Not for publication

# ANNUAL REPORTS OF FOREST BIOLOGY RANGERS

# BRITISH COLUMBIA, 1958

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FOREST BIOLOGY LABORATORY

VICTORIA, B.C.

CANADA

DEPARTMENT OF AGRICULTURE

SCIENCE SERVICE

FOREST BIOLOGY DIVISION

MARCH, 1959

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British Columbia, 1958

# BRITISH COLUMBIA

# FOREST BIOLOGY RANGERS' ANNUAL REPORT

## 1958

R. L. Fiddick

## FOREWORD

A very mild winter, early spring, and hot dry summer created favourable conditions for an increase in the population of some insect species in 1958. A number of insects, considered to be of minor importance economically caused noticeable damage to some species of conifers as well as deciduous trees. Notable among these were three species of loopers Erranis vancouverensis Hlst., Epirrita autumnata (Gn.) and Melanolophia imitata Wlk., all in the Vancouver Forest District.

The balsam woolly aphid was recorded in British Columbia for the first time, near Vancouver, although it has apparently been present for a number of years.

The Douglas-fir beetle continued to attack groups of Douglas fir trees in the Kamloops and South Prince George districts. Indications are that it increased considerably in intensity.

The total number of insect collections made in British Columbia and the Yukon was 5,167. Tree disease collections totalled 474.

The quality of tree disease collections improved somewhat in 1958. Preliminary examinations and reports indicate the rangers have a better understanding of forest disease problems and requirements. Of considerable interest was the occurrence of disease of alpine fir causing bark and cambial lesions, associated with bark beetles. This condition affected large areas of balsam fir at higher elevations.

This was the first year in which rangers were assigned to the North Prince George and Yukon districts for a complete season. Although somewhat hampered by serious forest fires, they were able to attain good coverage of accessible areas.

A new ranger cabin established at Prince George for the South Prince George District released a house trailer for use on the Alaska Highway.

A slight departure from the regular survey with the M/V Forest Biologist was accomplished this year. Instead of surveying lightly the whole of the coast a detailed survey was carried out in the North Vancouver District and a concentrated survey was done in one drainage division of the South Prince Rupert District. This had certain advantages in that it kept the boat running time to a minimum and allowed ranger personnel considerably more time for insect collecting and observations.

Some detailed surveys were conducted to assess the present status of several insect outbreaks. Of these the Douglas-fir damage appraisal survey was the largest, requiring four to six rangers for approximately three weeks. Egg counts and defoliation estimates were made in the spruce budworm infestations at Babine Lake, and in the Lillooet and Fraser River valleys. Black-headed budworm egg counts on northern Vancouver Island were made on a reduced scale.

The following table lists forest insect and tree disease collections for each ranger district by the various agencies.

Table 1

Forest Insect and Tree Disease Collections
by Agencies
British Columbia and Yukon - 1958

| Personnel involved | | South Vancouver Island | North Vancouver Island | South Vancouver | North Vancouver | South Prince Rupert | West Prince Rupert | East Prince Rupert | East Kamloops | Central Kamloops | West Kamloops | East Nelson | Central Nelson | West Nelson | South Prince George | West Prince George | North Prince George | Yukon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Forest Biology Rangers Independently | Insect | 290 | 442 | 302 | 187 | 113 | 214 | 286 | 301 | 255 | 236 | 361 | 224 | 224 | 322 | 271 | 365 | 235 |
| | Tree disease | 56 | 66 | 74 | 24 | 27 | 15 | 65 | 2 | 17 | 20 | 14 | 19 | 12 | | 44 | 9 | 10 |
| Forest Biology Rangers with Forest Service Personnel | | | | | | | | | | 10 | | | 15 | 1 | | | | 10 |
| Forest Service Personnel Independently | | 45 | 10 | 25 | 20 | 3 | 12 | 11 | 10 | 3 | 1 | 8 | | 1 | 1 | 1 | 3 | 1 |
| Other Co-operators | | *238 | 27 | 20 | 5 | | 12 | | 59 | 1 | | | 3 | | 1 | | | 2 |
| Totals | | 629 | 545 | 421 | 236 | 143 | 253 | 362 | 372 | 286 | 257 | 383 | 261 | 238 | 324 | 316 | 377 | 258 |

* Includes collections from light-trap at Langford Insectary.

# ANNUAL REPORT OF FOREST BIOLOGY RANGERS

# BRITISH COLUMBIA

# 1958

# VANCOUVER FOREST DISTRICT

# FOREST BIOLOGY SURVEY

## VANCOUVER FOREST DISTRICT

## 1958

E. G. Harvey

## INTRODUCTION

During 1958 Forest Biology Rangers were assigned to ranger districts as follows:

| | |
|---|---|
| E. G. Harvey | - South Vancouver Island |
| S. J. Allen | - North Vancouver Island |
| A. K. Jardine | - South Vancouver |
| R. H. Murfitt ) | - North Vancouver |
| ) | |
| R. Woods ) | Boat District |

The forest biology survey was curtailed during much of July and August by a complete forest closure resulting from the exceedingly dry weather. However, an early spring made it possible to achieve good coverage before the closure was enforced. There was a noticeable increase in the numbers of some species of forest insects throughout the Vancouver Forest District.

The spruce budworm infestation in the Lillooet and Fraser River valleys increased in size, with localized areas of heavy defoliation, although some of the older areas of the outbreak have almost completely recovered from the attack. Trees show increased radial growth and a good complement of needles on the crown.

Populations of the western hemlock looper, phantom hemlock looper, and oak looper increased considerably.

A new menace to shade trees appeared with the sudden rise to infestation numbers of the western winter moth looper.

Two loopers which appeared consistently, and in fairly large numbers in a few areas, were the green-striped forest looper and the green velvet looper.

The black-headed budworm infestation has died out; larvae were collected in small numbers only.

Spot infestations of the western tent caterpillar, forest tent caterpillar, fall web-worm, satin moth, alder saw-fly, and willow leaf beetle occurred on broad-leafed trees.

A new potentially dangerous forest insect in this district is the balsam woolly aphid, which is doing considerable damage in the greater Vancouver area.

The green spruce aphid caused heavy damage to both Sitka spruce and ornamental blue spruce throughout the southern portion of the district.

Webs of the silver spotted tiger moth increased considerably in number compared with 1957. Webs were evident throughout the area of the previous infestation.

Exotic tree plantations were in much better condition than in 1957. Young trees have recovered from heavy deer browsing of the previous year.

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

SOUTH VANCOUVER ISLAND DISTRICT

1958

# FOREST BIOLOGY SURVEY

## SOUTH VANCOUVER ISLAND DISTRICT

## 1958

E. G. Harvey

## INTRODUCTION

The field season in the South Vancouver Island District started early this year, in the middle of April, as a result of the mild winter and early spring. This would have resulted in excellent coverage, except for a two month forest closure, from mid-June to mid-August. During this period practically no collecting or detection work was done in the district.

A total of 573 insect and 56 tree disease collections were made. The insect collections included over 200 made by the insectary staff at Langford, from light traps, or as collections made by individual members of the staff. Of the 56 Pathological collections made, 24 have been identified. The others are being cultured or have been forwarded to Ottawa. Special collections included six aphis collections sent to Mr. G. A. Bradley at Winnipeg and 22 spider collection to Mr. J. C. B. Choudhuri at Fredericton. Collections by host species are shown in Table 1, and the distribution of sample points is shown in Map 1.

Table 1

Collections by Hosts

South Vancouver Island District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Douglas fir | 129 | 14 | No host | 143 | |
| Western hemlock | 67 | 5 | Miscellaneous | 44 | 1 |
| Western red cedar | 21 | | Garry oak | 34 | |
| Grand fir | 21 | 8 | Willow | 25 | |
| Amabilis fir | 8 | 7 | Western red alder | 17 | |
| Sitka spruce | 14 | | Hawthorn | 8 | |
| Western white pine | 7 | 6 | Apple | 5 | |
| Lodgepole pine | 5 | 6 | Arbutus | 4 | |
| Eastern white pine | | 1 | Silver poplar | 7 | |
| Scots pine | 1 | | Lombardy poplar | 1 | 1 |
| European larch | 1 | 3 | Trembling aspen | 2 | |
| Juniper | 1 | 1 | Maple | 2 | |
| Yew | | 1 | Wild plum | 3 | 1 |
| | | | Cherry | 2 | |
| | | | Holly | 1 | |
| | | | Beech | | 1 |
| | | | Total | 298 | 4 |
| Total | 275 | 52 | Grand Total | 573 | 56 |

## STATUS OF INSECTS

### Black-headed Budworm, Acleris variana (Fern.)

This insect, which showed signs of increasing in 1957, was found in only 10 collections in 1958. (Table 2.) Most larvae were found in the Klanawa River and Nitinat Lake areas. (Map 2.)

Table 2

Number of Black-headed Budworm per 3-tree Beating Sample Collected in the Respective Drainage Divisions of the South Vancouver Island District.

| Drainage division | Total no. samples taken during larval period | | | No. samples containing black-headed budworm | | | Average no. larvae per sample | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 |
| 001 | 26 | 0 | 1 | 7 | 0 | 0 | 1.43 | - | - |
| 002 | 56 | 68 | 37 | 22 | 24 | 2 | 2.68 | 4.83 | 1.50 |
| 003 | 50 | 27 | 21 | 11 | 14 | 7 | 3.91 | 12.71 | 2.57 |
| 004 | 34 | 22 | 5 | 10 | 3 | 1 | 2.30 | 1.00 | 1.00 |
| Total | 166 | 117 | 64 | 50 | 41 | 10 | 2.70 | 7.24 | 2.20 |

### Spruce Budworm, Choristoneura fumiferana (Clem.)

Only three larvae were found in the district this year.

### Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

There was no evidence of any change in the numbers of larvae per collection or in the distribution of this insect. Most of the larvae found were in the Nitinat - Caycuse River area. (Map 2).

### Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Infestations of this broadleaf defoliator decreased considerably in intensity. On the Saanich Peninsula tents were scarce and colonies were lacking in vigor. The local infestation at Youbou also showed signs of dying out; only one new egg mass was found. A light population persisted on the Gulf Islands.

Spruce Aphid, Neomyzaphis abietina (Wlkr.)

This year another infestation of this insect occurred in all parts of this district. Sitka spruce was the major host. Attacks were heaviest where this host was planted as an ornamental or border tree out of its natural environment. Ornamental blue spruce were also defoliated. Attacks resulted in defoliation ranging from a trace to 100 per cent of the old needles. New growth was not damaged, but in some cases may not be sufficient to keep the tree alive.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

A few large, healthy colonies of this insect were found in scattered sections of the district early in the spring, indicating a possible increase in the population of the defoliator. A previous outbreak collapsed suddenly in 1956. A roadside visual survey from a vehicle travelling at a speed of not over 20 miles per hour was made in the fall. A total of 323 colonies were counted, nearly all between Goldstream and Cameron Lake. The only other area in which webs were observed was by Cowichan Lake, where 42 colonies were counted between Lake Cowichan and Youbou.

The collections in which larvae of this insect were found in the spring, and the location of webs recorded in the fall, are shown in Map 3.

Oak Looper, Lambdina somniaria (Hlst.)

A heavy spot infestation on Garry oak occurred in Saanich, about four miles west of the area in the Lake Hill district where the infestation occurred in Victoria from 1946 to 1950. Approximately four acres were heavily defoliated. Larvae were also found in larger than usual numbers throughout the Victoria area, and on Salt Spring Island.

Variegated Cutworm, Peridroma margaritosa Haw.

The variegated cutworm was found in large numbers in several areas, particularly in Nanaimo and Duncan. At Duncan they infested the seed beds of the Forest Service nursery and cut off seedlings as they sprouted, thus completely destroying several beds of Douglas fir, Sitka spruce and balsam. In other areas they fed on flowers, vegetables, and understory plants.

Satin Moth, Stilpnotia salicis (L.)

Satin moth larvae, which severely defoliated silver and Lombardy poplar trees in Nanaimo and Victoria, were heavily parasitized this year. Many larvae were covered with so many parasite eggs that they appeared white and crusty. Of 1,366 larvae collected and reared at the insectary, only 208 pupated and three of these later died of parasites. Seventy-four

parasites were obtained, of which about two-thirds were Dipterous and one third Hymenopterous. Of the former about half emerged and were identified as Campsilura concinnata Mg.; the latter were mostly Apanteles solitarius (Ratz.)

Western Winter Moth, Erannis vancouverensis Hlst.

A new threat to shade trees appeared in the form of this looper which infested Garry oak trees in the Uplands and Cedar Hill areas of Victoria, causing up to 90 per cent defoliation to some trees. All other broad-leafed trees in these areas, as well as shrubs and flowers, were heavily defoliated. Larvae were found in smaller numbers on Lombardy poplars at William Head.

Douglas Fir Needle Miner, Contarinia sp.

Douglas fir stands in the district were all infested to varying degrees with this needle miner. The heaviest attacks occurred on young regeneration.

Green-striped Forest Looper, Melanolophia imitata Wlk.

This large looper appeared in collections throughout the district, ranging from one to 20 larvae per collection (Map 4). The number of larvae collected increased appreciably in 1958 (Table 3).

Table 3.

Number of Green-striped Forest Looper per 3-tree Beating Sample Collected in the Respective Drainage Divisions of the South Vancouver Island District.

| Drainage division | Total no. samples taken during larval period | | | No. samples containing green-striped forest looper | | | Average no. larvae per sample | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 |
| 001 | 21 | 25 | 0 | 2 | 3 | 0 | 1.50 | 1.67 | - |
| 002 | 60 | 43 | 32 | 7 | 5 | 14 | 1.57 | 1.60 | 3.86 |
| 003 | 50 | 21 | 28 | 5 | 8 | 17 | 1.60 | 2.50 | 4.53 |
| 004 | 35 | 23 | 11 | 7 | 16 | 4 | 1.43 | 2.13 | 2.00 |
| Combined | 166 | 112 | 71 | 21 | 32 | 35 | 1.52 | 2.09 | 3.97 |

Willow Leaf Beetle, Galerucella carbo (Lec.)

This leaf beetle was again plentiful, defoliating willow throughout much of the district.

## STATUS OF TREE DISEASES

Twig Canker of White Pine.

Regeneration white pine trees in Copper Canyon, near Chemainus, were infected by Atropellis pinicola Zeller & Goodd. A similar condition was noted in the Robertson River Valley and in the area around Ladysmith. Collections from these points have been forwarded to Ottawa for confirmation.

Douglas Fir Sampling Dieback and Canker.

As a result of damage caused by the severe November 1955 frost some Douglas fir saplings are still found with continuing leader and branch dieback. Three fungi were isolated from samples collected at Salt Spring, North Pender, and Valdes islands. Stereum sanguinolentum (Alb. & Schw. ex Fr.) Fr. was common to all three samples. Dasycyphus pseudotsugae Hahn was isolated from the Salt Spring and Valdes Islands samples, and Pullularia spp. from the Salt Spring and North Pender islands samples.

Dasycyphus pseudotsugae was also found in samples from Mt. Douglas near Victoria, and Durant's Road on the Saanich Peninsula. Because of the relatively small number of these isolates the distribution of these fungi on the collections is not considered significant.

Needle Blight of Douglas fir.

Rhabdocline pseudotsugae Syd. was found defoliating regeneration Douglas fir trees. The areas in which the discoloration of the foliage was most prevalent were Malahat Mountain, Alberni Highway Summit, and North Pender Island.

Black Knot of Cherries.

This canker disease caused by Dibotryon morbosum (Schw.) Theiss. & Syd. previously reported prevalent from Chemainus to Cowichan Bay, was found on wild plum trees in the West Saanich area.

Exotic Tree Plantations.

All but seven of 27 exotic tree plantations in the district were examined during the year. Some of these are to be discontinued because of poor survival after planting.

Collections from plots are shown below:

| Plot | Host | Disease organism |
|---|---|---|
| XP-75 | Pinus strobus | Cronartium ribicola J. C. Fisch. |
| XP-28C | Larix decidua | * To Ottawa |
| XP-28C | " " | * Hypodermataceae |

* To be identified and reported on later.

Drought Injury

Regeneration Douglas fir and hemlock trees on dry, exposed, and rocky sites throughout the South Vancouver Island District turned red or dropped their needles. Many trees were injured only in the top exposed half, and retained green needles on the lower, sheltered portion of the crown. The full extent of the damage cannot be ascertained until another growing season has passed.

Damage by Goats.

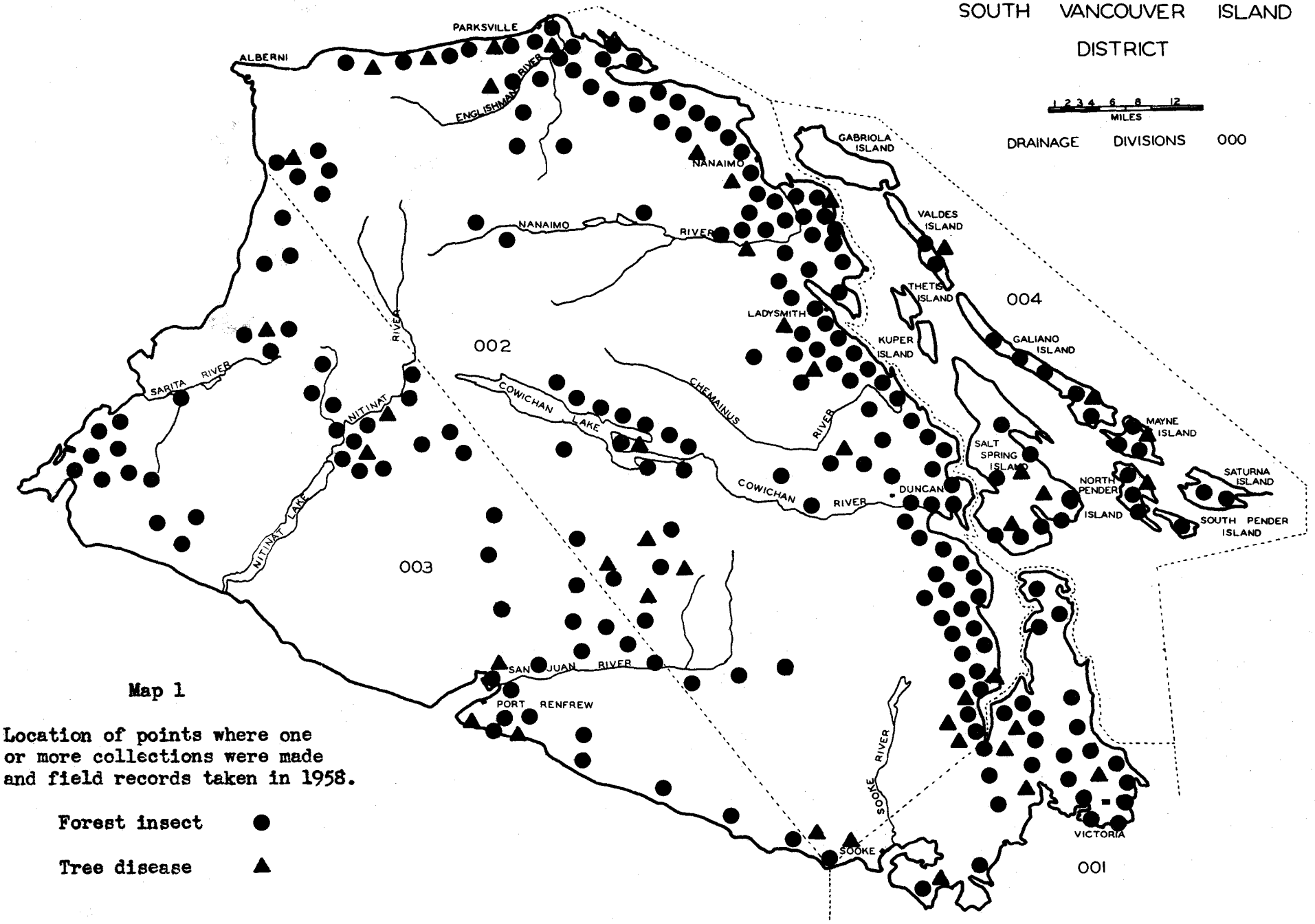
An area of regeneration consisting mainly of Douglas fir, with scattered lodgepole and white pine associated, was heavily bark-browsed. In many cases, the trees were girdled with the bark stripped off to about six feet from the ground. Of 100 tree examined 88 had been browsed to some extent. An investigation revealed that a farmer nearby had a herd of goats which roamed the area, and damaged the trees.

## OTHER NOTEWORTHY DISEASES

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Fir, Douglas | Hymenula sp. | Malahat | A hyperparasite on the needle cast Rhabdocline pseudotsugae Syd. Possibly a new record. |
| | Polyporus schweinitzii Fr. | Nitinat R<br>Englishman's R | Conks from scarred face of living trees. |
| Hemlock western | Fomes pini (Thore ex Fr.) Karst. | Ladysmith | Red ring rot, common in the district. |

OTHER NOTEWORTHY DISEASES - continued

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Fir, grand | Peridermium pseudo-balsameum (Diet. & Holw.) Arth. & Kern | Galiano Is. Errington Esquimalt | White needle rust |
| Pine, lodgepole | Peridermium harknessii J. P. Moore | Malahat | Gall rust prevalent throughout most of area. |
| Juniper sp. | Gymnosporangium sp. | Cowichan L | Gall rust |
| Lombardy poplar | Taphrina populina Fr. | Nanaimo | A new host record of this leaf spot disease |

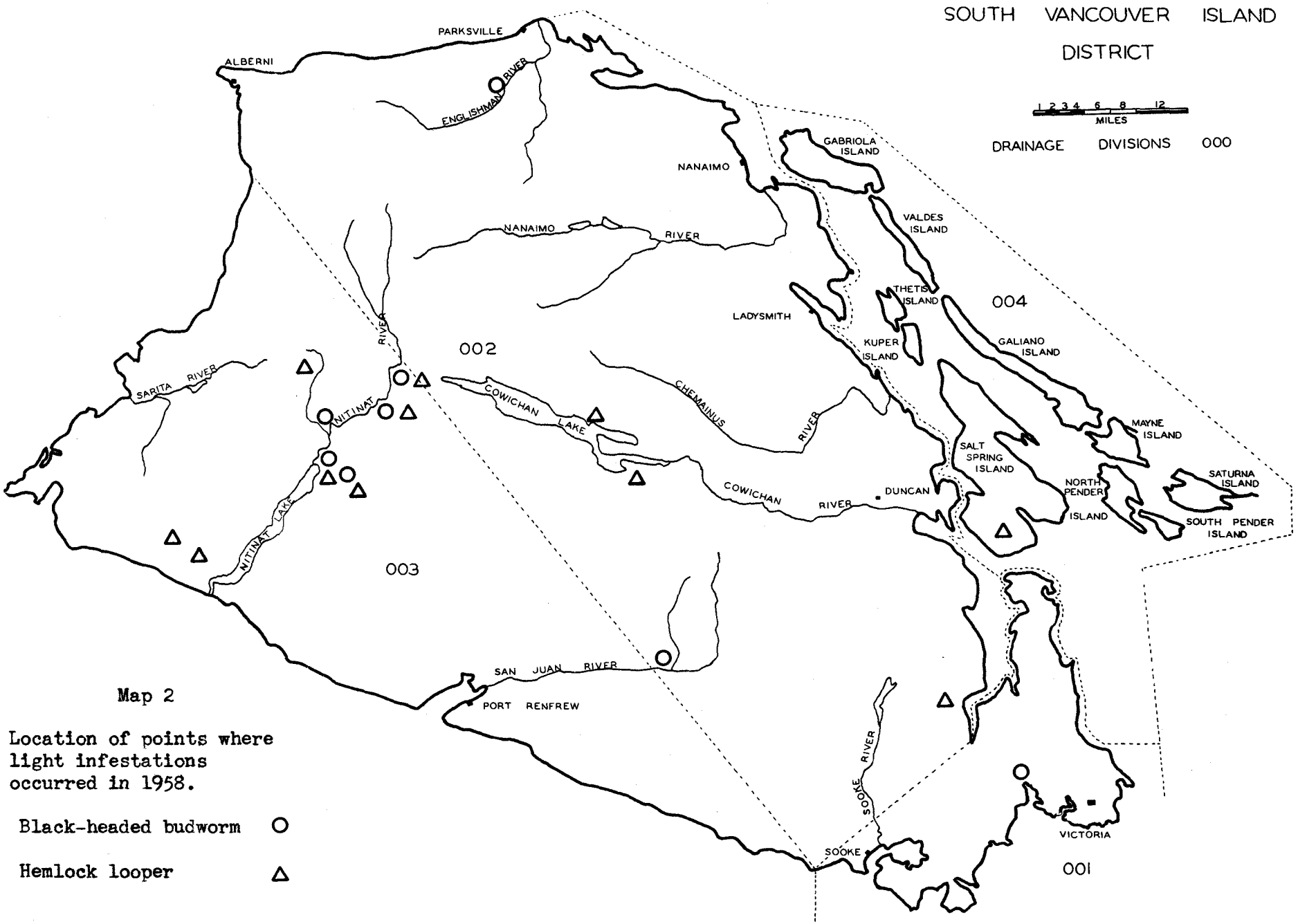



**Map 1**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect** ●

**Tree disease** ▲

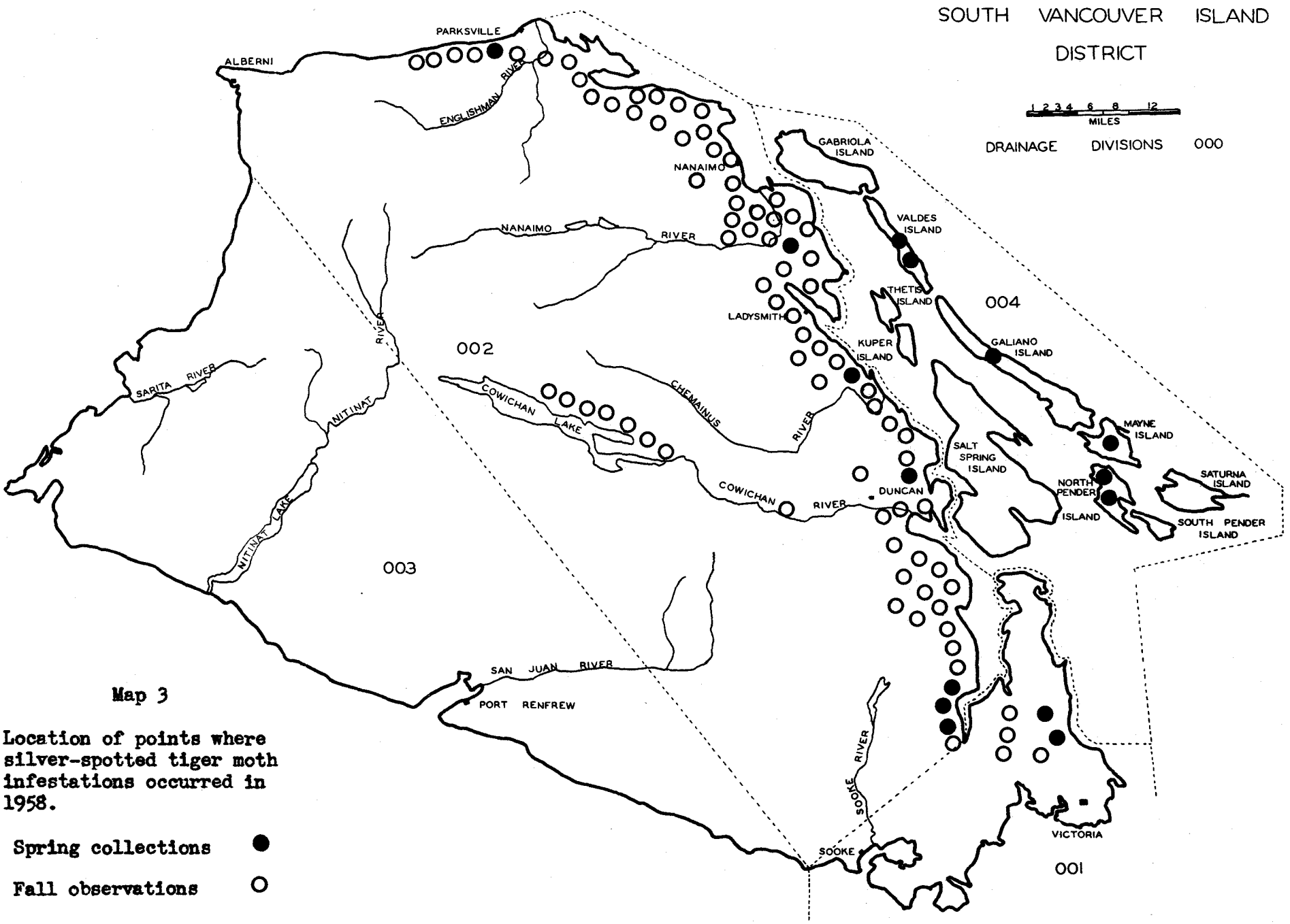



Map 2

Location of points where light infestations occurred in 1958.

Black-headed budworm ○

Hemlock looper △




**Map 3**

**Location of points where silver-spotted tiger moth infestations occurred in 1958.**

**Spring collections** ●

**Fall observations** ○

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

NORTH VANCOUVER ISLAND DISTRICT

1958

# FOREST BIOLOGY SURVEY

## NORTH VANCOUVER ISLAND DISTRICT

## 1958

S. J. Allen

## INTRODUCTION

The forest biology survey of North Vancouver Island commenced May 8 and ended October 4. Table 1 lists collections by hosts and Map 1 shows the location of points where collections were made. The warm dry summer resulted in rapid development of insects and trees. Of outstanding interest was the increase in numbers of many forest insects, particularly those of the family Geometridae.

Sixty-six tree disease samples were submitted to the Victoria Laboratory for identification. Of these samples, 16 were unidentified, 10 suspected insect damage, eight suspected drought symptoms, four were sent to Ottawa and 28 were identified. Of the 10 suspected insect damage, six were from what is believed to have been a spruce aphis infestation.

Table 1

Collections by Hosts

North Vancouver Island District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Sitka spruce | 20 | 7 | Red alder | 5 | - |
| Lodgepole pine | 2 | 2 | Dogwood | 1 | - |
| White pine | 2 | - | Holly | 1 | 1 |
| Yellow pine | - | 2 | Poplar | 1 | 5 |
| Scots pine | 1 | - | Willow | 4 | 1 |
| Red pine | - | 1 | Miscellaneous | 4 | 10 |
| Douglas fir | 89 | 11 | No host | 5 | - |
| Red cedar | 17 | - | | | |
| Port Orford cedar | - | 2 | | | |
| Amabilis fir | 24 | 2 | | | |
| Grand fir | 10 | 2 | | | |
| Alpine fir | 1 | 1 | | | |
| Western hemlock | 289 | 17 | | | |
| Mountain hemlock | 3 | - | | | |
| European larch | - | 1 | | | |
| Western yew | - | 1 | | | |
| | | | Total | 21 | 17 |
| Total | 458 | 49 | Grand Total | 479 | 66 |

## STATUS OF INSECTS

### Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm population remained at a low level in 1958. A total of only 38 larvae were found in 26 positive samples (Map 2). Of the 38 specimens submitted, seven were parasitized.

Egg counts were made in 34 localities, 32 of which were established in 1955. The sampling method was revised in 1958, instead of two 18-inch branch tips from each of three trees in an area, a sample consisted of five 10-inch branch tips from each of three trees. Analysis of data collected during the past two years show that the 10-inch sample is as satisfactory a measure of eggs at low levels as the 18-inch unit.

Egg counts made in the 32 localities from 1955 to 1958 are shown in Table 2. The average number of eggs in the 34 localities decreased 85 per cent compared with 1957. Eggs were found in three main areas, at Holberg, Port Hardy to Port McNeill, and in the Nimpkish River Valley. According to the low egg counts black-headed budworm larvae will be very scarce in 1959, and there should be no noticeable defoliation.

No defoliation was observed throughout the old infestation area in 1958. Foliage was still thin in some areas where severe feeding occurred from 1955 to 1957, but in most cases the stands were recovering. The exceptions are reproduction trees in a forty-year old stand around the Beaver Cove - Englewood area. Here in three plots, 116 out of 250 trees suffered top kill varying from one to 10 feet, (Table 3, plot numbers 10, 11, 12).

The lack of rainfall from May to August, 1958, resulted in Heavy transpiration and caused the shedding of some terminal foliage, creating heavier defoliation readings in some plots in 1958. This was evident in the Kokish River, (Table 3, Plot 2), where the estimated defoliation increased over 1957.

Table 2

Black-headed budworm egg counts at sample points on northern Vancouver Island

| Locality | Average number of eggs per 10-inch sample unit | | | |
|---|---|---|---|---|
| | 1955 | 1956 | 1957 | 1958 |
| Holberg airforce road | 3.0 | 0 | 0.17 | 0.07 |
| Holberg side 3 P. L. 335 | 0.3 | 0.7 | 1.0 | 0 |
| Holberg Inlet | 0.6 | 2.0 | 0.17 | 0 |
| Holberg - mortality plot | 0.2 | 2.2 | 0.17 | 0.20 |
| Holberg - N. E. main | 2.4 | 1.8 | 0.50 | 0 |
| Dahlstrom pt. | 8.3 | 1.0 | 0.17 | 0 |
| Mahatta River | 8.0 | 1.5 | 0.50 | 0 |
| Mine road opposite Jeune Landing | 13.0 | 5.0 | 0 | 0 |
| Jeune landing | 2.0 | 1.8 | 0.17 | 0 |
| Teeta Creek | 2.8 | 7.0 | 0 | 0 |
| Port Alice | 1.3 | 17.5 | 0.33 | 0 |
| Alice Lake bl. 25 | 12.2 | 3.8 | 0 | 0 |
| Port Hardy, B. C. F. S. | 11.7 | 1.0 | 0 | 0.13 |
| Alice Lake logging Br. 2 | 16.3 | 27.8 | 0 | 0 |
| Rupert Inlet | 3.1 | 3.5 | 0.33 | 0 |
| Port Hardy, airport road | 13.3 | 4.2 | 0 | 0.07 |
| Nine mile lake | 7.2 | 1.8 | 0 | 0.07 |
| O'Connor Lake | 3.0 | 1.2 | 0.17 | 0 |
| Port McNeil N. main | 1.0 | 0.3 | 0 | 0 |
| Port McNeil | - | 10.7 | 0.66 | 0 |
| Port McNeil, E. main | 15.9 | 12.0 | 0 | 0 |
| Nimpkish - Kilpala River | 4.8 | 2.1 | 0 | 0 |
| Nimpkish - lake road | 0.3 | 0.2 | 0.17 | 0 |
| Nimpkish Camp "A" side 3 | 14.2 | 0.8 | 0 | 0 |
| Englewood-Nimpkish Grade, 3 mi. | 2.6 | 2.7 | 0 | 0.07 |
| Beaver Cove | 9.7 | 2.0 | 0.50 | 0.07 |
| Kokish River | 0.3 | 1.2 | 0 | 0.07 |
| Ida Lake | 9.1 | 4.7 | 0.17 | 0 |
| Robson Bight | 5.9 | 2.0 | 0 | 0 |
| Tsitika River | 7.0 | 1.7 | 0 | 0 |
| Naka Creek | 2.0 | 4.3 | 0 | 0 |
| Salmon River | 4.8 | 2.3 | 0.17 | 0 |
| Winter Harbour | 1.9 | 4.3 | 0.17 | 0 |
| Hustan Lake | - | 3.5 | 0 | 0.07 |
| Total | 188.2 | 138.6 | 5.52 | 0.82 |
| Average | 5.88 | 4.08 | 0.16 | 0.024 |

Table 3

Defoliation and Top-kill, North Vancouver Island, 1955-1958.

Average per cent over-all defoliation and top kill.

| Plot no. | Location | No. of Trees | 1955 | | | 1956 | | |
|---|---|---|---|---|---|---|---|---|
| | | | T* | No./trees with top-kill | Av. length of top-kill | T* | No./trees with top-kill | Av. length of top-kill |
| 1 | Naka Creek | 40 | 7.3 | 0 | 0 | 47 | 0 | 0 |
| 2 | E fork Kokish R | 50 | 9.1 | 0 | 0 | 6.9 | 0 | 0 |
| 3 | Port McNeill | 50 | 14.5 | 0 | 0 | 19.0 | 0 | 0 |
| 4 | Mahatta River | 50 | 8.5 | 0 | 0 | 37 | 9 | 3.9' |
| 5 | Port Hardy airport | 50 | 17.1 | 0 | 0 | 43.6 | 12 | 5.0' |
| 6 | Holberg | 50 | 25.5 | 1 | 3' | 37 | 0 | 0 |
| 7 | Salmon R. logging | 50 | 4.4 | 0 | 0 | 7.4 | 0 | 0 |
| 8 | Robson Bight | 45 | 8.6 | 0 | 0 | 51.5 | 1 | ? |
| 9 | Port Hardy B.C.F.S. | 50 | - 1/ | - | - | 62 | 15 | 3.2 |
| 10 | Englewood log. rr grade | 50 | - | - | - | 62 | - | - |
| 11 | Kokish R near Beaver Cove | 100 | - | - | - | 52.1 | 52 | 4.3' |
| 12 | Elk R near Beaver Cove | 100 | - | - | - | 60 | 57 | 4.5' |

* T Average defoliation per tree in per cent

1/ No records taken

Table 3 - continued

| Plot no. | 1957 | | | 1958 | | |
|---|---|---|---|---|---|---|
| | T* | No./trees with top-kill | Av. length of top-kill | T* | No./trees with top-kill | Av. length of top-kill |
| 1 | 19.1 | 0 | 0 | 8.9 | 0 | 0** |
| 2 | 4.6 | 0 | 0 | 8.0 | 0 | 0 |
| 3 | 26.4 | 0 | 0 | 9.6 | 0 | 0 |
| 4 | - | - | - | - | - | - |
| 5 | 43.5 | 0 | 0 | 14.3 | 0 | 0 |
| 6 | 16.8 | 3 | 2.7' | 15.0 | 3 | 3.3' |
| 7 | 4.6 | 0 | 0 | .02 | 0 | 0 |
| 8 | 45.5 | - | 3.6' | 9.1 | 2 | ? |
| 9 | 23.4 | 7 | 3.4' | 28.9 | 2 | 2.5' |
| 10 | 66.0 | 21 | 2.6' | 43.6 | 26 | 3.5' |
| 11 | 40.6 | 45 | 2.5' | 35.6 | 48 | 2.6' |
| 12 | 47.7 | 54 | 2.4' | 39.2 | 42 | 2.9' |

*T Average defoliation per tree in per cent

** Three trees dead in Plot 1.

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Forty-seven specimens of the hemlock looper were found in 22 positive samples during the 1958 survey. Twelve larvae were found in 1957, four in 1956 and four in 1955.

Twenty-eight larvae were found in the Quatsino region in eight samples. The largest number was found at the mouth of Clesklagh Creek where 13 larvae were collected from western hemlock. The hosts, in order of preference were, western hemlock, Sitka spruce and western red cedar. Table 4 summarizes the occurrence of the hemlock looper by Drainage division since 1956, and Map 2 shows the 1958 distribution of hemlock looper collections.

Table 4

Summary of Hemlock Looper found by Drainage Divisions, North Vancouver Island, 1956-1958.

| Drainage Division | Total no/samples taken during larval period | | | No./samples containing hemlock looper | | | Average no. larvae per sample | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 |
| 020 | 0 | 54 | 17 | 0 | 1 | 1 | 0 | 2.0 | 1.0 |
| 021 | 4 | 38 | 85 | 2 | 1 | 4 | 2.0* | 1.0 | 1.3 |
| 022 | 0 | 60 | 49 | 0 | 0 | 2 | 0 | 0 | 2.0 |
| 023 | 0 | 5 | 37 | 0 | 0 | 6 | 0 | 0 | 1.5 |
| 024 | 0 | 43 | 6 | 0 | 0 | 0 | 0 | 0 | 0 |
| 025 | 0 | 36 | 68 | 0 | 4 | 9 | 0 | 1.26 | 3.23 |
| 026 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 4 | 238 | 264 | 2 | 6 | 22 | 2.0* | 1.98 | 2.16 |

* In 1956 only two samples containing hemlock looper were found, both on the same day and in the same area.

Green-striped Forest Looper, Melanolophia imitata Wlk.

The average number of larvae per collection in 1958 increased over five times compared with 1957, and samples containing the looper were distributed throughout most regions in the district (Map 3). In 1958, 182 samples containing this species were collected compared to 78 in 1957. Collections ranged from one to 79 larvae per 3-tree beating

sample. Of the 182 collections, 146 contained one to five larvae, 18 contained six to 10 larvae, 17 contained 11 to 20 larvae and one collection at Zeballos contained 72 larvae.

Hosts in order of preference were western hemlock, western red cedar, Douglas fir, Sitka spruce, grand fir, amabilis fir, mountain hemlock and willow.

Esperanza Inlet, Nootka and Kyuquot areas contained the heaviest population in the district. Four hundred and six larvae were collected in 30 samples. Table 5 shows the average number of larvae found in drainage divisions 020 to 026.

Table 5

Summary of green-striped forest looper found by Drainage Division, North Vancouver Island, 1956-1958.

| Drainage division | Total no/samples taken during larval period | | | No./samples containing looper | | | Average no. larvae per sample | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 |
| 020 | 12 | 46 | 69 | 0 | 11 | 31 | 0.0 | 1.38 | 2.05 |
| 021 | 59 | 75 | 89 | 4 | 16 | 45 | 1.05 | 1.41 | 4.0 |
| 022 | 40 | 64 | 47 | 1 | 20 | 26 | 4.80 | 2.1 | 2.19 |
| 023 | 3 | 6 | 37 | 0 | 0 | 33 | 0.0 | 0.0 | 12.0 |
| 024 | 23 | 48 | 7 | 3 | 10 | 5 | 1.0 | 2.11 | 2.6 |
| 025 | 38 | 36 | 62 | 0 | 18 | 39 | 0.0 | 2.0 | 4.30 |
| 026 | 7 | 9 | 5 | 2 | 1 | 3 | 1.5 | 0.99 | 2.60 |
| Total | 182 | 284 | 316 | 10 | 76 | 182 | 1.45 | 1.81 | 4.77 |

Yellow-lined Forest Looper, Nyctobia limitaria (Stkr.)

Similar to the green-striped forest looper, this species was well distributed throughout the North Vancouver Island district. A total of 225 larvae was found in 70 samples in 1958 compared to a total of 266 larvae in 80 samples in 1957. Only eight of the larvae were parasitized. In 1957 the heaviest population occurred in the Quatsino area, but in

1958 this had decreased and the largest numbers were found in the Kyuquot area. Larval counts ranged from one to 10 larvae per collection excepting four collections: Moketas Island, 23 larvae; Espinosa Inlet, 26 and 15 larvae; and Koskimo Bay, 13 larvae. The hosts in order of preference were western hemlock, Douglas fir, amabilis fir, grand fir and western red cedar.

Saddle-backed Looper, Ectropis crepsucularia Schiff.

Fifty-seven larvae of the saddle backed looper appeared in 40 samples compared to 24 larvae in 16 samples in 1957. The distribution of the 1958 collections was more widespread than in 1957. Only one specimen was parasitized.

Green Velvet Looper, Epirrita autumnata Harr.

During the period May 28 to June 19, 104 larvae were found in 25 samples. Twenty of the samples were between Bowser and Campbell River above 500 feet elevation. This was an increase over 1957 when only 37 larvae were found in 14 collections.

Hemlock Sawfly, Neodiprion sp.

The population of this sawfly decreased greatly in numbers during 1958, although the distribution was more widespread. In 1957, 29 samples averaged 30.2 larvae each whereas in 1958, 66 samples averaged only 4.6 larvae. During 1958, all specimens, other than those in three collections were feeding singly. No parasites were recovered from material reared.

Phantom Hemlock Looper, Nepytia phantasmaria (Stkr.)

Three larvae were collected in 1958, one at Oyster River on Douglas fir, and at Great Central and Wolf lakes on western hemlock.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

This insect was noted on willow and red alder on the east side of Denman Island in 1958. Forty larvae were submitted, but no parasites were recovered.

Silver-spotted Tiger-moth, Halisidota argentata Pack.

Little activity from this Arctiid was observed in May and June, but in October, 78 webs were counted in the Courtenay-Parksville area, over a distance of 43 miles. The heaviest concentration was between

Qualicum and Dashwood where 31 webs were counted along five miles of highway. Twenty-two webs were recorded from Hilliers to Parksville, a distance of nine miles. One web was found on the Horne Lake road and one on the Cape Lazo road near Kye Bay.

Fall Webworm, Hyphantria cunea Harr.

Two webs of the fall webworm were observed near Royston and 37 larvae collected.

Antique Tussock-moth, Orgyia antiqua badia (Hy. Ed.)

In 1958 a total of 70 eggs and 40 larvae were submitted to the Victoria insectary in 18 samples. Thirteen samples were from the Holberg Inlet - Rupert Inlet area and three from other areas in the same Drainage Division. In 1957 a total of 16 larvae were collected from four samples on hemlock in the Holberg Inlet area.

Pine Butterfly, Neophasia menapia Feld.

Mass flights were observed in the Neroutsos Arm area, at Nimpkish Lake and in the Gold River Valley from August 1 to August 15.

Spruce Aphid, Neomyzaphis abietina (Wlkr.)

Sitka spruce stands along the east coast of Vancouver Island from Courtenay to Campbell River were attacked early in the spring of 1958 and some trees lost up to 100 per cent of their old foliage and up to 50 per cent of their new foliage. Many of the dead needles were retained with no sign of feeding evident. Two areas, containing over 90 per cent Sitka spruce were examined. At Mission Hill 16 out of 23 trees appeared dead with all the old foliage brown.

At Willow Point 16 out of 17 trees showed the same symptoms. Many of these trees displayed distress cone crops.

Windbreak spruce trees on farmlands between Campbell River and Courtenay showed the same symptoms. Most of the effected trees ranged from 14 to 50 inches D. B. H. Only one branch sample carried a nymph of the spruce aphid, Neomyzaphis abietina (Wlkr.)

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The activity of the Douglas-fir beetle in Van West Logging Company's area at Trent Creek was light in 1958. A very effective slash burn was carried out in 1957 in the former areas of infestation and very little bark beetle activity was found in the felled and bucked timber in 1958.

## STATUS OF TREE DISEASES

### Shoestring root rot.

Symptoms of root rot on Douglas fir plantations were found at Salmon River near Spirit Lake in Sayward Forest on May 9 and on the north side of John Hart Lake near the Camp 5 road. Ten year old Douglas fir exhibited chlorotic symptoms on the needles of two trees in close proximity while resinosis was found at both root collars. Mycelial fans were evident and identified as Armillaria mellea (Vahl ex Fr.) Quél. On returning to the area in September it was found that the current foliage had grown to normal length on other similarly affected trees and was unaffected by chlorosis at this time.

### Sitka spruce cone rust.

The alternate host for this rust, one-flowered pyrola, was found at Naka Creek bearing postules of Chrysomyxa monesis Ziller. Sitka spruce is plentiful in the immediate vicinity around the creek mouth where the alternate host was found, however, spruce cones had not developed at this time (May), thus the rust could not be detected on Sitka spruce.

### Spruce needle rust.

In September a small plantation of Sitka spruce near the junction of the Kelsey Bay and Rock Bay roads was found to be infected by Chrysomyxa ledicola Lagerh. All 50 trees examined were infected and approximately 80 per cent of the old foliage was missing. An abundant supply of Labrador tea, the alternate host for this disease, surrounded the plantation of Sitka spruce.

### Leaf rust of cottonwood.

This rust disease, caused by Melampsora occidentalis Jacks., was found on sapling cottonwood trees in the Sayward, Nimpkish and Woss Lake areas. Thirty-five per cent of the leaves were infected. The primary host is Douglas fir.

### Drought.

In 1958 a drought condition was encountered from early May until late August. There was an acute water shortage in most of the watersheds after snow supplies at upper levels had diminished and water tables dropped. The drought condition was most noticeable on the flora of shallow bedded and rocky outcrop areas. Douglas fir and western hemlock reproduction in such areas expressed drought symptoms by scorched

tips of twigs, drying of foliage to a reddish colour and finally to a top killing of one or more trees in the odd groups of saplings.

The most obvious damage was seen in the Roberts Lake area, the north-east side of Neroutsos Arm, the east side of Tahsis Inlet, the east side of Sydney Inlet and the east sides of Herbert Inlet and Bedwell Sound. The symptoms were most obvious on the east sides of north-south inlets from sea-level to approximately 500 feet.

Exotic Plantations.

In 1958, 26 out of 31 plantations were examined. Five plots were left out due to the forest closure. Only six plantations were found to be affected by disease and browsing (Table 6).

Table 6

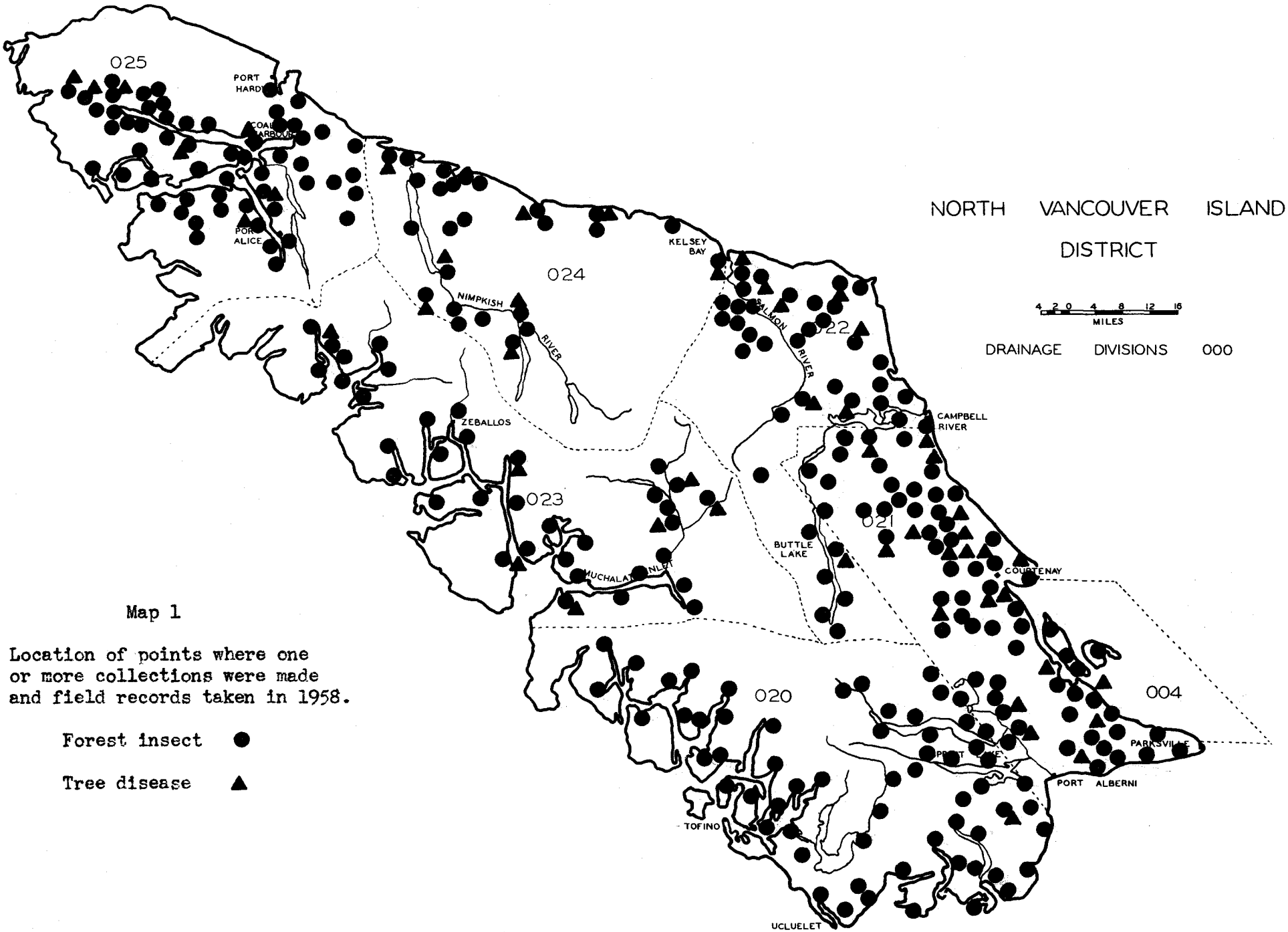
Exotic plantations affected by disease and physical damage.
North Vancouver Island, 1958.

| XP Number | Location | Exotic species | Remarks |
|---|---|---|---|
| 3 | Tsable River | Pinus resinosa Ait. | Five out of 50 1958 leaders were browsed. All trees in this plot are less than one foot in height due to brows-in previous to 1958. |
| 13 | Tsolum River | Pinus sylvestris L. | Forty-three of 45 saplings were browsed to ground level. The surrounding trees were similar to those in the plots. |
| 27 | Echo Lake | Pinus contorta latifolia Dougl. | Forty-nine of 50 trees were infected with Peridermium harknessii (Meinicke) Arth. All 50 trees were attacked by pitch moth. |
| 25 | Echo Lake | Pinus ponderosa Laws. | Thirteen of 50 trees were infected with Atropellis piniphila (Weir) Lohm. & Cash. and lesions resulted |
| 34 | Campbell River | Pinus ponderosa Laws. | Four of 50 trees were infected with Atropellis piniphila and lesions resulted. Two of 50 trees were attacked by pitch moth, Vespamia sequoiae (H. - E.) |
| 85 | Gold River | Populus tremula x tremuloides | Aspen leaf miner Phyllocnistis populiella Chamb. had infested 5 per cent of the leaves. |

Table 7

Other Noteworthy Diseases.

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Fir, alpine | Fomes pini (Thore ex Fr.) Karst. | Piggot Creek | Uncommon host for this decay fungus, only one found, elev. 3,000 ft. |
| Fir, Douglas | Phaeocryptopus gaeumannii (Rhode) Petr. | Comox Lake | Responsible for a needle cast on Douglas fir. |
| Fir, grand | Peridermium pseudo-balsameum (Diet & Holw.) Arth. & Kern. | Comox | Rust disease causing light mortality among current needles. |
| Huckleberry | Pucciniastrum goeppertianum (Kuhn) Kleb. | Salmon River | Causes yellow rust on current needles of true firs. |

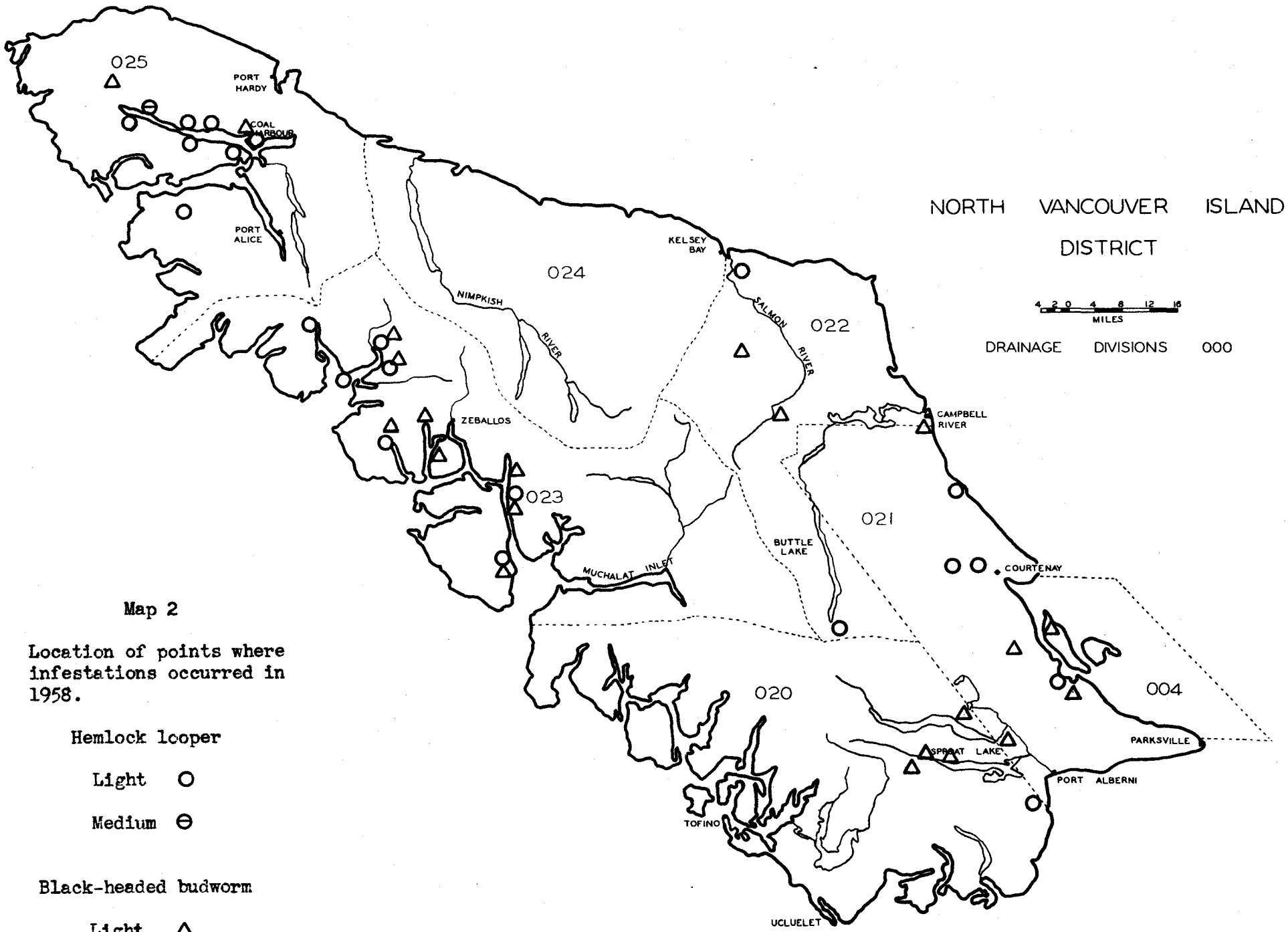



Map 1

Location of points where one or more collections were made and field records taken in 1958.

Forest insect ●

Tree disease ▲




Map 2

Location of points where infestations occurred in 1958.

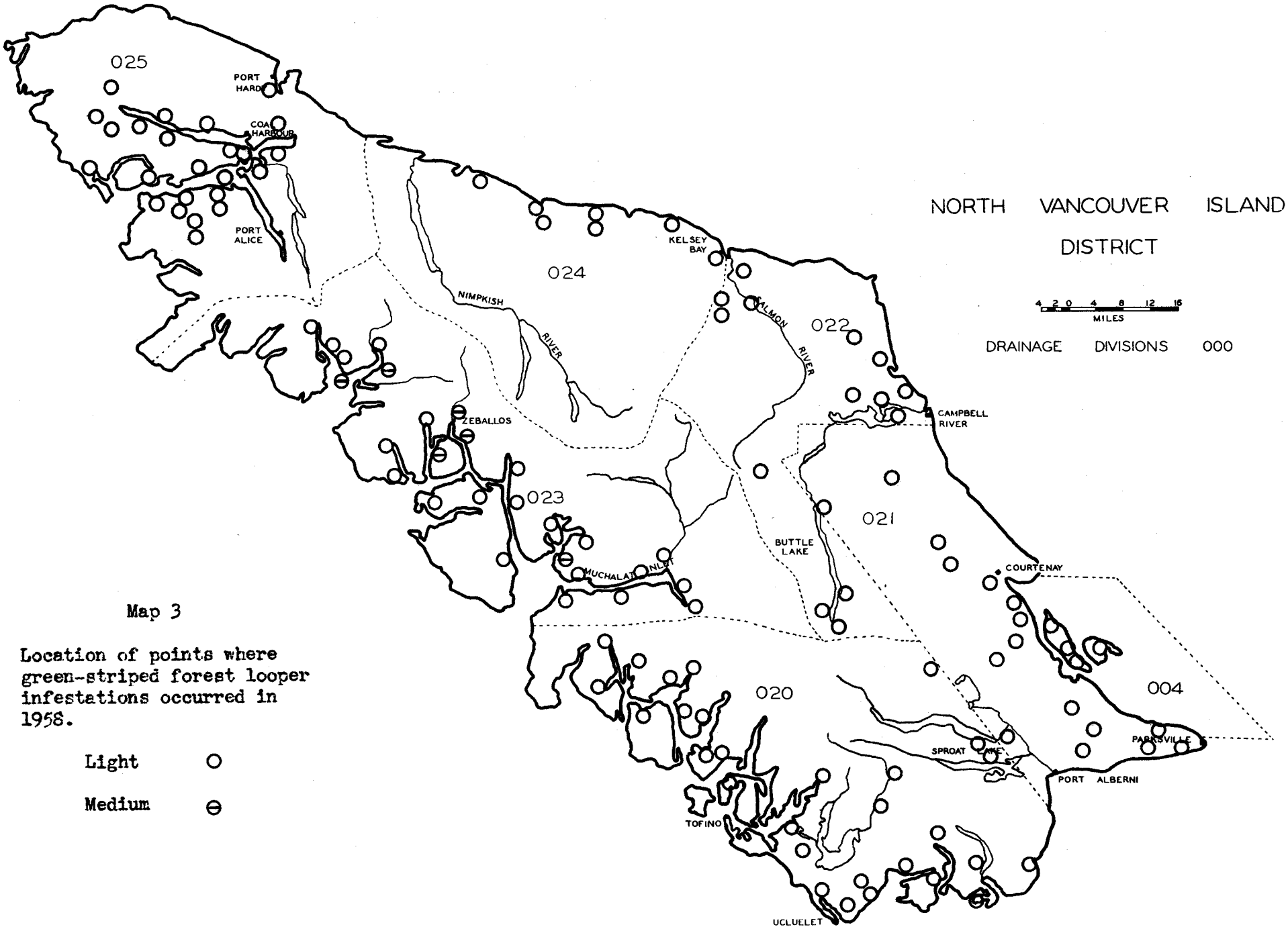
Hemlock looper

Light O

Medium ⊖

Black-headed budworm

Light △




Map 3

Location of points where green-striped forest looper infestations occurred in 1958.

Light ○

Medium ⊖

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

SOUTH VANCOUVER DISTRICT

1958

# FOREST BIOLOGY SURVEY

# SOUTH VANCOUVER DISTRICT

# 1958

K. Jardine

## INTRODUCTION

Field work in the South Vancouver district started on April 26 and continued through to October 1, with only slight interruptions by forest closures.

A total of 347 insect and 74 tree disease samples was submitted to the Victoria laboratory. Forty-two of the disease collections were identified, three were tentatively identified, four unidentified due to the lack of sufficient material or fruiting bodies, and nine have been forwarded to Ottawa. In the remaining 16 collections damage was attributed to insects or unknown causes.

A summary of collection by hosts is shown in Table 1 and localities where collections were made are shown in Map 1.

## STATUS OF INSECTS

### Spruce Budworm, Choristoneura fumiferana (Clem.)

The spruce budworm infestation in the Pemberton and Lillooet areas was confined to approximately the same localities as last year, although there were areas of heavy localized feeding and the perimeter of the outbreak enlarged to some extent (Map 2).

