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ANNUAL REPORTS OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA, 1959

INTERIM REPORT 1959

FOREST BIOLOGY LABORATORY

VICTORIA, B.C.

CANADA

DEPARTMENT OF AGRICULTURE

SCIENCE SERVICE

FOREST BIOLOGY DIVISION

APRIL, 1960

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FOREST BIOLOGY RANGERS' ANNUAL REPORT

1959

R. L. Fiddick

FOREWORD

The 1959 survey season was highlighted by a spectacular increase in the black-headed budworm population on the Queen Charlotte Islands. Larval and egg sampling combined with defoliation estimates indicated that chemical control should be undertaken in 1960 to protect over 30,000 acres of valuable timber stands on the Islands. Hemlock and spruce stands in some of these areas have not recovered from the effects of the last black-headed budworm infestation which subsided in 1955.

An expected increase in the hemlock looper population failed to materialize although the distribution of collections containing larvae was more widespread.

The Douglas-fir beetle continued its depredations in the Kamloops Forest District. Damage appraisal surveys revealed a larger number of trees killed in the period ending in 1959, than in any of the previous three year periods. Douglas fir trees killed and weakened by fire in the Prince George District in the spring of 1959 were heavily attacked by this beetle. The heavy population of beetles could constitute a serious hazard for the remaining Douglas fir stands in the area.

The aspen leaf miner population subsided in some areas although the infestation was still active in most aspen stands in the Province.

The spruce budworm population in the Pemberton-Lillooet area collapsed completely in 1960. It is not known at which stage of development the collapse occurred. Not more than a dozen larvae were found throughout the infestation area.

A more intensive survey of the balsam woolly aphid was done in 1959. Aerial surveys combined with ground surveys gave a more complete assessment of damage suffered by amabilis fir in the North Vancouver and Howe Sound areas. Heavily attacked trees were also found in the Sechelt Peninsula. Infested trees were discovered in Beacon Hill Park in Victoria and at Thetis Lake Park a few miles north of Victoria.

Several changes occurred in 1959 in the survey organization in British Columbia.

To facilitate organization and co-ordination of the biology survey the economically important Vancouver Forest District was divided into two administrative sections, Vancouver Island and the Mainland. Each of these districts now contain a Grade 2 ranger district and a Grade 1 ranger district.

It was possible, with the acquisition of an additional ranger vehicle, to assign a ranger to full time survey work in the North Vancouver District. This district had previously been surveyed from the survey boat.

On Vancouver Island, the area from the Alberni Canal north to Hesquiat Peninsula formerly designated as drainage division 020 in the North Vancouver Island District, was assigned to the South Vancouver Island District as drainage division 005.

The M/V Forest Biologist was used mainly in the South Prince Rupert District. A qualified man was employed to operate and maintain the boat, thereby permitting the ranger to concentrate completely on the field aspects of the survey.

Egg counts, defoliation surveys and damage appraisal work extended the field season to late October. Some Victoria ranger personnel were engaged on ranger cabin construction until November. Two members of the Vernon ranger staff were employed for most of October on a survey of Douglas fir dieback in the Nelson District.

Extension calls are becoming more numerous each year, especially in the more populated areas. This could be due to several causes such as, more public contact with our rangers or other staff in the field, an increase in the number of problems, a greater public awareness of the existence of problems, and the increasing esthetic and economic value being placed on natural and cultivated timber stands and wood lots. Extension requests have not reached the point where they are burdensome and the problems encountered are often interesting and varied.

The number of collections made by individual rangers from year to year fluctuate considerably. Emphasis has been shifted from quantity to quality of collections and it is apparent that a ranger who is not on a collection quota is much more observant and thorough in his work and consequently more valuable to the survey.

The quantity and quality of forest disease collections continued to improve. Interest in the disease survey is higher now than any time since its inception.

Forest insect and forest disease collections by rangers and co-operators are listed by individual districts in Table 1.

Table 1

Forest Insect and Forest Disease Collections
by Agencies

British Columbia and Yukon - 1959

Personnel involved		South Vancouver Island	North Vancouver Island	South Vancouver	North Vancouver	South Prince Rupert	West Prince Rupert	East Prince Rupert	West Kamloops	Central Kamloops	East Kamloops	West Nelson	Central Nelson	East Nelson	South Prince George	West Prince George	North Prince George	Yukon
Forest Biology Rangers Independently	Insect	293	532	377	202	74	340	245	371	257	309	315	312	360	291	346	394	184
	Forest disease	65	74	36	20	7	41	49	21	18	4	14	25	13	8	12	12	15
Forest Biology Rangers with Forest Service Personnel																		
Forest Service Personnel Independently		72	42	18	10	1	7	30	2	1	5	3		8	3		2	1
Other Co-operators		339* 90	2* 12	6			1* 7	2*			26	1	1					
Totals		859	662	437	232	82	396	326	372	254	310	333	338	348	302	358	406	147

* Includes collections from light-trap at Langford Insectary.

ANNUAL REPORT OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA

1959

VANCOUVER FOREST DISTRICT

VANCOUVER ISLAND SECTION

FOREST BIOLOGY SURVEY

VANCOUVER FOREST DISTRICT

1959

E. G. Harvey

INTRODUCTION

With the division of the Vancouver Forest District into two administrative areas rangers were assigned to Vancouver Island as follows:

E. G. Harvey - South Vancouver Island

S. J. Allen - North Vancouver Island

It was possible for the writer to spend considerably more time in his own district and more time in co-ordinating work in the two ranger districts. Excellent coverage was attained due in part to the good summer weather. Very little time was lost because of forest closures.

The threat of a hemlock looper infestation has lessened, but a near relative, the oak looper, re-appeared in outbreak numbers among the oak trees around Victoria. The green-striped forest looper was the only looper which showed a marked increase in numbers. The spruce budworm and the black-headed budworm were found, but only in small numbers. The maple looper was abundant again this year on hardwoods, but a virus disease caused heavy mortality. Fall web-worm colonies were large and numerous, and could develop into an infestation in 1960. The balsam woolly aphid was found on Vancouver Island in 1959 for the first time. Large flights of pine butterflies indicate the possibility of a new problem in the area. Leaf beetles on alder, willow and poplar, have become numerous, leaving trees bare in many areas before the end of summer. Silver-spotted tiger moth colonies were common, but the expected population increase did not occur.

The exotic tree plantations examined this year showed a marked improvement in vigour over 1958. Many of the small seedlings, too small to be observed previously, were growing well.

Calisiopsis sp. cankers on hemlock were found to be more widespread throughout the district than earlier observations suggested.

More pathology collections of better quality than in the previous year, were made in 1959. Many disease collections lacking sporophores remain to be identified by cultural means, however, while the identity of others requires verification at the mycology unit in Ottawa.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

SOUTH VANCOUVER ISLAND DISTRICT

1959

FOREST BIOLOGY SURVEY

SOUTH VANCOUVER ISLAND DISTRICT

1959

E. G. Harvey

INTRODUCTION

Good weather conditions in the district during 1959 resulted in excellent coverage, as shown in Map 1.

A total of 811 insect and 65 forest disease collections were made. Approximately 350 of the insect collections were made by the insectary staff at Langford, either at light traps, or as collections turned in by individual members.

Collections by host species are shown in Table 1.

Table 1

Collections by Hosts

South Vancouver Island District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	21	3	Apple	6	
Douglas fir	109	14	Arbutus	5	
Fir, amabilis	15	1	Alder, red	25	4
Fir, grand	17	6	Birch	2	
Hemlock, mountain	1		Cascara	3	
Hemlock, western	101	14	Cherry	7	
Larch, European	1	2	Cottonwood	3	1
Pine, lodgepole	6	5	Dogwood	3	
Pine, ponderosa	5		Elm	1	
Pine, red		2	Maple, broadleaf	9	
Pine, western white	5		Oak Garry	53	2
Spruce, Sitka	13		Pear		1
Yew,		2	Poplar	2	2
Miscellaneous hosts	76	1	Poplar, silver	11	1
			Willow	47	
			No host	264	4
			Total	441	15
Total	370	50	Grand Total	811	65

STATUS OF INSECTS

Black-headed Budworm, Acleris variana (Fern.)

The population of this insect continued to decline in the district. Of 93 collections made during the larval period, only 10 contained a total of 18 larvae. Table 2 shows the decline in population.

Table 2

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

1957 - 1959

Drainage division	Total no. samples taken during larval period			No. samples containing black-headed budworm			* Average no. larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
001	0	1	3	0	0	0	0	0	0
002	68	37	29	24	2	1	4.83	1.50	1.00
003	27	21	32	14	7	4	12.71	2.57	2.25
004	22	5	0	3	1	0	1.00	1.00	0
005	60	14	29	23	5	5	1.74	1.80	1.60
Totals	177	78	93	64	15	10	5.26	2.06	1.80

* The average number of larvae per sample refers to the samples containing black-headed budworm only, and not to the total number of samples taken during the larval period.

Green-striped Forest Looper, Melanolophia imitata Wlk.

This looper increased to infestation numbers in a small area between Tofino and Hot Springs Cove. Although collections contained over 200 larvae each, defoliation was not noticeable except on close examination, due to the economical feeding habits of the larvae. The incidence and numbers of larvae collected increased greatly (Table 3).

Table 3

Number of Green-striped Forest Looper per 3-tree Beating Sample Collected in the Respective Drainage Divisions of the South Vancouver Island District. 1957 - 1959.

Drainage division	Total no. samples taken during larval period			No. samples containing green-striped forest looper			* Average no. larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
001	25	0	40	3	0	1	1.67	0	1.00
002	43	32	75	5	14	13	1.60	3.86	3.23
003	21	28	52	8	17	33	2.50	4.53	11.51
004	23	11	16	16	4	5	2.13	2.00	2.80
005	46	69	51	11	31	40	1.38	2.05	46.47
Totals	158	140	234	43	66	92	1.91	3.07	24.90

* Includes only collections containing larvae of the green-striped forest looper.

Pine Butterfly, Neophasia menapia Feld.

Flights of the pine butterfly have been observed in the district each summer for the past three years. In 1957 a flight was reported at the headwaters of Englishman River to the south-east of Mount Arrowsmith, at an elevation of 1,500 feet. About 90 per cent of the current year's foliage on Douglas fir was defoliated. Since no eggs were found it could only be assumed that the damage was caused by this insect. In 1958 a comparatively light flight was observed at Cathedral Grove (MacMillan Park), followed by a spectacularly heavy flight in 1959, with thousands of butterflies covering the trees and the roadway. Light flights were also observed in the Nitinat River and Englishman River areas and another flight was reported in Herbert Inlet in 1959 which was believed to be the pine butterfly. Egg counts were conducted in November, 1959.

Four trees were sampled at Englishman River, and three trees from the area just outside the park at Cathedral Grove. Only two trees were sampled in the Nitinat Valley. Three branches were selected at random from the upper third of the crown of each tree, one branch from the mid-crown and one from the lower third. The area of each branch was calculated in square feet, and the foliage examined for eggs.

The egg counts were very light at Englishman River averaging only 0.27 eggs per square foot of foliage.

No comparable figure was obtained from the Nitinat Valley, as the sample trees were taken from an area about three or four miles from the observed flight. However, some egg clusters were found.

The egg counts from Cathedral Grove are shown in Table 4. The average of 7.4 sound eggs per square foot of foliage is not regarded as heavy enough to cause serious damage, but the area will be kept under close observations in 1960.

Over 21 per cent of the eggs were classified as unsound. The major cause was predation which was evident in two ways. Some eggs were punctured or holes chewed in the sides and the eggs were empty; other eggs were destroyed completely except for the base of the egg where it was cemented to the needle.

Table 4

Pine Butterfly Egg Counts, MacMillan Park, November 1959.

Tree No.	Crown level	Area of foliage examined (sq. ft.)	No. sound eggs	No. sound eggs per sq. ft.	No. unsound eggs	Total no. eggs	Total no. eggs per sq. ft.
1	upper 1/3	5.06	41	8.10	10	51	10.08
	mid 1/3	11.61	107	9.22	0	107	9.22
	lower 1/3	22.80	56	2.46	0	56	2.46
	Total	39.47	204	5.17	10	214	5.42
2	upper 1/3	6.69	105	15.70	44	149	22.28
	mid 1/3	12.54	63	5.02	0	63	5.02
	lower 1/3	8.82	83	9.41	19	102	11.56
	Total	28.05	251	8.95	63	314	11.94
3	upper 1/3	11.36	102	8.98	63	165	14.52
	mid 1/3	5.61	120	21.39	57	177	31.55
	lower 1/3	13.55	52	3.84	4	56	4.13
	Total	30.52	274	9.98	124	398	13.04
Grand totals		98.04	729	7.44	197	926	9.35

Silver-spotted Tiger Moth, Halisidota argentata Pack.

Surveys in 1958 indicated that the population of this insect was increasing. A visual survey was carried out on roads in the district in the fall of 1959, but the expected increase was not apparent. Because the heavy cone crop in 1959 tended to "hide" the webs, which were smaller than in 1958, some of the webs were probably missed. As the counts were considerably lower than in 1958, (Table 5), the decrease observed is probably correct.

Table 5

Areas Covered by Road Survey and Numbers of Colonies of the Silver-spotted Tiger Moth Observed in the Fall of 1958 and 1959.

Area surveyed	1958	1959
Victoria to Nanaimo	45	15
Nanaimo to Parksville	48	1
Parksville to Cameron Lake	22	23
Lantzville cut-off	10	0
Cedar District	102	9
Maple Bay -Crofton	3	7
Duncan to Cowichan Lake	1	1
Cowichan Lake to Youbou	44	5
Totals	275	61

Maple Looper, Erranis vancouverensis Hlst.

During the early summer months shade and ornamental hardwood trees in Victoria, between Cedar Hill Cross road and Mount Douglas, and in parts of the Uplands, were denuded by this insect (Figures 1 and 2).

Late in the development period a virus disease attacked and killed most of the larvae. Figure 3 shows the appearance of the larvae after the disease affected them. It is believed that this infestation has been brought under control by this disease.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

In 1958 the hemlock looper population was approximately the same as in 1957, with five collections containing 10 larvae. These were from

the Nitinat Valley. An early survey, in mid-June, 1959, indicated a possible rise in population, with nine larvae being taken in two collections in the same area. The larvae at this date were small, in the first and second instars, and it was possible that many may have been missed, so another survey was made in July. Only five larvae were found in four collections. Two larvae were also found in collections just north of Tofino. There is therefore no indication of a population increase of this species in this district.

Spruce Budworm, Choristoneura fumiferana (Clem.)

A slight increase in the numbers of larvae collected occurred in 1959. In 1957 no larvae were found. Three were collected in 1958 and eight in 1959.

Oak Looper, Lambdina somniaria (Hlst.)

The spot infestation of the oak looper which appeared in the Lake Hill district of Saanich last year has completely died out. Garry oak in another area, Christmas Hill, between Quadra Street and Douglas Street in Victoria, were heavily infested in 1959 with trees up to 50 per cent defoliated. Several thousand larvae were collected in the Christmas Hill area and sent East for laboratory experiments.

Ten larvae were found in a collection on Salt Spring Island.

Balsam Woolly Aphid, Adelges picaea (Ratz.)

The balsam woolly aphid, which has caused considerable tree mortality on the mainland, was found for the first time on Vancouver Island. Several large trees in Thetis Lake Park were suffering from a heavy stem attack, and one small tree in Beacon Hill Park was found to be heavily gouted. An intensive search was made from Victoria to Parksville, but no more attacked trees were found.

Fall Webworm, Hyphantria cunea Harr.

Large webs of this insect were common from Victoria to Sproat Lake. The heaviest infestation is centred around the Chemainus to Nanaimo area, where it was not uncommon to find several webs on one tree.

An Alder Leaf Beetle, Chrysomela alnicola littoria Brown

Widespread defoliation of alder on the east side of the district, mostly between Duncan and Nanaimo, turned much of the area to a brownish color during the summer. The larvae of this beetle were responsible for the majority of the damage, although Altica sp. and Galerucella sp. were also present.

Willow Leaf Beetle, Galerucella carbo (Lec.)

This beetle remained in infestation proportion throughout most of the district. Defoliation of willow shrubs ranged up to 100 per cent.

Satin Moth, Stilpnotia salicis (L.)

The only area in which satin moth larvae were found in the district in 1959 was in the parking lot of the B. C. Legislative Buildings in Victoria. Six infested trees provided material for mass collections. Of 1,639 larvae reared 71 died of parasites. The predominant parasite was Apanteles solitarius (Ratz.)

A Moth Flight, Hydriomena nubilofasciata Pack.

At the end of February a moth flight was reported in the Uplands area of Victoria. The moths, which were numerous in the grass and undercover around oak trees, were adults of this oak feeding looper.

Spruce Aphid, Neomyzaphis abietina (Wlkr.)

The infestation of this aphid has decreased in most parts of the district. Light attacks were noted on Sitka spruce trees between Sooke and Jordan River.

STATUS OF FOREST DISEASES

Twig Canker of Hemlock.

Cankers of Caliciopsis sp. were found on western hemlock in all parts of the district. In some cases they were associated with a dieback condition apparently caused by Haplosporella sp.

Twig Canker of Pine.

Atropellis pinicola Zeller & Goodd was confirmed to be the cause of twig cankers reported in 1958 on white pine in Copper Canyon, near Ladysmith and in the Robertson River valley. This same canker disease was found on lodgepole pine at Errington, where the trees were heavily spotted with red flags.

Branch Canker.

Retinocyclus abietis (Crouan) Groves and Wells found associated with cankers of lodgepole pine near Muir Creek, on the Jordan River road, constitute a new host record for this fungus.

