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ANNUAL REPORT
FOREST INSECT RANGER ACTIVITIES
VERNON FOREST INSECT LABORATORY
1948.

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ANNUAL REPORT

FOREST INSECT RANGER ACTIVITIES

VERNON FOREST INSECT LABORATORY

1948.

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Forest Insect Ranger Personnel

Vernon Forest Insect Laboratory

1948.

S. H. Farris - Chief Ranger (Grade 2).

B. A. Sugden - Ranger (Grade 2) in charge, Kamloops District.

K. W. Clarke¹ - Ranger (Grade 1) assistant to B. A. Sugden.

D. B. Bossley - Ranger (Grade 1) in charge, Nelson District.

R. Dickson² - Ranger (Grade 1) assistant to D. B. Bossley.

W. G. Simms - Ranger (Grade 1) in charge, Fort George District.

J. Grant³ - Ranger (Grade 1)

1 appointed August 5, 1948.

2 resigned June 30, 1948.

3 transferred to Calgary Laboratory May 27, 1948.

INTRODUCTION

By S. H. Farris.

For administrative purposes, that portion of the Province of British Columbia which comes under the jurisdiction of the Vernon Forest Insect Laboratory has been divided into three main ranger districts corresponding with the Provincial Forest Service districts, namely, the Fort George, Kamloops and Nelson Districts. Under our present organization, however, the adjoining portion of the Prince Rupert Forest District has been included in the Fort George Ranger District. These divisions are shown on the accompanying map.

During the 1948 field season, forest insect rangers of the Vernon Laboratory were active throughout the above-mentioned districts. It was planned to have two rangers operating in each district as a unit, but unforeseen circumstances prevented this. At the beginning of the season, (May 27) one ranger was transferred to the Calgary establishment and at the end of June another ranger resigned. This left a staff of four men to carry on ranger duties over an area of more than 163,000 square miles. Moreover, general adverse weather conditions during the months of July and August curtailed collecting considerably. Extreme flood conditions during June also hampered progress.

Despite the lack of adequate ranger staff for near-complete coverage of the districts, the forest insect survey, during 1948, was carried on with marked improvement over the year 1947. During the field season of 1948 the volume of collections submitted by the Vernon Rangers was over three times as much as that of 1947. For comparison the following figures are tabulated:-

Table I.

NAME	COLLECTIONS.	
	1947	1948
Bossley, D. B.	50	439
Clarke, K. W.	-	175
Dickson, R.	93	138
Farris, S. H.	8	331
Grant, J.	102	35
Simms, W.	46	525
Sugden, B.	178	468
Harvey, J. K.	127	-
TOTAL - -	604	2,111

Table II shows distribution of collections throughout the Kamloops, Nelson, Fort George and Prince Rupert Districts as made in 1948 by the rangers of the Vernon Laboratory.

The discrepancy in the total collections in the two tables is due to the fact that when a collection was made jointly by two rangers, each man received credit for a collection (Table I), whereas the figures in Table II are the actual number of separate collections made in each district.

Table II.

		1948.						
		D I S T R I C T S						
Host	:	Kamloops	:	Nelson	:	Fort George	:	Prince Rupert
Coniferous	:	588	:	402	:	91	:	47
Deciduous	:	116	:	64	:	119	:	7
TOTAL	:	704	:	466	:	210	:	54

The normal collecting season for the greater part of the interior of British Columbia is from the middle of May to the end of September. In the Fort George district, however, the collecting season is shorter than those in the southern portion of the Province. During most of June this year collecting from conifers in the southern portion of the Fort George district proved futile, but good results were obtained from deciduous trees. It would seem, therefore, that collecting in this area should not be started before the first week in June. At this time it is not possible to give a general closing date for collecting in this area, as to-date insect rangers have not operated in this district after the middle of August. It is thought that the collecting season might continue into the second week of September.

This year general collecting was carried on by the rangers in the three districts as follows:

Kamloops District.....May 12 to Sept.10, incl.
 Fort George District.....June 5 to Aug. 7, incl.
 Nelson District.....June 1 to Sept. 8, incl.

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As stated, insect rangers operated only until August 7 in the Fort George district. This was due to the necessity of the writer having to return to Vernon because of illness in his family. As this district is so isolated, with sparse population and poor roads, it was considered inadvisable for one man to continue operating alone with the present type of army vehicle. Ranger Simms, therefore, was transferred to the Kamloops district to carry on regular collecting and other work in the district, as required.

In addition to making collections of forest insects in their respective districts, the rangers were employed on several other projects throughout the spring, summer and fall.

As Chief Ranger, the writer was responsible for the immediate supervision and direction of the ranger staff. Due, however, to the shortage of personnel he spent the entire period from June 3 to July 28, inclusive, in the Fort George district with Ranger Simms. In March the writer, together with Rangers Grant, Simms, Dickson, Bossley and Chief Ranger R. L. Fiddick of the Victoria Laboratory, conducted an intensive egg survey of the false hemlock looper in the Windermere district. The report on this survey was prepared by Mr. Fiddick and the results obtained were the basis for a control project undertaken by the Provincial Forest Service, which employed a helicopter for spraying over 10,000 acres of the infested area.

During the year the writer also participated in the following phases of the field work.

On June 30, with the help of Ranger Simms, a special collection of spruce budworm larvae was collected at Stanley and shipped by air mail to Dr. S. G. Smith at Laniel, Quebec, for special studies.

On July 14 a trip was made into the Pinchi Lake area with Patrolman Almond of the B. C. Forest Service. It is in this area that a bark beetle infestation was reported in 1947. This proved to be an endemic infestation in old over-mature Douglas fir and judging from the number of "grey" trees in evidence, the infestation has been in progress for a number of years.

Patrolman A. Tyaek of the Provincial Forest Service accompanied the writer on July 16 on a reconnaissance trip on Stuart Lake. Small patches of "red tops" in Douglas fir appear on either side of the Lake.

One area was visited on the west side of the Lake opposite Pinchi Bay. A logging operation is underway on this area and no freshly attacked trees were found. A rough count of growth rings was made on stumps and it was found that the stand was between 185 and 200 years old. Another area on the west side of the Lake was visited. This area, opposite Battleship Island, is on the edge of a large burn. Here several green-infested Douglas fir were encountered.

On July 20 the writer, accompanied by Ranger Simms and Mr. H. Long of Palling, B. C., inspected an area of spruce north of Palling on which the B. C. Forest Service and Mr. Long, in 1947, conducted a control operation for bark beetle, by burning. It seems evident that this operation has been successful as "pitch tubes" were found only on two trees.

At the request of C. D. Schultz and Co. of Vancouver, private foresters, and the British Columbia Forest Service, a reconnaissance of bark beetle damage to white pine on the west side of the Columbia River at Downie Creek was made on August 17 and 18 by the writer and Ranger Bossley.

On August 16 Rangers Farris and Bossley made a preliminary inspection of an area of white pine being attacked by Dendroctonus monticolae in the Mt. MacPherson vicinity southwest of Revelstoke. Later, on October 13 and 14, the intensity and extent of the infestation was determined by strip cruises. The area was mapped and a report prepared for the District Forester at Kamloops.

August 30, 31 and September 1 were spent with Ranger Simms on a survey collecting trip in the lower Kettle River valley. This area is at present in the Kamloops Insect Ranger District, but pressure of work in his district prevented Ranger Sugden from working this area.

An unknown prospector reported to Ranger Bossley that he had noticed numerous larvae on hemlock in the Banting Creek area (Monashee) during 1947. On September 8 the writer, with Ranger Bossley, made a reconnaissance of this area. Nothing in the way of an insect infestation was found.

The period from September 14 to September 19, inclusive, was spent with Mr. W. G. Mathers, officer-in-charge of the Vernon Laboratory, on a reconnaissance trip of the Big Bend and Kootenay areas. During this period tree mortality from the hemlock looper outbreak of 1946 on the Big

Band was checked. A day was spent investigating the moth flight of the false hemlock looper in the infestation area of the Windermere Valley. District Forester H. B. Forse of the Nelson Forest District was contacted on September 18 concerning the spray work and plans for a fall egg survey of the false hemlock looper. Also during this trip investigations were made in the Grand Forks area as to possible areas where mass collections of larch sawfly cocoons could be made for shipment to the Dominion Parasite Laboratory at Belleville, Ontario. Small collections of these cocoons were made for dissecting purposes to determine the percentage of parasitism by Mesoleius aulicus.

Five days, September 27 to October 1, inclusive, were spent with Rangers Simms and Bossley in the vicinity of Grand Forks, collecting larch sawfly cocoons for shipment to Belleville, Ontario. During this time, eighteen thousand cocoons were collected and shipped. The majority of these were taken from an area on the Trans-Provincial Highway, approximately seven miles east of Christina Lake. Others were collected in the vicinity of Phoenix, a former mining town northwest of Grand Forks.

An egg survey of the false hemlock looper area in the Windermere Valley was conducted in the period of October 5 to 10, inclusive, with Rangers Bossley, Simms and Chief Ranger R. L. Fiddick of the Victoria Laboratory. This survey was made to determine what population of this insect might be expected in 1949. On October 9 the writer, with Ranger Simms, checked the four sample plots established in 1947 on the false hemlock looper area for determining tree mortality resulting from current defoliation.

The tussock moth infestation areas in the vicinity of Pritchard, Heffley Creek and Paul Lake were checked for presence of eggs with Ranger Sugden on October 26, 27 and 28. Other areas in the vicinity of Carquile, Mile High Lake and Barnhart Vale were investigated for tussock moth eggs on November 4 and 5 with Ranger Sugden.

Copies of "Special Reports" submitted on the foregoing problems may be found in this report, in the section "Special Reports".

Ranger Sugden spent considerable time during the normal collecting season making larval and pupal surveys of the Douglas fir tussock moth infestations and mapping the areas. Ranger Clarke, following his appointment, assisted in this work.

The B. C. Forest Service requested an examination of timber sales X24126, X40455 and X39128 in the Mable Lake area. Ranger Sugden made the examinations on June 9 and August 24 with Forest Ranger M. Johnson of Enderby.

Special collections of spruce budworm were made by Ranger Sugden at Lillooet, Bolean Lake and the Monashee for shipment to Dr. S. G. Smith at Laniel, Quebec.

Rangers Simms and Clarke made an egg survey of the Douglas fir tussock moth area at Oregon Jack Creek and Venables Valley on October 26, 27 and 28.

Detailed information concerning these infestations may be found in the section "Special Reports".

During the summer months rearing of insect material for the insect survey at the Trinity Valley Field Station was handled by student assistants. When they left to return to university, the insect rangers carried on this work under the direct supervision of Technical Officer D. Evans until October 25, when the Station was closed for the season.

Names of the rangers, with the dates they worked at the Field Station, are as follows:

B. A. Sugden - September 15 to October 16, incl.

K. W. Clarke - September 15 to October 25, incl.

W. G. Simms - September 15 to 24, incl.
October 2 to 4, incl.
October 12 to 25, incl.

E. G. Harvey # - September 7 to October 9, incl.

Ranger Bessley, with the help of Ranger Dickson, constructed a new constant-temperature cabinet during January for the incubating of insect material during the winter months.

During the field season, April 1 to November 30, inclusive, the rangers travelled a total of 21,645 miles. Three H.U.P.'s were used for transportation at an average cost of 5.4 cents per mile. It is interesting

From Victoria Ranger Staff.

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to note here that two Chevrolet Sedan Deliveries were used by officers of the Vernon Laboratory at an average cost of 1.82 cents per mile.

Also, during the field season, the rangers prepared 436 subsistence meals in the field at an average cost of 39 cents.

Important Insect Conditions.

The Douglas Fir Tussock Moth, *Hemerocampa pseudotsugata*.

This insect caused considerable damage to Douglas fir stands in the drier sections of the Kamloops Forest District. In previous years, recorded outbreaks of this insect seldom exceeded a thousand acres. However, this year saw thousands of acres devastated in the vicinity of Monte Creek, Lower Hat Creek and Oregon Jack Creek. Other areas of heavy defoliation, although not covering as large an acreage as the others, were located at Monte Lake, Stump Lake, Wallashin, Barns Lake, Cache Creek, and in the immediate vicinity of Kamloops. In some cases yellow pine, as well as Douglas fir, were defoliated. Some mortality is expected from this year's feeding. From field observations, larval collections, cocoon collections and egg surveys it is generally believed that this year is the "crash year". Both larval and pupal mortality were very heavy, due, mainly, to disease and parasitism. Very few new egg masses were found during the egg surveys. A check of these areas in 1949 during the normal hatching season will be made to determine the presence, if any, of the larvae. A more detailed report, with accompanying maps, will be found in the section "Kamloops District" by Ranger Sugden.

Mountain Pine Beetle, *Dendroctonus monticolae*.

This beetle continued to be a pest in the white pine stands of the interior of British Columbia, particularly at Downie Creek on the Big Bend, at Mable Lake and in the Mt. MacPherson district near Revelstoke. Large borers, possibly *Monochamus* sp., have started to attack white pine trees which have been dead for two or more years on the Mabel Lake area. An accurate estimate of loss due to these borers cannot be given at this time as no sealing of these logs has been done to-date. Special reports on these areas have been submitted and copies are to be found under the section "Special Reports".

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Spruce Budworm, Choristoneura fumiferana.

This was a flight year for the spruce budworm in the spruce-balsam stands of the Interior. Special collections of this insect were made and shipped to Dr. S. G. Smith at Laniel, Quebec, for special studies. Larvae were quite numerous near the Monashee summit, Bolean Lake and at Lillooet, but defoliation was very light, with no discoloration showing from feeding. Infestations were also reported to be active at Sock Lake and Parky Lake in the North Thompson district. Very light defoliation of spruce was noted south of Pinkut Lake on the Burns Lake - Babine Lake road. No larvae, pupae or adults were taken, but empty pupal cases were found. It is believed that the spruce budworm was responsible for the light defoliation. A check of this area will be made, if possible, during the 1949 field season.

False Hemlock Looper, Negyptia ? canosaria.

The outbreak of this insect in the Windermere Valley, first reported in 1947, was again active this year, covering an area from Salter Creek on the west side of Columbia Lake to a point about 10 miles north of Radium. As this outbreak constituted a serious threat to the Christmas tree industry of the Valley, the British Columbia Forest Service undertook to spray the most severely attacked areas with an application of DDT from a helicopter. The spraying, together with disease and parasites, has almost completely wiped out the looper. An egg survey made over this area during October revealed only five eggs. A more detailed report of this insect outbreak may be found in the main portion of the Annual Report of the Vernon Laboratory.

Larch Sawfly, Pristiphora erichsonii.

Scattered infestations of this insect occurred in the Grand Forks District this year. Light to medium defoliation of larch was found in the vicinity of McRae Creek on the east side of Christina Lake and on the west side of the Cascade summit on the Grand Forks - Rossland road. Light to medium defoliation occurred also in the vicinity of Holt and Phoenix. Some larvae were taken in collections in the Monashee district, but little defoliation was noted.

Hemlock Looper, Lambdina fuscicollis lugubrosa.

The hemlock looper outbreak of 1947 in the Big Bend area has completely subsided. No larvae of this insect were taken in collections

made in this area. Due to flood conditions, no survey was made this year of the Lardeau country, where an infestation of hemlock looper was in progress during 1947. A survey of this area will be made in 1949.

Hemlock Sawfly, Neodiprion tsugae.

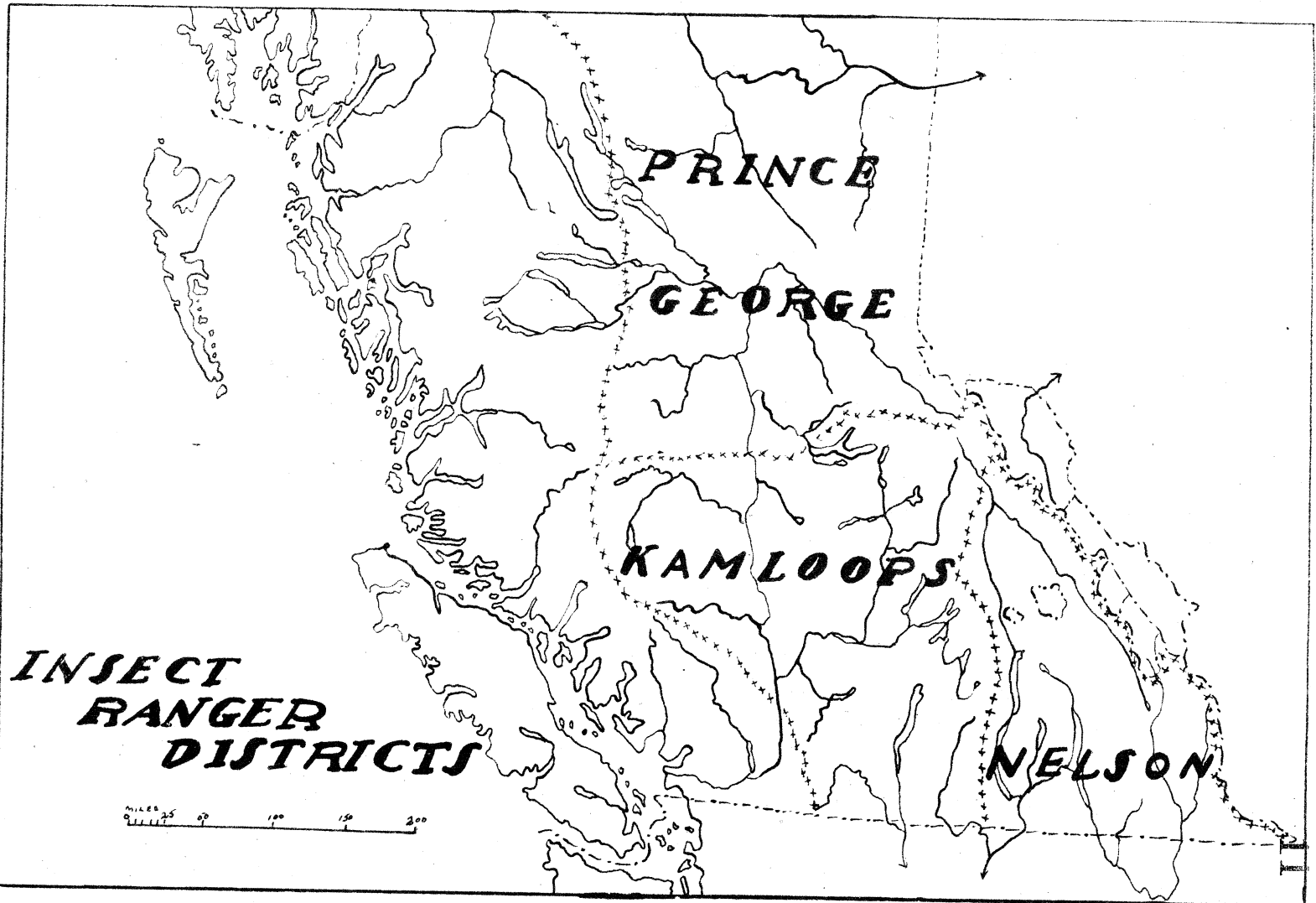
The 1947 infestation of this insect in the Big Bend region seems to have subsided. A collection of approximately 200 larvae of this insect was received from Patrolman K. East from Trout Lake, in the Lardeau district. As mentioned above, no survey was made in this area, but it will be checked in 1949.

C O N C L U S I O N .

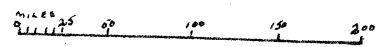
Although this year has shown considerable progress in the organization and work of the insect ranger staff, there is still plenty of room for improvement. The districts were not covered very thoroughly, and proper coverage is impossible unless the ranger staff is increased considerably and more vehicles are added to the present fleet of three trucks.

The false hemlock looper and the Douglas fir tussock moth were the two defoliators which caused the most intensive damage to our Interior forests this year. Bark beetles continued to take a heavy toll of the forest, especially in the white pine stands.

Excellent co-operation was received from all personnel of the British Columbia Forest Service. To this Department, especially the forest rangers and their assistants, we extend our appreciation.



**INSECT
RANGER
DISTRICTS**



ANNUAL REPORT
KAMLOOPS FOREST DISTRICT

By E. A. Sugden.

INTRODUCTION.

