ANNUAL REPORTS OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA, 1955

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FOREST BIOLOGY LABORATORY

VICTORIA, B.C.

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DEPARTMENT OF AGRICULTURE

SCIENCE SERVICE

FOREST BIOLOGY DIVISION

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Forest Insect and Tree Disease Survey

by Ranger Districts
British Columbia

SOUTH PRINCE GEORGE DISTRICT - continued.

BRITISH COLUMBIA

FOREST BIOLOGY RANGERS' ANNUAL REPORT

1955

R. L. Fiddick

INTRODUCTION

The Forest Biology survey field season commenced in early May, and with defoliation studies and egg sampling of the spruce budworm and black-headed budworm extended through to November. The tree disease survey, as in the past few years, was conducted by the rangers simultaneously with the insect survey. The quantity and quality of the tree disease collections has improved as the rangers gain increased knowledge through instruction and actual field experience.

More emphasis was placed on special insect collections in 1955 than in previous years. Special collections were submitted to research officers of the Victoria and Vernon laboratories as well as to other laboratories in the Science Service in Canada. The total number of collections for the year was 4,271, somewhat less than in preceding years. This decrease in the number of collections was due in part to some rangers being assigned to unfamiliar districts, although an increase in the amount of reconnaissance cruises in some areas and concentrated work on the spruce budworm, black-headed budworm, and Douglas fir-beetle, were also contributing factors.

The black-headed budworm infestation on North Vancouver Island increased in extent as well as intensity. A number of plots were established throughout the area for the purpose of studying the history of the outbreak and the effect of defoliation on the trees. Defoliation estimates were made in some areas and the larval populations in each case related to defoliation. The following index was used in classifying infestations.

Light - Larval populations 1 - 10 per 3-tree beating sample; defoliation nil to trace.

Medium - Larval populations 11 - 40 per 3-tree beating sample; loss of new foliage 10 - 50 per cent.

Heavy - Larval populations 41 - 100 per 3-tree beating sample; loss of new foliage 60 - 100 per cent.

Very heavy - Larval populations 100+ per 3-tree beating sample; tips and terminals may be bare with some tip and terminal killing.

Egg counts were made in the fall and the following tentative relationship was established between current defoliation and number of eggs per 100 inches of needle bearing twig.

No. of eggs	Estimated defoliation
1 - 10	light
11 - 29	medium
30 - 99	heavy
100+	very heavy

The spruce budworm infestation in the Lillooet and Fraser River valleys has apparently passed its peak although severe defoliation occurred in several areas. The following population index has been established for use in spruce budworm infestations.

Light - Larval populations 1 - 10 per 3-tree beating sample; defoliation not noticeable to trace.

Medium - Larval populations 11 - 40 per 3-tree beating sample; loss of new foliage from 10 - 50 per cent. Browning of foliage barely perceptible.

Heavy - Larval populations 41 - 100 per 3-tree beating sample; loss of new foliage from 60 to 100 per cent. Browning visible from a distance or from the air.

Very heavy - Larval populations 100+ per 3-tree beating sample; loss of new foliage complete with back feeding on older foliage - heavy tip feeding, buds killed, tree crown thin; browning clearly visible, as well as defoliated (and killed) terminals.

The hemlock looper population remained at a low level except for a number of small localized infestations in the Prince George District.

The Douglas-fir beetle, as in previous years, continued to cause severe mortality to Douglas-fir stands in the interior and in some stands on Vancouver Island.

FOREST BIOLOGY SURVEY

VANCOUVER FOREST DISTRICT

1955

E. G. Harvey

INTRODUCTION

During 1955 the forest biology survey was carried out in the Vancouver Forest District by the following rangers, in the ranger districts as shown:

a. South Vancouver Island - E. G. Harvey

b. North Vancouver Island - D. W. Taylor

c. South Vancouver - E. L. Avison

d. North Vancouver - K. W. Robertson and N. E. Alexander.

The survey boat, Forest Biologist, was under the charge of K. W. Robertson. It was used chiefly in the North Vancouver District and in the Gulf Islands in the South Vancouver Island District.

Each ranger was required to do some work on special surveys in one or more of the other districts.

A number of aerial reconnaissance flights were made during the year. These were a great help both in spotting and mapping infestations and familiarizing the rangers with their districts. Aircraft were supplied by the British Columbia Forest Service and logging companies, and in one flight a chartered aircraft was used.

The spruce budworm infestation in the South Vancouver District increased in extent although the population decreased.

The hemlock looper was found in fewer collections and fewer larvae per collection were obtained than in 1954.

The black-headed budworm outbreak extended over a large area on North Vancouver Island. Heavy defoliation is expected in some areas in 1956.

The Douglas-fir bark beetle is still active in the Nimpkish River Valley but appeared to be declining in other areas.

The silver-spotted halisidota extended over a larger area than in 1954 but in most areas the population has decreased.

Western tent caterpillar infestations passed their peak except in the Saanich Peninsula and Gulf Islands where populations were still high.

FOREST BIOLOGY SURVEY

SOUTH VANCOUVER ISLAND DISTRICT

1955

E. G. Harvey

INTRODUCTION

During 1955 a total of 494 insect and 13 tree disease collections were made. Table 1 shows the insect collections by agencies. Table 2 shows the host trees for both insect and tree disease samples. Map 1 shows the location of collections.

All permanent sampling stations were sampled at least once during the season. Two stations were discontinued. One was logged and the second was placed in a watershed area and made out of bounds.

The South Vancouver Island District is getting more accessible each year. This is due to companies expanding their logging operations, and also making access roads to camps which had been served previously by railroad speeder.

STATUS OF INSECTS.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Two small larvae collected at Thetis Lake were tentatively identified as spruce budworm. One of the immature larvae died in the insectary and the other one was killed by a parasite before the determination could be verified. There is therefore no definite proof of any spruce budworm in the district in 1955.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Larvae were collected in only two areas, the Nitinat Valley and the Klanawa Valley. Both of these areas are in old hemlock looper infestations. The largest collection, 5 larvae, was in the Nitinat area. An attempt to obtain a mass collection of larvae for study resulted in finding only 8 larvae from 10 trees in the same vicinity.

Table 1

Forest Insect Collections by Agencies,
South Vancouver Island District - 1955.

Personnel Involved in Collection	Number of Collections May	June	July	Aug.	Sept.	Oct.	Total*
Forest Biology Rangers Independently	45	122	43	13	50	2	309
Forest Biology Rangers with Forest Service Personnel							0
Forest Service Personnel Independently	8	12	13	19	10	2	66
Other Co-operators	12	16	16	32	18	9	119
Total							494

* Includes samples taken in months other than shown.

Table 2

Collections by Hosts,
South Vancouver Island District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
western red cedar	22		no host	23	
Douglas fir	172		miscellaneous	52	
spruce white	1		willows	25	
spruce Sitka	5		black hawthorn	1	
cypress	1		dogwood	1	
amabilis fir	8		maple	2	
grand fir	15		alder	32	
alpine fir	1		arbutus	1	
lodgepole pine	9		silver poplar	1	
white pine	11		trembling aspen	8	
western hemlock	76		apple	3	
mountain hemlock	4		mountain ash	1	
			garry oak	19	
			Total	169	
Total	325		Grand Total	494	

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm almost disappeared from the South Vancouver Island District. It appeared in only two collections. At Sarita River Camp 20 larvae were found in one 3-tree beating sample and 3 larvae were collected at Fourth Nanaimo Lake.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

No beetles were found in the areas which contained fresh beetle attacks in 1954. No new attacks were located, and although an aerial reconnaissance was made, only dead trees from previous attacks were observed.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

During an aerial reconnaissance several small groups of dying trees were located. Later examination showed these trees to be white pine attacked by mountain pine beetle. Groups ranging in number from 4 to 30 trees were found east of Cameron Lake; on branch 10, Corrigan Creek; around Lois Lake; on the south side of Eagle Heights; near Jump Lake; and in the Copper Canyon area on Sugar Loaf Mountain.

Silver-spotted Halisidota, Halisidota argentata Pack.

As predicted in 1954 there was an increase in the population of the silver-spotted halisidota in 1955. Early spring surveys recorded an approximate three-fold increase in the number of colonies. A road-side survey between Duncan and Nanaimo counted 363 colonies compared to only 133 in 1954. Although the number of colonies increased there was an apparent decrease in the number of larvae per colony; as low as 15 larvae were found in some webs compared to an average of 200. The outbreak increased slightly in area, but the heaviest populations were still found near tide-water (map 2). The heavy localized infestation at Crofton, where up to 14 colonies per tree were found in 1954, decreased in intensity.

Close examination of several study areas revealed that the silver-spotted halisidota does not attack the same trees each year. For example, trees which had up to five colonies in 1954 had none or possibly one colony in 1955, while adjoining trees which were not attacked last year were attacked by several colonies this year. Although Douglas fir is the preferred host, several instances were noted where lodgepole pine was more heavily attacked than were Douglas fir trees in the same immediate area.

Of 1,119 larvae collected from the district 197 or 17.6 per cent died of parasites. The first parasite obtained from pupae was from a sample collected May 29. Of 171 larvae which pupated on or after this date 23 or 13.5 per cent died of parasites. The common parasite was Uromacquartia halisidotae Tns. No diseased larvae were found.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

The infestation on the south end of Vancouver Island and the Gulf Islands remained about the same as in 1954. Egg collections indicate that there will be a high population again in 1956. Their distribution in 1955 is shown in map 3.

Parasitism was very low. Eight egg masses produced 21 Hymenopterous parasites. No other parasites were found on larvae from the infestation area, although 6 were found on a collection of 23 larvae from Nitinat Lake and one on a collection from Cowichan Lake.

Most of the larvae reared in the insectary died before pupation. It has not yet been ascertained if disease was responsible for this mortality.

Hemlock Sawfly, Neodiprion tsugae Midd.

There were fewer larvae of this sawfly collected in the district than in any of the seasons since the survey started. Although colony collections were requested, none could be found.

Satin Moth, Stilpnotia salicis (L.)

There are very few silver poplar shade trees in the district but those present were infested with this insect. Collections were taken in Nanaimo and Victoria. Only one larva, collected at Victoria, was parasitized.

Douglas Fir Needle Miner, Contarinia sp.

Samples containing this needle miner were collected at Cassidy. About 20 per cent of the needles on the samples were attacked.

STATUS OF TREE DISEASES

Needle Rusts on Amabilis Fir.

In several areas balsam fir (Abies spp.) was attacked by a white needle rust, Peridermium sp. This rust attacks needles older than those of the current year. Ordinarily it is not considered serious although considerable defoliation may result from an attack. However, along Branch 30, Camp B, MacMillan and Bloedel Ltd., between Coleman Creek and the headwaters of the Sarita River, the young amabilis fir trees about 4 to 10 feet in height were attacked by Peridermium sp. as well as by another white rust, Uredinopsis longimucronata Faull, which attacks the current year's foliage, and needle cast fungus of the family Hypodermataceae. As a result of this combined attack balsam regeneration in an area of about 500 acres was about 25 per cent defoliated.

Root Rot in Douglas fir Regeneration.

Several Douglas-fir trees about 4 inches D. B. H. were killed by the root rot, Armillaria mellea (Vahl ex. Fries) Quel. The dead trees were spaced about 100 to 300 feet apart in a reproduction stand at Mayo.

Needle Blight on Douglas Fir.

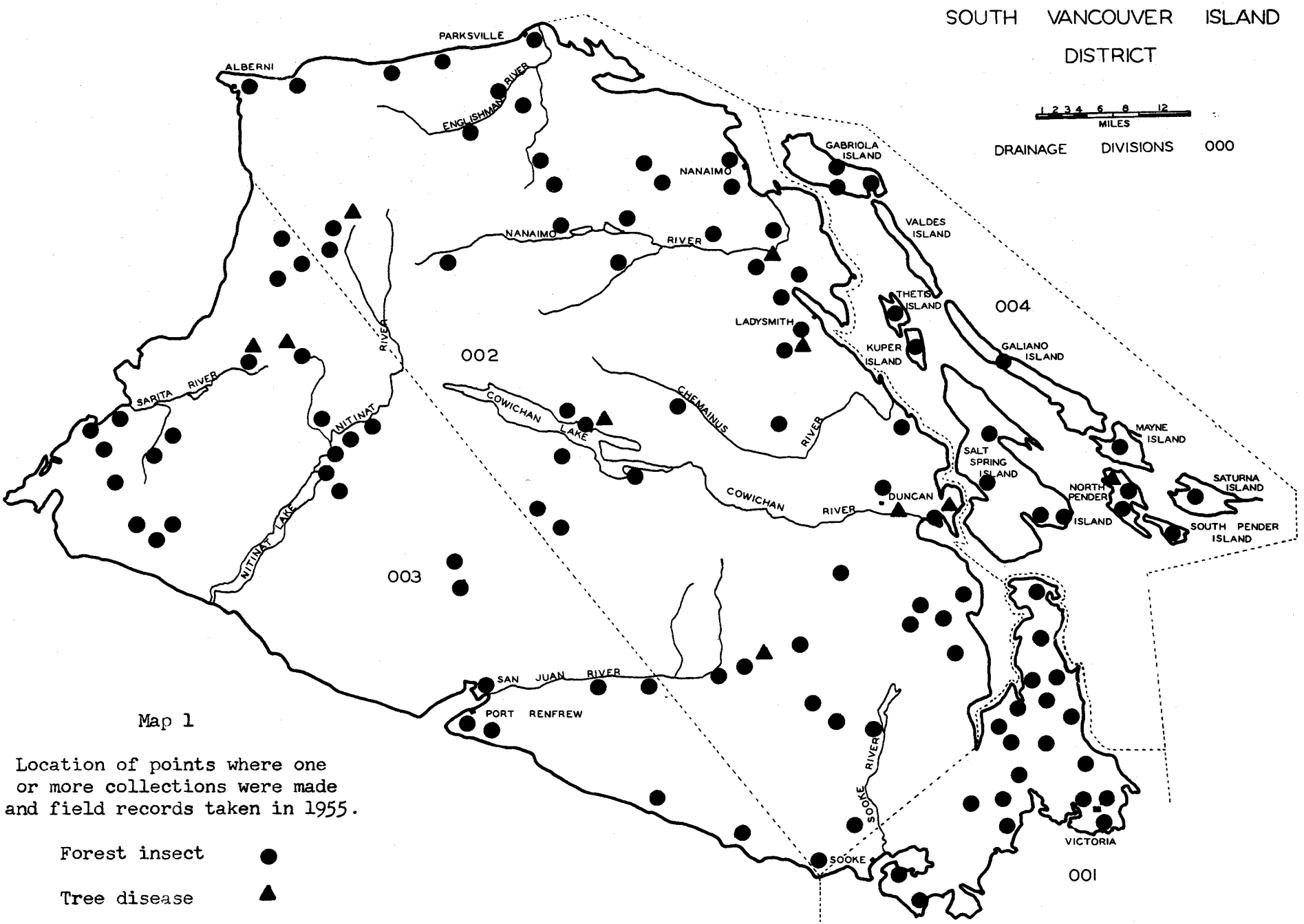
This blight was common but generally very light in most areas. However, trees in a study plot on North Pender Island were heavily attacked. Samples of the blight showed it to be Rhabdocline pseudotsugae Syd.

Twig Die-back on White Pine.

White pine regeneration about six miles west of Ladysmith on the Comox Logging Company's main road had up to 12 or 14 dead twigs and branches per tree. A sample was identified tentatively as Atropellis pinicola. The sample was forwarded to Ottawa for confirmation but no report has been received to date.

Black Knot of Cherries.

Wild cherry along the road between Duncan and Cowichan Bay, and on the Maple Bay road, are heavily attacked by the black knot, Dibotryon morbosum (Schw.) T and S.

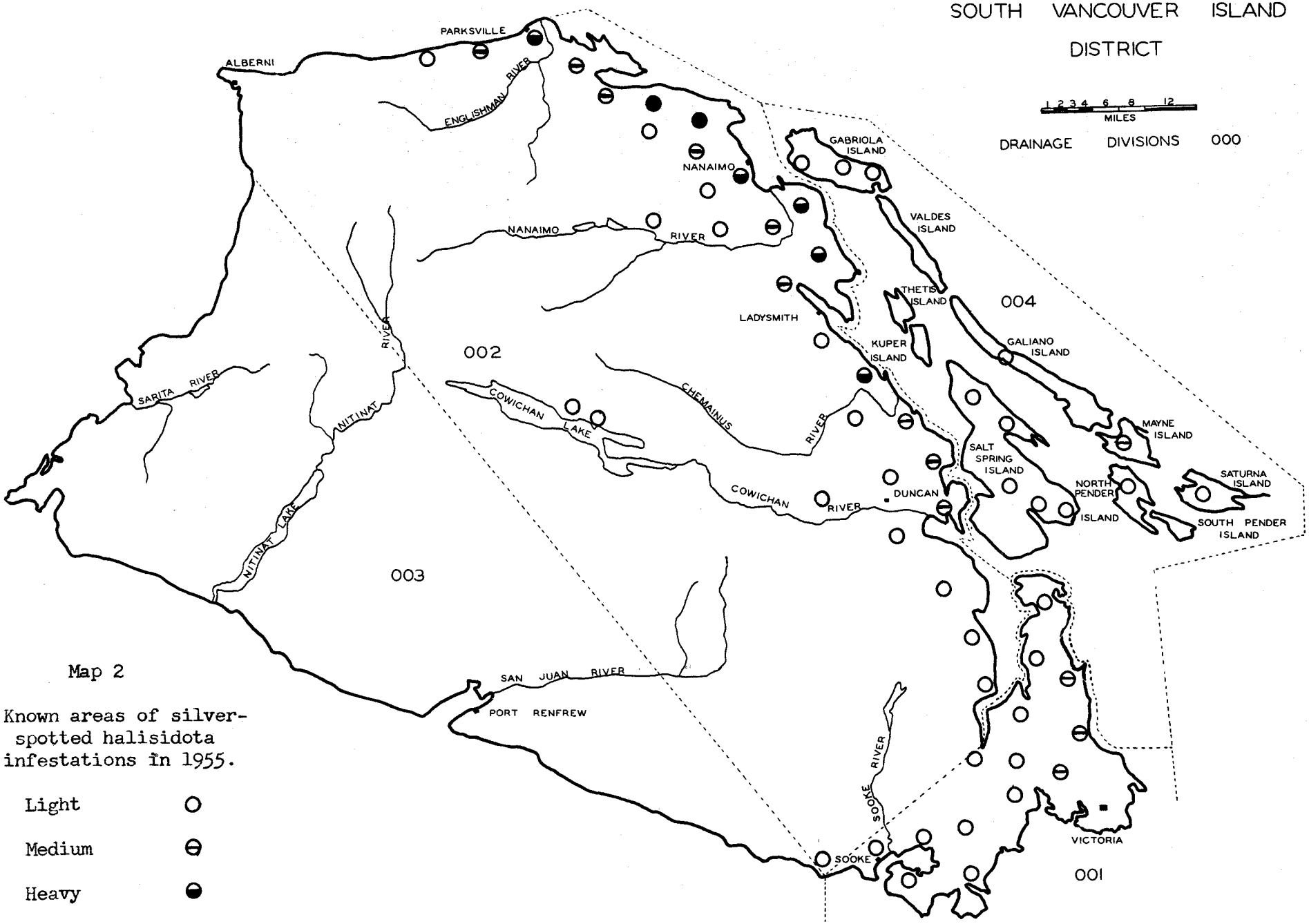


Map 1

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲



Map 2

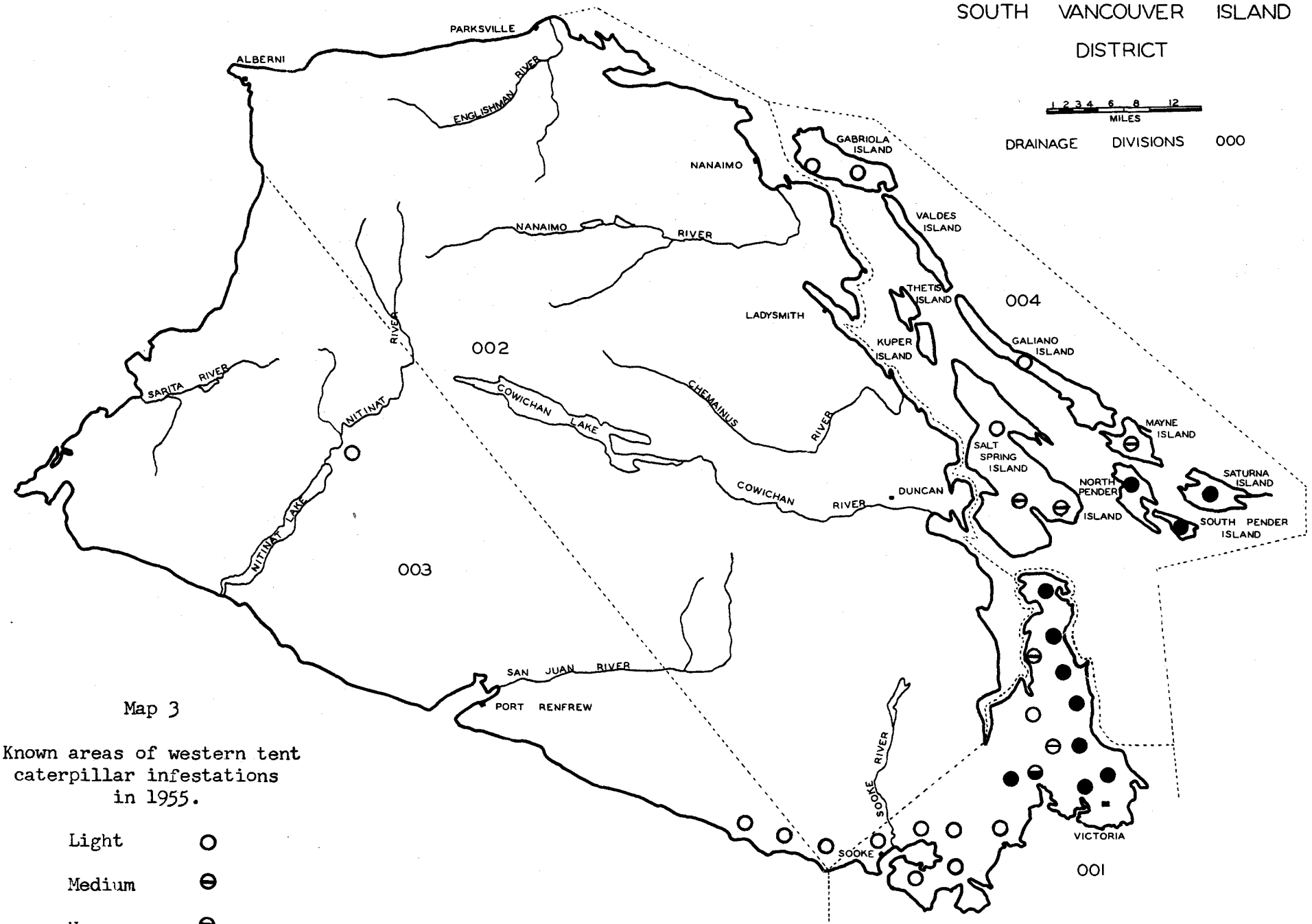
Known areas of silver-spotted halisidota infestations in 1955.

Light ○

Medium ⊖

Heavy ◒

Very heavy ●



Map 3

Known areas of western tent caterpillar infestations in 1955.

Light ○

Medium ⊖

Heavy ●

Heavy

FOREST BIOLOGY SURVEY

NORTH VANCOUVER ISLAND

1955

D. W. Taylor

INTRODUCTION

The survey on North Vancouver Island was carried out between early May and the end of October. The work was conducted in a pattern similar to that organized by the previous ranger and was, more or less, a continuation of the preceding season's program. Thirty-five of the thirty-seven permanent sample points were visited. It was not possible this year to do any actual sampling on the west coast of the Island but a large part of it was surveyed by air in a plane supplied by the McMillan - Bloedel Company.

The black-headed budworm outbreak on North Vancouver Island increased both in extent and intensity. Some concentrated work was necessary to determine the status of this infestation. Egg counts and defoliation estimates were made in the fall in representative localities throughout the area.

Table 1 lists forest insect collections by agencies and table 2 lists collections by hosts. The location of forest insect and tree disease collections is shown in Map 1.

STATUS OF INSECTS

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm infestation increased in both extent and intensity in 1955. Because of inaccessibility some areas were not visited by the ground survey. An aerial flight made on September 7th surveyed from Campbell River along the east side of Vancouver Island, north to Nahwitti Creek, west in a wide circle around Holberg, down the West Coast to Vernon Lake, north-east to Nimpkish Lake, down Nimpkish Lake and River, circled Cormorant Island, up the Kokish River and Bonanza Lake, and then south to Campbell River, a total of 390 miles. At the time of the flight, fog covered a mile wide strip around the north tip and along the west coast of Vancouver Island, thus making complete coverage impossible.

Table 1

Forest Insect Collections by Agencies,
North Vancouver Island District - 1955.

Personnel Involved in Collection	Number of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	11	68	72	94	11	2	258
Forest Biology Rangers with Forest Service Personnel							0
Forest Service Personnel Independently	3	2	5	4	5	3	22
Other Co-operators		1		3	4		8
Total							288

Table 2

Collections by Hosts,
North Vancouver Island District - 1955.

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
red cedar	3		no host	6	
Douglas fir	64		miscellaneous	7	
Sitka spruce	3		willow	5	
white spruce	1		silver poplar	2	
western hemlock	144		red alder	14	
mountain hemlock	1				
white pine	6				
lodgepole pine	7				
alpine fir	2				
amabilis fir	23				
			Total	34	
Total	254		Grand Total	288	

The extent of the infestation, as determined by ground and aerial surveys, was about 1,600 square miles, or over one million acres (Map 1). The heaviest defoliation occurred from the Holberg area to Port Hardy, along the east coast from Port McNeill to Adams River, and included Nimpkish Lake, Bonanza Lake, and the Tsitika River area. Other heavily infested areas were in the Kashutl and Kaouk River valleys on the West Coast of the Island. The latter areas were not surveyed in 1954.

Defoliation was heaviest in the valley bottoms and along the shore, and extended up the valley sides to an elevation of about 4,000 feet. In the Holberg area some hemlock-fir stands lost 90 per cent of their new foliage with some back-feeding, and in extreme cases the top four to 10 feet of the crowns were completely defoliated. Similar damage was observed in the Port McNeill area and the Tsitika River Valley. Defoliation was found on all size trees from reproduction to 250-foot hemlocks.

The late, cold spring resulted in delayed egg hatching. Under normal conditions first-instar larvae are usually found the first of June, however, in 1955 some eggs were found in the field as late as mid-July. By August defoliation was noticeable and as many larval collections were made as possible. The number of larvae collected at the same areas for the last three years gives an indication of the population increase (Table 3).

Table 3.

Number of Black-headed Budworm Larvae Collected in Beating Samples, North Vancouver Island.

Locality	1953	1954	1955
Port Alice area	0	3	0
Mahatta River	0	11	50
Holberg	5	561	201
Port Hardy	9	137	94
Englewood	18	174	58
Beaver Cove	20	312	110
Sayward	11	93	232
Dove Creek	13	0	0
Great Central Lake	44	6	0
TOTAL	120	1,287	745

	1953	1954	1955
Adam River *			45
Rupert Inlet *			108
Nimpkish *			50
Port McNeill *			126
TOTAL			329

* These localities were not sampled previous to 1955.

During a heavy rain on August 12th a beating sample was taken from hemlock at Holberg Inlet. When only six larvae were obtained the trees were examined and larvae were found back from the tip of the branch. Some of the larvae were in old webs in the branch axils. Three hours after it stopped raining the same trees were sampled and 50 larvae were obtained. Apparently comparisons made between beating samples taken under different weather conditions could be misleading.

The effect of the late, cold spring on egg and larval mortality is unknown. The late but rapid development of the larvae during July and August disrupted a program of systematic larval collections for disease and parasite studies. Disease, although present, did not kill any of the larvae examined. Larval parasitism was low, varying from three per cent to less than 15 per cent. Pupal parasitism did not exceed 14 per cent in any area with the exception of Sayward where 90 per cent of 77 pupae were parasitized.

Egg samples were taken in 32 localities on North Vancouver Island. Six Forest Biology Rangers were employed on this work. The method used was as follows: Three 18-inch branch tips were selected from each sample tree, one from the top third of the crown, one from the centre portion, and one from the bottom third. A 10-inch tip was taken from each of the samples, the total length of needle bearing twig for both sample units measured, and the eggs counted. The number of eggs per 100 inches of twig was used as a basis for estimating the 1956 defoliation. The results of the egg survey are shown in Table 4. In the final analysis only the samples from the upper crown level were used.

The infestation is expected to continue in 1956 with defoliation heaviest along the east coast of Vancouver Island from Port Hardy to Robson Bight, and along the southern half of Nimpkish and Bonanza lakes. This prediction does not consider the possible intervention of natural control factors which to date have been ineffective.

Douglas-fir Beetle, Dendroctonous pseudotsugae Hopk.

The Douglas-fir beetle has appeared persistently in areas on North Vancouver Island for several years. A salvage program at Van-West Logging Company operation near Cumberland has been successful in removing a large number of dead and infested trees and in July only six trees were recorded as green infested.

A few groups of from four to six newly attacked trees each occurred along the Upper Campbell Lake - Buttle Lake Road at intervals of about one mile. Heavy rain and low clouds prevented an on the spot appraisal of infested areas on the shore of Buttle Lake, but very few red tops were apparent during a flight over the area at a later date.

The Douglas-fir beetle has taken a severe toll in the Canadian Forest Products holdings around Woss and Vernon lakes. Company foresters estimate conservatively that about 40,000,000 F. B. M. of Douglas fir are attacked or have been killed. Salvage logging on a profitable scale has proved almost impossible because of the dispersed nature of the

Table 4

Black-headed Budworm Egg Population, Estimated 1955 Defoliation and Expected 1956 Defoliation. North Vancouver Island.

Locality	No. of Eggs per 100" twig length A Section	Estimated Defoliation 1955	Expected Defoliation 1956
Airforce rd Holberg Inlet	20	Heavy	Medium
Holberg - side 3	1	Heavy	Light
Holberg Inlet	1	Heavy	Light
Holberg - Branch 50	0	Heavy	Light
Holberg - N. E. main	3	Heavy	Light
Dahlstrom Point	45	Heavy	Heavy
Mahatta River	20	Light	Medium
Neroutsos Arm - opposite Jeune landing	76	Heavy	Heavy
Jeune Landing	20	Heavy	Medium
Teeta Creek	26	Heavy	Medium
Port Alice	8	Light	Medium
Alice Lake "A" Section	21	Light	Medium
Port Hardy near B. C. F. S.	76	Heavy	Heavy
Alice Lake, logging Branch 2	89	Heavy	Heavy
Rupert Inlet, behind dock	11	Light	Heavy
Port Hardy	38	Light	Heavy
9-mile lake - Rupert Inlet road	35	Heavy	Heavy
O'Connor Lake	14	Heavy	Heavy
Port McNeill - north main	2	Heavy	Heavy
Port McNeill - north main	256	Heavy	Very heavy
Port McNeill - east main	54	Heavy	Heavy
Kilpala River - Nimpkish	32	Heavy	Heavy
Ninyskish Lake	0	Heavy	Medium
Tsiko Lake	12	Light	Medium
Englewood - Nimpkish grade	22	Heavy	Heavy
Beaver Cove	48	Heavy	Heavy
Kokish River	2	Heavy	Heavy
Bonanza Lake	42	Heavy	Heavy
Robson Bight	37	Heavy	Heavy
Tsitika River	69	Heavy	Heavy
Naka Creek	5	Heavy	Light
Salmon River	13	Light	Medium
Winter Harbour	12	Light	Medium

groups of dead trees. Dead or dying trees are numerous in the following areas; the upper end of the Woss Valley, the main Nimpkish Valley (Kla-anch), Davie River, upper Klaklakama lakes, Maquilla Creek, east shore of Vernon Lake, Yookwa Valley, Sebalhal Creek, Surprise or Swan Creek, and over the Oktwanch divide into the Gold River area. The Maquilla Creek infestation is possibly the heaviest in the area.

During an aerial survey of the southern part of the North Vancouver Island District small current attacks were mapped at Dickson Lake,

Upper Ash River, near the junction of Gretchen Creek and the Ash River, Gretchen Creek, Pretty Girl Lake, Muchalat Lake, opposite the Upana River, the upper Heber, Mine Creek and Pigott Creek.

Sawflies, Neodiprion spp.

For the second year Neodiprion spp. were found only in small numbers. One collection of 130 larvae was found at the head of Holberg Inlet in conjunction with the black-headed budworm. Twenty-three samples distributed over the remainder of the district averaged 4.3 larvae per sample.

Spruce Budworm, Choristoneura fumiferana (Clem.)

No larvae of this defoliator were collected in this district.

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Only four hemlock looper larvae were collected. They were found in samples taken at Gracie Creek, Stamp Falls, and Eric Creek.

Spruce Gall Aphid, Adelges cooleyi (Gill.)

Two attacks of a serious nature were noted on spruce trees at Camp "A", Nimpkish, and at Courtenay Park. Only slight attacks were observed elsewhere in the district.

Alder Sawfly, Hemichroa crocea (Fourc.)

Populations of this sawfly continued to decline in 1955. Checks in areas sampled last year showed no signs of activity.

Tip Moth, Zieraphera diniana Gn.

Three tip moth larvae were found on spruce hosts. As the west coast of the district was not surveyed no additional information can be added to last season's report of light activity in low elevation stands.

Willow Leaf Beetle, Galerucella carbo (Lec.)

Defoliation of willow by this beetle averaged 80 per cent over a

large area (Map 4). Only a few beetles were collected to check on identification.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Some tents and comparatively light damage were observed on Hornby Island, Gracie Creek and Momekay River. In the latter area about 50 alder trees averaging 6 inches D. B. H. were 90 per cent defoliated. A check in two of the areas, at a later date, disclosed only one egg mass on wild rose on Hornby Island.

Satin Moth, Stilpnotia salicis (L.)

Satin moth larvae were found only on the Comox - Courtenay peninsula.

On the Kye Bay road from Comox two groups of farm shade trees were defoliated. The first group of trees, silver poplar, was about 40 per cent defoliated and the second group, consisting of Lombardy poplars, was 50 per cent defoliated.

Trees bordering Courtenay Ball Park were heavily attacked. Twenty-one large silver poplar shade trees of approximately 14" D. B. H. suffered severe defoliation. First generation feeding completely stripped some branches (Figures 1 and 2) and defoliation averaged 70 per cent for all the trees. During the summer these trees put out a second crop of leaves. The trees were re-examined on September 10th. On one branch containing 100 leaves, 61 had lost an estimated 10 per cent of the upper surface through young larval feeding. Average defoliation for all 21 trees was estimated at approximately 70 per cent of the upper surface of the leaves. This gave the trees a brownish appearance. Pupal cases were found in rolled up leaves with as many as four to a 36-inch branch. Survey records show that these same trees have been severely defoliated at least seven times.

Silver-spotted Halisidota, Halisidota argentata Pack.

The silver-spotted halisidota continued to spread northward in 1955. One colony was found at Menzies Bay ten miles north of Campbell River. The largest population was on Denman Island, just off the east coast of Vancouver Island. The pattern of showing preference for Douglas-fir hosts near salt water and less than 400 feet elevation continued to be apparent.

STATUS OF TREE DISEASES

Twenty-five tree disease samples were submitted to the Forest Pathology Laboratory, Victoria. Several diseases appear worthy of special note.

Root Rot, Armillaria mellea (Vahl ex. Fries) Quél.

Considerable activity by Armillaria mellea was observed on Douglas fir trees on the east coast of Vancouver Island in a very productive Douglas fir site containing a number of large tree farms. Although no mortality was found the presence of root rot in such an area is of considerable importance.

Needle Blight, Rhabdocline pseudotsugae Syd.

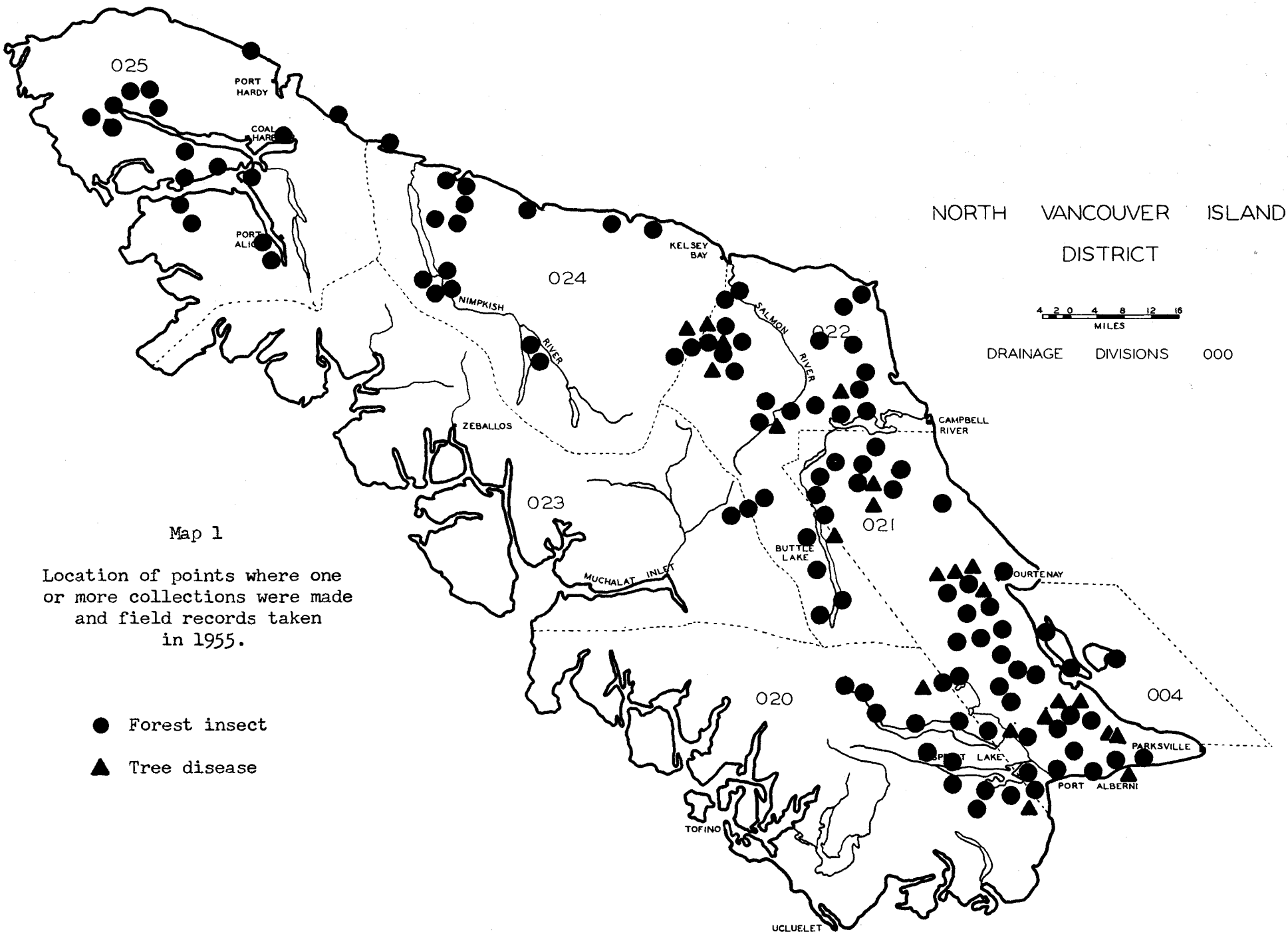
This needle blight was collected from a few small Douglas fir trees throughout the east coast of the district. No mortaltiy was observed.

Dwarf Mistletoe, Arceuthobium americanum (Nutt.)

Figure 3 shows the severity of stem attack by mistletoe on lodgepole pine hosts. In this area, near Bowser, 13 trees from four to six inches in diameter were killed by the parasite.

Blister Rust, Cronartium sp.

This rust was found attacking white pine in parts of North Vancouver Island. The attack was heavy enough to kill branches up to 2 inches in diameter (Figure 4).

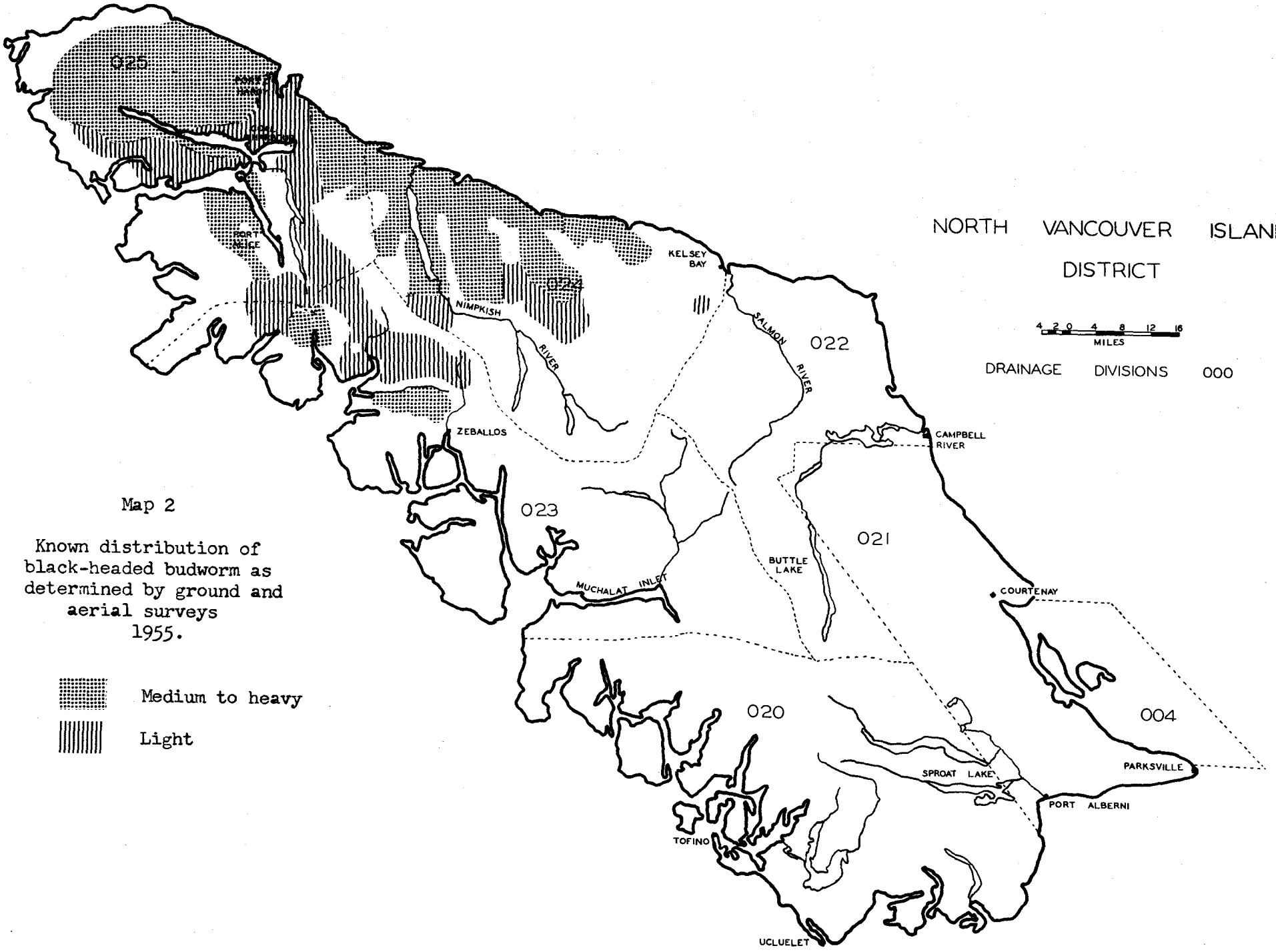


Map 1

Location of points where one or more collections were made and field records taken in 1955.

● Forest insect

▲ Tree disease

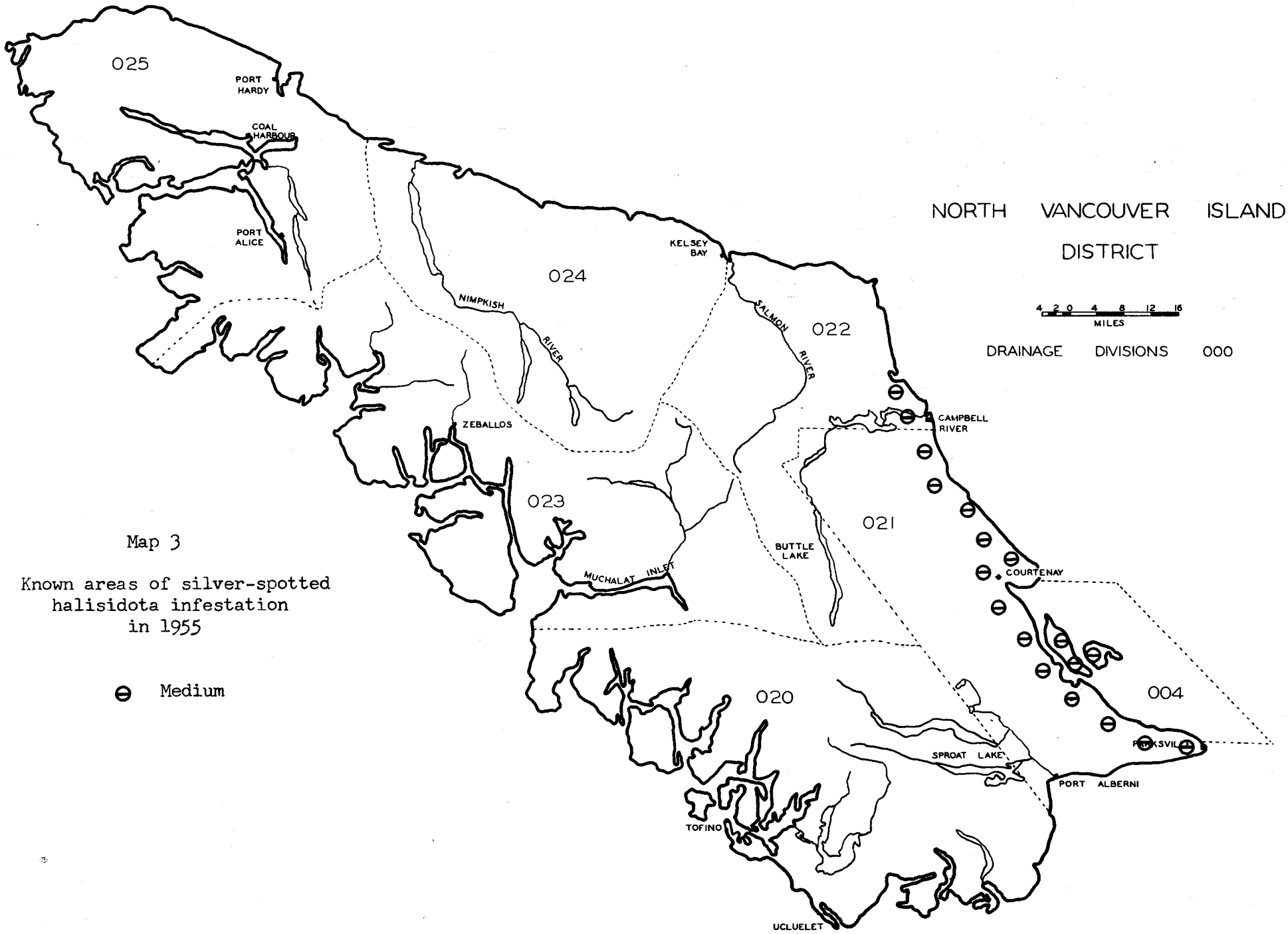


Map 2

Known distribution of black-headed budworm as determined by ground and aerial surveys 1955.

Medium to heavy

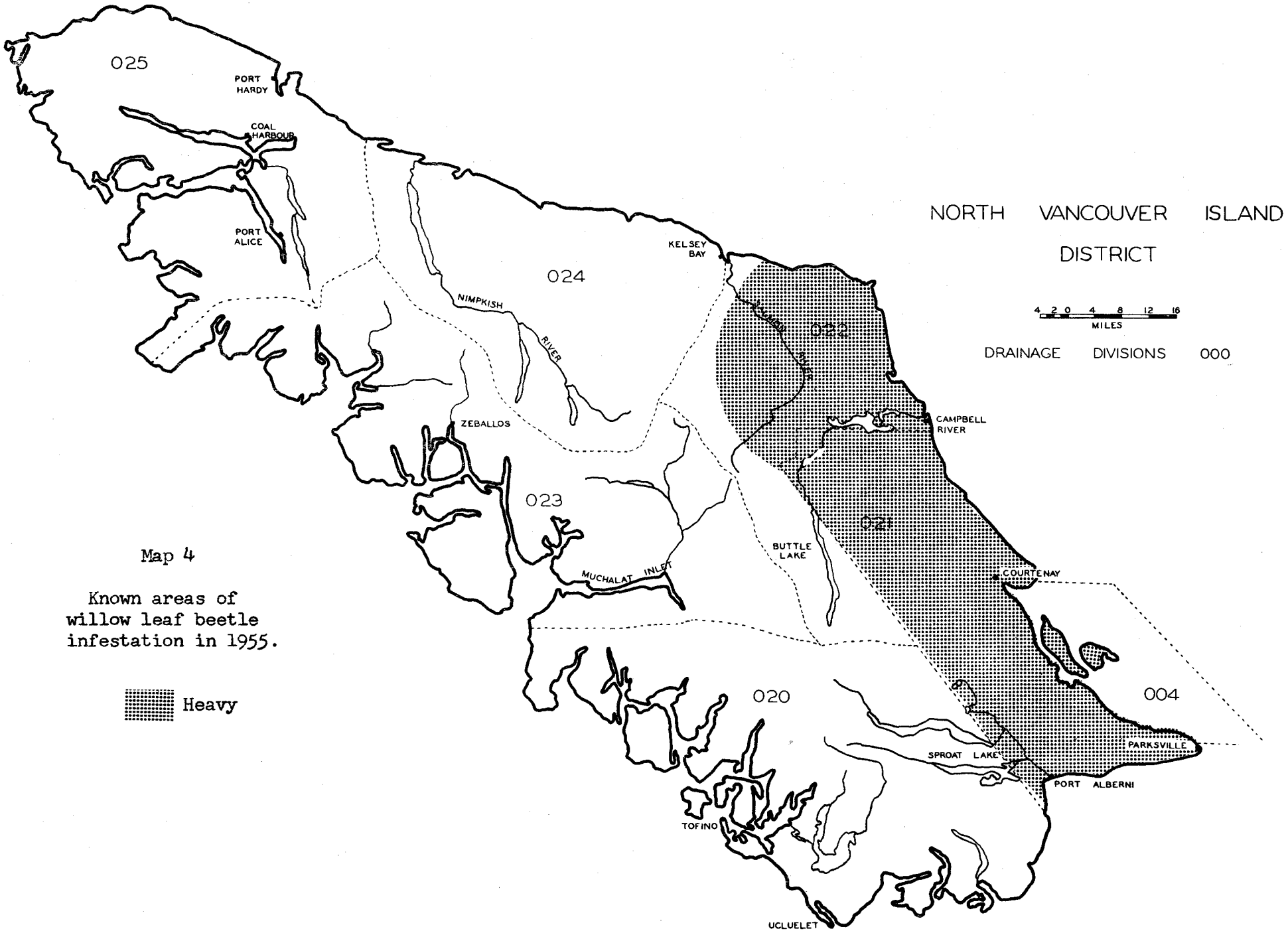
Light

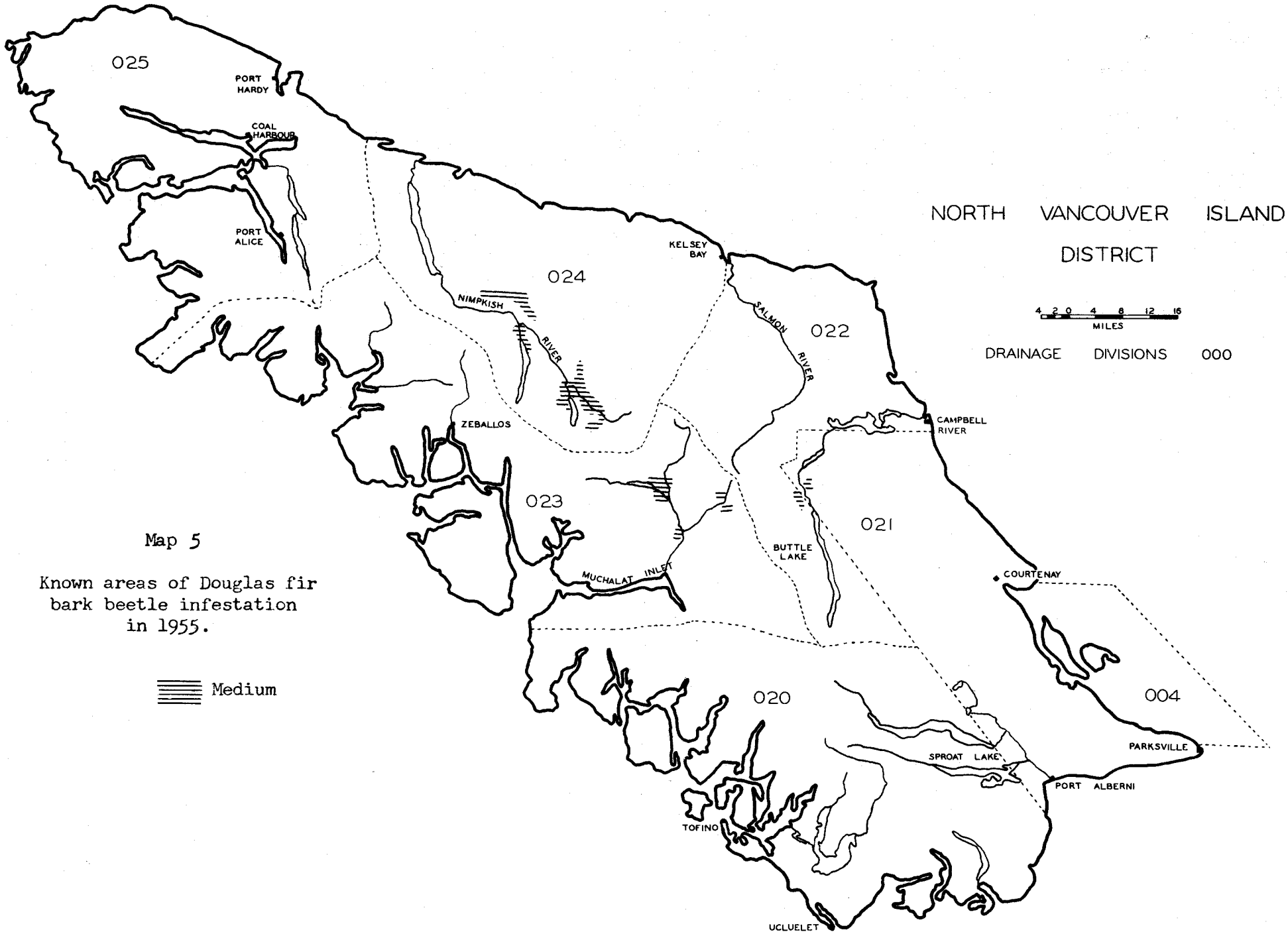


Map 3

Known areas of silver-spotted halisidota infestation in 1955

⊖ Medium


025
PORT HARDY
COAL HARBOUR
PORT ALICE
024
KELSEY BAY
NIMPKISH
RIVER
ZEBALLOS
023
MUCHALAT INLET
BUTTLE LAKE
022
021
CAMPBELL RIVER
COURTENAY
020
004
PARKSVILLE
SPROAT LAKE
PORT ALBERNI
TOFINO
UCLUELET
NORTH VANCOUVER ISLAND
DISTRICT
4 2 0 4 8 12 16
MILES
DRAINAGE DIVISIONS 000
Map 4
Known areas of willow leaf beetle infestation in 1955.
Heavy



Map 5

Known areas of Douglas fir bark beetle infestation in 1955.