Exotic Tree Plantations

X.P.No.	Location	Exotic species	Remarks
		Annual examination	
28A	Robertson River	European larch	Only three trees remain. Others were pushed out by a bulldozer.
28B	Robertson River	European larch	Growing well, but many trees bent; Armillaria mellea (Vahl ex Fr.) Quél. was isolated in pure culture from one dead tree. A small Douglas fir, in the same area, was also infested with this fungus.
28C	Robertson River	European larch	A fungus, collected in 1958, was identified as Dasyscyphus sp. Trees suffering from the effects of deer rubbing in 1958 are showing signs of recovering.
29	Robertson River	White spruce	Twenty-four trees found doing well but still quite small
30	Sutton Creek	Scots pine	Fifty per cent of trees in plot were browsed by deer.
32	Sutton Creek	Red pine	Trees all growing well, but badly bent by snow.
53	Renfrew plantation	Port Orford cedar	One tree died back to four inches, but recovering. All others doing very well.
76	Harmac	Mixed hardwoods	Most species of hardwoods failed to survive. Nineteen black locust doing well.
		Periodic examination (5 year)	
2	Nanaimo River	Red pine	Twenty-four out of 60 trees in plot freshly deer-browsed.
6	Dunsmuir Creek	Red pine	Forty-five per cent of trees in plot freshly deer-browsed
8	Nanaimo River	Pinaster pine	Only 8 trees found in plantation but they are doing well
75	Harmac	Mixed conifers	Mortality among several species of confiers, particularly Port Orford cedar and red pine, was attributed to the severe drought conditions of 1958. Cultural isolates from dead trees negated the suspicion that Phytophthora or other root rots may be involved.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Abies amabilis (Dougl.) Forb.	*Phaeocryptopus nudus* (Peck) Petr.	Mt. Benson Nanaimo	First record for B. C. and for host.
Pyrus communis L.	*Gymnosporangium clavariiforme* (Pers.) D. C.	Victoria	First record on pear in B. C.
Pseudotsuga menziesii (Mirb.) Franco	*Rhabdocline pseudotsugae* Syd.	Gabriola	Needle cast of Douglas fir
Pseudotsuga menziesii (Mirb.) Franco	*Chondropodium pseudotsugae* White	Malahat Mt.	Dime canker of Douglas fir.
Populus nigra var. *italica* Muench.	*Taphrina populina* Fr.	Lake Cowichan	Leaf spot disease found previously at Nanaimo and Revelstoke

Figure 1. Maple tree defoliated by maple looper larvae, Victoria, B. C., South Vancouver Island District, June 22, 1959.

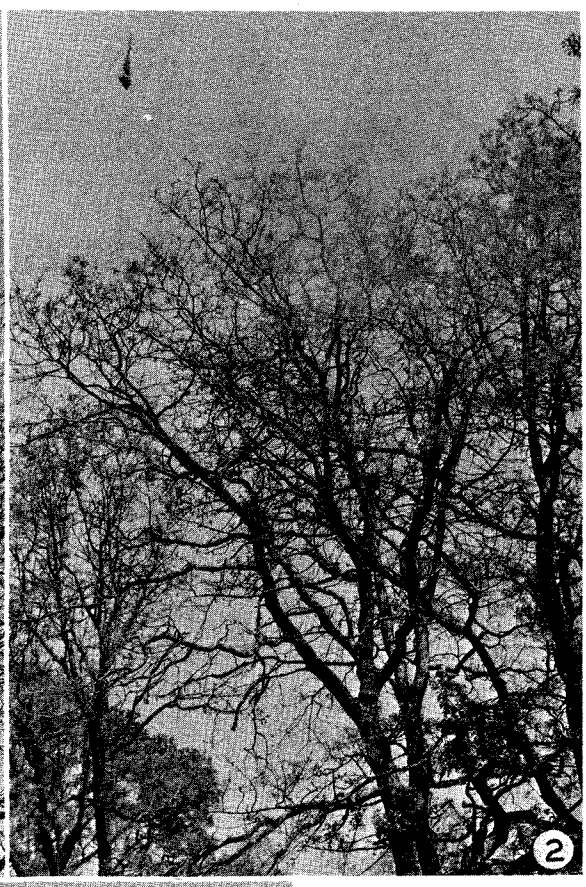
Photo by A. Craigmyle.

Figure 2. Oak trees defoliated by maple looper larvae, Victoria, B. C., South Vancouver Island District, June 22, 1959.

Photo by A. Craigmyle.

Figure 3. Maple looper larvae as they appeared after infection by virus disease, Victoria, B. C., South Vancouver Island District, June 22, 1959. Photo by A. Craigmyle.


1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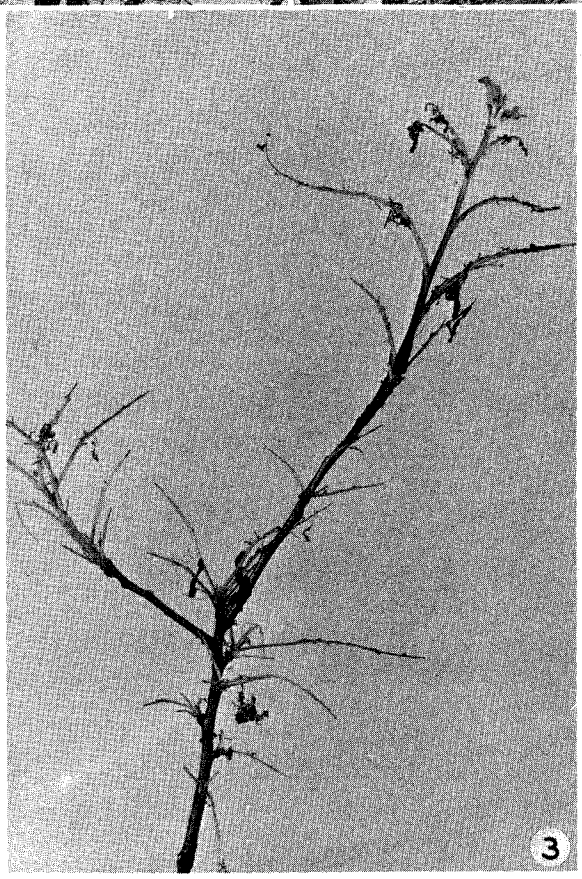
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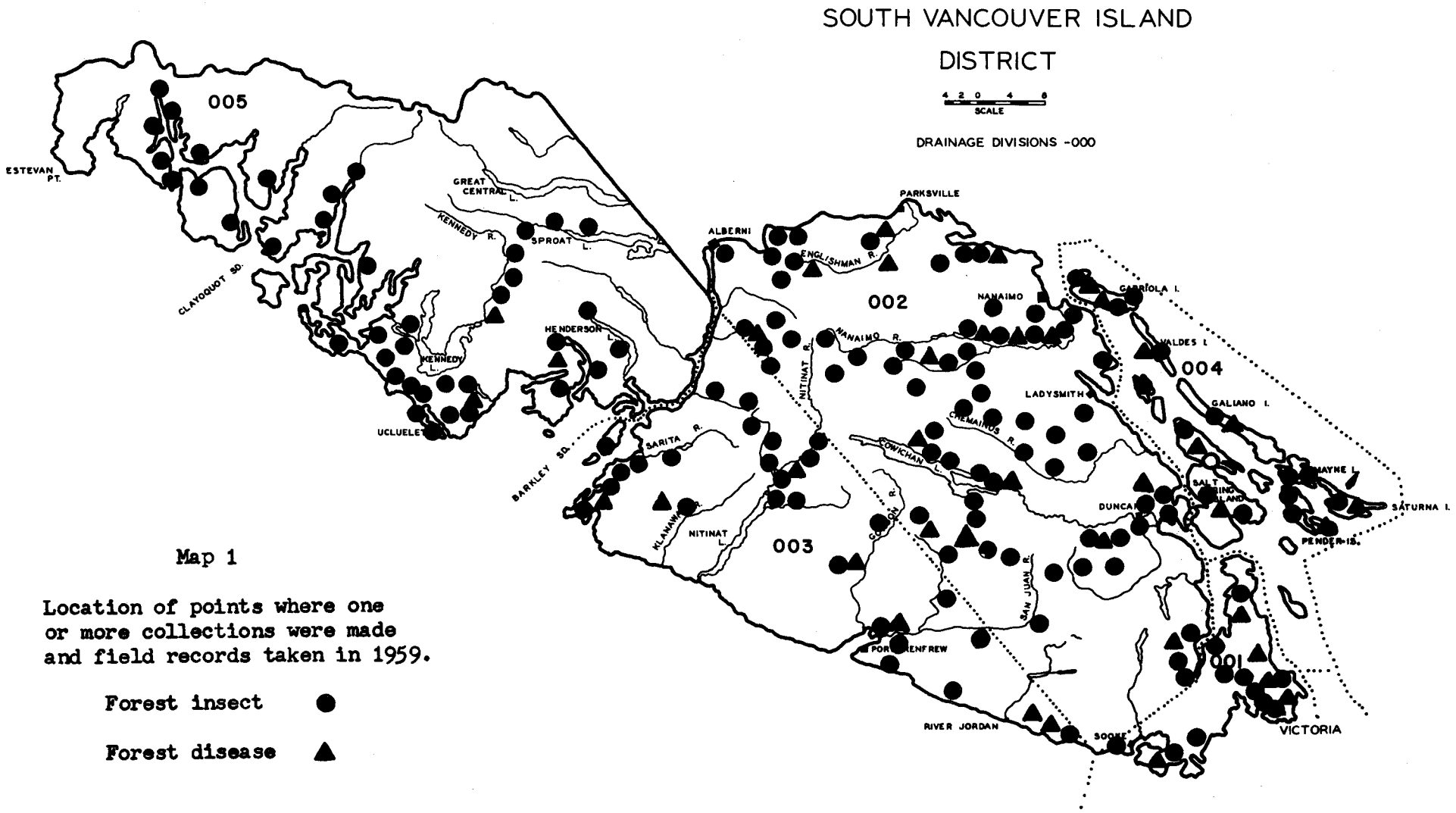
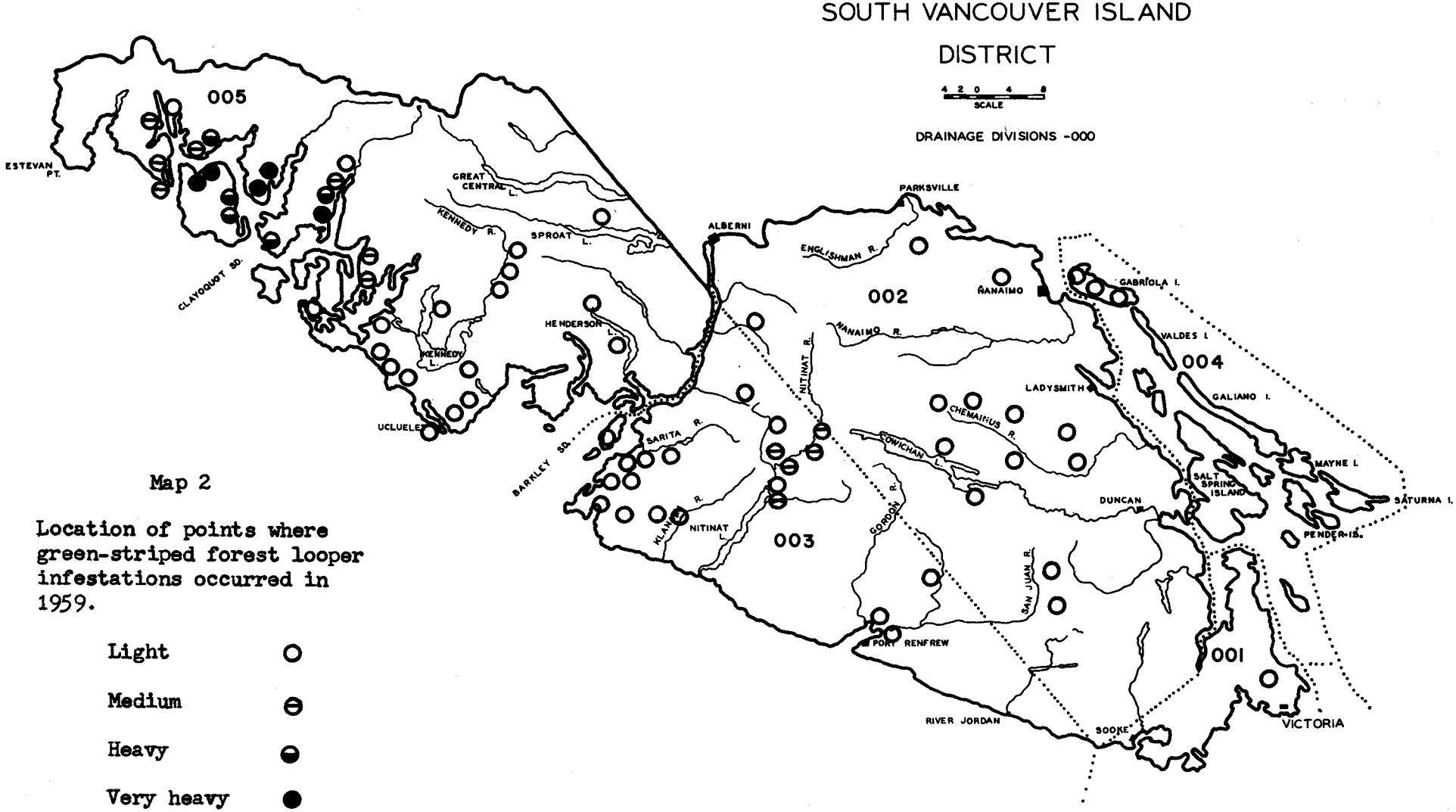


Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲



Map 2

Location of points where green-striped forest looper infestations occurred in 1959.

Light	○
Medium	⊖
Heavy	◒
Very heavy	●

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

NORTH VANCOUVER ISLAND DISTRICT

1959

FOREST BIOLOGY SURVEY

NORTH VANCOUVER ISLAND DISTRICT

1959

S. J. Allen

INTRODUCTION

The forest biology survey of North Vancouver Island commenced May 5 and ended October 8. Table 1 lists collections by hosts and map 1 shows the locations of points where collections were made. The rapid increase in population of some of the family geometridae continued in 1959.

Seventy-four tree disease samples were submitted to the Victoria laboratory for identification and one to the Calgary laboratory. Of these samples, 37 were identified, 11 sent to Ottawa for identification, nine are pending identification, seven are unidentified, one was a physiological disease and eight were negative samples. The unidentified samples lacked fruiting structures.

Table 1

Collections by Hosts
North Vancouver Island District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, red	31	-	Alder, red	15	1
Cedar, yellow	1	1	Alder, Sitka	1	-
Douglas fir	107	7	Cherry	2	-
Fir, alpine	2	-	Chestnut	1	-
Fir, amabilis	37	4	Hawthorn	2	1
Fir, grand	22	5	Maple, broad-leaf	1	3
Hemlock, mountain	13	1	Maple	1	-
Hemlock, western	267	18	Poplar	1	1
Larch, European	1	2	Willow	6	1
Pine, lodgepole	5	5	Miscellaneous	5	12
Pine, red	1	4	No host	11	2
Pine, Scots	-	1			
Pine, white	5	3			
Pine, yellow	-	1			
Pine	1	-			
Spruce, Sitka	23	-			
Yew, western	-	1	Total	46	21
Total	516	53	Grand Total	562	74

STATUS OF INSECTS

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

The black-headed budworm remained at a low population level in 1959. Thirty-eight larvae were collected in 27 samples throughout the North Vancouver Island District. The average number of larvae per sample remained unchanged compared with 1958, but the number of samples containing larvae increased 50 per cent (Table 2). One of the 38 larvae was parasitized.

Little defoliation was observed throughout the old infestation area. It was found that most of the trees have re-foliated enough since 1956 to appear normal again, and some of the top-killed trees in the Beaver Cove area have lost their dead tops and have formed new leaders. This was shown when three plots containing top-killed trees were tallied (Table 3).

Egg counts were made in 29 areas this year using the 10-inch branch sample unit as in 1958. The egg counts are shown in table 4. The average number of eggs increased from 0.024 eggs per 10-inch branch tip in 1958 to 0.040 eggs in 1959, an increase of 75 per cent. The main areas of black-headed budworm egg occurrence were at Port Hardy, Port Alice and Holberg.

Table 2

Summary of the Black-headed Budworm Found by Drainage Division, North Vancouver Island, 1957 - 1959.

Drainage division	Total no. samples taken during larval period			No. samples containing budworm			Average no. larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
021	83	84	66	18	4	0	3.0	1.2	0
022	64	45	36	32	2	2	11.7	1.0	2.0
023	20	39	23	18	10	2	1.3	1.6	1.0
024	41	0	49	23	0	10	33.0	0	1.0
025	37	0	43	32	0	13	13.0	0	1.7
026	11	4	0	1	2	0	1.0	1.0	0
Total	256	172	217	124	18	27	13.0	1.4	1.4

Table 3

Percentage Defoliation and Top-kill of Western Hemlock, North Vancouver Island, 1958 - 1959.

Plot no.	Location	No. of Trees	1958			1959		
			T*	No./trees with top-kill	Av. length of top-kill	T*	No./trees with top-kill	Av. length of top-kill
9	Port Hardy, B. C. F. S.	50	28.9	2	2.5'	0.3	0	0.0'
11	Kokish R near Beaver Cove	100	35.6	48	2.6'	0.2	13	2.3'
12	Elk R. near Beaver Cove	100	39.2	42	2.9'	1.3	26	2.9'

T* - Average defoliation per tree in per cent.

Table 4

Black-headed Budworm Egg Counts at Sample Points on Northern Vancouver Island, 1955 - 1959

Locality	Average number of eggs per 10-inch sample unit.				
	1955	1956	1957	1958	1959
Holberg - Airforce road	3.0	0	0.17	0.07	0
Holberg Pl 335	0.3	0.7	1.0	0	-
Holberg Inlet	0.6	2.0	0.17	0	0
Holberg mortality plot	0.2	2.2	0.17	0.20	0.20
Holberg NE main	2.4	1.8	0.5	0	-
Dahlstrom pt.	8.3	1.0	0.17	0	0
Mahatta River	8.0	1.5	0.5	0	-
Opposite Jeune Landing	13.0	5.0	0	0	0
Jeune Landing	2.0	1.8	0.17	0	0.07
Teeta Creek	2.8	7.0	0	0	0.07
Port Alice	1.3	17.5	0.33	0	0.07
Alice Lake Bl. 25	12.2	3.8	0	0	0.07
Port Hardy B. C. F. S.	11.7	1.0	0	0.13	0.53
Alice Lake Br. 2	16.3	27.8	0	0	0
Rupert Inlet	3.1	3.5	0.33	0	0
Port Hardy Airport Road	13.3	4.2	0	0.07	0.07
Nine-mile Lake	7.2	1.8	0	0.07	0
O'Connor Lake	3.2	1.2	0.17	0	0
Port McNeill N. main	1.0	0.3	0	0	0
Port McNeill	-	10.7	0.66	0	0
Port McNeill E. main	15.9	12.0	0	0	0
Nimpkish - Kilpala R.	4.8	2.1	0	0	-
Nimpkish Lake road	0.3	0.2	0.17	0	0
Nimpkish Camp A side 3	14.2	0.8	0	0	0
Englewood Grade mi. 3	2.6	2.7	0	0.07	0
Beaver Cove	9.7	2.0	0.5	0.07	0
Kokish R. E	0.3	1.2	0	0.07	-
Ida Lake	9.1	4.7	0.17	0	0
Robson Bight	5.9	2.0	0	0	0.07
Tsitika R.	7.0	1.7	0	0	-
Naka Creek	2.0	4.3	0	0	0
Salmon R.	4.8	2.3	0.17	0	0
Winter Harbour	1.9	4.3	0.17	0	-
Hustan Lake	-	3.5	0	0.07	0
Total	188.2	138.6	5.52	0.82	1.16
Average	5.88	4.08	0.16	0.024	0.040

Hemlock Looper, Lambdina fiscellaria lugubrosa Hlst.