The area of the outbreak increased by 155 square miles compared with 1957. Although a small portion of this increase was in the West Kamloops district, the majority was in the South Vancouver district. The largest increase was caused by light defoliation up creek valleys and hillsides, an extension westward to Alta Lake, and the area around Boston Bar which was not mapped in 1957. Feeding in the Anderson River Valley and along the Fraser River between Boston Bar and the Nahatlatch River covered an area of about 48 square miles. Sixteen of the 48 square miles were classified as medium and 10 square miles as heavy.

An aerial survey of the infestation area was conducted on July 3. All territory previously covered by aerial surveys was flown again this year in addition to several new creek valleys in which feeding was apparent.

Table 1

Collections by Hosts

South Vancouver District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Western larch | 1 | 2 | Maple | 7 | 2 |
| Sitka spruce | 9 | - | Alder | 26 | 4 |
| Scots pine | 1 | 3 | Birch | 3 | 1 |
| Douglas fir | 101 | 13 | Hawthorn | 2 | - |
| Red cedar | 2 | 4 | Red ash | 1 | - |
| Hemlock | 87 | 10 | Holly | 1 | - |
| Amabilis fir | 5 | 1 | Walnut | 1 | - |
| Grand fir | 14 | 6 | Poplar | 5 | - |
| Alpine fir | 5 | 3 | Cherry | 2 | - |
| Lodgepole pine | 7 | 6 | Plum | 2 | 1 |
| White pine | 2 | 2 | Apple | 1 | - |
| Mugho pine | 2 | - | Chokecherry | 1 | - |
| Ponderosa pine | - | 3 | Garry oak | 3 | - |
| Redwood | - | 1 | Trembling aspen | 4 | - |
| | | | Cottonwood | 15 | 8 |
| | | | Willow | 16 | 4 |
| | | | White elm | 1 | - |
| | | | Elderberry | 1 | - |
| | | | Linden | 1 | - |
| | | | Miscellaneous | 14 | - |
| | | | No host | 4 | - |
| | | | Total | 111 | 20 |
| Total | 236 | 54 | Grand Total | 347 | 74 |

This is the first year that noticeable defoliation was observed on lodgepole pine. Heavy feeding occurred in the Tisdall area where one tree approximately five inches D. B. H. lost 80 per cent of its current foliage. Other pine in the immediate vicinity also suffered comparatively heavy defoliation. Egg counts made on a sample tree were classified as light.

The only location other than the infestation area where spruce budworm were found in the district was in and around the vicinity of Hope where six collections contained 36 larvae.

## Defoliation Estimates

Ocular estimates of the defoliation of current year's foliage and the total defoliation were recorded for each of the ten tagged trees in each plot (Table 2).

The heaviest feeding in 1958 occurred along the Lillooet River between Tenas Lake and Gowan Creek. Many of the trees at the Skookumchuck lost all of their current foliage. In some cases up to 15 feet of the top had been completely stripped. In areas along the Blackwater Creek road and up the Anderson River Valley over 75 per cent of the current year's foliage was lost (Table 3).

Lighter total defoliation along the Upper Lillooet River in 1958 has been attributed to the reduced insect population and also the fact that over 50 per cent of the total foliage was comprised of current year's growth. By losing all of their 1958 growth the trees from Tenas Lake to the Skookumchuck also suffered a loss greater than the loss of two year's normal growth as their 1958 growth made up about 50 per cent of the total foliage present.

## Egg Counts

The number of egg masses in the permanent sample plots decreased an average of only 16 per cent compared with 1957. (Table 4). The distribution of the eggs also changed. Very few eggs were found above Tenas Lake but the number increased at Tenas Lake and Rogers Creek. There was a decrease of 66 per cent at the Skookumchuck, site of last year's heaviest population. The number of egg masses for random plots are shown in Table 5. There was no significant decrease in egg counts compared with 1957.

## Parasites

Of 109 larvae collected in the Lillooet River and Lake area 39.5 per cent died of parasites, slightly higher than the 29 per cent larval mortality in 1957.

Of 157 pupae collected and reared 32.4 per cent died of parasites compared with 34.8 per cent pupal mortality last year. Egg parasitism was low, only 0.7 per cent of the egg masses containing one or more parasites compared with 8.8 per cent in 1957.

Table 2

Ocular Estimate of Per Cent Defoliation of Douglas-fir Trees on Study Plots. Figures are an Average of 10 Trees. August, 1958.

| Area and Plot | | Defoliation 1957 shoots Av. | Sd. | Estimated total defoliation 1957 Av. | Sd. | Defoliation 1958 shoots Av. | Sd. | Estimated total defoliation 1958 Av. | Sd. |
|---|---|---|---|---|---|---|---|---|---|
| South of Joffre Creek | 1-1 | 7 | ± 2 | 46 | ± 20 | 4 | ± 3 | 30 | ± 16 |
| | 1-2 | T[1/] | ± | 47 | ± 9 | 5 | ± 3 | 40 | ± 11 |
| | 1-3 | 6 | ± 4 | 65 | ± 18 | 10 | ± 1 | 50 | ± 22 |
| Cariboo Trail (I.R.#687) | 2-1 | 3 | ± 2 | 52 | ± 17 | 4 | ± 2 | 38 | ± 7 |
| | 2-2 | T | | 48 | ± 16 | 2 | ± 2 | 32 | ± 9 |
| | 2-3 | T | | 41 | ± 11 | 3 | ± 2 | 38 | ± 10 |
| South of L2679 | 3-1 | T | | 51 | ± 26 | 2 | ± 2 | 39 | ± 12 |
| | 3-2 | T | | 41 | ± 6 | 2 | ± 2 | 21 | ± 7 |
| | 3-3 | T | | 50 | ± 17 | 4 | ± 3 | 29 | ± 15 |
| Tenas Lake | 4-1 | 61 | ± 12 | 47 | ± 11 | 57 | ± 26 | 57 | ± 13 |
| | 4-2 | 68 | ± 20 | 53 | ± 13 | 62 | ± 26 | 62 | ± 17 |
| Rogers Creek | 5-1 | 34 | ± 24 | 43 | ± 9 | 40 | ± 13 | 47 | ± 13 |
| | 5-2 | 72 | ± 30 | 64 | ± 18 | 57 | ± 22 | 53 | ± 11 |
| Skookum-chuck | 6-1 | 89 | ± 6 | 54 | ± 10 | 59 | ± 34 | 58 | ± 17 |
| | 6-2 | 83 | ± 15 | 69 | ± 6 | 89 | ± 15 | 69 | ± 14 |
| 1.3 miles north of Gowan Cr. | 7-1 | | - | | - | | | | |
| | 7-2 | 41 | ± 31 | 74 | ± 19 | 21 | ± 14 | 45 | ± 17 |

1/ T = Trace

Table 3

Ocular Estimate of Per Cent Defoliation of Douglas-fir Trees at Sample Points. Figures are an Average of 10 Trees. August, 1958.

| Area and Plot | Defoliation 1957 shoots Av. | Sd. | Estimated total defoliation 1957 Av. | Sd. | Defoliation 1958 shoots Av. | Sd. | Estimated total Defoliation 1958 Av. | Sd. |
|---|---|---|---|---|---|---|---|---|
| Nairn Falls | 9 | ± 5 | 3 | ± 2 | T | | 13 | ± 5 |
| Tisdall | 51 | ± 17 | 16 | ± 10 | 13 | ± 8 | 45 | ± 13 |
| Pemberton Meadows | - * | | - | | T | | 23 | ± 9 |
| 4.2 mi W of D'Arcy | - | | - | | 3 | ± 3 | 14 | ± 7 |
| 8.3 mi W of D'Arcy | - | | - | | T | | 14 | ± 6 |
| 11.4 mi W. of D'Arcy | - | | - | | 4 | ± 3 | 20 | ± 9 |
| 20.5 mi W of D'Arcy | - | | - | | 6 | ± 3 | 22 | ± 7 |
| Blackwater Cr. 3.7 mi | 36 | ± 14 | 77 | ± 11 | 75 | ± 25 | 46 | ± 15 |
| Blackwater Cr. 8.0 mi | 20 | ± 10 | 64 | ± 16 | 47 | ± 27 | 35 | ± 18 |
| Anderson River Valley 7 mi. | 17 | ± 26 | 54 | ± 13 | 16 | ± 10 | 31 | ± 8 |
| Anderson River Valley 9 mi. | 32 | ± 16 | 32 | ± 12 | 46 | ± 13 | 22 | ± 5 |
| Anderson River Uztlius Creek | - | | - | | 71 | ± 17 | 23 | ± 9 |

* Not sampled

Table 4

Number of Spruce Budworm Egg Masses per 100 Square Feet of Foliage Surface.

| Area and Plot | 1954 | 1955 | 1956 | 1957 | 1958 | Increase from 1957 | Decrease from 1957 |
|---|---|---|---|---|---|---|---|
| 1 - 1 | 304 | 229 | 47 | 48 | 0 | | |
| 1 - 2 | 198 | 208 | 31 | 0 | 0 | | |
| 1 - 3 | 386 | 108 | 103 | 0 | 0 | | |
| Average | 296 | 182 | 60 | 13 | 0 | | 13 |
| 2 - 1 | 32 | 29 | 57 | 7 | 0 | | |
| 2 - 2 | 99 | 31 | 58 | 4 | 0 | | |
| 2 - 3 | 50 | 19 | 7 | 0 | 0 | | |
| Average | 60 | 26 | 41 | 4 | 0 | | 4 |
| 3 - 1 | 742 | 517 | 38 | 17 | 11 | | |
| 3 - 2 | 93 | 265 | 91 | 11 | 0 | | |
| 3 - 3 | 467 | 204 | 63 | 11 | 0 | | |
| Average | 434 | 329 | 64 | 13 | 4 | | 7 |
| 4 - 1 | 194 | 58 | 136 | 13 | 110 | | |
| 4 - 2 | 133 | 13 | 50 | 7 | 15 | | |
| Average | 164 | 36 | 93 | 9 | 76 | 67 | |
| 5 - 1 | 186 | - | 26 | 42 | 166 | | |
| 5 - 2 | 568 | 16 | 122 | 48 | 7 | | |
| Average | 377 | | 74 | 45 | 76 | 31 | |
| 6 - 1 | 150 | 71 | 153 | 112 | 40 | | |
| 6 - 2 | 80 | 7 | 50 | 151 | 53 | | |
| Average | 115 | 39 | 102 | 128 | 44 | 84 | |
| 7 - 1 | 15 | 16 | 11 | 22 | 6 | | |
| 7 - 2 | 65 | 6 | 52 | 33 | 25 | | |
| Average | 40 | 11 | 32 | 29 | 16 | 13 | |
| Average (all plots) | 221 | 112 | 64 | 31 | 26 | | |

Table 5

Number of Spruce Budworm Egg Masses per 100 Square Feet of Foliage Surface

| Area | 1955 | 1956 | 1957 | 1958 | Increase from 1957 | Decrease from 1957 |
|---|---|---|---|---|---|---|
| Nairn Falls | | 41 | 30 | 0 | | 30 |
| Tisdall | | 108 | 0 | 21 | 21 | |
| Pemberton Meadows | - | - | 3 | 4 | 1 | |
| 4.2 mi W of D'Arcy | 45 | 109 | 12 | 6 | | 6 |
| 11.4 mi W of D'Arcy | 34 | 27 | 16 | 0 | | 16 |
| 20.5 mi W of D'Arcy | 72 | 21 | 16 | 0 | | 16 |
| Blackwater Cr. 3.7 mi | 4 | 6 | 0 | 0 | - | - |
| Blackwater Cr. 8.0 mi | | 65 | 29 | 13 | | 16 |
| Anderson River 7 mi | | 48 | 44 | 53 | 9 | |
| Anderson River 9 mi | | 29 | 8 | 0 | | 8 |
| Anderson River | | 30 | 18 | 48 | 30 | |
| Uztluis Creek | | - | - | 40 | - | - |

Annual Increment

Trees in areas 1, 2, and 3 which were only lightly defoliated in 1958 for the second consecutive year showed an increase in growth. The average radial growth at breast height of the sample trees for the years 1956 to 1958 was 0.42, 0.36, and 0.60 millimeters respectively. Average radial increment in areas 4, 5 and 6 remained about the same at 0.41 millimeters compared with 0.42 millimeters in 1957. Heavy defoliation occurred in these areas in 1958 giving the trees no opportunity to recover.

Summary

Although the egg counts were lighter this year compared with 1957, the decrease in the number of egg masses was not significant. The area from Lillooet Lake through to the upper reaches of the Lillooet River and from Nairn Falls to D'Arcy showed a marked improvement. Tree recovery was good, defoliation was light and in many areas no spruce budworm eggs were found. Heavy defoliation occurred between Tenas Lake and Gowan Creek leaving the trees with very thin foliage.

The outlook for the Skookumchuck and Rogers Creek areas in 1959 is for heavy defoliation, which, considering the present condition of the trees, could prove quite serious.

Medium to heavy defoliation is expected up Blackwater Creek to Blackwater Lake and in the Anderson River Valley. Trees in these stands are in relatively good condition and should withstand another year's feeding without mortality.

Light defoliation is expected over much of the area in 1959 with heavy defoliation in localized areas.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Forty-two collections containing hemlock looper were made in the South Vancouver district in 1958. The majority of these collections were made in the Stanley Park area. The preferred hosts were western hemlock and Douglas fir. One collection was made on vine maple. The largest single collection of 61 larvae was taken on hemlock in the vicinity of Prospect Point in Stanley Park. Comparatively large collections were also made at various other locations throughout the park. A slight increase in population was also noticed in Maple Ridge Park, Stave Falls and Steelhead areas (Map 3).

Stanley Park

Although this geometrid was not found in alarming numbers, there was a light to medium population throughout a large portion of Stanley Park and park officials were concerned as the timber in this parks has a high esthetic value.

A brief history of the hemlock looper situation in the park shows that in the period between 1911 and 1913 a heavy infestation occurred but was greatly reduced by 1914 by the action of a tachinid fly. Many hemlock were killed outright and others subsequently died from the attack of secondary insects. Again in 1929 the trees suffered moderate defoliation by this looper and in 1930 the area was dusted by aircraft. Since this last outbreak hemlock looper have been found consistently in Stanley Park.

By July 15, 1958 a large population of the green striped forest looper, Melanolophia imitata Wlk., along with Lambdina fiscellaria lugubrosa (Hulst) and other species of geometrids and tortricids existed in the park and had caused light to heavy defoliation on coniferous understory trees and visible defoliation to many mature overstory hemlock. Frass drop was quite heavy at this time and it was assumed that a large population was present on the larger mature trees from which proper samples could not be taken. Continued feeding at this time could result in top kill or possible mortality. The Vancouver Parks Board, at the suggestion of the Forest Biology Laboratory representatives had the park sprayed with 10 per cent DDT and fuel oil on July 26.

An inspection of the park one half hour after the spraying indicated that the operation had been effective. Roads and pathways were littered with dead and dying larvae. Two days after spraying samples were again taken in locations where previous collection had yielded high larval counts. These collections showed a significant reduction in the population (Table 6).

Even though there was a heavy midstory and understory throughout the sprayed area, fairly good coverage was indicated on the 32 spray assessment cards set out at various locations throughout the park.

The spray operation was considered successful in that it reduced the larval population and prevented further feeding which could have resulted in additional damage to the trees. Trees in Stanley Park remained in good condition. A few mature hemlock were noticeably defoliated but their condition is not serious. Young understory fir and hemlock were heavily defoliated in areas where large populations were present.

A light to medium population of this insect can be expected in this park in 1959.

Green Striped Forest Looper, Melanolophia imitata Wlk.

Although this insect has not increased greatly in distribution there has been a decided increase in the population compared with 1957. The species appeared in outbreak proportion in Stanley Park and at the gate to the Capilano watershed, and comparatively high populations were found in several other localities. The preferred host was western hemlock (Table 7).

Table 6

Number of Larvae per 3-tree Beating Sample Before, and Two Days After Spraying Stanley Park July 1958.

| Location of Collection | *Melanolophia imitata* | | *Lambdina f. lugubrosa* | | Host |
|---|---|---|---|---|---|
| | before spray | after spray | before spray | after spray | |
| Prospect Point) Lions Gate ) | 450 | 23 | 61 | 6 | F |
| Prospect Point | 308 | 2 | 27 | 1 | H |
| Siwash Point | 180 | 56 | 56 | 3 | H |
| Hollow Tree Trail | 72 | 11 | 20 | 1 | H |
| Tatlow Walk | 32 | 11 | 2 | - | H |
| Beaver Lake | 55 | 9 | 12 | 2 | H |
| Lumbermans Arch | 32 | 10 | - | - | H |
| Bridle Trail | 60 | 11 | 10 | 4 | H |
| Ferguson Pt. | 150 | 3 | 15 | 2 | H |
| Lake Trail | 32 | 4 | 9 | 1 | H |
| Average | 137 | 14 | 21 | 2 | |

Table 7

Areas Where High Larval Populations of Green Striped Forest Looper, *Melanolophia imitata* were Encountered in the South Vancouver District - 1958

| Drainage division | Total no. of samples taken during larval periods | | | No. samples containing green striped forest looper | | | Average no. of larvae per sample | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 |
| 040 | 46 | 50 | 53 | 5 | 10 | 2 | 2.0 | 3.0 | 3.0 |
| 041 | 39 | 26 | 25 | 0 | 0 | 2 | 0 | 0 | 1.5 |
| 042 | 90 | 117 | 145 | 25 | 53 | 68 | 2.4 | 19.0 | 44.0 |
| 043 | 26 | 22 | 26 | 3 | 6 | 2 | 1.0 | 2.0 | 3.0 |
| 044 | 24 | 25 | 24 | 3 | 7 | 1 | 1.0 | 3.6 | 1.0 |
| 045 | 64 | 28 | 47 | 9 | 5 | 6 | 2.0 | 3.0 | 4.0 |

In past years it has been observed that this geometrid can be present in large numbers with little sign of defoliation because of its clean feeding habits. However, it had increased in Stanley Park to such an extent that, in association with other loopers heavy defoliation resulted to understory conifers. (see section under Hemlock Looper).

Spruce Aphid, Neomyzaphis abietina (Wlkr.)

A major outbreak of this aphid occurred in the South Vancouver District in 1958. The aphid was first observed in the latter part of April and by the middle of May it had completely disappeared. The majority of native spruce as well as ornamental spruce were heavily attacked throughout the lower Fraser Valley and along the north shore from Deep Cove to Horseshoe Bay. Heaviest damage was caused to mature Sitka spruce in North Vancouver on the Capilano Indian reserve at the north-west end of Lions Gate Bridge. All spruce in this area lost from 90 to 100 per cent of their old foliage and are in very poor condition. Some tree mortality has already resulted and more can be expected.

Two shelter-belts of Sitka spruce in the Chilliwack area also suffered comparatively heavy damage. There was some tree mortality but most of the trees appeared to be recovering and should survive.

Balsam Woolly Aphid, Adelges piceae (Ratz.)

Although the balsam woolly aphid has been present in British Columbia for at least eight years its presence was not detected until 1958. A single amabilis fir tree, transplanted from Grouse Mountain, was found suffering from heavy stem attack as well as severe gouting. Further surveys found amabilis fir heavily attacked on Grouse Mountain, Mount Seymour, Hollyburn Mountain, inside the Capilano Watershed gate, and three miles inland from Porteau which is seven miles south of Britannia Beach. Five grand fir were also found attacked at Queens Park, New Westminster, and three grand fir on Ross Crescent, West Vancouver.

Three strips were run on Mt. Seymour and Grouse Mountain to determine the extent of the attack (Table 8). The stands are predominantly hemlock with amabilis fir making up about 26 per cent of the stems. About 80 per cent of the amabilis fir in two strips were attacked, in the third strip only 20 per cent of the trees were definitely attacked but 61.5 per cent were possibly suffering from gout.

Table 8

Stand Composition by Number of Stems, and Amabilis Fir Attacked by Balsam Woolly Aphid. October, 1958.

| Location | Length of 1 ch. strips | Number of stems | | | | Per cent of amabilis fir in stand | Per cent of amabilis fir attacked |
|---|---|---|---|---|---|---|---|
| | | Hw | Fd | C | B | | |
| Mount Seymour #1 | 10.5 | 93 | 3 | 8 | 36 | 25.7 | 80.5 |
| Grouse Mtn. #2 | 9.0 | 97 | 0 | 21 | 39 | 24.8 | 20.5 * |
| Grouse Mtn. #3 | 9.0 | 40 | 0 | 0 | 19 | 32.2 | 84.2 |

* A further 61.5 per cent of amabilis fir possibly suffering from gout attack.

The crown classes of the amabilis fir trees in the strips, and their condition are shown in Table 9. All crown classes were attacked. Examination of the field records also show that trees ranging from six to 36 inches D. B. H. were attacked.

Table 9

Condition of Amabilis Fir Trees by Crown Classes. Mount Seymour and Grouse Mountain. October, 1958.

| Crown class | Stem attack | Gout attack | Possible gout | Healthy | Trees dead | Total trees |
|---|---|---|---|---|---|---|
| Dominant | 11 | 16 | 6 | 6 | 1 | 40 |
| Co-Dominant | 7 | 4 | 6 | 3 | | 20 |
| Intermediate | 4 | 6 | 16 | 0 | | 26 |
| Suppressed | 7 | 6 | 1 | 4 | | 18 |
| Total | 29 | 32 | 29 | 13 | 1 | 104 |

A ground survey of all balsam stands in the South Vancouver District was conducted in the fall. Points examined and locations where balsam woolly aphid was discovered are shown in Map 4. Indications are that so far with the exception of one or two trees scattered throughout the Vancouver area the outbreak is more or less localized.

Poplar and Willow Borer, Sternochetus lepathi (L.)

This weevil has been common on willow and cottonwood throughout the South Vancouver District for many years but the damage caused has never been very noticeable. Outbreaks have occurred at various locations since 1939 and in 1958 several localized infestations were discovered in the district. All willow examined in a square mile area two miles north-east of Hope were heavily damaged by this insect. There was a considerable amount of branch kill as well as complete girdling at the base. Although it appeared that this particular area has been under attack for some time, many of the trees died in 1958 as a direct result of weevil attack.

Evidence of this borer was also found six miles north and six miles east of Hope respectively. Both host species were attacked. The extent of the infestation in these two locations is not known, but, at least a dozen trees were examined and all were damaged to some extent. Two outbreaks of similar nature and size were also found in the Silver Creek area 18 miles south of the Trans Canada Highway and at Slesse Creek in the Chilliwack River Valley. In each case only willow was attacked.

An examination of young cottonwood saplings six miles north of Port Douglas in the Lillooet River Valley showed heavy stem attack and stunting of growth. All cottonwood examined within a 1/4 mile radius were in much the same condition.

A small area of willow four miles east of Agassiz was attacked and trees from one inch to four inch D. B. H. suffered heavy stem attack and branch kill. All trees examined in an area approximately 1/2 mile long were injured to some extent.

Samples of this borer were also collected in the U. B. C. Forest at Haney, Herrling Island in the Fraser River, and in the Anderson River Valley at an elevation of 3,000 feet.

The extent of the poplar and willow borer outbreak is shown in Map 5.

Phantom Hemlock Looper, Nepytia phantasmaria (Stkr.)

No serious outbreak of this insect has occurred in the district this year, although larvae were found in 25 collections. The infestations in Queens Park, New Westminster, and Central Park, Burnaby

have completely disappeared following control operations in 1956 and 1957. No larvae were collected in either park this year.

Tree mortality in Central Park was much lighter than in Queens Park although the exact number of dead trees has not yet been determined. Eighteen trees with a volume of 10,780 bd. ft. have already died and more tree mortality is expected. Many trees in the park are in very poor condition.

Parasitism was partly responsible for the sudden decline in population and almost complete collapse in the localized outbreak in the Hope Municipal Park. Of 621 eggs collected and examined in the spring of 1958, 55.7 per cent were parasitized. There has, however, been a noticeable increase in the distribution of this geometrid in the vicinity of Hope.

Small numbers of larvae were found in collections taken throughout Stanley Park.

Nepytia larvae have been present in samples in Maple Ridge Park for the past two years, but never more than four or five per collection. Several other collections were made at various locations in the district but there were only one or two loopers in each.

Alder Sawfly, Hemichroa crocea (Fourc.)

The infestation in the Coquitlam Valley continued this year but decreased in intensity. A sample plot was established and field studies conducted in the outbreak area. The purpose of these studies was to determine the instar development, feeding habits, percentage of egg parasitism and period of overlap in generations. Scheduled trips to the study plot were made from May 8 to May 28 at one week intervals. Further observations were impossible because of other projects and forest closures.

By counting the number of hatched eggs and the number of emerged larvae it was found that approximately 10.7 per cent of the eggs laid were parasitized, and 41 per cent of the larvae had disappeared from the foliage by May 28. The last trip into the area was made on June 12 at which time no larvae were found.

During the period between May 28 and June 12 there were at least two heavy windstorms and a heavy rainfall which could have accounted for some of the young larvae being knocked from the leaves. High temperatures could also have caused the larvae to drop. Small colonies of larvae were found outside the plot in sheltered areas. This would seem to indicate that the above mentioned findings had some bearing on the disappearance of the larvae in the plot since it was completely exposed.

Very few larvae were noticed at the infestation area in Haney this year and feeding was negligible.

Colonies of this insect were present again at Brockton Point in Stanley Park but feeding was light.

Collections of alder sawfly were also made in Mahon Park and the Capilano Indian Reserve in North Vancouver and in the Garabaldi Park north of Haney. At each of these locations very little damage was caused.

On June 13, thirty-three colonies consisting of 321 living larvae were forwarded to the Victoria Laboratory from Ioco B. C. Attempts were made to rear the colonies at the Langford insectary. Due to the difficulty in transferring the larvae from old to fresh foliage there was a high mortality rate and very little information was obtained.

Black-headed Budworm, Acleris variana (Fern.)

Populations of this insect have remained constant for the past several years. Indications in 1957 pointed towards a possible build-up in several locations and 73 collections averaged 8.0 larvae per sample. In 1958 only 19 collections averaging 4.3 larvae were made. This is a considerable reduction in both numbers and distribution. The largest collections, 40 larvae, was made one mile east of Hope on Douglas fir. Locations where collections were made are shown on Map 6.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Two quite extensive outbreaks of this insect occurred in the South Vancouver District this year.

One infestation 18 miles north of Pemberton extended approximately four miles north beyond this point. Hosts were cottonwood, alder, and willow. The insects were in the last larval instar and were pupating when the outbreak was discovered. Moderate feeding had occurred on all hosts. Some tents of the Western Tent Caterpillar, Malacosoma pluviale (Dyar) were also present in this infestation.

The other outbreak, which was much more extensive, occurred south of the Fraser River in the municipalities of Delta, Surrey and Langley. Heavy defoliation was observed on alder, willow and fruit trees between Ladner and Murrayville as far as the Trans Canada Highway and south to the United States border. Many stands of alder and willow were completely defoliated within this area which comprised approximately 120 square miles.

Western Winter Moth, Errannis vancouverensis Hulst.

Large numbers of this looper were collected in the Skookumchuck area of the Lillooet River Valley in 1957. This year the population increased to infestation proportions in the same area. Although most of the deciduous trees and ground cover were attacked, heaviest feeding occurred on vine maple. Many of the young trees were completely stripped of foliage. Three collections taken in this area averaged 48 larvae each. The largest collection from vine maple contained 127 larvae.

Two collections of this geometrid were made in Stanley Park, one on Garry oak produced six larvae and the other on vine maple contained 34 larvae. The only other locality where it was found was in the Coquitlam watershed where one larva was found on vine maple.

Antique Tussock Moth, Orgyia antiqua badia (Hy. Ed.)

There was a noticeable increase in the number of tussock moth larvae in the district this year. Hosts were western hemlock and Douglas fir. Eighteen collections of this species taken throughout Stanley Park averaged 4.7 larvae per sample, with the largest collection containing 39 larvae. Larvae were also collected on Grouse Mountain and in the Capilano Watershed.

European Pine Shoot Moth, Rhyocionia buliana (Schiff.)

Damage by this insect in the form of curled leaders and stunted growth was evident on dwarf Mugho pine in a nursery at Yarrow. Approximately 50 per cent of the young pines were affected.

Spruce Tip Moth, Zeiraphera ratzburgiana (Ratz.)

Fourteen collections of this insect were made in the district this year. Two collections in the Poole Creek area totalled 34 larvae. There was a slight increase in population over 1957 when the spruce tip moth appeared in approximately the same areas.

Green Velvet Looper, Epirrita autumnata (Gn.)

Ten collections containing this looper averaged 8.4 larvae. The heaviest population occurred in the Seymour Watershed where two collections totalled 37 larvae.

Although the distribution of this insect has increased slightly over 1957 the population remains low.

Sawflies, Neodiprion spp.

Neodiprion larvae were found in 53 collections averaging 9.3 larvae per collection. The only locality where any appreciable defoliation was observed was in the Lorenzetta Creek area where light feeding occurred on hemlock and balsam. Two collections in this area, one from western hemlock and the other from amabilis fir, totalled 173 larvae. Comparatively large collections were made on Grouse Mountain and in the British Properties in North Vancouver.

Brown Leaf Beetle, Galerucella punctipennis Mann.

Medium infestations of this beetle associated with a flea beetle, Altica sp., appeared on alder throughout the Coquitlam Valley and at various locations throughout the Fraser Valley with heaviest concentrations in the vicinity of Flood. Considerable feeding occurred in all locations but damage was light.

## STATUS OF TREE DISEASES

Needle Casts of Douglas fir.

Phaeocryptopus gaeumannii (Rhode) Petr. and Rhabdocline pseudotsugae Syd. were found in association on Douglas fir 2.5 miles south of the Trans Canada Highway on Silver Creek. The former could be mistaken for a drought condition which gives the same appearance to the needles. About 30 per cent of the foliage examined on three small Douglas fir trees was affected by both species of pathogen.

Similar conditions existed on several young Douglas fir examined along the Cariboo trail north of Mount Currie.

Branch Canker of Douglas fir.

The canker disease caused by Calisiopsis pseudotsugae Fitzp. appears to be quite common throughout the South Vancouver district. The attack is mainly confined to Douglas fir stands up to 30 years old. Damage is apparent in the form of many small cankers from 1/4 to two inches in length on the under-surface of the lower branches. In many cases branches have been killed but no tree mortality was observed.

Heaviest damage was observed six miles north of Mission where all Douglas fir trees examined in a square mile area were in an extremely unhealthy condition. Many of the young trees had only 20 to 30 per cent of their foliage remaining as a result of twig mortality. Areas of comparable size and intensity of attack were found 1.5 miles north of Port Douglas in the Lillooet River Valley.

Collections of this disease were also made along the Cariboo trail and two miles north-east of Hope. The intensity of attack was lighter in the latter two regions.

Sooty Mold.

Heavy needle drop occurred in young hemlock stands examined three miles north of Mount Currie as a result of sooty mold caused by Dimerosporium tsugae Dearn. Samples of this disease were collected on hemlock in the Silver Creek and Emory Creek areas in the vicinity of Hope. The disease seemed to thrive in regeneration hemlock stands or shaded understory sites. Host damage appeared to be very light in all areas.

Cronartium Gall Rust.

Gall rust caused by Peridermium harknessii J. P. Moore was quite severe in many areas of the district but was confined mainly to younger lodgepole pine stands. Quite extensive infections occurred in such stands one mile south of Tisdall. Although there was very little mortality there was considerable malformation and branch kill. The disease was observed quite frequently on lodgepole pine between Port Douglas and the Skookumchuck in the Lillooet River Valley and severe infection to young pine on the Cascade peninsula in Harrison Lake caused extensive damage. One hundred galls were counted on one five inch D. B. H. tree. Samples were also found on lodgepole pine eight miles north of Squamish and up Silver Creek, 18 miles south of the Trans Canada Highway. All, however, were of a lesser incidence.

Hemlock Mistletoe.

Between five and six acres of hemlock regeneration at Slesse Creek in the Chilliwack River Valley was found to be attacked by the mistletoe Arceuthobium compylopodum Englm. Several severely infected "mother trees" were responsible for the high incidence of infection of the younger trees and seedlings in the immediate vicinity. Although witches' broom was quite prevalent there was little stem infection. There was also considerable branch swelling, yellowing of foliage and loss of vigor. Similarly comparatively large areas of mature hemlock on Grouse Mountain and Mount Seymour Park were heavily infected with mistletoe. No tree mortality was observed.

Rust on Willow.

Small patches of the rust disease caused by Melampsora paradoxa Diet & Holw. were noted on willow 20 miles north of Pemberton in the Lillooet River Valley. About 30 per cent of the foliage was affected. No appreciable damage occurred.

Exotic Plantations.

Thirty-two exotic tree plantations throughout the South Vancouver district were visited this year. The majority of the old and young plantations were reasonably free from insect attack but several disease samples were collected from the various plantations. None, however, represented significantly damaging conditions.

Damage by Rodents.

Approximately 50 per cent of young Populus regenerata in plantations in the Pitt Meadows area of the Fraser River died as a result of girdling at their base by voles and mice. In another plantation in the same region 17 out of 22 Populus regenerata suffered the same damage.

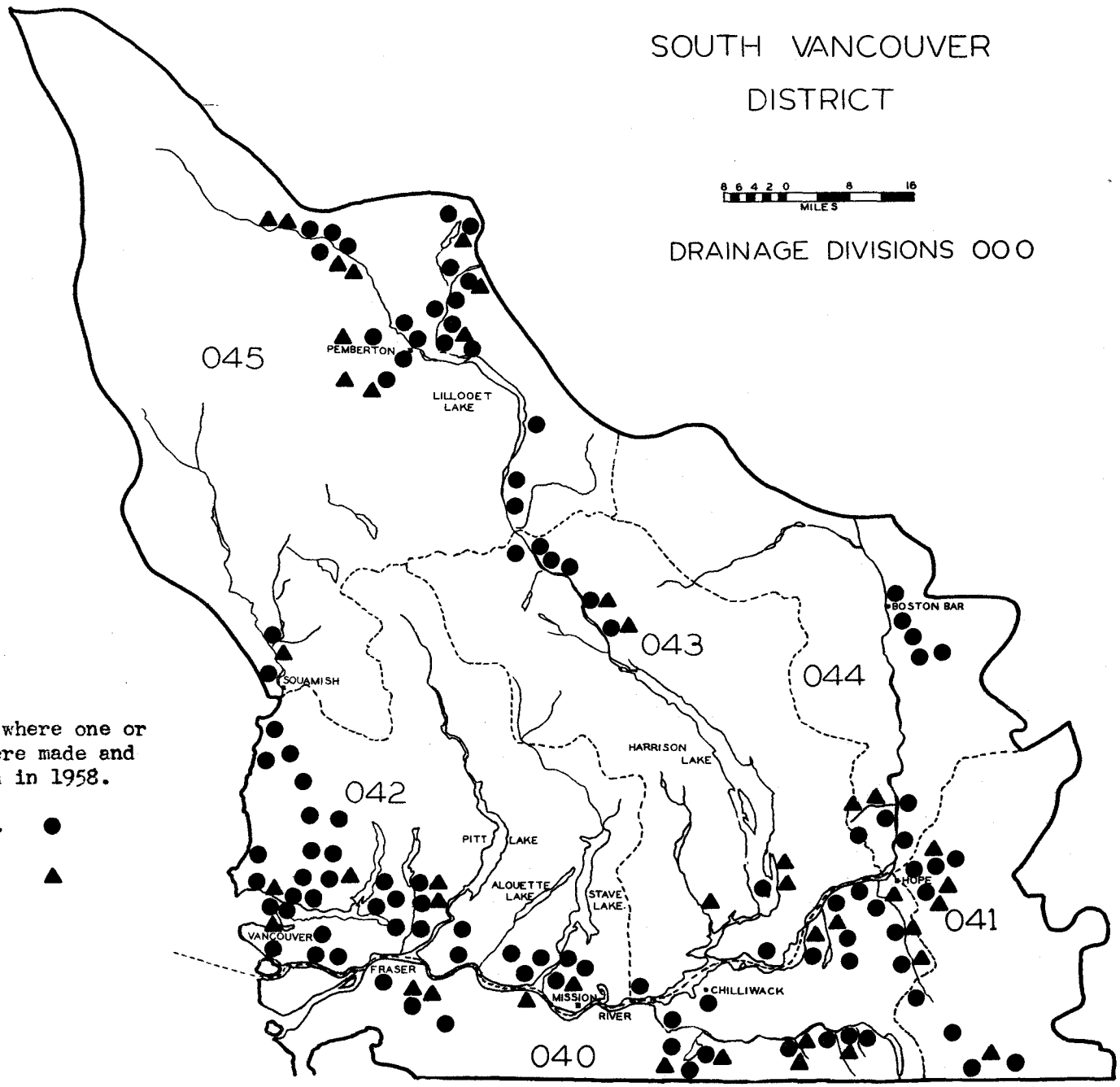
Young seedlings in plantations at Haney and Silverdale are struggling to survive under heavy ground cover. Some of the older plantations in the Garabaldi Park area have now been released and are showing good recovery.

Mortality from Unknown Causes

Scattered groups of from 50 to 100 dead Douglas fir regeneration were observed throughout the South Vancouver district. The majority of mortality occurred on sloping and rocky sites. No signs of insect or disease were found on the trees sampled and it is suspected the condition was caused by drought.

## OTHER NOTEWORTHY DISEASES

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Cedar, western red | Didymacella thujina (Durand) Maire | Mission 6 miles north | 50 per cent of foliage affected in area examined |
| Cottonwood | Taphrina populi-salicis Mix | Coquitlam Valley | Rust on back of leaves (light infection) |
| Fir, Douglas | Melampsora occidentalis Jacks. | U. B. C. Forest, Haney | Orange fructifications on under surface of needles. Light infection on several trees examined |
| Fir, amabilis | Peridermium sp. | Lorenzetta Creek | White fruiting bodies on under surface of needles. Light infection on all trees examined |
| Fir, grand | Uredinopsis sp. | Chilliwack River Valley | Needle rust Light infection |
| Hemlock, western | Melampsora epitea Thuem f. sp. tsugae Ziller | Green Timbers | Orange rust on under surface of foliage |
| Maple, broadleaf | Rhytisma punctatum (Pers.) Fr. | Coquihalla River | Black spots on back of leaves (light). |
| Pine, white | Cronartium ribicola J. C. Fisch. | Tisdall 1 mile north | Blister rust, heavy stem and branch attack in this area |
| Pine, lodgepole | Peridermium stalactiforme Arth. & Kern. | Tisdall 3 miles south | Black spots on needles, many trees affected. |
| Pine, Scots | Peridermium harknessii J. P. Moore | Green Timbers | Globose galls, deforming of leaders and branches |
| Pine, ponderosa | Armillaria mellea (Vahl ex Fr.) Quél | Garibaldi Park | Mycelial felt at root collar. One tree in plantation dead. |

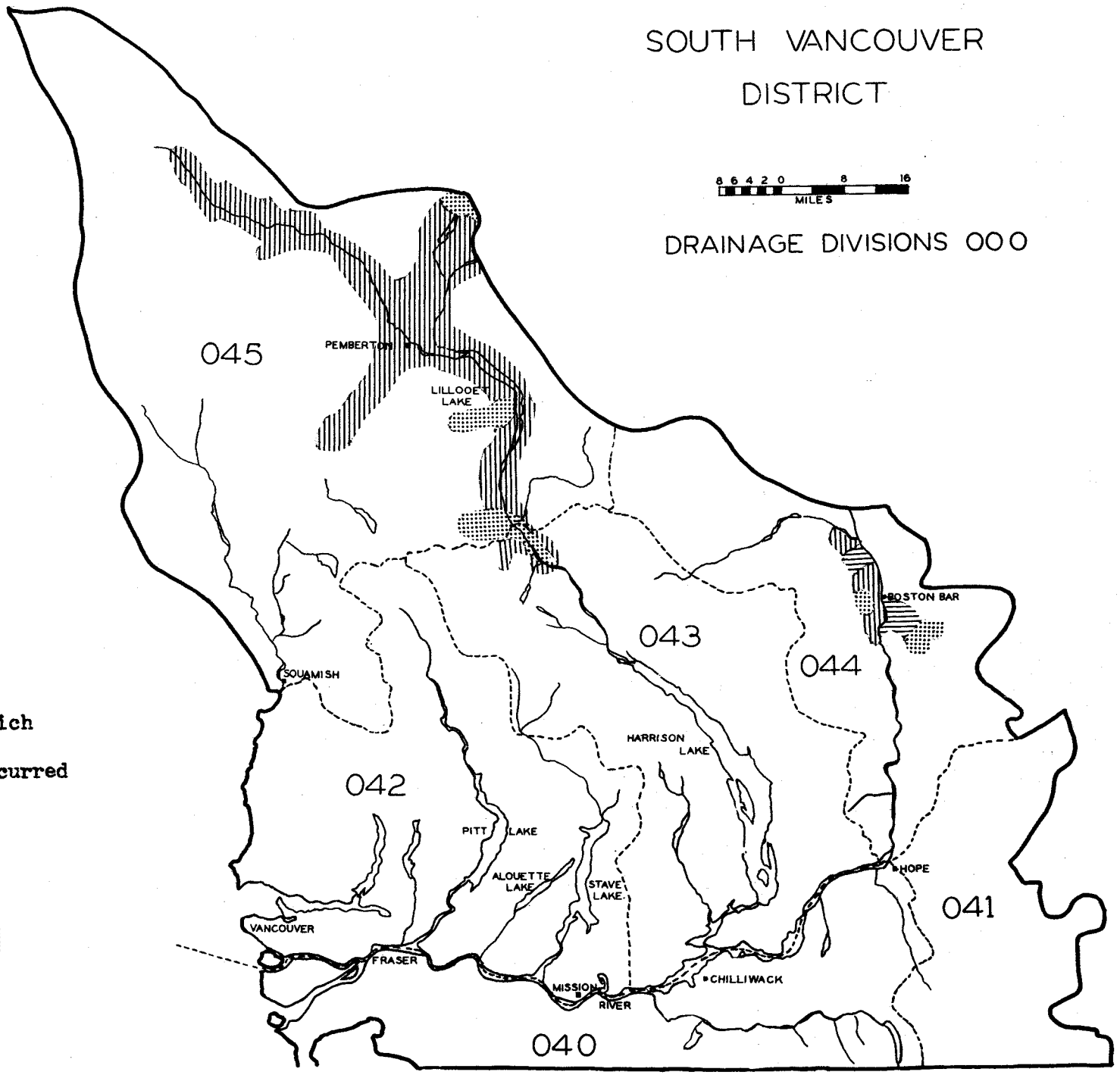



Map 1

Location of points where one or more collections were made and field records taken in 1958.

Forest insect ●

Tree disease ▲



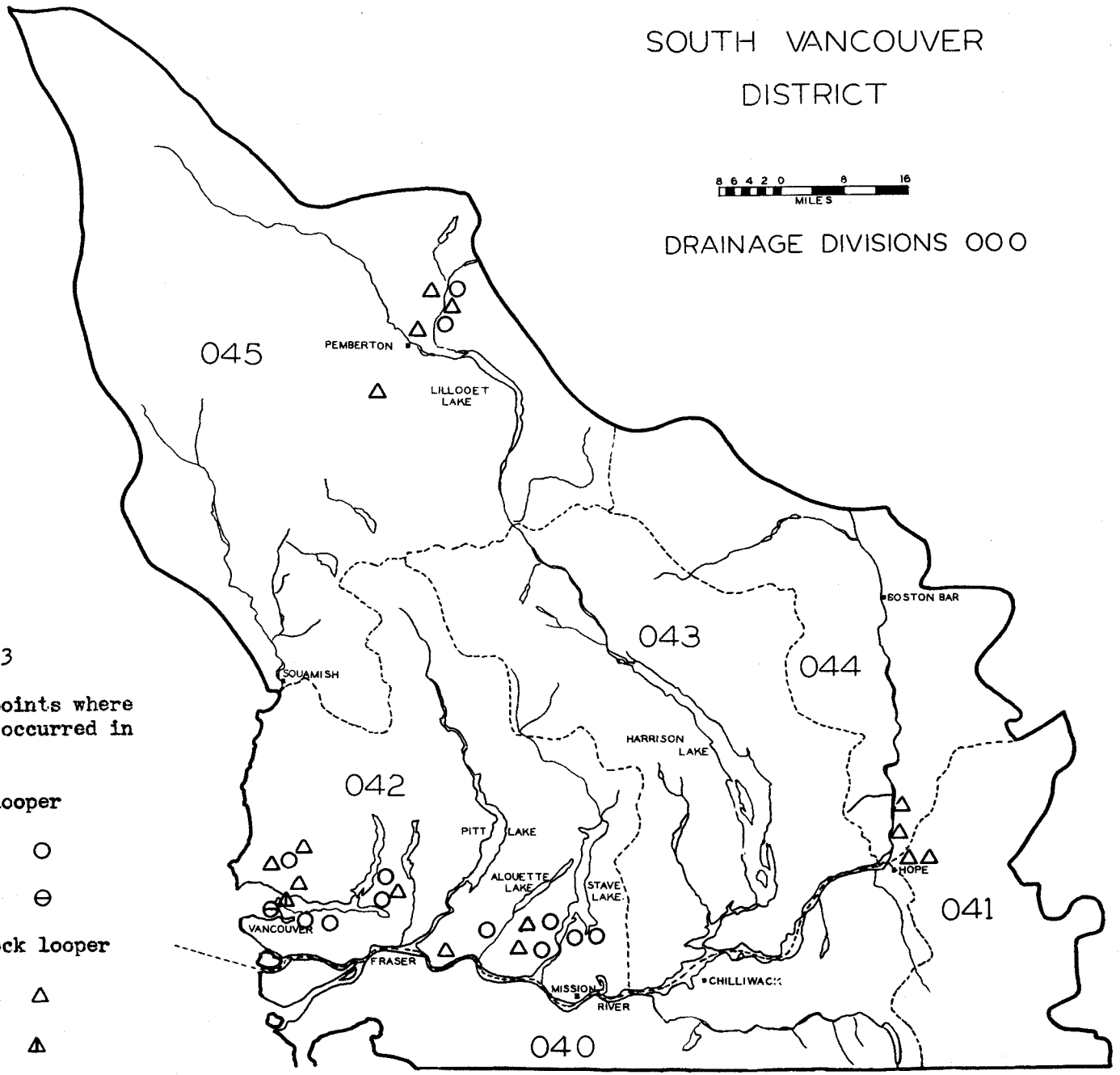

**Map 2**

**Areas within which spruce budworm infestations occurred in 1958.**

**Light**

**Medium**

**Heavy**




Map 3

Location of points where infestations occurred in 1958.

Hemlock looper

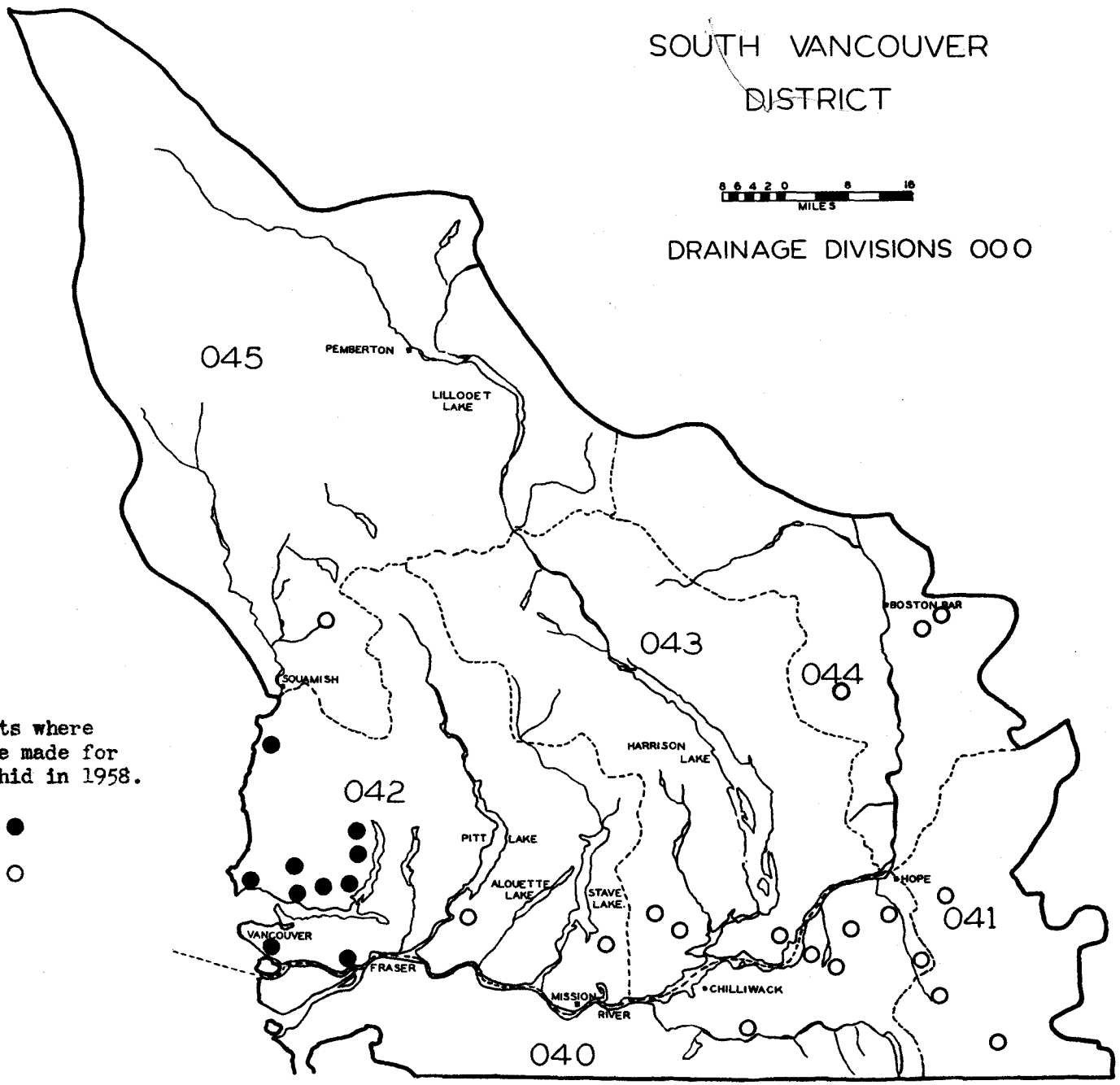
Light ○

Medium ⊖

Phantom hemlock looper

Light △

Medium ⧋

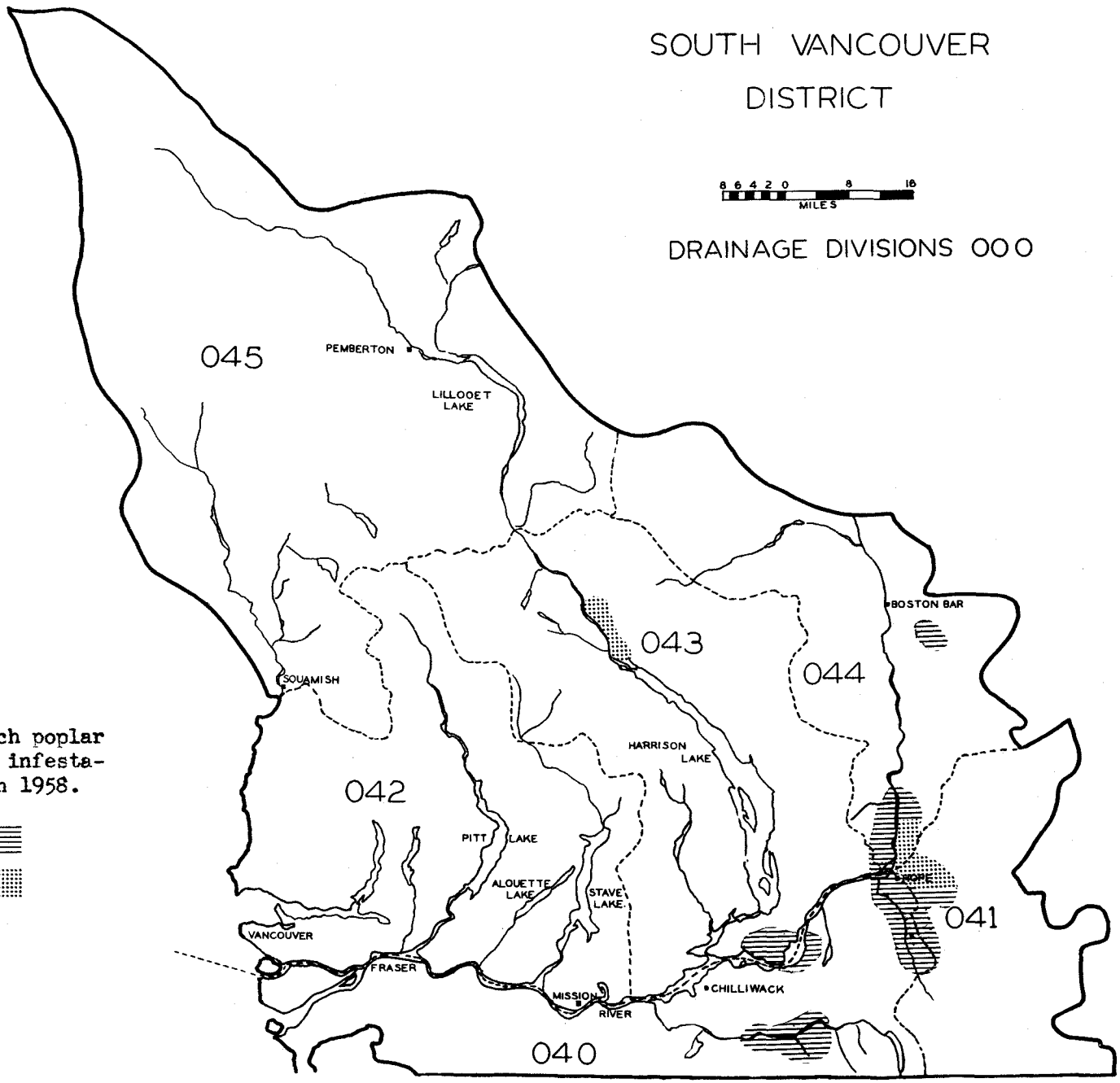



Map 4

Location of points where examinations were made for balsam woolly aphid in 1958.

Present ●

Not present ○

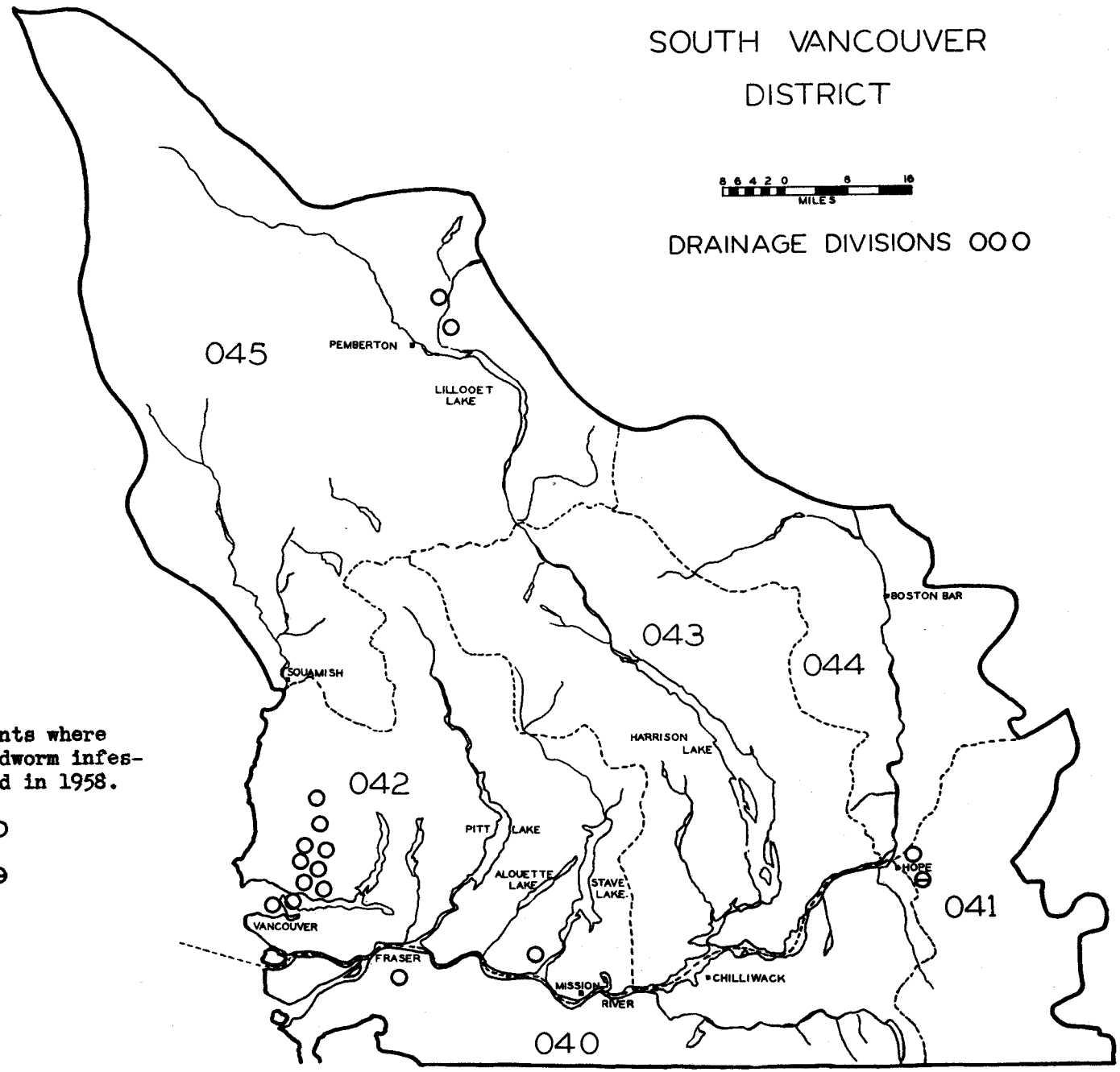



Map 5

Areas within which poplar and willow borer infestations occurred in 1958.

Medium

Heavy




**Map 6**

**Location of points where black-headed budworm infestations occurred in 1958.**

**Light** O

**Medium** ⊖

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

NORTH VANCOUVER DISTRICT

1958

# FOREST BIOLOGY SURVEY

# NORTH VANCOUVER DISTRICT

# 1958

R. H. Murfitt

## INTRODUCTION

The M. V. "Forest Biologist" left Victoria on April 21st and was employed on survey work in the South Vancouver Island district for a week before commencing 10 weeks of survey work in the North Vancouver District. Road and ferry improvements along the mainland coast enabled additional coverage to be attained with the use of a vehicle.

One hundred and eighty-seven forest insect and 24 disease samples were submitted. Of the latter 18 were identified. The location of forest insect and tree disease collections are shown on Map 1. Table 1 lists collections by host.

## STATUS OF INSECTS

### Black-headed Budworm, Acleris variana (Fern.)

Forest closures prevented a complete survey of the black-headed budworm infestation areas in the Johnstone Strait and adjacent channels. Hardwicke Island and Port Neville, two areas that contained high larval populations in 1957, were sampled extensively this year but no larvae were found.

Of seven samples collected on Quadra Island one contained nine larvae, the others none. Elsewhere only occasional larvae were found during routine sampling.

### Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Out of a total of 187 collections made in the North Vancouver District only 14 contained hemlock looper. In Loughborough Inlet samples contained one or two larvae per sample. One sample taken at Phillips Lake contained 10 larvae. At Narrows Inlet the highest number of larvae per collection was four, at nearby Princess Louisa Inlet two samples of 12 larvae each were found. Subsequent collections in Jervis Inlet produced only small numbers of larvae. (Map 1)

### Spruce Budworm, Choristoneura fumiferana (Clem.)

Only two larvae were found, one on Douglas fir at Cortez Island, the other on western hemlock on Quadra Island.

Table 1

Collections by Hosts

North Vancouver District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Amabilis fir | 1 | 5 | No host | 1 | |
| Grand fir | 5 | | Miscellaneous | 1 | 2 |
| Douglas fir | 78 | 5 | Dogwood | 1 | |
| Red cedar | 15 | 2 | Apple | 1 | |
| Western hemlock | 87 | 5 | Cascara | 1 | |
| Shore pine | 1 | | Willow | 1 | |
| Lodgepole pine | 6 | 4 | Maple | 1 | |
| White pine | 3 | 1 | Alder | 10 | |
| | | | Total | 17 | 2 |
| Total | 195 | 22 | Grand Total | 212 | 24 |

Silver-spotted Tiger Moth, Halisidota argentata Pack.

Only one larva was found on Douglas fir at the southern end of Nelson Island.

Green-striped Forest Looper, Melanolophia imitata Wlk.

This looper appeared uniformly throughout the district in a total of 34 collections containing 218 larvae. The highest larval counts per 3-tree beating sample was 55 larvae at Heydon Lake in Loughborough Inlet, 29 at Glendale Lake and 21 on Quadra Island. The majority of the remaining collections were under 10 larvae (Map 2).

Green Velvet Looper, Epirrita autumnata (Gn.)

Like some other geometrid species the population of this insect increased noticeably in 1958. Samples averaged 4.4 larvae throughout the area surveyed.

The heaviest populations were in the southern part of the district. At a logging operation in Vancouver Bay 56 loopers were found in one sample, and 10 in another sample nearby. No feeding was visible at this time as the larvae were in the early instars. Lesser collections of 30, 25, and 15 loopers were found in Narrows Inlet, Halfmoon Bay, and on the Sechelt Peninsula.

Yellow-lined Forest Looper, Nyctobia limitaria Wlk.

The general upward trend of looper populations was reflected in this species also, and larvae were prevalent in small numbers throughout the district. There was a noticeable concentration in the Sechelt and adjacent inlets where seven samples, the largest containing 30 larvae, were made. The remaining six samples averaged 3.2 larvae per sample.

Sawflies, Neodiprion spp.

Sawfly larvae were found consistently throughout the district although no appreciable defoliation was apparent. In some inlets clumps of lodgepole pine on rocky shore sites showed light tip feeding.

Seventy-four samples, averaging 5.6 larvae each, were made. Ten of these collections containing above average numbers of larvae are listed in Table 2.

Table 2

Location of Collections where Above Average Numbers of Neodiprion spp. Larvae were found. North Vancouver District. 1958.

| Location of collection | Drainage division | Number of larvae |
|---|---|---|
| Princess Louisa Inlet, Loquilts Creek | 061 | 16 |
| Princess Louisa Inlet, Louisa Inlet | 061 | 45 |
| Jervis Inlet, Deserted River | 061 | 28 |
| Jervis Inlet, Britain River | 061 | 11 |
| Narrows Inlet I. R. No. 7 | 061 | 17 |
| West Redonda Island | 063 | 12 |
| Loughborough Inlet, Meadow Creek | 064 | 64 |
| Loughborough Inlet, Glendale Lake | 064 | 14 |
| Loughborough Inlet, Heydon Bay | 064 | 27 |
| Phillips Arm, Phillips Lake | 064 | 55 |

## STATUS OF TREE DISEASES

Douglas fir needle cast.

Douglas fir in a Douglas fir-cedar regeneration stand on a rocky site on the east shore of Sakinaw Lake was heavily infected by needle disease caused by Rhabdocline pseudotsugae Syd. and Phaecryptopus gaeumannii (Rohde) Petr. The discoloured trees were noted for approximately three miles along the Powell River highway. Of fifty trees examined 80 per cent of the old needles were infected.

Sooty mould.