Medium

Figure 1. Satin moth, Stilpnotia salicis (L.), defoliation on silver poplar shade tree at Courtenay, North Vancouver Island. June , 1955.

- by D. W. Taylor

Figure 2. Satin moth, Stilpnotia salicis (L.). The completely defoliated silver poplar branch is typical of heavy defoliation at Courtenay, North Vancouver Island. September, 1955.

-by D. W. Taylor

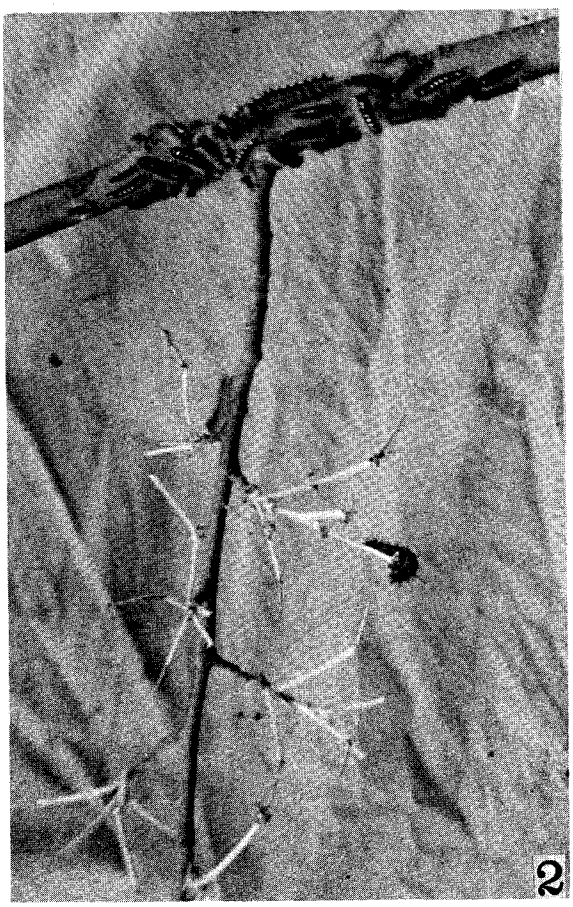
Figure 3. Dwarf mistletoe, Arceuthobrium americanum (Nutt.). Heavy attack on stem of lodgepole pine. Bowser, North Vancouver Island. August, 1955.

- by D. W. Taylor

Figure 4. Blister rust, Cronartium sp., on white pine. The large branch in the foreground has been killed. North Vancouver Island. August, 1955.

- by D. W. Taylor


1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3


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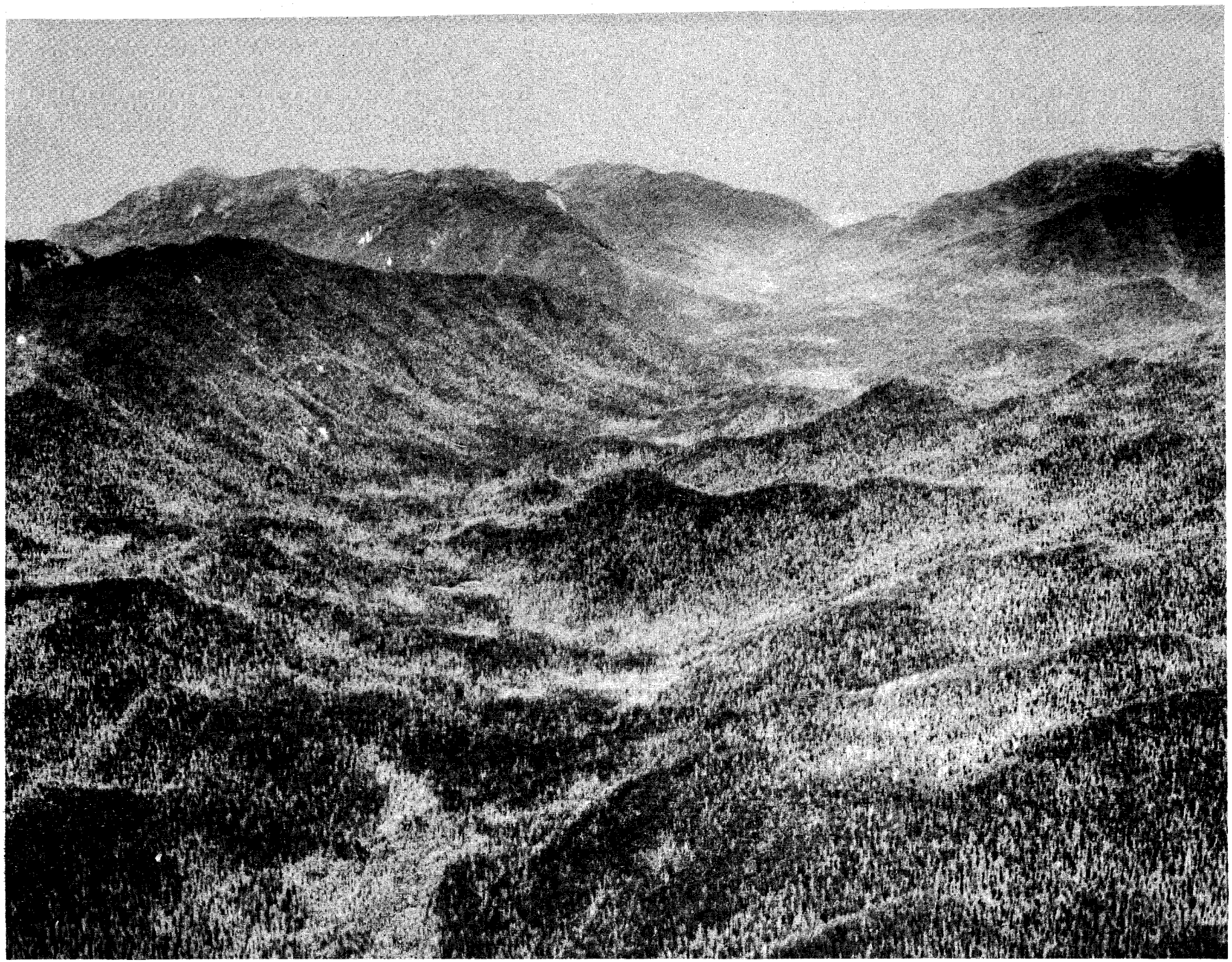
Figure 5 Black-headed budworm defoliation (shows white on photograph) in hemlock stands in the Tsitika River Valley, North Vancouver Island. Aerial photograph was taken looking north from Davie River toward Johnson Straits. August, 1955.

Courtesy of the Photographic Department
Canadian Forest Products Limited.



FOREST BIOLOGY SURVEY

SOUTH VANCOUVER DISTRICT

1955

E. L. Avison

INTRODUCTION

In 1955 insect activity was more noticeable than during the previous year. Of six economically important insects encountered in the South Vancouver District two species increased in numbers, one remained static, and three decreased.

A total of 257 forest insect and seven tree disease collections was submitted to the Victoria laboratory. A summary of insect collections by agencies is shown in Table 1, and a summary of collections by hosts in Table 2. Localities where collections were made are shown in Map 1.

In the course of the survey, approximately 9,200 miles were travelled by motor vehicle and 260 miles by dinghy and lake ferries.

Ranger personnel were engaged jointly in spruce budworm egg and defoliation surveys in the Lillooet and Fraser River areas.

The assistance of all those who co-operated in the survey is gratefully acknowledged. The British Columbia Forest Service, Canadian Forest Products Limited and Trethewey Logging Company provided a total of 12 hours flying and other facilities such as lodging, meals and vehicles for transportation. A large number of samples were collected by personnel of the above agencies.

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

The known extent of the spruce budworm infestation, as determined by aerial reconnaissance and ground surveys, was larger than in 1954. The total area affected was approximately 171 square miles of which 30 square miles was in the Fraser River Valley. This represented an increase of approximately 58 square miles over 1954, mainly to the northeast in the vicinity of D'Arcy, and to the north to include the upper reaches of the Owl and Birkenhead River valleys. The increase of the main outbreak to the south was slight, (Map 2).

Aerial Survey.

Three flights, totaling 12 hours and 30 minutes flying time, were used primarily to determine the extent of spruce budworm infested areas and to map areas of Douglas-fir beetle attack.

Flight 1, on May 11th, covered Harrison Lake, Lillooet Lake, Pemberton and the Birkenhead River Valley. Poor weather conditions hampered visibility and only limited information could be obtained. Time in the air was 4 hours, 5 minutes.

The second flight on August 4th, by rangers E. G. Harvey and D. W. Taylor, covered the area from Squamish north to Pemberton, and up the Lillooet River to North Creek. The flight from this point passed beyond the South Vancouver District and continued in a southerly direction to Vancouver via Jervis Inlet. Time in the air was 5 hours.

The third flight, on August 22nd, passed over all the heavily infested areas commencing at Parkhurst, 34 miles north of Squamish. Areas surveyed included the Soo River, Pemberton, Upper Lillooet River, Lillooet Lake, the Lillooet River to the southern most boundary of the outbreak at Gowan Creek, then in a southeasterly direction over Stave and Alouette lakes and the Fraser River Valley to Vancouver. Time in the air was 3 hours, 25 minutes.

Although the areas surveyed from the air were relatively the same in all three flights, the information sought was satisfactorily obtained in Flight 3. At the time of this flight, the reddened foliage was very noticeable and enabled the extent of the infestation to be readily observed and mapped.

Defoliation Estimates.

The study plots established in 1954 were re-examined in 1955. Two of the plots were lost as a result of logging.

Ocular estimates on the defoliation of current year's foliage and total defoliation were recorded for each of the ten tagged trees in each plot (Table 3). The loss of new growth, although heavy in all areas, was less than in 1954. There was a slight improvement in the general condition of the trees in the old infestation area. Defoliation was very heavy at Joffre Creek and along the Caribou Trail. Numerous tree tops were completely stripped of needles. Many trees which suffered severe defoliation in 1954 produced adventitious buds in 1955. By far the heaviest defoliation, as observed from both aerial and ground surveys, occurred in a stand of relatively pure Douglas fir, north of Pemberton, in the vicinity of L-2679. In many instances, the upper 10 feet of trees were completely defoliated and heavy top killing appears imminent.

Defoliation was visible on both sides of the Lillooet River from Pemberton north almost to Pebble Creek. This was the second year of feeding in this area. Noticeable feeding was also observed on the side-hills at least as far east as D'Arcy.

Douglas-fir stands in the Boston Bar area, although suffering heavy loss of foliage, put out new growth in 1955.

Table 3

Ocular Estimates of Per Cent Defoliation of Douglas Fir Trees on Study Plots.

Area and Plot	Total Defoliation 1954 Av.		Sd.	Defoliation 1955 Sheets Av.		Sd.	Estimated total Defoliation up to 1955
1 - 1	23	±	8	70	±	22	37
1 - 2	20	±	10	85	±	9	37
1 - 3	18	±	4	92	±	6	36
2 - 1	33	±	8	68	±	25	47
2 - 2	19	±	5	55	±	28	30
2 - 3	16	±	5	54	±	26	27
3 - 1	23	±	5	86	±	15	40
3 - 2	30	±	7	90	±	14	48
3 - 3	27	±	7	92	±	9	45
4 - 1	20	±	6	81	±	11	36
4 - 2	29	±	8	69	±	22	43
5 - 1	32	±	6		-		-
5 - 2	29	±	4	73	±	16	44
6 - 1	15	±	5	67	±	14	28
6 - 2	28	±	5	72	±	18	42
7 - 1	9	±	3		-		-
7 - 2	22	±	5	72	±	18	40

Larval Sampling

A summary of the collections obtained from June 9th to August 11, 1955 is shown below:

Total Collections taken in Budworm Areas	No. of Collections containing Budworm	Total No. of Budworm Larvae	Av. per Sample
65	54	1,581	29.3

Disease or Parasites Present.

Of the larvae reared in the insectary at Langford this year, no disease of any significance was found. Parasitism was quite high in mass collections of larvae submitted from special collection points in the infestation (Table 4).

The only figures available on pupal parasitism were obtained by examining the pupae and pupal cases found on the sample branches. Of 262 pupae examined, 55.7 per cent died of parasites.

A large number of the larvae and pupae which were reared became deformed and died. A few late instar larvae found in the field were also deformed. Dissection of a small number of larvae exhibited the presence of Nematoda. It is apparent that the deformation contributed to the death of the specimens, but whether or not the occurrence of this parasite was a direct result of this condition is unknown.

The number of egg masses containing one or more parasites averaged 27.2 per cent.

Egg Samples

One sample tree in each plot area was cut, two branches selected from the middle third of the crown, the area measured, and the foliage examined for egg masses. Fifty buds from each sample branch were selected at random and classified as killed, normal, completely or partially defoliated. Buds less than 50 per cent defoliated were considered as normal. The egg population is presented in Table 5 and 6.

Analysis of data obtained in the egg survey of mid-August in the infestation areas, showed that populations of the insect will probably decline in 1956.

Table 4

Results of Spruce Budworm Insectary Rearings, 1955.

Date of Sample	Area	Number of Specimens	Per Cent Mortality Deformed Specimens		Per Cent Parasitism	Per Cent Adult Survival
			Larvae	Pupae		
June 10	Chaumox	50	37	22	11	21
June 11	Anderson River (850')	13	31	43	10	14
June 15	D'Arcy	23	19	30	13	24
June 15	Birken	178	9	32	19	23
June 16	Caribou Trail	141	22	29	26	9
June 19	Anderson River (3,950')	30	36	33	14	11
June 19	Anderson River (850')	28	39	42	9	6
June 19	Chaumox	37	41	36	7	14
June 27	Tenas Lake	185	31	33	16	13
June 27	Rogers Creek	199	28	41	21	5
July 7	Falls Creek	139	21	58	12	7
Total No. of Specimens		1,023				
Av. Per Cent			23.0	33.0	16.0	11.0

Note: Mortality from miscellaneous and unknown causes not included in table.

Table 5

Number of Egg Masses Per 100 Square Feet of Foliage Surface.
Data Collected at Permanent Sample Plots. August, 1955.

Area	Plot and Tree	1955	1954	Increase from 1954	Decrease from 1954
1	1	229	304		75
	2	208	198	10	
	3	108	306		278
Average		182	296		114
2	1	29	32		3
	2	31	99		68
	3	19	50		31
Average		26	60		34
3	1	517	742		225
	2	265	93	172	
	3	204	467		263
Average		329	434		105
4	1	58	194		136
	2	13	133		120
Average		36	164		128
5	1	-	186		-
	2	16	568		552
6	1	71	150		79
	2	7	80		71
Average		39	115		76
7	1	16	15	1	
	2	6	65		59
Average		11	40		29

Table 6

Number of Egg Masses Per 100 Square Feet of Foliage Surface.
Samples Taken at Random Points. August, 1955.

Location of Samples	Number of Egg Masses per 100 Square Feet.
4.2 miles west of D'Arcy	45
8.3 miles west of D'Arcy	34
11.4 miles west of D'Arcy	72
20.5 miles west of D'Arcy	4
21 miles north of Pemberton	13
Maude Lake trail	37
Maude Lake trail	40
Anderson River	32
Anderson River	18
Anderson River	27

Summary

1. The infestation has apparently passed its peak since populations are decreasing and parasitism is increasing.

2. Although still relatively high there was a marked decrease in the egg population.

3. The loss of new growth, although heavy in several areas was, on the whole, less than in 1954.

4. Annual increment at D. B. H. is still high and it is unlikely that widespread mortality will occur while growth is being put on by the trees.

Douglas-fir Beetle, Dendroctonus pseudotsugae (Hopk.)

Douglas-fir beetle losses in the Lillooet River Valley increased during the last year. Current damage was heaviest in widely scattered groups of mature to overmature Douglas fir at high elevations. However, the cut-over reserve and second growth timber at lower levels now contains a number of areas where populations of this beetle are increasing rapidly. Groups of infested trees are common along recently constructed logging roads. Approximately 70 per cent of the recent attacks were made on trees subjected to concentrated feeding by the spruce budworm. A large amount of slash left by logging is contributing greatly to the beetle increase.

Due to their inaccessibility the number of spot outbreaks examined were relatively few. However, a check strip was run eight miles northwest of Port Douglas in the Rogers Creek Valley. The trees on a 20 x 2 chain strip were 33 per cent dead, 20 per cent green infested and 47 per cent unattacked.

Three trees were selected at random within the plot and one square foot of bark was removed at breast height. An average of six entrance holes per square foot was recorded.

Results of Douglas-fir beetle cruises in this area, limited as they were in comparison with the area concerned, indicated that an increase in the size of the infested patches can be expected in 1956.

Through the recommendations of field personnel, logging operations are proceeding in the beetle-infested stands of the Anderson River Valley. Beetle-killed trees are being salvaged and susceptible trees in surrounding areas are being removed to prevent further local spread of the infestation.

The known areas of Douglas-fir beetle are shown in Map 3.

Western Tent Caterpillar, Malacosoma pluviale (Dyar).

The two infestations reported in 1953 and 1954, one 3 miles north east of Port Coquitlam at Pitt Meadows, the other 3 miles south west of Lindell Beach, in the Columbia Valley subsided this year.

Pitt-Meadows - Port Coquitlam area (Drainage Div. 042).

The decline of the outbreak in this flat exposed region is attributed to unfavourable weather conditions that prevailed after the egg hatch and throughout the early larval feeding period. High temperatures during early May probably stimulated the hatching of between 75 and 100 per cent of the eggs. This was followed by two weeks of unusually low temperatures, heavy rainfalls, and high winds, during which the small larvae remained inactive and clustered around the egg bands. Counts made immediately following this condition indicated little or no mortality although the larvae were very sluggish. As the unfavourable conditions continued, an estimated 70 to 85 per cent of third and fourth instar larvae died. The high mortality is attributed to the prolonged cool, wet weather during which the larvae did little or no feeding and consequently died of starvation.

Columbia Valley - Lindell Beach Area. (Drainage Div. 040).

In contrast to the population in the Pitt Meadows region, feeding in the Columbia Valley area resembled that of 1954. Complete defoliation of red alder and apple occurred. Six sample trees of from 3 to 5 inches D. B. H. were selected at random and felled on June 6th in Plot 1. The crown of each tree was divided into three equal sections and the number of tents and larvae per tent recorded (Tables 7 and 8).

A second and third examination was made on the 8th and 22nd of June. Ocular estimates made on the latter date disclosed an estimated 90 to 100 per cent defoliation of both red alder and apple.

The predicted decrease in populations was verified with a fourth and fifth examination on July 5th and 15th. Apparently the foliage was depleted before the larvae reached the sixth instar. Consequently, they were forced to migrate and starvation resulted. Larval mortality was estimated at between 75 and 85 per cent.

On July 24th a total of 6 pupae were obtained from 3 sample trees.

Contrary to expectations, there was no appreciable increase in polyhedral virus which appeared in a few larvae in 1954.

The amount of parasitism was negligible.

The outbreak condition which has prevailed in these two widely separated areas since 1953, has been abruptly terminated and little or no defoliation is expected in 1956.

Table 7

Forest Tent Caterpillar. Number of Tents on Sample Trees by Crown Level. Plot 1, Columbia Valley.

Tree No.	No. of Tents per Tree			Total
	Lower	Middle	Upper	1955
1	10	6	8	24
2	14	7	3	24
3	9	6	4	19
4	11	5	2	18
5	5	3	1	9
6	28	12	10	50
Totals	77	39	28	144
Av.	13	6	4	24

Table 8

Number of Forest Tent Caterpillar per Tent. Plot 1, Columbia Valley, 1955.

Tree No.	No. of Larvae per Colony			Total
	Lower	Middle	Upper	1955
1	120	97	94	311
2	148	121	104	373
3	137	134	121	392
4	158	119	86	363
5	152	78	71	301
6	187	91	79	357
Totals	902	640	555	2,097
Av.	150	107	93	117

Black-headed Budworm, Acleris variana (Fern.)

Following an increase in 1954 there was a decrease in the number of black-headed budworm larvae collected in 1955. The largest population was from Mount Urquhar in the Yale district where three collections averaged 25 larvae each. Collections and number of larvae by drainage divisions are shown in Table 9.

Table 9

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

1954 - 1955.

Drainage Division	Total No. Samples Taken During Larval Period		No. Samples Containing Black-headed Budworm		Av. No. Larvae per Sample	
	1954	1955	1954	1955	1954	1955
040	67	79	11	5	30.0	5.2
041	17	25	0	6	0	2.0
042	100	75	10	14	1.1	4.2
043	12	18	1	0	1.0	0
044	50	45	6	11	3.1	9.2
045	21	15	1	0	8.0	0
TOTAL	267	257	29	36	12.7	5.5

Sawflies, Neodiprion spp.

These insects were common throughout the district but the population remained low. The only exception was two miles south of Boston Bar in the Anderson River Valley where larger than average numbers were found in association with the spruce budworm.

Forty 3-tree beating samples avaeraged 4.5 larvae per sample. The average recorded from the same number of samples in 1954 was 5.0.

The small spot infestation reported at the southwest corner of Jones Lake in 1954, was eliminated as a result of logging operations.

Collections containing this sawfly were made between June 9th and August 31st.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Very few specimens of this species were collected this year. Twelve samples averaged 1.5 larvae per sample compared with an average of 5.0 larvae per sample in 30 collections in 1954.

This geometrid was found in collections made between June 7th and August 11th.

Phantom Hemlock Looper, Nepytia phantasmaria (Stkr.)

During the past four years the population of this geometrid has remained low. There were 14 collections submitted in 1952, and 14 in 1953, as against a total of 24 in 1954 and 12 in 1955. The average number of larvae per collection was 2.0 in 1952, 2.1 in 1953, 3.0 in 1954 and 4.0 in 1955.

The largest collection, taken in the budworm infestation at Boston Bar, contained 11 larvae.

Larvae were found in collections made from July 7th to August 30th.

Striped Alder Sawfly, Hemichroa crocea (Fourc.)

The numbers of this tenthredinid declined sharply in both the eastern and western portions of the district.

A heavy spot infestation occurred one half mile east of Yarrow on the Yarrow - Cultus Lake road. Severe defoliation of understory red alder occurred over an area of approximately 60 acres.

Green-striped Forest Looper, Melanolophia imitata Wlk.

Small numbers of this insect were present in collections made between July 16th and August 30th. Eight collections this year averaged 1.0 larva. The same average was recorded in 11 collections in 1954.

Spruce Aphid, Neomyzaphis abietina (Wlkr.)

This common pest of ornamental blue spruce Picea pungen (Engelm.)

continued to cause varying degrees of damage throughout the residential areas of Vancouver.

Spotless Fall Webworm, Hyphantria textor Harr.

Light sporadically distributed populations were observed along main highways in the Fraser Valley. There was no perceptible defoliation.

Douglas-fir Needle Miner, Contarinia sp.

Light damage to Douglas fir foliage was noted at the west end of Cultus Lake in the Columbia Valley.

STATUS OF TREE DISEASES

Of the seven tree disease samples submitted for identification two are worthy of note.

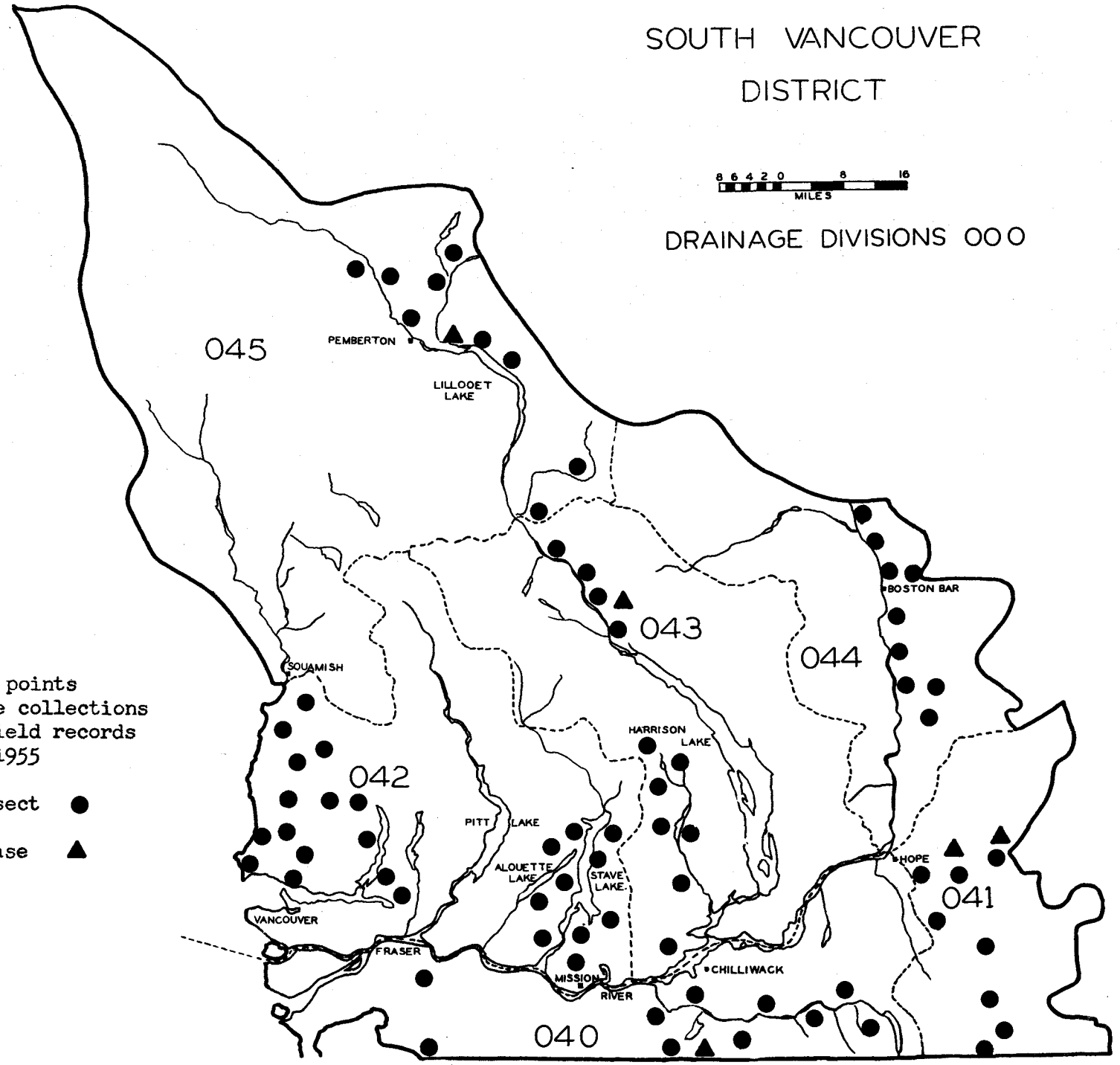
Douglas-fir Needle Blight, Rhabdocline pseudotsugae Syd.

Moderate needle infection was noted on Douglas-fir regeneration in the Columbia Valley in 1955. Of twelve trees examined, four exhibited the disease in varying degrees of severity.

Brown Felt Blight, Herpotrichia nigra Hart.

This common fungus on amabilis fir is of little economic significance. Damage is generally confined to the lower branches. The foliage is killed, chiefly by the dense mycelium excluding light and air from it.

One sample was taken in a mature Engelmann alpine fir type at Allison Pass, 4,420 feet above sea level.

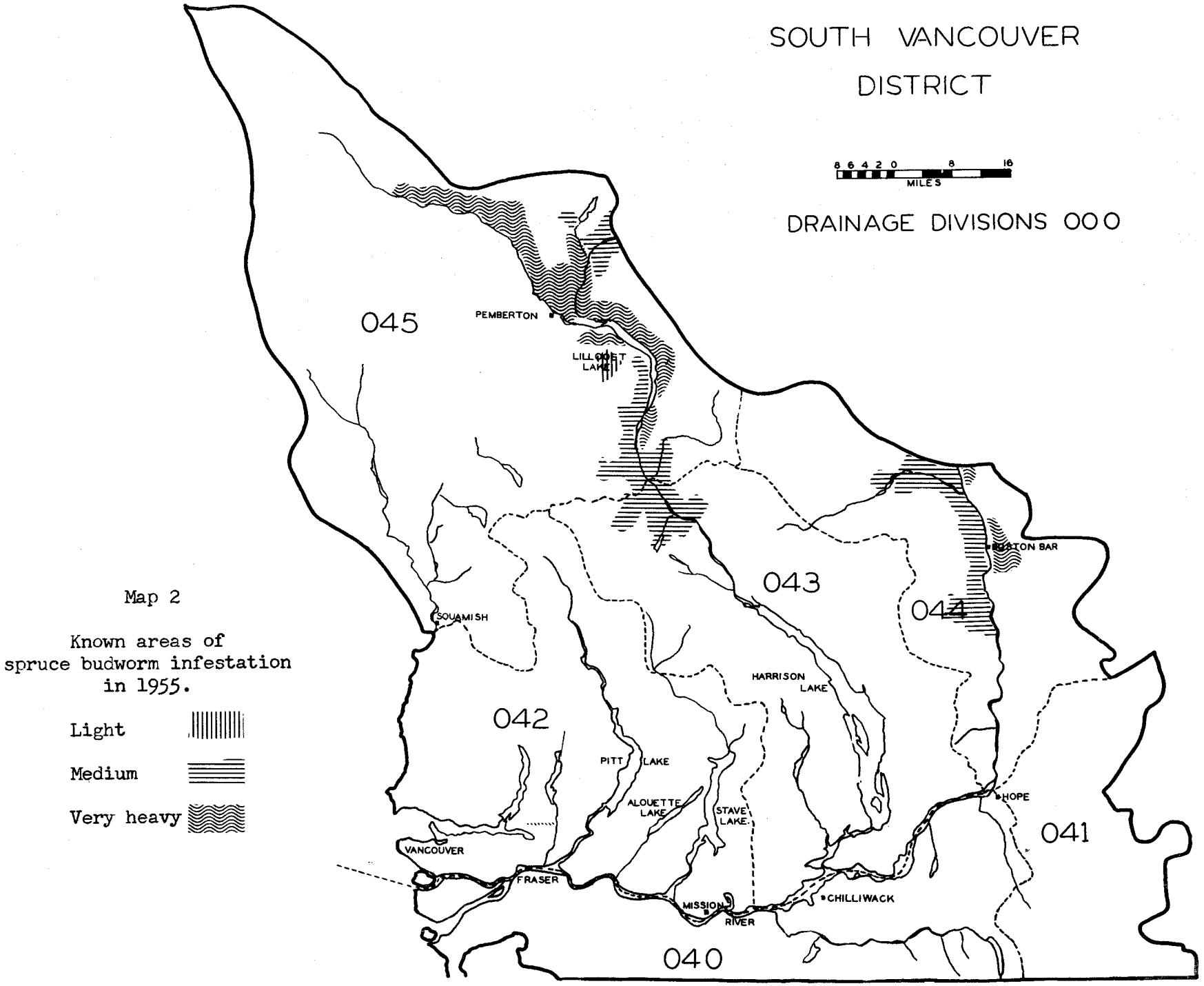


Map 1

Location of points where one or more collections were made and field records taken in 1955

Forest insect ●

Tree disease ▲



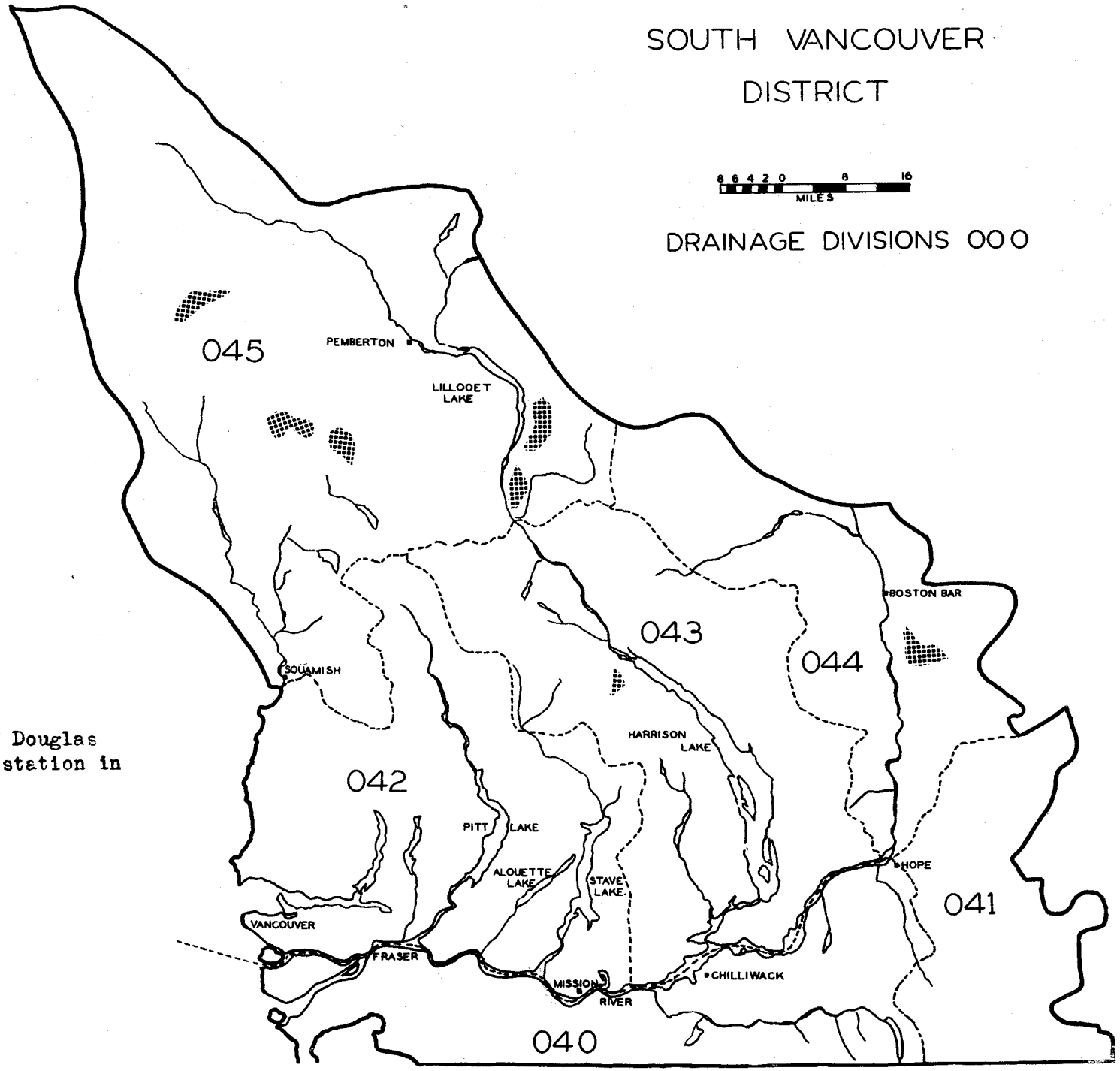
Map 2

Known areas of spruce budworm infestation in 1955.

Light

Medium

Very heavy



Map 3

Known areas of Douglas fir beetle infestation in 1955.

FOREST BIOLOGY SURVEY

NORTH VANCOUVER DISTRICT

1955

K. W. Robertson

INTRODUCTION

Complete coverage of the North Vancouver District was not obtained during the summer of 1955. The area surveyed extended from the Gulf Islands - Howe Sound area north to Seymour Inlet excluding Jervis and Sechelt inlets and the Gilford Island - Kingcome Inlet - Thomson Sound area. See map 1.

Biology rangers K. Robertson and N. Alexander conducted the survey in the North Vancouver ranger district with the M. V. Forest Biologist as headquarters. A ten-foot fibre-glass dinghy was operated from the Forest Biologist and used extensively for survey work in the inlets. Access roads were utilized more than in 1954 due to the increased number of larger logging companies on the southern portion of the coast.

The boat with biology rangers E. Harvey, K. Robertson and N. Alexander was employed on a special Halisidota argentata Pack. survey of the Gulf and Johnstone Strait Islands in May. The main survey of the North Vancouver District was commenced June 1.

Excellent co-operation was received from the British Columbia Forest Service and use was made of their private floats and radio communications.

Two hundred and thirty-four forest insect and 19 tree disease samples were submitted. Thirty-eight of the insect samples were made in the Gulf Island area of the South Vancouver Island ranger district. The distribution of insect and tree disease samples by agencies and hosts are shown in tables 1 and 2.

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

This insect was found in only two samples collected on Cortes Island and Loughborough Inlet.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm was found in only six samples. The largest sample, containing 48 larvae, was collected in Seymour Inlet. No feeding or

Table 1

Forest Insect Collections by Agencies
North Vancouver District - 1955

Personnel Involved in collection	Number of Collections May	June	July	Aug.	Sept.	Oct.	Total*
Forest Biology Rangers Independently	4	92	80	28	0	0	213
Forest Biology Rangers with Forest Service Personnel	0	0	0	0	0	0	0
Forest Service Personnel Independently	6	5	4	5	1	0	21
Other Co-operators	0	0	0	0	0	0	0
Total	10	97	84	33	1	0	234

* Includes samples taken in months other than shown

Table 2

Collections by Hosts
North Vancouver District - 1955.

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
Douglas fir	58	4	willow	1	0
western red cedar	21	3	black cottonwood	2	1
western hemlock	92	6	maple	1	0
mountain hemlock	3	0	broadleaf maple	1	0
amabilis fir	3	1	red alder	20	1
grand fir	5	1	arbutus	1	0
alpine fir	3	0	miscellaneous shrubs	5	1
Engelmann spruce	4	0	no host	3	0
Sitka spruce	5	0	apple	0	0
lodgepole pine	4	0	salmonberry	0	1
western white pine	2	0	Total	34	4
Total	200	15	Grand Total	234	19

defoliation was observed and other samples in the same area indicated this was a localized population. The number of black-headed budworm collected in this district was small considering the current infestation on North Vancouver Island. There appears, thus far, to be a fairly well defined boundary of population densities between the two areas. See Map 2.

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Twelve well dispersed samples contained 16 specimens with a maximum number of three larvae per sample.

Silver-spotted Halisidota, Halisidota argentata Pack.

The silver-spotted halisidota reached infestation proportions in localized areas throughout the southern half of the North Vancouver ranger district. Light and medium defoliation extended from Gibsons' Landing north to Powell River and Lund on the west coast of the mainland. Heavy populations were present on fringe trees along the shores of Calm, Lewis and Sutil channels in the Johnstone Strait Islands, along the east coast of Texada Island and some localities of Lasqueti Island (Map 3). There was no tree mortality. The insects showed a preference for immature and pole size Douglas-fir trees along the seashore and up to 500 feet elevation. Colonies averaged 218 larvae in the area surveyed.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Heavy populations of the tent caterpillar were present throughout the southern portion of the North Vancouver District. The heaviest populations were on Bowen Island and Gibsons' Landing in the Howe Sound area. Defoliation of red alder, especially on Bowen Island was noticeable from the water and reached as high as 100 per cent. Other hosts were, in order of preference, domestic apple and cherry trees, salmonberry, mountain ash and red cedar. No mortality was observed.

Larval sampling consisted of choosing a tree supporting an average number of webs. An average sized web was then chosen and all larvae counted. The number of webs per sample tree were then counted. In the Howe Sound and Gulf Island area, this average was 415 larvae per web and 39 webs per tree. Average tree heights were 20 feet.

STATUS OF TREE DISEASES

In the area surveyed nineteen pathological samples were made. All were occurrences of minor significance. The specific diseases and the hosts are given below. Six of the samples are still undetermined and are not listed.

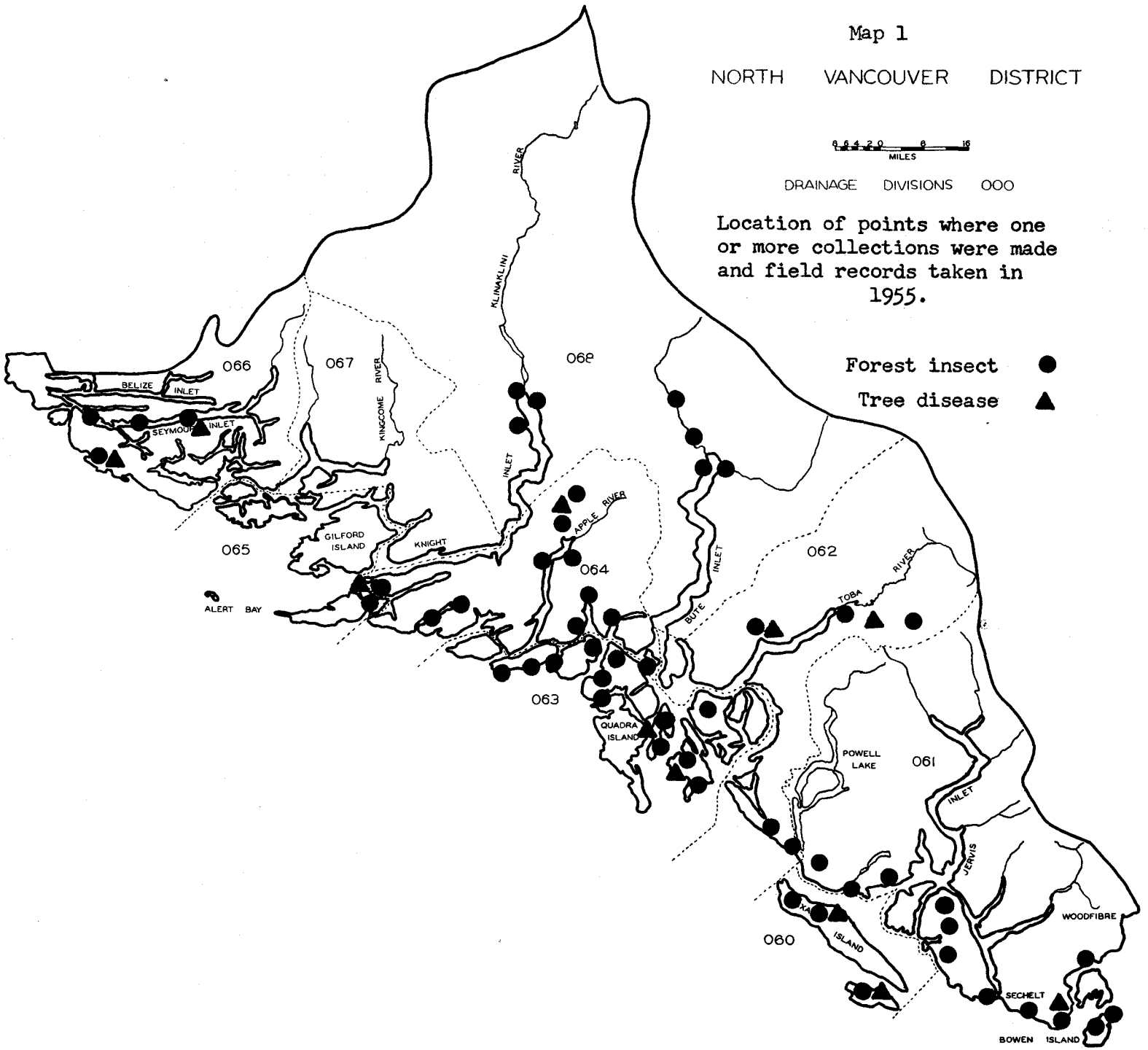
Pathogen	Host
Keithia thujina Durand, cedar leaf blight	red cedar
Dimerosporium abietis Dearn, sooty mold	grand fir and amabilis fir
Fomes pini (Thore) Lloyd, heart rot	Douglas fir

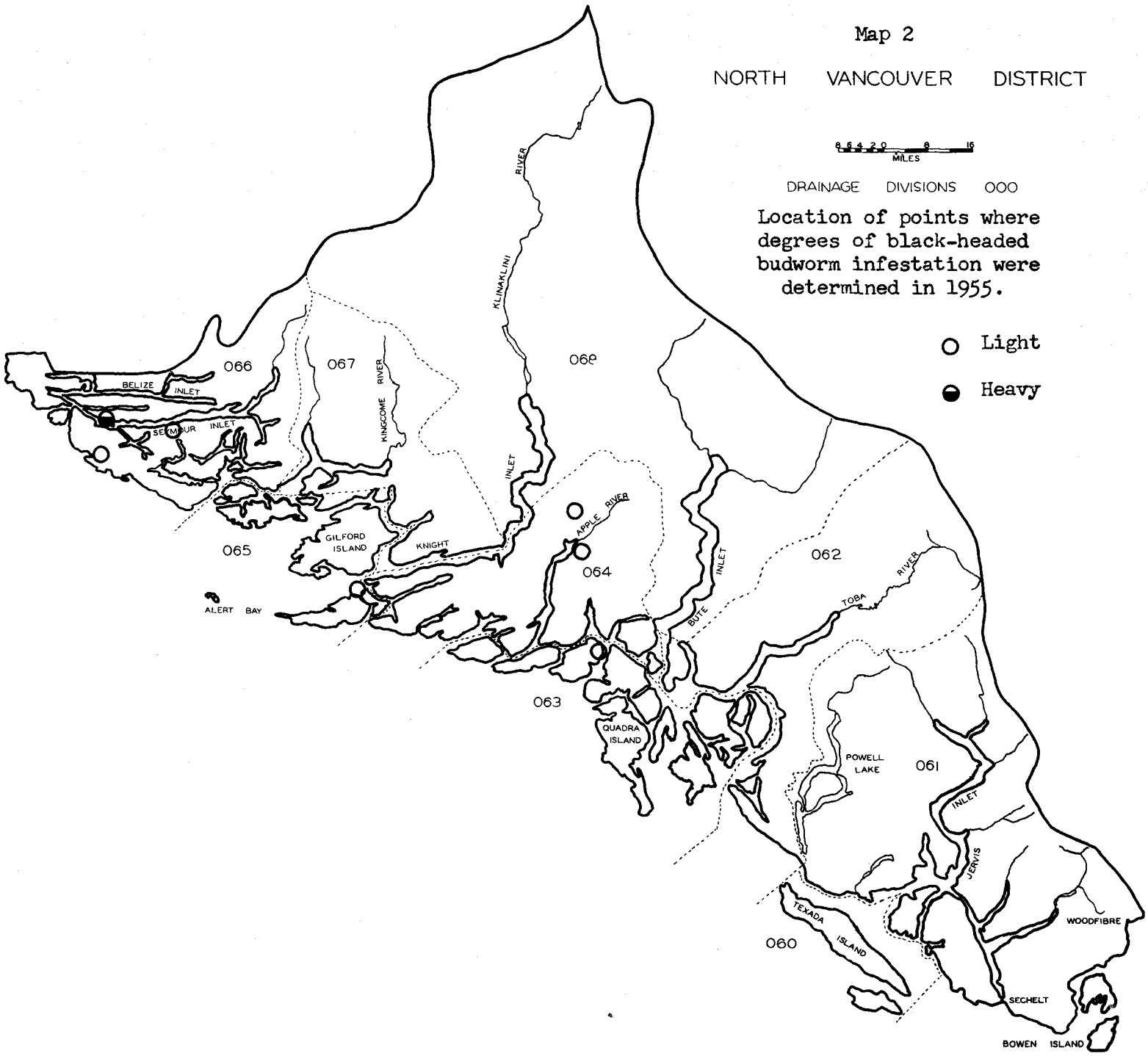
- continued

Pathogen	Host
Bacterium pseudotsugae Hansen and Smith branch and stem gall	Douglas fir
Taphrina populi-salicis Mix leaf blister	black cottonwood
Rhabdocline pseudotsugae Syd., needle blight	Douglas fir
Calyptospora goeppertiana Kuhn needle rust	huckleberry
Phyllosticta gautheriae Ell. & Ev. leaf spot	salal
Dimerosporium tsugae Dearn. sooty mold	western hemlock

Map 1

NORTH VANCOUVER DISTRICT




Map 2
NORTH VANCOUVER DISTRICT
8 6 4 2 0 8 16
MILES
DRAINAGE DIVISIONS 000
Location of points where degrees of black-headed budworm infestation were determined in 1955.
Light
Heavy
066
067
068
065
064
062
063
061
060
BELIZE INLET
SEYMOUR INLET
KINGCOME RIVER
KLINAKLINI RIVER
INLET
APPLE RIVER
GILFORD ISLAND
KNIGHT INLET
ALERT BAY
BUTE INLET
TOBA RIVER
QUADRA ISLAND
POWELL LAKE
JERVIS INLET
TEXADA ISLAND
WOODFIBRE
SECHELT
BOWEN ISLAND

Map 3

NORTH VANCOUVER DISTRICT

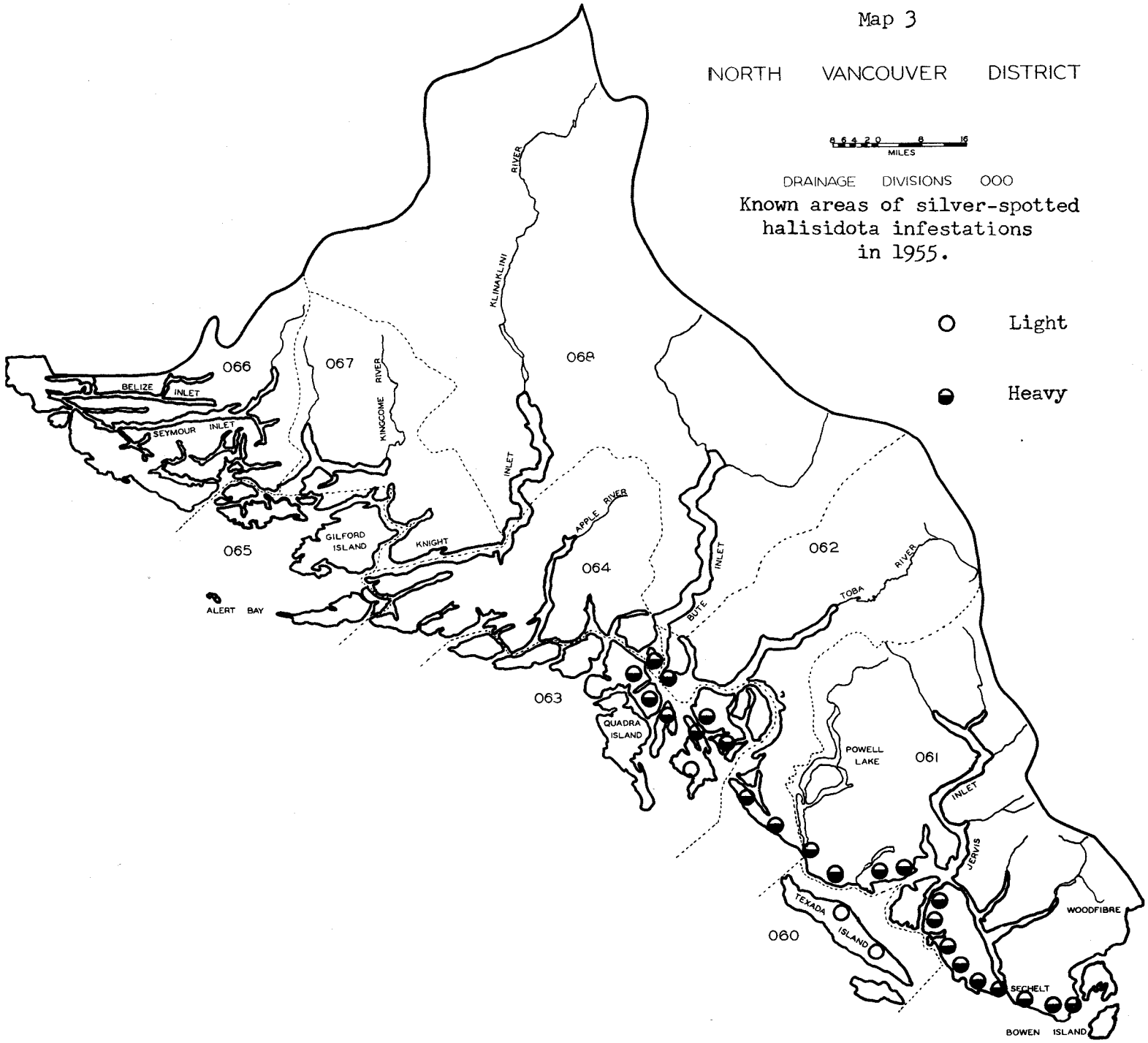
8 6 4 2 0 8 16
MILES

DRAINAGE DIVISIONS 000

Known areas of silver-spotted halisidota infestations in 1955.

○ Light

◒ Heavy



FOREST BIOLOGY SURVEY

PRINCE RUPERT FOREST DISTRICT

1955

D. G. Collis

INTRODUCTION

The Prince Rupert Forest District is divided into three Biology Ranger districts, the East Prince Rupert surveyed by ranger D. Collis, West Prince Rupert surveyed by S. J. Allen and the South Prince Rupert District also covered by ranger Allen this season. No roads serve the latter area and coverage was possible only through the co-operation of British Columbia Forest Service Personnel.

The rangers worked in conjunction with one another for the major part of June covering inaccessible areas by trail and outboard boat.

Ranger N. Alexander joined the district in late August and assisted with the field work until the end of September.