The hemlock looper was more numerous in the north-western extremities of Vancouver Island in 1959 and increased slightly compared with the previous year's population. In 1958 an increase was obvious in the Coal Harbour and Holberg Inlet areas of Drainage Division 025. In 1959 the hemlock looper population almost doubled again.

Six samples averaging 1.7 larvae each were collected in the Nimpkish River Valley. The last record of hemlock looper in this region was in 1957 when one sample at Huston Lake from hemlock contained four larvae. The population trend of the hemlock looper from 1957 to 1959 is shown in Table 5.

Table 5

Summary of Hemlock Looper Found by Drainage Divisions, North Vancouver Island, 1957 - 1959.

Drainage Division	Total no. samples taken during larval period			No. samples containing looper			Average no. of larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
021	38	85	30	1	4	2	1.0	1.3	1.5
022	60	49	0	0	2	0	0	2.0	0.0
023	5	37	34	0	6	15	0	1.5	2.3
024	43	6	45	1	0	6	4.0	0	1.7
025	36	68	43	4	9	6	1.26	3.23	5.3
026	2	2	0	0	0	0	0	0	0
Total	184	247	152	6	21	29	1.7	2.2	2.8

Green-striped Forest Looper, Melanolophia imitata Wlk.

Throughout the North Vancouver Island District the numbers of this looper increased four-fold over 1958 but showed a slight decrease in distribution (Map 2). Light defoliation was noticeable in the areas of higher populations in Drainage Divisions 024 and 025. The largest collections were found at Hustan Lake, Beaver Cove, Quatsino Sound, O'Connel Lake and Little Espinosa Inlet. During the larval period,

48 per cent of all random samples taken throughout the district and 77 per cent of all samples in Drainage divisions 023, 024, and 025 contained this species (Table 6).

Hosts in order of preference were western hemlock, western red cedar, Douglas fir, amabilis fir, mountain hemlock and alpine fir.

Symptoms of disease were found in some larvae during late July and August at Salmon River, Naka Creek, Tsitika River and Mahatta River.

Although this species was the most outstanding in the heavy populations of Geometridae larvae, in a few samples in the same areas larvae of the yellow-lined forest looper, Nyctobia limitaria (Stkr.), were equally as numerous.

Table 6

Summary of Green-striped Forest Looper found by Drainage Division, North Vancouver Island, 1957-1959.

Drainage division	Total no. samples taken during larval period			No. samples containing larvae			Average no. larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
021	75	89	124	16	45	22	1.4	4.0	3.2
022	64	47	42	20	26	12	2.1	2.2	2.3
023	6	37	59	0	33	41	0.0	12.0	25.0
024	48	7	55	10	5	44	2.1	2.6	14.8
025	36	62	42	18	39	35	2.0	4.3	24.5
026	9	5	5	1	3	4	0.9	2.6	3.7
Total	238	247	327	65	151	158	1.9	4.4	16.7

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

The population of this looper remained static during 1957 and 1958 but in 1959 the population tripled. Larvae of the yellow-lined forest looper were found in many samples in association with the green-striped forest looper, Melanolophia imitata Wlk., although in smaller numbers.

The largest collections were in Drainage Divisions 023 and 025 and the largest collections were found at Chachalot Inlet, 82 larvae; Quatsino Sound, 127 larvae; Koprino Harbour, 44 larvae; Fair Harbour, 32 larvae; Artlish River, 32 larvae; McBride Bay, 36 larvae, and Barr Creek, 39 larvae. The comparison of populations from 1957 to 1959 is shown in table 7. Four larvae were parasitized out of a total of 848 larvae submitted.

Saddle-backed Looper, Ectropis crepuscularia Schiff.

This geometrid appeared in some collections in association with Nyctobia limitaria (Stkr.), but in much smaller numbers. However, as in the case of both Melanolophia imitata Wlk. and Nyctobia limitaria (Stkr.), the population increased considerably over that of 1958, (Table 8). The highest numbers collected were at: Wanokana Creek, 12; Holberg, 28; Quatsino Sound, 49; Koprino Harbour, 12; Mahatta River, 11.

Table 7

Summary of Yellow-lined Forest Looper found by Drainage Division, North Vancouver Island, 1957 - 1959.

Drainage division	Total no. samples taken during larval period			No. samples containing larvae			Average no. larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
021	73	86	88	9	18	5	1.3	5.4	1.0
022	64	50	54	21	19	1	1.9	1.6	2.0
023	10	35	59	6	23	34	1.3	6.0	13.6
024	44	7	55	16	2	20	2.6	1.0	1.3
025	37	54	42	21	19	31	7.2	3.0	11.5
026	6	4	5	5	0	1	1.2	0	2.0
Total	234	236	303	78	81	92	3.4	3.1	9.3

Table 8

Summary of Saddle-backed Looper found by Drainage Division,

North Vancouver Island, 1957-1959.

Drainage division	Total no. samples taken during larval period			No. samples containing larvae			Average no. larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
021	41	86	72	0	4	2	0	1.0	1.0
022	64	54	48	3	6	2	1.0	1.3	1.0
023	6	39	59	1	13	13	1.0	1.6	3.5
024	31	7	49	3	0	3	1.0	0	2.0
025	37	59	43	5	11	15	2.6	1.6	9.5
026	0	4	5	0	1	0	0	1.0	0
Total	179	249	276	12	35	35	1.7	1.4	5.7

Rusty Tussock Moth, Orgia a. badia (Hy. Ed.)

A total of 94 larvae was collected in nine samples in Holberg Inlet areas in 1959 compared to 40 larvae in 1958. Two samples containing larvae, pupae and adults, were submitted in late September by Alaska Pine Company and the B. C. Forest Service, both from Drake Island. Five other collections were sent from Drainage Divisions 022 and 024, each containing one larva.

Pine Butterfly, Neophasia menapia Feld.

Mass flights were observed again in the Neroutsos Arm, Nimpkish Lake, Drum Lakes, Comox Lake and Cathedral Grove areas in August, 1959. Egg samples were taken in Cathedral Grove (see South Vancouver Island Ranger Report).

Hemlock Sawflies, Neodiprion spp.

Sawfly collections averaged 7.8 larvae each in 1959, double that of 1958, (Table 9). Collections were also more widespread in distribution and the number of samples containing Neodiprion spp. increased. No defoliation was observed.

Table 9

Summary of Neodiprion spp. Sawflies by Drainage Division, North Vancouver Island, 1957-1959.

Drainage division	Total no. samples taken during larval period			No. samples containing sawfly larvae			Average no. larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
021	103	89	119	21	22	11	11.6	3.9	1.5
022	64	61	71	11	11	8	2.8	2.6	2.1
023	20	39	59	4	11	19	1.8	3.8	4.3
024	36	7	49	11	1	20	2.0	2.0	14.9
025	37	75	42	29	12	25	60.9	5.1	9.4
026	11	4	5	4	0	0	5.8	0	0
Total	271	275	335	80	57	83	26.0	3.8	7.8

Green Velvet Looper, Epirrita autumnata Harr.

Due to an early survey and the retarded development of insects with spring larval periods, a more complete survey of the green velvet looper was possible in 1959. Larvae were numerous and were found in all Drainage Divisions from May until late July. Forty-nine samples contained the green velvet looper in 1959 compared to 25 samples in 1958 and 14 in 1957. However, average numbers of larvae dropped from 4.2 in 1958 to 3.6 in 1959. The largest sample, 30 larvae from hemlock, was collected at Idle Creek.

Fall Webworm, Hyphantria cunea Harr.

An infestation of fall webworm was found on the east side of Vancouver Island from Parksville to Campbell River. The most concentrated group of webs was found from Oyster Bay inland to Comox Logging Co. bridge. Approximately 146 webs were counted on red alder along 3 1/2 miles of highway. Eight webs were submitted to the insectary but no parasites were obtained from the rearings.

Phantom Hemlock Looper, Nepytia phantasmaria (Stkr.)

No larvae of the phantom hemlock looper were found in North Vancouver Island District in 1959.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Two tents of western tent caterpillar larvae were found on the Lazo road near Comox in 1959 on wild rose and willow.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

The 1959 survey of the silver spotted tiger moth, resumed in October, showed a decrease in population. Twelve webs were counted between Parksville and Campbell River on the Island Highway compared to 78 webs in 1958. Nine webs were found in the Qualicum-Dashwood area and three were found at Fanny Bay, Union Bay and Oyster River.

STATUS OF FOREST DISEASES

Important Diseases

Spruce Needle Rust

One sample of this rust was collected in 1959 on the alternate host, Ledum groenlandicum Oeder in the area of infected Sitka spruce reproduction at Rock Bay road junction. The sample bore the telial stage of the rust Chrysomyxa ledicola Lagerh. Sitka spruce in this area was infected by the rust in 1958.

Brown Cubical Root and Butt Rot

Fruiting bodies of Polyporus schweinitzii Fr. were found at the Comox Lake road and Power line road junction in a Douglas fir, western hemlock and western white pine reproduction area. This fungus normally causes a root and butt rot of mature trees but has occasionally been found causing root-rot mortality in young stands.

Leaf Rust of Cottonwood

This rust disease, caused by Melampsora occidentalis Jacks., was absent on young black cottonwood trees Populus trichocarpa T. & G. in 1959 in the areas of the Sayward Forest and the Nimpkish River Valley where it was found in 1958. No infections were found on Douglas fir, the alternate host.

Douglas Fir Needle Cast

Rhabdocline pseudotsugae Syd. infection was very noticeable in the Sayward forest at the Salmon River access road and Big Tree Creek areas in 1959. The attack may be related to the weakening caused by the drought of 1958.

Twig Canker of Hemlock

Symptoms of Caliciopsis sp. on Tsugae heterophyla (Raf.) Sarg. infection were found at Robson Bight, Salmon River and Bonanza Lake, in the form of cankers and resinosis on western hemlock branches. Other suspected infections were submitted from Muchalat Inlet, Quatsino Sound, Menzies Bay, Port McNeill and Holberg, but in absence of fruit bodies positive identification was not possible until results of cultural studies are completed.

Exotic Plantations

In 1959, 28 exotic plantations were examined. Of these, three plots were abandoned due to poor survival. Eight plantations were affected by insect and disease organisms and mechanical injury, (Table 10).

Table 10

Exotic plantations examined in 1959, North Vancouver Island.

Plantation Number	Location	Exotic species	Remarks
13	Tsolum River	Scots pine	Plantation was browsed to ground level; shows no recovery but most of the seedlings living.
14	Tsolum River	Norway spruce	Alder in this area was sprayed with a weed killer solution and 18 out of 50 Norway spruce were affected; showing heavy die-back of the foliage on the top 60 per cent of the sapling.
18	Tsolum River	Norway spruce	As in XP 14, alder spraying affected this plantation and 12 out of 50 saplings were affected.

Table 10 - continued

Plantation Number	Location	Exotic species	Remarks
25	Echo Lake	Yellow pine	Fourteen out of 50 trees were infected by Atropellis piniphila (Weir) Lohm. and Cash; small black apothecia present on cankers.
27	Echo Lake	Lodgepole pine	Of this 50 tree plot of lodgepole pine, all trees were infected with gall rust caused by Peridermium harknessii J. P. Moore, 13 with Atropellis piniphila (Weir) Lohm. & Cash and all were infested with pitch moth Vespamima sequoiae (H. & E.)
34	Campbell River	Yellow pine	Four trees were found infected with Atropellis piniphila (Weir) Lohm. and Cash.
56	Sayward Forest	Red pine	Two dead trees outside of the 50-tree plot were found infected with Armillaria mellea (Vahl ex Fr.) Quél.
57	Sayward Forest	European larch	One dead tree was found infected with Armillaria mellea (Vahl ex Fr.) Quél.

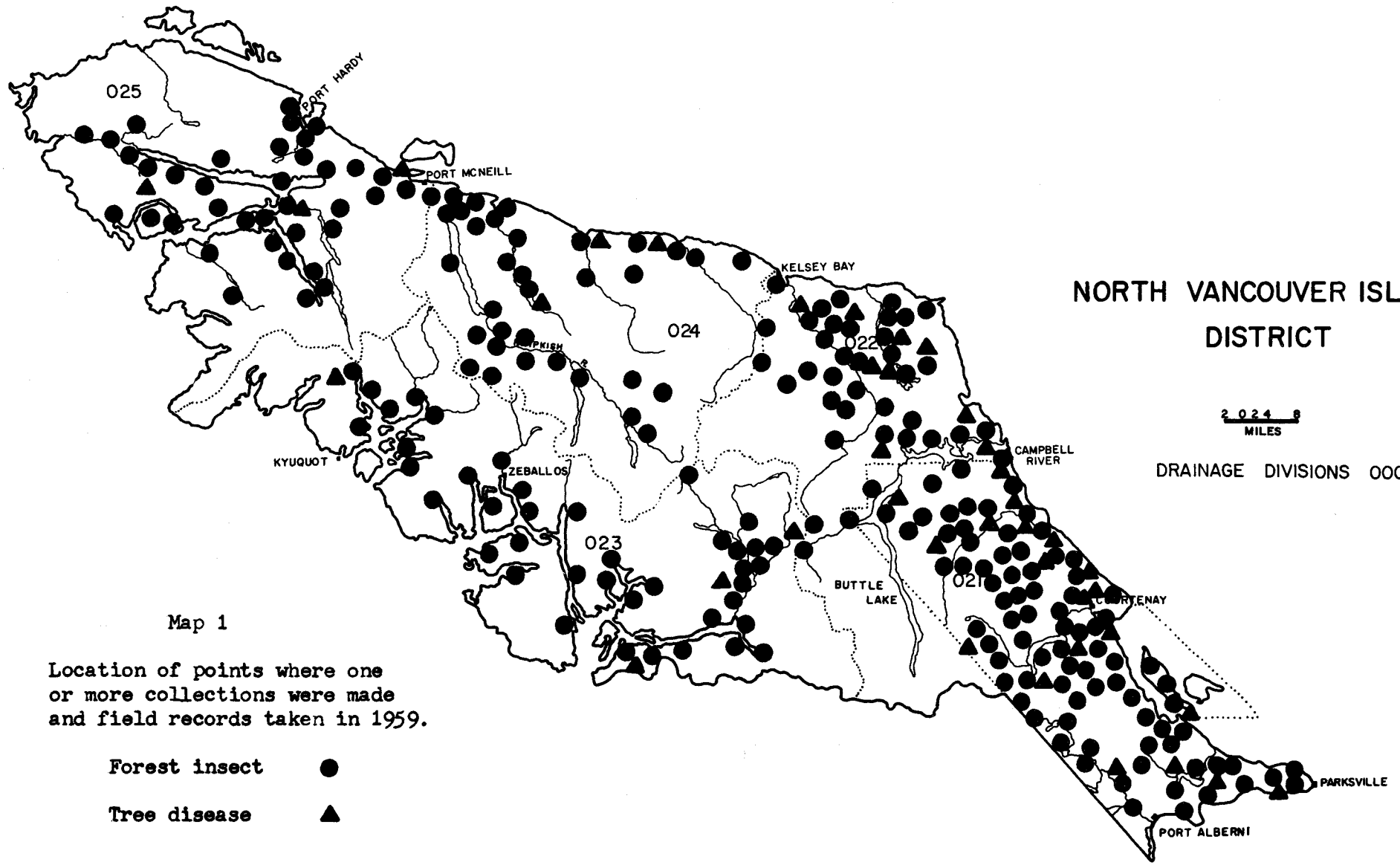
Table 11

Other Noteworthy Diseases

Host	Organism	Locality	Remarks
Fir, amabilis	Melampsorella careophyllacearum Shroet.	Salmon River	Rust causing witches broom of true firs.
Fir, Douglas	Chondropodium pseudotsugae White	Upper Campbell Lake	Superficial bark cankers found only on dry Douglas fir sites.
Fir, Douglas	Caliciopsis pseudotsugae Fitzp.	Roberts Lake	Cankers common in the Roberts Lake area on Douglas fir reproduction

Other Noteworthy Diseases - continued

Host	Organism	Locality	Remarks
Fir, grand	Peridermium pseude-balsameum (Diet. and Holw.) Arth. and Kern.	Salmon River to Port Alberni	A rust disease which causes light mortality among current needles of true firs.
Pine, white	Atropellis pinicola Zeller and Goodd.	Comox Lake Horne Lake	A weak branch canker fungus; found on branches of living white pine blister rust infected reproduction.
Ash, mountain	Gymnosporangium nootkatense Arth.	Forbidden Plateau	Rust; alternate host yellow cedar; found in August.
Fern (Dryopteris disjuncta)	Hyalopsora aspidiotus (P. Magn.) P. Magn.	Cruikshank River	Foliage rust alternates on true firs.



