numerous broken snags. This was a site of heavy Lambdina fiscellaria lugubrosa Hlst. attack in 1929. Stand composition consists of balsam and hemlock overstory and understory of hemlock (80%) balsam and cedar with ground cover of salmonberry, blueberry and brachen in the open.

Aspect and Slope - neutral. Elevation 600'.

Host:- 1 collection:- 5 hemlock hosts.

WB- 33. Location:- Coquitlam Lake, Flour Sack point, ½ way west shore of lake.

Type:- Virgin growth of cedar, hemlock and Douglas fir with understory of hemlock and cedar and ground cover of salal, blueberry, huckleberry, and brachen.

Aspect - east. Slope 40%. Elevation 650';

Host:- 1 collection; 5 hemlock hosts.

WB- 34. Location:- Coquitlam Lake, 8 miles up east shore.

Type:- Virgin growth of cedar with understory of cedar and hemlock. Close growing with salmonberry, blueberry, huckleberry, swordfern and moss ground cover in the open.

Aspect - West. Slope - 15%. Elevation 650'.

WB- 35. Location:- Coquitlam lake, north end of island at south end.

Type:- Virgin growth of hemlock, balsam and cedar, moderately open growth with sparse blueberry, china-berry and brachen ground cover.

Aspect - east. Slope 5%. Elevation 600'.

WB- 36. Location:- Coquitlam Lake, north end at Upper Coquitlam River Mouth.

Type:- Maturing virgin growth of hemlock, cedar and balsam fir with hemlock and balsam understory and moderate ground cover of salmonberry, blueberry, swordfern, huckleberry, moss and hemlock-balsam regeneration.

Aspect and slope - neutral. Elevation 600'.

Host:- 1 collection; 3 hemlock hosts.

WB- 37. Location:- Coquitlam Lake, old B.C. Electric camp site, north east shore.

Type:- Virgin growth of hemlock, and cedar with hemlock-cedar - and Douglas fir understory, close growing and a ground cover of sparse blueberry, salmonberry, huckleberry, swordfern and moss.

Aspect - north west. Slope - 2%. Elevation 600'.

Host:- 1 collection; 3 hemlock hosts.

WB- 38. Location:- Coquitlam Lake, flat east shore, 2 miles from south end of lake.

Type:- Virgin growth of hemlock, balsam and cedar, with hemlock and balsam understory and ground cover of salmonberry, blueberry and weed in the open.

Aspect - north. Slope - 5%. Elevation 600'.

Host:- 1 collection; 3 hemlock hosts.

Nine beatings were made along the Burwell Creek trail where it transverses the Burwell - Seymour Creek, Lambdina fiscellaria lugubrosa infestation. 8 were on hemlock hosts and one on a balsam fir host. These are recorded as follows:

Host	*Defoliation		Elevation
	Old Foliage	Current Foliage	
Hemlock	60%	25%	750'
Hemlock	60%	25%	840'
Hemlock	60%	25%	900'
Hemlock	75%	10%	1050'
Balsam fir	25%	5%	1250'
Hemlock	90%	40% (some top 100%)	1300'
Hemlock	100%	50%	1500'
Hemlock	50%	25%	1655'
Hemlock	Nil	Nil	1750'

* Defoliation figures apply to intermediate, suppressed and regeneration growths. Dominant and co-dominant defoliation ranged from 25% to 50% on old foliage with little apparent defoliation of current foliage.

In order to determine, arbitrarily, the seasonal progress and period of larval hatch to obtain some idea of the earliest possible date for commencing future Insect Surveys in the Mainland district, five beatings were made in the infested area of Burwell Creek and Seymour Creek and five in the Lost Lake trail area on May 22nd and 23rd.

These areas were picked because egg samples made in the fall of '46 showed a definite continuation of the Lambdina fiscellaria lugubrosa outbreak.

From October 9th to 12th egg samples were made in the infested areas of Burwell and Seymour Creeks and along the Lost Lake trail in the Seymour Catchment and in the Capilano Catchment, along the trail from the seven mile cabin to Palisade Creek where a relatively high endemic population of Lambdina fiscellaria lugubrosa was indicated from collections in August.

(E) Forest Insect Conditions:

The Burwell Creek area in the G.V.W.B. district of Seymour Creek catchment, showed renewed attack and defoliation by Lambdina fiscellaria lugubrosa Hlst. but to a much lesser degree than previously recorded in '46. Occasional frass and chewed needles were evident on the undergrowth, but only to a minor degree, chiefly on the bench extending from an elevation of thirteen hundred (1300) feet to fifteen hundred (1500) feet. Here the overstory is in the main cedar, Douglas fir and balsam fir, which is untouched, the attack being mainly confined to intermediate and suppressed hemlock growth. Slight evidence on corresponding balsam fir was noted, also some feeding has and is occuring on the hemlock and cedar regeneration. Collections made at this elevation averaged one hundred and fifty-eight larvae with an individual collection being two hundred and fifty-nine. Parasitic percentage observed was seven and a half percent (7½%) a few dead larvae were found and preserved for disease study. Defoliation in this area ranges up to twenty-five percent for this year's growth and in some cases as high as fifty percent

(50), but is confined to the hemlock growth in the main.

In general the average larval collection was forty-five (45) with a parasitic percentage of ten percent (10%) and while active feeding was taking place at the time of survey it is mainly confined to the intermediate and suppressed growths of hemlock and the dominating overstory of cedar, balsam fir or cedar, Douglas fir is relatively untouched this year and appears little affected from slight attack in '46. Reports from W. Angus, show a decline in larval populations from late June and early July to the time of the survey which seems to indicate while a dangerously high residual population is still present natural causes are gaining control of this infestation.

The Lambdina fiscellaria lugubrosa infestation recorded in '46 survey of the Seymour Creek Valley, extending from the Balancing Basin to a distance of five (5) miles up stream shows little activity at the present time. Average collection of larvae being twenty-two (22) with an observed parasitic percentage of eight point six percent (8.6%). It should be noted, however, feeding and defoliation was observed at two points: two miles up stream in a close growth of small hemlock poles - ten percent, and four miles up stream in area with mature Sitka spruce overstory - five percent.

The Lost Lake area, which showed a decline in the Lambdina fiscellaria lugubrosa attack in '46 appears unchanged with a fairly high residual population. Defoliation was recorded in only one instance and appeared confined to the one tree alone, where a collection of one hundred and forty-three larvae were obtained. The defoliation in this instance was five percent (5%) on the '47 foliage. The average collection for the area was sixty-nine larvae with no observed parasitism.

The following tables show the Lambdina fiscellaria lugubrosa egg count results from moss samples obtained in the Greater Vancouver Water Board Districts, Oct. 9th to 12th.

Burwell Creek Valley; 16 moss samples from 4 trees at varying elevations.

Average per ½ sq. ft.	1946		1947	1946 Egg Mortality
	Hatched	Dead	New	Percentage
	70.06	21.56	1.5	23.53%

Seymour Creek Valley; 17 moss samples from 4 trees at similar elevations.

Average per ½ sq. ft.	1946		1947	1946 Egg Mortality
	Hatched	Dead	New	Percentage
	68.04	30.45	0.49	30.24%

Lost Lake Trail; 8 moss samples from 2 trees at similar elevations.