In general, insect activity declined during 1955. The black-headed budworm Acleris variana (Fern.) continued to cause dangerous defoliation along the coast during the feeding period, however egg counts conducted in late September indicated a collapse of the infestation in the West Prince Rupert District.

The spruce budworm, Choristoneura fumiferana (Clem.) was in the first stage of its two year development period and appeared to have reached the lowest population level since 1949.

The mountain pine beetle Dendroctonus monticolae (Hopk.) continued to spread in mature lodgepole pine stands along the eastern side of Babine Lake for a distance of 60 miles.

Western hemlock looper Lambdina fiscellaria lugubrosa (Hlst.) populations either remained static or showed a slight decline over 1954.

The hemlock sawfly Neodiprion tsugae (Midd.) seems to be following in the wake of the now declining black-headed budworm infestation. Large populations were located along Portland Canal and on the Queen Charlotte Islands.

FOREST BIOLOGY SURVEY

SOUTH PRINCE RUPERT DISTRICT

1955

S. J. Allen

INTRODUCTION

The Forest Biology Survey of this district was limited to the areas surrounding Ocean Falls and Bella Coola. A total of 57 insect and 2 tree disease samples was collected, most of them from July 19 to July 26. The survey of this area would have been impossible without the co-operation of the British Columbia Forest Service personnel who supplied water and land transportation throughout the area visited. Forest service personnel and the company forester at Northern Pulpwood camp, South Bentinck Arm, were very co-operative in submitting egg samples. The number of samples taken by the insect ranger and forest service are shown in Table 1, and the collections by host trees are given in Table 2. The areas surveyed in 1955 are shown on Map 1.

Table 1

Forest Insect Collections by Agencies

Personnel Involved in Collection	Number of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	-	15	-	-	-	15
Forest Biology Rangers with Forest Service Personnel	-	-	28	-	-	-	28
Forest Service Personnel Independently	-	7	5	-	-	2	14
Other Co-operators	-	-	-	-	-	-	-
Total		7	48	-	-	2	57

Table 2

Collections by Hosts
South Prince Rupert District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
western hemlock	29	1	no host	4	
western red cedar	7		garry oak	2	
Douglas fir	6		apple	1	
amabilis fir	2		miscellaneous		1
Sitka spruce	2				
Engelmann spruce	4				
			Total	7	1
Total	50	1	Grand Total	57	2

STATUS OF INSECTS

Black-headed Budworm, Acleris variana (Fern.)

Black-headed budworm defoliation was observed this year for the first time in the Ocean Falls area. Discoloured hemlock foliage was present in patches along the shores of Labouchere Channel and South Bentink Arm, (Map 2).

Larval populations were high at Ocean Falls, Nascall Bay, Bella Coola and the Taleomy and Noeik River valleys but little defoliation was noticeable. A British Columbia Forest Service ranger reported budworm larvae hanging from hemlock trees in the Smith Inlet. Table 3 shows the number of larvae found in the seasons 1953 to 1955.

In the 1955 infestation, 416 larvae were submitted to the insectary. Of these, 117 survived to the adult stage, 63 died of parasitism and 236 died of other causes. No disease was found. Because of lack of adequate boat shelter it was impossible to take egg samples in the areas of heaviest defoliation. Two egg samples were taken by the British Columbia Forest Service and logging company personnel in areas of light defoliation (Table 4). The egg samples indicate a light population for 1956 in these areas, but it is impossible to predict what the population trend will be in the more heavily defoliated areas. As this is the first year of heavy attack it seems unlikely that there will be any decrease.

Table 3

Number of Black-headed Budworm per 3-tree Beating Sample, 1953-1955, South Prince Rupert District.

Location	Host	No. of larvae per sample 1953	1954	1955
Bella Coola	H*	0	4	22
Saloomt River	H	1	5	14
Firvale	H	0	0	10
10 mi W/Firvale	H	0	0	20
Noeik River Valley	H	2	0	12
Taleomy River	H	0	23	62
S. Bentinck Arm	H	-	-	33
Nascall Bay	H	-	-	64
Bella Bella	H	-	0	8
Gunboat Passage	H	-	0	18
Return Channel	H	-	0	33
Chatfield Island	H	-	0	10
	Total	3	32	306
	Average	0.5	3.2	25.5

* H - western hemlock

Table 4

Average Number of Black-headed Budworm Eggs per 100 Inches of Hemlock Twig.

Location	Inches of Twig	Number of Eggs per 100 inches of twig	Population Index
Taleomy River	1,976	2	Light
Ocean Falls	990	4	Light

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

There was a noticeable drop in the western hemlock looper population in the Bella Coola River Valley and South Bentinck Arm area. The average number of larvae per 3-tree beating sample was 5.2 in 1955 compared to 15.4 in 1954 (Table 5). The population remained well distributed in 1955 (Map 3).

Table 5

Number of Western Hemlock Looper Larvae per 3-tree Beating Samples in the Bella Coola and South Bentinck Arm Areas, South Prince Rupert District.

Area	Host*	No. of Larvae per Sample		
		1953	1954	1955
Saloompt River	H	0	8	6
Bella Coola wharf	H	1	10	1
Firvale	F	0	1	1
Noeik River	H	1	30	4
Taleomy River	H	-	28	4
Total		2	77	16
Average		0.4	15.4	5.2

* H - western hemlock F - Douglas fir

Hemlock Sawfly, Neodiprion tsugae Midd.

In contrast to the West Prince Rupert District, the hemlock sawfly showed a decrease in 1955, averaging 0.4 larvae per sample compared to 3.8 in 1954. In 1954, 14 samples yielded 53 larvae compared to 5 larvae in 14 samples in 1955.

Spruce Budworm, Choristoneura fumiferana (Clem.)

No larvae of this insect were found during the brief 1955 survey. The area of spruce budworm population in 1954, the Dean River Delta, was not visited in 1955.

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

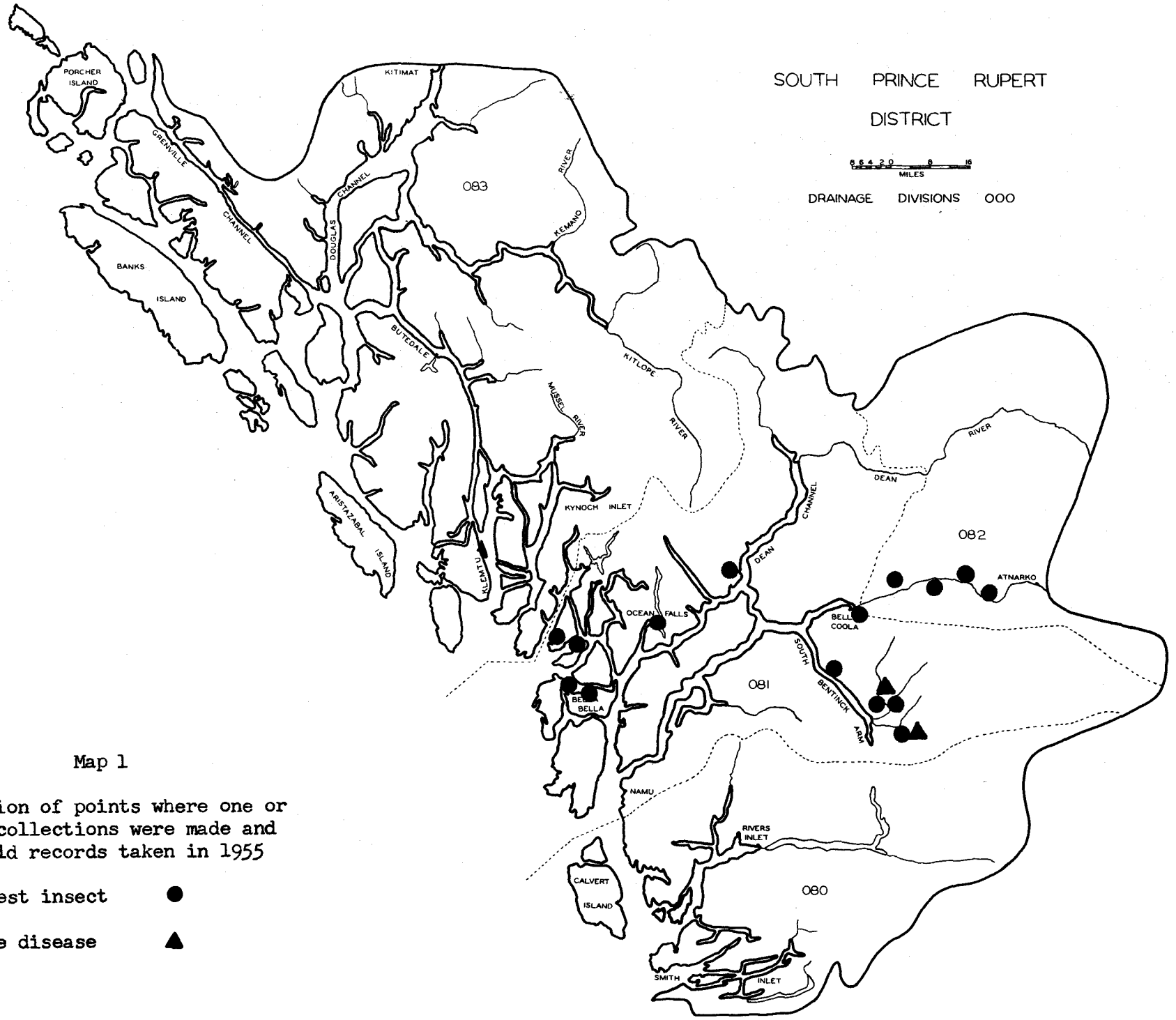
Only two specimens of this species were found in the Bella Bella area where as high as 80 larvae per sample were collected in 1954.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Since 1948 this bark beetle has killed small groups of scrub trees in lodgepole pine stands on the hillsides of the Mosure Creek - Atnarko area of the Bella Coola River Valley. In 1954 and 1955, the beetle attack spread to the younger lodgepole pines in the lower valley towards Stuie where scattered groups of red tops are more numerous than before.

STATUS OF TREE DISEASES

Only two collections were submitted in 1955. Fomes pini (Thore) Lloyd, scarce in the South Bentinck Arm area, was found in the Smitley River Valley. Puccinia porphyrogenita Curt., occurred quite commonly on bunchberry. The disease is not known to cause damage to forest trees.

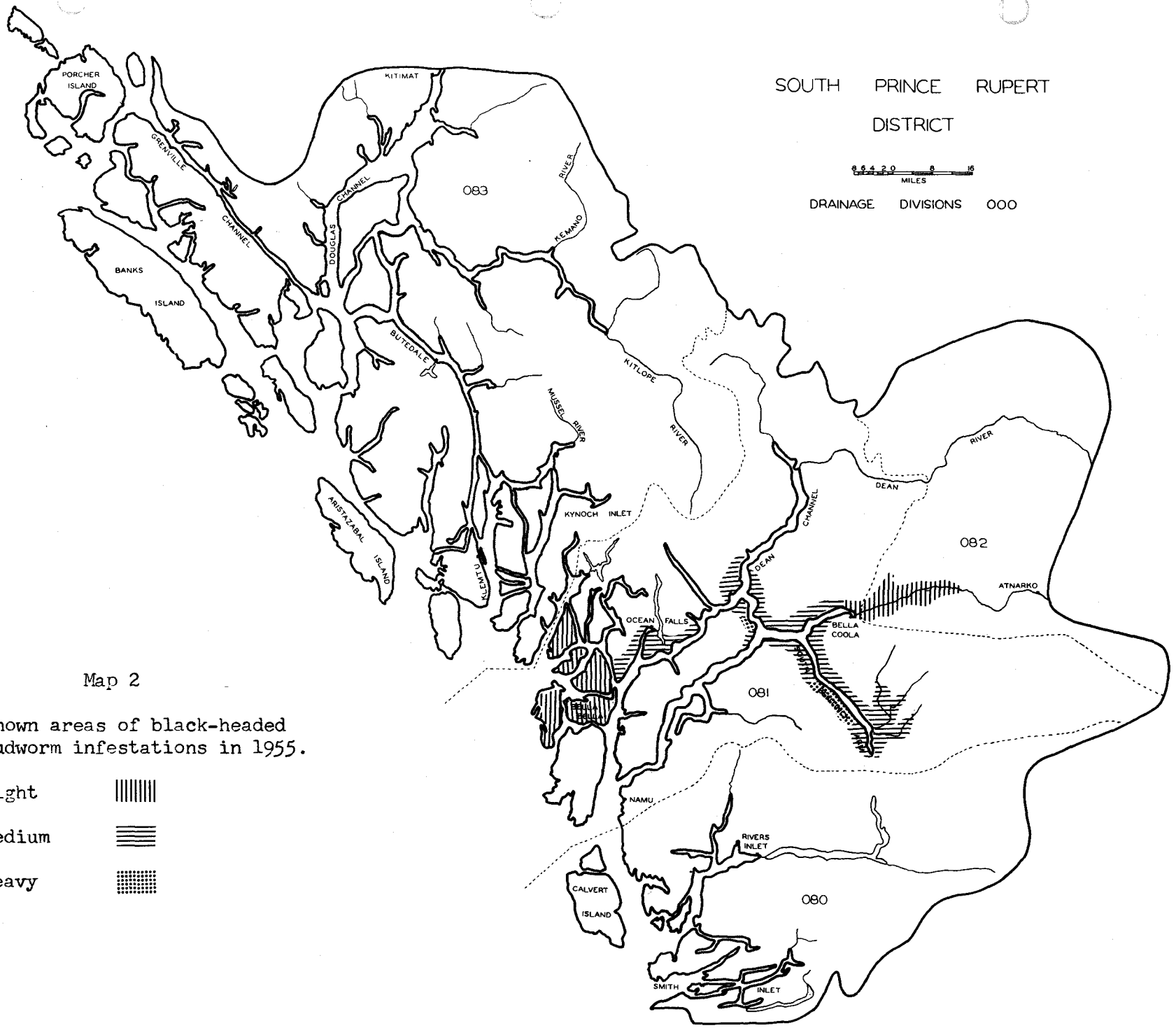


Map 1

Location of points where one or more collections were made and field records taken in 1955

Forest insect ●

Tree disease ▲



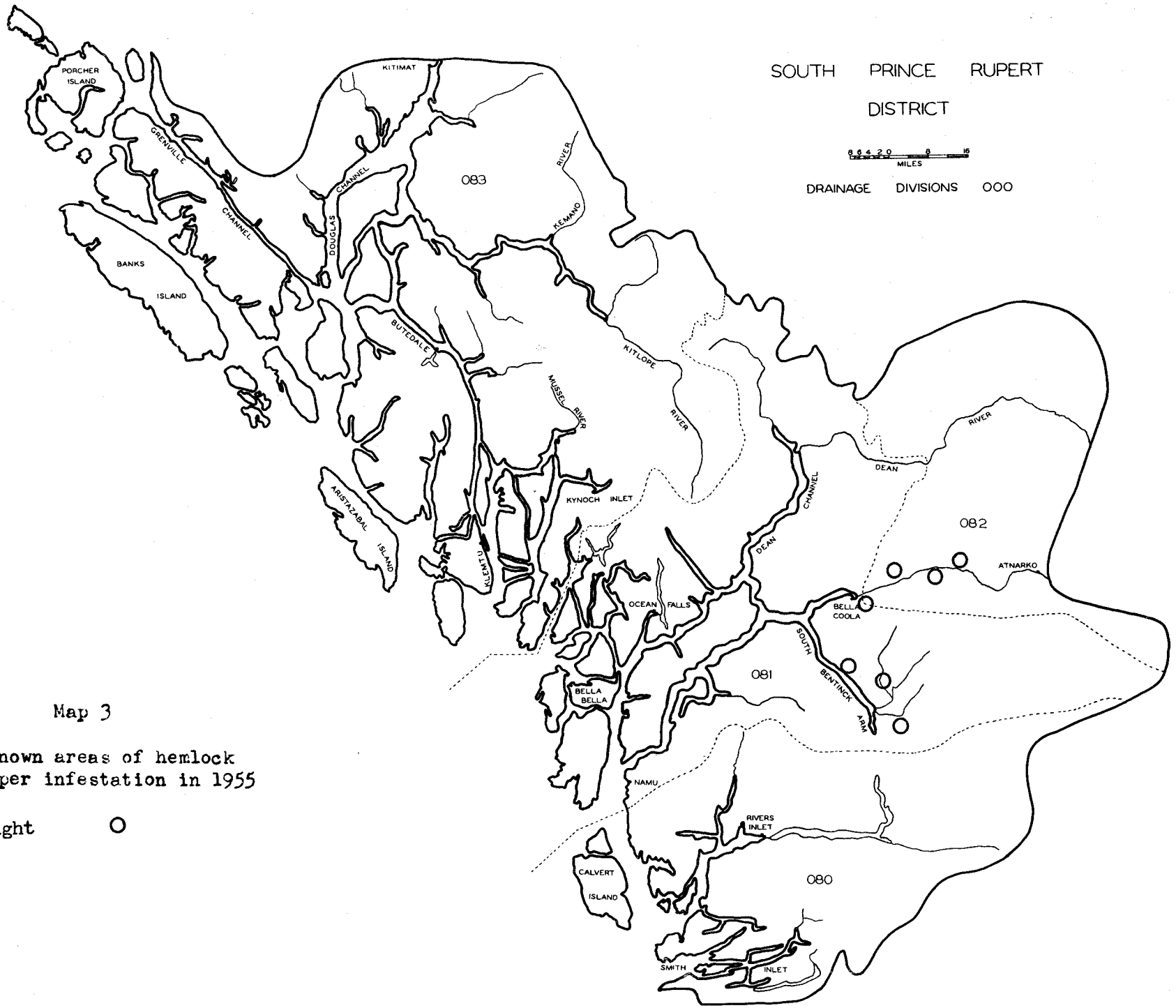
Map 2

Known areas of black-headed budworm infestations in 1955.

Light

Medium

Heavy



Map 3

Known areas of hemlock looper infestation in 1955

Light O

FOREST BIOLOGY SURVEY

WEST PRINCE RUPERT

1955

S. J. Allen

INTRODUCTION

A total of 232 insect and 44 tree disease samples were collected in the West Prince Rupert District. The survey of the Queen Charlotte Islands was accomplished through the co-operation of British Columbia Forest Service personnel who supplied water and land transportation. Forest Service personnel assisted with larval sampling and company foresters submitted black-headed budworm egg samples.

Insect collections by agencies are shown in Table 1, and Table 2 lists collections by hosts. The areas surveyed in 1955 are shown in Map 1.

Table 1

Forest Insect Collections by Agencies
West Prince Rupert District - 1955

Personnel Involved in Collection	Number of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	42	62	97	14	-	215
Forest Biology Rangers with Forest Service Personnel	-	-	-	-	-	-	-
Forest Service Personnel Independently	-	1	2	7	2	-	12
Other Co-operators	-	-	1	4	-	-	5
Total	-	43	65	108	16	-	232

Table 2

Collections by Hosts
West Prince Rupert District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
western hemlock	141	23	western white birch		1
mountain hemlock	3		aspen	1	4
Sitka spruce	26	1	miscellaneous	1	5
western white spruce	2				
western red cedar	31	9			
amabilis fir	12	1			
alpine fir	11				
lodgepole pine	4				
			Total	2	10
Total	230	34	Grand Total	232	44

STATUS OF INSECTS

Black-headed Budworm, Acleris variana (Fern.)

In 1954 the black-headed budworm population collapsed on the mainland coast from Prince Rupert to Stewart and in the Skeena and Nass River valleys. Few budworm were collected in 1955 and there was no apparent defoliation.

Although the population decreased on the Queen Charlotte Islands in 1955 a concentrated heavy population caused the most severe damage of the infestation to hemlock dominated stands in the Moresby Islands group and in two small areas on Graham Island, (Map 2). Damage was greatest from Skidegate Inlet southward through the centre of the Moresby Island group on the east side of the mountain range to at least Lyall Island. Two defoliated areas were observed on Graham Island, one at the east end of Juskatla Inlet, and the second at the Honna River mouth. Top defoliation of western hemlock was most severe in the middle story trees of uneven aged stands. Heavy top thinning was common in even-aged immature stands. The average number of larvae collected for the three years 1953 to 1955 is shown in Table 3.

Many of the larvae appeared to be diseased but laboratory examination indicated they died from other causes.

Sampling on the Queen Charlotte Islands showed larval development to be one or two instars behind the larvae previously sampled in the Bella Coola area. The former larvae may have died from starvation due partly to adverse weather conditions and lack of current foliage. Results of the

Table 3

Average Number of Black-headed Budworm Larvae per 3-tree Beating Sample for the Queen Charlotte Islands 1953 - 1955.

Location	Host	Average no. of larvae per sample		
		1953	1954	1955
Graham Island	H	143	200+	74
Moresby Island	H	143	200+	103

insectary rearings of larvae collected in the Queen Charlotte Islands is shown below, and shows the unusually high mortality encountered.

	Larvae submitted	Larvae parasitized	Larvae died from unknown causes	Adults survived
Number	1,297	167	1,037	93
Per cent		13	80	7

Special collections totalling 1,087 black-headed budworm were submitted to the Sault Ste. Marie laboratory during the summer.

Egg Counts

In 1954 egg counts were made at nine localities on the Queen Charlotte Islands. The low number of eggs found indicated a drop in population for 1955. This year egg samples were taken in five areas. Pupae and adults were very scarce and few eggs were found, indicating a further drop in population for 1956. The results of the egg sampling is shown in table 4 and a comparison of egg samples for the three years, 1953 to 1955 is shown in table 5.

Table 4

Egg Samples Collected on Queen Charlotte Islands. 1955.

Locality	Inches of twig length	No. of eggs per 100 inches of twig	Population index
Graham Is.			
Justakla Inlet	1,623	0.1	Very light
Swan Lake	1,589	0.6	Very light
Maude Island	1,638	0.2	Very light
Honna River	2.409	0.2	Very light

Table 5

Average Number of Black-headed Budworm Eggs Found in the Three Year Period Ending 1955. Queen Charlotte Islands.

Year	No. of Trees Sampled	No. of Eggs per 100 inches of twig
1953	5	24.0
1954	9	6.0
1955	12	0.3

Population Trends

The largest over-all black-headed budworm population in the Queen Charlotte Islands was in 1954. An analysis of parasitism, adult survival, and egg populations indicated that in 1955 the population on Graham Island and Moresby Island would remain static or decrease. This prediction was correct. Although parasites gave some control this year the cold, rainy weather conditions experienced in the early summer resulted in considerable larval mortality, probably due to starvation. Accordingly, the 1955 larval and consequently the pupal and adult population was greatly reduced even though some local areas suffered severe defoliation. The predicted black-headed budworm population for 1956 is shown below:

Locality	1955				Population trend (1956)
	Larval population	Parasitism	Adult survival	Egg population	
Graham Is.	Very heavy in areas-unevenly distributed	medium	very low	very light	decrease
Moresby Is.	Heavy and well distributed	medium	very low	very light	decrease

Initial Results of the Black-headed Budworm Infestation in the Portland Canal

Although there was no heavy budworm defoliation in the Portland Canal area in 1954 the results of the heavy feeding from 1951 to 1953 are evident. Some trees continued to lose their needles in 1955, particularly in the upper crown level. Top kill was observed from four miles south of Belle Bay northward to White Point, and between the Georgie and Marmot River mouths, while considerable numbers of top killed and dying trees were noted in the Belle Bay Creek Valley and in the creek valley directly south of White Point.

Tree mortality was restricted to overmature and decadent trees. The younger, more vigorous growing hemlock and spruce have so far survived the attack with little apparent damage.

Due to the inaccessibility of the area no mortality plots were established in the Portland Canal infestation. It is therefore unknown if the trees died as a direct result of defoliation, or if other factors such as secondary insects contributed to the mortality.

Hemlock Sawfly, Neodiprion tsugae Midd.

On the mainland area the hemlock sawfly increased in distribution and numbers in 1955, (Map 4). The largest populations were found in the Bear River Valley, the Kitsumgallum River Valley, and the Zymoetz River Valley. Samples for the entire district averaged 6.8 larvae per 3-tree beating sample in 1955 compared to 1.1 in 1954. An average of 14.7 larvae per sample was found in the Kitsumgallum River Valley and 22 larvae per sample in the Bear River Valley.

On the Queen Charlotte Islands the increase was greater than on the mainland. The highest larval population was found in the area from Copper Bay to Skidegate Lake, (Map 5). An average of 91 larvae per sample was found compared to 3.2 in 1954, while the over-all average jumped from 0.5 in 1954 to 26.3 in 1955. Defoliation amounting to 50 per cent of the 1954 needles was noticeable only where colonies were found in the Copper Bay-Skidegate Lake area. In September an evenly distributed cocoon population was found in the Skidegate Inlet - Cumshewa Inlet zone.

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

In 1955 the number of hemlock looper found in 3-tree beating samples decreased generally although small local increases were noted in several areas, (Map 3). The increases occurred at Williams Creek, Lakelse River and Copper River valleys while decreases were evident throughout the remainder of the Skeena River Valley and Kitimat River Valley. The average number of larvae per sample was 4.9 in 1955 compared to 7.9 in 1954, (Table 6).

Spruce Budworm, Choristoneura fumiferana (Clem.)

Only two larvae were found throughout the West Prince Rupert District in 1955, one at Kitsumgallum Park and one at Granite Creek. In 1954, 34 larvae were found in 19 samples, the highest total collected in the last three years.

Table 6.

Number of Hemlock Looper Specimens Found in 3-tree Beating Samples Showing the Rise and Fall of Numbers in a 3-year Period, West Prince Rupert District.

Sample Point	Host*	No. of insects per sample 1953	1954	1955
3 mi. west of Skeena Crossing	Ba	10	2	0
3 mi. west of Skeena Crossing	H	4	4	0
Kitwanga	H	2	0	2
Kitwanga	Ba	2	2	0
6 mi NE of Cedarvale	Ba	3	4	0
Legate Creek	H	2	1	3
Legate Creek	C	2	18	8
Sanderson Creek	H	0	22	3
Chimdemash Creek	H	1	4	4
Copper River	H	0	4	9
Salvus	H	9	6	2
Salvus	S	7	2	1
W. Kalum Block	H	0	3	1
Kitsumgallum Park	H	4	9	2
Williams Creek	H	5	11	29
Lakelse River	H	0	4	26
Scully Creek	H	9	56	1
Deep Creek	H	1	1	0
Camp Creek	H	1	3	2
Kitimat River	H	1	1	5
	TOTAL	63	158	98
	Average	3.1	7.9	4.9

* Ba - amabilis fir, H- western hemlock, C - western red cedar, S - Sitka spruce.

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

Only four larvae were found in 1955, at Lakelse Lake, Sanderson Creek and Kitsumgallum Valley. This insect has been relatively scarce since 1953 when 23 larvae were found throughout the district.

Striped Alder Sawfly, Hemichroa crocea (Fourc.)

Alder sawfly defoliation was absent for the first time in nine or ten years. Only occasional larvae were found.

Green Striped Forest Looper, Melanolophia imitata Wlk.

Twenty-seven larvae were found from June to mid-August throughout the West Prince Rupert District. As in 1954 the population was evenly distributed, but no samples contained more than two larvae.

Green Forest Looper, Nyctobia limitaria nigroangulata Stkr.

Sixteen beating samples averaged 1.6 larvae per collection compared to an average of 2.5 larvae per sample in 1954.

Spruce Sawflies, Pikonema alaskensis Roh.

In 1955, 16 samples averaged 2.8 larvae compared to 3.3 larvae in 1954 and 2.4 larvae in 1953. Eleven larvae were collected from Sitka spruce samples on the Queen Charlotte Islands at the Honna River mouth.

Tip Moth, Zieraphera diniana Gn.

Four samples collected at Lakelse Lake and Greenville mission contained 66 larvae. A gradual decline in the tip moth population has been noticeable since 1952.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Although some larvae were found in 1955, defoliation was negligible. Larvae were found on willow, wild rose and black cottonwood. No caterpillars were found in the Skeena River Valley where they were active in 1954.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

In 1955 aspen trees from Cedarvale to Hazelton were attacked although to a lesser degree than in previous years.

Green Spruce Looper, Semiothisa granitata (Guen.)

During 1955 larvae of the green spruce looper were not found until August 22. Thirty-seven collections produced 141 larvae averaging 4 larvae per sample. The largest numbers were found at Doreen, Onion Lake and Kitimat River.

STATUS OF TREE DISEASES

As in previous years insect sampling points more or less governed the distribution of disease samples.

Sitka Spruce Cone Rust, Chrysomyxa monesis Ziller

A number of herbacious plants infected with this rust were submitted from the Masset area on the Queen Charlotte Islands. Unfortunately, the spruce cone crop was non-existent in 1955, and the alternate host was not available.

Cedar Leaf Blight, Keithia thujina Durand

Samples of the cedar leaf blight were collected from the Portland Canal area and Queen Charlotte Islands.

Fomes pini (Thore) Lloyd.

No samples were submitted, but seven reports of occurrence of this tree disease were sent to the Forest Pathology laboratory. The disease was found in six overmature uneven aged stands in the Skeena River Valley.

Indian Paint Fungus, Echinodontium tinctorium Ell. and Everh.

This was very common in hemlock stands in the Zymoetz River Valley, Lakelse Lake area, and in the Kitwanga River Valley. All six records were from mainland areas.

Fomes igniarius L. Gill.

This disease was found on red alder, white birch and aspen and was most common from Cedarvale to Skeena Crossing in the aspen forests. This disease was not found on the Queen Charlotte Islands.

Other diseases found in 1955 are listed below.

Disease	Host
Melampsora epitea Thüm.	western hemlock
Exobasidium vaccinii (Fokl.) Wor.	blue huckleberry
Puccinia parkerae D. & H.	currant
Hyalopsora aspidiotus (Peck) Magn.	false maiden hair fern
Pucciniastrum pyrolae Diet. ex Arth.	bunchberry
Nectria (?) cinnabarina (Tode) Fr.	(Acer sp. -?)

Map 1

WEST PRINCE RUPERT

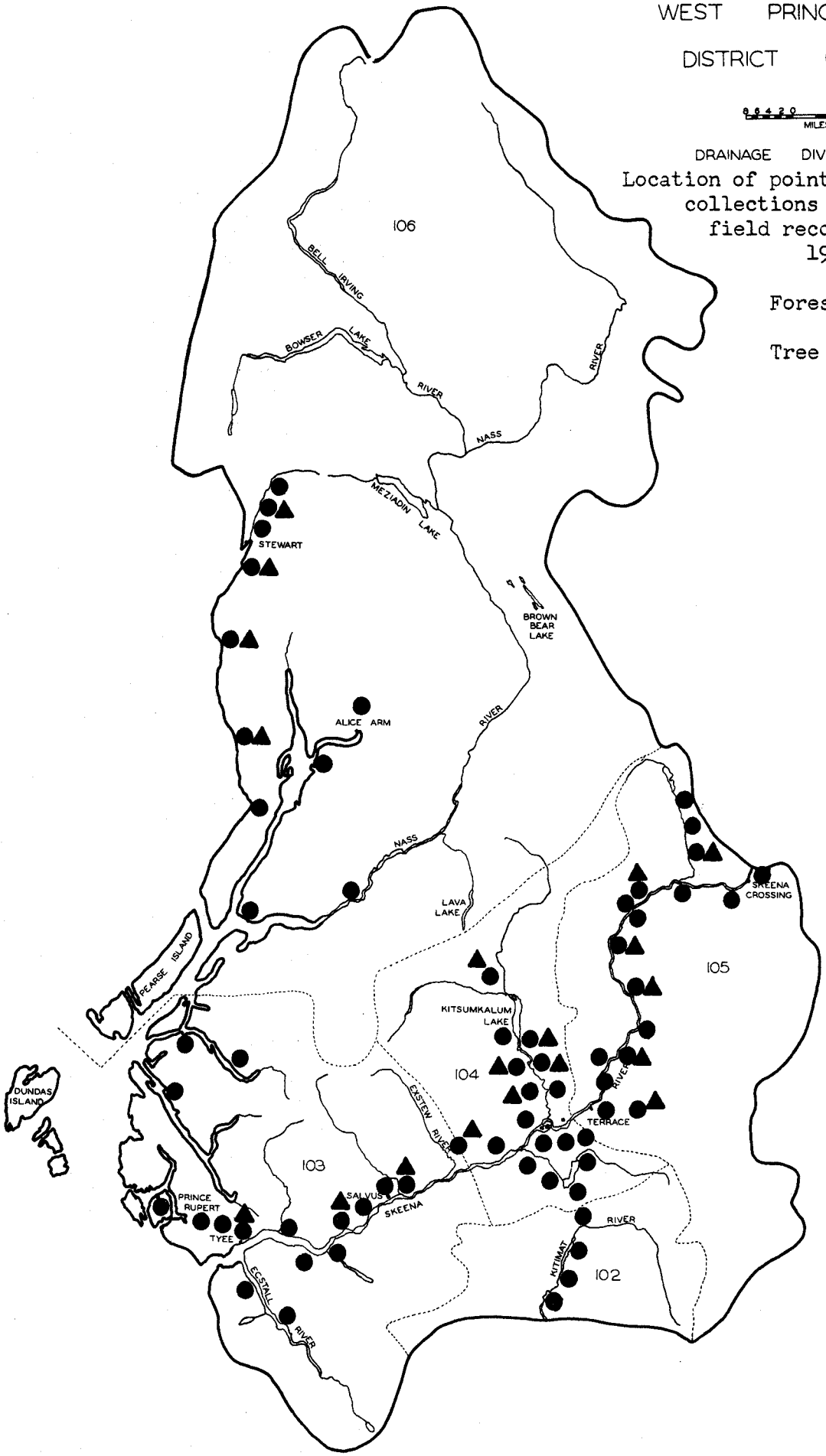
DISTRICT (MAINLAND)

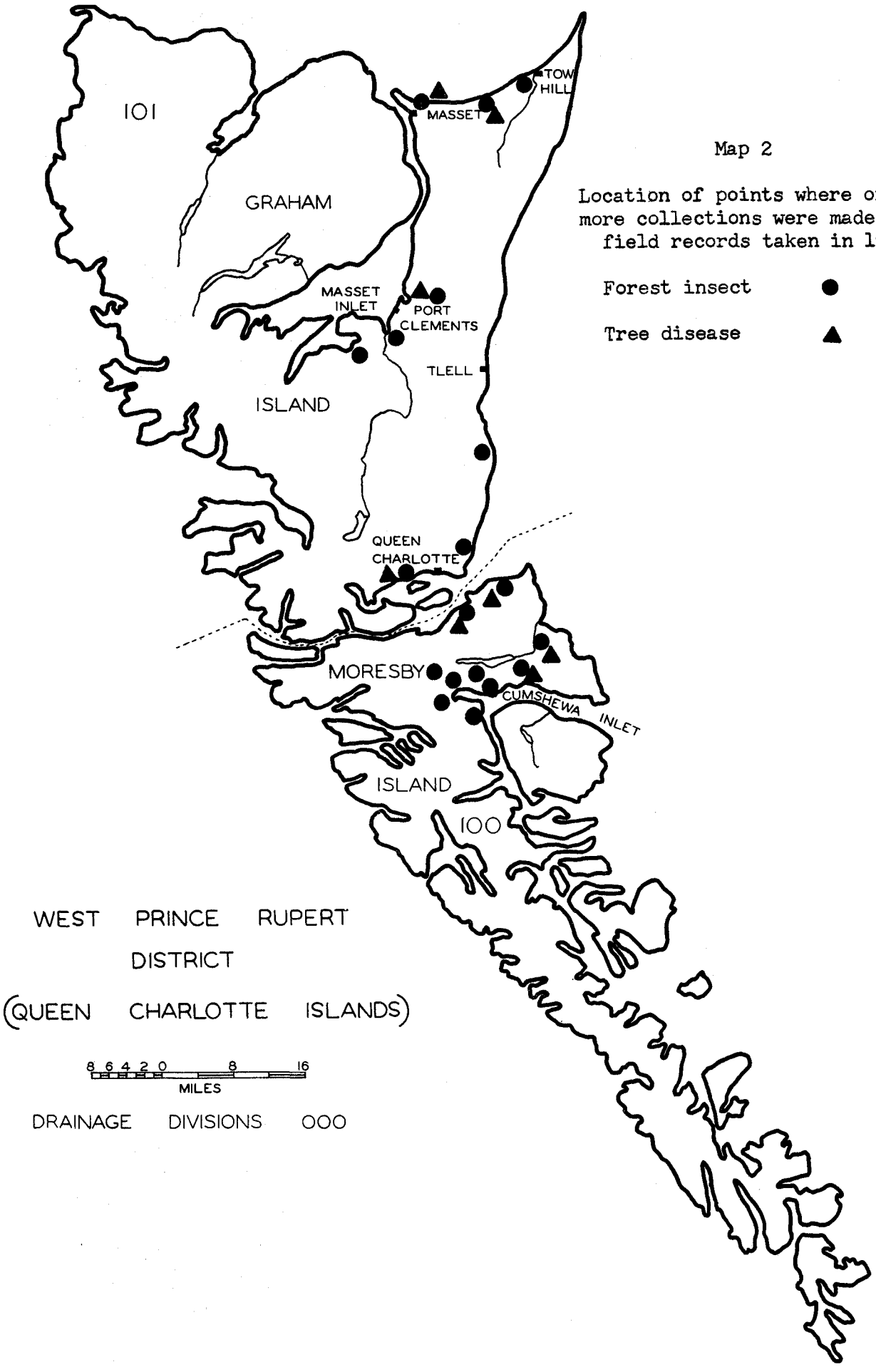
DRAINAGE DIVISIONS OOO

Location of points where one or more collections were made and field records taken in 1955

Forest insect ●

Tree disease ▲



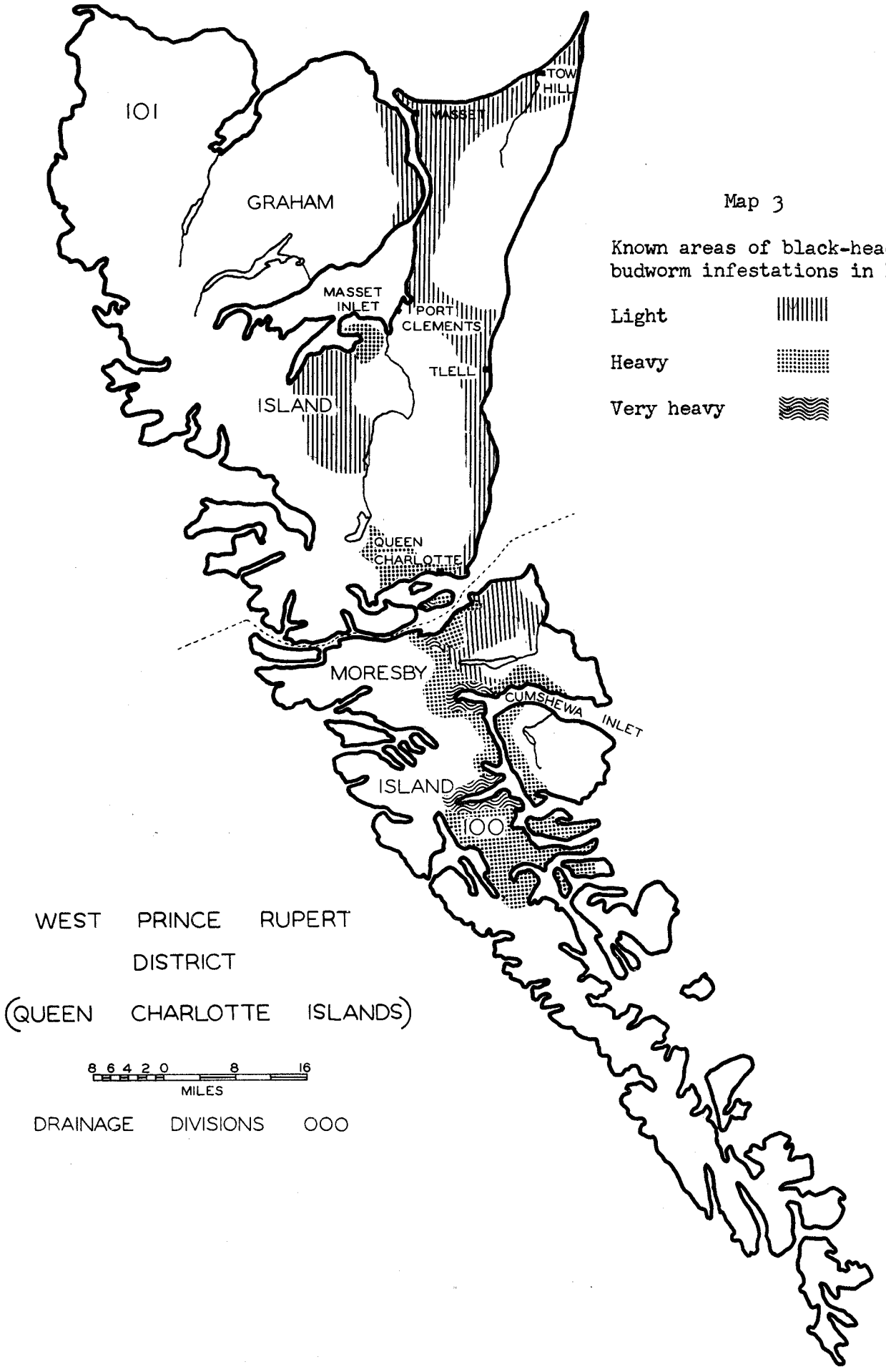


Map 2

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲



Map 3

Known areas of black-headed budworm infestations in 1955

Light

Heavy

Very heavy

Map 4

WEST PRINCE RUPERT

DISTRICT (MAINLAND)

0 8 4 2 0 8 16

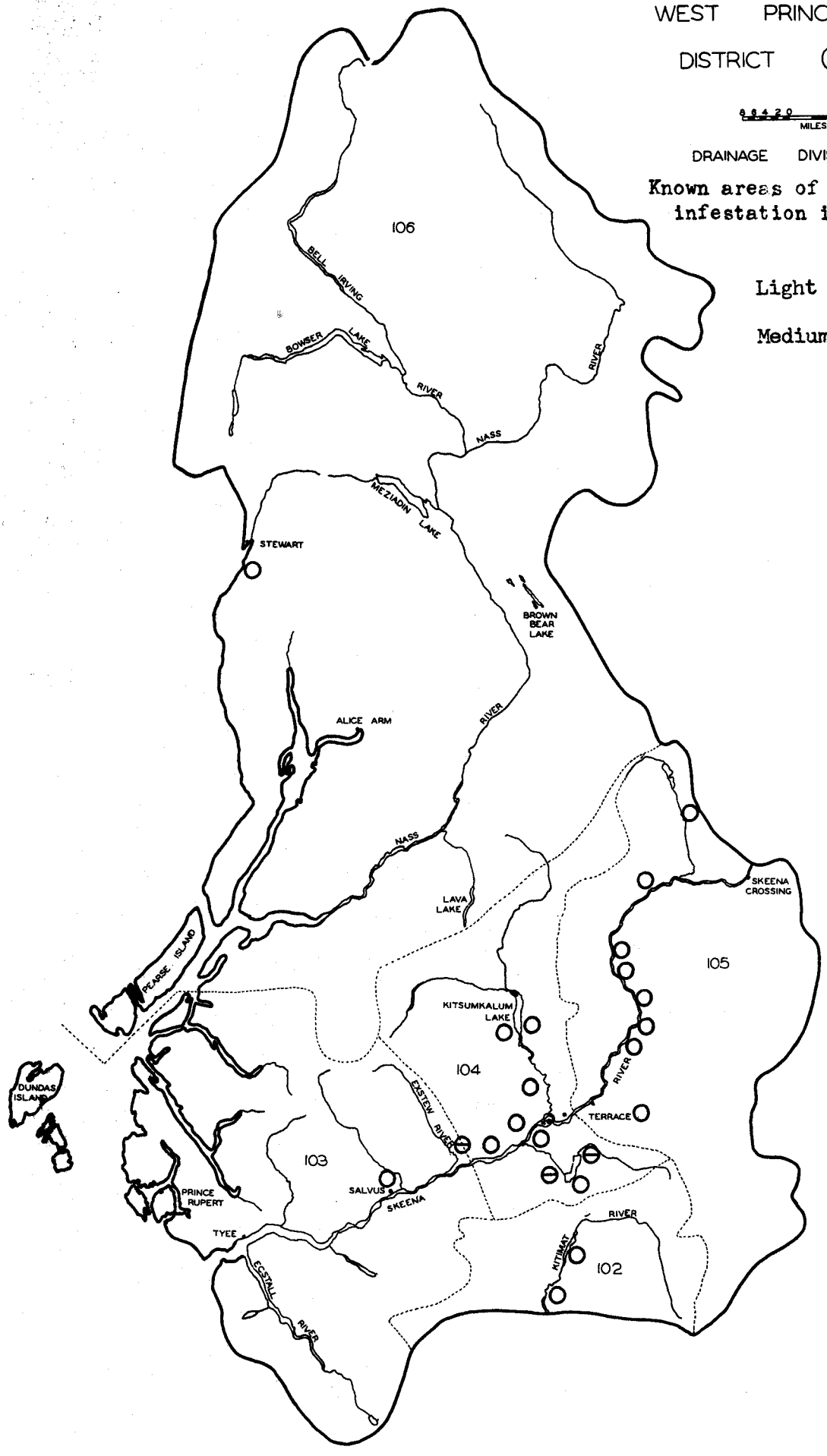
MILES

DRAINAGE DIVISIONS 000

Known areas of hemlock looper infestation in 1955.

Light O

Medium Θ



Map 5

WEST PRINCE RUPERT DISTRICT (MAINLAND)

8 6 4 2 0 8 16
MILES

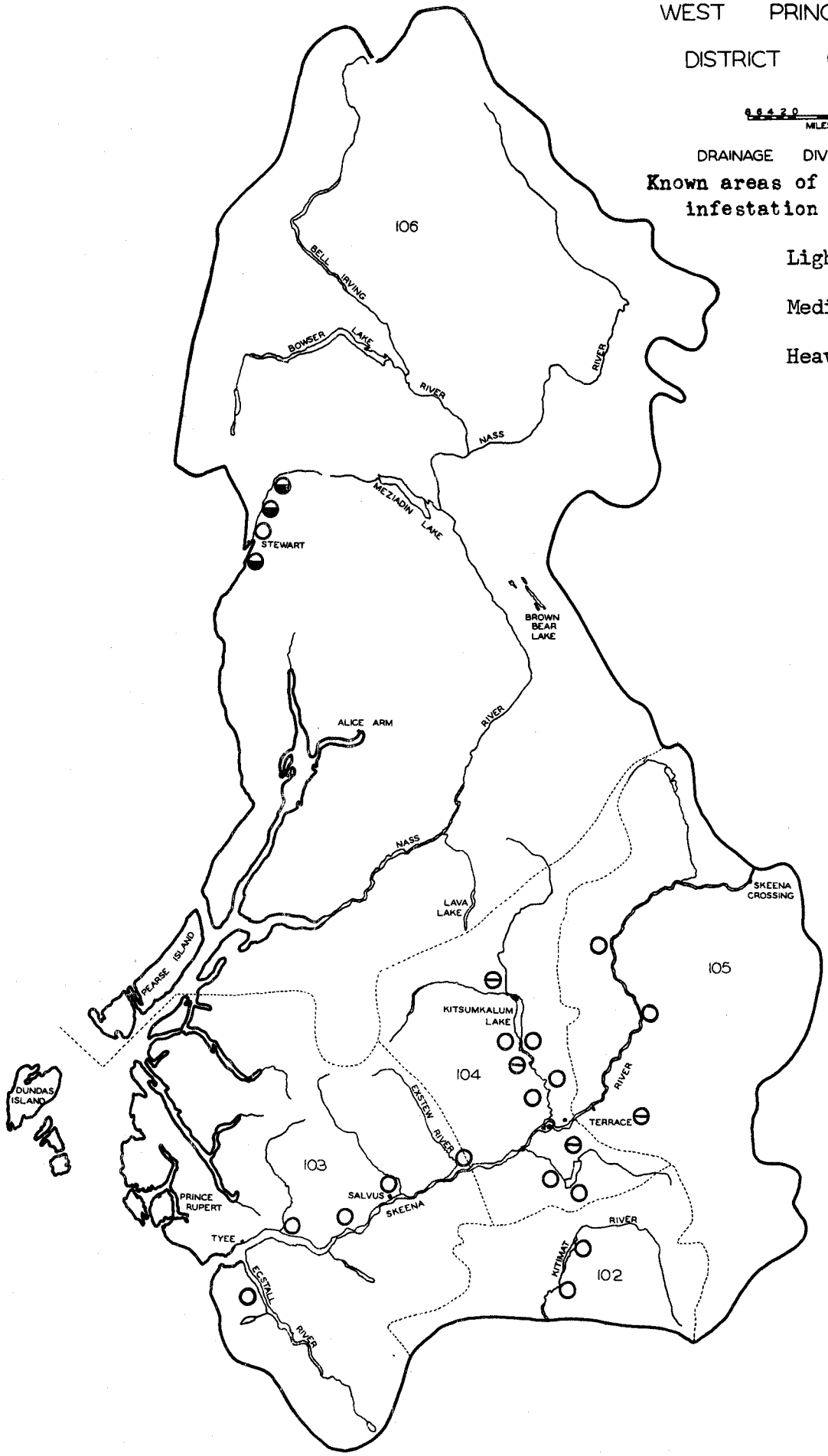
DRAINAGE DIVISIONS OOO

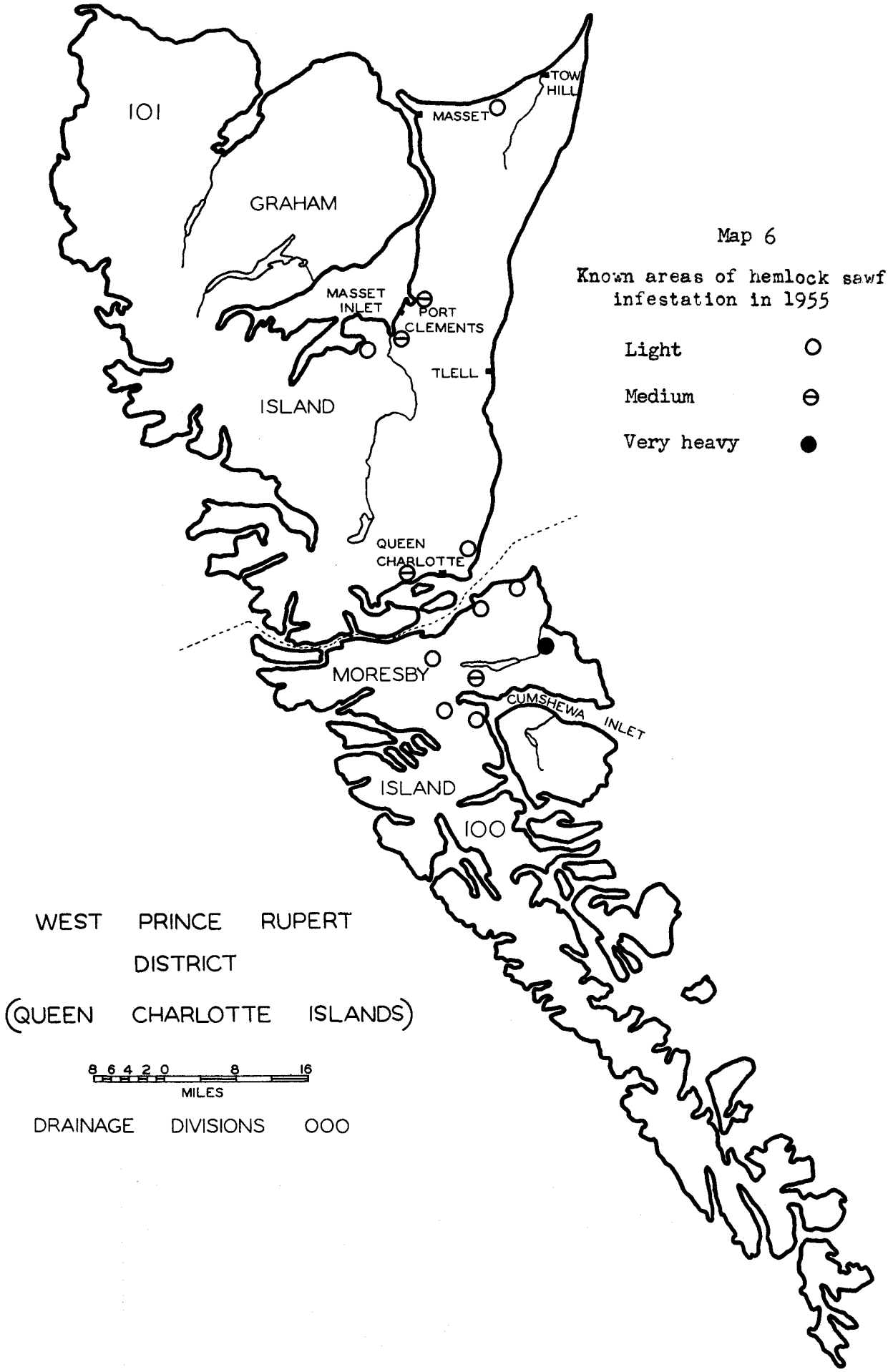
Known areas of hemlock sawf infestation in 1955.

Light O

Medium ⊖

Heavy ◒





Map 6

Known areas of hemlock sawf infestation in 1955

Light O

Medium ⊖

Very heavy ●

Figure 1. Black-headed budworm defoliation on understory western hemlock. Cumshewa Inlet, Queen Charlotte Islands, 1955.

S. J. Allen

FOREST BIOLOGY SURVEY

EAST PRINCE RUPERT DISTRICT

1955

D. G. Collis

INTRODUCTION

Field work commenced on June 1 and terminated at the end of September. During this period 306 entomological and 38 pathological samples were collected by Forest Biology Rangers (Tables 1 and 2).

Carrying out this work entailed driving 10,000 miles by Jeep and travelling 1,150 miles by outboard boat.

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

As the spruce budworm were in the first year of their 2-year cycle, defoliation was very light due to the short feeding period before hibernation. Larval activity was observed from July 1 to July 20.

The three spruce budworm infestations reported in 1954 at Star Lake, immediately north of the town of Burns Lake, along the Babine Lake road from Smithers, and in the Nilkitkwa River drainage were checked in 1955. Unfortunately, an attempt to survey this latter area in June was unsuccessful due to flooding conditions at a creek crossing 14 miles up the Nilkitkwa River trail. Up to this point 1954 defoliation was light. Only one budworm larva was found in the area around Star Lake this season. Small populations persisted along the Babine Lake road from Smithers. The largest larval count was made at the junction of the Babine Lake and Cronin Mine roads but this was not nearly as high as 1954 reports would indicate. No previous larval figures are available from the area for comparison.