NORTH VANCOUVER ISLAND DISTRICT

2 0 2 4 6
MILES

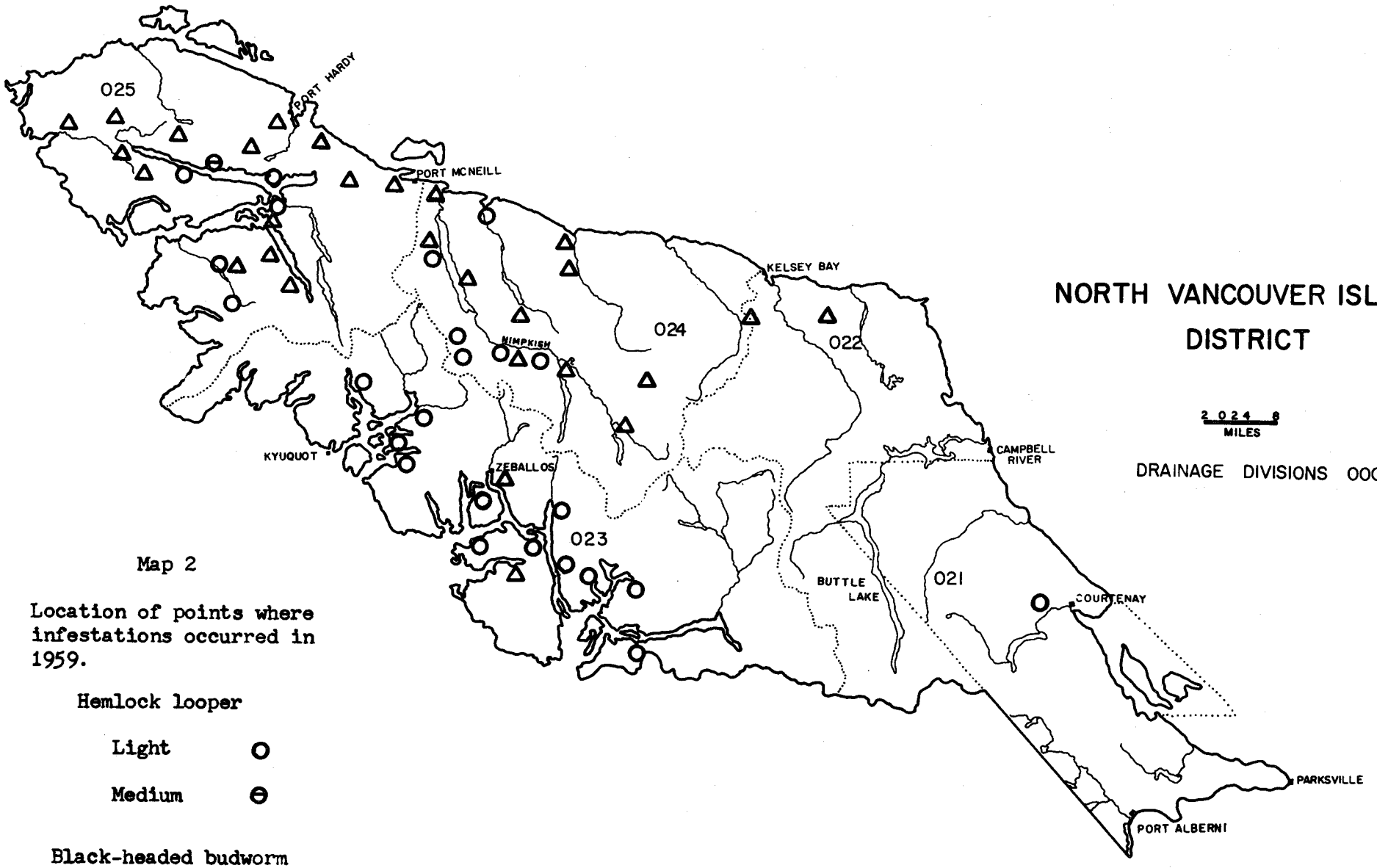
DRAINAGE DIVISIONS 000

Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Tree disease ▲



NORTH VANCOUVER ISLAND DISTRICT

2 0 2 4 6
MILES

DRAINAGE DIVISIONS 000

Map 2

Location of points where infestations occurred in 1959.

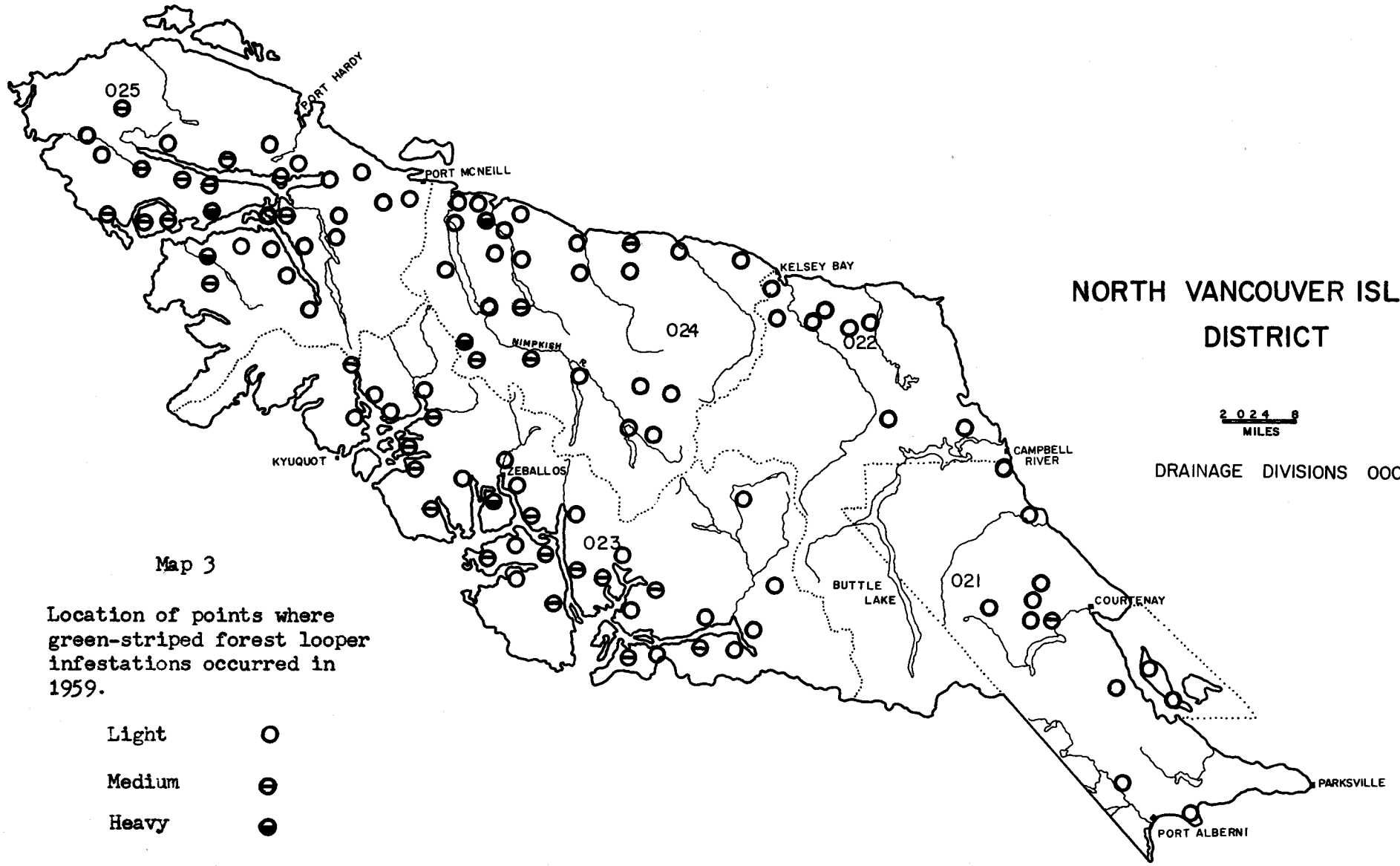
Hemlock looper

Light O

Medium ⊖

Black-headed budworm

Light △



NORTH VANCOUVER ISLAND DISTRICT

2 0 2 4 8
MILES

DRAINAGE DIVISIONS 000

Map 3

Location of points where green-striped forest looper infestations occurred in 1959.

Light O

Medium ⊖

Heavy ●

ANNUAL REPORT OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA

1959

VANCOUVER FOREST DISTRICT

MAINLAND SECTION

FOREST BIOLOGY SURVEY

VANCOUVER FOREST DISTRICT

MAINLAND SECTION

1959

D. H. Ruppel

INTRODUCTION

During 1959 Forest Biology Rangers were assigned to districts as follows:

D. H. Ruppel - South Vancouver

A. K. Jardine - North Vancouver

The spruce budworm infestation in the Pemberton area has apparently collapsed. Previously infested Douglas-fir trees were well foliated. Annual increment improved but has not yet returned to pre-infestation levels.

The known range of balsam woolly aphid was extended to the Sechelt Peninsula. At present 83,000,000 cu. ft. of amabilis fir on 300,000 acres in the southwest corner of British Columbia is in immediate danger.

The western hemlock looper increased in the vicinity of Vancouver, mostly on the watershed. This insect, in combination with the green striped forest looper, was sprayed in Stanley Park to prevent top kill of western hemlock. The population level in the remainder of the district was low.

Black-headed budworm remained at a very low level.

Douglas-fir bark beetles infested a small amount of Douglas fir at Pemberton and Anderson River but no serious outbreaks were found.

Western red cedars in the Sechelt and Fraser Valley areas, presumably weakened by drought in 1958, were attacked by western cedar bark beetles. Some mortality and top killing resulted.

The known range of the poplar and willow borer was extended over most of the North Vancouver District. In addition to willow, black cottonwood reproduction in natural stands and plantations was found to be infested in the Fraser Valley.

Webs of the fall webworm were very numerous in the southern and coastal regions of the district.

The spruce aphid infestation on Sitka spruce abated but various aphids were very numerous on deciduous hosts.

A number of disease specimens were found on exotics but most of them are not yet identified.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

SOUTH VANCOUVER DISTRICT

1959

FOREST BIOLOGY SURVEY

SOUTH VANCOUVER DISTRICT

1959

D. H. Ruppel

INTRODUCTION

Field work in the South Vancouver District commenced the first week in May and continued until mid September. The spring was retarded and the summer rather cool and moist with no forest closures.

A total of 405 insect and 36 tree disease collections were made. Disease collections were mostly from exotic plantations and many of them are not yet identified. Insect collections included a number of negative samples. Table 1 and Map 1 detail collections by host and locality respectively.

Survey work included an aerial survey of spruce budworm and balsam woolly aphid areas.

Table 1

Collections by Hosts

South Vancouver District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	30		Alder, red	15	2
Douglas fir	146	3	Apple	1	
Fir, amabilis	19	3	Ash sp.	1	
Fir, grand	2		Cascara	1	
Hemlock, mountain	2		Cherry, pin	1	
Hemlock, western	110		Chestnut, horse		1
Juniper, rocky mountain	1		Cottonwood, black	4	1
Larch spp.	3	2	Hawthorn	1	
Larch, Japanese	1	1	Hazelnut	1	
Pine, lodgepole	9		Linden	2	
Pine, ponderosa	1	1	Maple spp.	12	
Pine, red		1	Maple, broad-leaf	5	
Pine, Scots	1	4	Maple, vine	2	
Pine, shore	5		Oak sp.	1	1
Pine, western white	1		Plum		1
Spruce, Sitka	6		Poplar spp.	2	10
Spruce, white		1	Willow spp.	9	4
Miscellaneous	2		Miscellaneous	4	
			No host	5	
			Total	67	20
Total	338	16	Grand Total	405	36

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

The spruce budworm infestation in the Pemberton and Boston Bar areas collapsed in 1959. An aerial survey disclosed extensive areas of discoloured trees in the balsam - spruce stands at elevations of 4,000 to 5,000 feet. This discolouration may have been partly due to spruce budworm.

The maximum number of budworm larvae obtained in routine samples at Skookumchuk, Anderson River and North Bend, was six. A few larvae were found in the Vancouver, Squamish, Indian Arm and Hell's Gate areas. Douglas fir was the principal host. Lodgepole and shore pines were also attacked but no heavy feeding was seen.

During the aerial survey of known possible spruce budworm areas made on July 29, 1959, trees with apparently discoloured foliage were mapped. Areas and localities noted below were mostly between 4,000 and 5,000 feet elevation or more and contained balsam and spruce trees in addition to Douglas fir and other species. The abundant cone crop in 1959 made aerial observation very difficult.

Locality	Acres
N side of Soo River 3 mi. from Green River	250
N side of Soo River 5 - 6 mi. from Green River	750
3 mi. E of Green River and E of above areas	1,280
N side of Pemberton Creek 3.5 mi. from Pemberton	500
Upper Owl Creek basin	2,500
Owl Creek ridge E of Pemberton Meadows	50
W side of Joffre Creek 3 mi. from Lillooet Lake	500
W side of Boulder (Ure) Creek 3-4 mi. from Lillooet Lake	500
Anderson River Mountain on Anderson River	640
Creek basin NW of Spuzzum Mountain	200
N side of Spuzzum Mountain	50
SW of North Bend on ridge	200
Nahatlatch River, E of Log Creek	640
Nahatlatch River, NW of Hannah Lake	1,280
Nahatlatch River, SW of Hannah Lake	1,280

Trees in the Owl Creek and Joffre Creek areas had the characteristic appearance of budworm feeding but none of the areas showed signs of serious damage.

Defoliation Estimates

Ocular estimates of the per cent defoliation on 10 Douglas-fir trees on each of the plots were recorded (Table 2). The 1958 estimates are included for comparison. Table 3 lists similar information obtained at sample points.

Spruce budworm feeding on current foliage was not noticeable except for a "trace" at Rogers Creek, Skookumchuk, Blackwater Creek and Anderson River. There was an abundance of healthy current foliage on all Douglas firs.

Egg Counts

The number of spruce budworm egg masses per 100 square feet of foliage surface for study plots is shown in Table 4, and for sample points in Table 5. The count decreased to 14 at Tenas Lake and remained about the same (22) at Tisdall. No egg masses were found elsewhere.

Parasites

Due to the collapse of the infestation very few larvae were collected. Of fifty-four larvae submitted from all areas two were parasitized, 25 died of miscellaneous causes and 27 adult spruce budworm were obtained. Very few spruce budworm eggs and no pupae were found in the field.

Annual Increment

Trees on all plots except the ones at Skookumchuck and Tenas Lake showed an increased radial increment. The plots named had the heaviest over-all defoliation in 1958. None of the trees examined in 1959 had yet returned to the average rate of growth based on the radial increment before the infestation.

Summary

The spruce budworm outbreak collapsed in 1959 after causing heavy defoliation annually since 1954. Douglas firs, which have sustained defoliation for the past few years, now have a good complement of foliage, and radial increment is increasing. The effect of top-kill has yet to be determined. If recovery continues the stands should be back to normal in two or three years.

Table 2

Ocular Estimate of Per Cent Defoliation on Douglas-fir Trees on Study Plots. Figures are an Average of 10 Trees. August, 1959.

Area and Plot		Defoliation 1958 shoots Av.	Sd.	Estimated total defoliation 1958 Av.	Sd.	Defoliation 1959 shoots Av.	Sd.	Estimated total defoliation 1959 Av.	Sd.
South of Joffre Creek	1-1	4	± 3	30	± 16	0		22	± 15
	1-2	5	± 3	40	± 11	0		18	± 7
	1-3	10	± 1	50	± 22	0		55	± 16
Cariboo Trail (I.R.#687)	2-1	4	± 2	38	± 7	0		24	± 7
	2-2	2	± 2	32	± 9	0		20	± 8
	2-3	3	± 2	38	± 10	0		31	± 12
South of L2679	3-1	2	± 2	39	± 12	logged off			
	3-2	2	± 2	21	± 7	logged off			
	3-3	4	± 3	29	± 15	logged off			
Tenas Lake	4-1	57	± 26	57	± 13	0		29	± 9
	4-2	62	± 26	62	± 17	0		38	± 13
Rogers Creek	5-1	40	± 13	47	± 13	T 1/		30	± 11
	5-2	57	± 22	53	± 11	T		37	± 13
Skookum-chuck	6-1	59	± 34	58	± 17	T		36	± 16
	6-2	89	± 15	69	± 14	0		38	± 14
1.3 miles north of Gowan Cr.	7-1	-		-		0		26	± 14
	7-2	21	± 14	45	± 17	0		29	± 15

1/ T = Trace

Table 3

Ocular Estimate of Per Cent Defoliation of Douglas-fir Trees

at Sample Points. Figures are an Average of 10 Trees. August, 1959.

Area and Plot	Defoliation 1958 shoots Av.	Sd.	Estimated total defoliation 1958 Av.	Sd.	Defoliation 1959 shoots Av.	Sd.	Estimated total defoliation 1959 Av.	Sd.
Nairn Falls	T[1]		13	5	0		T	
Tisdall	13	8	45	13	0		9	16
Pemberton Meadows	T		23	9	-[2]		-	
4.2 mi. W of D'Arcy	3	3	14	7	0		4	6
8.3 mi. W of D'Arcy	T		14	6	0		5	8
11.4 mi. W of D'Arcy	4	3	20	9	0		5	8
20.5 mi. W of D'Arcy	6	3	22	7	0		10	7
Blackwater Cr. 3.7 mi.	75	25	46	15	T		20	10
Blackwater Cr. 8.0 mi.	47	27	35	18	T		26	10
Anderson River Valley 7 mi.	16	10	31	8	T ?		7	4
Anderson River Valley 9 mi.	46	13	22	5	T ?		10	8
Anderson River Uztlius Creek	71	17	23	9	0 ?		20	5

[1] T = Trace

[2] Not sampled

Table 4

Number of Spruce Budworm Egg Masses per 100 Square Feet of Foliage Surface on Study Plots. August 1959.

Area and Plot	1954	1955	1956	1957	1958	1959
1 - 1	304	229	47	48	0	0
1 - 2	198	208	31	0	0	-
1 - 3	386	108	103	0	0	0
Average	296	182	60	13	0	0
2 - 1	32	29	57	7	0	0
2 - 2	99	31	58	4	0	0
2 - 3	50	19	7	0	0	0
Average	60	26	41	4	0	0
3 - 1	742	517	38	17	11	0
3 - 2	93	265	91	11	0	-
3 - 3	467	204	63	11	0	0
Average	434	329	64	13	4	0
4 - 1	194	58	136	13	110	0
4 - 2	133	13	50	7	15	27
Average	164	36	93	9	76	14
5 - 1	186	-	26	42	166	0
5 - 2	568	16	122	48	7	0
Average	377		74	45	76	0
6 - 1	150	71	153	112	40	0
6 - 2	80	7	50	151	53	0
Average	115	39	102	128	44	0
7 - 1	15	16	11	22	6	0
7 - 2	65	6	52	33	25	0
Average	40	11	32	29	16	0
Average (all plots)	221	112	64	31	26	2

Table 5

Number of Spruce Budworm Egg Masses per 100 Square Feet of Foliage Surface at Sample Points. August 1959.