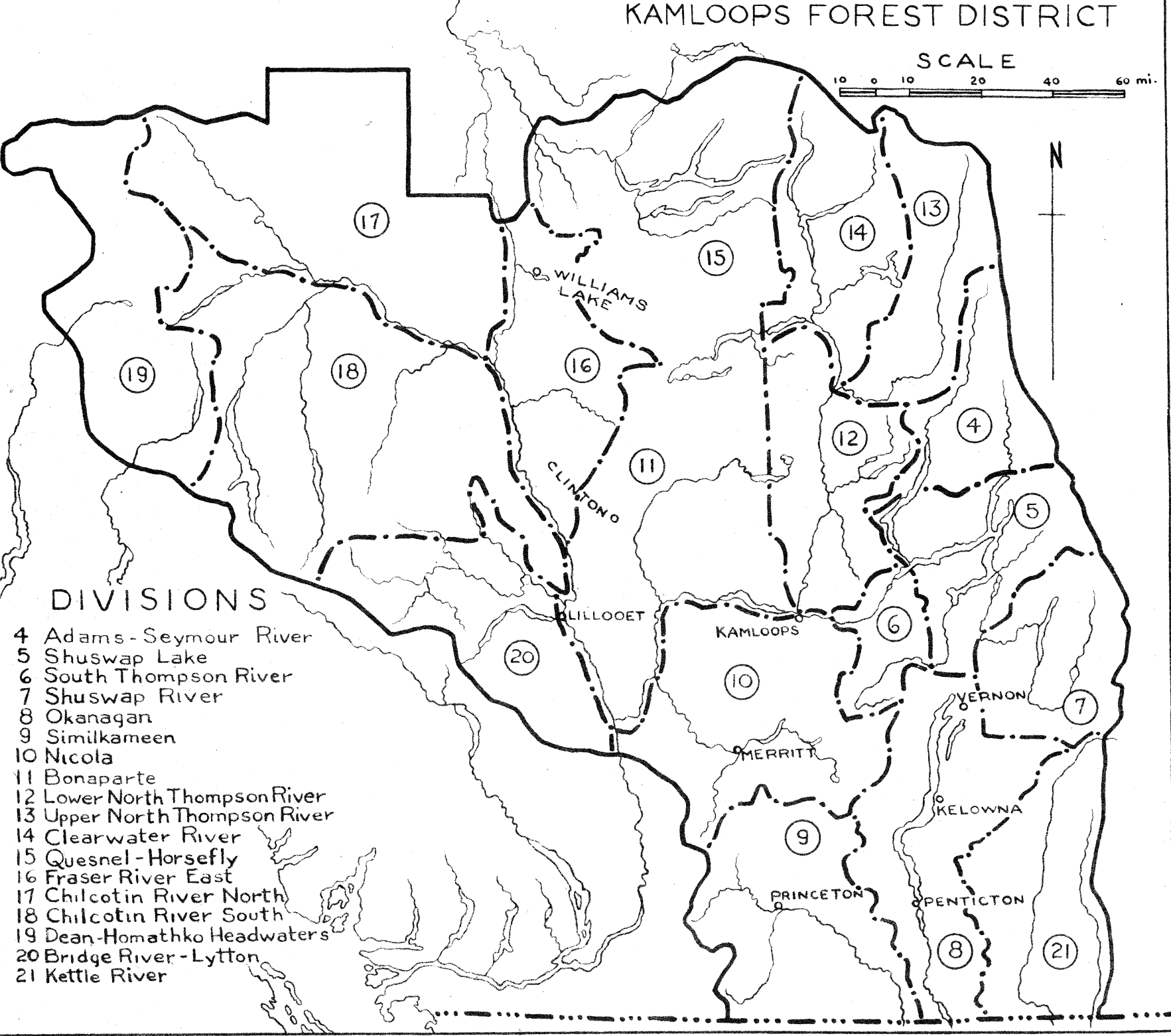
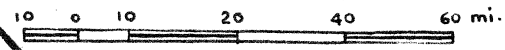
The field season began in the Kamloops Forest District on May 12 and continued until the completion of a Douglas fir tussock moth egg survey on November 6. There was a period from September 13 to October 16 when field work was suspended because the assistance of the personnel of this district was needed to carry on the work at Trinity Valley Insectary after the student assistants had returned to school.

During the field season the following districts were covered, - Okanagan, Similkameen, Nicola, Bridge River, Lytton, Bonaparte, Lower North Thompson River, South Thompson River, Shuswap Lake and Shuswap River. These divisions are shown on an accompanying map and are numbered to aid in locating their position in the district. Later in the report, as each division is discussed, the number of the division corresponding to its number on the map will be included with the title. Work accomplished during the season consisted of larval collections, mapping of infested areas, cocoon surveys of infestations, fall egg surveys, investigation of bark beetle activity, installation of permanent sampling points and investigation of reported infestations.

In the spring of the year a schedule was arranged so that one week of the field season could be allotted to each division in the Kamloops Forest District. There are eighteen divisions, comprising approximately thirty-nine million acres. Of these, two divisions were not accessible. The program started June 1 and was expected to continue until the end of September, after which date collecting is not practical, due to the scarcity of insects. After operating successfully for four weeks it had to be discontinued, necessitated primarily by the time required to map and collect data regarding large areas of infestation by Douglas fir tussock moth.

KAMLOOPS FOREST DISTRICT

SCALE



DIVISIONS

- 4 Adams-Seymour River
- 5 Shuswap Lake
- 6 South Thompson River
- 7 Shuswap River
- 8 Okanagan
- 9 Similkameen
- 10 Nicola
- 11 Bonaparte
- 12 Lower North Thompson River
- 13 Upper North Thompson River
- 14 Clearwater River
- 15 Quesnel-Horsefly
- 16 Fraser River East
- 17 Chilcotin River North
- 18 Chilcotin River South
- 19 Dean-Homathko Headwaters
- 20 Bridge River-Lytton
- 21 Kettle River

Due to geographical position and climatic conditions, insect activity is about a month later in the Prince George Forest District. For this reason, Chief Ranger Farris and Ranger Simms, who were going "north", collected in the Kamloops District until June 1. From this date until August the district had one insect ranger, B. Sugden. On August 5, W. Clarke joined the staff and was assigned here.

Throughout June gas rationing and flood conditions somewhat hampered travel. There was scarcely a route available where bridges were not washed out or portions of roads inundated. During this period it was necessary sometimes to drive the "Hups" on flooded roads for considerable distances, where the water occasionally was three and one-half feet deep.

Okanagan Division - 8.

This area consists mainly of a narrow, moderately deep north and south valley, with its greatest width at the northern end. Okanagan Lake is located in the upper two-thirds of the valley. The Lake is seventy miles long and ranges from three-quarters to two and one-half miles in width. The hills rise steeply from semi-arid valleys to the six thousand foot level of the higher peaks. The valleys and lower levels of the hills are, for the most part, open range lands, where the chief vegetation is sage brush (Artemisa tridentata) and bunch grass (Agropyron spicatum), which is typical of the interior dry belt. In the narrow draws may be found a scattering of chokecherry (Prunus demissa), saskatoon (Anelanchier cusickii) and aspen (Populus tremuloides). Higher up the slopes at about 2,000 feet occur open park-like stands of yellow pine (Pinus ponderosa). In their upper portions these stands become a mixture of pine and Douglas fir (Pseudotsuga taxifolia). Farther up the hillsides, above the yellow pine, are forests composed of fir, larch (Larix occidentalis), lodgepole pine (Pinus contorta), and in the upper reaches some white pine (Pinus monticola). Small pure, or nearly pure, stands of each of these species may be found throughout. Above the 3,500 foot level increased rainfall encourages denser stands of fir, larch, lodgepole pine and white pine. Spruce (Picea engelmanni), hemlock (Tsuga heterophylla), mountain fir (Abies lasiocarpa) and cedar (Thuja plicata) begin to appear in increasing numbers. Above 4,500 feet

and on the high, moist plateaus stands composed almost entirely of spruce and mountain fir are found. Broadleaf tree species most often encountered through the division are aspen, black cottonwood (Populus trichocarpa), birch (Betula occidentalis) and alder (Alnus sitchensis), (A. tenuifolia). Of these, black cottonwood is the most important commercially.

Road conditions are generally good in the Okanagan division during the drier months of the year. Though some of the secondary and logging roads are rough, travel is possible, if not always comfortable. During the wet months of spring, many of the secondary and logging roads become slippery, making travel by automobile hazardous. This is especially true of the logging roads on the mountain sides and high plateaus, where excessive rainfall during the wet seasons makes them, in many instances, impassable. During the winter little used secondary and logging roads are seldom cleared of snow, making travel at this time impractical, and on some roads, at the higher levels, impossible.

Permanent Sampling Points.

Three permanent sampling points were established in the Okanagan division. When selecting the sites for sampling points an effort was made to choose a site which best represented the timber types found in the division.

Permanent Sampling Point K.1 Tag No. 4701. - The best approach to this point is by the Armstrong - Salmon River road. The cutoff from this road to the Vernon - Kamloops road is used for 1.3 miles. From this point an old logging road is taken until a gate, marking the north boundary of the Salmon River Indian Reserve, is reached. From the gate the blazed tree marking the sampling point is visible due north, about twenty yards distant. Forest type at the sampling point is yellow pine. The stand is open growing and park-like, with very little understory or ground cover. The surrounding country is semi-arid, with occasional patches of open range, typical of much of the division where this species of pine occurs. No unusual insect conditions were noted through this area when the site was selected in early June. Photographs of the sampling points showing size of timber, ground cover and surrounding country are on Plate I, Figures 1, 2 and 3.

Permanent Sampling Point K.2 Tag No. 4702. - This point is

located four-tenths of a mile up a little used logging road. The tagged and blazed tree marking the sampling point thirty feet west of the logging road is also visible from the edge of the road. The intersection of the logging road with the Vernon - Kamloops road is 3.2 miles northwest along the main road from the store at O'Keefe's Siding. Forest type is Douglas fir and yellow pine in an open growing stand, with a light mixture of aspen and lodgepole pine. Insect activity appeared normal. The plot is located on Indian Reserve land and is used mainly for grazing purposes. Photographs showing the aspect of the plot are on Plate II, Figures 4, 5 and 6.

Permanent Sampling Point K.3 Tag No. 4703. - The site of point K.3 is on a moderately steep mountain side 1.7 miles up a logging road from the Armstrong - Vernon road. The intersection of the logging road with the highway is seven-tenths of a mile north of Larkin's store. The blazed tree marking the sampling point is just ten feet east of the logging road and easily visible. Approach to this plot should not be attempted during wet weather, as the road has some short grades of about 30 per cent, with a predominance of clay in the road's surface. Forest type is Douglas fir and larch, with some yellow pine, lodgepole pine and birch scattered through the stand. The area was logged ten to fifteen years ago and reproduction, mostly Douglas fir, is good. Though no defoliation was evident there appeared to be larger than normal population of sawflies, tentatively identified as Neodiprion abietis, existing here. These larvae were taken while making collections at the sampling point. The point K.3 is located on Crown land. Descriptive photographs of the site are shown on Plate III, in Figures 7, 8 and 9.

Important Insect Conditions.

Douglas fir tussock moth, Hemerocampa pseudotsugata. In 1946 - 47 this moth caused some damage by defoliation to the Douglas fir in the southern two-thirds of the Okanagan division. The outbreaks, mostly small, ranged in size from small isolated groups of five or six trees to areas of sixty to seventy acres. The localities affected by the outbreaks were Vernon and vicinity, Larkin, Lavington, Hydraulic Creek near Kelowna, and Sweets' Bridge southeast of Falkland. Control measures were taken in two small areas by the B. C. Forest Service on

their Suppression Crew camp near Vernon and on their Patrolman's property at Sweets' Bridge. Very good results were obtained by spraying with a mixture of 4 pounds of 50 per cent wettable DDF to 100 gallons of water. Other areas of former 1947 infestations checked this year showed no signs of fresh defoliation. Spot samples were taken by beatings made along traverses through the centre and edge of the infested areas. Results of sampling showed the present tussock moth population to be very light. Biotic factors were probably responsible for the abrupt drop of tussock moth activity through these areas.

Spruce budworm, Choristoneura fumiferana. 1948 was the flight year for the spruce budworm in the spruce - mountain fir stands. Larvae were quite numerous in the vicinity of Bolean Lake northeast of Falkland, at an altitude of 5,000 feet. Defoliation ranged from ten to twenty per cent of the new growth, which seemed surprisingly light considering the number of larvae observed. Very little discoloration from feeding was noted through the area. Collections of larvae made here were sent to Laniel, Que. for use in experiments being conducted by Dr. Smith. A small infestation by the budworm has been active in the past near the headwaters of Martin and Irish Creeks, east of the head of Okanagan Lake. These areas were checked in 1946 by S. H. Farris. At that time a slight brownish tinge was evident in the timber due to damage by feeding of the larvae. Ranger J. Hayhurst of the B. C. Forest Service, aware of this infestation, reported that he had been through this area three times during the summer of 1948. During these trips he took special note of the spruce and mountain fir. He reported that there were very few larvae evident and no noticeable signs of defoliation.

Fall Webworm, Hyphantria textor. Damage to deciduous trees and shrubs by larvae of this moth is common throughout most of the Okanagan division. There seems to be no preferred host among the broad-leaf trees, as most of those species represented here are subject to attack by the larvae of this moth. In some cases, the webs spun encompass a whole tree.

Alder leaf beetle, Altica bimarginata. The leaves of the alders Alnus sitchensis and A. tenuifolia bordering the streams and rivers were heavily skeletonized by the larvae and adults of this beetle. These trees have little or no commercial value. Damaged areas were particularly common through the northern portion of the division.

Collecting from conifers is generally good in the Okanagan division after June 15. Prior to this date larval collections are poor. Over-wintering species, such as Protobocarmia porcelaria, Paraphia piniata and Campaea perlata were most often found in collections. In May and early June adults taken in collections were numerous. However, the greatest number of these had very little bearing to the host from which they were taken, but seemed to be using the trees on which the collections were made solely as resting places. Throughout the division Douglas fir was generally the most favored host tree of the conifers. One collection from three firs produced as many as fourteen species of defoliating larvae.

The first collections made in this division were during May. They were generally poor in regard to the number of larvae collected. Later in the season they were much better. A total of 81 collections was made in the division, mainly from Douglas fir, yellow pine, lodgepole pine and birch.

B. C. Forest Service personnel contacted in the Okanagan division were Ranger J. W. Hayhurst and Assistant Ranger G. G. Jones of Vernon; Ranger R. B. Eden of Kelowna; Assistant Ranger H. G. Hewlett of Westbank; Ranger C. Perrin and Assistant Ranger G. H. Fewtrell of Penticton. None of these men had any insect damage to report.

Similkameen Division - 9.

This division is located in the southwest corner of the Kamloops Forest District, its western boundary being the boundary dividing the Kamloops and Coast Forest Districts. The division extends north from the Canada - United States Boundary for about seventy miles. The valleys are narrow, deep and winding, with a general northwest - southeast trend. From the valley floors the mountains rise precipitously to five and six thousand feet. Cliffs and rock slides are common on the steep hillsides. The mountain sides are mostly sparsely timbered, with a concentration of trees in the narrow canyons and high plateaus. Climatically the division, located in the Interior dry belt, is very similar to the neighboring Okanagan division previously discussed. The eastern two-thirds of the division is semi-arid with few trees and much open rangeland, whereas the western third, receiving more rainfall, produces denser stands of timber. In the valleys, and along the Similkameen River and its tribu-

tries, are found black cottonwood, alder, birch (Betula occidentalis), fir, spruce and the occasional cedar (Thuja plicata). On the lower slopes through the drier sections, sage brush and grass are commonly found with occasional patches of saskatoon, chokecherry, aspen and sumac (Rhus sp.). Here also occur mixed open growing stands of yellow pine and fir, while higher up the slopes lodgepole pine and fir are found. Above four thousand feet, forests composed of lodgepole pine, spruce and mountain fir begin to appear. Old fire scars are common throughout this division.

Travel conditions are moderately good on the main and secondary roads in the Similkameen division. Quite a large territory is made accessible here by the use of logging, mining and cattle company roads. Travel on these "side" roads, however, should be avoided, if possible, during wet weather because the majority are not "all weather roads". During June of this year many portions of the road bordering the Similkameen River between Hedley and Princeton was under from one to two feet of water.

Due to the high altitude of much of this division insect activity is somewhat later than would be expected from its geographic position. In June when this area was visited very few larvae were collected. Those that were found and sent in to the survey seemed too small for successful rearing or identification. No recent insect damage was observed, though a few dead yellow pine were noted just north of Princeton. These trees had been dead for some time. Examination disclosed bark beetle galleries, so possibly damage by Dendroctonus sp. was the cause of death. A check of the living pine made in this area revealed no recent damage by bark beetle. Twelve collections were made in the division. Trees sampled were Douglas fir, yellow pine and aspen.

Ranger J. H. Dearing and Patrolman R. K. Phillips were contacted at Princeton. There were, to their knowledge, no outstanding insect activity in their district at that time.

Nicola Division - 10.

The chief industry through the division, beef cattle raising, is indicative of the type of country. Open, grassy rangeland dominates much of the valleys, lower levels and benches. The floor of the valley

is about two thousand feet above sea level. The hills rise gradually from the valley, broken in their ascent by a series of benches. Generally, the mountains rising to four and five thousand feet are less steep and rocky than those of the neighboring division of Similkameen. Two large plateaus, Nicola and Douglas, account for much of the area in the Nicola division.

The timber is open growing, giving a park-like appearance to the forests. On the lower plateaus and benches occur good stands of yellow pine. These stands, in some localities, are mixed with Douglas fir and lodgepole pine. Above the three thousand foot level Douglas fir, lodgepole pine and spruce are found in mixed stands, with the occasional pure stand of each species scattered throughout. Here also cedar and white pine occur in small quantities. On the higher plateaus spruce, lodgepole pine and mountain fir are commonly found. The most abundant conifer in the division is Douglas fir, with yellow pine second. The commonest broadleaf tree species throughout is aspen. Shrubs encountered most often are chokecherry, saskatoon, wild rose (*Rosa nutkana*) and scopelallie (*Shepherdia canadensis*). Black cottonwood, willow, alder and birch are found in varying quantities bordering the streams and swampy areas.

Travel conditions through the division are moderately good on the main and secondary roads. Some of the latter are mostly clay and are often slippery during wet weather. Conditions for travel on logging roads during wet weather are uncertain. It is advisable, before using these roads, to obtain some information regarding their condition.

Important Forest Insects of the Nicola Division.

Douglas Fir Tussock Moth - Considerable damage was done by the larvae of this moth to the Douglas fir in the vicinity of Nicola, Stump and Trapp Lakes. This infestation was located in terrain typical of all the large tussock moth outbreaks in 1948. It was apparent this year that the moth prefers a semi-arid site for its activities. The forest type was Douglas fir in pure stands or mixed with yellow pine, with fir as the most abundant species. This year the infestations seemed to start in fir of marginal type. The outbreaks in the Nicola Division are confined

to an isolated strip of timber separated from the main stands in the region by a large expanse of open rangeland. For this reason it is extremely unlikely to spread beyond its present boundaries. There were, this year, about three hundred acres under attack. The area was checked twice during the season. Field observations indicate a "crash" year, so in 1949 little or no defoliation should occur. Unfortunately, however, the damage suffered this year will ultimately result in the death of a number of the trees, while others, left in a weakened condition, will be vulnerable to attack by bark beetle. The infestation was not mapped because, in the opinion of the B. C. Forest Service, the value of the timber involved and the isolated nature of the stand did not warrant the time required to complete the task.

Bark beetle - A survey was made in the vicinity of Aspen Grove, the site of a bark beetle (Dendroctonus monticolae and D. brevicornis) outbreak in the yellow pine stands during the early nineteen thirties. A small quantity of long-dead, apparently beetle-killed yellow pine were found. No "red top" or green infested pine were located here this year. These areas of former beetle infestations will be checked yearly in view of the possibility of a recurrence of an abnormally large beetle population.

Fall webworm - Defoliation by the larvae of this moth occurred frequently throughout the Nicola division. However, the defoliation of the deciduous trees and shrubs does not seem to appreciably impair their vigor. This may be due, in part, to the fact that most severe defoliation occurs comparatively late in the growing season.

Satin Moth - Stilpnotia salicis. This species was accidentally introduced from Europe many years ago and was first noted in large numbers in the coast regions. During 1933 its presence was reported from the interior of the Province in the vicinity of Lillooet. Since then it has spread slowly from this locality. During 1946 one light infestation occurred in the Nicola division. It was located in the Botanic Creek valley at an elevation of 1500 to 2000 feet in several hundred acres of aspen about seven miles from Lytton. There was no evidence of the existence of the satin moth in this area during the 1948 survey.

Unfortunately, due to unforeseen problems and a shortage of insect rangers, time was not available for proper coverage of the division

of the Kamloops Forest District this year. For example, if a division were covered in the early part of the year, little information is obtainable regarding insect enemies of the forests which may become active later in the season. In most cases time is not available for a second coverage of a division later in the season, so that an overall picture of insect populations is difficult to obtain.

The survey in the Nicola division was conducted in early June. Collecting at that time was poor; the larvae taken, other than P. poreelaria, were very small. Eighteen collections were made through this division. Tree species used for sampling were Douglas fir, yellow pine, spruce and willow.

Personnel of the B. C. Forest Service contacted in the division were Ranger R. C. Hewlett and Patrolman A. G. Cameron of Merritt, Assistant Ranger A. G. Kent of Lytton. None of these men had any insect damage to report. An effort is made, whenever possible, to accompany personnel of the Forest Service on their field trips to arouse, as much as possible, their interest in the importance of information obtained through their collections of forest insects. This year, in divisions where Douglas fir tussock moth outbreaks occurred, rangers and their assistants became keenly aware of the destructive power of these defoliators. It is likely that more trees were killed by tussock moth in these divisions this year than by fire.

Bridge River - Lytton Division, - 20.

This division lies west of the Fraser River. The eastern portion is very similar to much of the Nicola division. It is semi-arid, open country with grass, sagebrush, marginal yellow pine and Douglas fir. Toward the western and northern part of the division there is a change to a more rugged type of country with steep, rocky mountains, some of the higher peaks exceeding 9,000 feet. The hills are generally sparsely timbered and follow the usual pattern of semi-arid localities, with Douglas fir and yellow pine at the lower levels, and spruce and mountain fir stands confined to the higher elevations. A little cedar is found in the valleys bordering the Bridge River. Most abundant conifers in the division are Douglas fir and yellow pine. Deciduous trees occurring here are black cottonwood, aspen and birch. The area is drained mainly by the Bridge River, its

tributaries and Seaton Lake.

Though most of the surfaces of the main and secondary roads are of a dirt and gravel mixture, they are moderately good through most of the year. To reach the Bridge River territory in the northwestern part of the division, the Pacific Great Eastern Railroad must be used from Lillooet to Shalalth. If travelling by automobile and its use is required for travel in the Bridge River district, the vehicle must be transported by rail from Lillooet to Shalalth.

Important Insect Conditions of the
Bridge River - Lytton Division.

Spruce Budworm. This tortricid has been established north and west of Lillooet. Each season personnel from the parasite laboratory at Belleville conduct extensive collections of larvae and pupae for parasite studies. Tree mortality from defoliation is light. During June of this year, when the area was visited, a slight reddish cast was evident at the lower levels through the Douglas fir. There was also a noticeable thinning of the needles.

During the period spent in this division collecting was somewhat hampered by almost continuous rain. Eleven collections were made from Douglas fir, yellow pine and black cottonwood. No satin moth larvae, formerly reported from this area, were taken.