Pupae collected from the Star Lake and Babine road infestations in late August of 1954 produced no parasites.

A new sampling method for the 2-year cycle budworm was started in 1955. This consisted of selecting an 18-inch branch sample at random from the mid-crown of six trees and recording the percentage of buds damaged. The former method employed in 1951 and 1953, was to select three trees at random and take four branches, one from each side of the tree. Five buds were then selected at random from each branch and the percentage of damaged buds established. Table 3 shows the percentage of buds damaged from the odd years from 1951 to 1955 using the sample methods outlined above.

Table 1

Forest Insect Collections by Agencies
East Prince Rupert District - 1955

Personnel Involved in Collection	Number of Collections May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	26	154	99	27		306
Forest Biology Rangers with Forest Service Personnel		2					2
Forest Service Personnel Independently		10	15	33	10		68
Other Co-operators							
Total							375

Table 2

Collections by Hosts
East Prince Rupert District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
western hemlock	26		no host	4	
red cedar	6	1	miscellaneous	4	
Douglas fir	7	3	maple	1	
alpine fir	86	17	red alder	3	
lodgepole pine	46		willow	5	
white bark pine	2		trembling aspen	20	7
black spruce	1		birch	1	2
white spruce	162	7			
			Total	38	9
Total	336	28	Grand total	375	37

The only apparent damage from budworm feeding was in alpine fir, Abies lasiocarpa (Hook.) Nutt., understory. Though feeding has been light in many locations for the past two years the understory trees failed to recover their vigour. New growth was almost non-existent on many trees. The distribution of budworm samples is shown on Map 2.

Table 3

Percentage of Buds Attacked by Spruce Budworm in 1951, 1953 and 1955 in the East Prince Rupert District.

Location	1951	1953	1955
S. E. end Taltapin Lake	60	10	0
N. side Taltapin Lake	81	5	15
N. W. end Taltapin Lake	100	10	19
Babine Lake opp. Pendleton Bay	89	5	0
Star Lake	50	10	0
Nilkitkwa River	-	-	19
Junction Babine Lake road and Cronin mine roads.	-	-	18

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Attacks by this beetle continued to encompass new areas of lodgepole pine, usually adjacent to or among previous damage. The stands involved are mainly on the eastern side of Babine Lake from and including Morrison Lake south to a position north-east of Pierre Creek mouth.

A plot established at the southern end of this infestation during the fall of 1955 will be used to help assess the progress of the attack. At the time of establishment the plot contained 153 pine trees of which 80 were dead, 9 infested and 64 not attacked.

The described infestation area pertains only to East Prince Rupert District. Similar conditions exist east to Tochcha and Natowite lakes and along Stuart Lake in the West Prince George District. Map 3 shows only the area infested in the East Prince Rupert District.

Small spot infestations were located just north of Houston and in the Sheedy Creek Valley near Doughty Station.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm has caused serious damage in the coastal areas of the Prince Rupert District but has never reached dangerous proportions in the East Prince Rupert area. Table 4 shows the average number of larvae per collection in the last four years.

The locations where black-headed budworm larvae were found are shown on Map 4.

Table 4

Average Number of Black-headed Budworm Larvae per 3-tree Beating per Collection, East Prince Rupert District.

Year	No. of Collections	Average No. of Larvae
1952	62	8.5
1953	63	2.5
1954	41	10.0
1955	33	2.5

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

There are two areas of Douglas fir beetle activity in this district. One, at Moose Point on Babine Lake has been mentioned in previous reports. This attack continued at a low level in 1955. A cruise through the affected stand this fall failed to locate any infested trees, but a few red tops will probably appear in 1956.

The second infestation lies along the south side of Francois Lake near its eastern end. This outbreak involves approximately 290 trees of which only 15 red tops were counted, the remainder are dead and grey, having been killed over a period of years. The stand is located on a very rocky steep sidehill, the trees are fire scarred, flat or snag topped and of poor colour.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Larval collections, as in past years, were confined mainly to the hemlock dominated stands along the Skeena River Valley north of Hazelton. Samples from eight locations averaged 3.6 larvae each.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Damage by this insect usually occurred wherever white spruce reproduction was found on an open site such as old fields and grazing lands. Logging in this district is on a selective basis and does not usually create conditions conducive to this type of attack.

Figure 1 shows the effect of continuous attack on an open growing white spruce by the Engelmann spruce weevil.

Aspen Leaf Miner, Phyllocnisitis populiella Chamb.

An infestation of this small Lepidoptera on trembling aspen

Populus tremuloides Michx. extended from Smithers to Hazelton and north up the Kispiox and Skeena River valleys.

Trees of all sizes and ages were attacked and all leaves except the young growth on branch tips suffered damage. By mid-summer the stands had taken on a distinct silvery appearance. In other areas only the smaller trees were infested.

Bark Beetles in Dying White Spruce

In many areas of this district dead and dying white spruce form a considerable percentage of the stand. The dead timber does not occur in groups but is scattered throughout the stands, usually in the vicinity of old logging operations. Samples taken from such timber contained the Alaska spruce beetle, Dendroctonus borealis Hopk. the Engelmann spruce beetle Dendroctonus engelmanni Hopk., and Ips sp., sometimes separately or in conjunction with one another.

The dying trees are generally larger than average and often weakened by heart or root rots.

The areas most seriously affected include the Sheedy Creek, Kitsequecla pass, Fulton River, Carr Creek, Driftwood Creek and the Telkwa River Valley. All locations are in the vicinity of Smithers with the exception of the Fulton River which flows into Babine Lake.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

This sawfly was more widely distributed than any other insect collected in the district. Samples from 50 locations, collected between June 21 and August 30, averaged 2.5 larvae.

Green-headed Spruce Sawfly, Pikonema dimmockii (Cress.)

Usually found in conjunction with the yellow-headed spruce sawfly, larval collections were made in 49 locations and averaged 3.6 larvae each.

Sawflies, Neodiprion spp.

Collections made between July 7 and August 10 contained 24 of these larvae. Eight were identified as hemlock sawfly, Neodiprion tsugae Midd., ten as the balsam fir sawfly, Neodiprion abietis (Harr.) and six as Neodiprion spp.

Examination of Flooded Timber in
Tweedsmuir Park and Cheslatta Lake.

An inspection throughout the areas of flooded timber located occasional bark beetle infested trees along what was the Ootsa River and the east end of Ootsa Lake. The remaining areas, with the exception of Cheslatta Lake, appeared to be free of attack.

Practically all of the flood-killed coniferous trees along the shores of Cheslatta Lake and adjoining Murray Lake are beetle infested. This was probably the result of the lake level being raised long enough to weaken or kill the trees, and then lowered to a point just above the original high water mark.

All of the larvae and adult beetles from this flooded timber which were sent to Victoria for determination were identified as Ips sp.

STATUS OF TREE DISEASES

Needle Casts

The most outstanding pathological conditions in the East Prince Rupert District are needle rusts and diseases on alpine fir Abies lasiocarpa (Hook) Nutt.

The fungi responsible for this condition are listed below:

Name	Needles attacked
Pucciniastrum epilobii Otth	1955
Melampsora epitea Thüm.	1955
Hypodermataceae? Bifusella sp.	1954 and earlier
Peridermium howayi Syd.	1954

The heaviest needle drop is expected in an area from Smithers east past Chapman Lake to Babine Lake. Here virtually all 1955 needles on small trees were attacked and a heavy infestation occurred on the mature trees, many of which have lost their 1953 needles. Viewed from a distance the predominately alpine fir stands along Cronin Creek had a reddish tinge by midsummer. Trees in this and other areas are also supporting needle rusts and disease on their 1954 and earlier needles. Map 5 shows the known distribution of this condition.

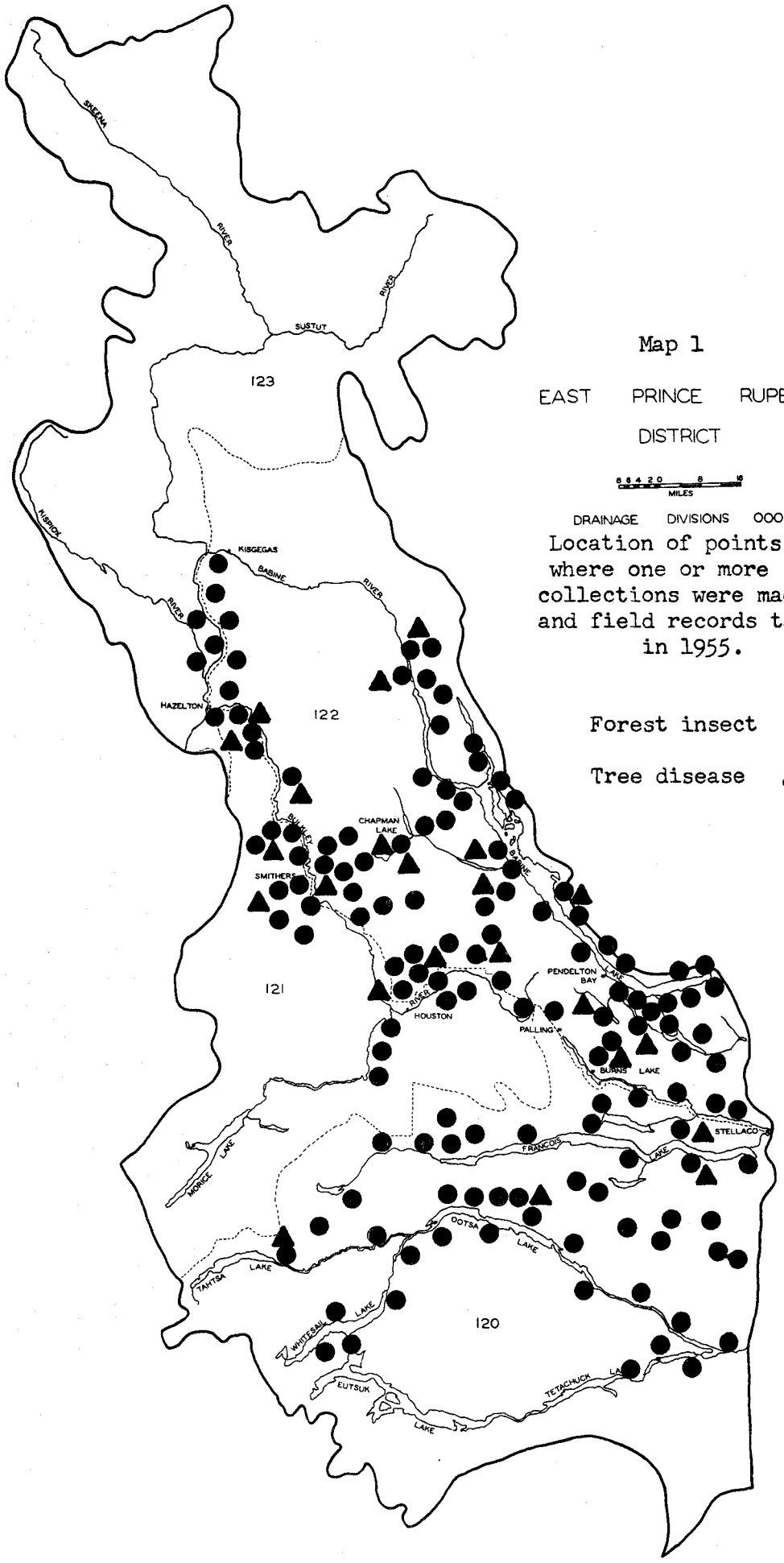
Defects on Aspen.

The overmature aspen Populus tremuloides Michx. along the eastern side of Babine Lake are heavily infected with Fomes igniarius (L. ex Fries)

Kickx. Other aspen not showing these sporophores are usually split down the trunk in one or several places for various lengths up to three feet. The cause of this checking has not been determined. No tree was observed showing both symptoms. Similar conditions exist in other areas but not of the same intensity.

RODENT DAMAGE

Porcupines are killing groups of lodgepole pine throughout the district. Damage was most common along Babine Lake and the eastern end of Ootsa Lake. From a distance these trees have the characteristics of a small bark beetle attack, and could be the source of a beetle population where a large portion of the bark is left on girdled trees.



Map 1

EAST PRINCE RUPERT DISTRICT

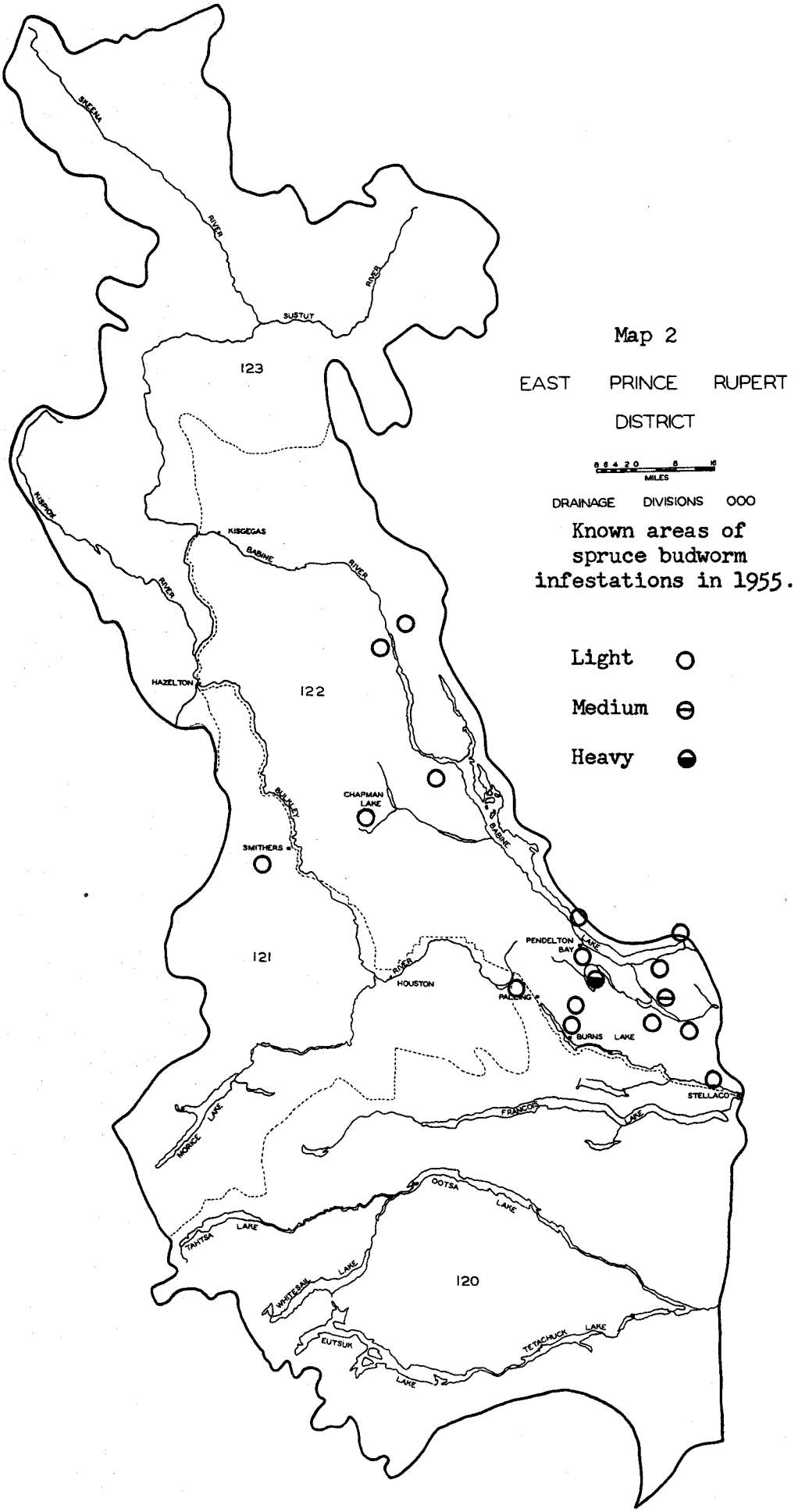
6 4 2 0 8 16
MILES

DRAINAGE DIVISIONS 000

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲



Map 2

EAST PRINCE RUPERT DISTRICT

6 4 2 0 6 16
MILES

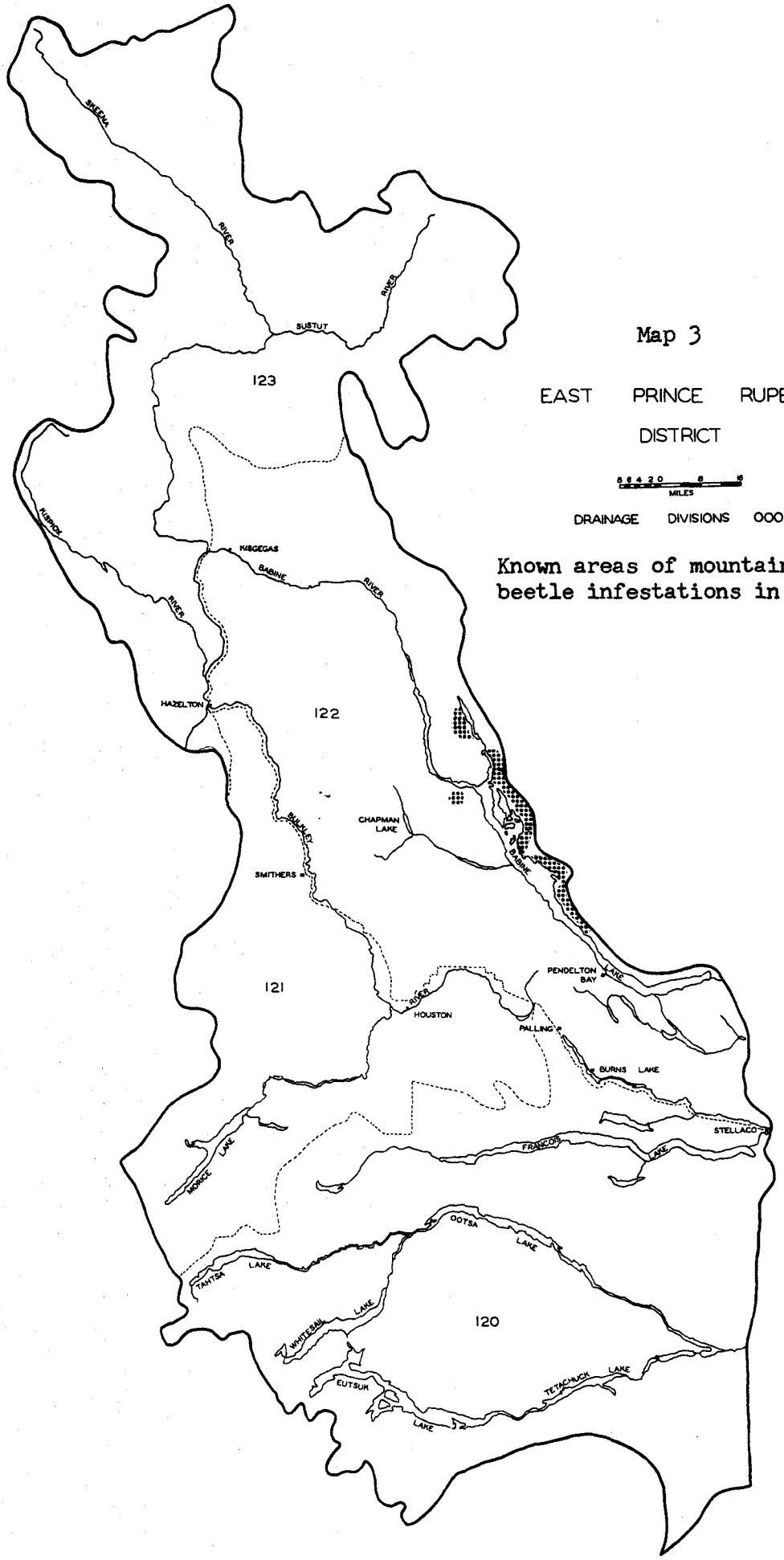
DRAINAGE DIVISIONS OOO

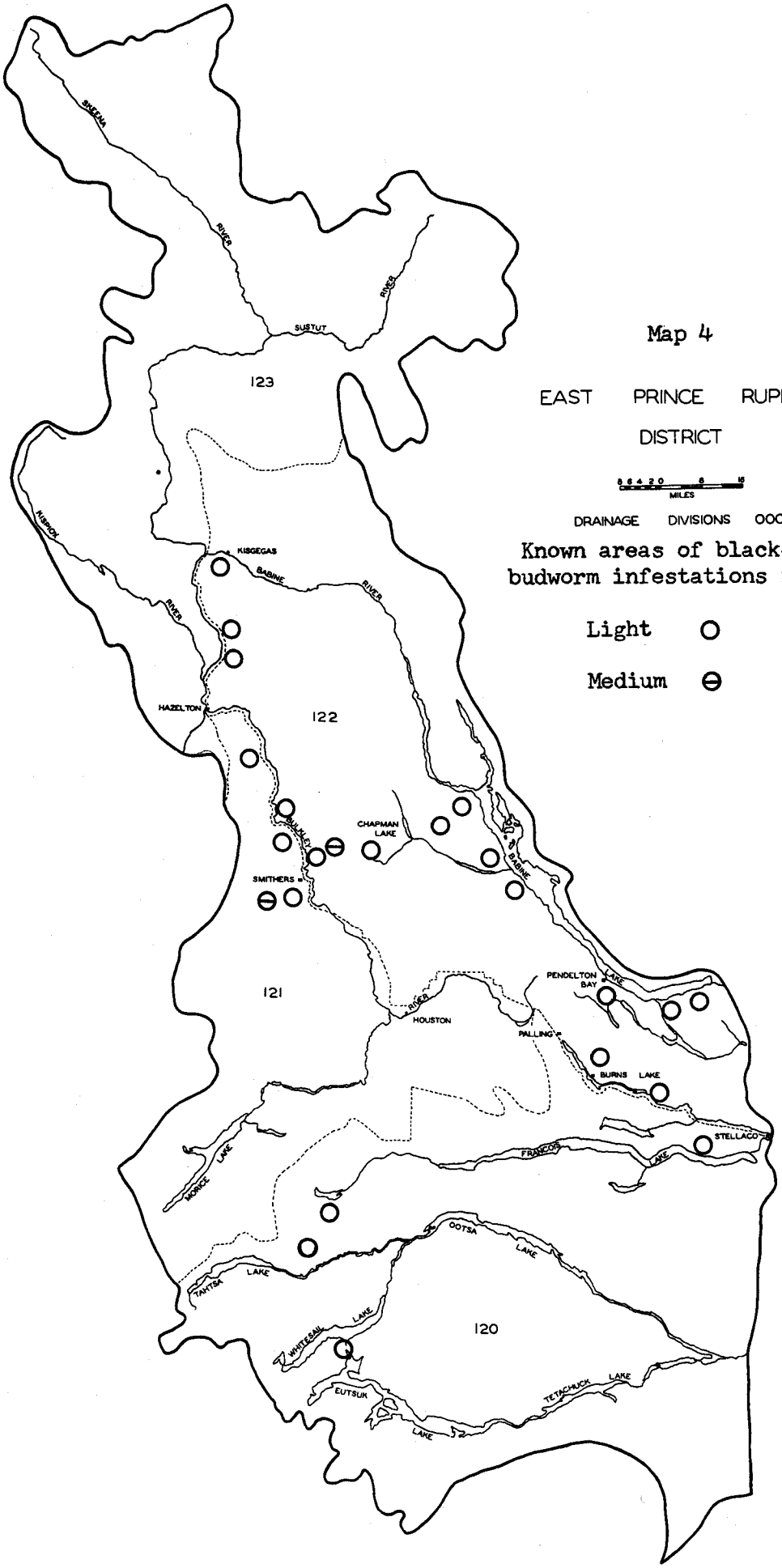
Known areas of spruce budworm infestations in 1955.

Light ○

Medium ⊖

Heavy ◒


SKEENA
RIVER
SUSTUT
RIVER
123
KISPIOX
RIVER
KISEGAS
BABINE
RIVER
HAZELTON
122
BULKLEY
SMITHERS
CHAPMAN
LAKE
BABINE
121
HOUSTON
PENDELTON
BAY
LAKE
PALLING
BURNS LAKE
STELLACO
FRANCOIS
LAKE
MORICE
LAKE
OOTSA
LAKE
TAHTSA
LAKE
WHITESAIL
LAKE
120
EUTSUK
LAKE
TETACHUCK
LAKE
Map 3
EAST PRINCE RUPERT
DISTRICT
6 4 2 0 6 10
MILES
DRAINAGE DIVISIONS 000
Known areas of mountain pine
beetle infestations in 1955.



Map 4

EAST PRINCE RUPERT

DISTRICT

8 6 4 2 0 5 15

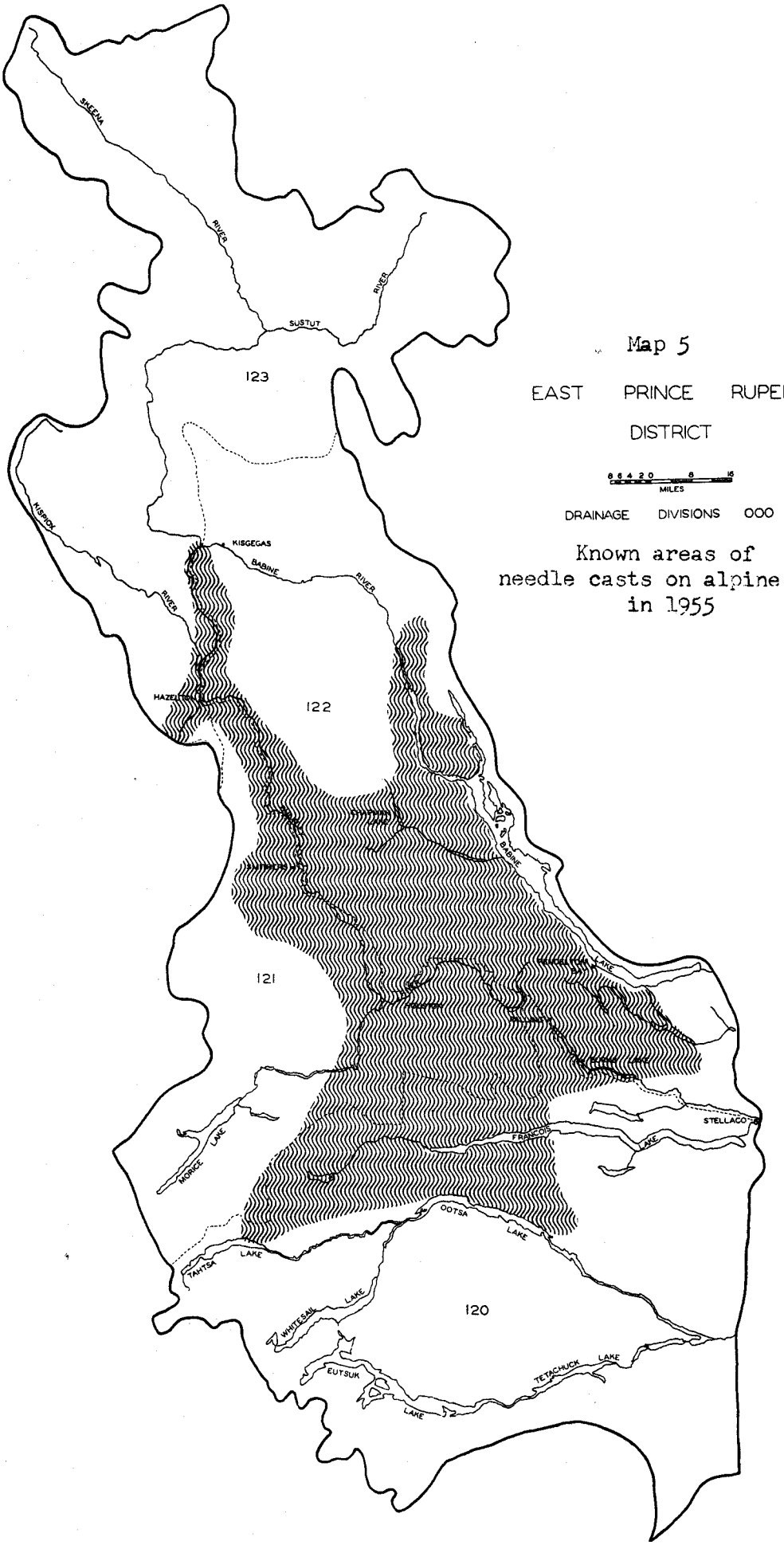
MILES

DRAINAGE DIVISIONS 000

Known areas of black-headed budworm infestations in 1955.

Light ○

Medium ⊖



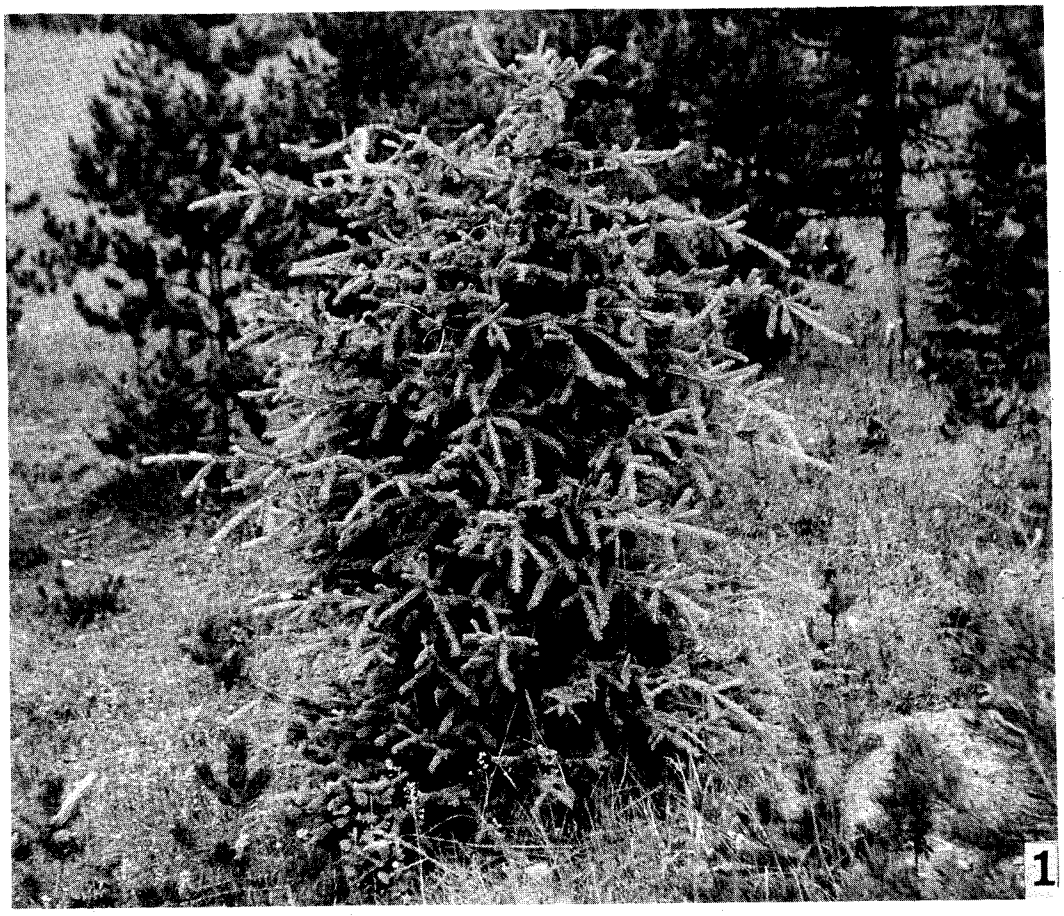
Map 5

EAST PRINCE RUPERT DISTRICT

8 6 4 2 0 8 16
MILES

DRAINAGE DIVISIONS 000

Known areas of needle casts on alpine fir in 1955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2

Figure 1. Engelmann spruce weevil, Pissodes engelmanni Hopk. Damage to open growing white spruce at Cheslatta Lake, East Prince Rupert. August 17, 1955.

- by D. G. Collis

Figure 2. Dieback on trembling aspen. This is typical of condition found on trembling aspen near Houston, East Prince Rupert. August 4, 1955.

- by D. G. Collis

FOREST BIOLOGY SURVEY

KAMLOOPS FOREST DISTRICT

1955

Compiled by B. A. Sugden for M. T. Hughes

INTRODUCTION

The Kamloops Forest District has been divided into three Forest Biology Ranger districts, namely West, Central and East Kamloops. In the 1955 field season Forest Biology Ranger W. G. Simms was assigned to West, M. T. Hughes to Central, and W. E. Bitz to East Kamloops Forest District.

During 1955, bark beetles of the genus Dendroctonus remained the most destructive forest insects of merchantable timber in the Kamloops Forest District.

The Douglas fir beetle continued to take an annual toll of Douglas fir trees in groups which ranged from less than 10 trees to others of nearly 100 trees. The most severe damage was located in the Central and West Kamloops Forest Biology Ranger districts near Bestwick, in the Valley of Tranquille Creek, and from 100 mile House north to Macalister. A survey to ascertain the volume of Douglas fir destroyed in these areas during 1955 was conducted in the fall.

A decline in the population of the mountain pine beetle was evident in stands where, during the past few years, considerable damage by this species has occurred in white, ponderosa and lodgepole pine timber. Locations of infestations examined this year were the ponderosa pine stands near Alleyne Lake, Allison Lake and Little Shuswap Lake, and the western white pine stands on Seymour Arm of Shuswap Lake.

A light population of the western pine beetle continued to destroy ponderosa pine trees near Alleyne Lake. It was associated in this area with the mountain pine beetle.

Apparently numbers of the Engelmann spruce beetle were quite low in the Kamloops Forest District. No outbreaks of this species were reported during 1955.

The 1-year-cycle budworm was common throughout the district but no areas of heavy population concentrations were discovered.

The 2-year-cycle budworm was present in most sub-alpine forests where this species has been active in the past. Damage was light as the feeding period of the larvae is quite short during a "non-flight year". Light

bud-mining on Engelmann spruce and alpine fir was noted in the following areas: Bear Creek, Bolean Lake, Johnson Lake, Hyas Lake, McGillivray Lake, and on the Adams Plateau.

Larvae of the black-headed budworm were common throughout most of the Kamloops District but no heavy concentrations of this species were discovered.

Severe defoliation of trembling aspen by satin moth larvae recurred this year at Bestwick, Lac du Bois, and on Harper Ranch. Smaller infestations with less damage were discovered near the north end of Stump Lake, Riverside Park in Kamloops, Spences Bridge and at Kinsmen Beach near Okanagan Landing. The satin moth, in the last three locations, was feeding on the leaves of ornamental poplars. Studies were carried out at Bestwick and Lac du Bois to determine the current parasite complex.

A small infestation of Douglas-fir tussock moth was found during 1955 near Olalla in a marginal stand of open-grown Douglas fir. Defoliation was not severe; however, an egg survey indicated that there may be an increase in population of this species in 1956.

The Douglas-fir needle-miner was widespread in varying degrees of intensity throughout most of the district. Although this species attacks the larger trees in a stand as well as the reproduction, damage to the smaller fir trees causes the most concern. Severe infestation of the needles and the resultant needle drop make the attacked Douglas fir unsuitable to harvest for the Christmas tree trade. The demand for Christmas trees by Canadian and export markets, and the revenue realized thereby, make the activity of the Douglas-fir needle-miner economically important.

No noticeable increase was apparent in the populations of western hemlock looper. Larvae of this species were represented in small numbers throughout most of the Kamloops Forest District.

FOREST BIOLOGY SURVEY

WEST KAMLOOPS DISTRICT

1955

Compiled by B. A. Sugden for W. G. Simms

INTRODUCTION

The field season in the West Kamloops District commenced June 3 and continued until September 1. A survey of Douglas-fir beetle infestations was made during the first week of November in the Lac la Hache area. This survey completed the field work done in the district for the year. Abnormally cold weather during June retarded the development of the current growth on the conifers in many areas. Undoubtedly larval development was adversely affected by this condition.

Totals of 309 insect and 28 tree disease collections were made in the district. Table 1 shows the insect collections by agencies for each month and Table 2 the host trees from which the insect and tree disease collections were taken. Map 1 shows the location of insect and disease collections.

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The Douglas-fir beetle remained generally active in areas where it was reported present during 1954. These areas were 100 Mile House, Lac la Hache, Timothy Lake, Canim Lake road, and Williams Lake to Macalister. In addition Douglas-fir beetles were active in timber west and south of Helena Lake. The Douglas-fir here was "winter injured" during 1952-53. The extent of the winter injury in this locality was estimated, by officers of the Forest Service, to extend over 200 square miles.

Two parties with a total of 6 men carried out investigations in areas of winter damage. One party conducted a survey on the extent of bark-beetle damage south of Williams Lake in the general area of Place Lake, while the other party worked in the vicinity of Helena Lake. Table 3 shows the number of fir stems infested by Douglas-fir beetles during 1955 on the strip surveyed.

Due to the age and poor condition of much of the Douglas-fir on the strip surveyed, continued beetle activity may be expected.

Map 2 shows points of known Douglas-fir beetle activity during 1955 in this district.

Table 1

Forest Insect Collections by Agencies,
West Kamloops District - 1955.

Personnel Involved in Collection	Number of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	77	107	114	7	-	305
Forest Biology Rangers with Forest Service Personnel	-	-	-	-	-	-	-
Forest Service Personnel Independently	-	1	3	-	-	-	4
Other co-operators	-	-	-	-	-	-	-
Total	-	78	110	114	7	-	309

Table 2

Collections by Hosts
West Kamloops District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
Douglas fir	122	2	trembling aspen	14	10
ponderosa pine	24		blackcottonwood	2	
lodgepole pine	43	13	willow	7	
Engelmann spruce	83	2	chokecherry	1	
alpine fir	2	1			
rocky mountain juniper	9				
western red cedar	2				
			Total	24	10
Total	285	18	Grand Total	309	28

Table 3

Number Per Acre of Douglas-fir Trees on Sample Cruise Strips Attacked by the Douglas-fir Beetle, November, 1955.

Place Lake			Helena Lake		
Strip	Size in chains	No. attacked trees per acre	Strip	Size in chains	No. attacked trees per acre
1	80 x 4	0.28	A	80 x 6	0.13
2	60 x 4	2.33	B	80 x 6	0.65
2A	22 x 4	0.11	C	80 x 6	0.25
3	80 x 4	0.09	D	80 x 6	2.85

Spruce Budworm, Choristoneura fumiferana (Clem.)

Larvae of this species appeared to be distributed throughout most of the West Kamloops District. The population level, however, was very low. Spruce budworm larvae were collected mainly from Douglas fir and Engelmann spruce trees. None was taken in the collections from lodgepole pine.

Black-headed Budworm, Acleris variana (Fern.)

The populations of black-headed budworm were at quite a low level throughout most of the district. Larvae of this species were collected from Engelmann spruce in the McLeese Lake area during June, and from Douglas fir trees on Pavilion Mountain during early August. The fir and spruce from which the collections were taken showed no apparent defoliation by the black-headed budworm.

Forest Tent Caterpillar, Malacosoma disstria (Hbn.)

The infestations of forest tent caterpillar have subsided throughout the district. No larvae were collected where formerly they were very numerous, even though the egg survey made during the early fall of 1954 indicated a high population for 1955. The reason for this sudden collapse was undetermined. It is believed, however, that the cold, late spring, after the period when the eggs had hatched, was in some measure responsible.

A Sawfly on Douglas Fir, Neodiprion sp.

A light population of this species persisted in the district north to Williams Lake. The maximum number of larvae taken in collections from Douglas fir was 8.

A Sawfly on Engelmann Spruce, Neodiprion sp.

Neodiprion larvae were taken in collections from Engelmann spruce in the Horsefly, Williams Lake and 100 Mile Ranger districts. They were not numerous.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Small colonies of sawfly on ponderosa pine were located in the southern portions of the district at Cache Creek and from Lytton north to Lillooet. Defoliation was negligible.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Throughout the district larvae of this geometrid were scarce. They appeared occasionally in collections taken from Douglas fir and Engelmann spruce foliage.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The stands of trembling aspen throughout most of the Cariboo region continued to suffer damage from this pest. The most severe attack occurred in the vicinity of 100 Mile House and Horse Lake where up to 90 per cent of the leaves of the aspen had been destroyed. Elsewhere in the Cariboo damage was comparatively light.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Larvae of this sawfly were distributed generally throughout the district where Engelmann spruce was sampled. Although common, they were not numerous enough to cause noticeable defoliation.

Green-headed Spruce Sawfly, Pikonema dimmockii (Cress.)

The green-headed spruce sawfly was found throughout the same area and from the same host as the yellow-headed spruce sawfly. Although having a wide distribution, it was encountered only in small numbers.

False Hemlock Looper, Nepytia canosaria Wlk. ?

This looper was found only in the Lillooet region during 1955. Collections from Douglas fir averaged three larvae with a maximum of six per three-tree beating sample.

STATUS OF TREE DISEASES

A Canker on Trembling Aspen caused by Fomes igniarius (L.) Gill.

Samples of this fungus were collected from aspen in the Williams Lake, Horsefly and 100 Mile House districts. At present the fungus does not appear to be a serious menace to the stands of aspen as it affected only one or two trees in each area.

Blister Rust caused by Cronartium harknessii (Moore) Mein.

Blister rust on lodgepole pine was noted throughout most of the district. Samples were taken from the following localities where it was comparatively common: Horse Lake, Buffalo Creek, Lac la Hache, Knife Creek, Alexis Creek, 150 Mile House, and Fountain Lake.

A Needle Blight on Douglas Fir.

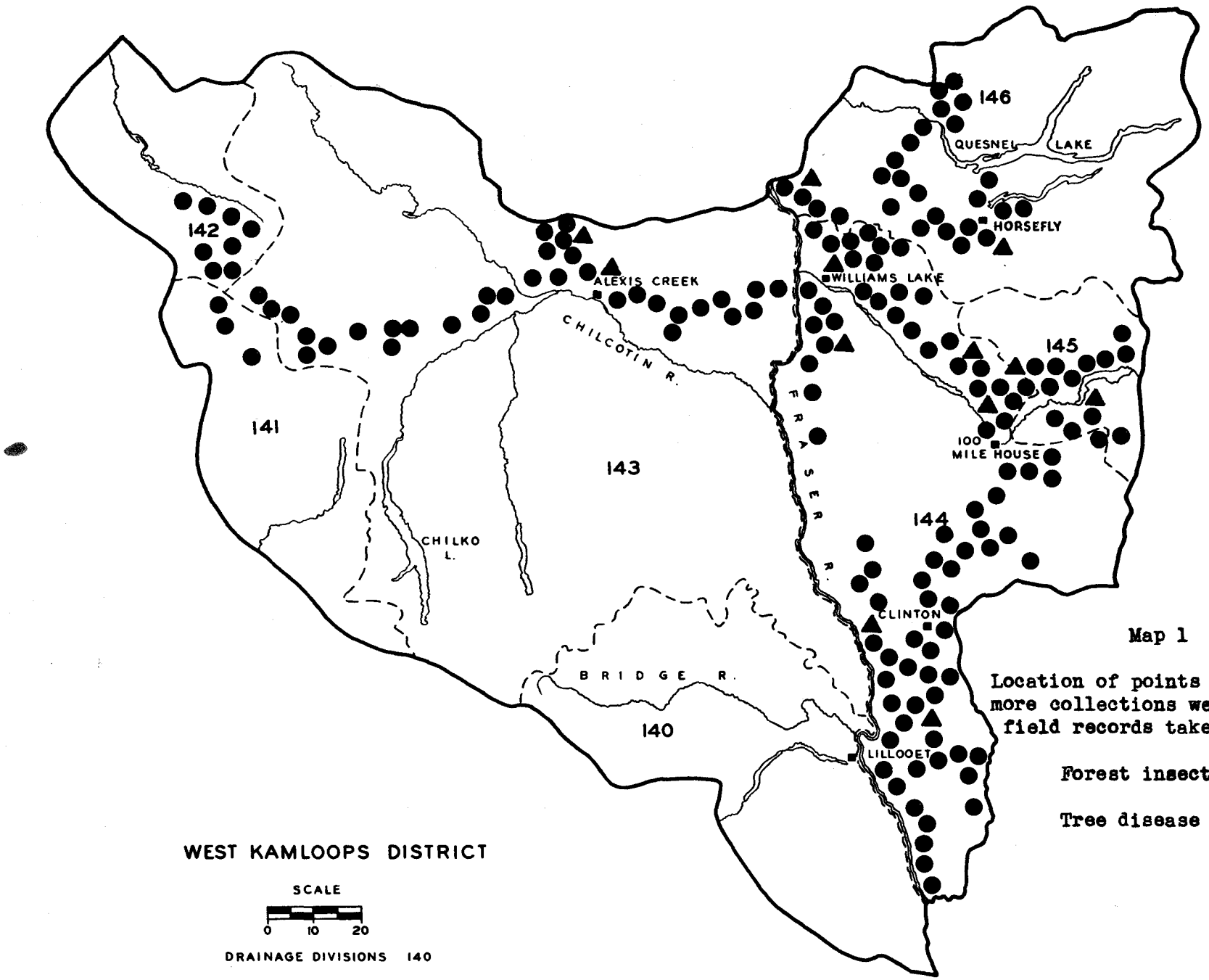
At the time of writing this report, identification of the disease causing the needle drop had not been received. The condition prevailed throughout most of the Chilcotin where Douglas fir reproduction was found but was most severe in the vicinity of Alexis Creek. Needle drop and discoloration of Douglas fir reproduction also prevailed to a lesser extent in the vicinity of Jesmond, Chimney Lake, and Alkali Creek.

Winter Injury.

Douglas fir trees which had been "winter-damaged" in 1952-53 were observed while conducting a survey of bark-beetle activity west of Helena Lake.

Discoloration was still evident on many of the dominant trees; others had dead tops or dead branches, while some were completely dead. Occasional trees had dropped most of the needles from the upper third of the crown, and had only tufts of current foliage on the branch tips and leaders, giving them an odd appearance.

Patches of reproduction Douglas fir were completely discolored and had not made any apparent growth during 1955.



Map 1

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

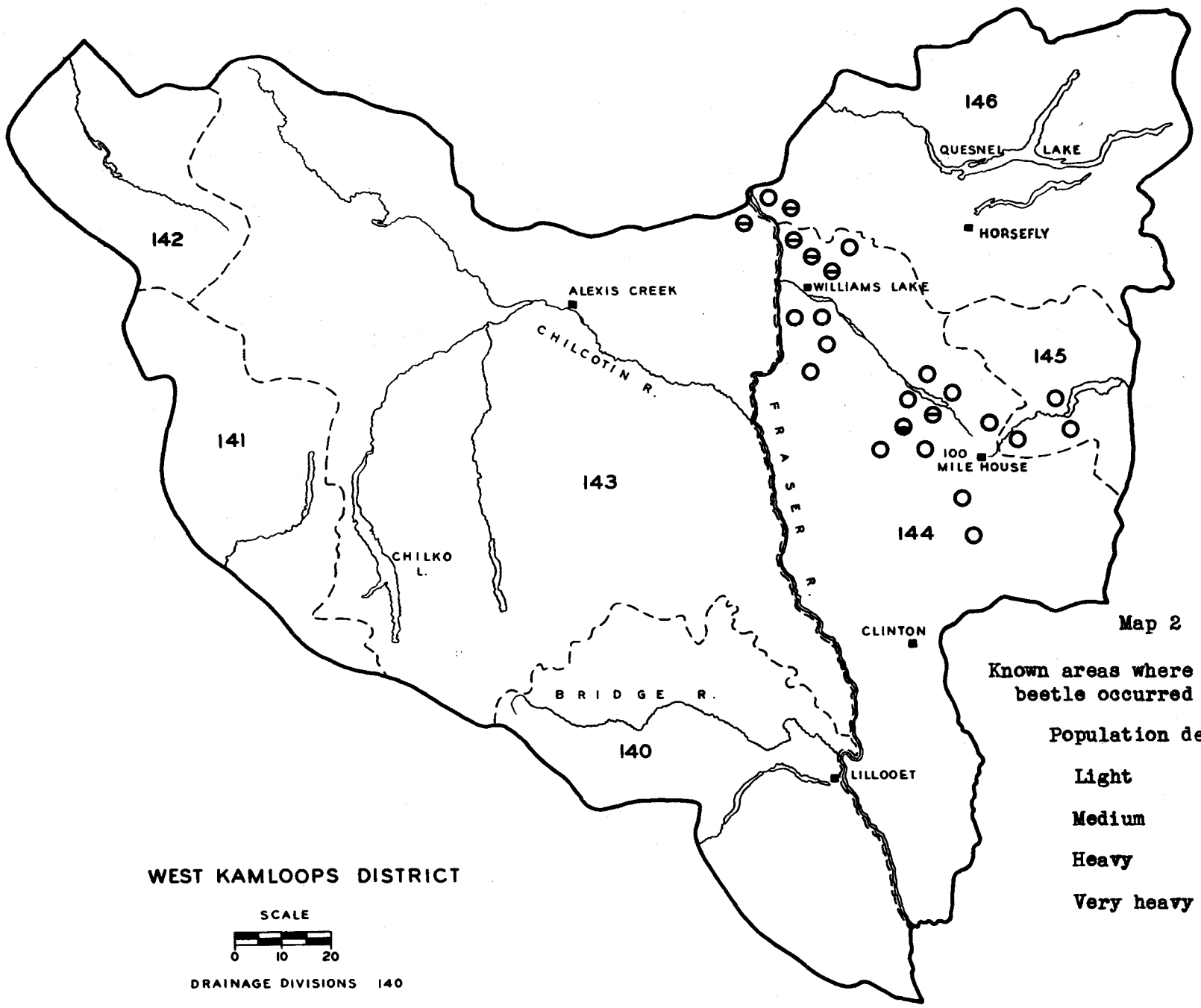
Tree disease ▲

WEST KAMLOOPS DISTRICT

SCALE

0 10 20

DRAINAGE DIVISIONS 140



Map 2

Known areas where Douglas-fir beetle occurred in 1955.

Population density

Light	○
Medium	⊖
Heavy	◒
Very heavy	●

FOREST BIOLOGY SURVEY

CENTRAL KAMLOOPS DISTRICT

1955

Compiled by B. A. Sugden for M. T. Hughes

INTRODUCTION

Field work in this district was begun on May 30 and continued until the middle of August. It was resumed during the second week in September and continued through to the middle of October. The latter period was devoted mainly to bark beetle surveys on Douglas fir and ponderosa pine.

During the field season illness somewhat restricted the activities of Ranger M. T. Hughes, thus the northern portions of the district were not checked this year.

Table 1 contains the insect collections by agencies for each month and Table 2 insect and disease collections by hosts.

Locations are shown on Map 1 where one or more insect and disease samples or field records were taken during 1955.

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudtosugae Hopk.

The Douglas-fir beetle continued to destroy merchantable timber in the Tranquille Creek Valley north of Red Lake, in the southern and eastern portions of the Nisconlith Forest Reserve and southeast of Bestwick.

An effort was made during the fall to discover, count and map the Douglas fir trees destroyed this year by the Douglas-fir beetle. It was hoped that the survey would give an indication of the annual toll of fir trees taken by this pest. Some difficulty was experienced in differentiating between the colour of 1955 and 1954 "red tops". The attacked trees were first counted from a distance, then examined in detail as a check. These examinations revealed that some had been attacked but had not turned red at the time of the survey during October. These, however, were in the minority. It was noted that during September and October most of the Douglas fir trees examined contained young adult beetles, though occasionally a tree was found containing bark beetle larvae.

Field observations indicated that outbreaks of the Douglas-fir beetle usually were associated with logging operations or portable mill sites.

Table 1

Forest Insect Collections by Agencies
Central Kamloops District - 1955

Personnel Involved in Collection	No. of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	178	126	68	-	-	372
Forest Biology Rangers with Forest Service Personnel	-	-	-	13	-	-	13
Forest Service Personnel Independently	2	3	3	-	1	-	9
Other Co-operators	-	-	-	-	-	-	-
Total	2	181	129	81	1	-	394

Table 2

Collections by Hosts
Central Kamloops District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
Douglas fir	168	12	trembling aspen	42	2
ponderos pine	61	3	western white birch	6	
lodgepole pine	12	5	black cottonwood	4	
western white pine	5	1	willow	6	
Engelmann spruce	31	3	alder	4	
alpine fir	20	2	ornamental poplars	3	
rocky mountain juniper	10	4	chokecherry	2	
common juniper	7		miscellaneous	1	2
western red cedar	4		no host	2	
western hemlock	6	1			
			Total	70	4
Total	324	31	Grand Total	394	35

Map 2 shows known areas where Douglas-fir beetle infestations occurred in 1955.

Table 3 lists the location and number of Douglas-fir trees destroyed by the Douglas-fir beetle during 1955 in the Central Kamloops District.

Table 3

Number of Douglas Fir Trees Destroyed by
Douglas-fir Beetle during 1955 in the Central Kamloops District

Location of Infestations	Douglas Fir Destroyed
Tranquille Forest Reserve	950
Nisconlith Forest Reserve	320
Bestwick	910
Total	2,180

The number of Douglas fir trees destroyed in each location was not one infestation but was composed of a series of infestations ranging from 10 to 100 current beetle-attacked trees for each.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The populations of this species, which had been destroying ponderosa pine in the forests around Alleyne Lake since 1952, are on the decline. This is shown in Table 4 which contains the data from the surveys made in this locality from 1952 to 1955.

Table 4

Volume of Ponderosa Pine Trees Destroyed Annually
by Dendroctonus spp. near Alleyne Lake 1952 - 55

Year	No. of Trees	D. B. H. Inches			Volume F. B. M.
		Av. Max.	Av. Min.	Wt'd. Av.	
1952	265	31.9	12.2	19.6	195,260
1953	331	32.6	9.4	22.9	279,530
1954	108	32.3	9.7	23.1	102,090
1955	26	31.2	8.6	20.8	16,620

In addition to the infestation near Alleyne Lake, scattered groups of beetle-killed ponderosa pine trees were observed to the north and south of Allison Lake, A count of 365 ponderosa pine trees apparently destroyed during 1955 was made in the latter area.

The infestation of the mountain pine beetle in ponderosa pine on the north shore of Little Shuswap Lake has subsided. No standing pine were attacked in that area during 1955 though a light population of beetles was located in logs remaining in the bush after a 1954 logging operation had been completed.

Western Pine Beetle, Dendroctonus brevicomis Lec.