This black crust on the foliage caused by Dimerosporium tsugae Dearn. completely covered the needles in some stands. A particularly heavy infection occurred on understory hemlock and balsam at Halfmoon Creek. A less severe condition was found at Powell Lake where hemlock was the host. Limacinia alaskensis Sacc. and Scalia was found commonly associated with this disease and the associated twig killing. It is suspected of pathogenic activity on otherwise weakened twigs but its exact nature is not known.

Cedar leaf blight.

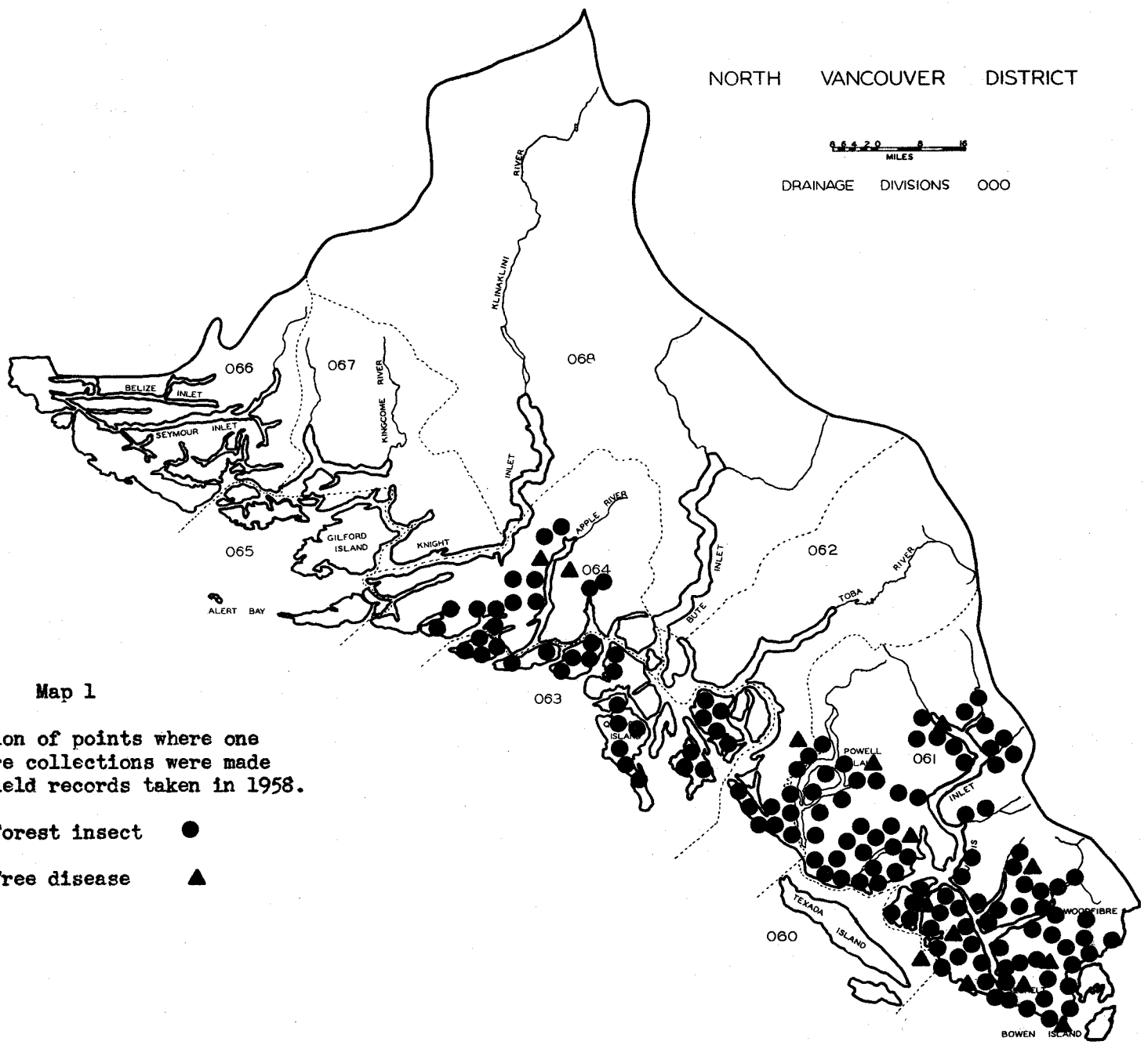
Reproduction red cedar at Laussman Creek, Jervis Inlet, was heavily infected by this blight disease caused by Didymascella thujina (Farl.) Farl. Trees were examined for two miles along a logging grade and every tree was found to be heavily attacked.

White-pine blister rust.

Blister rust cankers caused by Cronartium ribicola J. C. Fisch. were collected from young trees at Roberts Creek and were submitted for demonstration material.

## OTHER NOTEWORTHY DISEASES

| HOST | ORGANISM | LOCALITY | REMARKS |
|---|---|---|---|
| Fir, amabilis | Hypodermataceae | Roberts Creek | Sooty mold on foliage kept for further study |
| Fir, amabilis | Tuberculina persicina Sacc. on Peridermium balsameum | Wilson Creek | A hyperparasite on a rust fungus |
| Hemlock, western | Arceuthobium campylopodum Engelm. | Sechelt | Mistletoe on suppressed understory |
| Pine, lodgepole | Peridermium harknessii J. P. Moore | Jervis Inlet | Galls on branches of regeneration trees |

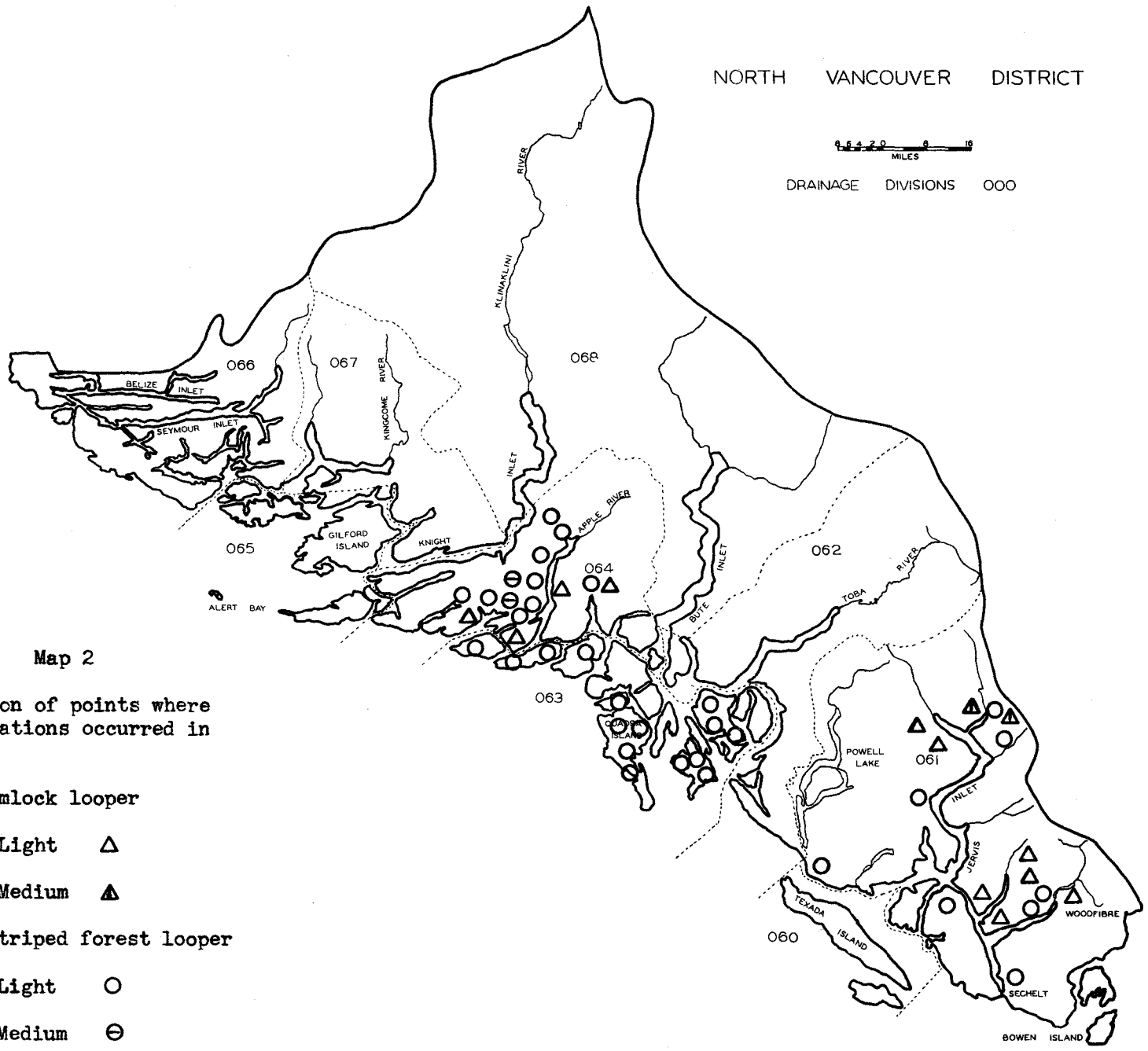



**Map 1**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect** ●

**Tree disease** ▲




Map 2

Location of points where infestations occurred in 1958.

Hemlock looper

Light △

Medium ▲

Green-striped forest looper

Light ○

Medium ⊖

# ANNUAL REPORT OF FOREST BIOLOGY RANGERS

# BRITISH COLUMBIA

# 1958

# PRINCE RUPERT FOREST DISTRICT

# FOREST BIOLOGY SURVEY

## PRINCE RUPERT FOREST DISTRICT

## 1958

D. G. Collis

## INTRODUCTION

The Prince Rupert Forest District south of and including the Bell-Irving, Skeena and Nass River drainages is divided into three biology ranger districts, the East, South and West Prince Rupert districts. The northern portion is surveyed by rangers from the Vernon Laboratory as a portion of the North Prince George district. Personnel who conducted this survey in 1958 were:

| | | |
|---|---|---|
| Northern area | - | T. A. D. Woods |
| East Prince Rupert | - | D. G. Collis |
| South Prince Rupert | - | R. Murfitt, R. Wood, E. G. Harvey |
| West Prince Rupert | - | N. E. Alexander |

The 2-year-cycle spruce budworm infestation at the northern end of Babine Lake completed its development this year after once again inflicting heavy defoliation on white spruce and alpine fir trees. Egg mass counts indicate a continuance of the outbreak with no reduction in feeding intensity.

The aspen leaf miner was present in varying intensities at all locations inspected in the East and West Prince Rupert ranger districts wherever the host tree existed.

Hemlock looper larvae were common in the Bella Coola Valley, South Bentinck Arm and Dean Channel areas of the South Prince Rupert district.

Black-headed budworm larvae and pupae were found in moderate numbers on the southern end of the Queen Charlotte Islands.

# FOREST BIOLOGY SURVEY

## SOUTH PRINCE RUPERT DISTRICT

## 1958

R. H. Murfitt

## INTRODUCTION

The survey of this district commenced on June 29th. A total of 113 insect samples and 27 tree disease samples were submitted to the Victoria Laboratory. Insect collections by host tree are shown in (Table 1).

Table 1

Collections by Hosts

South Prince Rupert District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Amabilis fir | 4 | 2 | No host | 1 | |
| Alpine fir | 1 | 0 | Miscellaneous | 5 | |
| Lodgepole pine | 5 | 2 | Red dogwood | 1 | |
| Douglas fir | 14 | 6 | Trembling aspen | 1 | |
| Red cedar | 11 | 1 | Cottonwood | 4 | 2 |
| Western hemlock | 47 | 8 | Willow | 3 | |
| Black spruce | 2 | 0 | Red alder | 6 | 1 |
| Sitka spruce | 8 | 2 | Mountain alder | 1 | |
| | | | Birch | 2 | |
| | | | Maple | 0 | 3 |
| | | | Total | 24 | 6 |
| Total | 92 | 21 | Grand Total | 116 | 27 |

A concentrated survey of the Bella Coola Valley was conducted and the M. V. "Forest Biologist" was used as headquarters. By prior arrangement R. L. Fiddick provided a vehicle at Bella Coola for use in the Bella Coola Valley. The survey was carried out by R. H. Murfitt and R. O. Wood, assisted for a time by R. L. Fiddick and E. G. Harvey.

## STATUS OF INSECTS

### Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

During the larval period of this insect 113 samples were collected of which 41 contained larvae. Although widely distributed the number of larvae per sample was quite low. Of the 41 collections containing hemlock looper (Map 2) the average number per sample was 3.8. Higher counts were centred in Dean Channel at Skowquilts Creek where 21 larvae were found, and 18 loopers were collected at Elcho Harbour. Larvae were found on all coniferous species but western hemlock was the favoured host.

### Spruce Budworm, Choristoneura fumiferana Clem.

One pupa was found on Douglas fir at Atnarko.

### Black-headed Budworm, Acleris variana (Fern.)

One larva was collected at Namu in Fitz Hugh Sound.

### The Green Striped Forest Looper, Melanolophia imitata Wlk.

Sampling was carried out late in the larval period of this insect so the results obtained are probably not indicative of the number of larvae present. The largest collection, at Rivers Inlet, contained 23 larvae. Seventeen other samples contained a total of 49 larvae.

### Sawflies, Neodiprion spp.

A total of 20 collections contained this sawfly. The largest collection of 130 larvae was taken from a hemlock sample at Rivers Inlet. The other 19 samples averaged 4.7 larvae.

### Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The small infestation that has been present in the Atnarko area in recent years was examined this year and found to be declining. Occasional patches of red-top trees were observed along some of the higher ridges of the Hotnarko and Atnarko River valleys. No new attacks were found.

### Antique Tussock Moth, Orgyia antiqua badia (Hy. Ed.)

Small numbers of this moth were collected throughout the district. At both Rivers Inlet and South Bentinck Arm four samples contained only one larva each. Of the seven positive samples taken along the Bella Coola

River two contained two larvae each and the remaining five collections one larva each.

Green Spruce Looper, Semiothisa granitata (Guen.)

This looper was found regularly in collections after July 1st. Forty-five samples distributed throughout the district contained from one to 58 larvae. Along the Bella Coola River at Hagensborg one sample from western hemlock contained 58 loopers, two more collections containing 28 larvae each were found on hemlock at Nusatsum River and Stuie. It is significant that the three highest samples occurred within a few miles of each other.

## STATUS OF TREE DISEASE

Red ring of mature Douglas fir.

Mature Douglas-fir stands growing along the Bella Coola Valley between Firvale and Stuie were heavily infected with red ring rot caused by Fomes pini (Thore ex Fr.) Karst. The results of two five-chain strips run to determine the extent of infection are shown below. Only the trees showing fruiting bodies were recorded as infected.

| Location of strips | Total no. trees | No. of trees infected |
|---|---|---|
| 3 1/2 miles east of Firvale | 58 | 23 |
| 2 miles west of Stuie | 32 | 13 |

Sooty mold on Hemlock and Balsam.

Sooty mold caused by Dimerosporium tsugae Dearn. was found on understory hemlock and balsam fairly consistently throughout the district. In some mature stands suppressed understory trees were heavily encrusted with black mold.

Foliage Damage to Douglas fir.

Phaeocryptopus gaeumannii (Rohde) Petr. and Limacinia alaskensis Sacc. and Scalia caused defoliation and possibly dieback damage to immature pole sized Douglas fir on a flat delta at the mouth of the Dean River.

Table 2

OTHER NOTEWORTHY DISEASES

| HOST | ORGANISM | LOCALITY | REMARKS |
|---|---|---|---|
| Fir, Douglas | Melampsora occidentalis Jacks. | Stuie | New foliage heavily infected collected July 7th. |
| Hemlock, western | Melampsora epitea Thüm. f. sp. tsugae. Ziller | Bella Coola | Needle rust on current foliage collected July 7th. |
| Pine, lodgepole | Peridermium harknessii J. P. Moore | Stuie | Gall rust on branches of immature pole trees |
| Pine, lodgepole | Arceuthobium americanum Nutt. | Dean Channel | Scattered infection throughout the area. |
| Maple, Douglas | Phleospora aceris (Lib.) Sacc. | Bella Coola | Associated with leaf curling. |

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST PRINCE RUPERT DISTRICT

1958

# FOREST BIOLOGY SURVEY

# WEST PRINCE RUPERT DISTRICT

# 1958

N. E. Alexander

## INTRODUCTION

In 1958 a total of 239 insect samples and 15 tree disease samples were collected. Collections, listed by hosts, are shown in Table 1. Points at which collections were made and records taken are shown in Maps 1 and 2.

There were no unusual disease conditions encountered in the West Prince Rupert District during the 1958 field season. Of the 15 samples submitted, 10 have been identified to date.

Some delay was occasioned by the extremely dry season and the resulting forest closure, but with the help of Ranger R. Wood, some new areas were surveyed in the Queen Charlotte Islands.

The writer would like to take this opportunity to express appreciation for the help given him by the British Columbia Forest Service personnel within the district and particularly in the Queen Charlotte Islands where every assistance was rendered the survey.

Table 1

Collections by Hosts

West Prince Rupert District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Lodgepole pine | 11 | 5 | Willow | 8 | 1 |
| Red cedar | 6 | 1 | No host | 1 | |
| Amabilis fir | 3 | | Miscellaneous | 3 | |
| Alpine fir | 6 | 2 | Birch | 5 | 1 |
| White spruce | 1 | | Trembling aspen | 16 | 2 |
| Western white spruce | 2 | | Cottonwood | 14 | |
| Sitka spruce | 26 | | Red alder | 11 | 1 |
| Western hemlock | 121 | 2 | Sitka alder | 4 | |
| Mountain hemlock | 1 | | | | |
| | | | Total | 62 | 5 |
| Total | 177 | 10 | Grand Total | 239 | 15 |

## STATUS OF INSECTS

### Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm population continued to increase in numbers and distribution in 1958. Fluctuation over the district as a whole is shown in Table 2. Distribution this year is indicated in Maps 3 and 4.

Table 2

Black-headed Budworm Population Trend in the West Prince Rupert District. 1952 to 1958.

| Year | Number of collections containing black-headed budworm | Average number of larvae, pupae, and adults per collection |
|---|---|---|
| 1958 | 22 | 6.8 |
| 1957 | 19 | 3.1 |
| 1956 | 2 | 1.5 |
| 1955 | 54 | 36.0 |
| 1954 | 169 | 34.9 |
| 1953 | 217 | 38.0 |
| 1952 | 111 | 17.5 |

Plots were established on the Queen Charlotte Islands in 1956 and 1958. Results of examination are shown in Table 3. Tree mortality occurred in only one plot, on Maude Island. Top kill was prominent in most areas, and heaviest at Bear Lake. On Maude Island, 40 per cent of the trees estimated to be heavily defoliated in 1957 are now dead, have dead tops, or are showing other signs of permanent injury.

The largest population in 1958 was found on Moresby Island. One area in particular, in the vicinity of Jedway, showed a marked increase over the remainder of the district. One collection here contained 37 pupae, and adults were observed in large numbers on understory trees. This location had not been surveyed for some years and no figures are available to indicate what increase if any this represents over previous seasons.

Table 3

Result of Examination of Black-headed Budworm Mortality Plots in the West Prince Rupert District, 1958.

| Location | Number of trees | Percentage of trees top killed | Length of top kill in feet | Average length of top kill | Percentage of trees dead |
|---|---|---|---|---|---|
| Maude Island | 50 | 28 | 1 - 15 | 6.9 | 6 |
| Juskatla Inlet | 50 | 0 | 0 | 0 | 0 |
| Moresby Camp | 100 | under 5 | N.R. * | N. R. | 0 |
| Naden Harbour | 50 | 6 | 5 - 7 | 5.6 | 0 |
| Dana Inlet | 78 | 18 | 3 - 7 | 4.1 | 0 |
| Bear Lake | 25 | 76 | 1 - 10 | N. R. | 0 |

* N. R. - no record

Branch samples submitted by the B. C. F. S. ranger at Queen Charlotte and by members of the Pest Control Committee, B. C. Loggers' Association, were examined in December and the results are shown in Table 4. Based on the number of eggs found per ten-inch tip, heavy defoliation is expected in 1959 at or near Dana Inlet. Medium defoliation is expected near Heather Lake (P. L. 165), in Peel Inlet, and in areas near Dana Inlet, and light defoliation is expected at the following: P. L. 140; Maude Island; T. L. 1716; Lagoon Inlet; T. L. 2387.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The aspen leaf-miner continued to infest trembling aspen throughout the district this year (Map 5). Adults were first observed on arrival in the district in early May and were present in large numbers in the duff and on coniferous species before the aspen buds were open. As early as May 13 a gallery of approximately one inch in length was observed near Terrace. Mines were generally completed (Figure 1) and adults emerged (Figure 2) by June 30th. Repeated observations failed to reveal any second crop of leaves by the attacked trees and those leaves unattacked by the spring adults remained uninfested for the duration of the season. Adults were again observed on the second of August at Lakelse Lake.

In the areas examined (Table 5), an average of 85.1 per cent of the galleries were aborted for various reasons.

The larvae of Phyllocnistis populiella Chamb. were recorded mining the leaves of black cottonwood in several instances.

Table 4

Black-headed Budworm Egg Counts, Moresby Island, West Prince Rupert District, 1958

| Location | Number of eggs on 15-10" branch tips. | Average number per tip | Total number parasitized | Expected defoliation in 1959* |
|---|---|---|---|---|
| P. L. 140 | 73 | 4.8 | 0 | Light |
| P. L. 165 | 111 | 7.4 | 21 | Medium |
| Maude Island | 42 | 2.8 | 3 | Light |
| T. L. 1716 | 15 | 1.0 | 0 | Light |
| Dana Inlet | 245 | 16.3 | 44 | Heavy |
| Lagoon Inlet | 20 | 1.3 | 1 | Light |
| T. L. 2387 | 27 | 1.8 | 2 | Light |
| Dana Inlet, Plot # 4 | 160 | 10.6 | 4 | Medium |
| Peel Inlet | 193 | 12.9 | 0 | Medium |

* Expected 1959 defoliation (determined by number of eggs per 10 inch tip): Light 1 - 7, Medium 8 - 15, Heavy 16+.

Table 5

Intensity of Aspen Leaf-miner Infestation, West Prince Rupert District, 1958.

| Location | Percentage of leaves infested | Percentage of trees infested | Mines present in 50 leaves Upper | Lower | Average number of mines per leaf |
|---|---|---|---|---|---|
| McDonnell Lake | 98 | 100 | 58 | 40 | 1.96 |
| Flint Creek | 84 | 100 | 47 | 39 | 1.72 |
| Kitwanga Lake | 94 | 100 | 45 | 53 | 1.96 |
| Kitwanga Village | 88 | 100 | 56 | 55 | 2.22 |
| Skeena Crossing | 87 | 100 | 56 | 51 | 2.10 |
| Shames River | 60 | 80 | 36 | 45 | 1.62 |
| Copper City | 89 | 100 | 73 | 55 | 2.56 |
| Skeena Crossing | - | - | - | - | adults |
| Hwy. 16, Kitwanga | 43 | 100 | 35 | 48 | 1.66 |
| Marmot River | 60 | - | - | - | - |
| Lakelse Road | 64 | 75 | - | - | - |

A Leaf-miner of Cottonwood, Phyllocnistis sp.

Larvae of this species were again active mining the leaves of black cottonwood. The percentage of leaves mined varied from 38.4 per cent to 96.6 per cent in the area where records were made (Table 6). In two instances, one at Terrace and the other at the Tseax River, Phyllocnistis populiella Chamb. was found to be mining in cottonwood foliage. The insect was found throughout the district.

Table 6

Intensity of Infestation by a Cottonwood Leaf-miner, West Prince Rupert District.

1958

| Location | Date | Leaves examined | Percentage infested | No. of galleries | Larvae and pupae | Percentage mines aborted |
|---|---|---|---|---|---|---|
| Terrace * | June 10 | 52 | 38.4 | 24 | - | 0 |
| Tseax R. * | June 11 | 100 | 83.0 | 142 | 142 | 0 |
| Zymoetz R. | June 13 | 160 | 29.0 | 36 | 36 | 0 |
| Little Oliver Cr. | June 13 | 120 | 90.0 | 214 | 170 | 20.6 |
| Kitimat R. | June 16 | 115 | 5.2 | 7 | 7 | 0 |
| Flint Creek | June 18 | 119 | 96.6 | 252 | 210 | 16.7 |
| Kitwancoole | June 19 | 129 | 66.6 | 97 | 61 | 37.2 |

* Phyllocnistis populiella Chamb.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

The hemlock looper showed a slight increase in numbers in 1958 compared with 1957. The first collection to contain this insect was made in early June and the last in early July.

Table 7

Population Fluctuation of the Hemlock Looper in the West Prince Rupert District.

1954 to 1958

| Year | Number of collections | Average number of larvae per collection |
|---|---|---|
| 1954 | 84 | 7.9 |
| 1955 | 65 | 4.9 |
| 1956 | 6 | 1.0 |
| 1957 | 2 | 1.0 |
| 1958 | 7 | 1.7 |

Generally speaking, collections in 1958 were made in the same areas as in previous years, (Table 8). To date there has been no record of this species occurring on the Queen Charlotte Islands. As far as is known, the hemlock looper has never reached population levels severe enough to kill trees within this district.

Table 8

Location of Points where Hemlock Looper were Found, West Prince Rupert District. 1958.

| Location | Drainage division | Host | Number of larvae found |
|---|---|---|---|
| Lakelse River | 104 | Hw | 1 |
| Glacier Creek | 104 | Hw | 1 |
| Scree Creek | 104 | Hw | 1 |
| Shames River | 104 | S | 2 |
| Shames River | 104 | Hw | 1 |
| Shames River | 104 | C | 5 |
| Hwy. 16, Exstew | 103 | Hw | 1 |

Striped Alder Sawfly, Hemichroa crocea (Fourc.)

The striped alder sawfly continued to feed heavily on many small, scattered patches of red alder throughout the district. In addition to the areas previously recorded on the Nass River and in the Queen Charlotte Islands (see 1957 report), additional areas of heavy feeding were noted on the southeast coast of Moresby Island and on the Nass in the vicinity of Gitzon Creek. Defoliation was estimated at 90 per cent in the Nass River area. Feeding was intense (Figure 3) but was confined to a few trees in each area, with the exception of Gitzon Creek where it was impossible to determine the limits of the area concerned.

Hemlock Sawfly, Neodiprion spp.

The hemlock sawfly continued to be common in 1958 (Table 9). The heaviest populations were found in the Kitsumgallum valley. Light tip defoliation was again visible this year and larval colonies (Figure 4) were submitted from this area. Severe fires which ravaged the areas of heaviest population this season may result in fewer collections containing larvae and perhaps a decrease in the number of larvae per collection in 1959.

Table 9

Population Increase of the Hemlock Sawfly in the West Prince Rupert District, 1954 to 1958.

| Year | Number of collections | Average number of larvae per collection | Range of larvae per collection |
|---|---|---|---|
| 1954 | 60 | 1.1 | 1 - 24 |
| 1955 | 64 | 6.8 | 1 - 200 |
| 1956 | 60 | 10.6 | 1 - 66 |
| 1957 | 74 | 11.7 | 1 - 176 |
| 1958 | 20* | 13.6 | 1 - 111 |

* Queen Charlotte Islands not surveyed during larval season in 1958.

Tent Caterpillars, Malacosoma spp.

The tent caterpillar population increased to heavy infestation levels in the district this year. Both M. pluviale (Dyar) and M. disstria Hbn. were intermingled in areas of very heavy feeding near Terrace.

The principal hosts were birch, trembling aspen, and willow. Red alder, cottonwood, apple, and rose were also being fed upon.

Tent counts were made in three areas near Terrace. The figures in Table 10 were obtained from observing one side of the road for a distance of one mile. The infestation was recorded at varying intensity from Exstew on the west to Flint Creek on the east of Terrace. It spread north to the Nass River and south to Kitimat. At these points only occasional tents were noted. Tent caterpillars were also reported at Stewart.

Table 10

Number of Malacosoma pluviale Tents per Mile on one Side of Road, West Prince Rupert District, 1958.

| Area | Host | | | | | Total |
|---|---|---|---|---|---|---|
| | Red alder | Aspen | Birch | Cottonwood | Willow | |
| West Kalum Road | - | 18 | 26 | 6 | 12 | 65* |
| Remo Road | 15 | 189 | 262 | 15 | 46 | 527 |
| Lakelse Lake Road | 0 | (These species not separated) | | | | 1,209 |

* Miscellaneous hosts included in total

Spruce Budworm, Choristoneura fumiferana (Clem.)

Spruce budworm were recorded in two collections in the district this year. One larva was found on the Lakelse River in early June and one adult was taken at Kitwanga Lake in mid June. The former was found on hemlock and the latter on Sitka spruce. There were no records of this insect in this district in 1957 and 1956.

Green-striped Forest Looper, Melanolophia imitata Wlk.

There was a slight increase in the numbers of this insect found this year. Seven collections averaged two larvae per collection compared with three larvae in three collections in 1957 and eight larvae in seven collections in 1956. This insect first appeared in mid June and occurred on western hemlock, amabilis fir, and Sitka spruce.

Yellow-lined Forest Looper, Nyctobia limitaria Wlk.

This looper continued to occur in the odd collection this year. An average of 1.8 larvae per collection in 1958 compared favorably with averages of 1.6, 1.5, 1.6, and 2.5 larvae per collection for the years 1957 to 1954 respectively.

Spruce Sawfly, Pikonema alaskensis Roh.

Four collections averaged 1.5 larvae compared with two collections averaging 1.0 larvae in 1957 and four single larva collected in 1956.

Antique Tussock Moth, Orgyia antiqua badia (Hy. Ed.)

There was a slight increase in the occurrence of this insect in 1958 with ten collections averaging 1.2 larvae. The maximum number of larvae in one collection was three. In 1957 five collections averaged 1.0 larvae each, and in 1956 there was no record of the insect in the district. Host trees were hemlock, Sitka spruce, alder, and willow.

Green Spruce Looper, Semiothisa granitata (Guen.)

Eighty-eight larvae were collected in 27 samples for an average of 3.3 larvae per collection. This was a marked increase from the four larvae in three collections in 1957. The first collection was made June 30th and the last collection on September 22nd.

Grey Forest Looper, Caripeta divisata Wlk.

The gray forest looper, commonly considered to be a fall insect, made its first appearance in this year's sampling on the 30th of June at Amsbury. It continued to be found throughout the district until sampling terminated at the end of September. Hosts were as follows:

| | | |
|---|---|---|
| Western hemlock | 19 | collections |
| Sitka spruce | 7 | " |
| Alpine fir | 3 | " |
| Red alder | 1 | " |
| Total | 30 | collections |

These 30 collections averaged 5.6 larvae each, with a minimum of one and a maximum of 35 larvae.

Spruce Weevil, Pissodes sitchensis Hopk.

The spruce weevil was observed regularly in the central portion of the mainland district. The only locality where any appreciable damage was noted was in the vicinity of Remo, near Terrace. On a 50 tree plot established here, 18 new terminal attacks (1958) were recorded (Figure 5). Five laterals were also attacked. On the same trees there was evidence of 98 old terminal attacks, as indicated by the deformed stems, and 11 old lateral attacks. The trees examined ranged from two to 10 inches d. b. h. but none exceeded 35 feet in height.

This species has not been recorded in the Queen Charlotte Islands.

Spotted Tussock Moth, Halisidota maculata angulifera Wlk.

Larvae of this species were first observed at Ford's Cove, Portland Canal, in early July. They were collected until the 10th of August. Feeding was mostly on Vaccinium spp., but at Zymoetz River and Kitimat, red alder and willow respectively were heavily defoliated.

## STATUS OF TREE DISEASES

Suspected Fume Injury - Port Edward Pulp Mill and Kitimat Smelter.

In 1957 three plots were established at the outer fringe of the area suspected to be suffering from plant fumes emitted by the Port Edward pulp mill. These plots were re-examined in 1958 and no clearly discernible change was noted in their condition.

This year two plots were established in the vicinity of the Kitimat smelter and observations and records made. To date the only tangible evidence of injury is exhibited by the dying understory. In areas immediately adjacent to the smelter there is virtually no underbush except in the open patches between trees. Many of the untagged trees near the plot are nearly dead. In 1959 it is expected that considerable mortality will show among trees in this area. Stems affected range up to 50 inches d. b. h. and include hemlock, amabilis fir, Sitka spruce, and cedar.

Canker Disease of Red Alder.

This disease caused by Didymosphaeria oregonensis Goodd. occurs commonly on red alder throughout the district. It causes a fusiform swelling on the stem of the host and a longitudinal cracking on the bark on the swelling. It is not believed that this pathogen causes any more than superficial damage to the host.

Canker Disease of Trembling Aspen.

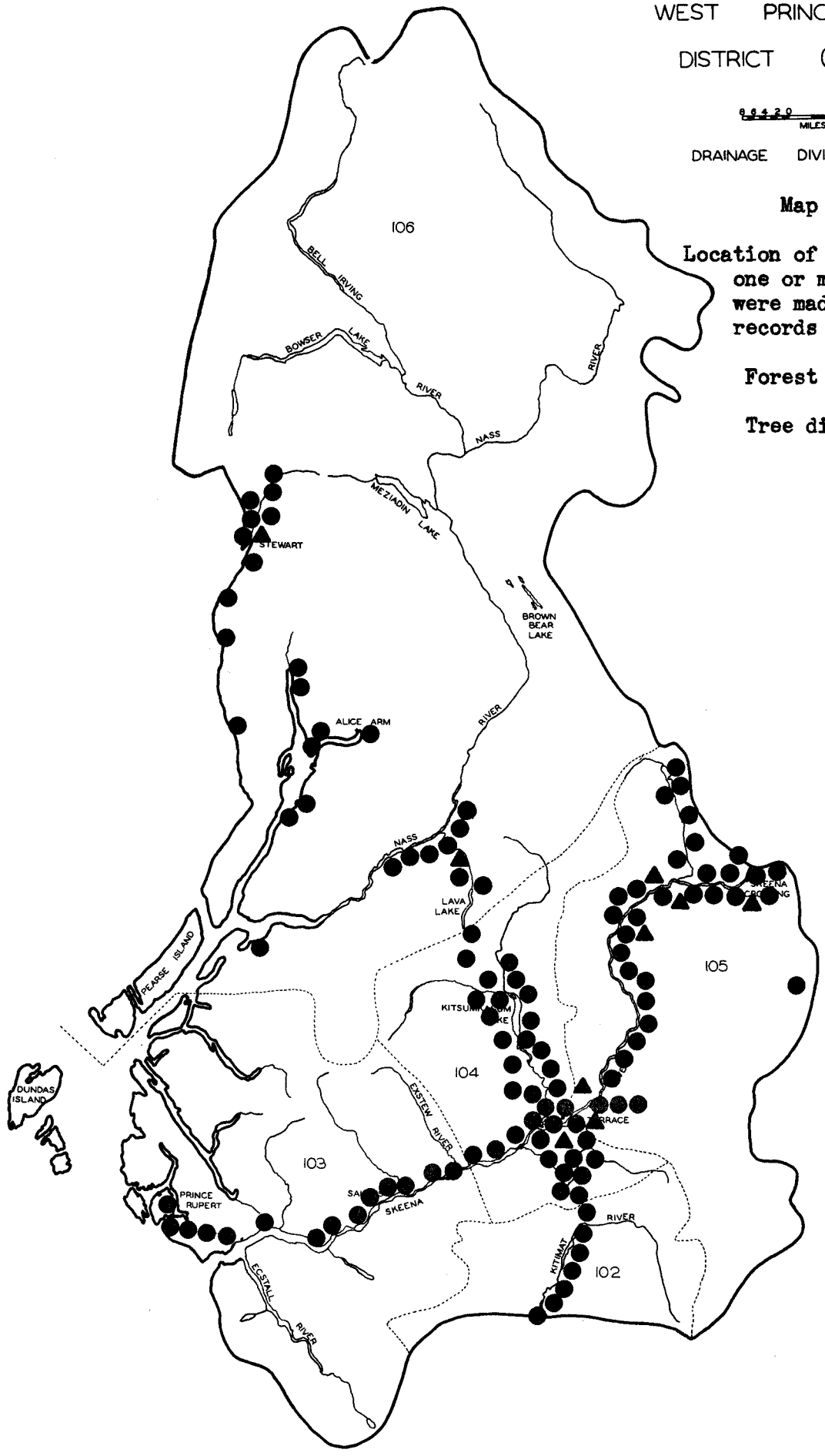
Samples submitted in 1957 were identified as Hypoxylon pruinatum (Klotzech) Cooke and constitute a new occurrence record in British Columbia. The collections identified were collected at Woodcock but trees exhibiting the same symptoms (Figures 6 and 7) have been observed at Kitwanga, Cedarvale, Copper City, and Terrace. This disease is capable of causing serious damage to aspen although only occasional trees with the symptoms have died in this area.

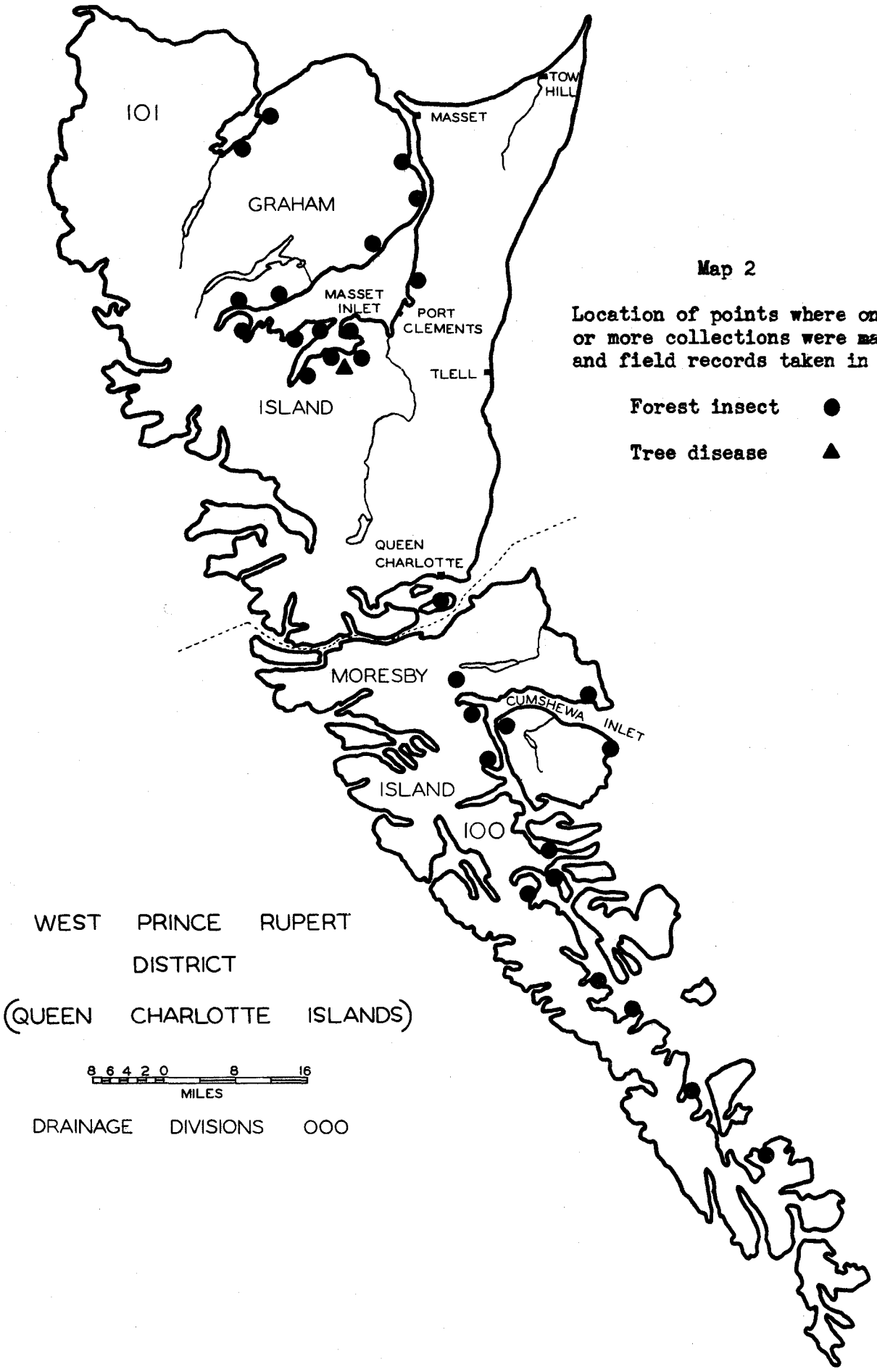
Spruce Needle Rust.

This disease caused by Chrysomyxa ledicola Lagerh. continued to heavily infect young Sitka spruce on Graham Island this year. There is still no evidence of any tree mortality.

Lodgepole Pine Gall Rust.

A mass collection of these pine cankers caused by Peridermium harknessii J. P. Moore was collected at Terrace for culturing. At the same time a 50-tree plot was established for recording the intensity of attack. On the 50 lodgepole pine trees examined there were 152 cankers of this disease. In addition to this there were 21 cankers of the disease Atropellis piniphila (Weir) Lohm. & Cash. Both these fungi occur quite commonly throughout the district.


WEST PRINCE RUPERT
DISTRICT (MAINLAND)
MILES
DRAINAGE DIVISIONS 000
Map 1
Location of points where one or more collections were made and field records taken in 1958.
Forest insect
Tree disease
106
BELL IRVING
BOWSER LAKE
RIVER
NASS
MEZIADIN LAKE
STEWART
BROWN BEAR LAKE
ALICE ARM
RIVER
NASS
LAVA LAKE
PEARSE ISLAND
105
KITSUMKALUM LAKE
104
DUNDAS ISLAND
EXSTEW RIVER
TERRACE
103
PRINCE RUPERT
SKEENA
RIVER
KITIMAT
102
ECSTALL RIVER

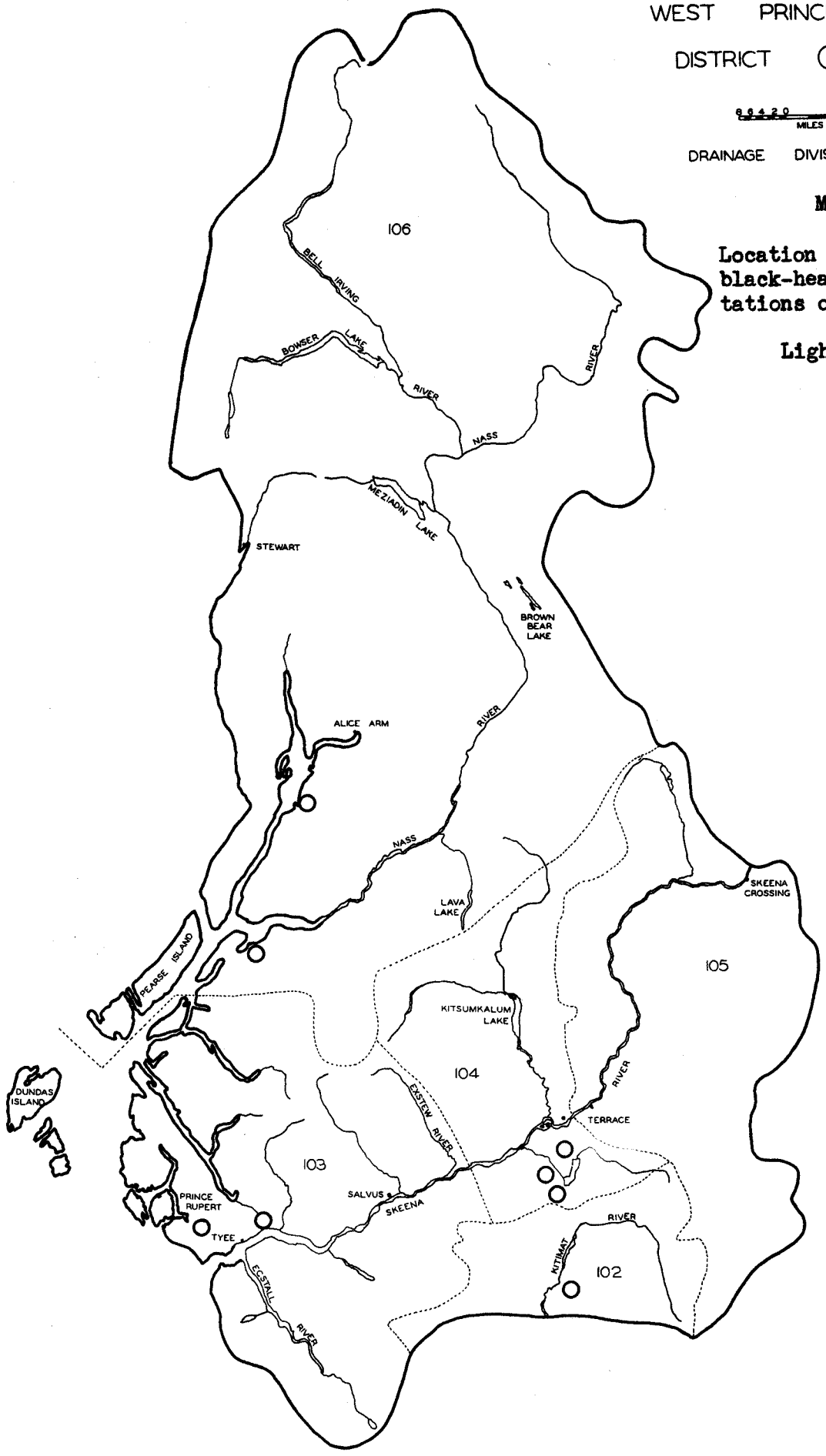


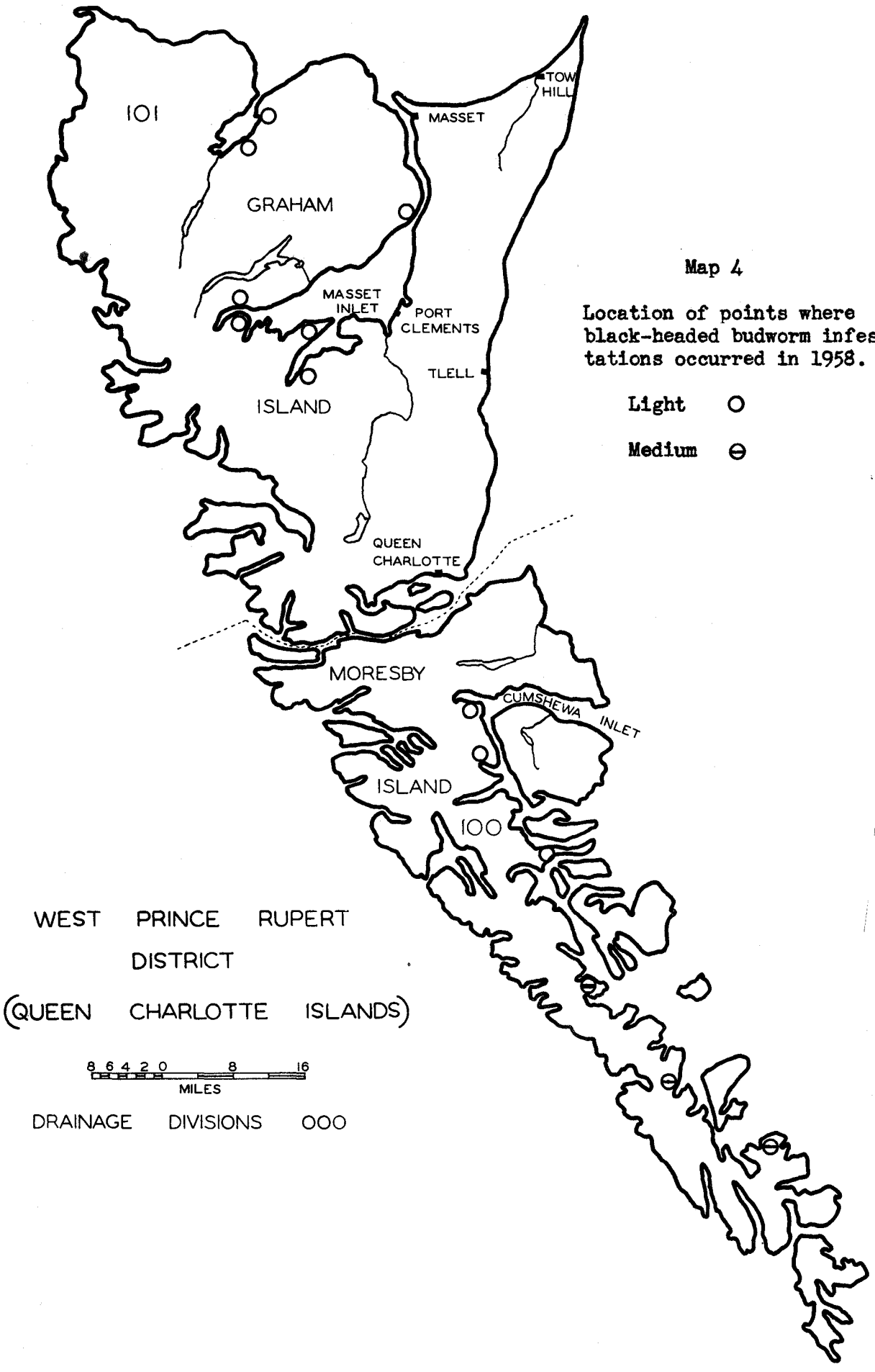

**Map 2**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect** ●

**Tree disease** ▲


WEST PRINCE RUPERT
DISTRICT (MAINLAND)
MILES
DRAINAGE DIVISIONS 000
Map 3
Location of points where black-headed budworm infestations occurred in 1958.
Light
106
BELL IRVING
BOWSER LAKE
RIVER
NASS
RIVER
MEZIADIN LAKE
STEWART
BROWN BEAR LAKE
ALICE ARM
RIVER
NASS
LAVA LAKE
SKEENA CROSSING
105
PEARSE ISLAND
KITSUMKALUM LAKE
104
RIVER
TERRACE
DUNDAS ISLAND
EXSTEW RIVER
103
SALVUS
SKEENA
PRINCE RUPERT
TYEE
RIVER
KITIMAT
102
EGSTALL
RIVER




**Map 4**

**Location of points where black-headed budworm infestations occurred in 1958.**

**Light** O

**Medium** ⊖

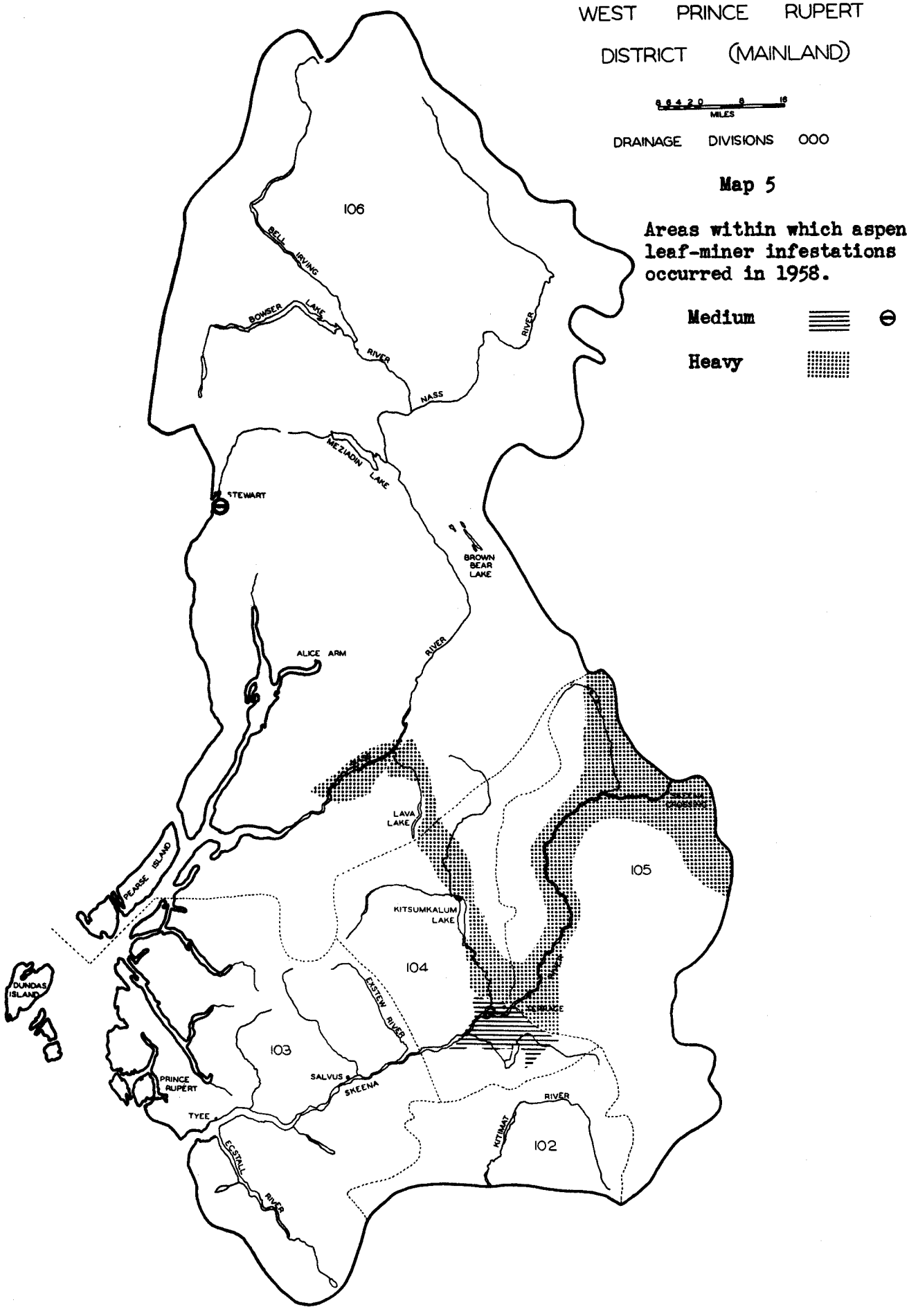
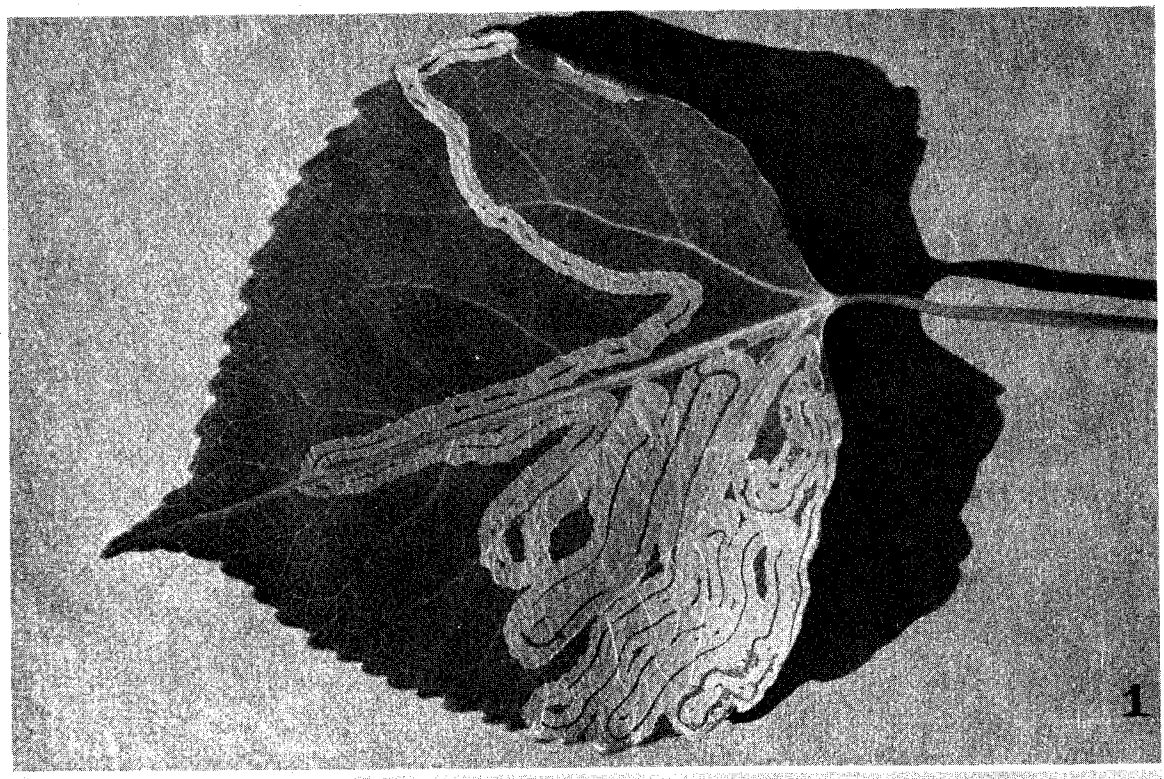

WEST PRINCE RUPERT
DISTRICT (MAINLAND)
MILES
DRAINAGE DIVISIONS OOO
Map 5
Areas within which aspen leaf-miner infestations occurred in 1958.
Medium
Heavy
106
BELL IRVING
BOWSER LAKE
RIVER
NASS
RIVER
MEZIADIN LAKE
STEWART
BROWN BEAR LAKE
ALICE ARM
RIVER
LAVA LAKE
105
PEARSE ISLAND
KITSUMKALUM LAKE
104
DUNDAS ISLAND
EASTERN RIVER
103
PRINCE RUPERT
SALVUS
SKEENA
RIVER
TYEE
KITIMAT
RIVER
102
ESTEVAL
RIVER

Figure 1. Completed gallery of the aspen leaf miner, Phyllocnistis populiella Chamb. Note pupal chamber under rolled leaf edge. West Prince Rupert District. N. E. Alexander.

Figure 2. Pupal chamber of Phyllocnistis populiella Chamb. showing adult emergence hole and rolled leaf edge at termination of gallery. West Prince Rupert District.
N. E. Alexander.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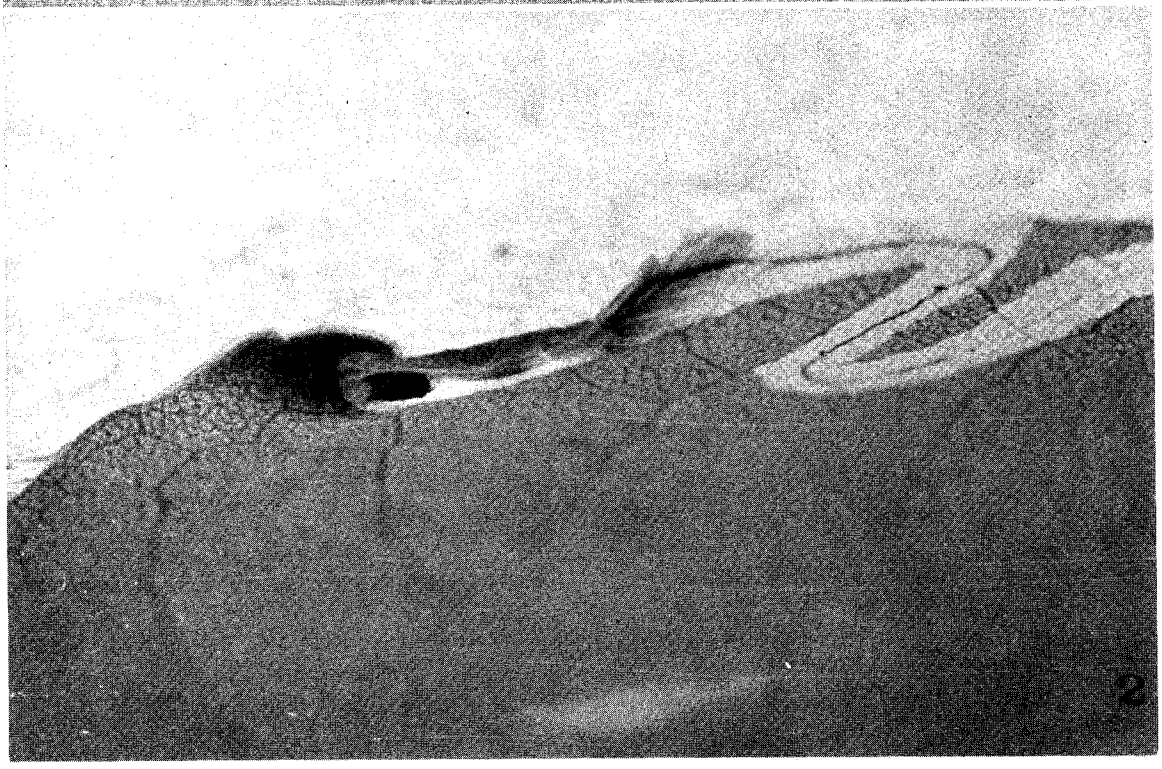
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Figure 3. Typically intense feeding of the striped alder sawfly, Hemichroa crocea (Fourc.) on red alder Louise Island, August, 1958.
N. E. Alexander.