Mr. H. Copel and Mr. J. H. McLeod of the Belleville Laboratory, and Patrolman M. Taylor of the B. C. Forest Service were contacted in this division. Mr. Taylor had no insect problems to report.

Bonaparte Division - 11.

The Bonaparte division lies due north of the Nicola division and is topographically the same in many respects as this division. The main drainage for the former is supplied by the Bonaparte River and its tributaries. There are large areas of open rangeland, with patches of

yellow pine, Douglas fir and aspen at the lower levels. The sparsely-timbered mountains rise gradually from the narrow valleys to 4,000 and 5,000 feet. On the lower slopes occur stands of yellow pine and Douglas fir. Higher up the hillsides the yellow pine disappears and is replaced in the open-growing fir stands by lodgepole pine. Toward the northern part of the division the aspect of the country gradually changes to resemble the Cariboo parklands. Here lodgepole pine becomes increasingly frequent in the Douglas fir stands, with occasional islands of pure lodgepole pine. The country is less mountainous, tending to be more rolling and open. Numerous small lakes and sloughs dot the upper portion of this area. It is just north of Clinton in the Bonaparte division that the northern limit for the natural distribution of yellow pine occurs.

The main road running generally north and south through the division is the Cariboo Highway, a gravel road, which is kept open the year around to most traffic. Two secondary roads help considerably in covering this area during the summer survey. The first from Clinton to Lillooet over Pavilion mountain is a narrow dirt road with some very sharp corners and steep pitches. It is not recommended for travel during a prolonged spell of wet weather or in winter. The second, also a dirt road, leaves the Cariboo Highway seven miles north of Cache Creek at Carquile, and travels in a westerly direction through Lower Hat Creek Valley and Marble Canyon to Lillooet. There are also numerous logging roads through the division, which make considerably more of this area accessible by automobile.

Important Insect conditions of the Bonaparte Division.

Douglas Fir Tussock Moth - Two areas of infestation by the Douglas fir tussock moth occurred this year in the Bonaparte division. The larger was located at Oregon Jack Creek and Venables Valley at about the 1100-foot level. Much damage was suffered by the Douglas fir, and in some cases yellow pine, over about 4,000 acres. Many trees were completely stripped of needles, while defoliation of others ranged from 10 to 75 per cent. Trees being attacked varied from seedlings to semi-mature. The

forest type was Douglas fir and yellow pine in open-growing stands, broken occasionally by strips of open range. The climate is usually dry and in the lower levels semi-arid. Photographs on Plate IV, Figures 10 and 11, show defoliation at Oregon Jack Creek.

The area under discussion was mapped in August. During the season the infestation was visited three times, once in the latter part of June for a larval survey, again in August to map the area and make cocoon collections, and in late October by W. Simms for an egg survey. The information obtained from these surveys indicates an extremely small tussock moth population throughout the area in 1949. Parasitism was heavy and no doubt assisted somewhat in controlling the outbreak. However, disease tentatively identified as polyhedral virus was the major factor contributing to the sudden drop in tussock moth population.

The second tussock moth outbreak affecting approximately 5,200 acres was located in Lower Hat Creek Valley, near Carquile. Climatically and topographically this area is much the same as Oregon Jack Creek. The outbreak was mapped and larval, cocoon and egg surveys were conducted through the season. Findings from the surveys paralleled those of the Oregon Jack Creek and Venables Valley infestation. Disease again appeared to be the main cause of the heavy larval mortality. During the egg survey egg masses were practically non-existent, indicating a very light population here next year. Photographs illustrating defoliation are shown on Plate IV, Figure 12. Should more detailed information regarding these infestations be required, it may be obtained from the maps and reports made during the surveys and accompanying this report.

Satin Moth - During 1946 a light infestation by this moth occurred in the European white poplars, Populus alba, in the vicinity of the Maiden Creek Ranch, ten miles south of Clinton. This is the northernmost limit of the satin moth yet recorded. This locality was checked this year, but no signs of the moth were found.

During late July adults of this species were observed frequently during the evenings in the vicinity of Cache Creek. This is the first record regarding the existence of satin moth in this locality. A check made of the area did not reveal any noticeable defoliation to the trees and shrubs.

Yellow pine sawfly, Neediprion sp. - This sawfly, as yet unnamed, was first brought to the attention of the Vernon Laboratory by a report from a ranger of the B. C. Forest Service in 1946. To date this infestation is small and is confined to marginal-type yellow pine just north of the Trans-Canada Highway east and west of Deadman River. The pine is scattered and though defoliation was heavy, up to 100 per cent on individual trees, due to the nature of the stand not many trees were involved. Feeding takes place early in the season, being completed by the end of June, when the larvae begin to enter the soil to spin their cocoons. When the infestation was checked this year the larvae had entered the soil. Five trees were badly defoliated. Two collections of approximately one hundred cocoons were removed from soil under the trees and shipped to Vernon. The infestation was confined within the same boundaries as in the two preceding years. Other areas of similar timber type and climate have been checked, but as yet no new locality producing this species has been found.

As previously stated, much of the lower levels and valley floor is barren and semi-arid. The chief vegetation here is sagebrush, grass and cactus, Opuntia sp. For this reason most of the collecting is done on the hillsides and higher benches. Fifty-nine collections were made in this division. Trees from which collections were made were mainly Douglas fir, yellow pine, alder and birch.

Personnel of the B. C. Forest Service contacted in the division were Ranger C. E. Robertson and Assistant Ranger J. St. Laurent of Clinton. They had no outstanding insect problems to report. Patrolman L. J. McKenna of Ashcroft assisted in mapping the Douglas fir tussock moth infestation at Oregon Jack Creek and Venables Valley. His co-operation was very much appreciated.

Lower North Thompson River Division - 12.

The main valley of the division is long and narrow and forms the basin for the North Thompson River. The southern portion north to Barriere lies within the interior dry belt. A gradual change takes place north of Barriere as the country gradually becomes part of the interior wet belt. This difference is very apparent at Clearwater. The elevation

of the valley at the south end of the division is 1,160 feet; there is a moderate change to 1,300 feet in the northern portion. The mountains rise gradually from the valley to an elevation of 4,000 and 6,000 feet. Throughout the southern portion the lower hillsides are sparsely timbered by mixed stands of yellow pine and Douglas fir. Higher up the slopes are found chiefly Douglas fir and lodgepole pine. Just north and south of Barriere, lodgepole pine becomes increasingly frequent in the valleys and on the hillsides. North of Barriere, increased rainfall encourages denser timber stands composed of a mixture of Douglas fir, lodgepole pine, cedar, hemlock, white pine, spruce and some yellow pine. On the mountain tops and high plateaus stands of spruce, lodgepole pine and mountain fir are found throughout.

The main road through the division follows, more-or-less, the general course of the North Thompson River. It is a dirt road, which, during extended wet spells, does become slippery. There are numerous secondary and logging roads which may be used. A good secondary road making accessible the territory lying between the North Thompson River and Adams Lake leaves the main road at Hefley Creek and rejoins the main road just south of Barriere.

Important Insect Conditions of the North Thompson River Division.

Douglas Fir Tussock Moth - Some damage to the fir by tussock moth larvae was evident this year in the southern portion of the division. One mile north of Hefley Creek the Douglas fir showed signs of light feeding confined mostly to the upper-third of the trees. The infestation extends for eight miles up the east side of the valley, along the base of the hills. It is not of a continuous nature but is a series of spot outbreaks. An egg survey was conducted during the fall. Although a few egg masses were found, they were not numerous enough anywhere in the area to produce a large population next year.

Tussock moth was also active in the vicinity of the western end of Paul Lake. The outbreak was confined to marginal-type Douglas fir, scattered over about forty acres of rangeland. A search for egg masses was conducted in this locality and only one was found. Many egg masses

from the previous year were located, indicating a marked decline in the moth population.

Spruce Budworm. - An infestation has existed in the vicinity of Sock Lake for a number of years. In 1946 a slight reddish cast in foliage caused by the feeding of the larvae, was noted by S. H. Farris when he visited the area. The forest is a spruce and mountain fir type at an elevation of over 4,000 feet. The budworm there has a two-year life cycle. This year when the area was checked no discoloration was observed. Logging operations are taking place in the vicinity of Sock Lake at the present time.

Douglas Fir Bark Beetle, Dendroctonus pseudotsugae. - The bark beetles have been active in the vicinity of Paul and Louis Lakes, about twelve miles northeast of Kamloops, for some time. This light infestation is located in the timber surrounding Paul Lake and in the area between Paul and Louis Lakes. It is not concentrated, but scattered through the stand in groups of from one to three trees. Information received from the B. C. Forest Service indicates that this has been the nature of the infestation since it was first brought to their attention. There has, during recent years, been no marked increase in the beetle population.

Other insects causing minor damage in the division are fall webworm and alder leaf beetle. The trees and shrubs of the black cottonwood, willow, alder and chokecherry are of little value commercially, though they are, no doubt, indirectly valuable as ground cover.

Eighteen collections were made in the division this year. The trees from which the collections were taken were Douglas fir, yellow pine, lodgepole pine and aspen.

Personnel of the B. C. Forest Service visited were Ranger H. G. Mayson and Assistant Ranger K. Petersen. Mr. Mayson reported heavy defoliation and mortality of the spruce and lodgepole pine in the Fishtrap area. Time was not available to check the area this year. However, a four-day pack trip is planned for next summer to conduct a survey through this area.

South Thompson River Division - 6.

This division is located in the interior dry belt, where much of the land is sparsely timbered, with many areas of open rangeland. Throughout the semi-arid valleys and lower slopes the vegetation consists mainly of sagebrush, grass with a scattering of aspen, choke-cherry and saskatoon in the draws. Here, also, may be found isolated clumps of yellow pine and Douglas fir. At about 2,000 feet open park-like stands, composed of yellow pine and Douglas fir, occur. Through these some pure stands of each species are found. Higher up the slopes the yellow pine disappears and lodgepole pine begins to appear with the fir. Burnt-over areas in this division seem to reproduce mainly lodgepole pine. On the high plateaus lodgepole pine, spruce and mountain fir represent the main tree species. The principal drainage systems for the division are the South Thompson River and its tributaries in the northern part and the Salmon River system in the southern part. The narrow valleys have a general north and south trend. From the valleys the hills rise with moderate steepness to 4,000 and 5,000 feet. Rocky outcrops and boulders are commonly observed on the hillsides.

Throughout most of the year the main and secondary roads are in fair condition. Numerous logging roads in this division give access to much of the back country. Because of the park-like stands of timber in many parts, travel is possible by automobile even on logging roads long neglected.

Important Insect Conditions in the South Thompson River Division.

Douglas Fir Tussock Moth. - One active infestation, lying between Ducks Range and Monte Creek in the division, was mapped this year. Conditions here were much the same as those tussock moth infestations already described as occurring in other divisions. The outbreak was large, covering about 3,200 acres of open-growing Douglas fir and yellow pine ranging in size from seedlings to semi-mature trees. Defoliation in the area was moderately heavy, with occasional patches of two to four acres where the trees were completely stripped. Through these areas of very

heavy feeding, yellow pine was used readily by the larvae as host trees. Parasites, tentatively identified as Hyposoter sp. and Pimpla pedalis, were numerous throughout the infestation. These parasites undoubtedly helped to control the tussock moth. However, the main factor appeared to be diseases, of which polyhedral virus was the most common. Larval, cocoon and egg surveys were conducted here this year. During the fall egg survey, only one fresh egg mass was located throughout the division, indicating a light population of the tussock moth in this area in 1949. Figure 13, on Plate V, shows damage to Douglas fir and yellow pine here.

Two former infestations were surveyed this season. These, active in 1947, were located at Pritchard and the Indian Reserve near Squilax. No noticeable defoliation was observed in either locality, though a light population of the moth existed as revealed by "beatings" taken through the areas.

Green Rose Chafer, Dichelonyx backii. - A noticeable thinning of Douglas fir foliage by this beetle occurred at about the 2,500 foot level in the localities of Ducks Range, Robbins Range, Westwood and Falkland. This infestation, distributed over from forty to sixty acres in each locality, was rather light and spotty. A beating from the lower branches of a twenty-foot fir usually produced from forty to fifty beetles.

Fall webworm and alder leaf beetle damage was common throughout the division. The trees and shrubs being attacked, however, are of little commercial value, consisting mainly of black cottonwood, aspen, alder, chokecherry, saskatoon and willow.

When making collections on the sites of Douglas fir tussock moth infestations, traverses were made through the infestations. Usually one tree in each chain was selected as a sample tree. A count of the larvae on three branches, about two feet long, was made. Larvae taken in this manner made up one collection. Other collections through the division were made by the standard method of beating three trees to make one collection. Ninety-five collections were made in the division from Douglas fir, yellow pine, lodgepole pine, birch, willow and aspen.

Personnel of the B. C. Forest Service contacted this year were Col. Parlow, District Forester, and Ranger Williams of Kamloops, Ranger H. Ferguson and Assistant Ranger Whelan of Chase and Assistant Ranger R. Sweet of Sweet's Bridge. These men were quite perturbed concerning the

activity of the tussock moth in the division. Mr. Sweet's assistance in locating corner posts and little-known logging roads during the mapping of the infestation at Ducks Range was appreciated. Other than the tussock moth, the rangers had no further insect problems to report.

Shuswap Lake Division - 5.

A transition zone exists from the interior dry belt to the interior wet belt in this division. The western and southern portions bordering on the dry belt have many of its characteristics. Through the central, northern and eastern parts, increased rainfall encourages timber types similar to the wet coastal region of British Columbia. The area is drained primarily by the Shuswap Lake system located centrally in the division. The heavily timbered mountains rise steeply from the shores of the Lake. In the valleys and along the lakeshores pure cedar stands occur in forests composed of Douglas fir, cedar, hemlock and white pine. Higher up the slopes to about 4,000 feet Douglas fir, the most abundant species, is found associated with larch, spruce, hemlock and cedar. Above this level, up to 6,000 feet, stands composed mainly of spruce, mountain fir and lodgepole pine are present. Better stands of deciduous trees grow in the moist valleys and lower slopes than in any of the divisions discussed so far. Most important of these trees are black cottonwood and birch. Some birch have been observed in this area with a D.B.H. of thirty inches.

Much of the western, southern and eastern portions of the division are accessible by motor vehicle. The main highway in the southern part follows generally the southern shoreline of Shuswap Lake. It turns in a northerly direction at Sicamous, making the eastern portion conveniently accessible. Many secondary and logging roads branch from the main highway, giving quick access to considerably more of the division. The most practical means of approaching the central and northern parts of the division is by boat on Shuswap Lake. This Lake has one of the longest shorelines of any of the lakes in British Columbia. Much of the interior and northern portions of the division can be easily reached by boat as a result of its 700 miles of shoreline.

Important Insects of the
Shuswap Lake Division.

Western mountain pine beetle, Dendroctonus monticolae. - In the fall of 1947 an extensive survey of bark beetle activity in the Shuswap Lake and Malakwa areas was made. It was found that though bark beetle did exist in these areas, they appeared to be decreasing in number. From a distance, numerous "red tops" could be observed. On examination, some of these white pine showed no signs of beetle damage, but appeared to have been killed by blister rust. This fungus disease seemed to be the cause of some of the mortality in white pine in these areas. Time was not available for an extensive survey this year. Only one area at Malakwa was checked. A traverse 24 chains by $\frac{1}{2}$ chain through the infested area showed only three green-infested white pine out of one hundred and thirteen counted. Damage by this beetle seems to be decreasing here this year.

American poplar leaf beetle, Phytodecta americana. - In a small area midway between Salmon Arm and Notch Hill the adults and larvae of this beetle were commonly taken in collections. At Tappen the aspen were completely stripped over an area of about two acres. The trees were small, ranging in height from 6 to 25 feet, with a D.B.H. of 1 to 4 inches.

Other insects causing damage were the fall webworm and alder leaf beetle. Defoliation by fall webworm was noted throughout, but did not seem as common as in the drier divisions. Alder leaf beetle damage was extremely common, particularly in the Salmon River valley. The brownish tinge caused by the skeletonization of the alder leaves by the larvae and adults was observed for miles along the course of the River.

Collecting was particularly good in this division, due, possibly, to the large and varied number of host trees. Collections were made from Douglas fir, hemlock, white pine, spruce, cedar, ledgespole pine, birch, alder, cottonwood and willow. Eighty-four collections were made in this division.

Through the season personnel of the B. C. Forest Service visited were Assistant Ranger O. Paquette of Celista, Ranger J. Boydeil and Assistant Ranger J. L. Humphrey of Salmon Arm, Ranger J. A. Sim, Assistant Ranger C. Mizon and Patrolman P. Neilson of Sicamous. None of these men had any insect problems to report.

Shuswap River Division - 7.

As in the Shuswap Lake division, this division lies partly within the transition zone of the dry and wet belts. In the southern quarter the climate and timber are nearly typical of the dry belt. A marked change in vegetation takes place in the central and northern parts as the wet belt is reached. The division is divided by numerous narrow north and south valleys. Mountains rise from the valleys with moderate steepness, to four and five thousand feet in the south, and seven thousand feet on the higher peaks in the Monashee Range through the northern section.

In the valleys and on the lower slopes in the south, yellow pine and Douglas fir dominate the stands. In lesser quantities, with these trees, occur larch and lodgepole pine. Higher up the mountain sides, above thirty-five hundred feet, Douglas fir, the most abundant species, is found in stands mixed with lodgepole pine, larch and a little cedar.

In the wetter portions of the division at lower levels Douglas fir, cedar, larch, lodgepole pine, spruce, white pine, hemlock and mountain fir are closely associated in the forests. Throughout these mixed stands, small pure or nearly pure stands of each of these species are occasionally found. At higher levels, above 3,500 feet, the timber is generally Douglas fir, larch and lodgepole pine, which changes to become predominantly spruce, mountain fir and lodgepole pine on the high plateaus throughout the division.

The main and secondary roads in the division are mostly of dirt and gravel construction. However, they are, as a rule, in fairly good condition during most of the year. Due to the fact that the manufacture of forest products is one of the main industries in this division, many logging roads exist which may be utilized to gain quick access to many "out-of-the-way" places. It is advisable, before using these roads, to obtain information regarding logging truck schedules, as the roads are usually narrow, leaving no space for vehicles to pass.

Important Insect Conditions in the Shuswap River Division.

Poplar Sawfly, Nematus nigriiventris. - Defoliation by the larvae of the poplar sawfly has been taking place in the vicinity of Shuswap Falls

for at least three years. When the survey was conducted this year the black cottonwood were defoliated from 40 to 100 per cent over an area about two and one-half miles by one-half to one-quarter of a mile. Defoliation takes place early in the season, from about the middle of May to the middle of June. By the second week in July most of the signs of sawfly damage have disappeared as new leaves have replaced those destroyed by the larvae. A plot was established here in 1947 to determine tree mortality due to the heavy defoliation. When the ten cottonwoods on the plot were checked this year, defoliation on eight trees was 100 per cent and on 2 trees 70 per cent. None of the trees seemed to be weakened noticeably after three years of heavy defoliation.

Mountain Pine Beetle. - The activity of this beetle has decreased to a marked degree in the Mabel Lake region since 1946 and 1947. The drop in the beetle population may be caused, in part, by the scarcity of living host trees, due to the heavy toll of white pine taken by the beetle during the two preceding years. This year only four small patches of fresh "red tops" were located. Two of these were confined to timber sale X24126, at present being logged. No green-infested trees were located through this area. The other two patches of "red tops" were at the north end of the Lake, on the west side near the mouth of Noissey Creek. It was here that the infestation was first noted in the early 1930's. This area is described on the B. C. Forest Service maps as "logged" and "burn".

There was a report of bark beetle damage to white pine near the headwaters of Kingfisher Creek in the Mabel Lake area. It is located about seven miles up the creek; five of the seven miles may be reached by logging road. An investigation of this report is planned for 1949, as the information pertaining to the infestation was received too late in the season this year.

Spruce Budworm. - The larvae of spruce budworm were fairly common near the Monashee Summit at about the 4,500-foot level this year. No discoloration to the foliage of spruce and mountain fir was noted. Heavy rain-fall prevailed during the time spent in this area. However, over two hundred larvae were collected by hand. Fifty spruce budworm larvae were shipped from here to Dr. Smith at Laniel, Quebec, for study.

Larch Sawfly, Pristiphora erichsonii. - This sawfly was first noted defoliating the larch near the junction of the Monashee and Creighton Valley roads by Mr. W. G. Mathers in 1942. Shortly after this was reported

the sawfly was found through an area extending from the lower part of Trinity Valley south to the B.X. District near Vernon. This infestation built up to population peak in 1946. During 1947 very few of the larvae were found in these areas, due mainly to the control effected by the parasites Tritneptis klugii and Mesoleius tenthredinis. The parasite M. tenthredinis was released in this area during 1941 of parasites reared from collections of larch sawfly cocoons taken in the Grand Forks district. This year very few larch sawfly were taken in collections, so damage by this species during 1949 is unlikely to occur.

A trip was made to Mabel Lake this year in company with Ranger M. A. Johnson of the B. C. Forest Service at Enderby. The purpose of the trip was to check bark beetle activity on timber sale X24126 at Mabel Lake. During this survey collections were made in the area between Enderby and the Lake from Douglas fir, spruce, white pine and cedar. Other members of the B. C. Forest Service contacted were Assistant Ranger J. F. Laforge of Enderby, Patrolman R. C. Hall of Mabel Lake and Assistant Ranger A. Corbett of Lumby.

Mr. Melpas, a mill operator, in charge of logging timber sale X24126 at Mabel Lake, reported that he was taking quite a loss in white pine from large borers. This report was investigated and it was found that white pine, dead more than a year, had been quite heavily attacked by a large borer, possibly Monochamus sp. While making the investigation it was noted also that logs decked in the woods were being attacked by ambrosia beetle. The suggestion was made to Mr. Melpas that he would find less damage from the beetle if he arranged to have his logs put in the Lake soon after felling.