This beetle occurred throughout the stands of ponderosa pine in the Alleyne Lake area affected by the mountain pine beetle. Fortunately it was not too common as it is one of the most important insect enemies of mature ponderosa pine.

The Red Turpentine Beetle, Dendroctonus valens Lec.

This beetle occurred around the base of most trees infested by either the western pine beetle or the mountain pine beetle. Their attack probably was secondary and was induced by the weakened condition of the pine.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

No information was obtained regarding the activity of the Engelmann spruce beetle in the district during the 1955 field season.

Satin Moth, Stilpnotia salicis (L.)

The infestations of satin moth in the groves of trembling aspen near Currie Lake, Lac du Bois and Harper Ranch continued this year with some increase in population. Defoliation in these areas ranged from 75 to 100 per cent. Light populations of this species were also located at Spences Bridge on 4 silver poplar shade trees, Kamloops Riverside Park on 9 ornamental poplars and the northeast end of Stump Lake in a small grove of aspen. Map 4 shows the known distribution for this year in the Central Kamloops district.

During 1955 a study of the parasites of satin moth was carried out for the purpose of determining the current parasite complex. The site for these studies was Currie Lake. Mass collections of satin moth were hand-picked during the following stages: fourth instar, early last instar, early cocoon stage, and late pupal stage. These collections were supplemented with mass collections from other localities. All specimens were reared to the adult stage at Vernon.

In Tables 5 and 6, the per cent parasitism is shown for each mass collection. The degree of successful emergence of satin moths, expressed as a per cent of the number of individuals originally collected, is shown for each sample.

Table 5

Data on Mass Collections of Stilpnotia salicis (L.)
Currie Lake, 1955.

Date Collected	No. Collected	Stage	* Per Cent Parasitism	** Per Cent Emergence
June 18	263	IV larvae	0	68
June 27	221	Penultimate and ultimate instar larvae	0	61
July 9	218	"early cocoon"	0.5	92
July 16	220	late pupal	4.1	86

* based on issuance from host of immature parasites.
** based on number of insects collected.

Table 6

Data on Mass Collections of Stilpnotia salicis (L.),
from Various Localities, 1955.

Stage	No. Collected	Date Collected	Locality	* Per Cent Parasitism	** Per Cent Emergence
Penultimate	200	June 1	North Kamloops	11.0	52
and	210	June 15	Spences Bridge	0.4	81
ultimate	263	June 18	Lac du Bois	0.4	69
instar	241	June 27	Lac du Bois	0.4	71
larvae	61	July 4	Lac du Bois	8.0	30
Pupae	129	July 9	Lac du Bois	0.7	43

* based on issuance from the host of immature and mature parasites.
** based on the number of insects collected.

In addition to the larval and pupal collections 10 egg masses were collected from the tree boles at each collecting point. The eggs were reared in the insectary at Vernon to determine the hatch and per cent parasitism.

Table 7 shows the average hatch per egg mass and the per cent parasitism for each of the egg masses. Per cent parasitism is based on the total number of parasites and satin moth larvae that issued from the eggs.

Table 7

Average Hatch and Per Cent Parasitism of
Stilpnotia salicis Egg Masses, Kamloops Region - 1955

Date	Locality	Number of egg masses	Average hatch per egg mass	* Per Cent Parasitism
July 28	Lac du Bois, Grove 2	9	61	2.98
July 28	Elder Lake, Bestwick	5	108	0
July 28	Currie Lake, Bestwick, Grove 1	8	79	0
	Currie Lake, Bestwick, Grove 1	10	83	0
	Currie Lake, Bestwick, Grove 2	17	73	0
	Currie Lake, Bestwick, Grove 3	9	84	0.11
Aug. 18	Currie Lake, Bestwick	10	76	0.13

* parasitism based on total number of parasites and satin moth larvae that issued from the eggs.

As shown in Table 5, no parasites were reared from either of the collections of larvae taken in the feeding instars. Only 10 parasites, all Diptera of the species Pseudosarcophaga affinis (Fall.), were reared from the pupae. Total parasitism, excepting the first two or three larval instars which were not collected, therefore, was just one per cent.

In Table 6 parasitism was very low in collections from Spences Bridge and Lac du Bois. Three Apantelles sp., probably solitarius Ratz., were reared from satin moth larvae and one Coccygomimus pedalis (Cress.) was reared from pupae taken near Lac du Bois. The larvae collected from North Kamloops yielded 22 Apantelles sp. for a parasitism of 11 per cent.

Parasites of the superfamily Chalcidoidea were reared from egg masses collected at three of the seven collecting points. Parasitism at these three points ranged from 0.1 to 2.9 per cent.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

The largest stand of mature and semi-mature western hemlock is located in the northern portions of the district and as this was not checked during 1955, for reasons given in the introduction, no information of hemlock looper activity in that region was obtained. Larvae of this species were common on Douglas fir in the Tranquille River Valley, though no damage was apparent. Occasional larvae were also obtained from Douglas fir at Adams River, Adams Lake, Bear Creek, Pinanton Lake and Bestwick.

Spruce Budworm, Choristoneura fumiferana (Clem.).

Larvae of the 1-year-cycle spruce budworm were collected frequently,

though in small numbers, from Douglas fir throughout the southwestern portions of the district. No damage was evident.

In the sub-alpine forest of Engelmann spruce and alpine fir, damage from the feeding of the 2-year-cycle spruce budworm was light. This was due to the short feeding period on odd years when the larvae develop from the second to the fourth instar. Branch sampling of alpine fir at Johnson Lake showed 10 per cent of current buds had been mined. Light bud-mining was also observed on alpine fir and Engelmann spruce at Hyas Lake, McGillivray Lake and on the Adams Plateau. At McGillivray and Johnson lakes pupal skins of the 1953-54 population were numerous. Evidence of spruce budworm feeding was noticeable. Some mortality and top-killing, particularly to understory alpine fir, had occurred during recent years in the vicinity of McGillivray Lake.

Black-headed Budworm, Acleris variana (Fern.)

Throughout the Adams Lake, Johnson Lake, McQueen Lake, Pass Lake, Watching Creek, Harper Mountain, Scuitto Lake, and Cherry Creek areas, larvae of the black-headed budworm were common. Damage by the feeding larvae was not apparent except in the Johnson Lake area where occasional branches of Engelmann spruce were lightly defoliated. Host trees generally favoured were Douglas fir, Engelmann spruce, alpine fir and western hemlock.

A Sawfly on Douglas Fir, Neodiprion sp.

Larvae of this sawfly occurred frequently in collections from Douglas fir throughout the southern portions of the district. Defoliation was generally negligible; however, understory regeneration fir on the Nisconlith Indian Reserve, near the northeastern end of Little Shuswap Lake, showed light defoliation.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Damage by a sawfly on ponderosa pine was not apparent in the district except on the Nisconlith Indian Reserve where some light defoliation was evident on the lower branches. A Neodiprion of probably a different species was noted feeding on the foliage of lodgepole pine in the same area. Map 3 shows the known localities where Neodiprion spp. occurred on Douglas fir and ponderosa pine in 1955.

A Sawfly on Engelmann Spruce, Neodiprion sp.

Noticeable light defoliation was observed on Engelmann spruce at Bestwick and on Harper Mountain. Pikonema, probably alaskensis Roh., also was common on the same host and in the same localities.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

Attack by the aspen leaf-miner was widespread through the southern portions of the Central Kamloops District. The attack varied in intensity from a few larvae per branch to the complete mining of all leaves on the trees. The most severe damage was on aspen in the Deadman River Valley near Snohoosh Lake.

A Douglas Fir Cone Borer, Barbara colfaxiana Kft.

The cone crop on Douglas fir suffered considerable damage from the mining activities by the larvae of this Lepidoptera. In the forests north of the South Thompson River and east of Kamloops to Monte Creek, field checks indicated that approximately 50 per cent of the cones examined had been attacked by this pest.

A Ponderosa Pine Cone Borer, Dioryctria xanthoenobares Dyar.

Throughout the ponderosa pine forests on the east slope of the Thompson River from Lytton to Spences Bridge larvae of this species were common. They were also noted infesting ponderosa pine cones near Kamloops, Savona, Deadman River Valley and Durand Creek.

Douglas-fir Needle-miner, Contarinia sp.

Damage to the current needle crop on Douglas fir by this miner was concentrated mainly in 2 areas north of Kamloops and along the east side of the Fraser River from Falls Creek north to Lytton. Samples of Douglas fir foliage sent to the laboratory at Vernon indicated that approximately 15 per cent of the new needles had been infested.

STATUS OF TREE DISEASES

A Needle Rust on Douglas Fir, Melampsora albertensis Arth.

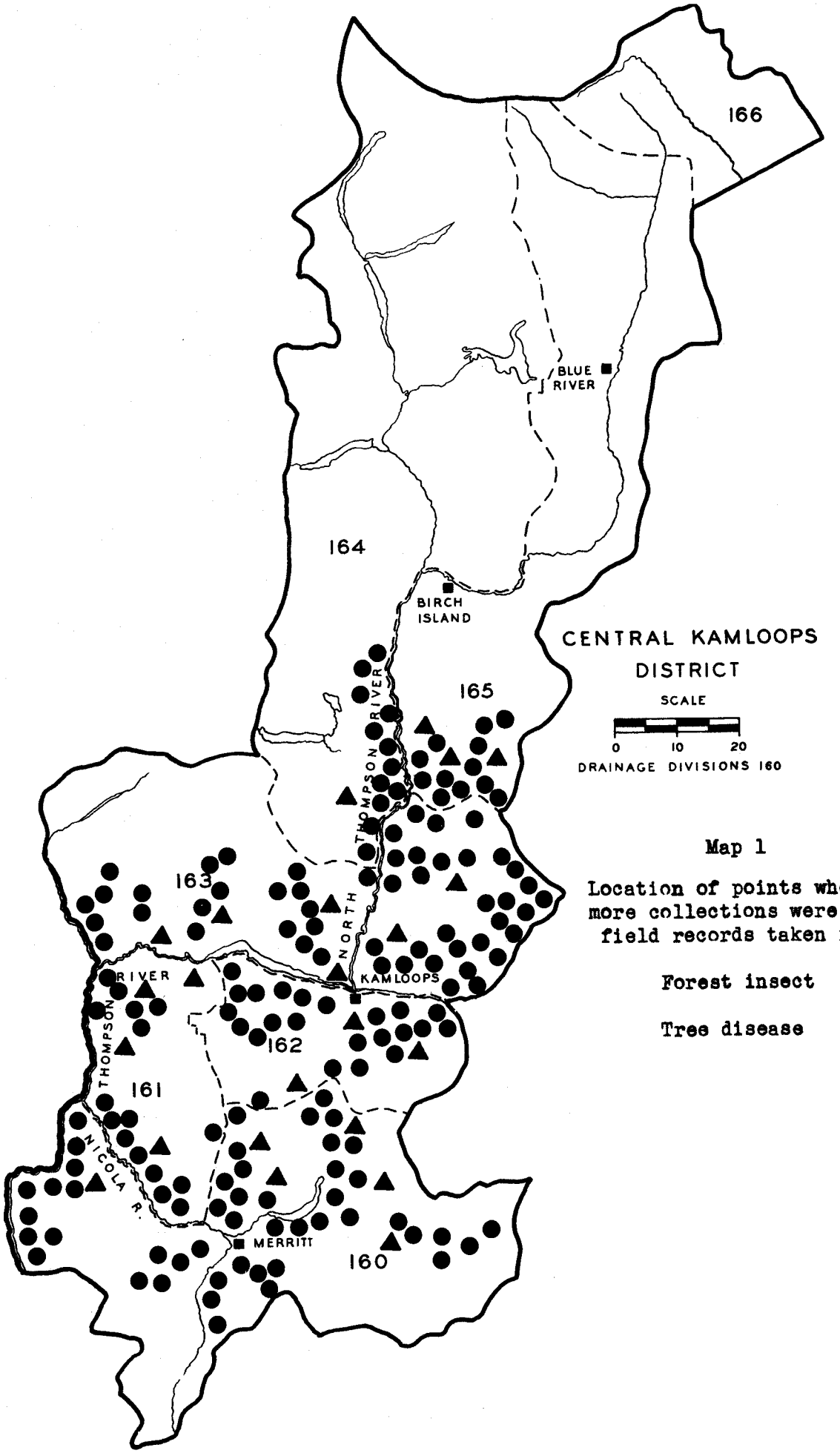
Douglas fir received some damage by a needle rust near Lac du Bois. Tranquille Creek, McQueen Lake, Heffley Lake, Dixon Creek, Johnson Creek, and Barriere. The fungus affected the new growth on both overstory and reproduction fir in these areas. It was active prior to 1955 as indicated by the sparse needles on the 1954 growth.

Fomes pini (Thore.)

Only 2 collections were made of this fungus during 1955. The samples submitted were taken from lodgepole pine and Douglas fir near Barriere and Eakin Creek. At the former locality it was also observed on a wind-thrown Engelmann spruce tree.

Blister Rust, Cronartium spp.

Two species of blister rust were collected this year. The first, C. comandrae, affecting lodgepole pine was found near Ashcroft and the second, C. co-harknessi, also from lodgepole pine near Tunkwa Lake. Dwarf mistletoe was noted frequently on lodgepole pine in the Tunkwa Lake area.

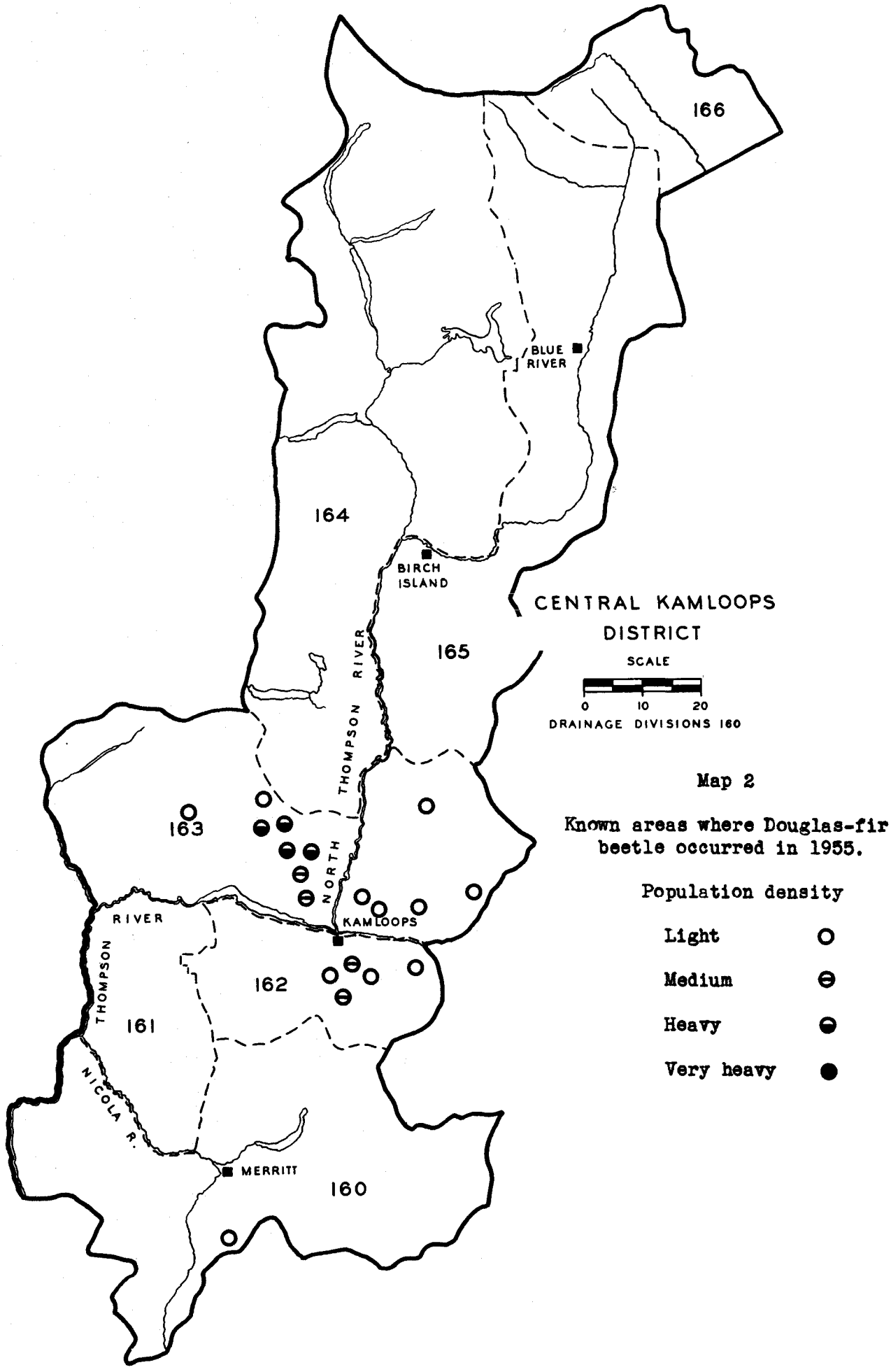


Map 1

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲

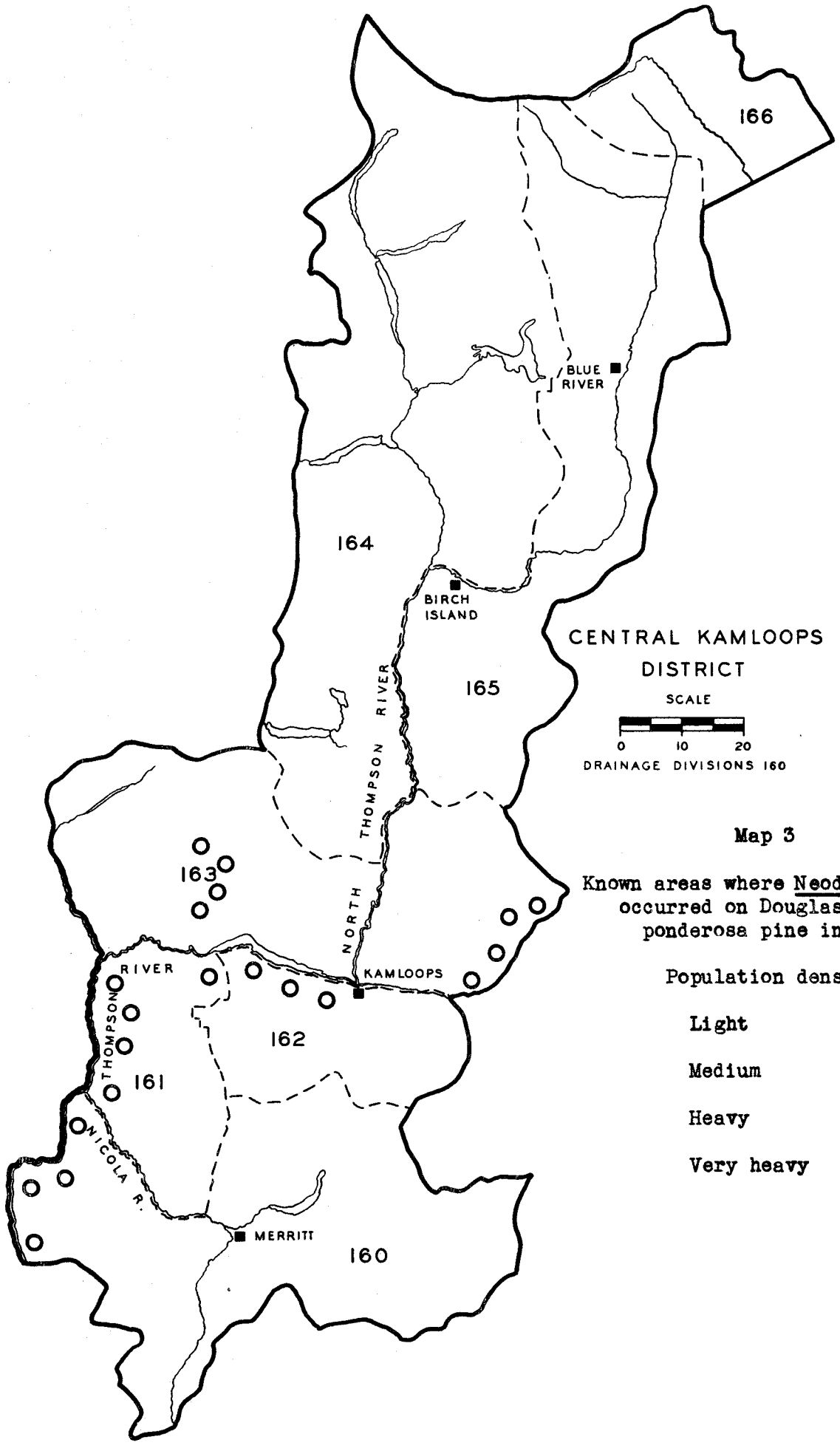


Map 2

Known areas where Douglas-fir beetle occurred in 1955.

Population density

Light	○
Medium	⊖
Heavy	◒
Very heavy	●

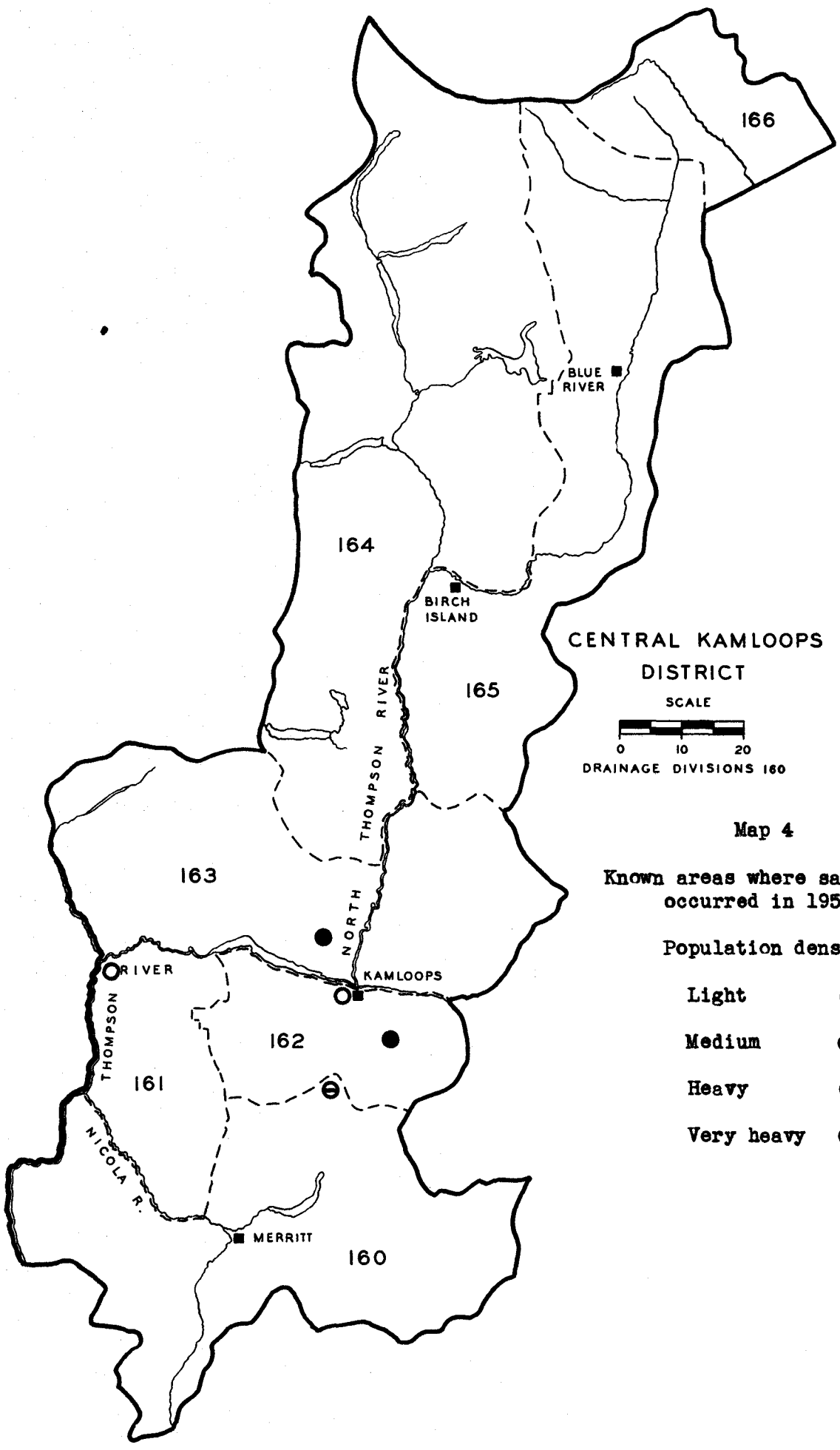


Map 3

Known areas where Neodiprion spp. occurred on Douglas fir and ponderosa pine in 1955.

Population density

Light	○
Medium	⊖
Heavy	◒
Very heavy	●



Map 4

Known areas where satin moth occurred in 1955.

Population density

Light	○
Medium	⊖
Heavy	◒
Very heavy	●

CENTRAL KAMLOOPS

Figure 1 — Satin Moth, Stilpnotia salicis (L.) A grove of trembling aspen near Lac du Bois completely defoliated by satin moth larvae.

- by M. T. Hughes

Figure 2 — Spruce Budworm, Choristoneura fumiferena (Clem.) Top-kill on reproduction alpine fir by 2-year-cycle spruce budworm near Johnson Lake - altitude 4,000 feet.

- by M. T. Hughes


1


2

FOREST BIOLOGY SURVEY

EAST KAMLOOPS DISTRICT

1955

W. E. Bitz

INTRODUCTION

The field season extended from June 1 to September 6. A survey of bark beetle damage to Douglas fir, ponderosa pine and western white pine trees was begun during the second week of September and was continued to November 4.

Prior to the field season, the writer was engaged in ranger cabin construction at Williams Lake in the Kamloops Forest District, and at Wasa Lake in the Nelson Forest District. This was followed by occasional field trips for special collections of wood-boring Lepidoptera and collecting bark-beetle infested logs for project work.

Accessibility within the East Kamloops District was improved by the acquisition of a 12-foot boat with outboard motor and boat trailer. Approximately 500 miles were travelled by boat.

During the field season, 392 forest insect collections and 57 tree disease collections were obtained in the East Kamloops Forest Biology Ranger District. Tables 1 and 2 show these collections by agency and host.

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The most severe attack by this beetle occurred in the Monte Lake area. In October a count of red-topped Douglas fir trees showed that 185 stems were killed during 1955. Another area to the south and east of Monte Lake, along Paxton Valley, also showed considerable beetle activity; a count there revealed 100 trees in small groups were killed during 1955. Additional light beetle infestations occurred in the following localities: Harris Creek near Lumby, Upper Whiteman Creek and Terrace Mountain on the west side of Okanagan Lake, Long Mountain near Oyama, Allison Lake near Princeton, and near the British Columbia Forest Service Ranger Station in Manning Park.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The infestation of the mountain pine beetle in western white pine in

Table 1

Forest Insect Collections by Agencies
East Kamloops District - 1955

Personnel Involved in Collection	Number of Collections						Total
	May	June	July	Aug.	Sept.	Oct.	
Forest Biology Rangers Independently	7	78	115	98	4	2	304
Forest Biology Rangers with Forest Service Personnel	-	-	1	32	-	-	33
Forest Service Personnel Independently	-	8	6	16	14	-	44
Other co-operators	3	4	2	2	-	-	11
Total	10	90	124	148	18	2	392

Table 2

Collections by Hosts
East Kamloops District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
Douglas fir	187	8	western white birch	7	1
ponderosa pine	53	19	willow spp.	9	1
lodgepole pine	31	1	alder spp.	4	
western hemlock	14	3	cherry spp.	1	
western larch	10		trembling aspen	10	13
western white pine	23		black cottonwood	2	
alpine fir	12	9			
western red cedar	9				
Engelmann spruce	11	2			
common juniper	1				
miscellaneous	6				
no host	2				
			Total	33	15
Total	359	42	Grand Total	392	57

the Shuswap Lake area appears to have subsided considerably. With the exception of a small area at Beach Bay on Seymour Arm and another at the head of Anstey Arm, activity was confined to widely separate individual trees. A cruise of a 32-chain strip at Beach Bay carried out in 1954 was repeated during 1955. The tally showed a reduction from 29 trees attacked in 1954 to 18 in 1955. It should be noted that 14 of the 18 trees attacked were windthrown during a storm earlier in the year.

Minor infestations were observed in ponderosa pine stands in the vicinity of Allison Lake near Princeton where small groups of infested trees occurred over a large area.

Douglas-fir Needle-miner, Contarinia sp.

An extensive search conducted in the dry belt Douglas fir forest revealed that this dipterous needle-miner was active throughout most of the district. The degree of infestation of the new Douglas fir foliage ranged from 5 to 90 per cent. The heaviest concentration was in the Peachland - Summerland area. By October many of the trees in this area had taken on an over-all yellow appearance. Some twigs and branch terminals had been killed and thinning of leaders was noted. All sizes of trees were attacked. Table 3 shows the degree of infestation determined from branch samples in various localities of the East Kamloops District.

Table 3

Locality and Degree of Infestation by Contarinia sp. in Douglas Fir Trees, 1955.

Locality		Degree of Infestation
Summerland - Peachland		Heavy
Chute Lake (Penticton)		Heavy
Trout Creek (Summerland)		Heavy
Anarchist Mountain		Medium
Kelowna City Park		Medium
Oyama - Winfield		Medium
Oliver		Medium
Anstey Arm	Shuswap Lake	Medium
Scotch Creek		Medium
Cape Horn		Medium
Seymour Arm		Light
Salmon Arm		Light
Lumby - Sugar Lake		Light
Armstrong - Enderby		Light
Westwold		Light
Lavington		Light
Creighton Valley		Light

Douglas-fir Tussock Moth, Hemerocampa pseudotsugata (McD.)

About two acres of open-grown Douglas-fir trees at Olalla Creek near Keremeos were infested by the Douglas-fir tussock moth. A maximum of 35 larvae were taken in one beating sample. There was no noticeable defoliation. A special collection of 100 larvae was obtained for S. M. Sager, Insect Pathologist of the Victoria Laboratory. The area on Long Mountain near Oyama, which showed tussock moth activity in 1954, was examined carefully to ascertain population fluctuations; larvae were scarce and the standard beating yielded only one or two larvae per tree. A second special collection was sent from this area to S. M. Sager.

During October, 1955, Douglas-fir tussock moth egg masses deposited in 1955 were counted on the basal five feet of crown of 12 open-grown Douglas fir trees at Olalla Creek. Table 4 shows data from this count.

Table 4

Egg Mass Count on Basal 5 Feet of Crown of Douglas Fir Trees at Olalla Creek.

Tree No.	D. B. H.	Number of egg masses deposited in 1955
1	10	0
2	22	8
3	14	5
4	6	0
5	8	3
6	10	0
7	14	1
8	12	0
9	10	0
10	16	1
11	10	2
12	8	0
Average	11.7	1.65

The table shows an average of 1.65 egg masses per tree.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Two old infestations of 2-year-cycle spruce budworm were sampled to obtain information regarding population changes. These areas are at Bolean Lake near Falkland and at Bear Creek near Kelowna. A quantitative bud count was made at both locations. Table 5 gives the total number of buds and number of damaged buds on 18 inch branch samples from Engelmann spruce and alpine fir at Bear Creek.

Table 5

Quantitative Bud Count on Engelmann Spruce and Alpine Fir Trees at Bear Creek, 1955.

No.	D.B.H.	Engelmann Spruce		Alpine Fir	
		Total Buds	Damaged Buds	Total Buds	Damaged Buds
1	6	33	5	67	7
2	6	37	7	36	6
3	6	85	3	48	5
4	6	26	3	42	1
5	6	38	6	67	5
6	6	36	4	39	3
Total		255	28	299	27
Per Cent Damaged			11		8

This table reveals that 11 per cent of the Engelmann spruce and 8 per cent of the alpine fir buds were damaged, presumbaly by the spruce budworm.

A bud count in the Bolean Lake area indicated that an average of 5 per cent of the buds on both Engelmann spruce and alpine fir trees were damaged, presumably by spruce budworm.

Another area, previously inaccessible, north of Silver Star Provincial Park was examined in 1955; it contained light to medium defoliation presumably by the spruce budworm. Dead leaders and branch terminals were common on both Engelmann spruce and alpine fir trees. There appeared to have been little or no activity during the past two or three years and no larvae or hibernaculae could be found.

The 1-year-cycle spruce budworm was most common in the dry belt Douglas fir forest in the southern part of the district. Small numbers of larvae were collected consistently from Douglas fir trees on Darcy Mountain, southeast of Princeton. Three collections from lodgepole pine in the adjacent Copper Mountain area contained specimens as did one lodgepole pine collection near Tulameen to the north of Princeton.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Severe infestation by this scale insect continued unabated in the stands of ponderosa pine around Penticton, and to a lesser extent at East Kelowna, Winfield and near Wilcox, north of Oliver. Parts of these stands are unsightly due to a ragged appearance caused by dwarfing of needles and needle drop.

Figure 1 shows a scale-infested ponderosa pine tree with thin foliage.

Some mortality of ponderosa pine has occurred and many of the trees are in a very unhealthy state.

A control project by spraying was undertaken this summer by British Columbia Forest Service Ranger E. L. Scott of Penticton in co-operation with officials of the Fruit Insect Laboratory at Summerland. The site was the infested ponderosa pine grove on the British Columbia Forest Service Ranger Station at Penticton. The degree of control has not been ascertained.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Larvae of this species were rare in the district in 1955. They were obtained consistently only near Hedley, where a maximum of five larvae in one collection was obtained. Other scattered locations yielding one or two specimens per collection were: Trinity Valley road near Lumby, Westwold, and Mabel Lake. The host was Douglas fir in all cases except near Mabel Lake where the host was western red cedar.

False Hemlock Looper, Nepytia canosaria Wlk. ?

False hemlock looper larvae were common only in the southern part of the district. Collections obtained from Douglas fir trees, east and west of Princeton, consistently yielded larvae of this species. The maximum number obtained in one collection was eight; the collecting point was between Hedley and Princeton. Larvae were present in several collections from Douglas fir trees in the area between Pritchard and Chase; otherwise only scattered individuals were obtained.

Black-headed Budworm, Acleris variana (Fern.)

A very light population of this species was present on Douglas fir trees throughout the area between Keremeos and Whipsaw Creek, a distance of nearly 50 miles. Larvae were collected most commonly in the Copper Mountain area, near Princeton, where the average was six per collection, and near Whipsaw Creek where the average was twelve per collection.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

An area of about ten acres near the headwaters of Ellis Creek in the Pentiction Ranger District was found to contain an infestation of Engelmann spruce weevils. The most severe attack was concentrated in one or two acres on the banks of the creek where Engelmann spruce reproduction was most abundant. Most of this area consists of an old burn and spruce reproduction is found only at intervals among the dense lodgepole pine growth.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

This leaf-miner was active throughout the range of trembling aspen in the northern part of the district. The intensity of attack ranged from 5 to 90 per cent of the leaves. In the heaviest infestations, patches of trees took on a silver-gray appearance. A quantitative leaf count was made in two locations to determine the percentage of foliage affected. Leaf counts were made on 18-inch branch samples.

Table 6

Leaf Count on 18 Inch Branch Samples
Showing Per Cent of Foliage Attacked, 1955.

Locality	Branch Number	Leaves Attacked	Total Leaves	Per Cent Leaves Attacked
Robbins Range	1	5	55	9
	2	24	43	55
Pillar Lake	1	17	60	28
	2	36	38	93

Birch Skeletonizer, Bucculatrix canadensisella (Chamb.)

A new locality record for the birch skeletonizer was established for the Interior when this species was found near Salmon Arm. The infestation was localized and the intensity of attack varied from 15 to nearly 100 per cent of the foliage affected. This miner spends most of its life within the leaf but emerges in the late instars to feed externally, skeletonizing the leaves.

Spotless Fall Webworm, Hyphantria textor (Harr.)

All the trees and ground cover in an area of heavy attack last year, along Woods Lake, have been cut and completely cleared for a road right-of-way, possibly eradicating the heavy webworm population there. The area to the north, along Kalamalka Lake, has however maintained a high population level; the favoured hosts were chokecherry and black cottonwood. Other sections of the district supporting large populations were between Armstrong and Vernon, and between Vernon and Lumby. The host was mainly open-growing chokecherry.

Satin Moth, Stilpnotia salicis (L.)

A new locality record for the Interior was established this year when this species was observed at Okanagan Landing by D. K. Campbell of the Provincial Entomologist's office. The infestation occurred on eastern cottonwood, Populus deltoides, growing around a rectangle of lawn at Kinsmen Beach. There is a total of 105 trees of a more or less uniform height of about 50 feet. An examination of the area on August 1 revealed that the adults had emerged; empty pupal cases and ultimate instar larvae were seen on the foliage. The pupal population was very light and only traces of feeding could be seen. No 1954 egg masses could be found, but a number of 1955 egg masses were present. A count of these was made on the majority of trees at the site. The standard sample area per tree employed was the basal eight feet of trunk. A total of 34 masses were counted.

A co-operative satin moth control project proposed for early June, 1956 probably will involve the Provincial Entomologist, Provincial District Horticulturist and Forest Biology Laboratory personnel.

An Aphid on Trembling Aspen, Aphiidae.

A blister-causing insect, tentatively identified as a member of Aphiidae, was found in heavy infestation proportions along Trout Creek near Summerland. The infestation occurred in a grove of immature trembling aspen trees in a Douglas fir forest type. The area affected was approximately 100 acres in extent. The damage was caused by this insect forming a pale greenish-white leaf-gall. On many trees 100 per cent of the foliage was affected, giving an unusually conspicuous appearance to the stand (see Fig. 2).

Neodiprion sp.

An effort was made this year to obtain colonies of these sawflies for study to assist in clarifying the Neodiprion complex. They were obtained from a number of hosts but were relatively few compared to other years.

Pitch Nodule Maker, Petrova albicapitana (Busck.)

Collections of this species were obtained from lodgepole pine near Cambie in the Sicamous Ranger District and near Salmon Arm. No noteworthy damage was encountered.

An Alpine Fir Twig Sawfly, Pleroneura borealis Felt.

This sawfly was common in alpine fir twigs in the Bolean Lake area near Falkland. Similar damage was noted on alpine fir at Whiterocks Mountain near Kelowna; however, no specimens could be found.

STATUS OF TREE DISEASES

Flagging of Ponderosa Pine caused by Cenangium ferruginosum (Fr.)

Although positive determinations have not yet been made on samples from a number of locations, it is believed that this fungus is present throughout the stands of ponderosa pine, its favoured host. Samples positively identified as Cenangium were taken at Chase and Scotch Creek in the Shuswap Lake area, between Princeton and Tulameen in the Princeton Ranger District, and along the west slope of Anarchist Mountain.

Dieback of Ponderosa Pine caused by Cenangium abietis (Pers.) Rehm.

One collection of this dieback of ponderosa pine was obtained near Silver Star Mountain adjacent to Vernon.

A Needle Cast of Ponderosa Pine caused by Elytroderma deformans (Weir) Darker.

The needle cast fungus was found to be widespread throughout the range of ponderosa pine in the district. Heavy attack was recorded at Duck Range between Westwold and Pritchard, Whipsaw Creek near Princeton, Blue Lake near Oliver, and in the Kelowna area.

Douglas-fir Needle Rust caused by Melampsora albertensis Arth.

Douglas fir trees on an area of about 100 acres at the 3,400-foot level on the Bolean Lake road were found to be severely infected by this rust. Some trees showed 100 per cent of the new foliage affected. Other areas of heavy, although localized, infection were Ellis Creek near Penticton, and Trout Creek near Summerland; both locations contained patches of trees with noticeable discoloration.

Hypoxylon Canker of Poplar caused by Hypoxylon pruinatum (Klotsche) Cke.

During 1955 a new locality record for the Interior was obtained with the finding of this canker near the northwest arm of Okanagan Lake. The host was trembling aspen.

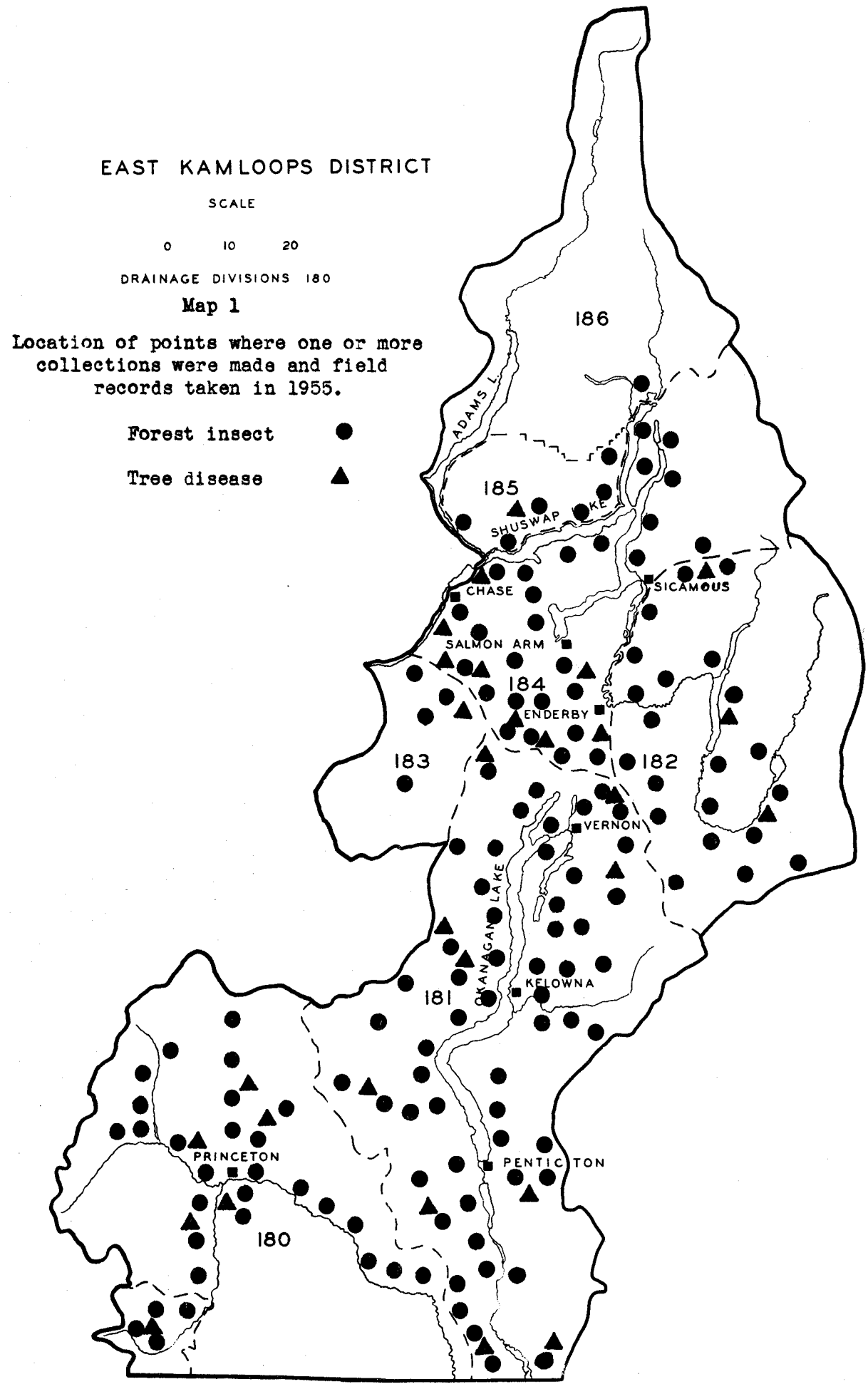
A Needle Rust on Alpine Fir, Pucciniastrum epilobii Otth.

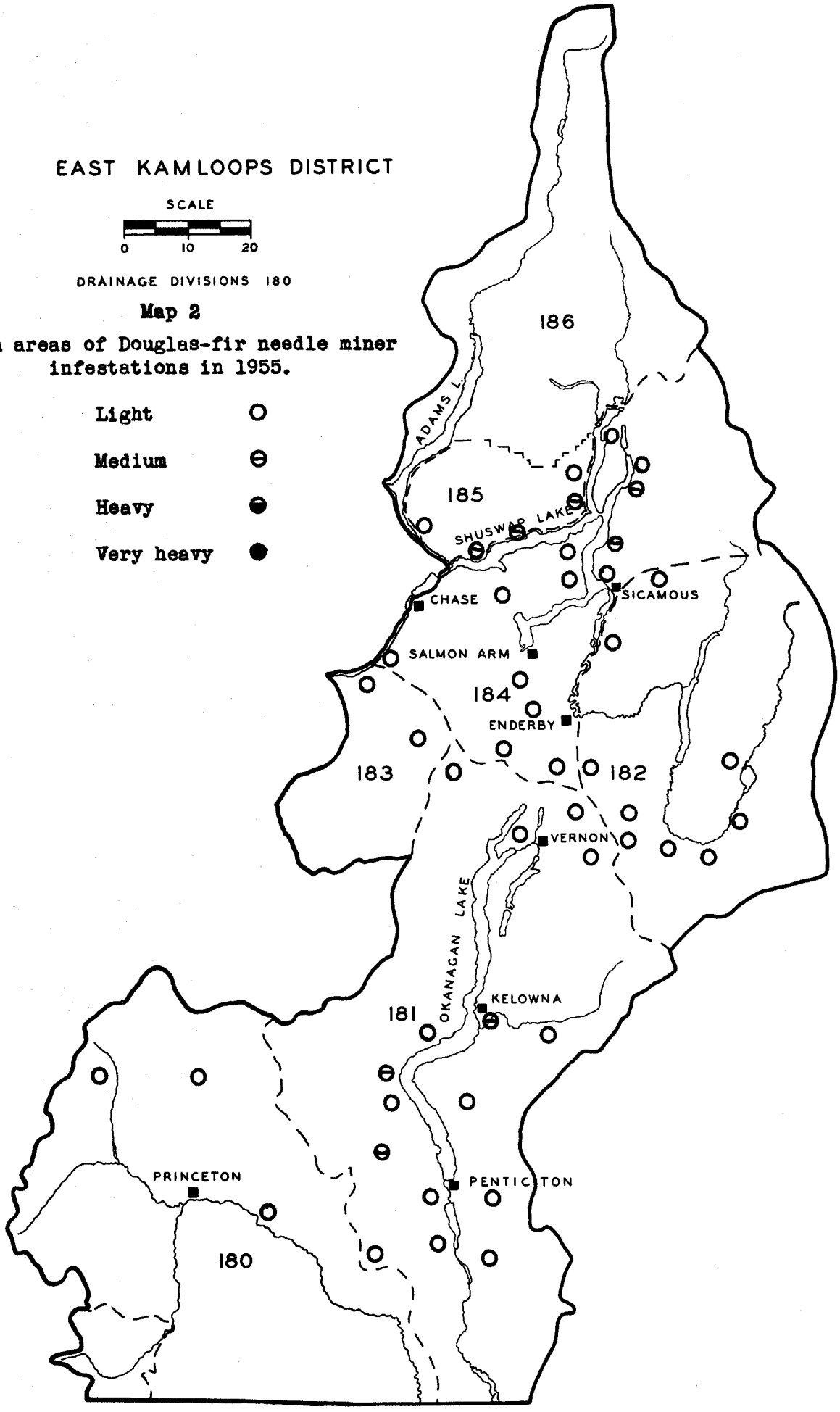
A heavy infection of rust occurred on alpine fir trees on Terrace Mountain. The affected area extended over all of the accessible portion

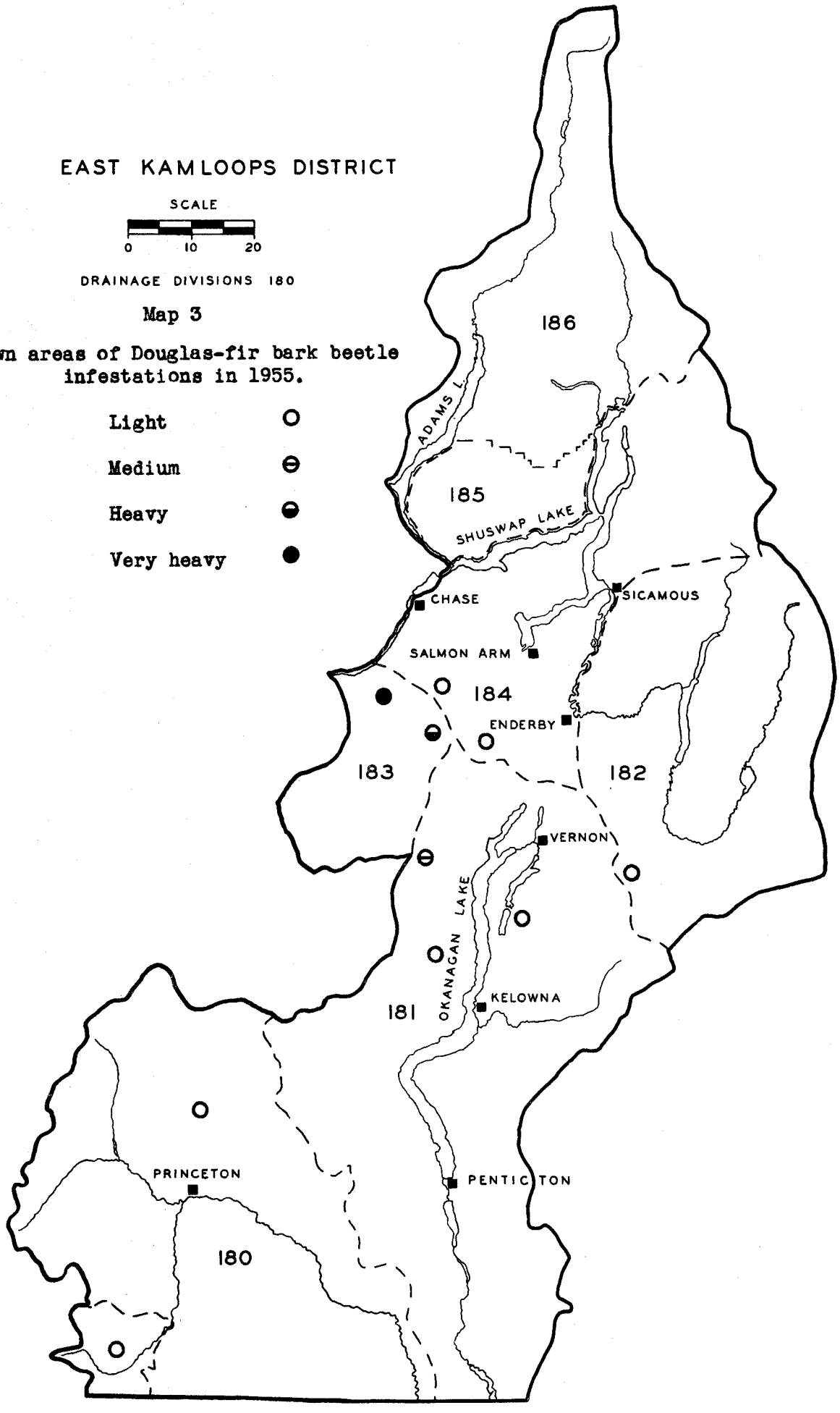
of the Engelmann spruce - alpine fir stand. The infected trees had taken on a conspicuous white hue. Traces of this rust were also noted in similar stands in the Bolean Lake area near Falkland and the Aberdeen Lake area near Vernon.

Douglas-fir Dwarf Mistletoe caused by Arceuthobium douglasii Engelm.

Areas of severe infection by this mistletoe were noted at many points in the district. The most notable were Wilsons Landing on the west side of Okanagan Lake, Peachland Creek near Peachland, and Ellis Creek near Penticton (see Fig. 3). The formation of brooms were so severe that some trees appeared to be one large broom.


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 1955.
Forest insect
Tree disease
186
185
184
183
182
181
180
ADAMS L.
SHUSWAP LAKE
CHASE
SICAMOUS
SALMON ARM
ENDERBY
VERNON
OKANAGAN LAKE
KELOWNA
PRINCETON
PENTICTON


EAST KAMLOOPS DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 180
Map 2
Known areas of Douglas-fir needle miner infestations in 1955.
Light
Medium
Heavy
Very heavy
186
185
184
183
182
181
180
ADAMS L.
SHUSWAP LAKE
OKANAGAN LAKE
CHASE
SICAMOUS
SALMON ARM
ENDERBY
VERNON
KELOWNA
PRINCETON
PENTICTON


EAST KAMLOOPS DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 180
Map 3
Known areas of Douglas-fir bark beetle infestations in 1955.
Light
Medium
Heavy
Very heavy
186
ADAMS L.
185
SHUSWAP LAKE
CHASE
SICAMOUS
SALMON ARM
184
ENDERBY
183
182
VERNON
OKANAGAN LAKE
181
KELOWNA
PRINCETON
PENTICTON
180

EAST KAMLOOPS

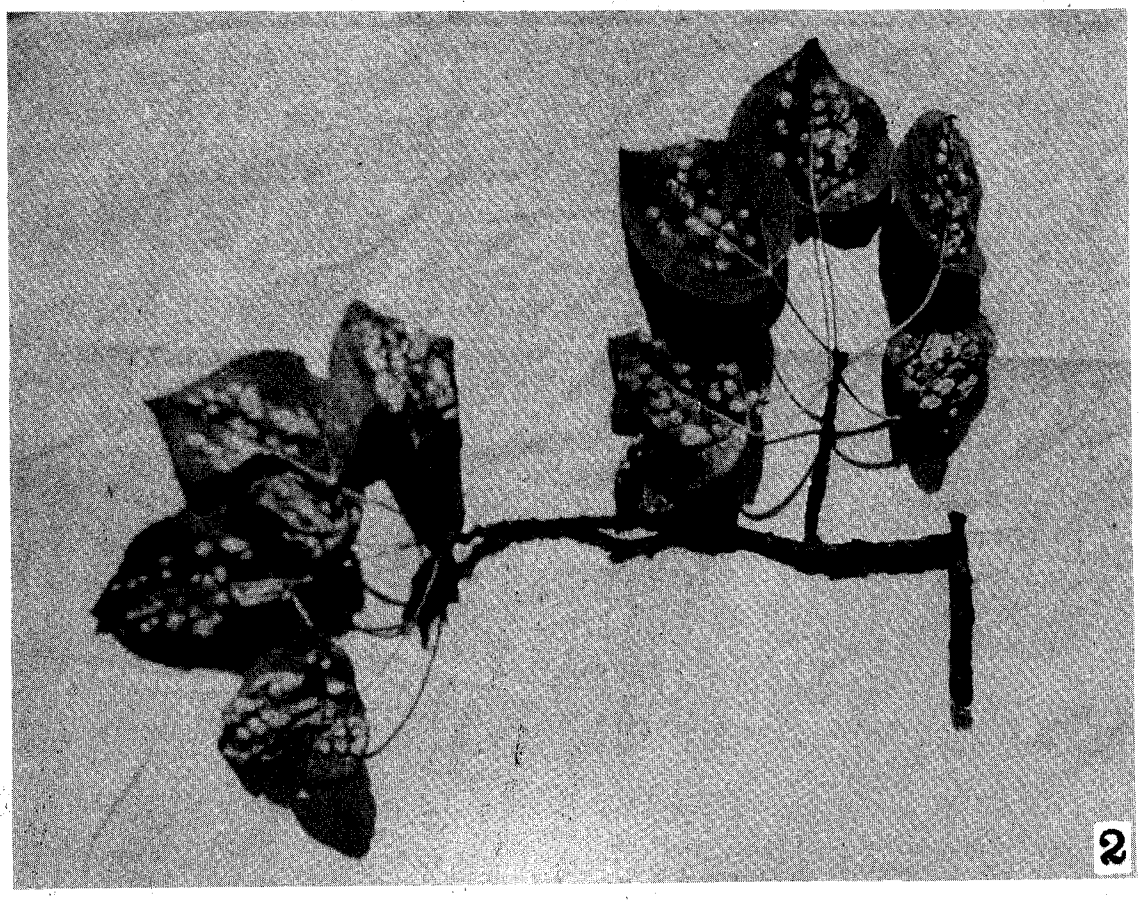
Figure 1 — Pine Needle Scale, *Phenocaspis pinifoliae* Fitch. Loss of foliage on ponderosa pine due to repeated attacks near Penticton.