Average per ½ sq. ft.	1946		1947	1946 Egg Mortality
	Hatched	Dead	New	Percentage
	60.75	9.63	2.0	14.01%

Capilano Creek Valley; 12 moss samples from 3 trees at varying elevations.

Average per ½ sq. ft.	1946		1947	1946 Egg Mortality
	Hatched	Dead	New	Percentage
	4.08	0.42	0.08	6.88%

It is evident from the above tables that in the section of this area where infestation occured the larval populations for 1948 can be expected to be within endemic levels.

It was noted that of the 34 Lambdina fiscellaria lugubrosa larvae collected at Coquitlam Lake 10 showed evidence of parasitism, giving a percent of 29.4%. 37 Nepytia phantasmaria larvae were also observed to be parasitized to the extent of 29.7%.

Neodiprion tsugae and Neodiprion spp. larvae were relatively common in collection where elevation ranged above 2000' at Burwell Creek and Lake, Dog Mountain and Loch Lomond.

Beatings and collections made in the Seymour Creek Valley, May 22nd and 23rd, indicate that larval hatches begin from overwintering eggs in this area in the latter part of May. However, good qualitative samples could quite possibly be obtained in early and mid-May in the Fraser south and Chilliwack areas due to the fact that these areas are farther south and the generally neutral aspect, the low elevation and absence of narrow steeply sloping valleys of the mountainous areas, tend to advance the season.

The beatings made along the north slope of the Burwell Creek Valley, having a southern aspect and approximately 20% to 30% slope gave the following results:

Host	Elevation	Larvae		
Hemlock	700'	64	Lambdina fiscellaria lugubrosa	1st instar
		2	Geometridae	early instar
		1	Tortricidae	" "
Hemlock	800'	34	Lambdina fiscellaria lugubrosa	1st instar
Balsam	1000'	4	Lambdina fiscellaria lugubrosa	1st instar

Beating in the main Seymour Creek Valley, having an easterly to neutral aspect and neutral to 20% slope gave the following results:

Host	Elevation	North of Balancing Basin	Larvae
Hemlock	750'	1 mile	2 Geometridae, early instar
			3 Lambdina f. lugubrosa 1st instar
Hemlock	750'	2½ Miles	Negative.
Balsam	750'	2½ Miles	Negative.

Unhatched, Lambdina f. lugubrosa eggs were found on moss taken from tree trunks at breast height.

Beating made on the Lost Lake trail at the Seymour Creek Crossing where the aspect and slope are neutral gave the following results.

Host	Elevation	Larvae
Hemlock	550'	4 Lambdina f. lugubrosa 1st instar
Hemlock	550'	2 Lambdina f. lugubrosa 1st instar
Balsam	550'	Negative
Sitka spruce	550'	8 Lambdina f. lugubrosa 1st instar
		3 Syriphidae

Rust spores, identified by the Vernon laboratory as a species of balsam fir needle rust, Uredinopsis sp., were causing reddening of balsam needles in the Upper Furry Creek Valley along the Loch Lomond trail. It didn't, however, extend into the W.V.B.B. area. Similar needle damage was noted in the West Capilano Creek, on balsam fir regeneration, 3 miles above the creek forks. The reddening of the needles in this area was to a lesser degree than that of the Furry Creek Valley. In both areas it was confined to balsam alone.

(i) Insects of Major Economic Importance

Lambdina f. lugubrosa Hlst. This insect pest was found to be present in all three catchments. The numbers of larvae collected and points of collection being shown below:

No. of Larvae	Place	Perm. Sample Point	Host
* 117	Lost Lake Trail	WB-1	Hemlock
* 146	Lost Lake Trail	WB-1	Sitka spruce
* 78	Lost Lake Trail	WB-2	Hemlock
20	Burwell Creek Valley	WB-5	Hemlock
* 29	Burwell Creek Valley	750' Elevation	Hemlock
* 30	Burwell Creek Valley	840' Elevation	Hemlock
* 70	Burwell Creek Valley	900' Elevation	Hemlock
* 21	Burwell Creek Valley	1050' Elevation	Hemlock
* 59	Burwell Creek Valley	1250' Elevation	Balsam
* 259	Burwell Creek Valley	1300' Elevation	Hemlock
* 157	Burwell Creek Valley	1550' Elevation	Hemlock
* 56	Burwell Creek Valley	1655' Elevation	Hemlock
* 18	Burwell Creek Valley	1750' Elevation	Hemlock
20	Burwell Creek Valley	WB-6	Hemlock
* 10	Seymour Creek Valley	WB-7	Hemlock
* 64	Seymour Creek Valley	WB-8	Hemlock
* 41	Seymour Creek Valley	WB-9	Hemlock
* 43	Seymour Creek Valley	WB-10	Hemlock
* 54	Seymour Creek Valley	WB-11	Balsam
13	Seymour Creek Valley	WB-20	Hemlock
57	Seymour Creek Valley	WB-21	Hemlock

Lambdina f. lugubrosa Hlst. points of collection continued.

No. of Larvae.	Place	Perm. Sample Point	Host
22	Seymour Creek Valley	WB-22	Hemlock
34	Capilano Creek Valley	WB-29	Hemlock
42	Capilano Creek Valley	WB-30	Hemlock
3	Capilano Creek Valley	WB-31	Hemlock
6	Coquitlam Lake	WB-32	Hemlock
1	Coquitlam Lake	WB-33	Hemlock
2	Coquitlam Lake	WB-34	Hemlock
5	Coquitlam Lake	WB-35	Hemlock
1	Coquitlam Lake	WB-36	Hemlock
1	Coquitlam Lake	WB-37	Hemlock
17	Coquitlam Lake	WB-38	Hemlock

* Areas of infestation.

Nepytia phantasmaria - Larvae were collected in the Seymour and Coquitlam catchment at the following points:

No. of Larvae	Place	Perm. Sample Point	Host
* 1	Burwell Creek Valley	850'	Hemlock
* 1	Burwell Creek Valley	1050'	Hemlock
* 1	Burwell Creek Valley	1250'	Balsam
* 11	Burwell Creek Valley	1300'	Hemlock
* 1	Burwell Creek Valley	1550'	Hemlock
* 1	Burwell Creek Valley	1655'	Hemlock
* 1	Burwell Creek Valley	1750'	Hemlock
5	Seymour Creek Valley	WB-20	Hemlock
8	Seymour Creek Valley	WB-22	Hemlock

Nepytia phantasmaria points of collection continued.

No. of Larvae	Place	Perm. Sample Point	Host
5	Coquitlam Lake	WB-32	Hemlock
1	Coquitlam Lake	WB-33	Hemlock
1	Coquitlam Lake	WB-34	Hemlock
12	Coquitlam Lake	WB-35	Hemlock
1	Coquitlam Lake	WB-36	Hemlock
8	Coquitlam Lake	WB-37	Hemlock
9	Coquitlam Lake	WB-38	Hemlock

* Areas of infestation.

Neodiprion tsugae Midd. The distribution and number of larvae collected throughout the three catchments are shown in the following list.