Collecting was found to be generally good through this division. On the hillsides and benches bordering the Shuswap River good stands of birch are found. Collecting was particularly good from this species during the late August and early September period. A total of ninety collections were made in this division.

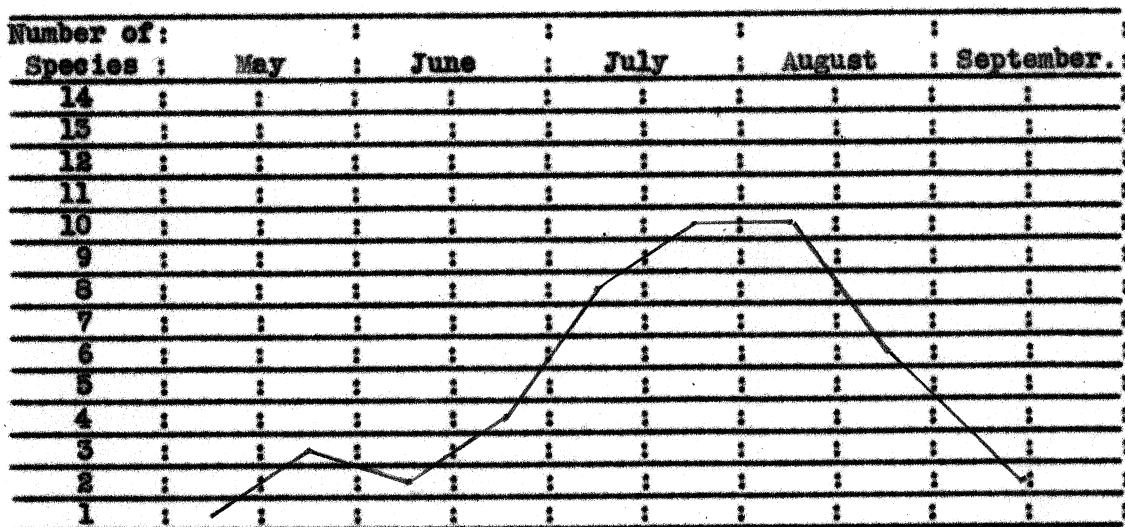
A species tentatively identified as Eupithecia ? gibsonata was taken commonly while collecting from cedar in an area lying between Mabel Lake and Enderby. No survey record exists at the Laboratory in Vernon of this moth occurring in the interior of the Province. Until this year the only specimens of E. ? gibsonata were sent in from the coast and were generally considered to be restricted to that area.

Semiothisa granitata appeared frequently in collections from Douglas fir and hemlock throughout the Shuswap Lake and Shuswap River divisions. No damage has been attributed to this species. However, from its constant appearance in collections this year the possibility is indicated of an increase in population of this moth throughout these divisions.

S U M M A R Y

The most destructive defoliator this year in the Kamloops Forest District was the Douglas fir tussock moth. It was apparent, though, in all the areas where a large population of this moth existed this year that 1948 was the "crash" year for this species. Other areas having a larger-than-normal population of this moth, as shown from collections in the summer, were checked this fall by egg surveys. Although some egg masses were found, they were not numerous enough to produce a large population in 1949. Unfortunately, due to the shortage of insect rangers in the district this year, certain areas in which the species may be increasing could have been missed. It is regrettable that a more thorough coverage was impossible and that, therefore, a definite statement concerning the possible recurrence of damage by this pest cannot be made. Acre plots are planned for heavily defoliated areas to determine tree mortality from defoliation by the larvae of the tussock moth.

As stated earlier in the report collecting was rather poor through May and early June. The following graph was prepared from replies to enclosure slips of collections from conifers to illustrate the trend in collections by species during the period from May to the end of September. The replies to collections made at infested areas are not included in compiling the graph.



Total collections made this year throughout the Kamloops district from conifers and deciduous trees amounted to 468. The following table shows the number of collections made from each tree species.

CONIFEROUS.

Tree species	Total No. of Coll.	Neg. Coll.
Douglas fir	265	-
Yellow pine	18	1
Lodgepole pine	7	-
White pine	10	-
Spruce	21	-
Cedar	22	5
Hemlock	15	1
Larch	8	-
Balsam	8	-

DECIDUOUS

Tree species	Total No. of Coll.	Neg. Coll.
Birch	36	-
Alder	24	1
Aspen	12	-
Black cottonwood	4	-
Willow	11	-
Maple	3	-
Wild rose	3	-
Mountain Ash	2	-
Hazel	1	-

In addition, other officers of the Vernon Insect Ranger staff made 98 collections in the Okanagan division and 79 in the Shuswap River division, making a grand total of 645 collections for the Kamloops district.



Fig.1 Permanent sampling
Point K.1.



Fig.2 Ground Cover at
Point K.1.

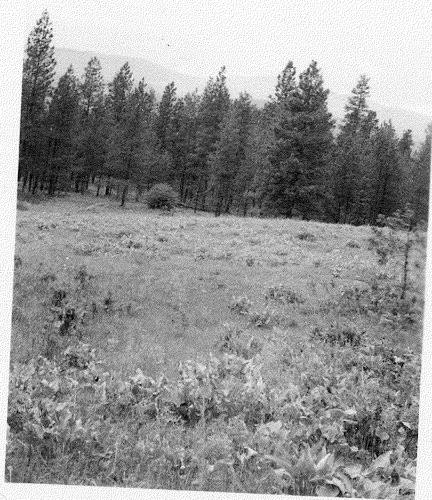


Fig.3 Aspect of the country
surrounding Point K.1.



Fig.4. Permanent Sampling Point K.2.



Fig.5. Ground Cover at Point K.2.



Fig.6. Aspect of Country surrounding Point K.3.



Fig.7. Permanent Sampling
Point K.3.



Fig.8. Ground Cover at
Point K.3.



Fig.9. Aspect of forest
surrounding K.3.



Fig.10. Defoliation by Douglas fir tussock moth - Oregon Jack Creek.

Fig.11. Tussock moth damage to D.fir and Y. pine - Oregon Jack Creek.

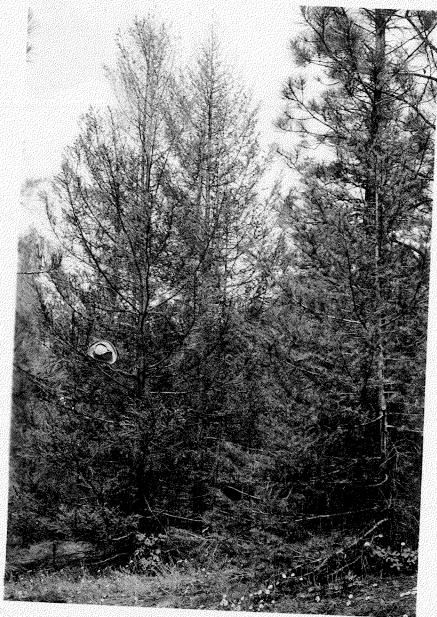


Fig.12. Early season damage at Lower Hat Creek showing typical tree-top defoliation by the early instars of tussock moth larvae.



Fig.13. Defoliation of Douglas fir and yellow pine at Ducks Range.



Fig.14. A logging road - Interior wet belt.



Fig.15. A valley - Interior dry belt.



Fig.16. Trinity Valley Field Station.

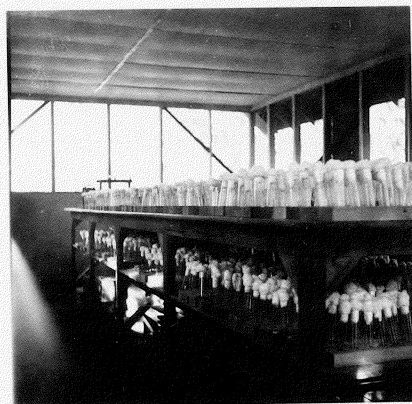
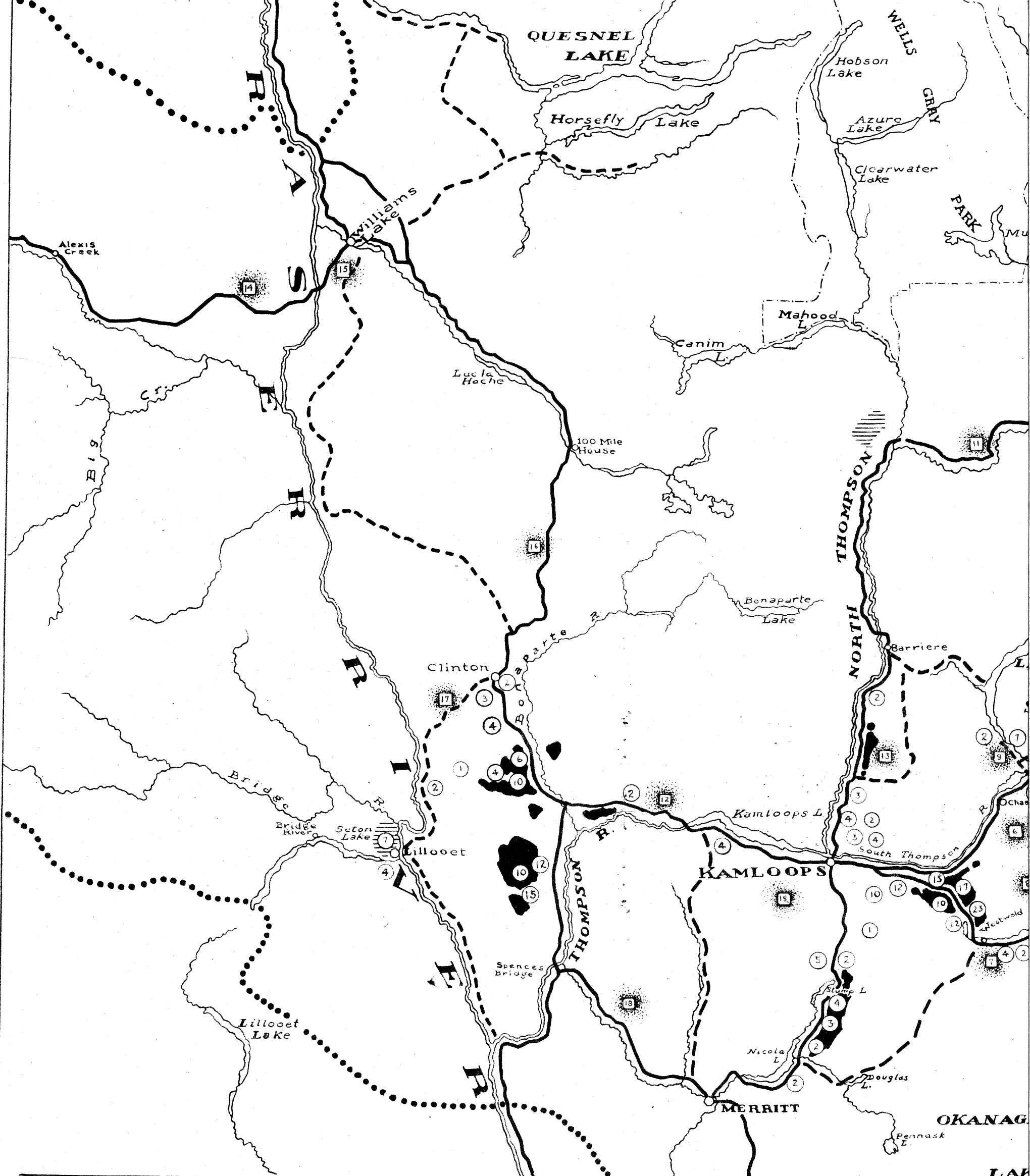


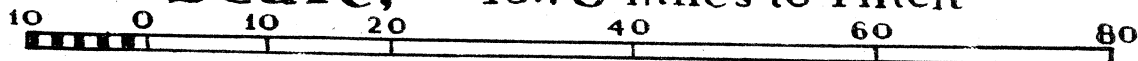
Fig.17. Interior of Insectary at Trinity Valley Field station showing rearing vials.



LEGEND

- Main Highways ---
- Local Roads ---
- District Boundaries
- Collections ○
- Permanent Sample Plots □
- Permanent Collecting Points ▽
- Douglas Fir Tussock Moth Infestations ■
- Mountain Pine Beetle Infestations ▨
- Spruce Budworm Infestations ▬

Scale, 15.78 miles to 1 inch



KAMLOOPS INSECT RANGER DISTRICT

ANNUAL REPORT

NELSON FOREST DISTRICT, 1948.

By D. B. Bossley.

Introduction.

The Nelson Forest District consists of seventeen Ranger Districts, covering sixteen drainage basins and including a total of 5,980,800 forest productive acres. During the four months of the survey season, June to September inclusive, work carried out in this district was designed to cover as much of the area as possible.

Two egg surveys were made of the false hemlock looper (Nepytia nr. canosaria) during March and September, 1948, in the Upper Columbia River Valley. One cruise was made of the white pine beetle (Dendroctonus monticolae) in white pine (Pinus monticola) in the Big Bend area of the Columbia River during August and another in the Revelstoke area during September.

During September, larch sawfly cocoons (Pristiphora erichsonii) were collected by rangers of the Vernon Laboratory in the Grand Forks area, for the use of the Belleville Parasite Laboratory.

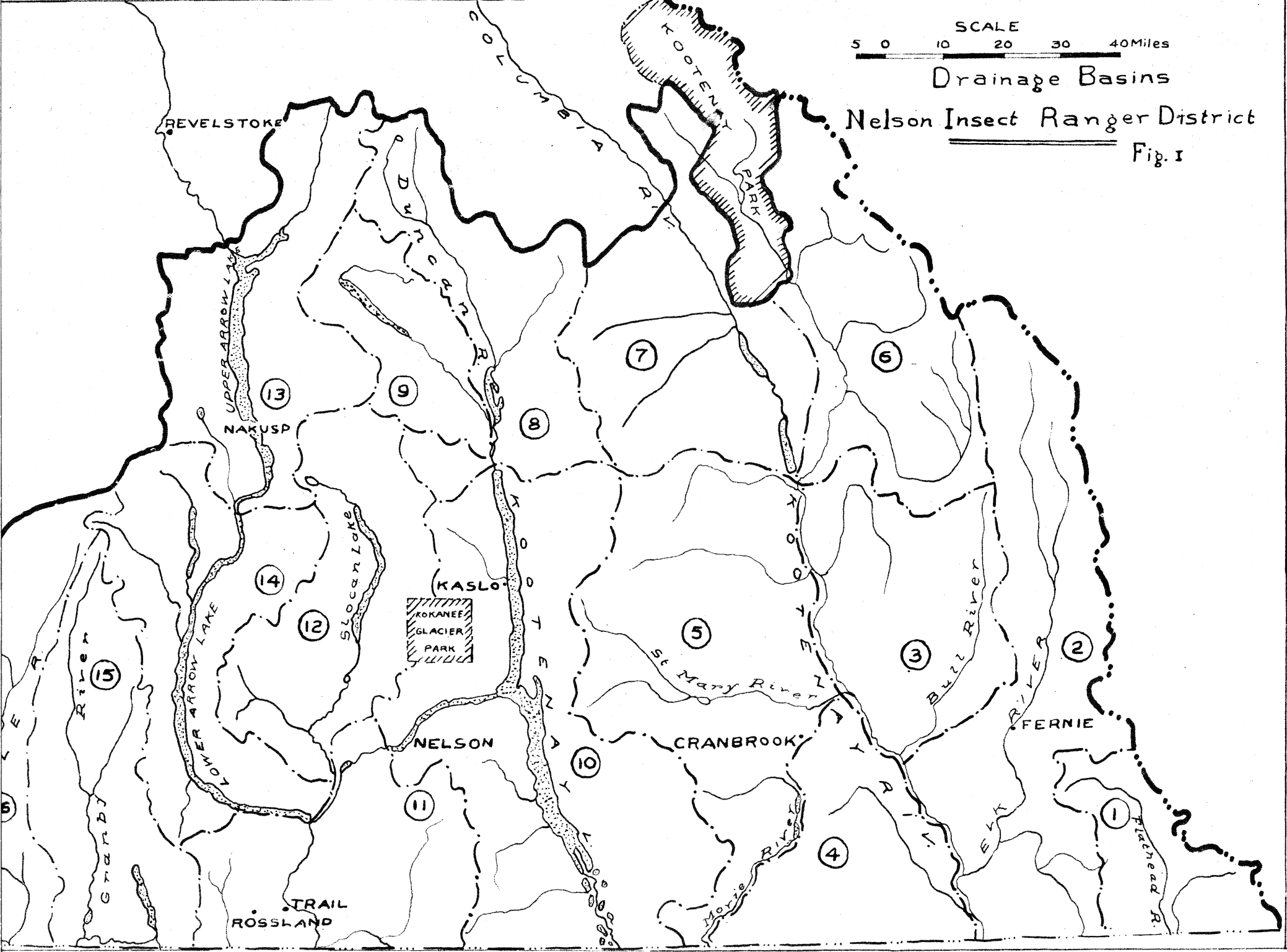
In the latter part of June the writer aided in the work on the spraying project undertaken by the B. C. Forest Service in the Upper Columbia Valley, which dealt with the false hemlock looper infestation.

Four hundred and thirty-nine collections, including negatives, were submitted to the Vernon Laboratory. Sampling covered the beating of 1,317 trees of both coniferous and deciduous species.

SCALE
5 0 10 20 30 40 Miles

Drainage Basins
Nelson Insect Ranger District

Fig. I



Following is a comparison of collections relative to their host trees.

<u>Coniferous</u>		<u>Deciduous</u>	
<u>Species</u>	<u>Collections</u>	<u>Species</u>	<u>Collections</u>
D. Fir	108	Aspen	12
Spruce	30	Alder	5
Lodgepole Pine	35	Willow	34
Larch	75	Maple	2
W. Pine	39	Juniper	2
Hemlock	46	Birch	4
Cedar	18	Hazel	3
Y. Pine	6	Choke Cherry	2
Balsam Fir	<u>18</u>		
Total Collections -	<u>375</u>	Total Collections -	<u>64</u>

Due to flood conditions and adverse weather collecting was somewhat curtailed during the 1948 collecting season.

A cover map of the Nelson Forest District bearing the following legend is attached.

- "Routes of Travel"
- "Main Highways"
- "District Boundary"
- "Permanent Plots"
- "Random Collecting Points"
- "Infestations".

The Nelson Forest District has been divided into the following sixteen drainage basins, which are shown by numbers in an accompanying map (Figure 1).

<u>Drainage Basin</u>	<u>Number</u>
Flathead River	(1)
Elk River	(2)
Kootenay River East	(3)
Yahk	(4)
Kootenay River West	(5)
Upper Kootenay River	(6)
Upper Columbia River	(7)
Duncan River	(8)
Lardeau River	(9)
Kootenay Lake	(10)
Lower Columbia River	(11)
Slocan	(12)
Upper Arrow Lake	(13)
Lower Arrow Lake	(14)
Granby	(15)
Kettle River	(16)

Areas Surveyed.

- A. Arrowhead Forest Ranger District - Upper Arrow Lake drainage basin (15).
- B. Nakusp Forest Ranger District - Upper Arrow Lake drainage basin (13).
- C. Grand Forks Forest Ranger District - Granby drainage basin (15).
- D. Edgewood Forest Ranger District - Lower Arrow Lake drainage basin (14).
- E. Nelson Forest Ranger District - Kootenay Lake drainage basin (10).
- F. Kaslo Forest Ranger District - Kootenay Lake drainage basin (10).
- G. Creston Forest Ranger District - Kootenay Lake drainage basin (10).
- H. Granbrook Forest Ranger District - Kootenay River West drainage basin (5).
- I. Canal Flats and Invermere Forest Ranger Districts - Upper Columbia River drainage basin (7).
- J. Big Bend Columbia River Area - Revelstoke to Golden.

Details of Individual Areas.

A. The Arrowhead Forest Ranger District.

This district, situated on the northern end of the Upper Arrow Lake in drainage basin (13), is so located as to be approached by highway south from Revelstoke or by boat which travels north from Nakusp. The Trout Lake area of this district can be reached by ferry only via the northeast arm of the Upper Arrow Lake. Twelve miles of mountainous mine road connects Trout Lake with the ferry at Beaton. The area surrounding Trout Lake is quite mountainous, but passable in most cases by old mine roads. Trout Lake, approximately sixteen miles in length, is connected on the southeast end by railway with Argenta, located at the most northerly point of the Kootenay Lake. As most of the Arrowhead Forest Ranger District is accessible by boat only, travel in this country is very difficult.

Cedar - Hemlock is the principal forest type of the region. A large area of this country, burned by fire (date of fire unknown), is slowly forming a cover of raspberry (Rubus strigosus), thimbleberry (Rubus parviflorus), and salmonberry (Rubus spectabilis). A light reproduction of western hemlock and red cedar is also noted, but is patchy and widely scattered throughout the Trout Lake and Lardeau Creek areas.

Permanent Sampling Stations. No permanent sampling stations have been established in the Arrowhead Forest Ranger District. One random sample was made on western red cedar at Sidmouth Ferry, which is located on the northwest boundary of the Arrowhead Forest Ranger District.

Results. Two trips were made into this area to contact Ranger L. G. Hesketh for the use of boat transportation. The first trip made in June found Ranger Hesketh away at Trout Lake on inspection work. The second try made during the month of August found the district with but one boat available for use on fire protection, so without the use of a boat in this district, survey work was abandoned until 1949.

Important Forest Insect Conditions. An infestation on western hemlock by the hemlock looper

(Lambdina fuscicollis lugubrosa) in the Lardeau and Trout Lake area reported on in 1947, was not visited during 1948 due to lack of boat transportation. A collection of 200 larvae of the hemlock sawfly (Neodiprion tsugae) was sent to the Vernon Laboratory by Patrolman K. H. Kast from this area in 1948. A survey of this area will be made in 1949.