Figure 4. Hemlock sawfly colony, Neodiprion sp. feeding on hemlock, Kitsumgallum Lake, West Prince Rupert District. June, 1958.
N. E. Alexander


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Figure 5. Typical spruce weevil damage, Pissodes sitchensis Hopk. on Sitka spruce. Terrace, West Prince Rupert.
N. E. Alexander

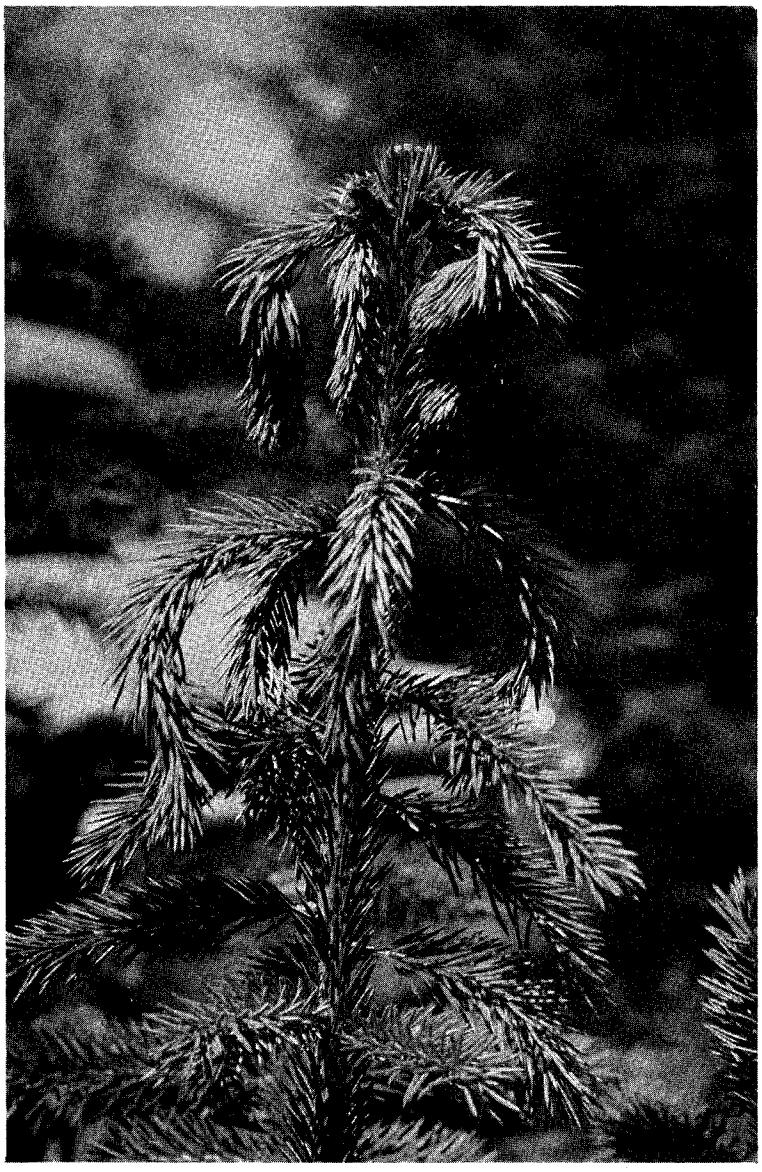
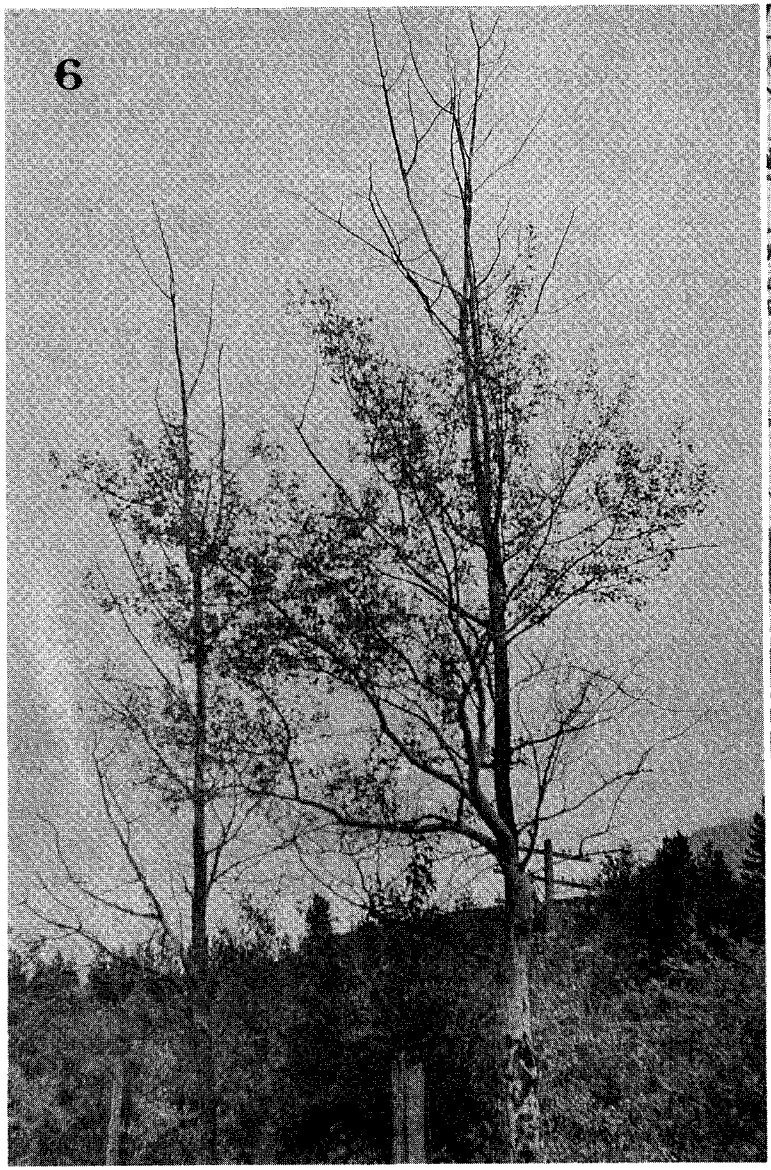


Figure 6. Trembling aspen trees dead (1) and dying from infection by Hypoxylon pruinatum (Klotzsch) Cooke at Woodcock, West Prince Rupert 1957.

Figure 7. Close-up juncture of living and dead portions of an infected tree. West Prince Rupert. 1957.
N. E. Alexander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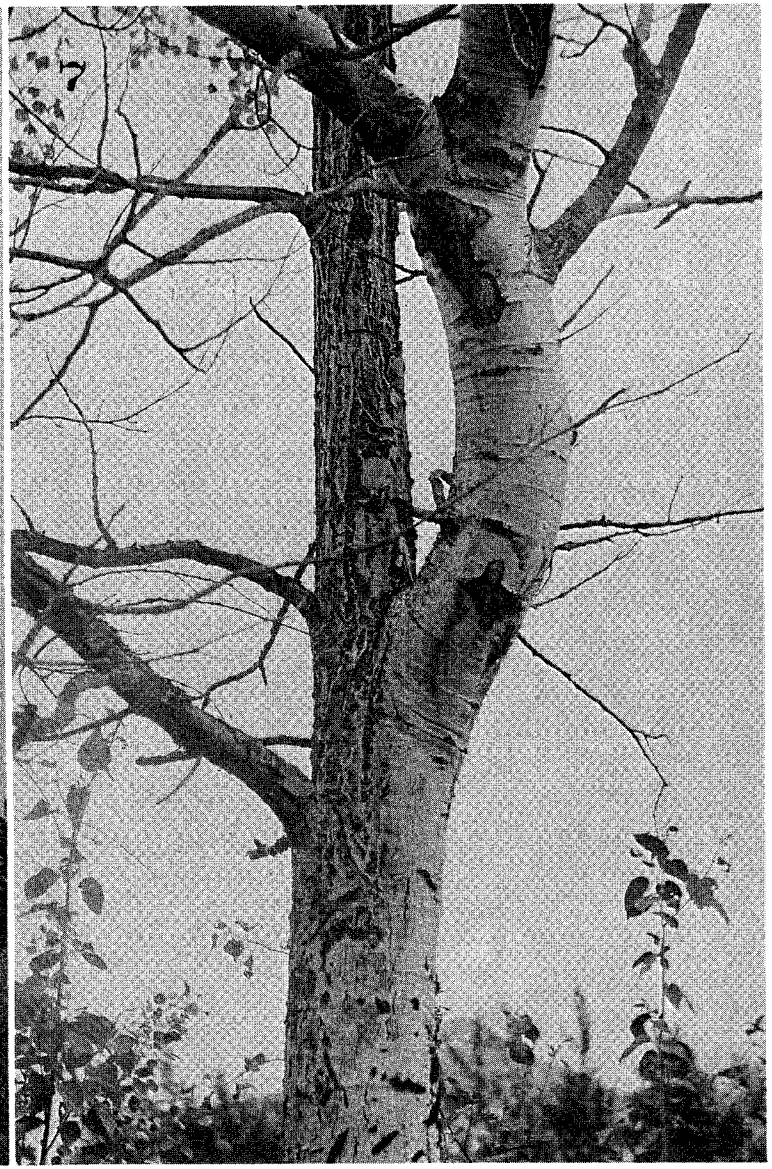
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# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

EAST PRINCE RUPERT DISTRICT

1958

# FOREST BIOLOGY SURVEY

## EAST PRINCE RUPERT DISTRICT

1958

D. G. Collis

## INTRODUCTION

Field work in this district began on May 7th and ceased at the end of September. Forest insect and tree disease collections by hosts, are shown in Table 1. Of the 65 tree disease collections submitted, 25 were identified, 18 were cultured, two were sent to Ottawa and 29 were classified as unidentifiable or unsuitable. The locations of samples taken by the writer are shown on Map 1.

The tree species referred to in this report include:

alpine fir, Abies lasiocarpa (Hook) Nutt.
white spruce, Picea glauca (Moench) Voss
lodgepole pine, Pinus contorta var. latifolia Engelm.
trembling aspen, Populus tremuloides Michx.
Sitka aspen, Alnus sinuata (Regel) Rydb.

Table 1

Collections by Hosts

East Prince Rupert District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| White spruce | 113 | 16 | Trembling aspen | 25 | 6 |
| Alpine fir | 81 | 17 | White birch | 8 | 1 |
| Lodgepole pine | 33 | 6 | Willow | 3 | 3 |
| Western hemlock | 15 | 0 | Black cottonwood | 3 | 4 |
| Mountain hemlock | 4 | 0 | Sitka alder | 1 | 5 |
| White bark pine | 3 | 1 | Wild cherry | | 1 |
| Red cedar | 2 | 0 | Mountain ash | | 1 |
| Douglas fir | 2 | 2 | Rose | | 1 |
| Sitka spruce | 1 | 0 | No host | 2 | 1 |
| Black spruce | 1 | 0 | | | |
| | | | Total | 42 | 23 |
| Total | 245 | 42 | Grand Total | 297 | 65 |

# STATUS OF INSECTS

## Two-year-cycle Spruce Budworm, Choristoneura fumiferana (Clem.)

The two-year-cycle spruce budworm infestation which encircles the northern half of Babine Lake continued to cause heavy damage in 1958. Egg samples indicate a general increase in the larval population for 1959. The extent of the outbreak as mapped from the air during the summer of 1958, covered an area of approximately 1,300 square miles, an increase of 400 square miles compared with 1956 (Map 1).

### Methods of survey

Larval sampling was conducted in May and early June over the accessible portions of the infestation. Larval counts were made on five 18-inch branches from each host where two or more species were present, and ten 18-inch branch samples where only one host species occurred. The same methods were used in conducting an egg mass survey in July. Per cent defoliation and top kill were also estimated at this time.

### Budworm Development

Up to the fifteenth of May patches of snow still persisted in shaded locations along Babine Lake, but within a few days the temperature reached the high eighties and the summer proved to be one of the hottest and driest on record. The deciduous trees around the lake did not start to leaf out until after May 22, but on that date the buds of coniferous regeneration were open, and those on mature trees were ready to burst.

The larvae were seldom observed mining buds, possibly because of the extreme heat. They were usually found in "hammock like" webs under the twigs, and apparently fed during the cooler early morning hours. The high temperatures and long hours of sunshine at this latitude (55° N) combined to cause very rapid development of the insect. The first evidence of larvae feeding on old needles was observed on June 2 and the first pupa was found on June 5. Adults were plentiful from June 20 on, and egg masses were hatching by July 15.

As a comparison, in 1954 sampling on August 6 produced late instar larvae and pupae. In 1956, on July 7 the insect was found as late instar larvae and pupae.

Larvae collected and preserved on May 28 were mainly in their fifth instar. Preserved larvae collected on June 7 were mostly sixth instar with numerous prepupal larvae and pupae.

### Larval Populations

Comparison of larval counts in areas where samples were made in 1957 and 1958 when the larvae were at the height of feeding activity

showed a population reduction of 68 per cent (Table 2). The 1957 counts indicated one budworm to every bud and it appeared that a large percentage of this tremendous population emerged in the spring of 1958.

Large numbers of larvae emerged from branch samples sent to Victoria from the infestation area in April. No close check was kept of this emergence because the foliage was intended for another project, but over 100 small larvae were collected from six branches, many escaped or died, and probably more were still on the foliage.

This large rapidly developing larval population soon consumed most of the new buds and larvae began moving about in search of suitable food. The trees became draped in silk and ground objects were often covered with a mat of webbing. Many of these wandering larvae had small shriveled bodies in comparison to the width of the head capsule. It therefore seems likely that starvation was a main contributing factor in the reduction of the larval population.

Table 2 shows the number of larvae per square foot of foliage at various locations from the Babine Lake infestation for the years 1955, 1956, 1957 and 1958.

Table 2

Comparison of Spruce Budworm Larval Counts per Square Foot of Foliage, Babine Lake.

| Location | Larvae per square foot | | | |
|---|---|---|---|---|
| | 1955 | 1956 | 1957 | 1958 |
| 1/4 mi. Nilkitkwa River trail | | 3.1 | | 0.9 |
| Smithers Landing Road | 0.9 | 2.1 | 18.5 | 6.2 |
| 5 mi Nilkitkwa River trail | | 7.2 | | 13.5 |
| Babine Lake opp. McKendrick Is. | | 7.8 | 17.9 | 5.5 |
| Smithers Landing | | 16.0 | 37.7 | 18.6 |
| Cronin Mine Road | | | 54.0 | 25.8 |
| Chapman Lake | | | 44.0 | 14.3 |
| West side Chapman Lake | | | 58.0 | 8.4 |
| Doris Lake | | | 75.3 | 6.4 |
| Average | 0.9 | 7.2 | 43.5 | 11.0 |

Defoliation Estimates

For the third consecutive year defoliation of the current year's foliage was generally between 90 and 100 per cent. The new foliage that did survive was almost always at the top of the crown. On branch samples collected for egg counts from the lower and mid crown of trees at 22 locations, new foliage was found at only three locations, and then only on the occasional tree. Total defoliation at eleven survival plots established in the infested area varied from 15 per cent at the edge of the infestation to 75 per cent in the hardest hit area. The average for the 11 plots was 44 per cent.

Up to 1958, top killing had not usually exceeded two to three feet, but this year considerable top killing occurred at two locations. The first, west of Sunnyside on Babine Lake, where total defoliation was estimated at 75 per cent, (location No. 9 on Map 3) 26 of 50 trees in the plot had dead tops ranging in length from one to seven feet. One tree 28 feet high was completely defoliated and dead. In the second area, at the north end of Babine Lake (location No. 6 on Map 3) the length of top kill averaged 8.6 feet and ranged from one to 25 feet. Numerous trees had bare tops which were not considered killed and on many others a large portion of the crown was completely red. Small understory trees over the whole area suffered heavily, large numbers were killed and the remainder were usually top killed, often with only the lower branches still alive.

Extensive feeding was reported by a British Columbia Forest Service party around a small unnamed lake 15 miles north of Fort Babine in 1954. Using an aircraft, egg samples were taken at this location in 1958, the first time anyone from the department had made a ground inspection. Defoliation on the west side of this lake was the heaviest yet caused by the spruce budworm in this infestation. Large mature white spruce and alpine fir were dead, and although other causes could have been partly responsible for this mortality the most probable was budworm feeding. Egg counts averaged 12 egg masses per square foot of foliage, so that no reduction in feeding can be anticipated.

Insect Parasitism

No parasites emerged from 574 larvae reared in the Victoria Insectary. A special collection of 742 budworm larvae was sent to the Sault Ste. Marie laboratory. One Meteorus sp. had emerged on arrival, and two Glypta sp. subsequently emerged, a parasitism of only 0.4 per cent.

The only record of pupal parasites came from a small study of larvae and pupae collected from two adjoining trees. One tree had suffered heavy defoliation and the insects showed signs of starvation while on the second tree suitable food was abundant. Pupae from the first tree were smaller and were 13.8 per cent parasitized while only two per cent of those from the lightly defoliated second tree were parasitized.

Of 16,764 eggs examined only nine were parasitized.

Egg Mass Survey

The 1956 egg survey was based almost entirely on alpine fir trees. In 1958, alpine fir, white spruce and lodgepole pine trees were sampled. The results of this work are summarized in Table 3, along with the 1956 egg counts. The branch samples from alpine fir and white spruce were gathered with 30-foot pole clippers, but the crown of the pine trees could not be reached by this method and the trees had to be felled. Studies by Dr. D. Edwards indicate that a much higher concentration of egg masses exists in the upper portions of the crown of white spruce and alpine fir trees. Considering the short nature of the pine crowns and the fact that the lower portions of the spruce and fir crowns were sampled no comparison should be made between the egg masses from pine and the other hosts. The important fact is that egg masses were found on the lodgepole pine in large numbers. Only one egg sample was taken from pine in 1956 and that was negative. In 1958, 13.7 egg masses per square foot were found in the same area. There was no defoliation on any host at this locality. However, some eggs were probably laid on pine in 1956 as light feeding was observed in several areas and in one, on the east side of Hagan Arm on Babine Lake, the foliage of a stand of pine had turned sufficiently red to be suspected as a beetle killed area.

Egg masses from white spruce averaged 38.5 eggs, from alpine fir 41.9 eggs, and from lodgepole pine 38.1 eggs per mass.

Table 3 shows the number of egg masses per square foot of foliage found in 1956 and 1958 at the locations shown on Map 3.

DISCUSSION

Based on egg counts the infestation can be expected to continue through 1959 and 1960 with a small increase in intensity over the past two seasons. Although there was a decrease in the number of egg masses in some areas where feeding has been heavy, there was no indication of a population collapse anywhere. Parasitism was too light to give any control.

The spread of the infestation is partly checked to the north, east and west by mountain ranges. One route of enlargement could be from the Babine River Valley down the Skeena River and into the Kispiox drainage. Thus far the hemlock-cedar stands along the Skeena seem to have formed a barrier. There has been a spread south from the Smithers Landing Road past the east side of Dome Mountain, but this area again forms a barrier in that most of the adjoinging terrain is either burned over or swamp. Light discolouration of timber occurred east from Natowite Lake and budworm feeding has been reported along Takla Lake. If the insect establishes itself on lodgepole pine considerable increase in the area involved can be expected, as well as a vast increase in the volume of affected timber. It is not known what effect defoliation would have on the pine stands, but there is a possibility of renewed beetle attack if the trees are weakened by defoliation.

Table 3

Number of Egg Masses per Square Foot of Foliage by Host Trees From the Locations Shown on Map 3. East Prince Rupert.

| Location | Area no. on Map 3 | 1956 | 1958 | | |
|---|---|---|---|---|---|
| | | Ba | Ba | Sw | Pl |
| 5 mi. Nilkitkwa R trail | 1 | | 11.9 | 14.7 | |
| 1/4 mi. " " " | 2 | 4.0 | 3.9 | 1.7 | 13.7 |
| Devils Club Lake | 3 | | 14.2 | 9.6 | |
| Babine River | 4 | | 2.9 | 1.3 | |
| Suskwa R.Trail | 5 | 3.7 | .9 | 1.0 | 7.1 |
| opp. Fort Babine | 6 | 5.5 | 2.6 | | |
| Haul Lake | 7 | | 4.0 | 2.2 | |
| N.arm Babine Lake | 8 | | 2.8 | 1.7 | |
| W. of Sunnyside | 9 | 1.3 | 2.3 | | |
| Wood borer Lake | 10 | | 9.3 | 9.1 | |
| opp. McKendrick Island | 11 | 1.0 | 4.3 | | |
| N. end of Chapman Lk. | 12 | | 5.7 | 5.5 | |
| Cronin Mine Road | 13 | 7.4 | 3.3 | | |
| opp. Old Fort | 14 | 1.3 | 8.0 | 14.0 | |
| Doris Lake | 15 | 12.5 | 8.0 | 14.0 | 7.6 |
| Smithers Landing Rd | 16 | 0.0 | 3.8 | | |
| Fulton Lake | 17 | | . | 7.5 | 8.1 |
| N. of Halifax | 18 | | 1.6 | 1.1 | 6.3 |
| Hatchery Arm | 19 | | .9 | 2.5 | |
| Hagan Arm | 20 | | 2.5 | | 3.0 |
| Averages | | 4.0 | 4.8 | 6.1 | 7.6 |

Summary

Little tree mortality has occurred to date and top kill has been light and not too frequent. The host trees seem to be able to withstand the annual loss of foliage and continue to put out heavy adventitious growth. On the other hand the budworm population shows no sign of lessening its intensity. If this is the case, a large percentage of the defoliated trees must eventually succumb to the annual loss of foliage. Many have been unable to retain any amount of foliage newer than that produced in 1955 and much of this has been lost through back feeding.

Spruce Budworm Infestation on the West Side of the Bulkley Valley.

Another spruce budworm infestation was discovered during the aerial survey of the Babine outbreak on the west side of the Bulkley Valley opposite Walcott Station, and covered about 74 square miles in 1958.

Defoliation was heavy on the alpine fir trees, the 1957 and 1958 growth was destroyed and light back feeding occurred on older needles. Some white spruce were in similar condition while others had produced 1958 twig growth but lost all their new needles. The occasional spruce showed no sign of feeding and defoliation to lodgepole pine was undetectable until the trees were felled.

Egg counts indicate that large larval populations will be active in 1959. Alpine fir averaged 8.3 egg masses per square foot of foliage, white spruce 8.9 and lodgepole pine 8.3 masses per square foot.

This area is shown as number 23 on Map 3.

Spruce Budworm Infestation between Babine Lake and Burns Lake.

Estimated to have caused defoliation over 352 square miles in 1950, there are now only two areas known where visible feeding damage occurred in 1958. These were on the east side of Pinkut Lake and at the east end of Taltapin Lake. Larvae and egg mass figures pertaining to these locations are shown in Table 4.

Table 4

Larvae and Egg Masses per Square Foot From the Babine Lake to Burns Lake Budworm Infestation. East Prince Rupert.

| Location | Area no. on Map 3 | Larvae per sq. ft. 1955 | 1956 | 1957 | 1958 | Egg masses per sq. ft. 1956 | 1958 |
|---|---|---|---|---|---|---|---|
| Pinkut Lake | 21 | 9.0 | 9.1 | 4.9 | 6.1 | 1.5 | 2.4 |
| Taltapin Lake | 22 | | | 6.8 | 3.0 | | 1.8 |

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

Damage to aspen foliage by these small larvae occurred in varying degrees at all locations surveyed in the district. Even scrub aspen and cottonwood at an elevation of 4,800 feet were heavily attacked. The intensity of mining decreased sharply around Smithers where the percentage of leaves mined dropped from 88 per cent in 1957 to .02 per cent in 1958. Larval activity increased in most of the southern portions of the district as well as around Babine Lake. The known distribution of feeding and intensity is shown on Map 4.

Eggs were observed on the leaves as soon as they opened in May and adults remained active around coniferous trees up to the end of August.

Alaska Spruce Beetle, Dendroctonus obesus (Mann)

An infestation by this beetle, four miles south west of Smithers covered approximately 33 acres, and 21,000 cubic feet of white spruce had been killed by June 17, 1958. The trees in this stand are large, mostly over-mature, and stumps in adjoining slash indicate a high incidence of butt and root rot. Only five freshly attacked trees were discovered when the area was cruised, but considering the difficulty of detecting new beetle attacks a number of trees will probably die in 1959.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Tree mortality by this insect has been observed since 1951 along both sides of Babine Lake and Morrison Lake. Red tops covered the greatest area in 1955 and 1956, but showed a considerable decline the following year. In 1958, recently killed red top trees were mainly confined to the eastern side of Hagan Arm on Babine Lake. This has been the area of heaviest mortality from this beetle. Cruise figures indicate that a total of 9,185,000 cu. ft. of lodgepole pine have been killed in this area during the past five years. Fresh attacks were difficult to find but the outbreak will probably continue at a reduced level.

An Aspen Defoliator, Itame sp.

In 1956 and 1957 larvae of this species completely defoliated about seven square miles of trembling aspen north of Topley. In 1958 the larval population was low and no noticeable defoliation occurred. A collection of 18 larvae sent to the Victoria Insectary died. Samples taken in 1957 indicated a high incidence of larval mortality and pupal parasitism.

Terminal Bud Mortality of White Spruce

Mortality of the terminal buds of white spruce regeneration has been recorded in the East Prince Rupert District for several seasons. By fall the trees usually manage to recover to a more or less normal

development but repeated bud killing has caused considerable deformity, multiple leaders and loss of growth.

In the spring of 1958 Mr. A. C. Molnar conducted a spruce bud necrosis survey and observed that the terminal buds of many branches failed to open. Investigation disclosed that most of these buds were mined by small larvae. Buds showing similar symptoms were preserved and eight of these from spruce regeneration contained four Torymid larvae, one pupa, and two Olethreutid larvae. A sample of 15 terminal buds from mature spruce produced three pupae and six Torymid larvae and four Olethreutid larvae.

Striped Alder Sawfly, Hemichroa crocea (Fourc.)

Larvae of this insect were found feeding in small groups, along the Cronin Mine Road, some 20 miles east of Smithers B. C. The host was Sitka alder growing at an elevation of 3,200 feet. This was the first time this insect has been recorded in the East Prince Rupert District.

An Aspen Leaf Roller, Archips rosana Linn.

Damage to trembling aspen occurred in patches, from six miles east of Houston to Hazelton along Highway 16. Similar feeding occurred in 1957.

Grey Forest Looper, Caripeta divisata Wlk.

This geometrid was found only in the western portion of the district. It disappeared from collections when western hemlock did not comprise a portion of the stand. The host tree was usually hemlock, and an average of 3.4 larvae was found in 10 collections made early in July.

## STATUS OF TREE DISEASES

Mortality and Dieback of Aspen

Small areas of dead and dying mature aspen were found along the Morice Access Road near Houston. On a 1 x 5 1/2 chain strip, 55 trees were dead, 14 were dying or partially killed and 12 appeared to be undamaged. Cultures from wood and bark samples indicate that Ceratocystis sp. was possibly a cause of this mortality and dieback. Cytospora sp., also found in the bark, was considered secondary as was Graphium found in the stained wood.

Canker of Lodgepole Pine

Close growing lodgepole pine stands along the Babine Lake road to Pendleton Bay were heavily infected with Atropellis piniphila (Weir)

Lohm. & Cash. A plot 1x2 chains was established in an 80 year old stand. This contained 120 trees, 103 of which were living and 17 dead. Nineteen of the living trees showed no cankers and the remaining 84 averaged four cankers each. Of the 17 dead trees, three had no visible cankers and the other 14 averaged 4.6 cankers each. Only one of the dead trees occupied a dominant crown position. Eight cankers were visible on this stem. Four dead trees were in the co-dominant class, nine intermediate and three suppressed.

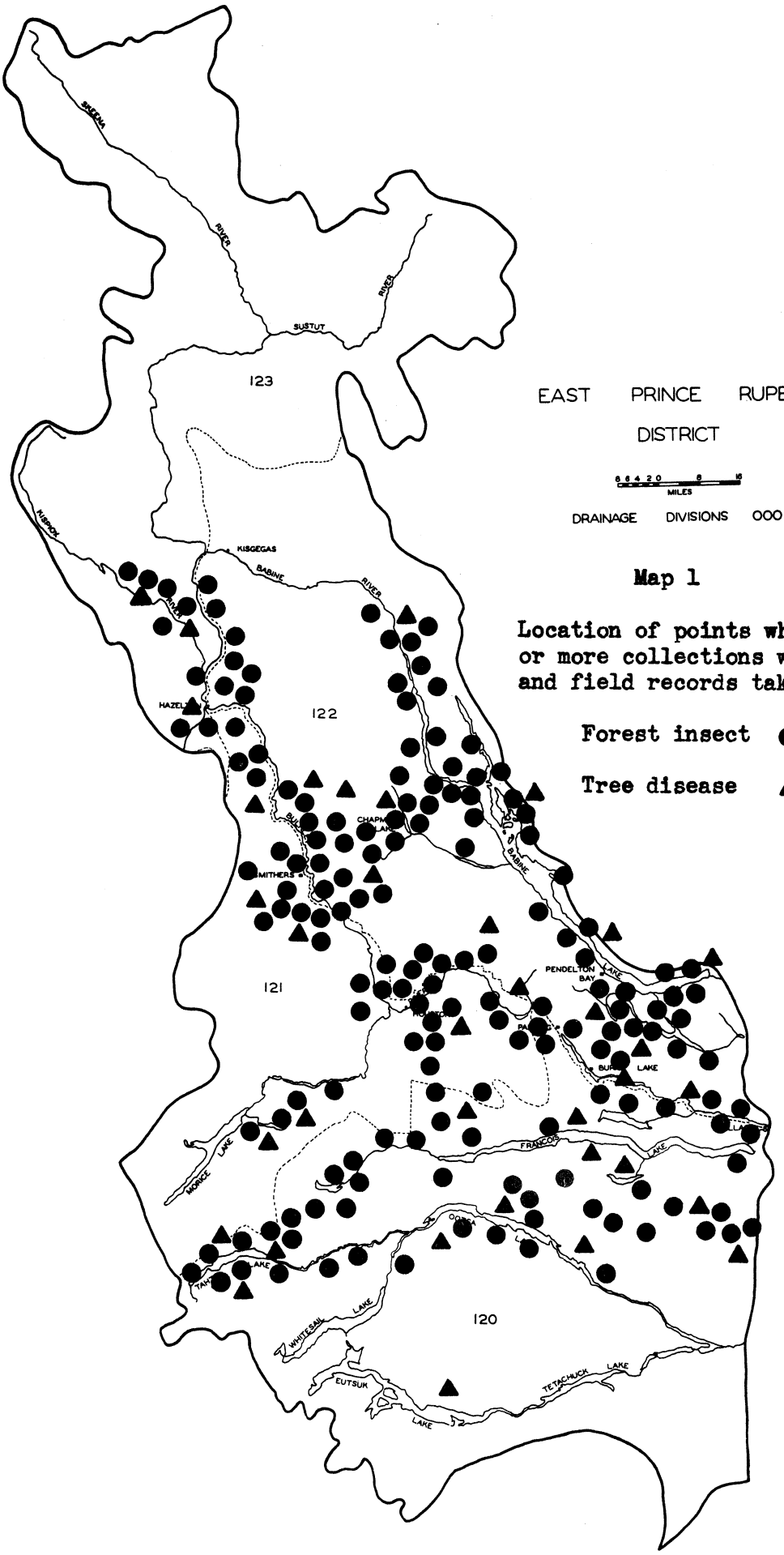
Dieback of Lodgepole Pine

Upper crown branch dieback was found on a 25 year old lodgepole pine stand on the Dome Mountain Road east of Telkwa. Twelve of twenty trees inspected showed this damage. From one of the dead branches submitted for inspection a few pycnidia were found and tentatively identified as Dothichiza? sp. which is the imperfect form of Cenanguim ferruginosum Fr. ex Fr.

Cenanguim ferruginosum has been found associated with dieback of yellow pine following severe drought in British Columbia.

OTHER NOTEWORTHY DISEASES

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Aspen, trembling | Melampsora albertensis Arth. | Burns Lake | Fruiting on previous year's foliage. Severe in small areas. |
| Fir, alpine | Peridermium holwayi Syd. | Tahtsa Lake | Light occurrence but persistent. |
| Pine, lodgepole | Peridermium stalactiforme Arthur & Kern. | Smithers | A blister-rust causing large cankers on lodgepole pine; very severe damage in local areas. |
| | Atropellis piniphila (Weir) Lohm. & Cash | | Causes extensive damage to pine |
| | Arceuthobium americanum Nutt. | Morice Lake | Very common in district, apparently causes some mortality. |
| | Cronartium comandrae Peck | Forestdale | Canker on lodgepole pine; can be damaging |

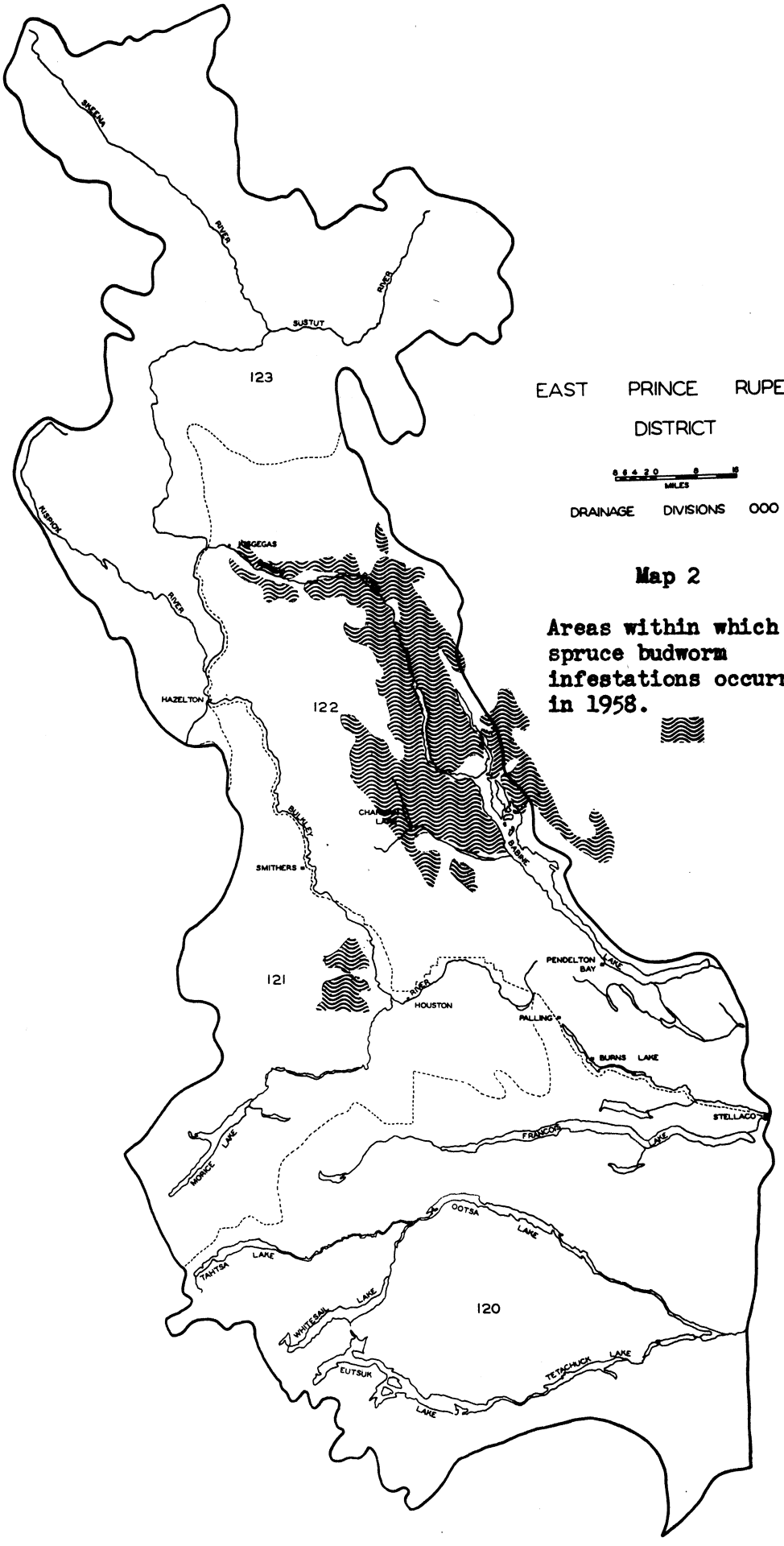


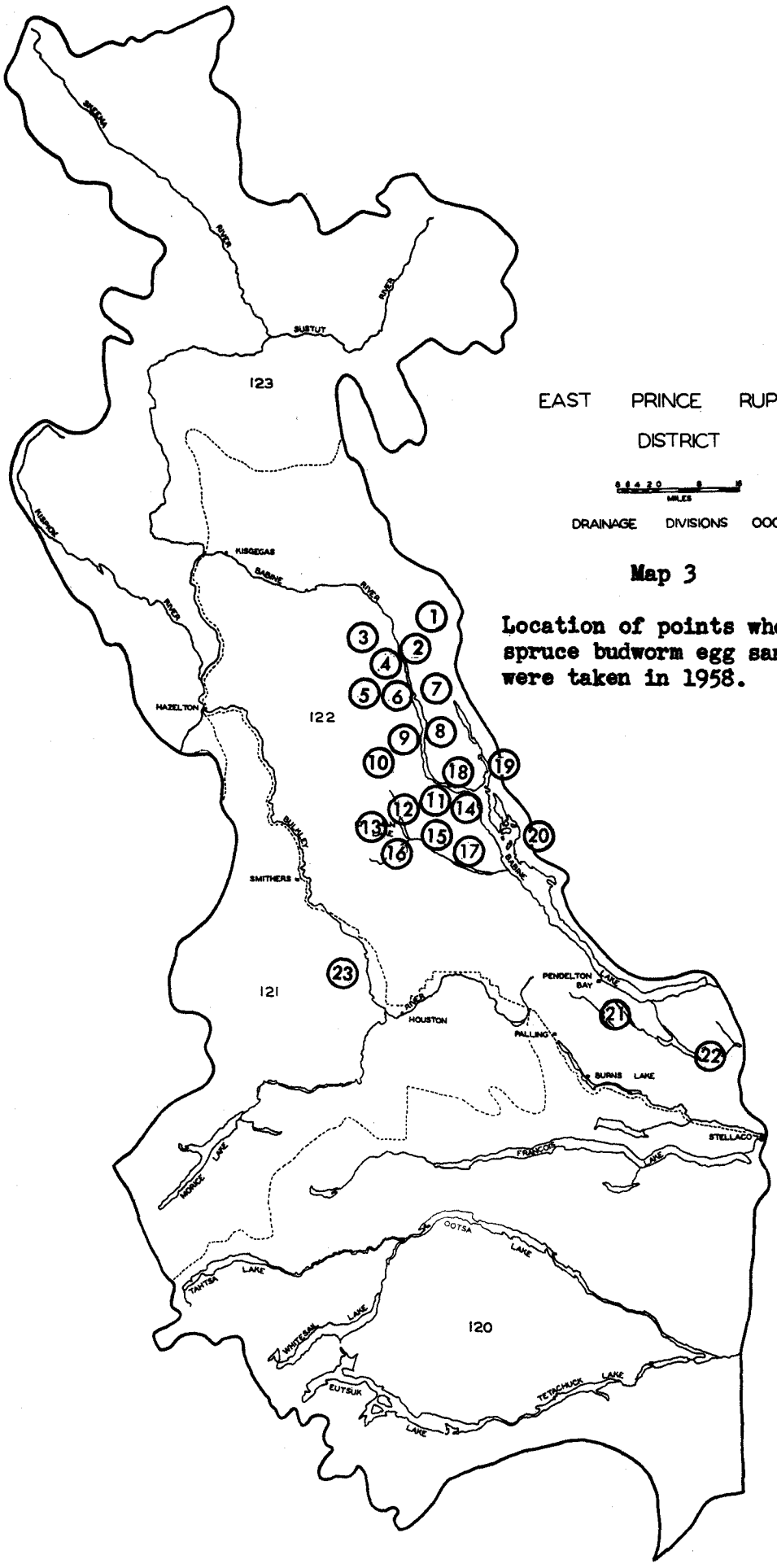

**Map 1**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect ●**

**Tree disease ▲**


SKEENA
RIVER
SUSTUT
RIVER
123
EAST PRINCE RUPERT
DISTRICT
6 4 2 0 0 6
MILES
DRAINAGE DIVISIONS 000
Map 2
Areas within which spruce budworm infestations occurred in 1958.
KISPIOX
RIVER
KISEGAS
HAZELTON
122
BULKLEY
SMITHERS
BABINE
121
PENDELTON BAY
HOUSTON
PALLING
BURNS LAKE
STELLAKO
FRANCOIS
LAKE
MORICE LAKE
OOTSA
LAKE
TAHTSA LAKE
WHITESAIL LAKE
120
EUTSUK
LAKE
TETACHUCK LAKE




EAST PRINCE RUPERT

DISTRICT

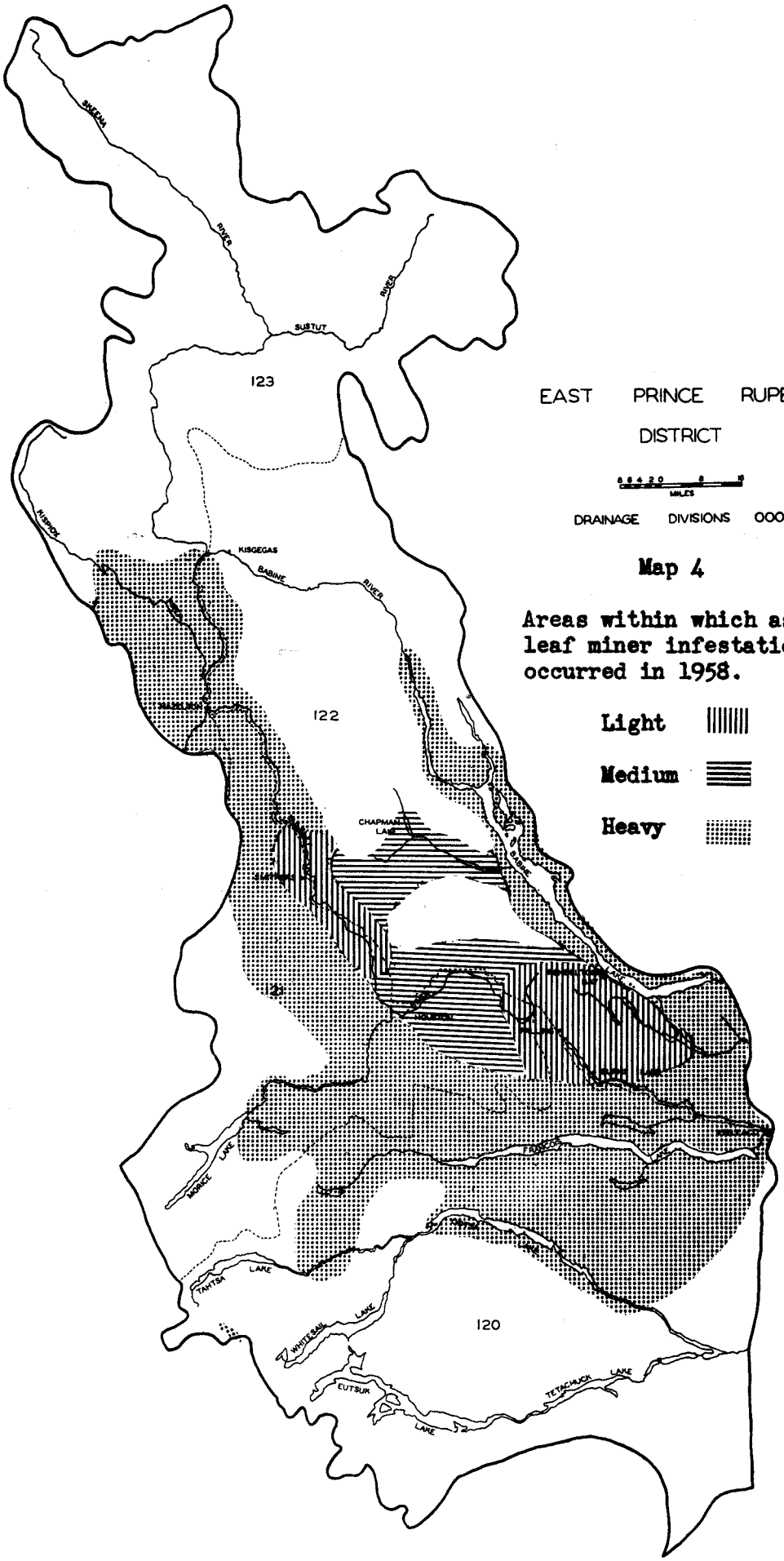
6 4 2 0 6 12

MILES

DRAINAGE DIVISIONS 000

**Map 3**

**Location of points where spruce budworm egg samples were taken in 1958.**




EAST PRINCE RUPERT
DISTRICT

6 4 2 0 0 5
MILES

DRAINAGE DIVISIONS 000

**Map 4**

**Areas within which aspen leaf miner infestations occurred in 1958.**

**Light**

**Medium**

**Heavy**

# ANNUAL REPORT OF FOREST BIOLOGY RANGERS

# BRITISH COLUMBIA

# 1958

## KAMLOOPS FOREST DISTRICT

# FOREST BIOLOGY SURVEY

## KAMLOOPS FOREST DISTRICT

## 1958

B. A. Sugden

## INTRODUCTION

Ranger personnel remained unchanged in the Kamloops Forest District during 1958. The rangers and their districts were: W. E. Bitz, West Kamloops; C. B. Cottrell, Central Kamloops; and B. A. Sugden, East Kamloops Forest Biology Ranger District.

A house trailer was used as fieldquarters in the Central Kamloops District while the ranger and his family in the West Kamloops District lived in a cabin on the shore of Williams Lake.

Field work in parts of the Kamloops Forest District had begun by the first of April and continued until mid-November. The rangers from Central and East Kamloops assisted with the Douglas-fir beetle damage appraisal in the West Kamloops District during August. Some help on this project was obtained from two members of the Victoria Laboratory and two Forest Biology Rangers from the Prince George District.

During the spring and summer, dry weather caused an almost continuous period of high forest fire hazard. This necessitated the postponement, until September, of most of the aerial surveys of insect damage as all available aircraft, in the interior of the province, were engaged for forest protection duties. A total of 13 hours of aerial surveys were compiled in the Kamloops District in 1958.

Undoubtedly the Douglas-fir beetle killed more merchantable timber in the District, in 1958, than did any other pest. Populations of Douglas-fir beetle remained active throughout and increased in the West and East Kamloops districts.

Other members of the genus Dendroctonus that caused damage to conifers were the western pine, mountain pine and red turpentine beetles. Of these only the mountain pine beetle showed an increase in population during 1958.

The infestation of 1-year-cycle spruce budworm on Douglas fir in the south-western corner of the West Kamloops District remained active. An increase was apparent in the numbers of larvae collected from Douglas fir and Engelmann spruce in portions of the Central Kamloops District.

Populations of the black-headed budworm remained low throughout.

Severe infestations of satin moth occurred in groves of black cottonwood and trembling aspen in the Central and East Kamloops districts. The satin moth has become an important pest of shade and ornamental trees in residential sections of the Okanagan Valley. Severe defoliation is expected during 1959.

Infestations of aspen leaf-miner remained active throughout the District. Generally the damage to trembling aspen leaves was greater during 1958 than in recent years.

The populations of fall webworm increased in the District in 1958. Marginal and open growing trees and shrubs suffered the greatest defoliation.

In the sub-alpine forests, near McGillivray and Bolean lakes of the Central and East Kamloops districts, the western balsam bark beetle has killed a large number of alpine fir. There appeared to be an association between the western balsam bark beetle and a disease of the inner bark and cambium, Leptographium sp. Attack by the beetles was usually accompanied by the disease which caused lesions surrounding the beetle galleries.

A needle-cast of ponderosa pine was widespread through the West and Central Kamloops districts. The most severe damage occurred in the vicinity of Clinton.

The dry spring and summer of 1958 resulted in drought damage to many trees in the District; mortality of Douglas-fir trees was particularly noticeable.

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST KAMLOOPS DISTRICT

1958

# FOREST BIOLOGY SURVEY

# WEST KAMLOOPS DISTRICT

1958

W. E. Bitz

## INTRODUCTION

Forest Insect Survey field work began April 22 when assistance was given to Dr. L. H. McMullen on winter mortality studies of the Douglas-fir beetle. Subsequent field trips were made to examine foliage-colour-change plots of beetle-attacked trees.

Regular survey work extended from May 21 to October 30. During the field season 241 forest insect collections and 20 tree disease collections were obtained. Table 1 shows these collections by host. Map 1 shows the distribution of collections and field records.

Table 1

Collections by Hosts, West Kamloops - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| cedar, western red | 3 | - | alder sp. | 1 | - |
| Douglas fir | 119 | 5 | aspen, trembling | 15 | 2 |
| juniper, common | 7 | 1 | cottonwood, black | 2 | 2 |
| pine, lodgepole | 41 | - | birch, spp. | 2 | - |
| pine, ponderosa | 20 | 4 | cherry, choke | 2 | - |
| spruce, Engelmann | 25 | - | willow sp. | 1 | - |
| | | | miscellaneous | 3 | 6 |
| | | | Total | 26 | 10 |
| Total | 215 | 10 | Grand total | 241 | 20 |

## STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Douglas-fir tree mortality caused by this beetle increased decidedly according to the Damage Appraisal Survey. Mortality was determined late in the summer by a count of all trees bearing red foliage; these were presumed to have been killed during the three-year period preceding the year of survey. The periods covered are 1953-1955, 1954-1956, 1955-1957 inclusive. Table 2 lists the data for the three periods.

Table 2

Douglas-fir Tree Damagae Appraisal for Periods 1953-55, 1954-56, and 1955-57, West Kamloops District

| | 1953-55 | 1954-56 | 1955-57 |
|---|---|---|---|
| No. red-top trees counted | 8,800 | 4,984 | 13,474 |
| Vol. red-top trees (est.) f. b. m. | 4,400,000 | 2,492,000 | 6,737,000 |

These data show a decrease in tree mortality of 43 per cent during the period 1954-1956, followed by an apparent increase of 170 per cent in the 1955-1957 period. This increase is due to a greatly increased attack during 1957.

In addition to the Damage Appraisal Survey, the annual cruise of the "winter damage" area west of Lac La Hache was done in August. Data on bark beetle fluctuations are obtained by counting currently attacked Douglas-fir trees on permanent strip plots. Five new strip plots were established this year, bringing the total to 21, covering 1,008 acres. The average number of freshly attacked trees per acre in 1958 was 0.10 compared with 0.32 in 1957, a 69 per cent reduction in the number of trees attacked in 1958. See map 2 for distribution of beetle-killed trees. Table 3 shows the data for the years 1955 to 1958 inclusive.

Table 3

Number of Douglas-fir Trees Killed Annually by Douglas-fir Beetles on Strip Plots in Winter Damage area West of Lac la Hache, 1955 - 58.

| | 1955 | 1956 | 1957 | 1958 |
|---|---|---|---|---|
| No. acres cruised | 288.8 | 768 | 768 | 1,008 |
| No. trees killed by beetles per acre | 0.84 | 0.28 | 0.32 | 0.10 |

Based on an estimated area of 128,000 acres of winter damage, the number of Douglas-fir trees killed in 1958 was 12,800. Total depletion on this basis, for the period 1955-1958 inclusive was 1.54 trees per acre.

The examination of overwintering beetle broods, first conducted in 1956, was continued this year. As in previous years, a number of logs from Place Lake and Lac la Hache were inspected shortly before the spring beetle flight. Table 4 shows the year to year variations in brood mortality at these locations.

Table 4

Percentage Mortality of Wintering Douglas-fir Beetle Broods, West Kamloops, 1956 to 1958.

| Location | Percentage mortality | | |
|---|---|---|---|
| | 1956 | 1957 | 1958 |
| Place Lake | - | 51.6 | 12.9 |
| Lac la Hache | 93.4 | 23.9 | 8.2 |

Variation in brood mortality has been extreme, ranging from a maximum of 93.4 per cent at Lac la Hache in 1956 to a minimum of 8.2 per cent in the same area in 1958.

Four study plots of freshly attacked trees, established in 1957, have been visited at regular intervals for two years to observe foliage colour changes. Two plots are located in the Williams Lake area and 2 near Clinton about 100 miles to the south.

In 1957, the first indication of colour change in the Williams Lake area was noted in early September when yellowing of the foliage was observed; the attacked trees near Clinton had turned sorrel by this time. This lack of uniformity was present among trees within a plot as well as between plots. Generally, the advanced stage of discoloration was found on trees of a low vigor class such as over-mature, thin crowned, damaged or diseased. In the 1957 attacked trees in the Williams Lake area, the main colour change occurred right after the spring thaw of 1958; by mid-summer nearly all the successfully attacked trees had turned red.

The two years during which this study was made provide extremes in climate. The spring and summer of 1957 were abnormally cool and wet whereas 1958 was very hot and dry. Colour change in trees attacked in 1958 was much accelerated by this change in weather. Foliage fading began early in the summer; by July some trees had turned red and by September nearly all attacked trees had turned red and were indistinguishable from many groups of trees attacked in 1957.

The chief factors related to foliage colour changes in these plots were tree vigor, exposed position and geographical location.

No conclusions can be drawn about variations in rate of colour change between spring and summer attacked trees. This is due mainly to the scarcity of summer attacks in this area; the limited number found so far have shown a slower rate of change during the first summer

of attack. These trees are indistinguishable from spring attacked trees during the second year.

Groups of trees attacked in 1958 were found throughout the District to a greater extent than in 1957. Of particular interest is the increase in the southern part of the District heretofore considered relatively free from attack. Large areas of 1957 attack were seen in the Clinton area, near Cache Creek and to a lesser extent, near Lillooet. Many groups of trees attacked in 1958 were found in the areas of previous heavy attack between 100 Mile House and Williams Lake. From these observations it is expected that the 1958 infestation will be at least equal to that of 1957.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Douglas-fir stands in the Lillooet area suffered heavy attack for the third consecutive year. As in previous years the extent of the infestation was mapped by ground and aerial surveys (Map 3). The aerial survey was made in co-operation with personnel from the Forest Biology Laboratory, Victoria. Extent of the infestation was unchanged from 1957; budworm larvae were found consistently in a large area around the perimeter of the infestation. As in 1957, the heaviest attack occurred along the west bank of the Fraser River near Lillooet, at Cayoosh Creek, and along the south shore of Seton Lake to Machute Creek. On the north shore of Seton and Anderson lakes, areas of heavy attack were at Retaskit, Whitecap Creek and McGillivray Creek.

Increased activity was found along Bridge River, at Mission Mountain near Shalalth and on the east bank of the Fraser River south of Lillooet. The anticipated heavy infestation on the south shore of Anderson Lake failed to develop and reduced defoliation occurred.

The eight study plots established in 1956 to follow population trends, were examined as in previous years. Table 5 contains comparative data on current and total foliage loss for 1957 and 1958, based on a count of needles on branch samples from Douglas-fir trees at each plot. These data show that loss of foliage was only about half as severe as in 1957.

The degree of budworm damage to terminals was determined in eight localities. Fifty new buds were selected at random from each of two branches from one tree per plot. Table 6 describes the condition of the new terminals that were attacked and shows percentage variation from 1957.

Damaged terminals only are listed in Table 6. It should be noted that 60 per cent of the new terminals examined were normal. Although defoliation was reduced from 1957 over the general area, populations were still heavy in a number of areas mentioned earlier.

Table 5

Percentage Defoliation of New Foliage and of Total Foliage in 1957 and 1958, Lillooet Area.

| Location | Plot no. | Defoliation in 1957 | | Defoliation in 1958 | |
|---|---|---|---|---|---|
| | | New foliage | Total foliage | New foliage | Total foliage |
| Seton Lake | 1 | 60 | 18 | 34 | 9 |
| Seton Lake | 2 | 85 | 25 | 58 | 20 |
| Anderson Lake | 3 | 69 | trace | 31 | 17 |
| Anderson Lake | 4 | 83 | 30 | 25 | 13 |
| Spider Creek | 5 | 71 | 19 | 11 | 15 |
| Fraser River | 6 | 45 | 17 | 60 | 17 |
| Fraser River | 7 | 28 | trace | 22 | trace |
| Cayoosh Creek | 8 | 75 | 26 | 62 | 13 |
| Average | | 64.5 | 24 | 34.1 | 12 |

Table 6

Percentage of New Douglas-fir Terminals Partially Defoliated, Completely Defoliated, or Killed by Spruce Budworm, and Percentage Variation from 1957 Based on Two Branch Samples from One Tree on Each Plot, Lillooet Area, August, 1958.

| Plot no. | Percentage 1958 terminals | | | Increase (+) or decrease (-) from 1957 | | |
|---|---|---|---|---|---|---|
| | Partially defoliated | Completely defoliated | Killed | Partially defoliated | Completely defoliated | Killed |
| 1 | 11 | 7 | 8 | -35 | - 1 | + 6 |
| 2 | 28 | 21 | 8 | -10 | -- | -11 |
| 3 | 16 | 5 | 3 | - 4 | -20 | - 1 |
| 4 | 13 | 4 | 3 | -15 | -20 | -17 |
| 5 | 6 | 2 | 11 | -28 | - 7 | - 3 |
| 6 | 30 | 21 | 20 | + 8 | +15 | +12 |
| 7 | 15 | 2 | 0 | + 6 | - 2 | - 3 |
| 8 | 14 | 27 | 20 | -15 | - 1 | +12 |

The annual spruce budworm egg survey was done in the eight sample plots in conjunction with defoliation estimates. An increase in egg masses was found in the Fraser River area and along the south shore of Seton Lake; all other locations showed a decrease. The largest gain in egg masses occurred at Machute Creek on Seton Lake, the only area showing any sign of tree damage; up to six feet of the leaders have been killed on second growth although the damage is still confined to a few acres. Table 7 shows the results of egg mass counts and variation from 1957.

Table 7

Number of Spruce Budworm Egg Masses per 100 Square Feet of Douglas-fir Foliage Surface for Years 1956 to 1958 Inclusive, Lillooet Area.

| Plot no. | No. of egg masses | | | Increase (+) or decrease(-) from 1957 |
|---|---|---|---|---|
| | 1956 | 1957 | 1958 | |
| 1 | 120 | 12 | 25 | + 13 |
| 2 | 256 | 96 | 135 | + 39 |
| 3 | 44 | 40 | 0 | - 40 |
| 4 | 159 | 48 | 6 | - 42 |
| 5 | 105 | 8 | 13 | + 5 |
| 6 | 16 | 6 | 33 | + 27 |
| 7 | 47 | 4 | 0 | - 4 |
| 8 | 234 | 54 | 47 | - 7 |
| Total | 981 | 268 | 259 | |

In 1957 there was a substantial reduction in the total number of egg masses over the entire infestation; there was no significant change in 1958.

The only larval parasitism records available are from Cayoosh Creek. Of 172 late instar larvae, 34 per cent were parasitized, and 34 per cent pupated. Parasites were reared from 20 per cent of the pupae. Large numbers of dipterous adults of the families Sarcophagidae and Tachinidae have been noted during the late instar larval period for the past two years at Cayoosh Creek and along the Fraser River.

Although severe defoliation has occurred in a number of localities for three consecutive years, no serious damage has been noted except in the Machute Creek area. On the basis of egg mass occurrence, the heaviest attack in 1959 may be expected along the west bank of the Fraser River near Lillooet and along the south shore of Seton Lake. From observations made during the past three years on the progress of attack near Shalalth, Retaskit and Bridge River, heavy attack will probably occur in these areas. In addition the infestation appears to be spreading to the east bank of the Fraser River and along Bridge River to Yalakom River, about 20 miles. If the budworm populations continue to build up in these areas the extent of the infestation may double in 1959.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

An increase in attacks by this species on lodgepole pine was noted in 1957 and 1958. All attacks were widely separated except at Joes Lake where a group of 26 newly infested lodgepole pine trees was found.

Pine Needle Fascicle Miner, Zelleria haimbachi Busck.

Some 2,500 acres, north of Spences Bridge, were found to contain light to heavy attack by this fascicle miner. Nearly all ponderosa pine trees growing in pure stands were affected. On many of the trees less than 4 inches d. b. h., 100 per cent of the new terminals were infested. Two localities of heavy attack, Twaal Creek, and Venables Valley, were selected for examination. Two 18-inch branch samples were taken from each of 5 trees selected at random at each location. All new terminals were examined and classified either as "healthy" or "infested". Table 8 shows the percentage of infested terminals for each location.

Table 8

Percentage of Ponderosa Pine Terminals Containing A Pine Needle Fascicle Miner, Spences Bridge District, 1958.

| Location | No. of terminals examined | Percentage infested |
|---|---|---|
| Venables Valley | 133 | 76 |
| Twaal Creek | 187 | 68 |

Black Pine Leaf Scale, Nuculaspis californica (Cole.)

The 10-acre infestation, found in 1957 in Botanie Valley near Lytton, has expanded along Botanie Creek. Traces of attack were found on ponderosa pine for two miles northward. Stunting of foliage and excessive needle drop is still confined to the few acres first noted in 1957.

Douglas-fir Tussock Moth, Hemerocampa pseudotsugata McD.

The small infestation near Lillooet, discovered two years ago, appears to have doubled its population since 1957. A maximum of 62 larvae was obtained in a standard 3-tree collection compared with 29 larvae similarly obtained in 1957. Collections at Seton Lake and at Bridge River contained 14 and 2 larvae respectively. A special collection of 100 fourth-instar larvae was sent to S. M. Sager of the Victoria Laboratory.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

Although a lessening of activity by this leaf-miner was found in some parts of the District, repeated heavy attack was noted in most of the areas containing severe infestations in 1957. Areas most seriously affected in both 1957 and 1958 were Hat Creek, Oregon Jack Creek, Lac la Hache, Horsefly and Nimpo Lake. Reduced activity was found at Cache Creek, 100 Mile House and Alexis Creek. Table 9 shows the percentage infestation at random points.

Table 9

Number of Trembling Aspen Leaves Examined, Percentage of Leaves Infested and Stage of Aspen Leaf-miner Present at Eight Localities, West Kamloops District, 1958.

| Location | Date | No. of leaves examined | Percentage leaves infested | Stage of insect present* |
|---|---|---|---|---|
| Hat Creek | June 10 | 580 | 100 | L. P. |
| Oregon Jack Creek | " 10 | 760 | 100 | L. P. |
| Cache Creek | May 23 | 612 | 80 | L. |
| 100 Mile House | Aug. 11 | 487 | 49 | P. |
| Lac la Hache | July 22 | 417 | 100 | P. |
| Horsefly | July 15 | 413 | 100 | P. |
| Alexis Creek | July 18 | 362 | 8 | L. P. |
| Nimpo Lake | July 17 | 389 | 98 | L. P. |

* L - larvae P - pupae

Spotless Fall Webworm, Hyphantria cunea Harr.

A substantial increase in populations was evident in the Lillooet area and north of Williams Lake. One hundred and eighteen webs were counted on 27 western coke cherry bushes and 12 webs on 4 black cottonwoods, along a 1-mile strip of roadside near Williams Lake.

In the Lillooet area, webs were common on western choke cherry and trembling aspen; occasional webs were noted on black cottonwood and alder along the west bank of the Fraser River and near Pavilion.

False Hemlock Looper, Nepytia canosaria Wlk.?

Light populations of this species were found consistently on Douglas fir in the spruce budworm infestation area. An average of six larvae per standard three-tree collection was obtained, the same as in 1957, but larvae were collected over a much wider area.

Web-spinning Sawflies, Pamphiliidae.

Two special collections of larvae from ponderosa pine were obtained near Lillooet for rearing studies. Additional collections from Engelmann spruce, lodgepole pine and Douglas fir contained one or two larvae per collection.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Two collections containing colonies of Neodiprion sp. larvae were taken from ponderosa pine near Lillooet. A number of beating collections throughout the range of ponderosa pine contained sawfly larvae.

A Sawfly on Lodgepole Pine, Neodiprion sp.

These larvae were common on lodgepole pine at Carquille in the Cache Creek area. Specimens were found on every tree examined in an area of about 10 acres.

## STATUS OF TREE DISEASES

### Winter Injury

The area of western red cedar discoloration at Horsefly Lake, discovered in 1957, was re-examined in September. Nearly all the pole-size trees had been affected by combined winter drying and heart rot and had died during the summer of 1958. The adjoining mixed forest was more lightly affected in the spring of 1958 than it was in 1957, however, the discoloration became more obvious late in the year. It is believed this resulted from the dry, hot spring and summer of 1958.

### A Needle Cast of Pine Combined with Severe Drought

Early in June, about 100 acres of discoloration was noted in a pure ponderosa pine stand near Clinton. Examination revealed severe infection by a needle fungus, Elytroderma deformans (Weir) Darker and a lesser discoloration due to drought. An estimate of incidence of needle fungus was made on branch samples. Six 18-inch branches were taken at random and all terminals were classified according to the degree of infection: 0-50 per cent, 51-90 per cent and 91-100 per cent. Only the last two years' foliage was on the branches. Table 10 shows the number of terminals in each category of infection.

Table 10

Degree of Needle Cast Infection on Terminals of Six Branch Samples of Ponderosa Pine, Clinton, 1958.

| Branch | No. of terminals | | |
|---|---|---|---|
| | 0 - 50 per cent infected | 51 - 90 per cent infected | 91 - 100 per cent infected |
| 1 | 2 | 4 | 1 |
| 2 | 4 | 5 | 0 |
| 3 | 1 | 7 | 3 |
| 4 | 5 | 8 | 0 |
| 5 | 2 | 6 | 2 |
| 6 | 20 | 3 | 0 |
| Total | 34 | 33 | 6 |

These data indicate that 47 per cent of the terminals had less than half of their needles infected; 45 per cent had 50 - 90 per cent of their needles infected, and 8 per cent of terminals were 91 - 100 per cent infected.