No. of Larvae	Place	Perm. Sample Point	Host
13	Burwell Lake	WB-3	Hemlock
13	Burwell Creek	WB-4	Hemlock
11	Burwell Creek	WB-5	Hemlock
* 1	Burwell Creek	1300' elevation	Hemlock
20	Burwell Creek	WB-6	Hemlock
27	Fairwest Camp	WB-12	Hemlock
1	Fairwest Camp	WB-12	Balsam
50	Loch Lomond	WB-13	Balsam & hemlock
37	Loch Lomond Trail	WB-14	Hemlock
11	Loch Lomond Trail	WB-15	Hemlock
2	Loch Lomond Trail	WB-16	Hemlock
4	Dog Mountain Trail	WB-23	Hemlock
30	Dog Mountain Trail	WB-24	Hemlock

Neodiprion tsugae Midd. collections continued.

No. of Larvae	Place	Perm. Sample Point	Host
9	Dog Mountain Trail	WB-25	Hemlock
3	Capilano Creek	WB-29	Hemlock
5	Capilano Creek	WB-30	Hemlock

Pikonema dimmockii-

1	Loch Lomond	WB-13	Balsam

Ambrosia beetles:- Larvae and adults were found attacking a heavily defoliated suppressed hemlock, miles up stream in the Seymour Creek Valley.

(ii) Insects of Minor Economic Importance

Galerucella carbo:- Light attack by this insect in its larval stage was noted on the scrub willow growths in the Capilano Creek Valley.

Neodiprion spp. The numbers and distribution of larvae are as follows:

No. of Larvae	Place	Perm. Sample Point	Host
14	Lost Lake Trail	WB-1	Sitka spruce
2	Burwell Lake	WB-3	Mt. Hemlock
15	Burwell Creek	WB-5	Hemlock
37	Burwell Creek	WB-6	Hemlock
38	Loch Lomond Trail	WB-15	Hemlock
22	Dog Mountain Trail	WB-24	Hemlock
2	Rodgers Lake	WB-31	Hemlock
1	Coquitlam Lake	WB-38	Hemlock

(F) Personnel Contacted

Dr. Stewart Murray	Health Officer Vancouver City	City Hall, Vancouver, B.C.
W. Angus	Chief Forest Ranger and Supt. of field sanitation	Crown Rd., Lynmour, B.C.
C. Catteral	Patrolman	Dog Mountain
H. Reid	Patrolman	Capilano Creek
P. Barber	Intake operator	Capilano Creek
A. Humpheries	Tunnel Supt. B.C. Electric	Coquitlam Lake

Dr. Murray requested that the necessary health tests be taken each season prior to commencing work in the Districts of the Water Board. He should be contacted before obtaining the health test and again to find the results. It would be advisable to have tests made a week or two before intended date of survey.

Bill Angus and staff are both cooperative and helpful and will arrange water transportation where it is needed if at all possible. He would appreciate a day or two notice of survey date in order to make arrangements. He willingly agreed to have his staff members on patrol duty forward 2 collections monthly to the Vernon Laboratory throughout the survey season.

Supt. Humpheries will accommodate with lodging and board while survey is made of Coquitlam Lake area. Contact can be made directly or through W. Angus. If work schedule will permit the company boat is at the Dept. disposal.

(G) Comparison Summary of 1946 and 1947 Survey.

Comparison of the numbers of Lambdina fiscellaria lugubrosa Hlst. larvae and eggs collected in the infested areas are shown in the following tables.

Infestation	Average No. of Larvae Per Beating		Parasitism %	
	1946	1947	1946	1947
Burwell Cr. Trail	93.0	45	38.4%	10%
Seymour Creek	68.8	22	30.8%	8.6%
Lost Lake Trail	32	65.0	21.9%	0.0%

* 1947 parasitism % is based on field observations only.

Infestation	Number of Eggs Per ½ sq. ft. of moss						Egg Mortality Percentage	
	Hatched		Dead		New			
	1946	1947	1946	1947	1946	1947	1946	1947
Burwell Cr. Trail	26.81	70.06	3.43	21.56	43.18	1.5	4.3%	23.53%
Seymour Creek	16.06	68.04	2.56	30.45	29.24	0.49	6.95%	30.24%
Lost Lake Trail	11.66	60.75	1.33	9.63	5.66	2.0	7.1%	14.01%
Capilano Trail *	3.5	4.08	.18	.42	1.0	.08	1.4%	6.88%

* High endemic population only

A decided increase was noted in the number of Neodiprion tsugae and Neodiprion spp. larvae collected. Comparison of collections made from similar host at the same sample points in 1946 and 1947 are tabulated below:

Sample Point	1946		1947	
	No. of Beatings	Average Number of Larvae Per Beating	No. of Beatings	Average No. of Larvae Per Beating
Burwell Lake	1	3.0	3	8.6
Dog Mountain	2	0.5	3	14.3
Rodgers Lake	3	0.6	3	2.3

(10) INDIAN RIVER

(A) Description of Area

This area includes the summer resort park reserve area of the Wigwam Inn at the head of Burrard Inlet and the narrow steep-sided valley of Indian River, extending northward from the head of the inlet for approximately 20 miles and reaching an elevation from 3000' to 3600' at its source.

(B) Timber Types and Economic Importance

The mature, virgin growths of cedar, hemlock, Douglas fir and white pine and the second growth of cedar, hemlock and maple of the lower level at the Wigwam Park Reserve form natural sylvan landscaping and is a valuable asset to the resort.

The precipitous nature of the Indian River Valley has limited logging operations in this area to a narrow more gradually sloping bench extending from the mouth of the river up stream along the west bank for 5 miles. Second growth balsam, hemlock, cedar, maple and alder occur on this bench giving way to similar regeneration growths on the more recently cut over sites. Patchy stands of virgin growth cedar, hemlock and Douglas fir form the remaining forest cover along the west slope. Numerous snags were noted in the virgin growth of cedar, balsam and hemlock along the east slope and a large area of fire killed timber extends up the valley north of Hixon Creek.

At the present time, the only logging operation carried on is the cutting of cedar for shingle bolts in the virgin stands on the higher levels $2\frac{1}{2}$ miles upstream on the west slope.

(C) Route Travelled

Water transportation is available from Deep Cove or Vancouver to the Wigwam Inn via the Harbour Navigation Steamship Co. From the Wigwam Inn a good trail extends into the Indian River Valley where use of the shingle-bolts flume on the west bank offers the best means of travel. This flume extends up the valley for five miles but care is advisable due to the decaying condition of a number of the supports. Above the flume good progress can be made in the river bottom.

(D) Sample Points:

6 permanent sample points were established and seven collections forwarded to the Vernon Laboratory from the following host trees:

Host	No. of Collections	No. of Insects
Hemlock	7	165

The Date, Location, Timber Type and Host Tree of permanent sample points are as follows:

Indian River August 23rd

IR- 1. Location:- 1 mile up Indian River Valley on flume, blazed hemlock "FII Perm. Sample point 23 - VIII - 47."

Type:- Second growth balsam, hemlock and cedar with hemlock and balsam understory and moderate blueberry, salmonberry, bunchberry, thimbleberry and swordfern ground cover.