B. Nakusp Forest Ranger District.

The Nakusp district, located on the south end of the Upper Arrow Lake in drainage basin (13), can be approached from the south by Highway #4, or from the Upper Arrow Lake south from Arrowhead, or the Lower Arrow Lake north from Castlegar. The north boundary crosses the Upper Arrow Lake at St. Leon Creek. The south boundary recrosses the Upper Arrow Lake approximately three miles south of Burton. In addition to the main highway in this district there are only three roads: (a) eight miles of mining road northeast from Burton to Mineral City, (b) ten miles of settlers' road on the west side of Upper Arrow Lake (reached by ferry from Arrow Park), (c) six miles of logging road east from Brouse to Wilson Lake. Brouse is located approximately three miles east of Nakusp. In that area adjacent to Brouse and Wilson Lake the timber type is overmature western hemlock, red cedar, with some white pine. As considerable logging has been done in this area there is but a small percentage of second growth and little or no reproduction. However, some second growth white pine logs are being removed and some western red cedar poles are being cut. In the area of Arrow Park, Graham Landing and West Demars, located south of Nakusp, timber type is overmature western hemlock and red cedar. However, considerable second growth and reproduction of the same species also occurs here. In that portion of the district lying west of the Upper Arrow Lake and south of McDonald Creek to Burton, considerable lodgepole pine reproduction and second growth are the results of a heavy burn during the middle twenties.

Permanent Sampling Stations. No permanent sampling stations were established during 1948, but the following two permanent plots were established during 1947.

Plot N-4.

Location: Eight miles south of Nakusp and one-half chain

west of the south end of Dog Creek Bridge
on Crown land west of highway.

Stand: Douglas fir with two per cent mixed
deciduous.

Area: $\frac{1}{2}$ acre.

Altitude: 2100 feet.

Plot N-5.

Location: 8.6 miles south of Nakusp and one-half
chain west of main highway from New
Denver to Nakusp.

Stand: Second growth white pine.

Area: 8 X .5 chains.

Random Samples. Ten random samples were made. One sample sub-
mitted to Vernon Laboratory from Plot N-5
yielded two larvae of Melanolophia imitata species.

Results. Three collections from western hemlock, western larch
and lodgepole pine made adjacent to plot #N-5 were
negative. One collection made off Douglas fir yielded one larva
of Melanolophia imitata species.

Along the six miles of logging road from Brouse to Wilson
Lake, five random samples were made. Of these, three were negative
and the remaining two yielded three larvae of Semiothisa granitata
taken from western larch and a series of Adelges cooleyi from
Engelmann spruce.

As no survey was conducted in the areas adjacent to the
Upper Arrow Lake proper, no information is available for the areas
immediately surrounding the Lake.

White pine blister rust (Gronartium ribicola) is noted to
be quite rampant throughout the West Kootenays, particularly those
areas known as the Nakusp, New Denver and Kaslo Forest Ranger Districts.

G. Grand Forks Forest Ranger District.

Situated at the extreme southern part of the Granby River
drainage basin (15) it is bordered on the west by the Kettle Valley
District and on the east by the Lower Arrow Lake and the Edgewood
and Rosslund Forest Ranger District. On the south is the International

Boundary. This district may be approached from either the east from Rossland or the west from Osoyoos by highway. There are also three points of entry by highway from the United States; Cascade, Carson and Midway. In addition to the main highway, approximately eighty-five miles of arterial roads are traversable by truck or car and located in such a manner as to permit excellent coverage of this area. These roads are situated as follows: (a) from Greenwood north ten miles up tributary of Boundary Creek; (b) from Grand Forks, following Burrell Creek north for a distance of approximately forty miles; (c) north from Grand Forks, following the west side of Granby River for a distance of sixteen miles, terminating at Lynch Creek; (d) along the east shore of Christina Lake for a distance of ten miles, terminating at Texas Point. A branch of the latter road follows the McRae Creek east for a distance of approximately five miles. Considerable mileage may be made in the vicinity of the old Phoenix Smelter on the mining railway grades and roads. This road over the Phoenix Mountain also connects with the town of Greenwood. The overall timber type of the Granby drainage basin (15) where the survey was conducted this year tends to run to yellow pine (*Pinus ponderosa*), western larch (*Larix occidentalis*) and lodgepole pine (*Pinus contorta*).

Permanent Sampling Stations. No permanent sampling stations were established in this area during 1948 but permanent plots, N-11 and N-12, were established during 1947. Particulars of these two plots are as follows:

Plot N-11.

Location: $\frac{1}{2}$ mile north of the Phoenix and Grand Forks highway junction, $\frac{1}{2}$ chain west of highway.
 Stand: Lodgepole pine and western larch.
 Area: 7 X .5 chains.
 Exposure: north.

Plot N-12.

Location: 1 mile east of Eholt Creek, $\frac{1}{2}$ chain north of road.
 Stand: Lodgepole pine.
 Area: 10 X .5 chains.
 Exposure: north.

Random Samples. Twenty-six random samples were made in this district. One negative collection was made on permanent plot N-11.

from lodgepole pine.

Results. Collections made from western larch in these areas yielded 375 Pristiphora erichsonii larvae in six samples.

In the Gilpin area 700 larvae of the fall webworm, Hyphantria textor, were collected off two bushes of choke cherry (Prunus demissa). These two collections, made in the vicinity of the main highway, were from the only bushes under attack from this insect. Some phalaenid species were collected from western larch.

Eighteen thousand cocoons of the European larch sawfly were collected by members of the Vernon Ranger staff in an effort to secure parasites for the Belleville Parasite Laboratory. These cocoons were collected during the latter part of September on an area seven miles northeast of Cascade in the vicinity of the Cascade-to-Rossland highway. In the McRae Creek area, which is northeast of Christina Lake in the Grand Forks district, 173 larvae were taken in two collections, N228-48, N229-48. This area, covering Lots 2828, 2829, 2827 and 2826 is approximately two miles long by three-quarters of a mile in width. The timber stand being of second growth and mixed, runs approximately 50 per cent larch. On a complete survey of the area it was found that it was only lightly defoliated throughout. The larvae were found to be working in small, widely scattered colonies.

Important Forest Insect Conditions. Defoliation of western larch by the European larch sawfly varied from light to medium in the areas of the Cascade highway from seven mile to the west summit. Light defoliation by this insect was also noted in the Christina Lake and Phoenix mountain areas.

Heavy defoliation by fall webworm on choke cherry in the Christina Lake area confined itself to widely scattered patches adjacent to the highway.

D. Edgewood Forest Ranger District.

This district is in the Lower Arrow Lake drainage system (14) and is so located as to be approached by highway from the north (Nakusp) or from the northwest by highway over the Monashee Mountain

from Vernon. The Arrow Lake steamer service from the north (Arrowhead) and the south (Robson) also supplies the second means of entry to this district. The Lower Arrow Lake, which is 55 miles long and $\frac{1}{2}$ to $1\frac{1}{2}$ miles in width, divides the southern part of this district in half. The altitude runs from 1,418 feet down to 1,362 feet at its southern tip, whereas from Needles to Kettle River Crossing, which is located in the northwest portion of this district, the general altitude starts at 1,418 feet and runs as as high as 5,000 feet where the Monashee highway crosses the Kettle River. Due north of Needles, approximately five miles, lies the Whatshan Lake area with an altitude of 2,100 feet. It is responsible for the drainage of approximately one-half the northwest portion of the Edgewood Ranger District.

Cedar, hemlock, Engelmann spruce, Douglas fir, larch and yellow pine are the principal species of this region. The area west of the Whatshan Lakes and adjacent to the Inonoaklin Creek and west was burned extensively in the middle twenties, but is coming back in ledgepole pine and western larch reproduction, with a light growth of western hemlock. Approximately twenty miles of tributary roads that are passable by truck or car are all that cover this country. They are as follows: from Needles north approximately five miles to Whatshan, once a Mennonite settlement; from Fauquier south on the east side of the Lower Arrow Lake for a distance of approximately ten miles; from Inonoaklin Falls on the Monashee road northwest to Killarney Creek, a distance of approximately ten miles.

Permanent Sampling Stations. No permanent sampling stations were established during 1946, but located in 1947 in the Edgewood Forest Ranger District are three permanent plots N-3, N-16 and N-17. They are situated as follows:

Plot N-3.

Location: 15 chains south of Lower Whatshan Lake southern point and 1 chain east of Whatshan to Needles road.

Stand: western larch.

Area: 7 X .5 chains.

Exposure: east.

Plot N-16.

Location: 2.6 miles northwest of the Edgewood and Needles turn-off.
Stand: lodgepole pine.
Area: 10 X .5 chains.
Exposure: southern.

Plot N-17.

Location: 35 miles west of Needles, 4 chains west of bridge.
Stand: balsam fir.
Area: 9 X .5 chains.
Exposure: west.
Altitude: 2,500 feet.

Random Samples. Eighty-two random samples were made in Edgewood Forest Ranger District.

Results. In that area of the Edgewood Forest Ranger District known as the Monashee, situated between Wauchope Creek and south-east to Whatshan, five mat samples yielded 121 European larch sawfly larvae. This area, burned clean by fire during the middle twenties, is now slowly coming back in western larch and lodgepole pine reproduction ranging from 8' - 20' in height and D.B.H. of 1" - 4". The defoliation of western larch in this area was noticeable only on a close examination and then was found to be patchy and widely scattered. It was noted that the larch sawfly larvae did not start to go into the ground this year until the last week in August. This was probably due to one of two reasons, - the altitude in this area ranges up to 5,000 feet, or the lateness of the season and the heavy needle cast on western larch during May and June.

In the area of the Monashee highway located between Deep Creek and Boulder Creek, which is approximately twenty miles northwest of Edgewood, some two thousand acres were reported under attack during July, 1947, from a lodgepole pine tip moth. Examination carried out during 1948 shows no recurrence of this infestation. There is also no noticeable damage of any type on this particular area. The forest cover is pure lodgepole pine reproduction.

Noticeable insect damage in the remainder of the areas surveyed in this district appears to be quite negligible.

Important Forest Insect Conditions. European larch sawfly defoliated western larch in the vicinity of the Monashee highway from the Kettle River crossing southeast to Edgewood. Spasmodic and lightly scattered dying tops of Engelmann spruce were the resultant damage caused by the weevil (Pissodes engelmanni), also located in this area.

E. Nelson Forest Ranger District.

This district is situated in the Kootenay Lake drainage system (10) and is accessible by the main highway in the northern portion, and in the southern part by an all-winter road from Nelson, south through Ymir and Salmo to the International Boundary; also by the Great Northern Railway.

From knowledge gained from collecting points only, the timber stands of the district are mainly western larch and lodgepole pine reproduction in the southern portion. As much of this area has been clean-burned by fire, the second growth and mature timber is quite patchy, but according to evidence of the remaining overmature species the timber types were Douglas fir-larch and cedar-hemlock up to 3,500 foot contour and Engelmann spruce-alpine fir from 3,500 feet and 6,500 feet.

Permanent Sampling Stations. No permanent sampling stations were established in the Nelson Forest Ranger District during 1948, but permanent plot N-8 was established in 1947.

Plot N-8.

Location: 7 miles south of Nelson 1 chain northeast of highway opposite Cottonwood Lake.
 Stand: Douglas fir.
 Area: 10 X .5 chains.
 Exposure: southeast.
 Altitude: 2,800 feet.

Random Samples. Seven random collections were made in this district.

Results. In the southern portion of this district where the above collections were made, some larch sawfly were encountered on reproduction western larch in the immediate vicinity of the south

fork of the Salmo River, but as this country has been clean-burned and is still in a slow growing reproduction state, insect activities of any kind are negligible.

Important Forest Insect Conditions. Light, widely scattered defoliation by European larch sawfly occurred on western larch in the Ymir and Salmo areas south to the International Boundary.

F. Kaslo Forest Ranger District.

This district is in the Kootenay Lake drainage system (10). As the writer has no knowledge of that part of this district north of Kaslo, information is relative to that part lying south of Kaslo to Queens Bay.

Entrance to this district is by highway, travelling north on the west side of Kootenay Lake, which connects to the main highway at Balfour, located on the west arm of the Kootenay Lake, or via Kootenay Lake steamer. This portion of the district is very mountainous, being located in the southern section of the Selkirk Mountains. The timber type is Douglas fir-larch, with lightly scattered ground cover of deciduous species on burned off areas.

Permanent Sampling Stations. No permanent sampling stations were established in this district during 1948, but plots N-6 and N-7 were established during 1947. Locations are as follows:

Plot N-6.

Location: 2.5 miles north of Kaslo on the west side of Kootenay Lake.
Stand: lodgepole pine and Douglas fir.
Area: 9 X .5 chains.
Exposure: west.

Plot N-7.

Location: 9 miles from Kaslo on the southwest side of Kaslo, New Denver road.
Stand: white pine.
Area: 7 X .5 chains.
Exposure: west.

Random Samples. Twenty random samples were made between Kaslo and

Queens Bay, a distance of twenty miles. Samples were made, for the most part, in areas adjacent to the highway.

Results. Collecting in this area was confined to coniferous species. No noticeable damage was noted in the areas where collections were made.

Important Forest Insect Conditions. Eupithecia and Semiothisa species were the most common and abundantly collected. No defoliation was noted.

G. Greston Forest Ranger District.

This district is located in that part of the Kootenay Lake drainage system (10) surrounding the southern end of Kootenay Lake. This covers both the east and west sides of the Lake. The southwest boundary follows the Nelson Range of mountains south to the International Boundary. Method of approach to this district is from the north or east by main highway or G.P.R. Timber types in this region are Douglas fir-larch and cedar-hemlock. Considerable lodgepole pine reproduction covers the areas north and east of Kitchener to Ryan, located on the east boundary of the Greston district.

Permanent Sampling Stations. No sampling stations were established during 1948, but plot N-13 was established in this area during 1947.

Plot N-13.

Location: 6 miles east of Greston, 5 chains up side road.
Stand: Douglas fir.
Area: 9 X .5 chains.
Exposure: east.

Random Samples. Thirty-one random collections were made in the Greston district.

Results. Of nine random collections submitted to the Vernon Laboratory, eighty-seven larvae of the larch sawfly were collected off western larch. A small number of hemlock looper, Lambdina fuscicollis lugubrosa, were also collected off western larch. Geometrid larvae, including Eupithecia sp., were collected in small numbers off lodgepole pine.

Important Forest Insect Conditions. Light, fairly scattered defoliation was the result-
ant damage on western larch by the European larch sawfly in the vicinity of the highway east of Creston for a distance of approximately eight miles.

H. Granbrook Forest Ranger District.

This district is located in the Kootenay River West drainage basin (5) and may be approached from the north, southeast and southwest by highway, and from the northeast and south by railway. The northwest portion of this district is drained by the St. Mary's River, the northeast portion by the Bull River, and the southern portion by the Moyie River. Bordered on the west by the Selkirk Mountains and on the east by the Rocky Mountains, this district has an altitude of approximately 3,000 feet.

Yellow pine and Douglas fir-larch are the most important forest types. Logging operations are being carried on in both types. As a type, yellow pine does not occur above the three-thousand-foot contour, but is found to be scattered through the Douglas fir-larch type and may form up to 25 per cent of its stand. Lodgepole pine also covers a considerable amount of burnt over areas.

Permanent Sampling Stations. No permanent sampling stations were established during 1948, but plot N-14 and N-15 were established during 1947. They are located as follows:

Plot N-14.

Location: 20 chains west of Moyie River bridge, 2½ miles west of Moyie adjacent to highway.
Stand: western larch and Engelmann spruce.
Area: 8 X .5 chains.
Exposure: southern.

Plot N-15.

Location: 9.8 miles west of Moyie, adjacent to main highway on the telephone right-of-way.
Stand: lodgepole pine.
Area: 10 X .5 chains.
Exposure: southeast.

Random Samples. Twenty-one random samples were made in this area.

Results. From random sampling conducted in this area the insect taken in the largest quantities was western tent caterpillar. Some western hemlock looper were taken from Douglas fir and some European larch sawfly from western larch. No rise in population of the European larch sawfly as yet seems evident from collections and observations made on western larch. Feeding of this insect was very light and widely scattered.

Important Forest Insect Conditions. Western tent caterpillars defoliated large areas of willow southeast of Cranbrook, adjacent to the highway.

Hemlock looper were collected from Douglas fir in small quantities east of Wardner in the Haw Haw valley.

European larch sawfly collected from western larch in the Moyie Lake area were taken in very small quantities and no noticeable damage was to be seen.

An outbreak of the Engelmann spruce weevil on Engelmann spruce in the Lumberton area was visited and a special report, N-1-48, was submitted to the Vernon Laboratory.

I. Canal Flats and Invermere Forest Ranger Districts.

These two districts, located in a trench between the Rocky Mountains on the northeast and the Selkirk Mountains on the southwest, are located in the Upper Columbia River drainage basin (7). The approximate altitude of the valley floor is 2,600 feet. Timber types of this region are of Douglas fir-larch and cedar-hemlock. However, there is a considerable coverage of temporary type lodgepole pine on the burned over areas.

These districts are approached from the south, north, or northeast via highway, or from the north and south by C.P.R. railway. Some fire damage is evident in the southwest portion (origin of date not known) of the Findlay Creek areas. As yet no reproduction is in progress, although the burn is evidently some years old.

Permanent Sampling Stations. No permanent sampling stations were established during 1948, but plot N-9 and N-10 were established in this area during 1947. They are located as follows:

Plot N-9.

Location: 2 miles southeast of Canal Flats, east of main highway 1 chain.
Stand: mixed Douglas fir and yellow pine.
Area: 10 X .5 chains.
Exposure: southeast.

Plot N-10.

Location: 3 miles northwest of Canal Flats, $\frac{1}{2}$ chain west of main highway.
 Crown land.
Stand: Douglas fir.
Area: 8 X .5 chains.
Exposure: northwest.
Altitude: 5,000 feet.

Random Samples. Fifty-five random samples were made in these areas.

Results. Collections made throughout these areas showed no defoliation at any particular point except in the vicinities of the false hemlock looper infestations. Collections of the sawfly, Pikonema dimmoeki, were taken in small quantities, averaging from one to three larvae in each collection. Small numbers of Neodiprion species were found in collections made on lodgepole pine.

Important Forest Insect Conditions. False hemlock looper: of the two egg surveys conducted over the false hemlock looper area, which is located north of Columbia Lake to Sinclair Canyon, a marked contrast is noted. The spring egg survey made during the latter part of March, 1948, showed a very heavy population of eggs, while the fall egg survey conducted during the month of September, 1948, showed a comparatively small amount of eggs.

During the latter part of June and the month of July, the B. C. Forest Service conducted an aerial spraying operation over this area, using a helicopter. The writer, who was conducting a field survey in

this area at the time of the spraying project, helped for ten days with the work of establishing base lines, constructing and setting out trays for mortality counts and spotting spraying strips. Combined with this work, transportation was supplied for Mr. W. G. Mathers, who was acting as technical advisor for this project. A more detailed report of the spraying operation will be found in the combined annual report of the Vernon Laboratory.

J. Big Bend, Columbia River Area, - Revelstoke to Golden.

This area is very mountainous. Between the Rocky and the Selkirk Mountains the Columbia River, starting from Canal Flats (Columbia Lake), flows northwest to Cance River and here, making the Big Bend, it swings due south and flows down the trench formed by the Selkirk Mountains and the Gold Range, to the Upper Arrow Lake. From Canal Flats to Upper Arrow Lake this River drops 1,255 feet in approximately 291 miles.

Timber type is Douglas fir and cedar-hemlock, with a small amount of white pine.

Approach to this area is by highway from the south via Revelstoke, or from the southeast via highway from Golden. This road is open to travel only during the period from June to October.

Permanent Sampling Stations. No permanent sampling stations were established in this area during 1948. However, plots N-19, N-20, N-21, N-22 and N-23 were established during 1947. They are located as follows:

Plot N-19.

Location: 3 miles south of Carnes Creek Bridge,
Big Bend highway, $\frac{1}{4}$ mile west of highway.
Stand: western hemlock.
Area: 8 X .5 chains.
Exposure: east.

Plot N-20.

Location: 10.5 miles east of Cance Crossing on the
Big Bend highway.
Stand: western hemlock.
Area: 10 X .5 chains.
Exposure: southeast.

Plot N-21.

Location: 3.2 miles northwest of the Bush River bridge.
Stand: Engelmann spruce.
Area: 9 X .5 chains.
Exposure: southwest.

Plot N-22.

Location: 19 miles north of Golden on the Big Bend highway.
Stand: Engelmann spruce, balsam fir.
Area: 10 X .5 chains.
Exposure: southern.

Plot N-23.

Location: 5.9 miles northwest of Golden.
Stand: Douglas fir.
Area: 9 X .5 chains.
Exposure: northwest.

Random Samples. Sixty-seven random samples were made throughout the Big Bend - Revelstoke areas.

Results. Very few insects were taken from western hemlock. Phalaenids were, for the most part, the only insects collected. Some large collections of Malacosoma pluvialis off willow were made adjacent to the Bush River bridge on the Big Bend highway.

Numerous collections of the beetle Dichelonyx were made off Douglas fir, although no noticeable damage on the needles was noted. A few collections of Neodiprion species were also made on Douglas fir.

Important Forest Insect Conditions. On August 17 and 18, an examination on an area forty miles north of Revelstoke and west of the Columbia River, lying between Forty-nine Creek and Seymour Creek, was made by Rangers S. H. Farris and D. B. Bossley.

The examination showed white pine to be under heavy attack from the bark beetle Dendroctonus monticolae. The method employed for cruising was by traverse. Five or more miles of traverses showed practically a 100 per cent kill. It is not likely that what little white pine has escaped attack will remain so the following year (1949). A special report and map submitted on August 25, 1948, by S. H. Farris will supply further information. ("Downie Creek Bark Beetle Infestation 1948"). See section "Special Reports".

In the Mt. McPherson area an examination was made by Rangers S. H. Farris and D. B. Bossley on October 13 and 14, 1948, the results of which showed considerable damage by Dendroctonus monticolae to white pine over an area of approximately sixty acres.