Area	1955	1956	1957	1958	1959
Nairn Falls	-	41	30	0	-
Tisdall	-	108	0	21	22
Pemberton Meadows	-	-	3	4	-
4.2 mi. W of D'Arcy	45	109	12	6	0
8.3 mi. W of D'Arcy	-	-	-	-	0
11.4 mi. W of D'Arcy	34	27	16	0	0
20.5 mi. W of D'Arcy	72	21	16	0	0
Blackwater Cr. 3.7 mi.	4	6	0	0	0
Blackwater Cr. 8.0 mi.		65	29	13	0
Anderson River 7 mi.		48	44	53	0
Anderson River 9 mi.		29	8	0	0
Anderson River		30	18	48	-
Uztlius Creek		-	-	40	0

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

The western hemlock looper occurred in light to heavy infestation proportions in Stanley Park and light to medium proportions elsewhere in the South Vancouver District. Map 2 shows the distribution of collections containing this looper.

During the larval period, June 17 to August 12, 23 of 118 collections from western hemlock, western red cedar, Douglas fir and vine maple contained hemlock looper larvae. The average number of larvae per positive collections was 5.6 with a maximum of 24 on Seymour River and 19 at Coquitlam Lake, both from western hemlock. No serious defoliation was noted.

Stanley Park

Despite a successful spray project in the park in 1958, there was a light to heavy infestation of loopers in 1959. The green striped forest looper accompanied the hemlock looper and is reported separately. The park was sprayed for the second time in two years on July 23, 1959. On both occasions no spraying was done in close proximity to the zoo and this may partly account for the 1959 insect population. It is considered expedient by Park Officials to spray any insect population in the Park which might cause top kill or tree mortality.

The principal host was western hemlock. Douglas fir, western red cedar and vine maple were also attacked. Thirty collections out of a total of 35 contained hemlock looper larvae. The average for all collections was 12.3 and the maximum collection, in the hollow tree area, was 62. It was considered likely that some top killing would take place if the park was not sprayed.

Mortality, 12 days after the spray project, was 96.8 per cent. The figure was based on three artificial devices in which a total of 216 larvae were released on foliage suspended over trays in forest openings. The figure was not corrected for natural mortality and may be a little high.

No serious hemlock looper problem is anticipated in Stanley Park in 1960. Elsewhere in the district the increased population and occurrence of the insect may indicate possible population increases, especially on the Greater Vancouver Waterboard watersheds.

Green Striped Forest Looper, Melanolophia imitata Wlk.

This insect was very common throughout the district for 1959 but decreased from 1958. It occurred with western hemlock looper in Stanley Park and other localities. Table 6 shows the larval population trends of green striped forest looper for the past three years by drainage divisions based on random samples made during the larval period. The chief hosts were western hemlock, western red cedar and Douglas fir. Several collections were made on lodgepole pine, mountain hemlock and vine maple.

The population level ranged to medium in Stanley Park and to heavy in the rest of the district.

The maximum number of larvae per collection was 111 from hemlock on Grouse Mountain. Map 3 shows general distribution and intensity. One hundred and ninety collections outside the park averaged 2.8 larvae each and 38.4 per cent of the collections contained the insect.

Table 6

Population Trend of Green Striped Forest Looper, Melanolophia imitata Wlk. by Drainage Divisions as Determined by Collections from Host Species During the Larval Period. South Vancouver District.

Drainage division	Total no. of samples taken during larval period			No. samples containing green striped forest looper			Average no. of larvae per sample		
	1957	1958	1959	1957	1958	1959	1957	1958	1959
040	50	53	30	10	2	28	3.0	3.0	0.9
041	26	25	5	0	2	0	0	1.5	0
042 1/	117	145	115	53	68	84	19.0	44.0	13.6
043	22	26	9	6	2	2	2.0	3.0	0.2
044	25	24	40	7	1	8	3.6	1.0	0.5
045	28	47	27	5	6	4	3.0	4.0	0.3

1/ Includes Stanley Park

Stanley Park

The green striped forest looper occurred with the hemlock looper in the park. Their larval period and host preference are very similar. Thirty-two or 88.9 per cent of 36 beating collections made in the park, chiefly from western hemlock, contained the above looper in varying numbers up to 89 larvae.

The spray project of July 23 resulted in 89.9 per cent mortality of 271 test larvae 12 days from the time of spray. Three lots of larvae were exposed to the spray as for hemlock looper.

No serious outbreak of this insect is anticipated in the park in 1960.

Douglas-fir Bark Beetle, Dendroctonus pseudotsugae Hopk.

Felled and bucked Douglas fir trees extending over three or four acres near Green River at Pemberton were heavily infested with Douglas-fir bark beetles. The area had been selectively cut and residual fir trees were badly damaged. Some logs had been skidded but in these areas numerous infested tops and long butts had been left.

Similar areas were found on Anderson River at Boston Bar where sporadic outbreaks of beetles have occurred over a period of years.

Very little current beetle damage was noted on standing firs in either area but the hazard is a threat to extensive stands of Douglas fir.

Western Cedar Bark Beetle, Phloeosinus punctatus Lec.

Western red cedars at Cultus Lake, Silverdale and scattered points in the lower Fraser River Valley were infested by western cedar bark beetle. Most of the attacked trees were probably severely weakened by drought in 1958. The beetle attack merely intensified this damage. Trees which were attacked on the upper crown only will have "spike" tops.

The condition of cedars in two areas was recorded for future comparison to determine continuing damage. At Maple Bay, Cultus Lake, 60 trees were tagged in an area of 4 x 5 chains. Fifteen trees were infested and the remainder were healthy. At Silverdate 21 of 46 cedars on a 2 x 3 chain area had one quarter or more of the crown killed. Trees examined ranged from reproduction to 28 inches d. b. h.

Table 7 shows a tally of dead or damaged cedars in the Cultus Lake area recorded from a slow moving vehicle and presumed to be beetle damage on the basis of several samples.

Western cedar bark beetle is not known to be an important primary pest of cedar. Future observations may indicate whether the insect continues its attack in the above plots or is confined to weakened trees.

Poplar and Willow Borer, Sternochetus lepathi (L.)

This wood borer caused severe damage to native willows in the South Vancouver District in 1959. A black cottonwood plantation was found to be heavily infested, as well as the natural regeneration. Plantations of exotic poplars were examained to determine possible infestation by borers but none were found. Areas where weevil examinations were made and the number of healthy and infested stems are shown in Table 8.

The principal host of the poplar and willow borer, willow, is a non-commercial species. However, willow is planted in some areas to prevent erosion and run off and the borer constitutes a real hazard to these planted areas. Attacks by the insect on black cottonwood or introduced poplars, especially in planted areas, could be quite serious. Stems on which damage was noted were all under four inches d. b. h.

Table 7

Dead or Damaged Western Red Cedar Counted Along Roads in the Cultus Lake Area Due to Western Cedar Bark Beetle Following 1958 Drought. South Vancouver District 1959.

Strip	Location	Length in miles	Top killed		Dead	
			d.b.h. in inches	No. of trees	d.b.h. in inches	No. of trees
1	Entrance Bay Campsite	0.2	1	1	1	2
			2	2	2	4
			6	1	3	1
2	Park Road-Entrance Bay to Lindell	2.9	2	1	1	2
			3	1	2	10
			4	3	3	6
			5	5	4	3
			6	2	6	1
			8	1		
			10	1		
			12	2		
3	Maple Bay Trailer Park	0.3	4	1		0
4	Maple Bay corner SW	1.8	4	1	4	4
					5	1
5	Fish Hatchery along Hwy to Cultus Lake P. O.	1.7	1	18	1	25
			2	23	2	39
			3	15	3	9
			4	5	4	4
			5	3	5	1
			7	1		
	Totals	6.9		87		112

Table 8

Areas Where Quantitative Studies were made of the Poplar and Willow Borer, Sternochetus lepathi (L.) South Vancouver. 1959.

Locality	Size of area in chains	Tree spp.	D.B.H. in inches	Healthy stems	Infested stems
Natural stands					
Rosedale	7 x 1/4	Willow	1/2 - 2	13	37
Rosedale	-	"	1/2 - 2	100	0
Mission	1/2 x 1/2	"	1/2 - 4	43	57
Chilliwack	1/4 x 2	"	1/2 - 4	21	100
Ryder Lake	1/2 x 2	"	1/2 - 4	110	10
Herrling Island	1/2 x 1/2	"	1/2 - 4	80	40
Agassiz	1/2 x 1	Black cottonwood	1 - 4	107	20
Rosedale	-	" "	4 - 12	100	0
Plantations					
U.B.C. Forest Haney					
Plot 10	-	Black cottonwood	1/2 - 1	19	7
Plot 12	-	" "	1/2 - 1	38	12
Plot 8	-	P. carolina and regenerata	1/2 - 1	28	0
Plot 9	-	P. canadensis regenerata	1/2 - 1	25	0
Plot 11	-	P. regenerata	1/2 - 1	20	0
Plot 24	-	P. robusta bachelieri	1/2 - 1	42	0
Plot 23	-	P. grandis	1/2 - 1	31	0
Plot 22	-	Populetum (81 var. or spp.)	1/2 - 1	-	0
" 25 & 26	-	P. isendorf and regenerata	1/2 - 1	-	0
Herrling Island	-	Populetum	1 - 4	-	0
Gardener Island	-	Populetum	1/2 - 1	-	0

Balsam Woolly Aphid, Adelges piceae (Ratz.)

The balsam woolly aphid was not reported over any greater range in the South Vancouver District in 1959 than that established in 1958. Damage to amabilis fir was, however, more fully assessed by aerial and ground surveys.

During the last week in August an aerial survey over the North Vancouver and Howe Sound areas revealed dead and dying amabilis fir listed below. Trees in an early stage of attack could not be discerned from the air. The host trees ranged in size up to four feet d. b. h.

Mt. Seymour (NW of Radio Tower)	500 trees
Lynn Creek Dam	30 "
Upper Lynn Creek basin	120 "
Lynn Creek, West side	510 "
Grouse Mountain	65 "
Capilano River, East side	95 "
Capilano River, West side	100 "
Cypress Creek basin	2,000 "
Total	3,420

Table 9 shows the stand composition by number of stems and amabilis fir attacked by balsam woolly aphid at Cypress Creek, September, 1959. Four one-acre strips were run at about 2,500 feet elevation between the Hollyburn Chair-lift and Cypress Creek on September 11, 12. Some mountain hemlock and yellow cedar occurred with the trees named. One hundred and sixty-eight or 32 per cent of a total of 528 tallied were infested with balsam woolly aphid. Diameters ranged from one to 50 inches. Twenty-two snags and dying trees over 10 inches d. b. h. were counted. It is probable that many trees classes as healthy actually had a light attack on the crown which was not easily identifiable due to the height and closeness of the canopy.

It is not known how fast the balsam woolly aphid will spread through balsam stands on the coast. In the absence of effective controls infested stands can only be expected to progressively deteriorate. The southwest corner of Vancouver Forest District has 300,000 acres containing 83,000,000 cu. ft. of amabilis fir which is in immediate peril.

Table 9

Stand Composition by Number of Stems and Amabilis Fir Attacked by Balsam Woolly Aphid, Adelges piceae (Ratz.), Cypress Creek. South Vancouver, September, 1959.

Strip No. (1 acre)	No. of stems Hemlock	Cedar	A.fir	Per cent of A. fir in stand	Per cent of A. fir attacked
1	76	-	143	65	26
2	149	13	126	44	33
3	161	60	116	34	14
4	124	12	143	51	51
Total	510	85	528	47	32

Spruce Aphid, Neomyzaphis abietina (Wlkr.)

The outbreak of spruce aphid reported in 1958 on Sitka spruce and some ornamental spruces in the Vancouver area subsided in 1959. Most trees produced a good complement of foliage this year. Some trees on Capilano Indian reserve near Lion's Gate Bridge showed poor recovery and some ornamental plantings have had their appearance badly impaired.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm was very scarce in South Vancouver District in 1959. Seven collections from Douglas fir and western hemlock each contained one larva.

Alder Sawfly, Hemichroa crocea (Fourc.)

This insect was scarce during the first part of the summer but in late August and early September several small but flourishing infestations were noted on red alder. These were in the vicinity of Haney. Alder sawfly is subject to sudden population fluctuations.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Two infestations of this defoliator reported in 1958 at Pemberton and Ladner were not active this year. Larvae were found at both localities but no noticeable damage took place.

Fall Webworm, Hyphantria cunea Harr.

An infestation of fall webworm occurred from Ladner to Hope. It was chiefly confined to the south side of the Fraser River. Red alder was the preferred host but all native, orchard and common exotic deciduous trees were attacked with the exception of broadleaf maple. Table 10 shows the results of several road surveys. The method used was to drive along the road as close to 20 m.p.h. as possible and count the webs along clocked mileage. One person did the driving and observing so the count is conservative. One small yard in Yarrow contained an alder bearing 30 webs and about six cottonwoods with another 70 webs.

The fall webworm is more noteworthy for its unsightly webs on shade and orchard trees than for the defoliation it causes.

Table 10

Web Counts of Fall Webworm, Hyphantria cunea Harr. in the Fraser Valley on Various Deciduous Hosts as Determined by Measured Strips. South Vancouver District, 1959.

Location	Miles travelled	No. of webs	Webs per mile
from Pierdonville west	3.0	21	7.0
from Rosedale north	2.8	20	7.1
Chilliwack (Islands)	7.4	27	3.6
Cultus Lake (SE side)	3.2	69	21.6
from Yarrow east	3.5	80	22.9

Fir Engraver, Scolytus ventralis Lec.

A small number of grand firs in Yale were infested with fir engraver beetles. The trees examined were "red-topped" and two to 36 inches d. b. h. No green infested trees were found. The site was an exposed dry rocky southern exposure and probably suffered severely from drought in 1958. This insect is not known to kill trees in British Columbia and the mortality at Yale may have resulted from the host being in a weakened condition. A fir twig beetle, Pityophthorus pseudotsugae Sw. was also present.

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

Pitch moths were responsible for serious breakage and malformity of ponderosa pine in plantations at Alouette Lake and Green Timbers. It is a common but not serious pest of native pines. The infestation on planted ponderosa pine, however, caused sufficient top breakage to allow native trees to surpass them in height, leaving them shaded. In situations where the trees have remained in the open, malformation of stems is severe enough to impair their use commercially.

Hemlock Sawfly, Neodiprion sp.

This insect was common on western hemlock, particularly in the North Vancouver area. The lower portion of the crowns of trees suffered light defoliation.

Fir Bark Maggot, Cheilosia hoodiana (Bigot)

Amabilis fir on the Cypress Creek drainage basin, Mount Seymour and Grouse Mountain was infested with fir bark maggots. The insect feeds in the cambium having little effect on the vigour of the tree but causing the "black check" defect found in finished lumber products.

Fir Root Bark Beetle, Pseudohylesinus granulatus Lec.

Balsam woolly aphid infested amabilis firs at Cypress Creek, Grouse Mountain and Mount Seymour, were infested with this beetle. The only successful galleries were found in aphid killed trees. No galleries were found in green trees but numerous entries had been made in the bark and most of these were occupied by one or two adult beetles.

Aphids and Adelgids

In addition to balsam woolly aphids and spruce aphids reported above, several others were found. The spruce gall aphid, Adelges cooleyi Gill. was common on Douglas fir and Sitka spruce. Western hemlock was lightly infested with a hemlock aphid, Adelges tsugae (Annand). Various exotic larches in the lower Fraser Valley were heavily infested with an unidentified woolly aphid attacking the foliage.

Thirty-one collections from broad-leaved hosts contained aphids. Various maples were the most heavily infested. Premature drying of foliage occurred at many points.

STATUS OF FOREST DISEASES

Important Diseases

Drought

In the Fraser Valley several insect infestations were noted in areas where drought was severe in 1958. Western red cedar at Cultus Lake and Silverdale was attacked by western cedar bark beetle. Mortality was limited but many trees had the upper portion of the crown killed which may result in multiple tops. Other details will be found under the insect heading.

In Yale 15 to 20 grand firs from 2 - 36 inches d. b. h. were killed by fir engravers and other secondary insects. The site was an exposed dry rocky southern exposure.

Douglas fir reproduction from Hope to Boston Bar was mostly recovered from the drought but some mortality took place. Most mortality was on rocky outcrops. No serious loss of stems occurred.

Ice

Douglas fir reproduction along the Chilliwack River was found to have numerous broken leaders. The trees were 10 to 25 feet in height. A local woodsman reported that winter icing conditions during the winter of 1958 - 1959 were responsible for the damage. Malformation of stems could result.

General

No unusual disease conditions were noted on native trees.

EXOTIC PLANTATIONS

Examinations were made of 35 sample plots in plantations of non-indigenous species. The results of the examination are listed in Table 11. Four plots were not examined. A special search was made to determine the presence of mottled willow borer in poplar plantations. The only infested trees found were on two plots of native black cottonwood listed at the end of the table. These were adjacent to plantings of various exotic poplars in the University of British Columbia Forest at Haney.

Table 11

Summary of Disease Conditions on Exotic Plantations. South Vancouver District, 1959.

XP Number	Location	Exotic species	Remarks
20	Pitt Meadows	Populus *Regenerata	Many stems girdled by voles at base.
39	Silverdale	Mixed conifers	Being smothered by alder reproduction.
40	Suicide Creek	Mixed conifers	Grazed by horses, plot abandoned.
41	Garibaldi Park	Mixed conifers and hardwoods	Most sub-plots recently swamped, beneficial to pines, oaks, redwood and larch.
41-7	" "	yellow pine	Severe breakage and malformity of all stems by sequoia pitch moth, Vespamima sequoia (Hy. Edw.)
41-11	" "	Dahurian larch	Severe lesions on boles of most trees with some mortality.
41-14	" "	White spruce	Lesions up to three feet long on boles.
41-16	" "	Japanese larch	Lesions on boles but no mortality.
41-17	" "	Scots pine	Doing poorly. Mechanically damaged by bears biting boles.
41-19	" "	Scots pine	Cankers on branches caused by Caliciopsis sp. Trees doing poorly.