Aspect and slope - neutral. Elevation 75'.

Host:- 1 collection:- 3 hemlock hosts.

IR- 2. Location:- Flume intake, 5 miles up Indian River Valley. Blazed cedar "FII Perm. Sample point 23-8-47".

Type:- Mature stand of virgin Douglas fir, hemlock and cedar, with hemlock understory and ground cover of salal, blueberry, huckleberry, brachen and deer fern.

Aspect- east. Slope - 30%. Elevation - 700'.

Host:- 1 collection: 3 hemlock hosts.

August 24th

IR- 3. Location:- 8 miles up stream in Indian River Valley. Blazed cottonwood on west side of the river, "FII Perm. Sample Point 24-VII-47".

Type:- Virgin stand of cedar, balsam and hemlock with understory of hemlock and balsam. Open growing with numerous broken snags which appear to be hemlock. Ground cover of blueberry, huckleberry, salmonberry, Devils club, sword fern and moss. Aspect and slope - neutral. Elevation 400'.

Host:- 1 collection: 3 hemlock hosts.

IR- 4. Location:- 10 miles up stream in Indian River valley. Blazed balsam on west shore "FII Perm. Sample Point 24-VIII-47".

Type:- Open growing mature cedar, balsam and hemlock with understory of hemlock and balsam with ground cover of blueberry, salmonberry and elderberry.

Aspect and slope - neutral. Elevation 450'.

Host:- 1 collection: 3 hemlock hosts.

August 25th

IR- 5. Location:- 1 mile up Cathedral Mountain trail, Wigwam Inn Park Reserve. Blazed cedar "FII Perm. Sample Point 25-VIII-47"

Type:- Virgin stand of cedar, hemlock Douglas fir and western white pine with hemlock, cedar and yew understory and ground cover blueberry, huckleberry, salmonberry, bunchberry and swordfern.

Aspect - south. Slope - 20%. Elevation - 1000'.

Host:- 1 collection: 2 hemlock hosts.

IR- 6. Location:- Park Reserve Wigwam Inn shore margin.

Type:- Second growth cedar and hemlock with hemlock, cedar, maple and alder. Close, vigorous and sparse salal, blueberry, huckleberry, swordfern and salmonberry.

Aspect - Slope - neutral. Elevation 25'.

Host:- 1 collection: 2 hemlock hosts.

(E) Forest Insect Conditions

Forest insect conditions were apparently normal in this area, apart from high observed parasitism of the Lambdina fiscellaria lugubrosa Hlst. and Nepytia phantasmaria Stkr.larvae, collected from 18 beatings of hemlock hosts.

Of the 51 Lambdina fiscellaria lugubrosa Hlst. larvae collected 24 were observed to be parasitized giving a percentage of 47%.

18 of the 32 Nepytia phantasmaria Stkr. larvae were found to be parasitized giving a percentabe of 56¼%.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. The 51 larvae of the endemic population collected were distributed throughout the area as follows:

No. of Larvae	Place	Sample Point	Host
1	Indian River	IR- 1	Hemlock
5	Indian River	IR- 2	Hemlock
1	Indian River	-----	Hemlock
5	Indian River	IR- 3	Hemlock
1	Indian River	IR- 4	Hemlock
16	Wigwan Park	IR- 5	Hemlock
23	Wigwam Park	IR- 6	Hemlock

Nepytia phantasmaria Stkr. A total of 32 larvae were collected throughout the area at the following points.

No. of Larvae	Place	Sample Point	Host
5	Indian River	IR- 2	Hemlock
1	Indian River	IR- 3	Hemlock
7	Wigwam Park	IR- 5	Hemlock
19	Wigwam Park	IR- 6	Hemlock

Notolophus antiqua badia: 1 larva of this pest was obtained in beatings on hemlock host sample point IR- 6 in Wigwam Park.

(ii) Insects of Minor Economic Importance

Nil.

(F) Personnel Contacted

Major Haddock, Proprietor, Wigwam Inn, Indian River.

J. Gibson, Patrol Man, B.C. Forest Service, Deep Cove, B.C.

P. Daiken, Cruiser and old timer, Indian River.

Patrolman Gibson kindly supplied transportation to and from the head of the inlet.

Phil Daiken readily supplies information as regards trail, etc.

(G) Comparison Summary of '46 and '47 Survey

The light Lambdina fiscellaria lugubrosa Hlst. infestation causing slight defoliation of the timber in the Wigwam Park and lower Indian River Valley in 1946 has apparently subsided. The residual population still present in the area showed a high percentage of parasitism. Comparison of larval collections obtained from similar hosts and localities in 18 beatings in 1946 and 1947 is shown below:

	1946		1947	
	Average No. of Larvae.	% Parasitized	Average No. of Larvae	% Parasitized
Lambdina f. lugubrosa Hlst.	22	9.0%	2.5	47%
Nepytia phantasmaria Stkr.	1.6	6.8%	1%	56¼%

* The presence of Notolophus antiqua badia and Acleris variana was noted in the area by the collection of one larva of each species in 1946. In 1947 larvae of Notolophus antiqua badia were again collected.

(11) HOWE SOUND AREA

(A) Description of Area:

This area includes the southwest shore of Howe Sound from Rainy River to Gibson Creek and collections made at the Sechelt Indian Reserve. In the vicinity of Gibsons Landing summer resort at the mouth of Gibson Creek, a fairly wide benchland slopes gradually north and west to the 4500' Mountain Elphinstone. Northward along the coast to Rainy River the bench narrows and with the exception of a small flat at the mouth of Rainy River the mountainous terrain rises sharply from the shore margin and valleys become steep sided rising up to 5000' mountain ridges.

(B) Timber Type and Economic Importance:

Most of the accessible virgin timber has been cut in this area and replaced by naturally seeded, vigorous, close growing regeneration and second growth. The arable benchland supports numerous homesteads, very largely cultivated, as well as a thriving summer resort which depends on the second growth for its sylvan landscaping. The more mature second growth is being cut and milled for local markets by a number of small portable mills or cut and carded for pulp wood, going to the Sorg Pulp Mill at Port Mellon at the mouth of Rainy River. These second growth stands in the vicinity of Gibson Creek are predominately Douglas fir with small percentages of red cedar and hemlock and appear exceptionally thrifty.

At Rainy River the second growth is predominately hemlock, with cedar and balsam along the west slope giving way to more evenly mixed stand of balsam, hemlock and small percentages of cedar in the east slope. Along the bench extending from Rainy River to McNair Creek

Douglas fir is the predominating species. This growth, with the present outbreak of Lambdina fiscellaria lugubrosa Hlst. in area, was being held leases as a reserve by the Sorg Pulp Co. Operations to salvage the areas suffering heavy attack are being carried on at the present time.

Virgin timber stands on the higher slopes are principally hemlock and balsam fir. While no extensive cutting has been done for sometime the Franco-Canadian Co. are constructing a camp, a logging road on east Rainy River Valley for the purpose of logging limits held in the upper valley.

(C) Route Travelled:

The Union Steamships was used to reach Gibson Landing and Rainy River and local bus transportation from Gibson Landing to Sechelt.