This area, which is confined to Sec. 9 and 10, Tp. 23, R2, W 6 N, is located approximately five miles southwest of Revelstoke in the old Mt. McPherson school district.

Three 20 X 1 chain traverses were made throughout this area showing a tally of 345 green-infested trees. The white pine on this area runs from 8 - 22" D.B.H. and is secondary to the cedar-hemlock stand predominating the area.

Salvaging this white pine would be a simple operation. A previous pole cutting has left good skid roads and a truck road is located within 15 or 20 chains of the northwest corner of this infested area.

A more detailed report will be found in the section "Special Reports".

Western tent caterpillars defoliated scattered areas of willow adjacent to the Bush River bridge on the Big Bend highway.

APPENDIX.

Owing to the omission of the names and addresses of co-operators contacted, a list has been compiled as follows:

B. C. Forest Service
Personnel.

Ranger F. G. Hesketh	Arrowhead, B. C.	June 4, 1948.
Ranger H. J. Coles	Golden, B. C.	June 9, 1948.
Asst. Ranger I. C. Robinson	Golden, B. C.	June 9, 1948.
Asst. Ranger J. E. Connolly	Golden, B. C.	June 9, 1948.
Asst. Ranger A. Horth	Golden, B. C.	June 9, 1948.
Ranger J. L. Johnson	Invermere, B. C.	June 11, 1948.
Ranger R. O. Christie	Cranbrook, B. C.	July 2, 1948.
Asst. Ranger A. H. Markusen	Cranbrook, B. C.	July 2, 1948.
Asst. Ranger W. G. Claydon	Cranbrook, B. C.	July 2, 1948.
Ranger L. M. Quance	Elko, B. C.	July 4, 1948.
Ranger A. I. Ross	Creston, B. C.	July 10, 1948.
Asst. Ranger R. E. Robinson	Creston, B. C.	July 10, 1948.
Ranger C. R. Tippie	New Denver, B. C.	July 19, 1948.
Ranger E. W. Reid	Grand Forks, B. C.	July 23, 1948.
Asst. Ranger S. G. Peterson	Grand Forks, B. C.	July 23, 1948.
Asst. Ranger J. B. Gierl	Greenwood, B. C.	July 23, 1948.
Ranger H. L. Couling	Nakusp, B. C.	Aug. 6, 1948.
Asst. Ranger H. R. Wood	Nakusp, B. C.	Aug. 6, 1948.
Asst. Ranger R. J. Kerr	Nakusp, B. C.	Aug. 6, 1948.
Ranger W. D. Haggart	Edgewood, B. C.	Aug. 26, 1948.
Asst. Ranger W. R. Colegrave	Edgewood, B. C.	Aug. 26, 1948.

Private Industry.

Mr. Boker, Manager Kirk Christmas Tree Industry, Edgewater, B. C.
June 11, 1948.

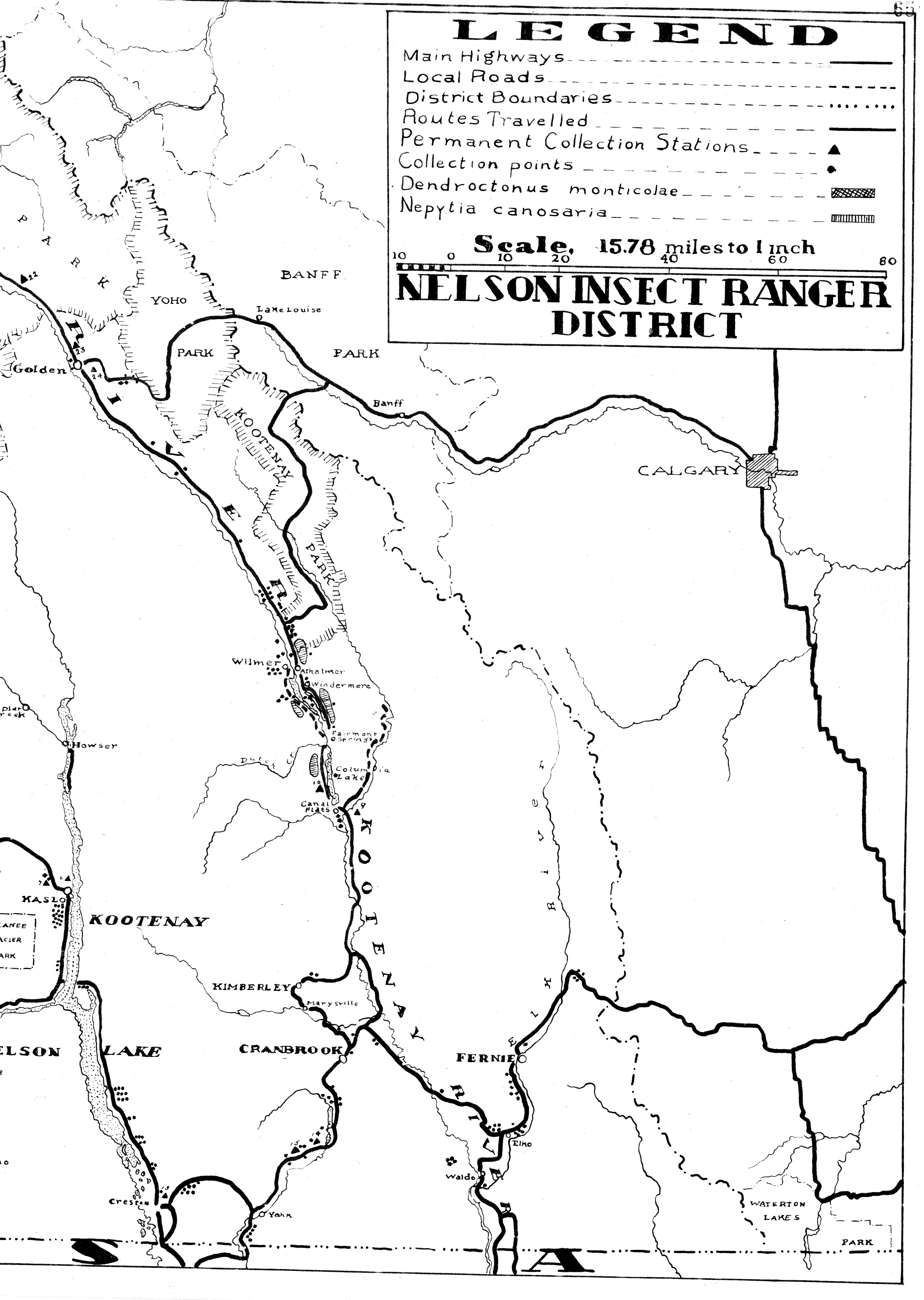
LEGEND

- Main Highways ————
- Local Roads - - - - -
- District Boundaries
Routes Travelled ————
- Permanent Collection Stations ———— ▲
- Collection points ———— ●
- Dendroctonus monticolae* ———— [diagonal hatching]
- Nepytia canosaria* ———— [horizontal hatching]

Scale, 15.78 miles to 1 inch



NELSON INSECT RANGER DISTRICT



ANNUAL REPORT 1948

Fort George and Prince Rupert Forest Districts

- By W. G. Simms -

Introduction

Forest Insect Survey in the Fort George and Prince Rupert Forest Districts was conducted from June 5th to August 7th by Rangers W. G. Simms and S. H. Farris. These two Forest Districts combined, cover a total area of 89,781,200 acres. Areas surveyed during this period were in the Quesnel, Prince George, Vanderhoof, Burns Lake, Smithers and Hazelton Ranger Districts.

Because of sickness in Mr. Farris' family, he was forced to return to Headquarters at Vernon on the 26th of July. Owing to the fact that the north country is so isolated, it is very difficult and not practical for one man to operate alone in most of this area, and also that Ranger B. A. Sugden was spending most of his time in conducting larval surveys in the Douglas Fir Tussock Moth infested areas in the Kamloops District, it was decided to transfer Ranger Simms to the Kamloops Forest District to help out.

During the latter part of June, larval and pupal collections of spruce budworm (Choristoneura fumiferana) were made at Stanley for Dr. S. G. Smith of Laniel, P.Q.

Three infestations were noted and reported on; two in the Quesnel Ranger District and one in the Vanderhoof Ranger District.

A total of 264 random collections, including negatives, were made in the two Forest Districts.

The remaining portion of the field season was spent in making random survey collections and doing other related forest insect survey work including egg surveys, cocoon collections and insect rearing.

Each Ranger District visited in the Fort George Forest District will be discussed separately while the Prince Rupert Forest District will be discussed as a whole.

During the month of June, weather conditions for collecting were perfect, but from July 1st until August 7th much rain persisted and thus hampered the survey work to quite an extent.

A total of 263 random collections including egg survey and cocoon survey collections were made in the Kamloops and Nelson Forest Districts.

We sincerely express our thanks to all members of the B. C. Forest Service and private co-operators who assisted and co-operated with us in our work during the 1948 field season.

Details of Individual Areas.

Quesnel Ranger District.

(a) Timber Types and Topography:

The general forest type occurring in this district is of a lodgepole pine nature intermixed with Engelmann spruce, aspen and willow. Small localized areas of Douglas fir occur south of Quesnel in the vicinities of McLeese Lake and Macalister. In the vicinity of Wells which is east of Quesnel, lodgepole pine gives way to a balsam-spruce forest type.

The topography of the country west of Quesnel is quite rolling and contains many small lakes, while to the east near Wells and Barkerville, mountains rise to heights of over 5000 feet.

Travel conditions are very poor owing a great deal to the small population and also to the muddy roads which persist upon very little precipitation. Three main roads exist; the Cariboo Highway which starts at Cache Creek and runs north through Williams Lake and Quesnel to Prince George, the Quesnel-Wells Highway which runs as far east as Barkerville, and the Nazko road which is quite good for the first twenty-five miles west of Quesnel but is not much better than a wagon road from there on. A fairly good road on the west side of the Fraser River runs from Alexandria to Quesnel, a distance of thirty miles. Contact between this road and the Cariboo highway is made possible by a ferry service at Alexandria.

This district is drained largely by the Fraser, Quesnel and Cottonwood Rivers.

(b) Sample Stations.

(i) Permanent Sampling Stations:

No Permanent Sampling Stations were established in the Fort George or Prince Rupert Forest Districts this year. The combined acreage of these two districts is 89,781,200 acres. It was the idea of the Insect Rangers working in this area to cover as much of the territory as possible and still keep up with random sampling. Had any permanent stations been established it is unlikely that they could have been re-visited during the summer. However some permanent sampling stations should and will be established in the coming years.

(ii) Random Sampling Stations:

A total of 123 random collections were made in the Quesnel Ranger District. These Sample Stations are shown on the map accompanying this report.

(c) Results:Spruce Budworm (Choristoneura fumiferana)-

Results from sampling of spruce and balsam at Stanley where outbreaks occurred several years ago, showed that larvae of this species are still present but the population is very low. One larva was taken from beatings on Engelmann spruce on the Blackwater road ~~seventy miles~~ north west of Quesnel.

Forest Tent Caterpillar (Malacosoma disstria) -

Three larvae were found from beatings on birch (Betula sp.), nine miles west of the Cottonwood bridge on the Quesnel-Wells road on June 15. One larva was found at Six Mile Lake from beatings on alder (Alnus sp.), and also one larva from willow (Salix sp.), at Nine Mile Lake. Both these lakes are west of Quesnel.

Hemlock Looper (Lambdina fiscellaria lugubrosa) -

One larva was found from beating on Engelmann spruce a few miles north of Cinema between Quesnel and Prince George.

(d) Special Collections:

On June 30th hand-picked collections of spruce budworm larvae and pupae were made at Stanley for Dr. S. G. Smith of Laniel, P. Q.

(e) Special Reports:

Two special infestation report forms were submitted and are on file at the Vernon Forest Insect Laboratory.

(i) Poplar Leaf Beetle (Phytodecta americana)

In a stand of aspen (Populus tremuloides), reproduction, approximately $1\frac{1}{2}$ acres has been attacked and

defoliation ranges from 25 per cent to 100 per cent. This small infestation is located eight miles north west of Quesnel on a side road running north one-half mile from the Quesnel-Nazko road. Pictures showing damage were taken. See Figures 1, 2, and 3.

(ii) Cecidomyid species -

Larvae of this species were found feeding in partially-opened buds of balsam between Mouse Mountain and Stanley in a mixed stand of lodgepole pine, Engelmann spruce and balsam fir.

Due to the late spring, collecting on conifers was very poor during the month of June. Most buds were neither open nor showing any signs of opening during the first week in June. However, a few very small larvae were found. Adults were also very scarce. During this period though, collecting from deciduous trees was excellent, therefore rather than submitting negative reports from conifers it was decided to spend more time collecting from deciduous species.

Co-operators contaded in this district were Ranger L. A. Willington and Assistant Rangers W. J. Irwin and J. D. Woolsey of Quesnel and Assistant Ranger J. W. Walker of Wells, all of the B. C. Forest Service. Contacted also was Mr. A. B. Rawlings of Quesnel who reported during June the outbreak of Poplar Leaf Beetle (Phytodecta americana) in a stand of aspen, eight miles north west of Quesnel.

Prince George Ranger District

(a) The Prince George District is situated north of Quesnel and starts at Canyon Creek on the Cariboo Highway and extends north to the Nechako River, west to Isle Pierre and north-east to where the Salmon River empties into the Fraser River. The above mentioned are approximate boundaries. The terrain throughout is generally roilly and to the north-east of Prince George, swamps are not uncommon.

The general aspect of the forest is of an Engelmann spruce and lodgepole pine type which is largely reproduction and second growth. Most of the area west of Prince George has been burnt over and has come back in lodgepole, spruce and aspen.

Travel conditions to the south and west of Prince George are fair with the Cariboo and Vanderhoof Highways bearing the brunt of traffic. A main highway running from Prince George now extends as far north as Summit Lake, a distance of approximately twenty-seven miles. To the east of Prince George conditions are much different. When rainy weather prevails for more than a few days at a time the roads become almost impossible to travel and at times have to be closed indefinitely.

(b) Random Sampling Stations.-

Forty-five random collections including negatives were made in the Prince George Ranger District.

(c) Results.-

Results from these collections were quite favourable and produced only one important species of larvae, this being a spruce budworm (Choristoneura fumiferana) taken on a beating from Engelmann spruce near Isle Fierre. The most common larvae found were yellow-headed spruce sawfly (Pikonema alaskensis) and green-headed spruce sawfly (Pikonema dimockii) but populations of these species were low.

Pictures of Permanent Plot #8 were taken on June 23. This plot was established in 1947 and is situated on the south side of the Vanderhoof-Prince George highway, six miles west of the Chilako River. See Figures 4 & 5.

Co-operators contacted at Prince George, Headquarters for the Fort George Forest District were District Forester L. F. Swannell and Assistant District Forester A. H. Dixon.

Vanderhoof Ranger District.

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The timber type in this district south of the Nechako River is lodgepole pine inter-mixed with spruce and aspen. A spruce type predominates between the Nechako River and Stuart Lake. To the north in the Stuart and Pinchi Lake area the general forest is an over-mature Douglas fir type, the reproduction and second growth timber being lodgepole pine and spruce. Further to the north in the Takla Lake area a spruce-balsam and lodgepole pine type exists, with the former being mostly mature and over-mature and the latter largely second growth and mature.

The topography from Stuart Lake south is generally flat and contains many small lakes. From Stuart Lake north the terrain becomes quite mountainous and large lakes and streams are abundant.

Travel conditions in the Vanderhoof District are much the same as in the rest of the north country. The main highway between Prince Rupert and Prince George runs through the lower portion of the district. The only other road in this district that is travelled to any extent is the Vanderhoof-Fort St. James road. This extends as far as Germansen Landing which is approximately one hundred miles to the north. Although this is a main road in the district no service stations are located between Fort St. James and Germansen Landing. Most travelling done north of Fort St. James is either by air or by water. The headquarters for Central Airways is located at Fort St. James. A good water route exists through Stuart, Trembleur and Takla Lakes where supplies are freighted once a week during the summer to the settlement at Takla Landing, approximately 130 miles north of Fort St. James.

(b) Random Sampling Stations.-

Forty-two random samples including negatives were made in the Vanderhoof Ranger District as follows:

Engelmann spruce (<i>Picea Engelmanni</i>).....	28
lodgepole pine (<i>Pinus contorta</i>).....	9
trembling aspen (<i>Populus tremuloides</i>).....	2
willow (<i>Salix</i> species).....	2
balsam fir (<i>Abies</i> species).....	1

(c) Results.-

The only insect found in the Vanderhoof district that is a threat at the present time was the mountain pine beetle (Dendroctonus monticolae) attacking lodgepole pine at Takla Landing.

The outbreak of Douglas fir bark beetle (Dendroctonus pseudotsugae) which was reported in 1947 in stands of Douglas fir (Pseudotsuga taxifolia) on the slopes north of Pinchi Lake has remained much the same. Spotty patches of bark beetle are present in mature stands of Douglas fir on both sides of Stuart Lake between Fort St. James and Tachi River.

Yellow-headed sawfly and green-headed sawfly were common on beatings from Engelmann spruce. Insect populations on lodgepole pine were very low.

(d) Special Reports.-

A special report on the mountain pine beetle (Dendroctonus monticolae) at Takla Landing was submitted and is on file in the Vernon Forest Insect Laboratory.

(1) About 70 per cent of the lodgepole pine (Pinus contorta) in a six acre area has been attacked and is either dead or dying. Most of this timber is on I.R.7 and many trees have been cut down and used as firewood. Other isolated spots are present in mature stands on the east and west sides of Takla Lake, the largest being on the west side of the lake at Takla Narrows.

Co-operators contacted in this district were Rangers A. V. O'Meara and N. Threatful, Assistant Rangers R. E. Sewell, R. I. Patterson, R. A. MacKenzie, Patrolmen A. Almond, A. Tyacke and A. Smith.

Below is a table of the collections made in the Fort George Forest District.

SPECIES	COLLECTIONS	NEG. COLLECTIONS	TOTAL
Douglas fir	7	5	12
Lodgepole pine	12	5	17
Balsam fir	4	2	6
Engelmann spruce	47	9	56
Aspen, poplar, Willow, Birch, Alder & Maple	116	3	119
TOTAL	186	24	210

Prince Rupert Forest District.

Two weeks only were spent in the Prince Rupert Forest District this year. During this period random collecting was done between Endako at the west end of Fraser Lake and Usk, about fifteen miles east of Terrace. More time would have been spent in this district if unforeseen circumstances had not forced S. H. Farris back to Vernon.

There is one main route only through the Prince Rupert Forest District, that being the highway which runs through Burns Lake, Houston, Telkwa, Smithers, Hazelton and Terrace. One other main road running from Burns Lake south to Ootsa Lake, then northwest to the west end of Francois Lake and north to Houston, was closed to traffic this summer while undergoing repairs. Local roads from Topley and Burns Lake run north to Babine Lake.

The principal forest types of the region between Fraser Lake and Smithers are the lodgepole pine type and spruce type, intermixed with aspen and willow. Many areas in this district have been badly burned and scattered pure stands of aspen and lodgepole pine are common throughout.

This region contains many lakes. The largest of these are the Babine (altitude 2,327 feet), Francois (2,375 feet) and Ootsa Lake (2,700 feet). Most of this district is drained by the Nechako and Bulkley Rivers.

From Smithers west, the country becomes mountainous with rugged peaks reaching altitudes of 5000 to 8000 feet.

The timber type change from the interior type to coast type takes place near Hazelton where the lodgepole pine and engelmann spruce types give way to a sitka spruce-hemlock type. Cedar occurs on the upper benches of the Skeena River, up to forty miles north of Hazelton.

The territory from Smithers to the coast is drained mainly by the Bulkley and Skeena Rivers.

Random Sampling Stations:

A total of 54 random collections including negatives were made in the Prince Rupert Forest District; 47 on coniferous trees and 7 on deciduous as tabulated on the following table:

SPECIES	COLLECTIONS	NEG. COLLECTIONS	TOTAL
Engelmann Spruce	17	4	21
Western hemlock	13	0	13
Balsam fir	8	0	8
Sitka spruce	3	0	3
Red cedar	0	1	1
Lodgepole pine	0	1	1
Aspen, Willow & Birch	7	0	7
TOTAL	48	6	54

Results:-

Beatings from Engelmann spruce in the Burns Lake District produced mostly Pikonema alaskensis and Pikonema dimmocki.

Willow Leaf Beetle (Galerucella carbo) - heavy defoliation of willow (Salix sp.) by larvae of this species was general throughout the Hazelton, Smithers and western portion of the Burns Lake District.

Poplar Leaf Miner (Lithocolletis populiella) - larvae were very numerous on aspen between North Bulkley and Smithers. From 25 per cent to 100 per cent of the foliage was affected.

Gray "Spruce" Looper (Caripeta divisata) - near Skeena Crossing larvae of this species were common on beatings from western hemlock, Sitka spruce and balsam fir, but were not heavy in population.

Spruce Budworm (Choristoneura fumiferana) - very light defoliation was noted on July 20, on reproduction Engelmann spruce south of Pinkut Lake on the Burns Lake-Babine Lake road. Since beatings produced empty pupal cases from these trees the defoliation was most likely caused by this species.

Alaska Spruce Bark Beetle (Dendroctonus borealis) - in July, Mr. H. Long was contacted at Palling, near Burns Lake and accompanied Rangers Simms and Farris through the area in which bark beetle control work in Engelmann spruce was carried out in 1947 by the B. C. Forest Service. This project proved very effective. Only a few pitch lobes were found, these being on the east end of the infestation.

On August 2nd W. G. Simms accompanied Assistant Ranger C. Dahlie on a pack trip into the Kitsequekia Valley, about eighteen miles northwest of Smithers. Isolated patches of "red tops" in lodgepole pine (Pinus contorta) were seen on the hillside south of Taltzen Lake but would have taken days to reach as the entire valley is covered with Devil's Club and the only trails present are those of game. Timber in this valley consists mainly of second growth and mature Engelmann spruce, balsam fir and lodgepole pine.