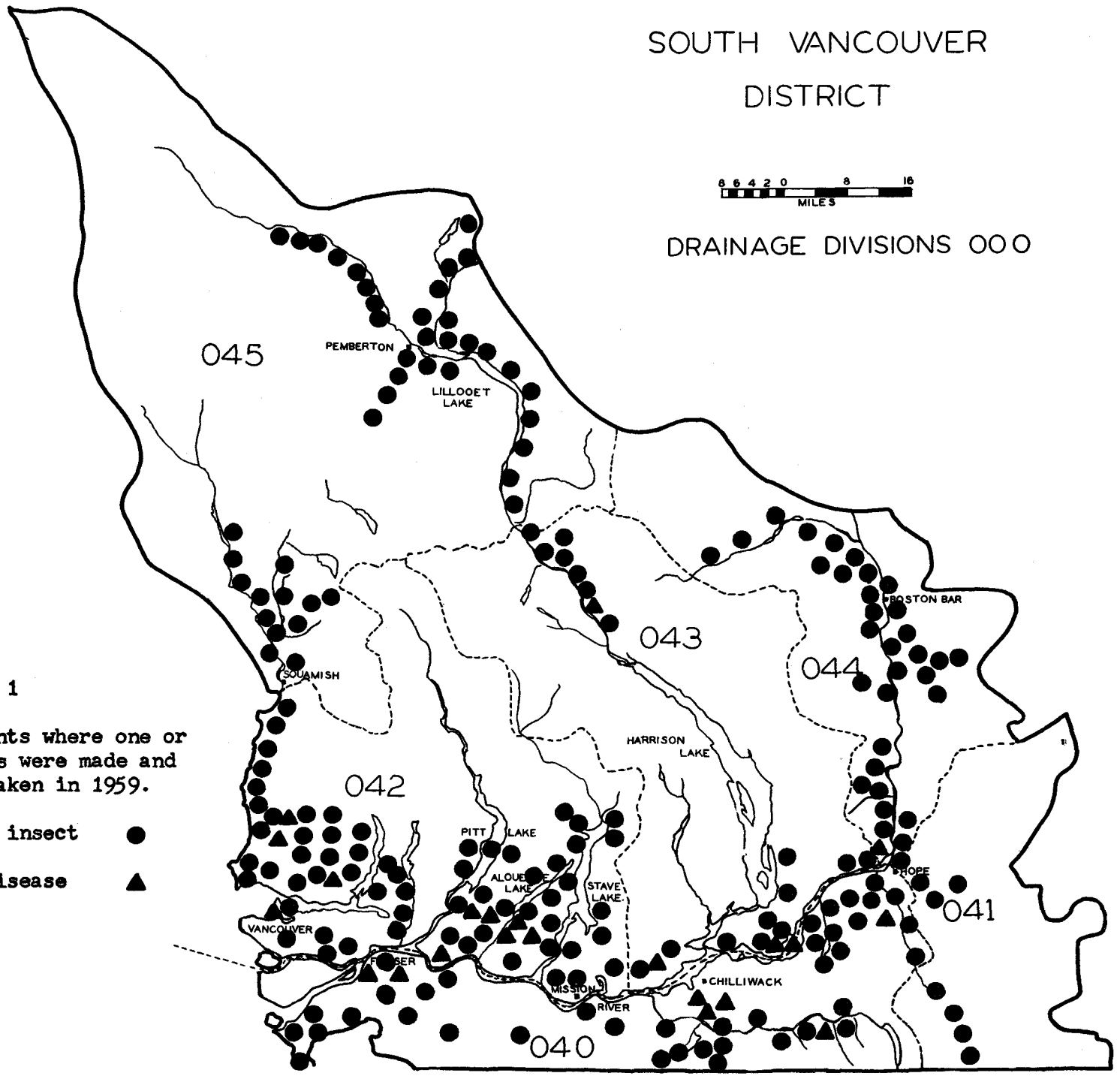
* All hybrids shown with latin names

Table 11 - continued

XP Number	Location	Exotic species	Remarks
43	Green Timbers	Scots pine	Good survival but poor form due to infection of all trees by Cronartium sp. causing galls. Not growing fast enough to compete with native species.
44	Green Timbers	Scots pine	Good survival, vigorous.
45	" "	red pine	Healthy and vigorous, swamped and thinned.
46	" "	English oak	Boles scarred, possibly sun scald, several sickly trees had previous year's foliage still attached. One tree dead.
47	Agassiz	Mixed conifers and hardwoods	Very heavy infestation of aphid on most hardwoods, otherwise normal.
52	Herrling Island	Black cottonwood	Vole girdling and an unnamed dieback.
		Populus regenerata	Vole girdling and an unnamed dieback.
		Populus x canadensis P. robusta bachelieri	Vole damage and a canker, Cytospora sp., causing dieback.
77	Green Timbers	red pine	Good survival, vigorous. Heavy ground cover.
92	Haney (U.B.C. Forest)	Mixed conifers European larch	Larches lack rigidity. Most of species dead, unidentified dieback.
		Japanese larch	Mediocre growth.
		Dahurian larch	Doing fairly well.
93	"	Mixed conifers	Duplication of plot 92.

Table 11 - continued

XP Number	Location	Exotic species	Remarks
94, 95	Haney	European larch Japanese larch Dahurian larch	Three larches doing well except for lacking rigidity.
96	"	red fir	Mostly living but not very vigorous.
97	Haney	Corsican pine	Healthy but lightly browsed by deer.
99	"	Scots pine	Very healthy and vigorous.
100	"	Norway spruce	Healthy but slow growth.
102	"	Populus canadensis var. eugenei	Mostly healthy and vigorous, one diseased leader.
103	"	P. regenerata	Some mortality and some top kill caused by a canker forming disease Cytospora sp.
104	"	P. canadensis regenerata	Healthy and vigorous
105	"	P. regenerata	Mechanical damage by machinery.
106	"	red pine	Browsed, probably by deer.
107	"	Populetum	Apparently healthy.
108	"	Populus grandis	Healthy and growing
109	"	P. regenerata var. bachelieri	Healthy
Misc.	"	Black cottonwood	On U. B. C. plot 10, 7 of 26 plantings under one inch d.b.h. were infested by Sternochetus lepathi (L.). On U.B.C. plot 12, 12 of 50 sets under one inch d.b.h. were infested by the same insect, mottled willow borer.

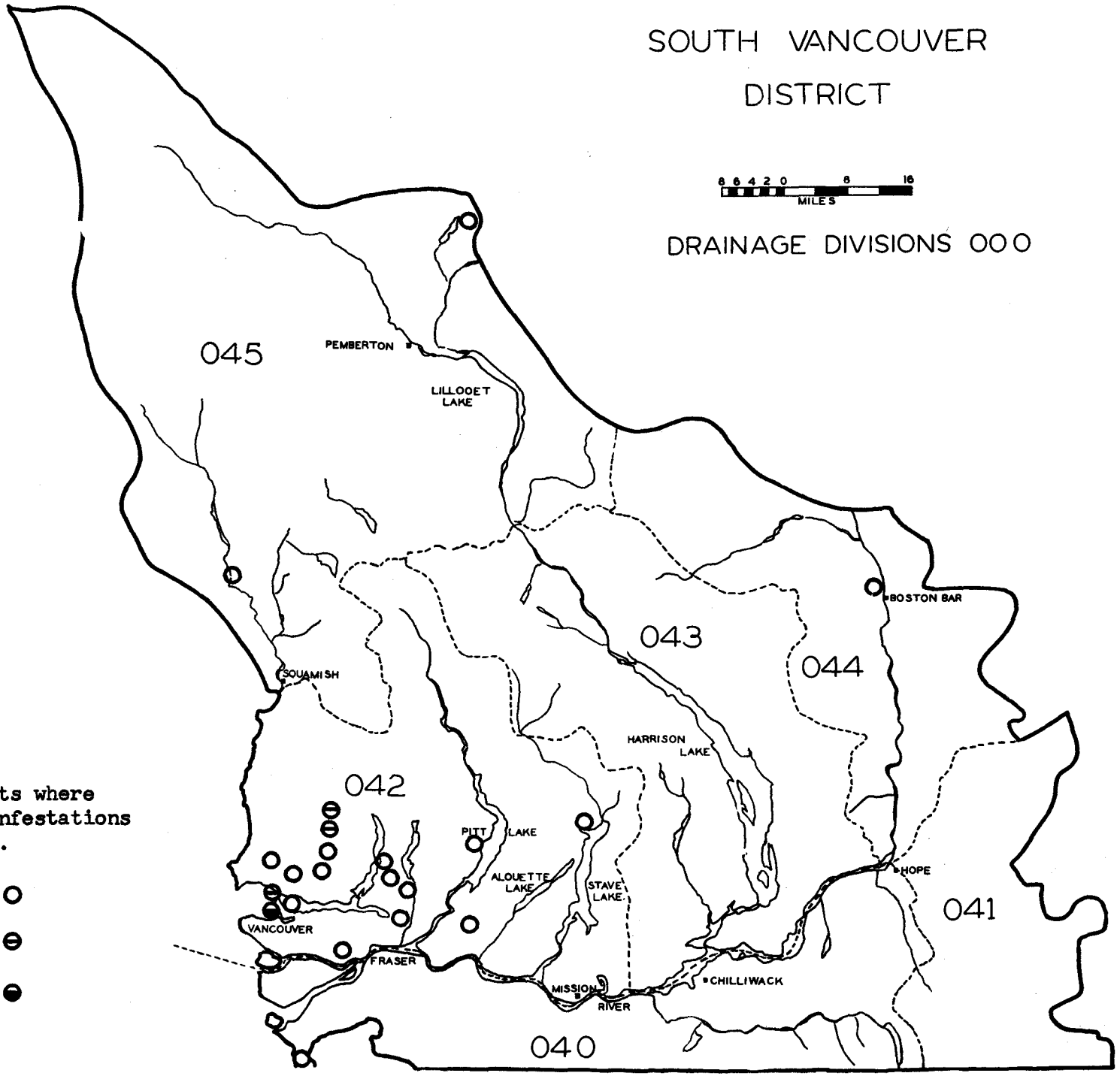


Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Tree disease ▲



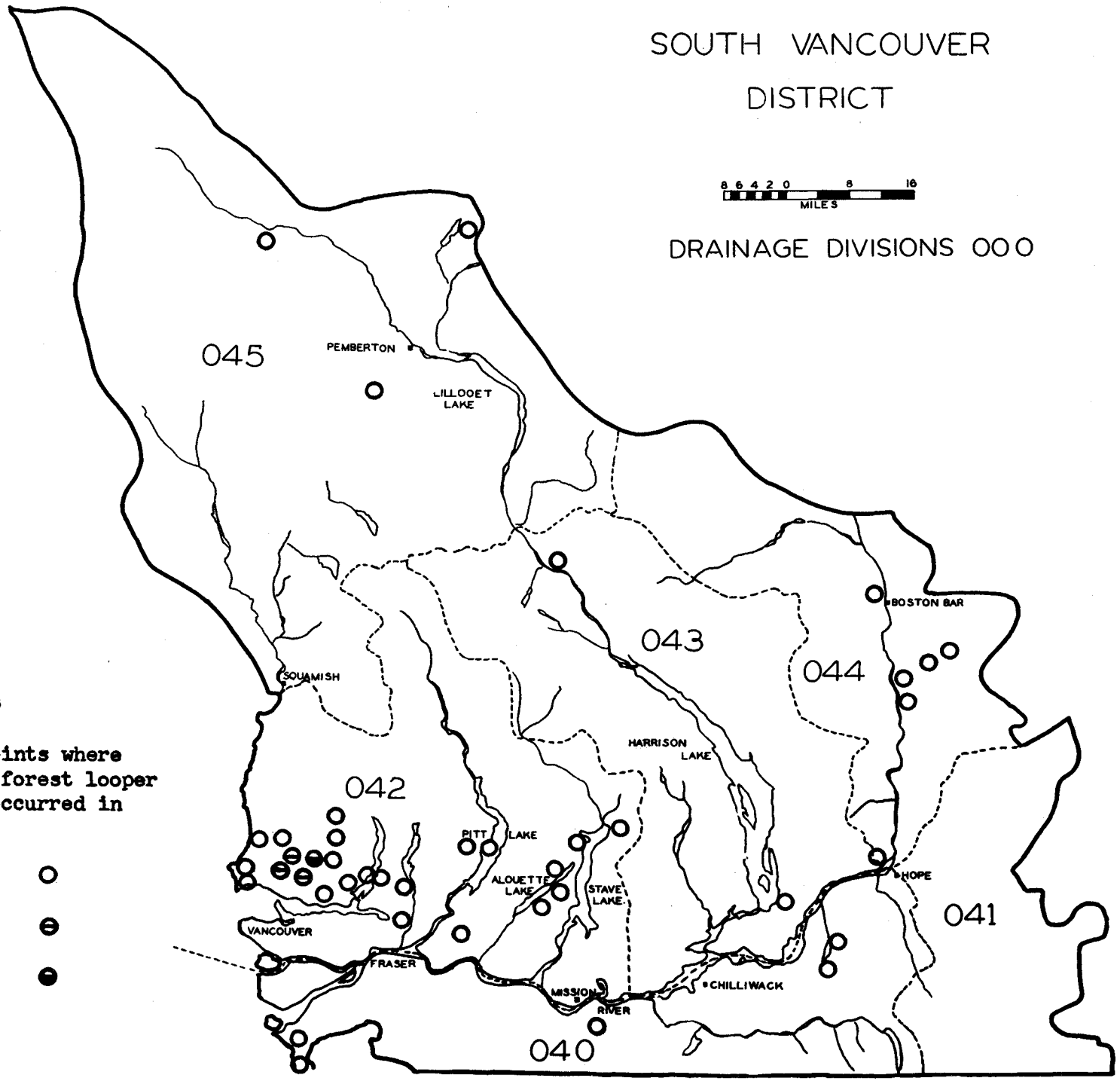
Map 2

Location of points where hemlock looper infestations occurred in 1959.

Light

Medium

Heavy



Map 3

Location of points where green-striped forest looper infestations occurred in 1959.

Light ○

Medium ⊖

Heavy ●

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

NORTH VANCOUVER DISTRICT

1959

FOREST BIOLOGY SURVEY

NORTH VANCOUVER DISTRICT

1959

K. Jardine

INTRODUCTION

Survey work in the district began on May 18 after the M/V Forest Biologist completed a survey of the Gulf Islands. The survey boat was used for approximately six weeks to obtain coverage of the Johnstone and Georgia Strait islands and mainland inlets. The boat was then transferred to the South Prince Rupert District Ranger and the remainder of the survey was carried out by truck and dinghy.

An aerial survey to determine the extent of balsam woolly aphid infestations in the South Vancouver District was extended to include the southern portion of the North Vancouver District.

A total of 214 insect and 20 forest disease collections was submitted to the Victoria laboratory. A summary of collections by hosts is shown in Table 1. Localities where collections were made are shown in Map 1.

Table 1

Collections by Hosts

North Vancouver District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	9		Alder, red	11	2
Douglas fir	52	7	Cherry	1	
Fir, amabilis	2		Cottonwood	1	
Fir, grand	3	2	Crabapple, wild	3	
Hemlock, western	89	4	Hazelnut	1	
Pine, lodgepole	4	4	Willow	8	
Pine, white	2		No host	4	
Spruce, Sitka	14	1	Miscellaneous	10	
			Total	39	2
Total	175	18	Grand Total	214	20

STATUS OF INSECTS

Balsam Woolly Aphid, Adelges piceae (Ratz.)

Damage by this insect to amabilis fir has become evident for the first time in the North Vancouver District this year. All five outbreaks so far discovered seem to be localized and are confined to the Sechelt Peninsula.

The first of these outbreaks discovered was in the Rainy River area where both stem and gout attacks were present at elevations from 800 to 1,300 feet. A single amabilis fir was found suffering from gout attack in the Roberts Creek area.

Damage appraisal strips have not yet been undertaken in these outbreak areas, however, an aerial survey of the Sechelt Peninsula on August 25 uncovered three more areas of infestation. The five areas with number of trees attacked in each are shown below. The tree counts include both dead and red-topped trees, all of which appeared heavily gouted.

Rainy River	250 trees
Potlatch Creek	100 trees
Dakota Creek	100+ trees
McNair Creek	6 trees
Roberts Creek	1 tree

Western Cedar Bark Beetle, Phloeosinus punctatus Lec.

Considerable numbers of both dead and dead topped cedar were observed throughout the lower portion of the district this year. Examination of these trees showed them to be infested by the western cedar bark beetle. Areas containing from one to six immature cedar were recorded in Princess Louisa Inlet, Lund, and at intervals along Texada Island. At MacMahon Creek in the Powell Lake area 20 dead and infested trees were counted.

The largest outbreak was on Bowen Island where two areas of dead trees were observed. One area comprised more than 200 trees and the other approximately 50 trees. It is possible that these recent outbreaks are the results of drought conditions of 1958. The majority of all trees examined were on side hills and rocky sites.

Poplar and Willow Borer, Sternochetes lepathi (L.)

Although this insect has apparently been in the district for some time the first record of the appearance was made this year. Weevil damage was evident on willow throughout the Rainy River area up to an elevation of 3,000 feet. All willow examined within this area were attacked to some extent but there was no mortality.

Willow stands examined in the Chapman and Roberts creek areas were in similar condition. Willow examined at points north of Roberts Creek did not show any signs of attack.

Fall Webworm, Hyphantria cunea Harr.

Fall webworm webs were quite prominent in 1959 along the Sechelt coast from Gibsons to Lund. The largest concentration of webs appeared in a stand of alder approximately seven miles north of Powell River in the Powell Lake area. Two-hundred webs were counted in an area of approximately four acres with a maximum of 10 webs per tree.

Sawflies, Neodiprion spp.

Although samples in certain areas within the district contained higher than normal numbers of larvae, the over-all average per collection still remains consistently low for this species of insect. Sixty-four samples averaged 24.6 larvae each.

No appreciable damabe was observed at any location. The majority of the collections were made on western hemlock. Other hosts were Douglas fir, Sitka spruce and white pine.

Hemlock Looper, Lambdina fiscellaria lugubrosa Hulst.

Only eleven samples averaging 1.7 larvae each taken in the district this year contained hemlock looper. The largest collection of four larvae came from Reid Bay in Kingcome Inlet. Areas where hemlock looper appeared in 1958 failed to show any significant increase this year.

STATUS OF FOREST DISEASES

Important Diseases

Rust gall on lodgepole pine.

All lodgepole pine stands so far examined throughout the North Vancouver District have been affected to some extent by the gall-forming rust Peridermium harknessii J. P. Moore. The most heavily affected area is at Malibu in Princess Louisa Inlet. The majority of trees examined were severely stunted with almost all branches containing at least one gall. Small saplings up to one inch D. B. H. were affected in the same way.