As there are a number of fairly good secondary roads in the area in future if costs will permit, transportation of a Department vehicle to this point would greatly simplify the work of the survey.

(D) Sample Points:

15 permanent sample points were established and 21 collections sent to the Vernon Laboratory from the following host trees.

Host	No. Collections	No. Insects
Hemlock	16	1179
Douglas fir	3	38
Lodgepole pine	1	4
Willow	1	12
	21	1233

Variation from the beating method of collection occurred when obtaining specimens from Douglas fir slash and lodgepole pine at Gibson Creek, and from defoliated trees suffering ambrosia attack in the Rainy River Valley.

The Date, Location, Timber Type and Host Trees of permanent sample points are as follows:

Sechelt — August 3rd

HS- 1. Location:- Sechelt Indian Reserve, N2, Park Area.

Type:- 2nd growth, hemlock, cedar and Douglas fir in open growing stand.

Aspect and Slope - neutral. Elevation - 50'.

Host:- 2 collections: 3 Douglas fir and 3 hemlock hosts.

Gibson's Creek — August 4th

HS- 2. Location:- End of logging road north slope 1½ miles up Gibson's Creek Valley. Blazed "R.F. FII Perm. Sample Point 4-VIII-47".

Type:- Dense, close, 2nd growth Douglas fir, cedar and hemlock pole stand with moderate salal ground cover.

Aspect - east, Slope - 5%, Elevation - 820'.

Host:- 1 collection: 3 hemlock hosts.

HS- 3. Location:- 2 miles up stream on Gibson Creek trail. Blazed Douglas fir "FII Perm Sample Point 4-VIII-47".

Type:- Close, vigorous, second growth Douglas fir, cedar and hemlock pole stand with alder in creek bottom and ground cover of salal, blackberry, brachen and Devils club.

Aspect - east. Slope - 5%. Elevation - 900'.

Host:- 1 collection:- 3 hemlock hosts.

HS- 4. Location:- 1½ miles up stream on trail by water intake L. 691. Blazed "FII Perm Sample Point 4-VIII-47".

Type:- Second growth of Douglas fir, cedar and hemlock and lodgepole pine pole stand with willow and alder in creek bottom and moderate brachen and salal ground cover.

Aspect and slope - neutral. Elevation - 800'.

Host:- 3 collections; willow, Douglas fir and lodgepole pine hosts.

Rainy River - McNair Creek July 5th

HS- 5. Location:- 3 miles up Rainy River Valley on east slope, N.E. corner T.L. 13127. Margin of severe defoliation.

Type:- Second growth hemlock, cedar Douglas fir and balsam in dense vigorous stand. Ground cover of salmonberry and swordfern.

Aspect - southwest. Slope - 5%. Elevation 765'.

Host:- 1 collection: 3 hemlock hosts.

HS- 6. Location:- 2 miles up Rainy River Valley on east slope above Franco - Canadian Logging Co. Road.

Type:- Second growth hemlock, balsam and cedar, 100% defoliated in 1946 and 15% on current foliage. Sparse ground cover salmonberry and moss.

Aspect - southwest. Slope - 10%. Elevation 350'.

Host:- 1 collection: 2 hemlock hosts.

HS- 7. Location:- 1 mile up of plank logging road, east slope of Rainy River Valley, N.E. corner L. 1366.

Type:- Second growth hemlock, cedar, balsam and alder in a close vigorous stand which suffered heavy top defoliation in 1946 and 5% defoliation on current foliage. Sparse ground cover of salmonberry, salal and swordfern.

Host:- 1 collection: 2 hemlock hosts.

HS- 8. Location:- Seaside Park at the mouth of Rainy River.

Type:- Maturing second growth of hemlock, cedar, Sitka spruce and Douglas fir in Park Reserve. Defoliation in 1946 from 75% to 100% with 1947 defoliation up to 25%. Sparse salal, salmonberry, bunchberry and grass.

Aspect and Slope - neutral. Elevation - 20'.

Host:- 1 collection: 2 hemlock hosts.

August 6th

HS- 9. Location:- 1½ miles upstream on trail, west slope Rainy River. Blazed hemlock "FII Perm Sample Point 6-VIII-47".

Type:- 2nd growth hemlock stand with 5% balsam fir 75% to 100% defoliated 1946, showing 10% defoliation on current foliage. Sparse brachen, Devils Club and salmonberry.

Aspect - east. Slope - 5%. Elevation - 325'.

Host:- I collection: hemlock host.

HS- 10. Location:- 2 miles up trail west slope of Rainy River. Blazed hemlock "FII Perm Sample Point 6-8-47".

Type:- Second growth hemlock and balsam fir with 100% defoliation of hemlock and 50% to 75% on the balsam. Few hemlock show '47 foliage. Moderate salmonberry, brachen and deerfern ground cover.

Aspect - east. Slope - 5%. Elevation 455'.

Host:- 1 collection: hemlock host.

HS- 11. Location:- 4 miles up trail, west slope of Rainy River Valley. Blazed hemlock "FII Perm Sample Pt. 6-VIII-47".

Type:- Hemlock and balsam stand of virgin growth and hemlock, balsam regeneration understory. Hemlock 100% defoliated in '46, balsam 50%. Light attack in '47 approximately 5% defoliation on '47 foliage.

Aspect - east. Slope - 10%. Elevation - 1050'.

Host:- 1 collection: hemlock host.

McNair Creek August 6th

HS- 12. Location:- ½ mile up McNair Creek Valley on old logging road. Blazed hemlock "FII Perm Sample Point (6-8-47)".

Type:- Hemlock and balsam second growth stand with defoliation ranging 75% to 100% on the hemlock and 50% on the balsam. Ground cover salmonberry, salal, fireweed and moss.

Aspect - S70° E. Slope - 5%. Elevation 200.

Host:- 1 collection: hemlock host.

HS- 13. Location:- 1 mile up McNair Creek Valley on old logging road. Blazed hemlock "FII Perm Sample Point 8-VIII-47".

Type:- Second growth hemlock, balsam and cedar with 90% defoliation of hemlock in 1946 and 50% on the balsam fir. Sparse ground cover of thimbleberry, salmonberry, bracken, swordfern and blackberry. One tree which produced '47 foliage suffered approximately 10% defoliation.

Aspect and slope - neutral. Elevation 600'.

HS- 14. Location:- 1¼ miles up McNair Creek Valley on old logging road. Blazed cedar "FII Perm Sample Point 6 VIII-47".

Type:- Second growth hemlock, cedar, balsam and Douglas fir stand at margin of infestation. Light defoliation in '46 and '47. Ground cover of thimbleberry, huckleberry, salmonberry, blackberry, swordfern and bracken.

Aspect - south. Slope - 5%. Elevation - 860'.

Host:- 1 collection: 3 hemlock hosts.

HS- 15. Location:- 2¼ miles up McNair Creek Valley on old logging road, at old logging campsite.

Type:- Second growth hemlock, cedar, balsam and Douglas fir in moderately open stand with moderate ground cover of salmonberry, thimbleberry, fireweed, blackberry and scrub willow and alder.

Aspect - southwest. Slope - 15%. Elevation - 1250'.

Host:- 1 collection: 3 hemlock hosts.