The early season discoloration became much more apparent as the hot, dry summer progressed. In early September a one-quarter acre plot was established on this site. All 38 trees on the plot were tagged, the crowns were examined and discoloration and foliage loss were recorded. No attempt was made to establish the amount of foliage browning due to disease in relation to drought. Foliage discoloration was classified in 4 categories: 0-25, 26-50, 51-75, and 76-100 per cent. Table 11 shows the number of trees in each category and the percentage of the total number of trees.

Table 11

Percentage Foliage Discoloration of Ponderosa Pine on a Quarter-acre Plot, Clinton, 1958.

| | Percentage foliage discoloration | | | | Total |
|---|---|---|---|---|---|
| | 0-25 | 26-50 | 51-75 | 76-100 | |
| No. of trees | 8 | 15 | 4 | 11 | 38 |
| Percentage of total | 21 | 39 | 11 | 29 | 100 |

Table 12 shows the foliage loss by categories as in the previous table.

Table 12

Percentage Foliage Loss of Ponderosa Pine on a Quarter-acre Plot, Clinton, 1958.

| | Percentage foliage loss | | | | Total |
|---|---|---|---|---|---|
| | 0-25 | 26-50 | 51-75 | 76-100 | |
| No. of trees | 5 | 23 | 9 | 1 | 38 |
| Percentage of total | 13 | 61 | 24 | 2 | 100 |

Drought Damage in Exotic Plantations

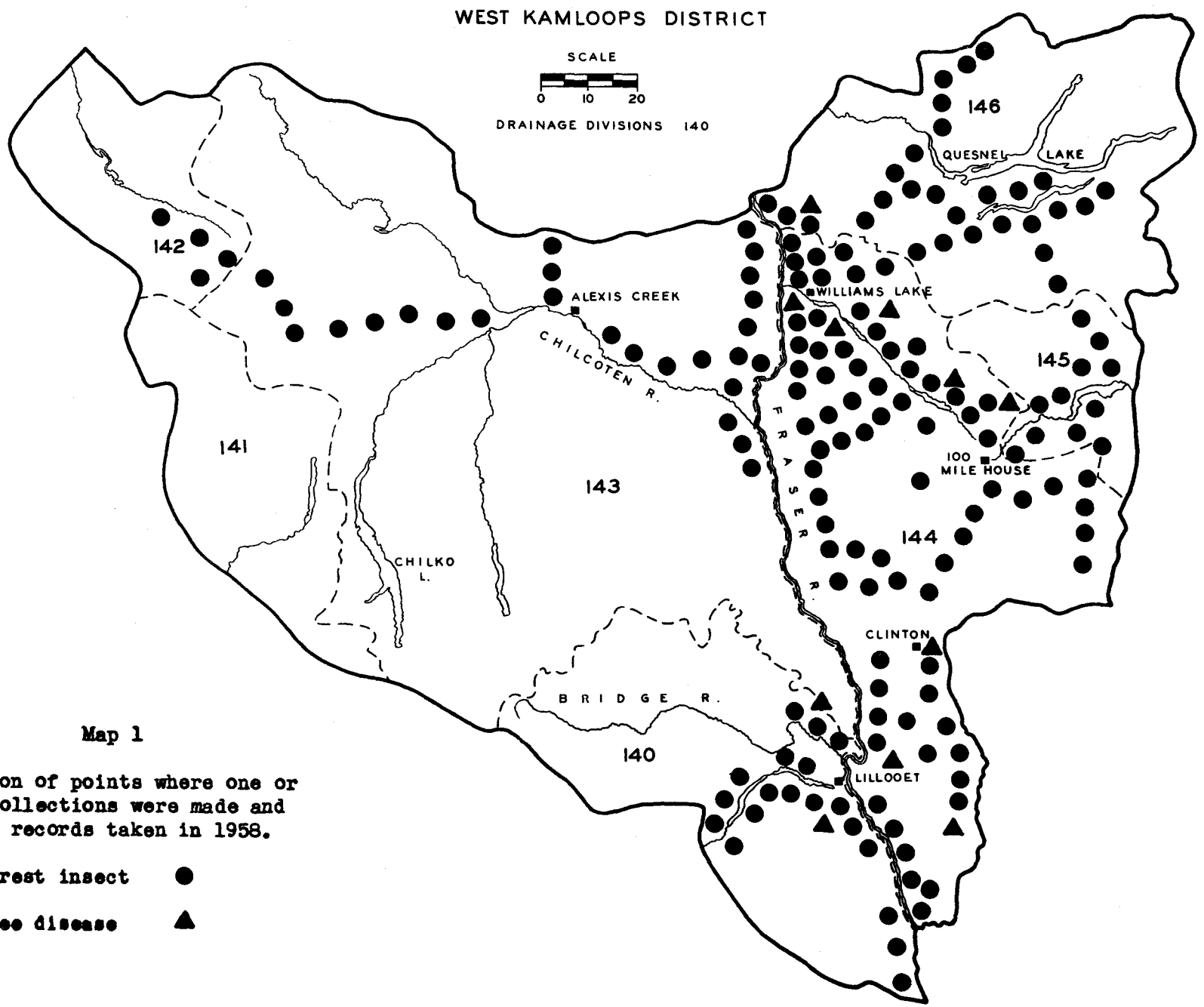
In the spring of 1957, seedlings of a number of exotic species of pine and some European larch were planted in an experimental plot north of Clinton. The first inspection of these plots was made in September 1957 and additional examinations were made in May and September 1958. At the time of the first inspection, evidence of drought had already appeared on many of the seedlings. This condition became more obvious

during the spring and summer of 1958, one of the driest growing seasons in recent years. By September 1958 all seedlings in the plots appeared dead although a few retained some green needles and may recover under favourable conditions. Table 13 indicates the mortality of the different species of trees at various periods of inspection.

Table 13

Mortality of Exotic Species of Pine and European Larch in Experimental Plots at Clinton, 1957 and 1958.

| Species | Date established | No. of plants | No. of dead trees | | |
|---|---|---|---|---|---|
| | | | Sept. 1957 | May 1958 | Sept. 1956 |
| Pinus sylvestris | April 1957 | 95 | 35 | 50 | 95 |
| Pinus resinosa | April 1957 | 95 | 0 | 29 | 95 |
| Pinus pinaster | April 1957 | 12 | 0 | 8 | 12 |
| Larix decidua | Oct. 1957 | 50 | 0 | 15 | 50 |

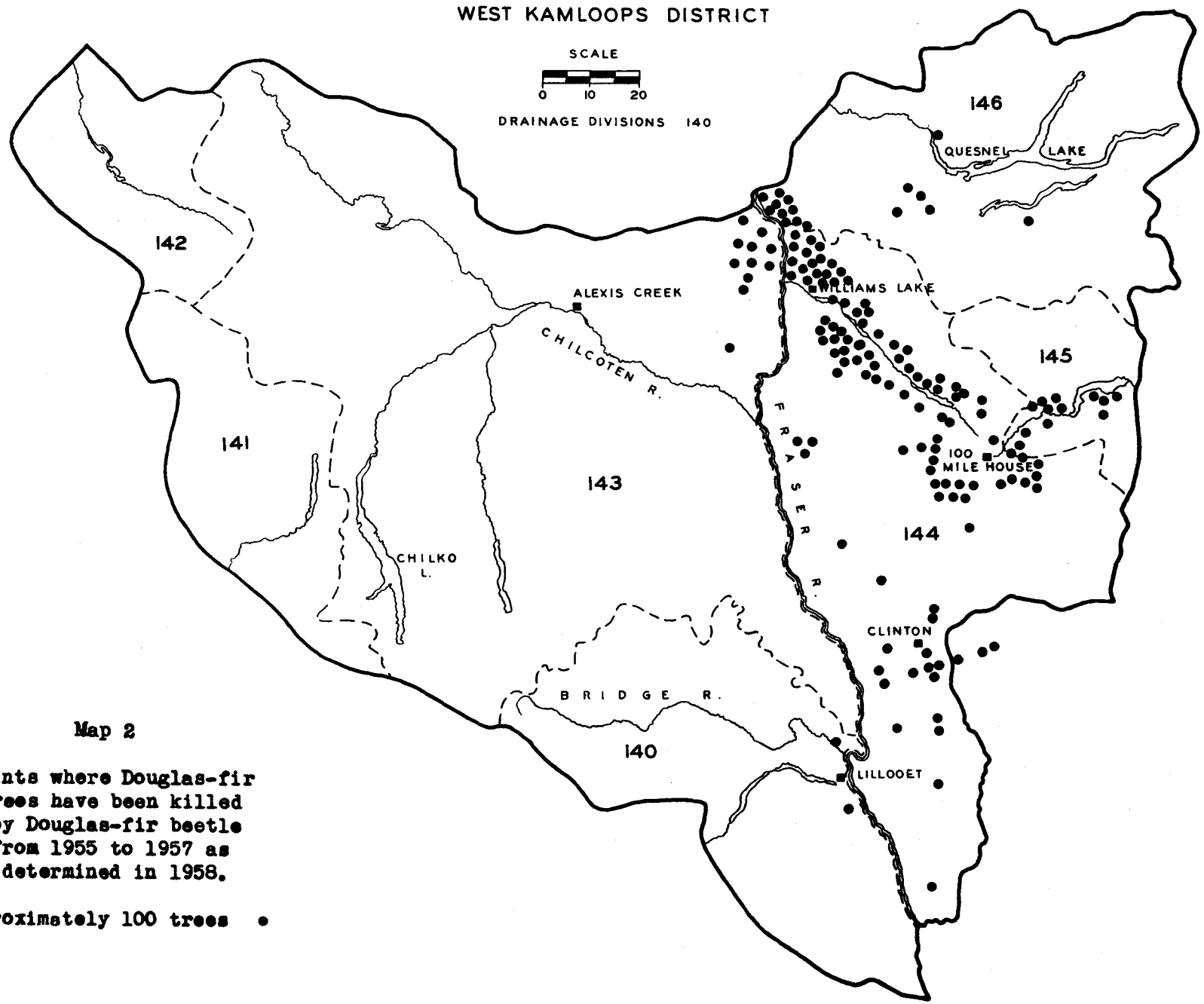



**Map 1**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect** ●

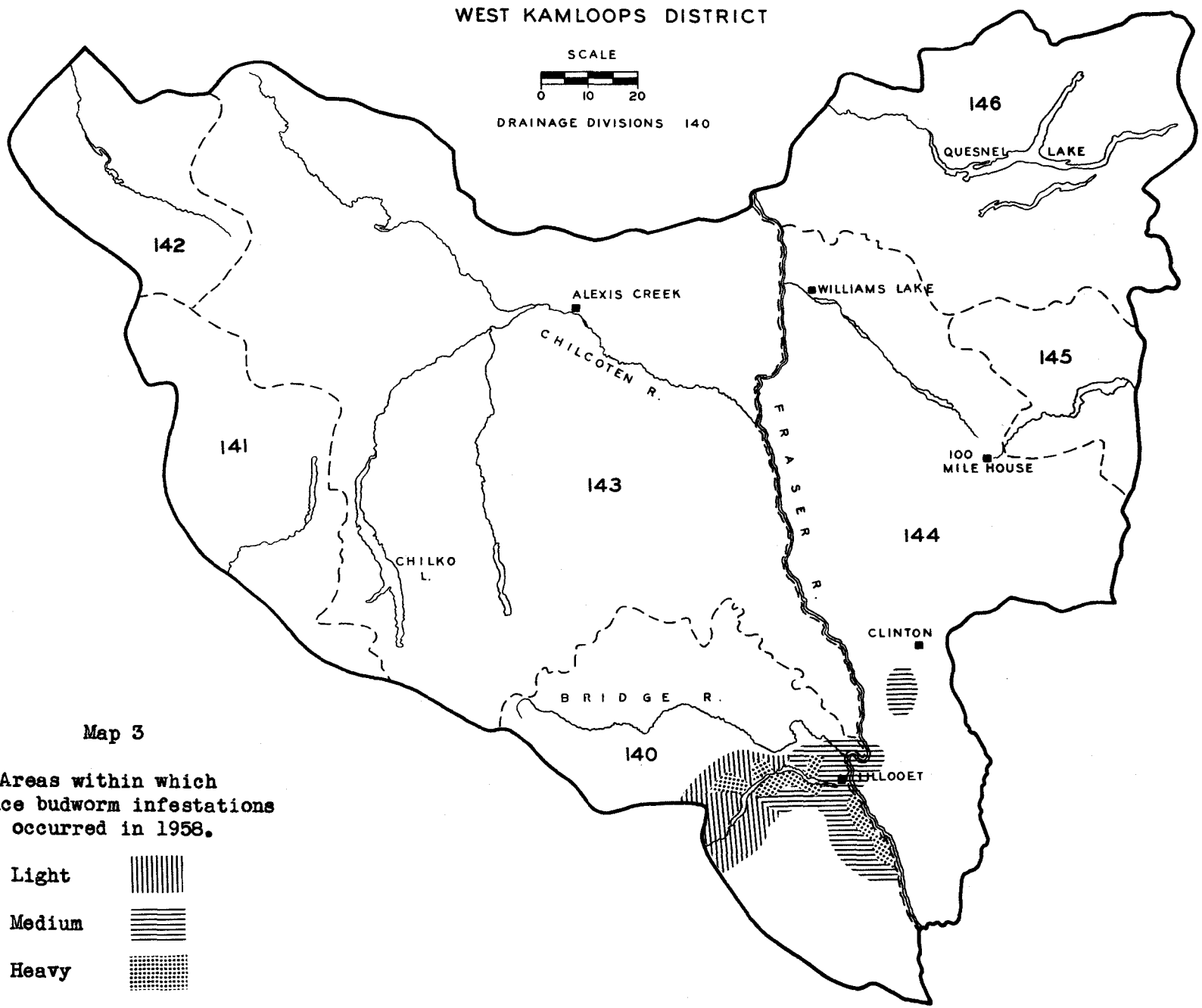
**Tree disease** ▲




Map 2

Points where Douglas-fir trees have been killed by Douglas-fir beetle from 1955 to 1957 as determined in 1958.

Approximately 100 trees •




Map 3

Areas within which spruce budworm infestations occurred in 1958.

Light

Medium

Heavy

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

CENTRAL KAMLOOPS DISTRICT

1958

# FOREST BIOLOGY SURVEY

# CENTRAL KAMLOOPS DISTRICT

# 1958

C. B. Cottrell

## INTRODUCTION

Field work in the Central Kamloops Forest Biology Ranger District commenced on April 22 and ended on November 18. A survey of beetle-killed Douglas-fir trees in the West Kamloops Forest Biology Ranger District occupied most of August. During the field season 269 insect and 17 tree disease collections were taken. Table 1 shows the collections by hosts, and Map 1 shows the location where one or more collections were made and field records taken in 1958.

Table 1

Collections by Hosts

Central Kamloops District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| cedar, western red | 2 | - | aspen, trembling | 27 | - |
| Douglas fir | 72 | 3 | birch, western white | 4 | - |
| fir, alpine | 8 | 3 | cherry, choke | 10 | 1 |
| hemlock, western | 14 | 1 | cottonwood, black | 5 | - |
| juniper, common | - | 1 | willow spp. | 9 | - |
| juniper, Rocky Mountain | 7 | - | miscellaneous | 6 | 1 |
| pine, lodgepole | 25 | 1 | no host | 2 | - |
| pine, ponderosa | 41 | 5 | | | |
| pine, western white | 1 | - | | | |
| spruce, Engelmann | 35 | 1 | | | |
| yew, western | 1 | - | | | |
| | | | Total | 63 | 2 |
| Total | 206 | 15 | Grand total | 269 | 17 |

## STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The 1958 Douglas-fir beetle attack was very light in the Central Kamloops District. Infested Douglas firs were noted at 4 locations: Arrowstone Hills, approximately 60 trees; Paul Lake, 21; Campbell Lake, 16; and 6 trees at 4,200 feet elevation near McGillivray Lake. Attacked trees turned red in late July and early August.

On the north side of Louis Lake, several hundred decked Douglas-fir logs were examined on April 10 to determine the overwintering mortality of adults. In each of 4 samples, 100 randomly selected adults were examined. The percentage of living beetles in logs near the top of the deck was 84.5, while 75 per cent were alive in logs lying on the ground. No standing Douglas-fir trees were attacked at Louis Lake. The closest attack was one mile west, near Paul Lake.

During late June and early July, beetle-killed Douglas-fir trees in Central Kamloops Forest District were counted. Trees bearing red foliage were classified as having died in the 3-year period from 1955 to 1957. In Table 2, a loss of 215,810 cubic feet was computed by multiplying the number of dead trees by the estimated average volume for beetle-killed Interior Douglas fir in each district.

Table 2

Douglas-fir Trees Killed by the Douglas-fir Beetle in the Period 1955 to 1957, Central Kamloops District

| Locality | Number of dead trees | Average volume per tree (cubic feet) | Estimated volume of timber (cubic feet) |
|---|---|---|---|
| Arrowstone Hills | 267 | 90 | 24,030 |
| Tranquille Forest Reserve | 636 | 100 | 63,600 |
| Niskonlith Forest Reserve | 1,343 | 80 | 107,440 |
| Long Lake Forest Reserve | 70 | 40 | 2,800 |
| Campbell Range | 234 | 50 | 11,700 |
| Coldwater Valley | 78 | 80 | 6,240 |
| Total | 2,628 | | 215,810 |

Western Pine Beetle, Dendroctonus brevicomis Lec.

More ponderosa pine trees were attacked by the western pine beetle in 1958, than in any year since 1954. Sixty-seven trees north of Pritchard, and 20 on the north side of Little Shuswap Lake were killed. North of Lytton, 17 trees in 3 groups were infested and on Robbins Range, 5 trees were attacked. A small number of red turpentine beetles were associated with the majority of attacks.

Red Turpentine Beetle, Dendroctonus valens Lec.

Near Little Shuswap Lake, 28 of the 48 immature ponderosa pine trees attacked in 1957, have died. No new attacks were located in this area.

West of Niskonlith Lake, 67 mature ponderosa pines were infested in association with the western pine beetle, and 46 immature trees by the red turpentine beetle alone. One tree, 10 inches in diameter had been attacked in seven places around the root collar. The bole was completely girdled.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

A slight increase in bark beetle activity was noted in the North Thompson River Valley. Approximately 75 western white pine trees were attacked two miles east of Blue River. There were 22 infested trees at Thunder River and six at Gosnell.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

The western balsam bark beetle and an associated tree disease, Leptographium sp., have attacked alpine fir trees in many of the spruce-balsam stands in the District. The largest area of dead and dying trees, 33 square miles, surrounds McGillivray Lake. East of Knouff and Badger lakes, seven square miles of alpine fir have been killed. Between Johnson and East Barriere lakes, five patches of infested trees cover 11 square miles. On the west side of the North Thompson River, between Barriere and Heffley, six regions covering an estimated 15 square miles were attacked. These infestations have been active for many years and have gradually increased in size.

At McGillivray Lake, it was observed that some trees had been lightly attacked by western balsam bark beetles, and might have survived except that they were severely infested by a secondary beetle, Pityokteines minutus (Swaine).

Oregon Pine Engraver, Ips oregonis (Eich.)

North of Pritchard, 32 immature ponderosa pine trees were killed by the oregon pine engraver. The affected trees border a hay field and presumably the beetle population built up in slash around the field.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Although the one-year-cycle spruce budworm is considered to be an important pest of Douglas fir and Engelmann spruce, it has not been destructive in the Douglas-fir - ponderosa pine forests in Central Kamloops District. This timber type occurs roughly within a 30 mile radius of Kamloops. Douglas fir is the major tree species in the region, and Engelmann spruce is confined to wet sites along creeks and lake shores.

In the past three years, very few budworm larvae were collected in random samples, however, their numbers seem to be increasing. The average number of larvae per Douglas-fir collection has increased from 0.11 in 1956, to 0.17 in 1957, and to 0.43 in 1958. In Engelmann spruce collections, the increase was more rapid, from 0.1 in 1956, to 0.15 in 1957, and 0.5 in 1958. Collections made between June 1 and July 15 are shown in Table 3.

Table 3

Number of Collections from Douglas Fir and Engelmann Spruce, Total Number of Spruce Budworm Larvae Collected and the Number of Larvae per Collection taken between June 1 and July 15, 1956 to 1958. Central Kamloops District

| | Douglas fir | | | Engelmann spruce | | |
|---|---|---|---|---|---|---|
| | 1956 | 1957 | 1958 | 1956 | 1957 | 1958 |
| No. of collections | 28 | 48 | 38 | 20 | 20 | 18 |
| Average no. larvae per collection | 0.11 | 0.17 | 0.43 | 0.10 | 0.15 | 0.50 |

A Sawfly on Lodgepole Pine, Neodiprion sp.

During June, larvae were numerous in 20 acres of lodgepole pine reproduction in Little Shuswap Indian Reserve near Squilax, where in 1957, up to 90 per cent defoliation had been recorded. Defoliation was lighter in 1958. A few new trees were attacked, but the area of infestation did not increase.

On November 20, egg clusters were collected from 10 lodgepole pine trees averaging seven feet in height. As illustrated in Table 4, the number of egg clusters per tree ranged from 0 to 12, averaging two, while the number of eggs per cluster ranged from 11 to 122, averaging 69.3. This number of eggs might be expected to result in a population of 139 larvae per tree, if there was no over-wintering mortality. On the basis of a similar examination in 1957, a population of 308 larvae per tree was expected.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Mature, open-grown ponderosa pine trees in the vicinity of Deadman River, were heavily attacked by sawfly larvae. On May 6, larvae were one-quarter inch in length and defoliation was not noticeable. As many as six colonies, each containing from 10 to 37 larvae, were observed on a single branch tip. On May 21, larvae were one half inch long and up to 25 per cent defoliation was apparent on needles produced before 1957. Clusters of "1957 needles" which had contained sawfly eggs were brown and wilted, giving the trees a "flagged" as well as defoliated appearance.

Table 4

Number of Neodiprion sp. Egg Clusters, Average Number of Eggs per Cluster, and Average Number of Eggs per Needle on Each of 10 Lodgepole Pine Trees Sampled at Little Shuswap Indian Reserve, November 20, 1958.

| Tree no. | Total no. of egg clusters per tree | Average no. of eggs per cluster | Average no. of eggs per needle |
|---|---|---|---|
| 1 | 0 | 0 | 0 |
| 2 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 |
| 4 | 1 | 54 | 10.8 |
| 5 | 4 | 66 | 6.6 |
| 6 | 12 | 74 | 8.0 |
| 7 | 0 | 0 | 0.0 |
| 8 | 1 | 67 | 6.7 |
| 9 | 0 | 0 | 0 |
| 10 | 2 | 58 | 11.6 |
| 1958 Averages | 2.0 | 69.3 | 7.9 |
| 1957 Averages | 3.8 | 81.2 | 8.4 |

Satin Moth, Stilpnotia salicis (L.)

A total of 42 aspen groves and 6 groups of black cottonwood within a 25 mile radius of Kamloops were severely defoliated. The location and number of groves are as follows: Knutsford, 3; Stump Lake, 17; Trapp Lake, 5; Campbell Lake, 2; between Kamloops and Heffley, 7; and between Kamloops and Chase, 14.

At Knutsford over 500 immature trembling aspen trees were 95 per cent defoliated. When the new leaves appeared they were immediately skeletonized by the young larvae and by May 21 the trees were completely denuded. The trunks and branches of many trees were covered with larvae, which starved for want of foliage. It was noted, as in other satin moth infestations, that numerous larvae of the geometrid Dysmigia loricaria Evers., were present.

During the week of June 22 to 28, adults were very numerous around building and street lights in the City of Kamloops.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Northwest of Adams Lake, the Barton Creek infestation which has been active since at least 1955, reached a peak in 1957. In 1957, defoliation in the 700-acre trembling aspen infestation was 50 to 75 per cent on the outskirts, and up to 100 per cent in the centre. In 1958, defoliation ranged from 30 to 40 per cent on the outskirts, to 60 per

cent in the centre. For the first time in four years the most heavily defoliated trees did not "leaf out" again during the summer. From 10 to 20 trees per acre have died.

On September 22, all the egg masses from nine randomly selected aspens were collected, as was done in 1957. In 1958, 115 egg masses were collected, as compared with 354 from the same number of trees in 1957, a decrease of 68 per cent.

Data obtained from dissections of forest tent caterpillar eggs on October 17, by Forest Biology Ranger T. A. D. Woods (Table 5) show the potential larval populations which would have developed and fed upon the sample trees the following year. The eggs from five randomly selected egg masses per tree were dissected. The number of living larvae per egg mass averaged 94, a decrease from 98 in 1957. The average number of egg masses per tree was 13, a decrease from 41 in 1957. The number of larvae per tree was 1,203 compared with 4,018 in 1957. This was an overall reduction of 70 per cent of the prospective larval population. Even this reduced quantity should be sufficient to continue the infestation on the basis that the larvae from 10 or more egg masses per tree will cause heavy defoliation.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

Trembling aspens were heavily infested throughout the District, with the exception of isolated groves between Kamloops and Merritt. Aspen leaf counts were made at nine localities. The number of infested leaves per tree ranged from 57 to 99 per cent as shown in Table 6. The average percentage of leaves infested was 90.3 compared with 89.6 in 1957.

A plot for gathering data on the development of the aspen leaf-miner was established at Paul Creek. On April 10, approximately 10 groves of trembling aspen trees on the plot had not leafed out, while the trees in two other groves bore leaves up to three quarters of an inch in width. Aspen leaf-miner moths were flying but no eggs were found on the leaves at that time.

On April 22, all of the aspen trees had leafed out. One hundred and fifty leaves collected from the early-leafing aspens contained an average of 3.8 eggs per leaf, four per cent of which had developed into larvae. The maximum length of the larval mines was one half inch. The leaves of trees in the two early-leafing groves were up to two and one half inches wide, while those in the late groves were only three quarters of an inch wide. This indicated a phenological difference of about 12 days between the early- and late-leafing groves.

On April 29, 82 per cent of the eggs had hatched, and by May 6, three per cent of the larvae had pupated. Adults were observed in flight during late May and throughout June. Table 7 shows the results of five examinations at Paul Creek.

Table 5

Analysis of Forest Tent Caterpillar Egg Masses
Collected from Trembling Aspen Trees at Barton Creek, September 22, 1958.

| Survey no. | Tree diameter (inches) | Tree height (feet) | Crown length (feet) | Total no. of 1958 egg masses | Average no. of eggs per 5 masses | Percentage | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Living larvae | Dead larvae | Undeveloped eggs | Parasitized eggs |
| 58-7837 | 7 | 61 | 16 | 18 | 90.4 | 70.0 | 1.5 | 24.1 | 4.4 |
| 58-7838 | 6 | 48 | 12 | 20 | 114.2 | 80.0 | 1.2 | 17.0 | 1.8 |
| 58-7839 | 5 | 42 | 18 | 8 | 112,4 | 80.6 | 3.0 | 15.5 | 0.9 |
| 58-7840 | 7 | 65 | 15 | 17 | 96.4 | 76.6 | 1.9 | 17.8 | 3.7 |
| 58-7841 | 6 | 54 | 12 | 10 | 141.0 | 79.6 | 2.0 | 15.9 | 2.5 |
| 58-7842 | 6 | 56 | 14 | 5 | 125.0 | 64.4 | 2.6 | 26.4 | 6.6 |
| 58-7843 | 5 | 42 | 18 | 5 | 130.8 | 80.4 | 3.1 | 15.1 | 1.4 |
| 58-7844 | 6 | 45 | 20 | 6 | 116.4 | 76.3 | 1.7 | 19.6 | 2.4 |
| 58-4845 | 6 | 42 | 10 | 26 | 141.4 | 89.4 | 0.7 | 7.5 | 2.4 |
| 1958 averages | | | | 12.8 | 118.7 | 77.9 | 2.0 | 17.3 | 2.8 |
| 1957 averages | | | | 41.0 | 102.6 | 78.6 | 0.5 | 14.8 | 6.1 |
| 1956 averages | | | | 45.8 | 127.6 | 85.3 | 0.9 | 10.2 | 3.6 |

Table 6

Number of Trembling Aspen Leaves Examined
and Percentage of Leaves Infested by Aspen Leaf-miners
in Central Kamloops District, 1958.

| Locality | No. leaves examined | Percentage infested |
|---|---|---|
| Wells Gray Park | 389 | 99.5 |
| Lac des Roches | 444 | 94.5 |
| Knouff Lake | 442 | 93.9 |
| Paul Creek | 411 | 98.5 |
| Westsyde | 433 | 57.7 |
| Deadman River | 447 | 93.2 |
| Le Jeune Lake | 386 | 97.6 |
| Stump Lake | 370 | 92.1 |
| Coldwater Valley | 419 | 87.8 |
| Average | | 90.3 |

Table 7

Percentages of the Various Stages of Aspen Leaf-miner
Present on Trembling Aspen at Paul Creek, April and May, 1958.

| Date | Stage present, per cent | | |
|---|---|---|---|
| | Eggs | Larvae | Pupae |
| April 10 | - | - | - |
| April 22 | 96.0 | 4.0 | - |
| April 29 | 17.7 | 82.3 | - |
| May 6 | 6.7 | 90.2 | 3.1 |
| May 22 | - | 1.0 | 99.0 |

During early July, an aspen grove near Knutsford which had been completely defoliated by satin moth in May, leafed out again. The leaves were immediately infested by the aspen leaf-miner. Instead of the usual zig-zag larval mines across one side of the leaf and up and down the other side, these mines started at the base of the leaf blade and followed the main vein in a more or less straight line; the pupal cell was at the tip of the leaf. An estimated 10 per cent of the larvae had pupated by mid-July.

Poplar and Willow Borer, Sternochetus lapathi (L.)

On alluvial flats along the Thompson River near Tranquille, an estimated 250 acres of mature willow trees have been killed, possibly by a combination of girdling by the willow borer and flooding. The willows growing on the sand flats formed a dense pure stand of trees 6 to 8 inches in diameter and 35 feet high. The average age was 25 years.

The bulk of the stand was dead, only a fringe of willows around the perimeter having sent out new sucker growth in 1958. A flood-water mark was in evidence 10 feet high on the main boles. The area is flooded for two to eight weeks each spring. On July 21, adults were present above the high water mark, often spaced only one inch apart on the trunk. Below the water mark, fully grown larvae were drowned in their galleries. The flooding may have weakened the trees, making them more susceptible to weevil attack, however, it also deterred the weevils by drowning a great number of larvae.

Black-headed Budworm, Acleris variana (Fern.)

Black-headed budworm larval populations, on Douglas fir, Engelmann spruce and alpine fir, remained at a low level with the exception of a few localities.

Collections from mature Douglas-fir trees contained 30 to 50 larvae in Highland Valley and an average of 11 on the south slope of Mount Lolo. Near Tunkwa Lake Engelmann spruce collections contained an average of 32 larvae. A small amount of defoliation was noticeable on the current growth. South of McGillivray Lake 3-tree beating collections from alpine fir averaged 15 larvae.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

A total of seven larvae were taken in random collections from western hemlock, Engelmann spruce and alpine fir in the Blue River Ranger District. There was no significant change in the population density from the past two years.

Spotless Fall Webworm, Hyphantria cunea (Drury)

Small infestations on western choke cherry and black cottonwood increased greatly in 1958. Areas where trees and shrubs were heavily infested are: the North Thompson Valley from Kamloops to McLure; the South Thompson Valley from Chase to Kamloops and along the Thompson River to Savona; Deadman River Valley, and the Nicola River Valley near Spences Bridge.

Savona continued to be the most severely infested area. The annual 3-mile strip count increased from 291 webs in 1957 to 809 in 1958.

Table 8 shows the number of webs on various hosts counted from a moving vehicle for three miles at Savona.

Table 8

Spotless Fall Webworm Strip Counts
Savona Cut-off from East to West, July 8, 1958

| Host | No. of webs per mile | | | Totals |
|---|---|---|---|---|
| | Mile 0-1 | Mile 1-2 | Mile 2-3 | |
| western choke cherry | 300 | 59 | 56 | 415 |
| black cottonwood | 196 | 34 | 89 | 319 |
| Manitoba maple | - | 23 | - | 23 |
| Lombardy poplar | 17 | - | 5 | 22 |
| apple | 5 | 17 | - | 22 |
| wild rose | 5 | - | - | 5 |
| trembling aspen | 1 | 2 | - | 3 |
| 1958 totals | 524 | 135 | 150 | 809 |
| 1957 totals | 278 | 79 | 34 | 291 |

A Ponderosa Pine Cone Borer, Dioryctria auranticella (Grote)

At each of 5 localities in the District, 50 ponderosa pine cones were examined for cone borers. As shown in Table 9, the average percentage of cones infested by this species was 31.2, slightly less than the 1957 average of 35.2.

The decrease in the percentage infested, however, was not evenly distributed among the five collecting sites. Infestations increased at the two northern sites of Little Shuswap Lake and Savona, while the collections were negative at the southern sites of Nicola, Merritt and Mamette Lake.

A Sawfly, Xyela sp.

The staminate flowers of ponderosa pine were examined during May at seven locations in the District. At each sampling point, the flowers in 12 flower clusters from each of three trees were examined. As shown in Table 10, the number of infested flowers ranged from 13.7 to 83.6 per cent and averaged 39.1. In 1957, the average number of infested flowers was 26.7 at six of the seven sampling points.

Table 9

Number of Ponderosa Pine Cones Examined and Percentage Infested by a Ponderosa Pine Cone Borer, Central Kamloops District, 1958.

| Location | No. cones examined | Percentage infested | |
|---|---|---|---|
| | | 1958 | 1957 |
| Little Shuswap Lake | 50 | 58 | 20 |
| Savona | 50 | 98 | 78 |
| Mamette Lake | 50 | 0 | 6 |
| Nicola | 50 | 0 | 70 |
| Merritt | 50 | 0 | 2 |
| Average | | 31.2 | 35.2 |

Table 10

Number of Ponderosa Pine Staminate Flowers Examined and Percentage Infested by a Sawfly, Xyela sp., Central Kamloops District, 1958.

| Location | No. flowers examined, 1958 | Percentage infested | |
|---|---|---|---|
| | | 1958 | 1957 |
| Heffley | 297 | 82.8 | 7.5 |
| Barnhartvale | 471 | 23.3 | 13.9 |
| Nicola | 562 | 34.5 | 36.8 |
| Merritt | 761 | 13.7 | 7.5 |
| Savona | 531 | 83.6 | 54.8 |
| Kamloops | 346 | 16.5 | 37.4 |
| Lytton | 416 | 40.4 | - |
| Average | | 39.1 | 26.7 |

Ugly-nest Caterpillar, Archips cerasivorana (Fitch)

Sporadic defoliation occurred on choke cherry in the North Thompson River Valley as far north as Birch Island, and along the South Thompson River from Chase to Savona. Denuded choke cherry bushes were also noticeable along the Nicola River, south of Spences Bridge.

Mourning-cloak Butterfly, Nymphalis antiopa (L.)

Larvae and adults were observed frequently throughout the central and northern portions of the District. The heaviest concentration occurred north of Blue River where defoliation of willows ranged from 10 to 20 per cent.

# STATUS OF TREE DISEASES

## A Needle Cast of Ponderosa Pine

In 1957, ponderosa pine trees were infected by Elytroderma deformans (Weir) Darker, in only a few localities: the Nicola River Valley; the Deadman River Valley; Batchelor Range; and the Paul and Heffley Creek valleys. In 1958, trees of various ages were discoloured throughout most of the range of ponderosa pine. The 1957-attacked trees were severely discoloured and lost many of their needles during the summer, so that the trees were defoliated as well as discoloured. On some trees the only green foliage was the 1958 growth.

In other localities in the District, discoloration was light to medium, visible in the spring but diminishing as the summer progressed.

Map 2 illustrates the distribution of needle cast within the range of ponderosa pine.

## A Disease of the Inner Bark and Cambium of Alpine Fir

Near McGillivray Lake in 1957, it was noted that the western balsam bark beetle, Dryocoetes confusus Sw., and a lesion-causing disease, Leptographium sp., were jointly attacking alpine fir trees. The attack has continued for many years until, in 1958, an estimated 33 square miles of alpine fir were affected. In many cases the beetle attacks were light and the adults were "drowned out" by the sap. Lesions, however, surrounded the insects' entrance galleries thereby girdling the bole. A lesion is shown in Figure 1.

In 1958, plots were established at McGillivray Lake by Mr. A. C. Molnar of the Forest Pathology Laboratory, Victoria, to determine relationship between the insect and disease.

## A Dieback Disease

Flagging on ponderosa pine caused by Cenangium ferruginosum Fr. ex Fr. appeared in several locations along the South Thompson River during the late summer. The most noticeably damaged trees were growing on a bench between Pritchard and Niskonlith Lake. Much of the terminal foliage of the mature trees had died as a result of the infection. None of the mature trees was dead, but a few saplings had been killed.

## Drought Damage

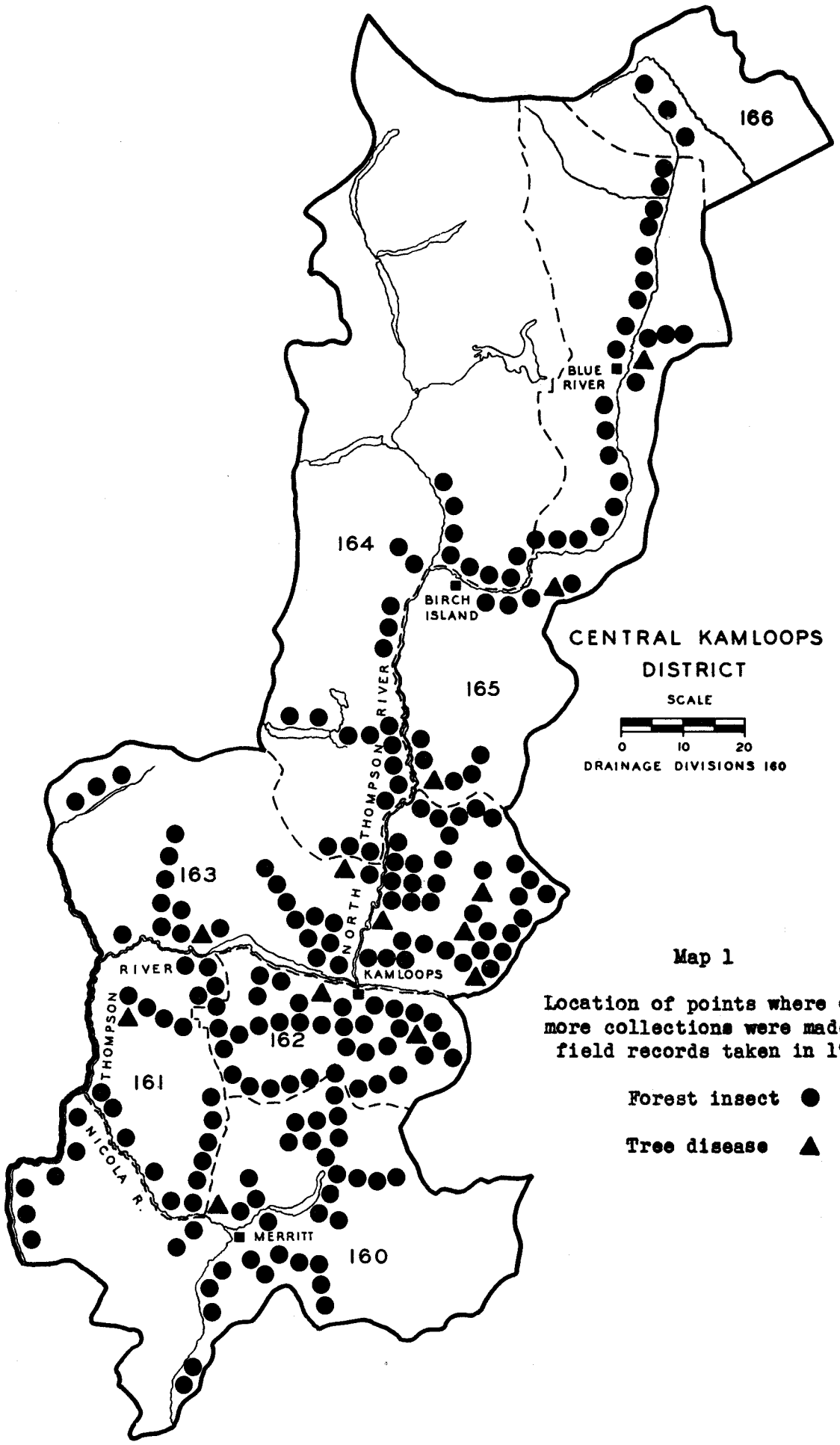
In the vicinity of Little Fort, several hundred Douglas-fir trees of all age classes died during the summer. Common juniper shrubs and a few immature Engelmann spruce were also killed. The dead trees were

scattered among healthy ones, but all of the dead trees had a rocky footing in common. No signs of insect or fungus were noted.

For eight miles along the Thompson River, north of Lytton, scattered discoloured immature ponderosa pines were observed.

A Needle Rust on Alpine Fir.

A needle rust on the terminal foliage of alpine fir reproduction was common along the McGillivray Lake Road. Trees growing between 3,500 and 4,000 feet in elevation were the most heavily infected.

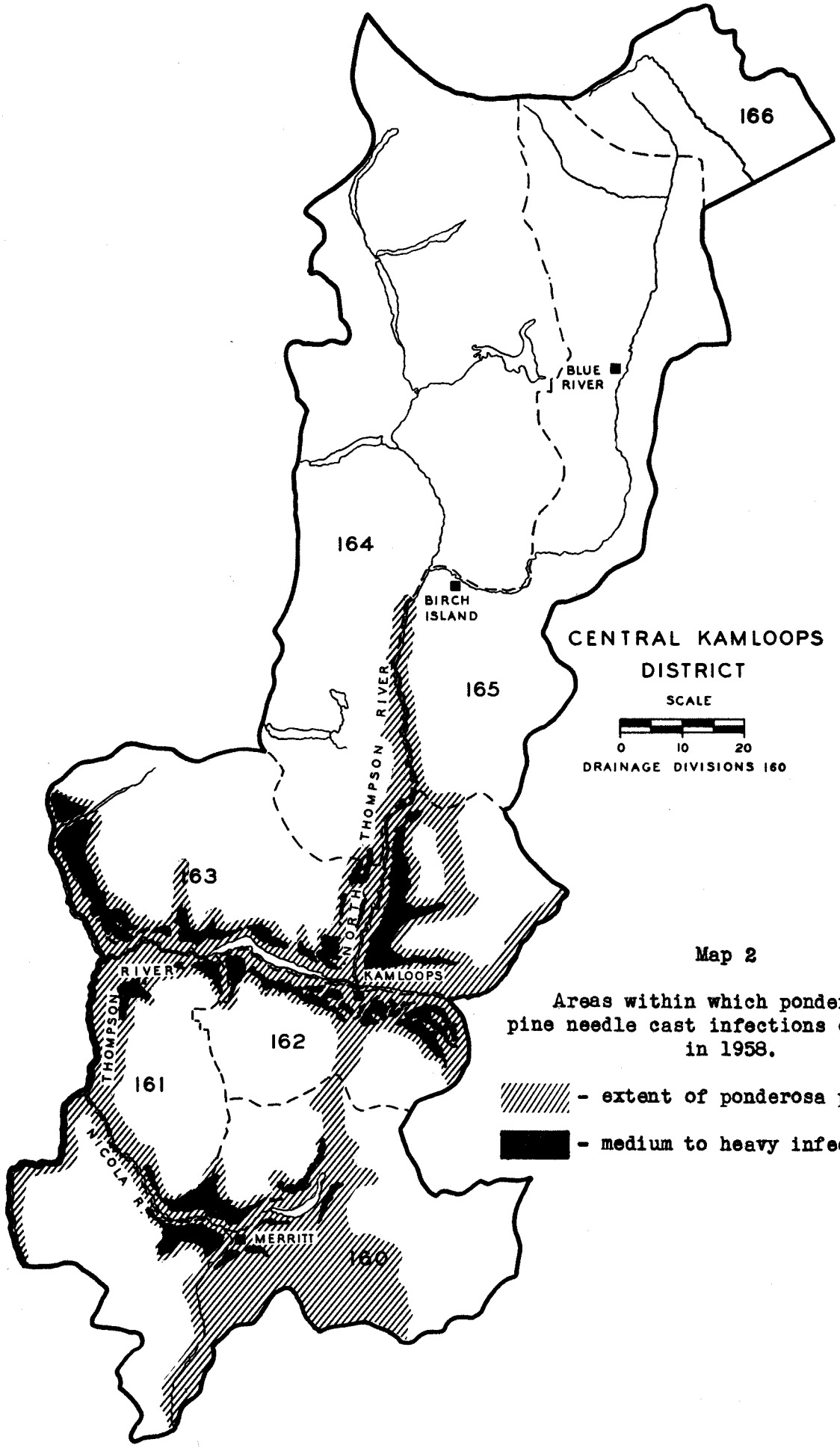



**Map 1**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect ●**

**Tree disease ▲**




**Map 2**

**Areas within which ponderosa pine needle cast infections occurred in 1958.**

**- extent of ponderosa pine type**

**- medium to heavy infections**

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

EAST KAMLOOPS DISTRICT

1958

# FOREST BIOLOGY SURVEY

# EAST KAMLOOPS DISTRICT

## 1958

B. A. Sugden

## INTRODUCTION

A survey to determine the distribution and population density of a cecidomyiid in the terminal growth of ponderosa and lodgepole pines opened the field season on April 1. Field work continued until the third week in November. Most of August was spent assisting with a survey of Douglas-fir beetle damage in the West Kamloops Forest Biology Ranger District.

During 1958 a total of 360 insect and two tree disease collections were made in the District. Table 1 contains a list of the host trees and the number of insect and tree disease collections obtained from each species. Map 1 shows each location where one or more insect and tree disease collections or field records were obtained during 1958.

Table 1

Collections by Hosts
East Kamloops District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Douglas fir | 84 | 1 | alder sp. | 17 | - |
| hemlock, western | 7 | - | aspen, trembling | 16 | - |
| juniper, Rocky Mountain | 2 | - | birch spp. | 5 | - |
| larch, western | 21 | - | cherry, choke | 14 | - |
| pine, lodgepole | 38 | 1 | cottonwood, black | 10 | - |
| pine, ponderosa | 39 | - | hawthorn | 2 | - |
| pine, western white | 5 | - | maple | 2 | - |
| spruce, Engelmann | 14 | - | poplar, ornamental | 5 | - |
| | | | willow | 14 | - |
| | | | miscellaneous | 65 | - |
| | | | Total | 150 | 0 |
| Total | 210 | 2 | Grand total | 360 | 2 |

## STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The Douglas-fir beetle remained active in most areas where there had been infestations in recent years. There was generally an increase in beetle populations during 1958.

The foliage of Douglas-fir trees, attacked in the spring, had begun to turn red by the third week in July, consequently the counts of beetle-killed Douglas fir will include, in many instances, trees which had died in 1958. During the past few years, most Douglas-fir trees attacked during the spring and summer, have changed color early the following year. Table 2 contains the location and number of Douglas-fir trees killed by the Douglas-fir beetle in 1957 and 1958.

Table 2

Location and Number of Douglas-fir Trees Killed by the Douglas-fir Beetle in the East Kamloops District, in 1957 and 1958

| Location | Number of trees |
|---|---|
| Monte Lake | 72 |
| Salmon River Valley (lower) | 18 |
| Salmon River Valley (upper) | 89 |
| West side of Okanagan Lake | 37 |
| Yellow Lake | 25 |
| Shatford Creek | 16 |
| Lumby | 157 |
| Knob Hill | 114 |
| Echo Lake | 11 |
| Cherryville | 25 |
| Hupel | 29 |
| Chase Creek | 48 |
| Pillar Lake | 65 |
| Malakwa | 95 |
| Enderby | 16 |
| Woods Lake (Westwold) | 311 |
| Hidden Lake | 72 |
| Total | 1,200 |

A Douglas-fir tree 22 inches d. b. h. and 93 feet in height was felled near Westwold during mid-April to attract Douglas-fir beetles to a selected site so the foliage color changes that occur after the trees

had been killed by beetles, could be recorded from the time of initial attack. The site was visited periodically throughout the summer. The felled tree was attacked by the first week in June but none of the Douglas fir growing nearby was attacked.

In September, a 1-foot cylinder of bark was removed every 10 feet from the felled tree and the Douglas-fir beetle galleries in the sample counted. Each complete gallery was counted as one and each part gallery as a half. The number of galleries per square foot for each bark section is shown in Table 3.

Table 3

Number of Douglas-fir Beetle Galleries in Bark Samples from a Douglas-fir Tree Felled in April near Westwold and Examined in September, 1958.

| Number of feet from butt | Diameter (inches) | No. of galleries per square foot |
|---|---|---|
| 0 | 22 | 2.95 |
| 10 | 19 | 2.81 |
| 20 | 17 | 2.47 |
| 30 | 15 | 4.07 |
| 40 | 14 | 5.18 |
| 50 | 11 | 3.47 |
| 60 | 9 | 4.66 |
| 70 | 7 | 2.73 |

Each section of bark contained a number of callow Douglas-fir beetles. No larvae were found. There appeared to be some competition from cerambycid and buprestid larvae. In the thinner-barked sections of the tree, galleries of the Douglas-fir hylesinus, Pseudohylesinus nebulosus Lec., were noted.

Western Pine Beetle, Dendroctonus brevicomis Lec.

Populations of the western pine beetle remained low throughout the District. Small groups and single trees of ponderosa pine had been killed near Monte Lake, Aspen Grove and Naramata. Most of the trees examined showed numerous signs of woodpecker activity.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

An increase of the mountain pine beetle was apparent in 1958. Western white pine ranging from 8 to 36 inches d. b. h. were killed near Noisy Creek in the Mabel Lake district, at Railroad Creek in the Cherryville district, and near Hidden Lake. Although the known total white pine mortality for these localities was only 38 trees, this was the greatest destruction of white pine by mountain pine beetles in the district since 1955.

Red Turpentine Beetle, Dendroctonus valens Lec.

Red turpentine beetles were associated with the western pine beetle at Aspen Grove and Monte Lake. They were found only in ponderosa pine that had been attacked first by the latter species.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Populations of Engelmann spruce beetle remained low. A small deck of spruce logs near Spa Lake was lightly infested. No standing spruce trees were known to have been attacked in the District.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

The western balsam bark beetle has been active in the sub-alpine forest around Bolean Lake for a number of years but the annual toll of alpine fir has not been severe. During 1957 and 1958 a marked increase was noted in the number of alpine fir killed by this beetle. Scattered groups of trees with red foliage were examined on the south-west and north-east sides of the lake. Attack by the western balsam bark beetle was accompanied by a disease, Leptographium sp., which caused lesions to develop in the inner bark.

On the hillside south-west of Bolean Lake, groups of dead and dying alpine fir were located within an area 110 by 30 chains. To obtain information on tree mortality, three plots, one chain wide and 20 chains long, were established 20 chains apart in the area. An old logging road was used as a base line. Table 4 contains the number and volume of alpine fir killed during and prior to 1958.

Table 4

Number and Volume of Alpine Fir Trees Apparently Killed by the Western Balsam Bark Beetle near Bolean Lake September, 1958.

| Plot number | No. of fir attacked in 1958 | No. of fir attacked prior to 1958 | | Volume of fir killed (f. b. m.) |
|---|---|---|---|---|
| | | *Red | +Gray | |
| 1 | 29 | 47 | 41 | 22,870 |
| 2 | 16 | 24 | 23 | 9,990 |
| 3 | 17 | 41 | 22 | 14,250 |
| Totals | 62 | 112 | 86 | 47,110 |

* Red - Dead alpine fir with red needles probably retained two or three years.

\+ Gray - Dead alpine fir with no foliage.

Larvae and adults of the western balsam bark beetle were numerous in the trees attacked during 1958. The infestations are expected to remain active through 1959.

Satin Moth, Stilpnotia salicis (L.)

Severe defoliation by satin moth larvae occurred in 1958 through the central Okanagan Valley, from Monte Creek east to Shuswap and near Falkland. Lighter defoliation was observed near Armstrong, north-east of Salmon Arm and from the mouth of Adams River along the shore of Shuswap Lake to Celista. Map 2 shows the areas within which satin moth infestations occurred during 1958.

In the residential areas of Penticton, Kelowna and Vernon ornamental poplars and willows were sprayed where large populations of satin moth larvae were established. With the exception of resort areas, no control measures were undertaken in the rural areas where black cottonwood, and to a lesser degree, trembling aspen were severely defoliated.

In October the lower trunk of black cottonwood trees near Shuswap and Duck Lake were examined for overwintering satin moth larvae. At each of two localities three trees, over 12 inches d. b. h., were selected in a grove that had been defoliated. All the satin moth larvae on one square foot of bark surface on the south side of the tree were counted at 2-foot intervals up to seven feet. This made a total of three square feet of bark surface sampled on each tree. Details of the larval counts are shown in Table 5.

Table 5

Number of Satin Moth Larvae Hibernating on Samples of Bark surface of Six Black Cottonwood Trees at Shuswap and Duck Lake, 1958.

| Tree no. | Location | D.B.H. of tree (inches) | No. of square feet examined | Average no. of larvae per square foot |
|---|---|---|---|---|
| 1 | Shuswap | 16 | 3 | 51 |
| 2 | Shuswap | 14 | 3 | 25 |
| 3 | Shuswap | 14 | 3 | 33 |
| 4 | Duck Lake | 12 | 3 | 30 |
| 5 | Duck Lake | 14 | 3 | 31 |
| 6 | Duck Lake | 13 | 3 | 27 |

The overwintering population of satin moth larvae appeared to be quite high. Some difficulty was experienced in making the examinations due to the deeply fissured bark on black cottonwood.

The first satin moth pupae were found at Wood Lake on May 27; the host tree was white poplar. Egg masses were noted at Wood Lake, during the second week in June. Satin Moth larvae in hibernacula were observed at Vernon on July 21 and at Trout Creek on July 25.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Larvae of the 1-year-cycle spruce budworm were collected occasionally from Douglas fir, western hemlock and Engelmann spruce. They were not numerous.

In sub-alpine forests of the Larch Hills Plateau, Monashee Pass and Adams Plateau the 2-year-cycle budworm were very scarce. Near Bolean Lake and the Monashee Pass, beating samples were taken from 10 Engelmann spruce and 10 alpine fir trees in each locality. Only four larvae were taken in the sample from the Monashee Pass, while 11 were collected in the Bolean Lake area.

Douglas-fir Tussock Moth, Hemerocampa pseudotsugata McD.

The populations of Douglas-fir tussock moth remained low throughout the District. During 1958 one larva was collected near Yellow Lake.

Black-headed Budworm, Acleris variana (Fern.)

There appeared to be a general decline in the light population of black-headed budworm that has persisted in the District. Some larvae were collected from Douglas fir east of Oyama and from Engelmann spruce in the Monashee Pass area.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The infestations of aspen leaf-miner remained active throughout the District. Infested trembling aspen leaves from two 1-foot branch samples per tree were examined; five trees were sampled at nine localities. Table 6 contains the percentage of trembling aspen leaves infested at these localities during 1957 and 1958.

Infestation by aspen leaf-miner was severe in all areas and the degree of infestation increased at all sampling points with the exception of Glenemma Range.

During the first week of May two plots were established in trembling aspen stands, one near Larkin and the other west of Falkland. They were visited once a week from the time the eggs were laid through the larval and pupal stages until the adults had emerged. To maintain a record of the development of the aspen leaf-miner, two 12-inch branch samples were taken once a week from each of five aspen trees on the plots. From each

branch sample five leaves were selected at random and the progress of the leaf-miners recorded. The entire cycle from egg to adult was completed in about a month. At Larkin, eggs were present on May 5 and adult emergence was well under way by June 9. Sampling on the plots was carried out over a period of seven weeks. Table 7 contains information obtained from these samplings.

Table 6

Percentage of Trembling Aspen Leaves Infested by Aspen Leaf-miner, East Kamloops District - 1957 and 1958.

| Locality | Percentage leaves infested 1957 | Percentage leaves infested 1958 |
|---|---|---|
| Squilax | 73.1 | 94.6 |
| Glenemma Range | 93.1 | 89.5 |
| Falkland | 96.1 | 99.2 |
| Winfield | 87.8 | 90.0 |
| Trout Creek | 63.3 | 81.0 |
| Trepanege Creek | 75.3 | 94.1 |
| E. C. Manning Prov. Park | 35.3 | 95.3 |
| Aspen Grove | 48.6 | 94.9 |
| Anarchist Mtn. | 29.4 | 82.6 |

Table 7

Progress of Aspen Leaf-miner Populations at Larkin and Falkland, May 1 to June 17, 1958.

| | Larkin | Falkland |
|---|---|---|
| Percentage of leaf surfaces infested (upper and lower) | 99 | 99 |
| *Average number of eggs per leaf | 4.3 | 4.3 |
| Average number of larvae per leaf | 3.3 | 4.3 |
| Percentage larval mortality | | |
| undertermined causes | 48.4 | 44.2 |
| parasitism | 8.9 | 14.2 |
| total | 57.3 | 58.4 |
| Percentage mines completed | 42.7 | 41.6 |
| Percentage mortality in cocoons | | |
| undetermined causes | 6.7 | 10.0 |
| parasitism | 67.6 | 81.6 |
| total | 74.3 | 91.6 |
| Percentage cocoons successfully emerged | 25.7 | 8.4 |
| Average number of adults produced per leaf | 0.54 | 0.12 |

* Figures for numbers of eggs are subject to error due to possible loss of eggs prior to time of sampling - hence minimum figures must be quoted.

During July large numbers of aspen leaf-miner adults were noted at widely separated points in the District. They could be flushed from a variety of resting sites, the commonest of which were Douglas fir, lodgepole pine, ponderosa pine, hemlock, white pine, larch, aspen, birch, alder and willow foliage.

Black Pine Leaf Scale, Nuculaspis californica (Cole.)

The infestation of black pine leaf scale remained active in the Penticton and Skaha Lake regions. Mortality of ponderosa pine continued where severe repeated attacks of scale had occurred. The needle length on heavily attacked trees ranged from 4.5 to 15 centimeters. On the shorter needles, scale nymphs failed to develop, partly due to the competition between themselves and the nymphs of the pine needle scale with which they were associated.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Populations of the pine needle scale on marginal ponderosa pine increased near Penticton, Naramata, Summerland, Vernon and Winfield. They were associated with the black pine leaf scale near Penticton, Naramata and Summerland but were more widely distributed in these localities than the preceding species.

East of Naramata a few pole-sized ponderosa pine that had died during the late summer of 1958 were examined. They had been heavily infested by pine needle scale for a number of years and had retained only 1957 and 1958 needles. The 1958 needles were very stunted, measuring between four and five centimeters.

A Ponderosa Pine Cone-borer, Dioryctria auranticella (Grote)

With the exception of the lower slopes of Anarchist Mountain there was an increase in the number of cones infested by D. auranticella during 1958 in localities where the same trees were sampled in 1957 and 1958.

To obtain the number of infested cones, 20 cones were selected at random from one tree in each locality. Again this year it was noted that larvae, probably D. auranticella, were infesting immature ponderosa pine cones which would not mature until 1959. The percentages of cones infested during 1957 and 1958 are shown in Table 8 .

A Sawfly in the Staminate Flowers of Ponderosa Pine, Xyela sp.

Infestation of ponderosa pine staminate flowers recurred in many parts of the District. Staminate flowers on the same trees as in 1957 were examined to determine the percentage attacked. In sampling, three trees were selected at each site; three clusters of flowers were examined on the north, south, east and west sides of the lower third of the crown. Totals of 12 flower clusters on each tree and 36 at each sampling plot were examined. Table 9 shows the percentage of flowers infested in seven localities in 1957 and 1958.

Table 8

Percentage of Mature Cones of Ponderosa Pine Infested by a Pine Cone Borer 1957 and 1958.

| Locality | Percentage of cones infested | |
|---|---|---|
| | 1957 | 1958 |
| Southeast of Oliver | 45 | 68 |
| Lower slopes of Anarchist Mtn. | 62 | 36 |
| Keremeos | 48 | 52 |
| Richter Pass | 70 | 72 |
| Winfield | 68 | 74 |
| Glenemma Range | 73 | 76 |

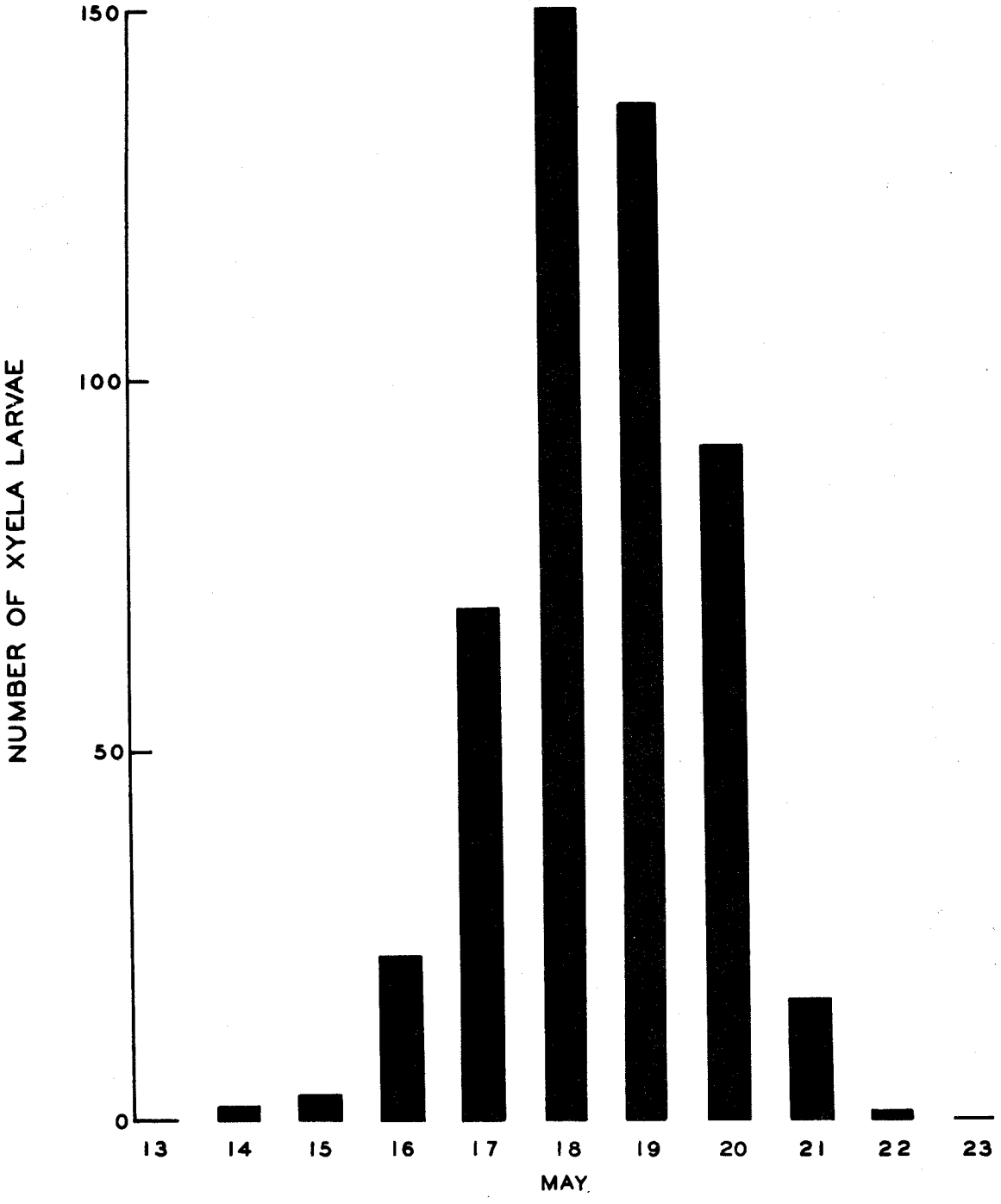
Table 9

Percentage of Ponderosa Pine Staminate Flowers Infested by Xyela sp., May, 1957 and 1958

| Location | Percentage of flowers infested | |
|---|---|---|
| | 1957 | 1958 |
| Pritchard | 45 | 87 |
| Westwold | 55 | no staminate flowers in 1958 |
| Glenemma Range | 92 | 82 |
| Winfield | 39 | 56 |
| Kelowna | 26 | 49 |
| Oliver | 94 | 73 |
| Aspen Grove | 14 | 11 |

Early in May two plots were established at Glenemma Range to determine date, duration and rate of emergence of the Xyela sp. larvae. At each plot three trees were sampled. On each tree, four traps measuring five inches in diameter and seven inches in depth, were hung at the cardinal points. The traps were examined daily and the number of Xyela sp. larvae in each was recorded. Graph 1 shows the number of larvae recorded daily during the emergence period.