- by W. E. Bitz

Figure 2 — Blisters on leaves of young trembling aspen caused by an unidentified aphid at Trout Creek near Summerland.

- by W. E. Bitz

1

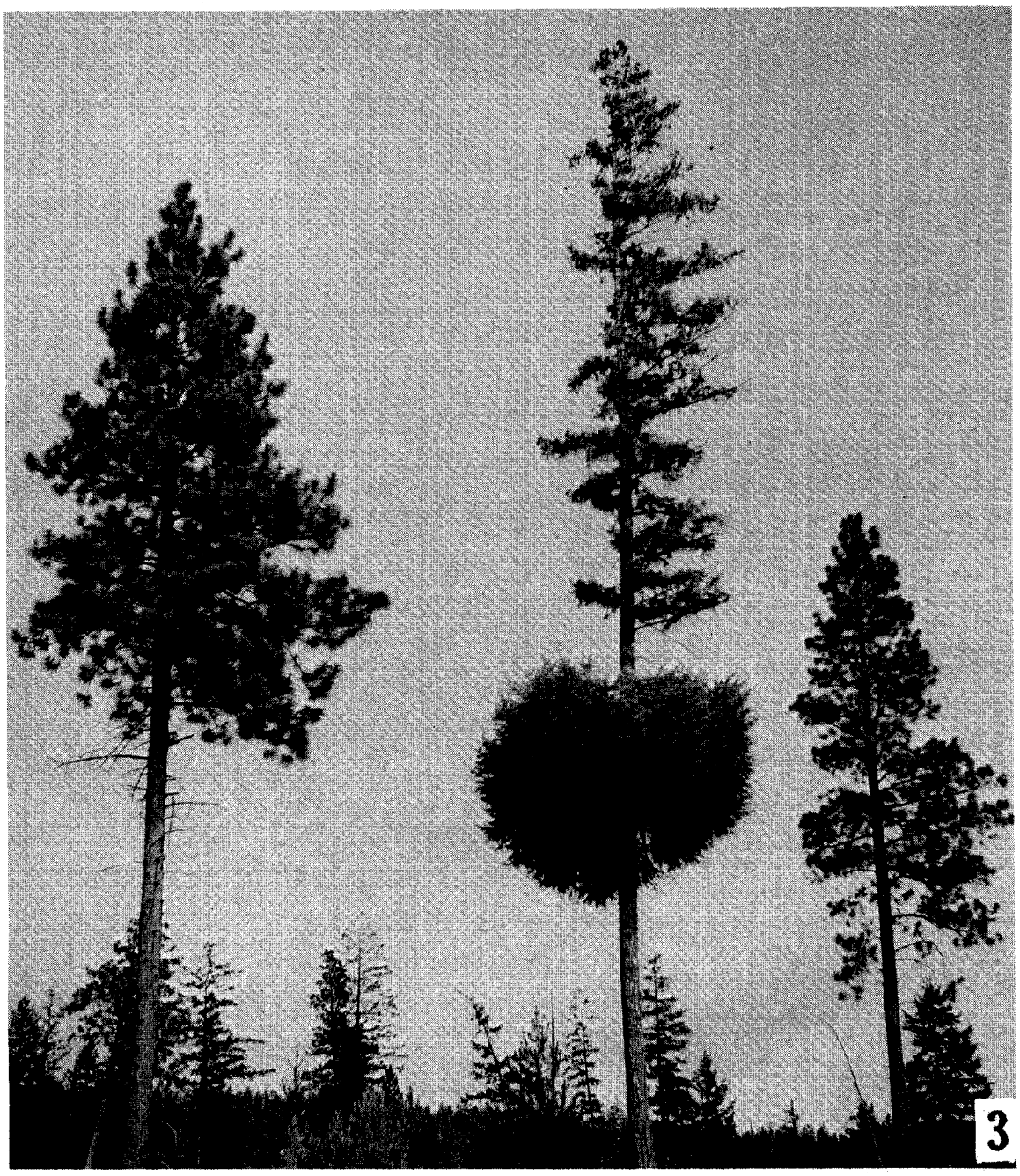


2

EAST KAMLOOPS

Figure 3 — Dwarf Mistletoe, Arceuthobium douglasii Engelm. Witch's broom on Douglas fir caused by this mistletoe at Ellis Creek near Penticton.

- by W. E. Bitz.


3

FOREST BIOLOGY SURVEY

NELSON FOREST DISTRICT

1955

B. A. Sugden

INTRODUCTION

Personnel of the Forest Biology Laboratory assigned to the Nelson Forest District for 1955 were: Forest Biology Rangers B. A. Sugden, D. H. Ruppel and C. B. Cottrell. These rangers conducted the field work in West, Central and East Nelson Forest Biology Ranger districts respectively.

There are three cabins provided for the use of the Forest Biology Rangers working in the Nelson Forest District. These are located at Christina Lake in the West, New Denver in the Central, and Wasa Lake in the East Nelson districts. The cabin at Wasa Lake was not completed; for this reason a trailer was used in the district during 1955.

During 1955 the infestations of mountain pine beetle in lodgepole pine at Windermere Creek, Steamboat Mountain, Whitetail Lake and White Swan Lake remained active. This bark beetle has destroyed a considerable volume of lodgepole pine in the past five years in these areas.

Mountain pine beetle damage to western white pine continued in scattered infestations; however there appeared to be a slight decline in their populations. Areas where some distruction of white pine occurred were: Nacillewaet Creek, Bannock Point and along the Northeast Arm of Upper Arrow Lake, Craig Creek, Trout Lake, Begbie Lake and in the Columbia River Valley north of Revelstoke to Boat Encampment.

The populations of Engelmann spruce beetle apparently have subsided somewhat in most areas. Adult beetles and larvae were found in spruce logs decked near Boundary Lake. Trap logs, felled for the purpose of attracting Engelmann spruce beetles on a timber sale at Cold Creek, were heavily infested. The trap logs will be removed from the bush with their population of beetles before they emerge in early summer. It is hoped that this procedure, repeated annually, may reduce the Engelmann spruce beetle population, and result in minimum damage to the standing Engelmann spruce stems in this area.

No large infestation of the Douglas fir beetle was reported this year from the Nelson Forest District. Small scattered outbreaks of this species occurred in Douglas-fir stands in the East and West Nelson districts. Damage was light.

An infestation of black-headed budworm was discovered in the valley of the Columbia River north of Revelstoke. Light to medium defoliation occurred on overmature western hemlock. An examination of collections

taken at the site of the infestation indicated that a disease was present among the larvae. This condition may reduce the population of black-headed budworm in this infestation during 1956.

No defoliation by the western hemlock looper was observed during 1955 in the stands of mature and semi-mature western hemlock trees in the Columbia River Valley. A light population of this looper was present. An analysis of egg samples shows that there should be a light population of hemlock looper in this area in 1956 but not in sufficient numbers to cause much defoliation.

A pine root weevil, Hypomolyx sp., was discovered on western white pine along Arrowpark Creek at Mackinson Flats. The larvae of this species feed below the layer of duff on the outer bark and cambium of the root crown and roots. No mortality of the larger white pine trees was attributed to this weevil; however a few small stems, 2 inches d. b. h. or less, had been completely girdled and had subsequently died.

On the evening of June 22, 1955, a severe storm with accompanying high winds caused a considerable amount of "blow-down" in the Nelson Forest District. Many known areas of "blow-down" were examined for bark beetle activity. Very little evidence of bark beetle attack was found; however these areas will be rechecked periodically during the next few years. Bark beetles are known to be attracted to recently-killed or weakened trees. It is possible that these areas of "blow-down" could foster a beetle population which might later attack adjacent standing timber.

FOREST BIOLOGY SURVEY

WEST NELSON DISTRICT

1955

B. A. Sugden

INTRODUCTION

The field work in the West Nelson District began on June 13 and continued through to September 9. Larval development was slow during June due mainly to a late spring.

Table 1 contains the insect collections by agencies for the months of May to September and Table 2 shows the host trees and the number of insect and tree disease collections made from each.

Map 1 shows the location where one or more insect and tree disease collections or field records were obtained during 1955.

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Only one small active infestation of Douglas-fir beetle was discovered in the West Nelson District during 1955. It was located on a dry, rocky hillside north of Cockle Creek. Examination showed a total of 33 Douglas-fir trees had been destroyed, 17 prior to 1954, 11 during 1954 and 5 had been attacked in 1955. The d. b. h. of the fir trees affected ranged from 8 to 14 inches.

A second group of Douglas fir killed by the Douglas-fir beetle was discovered discovered three miles north of Carmi. A total of seven fir trees had been destroyed during 1953-54; however, no current bark-beetle activity was noted. South of Carmi and west of the Kettle River, standing dead fir trees were common. Fourteen fir trees were examined; all showed signs of Dendroctonus actitivty. These trees had been dead for some years so it was difficult to be certain that the Douglas-fir beetle attack had been the primary cause of tree mortality.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

The spruce-alpine fir forest in the Boundary Lake area was examined for further Engelmann spruce beetle activity. No green-infested spruce trees were located. Recent logging operations in the vicinity of Boundary Lake had removed most of the beetle-killed trees.

Table 1

Forest Insect Collections by Agencies
West Nelson District - 1955.

Personnel Involved in Collection	Number of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	62	75	123	-	-	260
Forest Biology Rangers with Forest Service Personnel	-	-	-	-	-	-	-
Forest Service Personnel Independently	1	2	1	-	-	1	5
Other Co-operators	-	-	-	2	-	-	2
Total	1	64	76	125	-	1	267

Table 2

Collections by Hosts,
West Nelson District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
Douglas-fir	108	1	trembling aspen	2	1
ponderosa pine	14		western white birch	2	
lodgepole pine	24	4	willow	4	1
western white pine	5		alder	4	
western larch	65	2	soopolallie	1	
Engelmann spruce	19	1	Saskatoon	1	
alpine fir	3	2	chokecherry	1	
grand fir	2		red-osier dogwood	1	
western red cedar	3				
western hemlock	8				
			Total	16	2
Total	251		Grand Total	267	12

A low population of D. engelmanni and Ips. sp. was found in logs decked near the east end of the lake. Both the adult and larval stages of the Engelmann spruce beetle were collected. Some of the larvae were dead, particularly those taken from the sections of the logs most exposed to the sun. The logs examined were cut during the fall and early winter o 1954.

A timber sale, designed to salvage much of the spruce destroyed by bark-beetle in this area, recently had been effected. It was expected that logging operations would commence soon on this new sale northwest of Boundary Lake.

Douglas-fir Tussock Moth, Hemerocampa pseudotsugata McD.

The small infestation of the Douglas-fir tussock moth, in open-grown Douglas-fir trees near Cascade, was still active during mid-June. Discoloration was quite apparent over approximately three or four acres. Most of the larvae were in the first and second instars. Feeding activities were generally restricted to the current growth. The average number of larvae to a collection was 180.

Later in the season the infestation was again examined. Discoloration was about the same as during June, however, defoliation was much more noticeable, particularly in the upper third of the tree crown. It was estimated that 50 to 70 per cent of the needles on that section of the tree had been destroyed. During the second visit it was noted that large numbers of tussock moth larvae had died. Generally they were found wilted and hanging by their anal prolegs from the twigs and branches. A polyhedral virus apparently was responsible for this condition.

During the first week of September a search for egg masses was made in the Cascade infestation. A total of 15 infested Douglas fir was examined; no new egg masses were found. It seems likely that the population of Douglas-fir tussock moth at Cascade will be quite low in 1956. Map 2 shows the location of points where Douglas-fir tussock moth occurred during 1955.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

A survey of the upper Inonoaklin Valley indicated that the Engelmann spruce weevil was active from Inonoaklin Crossing north up the Valley to the bridge over Kettle River. The most severe damage occurred over about seven acres located one mile north of Inonoaklin Crossing. In the past, the timber in the Valley had been burned and the resulting forest is mainly reproduction lodgepole pine, Engelmann spruce, alpine fir, aspen, and willow.

The Engelmann spruce trees examined were on a strip seven chains long by one chain wide; results of the examination are shown in Table 3.

The table shows persistent activity. It may be expected that during 1956 the Engelmann spruce weevil will continue to attack and deform the leaders of the spruce in this area.

Table 3

Number and Per Cent of Engelmann Spruce Trees Attacked by Engelmann Spruce Weevil on a Strip 7 Chains by 1 Chain, Upper Inonoaklin Valley, 1955.

Status of Engelmann spruce	No. trees	Per Cent
Attacked during 1955	38	21
Attacked prior to 1955	36	20
Not attacked by weevils	109	59

European Larch Sawfly, Pristiphora erichsonii (Htg.).

Throughout the western larch stands of Myncaster, lower McKenny Creek, Beaverdell, Greenwood and Granby River Valley, only one sickly specimen of the European larch sawfly was taken in collections. This one was found near Snowball Creek, a tributary of the Granby River. No distorted leader or lateral growth on western larch, caused by oviposition of the European larch sawfly, was noted in the areas examined.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Larvae of the yellow-headed spruce sawfly were common in collections taken from Engelmann spruce at an elevation of 4,000 feet in the Monashee Pass and Upper Boundary Creek on Timber Management Number 8. The larvae were not numerous enough to cause noticeable defoliation. The average number of yellow-headed spruce sawfly larvae per collection was 9, and the maximum number 14. The green-headed spruce sawfly was occasionally associated with the yellow-headed spruce sawfly in these areas.

A Pitch Nodule-maker, Petrova sp.

A light to medium population of this Lepidoptera was examined on an area, 3 chains by 2 chains, near the south end of Christina Lake. The trees affected were reproduction lodgepole pine, 3 to 8 feet in height. The larvae appeared to prefer the upper portions of the main stem as a feeding site, on the 1953-54 growth. When feeding, the larvae mine the cambium, but seldom girdle the tree. For this reason tree mortality, which could be attributed directly to Petrova sp. activity, was rare. A thin-walled, fragile nodule, composed of a mixture of pitch and frass is typical of the work by members of this genus.

A total of 47 young lodgepole pine stems were examined. Of these, 37 had been attacked and 10 had not. Table 4 shows the number of lodgepole pine trees attacked during 1955, prior to 1955, and also the number of pitch nodules. The trees examined have been grouped by diameter classes.

Table 4

Numbers of Lodgepole Pine with and without Petrova Nodules on a Strip 3 Chains by 2 Chains, Christina Lake, 1955.

D.B.H. inches	Lodgepole pine attacked by Petrova sp. Number of stems	No. of 1955 pitch nodules	No. of old nodules	Lodgepole pine not attacked
1/2	10	21	15	8
1	15	31	23	1
1 1/2	4	9	7	0
2	7	20	11	1
3	1	5	2	0
Totals	37	86	58	10

It will be noted that an increase in population of this species is apparent when the total number of 1955 pitch nodules is compared to the total number of old nodules. The increase is 28, but the increase in population will be greater than is indicated because some of the old nodules recorded were undoubtedly constructed during 1953.

Although no destruction of lodgepole pine trees by Petrova sp. was observed, 3 small pines were discovered broken at the point where an attack had taken place indicating that feeding of the larvae might have a tendency to weaken the main stem.

Pine Tube Moth, Argyrotaenia pinatubana Kearf.

Larvae of the pine tube moth were common on a small area of reproduction lodgepole pine near Beaverdell. The trees examined were up to four feet in height, though the majority were about two feet. Damage was not severe; an average of three larvae per tree occurred on the area examined.

Pine Butterfly, Neophasia menapia Feld.

During mid-August the adults of the pine butterfly were noted in flight around the upper third of the crowns of ponderosa pine. They were quite common throughout the ponderosa pine stands of Lower Granby River Valley, and from Christina Lake south to the International Border. No larvae of this species were collected from the pine in these regions.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

Extensive damage to the foliage of trembling aspen trees occurred in the Valley and on the lower hillsides of Upper Arrow Lake between Fauquier and

Burton and also, though less severe, through Inonoaklin River Valley at the lower elevations. Many trees examined had 100 per cent of the leaves infested; all the aspen trees examined in these areas showed evidence of attack ranging from 20 to 100 per cent. From a distance, attacked aspen presented a silvery appearance due to mining activity of the larvae in the leaves.

Willow Leaf-miner, Lyonetia saliciella Busck.

Throughout the same areas frequented by the aspen leaf-miner and also in the northern sections of the Beaverdell Ranger District, the willows suffered severe damage by Lyonetia saliciella. Attacked leaves of the willow turn brown making the infested trees easy to locate. Generally from 15 to 80 per cent of the leaves were destroyed. This leaf-miner was active during early summer, and by mid-July most of the larvae had pupated. In the Beaverdell area some of the infested trees produced a second crop of leaves.

Spruce Budworm, Choristoneura fumiferana (Clem.).

Larvae of the 1-year-cycle spruce budworm occurred sporadically on Douglas-fir trees over most of the district. The population level appeared to be quite low. A few 1-year-cycle budworm were also collected from lodgepole pine north of Beaverdell in the valley of Kettle River.

Some bud-mining of Engelmann spruce and alpine for by 2-year-cycle budworm was noted in the sub-alpine forests of the Monashee Pass, and along upper Boundary Creek. Apparently damage was light as mined buds were difficult to locate in both areas.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Very few western hemlock looper larvae were collected during 1955. A light population apparently existed on Douglas fir, Engelmann spruce and western hemlock in the West Nelson District.

A Sawfly on Douglas Fir, Neodiprion sp.

This was noted throughout the district on Douglas fir trees. Although common it did not occur in numbers sufficient enough to cause any appreciable defoliation.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Colonies of a sawfly on ponderosa pine were found in the lower Kettle River Valley, Cascade and Creston areas. The colonies were not numerous but light defoliation occurred on single branches of the pine

where the larvae had been feeding. Map 3 shows known areas where Neodiprion spp. was known to be present on Douglas fir and ponderosa pine in the West Nelson District during 1955.

Black-headed Budworm, Acleris variana (Fern.)

No infestations of this species were found or reported in the district during 1955. Some larvae were collected from western hemlock, Engelmann spruce, and Douglas fir, but they were not common.

Douglas-fir Needle-miner, Contarinia sp.

The Douglas-fir needle-miner was distributed throughout most of the southern portions of the West Nelson District. The occurrence of light to medium populations was recorded east of Trail, in lower Inonoaklin Valley and Boundary Creek. The most severe damage was found near Cascade, where over 90 per cent of the current needles on the fir trees over a small area had been destroyed. During the last 3 years this needle-miner has certainly curtailed the harvesting of Christmas trees in areas where it has existed in numbers great enough to cause a noticeable needle drop.

STATUS OF TREE DISEASES

A Blister Rust caused by Cronartium harknessii (Moore) Mein.

Damage to lodgepole pine by this blister rust was widespread throughout the district. It was particularly common on Anarchist Mountain, in the Kettle River Valley and near Edgewood.

Larch Needle Cast caused by Hypodermella laricis Tub.

Probably the most spectacular example of tree diseases during 1955 occurred in many of the western larch stands. The disease, larch needle cast, not only kills the needles but may also destroy many of the spur shoots. Discoloration caused by the diseased needles makes the detection of severely infected stands quite simple.

Western larch infected by the larch needle cast were very numerous between Greenwood and Grand Forks. Stands also affected, but to a lesser degree, were those on Anarchist Mountain, in the Kettle River and Inonoaklin River valleys, and in the district lying between Nelson and Trail east of the Columbia River.

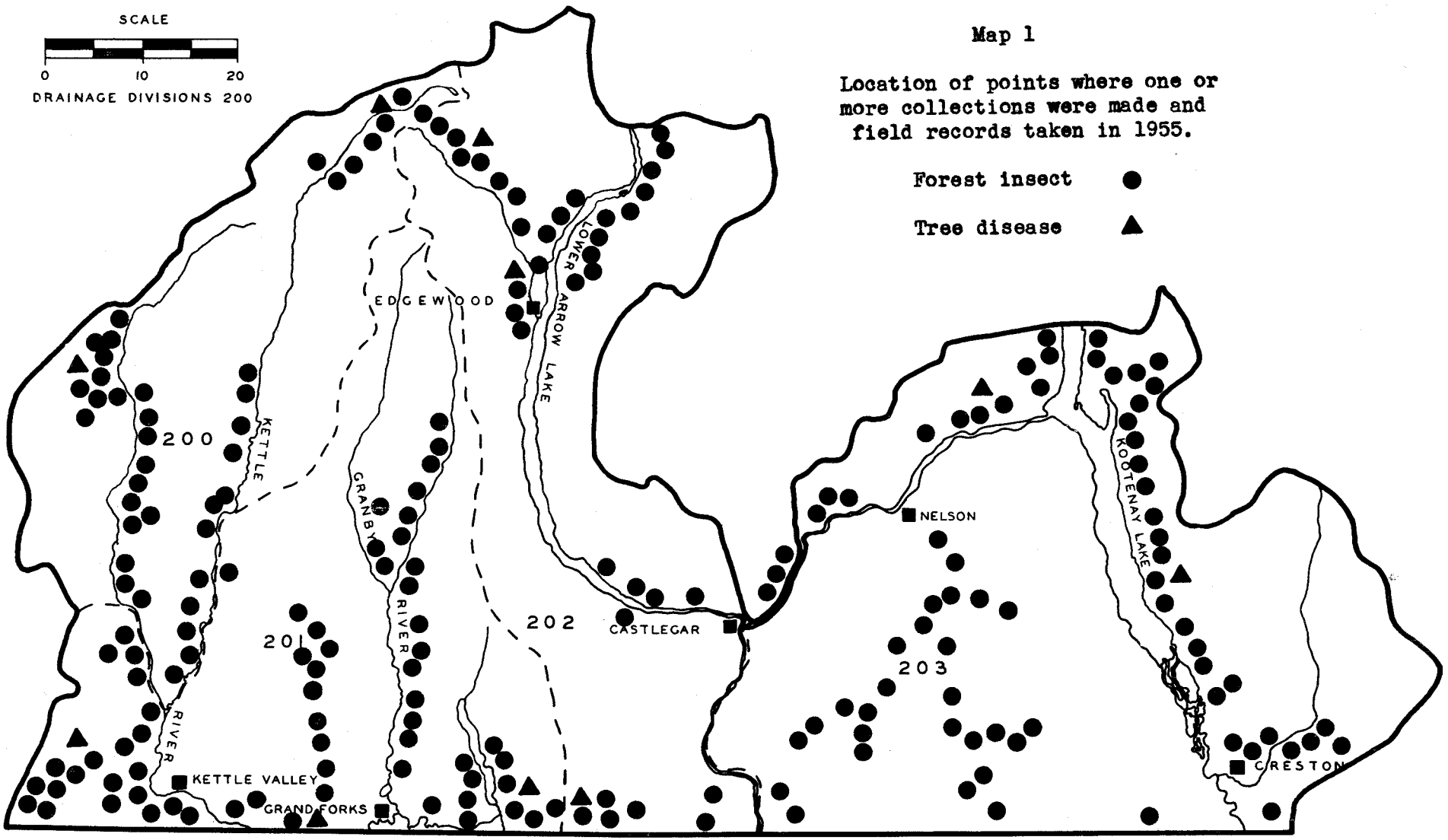
An examination of larch foliage in the Greenwood and Inonoaklin stands indicated that the disease had been active there during 1954. Old faded needles bearing black, oblong hysterothecia on their upper surfaces, were still present on the trees during June, 1955.

Red Ring Rot caused by Fomes pini Thore.

This fungus, which attacks most of the conifers, was collected from a western white pine tree northwest of Edgewood. The affected tree was located in a mixed stand of Douglas fir, western larch, western hemlock, western white pine, and western red cedar. The stand had been logged and most of the largest trees had been cut. This was the only example of the fungus observed in the area.

Needle Disease caused by Elytroderma deformans (Weir.).

A needle disease tentatively identified as E. deformans was abundant near Santa Rosa Summit east of Cascade. The disease was most common on reproduction lodgepole pine and the resulting discoloration was quite apparent.


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 1955.
Forest insect
Tree disease
EDGEWOOD
LOWER ARROW LAKE
200
KETTLE
GRANBY
RIVER
201
202
CASTLEGAR
203
NELSON
KOOTENAY LAKE
KETTLE VALLEY
GRAND FORKS
CRESTON

Map 2

Known areas where Douglas-fir tussock moth occurred in 1955.

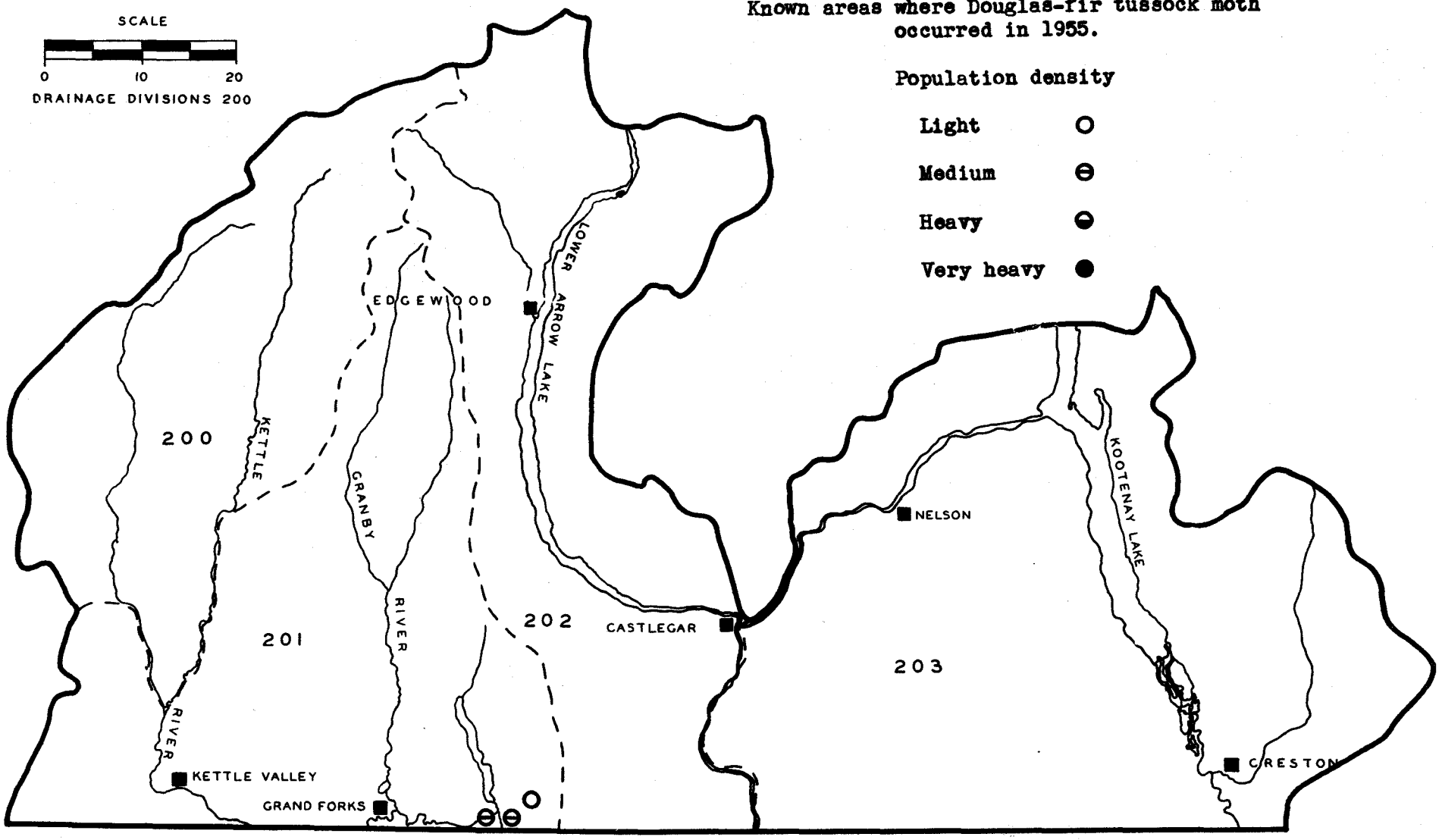
Population density

Light O

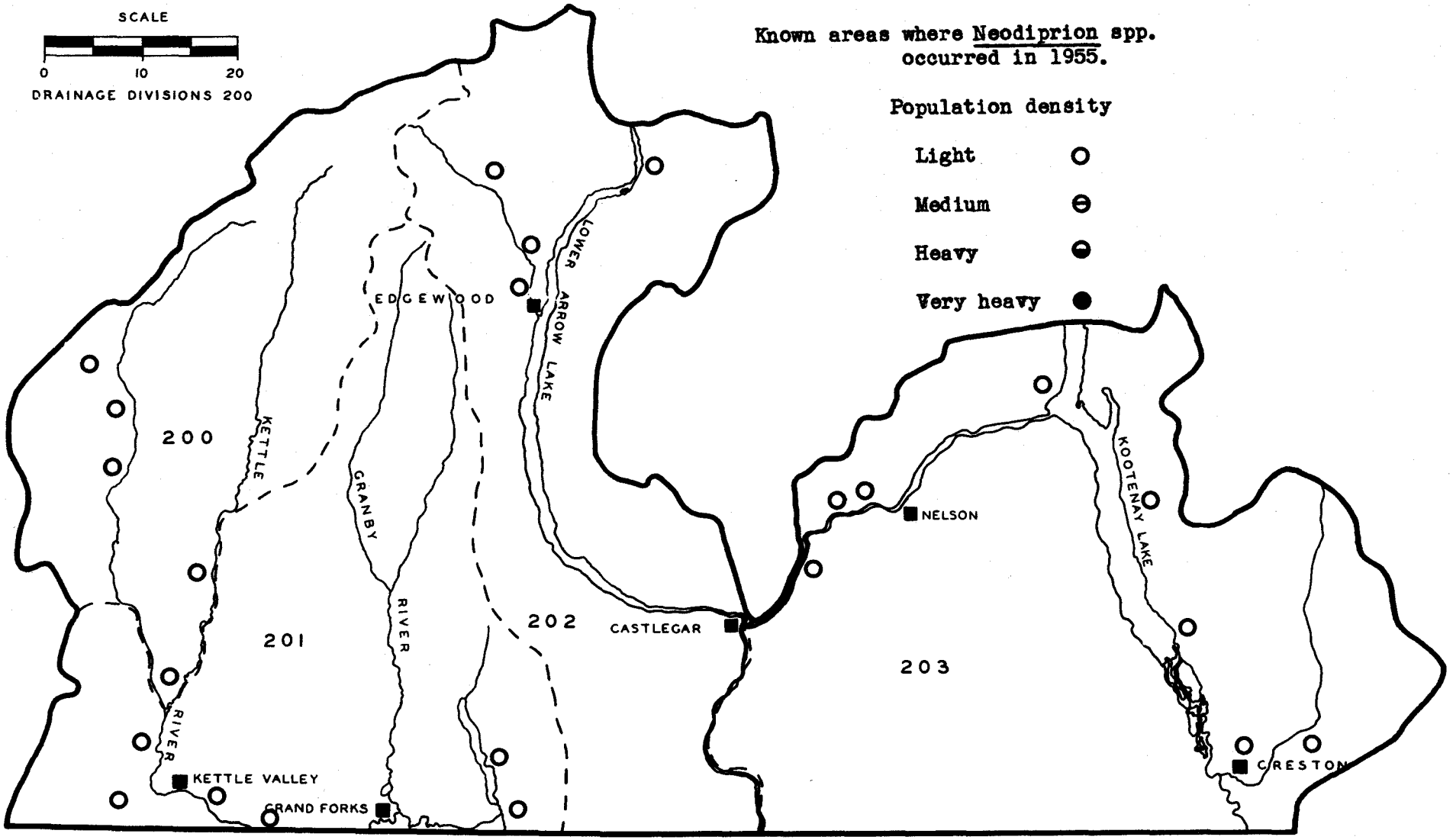
Medium ⊖

Heavy ◒

Very heavy ●



WEST NELSON DISTRICT



WEST NELSON

Figure 1 — Engelmann Spruce Weevil, Pissodes engelmanni Hopk. Damage to reproduction Engelmann spruce one mile north of Inonoaklin Crossing, Monashee area. Leaders were attacked during 1955 and when photographed were just beginning to turn red.

- by B. A. Sugden

Figure 2 — A Pitch Nodule Maker, Petrova sp. lodgepole pine sapling showing typical "blisters" of pitch created by Petrova sp. No tree mortality has been noted which could be directly attributed to this species. Attack photographed took place near Cascade.

- by B. A. Sugden


1


2

Figures 3 and 4 — Douglas-fir Tussock Moth, Hemerocampa pseudotsugata (McD.). Defoliation of Douglas-fir; note the thin tops. This is typical of Douglas-fir tussock moth larvae which tend to defoliate the upper third of the host tree first. Photographs were taken at Cascade. A light infestation has been active over a small area for about three years.

- by B. A. Sugden


3


4

WEST NELSON

Figure 5 Douglas-fir Needle-miner, Contarinia sp., Cascade, British Columbia. The bare twigs of the 1954 growth show the severity of the attack. The 1955 needles were also almost completely infested.

- by B. A. Sugden


5

FOREST BIOLOGY SURVEY

CENTRAL NELSON DISTRICT

1955

D. H. Ruppel

INTRODUCTION

Survey work was begun in the Central Nelson Forest Biology Ranger District during the first week in June and continued until mid-October. In addition to routine surveys and random collecting, egg surveys were conducted for the western hemlock looper and black-headed budworm in the Big Bend area. The pine root weevil was investigated at Arrowpark and several cruises to determine mountain pine beetle damage were carried out.

The number of forest insect and disease collections taken in Central Nelson District are listed in Tables 1 and 2. Table 1 shows a breakdown of forest insect collections by months, and the agencies which made the collections. Table 2 shows the number of forest insect and tree disease collections by host species. Map 1 shows the location of points where one or more collections and field records were taken in 1955.

Summer headquarters for Central Nelson District this year was a newly-constructed Forest Biology Ranger dwelling at New Denver. A 12-foot boat, with an outboard motor and boat trailer, was added to the equipment in 1955. This equipment was used on Kootenay, Duncan, Slocan and Upper Arrow lakes.

The British Columbia Forest Service provided a flight from Arrowhead to Goldstream River and return in July. This flight led to the discovery of an outbreak of the black-headed budworm along the Columbia River.

The writer wishes to acknowledge the helpful co-operation received from personnel of the British Columbia Forest Service on numerous occasions, as well as help from private co-operators.

STATUS OF INSECTS

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

The black-headed budworm was very common throughout the district and was found at infestation level along the Columbia River north of Revelstoke. Known infestations east and west of the Columbia River at LaForme Creek and west of the Columbia River at Downie Creek covered a total of about 10 square miles (see Map 4).

Table 1

Forest Insect Collections by Agencies
Central Nelson District - 1955

Personnel Involved in Collection	No. of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	72	118	78	4	-	272
Forest Biology Rangers with Forest Service Personnel	-	6	-	5	-	-	11
Forest Service Personnel Independently	-	-	1	-	-	-	1
Other Co-operators	-	-	-	6	-	-	6
Total	-	78	119	89	4	-	290

Table 2

Collections by Hosts
Central Nelson District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
western hemlock	130	14	willow	10	-
Douglas-fir	38	8	trembling aspen	5	-
western white pine	24	7	black cottonwood	5	-
western red cedar	17	-	western white birch	3	-
Engelmann spruce	15	-	alder	3	-
western larch	9	1	maple	1	-
alpine fir	7	2	red-osier dogwood	1	-
white spruce	7	-	no host	1	-
lodgepole pine	6	2			
mountain hemlock	4	2			
ponderosa pine	3	3			
grand fir	1	1			
ornamental cedar	-	1			
			Total	29	
Total	261	41	Grand Total	290	41

Damage occurred chiefly on overmature western hemlock in the infestation areas on the Big Bend. It was estimated that from 5 to 30 per cent of the needles were destroyed on the upper crown. The defoliation caused noticeable "browning" of the trees in the late summer. The buds did not appear to be damaged by the budworm.

The infestation reported from Keen Creek, near Kaslo, in 1954 appeared to have subsided.

The area was inaccessible during the budworm feeding period. No discoloration or other signs of damage were apparent in the late summer in this locality and budworm pupae or eggs were not found. Western hemlock and Engelmann spruce were the hosts noted in 1954.

Larval sampling in the Big Bend infestation areas was not extensive. The largest collection, at LaForme Creek, contained 125 larvae and 2 pupae. Egg sampling was done on 15 western hemlock trees in the same locality. Details are given in Table 3 and the analysis of the information is given in Table 4. Egg counts indicate that a light to moderate population and some defoliation can be expected in 1956. The standard for forecasting the intensity of infestation the following year is shown in the main introduction.

Disease studies of two collections from LaForme Creek by S. M. Sager indicate that a polyhedral virus disease was active in this area. In addition 2 pupal collections from the same locality yielded the information in Table 5. Parasitism was chiefly by a Hymenoptera tentatively identified as Ephialtes ontario (Cress.).

In view of the information obtained it would appear that the black-headed budworm infestations on the Big Bend may not be serious in 1956 and may decline considerably if disease continues as an active factor.

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

The western hemlock looper population decreased during 1955. Most collections were taken from western hemlock. Map 3 shows the known distribution and density of this insect during 1955. The symbols light, medium and heavy were used for 1 - 10, 11 -40, and 41 - 100 larvae per beating collection respectively. The highest numbers obtained in collections from any given area were used to arrive at the degree of density.

Damage by this insect was not noticeable except for a very slight thinning of foliage where it was accompanied by a hemlock sawfly, Neodiprion sp.

Larval sampling was done in June, July, and August in the Big Bend area and yielded the following average number of larvae for collections containing western hemlock looper:

June	2.2
July	17.3
August	6.6

Table 3

Black-headed Budworm Egg Count on Terminal 10 inches of Branch on Lower, Middle and Upper Crowns, Mastadon Mine Road, LaForme Creek, Mile 17, Big Bend Highway.

Plot No.	Tree No.	Lower Crown				Middle crown				Upper crown			
		Lower exposed		Lower shaded		Middle exposed		Middle shaded		Upper exposed		Upper shaded	
		Twig	Eggs	Twig	Eggs	Twig	Eggs	Twig	Eggs	Twig	Eggs	Twig	Eggs
1	1	87	3	91	3	70	5	71	5	42	18	77	20
	2	72	1	77	-	54	2	80	1	47	2	57	5
	3	153	6	118	1	81	2	69	1	48	2	79	36
	4	188	3	64	1	84	-	65	3	85	16	36	11
	5	127	-	80	-	66	-	129	-	38	6	72	-
2	1	62	-	48	-	108	2	107	-	38	1	35	2
	2	93	-	104	-	124	-	73	-	51	-	51	-
	3	82	2	177	-	45	1	63	1	57	3	86	8
	4	161*	2	126*	1	167*	17	65	10	54	12	71*	22
	5	82	-	106	1	115	2	105	3	94	12	61	2
3	1	85	1	79	-	125	10	63	4	109	2	148	6
	2	68	-	86	1	83	2	53	2	122	4	81	8
	3	98	2	84	-	62	-	56	-	80	2	58	4
	4	122	1	110	-	127	5	86	6	51	4	91	-
	5	135	-	128	10	113	6	76	2	58	9	97	1

* 12 inch branch tips used.

All trees were dominant or co-dominant up to 20 inches d. b. h.
The average height was 75 feet and the crowns were about 50 feet (estimate).

Table 4

Black-headed Budworm Egg Count
Analysis of Table 3, LaForme Creek 1955.

Plot number	Total Lengths of needle-bearing twigs			Number eggs per 100 inches of twig			Expected defoliation in 1956
	Top	Middle	Lower	Top	Middle	Lower	
1	581	685	1057	20	3	2	Medium
2	598	792	1041	10	5	1	*Light
3	859	844	995	5	5	2	Light

* Plot 2 is borderline and could be light to medium.

Table 5

Results of Pupal Rearings of Black-headed Budworm,
LaForme Creek (Big Bend) 1955.

Date	Number of pupae	Mortality (Per cent)		Emergence (Per cent)
		Diseased	Parasitized	
August 23,1955	80	71	20	9
August 25,1955	92	56	12	32

There was a drop in the larval population of about 65 per cent between July and August. The June figure is a reflection of the retarded season. The average number of larvae per sample taken in the Lardeau River and Duncan Lake regions was 1.4 and in Glacier Park 1.0.

Egg sampling was done in the Big Bend area during October on plots established at miles 60, 70 and 89.8 north of Revelstoke. A total of 6 trees, 5 western hemlock and 1 western red cedar, was cut and 6 x 12 inch bark samples taken at 10-foot intervals and the eggs counted on these samples. A condensed version of the information obtained from the samples at 20 foot intervals appears in Table 6. The alternative samples were sent to Mr. M. G. Thomson at Victoria.

There will probably be a noticeable western hemlock looper population along the Beg Bend Highway in 1956 but it is not anticipated that serious defoliation will occur.

Table 6

1955 Western Hemlock Looper Eggs on 6 x 12 Inch Bark Samples at 20 foot Intervals on Trunk, Big Bend Highway 1955.

Location north of Revelstoke	Tree number	Location above ground level of sample			
		20 feet	40 feet	60 feet	80 feet
Mile 60	1 (H)*	nil	nil	nil	3
Mile 60	2 (H)	2	3	nil	5
Mile 70	3 (H)	4	2	8	N/A
Mile 70	4 (C)*	2	7	5	6
Mile 89.8	5 (H)	nil	nil	5	4
Mile 89.8	6 (H)	nil	1	1	nil

* H - western hemlock
* C - western red cedar

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Mountain pine beetle activity continued in stands containing western white pine at many scattered points in Central Nelson District. Attacks, in most cases, were on the fringe of old infestations. These areas were the ones noted in previous years at Nacillewaet Creek, Bannock Point and along the Northeast Arm of Upper Arrow Lake, Craig Creek and Asher Creek on the west side of Trout Lake and an area opposite these creeks on the east side of Trout Lake, Beaton Creek, Begbie Lake (southwest of Revelstoke), both sides of the Columbia River at Downie Creek and numerous small patches between Revelstoke and Boat Encampment. Two infestations not previously reported were at Wragge Creek on the west side of Slocan Lake and Marblehead on the Lardeau River.

The beetle population appears to have dropped appreciably below that of previous years. However, a steady depletion of the valuable white pine continues to take place.

The writer has observed two distinctly different kinds of timber stands in which mountain pine beetle attacks take place. One is composed of overmature or decadent hemlock, cedar and white pine in which the beetles attack pine of declining vigor. The pine trees in these stands normally show neither signs of disease in the living tissues nor complicating insect associations. Beetle control in such stands becomes a matter of reasonably sanitary logging practices.

The other kind of stand may contain relatively immature hemlock, cedar, grand fir, Douglas fir, larch, ponderosa pine and spruce along with a high percentage of immature white pine trees. This kind of stand is more often found under attack by beetles than the first. Assessment of the beetle

situation in such stands is difficult due to the frequent presence of white pine blister rust, pole blight and several species of bark and wood boring moths. Mechanical injury from blow-down is increased in the stand due to breakage at disease lesions which weaken the stems of affected trees. The effects of blister rust lesions are aggravated by rodents, particularly squirrels, chewing on the bark around these lesions which is attractive to them.

A merchantable stand of this description is often selectively cut. Where beetle control is an objective it is desirable to consider all the factors relative to the beetle outbreak. Since many pines as small as 8 to 10 inches d. b. h. show damage by the factors mentioned above, it would appear that rigid adherence to d. b. h. cutting limits are not desirable when dealing with the white pine in these stands.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The widespread forest tent caterpillar infestations of the past few years appear to have collapsed in Central Nelson District during 1955. A mass collection of first instar larvae was taken from trembling aspen at Summit Lke on the 13th of June; a further visit on the 29th of June revealed that almost 100 per cent of the larval population had died. The spring of 1955 was very retarded and it is believed that adverse weather conditions coupled with disease were responsible for the collapse.

No larval activity was noted at Zincton, Sandon, Sidmouth or anywhere else in the district.

Ten egg masses (deposited during 1954) were collected at Summit Lake in the Slocan Valley on the 29th of June, 1955 and were held over for examination. The information obtained from the dissection of these eggs appears in Table 7. These data indicate that a heavy mortality occurred during the egg stage since only 36 per cent hatched successfully. (For further information on this refer to the Technical Report for interior British Columbia 1955.)

Pine Root Weevil, Hypomolyx piceus (DeG.)

This weevil was found attacking western white pine at Mackinson Flats along Arrowpark Creek 12 miles from West Arrowpark. The larvae of this rather large weevil feed on the outer bark and cambium layers of the roots and root crown below the duff layer. They work within a sticky mass of dirt, pitch and frass which becomes quite hard when dried out. The few teneral adults found were in pupal chambers formed of pitch and dirt very close to the larval feeding site. Insect resinosis in the ground is recognizable by the borings and frass mixed with pitch.

Verification of the identification of immature and adult specimens was obtained from G. L Warren of the Forest Biology Laboratory at Winnipeg.

Table 7

Analysis of Forest Tent Caterpillar Egg Masses
Collected at Summit Lake on June 29, 1955.

Mass number	Successfully hatched	Eggs not developed	Larvae formed but not hatched		Parasitized
			Egg cap not removed	Egg cap removed	
1	68	14	7	22	1
2	83	5	54	3	2
3	-	101	-	-	-
4	36	10	12	37	1
5	5	29	26	26	-
6	-	151	13	-	-
7	109	10	7	2	-
8	25	26	53	10	2
9	0	62	18	-	-
10	76	18	2	2	1
Totals	402	426	192	102	7
Per Cent	36	38	17	9	1-

The damage attributed to the insect was girdling or scoring of the root crown, which varied a great deal with the size of the tree. Where trees of 2 inches d. b. h. and less were attacked, they were completely girdled and dead or dying while larger trees (up to 12 inches d. b. h.) had damage consisting of severe scoring of the bark and cambium, to damage to the outer bark only.

The timber stand where samples were taken is an almost pure stand of white pine with very few trees larger than 12 inches d. b. h. The timber is affected by white pine blister rust, pole blight and root rot. The possible relationship of pine root weevil, Hypomolyx, to any of these is unknown. The soil in this area is very sandy.

No definite visible symptoms were noted on the larger attacked trees, other than resinosis revealed by digging. In the small reproduction the foliage turns bright red while the bark stays green the first year after Hypomolyx larval feeding.

Many pole-sized trees showed indications of weevil damage but no insects were present.

The sampling was random with the exception of some of the reproduction where an attempt was made to correlate certain symptoms with Hypomolyx attack. Earth and duff were removed from the base of the trees for a distance of about 12 inches to a depth of 6 to 8 inches. Trees less than one inch d. b. h. were pulled out of the ground for examination.

Table 8

Results of Examination of White Pine for the Pine Root Weevil at Mackinson Flats, August 18, 1955.

Tree No.	D.B.H.	Resinosis (Hypomolyx)	Insects present	Root rot present	Cambium layer scored	Disease symptoms (rust and blight)	Tree apparently healthy	Remarks
1	4	yes	-	-	-	yes	-	
2	12	yes	-	-	-	-	yes	
3	4	yes	-	-	-	yes	-	Cambium dry
4	5	yes	2 L	-	yes	yes	-	
5	7	yes	-	yes	yes	yes	-	
6	4	yes	2 L	-	yes	-	yes	
7	7	yes	1P + 1A	-	yes	-	yes	
8	9	yes	-	yes	-	yes	-	
9	12	yes	-	-	-	-	yes	
10	5	yes	-	-	-	-	yes	
11	9	-	-	-	-	yes	-	
12	5	-	-	-	-	-	yes	
13	9	yes	-	-	-	yes	-	

Trees attacked past and present: 11 out of 13, i. e. 85 per cent.

A dash (-) means "no" or "nil".

Table 9

* Results of Examination of White Pine for the Pine Root Weevil at Mackinson Flats, September 2, 1955.

Tree No.	D. B. H.	Hypomolyx resinosis	Non insect resinosis	Insects present	Root rot present	Cambium layer scored	Remarks
1	1.7	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
2	.5	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
3	.5	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
4	1.3	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
5	.7	-	yes	-	yes	-	Healthy - slight cast of 2 yr. ndls.
6	1.2	yes	-	-	-	yes	Healthy - slight cast of 3 yr. ndls.
7	1.3	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
8	1.2	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
9	.5	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
10	1.4	-	-	-	-	-	Healthy - slight cast of 3 yr. ndls.
11	1.4	-	-	-	-	-	Healthy - slight cast of 2 yr. ndls.
12	.7	-	yes	-	yes	-	Green tip - remainder red.
13	.5	-	-	-	-	-	Green tip - remainder red (die-back)
14	1.0	-	-	-	-	-	Green tip - remainder red (die-back)
15	.5	-	yes	-	yes	-	All red - bark dry
16	.6	yes	-	1 A	-	yes 100%	All red - bark green
17	.5	yes	-	-	-	yes 100%	All red - bark dry
18	.5	yes	-	-	yes	yes 100%	All red - bark dry
19	.5	-	-	-	yes	-	All red - bark dry

* Percentage not applicable (sampling not random)

A dash (-) means "no" or "nil"

Table 10

Results of an Attempt to Correlate Symptoms
of Attack with Occurrence of Pine Root Weevil at Mackinson Flats,
September 1, 1955.

Tree No.	D. B. H.	Resinosis (Hypomolyx)	Insects present around root	Root rot present	Cambium layer scored	Disease symptoms (rust and blight)	Tree apparently healthy	Remarks
1	10	yes	1 A	yes Lt	yes Hy	-	yes	
2	10	yes	-	yes* Hy	yes Hy	-	yes	* not Armillaria
3	9	yes	-	yes* Hy	yes Hy	yes	yes	* not Armillaria
4	11	yes	1 L	yes	yes	yes	-	
5	9	yes	1 L	-	yes	-	*	* medium healthy growth
6	8	yes	1 L	-	yes	-	yes	
7	6	yes	-	-	?	-	yes	
8	9	yes	1 L	-	yes	-	yes	
9	10	yes	-	-	yes Hy	-	yes	
10	12	yes	-	-	yes Hy	-	yes	

Past and present attack: 100 per cent.

A dash (-) means "no" or "nil".

The data given in Tables 8, 9 and 10 cover all trees examined with the exception of a few trees less than one inch d. b. h., one of which contained the pupae of Pissodes sp. at the base of the stem. The tables show a high per cent of Hypomolyx attack in white pine on the area examined. No further interpretations are attempted here.

Hemlock Sawfly, Neodiprion sp.

Light to heavy populations of hemlock sawfly were observed in widely scattered areas of the district on western hemlock. Map 2 shows the location of known hemlock sawfly populations with the terms light, medium and heavy indicating 1 - 20, 21 - 100, and 101 - 200 larvae respectively per beating sample. Damage to hemlock was light and consisted of slight defoliation on portions of trees supporting colonies of the insect. No foliage discoloration was noted. This sawfly is said to be capable of causing serious damage but is not recorded to have done so in the interior of British Columbia.

Willow Leaf-miner, Lyonetia saliciella Busck.

This insect continued in infestation proportions throughout most of the district causing discoloration of its host, willow. Damage was most noticeable at Trout Lake and Upper Arrow Lake where as much as 100 per cent of the host foliage was mined. Leaf mining was severe throughout the Columbia River Valley in the Central Nelson District.

A Poplar Leaf Blotch Miner, Phyllonorycter sp.

Severe "browning" of the cottonwoods on low lying areas in the Arrowhead region was caused by this leaf-miner. It was also active around Upper Arrow Lake and along the Columbia River but damage was not severe.

Aspen Leaf-miner, Phyllocnistis populliela Chamb.

The aspen leaf-miner was very common throughout the district wherever trembling aspen occurred. The heaviest attack was noted between Arrowhead and Revelstoke where the infestation varied from medium to very heavy.

Saddle-back Looper, Ectropis crepuscularia Schiff.

During 1955 the saddle-back looper was present only in small numbers with 12 collections from western red cedar and western hemlock combined yielding an average of 1+ larvae along the Big Bend Highway with numerous collections containing no larvae.

The filament bearer, Nematocampa limbata (Haw.), was collected in the same locality from western hemlock. An average of 4 larvae per collection for 16 collections with a maximum of 11 larvae was found. These insects have occurred in higher than normal numbers in the past few years but appear to be subsiding.

STATUS OF TREE DISEASES

Brown Stringy Rot Caused by Echinodontium tinctorium E. and E.

This fungus has been recorded previously as prevalent in the hemlock stands of the district. Noteworthy, however, was the very high incidence of the disease in Glacier National Park. Seventy-five per cent or more of the western hemlock and mountain hemlock trees observed along one-half mile of trail in the vicinity of Glacier Post Office had one or more fruiting bodies of the fungus on their stems. The stand is at an elevation of 4,000 - 5,000 feet. Fruiting bodies were not found on alpine fir in this locale.

Die-back of Ponderosa Pine Caused by Cenangium ferruginosum Fr.

A search was made for this disease but no positive samples were collected. The host, ponderosa pine, is not an important species in the Central Nelson District.