(E) Forest Insect Conditions:

Survey of Rainy River Valley infestation showed marked decline in the Lambdina fiscellaria lugubrosa Hlst. population, under that of '46, but a relatively high residual population was still present and feeding and slight defoliation was noted on trees with '47 foliage. At a point one and a half (1½) miles up the valley on the west slope at an elevation of 325 feet, a small amount of frass was noted on the undergrowth. While individual collections ran as high as one hundred and twenty-three (123) Lambdina fiscellaria lugubrosa larvae, the average was 52 with an observed parasitic percentage of 23½%. Occasional dead larvae were found and preserved for possible disease study. Three miles upstream on the west slope of the valley evidence of ambrosia beetle attack in heavily defoliated trees was recorded. Specimens collected from attacked trees were identified by the Vernon laboratory as Gnathatrichus sp.

In L. 688 at Gibsons Landing the lodgepole pine growth showed evidence of Vespamima sequoia larvae attack. Large pitch masses were found on the majority of the trees at the site of branch whorls, and while no mortality of trees was noted old pitch masses showed attack to be of some years standing.

Other sections of the area sampled contained apparently normal insect conditions.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. The number of larvae obtained at various sample points in the area are listed below:

No. of Larvae	Place	Perm. Sample Point	Host
2	Gibson's Creek	HS- 3.	Hemlock
149	Rainy River	HS- 5.	Hemlock
175	Rainy River	HS- 6.	Hemlock
75	Rainy River	HS- 7.	Hemlock
143	Rainy River	HS- 8.	Hemlock
123	Rainy River	HS- 9.	Hemlock
19	Rainy River	HS- 10.	Hemlock
54	Rainy River	HS- 11.	Hemlock
71	McNair Creek	HS- 12.	Hemlock
112	McNair Creek	HS- 13.	Hemlock
53	McNair Creek	HS- 14.	Hemlock
12	McNair Creek	HS- 15.	Hemlock

Nepytia phantasmaria: Larvae were collected in the numbers and places shown below.

No. of Larvae	Place	Perm. Sample Point	Host
1	Sechelt-Indian River	HS- 1.	Hemlock
1	Sechelt Indian River	HS- 1.	Douglas fir
3	Gibson's Creek	HS- 2.	Hemlock
1	Gibson's Creek	HS- 3.	Hemlock
33	Rainy River	HS- 5.	Hemlock
2	Rainy River	HS- 10.	Hemlock
14	McNair Creek	HS- 14.	Hemlock
26	McNair Creek	HS- 15.	Hemlock

Nepytia phantasmaria: Larvae were collected in the numbers and places shown below:

No. of Larvae	Place	Perm. Sample Point	Host
1	Rainy River	HS- 6.	Hemlock
2	Rainy River	HS- 8.	Hemlock

Notolophus antiqua badia: The distribution of larvae of this insect in the area is as follows:

No. of Larvae	Place	Perm. Sample Point	Host
1	Rainy River	HS- 6.	Hemlock
1	Rainy River	HS- 9.	Hemlock

Ambrosia Beetles: Larvae and adults, unidentified by Vernon, were found in slash in the S.E. ¼ of L. 688, at Gibson Creek. Gnathotrichus sp. were attacking looper killed trees in the Rainy River Valley.

Dendroctonus pseudotsugae: Adults and larvae of this bark beetle were breeding in Douglas fir slash in the S.E. ¼ of L. 688 at Gibson Creek.

(ii) Insects of Minor Economic Importance:

Galerucella carbo: Larvae of this chrysomelidae were collected from willow in Gibson Creek Valley at permanent sample point HS- 4.

Neodiprion sp. The distribution of this sawfly is as follows:

No. of Larvae	Place	Perm. Sample Point	Host
1	Gibson Creek	HS- 4	Hemlock
1	Rainy River	HS- 7	Hemlock
2	Rainy River	HS- 8	Hemlock
2	Rainy River	HS- 9	Hemlock

Vespamima sequoia: Larvae and pitch masses were collected from lodgepole pine host in the N.E. ¼ of L. 688 at Gibson's Creek.

(F) Personnel Contacted:

R.W. Aylett, Ranger, B.C. Forest Service, Seechelt, B.C.

M. Mudge, Assistant Ranger, B.C. Forest Service, Seechelt, B.C.

J. Gilgan, Assistant Ranger, B.C. Forest Service, Seechelt, B.C.

Supt. Paads, Supt. Sorg Pulp Mill, Port Mellon, B.C.

(G) Comparison Summary of '46 and '47 Survey:

While a definite decline was recorded in the Lambdina fiscellaria lugubrosa Hlst. populations in the Rainy River, McNair Creek infestations in '47 by comparison with that of '46, a relatively high population still existed at the time of survey and indications of secondary insect attack was noted by the presence of ambrosia beetles in dead and dying timber on the west slope of the valley.

Strip cruises and mortality estimates for this area are contained in a more detailed report made October by R.L. Fiddick.

(12) SQUAMISH - CHEAKAMUS VALLEY

(A) Description of Area:

This area extends from the north end of Howe Sound at the settlement of Squamish northward to Alta Summit at 2205', and includes the precipitous mountain valleys of the Squamish and Cheakamus Rivers. A narrow low lying delta, dyked against tidewater at its southern margin extends up the Squamish Valley for nine miles to the junction of the Cheakamus River. Above this point both river valleys narrow rapidly into rocky steep-sided canyons with marginal peaks rising above the timber line. The Cheakamus Canyon widens into a more gradually sloping mountain valley at its source of Alpha, Nita and Alta Lakes. The Mamquam River, joining the Squamish four miles above tidewater and the Cheekee River, joining the Cheakamus at Cheekee form a relatively wide gradually sloping basin to the east.

(B) Timber Types and Economic Importance

Most of the delta section of this area has been logged as well as the adjoining foothills to the east in the Mamquam and Cheekee River Valleys. Where the land has not been cultivated in this logged section good regeneration and second growth has developed in a mixed stand of alder, maple, birch, willow, Douglas fir, Sitka spruce, cedar and hemlock with the deciduous species dominating on the river flats with Sitka spruce and Douglas fir, cedar and hemlock being the principal species at the higher levels.

Above the delta as the valley narrows towards the canyons a severe forest fire burned over the valley and only patchy regeneration is now present. The canyons have little or no timber of commercial value being scrubby, open growing and patchy.

Large tracts of valuable virgin timber occur in the Mamquam - Cheekee River basin and at Alpha, Nita and Alta lakes areas where the principal logging operations are carried on. These virgin stands, generally, are cedar, hemlock, Douglas fir and balsam with different species dominating in varying localities.

(C) Route Travelled:

Squamish is reached by Union Steamship from Vancouver. From this point the following routes are available.

(a) Squamish River: Good gravel road extends up the valley for 29 miles.

(b) Cheakamus River: By Pacific Great Eastern Railroad or B.C. Alpha, Nita and Alta Lakes: Forest Service speeder.

(c) Mamquam & Cheekee Rivers: Logging Roads.