Larval emergence began on May 14 and continued until May 22. The staminate flowers matured slightly earlier on the south side of the trees and larval emergence began on that side earlier than on the others. The size of the larvae collected in the traps was variable. Most of the smaller larvae, however, were taken during the decline of the larval emergence period.




GRAPH 1. NUMBER OF XYELA SP. LARVAE THAT DROPPED INTO TRAPS FROM STAMINATE FLOWERS OF PONDEROSA PINE - GLENEMMA RANGE - EAST KAMLOOPS DISTRICT - MAY 13 TO MAY 23, 1958.

A Sawfly on Douglas Fir, Neodiprion sp.

Larvae of a sawfly were common on Douglas fir in parts of the Vernon, Kelowna, Penticton and Chase ranger districts. Light defoliation was observed on Long Mountain east of Oyama, along the Postill Lake road northeast of Kelowna and south of Squilax.

A Sawfly on Engelmann Spruce, Neodiprion sp.

Sporadic, light defoliation of spruce by sawfly larvae occurred along the north fork of Mission Creek and near McCulloch. The larvae were not common in other sections of the District.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Colonial feeding sawfly larvae on ponderosa pines were noted frequently in the southern and central sections of the Okanagan Valley. Damage was light throughout.

Spotless Fall Webworm, Hyphantria cunea (Drury)

Again in 1958 defoliation was severe in the drier sections of the District. The heaviest damage occurred on deciduous trees and shrubs along watercourses, roads and on open range land. By mid-July many choke cherry shrubs had been completely defoliated. Leaves, and less commonly, flowers, had reappeared on some of these by the end of August. This unusual occurrence probably resulted from the early spring and continuous warm weather through the summer which enabled the webworm larvae to terminate their feeding period sooner than usual. A mass collection of 10,000 late instar fall webworm larvae was sent to the Biological Control Laboratory at Belleville.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Hemlock looper larvae were distributed widely, but were not numerous. They were collected most frequently from Douglas-fir and Engelmann spruce trees.

A Cecidomyiid Infesting Ponderosa and Lodgepole Pines, Retinodiplosis sp.

In the past, it has been noted that a cecidomyiid was damaging terminal growth of ponderosa and lodgepole pines. During the spring a survey was made to determine the distribution and population density of this pest. Samples of the terminal growth of ponderosa and lodgepole pines were examined at 18 randomly selected localities. At each sampling point 10 branch tips on each of five trees were inspected for cecidomyiid damage. Cecidomyiid larvae had caused injury to the twigs and candles and were recorded separately. In all, 950 branch tips were examined. Table 10 contains the percentage of twigs and candles infested on each tree species.

Table 10

Percentage of Twigs and Candles of Ponderosa and Lodgepole Pines Infested by Cecidomyiid Larvae, East Kamloops District, 1958.

| Tree species | No. of trees examined | No. of branch tips examined | No. of twigs infested | No. of candles infested | Percentage infested |
|---|---|---|---|---|---|
| Ponderosa pine | 65 | 650 | 253 | 15 | 41.1 |
| Lodgepole pine | 30 | 300 | 18 | 147 | 55.0 |

Cecidomyiid larvae were found at all sampling points, however there was wide variation in population density. The infestation of branch tips ranged from 8 to 84 per cent. Severe infestation resulted in the death of the branch tip or candle. Although this insect was widely distributed, flagging, caused by the death of a branch tip, was found only at Monte Creek, Squilax and Kaleden. Some ponderosa pine in these areas were deformed, having multiple tops and also gnarled branches, presumably from repeated cecidomyiid attacks.

Douglas-fir Needle miners, Contarinia spp.

Little damage was caused by Douglas-fir needle miners in the district during 1958. Populations appeared to be very low.

Painted Lady Butterfly, Vanessa cardui L.

In 1958 colonies of painted lady butterfly larvae were common near Enderby. Ground cover such as thistle, strawberry and raspberry, was defoliated. Large numbers of adults were observed during the early summer in many parts of the district.

An Aphid on Ponderosa Pine Needles, Essigella gillettii Hottes

Ponderosa pine near Sweets Bridge, Glenemma Range and lower Whiteman Creek were heavily infested by a small, pale green aphid. Winged and wingless forms were present on the pine needles. Severely infested ponderosa pine appeared distinctly paler in color than uninfested trees.

## STATUS OF TREE DISEASES

Root Rot of Douglas Fir

During 1958, root rot caused by Poria weirii Murr. seriously affected Douglas-fir trees on about two acres of benchland south-west of Pillar Lake. Tree mortality was common. The disease had been

active for a number of years judging by the number and age of the Douglas fir lying on the ground.

Another smaller group of trees damaged by root rot was located about a quarter of a mile west of the larger group. Douglas-fir tree mortality was not as extensive on the smaller area.

Armillaria Root Rot

Armillaria root rot caused by Armillaria mellea (Vahl ex. Fr.) Quél. was associated in the Pillar Lake area, with P. weirii in Douglas fir. White mycelial fans were also found on a few Douglas fir, three to four inches d. b. h., that gave no indication of having P. weirii.

A Disease of the Inner Bark and Cambium of Alpine Fir

Near Bolean Lake alpine fir attacked by the western balsam bark beetle were also affected by a disease of the inner bark and cambium. Lesions had formed around the beetle entrance holes and galleries; their size varied from small spots about an inch in length to others that were 15 inches long and three to four inches wide. There seemed to be a direct relationship between the attack by the beetles and presence of the disease.

On a hillside south-west of Bolean Lake three strips 20 chains by 1 chain were cruised and 174 dead alpine fir recorded. All the recent beetle attacked trees examined had lesions. These lesions, in many instances, were undoubtedly partly responsible for the death of the alpine fir trees.

A fungus, a Leptographium with a Ceratocystis perfect stage, was associated with the lesions in both areas.

Weather Damage to Douglas-fir Trees.

During the fall it was observed that many young Douglas-fir trees, up to three feet in height, had died in the forest around Aspen Grove. The causal agent was tentatively identified as drought.

# EAST KAMLOOPS DISTRICT

SCALE

0 10 20

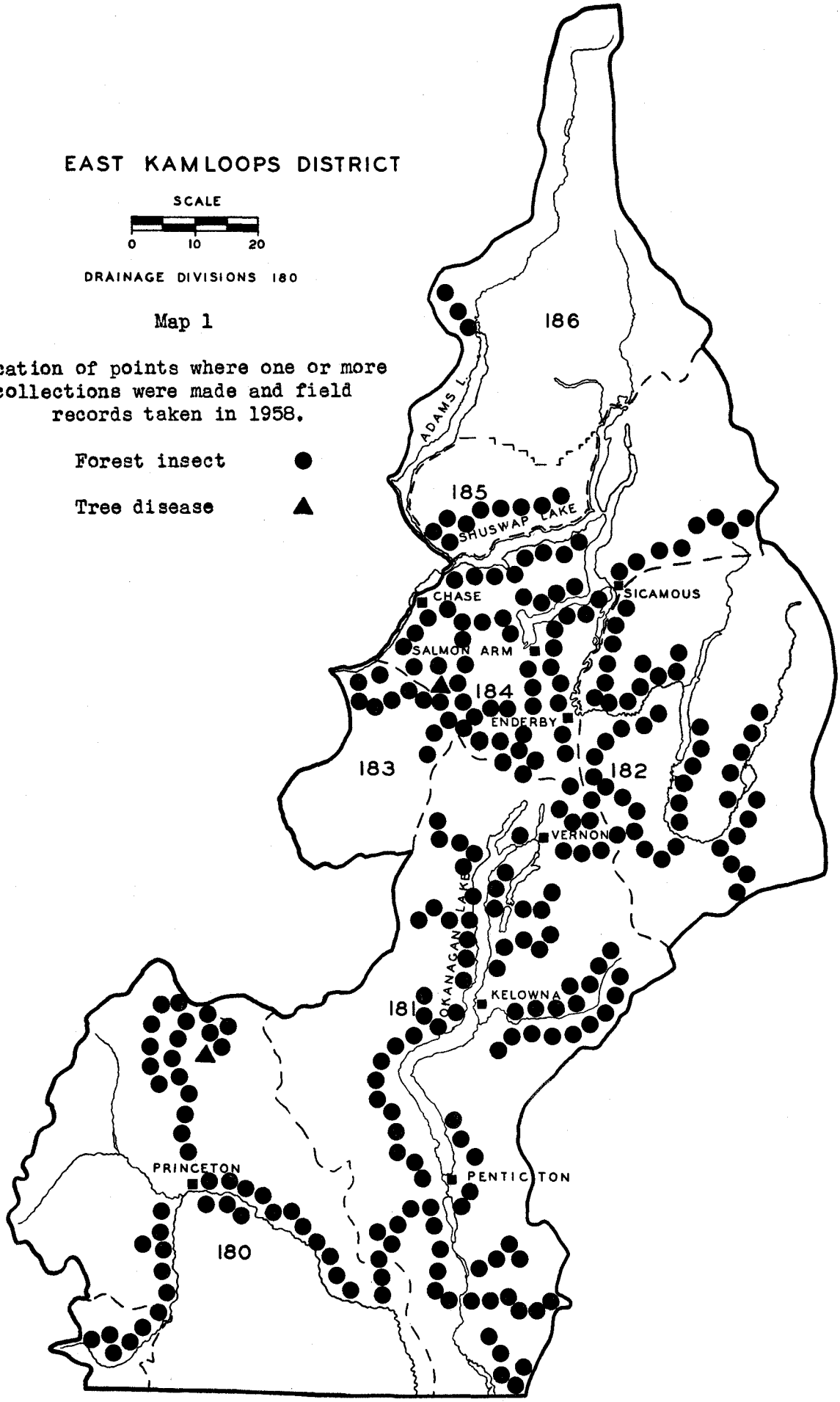
DRAINAGE DIVISIONS 180

Map 1

Location of points where one or more collections were made and field records taken in 1958.

Forest insect ●

Tree disease ▲



# EAST KAMLOOPS DISTRICT

SCALE

0 10 20

DRAINAGE DIVISIONS 180

Map 2

Areas within which satin moth infestations occurred in 1958.

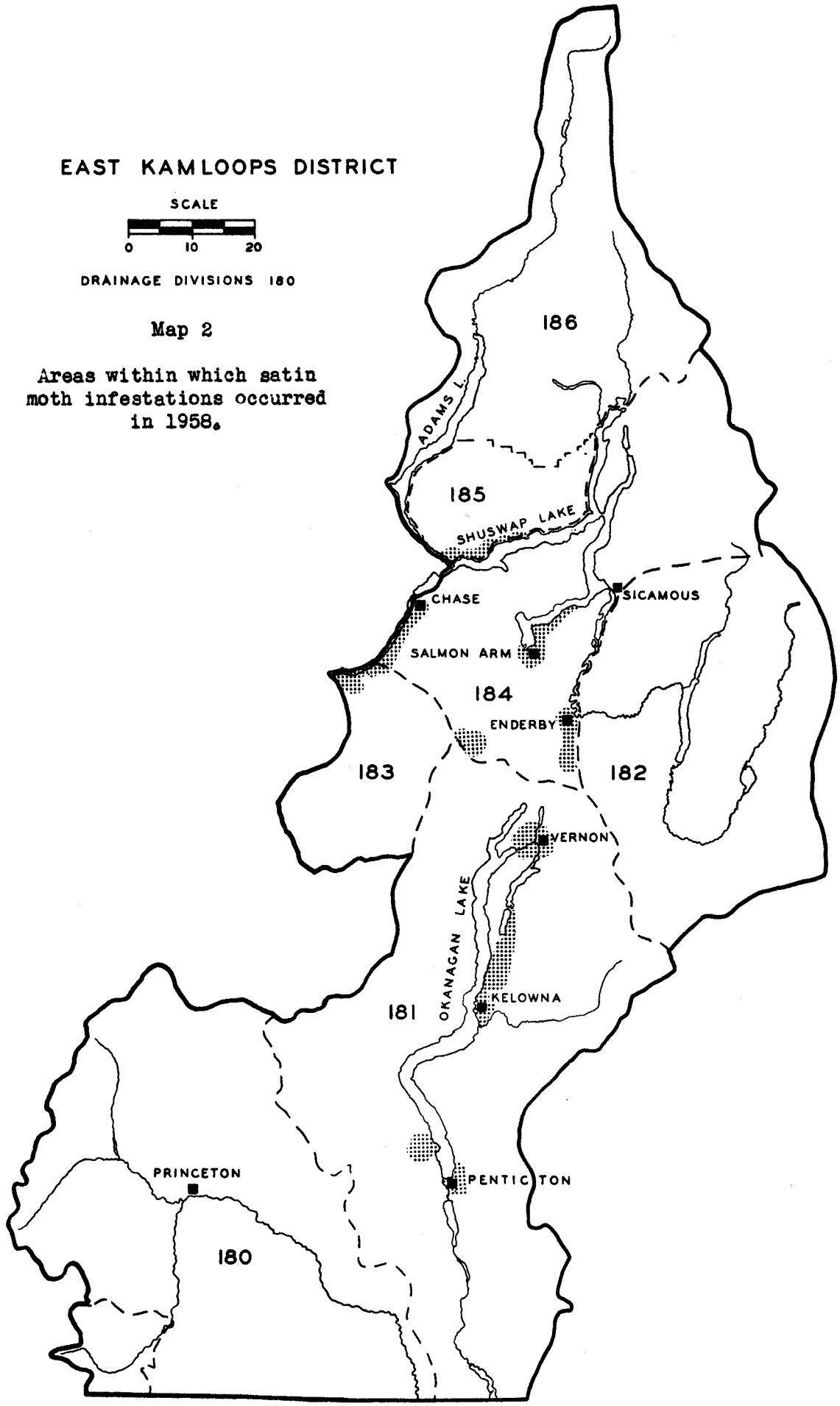


Figure 1. A cocoon of Retinodiplosis sp. that causes damage to the terminal growth of ponderosa pine, Monte Creek. East Kamloops District 1958. J. Obana

Figure 2. Needles of ponderosa pine infested by pine needle scale, Phenacaspis pinifoliae (Fitch) Vernon, East Kamloops District 1958.
J. C. Holms

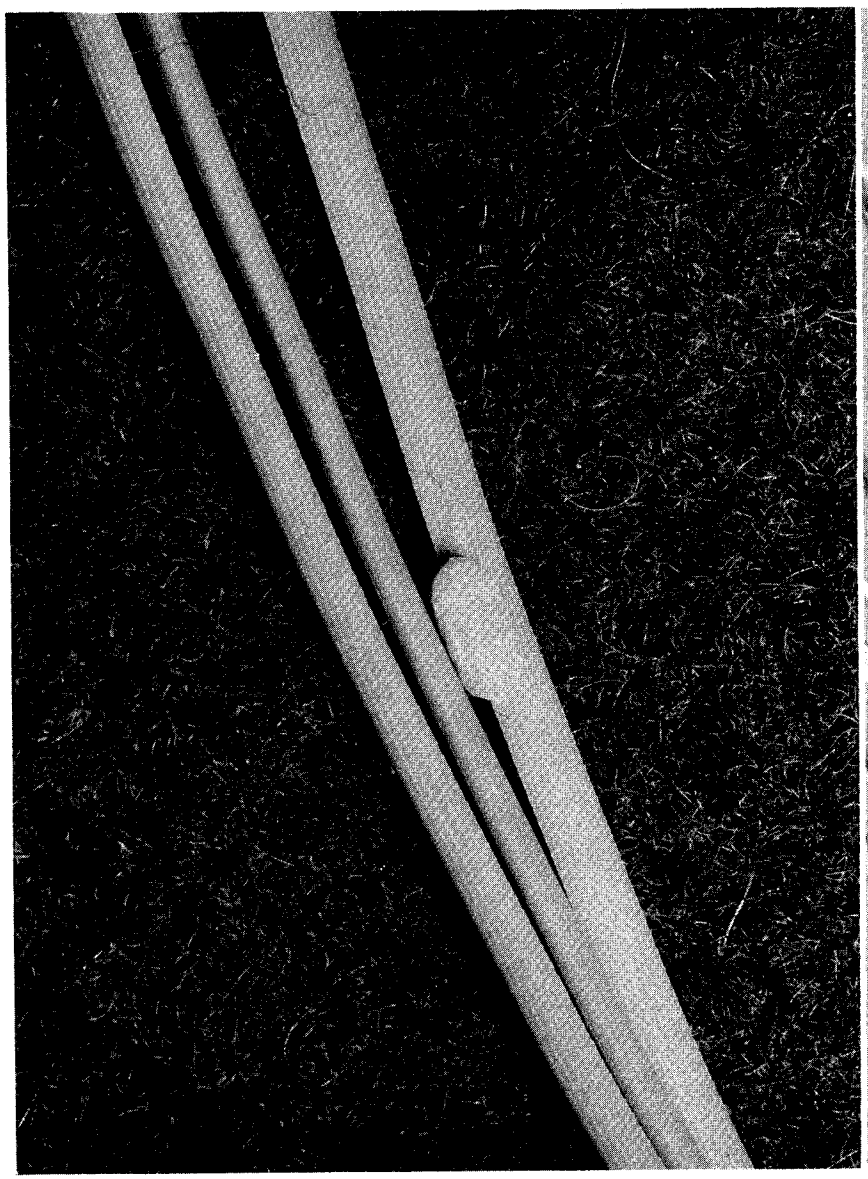
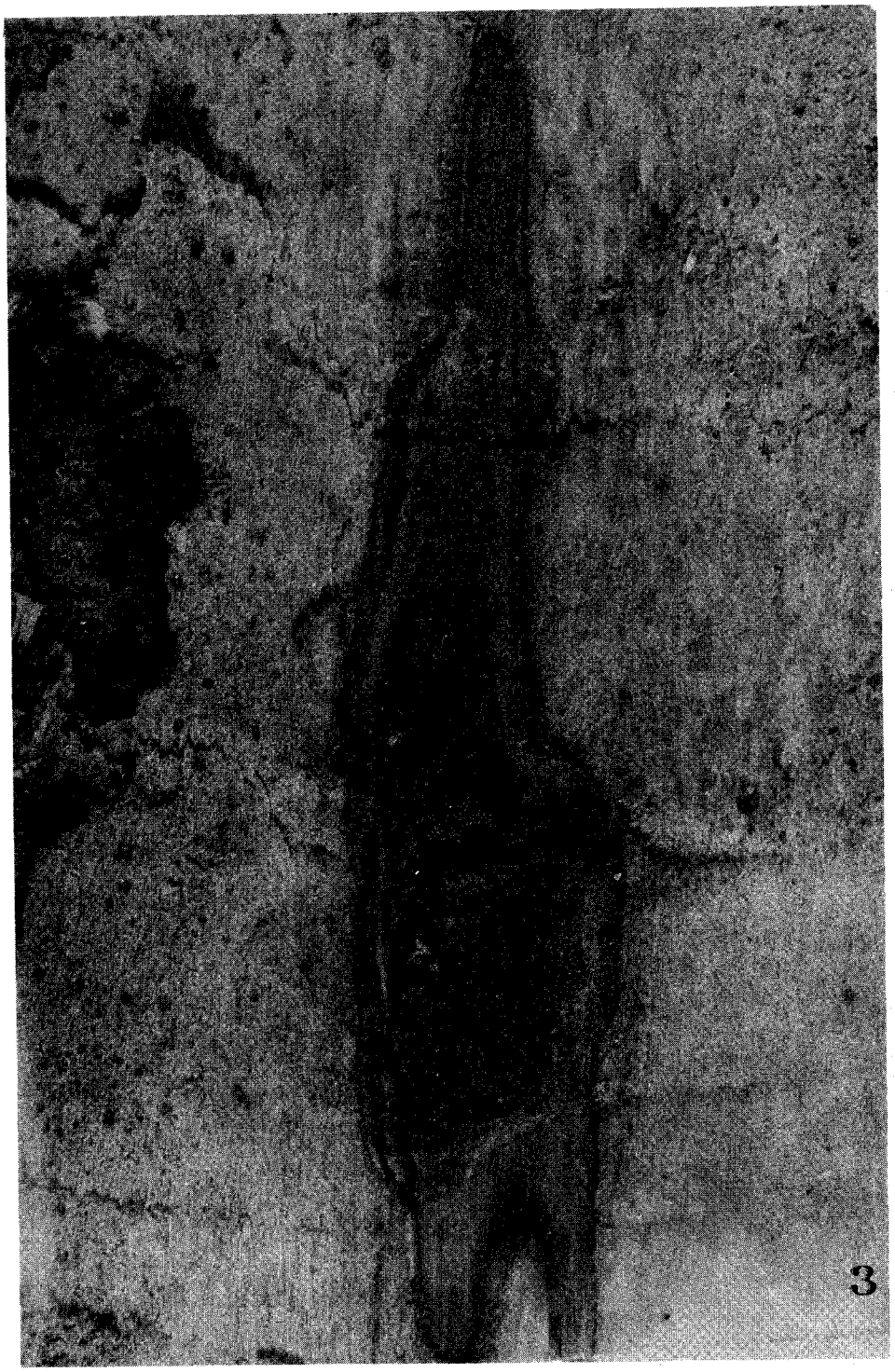


Figure 3. The outer bark removed from an alpine fir tree to show a lesion caused by Leptographium sp. spreading out from a gallery of the western balsam bark beetle, Dryocoetes confusus Sw. The length of the lesion is 3 1/2 inches. Bolean Lake, East Kamloops District November 13, 1958. J. C. Holms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# ANNUAL REPORT OF FOREST BIOLOGY RANGERS

# BRITISH COLUMBIA

# 1958

# NELSON FOREST DISTRICT

# FOREST BIOLOGY SURVEY

# NELSON FOREST DISTRICT

# 1958

J. Grant

## INTRODUCTION

In 1958 there were two changes in Forest Biology Ranger personnel in the Nelson District. In East Nelson, R. J. Andrews succeeded J. Y. Obana; D. H. Ruppel was again assigned to Central Nelson, but was transferred to the Victoria Laboratory late in August. J. Grant conducted the survey in the West Nelson District.

A decline in the numbers of the Engelmann spruce beetle was apparent in 1958, although depredations continued in two localities in East Nelson. There was an increase in damage caused by the Douglas-fir beetle but losses were not severe. The mountain pine beetle killed more white pine in the Central Nelson District than in recent years, but damage elsewhere was relatively light.

Defoliators caused no noteworthy damage in 1958. Black-headed budworm populations declined, as did those of the hemlock sawfly in most localities.

A heavy infestation of the aspen leaf-miner affected trembling aspen stands over most of the District, except the southeastern corner.

Foliage diseases of conifers were more prevalent in 1958, than in any period in recent years. Douglas-fir needle cast caused considerable discoloration in several localities, and western larch needle cast was severe in many parts of its host's range. Ponderosa pines in the Grand Forks and Kettle Valley Ranger districts were heavily infected by a needle cast disease.

A die-back disease of Douglas fir caused some concern in the Christmas tree industry in the East Nelson District. Mature Douglas firs in several localities in Central Nelson District were infected by a root rot which killed some trees, and apparently predisposed others to attack by bark beetles.

Considerable mortality of alpine fir at high elevations along Upper Arrow Lake is thought to be caused by a fungus disease associated with the western balsam bark beetle.

The assistance and co-operation of British Columbia Forest Service, National Parks Service and forest industries personnel is gratefully acknowledged.

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST NELSON DISTRICT

1958

# FOREST BIOLOGY SURVEY

# WEST NELSON DISTRICT

1958

J. Grant

## INTRODUCTION

Field work in the West Nelson District began on May 20 and terminated on October 23. Between these dates, and particularly towards the end of the season, other assignments necessitated absences totaling approximately seven weeks.

Two hundred and twenty-six forest insect collections and 12 tree disease collections were made. These are listed by hosts in Table 1. Map 1 shows the localities where one or more forest insect or tree disease collections were made.

Table 1

Collections by Hosts
West Nelson District - 1958.

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| cedar, western red | 1 | 1 | alder spp. | 7 | - |
| Douglas fir | 51 | 4 | aspen, trembling | 12 | - |
| fir, alpine | 11 | 4 | birch, western white | 8 | - |
| fir, grand | 7 | - | cherry, bitter | 1 | - |
| hemlock, western | 15 | - | cherry, choke | 1 | - |
| larch, western | 12 | - | cottonwood, black | 7 | - |
| pine, lodgepole | 26 | 2 | elder, blueberry | 1 | - |
| pine, ponderosa | 24 | - | hazel | 1 | - |
| pine, western white | 5 | - | willow spp. | 6 | - |
| spruce, Engelmann | 10 | 1 | miscellaneous | 20 | 1 |
| | | | Total | 64 | 1 |
| Total | 162 | 11 | Grand total | 226 | 12 |

## STATUS OF INSECTS

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

No noteworthy damage is known to have been caused by the Engelmann spruce beetle in 1958. The infestation at Nun Creek in the Creston District is believed to have subsided completely and most of the merchantable timber in the vicinity has been logged.

The bark beetle population in Monk Creek Valley remained at a very low level in 1958; no currently infested trees were found during a ground survey in September.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The mountain pine beetle caused only minor damage in 1958. A light infestation was discovered on the Boundary Sawmills Management License, where scattered small groups of dead lodgepole pine trees ranging in size from 6 to 14 inches d. b. h. were observed in the valley of Windfall Creek. Approximately 150 trees over four square miles had been killed prior to 1958. Although the trees attacked in 1958 had begun to fade when the survey was made in October, they were indistinguishable at a distance among the yellow foliage of western larch which comprised a large part of the stand; consequently the current year's losses could not be accurately determined. They were believed to be light.

No new attack was found at Damfino Creek in 1958, where a small population of bark beetle has barely maintained itself in recent years.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Populations of the Douglas-fir beetle appeared to be increasing although losses continued to be light. Small groups of "red-tops" were more numerous in the Kettle River Valley north of Westbridge than they have been in the past three years; a total of 58 Douglas-fir trees believed to have been killed in 1957, was counted in this area. Most of the attacks were close to logging operations, but near State Creek 14 trees in an undisturbed stand were killed by bark beetles in 1958.

Small groups of infested trees were observed near Barnes Creek and Snowshoe Lake in Edgewood Ranger District, and along the Pend d'Oreille River east of Waneta. In the latter locality, there was evidence that the infested trees had been weakened by disease, presumably a root rot.

Oregon Pine Engraver, Ips oregoni (Eich.)

Ponderosa pines in two localities in the Kettle River Valley were infested by the Oregon pine engraver. Two miles south of Westbridge, approximately 90 trees ranging from 2 to 12 inches d. b. h. were killed on a farm wood-lot where the majority of the pines had been logged. Tree-tops left on the site after logging had been heavily infested and undoubtedly had provided an ideal breeding ground for the beetles. In the same locality, an additional 50 trees were killed by engraver beetles under similar circumstances.

Near Grand Forks, two groups of ponderosa pines comprising about 30 trees were infested in 1958. The cause of these infestations was uncertain as there had been no obvious disturbance of the stand in the vicinity.

At both the Westbridge and Grand Forks infestations the attack in the larger trees was usually restricted to the part of the bole that was within the crown. In some cases it was 15 to 20 feet above the ground; consequently the detection of infested trees was difficult until the foliage had become discolored or woodpecker activity attracted attention.

Black-headed Budworm, Acleris variana (Fern.)

Approximately one third of the beating collections taken before mid-July from Engelmann spruce, western hemlock and true firs contained black-headed budworm larvae. Populations were generally low and no defoliation was observed. The maximum number of larvae taken in one 3-tree sample was 25; this collection was from grand fir, at an elevation of 4,600 feet on Leadville Creek.

Two hundred early-instar larvae were hand-picked near Balfour on June 13 for disease experiments at the Sault Ste. Marie Insect Disease Laboratory.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

Over most of the District, populations of the aspen leaf-miner remained near the 1957 level. Increases occurred in the Kettle Valley and Creston districts.

The sampling technique was similar to that used in 1957. Two 12-inch branches were cut from each of five trees, and the total number of infested and uninfested leaves recorded. Table 2 shows the results of leaf examinations in four localities.

The Barnes Creek and Grand Forks levels of infestation were within three per cent of the 1957 figure whereas the Damfino Creek infestation increased from 24 to 62 per cent of leaves infested. No samples were taken at Greenwood in 1957.

Development of leaf-miners was earlier than in 1957, probably as a result of unusually warm temperatures that prevailed through most of May. At Grand Forks, all miners had pupated by May 22, 1958, while at the same site on May 29, 1957, six per cent of the population were still in the larval stage. At Damfino Creek, all pupae were empty on July 11, 1958; on the same date in 1957, four per cent of the living pupae had not produced adults.

At Grand Forks on May 22, a young trembling aspen tree 10 feet in height was stripped of its leaves in an experiment to determine whether or not leaf-miners would attack the second crop of leaves. When the site was revisited on July 16, the tree had leafed out again and approximately 15 per cent of the leaves contained mines. All of the larvae had died from undetermined causes. Successful development was

observed in other localities, long after the majority of the population had reached maturity. At Creston on July 20, eggs, larvae, and pupae were found on "sucker" growth which was still producing new foliage, and on July 21, larvae and pupae were present in similar growth at Wynndel. On July 16, eggs and young larvae were found on new aspen leaves at Christina Lake. In all of these localities the peak of the larval period was in the latter part of May.

Table 2

Number of Trembling Aspen Leaves Examined, Percentage of Leaves Mined by the Aspen Leaf-miner, and Stage of Insect Present in Four Localities, West Nelson District, 1958.

| Locality | Date | No. of leaves examined | Percentage infested | Stage present, percentage | | |
|---|---|---|---|---|---|---|
| | | | | Larvae | Pupae | Adults |
| Grand Forks | May 22 | 527 | 31.4 | 0 | 100 | 0 |
| Greenwood | May 30 | 493 | 64.5 | 2 | 98 | 0 |
| Barnes Creek | June 20 | 437 | 97.7 | 0 | 71 | 29 |
| Damfino Creek | July 11 | 627 | 62.2 | 0 | 0 | 100 |

A Poplar Leaf-miner, Phyllocnistis sp.

Black cottonwood trees throughout the lower valleys in Edgewood Ranger District were heavily infested by leaf-miners. At Whatshan Lake, 89 per cent of the leaves were mined. Two-thirds of the population had reached the adult stage in this locality on June 19.

Light infestations were observed in cottonwoods growing near Christina Lake and in the Creston region.

A Hemlock Sawfly, Neodiprion sp.

The only known sawfly infestation in the District in 1958 was at Leadville Creek, northeast of Kitchener. Medium defoliation of western hemlock extended along the stream for one and one half miles, and from the valley bottom at 3,800 feet elevation, up to 4,600 feet. In contrast to the usually "patchy" defoliation caused by this sawfly, the feeding had been remarkably uniform, and the foliage of overmature and young trees alike had been noticeably thinned.

On July 23, two standard 3-tree samples from understory hemlock at 3,800 and 4,200 feet elevation yielded, respectively, 128 and 390 sawfly larvae. As cocooning had already begun, these figures do not give an accurate measure of the population.

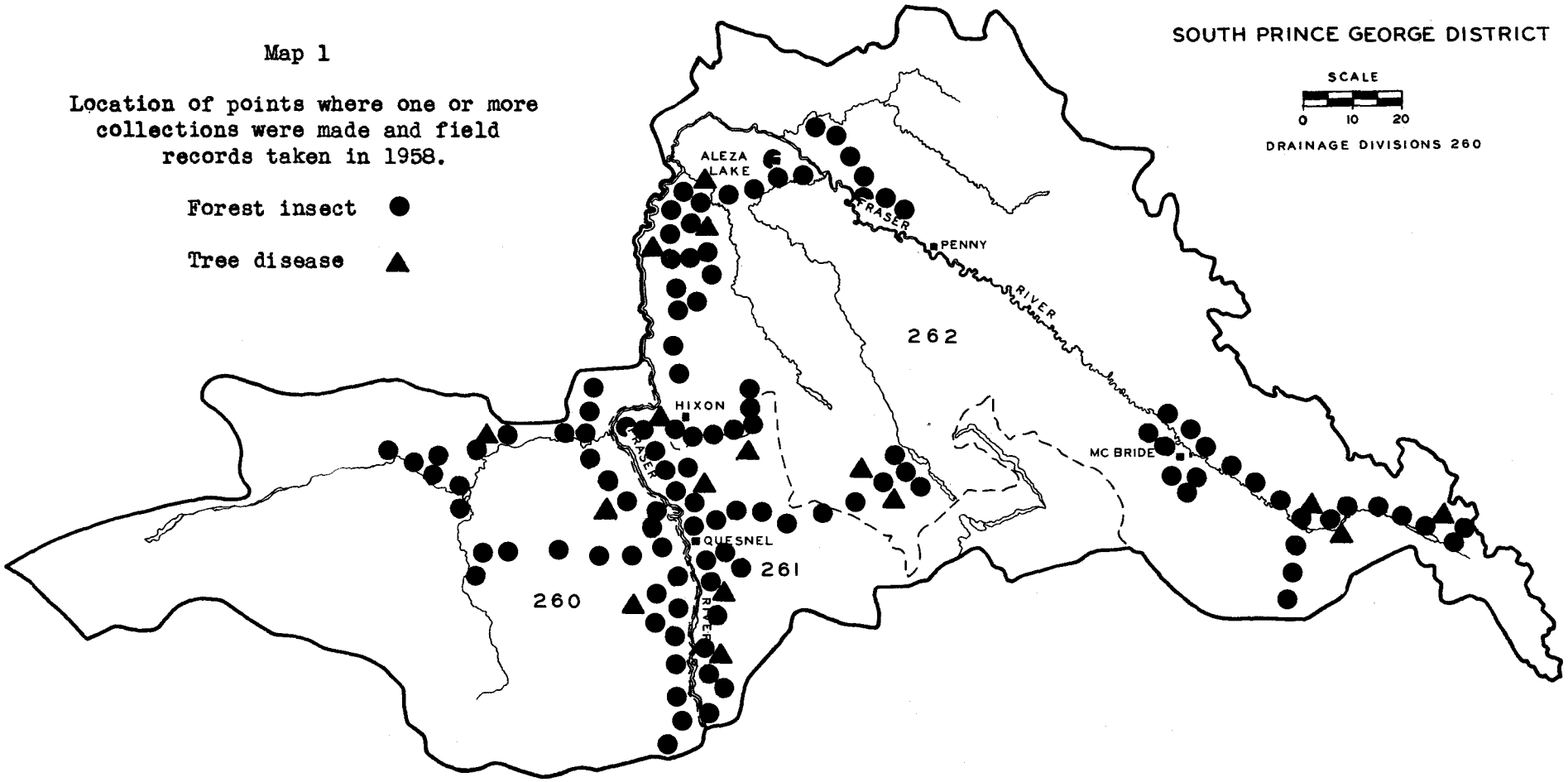
Light defoliation caused by scattered sawfly colonies was observed on western hemlock trees near Snowshoe Lake, and 17 miles south of Nelson.

Map 1

Location of points where one or more collections were made and field records taken in 1958.

Forest insect ●

Tree disease ▲



Sawflies on Douglas Fir, Neodiprion spp.

In 1958, mature Douglas-fir trees near Kuskanook were again partially defoliated by sawfly larvae. Damage was restricted to the forest fringe for about one half mile south of the settlement.

Although no damage was observed elsewhere in the District, sawfly larvae were of frequent occurrence in collections taken from Douglas fir. Exactly one half of the forty-two 3-tree beating samples taken between May 21 and July 15 contained one or more species of the genus Neodiprion.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

In 1958 there was no change in the light infestations of lodgepole pine near Beaverdell and Kitchener.

Most of the immature lodgepole pine trees on a gravelly bench near Westbridge were infested. In late summer the death of approximately 10 per cent of the stand was attributed to the combined effects of a heavy scale population, and an unusually hot, dry season.

A light infestation was discovered in the valley of Big Sheep Creek, west of Rossland. It was restricted to lodgepole pine trees growing on the gravelly valley bottom.

Black Pine Leaf Scale, Nuculaspis californica (Cole.)

Specimens of the black pine leaf scale were collected from a few ponderosa pines near Cascade. This is apparently the first record for the Nelson Forest District.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Black cottonwood trees and willows along the valley bottom from the south end of Kootenay Lake to the International Boundary were again infested by this introduced pest. A group of mountain alders on the lake shore near Taghum were attacked.

Douglas-fir Needle Miners, Contarinia spp.

The infestation near Christina Lake subsided in 1958.

A Pine Root Weevil, Hylobius probably warreni Wood

A few lodgepole pine saplings up to four inches d. b. h. were killed by weevil larvae in the Kettle River Valley north of Westbridge. Adults reared from two pupae collected on July 10 were Hylobius warreni Wood.

At Damfino Creek an examination of root collars of mature lodgepole pines killed by mountain pine beetles in 1956 and 1957 revealed that some

trees had been injured by weevils prior to the bark beetle attack. A few Engelmann spruce trees on the same site had suffered varying degrees of root girdling.

A Pine Shoot Borer, Eucosma sonomana Kft.

At Cascade, approximately 25 per cent of the young ponderosa pines less than 25 feet in height were infested by this shoot borer. Development was earlier than in 1957; on June 3 some larvae were almost fully grown and the mined leaders were beginning to show the first signs of wilting.

The affected stand at Cascade is on the northern fringe of a severe infestation which is centered near the confluence of the Columbia and Kettle rivers in the State of Washington.

A Woolly Aphid on Western Larch, Adelges oregonensis Annand

In June, open grown western larches over several square miles between Rock Creek and Camp McKinney were infested by woolly aphids. The insects were so abundant that the normal bright green of the foliage was suffused with white. Douglas-fir, lodgepole and ponderosa pine trees were not infested.

Leaf-eating Beetles, Altica spp. and Galerucella sp.

Leaf-eating beetles were unusually numerous in 1958. Mountain alders were completely skeletonized by Altica sp. along Boundary Creek between Eholt and Midway, and at several localities from Creston to Kitchener; by mid-July most of the skeletonized leaves had fallen and some groups of trees were bare. Beetles of this genus damaged the foliage of lakeshore cottonwoods in Creston Ranger District.

Larvae of Galerucella sp. skeletonized willow foliage in the Kettle River Valley above Westbridge, along Lower Arrow Lake, and at several localities near Creston. In August, adults caused slight damage to trembling aspens growing near heavily infested willows.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

In 1958, this looper was more abundant than in 1957, although nowhere was a high population encountered. Twenty per cent of all random collections taken from conifers in June and July contained one or more hemlock looper larvae.

Striped Alder Sawfly, Hemichroa crocea (Four.)

Although local infestations occurred in the vicinity of Kootenay Lake in 1956 and 1957, no damage was observed nor larvae collected in 1958.

A Noctuid on Elderberry, Zotheca tranquilla Grt.

For the second successive year, blue-berried alders in several localities around Creston were defoliated by this noctuid. Defoliation was not as complete as in 1957.

A Noctuid on Sumac, Marathyssa inficita Wlk.

Smooth sumac bushes five miles east of Grand Forks were infested. By June 27 most of the larvae were fully grown and sumac on about four acres had been 85 per cent defoliated.

Cicadas, ? Platypedia areolata (Uhl.) and ? Okanagana bella Davis

In 1959, damage to trees and shrubs caused by oviposition of cicadas was unusually severe in a few localities near Grand Forks. By May 22, the insects were abundant and egg-laying had begun. Western white birch, ocean-spray spiraea, hazel, snowbrush, nine-bark, thimbleberry, and wild rose were the species most commonly damaged at Christina Lake. The concentration of egg pockets in small branches frequently caused dieback, while birch trees were noticeably disfigured by the breakage of branch ends. On one representative sample from white birch, four lineal feet of lateral branches contained 134 individual egg pockets. Although two species of cicada were present, the smaller one, tentatively identifed as Platypedia areolata (Uhl.), is thought to be responsible for most of the damage. The larger species, believed to be Okanagana bella Davis, was less common, and appeared later in the season.

Larch Sawfly, Pristiphora erichsonii (Htg.)

No larch sawfly larvae were encountered in 1958.

## STATUS OF TREE DISEASES

Douglas-fir Needle cast

Heavy infection of Douglas-fir foliage in 1957 caused by Rhabdocline pseudotsugae Syd. resulted in conspicuous discoloration of stands in the Grand Forks Ranger District, early in the spring of 1958. The most severe damage occurred in the vicinity of Number 3 Highway between Grand Forks and Eholt; lighter infections were noted in the Granby River Valley 30 miles north of Grand Forks and at several places along the Cascade Highway. Even within areas of severe infection, the incidence of attack was variable and ranged from 5 to 85 per cent of the 1957 foliage, irrespective of tree size.

Needle Cast of Ponderosa Pine

Discoloration of ponderosa pine foliage caused by Elytroderma deformans (Weir) Darker was prevalent in several localities in the southwestern parts of the District. An estimated 80 acres of open pine forest was affected along the Morrissey Lookout road east of Grand Forks, and patches of infected trees ranging up to several hundred acres were noted in the Kettle Valley Ranger District.

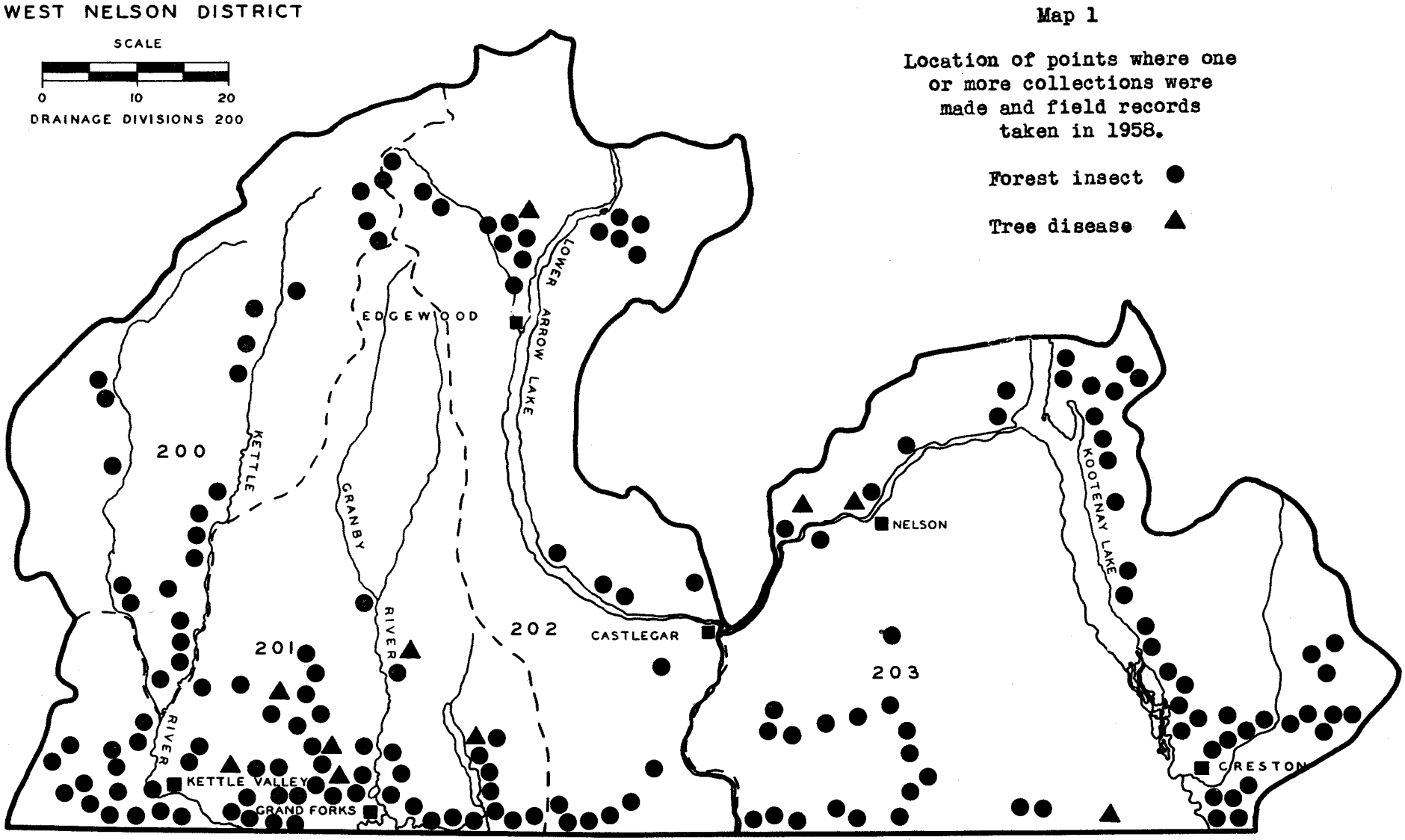
Larch Needle Cast

Western larch trees growing over several square miles near Camp McKinney were subject to an unusually heavy infection of Hypodermella laricis Tub. Up to 80 per cent of the foliage of dense reproduction was killed. Less severe infections were observed 8 miles east of Christina Lake, west of Rossland, and at several localities in the southern part of Creston Ranger District.

Dwarf Mistletoe on Western Larch

In 1958 a survey was undertaken to determine the range of larch mistletoe Arceuthobium campylopodum f. laricis Jones in the Nelson Forest District and the severity and effect of the infections. This survey will be continued in 1959. In 1958 it was established that mistletoe infections of economic importance were widespread, but not of general occurrence in the District; the parasite was not found west of the Midway Mountains.

Engelmann spruce and alpine fir trees in the understory of infected larch stands near Grand Forks and in the Edgewood Ranger District, occasionally had mistletoe plants on branches or stems. It was noted that, although alpine fir trees appeared to be accidental hosts, the mistletoe plants on firs were often more vigorous than those on neighbouring larches. This vigor, coupled with the alpine fir's dense habit of growth which probably favors re-infection of the host tree, was probably responsible for the large number of infections on individual trees.


WEST NELSON DISTRICT
SCALE
0
10
20
DRAINAGE DIVISIONS 200
Map 1
Location of points where one or more collections were made and field records taken in 1958.
Forest insect
Tree disease
EDGEWOOD
LOWER ARROW LAKE
KETTLE
GRANBY
RIVER
200
201
202
203
CASTLEGAR
NELSON
KOOTENAY LAKE
KETTLE VALLEY
GRAND FORKS
CRESTON

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

CENTRAL NELSON DISTRICT

1958

# FOREST BIOLOGY SURVEY

# CENTRAL NELSON DISTRICT

1958

D. H. Ruppel

## INTRODUCTION

Survey work in the Central Nelson District started the last week in April and continued till late August when the ranger for the district, D. H. Ruppel, was transferred to the coastal region. One week was spent in the East Nelson District in July, and in August one week was spent in the South Vancouver District on the spruce budworm survey at Pemberton. The early departure of the ranger prevented completion of observations on some insect outbreaks mentioned in the text.

Four hours flying time contracted by Vernon Laboratory was used in reconnaissance flights in this district. On August 5, the first flight proceeded from Nakusp to Burton, Burton Creek, Little Slocan River, the west side of the Slocan Valley and Slewiskin Creek to Nakusp. On August 6, a second flight was made from Nakusp along the west side of Upper Arrow Lake to Galena Bay, Halfway Creek, Kuskanax Creek to Nakusp. Flying weather was good but rough terrain prevented low flying.

The numbers of forest insect and tree disease collections by hosts taken in the Central Nelson District are listed in Table 1. Map 1 shows the location of points where one or more collections and field records were taken in 1958. Of the 19 tree disease collections shown in Table 1, 15 samples were identified locally to genus or species, one was cultured, one retained for the plant file and two sent to Ottawa for identification.

## STATUS OF INSECTS

### Black-headed Budworm, Acleris variana (Fern.)

The number of collections containing black-headed budworm decreased in Central Nelson District in 1958. A light infestation was present on western hemlock from Kaslo to Trout Lake, Slocan to Wilson Lake, Wilson Creek, Beaver River and Jordan River. A medium infestation was present along the lower portion of Keen Creek and south of Kaslo early in the larval feeding period but by July 22 had decreased to a very low level. The Keen Creek area had supported an appreciable population of budworms longer than any other area over the last few years.

The black-headed budworm did no serious damage in the district in 1958 and will probably remain at a very low level in 1959.

Table 1

Collections by Hosts

Central Nelson District 1958.

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| cedar, western red | 21 | - | alder spp. | 7 | - |
| fir, alpine | 5 | 1 | aspen, trembling | 14 | - |
| Douglas fir | 32 | 3 | birch, western white | 6 | - |
| hemlock, western | 67 | - | cherry, choke | 1 | - |
| larch, western | 9 | 5 | cherry, pine | 2 | 1 |
| pine, lodgepole | 4 | - | cottonwood, black | 12 | 1 |
| pine, ponderosa | 3 | - | poplar, silver | 1 | 2 |
| pine, western white | 25 | 2 | willow spp. | 5 | - |
| spruce, Engelmann | 13 | - | miscellaneous | 13 | 4 |
| | | | no host | 2 | - |
| | | | Total | 63 | 8 |
| Total | 179 | 11 | Grand Total | 242 | 19 |

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

The average number of western hemlock looper larvae per collection increased slightly compared with 1957. Map 2 indicates the location of points where this insect was collected and the intensity of the infestation. Western hemlock was the principal host but larvae were also found on western red cedar and western white pine. Sixteen collections containing this insect averaged 2.3 larvae per collection. In 1957 an average of 1.5 larvae was obtained from 14 collections containing hemlock loopers.

A medium infestation occurred on lower Keen Creek where a standard 3-tree beating sample of western hemlock contained 24 early instar larvae in June. Late in July, near the end of the feeding period, 112 larvae were obtained from 20 hemlock trees in the same location. This would be an average of 16.8 larvae per 3-tree sample. From one to 20 larvae were found on each tree.

Hemlock loopers were not found north of Revelstoke.

No serious damage was caused by the western hemlock looper in 1958 but larval populations indicate a further increase in 1959, especially in the hemlock and cedar stands in the Kaslo area.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

A general increase in bark beetle activity was noted in western white pine throughout the Upper Arrow Lake region as far north as Frisby Creek on the Columbia River, the Slocan Valley, Hoder Creek and Beaver River. Table 2 shows localities, area, and numbers of "red-topped" trees observed. Figures were obtained by ocular estimate and the presence of bark beetle verified by spot checks.

Most attacked trees in the "pole-sized" category were in areas where "pole blight", white pine blister rust, and associated pathological agencies have been prevalent. In many cases it was felt the beetle attack was too light to have killed the trees without their being weakened by other agents. Beetle attacks on mature and over-mature pines were not associated with the above factors.

No strips were run on which to base next year's forecast. If the hot dry summer of 1958 favoured bark beetle development, further damage may be anticipated.

Table 2

Estimated Acreages and/or Visual Counts of Western White Pine Killed by the Mountain Pine Beetle in 1957 and Observed as "Red-topped" Trees in 1958 in Central Nelson District.

| Locality | Approximate area in acres | Numbers of "red-topped" pines | Remarks |
|---|---|---|---|
| West of Arrow Park | 1,920 | 350 | pole-sized |
| Arrowpark Creek | - | 75 | pole-sized, 5 small groups |
| Nakusp, 10 mi. N. on both sides of Upper Arrow Lake | 16,000 | 550 ± | pole-sized |
| Stoney Creek, P. O. | 10 | 30 | mature & over-mature |
| Revelstoke to Frisby Creek | 12,800 | 175 | mature & over-mature |
| Halfway Creek | - | 360 | mature |
| Cranberry Creek | - | - | pole-sized, light but active |
| Shelter Bay | - | 120 | pole-sized, light but active |
| Galena Bay | - | - | pole-sized, light but active |
| Fosthall to Pingston Creek | 6,400 | 550 ± | pole-sized, light but active |
| Hoder Creek | - | 35 | mature & over-mature |
| Slocan Lake, west side | - | - | pole-sized, light & scattered |

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The Douglas-fir beetle was more common in standing Douglas-fir trees and continued to be numerous in logs and slash.

A tally of Douglas-fir trees on an 8-chain strip through a small outbreak six miles north of Nakusp revealed the following:

| | |
|---|---|
| Green and healthy trees | 83 |
| Green infested | 5 |
| Red-topped | 15 |
| Old grey | 2 |

The outbreak appeared to be the result of windthrow and unsanitary salvage logging.

On the north end of Perry Ridge at Slocan, one third of the fir trees on an irregular 10-chain strip were freshly attacked in early spring. The area was promptly logged and a subsequent visit in midsummer revealed very few beetle-infested trees in the immediate locality.

An infestation on lot 445, near the mouth of Cranberry Creek, was first noted early in 1957. By late fall of 1957 many infested trees had not perceptibly changed colour and the remainder had a slight yellowish tinge to the normal green. It appeared as if most trees would recover, some having "pitched out" the attack and others having retained healthy cambium on one side of the bole. However, by August 1958 the trees had been re-infested and killed. Most were "red-topped" and some of these had dropped most of their foliage. Approximately 100 fir trees 14 to 28 inches d. b. h. and 90 to 110 feet in height were killed. The host tree is now very scarce in the immediate vicinity.

In the area where the Slocan Highway crosses Enterprise Creek a number of Douglas-fir trees infected with Poria root rot, and other diseases were infested in varying degrees by the Douglas-fir beetle and secondary bark and wood-boring insects. The beetle attack was a contributing factor in the death of some trees but appeared to be of insufficient intensity to have killed the trees without accompanying agents. Elsewhere in the Slocan and Upper Arrow lakes regions a similar condition exists.

Although the Douglas-fir beetle is a continuing threat in the district direct losses to date have been light.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Damage to Engelmann spruce appears to be at a low level in the district at present.

Engelmann spruce were attacked by the spruce beetle at Watson and Russel creeks on the Little Slocan River watershed which comprises Forest

Management License No. 3. An aerial survey indicated that there were small numbers of dead spruce scattered through most of the mature spruce stands in the area.

Heavy mortality of Engelmann spruce was observed along the upper Beaver River in Glacier National Park. A 1.25 mile strip on a poor site had 62 healthy and 59 dead spruce trees. A 0.5 mile strip on a good site had 11 dead and 63 healthy spruce stems. The strip extended about one chain on each side of a trail and the trees were 12 to 36 inches d. b. h. Very little current activity was found. The damage probably occurred in the past 10 years.

Flat-headed Wood Borers, Buprestidae

At Mile 36, north of Revelstoke on the Columbia River, western hemlock which was killed by a ground fire in 1957 was heavily infested by flat-headed wood borers when the stand was visited in late July. Damage to fire-killed hemlock had progressed to the point where salvage for lumber was economically questionable. Other less abundant tree species had sustained similar damage. Many of the beetles may have originated in 1955 blow-down in adjacent areas. This blow-down is now badly deteriorated by wood-boring insects and rot.

A Hemlock Sawfly, Neodiprion sp.

Hemlock sawfly larvae on western hemlock were less common than in previous years. Most collections were obtained in the southern half of the district. Population foci were at Wilson, Keen, and Arrowpark creeks and Trout Lake. Noticeable defoliation of lower limbs occurred in areas of heavy and very heavy infestation but the damage was unimportant.

This insect is not expected to cause any serious damage in 1959.

Spruce Budworm, Choristoneura fumiferana (Clem.)

The spruce budworm was very scarce in the district in 1958. Only four larvae were collected in four samples. Hosts were western hemlock, Douglas fir, and Engelmann spruce.

A Beetle, Priacma serrata Lec.

Six adults of this beetle were collected between Sidmouth and Revelstoke in three collections. Household bleach on a cloth or log was used to attract the beetles. The specimens obtained showed up within a very few minutes after the bleach was put out.

Unknown Agency, possibly Western Balsam Bark Beetle, Dryocetes confusus Sw.

An aerial survey revealed that two areas comprising approximately 1,000 acres south of Ledge Creek and 1,280 acres on Pingston Ridge at about 5,000 feet elevation contained 20 to 30 per cent dead and dying trees. The affected trees were mostly alpine fir, Engelmann spruce, and lodgepole pine as well as other species present in the stands. These areas were very similar in appearance to the stands at McGillivray Lake where balsam bark beetle and a fungus disease were jointly responsible for the condition. No ground survey was made.

A Birch Leaf Blotch Miner, Lyonetia sp.

A small stand of western white birch at the south end of Trout Lake was heavily infested by this insect.

A Willow Leaf Blotch Miner, Lyonetia saliciella Busck.

Willows throughout the district were attacked in varying degrees by these blotch miners.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The aspen leaf-miner continued to heavily infest stands of trembling aspen in the district. Leaf counts indicated that 84 to 100 per cent of the leaves were infested and that most were mined in both surfaces.

Table 3 shows the percentage of leaves infested and the stages of the insect during each visit to the locality indicated. The number of larval and pupal parasites was noted. Samples of 50 leaves included five leaves from each of 10 branches obtained from five trees. Groups of leaves were chosen using a random numbers table.

Sampling points at Winlaw and Summit Lake were visited four times; the sampling point 5.8 miles south of the Illecillewaet River bridge was visited five times. In the first visit to the latter locality aspen buds were just beginning to open, although black cottonwood was almost fully leafed out. Leaves were considered infested if one or more eggs or mines of aspen leaf-miners were present. "Adults in flight" referred to in the table were Phyllocnistis sp. in flight or perching at the site. Eggs were found on sucker growth in July indicating the continuous presence of adults. No eggs were found at any time on mature foliage. Adults of Phyllocnistis sp. were netted on August 20. They were perching on a variety of understory conifers in a cool damp place some distance from an aspen stand.

Many eggs and larvae failed to develop. Aborted mines were hard to discern in the late larval period as many were obliterated. Their presence was determined by deduction only. Examination of pupal cases indicated that successful emergents were quite numerous.

Leaves damaged by leaf-miners dried out and dropped prematurely but the total effect on aspens is not known.

### A Poplar Leaf-miner, Phyllocnistis sp.

A leaf-miner of black cottonwood resembling the aspen leaf-miner was present in infestation proportions wherever the host occurred in the district. The upper crown seemed to be most heavily attacked. The foliage of most cottonwoods was discolored by leaf-miner feeding. The possible damage to trees has not been assessed but cottonwood leaves sustained more mining than aspen leaves without drying out. The infestation on cottonwood was generally less intense than on aspen in any locality.

Samples were collected from the lower crown as most cottonwoods were too large to fell indiscriminately. Sampling methods were similar to those described for the aspen leaf-miner.

Table 4 shows the percentage of black cottonwood leaves infested by poplar leaf-miners and the stage of the insect present at each visit to the locality is indicated. Five samples were collected 5.8 miles south of the Illecillewaet River bridge and four at Summit Lake (Slocan Valley). The first samples at the latter spot lacked sufficient foliage for a quantitative sample.

## STATUS OF TREE DISEASES

### Brown Stringy Rot of Alpine Fir

Fruiting bodies of Echinodontium tinctorium Ellis & Everh. were noted along the Beaver River in Glacier National Park. The incidence of conks on alpine fir was very low at Stoney Creek P. O. but increased steadily further up the river until 20 to 25 per cent of alpine firs 20 miles south of Stoney Creek were found to be infected by this important decay fungus.

### Needle Cast of Western Larch

Needle cast of western larch caused by Hypodermella laricis Tub. was very noticeable in reproduction stands on Koch Creek, a tributary of the Little Slocan River. Severe yellowing had taken place by late May.

### Root Rot of Douglas Fir

Root rot of Douglas fir caused by Poria weirii Murr. was very active in an area of about 750 acres straddling Enterprise Creek along the highway above Slocan Lake. In a 0.5 acre plot 20 per cent of 30 standing trees checked were dead. Blow-down was not counted. The stand

Table 3

Percentage of Trembling Aspen Leaves Infested by Aspen Leaf-miner and the Stage of the Insect Present at Each Visit to the Locality Indicated. Central Nelson District 1958.

| Locality | Date | No. of leaves examined | % leaves infested | Stage of Insect Present | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | No. of eggs present | Living larvae | Aborted mines | Living pupae | Dead pupae misc. | Dead pupae parasitized | Successful emergents | Adults in flight |
| 5.8 mi south Illecillewaet R. | April 29 | N.C.* | - | N.C.* | 0 | 0 | 0 | 0 | 0 | 0 | Yes |
| " | May 8 | 50 | 100 | 124 | 234 | 23 | 0 | 0 | 0 | 0 | Yes |
| " | May 22 | 50 | 100 | 0 | 41 | 89 | 96 | 5 | 5 | 0 | No |
| " | June 5 | 50 | 100 | 0 | 0 | 65 | 102 | 10 | 27 | 0 | No |
| " | June 20 | 50 | 100 | 0 | 0 | - | 0 | 2 | 36 | 114 | No |
| Summit Lake, Slocan | May 6 | 50 | 84 | 80 | 1 | 0 | 0 | 0 | 0 | 0 | Yes |
| " " " | May 15 | 50 | 98 | 18 | 99 | 1 | 0 | 0 | 0 | 0 | Yes |
| " " " | May 29 | 50 | 84 | 0 | 4 | 23 | 54 | 2 | 2 | 0 | No |
| " " " | June 12 | 50 | 96 | 0 | 0 | - | 45 | 5 | 12 | 0 | No |
| Winlaw | May 6 | 50 | 100 | 27 | 173 | 12 | 0 | 0 | 0 | 0 | Yes |
| " | May 15 | 50 | 100 | 0 | 116 | 39 | 0 | 0 | 0 | 0 | Yes |
| " | May 29 | 50 | 100 | 0 | 0 | 90 | 33 | 5 | 8 | 0 | No |
| " | June 12 | 50 | 98 | 0 | 0 | - | 26 | 2 | 22 | 32 | No |
| 9 mi. south Goldstream R. | June 3 | 50 | 100 | - | - | - | - | - | - | - | - |

* Not counted - foliage too young.