Atropellis canker

Two small areas of damage caused by Atropellis piniphila (Wier) Lohm. and Cash on lodgepole pine were detected during the survey this

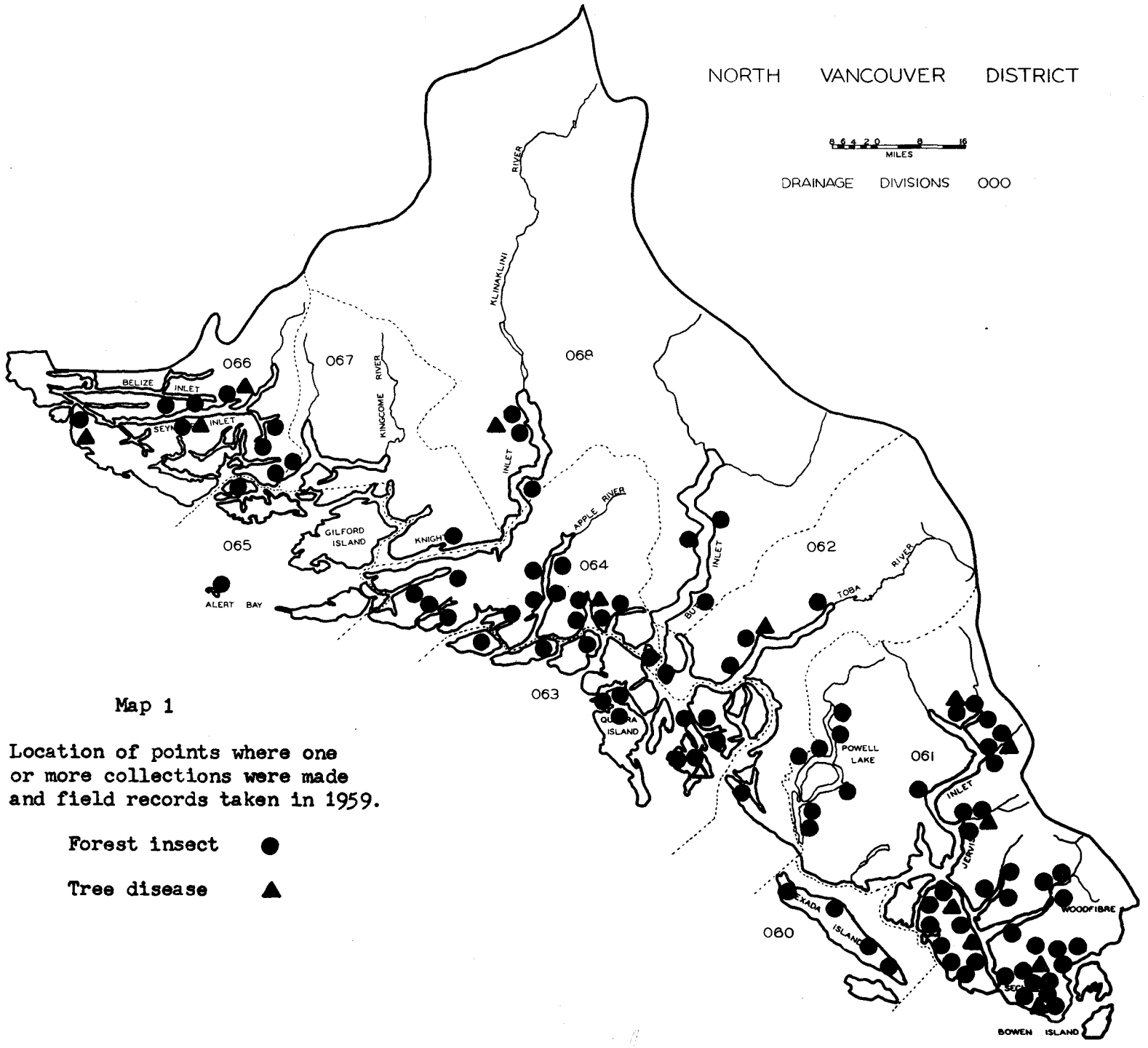
summer. One was on Joyce point West Redonda Island and the other on the Sechelt Peninsula. In each area, heavy flagging was observed, although there was very little mortality. The remainder of the stands examined were relatively free from attack.

Mistletoe on lodgepole pine

A small area of lodgepole pine north of Wilson Creek on the Sechelt Peninsula has been severely infected by a mistletoe, Arceuthobium sp. Infection was present on all trees examined including small seedlings. There has been very little growth in some cases as a result of the stunting effect of this parasite.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Fir, Douglas	Caliciopsis pseudotsugae Fitzp.	Halfmoon Bay and Egmont.	Causing stem and branch canker on young Douglas fir.
Fir, Douglas	Armillaria mellea (Vahl ex Fr.) Quél	Cortez Island	Causing root rot in young fir saplings.
Fir, Douglas	Rhabdocline pseudotsugae Syd.	Malibu, Princess Louisa Inlet	A needle cast causing defoliation of young trees.
Hemlock, western	Dimerosporium tsugae Dearn.	Deserted River	A sooty mold causing heavy needle drop in young stands.
Hemlock, western	Arceuthobium campylopodium Engelmann	Vancouver Bay	A mistletoe causing witches' broom, resulting in severe stunting of trees.



Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Tree disease ▲

ANNUAL REPORT OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA

1959

PRINCE RUPERT FOREST DISTRICT

FOREST BIOLOGY SURVEY

PRINCE RUPERT FOREST DISTRICT

1959

D. G. Collis

INTRODUCTION

The Prince Rupert Forest District, south from the Nass and Skeena River drainages is divided into three biology ranger districts, the east south and west Rupert districts. The northern portion, being accessible from the Alaska Highway, is surveyed by rangers from the Vernon laboratory as a portion of the North Prince George district. Rangers responsible for the survey of these areas in 1959 were:

Northern area	- T. Woods - Vernon
East Prince Rupert	- D. G. Collis
South Prince Rupert	- R. Murfitt
West Prince Rupert	- N. Alexander

The major insect problem in 1959 occurred on the Queen Charlotte Islands where the black-headed budworm population increased to major infestation proportions. Egg counts indicate similar conditions for 1960. Budworm larvae were also numerous along the mainland coast from Bella Bella north to Stewart.

The 2-year-cycle spruce budworm infestation around Babine Lake continued. The larval population was higher than in 1957, but defoliation was lighter.

Spruce bark beetles caused considerable scattered tree mortality in the East and West Prince Rupert districts.

The aspen leaf miner was again present throughout the range of the host tree.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

SOUTH PRINCE RUPERT DISTRICT

1959

FOREST BIOLOGY SURVEY

SOUTH PRINCE RUPERT DISTRICT

1959

R. H. Murfitt

INTRODUCTION

The survey of this district commenced on July 7th. A total of 75 insect samples and seven tree disease samples were submitted to the Victoria laboratory. Insect collections by hosts are shown in Table 1 and localities where collections were made are shown in Map 1.

Table 1

Collections by Hosts

South Prince Rupert District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Fir, amabilis	1	1	Alder, red		1
Cedar, red	8		Birch	1	
Cedar, yellow	2		Cottonwood	1	
Douglas fir	11	3			
Hemlock, mountain	1				
Hemlock, western	42	2			
Pine, lodgepole	2				
Spruce, Sitka	6				
			Total	2	1
Total	73	6	Grand Total	75	7

STATUS OF INSECTS

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

A special survey was made to study an anticipated population increase of this insect in the Bella Coola valley and the river valleys of the South Bentinck Arm. Sample points were revisited and a decrease in population was evident. Eleven collections averaged 2.0 larvae each compared with an average of 3.2 larvae for 28 collections in 1958. Distribution of collections containing hemlock looper is shown in Map 2 and Table 2 shows the average number of larvae found by drainage divisions.

Table 2

Summary of Hemlock Looper found by Drainage Divisions,

South Prince Rupert District, 1958 - 1959.

Drainage Division	Total no. of samples taken during larval period		No. of samples containing hemlock looper		Average no. of larvae per sample	
	1958	1959	1958	1959	1958	1959
080	5	7	1	2	1.0	2.0
081	39	11	25	8	5.0	2.0
082	43	18	14	5	1.6	1.6
Total	87	36	40	15	3.7	1.9

Spruce Budworm, Choristoneura fumiferana (Clem.)

Seven larvae were found in six collections throughout the area surveyed. One of the larvae died of parasites.

Black-headed Budworm, Acleris variana (Fern.)

Larvae of this important insect were found consistently in the coastal drainages of this district. A total of 225 larvae were collected in 27 samples (Map 2). The five above average samples were confined to the northerly part of the district Table 3. Only three larvae were collected in drainage division 082.

Table 3

Location of Above Average Collections of Black-headed Budworm

Larvae in the South Prince Rupert District 1959.

Drainage Division	Location	No. of larvae
083	Klemtu, Swindle Island	23
083	Princess Royal Island, Cougar Bay	35
083	Butedale, Klekane Inlet	46
083	Butedale, Klekane Inlet, Scow Bay	35
083	Gardener Canal, Bishop Bay	16

The Green Striped Forest Looper, Melanolophia imitata Wlk.

This insect, unlike the hemlock looper in the Bella Coola area, increased slightly in numbers this year. There was a local infestation in drainage division 080 where the five collections averaged 14 larvae per sample (Map 3). Table 4 shows the average number of larvae found by drainage division.

Table 4

Summary of Green Striped Forest Looper found by Drainage Division

South Prince Rupert District 1958 - 1959

Drainage Division	Total no. of samples taken during larval period		No. of samples containing green striped forest looper		Average no. of larvae per sample	
	1958	1959	1958	1959	1958	1959
080	4	7	2	5	14.0	14.0
081	40	26	9	9	2.9	3.0
082	41	18	8	4	2.4	4.0
083 *	-	19	-	8	-	3.0

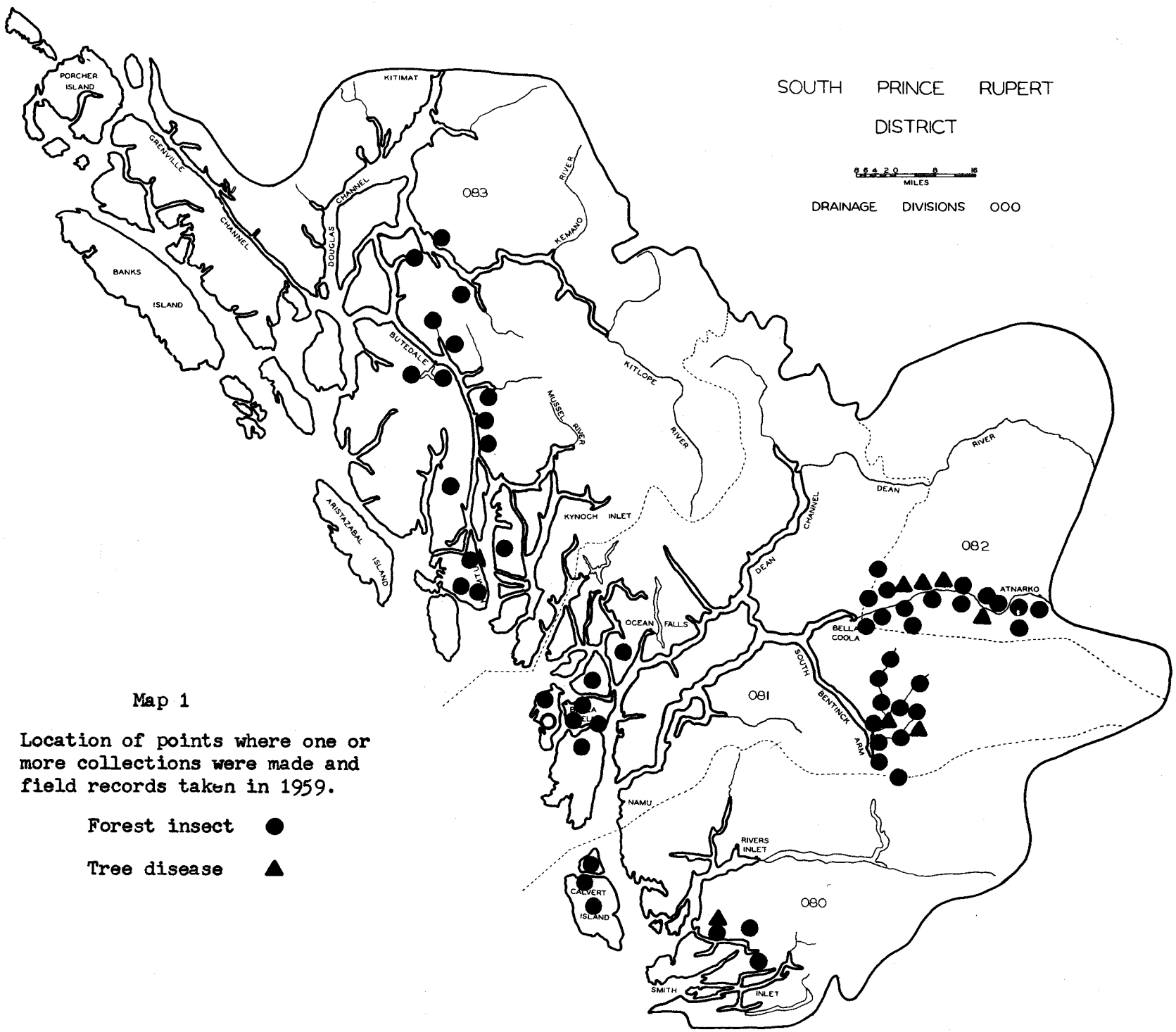
* Drainage division 083 was not sampled in 1958.

Saddle-backed Looper, Ectropis crepuscularia, Schiff.

Very few larvae were found in the district except for a localized population in an inlet in drainage division 080. Here samples averaged 22.8 larvae each. The largest collection contained 34 larvae.

Sawflies, Neodiprion spp.

Sawfly larvae were found in 30 collections. The majority were well under 20 larvae per sample. Significant collections of 78 and 84 larvae occurred at Klekane Inlet and Draney Inlet.

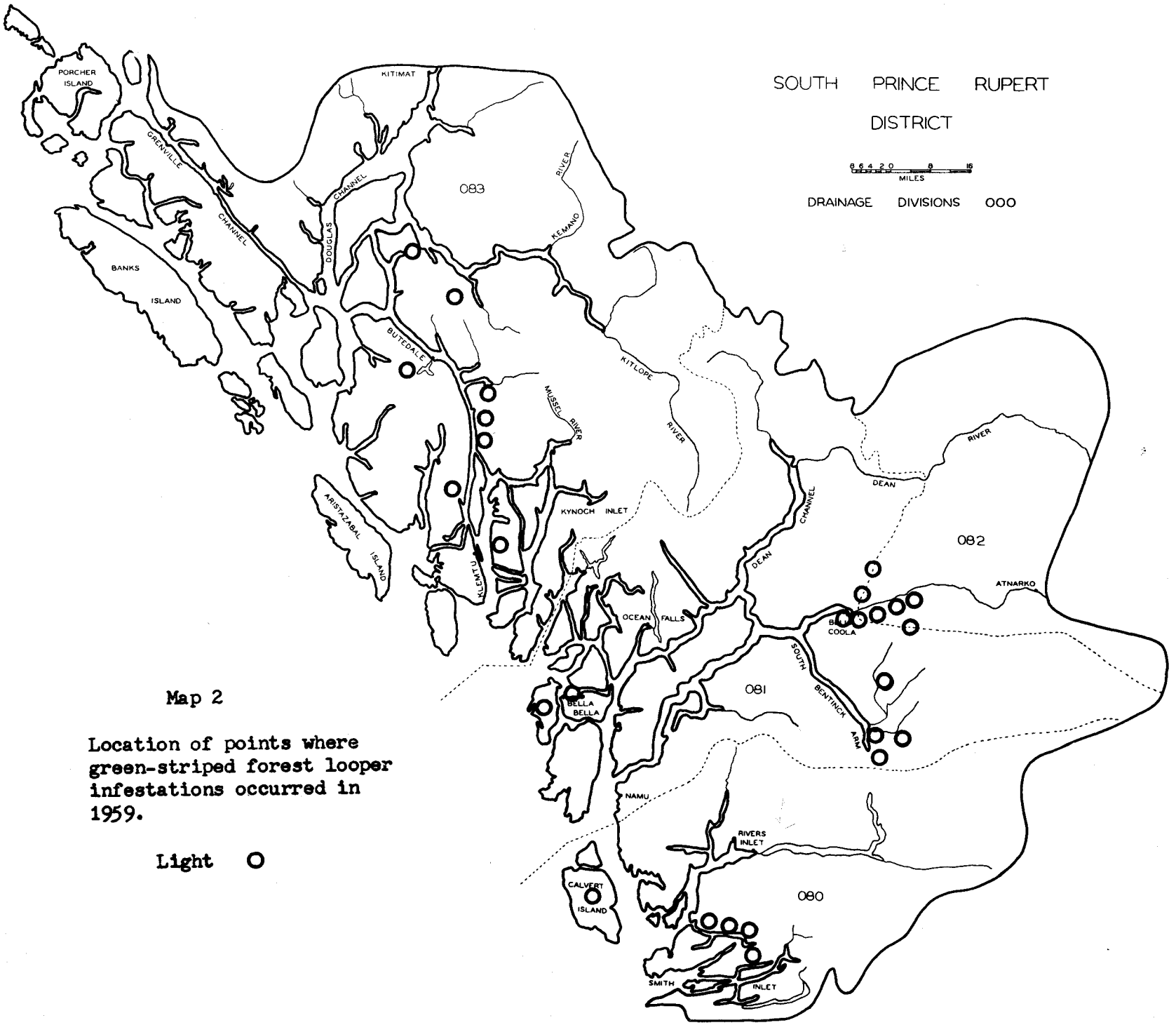


Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

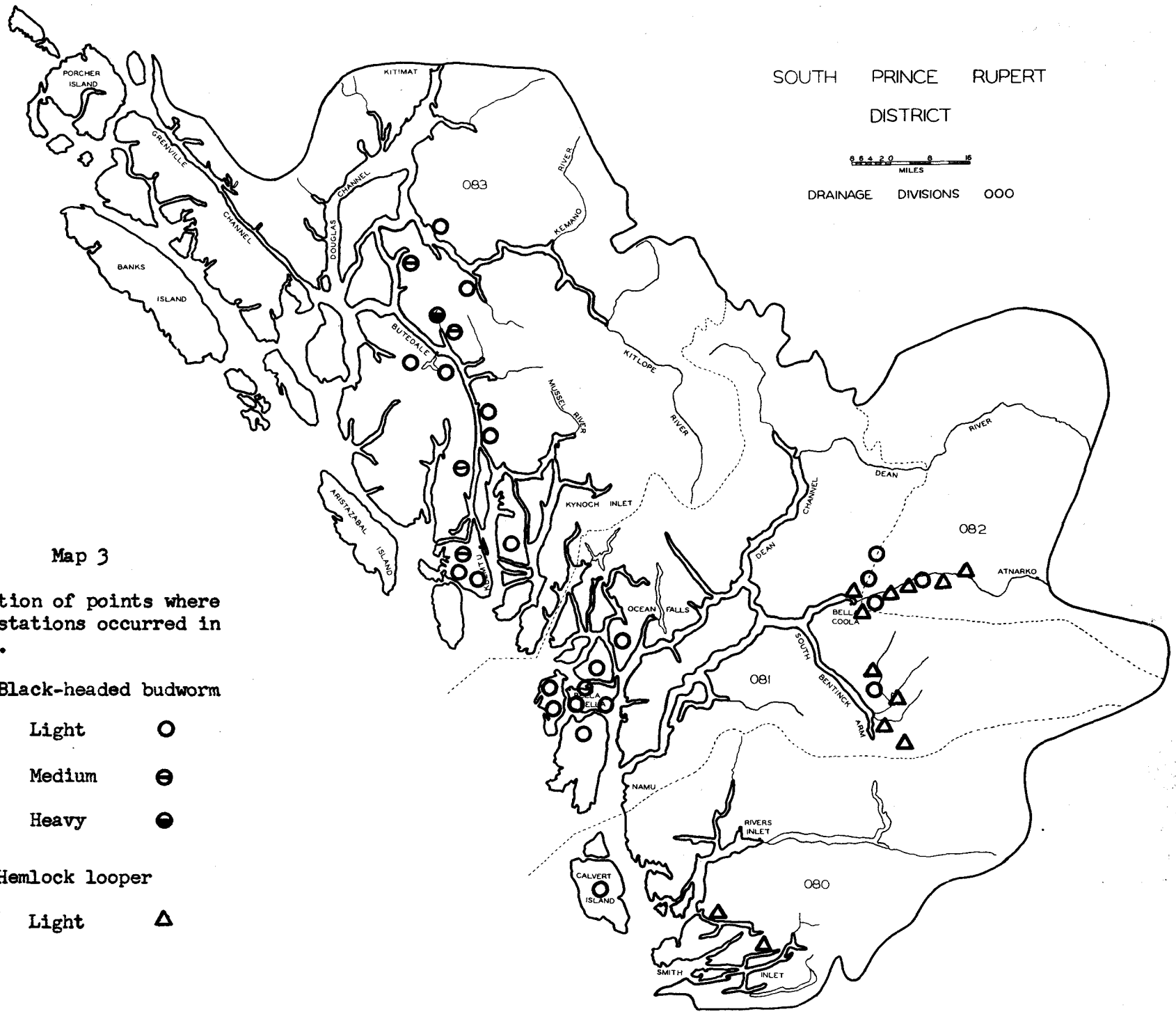
Tree disease ▲



Map 2

Location of points where green-striped forest looper infestations occurred in 1959.