It would simplify travel and facilitate survey work in and around Squamish townsite and the Mamquam - Cheekee basin if a Dept. car was ferried to this point. The available commercial transportation is supplied by taxi only. The cost of ferrying a HUP by Pacific Great Eastern train barge from Vancouver to Squamish at 1947 rates was quoted at $13.17 return.

(i) Insects of Major Economic Importance

Lambdina fiscellaria lugubrosa Hlst. One larva was collected from a hemlock host, 7 miles up the Mamquam River Valley.

Nepytia canosaria Wlk. One larva of this insect was found on a hemlock host at the junction of the Cheakamus and Squamish Rivers.

Neodiprion tsugae Midd. One larva of this sawfly was obtained from a hemlock host 3 miles up the Mamquam River Valley.

(ii) Insects of Minor Economic Importance

Caripeta sp. Larvae of this geometridae were present in small numbers in all collections made from beatings on Douglas fir and hemlock hosts.

(F) Personnel Contacted

S.C. Frost, Ranger, B.C. Forest Service, Squamish, B.C.

T. Hunter, Assistant Ranger, B.C. Forest Service, Squamish, B.C.

Ranger Frost is cooperative and placed the patrol speeder at the disposal of the Department.

(G) Summary Comparison of '46 and '47 Survey

No insect survey was conducted in this area in 1946 and in 1947 it was more of a reconnaissance to gain a better knowledge of transportation facilities within the area and the distribution and types of timber growth.

(13) UPPER LILLOOET RIVER VALLEY

(A) Description of Area:

This area includes the Upper Lillooet River and its main tributary Green River, Lillooet Lake and Tenas Lake.

The general topography is mountainous with high rugged peaks rising above the timber line, forming steep-sided narrow valleys.

The valley runs in a south east direction widening into Pemberton Meadows north of Lillooet Lake forming a trench of arable ranch land extending north west for many miles. At Pemberton the Green River Valley with more rolling and less precipitous slopes extends to the south to Green Lake while the Birkenhead Valley runs northward to Birkenhead Lake. South along the margins of Lillooet and Tenas Lakes the valley narrows to steeply rising slopes, particularly to the north east.

(B) Timber Types and Economic Importance

The present inaccessibility of this area lowers the economic value of the numerous virgin growths along the lower slopes of the valley and in the less canyon-like adjoining valleys. Mature growths of Douglas fir, cedar and hemlock were noted at Green Lake extending down the valley to Pemberton and Pemberton Creek Valley. At Tisdale this growth gives way to an almost pure small pole stand of lodgepole pine.

Cottonwood and maple growth predominates on the meadow with some Douglas fir and hemlock and extends along the valley bottom to Lillooet Lake where the coniferous species dominate in stands of Douglas fir, cedar and hemlock.

The principal logging operation in the section covered by the survey was at Green Lake where virgin stands of Douglas fir, cedar, hemlock and balsam are cut and milled for shipment to Squamish on the P.G.E. Railroad.

(C) Route Travelled

The Pacific Great Eastern Railroad is the only means of transportation in this area with the grading running through the Green River Valley to Pemberton. Poor secondary roads extend up the valley from Pemberton and the neighbouring vicinity.

Travel southward to Lillooet and Tenas Lakes is made by boat which was available this season from the B.C. Forest Service. The river is treacherous and swift and guiding by an experienced person is adviseable.

(D) Sample Points

Two collections were forwarded to Vernon from this area, one from hemlock hosts in a virgin stand of Douglas fir, cedar, hemlock, cottonwood and maple at the south end of Lillooet Lake in T.L. 3916P and at the north end of Tenas Lake. Both collections were made at an elevation of 1400'. Beating made on cedar regeneration at Pemberton was negative.

(E) Insect Conditions

No abnormal insect conditions were noted in the section of the area covered or at sample points and collections contained no insects of major economic importance.

48 larvae of Caripeta sp. geometridae were collected from the hemlock beatings at Lillooet Lake, one of which was parasitized, and 4 were obtained from beatings on the Douglas fir hosts at Tenas Lake.

(F) Personnel Contacted

B. Brown, Assistant Ranger, B.C. Forest Service, Pemberton, B.C.

Ranger Frost provided speeder transportation in this area as in the Squamish - Cheakamus Valley and also boat transportation down the Lillooet River to Lillooet and Tenas Lakes.

(G) Summary Comparison of '46 and '47 Survey

No survey was conducted in this area in 1946 and as in the Squamish-Cheakamus Valley this seasons survey was more of a reconnaissance to get information as to the accessibility and timber growth of the area.

REPORT ON EXAMINATION OF CROWN TIMBER

Under Deterioration at Tlowils Lake, April 9 - 12, 1947

General Statement

The main purpose of trip was to determine extent of hazard to weakened trees by secondary forest insects. Examinations revealed no hazard from this direction at the present time. Since none is building up now and the affected trees are already dead or dying, the bulk of mortality will follow the successive defoliations alone.

Secondary insects present were, in order of greatest occurrence: ambrosia beetles, buprestids and bark beetles. Fungal sheets of mycelium beginning in the lower basal portions of some trees noted.

The stands are decadent and overmature in their overstory and bear evidence of a previous catastrophe. Because airphotos taken in the area in 1930 show a similar appearance to those taken in 1946, it is highly probable that this area suffered extensively from the hemlock looper prevalent at the former time.

Some evidence of looper presence was noted at this time in the form of typically chewed 1946 needles. Examination of $\frac{1}{2}$ square foot of moss at 30' up the trunk of a lower co-dominant open-growing hemlock revealed two hatched 1946 eggs and a pupal skin. Three cocoons very nearly identical with those of the hemlock sawfly were also noted, two of them bearing Braconid emergence holes.

Programme of Work

The field work was under the direction of M. Pogue, assisted by R.L. Fiddick. G. Abernethy appraised the stand generally, D.N. Smith entomologically, and maintained liaison between all points of view concerned.

1. April 10, a strip was run as follows: a course due magnetic north (24° 30' from connected north) was run for 160 chains, thence east for 20 chains and south 36 chains. The end of the south line was then tied to the main creek just below the trail crossing. M. Pogue tallied trees by diameter classes, species, living and dead. Cull trees were not counted (these were trees with visible deject, such as broken tops, conks, etc.) Dead trees were those trees showing no foliage. The writer satisfied himself that such trees had no future by sampling representatives. In these the cambium was often alive, but more often though alive showed decadence, manifested by looseness, light browning of sapwood, presence of occasional secondary, etc.

The first part of strip averaged very low on kill, a middle portion about 100 chains in was heavy, up to 40% but strip average did not seem to exceed 20% (M. Pogue is in possession of full data). One suppressed balsam was attacked and killed directly by beetles with Scolytus type of galleries, attack occurring in 1946. This was the only such instance noted in the entire area.

2. April 11, stripping was undertaken on the south shore of Tlowils Lake, in crown timber adjoining the hard-hit Sunset holdings to the west. A line true south was run for 20 chains, thence east for 20 chains and thence north 35° west for 20 chains. Along this stripping mortality was considerably higher than upon the north lines, and it will probably be found to average 50%.

Along the bottom chainage of this course an examination of 14 killed trees was made. Of these only 2 contained the markings of borers, these being Buprestids and just barely present. Seven of the trees showed ambrosia beetle entrance tunnels, already well stained.