Along with Assistant Ranger C. Dahlie of Smithers and Mr. H. Long of Palling, other co-operators contacted in the Prince Rupert Forest District were Ranger T. Strimboi and Assistant Ranger W. Antilla at Burns Lake, Assistant Ranger J. Keefe at Telkwa, Ranger C. Gibson at Smithers and Assistant Ranger H. Hammar at Terrace.



Fig. 1

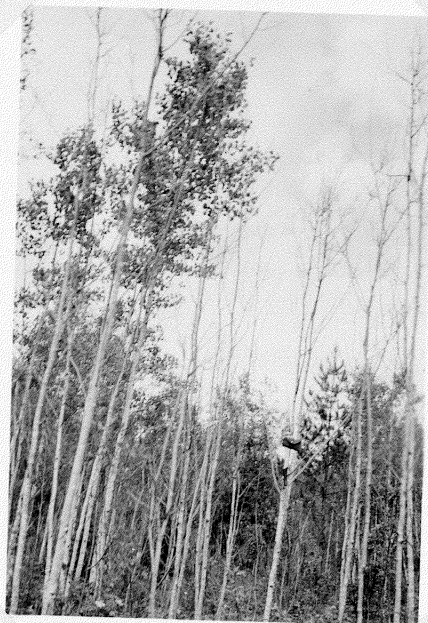


Fig. 2



Fig. 3

Showing defoliation of aspen by *Phytodecta*
americana, N. W. of Quesnel, B.C.



Fig. 4

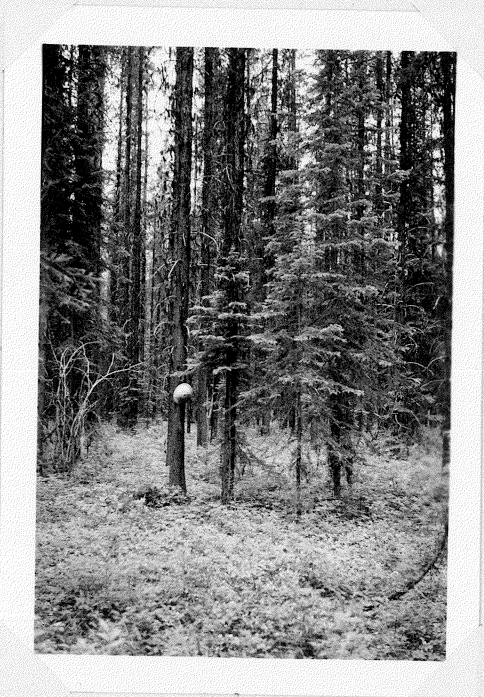


Fig. 5

Showing general view and close-up of permanent
Plot #8 on Prince George - Vanderhoof Highway.



Fig. 6 - Stand of western hemlock
just east of Usk, near Terrace.



Fig. 7 - Bark beetle-infested lodge-
pole pine at Takla Landing.

SPECIAL REPORTS.

Reports prepared by Insect Rangers on special surveys
and inspections undertaken during 1946 and contained in the
following section.

Report on the Bark Beetle Infestation in White Pine at
Downie Creek, B. C., August, 1948.

At the request of the B. C. Forest Service and C. D. Schultz and Co. of Vancouver, B. C. an examination was made on August 17 and 18 by S. H. Farris and D. B. Bossley of an active infestation of the bark beetle, Dendroctonus monticolae, in white pine, Pinus monticola, on the west side of the Columbia river, opposite Downie Creek, B. C., approximately 40 miles north of Revelstoke.

O B J E C T.

The object of the examination was to determine the present extent of the infestation and the probable spread. C. D. Schultz & Co. are particularly interested in the present status of the white pine in regards to bark beetle activity as the area is at present being cruised for the possible sale of the timber.

M E T H O D S.

Over five miles of traverses were run on the area south of the main part of the infestation to determine the rate and extent of spread and a general view of the area was obtained from a vantage point on the opposite side of the river.

R E S U L T S.

The infestation is at present confined, except for a small patch of "red tops" showing up on the north slope of Fortynine Creek, to an area bordered on the north by Fortynine Creek, on the south by Seymour Creek and extending back from the Columbia River for approximately two miles. A stand of almost pure white pine, area E on the accompanying map, occurs at the northern end of the infested area. The balance of the timber is a cedar-hemlock type, scattered throughout with spruce and white pine. Hemlock is the dominant species in the overstory and also the dominant reproduction species. The white pine is chiefly second growth, averaging from 10" to 14" D.B.H., with a few old

84

growth pine up to 3' D. B. H. The second growth pine is very patchy over this area, growing only in small pockets and constituting a very small portion of the total stand.

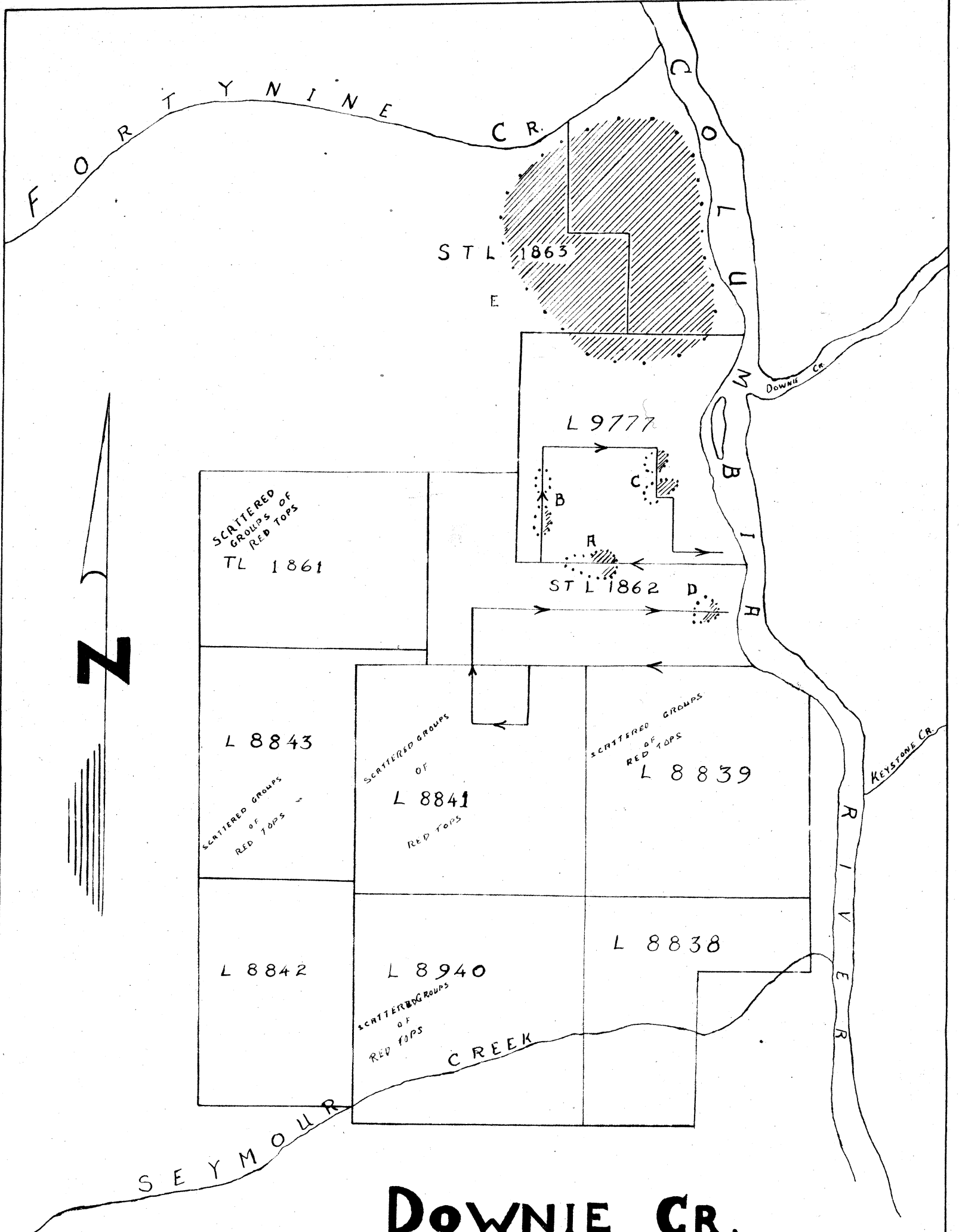
Practically 100 per cent of the white pine on area E has already been attacked and killed by the bark beetles.

On the traverses made to the south of area E only four pockets of white pine, areas A, B, C, and D were encountered and each showed heavy bark beetle attack. The beetles are very active in these patches. For example, a count on area A showed 25 "red tops", trees successfully attacked in 1947, and over 100 green infested trees, ones which had been attacked this year, but have not yet turned red. The same ratio of "red tops" to green infested trees was also found on areas B, C, and D and from the patches of "red tops" which could be observed throughout the rest of the infested area, it was concluded that what little white pine remained would not escape attack.

The help of Mr. J. B. Conway of C. D. Schultz and Co. in locating survey lines and of Patrolman Ed. Wallace of the B. C. Forest Service in providing transportation across the Columbia River, is acknowledged with thanks.


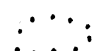
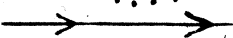
S. H. Farris,
Chief Insect Ranger,
Vernon Forest Insect Laboratory.

August 25, 1948.



Downie Cr. BARK BEETLE INFESTATION 1498

LEGEND

1946-47 ATTACK 
 1948 ATTACK 
 TRAVERSES 
 40 Chs = 1 in.

Report on the Bark Beetle Infestation in
White Pine in the Mt. MacPherson area.

October, 1948

An active infestation of the bark beetle Dendroctonus monticolae in white pine, Pinus monticola, was examined by Insect Rangers S. H. Farris and D. B. Bossley on October 13 and 14. The infested area lies within the boundaries of Secs. 9 & 10 TP 23 R. 2W6M, approximately 5 miles south west of Revelstoke, B. C.

O B J E C T

The object of the examination was to determine the present extent of the infestation and the probable spread. The possibility of salvaging the infested and uninfested timber on the area by logging was kept in mind while making the examination.

M E T H O D S

Three traverses, each 20 chains long by 1 chain wide were run on the area to determine the spread of the infestation. The present extent of the infestation was definitely tied in to a known point.

R E S U L T S

The infestation is at present confined to an overall area of 60 acres, as shown on the accompanying map. The timber on this area is of a Cedar-hemlock type. Most of the area has been logged for cedar poles leaving the hemlock and white pine. The hemlock is small and shows some signs of rot. White pine ranging from 8 in. to 24 in. D.B.H. is quite abundant throughout the area. A scattering of Douglas Fir 18-24 in. D.B.H. is also present. Second growth is chiefly cedar.

On the traverses that were run all white pine was tallied excepting those which have been dead for three or more years. The number of pine tallied on these strips ranging from 8 in. to 22 in. D.B.H. follows: green uninfested 345; green infested, those which were attacked this year, 17; red tops those which were attacked last year or the year before and are now dead, 33. The bulk of the infestation lies towards the west boundary of the infested area as shown on the accompanying map. However, beetle trees are also found along the north and east

boundary.

The boundary shown in red on the accompanying map encloses the infestation as it is at present but white pine of merchantable quality exists on the east, south and west of these boundaries.

Salvaging of the white pine within the infested area by logging should be a simple matter as most of the area has been logged for poles leaving good skid trails throughout. A good truck road is also located within 15 or 20 chains of the NW corner of the infested area.

The help of Ranger E. L. Scott of the B. C. Forest Service in locating survey lines is acknowledged with thanks.

S. H. Farris
Senior Insect Ranger
Vernon Forest Insect Laboratory.

October 20, 1948

9

X 28464

10

X 32945



Mountain Pine Beetle, Dendroctonus monticolae, at Mabel Lake.

A check on the activity of Mountain Pine Beetle at Mabel Lake was made between August 17 and 20, 1948. A marked decline in the number of fresh "red tops" as compared to those white pine killed during 1946 and '47 was found. This condition may be due, in part, to the scarcity of living host trees caused by the heavy toll taken of the white pine by beetles in the two or three preceding years.

Timber sales X24126, X40453 and X39129 were checked. Occasional fresh "red tops" were observed scattered through two of these sales, X40453 and X24126. On T.S. X24126, largest of these, three patches of "red top" were found. Of the three spots of infestation two were located along the western boundary and one in the southern portion. All were well confined by the present boundaries of the sale. No "green infested" trees were observed.

Logging is well under way on T.S. X24126. Mr. Melpas, the operator of logging on this sale, expects to take quite a loss in the white pine that has been dead over two years. Large borers, possibly Monochamus sp., are responsible for this damage. Their galleries extend from the bark well into the heart wood of the tree. The operator was unable to give an accurate estimate of his loss as so far he has not had any of his logs to the mill.

Logging is about finished on T.S. X39129. The larger white pine have all been cut, leaving only trees with a D.B.H. of six inches or less.

Arrangements have been made to start logging T.S. X40453 early this fall. On the survey no green infested trees or fresh "red tops" were noted outside the boundaries of this sale.

At the north end of Mabel Lake in the vicinity of the Wap river, three small patches of "red top" were found. It was from this area that damage by Mountain Pine Beetle was first reported by

W. G. Mathers in 1928. Three miles up Noisy Creek over an area of a quarter ($\frac{1}{4}$) section, 90% of the white pine had been killed out in a mixed stand of cedar, hemlock and white pine. This area is at present marked on the B. C. Forest Service maps as "logged" and "burned".

B. A. Sugden,
Insect Ranger,
Vernon Forest Insect Laboratory.

August 24, 1948.

21

Nepytia Canosaria ? - Egg Survey
Windermere Valley - October 7-9 inc. 1948.

An egg survey in the Windermere Valley was made between October 7 and 9 incl. by four insect rangers from the Vernon and Victoria laboratories.

The survey included the areas sampled during the spring egg survey and also extended to 10 miles north of Sinclair Creek and south to a point about one mile south of Canal Flats.

O B J E C T

This work was done to determine the present egg population of this insect as an indication of the extent and intensity of the infestation which might be expected in 1949.

M E T H O D S

Traverses were run through areas that were sprayed during this last summer and also through unsprayed areas. In addition to the traverses, spot samples were made throughout the area at known points.

On the traverses one tree with three samples per tree were sampled each quarter mile. Three trees with three samples were examined at each spot sampling point.

Eggs were counted over a two foot branch and the total length was calculated by measuring all twigs occurring in the two foot branch sample. A total of 862 feet of branches were examined.

Six traverses were run including 18 trees with 54 branch samples. Nineteen spot samples were made, consisting of 56 trees and 168 samples. The location of the traverses and spot samples are shown on the accompanying map.

R E S U L T S

Eggs were extremely scarce, only five eggs were

2

recovered during this survey. These were found at the following points, one egg on traverse #1 this being on the K 2 ranch, six miles south of Invermere. One egg on spot sample #7 this being two miles north of the Royal Antler Lodge road.

Three eggs were also found on spot sample #14, this being located at the NE Cor. of Lot 9561.

No eggs were found on the traverses that were run on the north and south ends outside the infestation. In a similar survey made in March, an average of 26.5 eggs were recovered per 2 foot branch sample, with numbers ranging from one to as high as 567.

The small number of eggs recovered in this survey would indicate that the outbreak has subsided completely.

S. H. Farris
Senior Insect Ranger
Vernon Forest Insect Laboratory.

October 20, 1948.

Location of Traverses and Spot Samples made
during the Nepytia canosaria egg survey as shown on map
October 1948

- Traverse #1 - Starting at a point 6 miles south of Invermere on the back road on the west side of the lake and run 40 chains west.
- Traverse #2 - Starting at a point 8.5 miles south of Invermere on the back road on the west side of the lake and run 60 chains west.
- Traverse #3 - Starting at a point $\frac{1}{2}$ miles south of the main highway bridge crossing the Kootenay river immediately south of Canal Flats and run 60 chains east.
- Traverse #4 - Starting at a point 1 mile north of the north turnoff road to Edgewater and run 60 chains west.
- Traverse #5 - Starting at the S. W. corner of Lot 7155 and run 80 chains west.
- Traverse #6 - Starting at the S. W. corner of Indian Reserve #3 and run 30 chains east.
- Spot Sample #1 - 7 miles south of Invermere on the K 2 Ranch.
- Spot Sample #2 - 2 miles west on the Royal Antler Lodge Road.
- Spot Sample #3 - 7 miles north of the K 2 Ranch road and main back road, Windermere Valley.
- Spot Sample #4 - $\frac{1}{2}$ mile south of the main Dutch Creek bridge.
- Spot Sample #5 - 3 miles north of Canal Flats on main highway.
- Spot Sample #6 - Columbia Lake Tea Gardens.
- Spot Sample #7 - 2 miles north of the Royal Antler Lodge Road.
- Spot Sample #8 - 1.5 south of the K 2 Ranch main gate.
- Spot Sample #9 - 600 ft. east of Fairmont Hot Springs north gate.

- Spot Sample #10 - North gate of Fairmont Hot Springs. 106
- Spot Sample #11 - S. W. Corner of Lot 4619.
- Spot Sample #12 - S. W. Corner of Sub. Lot 158.
- Spot Sample #13 - $\frac{1}{2}$ mile south of Jct. of Athalmer Road
and main highway.
- Spot Sample #14 - N. E. Corner of Lot 9561.
- Spot Sample #15 - S. W. Corner of Lot 5353.
- Spot Sample #16 - Junction of the main highway and the
north boundary of Lot 4596.
- Spot Sample #17 - Junction of main road and the south
Edgewater road turnoff.
- Spot Sample #18 - Junction of the Golden and Radium Roads.
- Spot Sample #19 - S. E. Corner of Lot 9009.

Douglas Fir Tussock Moth in the BK. District.

Through information received from Mr. Hankey a survey was conducted regarding a Douglas Fir Tussock Moth, Hemerocampa pseudotsugata infestation in the Douglas Fir Pseudotsuga taxifolia surrounding his house.

Investigation showed quite severe defoliation, about 40% in four of eleven trees. All trees showed some signs of insect attack. Two trees which had been 100% defoliated last year were cut down during the winter. Unhatched egg masses are quite numerous. It would be safe to predict a large population of larvae of the Douglas Fir Tussock Moth here this year.

Mr. Hankey intends to spray to save the remaining trees. A spray of 4 pounds of 50% wettable DDT to 100 gallons of water was recommended as soon as the larvae have become active.

The trees in question are about one hundred yards from the neighboring forest. Douglas Fir surrounding the infested trees were checked for cocoons or defoliation. No cocoons were found and defoliation, if any, was not noticeable. This infestation seems to be at the present time fairly well isolated.

B. Sugden.

Vernon, B. C.,
May 22, 1948.

**Douglas Fir Tussock Moth, Hemerocampa pseudotsugata,
at Ducks Range and Monte Creek.**

For convenience while mapping areas of infestation mileages start at intersection of Monte Lake-Holmwood road and the new road just completed joining Ducks Range and Monte Creek. It is along this six miles of new road where the bulk of the infestation occurs.

Strips were chained at half-mile intervals east and west of road to points where larvae were not commonly taken by branch sampling or beating. #Sampling through areas of noticeable defoliation was done by counting the number of living and dead larvae in five branches per tree. When strip through infestation was long enough one tree in each chain was sampled. A minimum of ten trees were sampled on each strip. Usually three collections were made at half-mile point at spots through infestation on areas showing varying degrees of defoliation ranging from 30 to 100 per cent.

Areas Covered by Infestation.

Infestation starts on east side of Monte Lake about $\frac{3}{4}$ of a mile south of the north end of Monte Lake and continues for $\frac{1}{4}$ of a mile north of the Lake. It varies in width from 12 to 21 chains. The timber here is a mixture of Douglas fir and Ponderosa pine, fir being the predominant species. The stand is open growing, mostly second growth, varying from 1 inch to 6 inches D.B.H.

The main infestation begins 1.3 miles south of Ducks Range from the point described earlier as a starting point for mileages. For the first half mile infestation is not visible from the road as it is confined to a bench above. From this point to mile 1 infestation borders, and in some sections overlaps, on a good stand of second growth Douglas fir. It extends from road up hillside for 101 chains.

Mile 1 to Mile 2. - Infestation swings down hillside bordering road. Heaviest defoliation is on the east side of road. The infestation is broken somewhat from mile 1 to mile 1.3 by a stand of about 90% Ponderosa pine. Infestation ranges from 19 to 53 chains in width. Here again Douglas fir is the most numerous species, trees range in size from 18" D.B.H. down to seedlings. The stand is for the most part open growing.

- A Branch sample consists of a branch 20 to 22 inches long.

Mile 2 to Mile 3. - Timber east of road generally larger than farther south in the area. Infestation here quite heavy, ranging in width 10 to 28 chains. At mile 2.8 infestation very heavy west of road. It crosses a narrow valley and moves in a south-westerly direction around the shoulder of a hill for 112 chains with an average width of thirty-seven chains.

Mile 3 to Mile 4. - At mile 3.5 the aspect of the country changes to open range land. This condition lasts until about mile 4. Trees, fir and pine, through this area, are quite scattered. However, numerous infested Douglas fir may be seen throughout.

Mile 4 to Mile 5. - Infestation is checked here by a nearly pure stand of Ponderosa pine. Only fir being attacked north and west of mile 4 bordering road for about 14 chains. These trees are in small scattered clumps and are mostly from 4 to 6 inches D.B.H.

Mile 5 to Mile 6. - This pine stand is maintained to mile 5.7. Here infestation begins again with heavy defoliation to the fir. It continues to base of hill at mile 6. From this point it swings west along the hillside 2.2 miles. The defoliation is very heavy through a belt averaging 15 chains in width.

From mile 0 north-west along old Kamloops road to Holmwood infestation is broken up into smaller patches, - though very heavy defoliation occurs in most of these. At Flatts ranch, mile 1.5, there is heavy defoliation on both sides of the road covering about four acres.