A Canker on Hemlock Caused by Caliciopsis sp.

No new records of this canker were obtained from western hemlock in 1955. It was recorded at Hill Siding (Slocan Valley) in 1954. A similar disease, Caliciopsis pseudotsugae, on Douglas fir was observed in the vicinity of Kootenay, Duncan, Slocan and Upper Arrow lakes in association with Cicada spp. damage.

Needle Cast of Western Larch Caused by Hypodermella laricis v. Tubeuf.

Reproduction western larch was heavily hit by needle cast at several points along the southwest side of Kaslo River at about 4,000 feet elevation. Approximately 300 acreas of forest was affected. The disease, which causes discoloration of the needles, was apparent but not severe on the east side of Kootenay Lake at Kaslo.

Blow-down, June 22, 1955.

On June 22 a very severe wind and rain storm caused "blow-down" in

localized areas throughout the Central Nelson District. Areas varied from one to several hundred acres. Forest Management Licence Number 3 at Passmore suffered blow-down in a residual stand of selectively cut hemlock and cedar which was "earmarked" for later recutting for pulp. On the west side of Slocan Lake at Wragge Creek, selective cutting plans were disrupted and logging operations severely complicated. Wilson Creek at the north end of Slocan Lake suffered widespread blow-down on logging operations as did areas northwest of Arrowpark.

Severe blow-down of Douglas fir, engelmann spruce, alpine fir, western hemlock and western white pine occurred in Revelstoke National Park. Two areas of hemlock blow-down were noted from the air at Downie Creek and Goldstream River on the Big Bend. Detailed information on the extent of blow-down probably will be available from the British Columbia Forest Service.

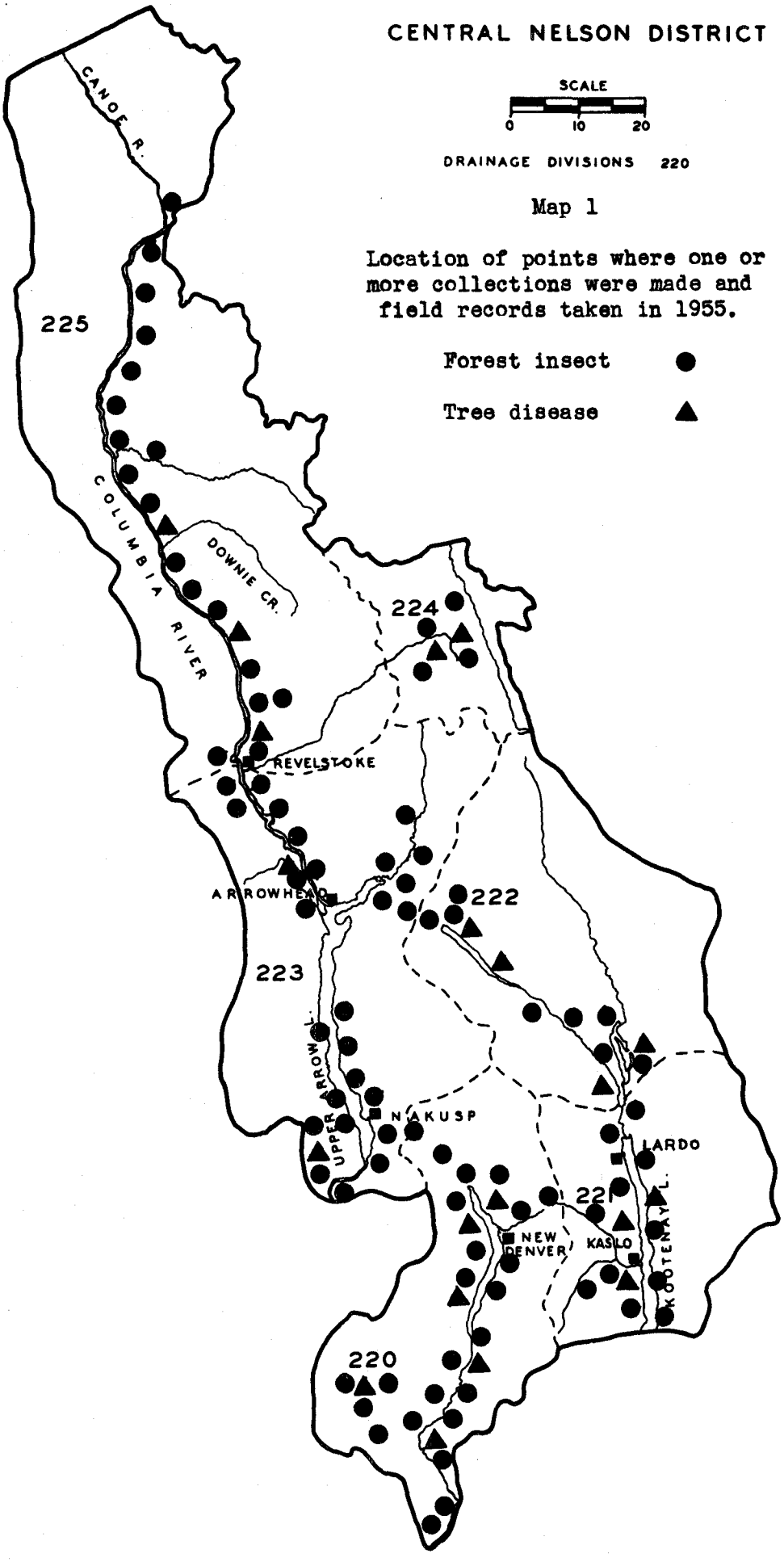
The blow-down in Revelstoke National Park was inspected for bark beetle attack. No beetles of the genus Dendroctonus were found on any of the tree species mentioned above as being on the area. However, one alpine fir tree was infested with Dryocoetes sp., which is a major pest to alpine fir and is capable of the destruction of this species if they become numerous enough. Ips. sp. were recorded from one spruce tree. They are not considered to be of primary importance in the destruction of standing timber but hasten the deterioration of dead or badly weakened trees.

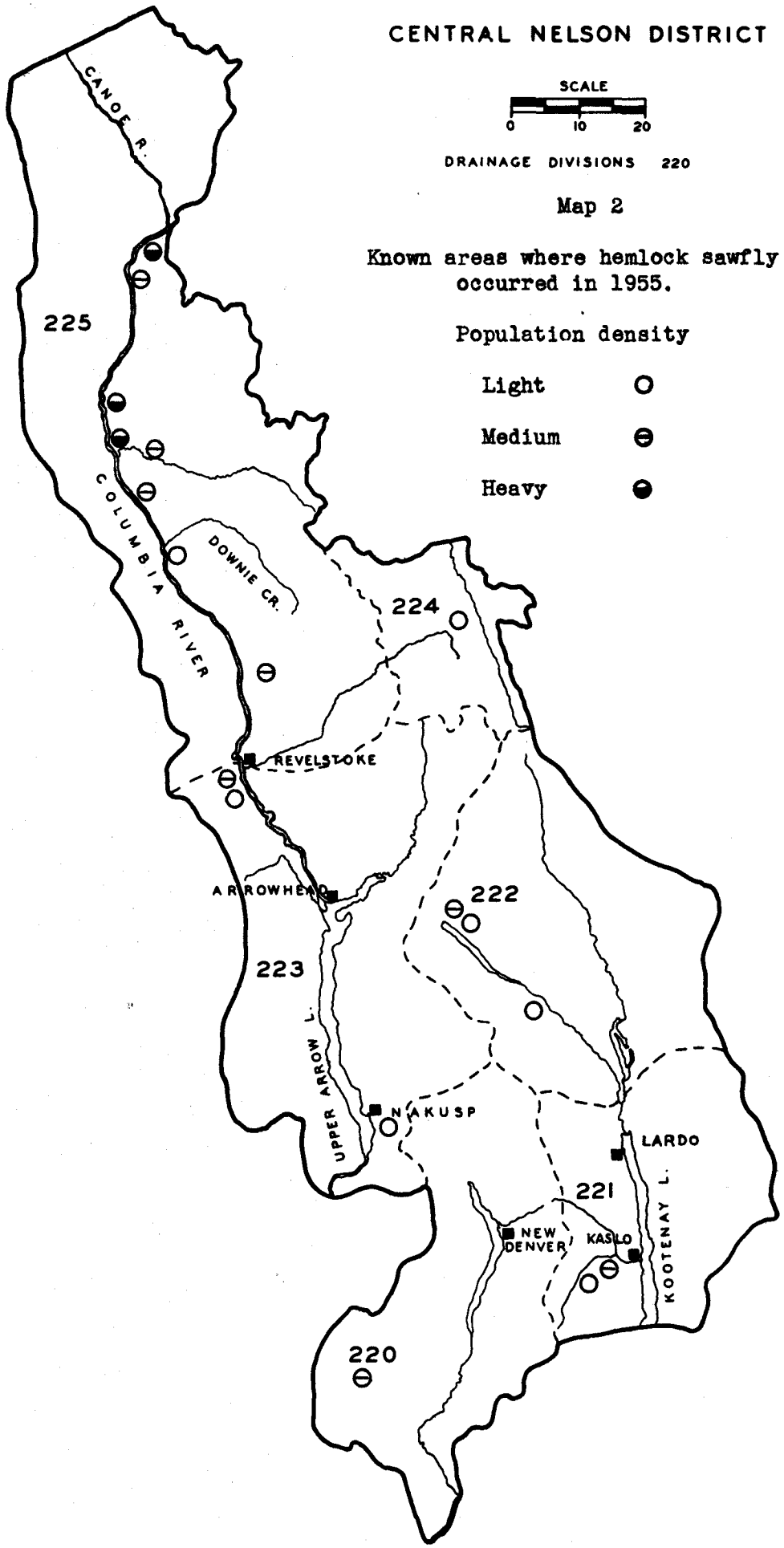
The blow-down at Wragge Creek and Arrowpark Creek are shown in Plate , Figures 1 to 6, in the photographic section of this report.

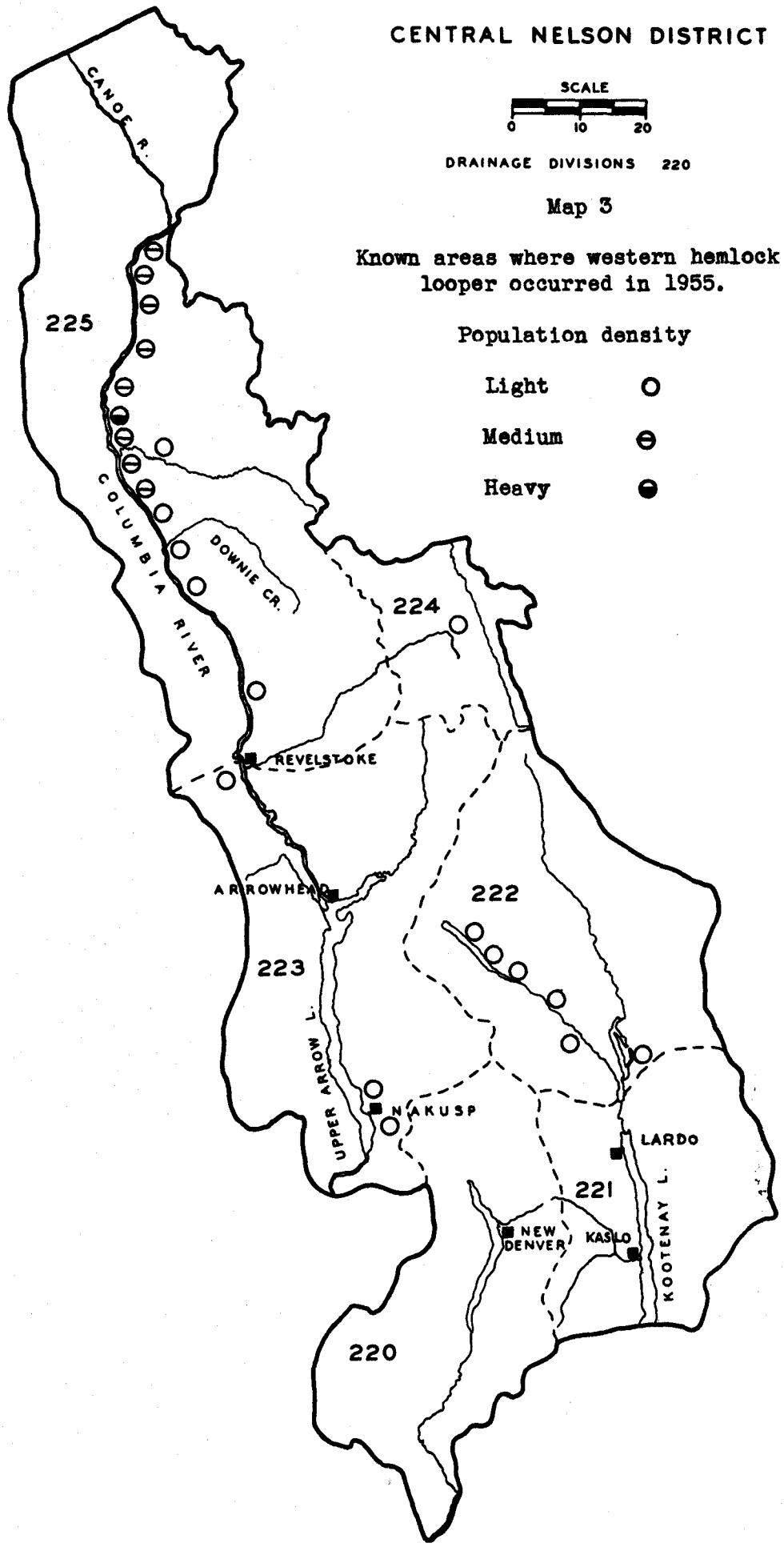
Porcupine Damage.

The northwest side of Duncan Lake showed evidence of severe mechanical injury on pole-sized Douglas fir, western red cedar and western larch over an area of about one square mile. Bark was stripped from the trunks of the trees from ground level to a 3- or 4-inch top diameter. Porcupines are considered to be the culprits but none were collected! Numerous dead or dying trees were observed. Those which were not completely girdled will have a greatly decreased commercial value due to the formation of extensive "cat faces" and greater susceptibility to disease.

CENTRAL NELSON DISTRICT




CENTRAL NELSON DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 220
Map 2
Known areas where hemlock sawfly occurred in 1955.
Population density
Light
Medium
Heavy
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
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Map 3
Known areas where western hemlock looper occurred in 1955.
Population density
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COLUMBIA RIVER
DOWNIE CR.
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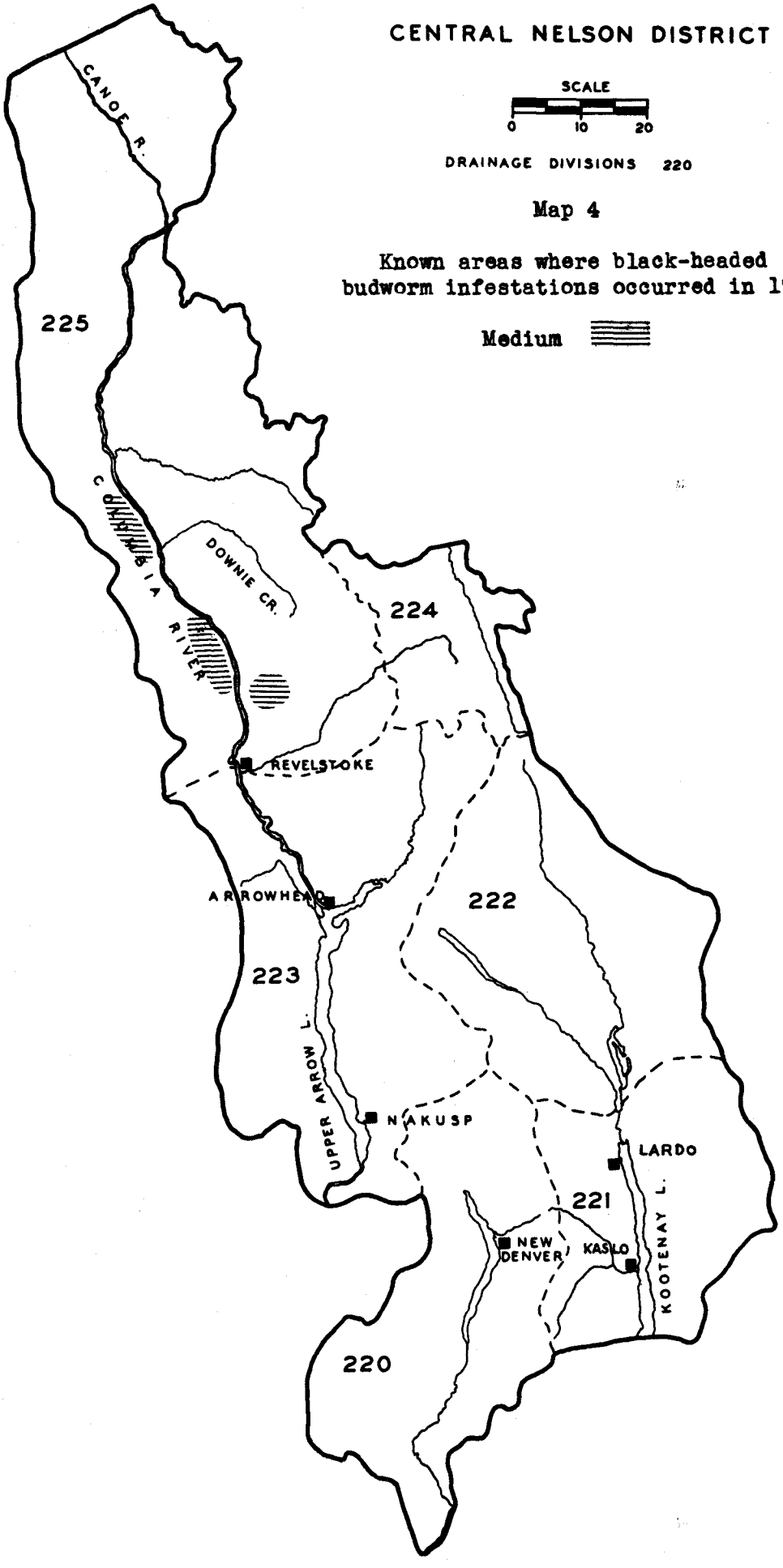
REVELSTOKE
ARROWHEAD
222
223
UPPER ARROW L.
NAKUSP
LARDO
221
NEW DENVER
KASLO
KOOTENAY L.
220

CENTRAL NELSON DISTRICT



Map 4

Known areas where black-headed budworm infestations occurred in 1955.

Medium

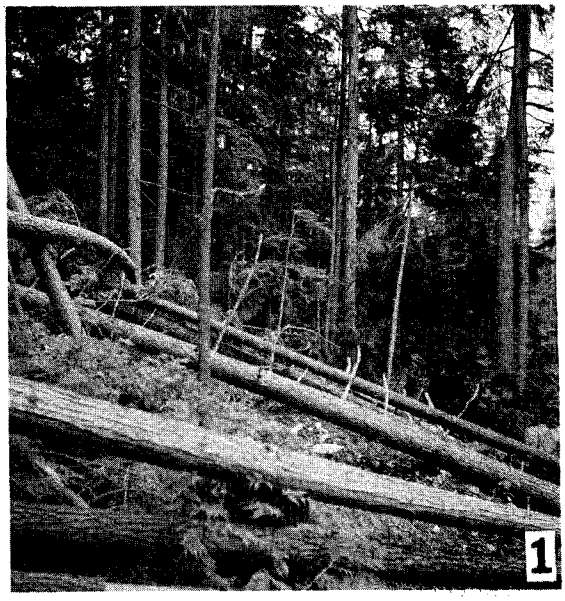
CENTRAL NELSON

Figures 1 and 2 — Blow-down of residual western hemlock and western red cedar trees on the fringe of an opening in the forest at Arrowpark Creek. The damage occurred June 22, 1955 and the pictures were taken one week later.

- by D. H. Ruppel

Figures 3, 4, 5 and 6 — Windfallen western hemlock, Douglas fir, western white pine, lodgepole pine, and deciduous trees 16 inches and under on a selectively cut area at Wragge Creek. The damage here also occurred June 22, 1955. These pictures were taken two weeks later.

- D. H. Ruppel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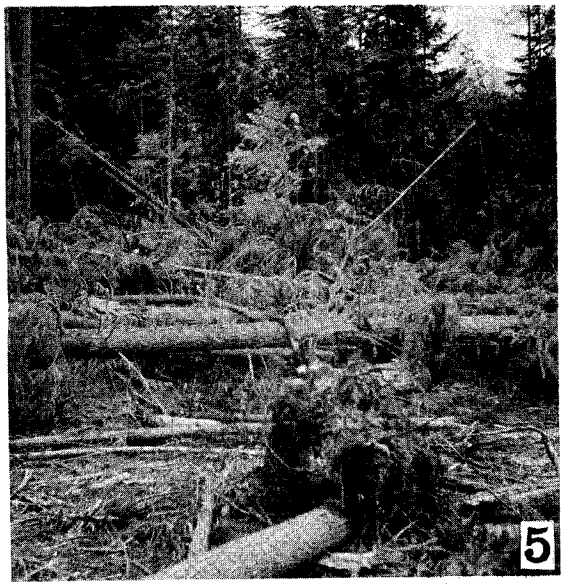
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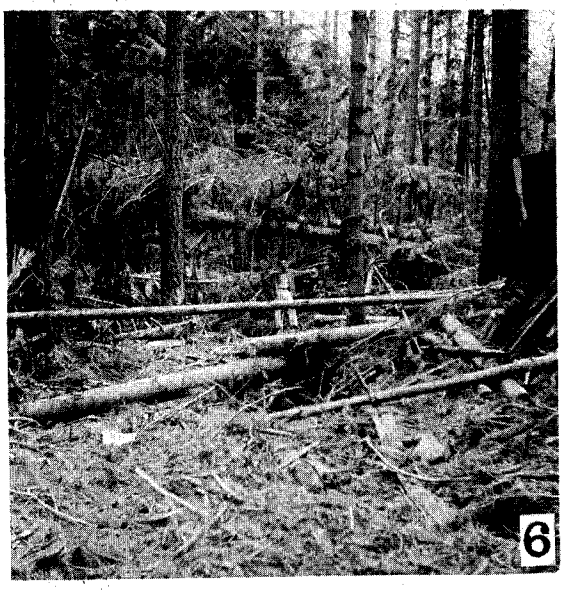

6

FOREST BIOLOGY SURVEY

EAST NELSON DISTRICT

1955

C. B. Cottrell

INTRODUCTION

The Forest Insect and Disease Survey began on June 4 and ended September 29. In addition to routine sampling an aerial bark-beetle survey was made through the co-operation of the British Columbia Forest Service.

Since the Forest Biology Ranger dwelling at Wasa Lake was not fully equipped, a house trailer was used as additional living quarters.

Forest Biology Rangers and co-operators made a total of 310 forest insect collections plus 15 tree disease collections in the East Nelson Forest Biology Ranger District. Table 1 shows the forest insect collections by agencies and Table 2, the forest insect and tree disease collections by hosts. Map 1 shows the distribution of forest insect and tree disease collections.

STATUS OF INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

This insect is still active in lodgepole pine stands, although populations are decreasing in most regions. The Windermere Creek infestation is slowly spreading eastward south of the creek, and a few trees north of the creek were also attacked. Of the two Steamboat Mountain infestations, the one near Luxor has remained active. There was very little beetle activity at White Swan Lake. The Whitetail Lake infestation is still spreading northward.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Time did not permit a complete survey of Douglas-fir trees infested during 1955. There were active populations of bark beetles in the following areas attacked during 1954:

Table 1

Forest Insect Collections by Agencies
East Nelson District - 1955

Personnel Involved in Collection	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	88	101	108	-	-	297
Forest Biology Rangers with Forest Service Personnel	-	-	6	3	-	-	9
Forest Service Personnel Independently	1	-	2	-	-	-	3
Other Co-operators	-	1	-	-	-	-	1
Total	1	89	109	111	-	-	310

Table 2

Collections by Hosts
East Nelson District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved Hosts	Forest Insects	Tree Diseases
Douglas fir	85	3	willow	6	
Engelmann spruce	61	1	trembling aspen	4	1
lodgepole pine	33	3	black cottonwood	2	
western larch	30		Douglas maple	1	
alpine fir	25	1	mountain alder	1	
western hemlock	25	2	chokecherry	1	1
ponderosa pine	12	2	miscellaneous	7	
western red cedar	6		no host	1	
rocky mountain juniper	6	1			
western white pine	2				
grand fir	2				
			Total	23	2
Total	287	13	Grand Total	310	15

Kootenay River: There were 6 infestations from Mile 4 to Mile 10 north-east of Canal Flats, of which 2 contained approximately 20 trees, and 4 from 25 to 30 trees each.

Steamboat Mountain: One group of 7 mature Douglas fir trees had been beetle-killed.

Jubilee Mountain: Several scattered Douglas fir trees had been attacked.

Toby Creek: A small number of larvae were present in Douglas-fir logging slash.

Windermere Creek: There were several patches of beetle-killed Douglas fir trees in the Twin Lakes area.

Fairmont Hot Springs: The "spot infestations" mentioned in previous reports appear to have subsided.

Two 1955 beetle-attacked Douglas-fir trees were discovered at a point 7 1/2 miles northeast of Canal Flats on the Kootenay River. By late summer the bark beetles had been "drowned out" by a heavy pitch-flow.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Although no serious outbreaks were reported, beetles were discovered in several stands of Engelmann spruce.

On September 28, 1955, an investigation was made of bark beetles in spruce at Cold Creek, a tributary of Hawkins Creek. Engelmann spruce trees felled during logging operations were heavily infested with Dendroctonus larvae. A "trap-tree" program is being carried out by Creston Sawmills and it is hoped that this project will prove to be a successful method of controlling the beetle population. In the spring of 1955, 6 groups of approximately 25 Engelmann spruce trees each, were felled as "trap-trees". These groups were at one quarter-mile intervals in an area which is to be logged in the winter of 1955-1956. Apparently the "trap-trees" as well as trees felled in the process of road construction were sufficient to attract the majority of the bark beetles since no standing Engelmann spruce trees were found to have been attacked in 1955. The beetle-infested trees are to be removed from the logging site and destroyed.

Eight Engelmann spruce trees in an overmature stand 12 miles south of Corbin had been attacked in 1954. One tree still retained green foliage and a few adult beetles. No 1955 attacked trees were discovered.

No beetles were seen in the recently infested areas of Van, Jim and Hawkins creeks.

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

The population level appeared to be increasing in the Big Bend region of the Columbia River. Forty-five miles of valley bottom, from 20 miles north of Donald to 10 miles north of Kinbasket Lake, may be considered as an area of light to medium population density. The average number of larvae taken in standard random collections was, western hemlock (10.8), western red cedar (7.0), and Engelmann spruce (13.5). Besides occurring in the greatest numbers, larvae on Engelmann spruce were more developed than those on western hemlock or western red cedar. Three hemlock looper sampling points were established in this area.

Larvae were collected also in small numbers in the following districts: Spillimacheen, Invermere, Canal Flats, and West Cranbrook (Map 2).

False Hemlock Looper, Nepytia canosaria Wlk.?

A random sample from Douglas fir at the junction of the Fort Steele road and Number 3 Provincial highway contained 26 larvae. Further collections showed this figure to be a representative sample of the population in approximately four acres of Douglas-fir reproduction. However, several collections within a radius of one mile around this area contained from one to four larvae only. No defoliation was noticeable.

In Windermere Valley, the site of an infestation in 1948, collections contained an average of less than one larva per sample.

A Sawfly on Lodgepole Pine, Neodiprion sp.

Larval colonies were common (Map 4) in the Spillimacheen, Invermere, and Canal Flats Forest Ranger districts. Several hand-picked collections contained over 60 larvae; the highest was 81. The average for the field season was 38 larvae per collection, however, the resulting defoliation on lodgepole pine was very slight.

A Sawfly on Hemlock, Neodiprion sp.

A light to medium population density occurred in almost all western hemlock stands, notably the Big Bend region of the Columbia River, Lamb Creek, and Canuck Creek (Map 3).

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Dead leaders and multi-topped trees were common in Engelmann spruce reproduction stands throughout the entire district. Up to 50 per cent of the trees were infested in such heavily attacked areas as Michel, Hawkins, and Canuck creeks.

A Leaf Miner, Lyonetia saliciella Busck.

This insect infested the leaves of the majority of willows in fringe areas along the Columbia River from Columbia Crossing to Golden. This resulted in discoloration and early dropping of the leaves.

Black-headed Budworm, Acleris variana (Fern.)

Collections from Engelmann spruce consistently contained from 10 to 15 larvae in the Golden and Spillimacheen Forest Ranger districts. The greatest populations occurred 25 miles northwest of Spillimacheen on the Spillimacheen River and along the Big Bend Highway in the vicinity of Donald and Bush River.

Poplar and Willow Borer, Sternochetus lapathi (L.)

This weevil has attacked scattered stands of willow throughout the southern half of the district. However, three areas in particular have been heavily infested; Kimberley to TaTa Creek, the mouth of the Bull River and a few miles west of Natal. Each of these areas covers several square miles of burnt-over country; willow provides almost all of the ground cover. A typical willow clump containing from 25 to 40 stems might have 60 per cent dead stems and up to 25 per cent recently infested stems (see Figures 3 and 4).

Sequoia Pitch Moth, Vespamima sequoiae (Hy. Edw.)

The Sequoia pitch moth is common throughout the Canal Flats, East Cranbrook, and Elko Forest Ranger districts. Up to 20 per cent of the lodgepole pine trees in localized areas have been infested but very few trees have been killed by this insect.

Spruce Budworm, Choristoneura fumiferana (Clem.)

The 1-year-cycle budworm was not present in significant numbers.

Two-year-cycle budworm: The only known infestation in this district is near Bugaboo Glacier. This area was not visited during 1955, however, as it is the "off year" it is assumed that feeding was light.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

This sawfly occurred commonly throughout the entire district in small numbers with one exception. Four open-grown Engelmann spruce (4 inches d. b. h.), 3 miles north of TaTa Creek P. O., had been denuded of 90 per cent of their new foliage and 10 per cent of their old foliage (see Figure 2).

Ugly-nest Caterpillar, Archips cerasivorana (Fitch)

The ugly-nest caterpillar completely defoliated road-side fringes of chokecherry bushes for a distance of one mile north of Invermere Junction on Provincial Highway 95 (see Figure 1).

Pine needle Scale, Phenacaspis pinifoliae (Fitch)

This scale insect was present in small numbers on road-side Douglas-fir reproduction in the northern portion of Windermere Valley.

Juniper Sawfly, Monoctenus sp.?

Collections from roacky mountain juniper on the west side of Columbia Lake contained from 5 to 16 larvae per sample.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The light infestations of 1954 have completely collapsed in the vicinity of Golden (Moberly, Parson, Nicholson, Brisco, McMurdo). No larvae were discovered during the field season and standard egg samples were negative. Not only were new egg masses absent, but old egg masses as well, the latter possibly due to the vigorous growth this year of trembling aspen and the resultant bursting of egg bands.

A Needle-feeding Scarabaeid, Dichelonyx sp.

Frequently this beetle was encountered in Douglas fir collections in the Invermere Forest Ranger District. One collection at Wilmer contained 40 adults and a collection at Radium Junction contained 52 adults.

STATUS OF TREE DISEASES

Brown Stringy Rot caused by Echinodontium tinctorium E. & E.

Conks of Indian Paint Fungus frequently were found on the trunks of western hemlock. The most heavily attacked areas were in the higher elevations of Hawkins Creek Valley, Lamb Creek, and along the Big Bend Highway.

A Root Rot probably caused by Armillaria mellea (Vahl.) Que'l.

White mycelia were found between the bark and wood at the root-collar of immature Douglas-fir trees. One or two trees per acre have been killed in the Windermere Valley.

Needle Blight of Douglas-fir caused by Rhabdocline pseudotsugae Syd.

This needle blight was very common Douglas-fir Christmas tree stock in the Spillimacheen, Invermere and Canal Flats Forest Ranger districts. It occurred on the 1954 needles causing a large percentage to turn yellow and drop off.

Larch Needle Cast caused by Hypodermella laricis Tub.

Larch needle cast was prevalent in western larch stands east of Kootenay River near Canal Flats. However, in general, the attack was much lighter than in previous years, especially in the Elko and West Cranbrook Forest Ranger districts.

A Gall caused by Hymnosporangium sp.

The gall appears on the twigs of rocky mountain juniper. It is very common in the vicinity of Columbia Lake but is not known to cause serious damage.

Tree damage caused by animals.

Feeding activities of the porcupine, Erethizon dorsatum L., were responsible for topkill and the destruction of occasional branches of ponderosa and lodgepole pine in the Canal Flats and East Cranbrook Forest Ranger districts (see Figure 6).

Injury to Alpine fir by an unknown cause.

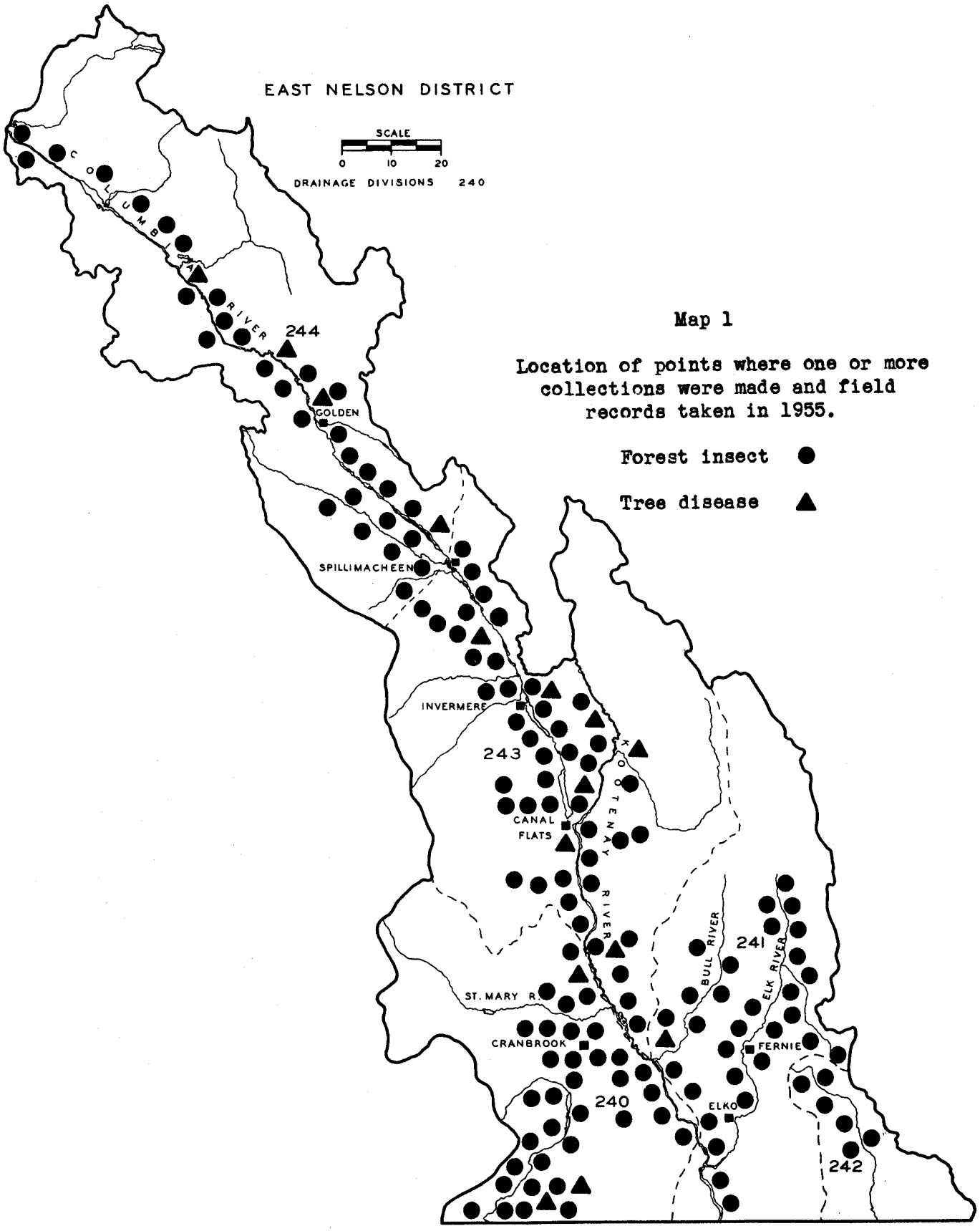
It was noted that many of the alpine fir in the Hawkins Creek area had a multi-topped growth. The injury resembled the damage caused by the balsam woolly aphid, in that the leaders were swollen and deformed. Samples were sent to the Forest Biology Laboratory in Vernon, and the Forest Pathology Laboratory in Victoria. Cause for the injury remains undetermined.

Blow-down areas.

Cartwright Lake: The blow-down of Douglas fir and lodgepole pine trees at Cartwright Lake occurred in July, 1952. As the bark of the fallen timber has thoroughly dried out, the risk of attracting primary bark beetles seems to have passed.

Skookumchuck Creek: On June 22, 1955, the timber on several thousand acres was wind-thrown in the valley. Douglas fir and western larch trees were up-rooted in the lower portion of the valley. Logging operations were being carried out before the storm occurred, therefore, it is possible that some of this timber may be salvaged.

At higher elevations, stands of lodgepole pine trees were blown over. As far as could be determined by aerial and ground reconnaissance, mountain pine beetles were not present before or after the storm. However, this timber may be attacked in 1956 as there are active populations of mountain pine beetle in the adjacent stands of lodgepole pine.

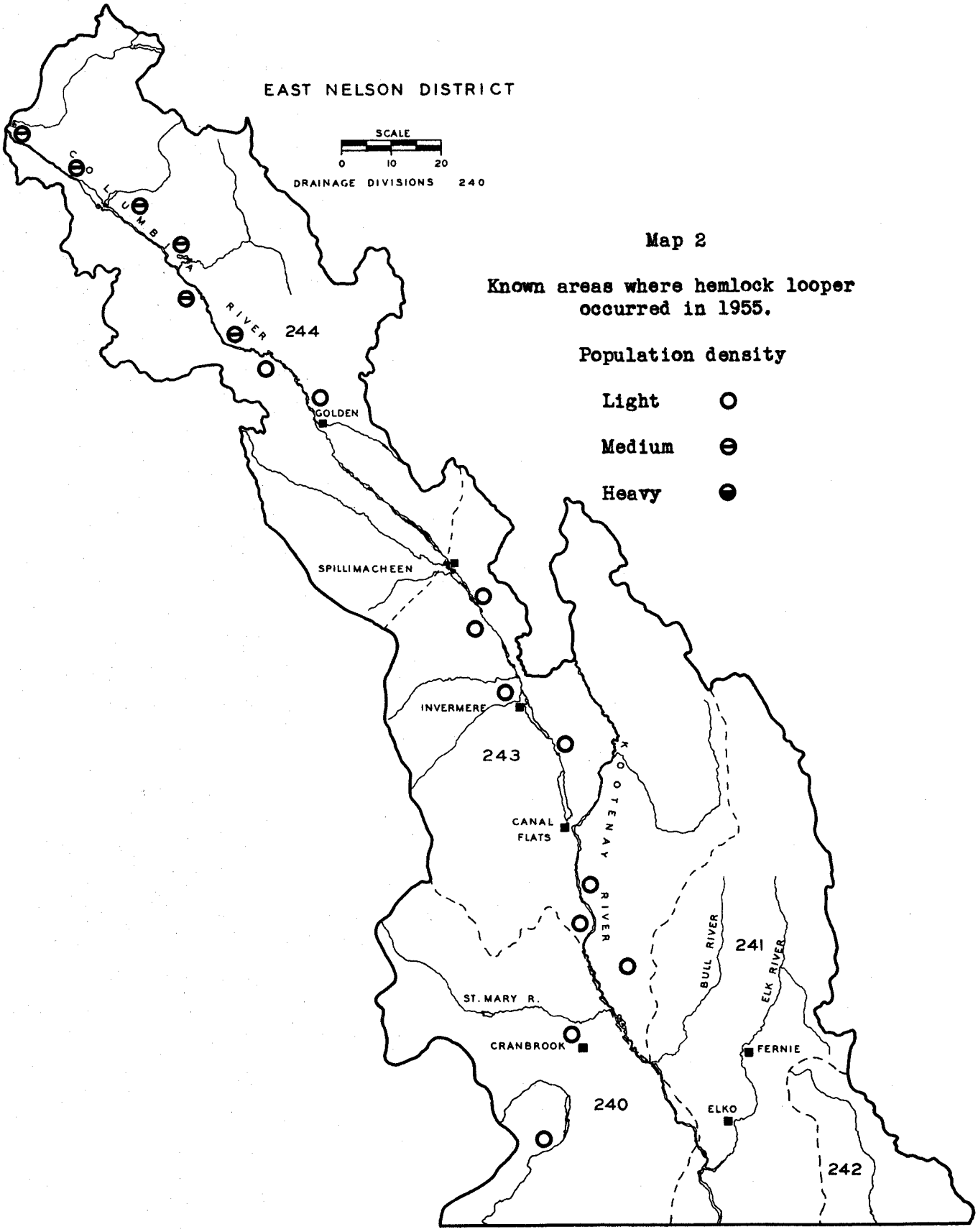


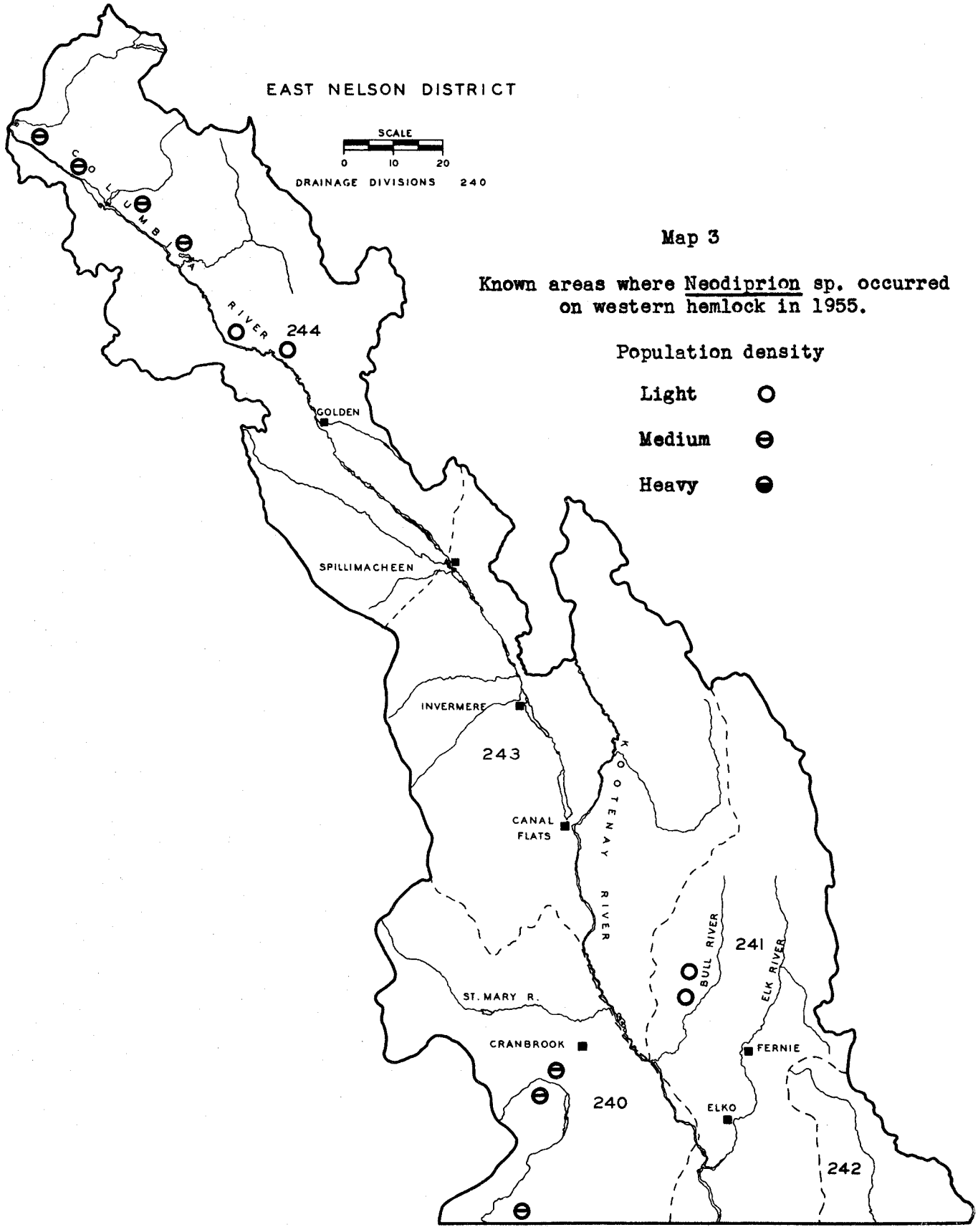
Map 1

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲


EAST NELSON DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 240
COLUMBIA RIVER
244
GOLDEN
SPILLIMACHEEN
INVERMERE
243
CANAL FLATS
KOOTENAY RIVER
BULL RIVER
241
ELK RIVER
ST. MARY R.
CRANBROOK
FERNIE
240
ELKO
242
Map 2
Known areas where hemlock looper occurred in 1955.
Population density
Light
Medium
Heavy



Map 3

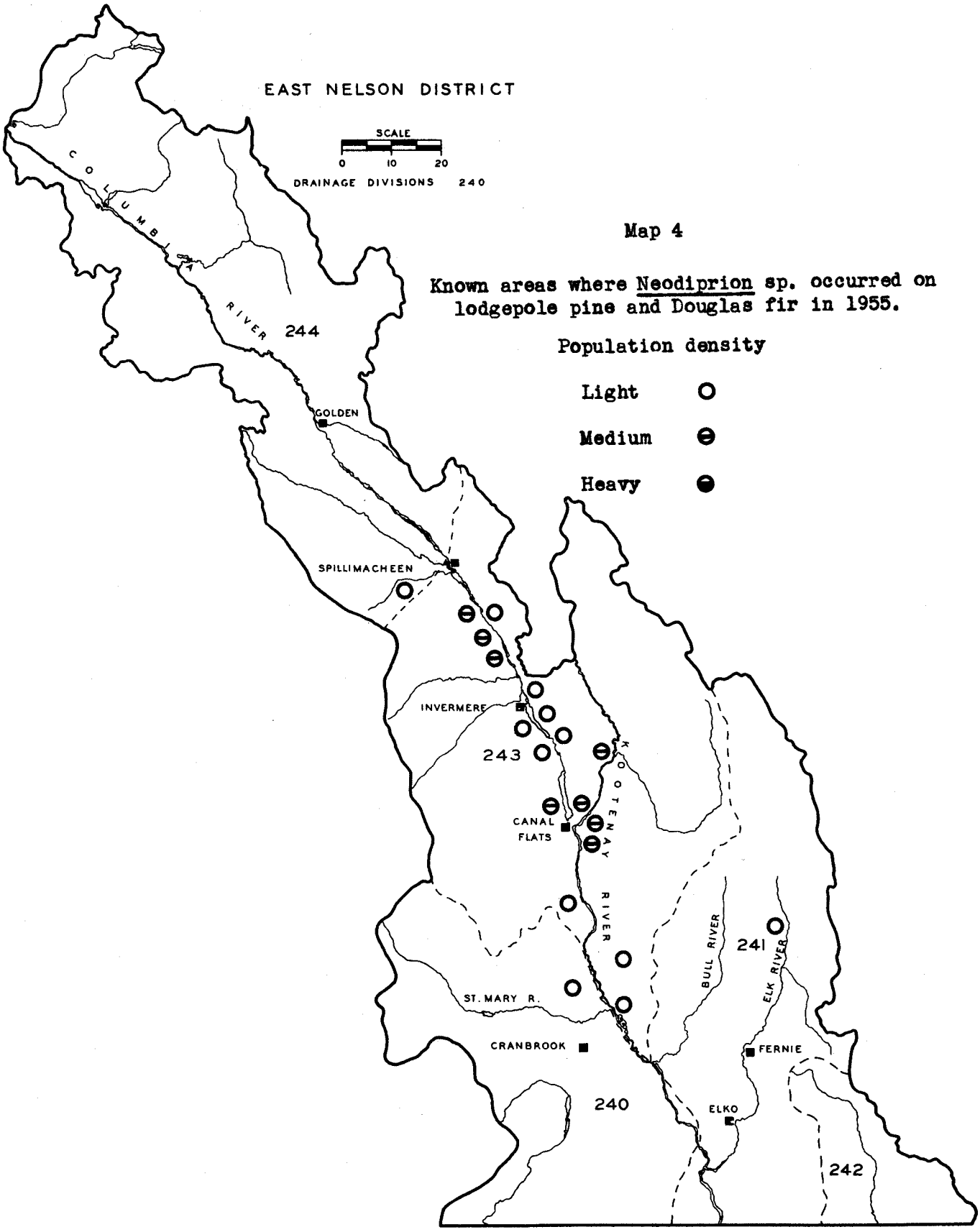
Known areas where Neodiprion sp. occurred on western hemlock in 1955.

Population density

Light

Medium

Heavy



Map 4

Known areas where Neodiprion sp. occurred on lodgepole pine and Douglas fir in 1955.

Population density

Light ○

Medium ⊖

Heavy ●

EAST NELSON

Figure 1 — Ugly-nest Caterpillar, Archips cerasivorana (Fitch). Defoliation of roadside chokecherry at Invermere, July 10, 1955.

- by C. B. Cottrell

Figure 2 — Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh. New growth of Engelmann spruce denuded by this sawfly near TaTa Creek, August 11, 1955.

- by C. B. Cottrell


1


2

Figure 3 Poplar and Willow Borer, Sternochetus lapathi (L.). A willow stem with the bark removed revealing the galleries made by the poplar and willow borer near Mather Creek, July 28, 1955.

- by C. B. Cottrell

Figure 4 Poplar and Willow Borer, Sternochetus lapathi (L.). Clumps of dead and dying willow infested by this borer near Natal, August 20, 1955.

- by C. B. Cottrell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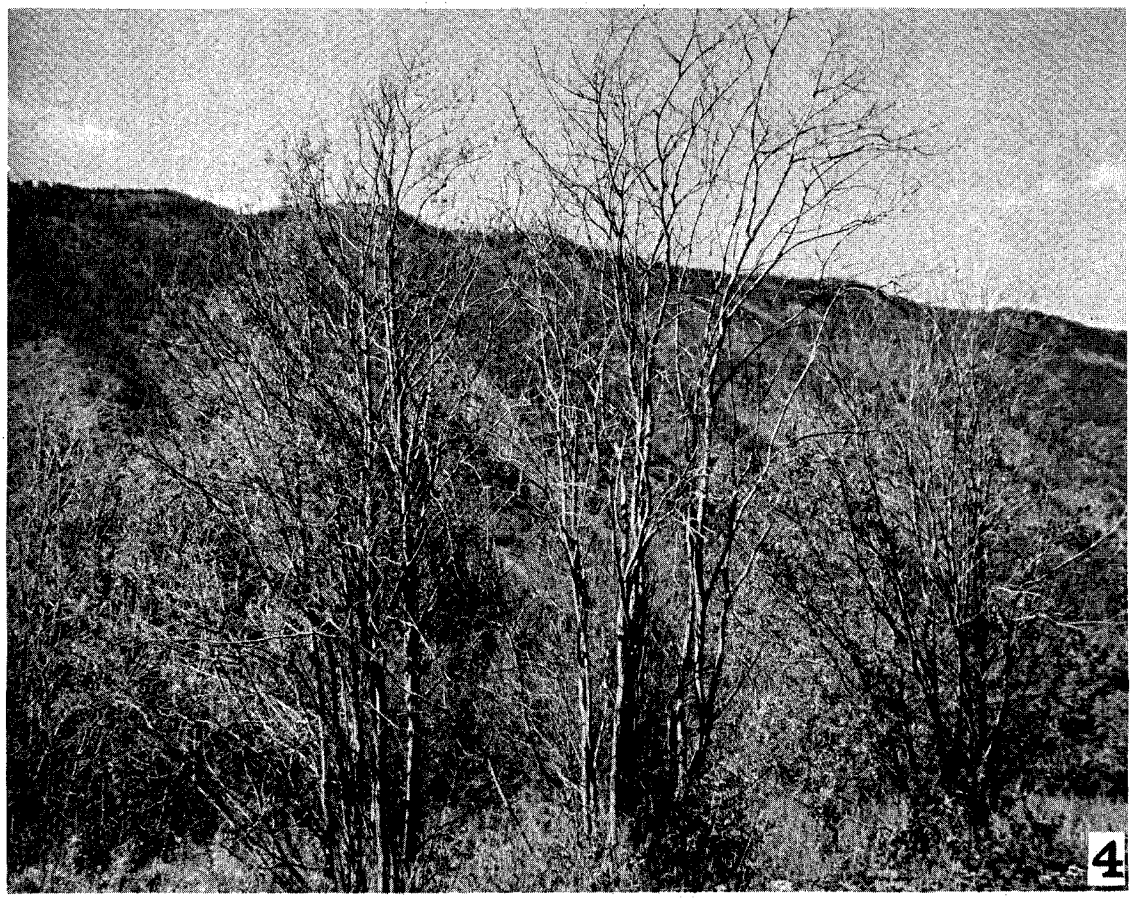
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Figure 5 A witch's broom on Douglas fir, cause unknown. Brisco, July 25, 1955.

- by C. B. Cottrell

Figure 6 Ponderosa pine top-killed by the feeding activities of the porcupine, Erethizon dorsatum L. Canal Flats, June 22, 1955.

- by C. B. Cottrell

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6

FOREST BIOLOGY SURVEY

PRINCE GEORGE FOREST DISTRICT

1955

J. Grant

INTRODUCTION

In 1955 three Forest Biology Rangers were assigned to the Prince George Forest District: G. M. Jones spent most of the field season in North Prince George Forest Biology Ranger District while J. Grant and R. B. Tocher worked in the South and West Prince George districts respectively.

Although 1955 was a "non-flight" year for the 2-year-cycle spruce budworm it continued to be the most important forest insect pest on the basis of extent of infestation. Population levels were lower in stands where heavy defoliation occurred prior to 1953, particularly in the Pine Pass, Wells-Barkerville and Nation River districts.

The western hemlock looper caused some damage in the McBride District but its numbers diminished in most other localities.

Attacks by the Douglas-fir beetle continued, chiefly in the region south of Quesnel; in September surveys were conducted to determine the volume of timber destroyed.