Miscellaneous

In several instances where Buprestids were at work in the area disease of larvae was noted. In one instance 4 square feet of sapwood surface showed 9 galleries excavated and in 5 of these dead Buprestid larvae were found. (see sample).

A considerable amount of witch's broom was noted over the whole general area. Trees bearing conks and brooms but otherwise green were noted to be inexplicably free from defoliation.

TREE MORTALITY STUDY SARITA RIVER VALLEY

April 30 - May 10, 1947

R.L. Fiddick, E.G. Harvey, H.E. Vey, and M.T. Hughes

The work in the Sarita River area at this time consisted mainly of the establishment of plots and examination of the trees in the plot.

Much of this valley has suffered severe defoliation and after an examination of the area it was decided to lay out plots in the area surrounding the river forks. Eighteen plots were established in the valley in areas representative of timber types and varying degrees of defoliation.

The first nine plots were established in random picked areas and the remaining nine were set out along a strip on the east side of the north fork of the river.

This strip was cruised and blazed as a trail connecting the plots. The strip started near the trail just east of the river forks and ran up hill magnetic north for a distance of forty chains, east for eighty-two chains and south for eighteen chains. In this manner it was possible to lay out the plots uniformly in all types of timber in different geographic conditions.

In the eighteen plots a total of 410 trees were tagged and examined and eight trees were felled and examined.

Of the 410 trees examined, 256 were found to still have a light and moist cambium. 130 trees had light dry cambium and 24 had a discoloured cambium.

The 24 trees with dry discoloured cambium are no doubt dead.

Tree No.	Location	Diam.	Ht.	Age	Condition of Cambium	Def.	Leader	Remarks
1.	Nr. Plot 1	19¾"	120'	110	Light and dry for 65' Top 55' dead	100%	dead	Tree dead Co. Dom.
2.	Plot II	12"	100'	75	Cambium at base light moist. Top 50' dead	100%	dead	Tree dying Co. Dom.
3.	Plot III	14"	136'	125	Cambium light & moist	75%	living	Tree very weak. New buds very meagre.
4.	Plot IV	16¾"	125'	97	Cambium for 90' light & moist. Top 35' dead-dry & brown.	98%	dead	Few small new buds between 60' - 90'
5.	Plot VIII	16"	135'	106	Light and moist	50% top 75%	weak	Limbs have few small new buds, but none on leader
6.	Plot IX	15"	130'	134	Cambium at base light & drying. Top 40' dry and discoloured	100%	dead	Few small buds at 60'. Tree dying.
7.	Plot XI	20"	145'	200	Only top 10' of tree dying. Cambium light & moist for 135'	100%	dead	Few small new buds at 100'. Tree very weak.
8.	Plot XVIII	23"	165'	110	Cambium for 90' discoloured but still moist. Top 25' dead.	100%	dead	Few green needles at 90'. No new buds. Tree very weak.

The 130 trees with light dry cambium are very weak and appear to be on the verge of dying.

The 256 trees with the light moist cambium will no doubt contain some borderline trees which will in all probability weaken and die, while some of them are sure to have dead tops. While the cambium on these trees was classed as light and moist it could in no way compare with the cambium moisture found in healthy trees in the valley.

It can be noted on examining the plot records that many of the 130 trees with light dry cambium are defoliated 80% or less, while many of the 256 trees with light moist cambium have been defoliated almost completely. This may be due to the fact that some trees were probably defoliated more heavily and earlier than others.

The following table gives data on eight sample trees felled in Sarita River Valley.

The eight sample trees were felled in order to obtain information as regards leaders and condition of cambium for the full height of the tree.

Six of the eight trees had top kill for 25 to 60', one had a living but very weak leader, the other sound and healthy for the full length.

An examination of similar trees later in the year may show further signs of mortality.

Insect Activity in Sarita Area.

In plot 2, one hemlock was under attack by ambrosia beetles.

In plot 9, four balsam were under attack by bark beetle(Hylurgop pinifex?) two of these trees being attacked by ambrosia beetles as well.

Also in plot 9, several adults of the long horn borer were found on the outer bark of a balsam.

In plot 18, nine hemlocks were under attack by ambrosia beetles and one hemlock under attack by bark beetle, possibly Hylurgop pinifex also.

SUMMARY FINANCIAL STATEMENT VICTORIA LABORATORY, APRIL 1947 - MARCH 31, 1948
PROJECT COST

	PROJECTS											
	General Administration	Capital	Lab. Maintenance	G.R. Wyatt	Forest Insect Survey J.M. Swaine	Land	H. Looper	Reforestation	Black Headed Budworm	Buprestis aurulenta	Extension	Nepytia
1. TRAVEL												
Personal	$ 509.90		$ 8.45		$ 329.08	$ 1066.32	$ 358.84	$ 174.57	$ 16.10	$ 39.45	$ 118.95	$ 209.00
Car	336.29											
Truck			25.46			621.49	171.84	67.61				
2. EQUIPMENT												
General		$7040.51	25.90		1079.87	461.97	52.99	8.94				
Scientific		Photo 552.59 11.45										
3. SUPPLIES												
General		514.29	35.64		1353.73	266.67	80.52	15.25		17.34		
Scientific		93.26					77.00					
Photographic	23.99	32.75				9.75		4.15				
Subsistence	12.20				938.96	63.23	798.63	4.23				
4. EXPRESS FREIGHT AND CARTAGE	12.66	131.76	66.90		5.56	7.30	10.15					
5. TELEGRAPH	1.04		16.79									.82
6. TELEPHONE			356.87		64.59					1.50		
7. MISCELLANEOUS	1.30	25.38	134.01 Postage 37.25		1337.32	75.45		3.41		.97		
8. SUB TOTAL	897.38	8401.99	707.27		5109.11	$ 2572.18	$1549.97	$ 278.16	$ 16.10	$ 59.26	$ 118.95	$ 209.82
9. SALARY	6551.45		614.50	$1761.00	3761.20	11697.79	5086.66	2059.50	97.50	35.00	173.00	335.00
10. GRAND TOTAL	$7448.83	$8401.99	$1321.77	$1761.00	8870.31	$14269.97	$6636.63	$2337.66	$113.60	$94.26	$291.95	$544.82

Meals eaten on subsistence 3891, cost $1817.25 - $ .467 each.

Mileage Cost:- E 37 - $ .0358 per mile.
E 37A - .0284 per mile.
E 87 - .0574 per mile.
E 88 - .0357 per mile.
E 89 - .0389 per mile.

EXPLANATIONS

General Administration: Includes administrative and supervisory expenses applied chiefly to Officer-In-Charge.

Capital: Includes expenses incurred in the acquisition of permanent equipment both scientific and field.

Lab. Maintenance: Includes the costs of general operation, laboratory towell service, express and freight on supplies and equipment received from Ottawa, telephone, telegraph, postage, etc.

Subsistence: has been based on the number of meals charged to each project and the average cost per meal for the season.

Car and Truck Costs: have been derived by multiplying the average cost per mile by the number of miles charged to each project. This takes into account each individual car since the cost per mile varies with the car.

Pacific 1947 Insect and Disease Species Index