Mile 3 - South of road, infestation is in a good mixed stand of Douglas fir and Ponderosa pine. This area is in a proposed timber sale and is located in the north-west quarter of Section 12, T.19, R.15 W.6. At present defoliation is confined to the top third of the firs and appears to be just getting established in this area.

From mile 3 on past Holmwood there is no noticeable signs of defoliation. However, beatings were made at $\frac{1}{2}$ mile intervals to mile 6 along this road in spots where no defoliation was evident. At each beating point Douglas fir tussock moth larvae were collected in far greater numbers than any other species. This would seem to indicate an abnormally large population of this insect throughout the area. However, at present it has not reached the infestation stage.

The results of some branch sample counts made while running strips through infestation are shown in the following table.

Mileage	Chains	Samples	Living Larvae	Dead Larvae
0	E3 - 10 - 19	5 - 5 - 5	31 - 36 - 14	10 - 17 - 2
1	E2 - 10 - 16	" " "	32 - 37 - 18	14 - 9 - 0
1.5	E2 - 6 - 12	" " "	28 - 31 - 10	11 - 6 - 4
2	E1 - 5 - 9	" " "	22 - 25 - 19	10 - 3 - 0
2.5	E1 - 7 - 12	" " "	17 - 24 - 16	6 - 8 - 5
3	N/A	" " "	21 - 27 - 25	3 - 7 - 11
4	W1 - 2 - 1	" " "	20 - 31 - 38	2 - 5 - 1
7	S1 - 3 - 9	" " "	22 - 12 - 18	7 - 10 - 13
8	S2 - 6 - 13	" " "	7 - 15 - 19	3 - 8 - 12

Branch samples taken from trees 100% defoliated may be, in comparing the number of living and dead larvae, a bit misleading. It was noted that where very heavy defoliation occurred the number of dead larvae was greater than on a tree not so heavily defoliated. This desertion of heavily defoliated trees, may be caused by larvae in search for food.

Parasites - Parasite activity appeared heaviest from mile 0 to mile 2 on both sides of the road. Dead larvae may be seen hanging from the lower branches of the Douglas firs while close beside them is a small oval Hymenoptera cocoon. This parasite may possibly be Hyposoter sp. A large parasite of Ichneumonid type was commonly seen about this area also. Collections of both adults and cocoons of these parasites were made.

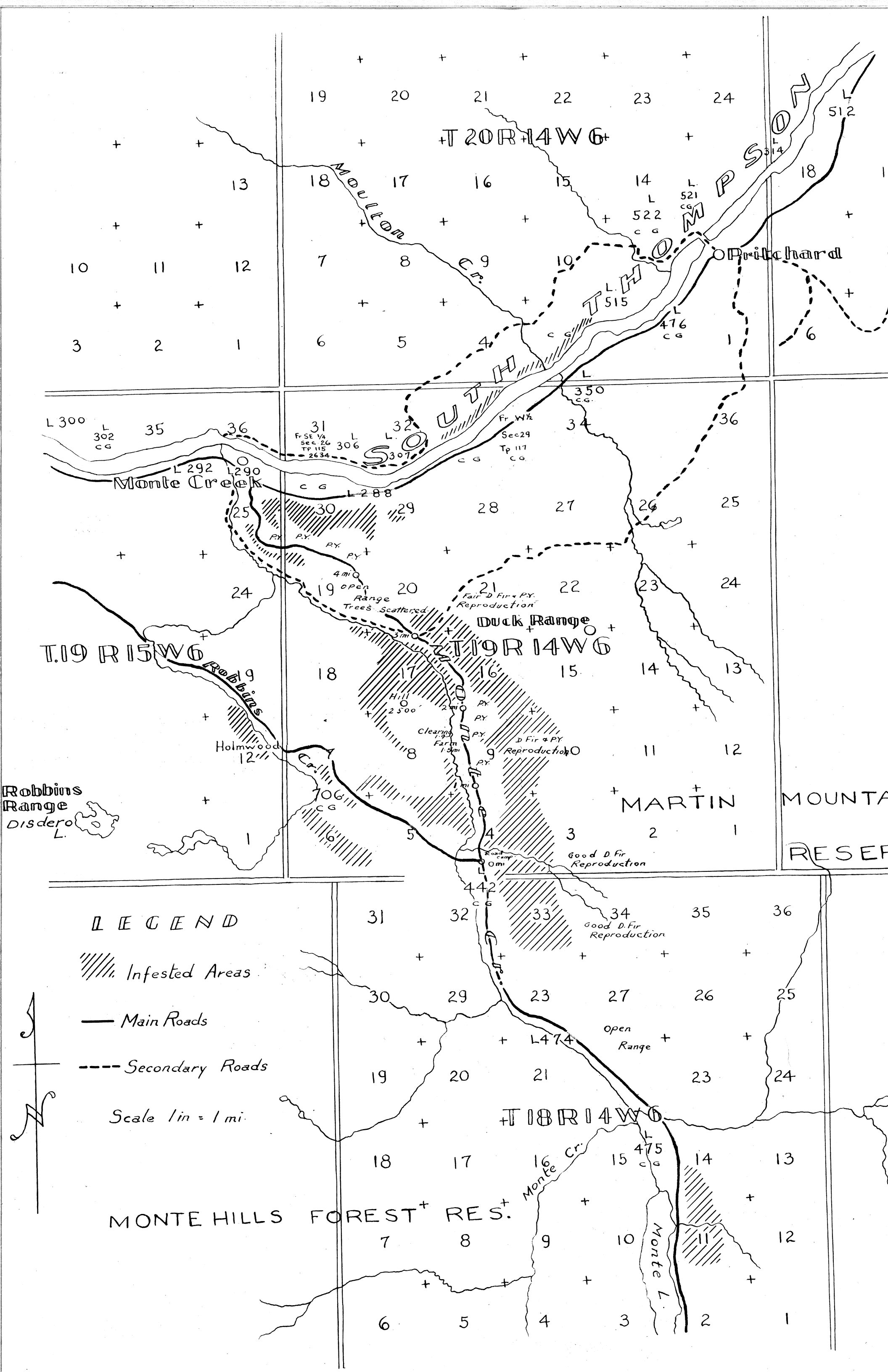
Disease - Diseased larvae were observed through most of the area. They were particularly common at mile 7 and 8. Collections taken of these larvae for possible identification of the disease.

Considerable damage is being done to Ponderosa pine in areas of heavy defoliation. The foliage of this tree, though not a preferred food, seems to be eaten readily enough when Douglas fir is not available.

From field observations and information received from earlier results of rearing collected material at Trinity Valley Field Station it would appear that disease and parasitism will check the activity of this insect over much of the area of infestation next year. However, considerable loss in Douglas fir will result from this year's damage.

B. A. Sugden,
Forest Insect Ranger,
Vernon Forest Insect Laboratory.

July 19, 1948.



T. 20 R. 14 W. 6

T. 19 R. 15 W. 6

T. 19 R. 14 W. 6

T. 18 R. 14 W. 6

MONTE HILLS FOREST RES.

LEGEND

/// Infested Areas

— Main Roads

--- Secondary Roads

Scale 1 in = 1 mi.

19 20 21 22 23 24

13

18

17

16

15

14

18

10

11

12

7

8

9

10

Pritchard

3

2

1

6

5

4

3

6

L 300

L 302 CG

35

36

31

Fr SE 1/4 Sec 26 T. 19 N. R. 15 W. 6

L 306

L 307

30

28

27

L 350 CG

36

Monte Creek

L 292

L 290

25

30

29

28

27

26

25

T. 19 R. 15 W. 6

Robbins Range

Holmwood

18

20

21

22

23

24

Duck Range

Hill 2500

2 mi

2 mi

2 mi

2 mi

2 mi

2 mi

clearing

1.5 mi

1.5 mi

1.5 mi

1.5 mi

1.5 mi

open Range

Trees Scattered

Fair D Fir + PY

Reproduction

D Fir + PY

Reproduction

Good D Fir

Reproduction

Good D Fir Reproduction

33

L 474

34

Good D Fir Reproduction

35

36

31

32

30

29

23

27

26

25

19

20

21

23

24

18

17

16

15

14

13

7

8

9

10

11

12

6

5

4

3

2

1

Monte cr.

Monte L.

L 475 CG

Douglas Fir Tussock Moth - Hemerocampa pseudotsugata Infestation
in the vicinity of Carquile, B. C.

While making a survey of extent and damage done by larvae of the Douglas Fir Tussock Moth in the lower Hat Creek Valley, Carquile was used as a central point. On the accompanying map the intersection of Hat Creek Valley Road and Cariboo Highway is marked as zero miles. The infestation extends north 2.7 miles, south 2.5 miles and west 4 miles from this point.

To estimate damage, condition and extent of infestation strips were chained through infestation at one mile intervals. Branch sample counts of larvae living and dead and cocoons were made by using portions of five branches fir tree each about 24 inches long. Beatings were also taken outside areas of noticeable defoliation to estimate the population of Tussock Moth not confined within the boundaries of the main infestation. These points are indicated by green circles on the map.

South of Carquile.

Mile 0 - Mile 2 - Infestation extends south in a belt along hillside for 2.5 miles, ranging in width for 11 to 13 chains. The stand, open growing, is comprised mainly of Douglas fir with a scattering of Ponderosa pine. The trees are limby, small and scrubby, with an average D.B.H. of 4 to 6 inches. Defoliation is very heavy, ranging from 50 per cent on the edges of infestation to 100 per cent in the centre. Many dead and parasitized larvae were noted here.

West of Carquile

Mile 0 to Mile 4 - Infestation weings west at Carquile and extends for 4 miles along south side and 2 miles along the north side of narrow Lower Hat Creek valley. The width varies on the south side of valley seven to twenty-one chains and on the north side five to thirty chains.

The stand is mainly Douglas fir open growing and scrubby, of little commercial value except as cord wood. Defoliation is very heavy, ranging up to 100 per cent. Reports from people living in this area indicate there was practically no noticeable defoliation last year. Apparently the Tussock Moth population built up very rapidly. Dead, apparently diseased and parasitized, larvae were very numerous throughout.

North of Carquile.

Mile 0 to Mile 2 - The infestation extends east and then north around the shoulder of a mountain for 2.6 miles varying in width from 74 to 16 chains. Here again the fir is poor and seems of little commercial value. Along the edge of the infestation defoliation is 60 per cent of the old needles and 80 per cent of new growth. Trees in the centre are 100 per cent defoliated.

Results from some of the branch sample counts, made while running lines through the area, are shown in the following table.

Mileage :	Chain :	Gr. Sample :	Living :	Dead :	Cocoons :
:	:	:	Larvae :	Larvae :	:
S 1.	: W.1-6-14	: 5-5-5	: 15-26-11	: 7-12-2	: 2-7-1
S 2.	: W.2-8-12	: " " "	: 25-14-32	: 4-0-7	: 0-3-2
W 2.	: S.1-4-9	: " " "	: 19-23-23	: 5-9-3	: 3-7-4
W 3.	: S.1-7-15	: " " "	: 14-22-27	: 11-6-2	: 5-0-0
W 4.	: S.2-6-17	: " " "	: 9-23-31	: 7-12-6	: 11-7-2
N 1.	: W.1-10-30	: " " "	: 16-25-11	: 2-7-4	: 2-7-6
N 2.	: W.2-7-12	: " " "	: 23-27-8	: 11-1-0	: 9-2-1

Parasites - Parasites were noted to be quite abundant throughout the whole area of infestation. Small oval Hymenoptera cocoons, possibly Hyposoter sp., were very numerous in that area lying south of Carquile. Dipterous parasites were very common. Larger parasites of Ichneumoid type, though not so numerous as the others mentioned, were often observed.

Disease - Diseased larvae were seen in considerable numbers throughout the area of infestation. They were found both on the ground and hanging head down from the twigs and branches of the trees. They were very limp and would quite often break open when touched or dropped to the ground.

Cocoons - While in the field 50 cocoons were opened. Of this number eleven contained living pupae. In the majority of cases it was found that the cocoons contained larvae in the prepupal form. Many of these prepupae, when opened, contained two, or sometimes three, dipterous maggots within the skin. Others were dry and dead.

Extensive damage has been done to Douglas fir, and in some cases Ponderosa pine, throughout the area of heavy defoliation. However, from field observations and earlier results of rearing collected material at the Trinity Valley Field Station, it seems that the heavy infestation will drop this year to a point where the population of Tussock Moth will be about normal in 1949. An egg survey will be made in this area in the fall to give a more accurate estimate of next year's population.

B. A. Sugden,
Forest Insect Ranger.

Vernon, B. C.,
August 3, 1948.

Douglas Fir Tussock Moth, Hemerocampa pseudotsugata
Infestation at Oregon Jack Creek and Venables Valley.

The mapping of these areas was considerably simplified by the able assistance of Patrolman McKenna. His intimate knowledge of the localities concerned aided greatly in obtaining an accurate map of the infestation. In dealing with the main infestation at Oregon Jack Creek the area has been divided into three parts, northern, central and southern sections, each about one and one-third miles long, varying in width from one to two and one-quarter miles. The infestation is approximately four miles long.

Northern Section: Defoliation is very heavy in this section ranging from 50 to 100 per cent. At the time the survey was made the majority of the moths should have been in the pupal stage. However, very few 1948 cocoons were found. Cocoons examined in the field were found, in most cases, to contain dipterous larvae, while others contained dead larvae in the prepupal form. Collections of cocoons and some late larvae were made. Many dead larvae were noted on the ground and hanging from the branches of the trees, victims possibly of disease or parasites.

Central Section: Conditions through area were found similar to those in the northern section. Fifty-two trees were examined and collections of cocoons and late larvae made. The larvae appeared in very poor condition. They were quite inactive, a condition caused, perhaps, by disease or parasitism. The number of fresh cocoons found in comparison to the number of larvae observed here earlier in the season was very low. Of the cocoons found, few were made by the 1948 population. Fresh cocoons examined were found in most cases to be dead.

Southern Section: Here again the survey findings paralleled those of the northern and central sections, with two modifications. More 1948 cocoons were found along the southern border and defoliation was not as heavy, ranging from 15 to 30 per cent. Two hundred and forty cocoons were examined in the field; all were dead, apparently, from disease or parasitism. Collections of cocoons were made for shipment to the Vernon Laboratory. A few

late larvae were observed. These, however, appeared sluggish and rather sickly. It seems doubtful they will live to, or be successful at, pupation.

Venables Valley: This small infestation, approximately one section in extent, is located about a mile south of Venables Lake. Field observations indicate very high mortality to larval populations here. Dead larvae were numerous on the ground under the trees. Cocoons and egg masses were very common for 1947, but few 1948 cocoons were found. Those examined contained dead larvae and pupae. Collections of these were made for shipment to the Vernon Laboratory.

Observations made throughout the season in these areas seem to indicate that damage by Douglas Fir Tussock moth should cease with this year's outbreak in these localities dealt with in this report. Earlier in the season larvae were very numerous, while at the time this survey was made few fresh cocoons or living larvae could be found. This may mean that 1948 is the "crash" year for the moth in this district. However, this conclusion will be checked by an egg survey through the area later in the year.

B. A. Sugden,
Insect Ranger,
Vernon Forest Insect Laboratory.

October 23, 1948.

Douglas Fir Tussock Moth, Hemerocampa pseudotsuga, Egg
Survey for the Ducks Range Area - Sept. 12, 1948.

The egg survey at Ducks Range was conducted to obtain information regarding the possible existence, size and extent of next year's tussock moth population. The same plan was employed as in previously mapping the area, using the intersection of the old Kamloops road and the new cut-off from Ducks Range to Monte Creek as a starting point for mileage.

Traverses were made at one mile intervals through the infestation. In traverses of 15 chains or less, a sample tree was selected from each chain, in longer traverses, one tree in three chains was examined. A count of the cocoons was made in each case from three branches per tree. Some of the findings from the sampling are shown in the following table.

: Traverse :	: No. of :	: No. of :	: No. of :	: Egg Masses :	
				: Chains :	: Branches :
1	: 12	: 5	: 12	: 4	: -
2	: 5	: 5	: 22	: 8	: -
3	: 12	: 5	: 16	: 5	: -
5	: 21	: 5	: 17	: 6	: -
4	: 8	: 5	: 30	: 12	: -
6	: 9	: 5	: 32	: 7	: -
7	: 12	: 5	: 29	: 9	: -
8	: 12	: 5	: 30	: 12	: -

It will be noted that no fresh egg masses are recorded in the above table. This condition was prevalent throughout the area of former infestation. It is safe, then, to assume from the scarcity of fresh egg masses that the tussock moth population will be very light in this area during 1949. Consequently, damage by this insect will be at a minimum.

B. A. Sugden,
Forest Insect Ranger.

Vernon, B. C.,
October 29, 1948.

Tussock Moth Egg Survey - Ashcroft

An egg survey was carried out during the last week in October by Rangers Simms and Clarke in the vicinities of Oregon Jack Creek and Upper and Lower Venables Valley, where outbreaks of Douglas Fir Tussock Moth (Hemerocampa pseudotsugata) occurred in 1947 and 1948. These three infested areas cover approximately 10 square miles, the Oregon Jack being much the largest.

Of 53 spot samples with 3 trees to each, only 5 of this year's egg masses were found; 2 in the lower portion of the Oregon Jack Infestation, 2 in the lower Venables Valley Infestation and 1 in the infestation just west of Venables Lake.

The fact that branch samples taken from 159 trees yielded only 5 egg masses seems to indicate that next year's larvae population will be very low.

October 29, 1948

W. G. Simms
Forest Insect Ranger

**Summary Report on Infestations of the Douglas
Fir Tussock Moth, Hemerocampa pseudotsugata,
in the Kamloops Forest District for 1948.**

During the summer of this year larvae of the Douglas fir Tussock Moth caused considerable injury by defoliating the Douglas fir and in some instances the Ponderosa pine located within the areas of infestation. Injury done to many of these trees will undoubtedly result in their death. To date such extensive damage from this insect has not previously been recorded in British Columbia. Their normal activity, when reaching population peak, seems confined to small areas rarely exceeding one thousand acres. This year in at least three localities the infestations covered twenty-five to thirty thousand acres each; these located at Ducks Range, Oregon Jack Creek and Lower Hat Creek Valley were mapped during the summer. A check on development of tussock moth populations was also made during the season by larvae, cocoon and egg surveys. The results of the surveys for the three areas were so similar that to avoid repetition they will be referred to as a single infestation in this report.

Larval Survey - Defoliation was severe ranging up to 100 per cent of the new foliage, and 40 to 100 per cent of the old foliage. Larvae were very numerous at the time of the larval survey, but mortality appeared high as illustrated by the following table:

Number of Branch Samples.	Living Larvae	Dead Larvae
5 - 5 - 5	31 - 36 - 14	10 - 17 - 2
" " "	28 - 31 - 10	11 - 6 - 4
" " "	17 - 24 - 16	6 - 8 - 5
" " "	22 - 25 - 19	10 - 3 - 0
" " "	21 - 27 - 25	3 - 7 - 11
" " "	22 - 12 - 18	7 - 10 - 13

Though it is shown that the dead larvae in some cases were fifty per cent or more of the living larvae, the percentage mortality would be greater as only the dead larvae hanging from the branches used for sample counts were listed. Large numbers of dead larvae were observed on the ground at the base of the trees.

Parasites were active throughout the infestations. A small hymenoptera, Hyposoter sp. seemed to be most numerous. Its small oval cocoons were seen on the ground and hanging from the lower branches of the trees in large numbers. A large Ichneumonid parasite was also common. It has been tentatively identified as Pimpla pedalis.

Disease was, however, the dominant factor affecting larvae mortality in these areas. Though more than one disease was evident, the commonest was a polyhedral virus. At the time of death from this disease larvae assume a shiny aspect and are entirely flaccid and without offensive odour. According to H. L. Sweetman, "The Biological Control of Insects" (1936) "Normally, spread of the infection from larva to larva occurs through the mouth from the eating of food contaminated by diseased larvae. The virus can be transmitted in the egg from parent to offspring, but it is likely that the eggs and adults serve merely as carrying agents." The presence of the virus disease in these localities should insure a very small tussock moth population in 1949.

Cocoon Survey - When the infestations were visited at the time of pupation very few fresh cocoons were found. This was interesting in view of the vast numbers of larvae seen earlier in the season. Many cocoons were examined in the field. Of these, none contained living pupae. The majority contained larvae that had died in the prepupal stage. In most cases disease was the cause of death. Collections of cocoons were made and sent to the Vernon Laboratory for examination.

Egg Survey - This survey was conducted to obtain information regarding the possible existence, size and extent of next year's tussock moth population. As was expected from the results of the larvae and cocoon surveys very few egg masses were found. In making the egg survey a count of cocoons and egg masses was made from three branches of each tree examined. Some of the results from the sampling are shown in the following table:

Number of Branch Samples :	Number of cocoons :	Egg Masses	
		1947	1948
3	12	4	-
"	22	8	-
"	16	5	-
"	17	6	-
"	30	12	-
"	32	7	-
"	29	9	-
"	30	10	-

It will be noted that no fresh egg masses were recorded. This condition was prevalent throughout the three main areas of infestation with one modification. Eleven egg masses were found at Lower Hat Creek Valley. The egg masses here, however, are not numerous enough to produce a large population in 1949. Results of the surveys this year indicate that damage by this moth will be at a minimum next year in the localities of Ducks Range, Oregon Jack Creek and Lower Hat Creek Valley.

Other areas having a larger than normal population of tussock moth in which egg surveys were conducted this fall were Heffley Creek, Cherry Creek, Paul Lake, Monte Lake and Buse Lake. Though egg masses were located in all of these areas, they were too few in number to constitute any real hazard. However, a check will be made of these localities in the late spring of 1949 shortly after the eggs have hatched.

B. A. Sugden,
Forest Insect Ranger,
Vernon Forest Insect Laboratory.

November 29, 1948.

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