Table 4

Percentage of Black Cottonwood Leaves Infested by A Poplar Leaf-miner and the Stage of the Insect Present at Each Visit to the Locality Indicated. Central Nelson District 1958.

| Locality | Date | No. of leaves examined | % leaves examined | Stage of Insect Present | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | No. of eggs present | Living larvae | Aborted mines | Living pupae | Dead pupae misc. | Dead pupae parasitized | Successful emergents | Adults in flight |
| 5.8 mi. south of Illecillewaet R. | April 29 | 50 | 98 | 150 | 14 | 0 | 0 | 0 | 0 | 0 | Yes |
| " | May 8 | 50 | 82 | 5 | 123 | 10 | 0 | 0 | 0 | 0 | Yes |
| " | May 22 | 50 | 84 | 0 | 5 | 78 | 35 | 4 | 7 | 0 | No |
| " | June 5 | 50 | 88 | 0 | 0 | 69 | 36 | 2 | 13 | 0 | No |
| " | June 20 | 50 | 90 | 0 | 0 | - | 0 | 0 | 5 | 31 | No |
| Summit Lake, Slocan | May 6 | - | - | N.C.* | - | - | - | - | - | - | Yes |
| " " " | May 15 | 50 | 64 | 0 | 30 | 2 | 0 | 0 | 0 | 0 | Yes |
| " " " | May 29 | 50 | 78 | 0 | 17 | 25 | 29 | 1 | 0 | 0 | No |
| " " " | June 12 | 50 | 76 | 0 | 0 | - | 29 | 1 | 12 | 0 | No |

* Not counted - foliage too young

was about 110 years old and trees averaged 14 inches d. b. h. and 80 to 100 feet in height. Many trees were attacked by Douglas-fir bark beetles and other bark beetles but these were thought to be secondary. Some logging in the area may have encouraged the bark beetles. Annual increment in the stand has been very small for the past 30 to 40 years.

Root rot was also found along Trout Lake but did not appear to be active. Old blow-down was numerous in some places.

Shoestring Root Rot

The decline of many pole-sized stands in the Slocan and Upper Arrow lakes regions may be partly attributable to a root rot caused by Armillaria mellea (Vahl ex Fr.) Quél. Several hundred Douglas firs, lodgepole pines and western white pines east of Slocan were attacked by secondary bark and wood-boring beetles. All attacked trees examined showed evidence of root rot. The same condition was evident to a lesser extent at various scattered points. Armillaria is rarely considered to be a primary agent, however.

Unknown Agent, Possibly A Lesion - Causing Disease of Alpine Fir.

Under the heading of Western Balsam Bark Beetle, two areas were mentioned at Ledge Creek (1,000 acres) and Pingston Ridge (1,280 acres). These areas were not visited on the ground but resembled in appearance the area at McGillivray Lake where the above insect was found to be only partly responsible for mortality and had associated with it a phloem and cambium killing fungus capable of girdling and killing trees.

Drought

Drought was believed responsible for premature yellowing of foliage in August but no mortality of trees was found up to the end of August.

Dwarf Mistletoe

A survey of dwarf mistletoe, Arceuthobium campylopodum Engelm., on western larch was undertaken in 1958 with the hope of determining the direct effect on growth. Increment borings were taken from 10 trees in each of ten plots in the Central Nelson District. Information gained from these increments was not clear cut because of many other influencing factors impossible of interpretation.

During the sampling it became apparent that the abundance of visual symptoms, i. e. brooms, swellings, plants, etc. is not necessarily an indication of the intensity of mistletoe infection. Larch branches heavily laden with brooms and swellings are prone to wind and snow breakage and often when such breakage occurs no visual symptoms remain.

Open grown trees replace missing limbs by adventitious budding but close growing trees do not; this may account for the variation in crown length between various types of stands.

The effects of suppression and overstocking, disease, and insects were not accounted for. Mistletoe mother trees, the sources of infection, were evident in most stands. Old infected dominant trees were surrounded by traceable areas of younger stock where the infection was not so heavy as to blanket the area.

Table 5 lists the incidence of mistletoe infection and mortality of larch in the plots. There is probably a higher rate of infection than indicated by the table since plots were selected for comparison rather than as a sample of the area.

Considerable damage and loss of increment, which is not easily assessed, is being caused by mistletoe on larch.

Table 5

Incidence of Larch Mistletoe on Western Larch and Mortality Caused by this Agent. Central Nelson District 1958.

| Locality | No. of trees examined | Percentage of trees infected with larch mistletoe | Percentage mortality caused by larch mistletoe |
|---|---|---|---|
| 6.0 mi. N. of Nakusp | 25* | 64 | 8 |
| 2.6 mi.N.of Kuskanax Creek | 50 | 0 | 0 |
| Passmore | 50 | 80 | 8 |
| Lemon Creek | 50 | 0 | 0 |
| Lemon Creek | 50 | 18 | 0 |
| Kaslo | 50 | 84 | 2 |
| Fletcher Creek | 50 | 0 | 0 |
| Three Forks | 50 | 86 | 6 |
| New Denver | 50 | 98 | 18 |
| Silverton | 50 | 100 | 18 |

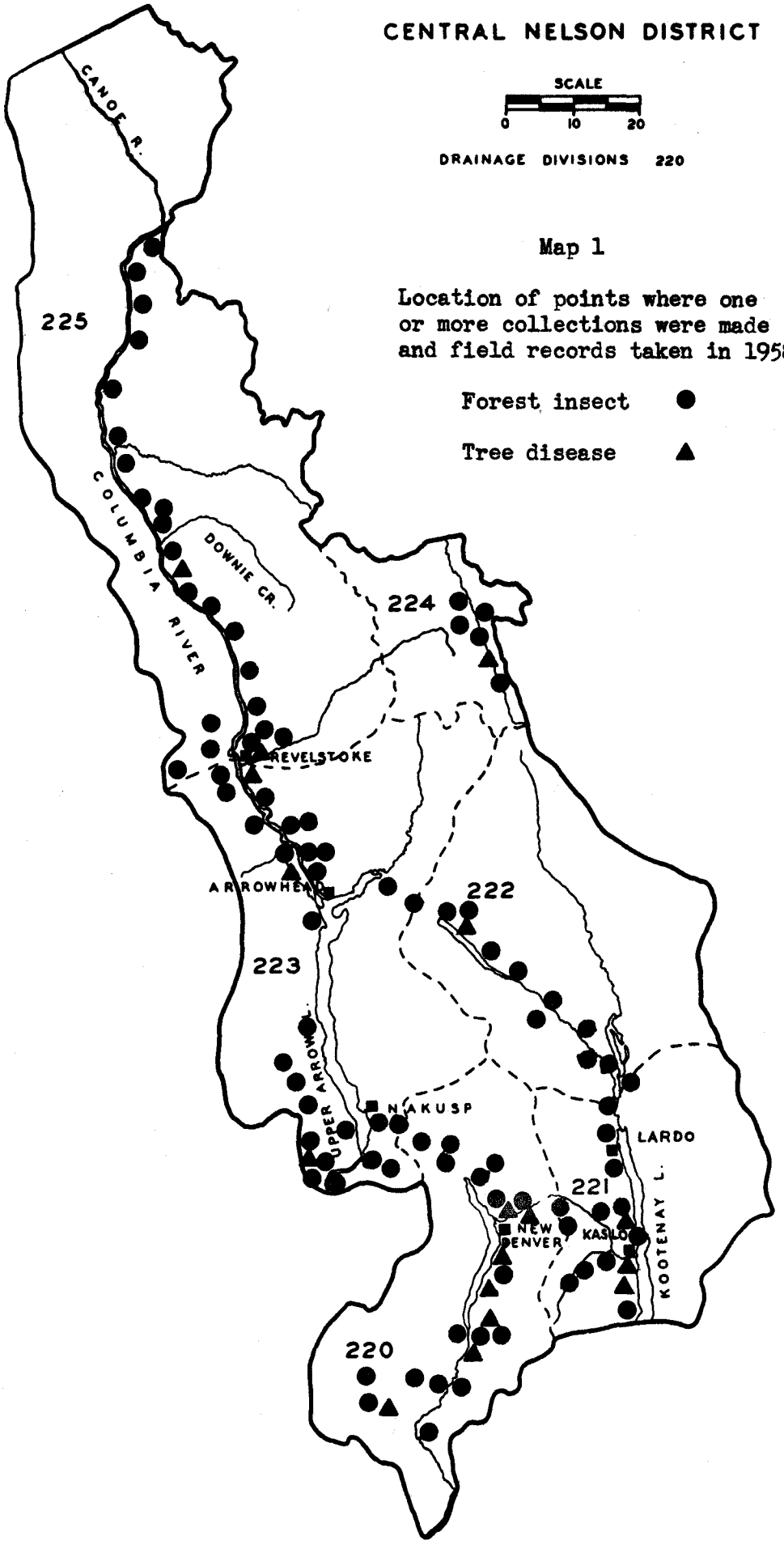
* Number of trees reduced because of difficulty in observing symptoms in dense stand.

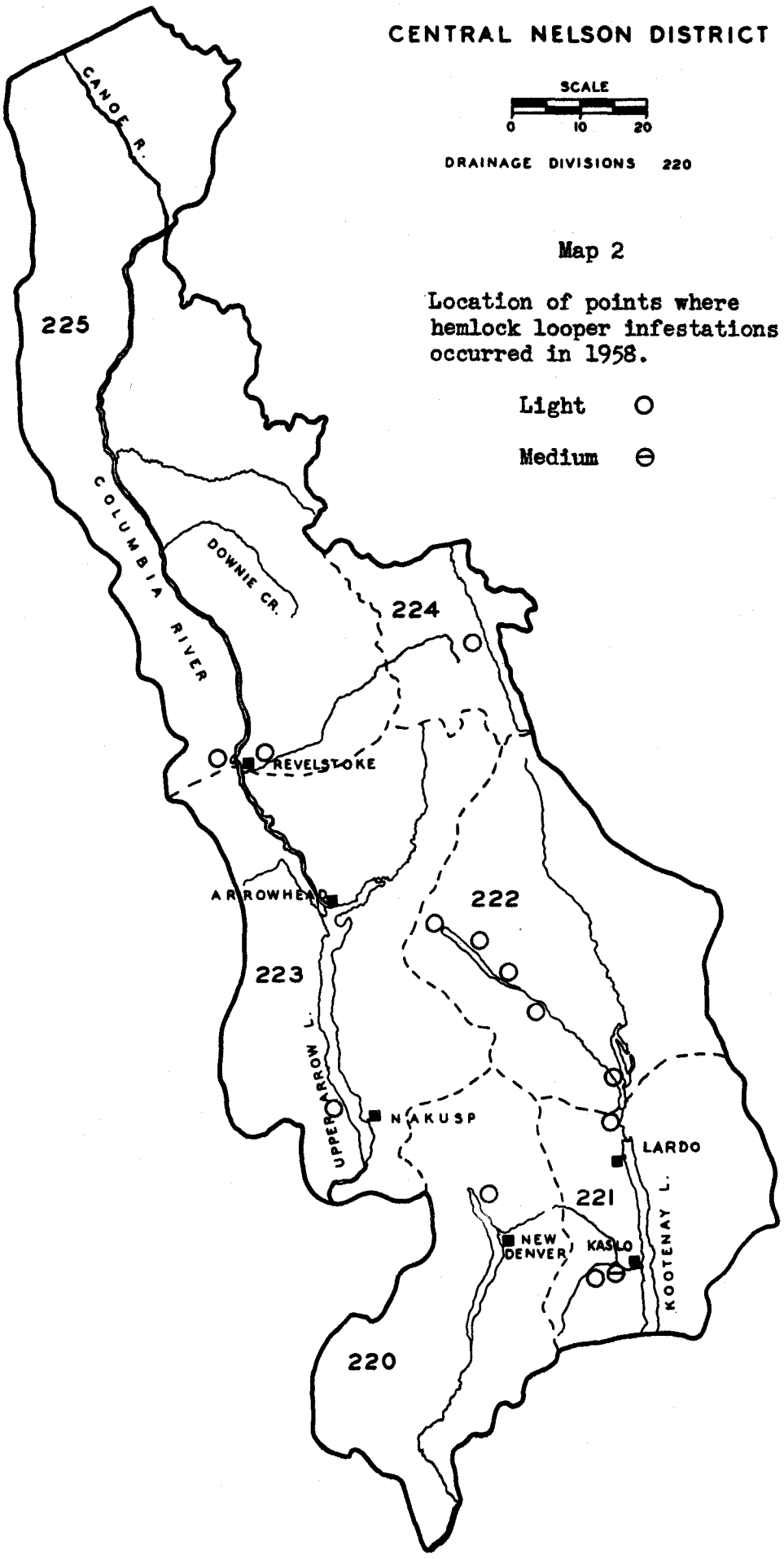
Noteworthy diseases not mentioned in the text of the report are listed in Table 6.

Table 6

Other Noteworthy Diseases Collected in Central Nelson District 1958.

| Host | Organism | Locality | Remarks |
|---|---|---|---|
| Cottonwood, black | Melampsora occidentalis Jacks. | Keystone Creek, Big Bend Hwy. | A leaf rust of cottonwood capable of serious damage but not known to have caused such. Alternate host is Douglas fir. |


CENTRAL NELSON DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 220
Map 1
Location of points where one or more collections were made and field records taken in 1958.
Forest insect
Tree disease
CANOE R.
225
COLUMBIA RIVER
DOWNIE CR.
224
REVELSTOKE
ARROWHEAD
222
223
UPPER ARROW L.
NAKUSP
LARDO
221
NEW DENVER
KASLO
KOOTENAY L.
220


CENTRAL NELSON DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 220
Map 2
Location of points where hemlock looper infestations occurred in 1958.
Light
Medium
CANOE R.
225
COLUMBIA RIVER
DOWNIE CR.
224
REVELSTOKE
ARROWHEAD
222
223
UPPER ARROW L.
NAKUSP
LARDO
221
NEW DENVER
KASLO
KOOTENAY L.
220

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

EAST NELSON DISTRICT

1958

# FOREST BIOLOGY SURVEY

# EAST NELSON DISTRICT

# 1958

R. J. Andrews

## INTRODUCTION

The forest Insect and Disease Survey was begun in the East Nelson Forest Biology Ranger District on May 27 after the cabin was painted and the water system was completed. A fence, 110 by 70 feet, was erected and painted in the latter 2 weeks of September.

In addition to routine sampling, two survey flights were made over the District. The first, provided by the B. C. Forest Service was over the Invermere Ranger District to examine mountain pine beetle infestations. The second, on time contracted for by the Vernon Laboratory, was over the Flathead Range to survey Engelmann spruce beetle infestations.

Totals of 369 forest insect and 14 tree disease collections were taken in the District by Forest Biology Rangers and co-operators. Table 1 shows the forest insect and tree disease collections by hosts. Distribution of the collections is shown on Map 1.

Table 1

Collections by Hosts

East Nelson District 1958.

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| cedar, western red | 3 | - | alder spp. | 4 | - |
| Douglas fir | 63 | 7 | aspen, trembling | 14 | - |
| fir, alpine | 11 | 3 | birch spp. | 21 | - |
| fir, grand | 3 | - | cherry, choke | 8 | - |
| hemlock, western | 9 | - | cottonwood, black | 3 | - |
| juniper, common | 10 | - | maple, Douglas | 2 | - |
| juniper, Rocky Mountain | 15 | - | willow spp. | 25 | - |
| larch, western | 22 | 2 | miscellaneous | 25 | - |
| pine, lodgepole | 52 | - | no host | 2 | - |
| pine, ponderosa | 33 | 1 | | | |
| pine, western white | 3 | - | | | |
| spruce, Engelmann | 40 | - | | | |
| | | | Total | 105 | 0 |
| Total | 264 | 14 | Grand Total | 369 | 14 |

## STATUS OF INSECTS

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Engelmann spruce beetle infestations declined in the East Nelson District in 1958. Heavy populations were found in only two areas, on Bighorn Creek and Grave Creek.

Surveys were begun on July 28. Forest Biology Rangers J. Grant and R. J. Andrews completed an examination of the Bighorn Creek infestation by July 31. Supervising Ranger R. L. Fiddick assisted in surveys of Cabin, Storm, Matheson (McPherson), and Grave creeks in August. The concluding ground survey was a check on the Blacktail and Warden creeks infestations.

An aerial survey of the Flathead Range was made in the first week of September.

The following paragraphs summarize the status of Engelmann spruce beetle infestations in areas where ground or aerial surveys were made in 1958. Data on Bighorn and Grave creeks are from reports by J. Grant.

Bighorn Creek:

To determine the severity and current status of the infestation, strips 1 chain in width and totalling 156 chains in length, were cruised in 5 localities. Spruce trees 10 inches d. b. h. and over were classified as: (1) healthy; (2) killed by bark beetles prior to 1956; (3) killed in the years 1956 and 1957; and (4) attacked in 1958. Table 2 shows the average percentages of the original volume in each of these four categories, for the five strips cruised.

Table 2

Percentage of Original Volume of Healthy Engelmann Spruce Trees, and of Those Killed by the Engelmann Spruce Beetle on Five Strips Cruised in the Bighorn Creek Area, July 1958.

| Strip no. | Length (chains) | Percentage | | | |
|---|---|---|---|---|---|
| | | Healthy | Killed before 1956 | Killed 1956-57 | Attacked in 1958 |
| 1 | 46 | 44.0 | 26.0 | 16.0 | 14.0 |
| 2 | 20 | 82.0 | 16.0 | 0.0 | 2.0 |
| 3 | 5 | 59.0 | 41.0 | 0.0 | 0.0 |
| 4 | 40 | 37.0 | 61.0 | .5 | 1.5 |
| 5 | 45 | 40.0 | 26.0 | 26.0 | 8.0 |
| Average | | 44.5 | 35.0 | 13.5 | 7.0 |

Matheson Creek (McPherson Creek) - An examination of this area in August revealed a complete collapse of the beetle population.

Cabin and Storm creeks - A survey of these two valleys showed that the spruce bark beetle population had declined during 1955 and 1956 after several years' activity, reducing the stand volume by approximately 20 per cent.

Warden and Blacktail creeks - These two infestations seem to have followed the same pattern as those at Cabin and Storm creeks, although a population of beetles was still in evidence in 1957. No "green infested" trees were seen in 1958.

Sage Creek - An aerial survey of this valley revealed old damage similar to that found on Cabin and Storm creeks.

Grave Creek - The Engelmann spruce beetle infested an estimated 200 trees in 1958 in the portion of the stand bordering the area where logging was discontinued in 1957. Strip cruises and a general reconnaissance revealed that almost the entire 1958 attack occurred within five chains of logging slash. Although there were a few beetle-killed trees in the more remote parts of the stand, it was obvious that the current infestation had been caused by beetles that had bred in the slash and high stumps left after logging.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Light losses in lodgepole pine stands continued. There was another decline in beetle populations in 1958. Areas where patches of "red tops" occurred were as follows: Frances and Forster Creek Valley; Steamboat Mountain; Whitetail Lake, Toby Creek Valley, Dutch Creek, and six miles north of Canal Flats on the Kootenay River.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Excepting two localities, populations remained at a low level throughout the District. A count of red-topped trees was made on the east side of Wigwam River Valley and near Whiteswan Lake. Table 3 shows the number of currently infested and beetle-killed trees in these areas.

A Pine Tube Moth, Argyrotaenia pinatubana Kft.

The infestation of this insect reported in 1957 persisted. The heaviest populations were noted on lodgepole pine in the following localities: two miles east of the Highway on Premier Lake Road, 11 miles north of Springbrook, and at the south end of Kimberley Airport.

Table 3

Number of Douglas-fir Trees Killed or Currently Infested by the Douglas-fir Beetle in Two Localities, East Nelson District, 1958.

| Locality | Old attack | Current attack |
|---|---|---|
| Wigwam River | 457 | 197 |
| Whiteswan Lake | 121 | 59 |

One 10-inch branch sample was taken from each of five randomly selected lodgepole pines and the tubes were counted. This method did not necessarily indicate the number of larvae on the branch but gave a measure of the damage. Table 4 shows the results of this count.

Table 4

Number of Tubes Made by Larvae of a Pine Tube Moth on Samples from Lodgepole Pine, East Nelson District, 1958.

| No. of tubes | Locality | | |
|---|---|---|---|
| | Springbrook | Kimberley Airport | Premier L. Road |
| Total on 5 branches | 101 | 171 | 79 |
| Average per branch | 20.1 | 34.1 | 15.8 |

The 1957 count of tubes on 20 branches from 10 trees showed an average of four tubes per branch.

A Cecidomyiid Infesting Ponderosa Pine Twigs

Severe damage to ponderosa pine branch tips was caused by a midge in five localities of the East Nelson District: four miles south of Waldo; four miles west of Baynes Lake; one mile west of Wardner; five miles south west of Kimberley; and one mile north of Ta Ta Creek. The dying of the tips with resulting flagging caused some malformation of the trees. Tree crowns were often rounded rather than peaked in severely infested stands.

Fifty-tree plots were established in three of the five infested stands. Sample trees were examined and the diameter and height of each stem and number of dead tips were recorded. Table 5 shows the percentage of trees infested and average number of dead tips in four diameter classes in the sample plots.

Table 5

Percentage of Ponderosa Pine Trees Infested by a Twig Cecidomyiid, and the Average Number of Tips Killed on Infested Trees in Four Diameter Classes in Each of Three Plots, East Nelson District, 1958.

| Condition | Locality | Diameter class (inches) | | | |
|---|---|---|---|---|---|
| | | 2 - 4 | 5 - 7 | 8 - 10 | 11+ |
| Percentage of trees infested | Waldo | 4 | 32 | 52 | 12 |
| | Baynes Lake | 44 | 36 | 16 | 4 |
| | Wardner | 44 | 28 | 22 | 6 |
| Average no. of dead tips per infested tree | Waldo | 5 | 6.1 | 25.2 | 10.3 |
| | Baynes Lake | 18.2 | 15.3 | 18.5 | 72.0 |
| | Wardner | 12.1 | 23.1 | 18.8 | 20.6 |

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Two sample plots were established on the Hawkins Creek and Michel Creek roads. Ninety-seven Engelmann spruce trees were tallied in each of the plots which were eight by five chains. The height of the trees, number of new attacks, and the number of old attacks were recorded. The incidence of laterals taking over as terminals was high due to previous weevil infestations. When the Hawkins Creek plot was established in the first week of June the insect was in the egg stage; a few weevils also were observed on or near the tips at this time. The first wilting of terminals was noted in the last week of June. Table 6 shows the number of Engelmann spruce trees infested by the Engelmann spruce weevil and the distribution of attack.

At Hawkins Creek, 63.9 per cent of the stand had been attacked previously, whereas 34.0 per cent of the stand was currently infested. At Michel Creek the corresponding figures were 67.0 per cent and 45.4 per cent.

Table 6

Number of Engelmann Spruce Trees Showing No Signs of Attack by Engelmann Spruce Weevil, 1958 Attack Only, Old Attack Only, and Distribution of New Attack on Terminals and Laterals on 97 trees on Each of Two Plots, East Nelson District, July 1958.

| Locality | Number of stems in plot | | | | Number of new attacks | |
|---|---|---|---|---|---|---|
| | Not attacked | 1958 attack only | Old attack only | 1958 and old attack | On terminals | On laterals |
| Hawkins Creek | 27 | 8 | 37 | 25 | 40 | 36 |
| Michel Creek | 19 | 13 | 34 | 31 | 30 | 16 |

A Juniper Web-worm Phalonia sp.

An outbreak of a juniper webworm, the first recorded in recent years in East Nelson District, was found on common juniper in the Fort Steele area.

The larvae spin a web enclosing several needles. The feeding takes place within the webbing, resulting in death of the foliage. Larvae found feeding in the first week of May continued till the latter part of the month. On June 10 the adults were in flight. In September larval feeding again was noted. Ten 10-inch branch samples taken from junipers at one-quarter mile intervals averaged 3.2 webs per sample.

A Juniper Needle Miner, Recurvaria sp.

Heavily infested Rocky Mountain junipers were observed four miles east of Cranbrook, and two miles southeast of Fort Steele on the Bull River Road. Severe browning of foliage was outstanding in both locations.

The adults emerged en route to the insectary, in the collection taken near Cranbrook on June 13, and at the insectary on June 24 from the Fort Steele collection.

A Spruce Needle Miner, Recurvaria spp.

A heavy population of needle miners presumably Recurvaria sp. was found in four Engelmann spruce trees near the Wasa Lake Bridge. On August 18, larvae were feeding in the needles. Duff samples were later collected and sent to the insectary for emergence of adults.

A Lodgepole Pine Needle Miner, Recurvaria sp.

A light population was observed on a few lodgepole pines near Ta Ta Creek in the latter part of August.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Heavy defoliation of three Engelmann spruce trees was noted three miles north of Wasa bridge. A single tree yielded over 35 larvae in a hand-picked collection. Elsewhere populations remained at a low level.

A Poplar Leaf Blotch Miner, Lithocolletis sp.

Two miles south of Wasa Lake a grove of trembling aspens was infested by Lithocelletis sp. Forty-eight per cent of 254 leaves examined on ten 10-inch branch samples were infested.

Near Kinbasket Lake, in a similar examination of the same host species, 30 per cent of the leaves were infested.

Aspen Leaf-miner, Phyllocnistis populiella Cham..

The heavy infestation along the Big Bend Highway continued in 1958. Examination of ten 10-inch branch samples from five aspen trees disclosed that 88 per cent of the 337 leaves were infested. Elsewhere in the District population levels were low.

Western Tent Caterpillar, Malacosoma pluviale Dyar

Two areas of antelope bush and wild rose were heavily infested in the East Nelson District in 1958. One mile south of Elko, in a 1-acre plot, 612 tents were counted.

In 1957, 579 tents were counted along a half-mile roadside strip near the Fort Steele Junction. In the same area in 1958, the total was 585 tents.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Young Douglas-fir trees near Canal Flats, Springbrook, and Elko were heavily infested with this scale. It is noteworthy that in each of these areas a predator, Chilocorus sp. was unusually abundant. In 3-tree beating samples the number of beetles ranged from 10 to 50 per collection. Elsewhere in the district the pine needle scale was commonly found on lodgepole pine and Douglas fir.

A Ponderosa Pine Cone Borer, Dioryctria auranticella Grote.

A light population again infested ponderosa pine cones at Phillips Canyon.

In two localities, near Canal Flats and near Springbrook, wind-thrown ponderosa pine trees contained light populations of these cone-borers. The infestation was slightly heavier at the former locality.

Douglas-fir Cone Borer, Barbara colfaxiana Kft.

Heavily infested cone crops were noted at two localities in East Nelson District in 1958; near Roosville where 98 per cent of the cones sampled were infested, and five miles south of Invermere where 70 per cent of the cones were infested.

Ugly-nest Caterpillar, Archips cerasivorana (Fitch)

At Ta Ta Creek 23 tents of the ugly-nest caterpillar were counted on four low chokecherry bushes. Near Wycliffe there were 18 nests on five bushes, and near Fairmont Hot Springs, 20 tents on 10 bushes of the same hosts.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Damage caused by this weevil to poplars and willows was noted at Skookumchuck Prairie, five miles west of Jaffray, and 12 miles north of Fernie.

A Flea Beetle on Birch, Altica plicipennis Mann.

The severe defoliation of water birch three miles southwest of Fort Steele recorded in 1957 was repeated in 1958.

Black-headed Budworm, Acleris variana (Fern.)

The largest number of larvae taken from a three-tree beating was nine from Engelmann spruce on the Crestbrook Logging Company Road near Lumberton. Elsewhere few larvae were collected.

A Shoot-borer on Ponderosa Pine, Eucosma sp.

Evidence of damage by this insect was again noted on ponderosa pine near Edwards Lake, south of Elko. A closer inspection of the shoots revealed that a number of larvae had died in their mines.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Very few larvae were collected in 1958.

## STATUS OF TREE DISEASES

Dwarf Mistletoe on Western Larch.

Dwarf mistletoe on western larch, Arceuthobium campylopodum f. laricis Jones, was found in two localities only in East Nelson District, at St. Mary's Lake and in the Moyie Lake area. A plot was established in each locality to determine the severity of the infection and its effect on tree growth. In both localities, spread of the disease in young larch stands was due to the presence of infected overmature larch, ranging in size from 12 to 20 inches d. b. h.

At the St. Mary's plot, alpine fir and Engelmann spruce were also infected by the parasite. At Moyie Lake an inspection of the codominant Douglas-fir regeneration disclosed no infection. Thirty-four per cent of the larch trees on both plots were infected.

Increment borings were taken from five healthy trees and five infected trees at each plot and a comparison was made of the width of annual rings in five-year periods for the past 30 years. (Table 7).

Table 7

Radial Increment of Western Larch Infected and Non-infected by Dwarf Mistletoe. East Nelson District, 1958.

| Location | Tree condition | Growth in mm. per 5-year period, 1928 to 1958 | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1928-32 | 1933-37 | 1938-42 | 1943-47 | 1948-52 | 1953-58 | Total |
| St. Mary's Lake | Infected | 3.6 | 3.4 | 3.4 | 2.6 | 2.8 | 2.4 | 18.2 |
| | Non-infected | 5.4 | 4.0 | 2.7 | 3.8 | 5.4 | 4.5 | 25.8 |
| Moyie Lake | Infected | 4.8 | 4.6 | 7.5 | 6.2 | 5.6 | 5.6 | 34.3 |
| | Non-infected | 4.3 | 5.6 | 6.6 | 7.4 | 7.9 | 7.4 | 39.2 |

A Dieback of Douglas Fir

The number of infected trees and the loss of quality caused by dieback in regeneration Douglas fir has caused some concern in the Christmas tree industry. Five plots were established to determine the extent and possible spread of the disease. The plots were located in the four ranger districts most concerned: Invermere, Canal Flats, East Cranbrook, and Elko. The number of terminal and lateral infections and the percentage of trees infected was recorded. (Table 8).

Needle Blight of Douglas Fir

Severe infection in reproduction Douglas firs caused by Rhabdocline pseudotsugae Syd. was prevalent in East Cranbrook, Canal Flats, Invermere, and Spillimacheen districts.

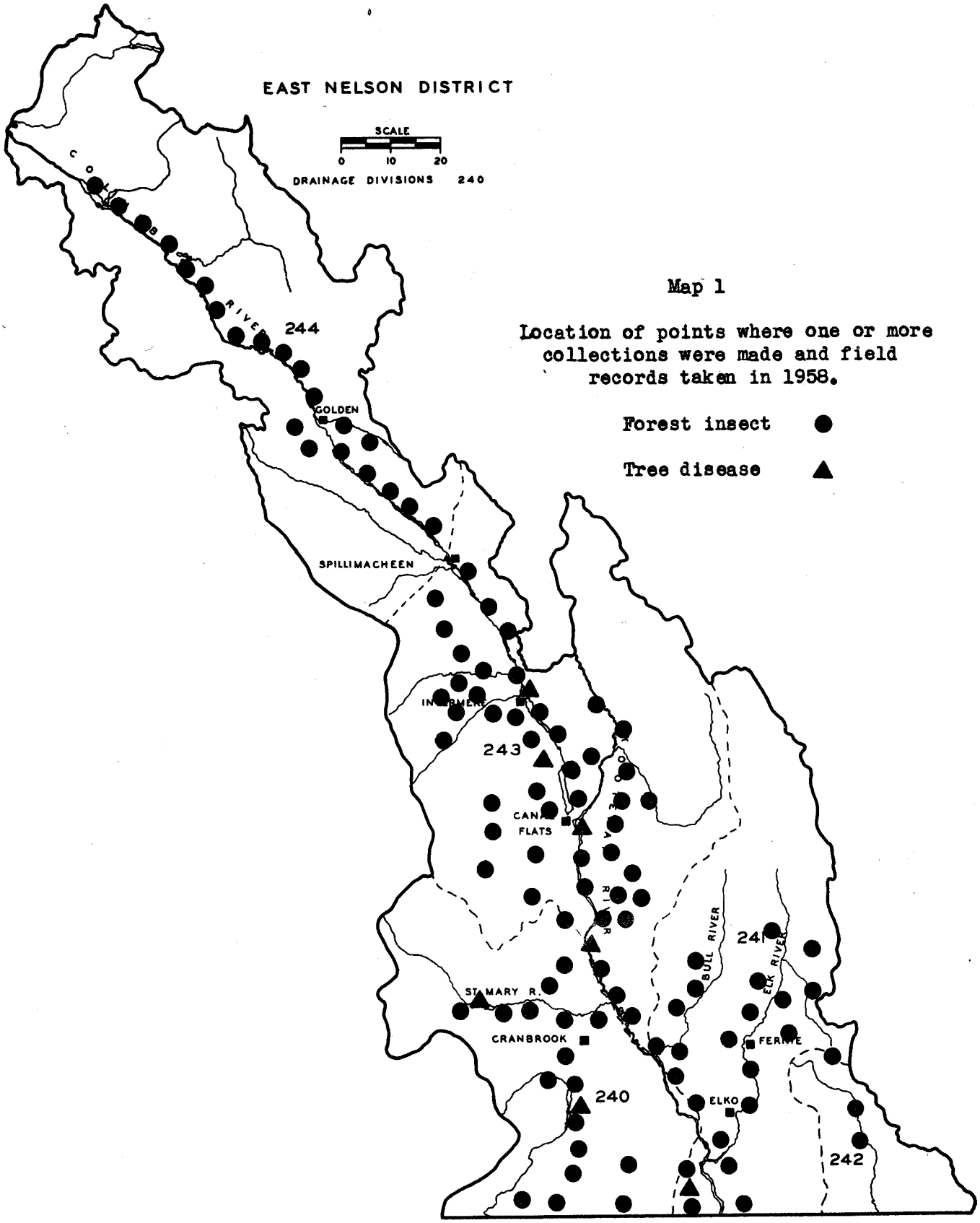
Larch Needle Cast

Western larch infected by Hypodermella laricis Tub. were common throughout the range of the host in the East Nelson District.

Table 8

Number of Trees per Plot, Total Number of Stem and Branch Infections, and Percentage of Trees Infected by a Douglas-fir Dieback Disease, East Nelson District, September, 1958.

| Plot No. | No. of trees | Total no. stem infections | Total no. branch infections | Percentage of trees infected |
|---|---|---|---|---|
| 1 | 100 | 11 | 44 | 29 |
| 2 | 100 | 7 | 45 | 27 |
| 3 | 100 | 1 | 48 | 19 |
| 4 | 19 | 2 | 13 | 20 |
| 5 | 41 | 2 | 10 | 30 |




Map 1

Location of points where one or more collections were made and field records taken in 1958.

Forest insect ●

Tree disease ▲

# ANNUAL REPORT OF FOREST BIOLOGY RANGERS

# BRITISH COLUMBIA

# 1958

# PRINCE GEORGE FOREST DISTRICT

# FOREST BIOLOGY SURVEY

## PRINCE GEORGE FOREST DISTRICT

## 1958

D. W. Taylor

## INTRODUCTION

The Prince George Forest Biology districts were again surveyed by four rangers, however, intensity of sampling was increased by the acquisition of an additional vehicle for the northern areas. Yukon Territory was covered by Ranger J. Obana while the North Prince George District survey was done by T. A. D. Woods. Rangers W. P. Hurst and D. W. Taylor served the West and South Prince George districts respectively.

Many transportation problems were solved by having four vehicles in this District and good coverage was obtained. A 350-miles boat trip was made with the West and South Prince George rangers co-operating.

The "even" or "flight" year of 1958 showed a further decrease in the population of the two-year-cycle spruce budworm in the previously heavily infested areas, but a shift in population was evident at Takla Lake and on the east side of the Lower Fraser River watershed between Prince George and Quesnel.

Defoliation by the one-year-cycle spruce budworm decreased at Smith River, Lower Liard Valley.

A further decrease in population of the mountain pine beetle was apparent in the vicinity of Takla Lake.

Forest tent caterpillar defoliation near McBride increased approximately three times in area compared with 1957.

The Douglas-fir beetle population increased greatly as evidenced by large numbers of red trees in the Douglas-fir regions.

Sawyer beetles caused serious deterioration of fire-killed timber in two areas north of Prince George.

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

SOUTH PRINCE GEORGE DISTRICT

1958

# FOREST BIOLOGY SURVEY

## SOUTH PRINCE GEORGE DISTRICT

## 1958

D. W. Taylor

## INTRODUCTION

Survey work began on May 30 and continued until September 29, after which a further 14 days were spent on project work in fire-killed timber in the West Prince George District. A period of eight days was spent on Douglas-fir beetle surveys in the West Kamloops District and a boat trip of seven days was carried out with the ranger in the West Prince George District, W. Hurst.

Three hundred and twenty-four forest insect collections and 30 tree disease collections were made.

Table 1 gives an analysis of the 1958 collections by hosts. Map 1 shows the distribution of insect and tree disease collections taken during the 1958 season.

Table 1

Collections by Hosts

South Prince George District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| cedar, western red | 3 | - | aspen, trembling | 21 | 3 |
| fir, alpine | 46 | 2 | birch, white | 11 | - |
| Douglas fir | 53 | 4 | cottonwood, black | 13 | 1 |
| hemlock, western | 14 | 1 | willow spp. | 19 | 3 |
| pine, lodgepole | 35 | 7 | miscellaneous | 39 | 5 |
| spruce, black | 11 | 1 | | | |
| spruce, white | 59 | 3 | | | |
| | | | Total | 103 | 12 |
| Total | 221 | 18 | Grand total | 324 | 30 |

## STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Activity of the Douglas-fir beetle increased greatly in 1957 and 1958 as evidenced by the increase in the number of red trees visible during the 1958 season. Infestations were almost entirely confined to the Lower Fraser River Trench (Map 2) between Hixon in the north, and Marguerite in the south. The Lazaroff Lake and Buck Ridge areas were most seriously affected and all investigations were carried out there. Each group of infested trees was associated with old logging or over-maturity. Sampling showed most of the attacks to be by the broods of 1957 and the spring flight of 1958. In a small number of cases the hosts had been successful in "pitching out" the beetles in 1957 but were succumbing to the 1958 attack. The common parasite was a wasp, Coeloides sp. and the most common predator was a dipteron, Medetera sp. Ambrosia beetles had attacked many of the affected stems.

Results of observations on four 1-acre plots laid out in infested areas at Lazaroff Lake and Buck Ridge are shown in Table 2.

Table 2

Intensity of Infestation of Douglas-fir Trees in Four 1-acre Plots, South Prince George District, September, 1958.

| Location | Percentage D. fir in stand | Average d. b. h. (inches) | No. of healthy trees | No. of red-topped trees | Percentage of D. fir trees infested |
|---|---|---|---|---|---|
| Lazaroff Lk. | 87.3 | 13.2 | 147 | 12 | 7.5 |
| Lazaroff Lk. | 78.7 | 15.9 | 42 | 10 | 19.2 |
| Buck Ridge | 100 | 15.1 | 38 | 14 | 26.9 |
| Buck Ridge | 100 | 11.7 | 77 | 17 | 18.0 |

Economic evaluation of the Lazaroff Lake area was made possible by the co-operation of Mr. P. Bodman, Forester, B. C. Forest Service, Prince George. His cruises and estimates show 6,000 trees currently infested or dead in the Lazaroff Lake area. Using Forest Service tables which give an average volume of 110 cubic feet per tree the loss amounts to approximately 660,000 cubic feet. By using a similar coversion in the Buck Ridge area where 619 infested trees were counted, the figure is 68,090 cubic feet, bringing the total loss for the beetle damaged areas to approximately 728,090 cubic feet.

The problem of counting trees killed by bark beetles in the Quesnel area was approached in three ways. The first method was by making use

of an instrument designed by the writer for use in a Beaver aircraft, the second was by individual tree counting from the same aircraft and the third was by a count from carefully chosen vantage points on the ground. The results were then brought together and the number of trees per acre calculated. Thus, a cross check of methods was possible. Table 3 presents a comparison of the three methods.

Table 3

Results of Aerial Counts With the Naked Eye, with Aid of a Viewer Instrument, and a Ground Count of Trees Killed by the Douglas-fir Beetle, Quesnel, September, 1958.

| Method | No. of acres examined | No. red trees | Average no. red trees per acre |
|---|---|---|---|
| Aerial, naked eye | 42,176 | 619 | 0.014 |
| Aerial, instrument | 3,600 | 157 | 0.043 |
| Ground, vantage points | 42,176 | 543 | 0.012 |

The extent of the forest surveyed from the plane by the naked eye was delineated by penciling off the approximate borders of the strip on which the counts were made. The area of the strip in this instance was obtained with the aid of a planimeter. When the instrument was used at a known altitude, the viewing was automatically limited to a calculable width. Lengths of the strips were determined using data on the speed of the plane and the length of time that counts were made. In both types of counts, the sample strips were random. The discrepancy between the average numbers of infested trees tallied with the viewing instrument and by the other methods was attributed to the fact that the viewed strip was close to the plane where all trees could be distinguished, whereas the "unlimited" observation areas included stands within visible range where, because of distance and other factors, detection was not as complete. Experimentation with the viewing instrument will continue.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Population densities of the two-year-cycle budworm varied greatly in 1958. Old infestation centres at Antler Creek, Barkerville, and the Torpy River Valley had very small larval populations and no defoliation was visible. An increase in the numbers of this tortricid was noted in the Fraser River Valley and along the ridge southeast of Prince George.

Results of plot samples in the Wells-Barkerville area were as follows: no budworm larvae were found on the 10 branches from the plot trees at Antler Creek; at Barkerville two larvae were collected from 10 samples. Defoliation in both instances was so slight as to be classed as nil.

At Antler Creek, a cross check of branch sampling was made by falling a tree, selected at random, outside the plot and removing the top five feet. All buds produced in 1958 were examined. Of 389 terminals examined on June 5 only nine showed evidence of feeding; no larvae were found.

A similar form of sampling was carried out in other areas where slight defoliation was visible. The top of a representative alpine fir tree was removed and a random tally of as many 1958 terminals as practicable was made. The result is shown in Table 4.

Table 4

Percentage of Terminals Infested by Spruce Budworm Larvae on Alpine Fir Trees at Five Localities in the South Prince George District. June, 1958.

| Locality | No. of 1958 terminals examined | Percentage of terminals infested |
|---|---|---|
| McGregor R. | 425 | 2.1 |
| Stone Creek | 250 | 44.0 |
| Naver R. | 500 | 53.6 |
| Frost Lake I | 500 | 21.2 |
| Frost Lake II | 425 | 20.2 |

The McGregor River count was made in an area bordering a stand that was severely infested in 1954. The remaining locations were not known to have had severe infestations. The population in the Frost Lake - Hixon area is expected to increase in 1959.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The tent caterpillar population which has been increasing since 1956, expanded greatly in the Tête Jaune-McBride area in 1958. Extent and intensity of the infestation is shown in Map 3; the southern or "medium" defoliation area represents 40 to 60 per cent defoliation while in the northern part an estimated 15 per cent of the trees were

15 per cent defoliated. As in previous years a leaf-roller added to the over-all damage after the feeding period of the tent caterpillar terminated.

The method used for estimating populations of the insect was similar to that used since 1956. Samples of egg masses were collected in September by Ranger C. Cottrell and the writer, and the analysis was carried out by Ranger T. Woods. Three representative aspen trees were felled at four points in the infested area and all egg masses were removed and taken to Vernon for study. Five egg masses were chosen at random from each tree and the number of eggs per mass and the numbers of living, dead, undeveloped and parasitized eggs were recorded. These data are shown in Table 5. The average number of egg masses per tree is less than in 1957 but the addition in 1958 of one sample point, in a light infestation area, reduces the average number of egg masses per tree. It appears that heavy defoliation will be repeated in two of the localities sampled.

To determine the combined effect of the tent caterpillar and the leaf-roller, a randomly selected tree was felled at McBride on July 25 and 500 leaves were examined. Fifty-seven per cent of the leaves were "rolled"; 43 per cent were fed on but were not rolled.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

This leaf-miner was not observed before mid-May in the South Prince George District. Mines were first in evidence about May 20 and by early June had reached more than 0.5 inches in length. This stage of development was reached at least 25 days later than in the southern interior regions. By June 10 the pupal stage predominated, and by June 20 large numbers of adults were noted on and around nearby conifer foliage. Leaves mined ranged from 25 per cent near Aleza Lake to 90 per cent near Marguerite. The information in Table 6 was gained from samples of leaves picked from two branches from each of five trees, at the sample points.

A Sawyer Beetle, Monochamus sp.

This destructive wood borer caused severe damage to a "cold deck" of logs at Deserter Creek, Narcosli Valley. An estimated 1,500 logs which had been decked in July prior to being transported to the mill, were examined in October. The majority of the logs in the deck were Douglas fir, with a few lodgepole pines. The logs were 30 feet in length and varied in diameter from 12 to 24 inches.

The main Monochamus attack occurred on the under side of the logs; buprestid larvae were also present. By October 11, penetration by the sawyer beetle larvae had reached at least two inches and by the buprestid larvae, one and one half inches. Both Douglas-fir and pine logs were heavily infested. This infestation was particularly detrimental in view of the fact that these logs were destined for "peeler" use in the plywood industry.

Table 5

Analysis of Forest Tent Caterpillar Egg Masses
Collected from Trembling Aspen Trees at Tête Jaune, B. C. September, 1958.

| Tree no. | D.B.H. (inches) | Tree height (feet) | Crown length (feet) | Total no. 1958 egg masses | Average no. eggs in 5 masses | Percentage | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Living larvae | Dead larvae | Undeveloped eggs | Parasitized eggs |
| N1 | 7 | 48 | 21 | 16 | 145.6 | 90.80 | 0.41 | 8.38 | 0.41 |
| N2 | 5 | 54 | 15 | 12 | 125.8 | 87.76 | 0.48 | 10.33 | 1.43 |
| N3 | 5 | 60 | 27 | 7 | 136.0 | 97.35 | 0.30 | 2.35 | 0.00 |
| C1 | 7 | 45 | 24 | 71 | 121.6 | 84.04 | 0.33 | 14.97 | 0.66 |
| C2 | 3 | 36 | 18 | 59 | 109.2 | 94.13 | 0.20 | 5.12 | 0.55 |
| C3 | 6 | 66 | 35 | 99 | 115.6 | 84.60 | 0.69 | 14.19 | 0.52 |
| S1 | 7 | 60 | 30 | 0 | - | - | - | - | - |
| S2 | 6 | 45 | 18 | 0 | - | - | - | - | - |
| S3 | 5 | 48 | 18 | 1 | 32.4 | 96.30 | - | 3.70 | - |
| D1 | 5 | 45 | 24 | 0 | - | - | - | - | - |
| D2 | 7 | 63 | 18 | 0 | - | - | - | - | - |
| D3 | 5 | 60 | 30 | 3 | 95.0 | 88.84 | 0.84 | 10.32 | - |
| Averages | | 1957 (3 plots) | | | 129.78 | 91.18 | 0.37 | 7.86 | 0.59 |
| | | 1958 (4 plots) | | | 73.43 | 90.04 | 0.43 | 9.03 | 0.50 |

Table 6

Percentage of Trembling Aspen Leaves Infested by Aspen Leaf-miners and the Stage of Insect Present, South Prince George District, 1958.

| Locality | Date | Number leaves examined | Percentage leaves infested | Stage of insect present | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | No. eggs present | Living larvae | Aborted mines | Living pupae | Dead pupae misc. | Dead pupae paras. | Successful emergents | Adults in flight |
| Kersley | May 30 | 50 | 96.0 | 0 | 94 | 18 | 2 | 0 | 0 | 0 | no |
| Dewey | June 11 | 50 | 94.0 | 0 | 8 | 0 | 23 | 6 | 2 | 0 | no |
| Cinema | May 31 | 30 | 93.3 | 0 | 37 | 4 | 0 | 0 | 0 | 0 | no |
| Cinema | July 30 | 50 | 66.0 | 0 | 0 | 8 | 0 | 3 | 10 | 23 | yes |
| Prince Geo. Airport | June 3 | 50 | 36.0 | 0 | 11 | 3 | 5 | 0 | 0 | 0 | no |
| Prince Geo. Airport | July 14 | 50 | 48.0 | 0 | 0 | 4 | 2 | 5 | 3 | 13 | yes |

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

Injury to white spruce by this bark beetle diminished greatly in 1958. Recent and new attacks were rarely seen along the Church Sawmill road, McGregor River, and at Aleza Lake, the major centres of infestation from 1954 to 1956.

The Stone Creek area was cleared of felled trees in March 1958, thus removing most of the broods present there in 1957.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

A small number of white spruce trees near Antler Creek was attacked in 1958 by this spruce tip weevil. At least two years' growth of the leaders has been killed on 18 regeneration spruces. Trees on which lateral branches and both leaders and lateral branches were killed were observed in a few instances. On a strip one by 10 chains through a stand of white spruce regeneration ranging from two to 10 inches d. b. h., 11 of 438 trees examined were infested. The average "back-kill" was three years.

Single trees were attacked at the Experimental Farm, Prince George, Mountview and Castle Creek near McBride and Swede Mountain at Hixon.

Black-headed Budworm, Acleris variana (Fern.)

At no time in recent years has this defoliator approached infestation level in the Prince George District. Only 40 larvae from a variety of widespread hosts were collected in 1958.

Hemlock Looper, Lambdina fiscellaria lugubrosa Hlst.

No hemlock looper were found near McBride where heavy defoliation in 1955 caused tree mortality. Small numbers of larvae were collected from various hosts throughout the District.

Spruce Sawflies, Pikonema spp.

Larvae of these species were collected throughout the District from June 9 to August 22. Although their presence was constant, no collection contained more than 11 larvae and the average for 18 collections was 3.6.

Mourning Cloak Butterfly, Nymphalis antiopa (L.)

Small colonies of this nymphalid were collected at six points within the District but others were observed in many more localities.

Although willow was the preferred host, larvae were found on aspen and cottonwood. Defoliation averaged about 30 per cent on willow but

ranged as high as 90 per cent on some aspen seedlings.

The largest population was at Moose Lake in the Yellowhead Pass where roadside willow for approximately three miles along the lakeshore were up to 40 per cent defoliated. Groups of from 25 to 50 of these and other nymphalid butterflies were common near Mount Robson by July 20. Adults were seen between July 3 and August 10, and at altitudes up to a maximum of 4,200 feet.

A Hemlock Sawfly, Neodiprion sp.

A stand of western hemlock near Sinclair Mills, which was moderately defoliated in 1955, was surveyed on June 10. Fifteen trees were sampled specifically for Neodiprion sp., and only 121 larvae were found on four of the hosts. Defoliation was light.

A Scolytid on Lodgepole Pine, Pityophthorus sp.

As in 1957, this beetle again caused injury and mortality to lodgepole pine 1.5 inches d. b. h. or less which had already been damaged by the disease Peridermium stalactiforme (Arth. and Kern). Samples of both insect and disease damage were collected on September 11 in the Blackwater River area.

Aphids, Aphiidae.

There was a marked increase in aphid activity in 1958. Although collections were made only on white spruce, lodgepole pine, alpine fir, Sitka alder, cottonwood and fireweed, damage was noted on almost all coniferous and deciduous hosts and on many of the shrubs in the forests. Despite this variety very little serious damage was caused to any host.

## STATUS OF TREE DISEASES

A Spruce Needle Rust

Yellow spotting of white spruce needles, caused by the rust fungus, Chrysomyxa weirii Jacks. was observed at Grouse Creek near Barkerville on June 6. Between 10 and 25 per cent of a groups of trees three to five inches d. b. h. were infected. The area concerned was approximately two acres in extent.

A Leaf Rust on Saskatoon

This rust caused by Gymnosporangium sp. was observed on several saskatoon bushes in the southern part of the District. In each case the

entire leaf complement was infected. Collections, from Australian and Marquerite, were sent to the Victoria Laboratory.

A Needle Rust on Spruce

"Witches' brooms", resulting from infection by Peridermium coloradense (Diet.) Arth. and Kern, once more caused light, but consistent damage to white spruce and black spruce branches in the District. The infection was most common on white spruce at Lucerne Lake in Yellowhead Pass.

A Rust on Douglas Fir

Alternate hosts for this aspen leaf rust, caused by Melampsora albertensis Arth., 20 to 30 Douglas-fir trees in an open field near Alexandria were infected. Severity was such that the trees had a yellow appearance from a distance.

Indian Paint Fungus

Fruiting bodies of Echinodontium tinctorium, Ellis and Everh. were common on almost all western hemlock trees growing on the north-eastern bench of George Mountain, in the Willow River Valley.

A Willow Leaf Rust

A sample of this leaf rust caused by Melampsora paradoxa, Diet. and Holw. was collected at Albreda in 1958, for distribution records only.

Dwarf Mistletoe on Lodgepole Pine

Mistletoe plants, Arceuthobium americanum Nutt., were seen on lodgepole pine in an area of two to three acres, about four miles north of Valemount.

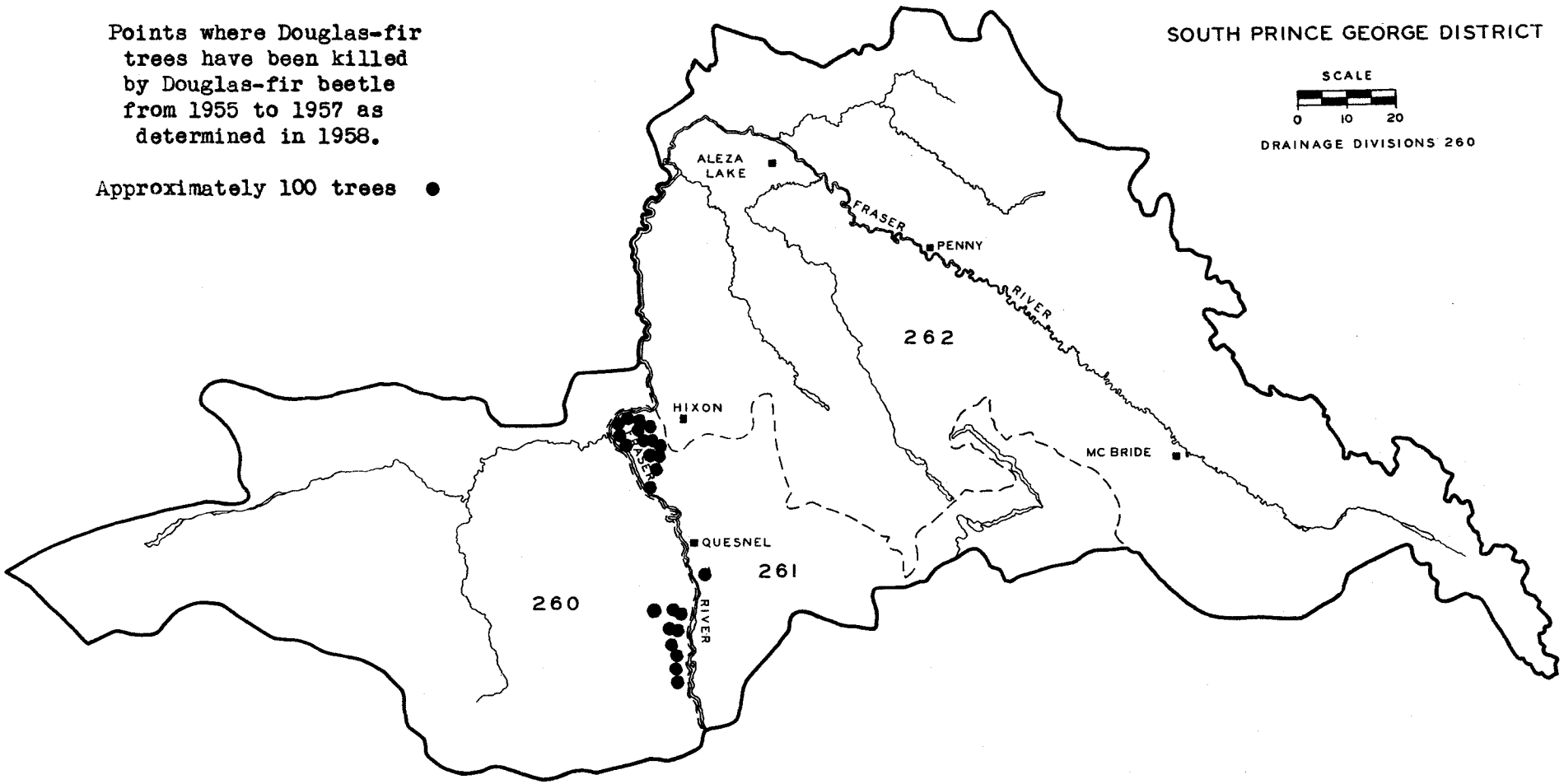
A Western Gall Rust

One collection of the gall rust of lodgepole pine caused by Peridermium harknesii J. P. Moore was made in the Blackwater River Valley. Damage caused by the rust was seen on lodgepole pine at St. Mary's Lake, Prince George Experimental Farm, South Fort George, and Quesnel airport.

Map 2

Points where Douglas-fir trees have been killed by Douglas-fir beetle from 1955 to 1957 as determined in 1958.

Approximately 100 trees ●

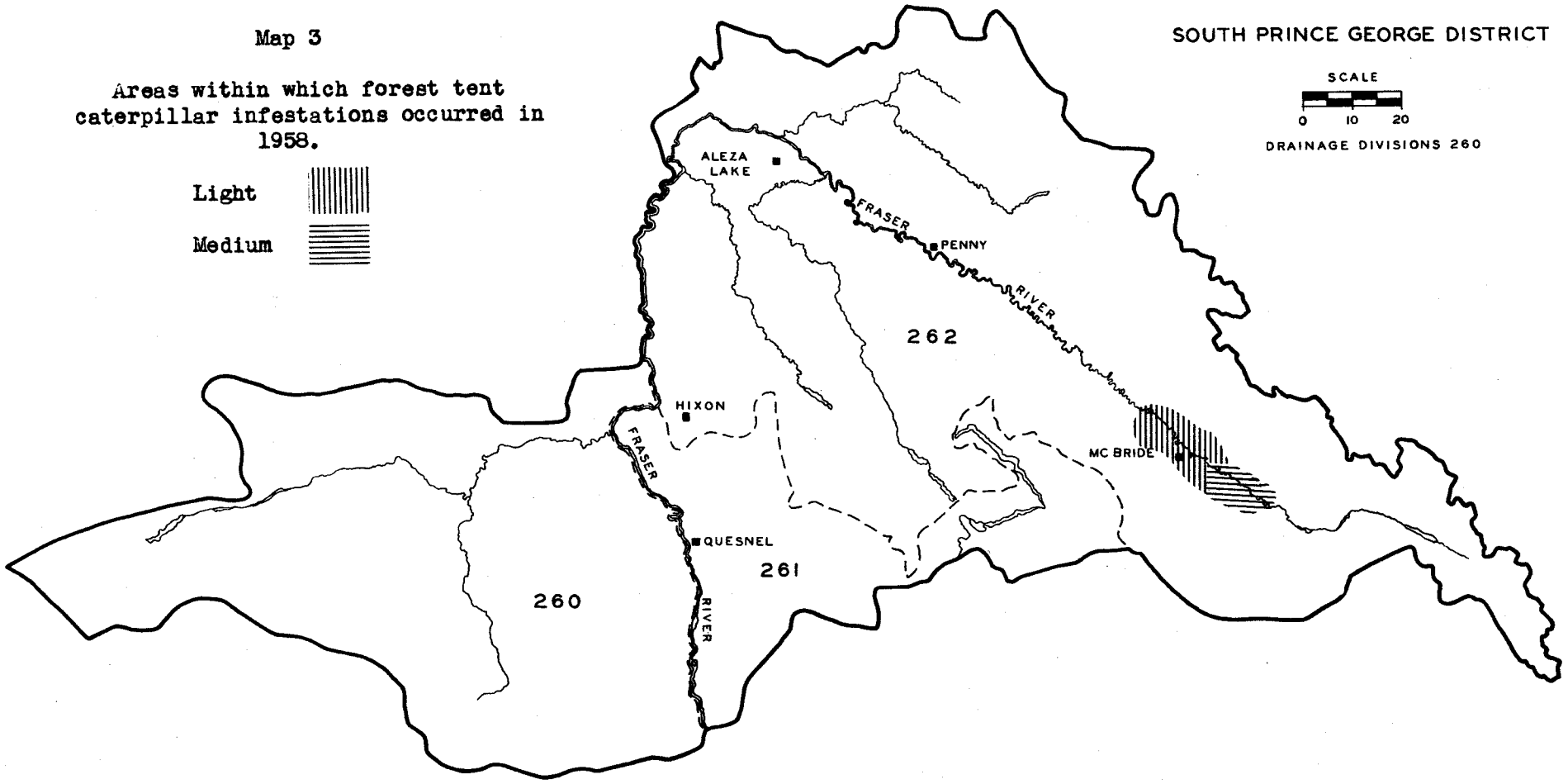


Map 3

Areas within which forest tent caterpillar infestations occurred in 1958.

Light

Medium



# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST PRINCE GEORGE DISTRICT

1958

# FOREST BIOLOGY SURVEY

# WEST PRINCE GEORGE DISTRICT

1958

W. P. Hurst

## INTRODUCTION

Field work in the West Prince George District began on May 6 and continued until September 25. Totals of 272 insect samples and 44 tree disease samples were made. In August, with the co-operation of Ranger D. W. Taylor, the Takla Lake watershed was surveyed by the outboard-motor boat assigned to the District.

Collections by hosts are shown in Table 1 and points at which collections were made are shown in Map 1.

Table 1

Collections by Hosts

West Prince George District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| Douglas fir | 20 | 1 | alder spp. | 17 | 2 |
| fir, alpine | 17 | 9 | aspen, trembling | 25 | 8 |
| juniper, common | 6 | - | birch spp. | 18 | 3 |
| juniper, Rocky Mountain | 1 | - | cherry, bitter | 2 | 2 |
| larch, eastern | 5 | - | cottonwood, black | 8 | 1 |
| pine, lodgepole | 37 | 8 | hazel | 1 | - |
| spruce, black | 14 | - | willow spp. | 35 | 4 |
| spruce, white | 56 | 4 | miscellaneous | 10 | 2 |
| | | | Total | 116 | 22 |
| Total | 156 | 22 | Grand total | 272 | 44 |

## STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

There was a definite increase in the Douglas-fir beetle in 1958. Concentrations of red-topped and green-infested Douglas-fir trees were

found at: Stuart Lake, opposite Tachie Village; the Chilako River, on a side road 15 miles south of Mile 17 of the Vanderhoof Highway; Angusmac Creek near Davie Lake; Isle Pierre Road; and on a side road, 14 miles south of Fort St. James. All apparently originated in logging operations. At the Stuart Lake site, red-tops were visible along a ridge for two miles. This was followed, in order of size, by the Chilako River infestation, where 91 trees were attacked.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The Takla Lake infestation was visited by the water route in the first week in August. Observations indicate that beetles were present in the same area as in 1957, but that the number of currently infested lodgepole pines had decreased greatly.

Small numbers of these beetles were also found in stumps on Ormond Lake Road, and Dead Dog Creek on the Manson Creek Road. However, only one green-attacked lodgepole pine tree was found.

Spruce Budworm, Choristoneura fumiferana (Clem.)

The two-year cycle spruce budworm continued to decrease in stands of alpine fir and white spruce in all parts of the West Prince George District except at Takla Lake. Here, the insects appeared to be building up from the south, caused light to medium defoliation along the hillsides. Concentrations occurred at the southwest end of the lake, at Dominion Point, and at Timber Bay. By early August, damaged needles had turned bright red and were readily noticeable from the middle of the lake. No defoliation was seen on the northwest shores.

The alpine fir plots at Pine Pass, Davie Lake, Tudyah Lake, and Lynx Creek were sampled in early June. Eighteen-inch branch clippings were taken from 10 trees at each plot and the larvae were counted. In September, plot trees were examined for defoliation. Table 2 shows the results of this work compared with the last flight year in 1956. It is evident that budworm activity has decreased greatly in these areas.