The forest tent caterpillar epidemic collapsed in 1955 but some defoliation of aspen was caused by the large aspen tortrix. In northern British Columbia the extensive infestation of aspen leaf-miner continued unabated.

The most conspicuous forest disease was a needle cast fungus which caused heavy loss of lodgepole pine foliage in many localities. Infection of spruce by needle rusts was also more prevalent than usual.

Valuable assistance was rendered during the field season by personnel of the British Columbia Forest Service, the Yukon Forestry Division, and the Dominion Department of Fisheries; their co-operation and generosity are gratefully acknowledged.

FOREST BIOLOGY SURVEY

SOUTH PRINCE GEORGE

1955

J. Grant

INTRODUCTION

The field season in the South Prince George Forest Biology Ranger District began on June 8 and ended on September 28. A special three day's trip was made to McBride in mid-October. During the summer, 20 working days were spent in West Prince George Forest Biology Ranger District, and 2 in North Prince George District.

A total of 126 insect collections were made in the district, the majority of which were random beating samples. Mass collections of the western hemlock looper were sent to the Victoria Laboratory, and two mass collections of the 2-year-cycle spruce budworm were taken for rearing at Vernon.

Table 1 gives the source of insect collections on a monthly basis, and Table 2 shows the numer of insect and tree disease collections by hosts. The distribution of locations where one or more collections or field records were taken in 1955 is shown on Map 1.

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

Two-year-cycle spruce budworm populations continued to diminish in most of the areas where heavy damage had occurred for several years prior to 1953; this trend was most marked in the Cariboo Mountains surrounding the settlements of Wells and Barkerville.

In the vicinity of Bowron Lake, where the infestation collapsed in 1954 following medium to heavy defoliation in the flight years 1950 and 1952, sampling indicated that the population had risen slightly above last year's level.

The infestation in the mountains north of Sinclair Mills fluctuated very little during the past five years, and larval counts taken in this area on July 13, indicated that medium defoliation may be expected again in 1956. Light infestations were present in the following localities during 1955: four miles south of McBride, in the Ptarmigan Creek Valley

Table 1

Forest Insect Collections by Agencies
South Prince George District - 1955

Personnel Involved in Collection	Number of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independetly	-	26	51	43	3	1	124
Forest Biology Rangers with Forest Service Personnel	-	-	-	-	-	-	-
Forest Service Personnel Independently	-	1	-	2	-	-	3
Other co-operators	-	-	-	-	-	-	-
Total	-	27	51	45	3	1	127

Table 2

Collections by Hosts
South Prince George District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
alpine fir	34	5	trembling aspen	9	1
western hemlock	32	2	white birch	3	
white spruce	19	4	willow	2	
Douglas fir	13	1	chokecherry	1	
lodgepole pine	7	3	alder	1	
western red cedar	2		mountain ash		1
rocky mountain juniper	2		miscellaneous		2
tamarack	1				
black spruce		1			
			Total	17	4
Total	110	16	Grand Total	127	20

in Penny Ranger District, and on Tabor Mountain. A widespread but generally light infestation persisted along the low mountains lying between the Fraser and Willow rivers.

Branch sampling was conducted in the Wells, Stanley, Barkerville, Bowron Lake and Sinclair Mills areas in 1955. At each sampling station, one 18-inch branch was cut from the middle crown of six alpine fir trees and all the buds counted and classified as "infested" or "non-infested".

Table 3 shows the per cent of alpine fir buds infested by spruce budworm in samples taken in 1955.

Table 3

Per Cent of Alpine Fir Buds Infested by Spruce Budworm in Branch Samples in 1955.

Locality	Date	No. of Samples	Per Cent of Buds Infested
Wells - Stanley	July 13	5	4.1
Barkerville	July 12	3	2.3
Bowron Lake - Lower Antler Creek	July 13	3	12.2
Sinclair Mills	July 14	1	53.3

The only locality where significant numbers of dead larvae were found in branch samples was at the lower Antler Creek bridge, where approximately 13 per cent of the larvae had died. No specific disease organism was found in specimens submitted to the Insect Disease Survey at Victoria.

Mass collections for rearing at the Vernon Laboratory were taken at Bowron Lake and near Sinclair Mills.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

A heavy but localized infestation developed in overmature western hemlock and western red cedar, three miles south of McBride. Severe defoliation was confined to an area about three quarters of a mile in length and one quarter of a mile wide, and visible damage extended along the valley side for two miles, in a belt half a mile across (see Figure 3).

Five collections taken from western hemlock understory trees on August 2 and 3, contained an average of 563 larvae; by August 23 pupation had begun.

In October two tree mortality plots were laid out, one of which was in the centre of heaviest defoliation, and the other near its fringe. A total of 100 trees was tagged and various data recorded. Table 4 summarizes, by tree species, the average size of overstory and understory trees and the per cent of estimated foliage loss.

Table 4

Per Cent of Estimated Defoliation by Western Hemlock Looper in Two Tree Mortality Plots Three Miles South of McBride, October, 1955.

Plot Number	Tree Species	Overstory			Understory		
		Number of Stems	Av. D. B. H.	Per Cent Defoliation	Number of Stems	Av. D. B. H.	Per Cent Defoliation
Plot 1	western hemlock	17	12.9"	86	17	4.1"	89
	western red cedar	18	13.7	52	5	4.0	47
	alpine fir	5	9.8	62	-	-	-
Plot 2	western hemlock	8	22.9	76	15	3.1	39
	western red cedar	10	28.0	18	4	2.7	20
	alpine fir	-	-	-	1	2.0	60

On October 13 and 14, egg samples were taken from four western hemlock trees near the centre of the infestation (Plot 1), and from four trees near the outer edge of noticeable defoliation (Plot 2). These plots did not coincide with those established to record tree mortality. Co-dominant or intermediate trees were cut down, then beginning at breast height, a 12 by 6-inch moss and bark sample was taken at 10-foot intervals from the base to the tree-top. Some branch samples consisting of one lineal foot of branch were also taken. The eggs were counted, and examined by Mr. M. G. Thomson, of the Victoria Laboratory; some of the results are presented in Table 5. A few larvae hatched before the examinations were completed, and because it was impossible to separate these empty eggs from those that hatched in the spring of 1955, (i. e. 1954 eggs), it is probable that the figures given in the table for 1955 viable eggs are between 2 and 4 per cent too low, and the figure for 1954 eggs correspondingly high.

Table 5

Western Hemlock Looper Egg Counts:
A Comparison of Hatched 1954 Eggs and Viable Eggs Laid in 1955

Plot No.	Defoliation of Four Trees Sampled	Crown Location of Samples	No. of Samples	Average Number of Eggs per Sample: 1954 Eggs Successfully Hatched	Average Number of Eggs per Sample: 1955 Eggs Viable Eggs
1	72 per cent	upper	10	36.7	23.3
		middle	16	21.0	12.5
		lower	8	14.5	5.0
2	19 per cent	upper	12	11.2	22.2
		middle	11	8.6	13.3
		lower	8	5.4	6.6

On the basis of the figures for hatched 1954 eggs and defoliation in 1955, it seems likely that there may be further damage in this area in 1956. Probably this will depend upon the prevalence of larval diseases which appeared in significant amounts in collections made in late August. No final diagnosis has been received for the diseased specimens sent to the Insect Disease Survey at Victoria.

In 1955 a light population of loopers persisted in several localities in Penny Ranger District but defoliation was not as heavy as in 1954. In overmature western red cedar stands, south of the Fraser River at Penny, frass and foliage fragments were plentiful on the leaves of ground cover although there was very little visible damage to the trees above. At Mile 1 of the Ptarmigan Creek Forestry trail, 45 larvae were taken in one collection from understory western red cedar on July 26; frass was noticeable beneath the larger cedar trees. An aerial reconnaissance from Prince George to McBride on September 20 did not reveal any defoliation along the upper Fraser River.

No further defoliation occurred in the western hemlock forest at the top of Eaglet Mountain north of Giscome, where medium to heavy damage occurred in 1954. An average of only six larvae per collection was taken in this stand on July 22. No explanation for the collapse of the infestation is offered except that inclement weather during the previous autumn may have prevented the emergence of adults or oviposition.

Small numbers of western hemlock looper larvae were taken in alpine fir collections at Aleza Lake and on the Stone Creek Access Road, and from western hemlock near Sinclair Mills.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Infestations of the Douglas-fir beetle continued in the southern parts of the district. The heaviest losses occurred in the Narcosli Creek and Buck Ridge area west of the Fraser River where an estimated 6,000 trees were beetle-killed during 1955. This figure was determined by aerial and ground reconnaissance, and by strip cruises in the Buck Ridge area where beetle attacks were concentrated in residual stands and small blocks of timber adjacent to recent logging. Infestations east of the Fraser River in the vicinity of Marguerite continued to expand; approximately 400 mature trees were killed in 1955. Small groups of less than 50 infested trees were noted near the confluence of the Fraser and Cottonwood rivers and in the Blackwater River Valley.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

A light but widespread infestation was discovered in the Narcosli Creek district where small, scattered groups of mature lodgepole pine had been killed. The greatest concentration noted was about four miles southwest of Buck Ridge Post Office, where 60 trees had been attacked in the last two years in an area of about 80 acres. In view of the approaching overmaturity of the lodgepole pine stands in this region, the presence of an active and widespread beetle population may present the threat of a major epidemic in future years.

Hemlock Sawfly, Neodiprion sp.

Light infestations of this sawfly were discovered on the logging road above Sinclair Mills and in the western hemlock stand on Eaglet Mountain. Sampling in shaded forest yielded comparatively few larvae, but on trees surrounding forest openings, defoliation was often noticeable. Near Sinclair Mills two beating collections yielded 139 and 67 larvae, while on Eaglet Mountain the maximum number taken in one sample was 128. Mass collections containing several hundred larvae were hand-picked in both localities.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Although egg counts in the autumn of 1954 had indicated a continuance of the tent caterpillar epidemic in 1955, the population collapsed throughout the district in 1955. This was apparently due to a high mortality of larvae within the eggs, and immediately after hatching. Sub-zero temperatures late in March, and an unusually late spring may have been responsible for this mortality.

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

No serious losses were known to have been caused by this beetle in

1955. A low population persisted on the Aleza Lake Forest Experiment Station and near Sinclair Mills.

Black-headed Budworm, Acleris variana (Fern.)

Although this species was collected frequently throughout the district, it was not abundant anywhere. Nine larvae was the maximum number taken in one collection.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Scattered light defoliation was noted on a few tamarack trees north of Pantage Lake on August 10; by this time most of the larvae had left the trees.

Douglas-fir Needle-miner, Contarinia sp.

Light infestations affecting about 10 per cent of the current year's foliage on young trees were found on Douglas fir at Chubb Lake, and near Hixon. In samples taken at Narcosli Creek, five per cent of the needles contained larvae.

A Web-spinning Sawfly, Pamphiliidae sp.

The upper branches of a few young aspen trees near Narcosli Creek were defoliated by these larvae (see Fig. 1).

Willow Leaf Beetle, Galerucella carbo (Lec.)

The foliage of open-grown willows in the Prince George, Hixon and Aleza Lake districts was heavily skeletonized by larvae of this beetle.

STATUS OF TREE DISEASES

A Needle Cast Disease of Lodgepole Pine caused by Hypodermataceae sp.

Widespread reddening of lodgepole pine foliage was noted during June and July with the heaviest infection observed in a pole-sized stand north of Kersley. Damage was most severe in dense stands, while open-grown trees usually were not affected.

Spruce Needle Rust caused by Chrysomyxa ledicola (Pk.) Lagerb.

For the second consecutive year, there was an extremely heavy infection of this rust on white spruce reproduction on an old burn 8.5 miles east of Hixon. About 90 per cent of the current year's needles were infected over an area of approximately 20 acres, giving the stand a pale yellow color. Foliage of mature trees along the fringe of the older forest nearby was also heavily infected up to a height of about 60 feet.

Spruce Needle Rust caused by Chrysomyxa ledi (A. & S.) de Bary.

White spruce trees over an area of about 10 acres, 12 miles south of Prince George, were discolored by this rust which infected most of the current year's needles. Black spruce trees growing on the same site were scarcely affected.

Spruce Needle Rust caused by Chrysomyxa weirii Jacks.

This rust, which attacks the previous year's foliage, was common on mature white spruce trees growing around the marshy edge of 15-Mile Lake near Quesnel.

A Canker on Western Hemlock caused by Caliciopsis sp.

These cankers were common on shaded branches of western hemlock growing on a steep rocky slope at an elevation of 3,100 feet, 3 miles south of Penny.

A Pine Needle Rust caused by Coleosporium solidaginis (Schw.) Thùm.

About 10 per cent of the three- and four-year old needles of lodgepole pine were infected by this rust in open reproduction near Mouse Mountain in the Quesnel District.

Winter Injury.

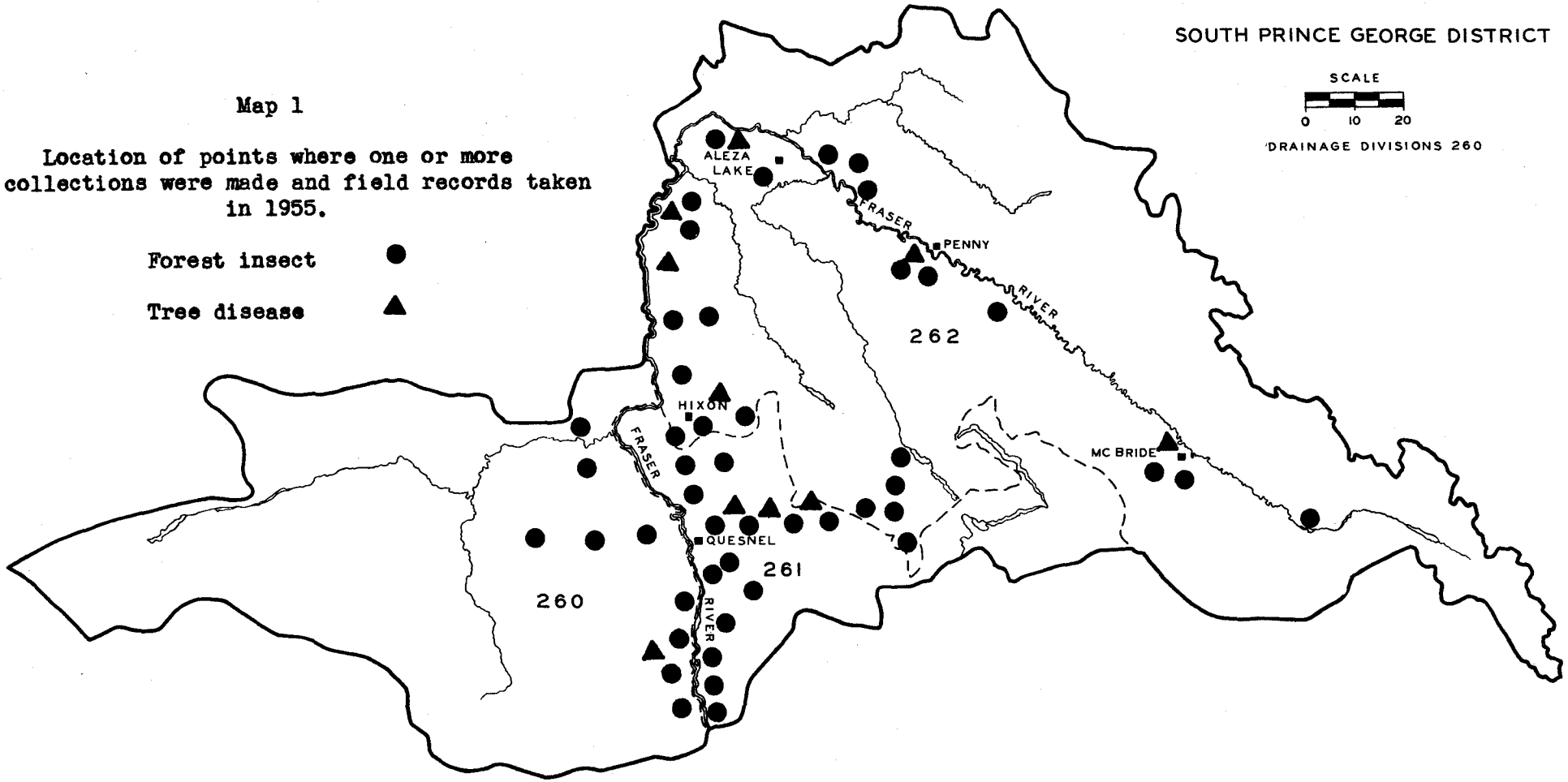
Lodgepole pine stands in the region around Wells continued to show the effects of severe damage caused by adverse weather conditions during the winter of 1952-53. By the summer of 1955 most of the trees had made a partial recovery, and produced tufts of new growth (see Fig. 2).

Map 1

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲



Map 2

Known areas where hemlock looper occurred in 1955.

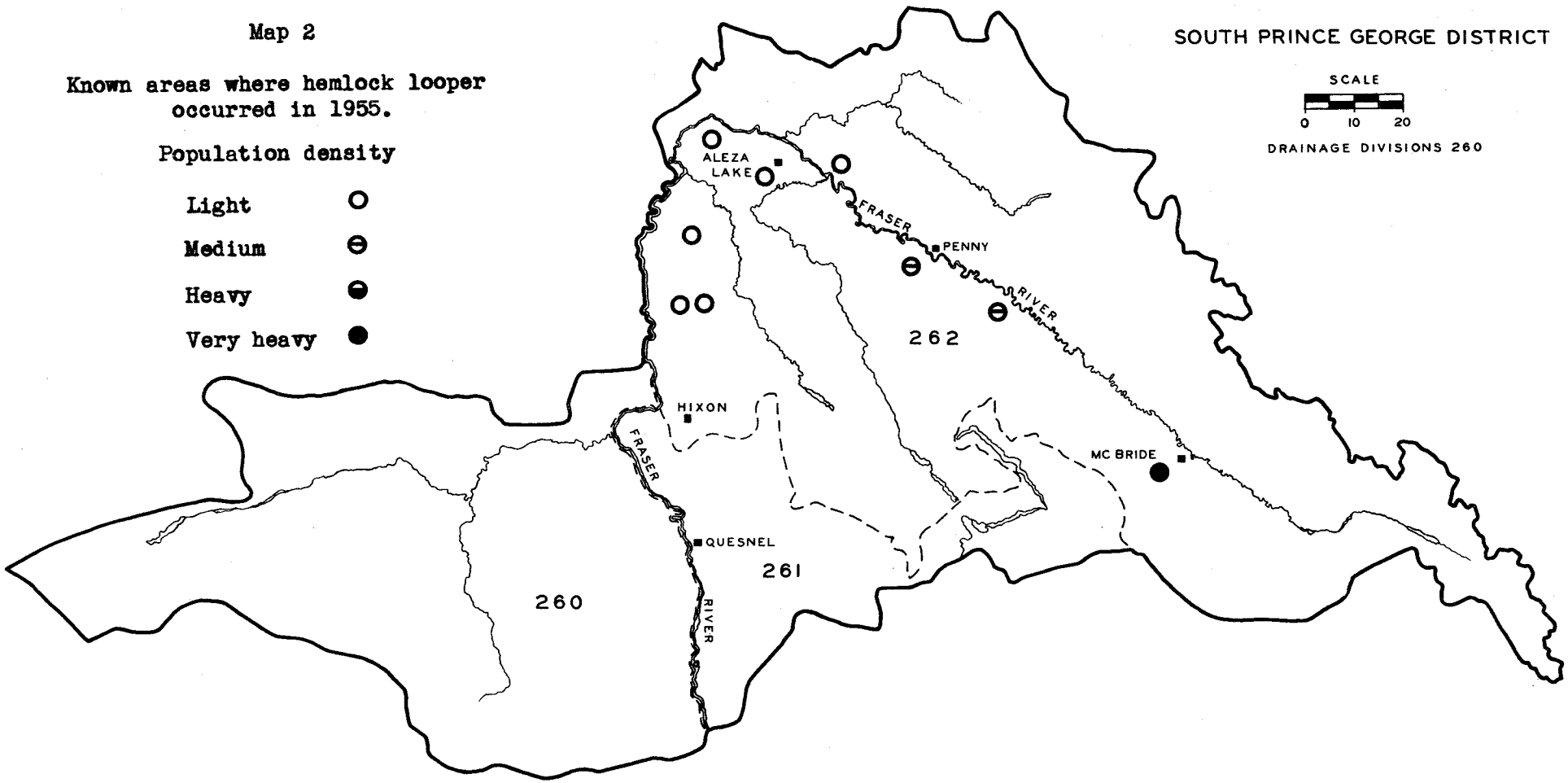
Population density

Light

Medium

Heavy

Very heavy



SOUTH PRINCE GEORGE

Figure 1 — A Web-spinning Sawfly, Pamphiliidae sp. Tent-like webbing spun by larvae on young trembling aspen near Narcosli Creek, B. C. August 12, 1955.

- by J. Grant

Figure 2 — Winter damage - A stand of lodgepole pine near Wells, B. C. (elevation 4,300') injured by adverse weather conditions during the 1952-53 winter. July 13, 1955.

- by J. Grant

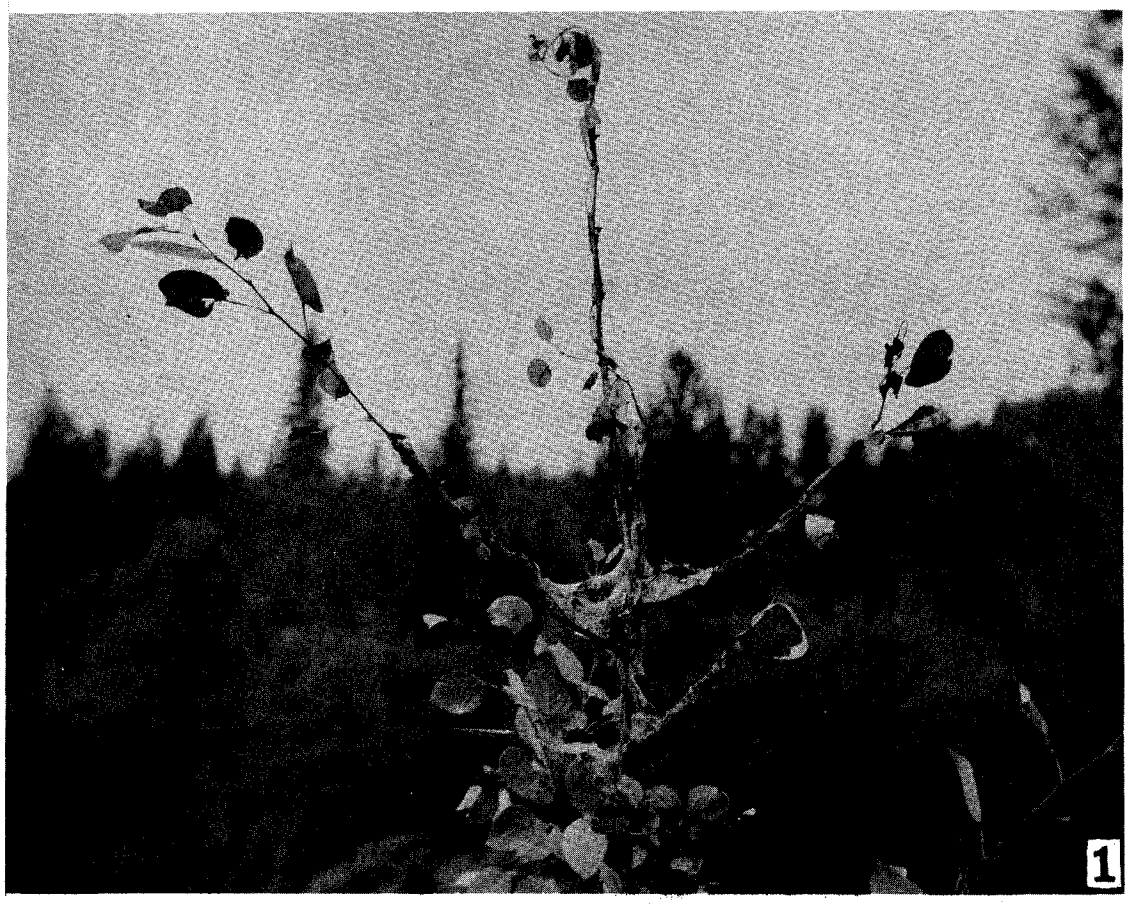

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Figure 3

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.) - Defoliated western hemlock three miles south of McBride. This tree was 28 inches D. B. H. and approximately 110 feet tall. August 23, 1955.

- by J. Grant


3

FOREST BIOLOGY SURVEY

WEST PRINCE GEORGE DISTRICT

1955

J. Grant

INTRODUCTION

Survey work in the West Prince George Forest Biology Ranger District began on June 8 and ended on September 29; during this time 16 working days were spent in South Prince George Forest Biology Ranger District. The early part of the season was occupied with branch sampling for spruce budworm and most of the remainder was devoted to random collecting. Two mass collections of hibernating spruce budworm were submitted to the Vernon Laboratory for rearing and two collections of larch sawfly sent to the Winnipeg Forest Insect Laboratory and to the Belleville Biological Control Laboratory.

Table 1 shows the number of forest insect collections by months and agencies and Table 2 shows the number of forest insect and tree disease collections by hosts.

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

In 1955, populations of the 2-year-cycle spruce budworm dropped sharply in some of the localities where heavy defoliation occurred in 1954, but this trend was not consistent throughout the district. In the area between Parsnip River and Pine Pass the infestation appeared to be lighter than at any time during the last five years, while populations in mature forest from Tudyah Lake south to Summit Lake remained at a fairly high level. In the Nation River area larvae were scarce in the decadent stands which were heavily defoliated in the flight years of 1950, 1952, and 1954, but this decrease was not general. Unfortunately, damage even in heavily infested stands is not conspicuous enough in the "off-year" of the 2-year-cycle to permit aerial mapping; therefore, no knowledge was gained regarding the status of the spruce budworm in areas not accessible by ground travel.

Branch sampling was carried out in several localities in an attempt to determine the level of budworm populations. A sample consisted of six 18-inch branches each cut from the mid-crown of a different alpine fir tree.

All the buds or growing tips were examined and classified as "infested" or "non-infested". Table 3 shows the per cent of buds infested by spruce budworm in the localities sampled.

Table 1

Forest Insect Collections by Agencies
West Prince George District - 1955

Personnel Involved in Collection	Number of Collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	21	61	60	18	-	160
Forest Biology Rangers with Forest Service Personnel	-	-	-	-	-	-	-
Forest Service Personnel Independently	-	-	-	1	-	-	1
Other Co-operators	-	-	-	-	-	-	-
Total	-	21	61	61	18	-	161

Table 2

Collections by Hosts
West Prince George District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
white spruce	56	1	trembling aspen	12	
alpine fir	53	2	willow	6	1
lodgepole pine	9	1	alder	3	
Douglas fir	9	1	birch	1	2
black spruce	6		miscellaneous	1	
tamarack	5				
			Total	23	3
Total	138	5	Grand Total	161	8

Table 3

Per Cent of Alpine Fir Buds Infested by
Spruce Budworm Branch Samples
West Prince George, 1955

Locality	Date	No. of Samples	Per Cent of Buds Infested
Summit Lake	June 17	1	36.2
Davie Lake	June 17, 27	2	36.7
Whiskers Creek (McLeod Lake)	June 17	1	46.0
Tudyah Lake	June 17	1	69.1
Parsnip River (9.6 miles east)	June 16	1	34.2
Nation River Rd., Mile .9	July 9	1	56.2
Nation River Rd., Mile 7.7	July 9	1	4.8
Nation River Rd., Mile 9.6	July 8	1	0.0
Sylvester Creek, 1 mi. NE	July 9	1	69.2
Kalder Lake, 6.6 mi. S	July 10	1	86.3

Mortality of larvae due to parasitism and disease was negligible during the feeding period, which terminated about the middle of July; however, dead individuals were found quite frequently in mass collections of hibernating larvae taken in August and September at Tudyah Lake. The cause of death was not determined, but was believed in many cases to be desiccation resulting from the hibernaculum being situated in too exposed a location.

Four mass collections totaling about 800 larvae were sent to the Vernon Forest Biology Laboratory during the feeding period and an additional three collections containing approximately 600 hibernating larvae were gathered in August and September.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The only active infestation of the mountain pine beetle in West Prince George District was in the Stuart-Trembleur-Takla Lake drainage system. While its northwestern boundary was not determined, the area in which beetle populations had reached epidemic proportions in lodgepole pine stands was known to extend from the vicinity of Tarnezell Lake at least to Takla Narrows, and southwestward into the Prince Rupert Forest District. The largest concentrations of attacked trees were along the lower mountain slopes bordering the southern end of Takla Lake. Some 300 trees were counted near Bivouac Creek, 800 above Leos Creek, and at least an equal number at the mouth of Sakeniche River. Between Tarnezell and Trembleur lakes, small groups were scattered through pine stands up to an elevation of 3,000 feet. Along Takla Lske, the attack was confined chiefly to stands of unusually large, decadent lodgepole pine, ranging in size up to 30 inches D. B. H.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Although egg counts in the autumn of 1954 had indicated that heavy defoliation would occur in some districts in 1955, no infestations developed. This was due to failure of the larvae to hatch, and to heavy mortality of the young larvae. The only locality where late-instar larvae were collected was in the Salmon River Valley north of Prince George.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

During 1955, populations of this beetle were very low except in recently logged stands on the south shore of Stuart Lake about 25 miles northwest of Fort St. James.

Green Velvet Looper, Opinia autumnata omissa Harr.

Larvae of this usually unimportant insect appeared in infestation proportions in an overmature stand of alpine fir and white spruce on the Nation River Mine road. In the most heavily infested part of the stand, defoliation of alpine fir was 50 per cent of the current year's foliage, and somewhat less on white spruce. Damage was confined to the overmature forest, which in this locality occupied a ridge about a mile and a half across at a mean elevation of 3,800 feet. The maximum number of larvae taken in one collections was 239. While under normal conditions the defoliation would be of little importance, the weakened condition of the trees caused by several year's heavy defoliation by spruce budworm rendered its effects more serious (see Figure 1).

Large Aspen Tortrix, Archips conflictana (Wlk.)

Defoliation ranging from 75 to 90 per cent was general in aspen stands over an area of approximately two square miles in the Salmon River Valley. Light defoliation occurred in a 50-acre stand four miles north of Vanderhoof.

Larch Sawfly, Pristiphora erichsonii Htg.

Populations of larch sawfly in tamarack swamps in the vicinity of Cluculz Lake were considerably lower than in 1954 and very little defoliation was visible.

Black-headed Budworm, Acleris variana Fern.

Although larvae were common over much of the district north of Fort St. James, no concentrations were found. Nine was the largest number taken

in one collection; two localities where this number was obtained were near Kalder Lake and north of Tsilcoh River.

Spruce Tip Moth, Zeiraphera sp.

This species was collected frequently in the Fort St. James district but no defoliation was observed. Twelve larvae, representing the maximum number taken in one sample, were collected from alpine fir near Sylvester Creek. At Mile 9.6 on the Nation River Mine road, nine larvae were recovered from one quantitative sample consisting of six 18-inch branches from alpine fir.

A Tent Caterpillar, Malacosoma nr. pluviale Dyar.

Willows and dwarf birch over an area of about six acres were defoliated by these larvae, 3.4 miles north of Redrocky Lake on the Hart Highway.

Douglas-fir Needle-miner, Contarinia sp.

Five per cent of the current year's needles of young Douglas fir trees four miles north of Summit Lake were infested.

Lodgepole Pine Beetle, Dendroctonus murrayanae Hopk.

Adults and larvae of this beetle were abundant around the root collars of decadent lodgepole pine infested by the mountain pine beetle near Bivouac Creek, on Takla Lake.

Ambrosia Beetles, Trypodendron sp.

Tunnels freshly bored by ambrosia beetles were numerous on the lower trunks of lodgepole pine attacked by the mountain pine beetle at the southern end of Takla Lake. On three trees, examination of the trunk at breast height yielded counts of 27, 48 and 107 entrance holes per square foot of trunk surface.

STATUS OF TREE DISEASES

Needle Cast of Lodgepole Pine caused by Hypodermataceae sp.

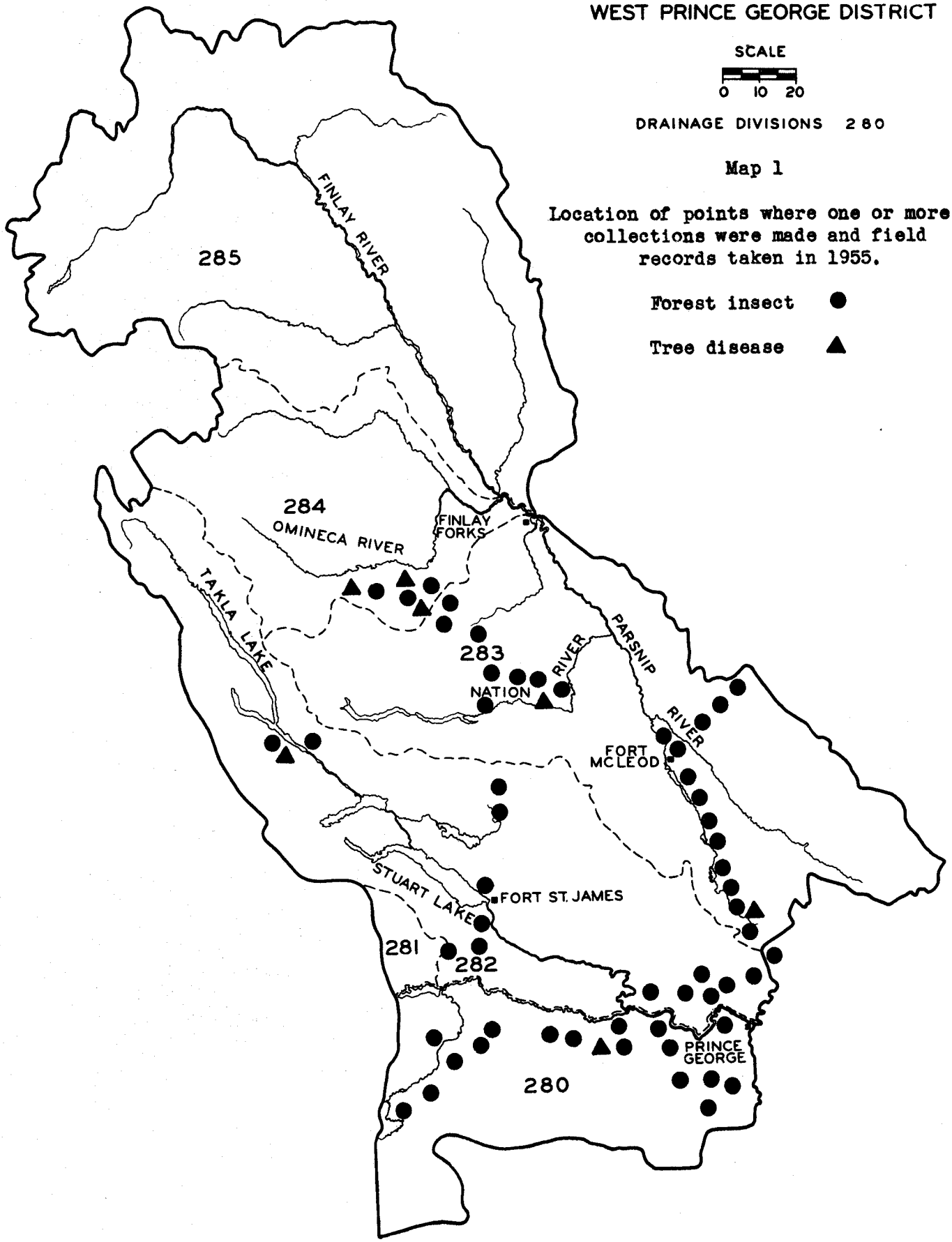
Foliage loss resulting from a needle cast fungus was heavy in lodgepole pine stands along the northern sector of the Fort St. James - Manson Creek road. Light infections were noted between the Parsnip River and Pine Pass, and at many localities between Prince George and Vanderhoof.

Red Ring Rot caused by Fomes pini (Thore) Lloyd.

Conks of this fungus were of frequent occurrence in a decadent stand of lodgepole pine at the south end of Takla Lake. This is the most northern locality in the Prince George District in which this fungus has been collected.

Winter Injury.

An unusual type of winter damage to white spruce and rarely to alpine fir was general in the vicinity of Germansen Lake and Manson Creek, and occasional as far south as Gaffney Creek in the Fort St. James district. When examined on July 8, the affected trees had failed to produce any new foliage except from a few adventitious buds, and on the branches within two feet of the ground which had presumably been protected by a layer of snow. Old foliage on these trees was of normal colour and the new growth on lodgepole pine and black spruce growing on the same sites as the affected trees was also healthy.


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 1955.
Forest insect
Tree disease
285
FINLAY RIVER
284
OMINECA RIVER
FINLAY FORKS
TAKLA LAKE
283
NATION
PARSNIP RIVER
FORT MCLEOD
STUART LAKE
FORT ST. JAMES
281
282
PRINCE GEORGE
280

WEST PRINCE GEORGE

Figure 1

Spruce Budworm, Choristoneura fumiferana (Clem.), and Green Velvet Looper, Oporinia autumnata omissa (Gn.). These alpine fir trees were weakened by a sustained attack of the 2-year-cycle budworm. The budworm population collapsed in 1954 but, in 1955, an infestation of the green velvet looper caused a loss of 50 per cent of new foliage. Mile 9, Nation River Mine road. July 8, 1955.

- by J. Grant


1

FOREST BIOLOGY SURVEY

NORTH PRINCE GEORGE DISTRICT

1955

Compiled by J. Grant for G. M. Jones

INTRODUCTION

In 1955 field work was carried out in this district (northern British Columbia and southern Yukon) from June 15 to August 25. Forest Biology Ranger G. M. Jones worked alone throughout the season.

Table 1 shows forest insect collections made by agencies and Table 2 shows forest insect and tree disease collections by hosts. Maps 1, 2 and 3 give the distribution of localities where field records or collections were made in 1955.

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

There was a sharp reduction in the numbers of spruce budworm in the area extending from Pine Pass to the Pine River bridge on the Hart Highway, where medium to heavy defoliation occurred in 1954. Branch sampling was conducted in two localities in this area; 1955 being an "off-year" of the 2-year-cycle budworm, the larvae were very small and an examination of the buds was necessary. In each locality, one 18-inch branch sample was taken from the centre of the crown of each of six alpine fir trees; the buds were examined and classified as "infested" or non-infested". Table 3 shows the per cent of infested buds in these two localities.

No appreciable damage was noted along the southern section of the Haines Road where the 2-year-cycle budworm caused light defoliation of Sitka spruce in 1954. Presumably the larvae had gone into hibernation before this area was visited in August, as none was collected.

The occurrence of a light infestation of 1-year-cycle spruce budworm was reported in the Liard River Valley a few miles north of the British Columbia - Northwest Territories boundary, but no evidence of the presence of this form was found in the area under consideration.

Table 1

Forest Insect Collections by Agencies
North Prince George District - 1955

Personnel Involved in Collection	Number of collections						
	May	June	July	Aug.	Sept.	Oct.	Total
Forest Biology Rangers Independently	-	76	105	54	-	-	235
Forest Biology Rangers with Forest Service Personnel	-	-	-	-	-	-	-
Forest Service Personnel Independently	-	-	3	8	-	-	11
Other co-operators	-	1	-	-	-	-	1
Total	-	77	108	62	-	-	247

Table 2

Collections by Hosts
North Prince George District - 1955

Coniferous hosts	Forest Insects	Tree Diseases	Broad-leaved hosts	Forest Insects	Tree Diseases
white spruce	111	6	trembling aspen	55	
black spruce	30	1	white birch	8	
lodgepole pine	22	3	willow	1	
tamarack	10		miscellaneous	2	2
alpine fir	4				
western hemlock	2				
Sitka spruce	1				
spruce sp.	1				
			Total	66	2
Total	181	10	Grand Total	247	12

Table 3

Per Cent of Buds Infested by 2-year-cycle Spruce Budworm in Two Six-branch Samples of Alpine Fir in the Pine Pass Region, June 16 and June 27, 1955.

Location	Total No. of Buds	Per Cent Infested	Date
3.4 mi. W. of Pine River bridge	224	15.6	June 16
1.6 mi. S. of Azouzetta Lake	508	7.3	June 27

Black-headed Budworm, Acleris variana (Fern.)

The light infestation in the coastal forest between Mile 40 and Mile 60 on the Haines Road continued in 1955. Two collections from western hemlock contained an average of 21 larvae and pupae, and two taken from Sitka spruce averaged 11 larvae and pupae. These collections were taken on August 2 and 3 when the larval feeding period was almost over; defoliation was light throughout this area.

This species was widely distributed but was collected only in small numbers throughout most of the northern interior of British Columbia and southern Yukon.

Engraver Beetles, Ips spp.

At Mile 56 on the Cassiar Road, mature black spruce trees over an area of 80 acres were heavily infested by beetles of this genus. Many trees have already been killed and the attack appeared to be spreading up both sides of the valley near Good Hope Lake.

At the mouth of McQuesten River a small stand of mature white spruce was reported to have been first attacked by beetles about five years ago and by the summer of 1955 the major portion of the stand had been killed. The trees, ranging up to 16 inches D. B. H., covered an area of about three acres.

Aspen Leaf-miner, Phyllocnistis populiella (Chamb.)

The extensive infestation in the Liard River Valley continued unabated in 1955. Aspen and cottonwood stands from Mile 483 to Mile 596 on the Alaska Highway were again almost 100 per cent infested, and aspen trees along the Muskwa River Valley for a distance of 40 miles west of Fort Nelson were also attacked. Leaf-miners were common on both host trees throughout northern British Columbia and the southern Yukon but did not reach infestation proportions except in the regions noted above.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Twigs scarred by the oviposition of larvè sawflies were found on tamarack trees in two swamps 18 and 26 miles east of Commotion Creek on the Hart Highway. Defoliation was negligible. No evidence of this insect was found in tamarack stands along the Alaska Highway.

Large Aspen Tortrix, Archips conflictana (Wlk.)

Aspen stands from Mile 80 to Mile 101 and from Mile 127 to Mile 140 on the Alaska Highway were not as heavily infested in 1955 as in the previous year. Less than 50 per cent of the leaves were defoliated. From Mile 10 to Mile 20 on the Beatton River Airstrip Road, defoliation ranged up to 50 per cent.

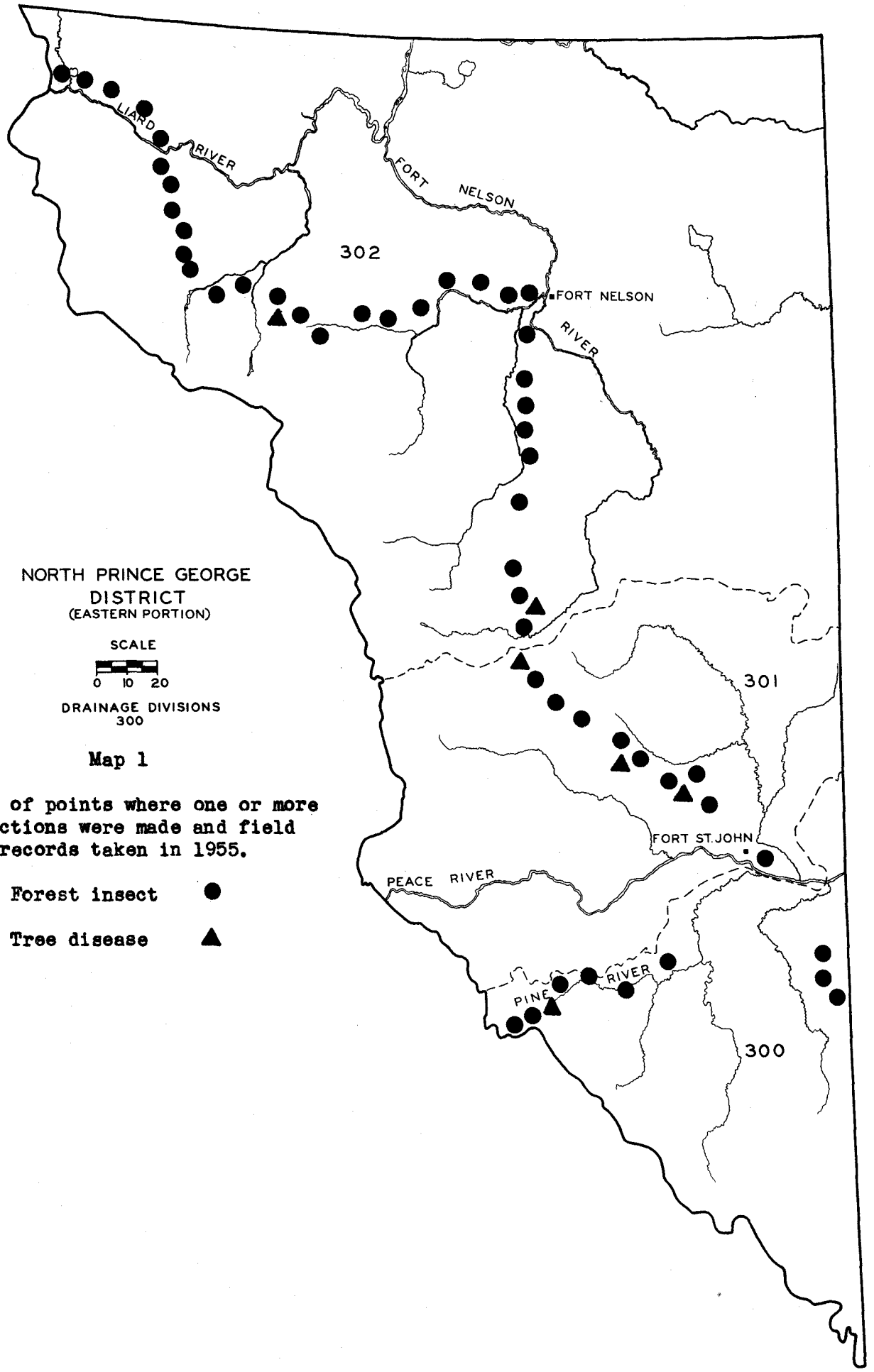
Spruce Tip Moth, Zeiraphera sp.

The only locality where an above normal population was found was at Mile 98 on the Alaska Highway, where 47 larvae were taken in one collection. This species was collected at several other points along the British Columbia section of the Alaska Highway but was not encountered in Yukon Territory.

STATUS OF TREE DISEASES

Spruce Needle Rust caused by Peridermium coloradense (Diet.)

"Witch's brooms" caused by this rust were very common on white and black spruce trees in the Teslin and Atlin Lake region, and along the northern section of the Haines Road. A heavy incidence of top-killing and tree mortality was noted in these areas.



NORTH PRINCE GEORGE
DISTRICT
(EASTERN PORTION)

SCALE

0 10 20

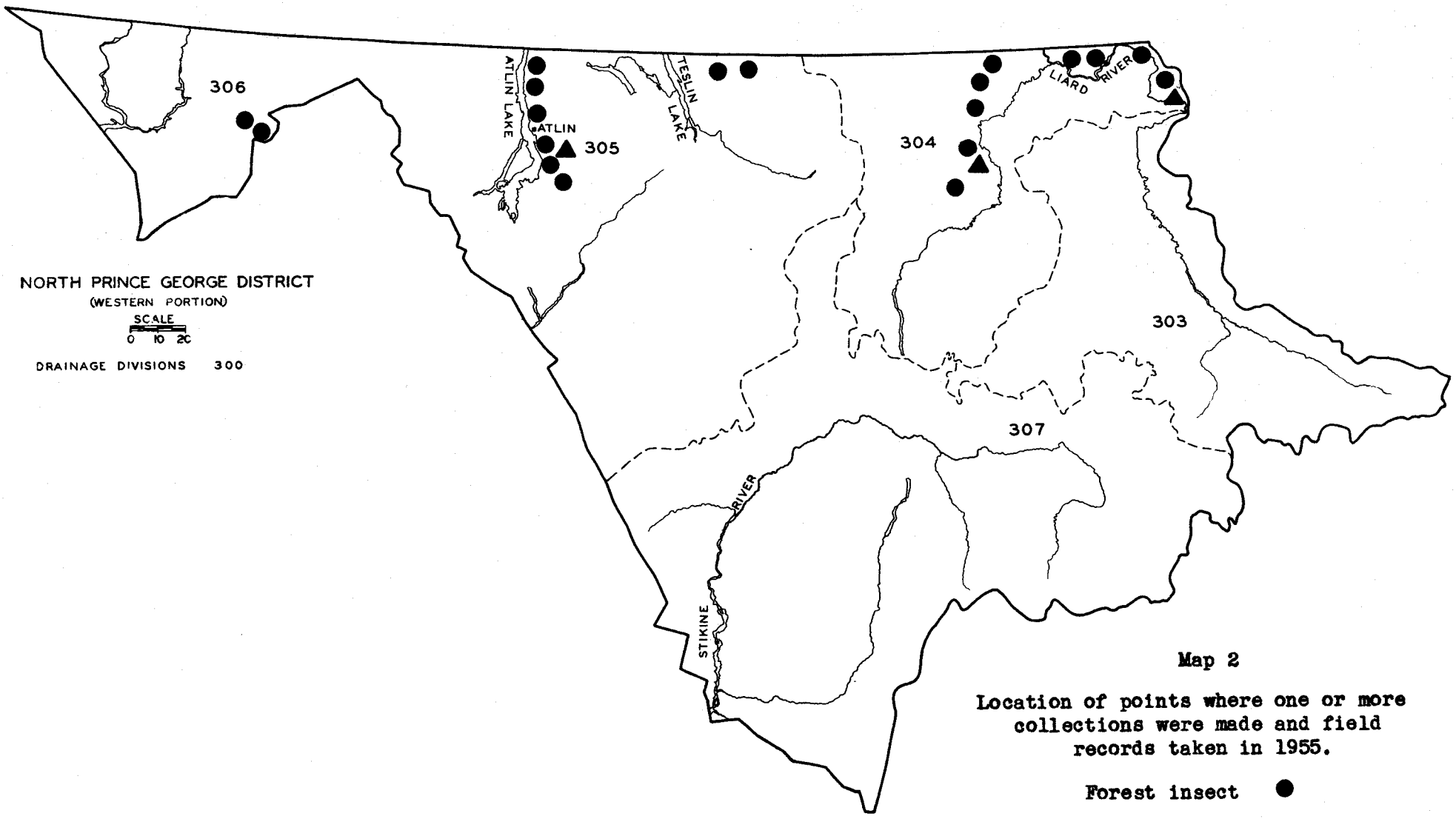
DRAINAGE DIVISIONS
300

Map 1

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲

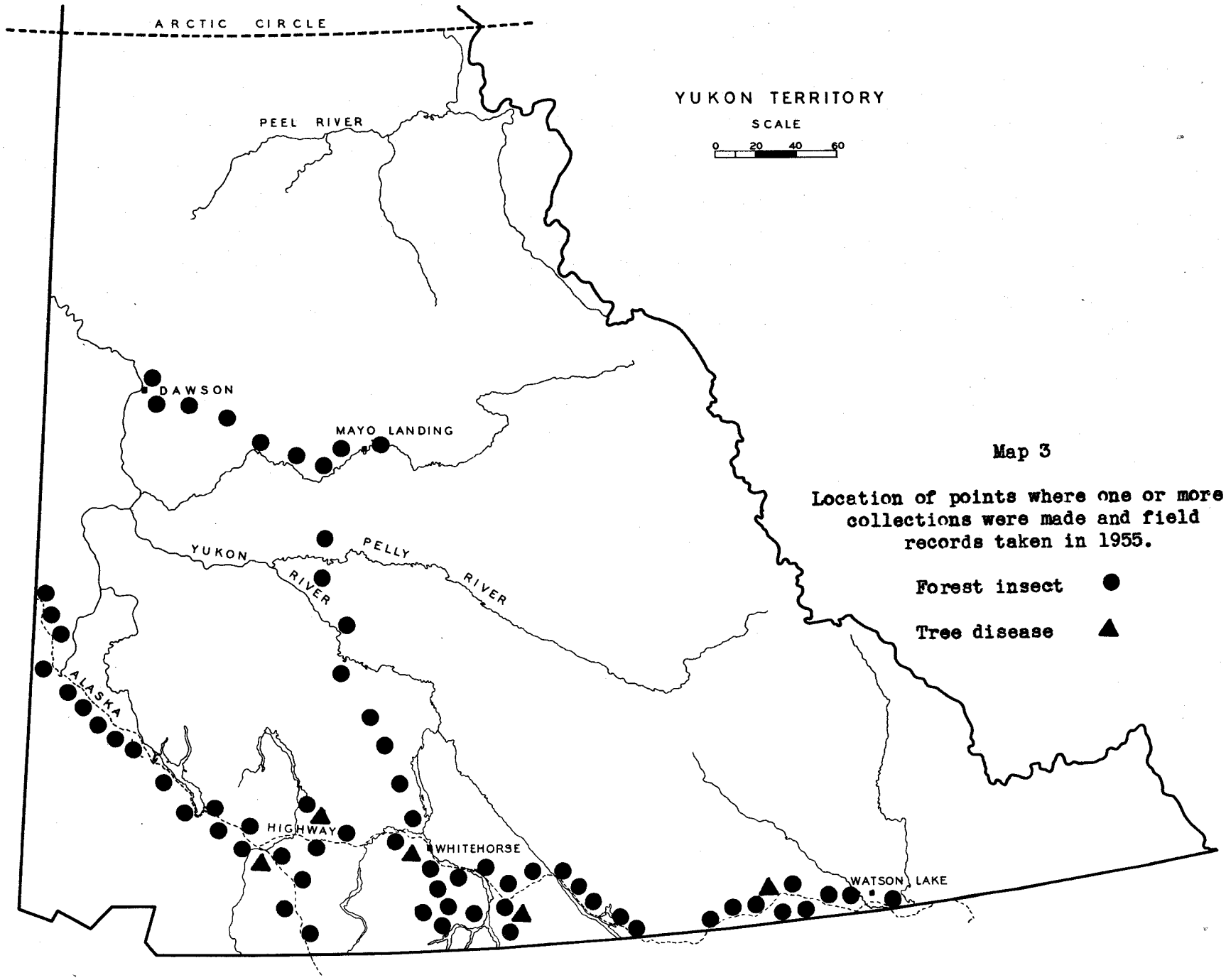


Map 2

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲



Map 3

Location of points where one or more collections were made and field records taken in 1955.

Forest insect ●

Tree disease ▲