Round-headed Borers, Monochamus sp.

In the autumn of 1958, it became apparent that wood-borers had infested otherwise salvageable spruce timber at the sites of several fires in the Crooked River Forest. Accordingly, Rangers J. Grant and D. W. Taylor conducted a survey to determine the severity and the distribution of borer damage.

Fire-killed timber was investigated at: the "Lin" fire which started on May 24 east of the Hart Highway 16 miles north of Summit Lake; the "Fir" fire, which started on June 5 at Mile 65 of the Hart Highway and

Table 2

Average Number of Spruce Budworm Larvae and Pupae per 18-inch Branch Sample on 10 Alpine Fir Trees per Plot, and Estimated Percentage Defoliation on 20 Trees in Four Plots, West Prince George District, 1956 and 1958.

| Locality | Larvae | | Pupae | | Per cent defoliation | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | New growth | | Old growth | |
| | 1956 | 1958 | 1956 | 1958 | 1956 | 1958 | 1956 | 1958 |
| Pine Pass | 1.8 | 1.0 | 0.4 | 0.1 | 0.0 | 6.4 | 13.7 | 0.3 |
| Davie Lake | 1.0 | 0.8 | 0.4 | 0 | 11.0 | 4.9 | 13.1 | 0 |
| Tudyah Lake | 3.9 | 2.8 | 0.5 | 0 | 59.5 | 11.7 | 31.2 | 2.0 |
| Lynx Creek | 5.6 | 0 | 1.9 | 4.1 | 79.5 | 14.7 | 16.6 | 3.3 |

extends eastwards; and the "Straw" fire, which started July 15, and was situated chiefly on the eastern side of the ridge separating the Crooked and Parsnip rivers, north of Tacheeda Lake.

The largest and most injurious wood-borer found was Monochamus sp.; it was frequently noted at depths of five inches in sample blocks and had been recorded by members of the Forest Service at depths of 10 inches in salvaged lumber. A second borer, believed to be Tetropium velutinum Lec., had penetrated the wood up to 1 1/2 inches. Twenty white spruce trees at the "Lin" fire ranging from nine to 22 inches d. b. h. were examined. Forty-two Monochamus entrance holes were found on 34 square feet of wood surface; an average of 1.2 holes per square foot. It is possible that the abundance of sap in these trees at the time of the fire may have resulted in their being attractive to beetles in spite of the severity of the burn.

At the "Fir" fire, on a strip 1 chain by 20 chains, 53 per cent of the 73 white spruce trees examined had entrance holes believed to have been made by Monochamus sp. At a portable sawmill set up on an experimental basis to test the quality of the fire-killed timber, 42 out of 104 planks examined contained borer holes. The results of examination of blocks cut from five trees are shown in Table 3.

Deterioration at the "Straw" fire was negligible. Larvae of the borer Tetropium velutinum Lec., had penetrated up to 1 1/2 inches of wood in a few trees, but no Monochamus galleries were found. Three trees with diameters of 13, 18, and 21 inches, and showing varying degrees of fire injury were felled, but no cerambycid larvae were found in 66 square feet of trunk examined.

Table 3

Result of Examination of 1-foot Blocks Cut at 8-foot Intervals from Five Fire-killed White Spruce Trees at Two Sites, "Fir" Fire, West Prince George District, October 5, 1958.

| Tree no. | D.B.H. (inches) | Area of wood surface exam'd. (sq. ft.) | Total no. Monochamus entrance holes | Av. no. entrance holes sq. ft. | Av. depth of penetration * |
|---|---|---|---|---|---|
| 1 | 19 | 26 | 44 | 1.8 | 2.4 |
| 2 | 17 | 20 | 6 | .3 | 1.9 |
| 3 | 22 | 34 | 37 | 1.1 | 3.4 |
| 4 | 16 | 19 | 0 | 0 | 0 |
| 5 | 19 | 20 | 12 | 0.6 | 2.9 |
| Total | | 119 | 99 | 0.8 | 2.9 |

* Maximum penetration was 5.25 inches

Major problems arising from the infestation are eliminating living borer larvae in the salvaged lumber and preventing additional deterioration in salvaged logs waiting to be sawn.

Two adults, identified as Monochamus oregonensis Lec., have since been reared from white spruce damaged in the "Lin" and "Fir" fires.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

Trembling aspen leaves in most parts of the District were again heavily mined in 1958. At Fraser Lake, trees had 80 per cent of their leaves infested. The remainder of the District maintained a level of 50 per cent. Reproduction and pole-size trees suffered more severely than the mature trees in the overstory.

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

The infestation on trembling aspen in the Salmon River Valley remained unchanged from the previous year. Fifty per cent of the aspen leaves were rolled or defoliated in May and June.

Larch Sawfly, Pristiphora erichsonii (Htg.)

On July 22, one colony of 30 early-instar larvae was found on the leader of an open-grown eastern larch tree in a bog by Cluculz Lake. The larch stand in the Isle Pierre area appeared to be free from this insect.

Mourning Cloak Butterfly, Nymphalis antiopa (L.)

Colonies of these large, spiny caterpillars were common throughout the District, severely defoliating willow and aspen. The first larvae were found on June 25 on the Kenny Dam Road, and the last on July 17 at Mile 70 of the Hart Highway. Adults were observed flying about until the middle of September.

A Cone-Feeder, Tortrix alberta McD.

Mature black spruce trees from Bednesti Lake to Chilco were attacked by these larvae, which in late instars feed externally on the cones. Masses of red frass, mined needles, gnawed cones, and silk were found in the upper crowns when examined in late July. All stages of the insect, except eggs, were present.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Flagged white spruce leaders were common throughout the District this year, although they were thinly distributed. About five per cent of the reproduction white spruce were infected from Mile 20 on the Hart Highway to Summit Lake.

An Alder Leaf-roller, Eulype sp.

Alder trees in the Punchaw area were lightly damaged by these larvae which skeletonized the inner surface of rolled leaves.

Douglas-fir Needle Miner, Contarinia spp.

The occurrence of Douglas-fir needle miners was very light wherever the host tree grew. Larvae were collected at Isle Pierre, Fraser Lake, Stuart Lake, and Pinchi Lake.

A Sawfly, Macremphytus lovetti MacG.

On July 28 red-osier dogwood bushes at Mile 2 on the Vanderhoof Highway had been defoliated by large numbers of these sawflies. By August 13 most of the larvae had pupated, leaving behind cast skins and head capsules. Further defoliation was found intermittently along a nearby side road for five miles. The larvae were yellow, sometimes covered with a whitish powder, and were found in a curled position on the undersides of leaves during the day.

A Native Larch Sawfly, Anoplonyx canadensis Hgtn.

Fifteen early-instar larvae were collected in a 3-tree beating sample of eastern larch in the vicinity of Isle Pierre on August 20. A few were collected two weeks later from the same host at Cluculz Lake, but in both instances, defoliation was not noticeable.

Green Spruce Looper, Semiothisa granitata Gn.

Although causing no visible damage, these geometrids were found often from early July to late August on most coniferous hosts. The largest numbers, averaging four larvae per collection, were from lodgepole pine.

Green Larch Looper, Semiothisa sexmaculata Pack.

Green larch loopers were found only at Isle Pierre and Cluculz Lake, where they were feeding lightly on eastern larch trees growing in bogs.

Black-headed Budworm, Acleris variana (Fern.)

Collections from white spruce averaged three larvae per 3-tree beating in the area from Prince George northwest to Lynx Creek, and south to Lily Lake. The highest population was found along Lily Lake Road, but damage to branch tips remained at a low level.

Conifer Sawflies, Neodiprion spp.

Neodiprion colonies, averaging 18 larvae each, were found feeding on the new growth of white spruce on the Endako River, at the Kenny Dam, and near Vanderhoof. Additional larvae were collected from the same host at Francois Lake, Swanson Creek, and Lily Lake.

Three Douglas firs at Cluculz Lake yielded 18 larvae, while a black spruce in the Lower Mud River Valley produced a single specimen. In all, this insect caused very light defoliation.

Aspen Blotch Miner, Lithocolletis sp.

These blotch miners on trembling aspen leaves occurred lightly throughout the District. Larvae were first noted on June 9 in an area south of Vanderhoof which appeared to be quite attractive to this pest.

A Leaf-rolling Sawfly, Pamphilius sp.

On July 10, a colony of 14 whitish larvae were found near Nalte sby

Lake inside a tube of white silk within a rolled red-osier dogwood leaf.

A Geometrid, Campaea perlata Gn.

These brownish fringed loopers were found in the months of June, August, and September on a wide variety of hosts. In September, two beating samples of willow bushes at Uslika Lake and Discovery Creek produced 27 young larvae. Defoliation was light.

Yellow-lined Forest Looper, Nyctobia limitaria Wlk.

During the month of June, this measuring worm was collected on an average of two larvae per 3-tree beating from Germansen Landing south to Lily Lake, and east to Vanderhoof. The host tree in most cases was white spruce, but Douglas fir and alpine fir were also lightly affected.

A Bark Beetle, Dryocoetes sp.

Light damage to mature alpine fir was noted on a hillside at Mile 8 of the Nation River Mine Road. In September, larvae and adults were found in red-topped trees at an elevation of 3,700 feet. Dead and dying trees were prominent for 200 feet up the hill.

Green-headed Spruce Sawfly, Pikonema dimmockii Cress.

There was no increase this year above the small population of 1957. During June and July an average of less than two larvae per sample was collected from Saxton Lake west to Endako. White spruce was the favoured host.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

The status of this insect remained unchanged in 1958. It occurred in small numbers in June and July from Merton Lake to Lily Lake.

Ambrosia Beetles, Trypodendron spp.

No instance of serious damage attributable to ambrosia beetles was discovered in West Prince George District in 1958. Douglas-fir stumps were attacked at Youngs Creek, and the stems of diseased trembling aspens on a side road at Mile 17 of the Vanderhoof Highway were also infested.

Coneworms on Lodgepole Pine and Black Spruce, Dioryctria sp. probably abietella D. & S.

Larvae were found under the bark of reproduction lodgepole pines that had been attacked by the blister rust Peridermium stalactiforme Arth. & Kern. Such conditions were found at Mile 47 of the Hart Highway, on the Finmoore Road, and at Ormond Lake.

Cones on mature black spruce were also lightly mined by this insect in the Cluculz Lake area.

## STATUS OF TREE DISEASES

### A Rust on Lodgepole Pine

This blister rust caused by Peridermium stalactiforme Arth. & Kern was again common throughout the District, usually attacking stems or branches of reproduction and occasionally pole-size lodgepole pine. Infections occurred predominantly in pure stands: in the East, on the Parsnip River; in the West, at Endako; and in the North, at Manson Lake.

### Needle Rust on White and Black Spruce

Yellow witches' brooms caused by Peridermium coloradense (Diet.) Arth. & Kern were a familiar sight on spruce branches in every part of the District. Black spruce was most noticeably affected in the Cluculz Lake area, where five per cent of the trees are attacked.

### Unidentified Disease of Trembling Aspen

Pole-size aspen trees were dead and dying from an unknown disease along a side road at Mile 17 of the Vanderhoof Highway and also to a lesser extent at Mile 30 of the Kenny Dam Road. Trees affected were dying back from the upper crown and had thin foliage throughout. The stems displayed longitudinal lesions on the bark and a small amount of "bleeding". At the former locality, ambrosia beetles were boring in the dead portions of the stems. Mortality was medium to heavy, and existed for two miles along the side road. Specimen material is presently being cultured in the Pathology Laboratory at Victoria.

### Indian Paint Fungus

Brown stringy rot caused by Echinodontium tinctorium Ellis & Everh. was prevalent in the over-mature stand of alpine fir at Davie Lake. Pole-sized understory trees were attacked, as well as the dominant trees. In all cases, the disease organism appeared to have gained entry through branch stubs.

Stem and Branch Cankers on Trembling Aspen

At Mile 9 of the Uslika Lake Road, mature and overmature trembling aspen trees were found to be suffering heavily from large longitudinal black cankers. These were as much as ten feet long, and had caused some mortality. This condition continued in aspen for a half mile along the road. Elsewhere in the area, the attack was much lighter, but still quite noticeable. The disease organism is currently being cultured.

Tar Spot on Willow

Willow leaves in most of the District displayed shiny black spots caused by Rhytisma salicinum (Pers.) Fr. which first appeared late in August. Attacks ranged from light at Sob Lake, to heavy at Uslika Lake.

Western Gall Rust

Small roundish galls caused by Peridermium harknessii J. P. Moore were observed on lodgepole pine branches near Endako and along the Nation River Mine Road. In all cases, damage was light, with no mortality recorded.

A Leaf Rust of Scrub Birch

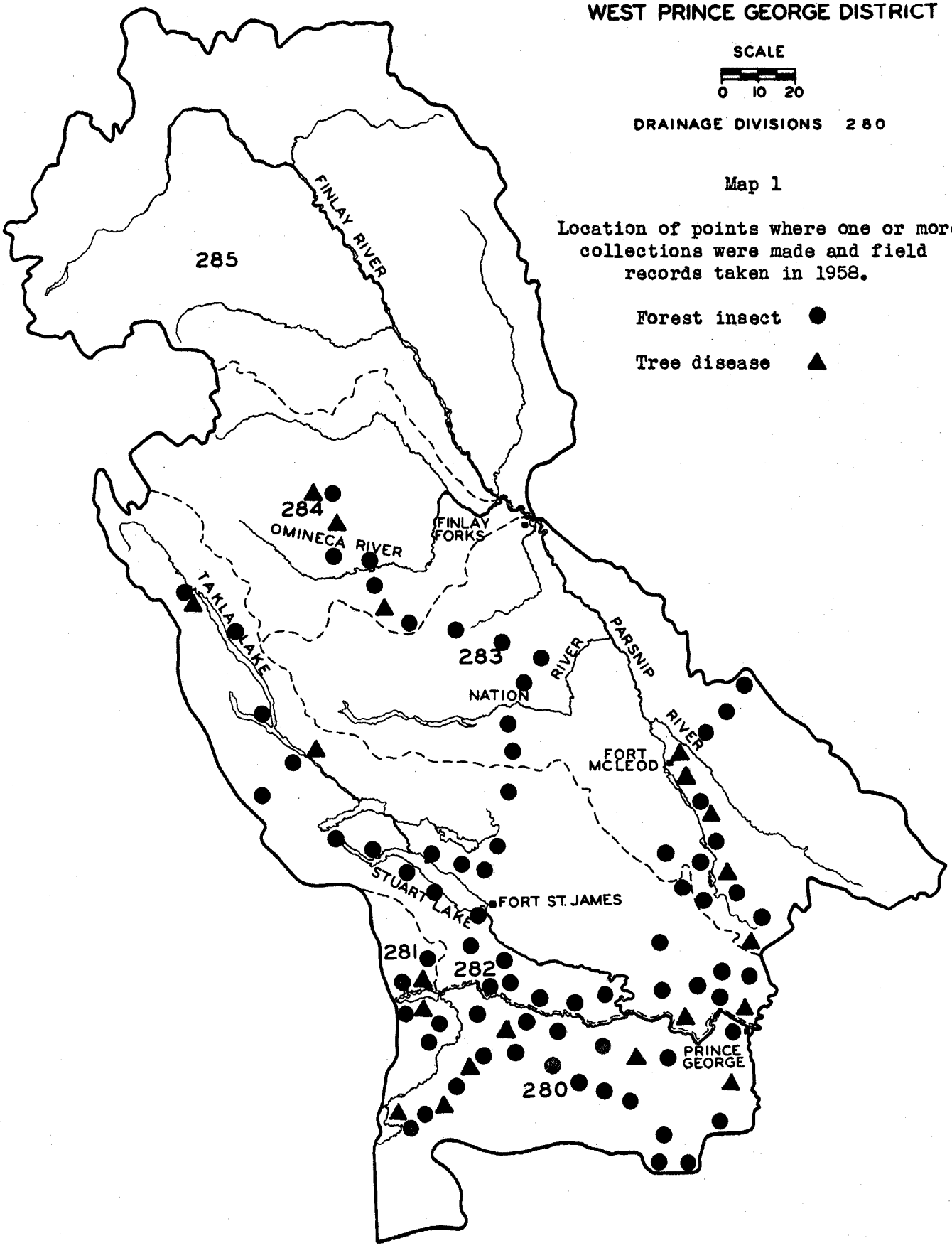
Scrub birches in an eastern larch bog near Isle Pierre were heavily infected with the leaf rust caused by Melampsoridium betulinum (Pers.) Kleb. Yellow pustules of the telial stage were found in mid-August on the undersides of leaves.

A Needle Rust of White Spruce

White spruce trees near Endako were infected with the needle rust caused by Chrysomyxa weirii Jacks. which occurred on 1-year-old needles. Light defoliation resulted.

Dieback in Douglas Fir

Dominant, overmature Douglas firs in the immediate vicinity of Prince George continued to die back from the crowns in 1958. The number of infected trees has shown no increase, but in some instances, bark beetles are hastening mortality. Possibly, unfavorable climatic conditions, or a combination of conditions, may have caused dieback.


WEST PRINCE GEORGE DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 280
Map 1
Location of points where one or more collections were made and field records taken in 1958.
Forest insect
Tree disease
285
FINLAY RIVER
284
OMINECA RIVER
FINLAY FORKS
TAKLA LAKE
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NATION
PARSNIP RIVER
FORT MCLEOD
STUART LAKE
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PRINCE GEORGE
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# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

NORTH PRINCE GEORGE DISTRICT

1958

# FOREST BIOLOGY SURVEY

## NORTH PRINCE GEORGE DISTRICT

1958

T. A. D. Woods

## INTRODUCTION

Field work in the North Prince George Forest Biology Ranger District began on May 30 and terminated on August 27.

Table 1 shows the number of forest insect and tree disease collections by hosts. Map 1 shows the localities where one or more collections or field records were taken.

Table 1

Collections by Hosts

North Prince George District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| fir, alpine | 6 | 1 | alder spp. | 41 | - |
| larch, eastern | 30 | - | aspen, trembling | 40 | - |
| pine, lodgepole | 52 | 1 | birch, dwarf | 11 | - |
| spruce, black | 8 | - | birch, white | 20 | - |
| spruce, white | 84 | 1 | cottonwood, black | 17 | - |
| | | | willow spp. | 51 | 3 |
| | | | miscellaneous | 5 | - |
| | | | Total | 185 | 3 |
| Total | 180 | 3 | Grand total | 365 | 6 |

## STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

The infestation of one-year-cycle spruce budworm at Smith River was still active but defoliation was lighter than in 1957. The heaviest known defoliation extended from Mile 510 to Mile 516 on the Alaska Highway. Between these points the feeding damage on the overstory was noticeable. Three-tree beating samples taken in this area on June 14 from eastern larch and white spruce yielded 60 and 23 ultimate instar larvae respectively.

Collections containing from one to three budworm larvae were taken at more than 20 points between Pine Pass and Mile 524 on the Alaska Highway. Hosts were white spruce, alpine fir, and eastern larch.

One full grown larva was collected on June 3 from lodgepole pine on the Hudson Hope road. From 5 to 10 per cent of the tips of alpine fir and white spruce were killed by two-year-cycle spruce budworm between Pine Pass and Boulder Creek on the Hart Highway.

Bruce Spanworm, Operophtera bruceata Hlst.

This insect caused considerable damage to trembling aspens between Pine Pass and Beatton River, Mile 147 on the Alaska Highway. From Mile 147 to Fort Nelson only a few larvae were taken in random samples. Information on the spot infestations is as follows:

Mile 236 on the Hart Highway - A small grove of trees on one side of the Highway was severely defoliated.

Little Prairie - Patches of trees up to one-half mile across on the hills north-west of the town were completely stripped of foliage.

East Pine - Aspen stands for half a mile along both sides of the road 20 miles west of East Pine were completely defoliated.

Dawson Creek - Small groups of trees were heavily defoliated five miles west of Dawson Creek and in the vicinity of Pouce Coupe.

Fort St. John - Defoliation ranged from 80 to 100 per cent in several localized infestations between Dawson Creek and Fort St. John.

Hudson Hope - On the Hudson Hope road defoliation extended from Mile 1.5 to 2.5. There had been heavy feeding on aspen trees and on willow, alder and rose understory.

Alaska Highway - One hundred per cent defoliation was noted at Miles 55, 61.5 to 66.5, 77 to 77.5 and 85 to 95.

In collections taken between May 31 and June 7, all larvae were full grown. At Mile 64 on the Alaska Highway the spanworm population had overflowed onto a white spruce tree which had become silver with the silk of the larvae. Three hundred larvae were taken in a beating sample from this tree.

By early July all trembling aspens that had been heavily defoliated had leafed out again.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The infestation of aspen leaf-miner which has been active for several years in the Liard River Valley, continued in 1958. Populations were light in the southern two-thirds of the District; up to 10 per cent of aspen leaves were mined at Pine Pass, Little Prairie, Moberly Lake, Dawson Creek, Cecil Lake and Bucking Horse River.

Leaf-miner populations were determined by examining the leaves on two 12-inch branches from each of five aspen trees in each locality. The number of infested leaves, and the stage of the insect present, were recorded. Results of quantitative sampling in 14 localities are shown in Table 2.

Table 2

Percentage of Trembling Aspen Leaves Infested in Samples at Localities Along the Alaska Highway and Dease Lake Road and Stages of Aspen Leaf Miner Present 1958

| Locality (mileposts) Alaska Highway | Date | Percentage leaves infested | Stage Present | | |
|---|---|---|---|---|---|
| | | | Egg | Larvae | Pupae |
| 295 | June 9 | 8 | | x | |
| 320 | June 11 | 8 | | x | |
| 364 | June 11 | 4 | | x | |
| 424 | Aug. 3 | 12 | | | x |
| 476 | June 18 | 76 | | x | |
| 479 | Aug. 4 | 100 | | | x |
| 501 | Aug. 4 | 100 | | | x |
| 533 | Aug. 4 | 100 | | | x |
| 553 | Aug. 7 | 100 | | | x |
| 571 | Aug. 7 | 100 | | | x |
| 591 | Aug. 8 | 88 | | | x |
| 605 | Aug. 8 | 86 | | | x |
| 624 | Aug. 8 | 82 | | | x |
| Dease Lake Road 54 | Aug. 9 | 72 | | | x |

The percentages of leaves infested indicate distribution of the aspen leaf-miner in the northern part of the District.

A Poplar Leaf-miner, Phyllocnistis sp.

The population distribution of a miner infesting black cottonwood leaves followed the same pattern as that of the aspen leaf-miner. Their numbers were generally low in most parts of the District but high in the Liard River Valley.

In conjunction with sampling for the aspen leaf-miner, similar data were obtained for black cottonwood leaves infested with Phyllocnistis sp. The sampling method was the same as that used for aspen leaf-miner. It consisted of an examination of the leaves on two 12-inch branches from each of five trees. Table 3 shows the degree of infestation in six localities in the northern part of the District.

Table 3

Percentage of Black Cottonwood Leaves Infested in Samples at Localities Along the Alaska Highway and Stages of Phyllocnistis Present 1958

| Locality (mileposts) Alaska Highway | Date | Percentage leaves infested | Stage Present | | |
|---|---|---|---|---|---|
| | | | Egg | Larvae | Pupae |
| 424 | Aug. 3 | 18 | | | x |
| 476 | June 18 | 100 | | x | |
| 501 | Aug. 4 | 100 | | | x |
| 506 | June 14 | 20 | | x | |
| 533 | Aug. 4 | 100 | | | x |
| 571 | Aug. 7 | 100 | | | x |

A Leaf-miner on Willow, Phyllocnistis sp.

Mining of willow leaves by Phyllocnistis larvae was first noted at Miles 524 and 578, and at Iron Creek on the Alaska Highway, June 17. The miner also infested 25 per cent of the leaves of two willow bushes at Mile 21 on the Dease Lake Road.

In random samples of 50 leaves each at Mile 546 and 588, 38 and 20 per cent of the leaves were infested. All the mines at Mile 588 were aborted.

Black-headed Budworm, Acleris variana (Fern.)

This budworm was collected from white spruce between June 11 and 20. The average number of larvae for the eleven 3-tree beating samples containing this species was nine. The highest numbers were taken at Miles 490 and 524 on the Alaska Highway and at Miles 30 and 60 on the Dease Lake Road. At each of these localities 18 larvae were collected.

Most of these samples were taken from open-grown trees. The larval development was very advanced and by June 18 some of the larvae had pupated.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Only three out of 30 beating samples taken from eastern larch, contained larch sawfly larvae. Thirty-five larvae were collected from three open-grown larch at Groundbirch, on the Hart Highway. One colony of 25 larvae was collected at Mile 19 on the Moberly Lake Road. The only other occurrence of this sawfly was at Mile 334 on the Alaska Highway where one colony of 11 larvae was collected. No serious defoliation was observed at any of these points.

Spruce Tip Moth, Zeiraphera fortunana Kft.

Small numbers of spruce tip moth larvae were common in white spruce samples throughout the district. On June 20, 1 collection at Mile 20 on the Dease Lake Road contained 19 larvae.

A Spruce Gall Midge, ? Rhabdophaga swainei (Felt)

A very light population of a spruce gall midge persisted in white and black spruce trees throughout the District in 1958. By June 14 at Muncho Lake the adults had flown.

Between August 3 and 18, samples were taken to determine the damage caused by this insect at a few localities in the northern half of the District. Table 4 shows the degree of infestation in samples consisting of three 18-inch branch samples from each of three trees. All the current year's buds were examined. There was considerable variation in the percentage of buds infested and the population was generally light.

Green Spruce Looper, Semiothisa granitata Gn.

Green spruce loopers were collected throughout the District on white spruce and lodgepole pine between August 15 and 21. Ten per cent of the total collections taken from these two tree species contained this looper.

Green Larch Looper, Semiothisa sexmaculata Pack.

The green larch looper was collected on eastern larch from Little Prairie to Dease Lake. Forty-three per cent of the 30 collections taken from eastern larch contained this species.

Table 4

Number of White and Black Spruce Buds Examined, and Percentage Infested by a Midge along the Alaska Highway and Dease Lake Road, North Prince George District 1958

| Locality (mileposts) Alaska Highway | Tree species Sw. | Sb. | No. of buds examined | Percentage buds infested |
|---|---|---|---|---|
| 304 | x | | 49 | 0.0 |
| 323 | x | | 52 | 5.7 |
| 333 | x | | 51 | 0.0 |
| 380 | | x | 52 | 5.7 |
| 469 | x | | 57 | 10.5 |
| 479 | x | | 57 | 1.7 |
| 501 | x | | 55 | 1.8 |
| 511 | x | | 54 | 0.0 |
| 546 | x | | 35 | 2.8 |
| 562 | | x | 51 | 0.0 |
| Dease Lake Road | | | | |
| 4.5 | x | | 58 | 0.0 |
| 14 | | x | 37 | 0.0 |
| 24 | x | | 49 | 0.0 |
| 34 | x | | 38 | 7.6 |

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

The yellow-headed spruce sawfly was collected at 20 localities in the District between Azouzetta Lake in the south, and Lower Post in the north. Damage caused by this insect was not noticeable at any of the sampling points.

Green-headed Spruce Sawfly, Pikonema dimmockii Cress.

The green-headed spruce sawfly was very scarce in 1958. Only two larvae were collected from white spruce.

An Alpine Fir Twig Sawfly, Pleroneura borealis Felt

Damage caused by this sawfly was found at two localities; Mile 345 on the Alaska Highway where 15 per cent of the buds on reproduction alpine fir were mined, and at Steamboat Mountain, Mile 364, where 25 per cent of the buds were mined over an estimated 2 acres.

Willow Leaf Blotch Miner, Lyonetia saliciella Busck.

The willow leaf blotch miner caused damage at many localities between Mile 500 and 602 on the Alaska Highway. In June, at Miles 524, 527 and 602 it was estimated that from 15 to 75 per cent of the foliage of willows was infested. At Mile 21 on the Dease Lake Road defoliation ranged from 15 to 75 per cent.

In July, after the larvae had pupated, samples of 50 leaves taken at random from one tree in each locality, were examined at Miles 500, 546 and 553. Infestation ranged from eight per cent of the leaves at Mile 500 to 80 per cent at Mile 546 and 90 per cent at Mile 553. No evidence of the miner was found beyond Mile 602.

At Mile 546, 20 per cent of the leaves of one alder tree were infested by Lyonetia sp.

An Aspen Leaf-roller, Sciaphila duplex Wlshm.

At Mile 35 on the Hudson Hope Road, a small grove of aspens and willows was moderately defoliated. Some of the leaf-rollers were still in the pupal stage on June 3; the rest of the population was in the adult stage.

A Tortricid in Black Cottonwood Stems.

A small borer infesting black cottonwood reproduction was noted at Sunset Prairie a few miles north of Hart Highway. Six infested stems were collected from the stand which bordered one side of the road for one and one half miles. The borers killed either the main stem or twigs by girdling them just beneath the bark. This was the only locality in the District where such damage was observed.

A Lepidopterous Shoot-borer.

An unidentified shoot-borer infested willows throughout the District, especially in the southern part. The borer mined the current year's shoots giving a wilted appearance to the under-developed leaves.

At Kiskatinaw River 40 per cent of the shoots of a willow shrub had been mined. At Mile 618 at the northern end of the District there was an average of one mined shoot per branch on one bush.

A shoot-borer attacking red osier dogwood at Liard River Hot Springs could be the same species.

Borers of Birch and Alder Catkins, Lepidoptera and Diptera (Cecidomyiidae)

A small larva boring into the catkins of white birch at Mile 588, 608 and 624 on the Alaska Highway was identified as a microlepidoptera. Random samples of 50 catkins each were 80, 60 and 70 per cent infested.

Four per cent of the cones of one alder bush were mined by an unidentified lepidopterous borer at Mile 546 on the Alaska Highway.

Cecidomyiid larvae were found infesting 10 per cent of the seed catkins of a dwarf birch bush on August 3 at Mile 469 on the Alaska Highway.

A Leaf Beetle, Chrysomela sp.

Leaf-eating beetles, in the larval and adult stages, caused light defoliation of reproduction black cottonwoods along one-half mile of shore line on the Bucking Horse River.

A Cottony Scale, Pulvinaria sp.

One sample of this scale insect was collected from willow at Mile 548 on the Alaska Highway.

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE

North Prince George District

| Insect | Host | Locality | No. of Collections |
|---|---|---|---|
| Acronicta grisea Wlk. | Bi.<br>D | Fort Nelson | 2 |
| Amphidasis cognataria Cn. | D | Peace River | 2 |
| Anagoga pulveraria Wlk. | D | Peace River<br>Fort Nelson | 2 |
| Anomogyna mustelina Sm. | Sw | Mile 501 | 1 |
| Anoplonyx canadensis Hgtn. | Le. | Peace River<br>Fort Nelson | 4 |
| Anoplonyx laricivorus Roh. & Midd. | Le | Fort Nelson | 2 |
| Archips persicana Fitch. | Cot<br>D | Peace River<br>Liard River | 2 |

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE - continued

| Insect | Host | Locality | No. of Collections |
|---|---|---|---|
| Arge clavicornis (F.) | W<br>D | Peace River<br>Fort Nelson<br>Liard River | 12 |
| Autographa ampla Wlk. | A | Mile 255 | 1 |
| Campaea perlata Gn. | Cot, A, W, D, Ds | Peace River<br>Fort Nelson | 18 |
| Caripeta aequaliaria Grt.? | Pl | Hudson Hope | 1 |
| Caripeta angustiorata Wlk. | Pl | Hudson Hope | 1 |
| Caripeta divisata Wlk. | Sw | Peace River | 2 |
| Catocala sp. | W, A | Peace River | 2 |
| Cimbex americana Leach | W, D | Peace River | 3 |
| Cosymbia pendulinaria griseor McD. | D | Peace River<br>Fort Nelson | 9 |
| Deilinia sp. | W | Hudson Hope | 1 |
| Dioryctria reniculella Grt. | Sw | Mile 506 | 1 |
| Drepena arcuata Wlk. | Bi | Moberly Lake | 1 |
| Drepena bilineata Pack. | D | Cecil Lake | 1 |
| Enargia infumata Grt. | W | Fort Nelson | 1 |
| Epicnaptera americana Harr. | A, Bi | Peace River<br>Fort Nelson | 5 |
| Epirrita autumnata omissa Harr. | Ba<br>Sw | Peace River<br>Fort Nelson | 2 |
| Eucordylea atrupictella Dietz | Pl<br>Sw | Peace River | 2 |
| Eupithecia filmata Pears. | Sw<br>Ba | Peace River<br>Fort Nelson | 4 |
| Eupithecia luteata bifasciata Dyar | Ba, Pl, Le, Sw | Peace River<br>Fort Nelson | 10 |

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE - continued

| Insect | Host | Locality | No. of Collections |
|---|---|---|---|
| Eupithecia palpata Pack. | Pl | Hudson Hope | 2 |
| Eupithecia transcanadata McK. | Pl | Hudson Hope | 3 |
| Feralia comstocki Grt. | Ba<br>Sw | Peace River | 3 |
| Graptolitha vivida Dyar? | D | Little Beaver Creek | 1 |
| Griselda radicana Wlshm.. | Sw | Liard River | 2 |
| Hemichroa crocea (Four.) | D | Cecil Lake | 1 |
| Homoglaea carbonaria Harv. | A | Hudson Hope | 1 |
| Hydriomena divisaria Wlk. | Sw | Fort Nelson | 1 |
| Hydriomena renunciata columbiata Tayl. | Cot | Fort Nelson<br>Liard River | 5 |
| Hypagyrtis piniata Pack. | Le | Mile 220 | 1 |
| Ichthyura sp. | A | Peace River<br>Liard River | 3 |
| Itame anataria Swett. | Cot, D,<br>A, Bi | Peace River<br>Fort Nelson<br>Liard River | 8 |
| Itame loricaria Evers. ? | W | Peace River<br>Fort Nelson | 2 |
| Lycia ursaria Wlk. | W | Mile 186 | 1 |
| Lygris xylina Hlst. | W | Dease Lake | 1 |
| Malacosoma disstria Hbn. | A, | Hudson Hope | 1 |
| Notolophus antiqua badia Hy. Edw. | A, D | Peace River | 2 |
| Nyctobia limitaria Wlk. | Sw, Pl, | Peace River | 6 |
| Orthosia revicta Morr. | Cot | Mile 345 | 2 |
| Panthea sp. | Pl | Peace River | 2 |
| Papilio sp. | A, Bi | Peace River<br>Liard River | 2 |

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE - continued

| Insect | Host | Locality | No. of Collections |
|---|---|---|---|
| Petrova sp. | Pl | Hudson Hope | 1 |
| Pheosia rimosa Pack. | W | Azouzetta Lake | 1 |
| Philobia ulsterata Pears. | Bi | Mile 363 | 1 |
| Phytophaga piceae Felt | Sw | Fort Nelson | 1 |
| Plagodis phlogosaria Dyar | W, D, A, Bi, Bi | Peace River Liard River | 10 |
| Protoboarmia porcelaria indictaria Wlk. | Sw, Pl, Le, D | Peace River Fort Nelson Liard River | 9 |
| Rhabdophaga carbonaria | A | Arras | 1 |
| Rhabdophaga ? rigidae (O. S.) | W | Mile 414 | 1 |
| Rhabdophaga strobiloides (Walsh) | W | East Pine | 1 |
| Selenia alciphearia Wlk. | D | Fort Nelson Liard River | 3 |
| Smerinthus cerisyi Kby. | W | Mile 363 | 1 |
| Syngrapha sp. | Ba, Sw, Pl, Le | Peace River Fort Nelson Liard River | 8 |
| Syngrapha ? alias interalia Ottol. | Sw | Hudson Hope | 1 |
| Syngrapha ? epigaea Grt. | Pl | Hudson Hope | 1 |
| Syngrapha ? selecta Wlk. | Sw, Le, Ba, Pl | Peace River Fort Nelson Liard River | 8 |
| Trichiosoma sp. | D, W, A | Peace River Fort Nelson | 5 |
| Zeiraphera diniana Gn. | Le | Fort Nelson Liard River | 5 |
| Zenobia pleonectusa Grt. | A | Hudson Hope | 2 |

DISTRIBUTION OF MISCELLANEOUS ADULT INSECTS

North Prince George District

| Insect | Host | Locality | Number of Collections |
|---|---|---|---|
| Acmaeops pratensis (Laich.) | Rosa sp. | Mile 530 | 1 |
| Anatis ocellata mali Say | Pl<br>Sw | Peace River<br>Fort Nelson | 2 |
| Anisocalvia 12-maculata Gebl. | Sw, Sb, Pl, Ba, Le, A, Cot, W, D | Peace River<br>Fort Nelson<br>Liard River | 17 |
| Anisocalvia 14-guttata Linn. | Le, Sw, W, A | Peace River<br>Fort Nelson | 3 |
| Anoplodera aspera Lec. | Sw | Fort Nelson<br>Liard River | 2 |
| Anoplodera sexmaculata Linn. | Sw,<br>Rosa sp. | Liard River | 4 |
| Asemum atrum. Esch. | In flight | Fort Nelson | 1 |
| Encalus decipiens Lec. | W | Mile 596 | 1 |
| Hippodamia 13-punctata tibialis Say | Cot | Mile 162 | 1 |
| Hylobius pinicola (Coup.) | Le | Mile 43<br>Dease Lake | 1 |
| Lepyrus sp. | Cot, A, W | Peace River | 7 |
| Ludius aeripennis Kby. | A | Mile 49 | 1 |
| Ludius virens (Schrank) ? | Le | Peace River | 1 |
| Magdalis sp. | Sw, Pl, D | Fort Nelson<br>Liard River | 5 |
| Mulsantina sp. | Pl, Sw, W, Sb | Peace River<br>Fort Nelson<br>Liard River | 25 |
| Orchestes salicis Linn. | A | Peace River<br>Fort Nelson | 2 |
| Orsodacne atra Ahr. | Cot, A | Peace River | 2 |

DISTRIBUTION OF MISCELLANEOUS ADULT INSECTS - continued

| Insect | Host | Locality | Number of Collections |
|---|---|---|---|
| Pachyta lamed Linn. | Sw | Boulder Creek | 1 |
| Phyllodecta americana Schff. | A | Mile 49 | 1 |
| Phytodecta notmani Schaef. | A, W | Fort Nelson | 2 |
| Pissodes sp. | Le, Sw, Pl | Fort Nelson<br>Liard River | 6 |
| Psyllobora vigintimaculata Say | Sw, D | Fort Nelson | 6 |
| Saperda moesta Lec. | Sw | Moberly Lake | 1 |
| Stenotrachelus aeneus (Fab.) | D, Bi | Peace River | 2 |
| Syneta hamata Horn ? | A | Arras | 1 |
| Syneta pilosa Brown? | Sw | Fort Nelson<br>Liard River | 2 |

## STATUS OF TREE DISEASES

### A Rust on Lodgepole Pine

The only locality in the District where this rust caused by Peridermium stalactiforme Arth. & Kern was noted was eight miles west of East Pine, where lodgepole pines were infected.

### A Stem Rust on Lodgepole Pine

No samples of this stem rust caused by Peridermium harknessii J. P. Moore were sent to Victoria in 1958 but it was prevalent throughout the District.

### Willow Rust

This rust caused by Melampsora paradoxa Diet. & Holw. was observed throughout the District. In some localities it had covered whole willow bushes, and in others only the tips of the upper branches.

Needle Rust of Alpine Fir

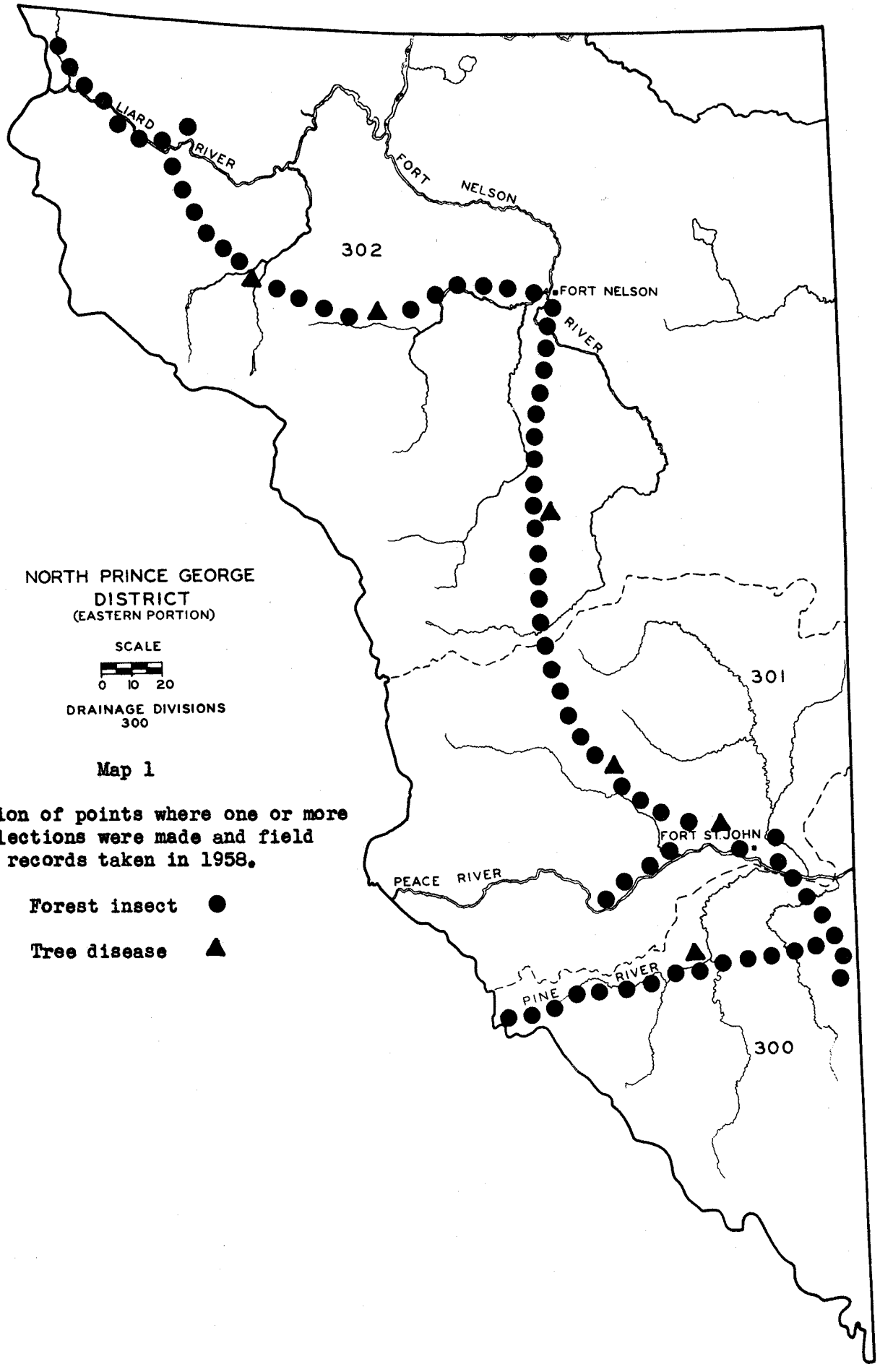
One collection of alpine fir rust caused by Peridermium holwayi Syd. was taken at Mile 82 on the Dease Lake Road.

Tar Spots on Willow

This disease caused by Rhytisma salicinum (Pers.) Fr. was present on one willow bush at Mile 404 on the Alaska Highway.

Winter Injury

A red belt condition in a stand of lodgepole pine was observed at two localities in the North Prince George District. One was between Miles 400 and 406 on the northeast side of the valley and the other at Cassiar. In both localities lodgepole pines at the 4,400 foot level were affected.




NORTH PRINCE GEORGE
DISTRICT
(EASTERN PORTION)

SCALE

0 10 20

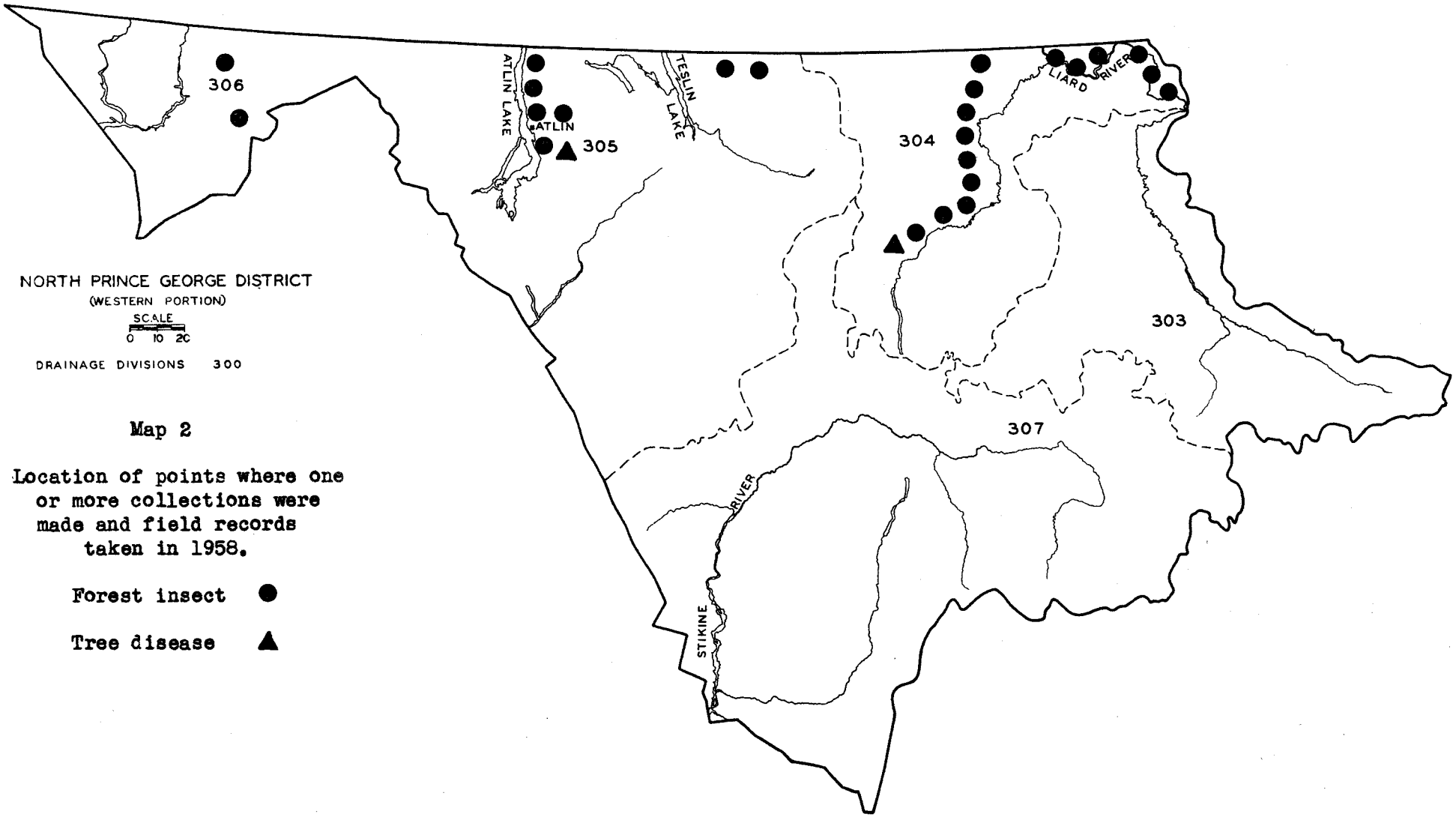
DRAINAGE DIVISIONS
300

**Map 1**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect** ●

**Tree disease** ▲




NORTH PRINCE GEORGE DISTRICT
(WESTERN PORTION)

SCALE
0 10 20

DRAINAGE DIVISIONS 300

**Map 2**

**Location of points where one or more collections were made and field records taken in 1958.**

**Forest insect** ●

**Tree disease** ▲

# ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

YUKON DISTRICT

1958

# FOREST BIOLOGY SURVEY

## YUKON DISTRICT

## 1958

J. Y. Obana

## INTRODUCTION

The Forest Insect and Disease Survey in the Yukon Forest Biology Ranger District began on June 20 and terminated on August 15. Only the areas accessible by roads in Yukon Territory and Atlin Ranger District were surveyed. A house trailer stationed at the Yukon Forestry Division in Whitehorse, Y. T. was used as headquarters.

Table 1 shows the host trees and the number of insect and tree disease collections made from each. Map 1 shows the localities where collections and field records were taken.

Table 1

Collections by Hosts
Yukon District - 1958

| Coniferous hosts | Forest insects | Tree diseases | Broad-leaved hosts | Forest insects | Tree diseases |
|---|---|---|---|---|---|
| fir, alpine | 6 | 1 | alder, mountain | 1 | - |
| hemlock, western | 1 | - | alder, Sitka | 6 | - |
| larch, eastern | 6 | - | aspen, trembling | 25 | 2 |
| pine, lodgepole | 21 | 2 | birch, dwarf | 11 | - |
| spruce, black | 5 | - | birch, water | 1 | - |
| spruce, Sitka | 1 | - | birch, white | 9 | - |
| spruce, white | 102 | 2 | cottonwood, black | 2 | - |
| | | | poplar, balsam | 4 | - |
| | | | willow | 43 | 2 |
| | | | miscellaneous | 4 | - |
| | | | Total | 106 | 5 |
| Total | 142 | 5 | Grand total | 248 | 10 |

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

At Mile 1070, Alaska Highway, a group of five scattered white spruce trees were attacked in 1958. The trees were examined on July 31 and both larvae and parent adults were present. These trees were also attacked by a species of engraver beetle.

An Engraver Beetle in Lodgepole Pine, Ips sp.

Damage caused by this beetle was very light in 1958, however, a group of three lodgepole pine trees was attacked in the vicinity of lower Hazel Creek, B. C. A few scattered trees near Minto, Yukon Territory were also attacked and when the trees were examined in early July only young larvae were present.

Black-headed Budworm, Acleris variana (Fern.)

A light population of the black-headed budworm was observed on white spruce in the Watson Lake, Whitehorse, Haines Junction, Carmacks and Atlin districts. An average of five larvae was collected per 3-tree beating sample in late June. Adults and pupae were present in beating samples taken in mid-July near Carmacks, Yukon Territory. Only an occasional larva was collected elsewhere in the Yukon District.

Spruce Seedworm, Laspeyresia youngana (Kearf.)

Although the white spruce cone crop was light, cone samples were obtained from five localities. Each sample consisted of 50 cones and the percentage infested is shown in Table 2. All the samples were taken in late July or early August and only the larval stage of this insect was present in the infested cones.

Table 2

Percentage of White Spruce Cones Infested by the Spruce Seedworm (50-Cone Samples) Yukon Territory, July-August, 1958.

| Locality | Percentage infested |
|---|---|
| Mile 139, Haines Road | 20 |
| Mile 1030, Alaska Highway | 15 |
| Mile 3, Aishihik Road | 16 |
| Mile 865, Alaska Highway | 9 |
| Carcross | 20 |

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The aspen leaf-miner infestation in the Watson Lake District increased slightly in 1958. The infestation extended from the British Columbia - Yukon border at Mile 626, Alaska Highway, to the Little Rancheria River at Mile 670. Only a trace of the miner was found elsewhere in the Yukon District. Table 3 shows the results of the examination of leaf samples taken at three localities. A sample consists of ten 18-inch branch tips selected from five trees.

Table 3

Percentage of Trembling Aspen Leaves Infested by the Aspen Leaf-miner (18-inch Branch Samples), Yukon District - 1958

| Locality | Date | No. leaves examined | Percentage of leaves infested | Stage of insect |
|---|---|---|---|---|
| Watson Lake | June 19 | 604 | 80.6 | pupa |
| Vand Creek | July 13 | 593 | 6.5 | adult |
| Rancheria River | August 13 | 742 | 27.2 | adult |

Aspen Leaf Blotch Miner, Lithocolletis sp.

Trembling aspen trees in an area which extended six miles west of Stewart Crossing on the Dawson Road and five miles east on the Mayo Road were infested by this miner. The degree of infestation ranged from medium to heavy. A standard branch sample taken at Stewart Crossing on July 15 showed that 90 per cent of the leaves were infested. Only a few living larvae and pupae were found in the infested leaves.

The aspen blotch miner was observed to a lesser degree in aspen stands growing along the highway between Carmacks and Stewart Crossing. Very few mined aspen leaves were seen elsewhere in the Yukon District.

A Birch Leaf-roller, Eulype sp.

The birch leaf-roller population southeast of Dawson decreased in 1958, but continued to severely defoliate alder and white birch trees in the area west of Dawson. Alder trees growing along the Alaska Highway from the Yukon - Alaska border to Kluane Lake were also lightly defoliated.

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

A stand of trembling aspen trees three miles north of Carmacks, covering about 400 acres was very heavily defoliated by this insect. The average defoliation was estimated to be about 75 per cent. When the District was surveyed in mid-July most of the adults had already emerged.

Willow Leaf-miner, Lyonetia saliciella Busck.

The infestation at McKee Creek, west of Atlin, B. C., increased to about 250 acres in 1958. Although the miner prefers willow leaves, trembling aspen leaves were also mined.

A Spruce Gall Midge, ? Rhabdophaga swainei (Felt)

Damage attributed to larvae of this midge was light in all areas in the southern Yukon with the exception of Dawson and Mayo districts where no evidence of this cecidomyiid's presence was found. No collections were made as the adults had emerged by late June. Figures 1 and 2 illustrate damage caused by the midge.

A Lepidopterous Spruce Tip Miner

This miner continued to cause light damage to white spruce buds in the Teslin, Whitehorse and Haines Junction districts. Figures 3 and 4 in the photographic section illustrate damage caused by this miner.

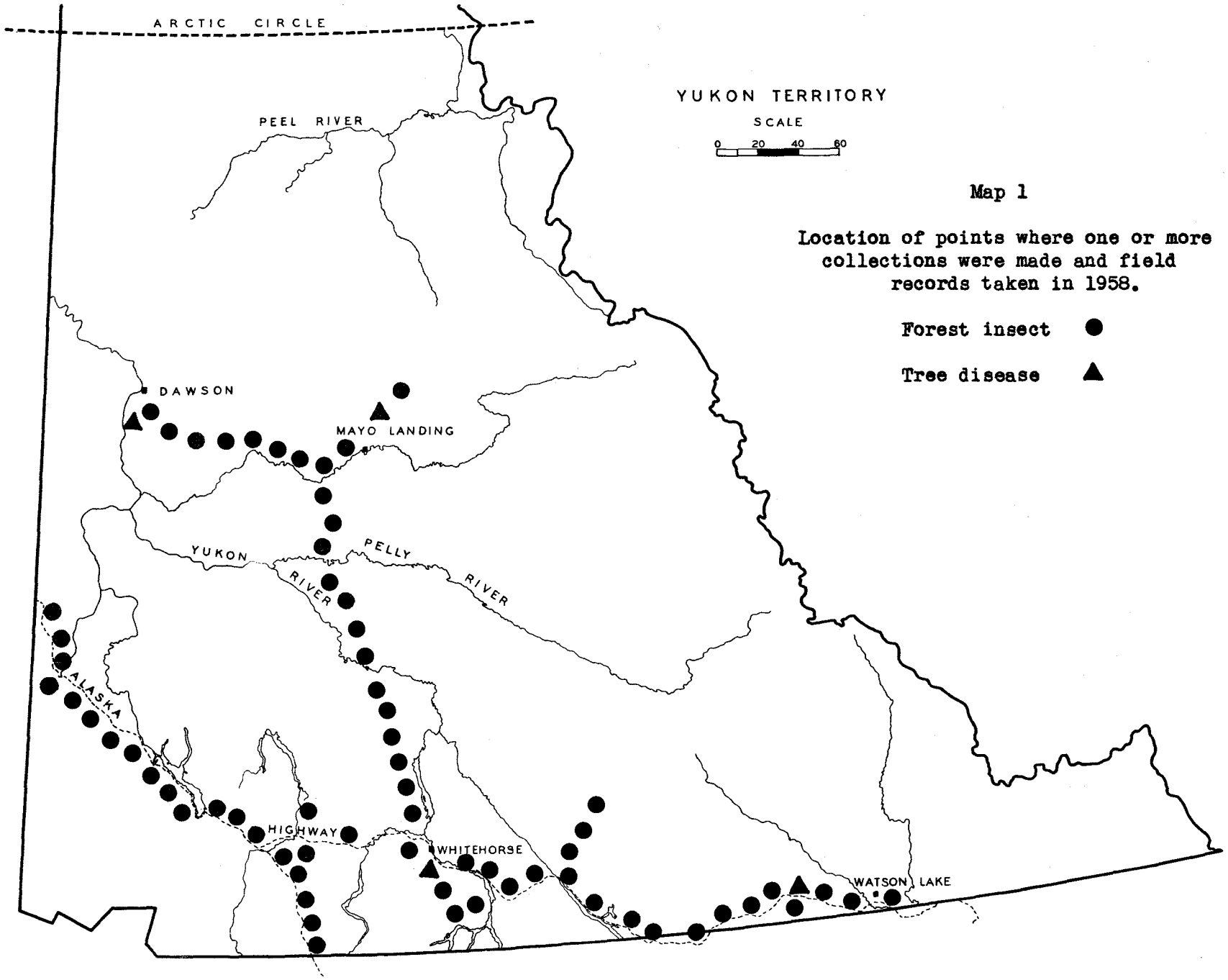
## STATUS OF TREE DISEASES

Needle Rust on White Spruce

"Witches' brooms" caused by Peridermium coloradense (Diet.) Arth. and Kern continued to be associated with light damage in the District. White spruce trees of all age classes in the Atlin Lake area were heavily infected by this rust.

Western Gall Rust

A group of ten reproduction lodgepole pine trees was infected by Peridermium harknessii J. P. Moore at Mile 658 Alaska Highway, Y. T. No sign of this disease was observed elsewhere in the District.




Map 1

Location of points where one or more collections were made and field records taken in 1958.

Forest insect ●

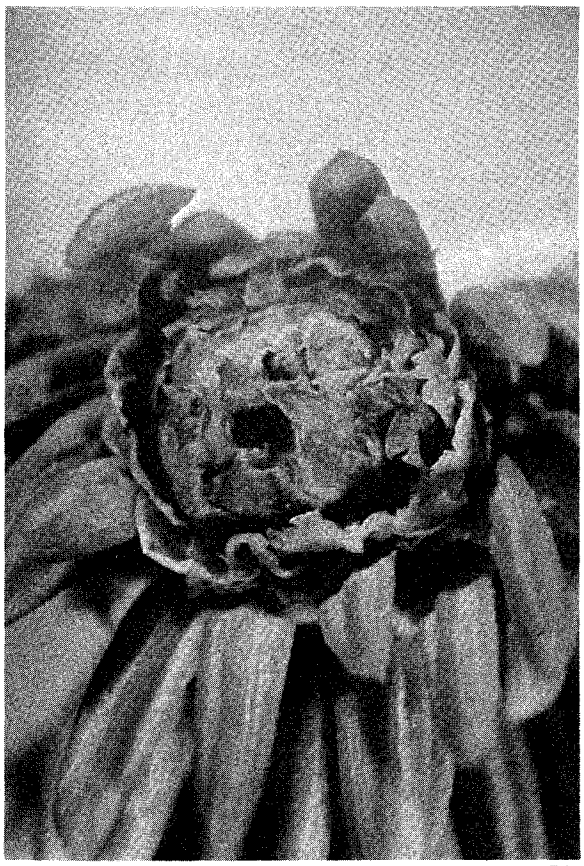
Tree disease ▲

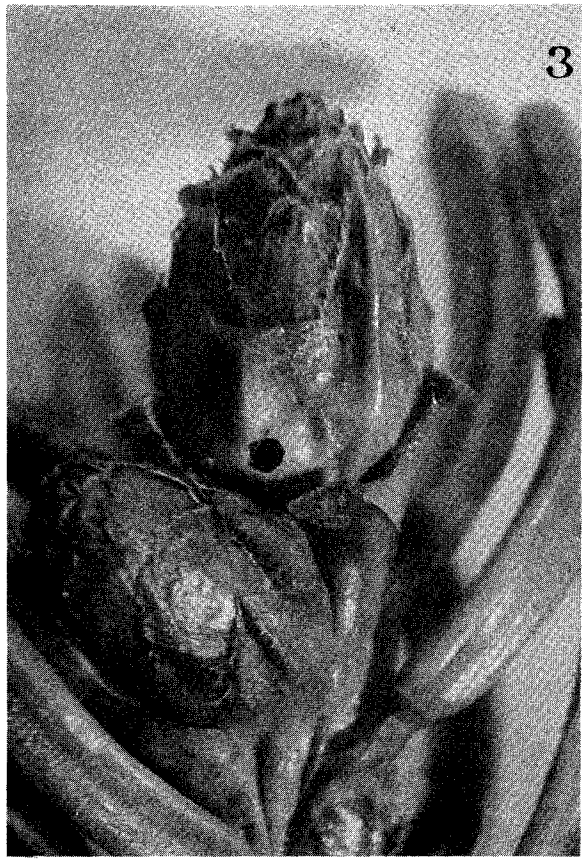
Figure 1. Spruce gall midge, Rhabdophaga swainei (Felt). Emergence hole made by an adult midge in a white spruce bud. Whitehorse, Y. T. August 2, 1958.
A. Craigmyle.

Figure 2. Cross section of a bud mined by the spruce gall midge. Whitehorse, Y. T. August 3, 1958.
A. Craigmyle.

Figure 3. Emergence hole made by an unidentified lepidopterous spruce tip miner in a white spruce bud. Whitehorse, Y. T. August 3, 1958.
A. Craigmyle

Figure 4. Cross section of a mined bud. Whitehorse, Y. T. August 3, 1958.
A. Craigmyle.





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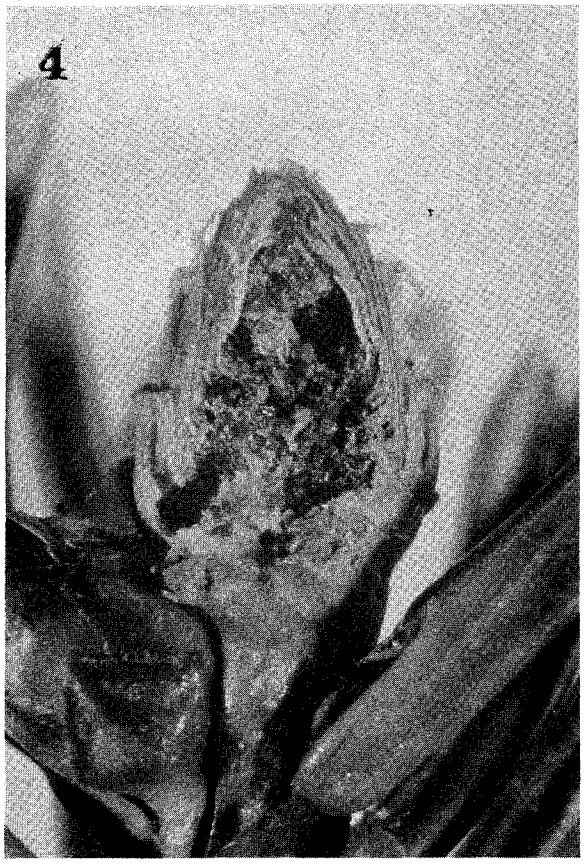

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