Light O



Map 3

Location of points where infestations occurred in 1959.

Black-headed budworm

Light O

Medium ⊖

Heavy ◓

Hemlock looper

Light △

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST PRINCE RUPERT DISTRICT

1959

FOREST BIOLOGY SURVEY

WEST PRINCE RUPERT DISTRICT

1959

N. E. Alexander

INTRODUCTION

In 1959 a total of 370 insect samples and 52 forest disease samples were collected. Collections, listed by hosts, are shown in Table 1. Points at which collections were made and records taken are shown in Maps 1 and 2.

There were no unusal disease conditions encountered in 1959.

As in previous years, the British Columbia Forest Service personnel within the district lent every assistance and the writer would like to express sincere thanks for their help and observations.

Table 1

Collections by Hosts

West Prince Rupert District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, red	10		Alder, red	20	8
Fir, alpine	15		Alder, Sitka	2	
Fir, amabilis	9	4	Aspen, trembling	9	4
Fir, balsam	1		Birch	4	
Hemlock, mountain	4		Cottonwood, black	11	2
Hemlock, western	205	13	Dogwood, red osier	1	
Pine, lodgepole	7	5	Maple, Douglas	1	
Spruce Engelmann	3		Willow	17	3
Spruce, Sitka	43	9	No host	3	
Spruce, white	1	1	Miscellaneous	4	3
			Total	72	20
Total	298	32	Grand total	370	52

STATUS OF INSECTS

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm increased to heavy infestation levels in the West Prince Rupert District in 1959. As there was considerable variation between the mainland area and the Queen Charlotte Islands, they will be discussed separately.

Queen Charlotte Islands

General Survey:

The survey of the Queen Charlotte Islands was conducted during the month of July. Thirty-one collections containing black-headed budworm averaged 298.9 larvae per three-tree beating sample. They ranged from one to more than 1,500 larvae per collection. The larvae were in very early instars at the beginning of the month but had matured by the end of July. Pupation commenced early in August and was complete by August 26th.

Sampling commenced on Graham Island and progressed south. With a few exceptions larval counts were light to medium on Graham Island and were very heavy from Skidegate Inlet south (Map 4). Egg sampling in October substantiated this general trend. The larval population was uniformly high throughout the south islands (D. D. 100).

Population trends since 1952 are shown in Table 2. In all years the figures shown are for the entire district with the averages for the Charlottes shown separately for 1959.

Defoliation was not as heavy as the larval figures would indicate. A flight made from Sandspit to Jedway on July 16, in company with Mr. D. McLeod of Rayonier Canada Inc., was too early to spot defoliation but subsequent ground surveys over the same area failed to reveal as much heavy defoliation as was expected from such a high population.

Parasitism was very low. Of the 824 larvae reared from Graham Island only 0.4 per cent died of parasitism. On Moresby Island, of 2,626 larvae reared, 5.0 per cent were parasitized. The four highest areas of parasite mortality were Lagoon Inlet - 13.2 per cent, Talunkwan Island - 12 per cent, Burnaby Island - 24.2 per cent, and Trotter Bay - 12 per cent. Parasitism was considered too low to have any significant effect on the population.

Table 2

Black-headed Budworm Population Trend in the West Prince Rupert District. 1952 to 1959.

Year		Number of collections containing black-headed budworm	Average number of larvae, pupae, and adults per collection
1952		111	17.5
1953		217	38.0
1954		169	34.9
1955		54	36.0
1956		2	1.5
1957		19	3.1
1958		22	6.8
1959	Entire district	61	106.5
	Q. C. Is. only	31	298.9

Aerial Damage Appraisal

On August 27 and 28 a damage appraisal flight was made over the Charlottes. A Beaver aircraft was supplied by the British Columbia Forest Service. Two Forest Biology Rangers, accompanied by the Forest Service Ranger and Deputy Ranger, made the flight which extended from Naden Harbour south to Jedway. Visibility was excellent but gale force winds necessitated flying at an altitude too high for really good appraisal.

The only discoloration observed was on Lyell, Kungo, and Talunkwan islands, at Rockfish Harbour on Louise Island, and at Porter Head (base of the peninsula). Ground checks indicated that defoliation was much heavier than observed from the air.

Egg Survey

An egg survey was conducted in the islands from October 4th to October 13th. The British Columbia Loggers' Association was represented by Mr. H. A. Richmond, two Forest Biology Rangers were assigned to the job, and Mr. R. L. Fiddick, Ranger Supervisor, was in charge of the field party.

The major objectives of the survey were: (1) to assess the amount of defoliation and damage to date, (2) to obtain egg counts which would enable the expected defoliation in 1960 to be predicted, and (3) to obtain a satisfactory basis for calculating the population trend and predicting probable further damage if another survey is required in 1960.

Five branches from each of three trees were examined at each sample location. The average number of eggs per 10-inch branch was determined for each 15-branch sample. The egg counts were classified as shown in Table 3. Defoliation was also recorded.

Table 3

Classification for Black-headed Budworm Egg Counts

Average number of eggs per 10-inch sample	Expected defoliation 1960
0	nil to trace
1 - 7	light
8 - 15	medium
16 +	heavy

For the purposes of this report, classes "nil to trace" and "light" were grouped as light in Map 5.

Defoliation caused by the 1959 feeding was also classified as follows:

Light - total defoliation nil to very light or loss of current year's foliage up to 25 per cent.

Medium - defoliation of current year's foliage from 25 per cent to 90 per cent or total defoliation up to 40 per cent.

Heavy - defoliation of current year's foliage 90 per cent or over, or total defoliation exceeding 40 per cent, or top third of tree crowns heavily defoliated or stripped.

Analysis of the present outbreak on the Queen Charlotte Islands must also take into consideration damage inflicted upon the stands during the previous outbreak which subsided in 1955. Close examination of the foliage taken in the egg sampling this year indicates that in some areas previous defoliation was quite severe. Trees suffering from this damage for up to four years are in poor condition to survive further insect feeding. In making a hazard rating for 1960 this old damage was classified as follows:

Light - Previous year's (1958) foliage heavily defoliated or total defoliation up to 25 per cent.

Medium - Total defoliation previous to current year from 25 per cent to 40 per cent or tips damaged and bud kill common.

Heavy - Total defoliation, not counting present year's feeding, over 50 per cent, or bud kill common. Some trees with no new foliage as a result of bud kill.

This old damage was taken into consideration when classifying stand condition and, in conjunction with actual egg count figures taken last fall, gave a hazard rating for 1960.

A total of 82 localities were sampled, 33 on Graham Island and 49 on Moresby and adjoining islands. Approximate locations are shown in Map 5. Since the above dates, an additional 14 egg samples were collected in the Cumshewa Inlet - Skidegate Inlet area by company foresters and forwarded to Victoria.

On the northern portion of Graham Island medium numbers of eggs were found only at Tow Hill and Awun Lake; all other points were light or very light. The heaviest egg counts were between Skidegate Inlet and Cumshewa Inlet. This was also the area of heaviest budworm damage in the previous outbreak. The area from South Bay to Alliford Bay had the heaviest egg counts on the south island. Heavy counts were also found at Takelly Cove on Lyell Island, one of the few areas where damage was observed from the air in August. Light to medium egg counts ranged from Cumshewa Inlet along the eastern side of Moresby Island to Jedway.

A summary of egg counts by classes is shown below:

	Very light	Light	Medium	Heavy
Graham Island	14	15	4	0
Moresby Island	3	32	8	6
Total	17	47	12	6

Condition of stands

Defoliation on Graham Island was, for the most part, light. Heavy damage was recorded at only two localities. Trees at Griffith Pt. on Masset Sound had very little new foliage as a result of heavy bud kill during the previous outbreak. Stands on the north-east end of Yakoun Lake were in similar condition. Four areas of medium defoliation along Skidegate Channel and on Maude Island were the result of 1959 feeding.

The heaviest damage was on Moresby Island with medium to heavy damage common from Skidegate Inlet south to Jedway. Areas still not recovered from the previous outbreak are Copper River, the vicinity of Aero Camp, Lagoon Inlet, Newcombe Inlet, and Barrier Bay in Tasu Sound.

Hazard rating in all points sampled in the area between Skidegate Inlet and Cumshewa Inlet were classified as medium or heavy. Heavy damage was recorded on Moresby Island from Peel Inlet south to Crescent Inlet and in Botany Inlet on the west coast. Medium defoliation was prevalent on Talunkwan Island and the western portion of Lyell Island, at Section Cove, Burnaby Island, and at Jedway.

Ocular defoliation estimates made on standing trees were compared with estimates made after the trees were cut and examined closely. Of 32 samples compared, the estimates were similar in 19, over-estimated in two, and under-estimated in 11 cases. As the defoliation estimates are, if anything, on the conservative side, there is little danger of the damage being over-estimated and raising the hazard ratings unduly (Table 4).

The number of eggs was 154 per cent greater in 1959 compared to the previous year. Eight locations are compared in Table 5.

Table 4

Status of Black-headed Budworm Infestation on the Queen Charlotte Islands, 1959.

Sample pt. number	Location of sample	Egg Counts		Damage rating			Hazard rating for 1960
		Av. Number	Class	Current defoliation	Old damage	Combined rating	
1.	Tow Hill	7.87	M	M	-	M	H
2.	Tow Hill-Masset Road Block 838A	1.33	L	T	0	L	L
3.	Bl.749 South of Massett	7.00	L-M	L	0	L	L
4.	Griffith Pt. south of Massett	2.07	L	L	H	H	M
5.	Bl. 2039 West side of Massett Sound	0.53	VL	0	0	0	L
6.	Collison Pt. Massett Sd.	2.33	L	L	0	L	L
7.	Sewell-opp. Ship Island	0.07	VL	0	0	L	L
8.	Kumdis No. 2 Creek Port Clements	0.93	VL	L	0	L	L

Table 4 - continued

Sample pt. number	Location	Egg Counts		Damage rating			Hazard rating for 1960
		Av. Number	Class	Current defoliation	Old damage	Combined rating	
9.	Craft Bay, Naden Hbr.	0.47	VL	L	0	L	L
10.	Naden River mouth Naden Hbr.	0.80	VL	0	0	0	L
11.	N.E. corner Eden Lake	0.20	VL	L	0	L	L
12.	South end Eden Lake	0.67	VL	0	0	0	L
13.	Ian Lake at Skundale Lk.	0.13	VL	0	0	0	L
14.	North shore W end Ian Lk.	9.27	VL	L	0	L	L
15.	Parker Pt. Massett Inlet	0.40	VL	L	0	L	L
16.	T.L. 8255-Shannon Bay	2.47	L	L	0	L	L
17.	Juskatla Inlet-T.L. 10749	2.33	L	L	0	L	L
18.	Juskatla Inlet-Bl.1504	0.53	VL	L	0	L	L
19.	Juskatla Inlet-Cowhoe Bay	0.73	VL	L	0	L	L
20.	Awun Lake-T.L. 412	7.53	M	M	0	M	M
21.	Juskatla Inlet T.L. 7549	2.10	L	L	0	L	L
22.	Mamin R.-T.L. 12348	0.13	VL	0	0	0	L
23.	E. of Yakoun R. bridge	4.67	L	L	0	L	L
24.	Juskatla-Br. 41Ax41B	1.20	L	L	0	L	L
25.	Juskatla-Marie Lake	0.47	VL	L	0	L	L
26.	Juskatla-Br. 40-far end	3.93	L	L	0	L	L
27.	Yakoun Lk.-N.E. end	0.66	VL	L	H	H	L
28.	Yakoun Lk. South end	1.40	L	L	0	L	L
29.	Kagan Bay - Skidegate Inlet	1.93	L	L	0	L	L

Sample pt. number	Location of sample	Egg Counts Av. Number	Class	Damage rating Current defoliation	Old damage	Combined rating	Hazard rating for 1960
30.	Leonide Pt. Skidegate In.	7.53	M	M	O	M	M
31.	Maude I. mortality plot	8.07	M	M	O	M	M
32.	W. side Trounce Inlet	4.67	L	M	O	M	M
33.	Skidegate Inlet opp. Buck Channel	3.47	L	M	O	M	M
34.	Alliford Bay Rd.-3 mi. W of Sandspit	1.40	L	M	O	M	L
35.	Alliford Bay-5 mi. W of Sandspit	12.60	M	M	O	M	M
36.	Alliford Bay end of rd.	17.83	H	M	O	M	H
37.	Directly behind Alliford Bay	6.27	L	M	O	M	M
38.	South Bay P. L 140	76.67	VH	M	O	M	H
39.	South Bay	20.27	H	H	O	H	H
40.	South Bay Deena River	15.93	H	M	O	M	H
41.	P.L.149-between South Bay and Skidegate Lk	2.40	L	M	O	M	L
42.	P.L.53-N.E. Skidegate Lk.	7.13	L	H	O	H	M
43.	Copper River-P.L. 170	8.93	M	L	H	H	H
44.	P.L.-890-891-E of Skidegate Lake	1.67	L	L	M	M	L
45.	Heather Lake	4.53	L	M	O	M	L
46.	T.L. 1218-Aero-Moresby Rd.	31.67	H	M	O	M	H
47.	Mosquito Lk. Bl. 1326	5.27	L	M	O	M	L
48.	Aero Camp Rd. T.L. 1718	1.73	L	L	H	H	M
49.	Peel Inlet Road	0.60	L	H	O	H	L
50.	Lagoon Inlet	3.40	L	M	M	H	M
51.	Renner Pt. Louise I.	3.53	L	L	O	L	L

Table 4 continued

Sample pt. number	Location of samples	Egg counts		Damage rating			Hazard rating for 1960
		Av. Number	Class	Current defoliation	Old damage	Combined rating	
52.	Traynor Pt. Louise I.	13.07	M	L	O	L	M
53.	Mathers Lk " "	1.40	L	O	O	O	L
54.	Vertical Pt. " "	2.00	L	O	O	O	L
55.	Rockfish Hbr. " "	2.00	L	L	O	L	L
56.	Tasu Cr. Newcombe Inlet	1.67	L	L	H	H	M
57.	Trotter Bay	1.40	L	H	O	H	M
58.	Thurston Hbr. Bl.2444 Talunkwan I.	1.27	L	M	O	M	L
59.	Thurston Hbr. south side of peninsula	2.53	L	M	O	M	L
60.	Selwyn Inlet-Talunkwan I.	11.80	M	M	O	M	M
61.	South side Talunkwan I. opp. T. L. 1209	5.33	L	M	O	M	M
62.	Barrier Bay-Tasu Sd.	2.80	L	L	H	H	M
63.	Dana Inlet	2.80	L	H	O	H	M
64.	Triumph Point	6.93	L	H	O	H	M
65.	Crescent Pt. south side	3.93	L	M	O	M	M
66.	Botany Bay	0.47	L	H	O	H	M
67.	Crescent Inlet-head	1.33	L	M	O	M	M
68.	N. side Tanu Island	5.53	L	M	O	M	M
69.	SW corner Kunga I.	1.67	L	L	O	L	L
70.	Lyell I. opp. Richardson I.	15.07	M+	M	O	M	H
71.	Lyell I.-Takelley Cove	1.20	L	M	O	M	L
72.	Lyell I.-Beljay Bay	7.60	M	M	O	M	M
73.	Lyell I.-T.L. 1292	0.33	VL	L	O	L	L
74.	Lyell I.-Powrivco Bay	1.33	L	M	O	M	L

Table 4 - continued

Sample pt. number	Location of sample	Egg Counts Av. Number	Class	Damage rating Current defoliation	Old damage	Combined rating	Hazard rating for 1960
75.	Bay on E. shore Lyell I.	7.47	M	L	O	L	M
76.	S.E. corner Lyell I.	4.33	L	O	O	O	L
77.	Lyell I.-Beresford Inlet	7.73	M	M	O	M	M
78.	Ramsay Island	6.00	L	L	O	L	L
79.	Burnaby Island - south of Alder Island	2.07	L	L	O	L	L
80.	Burnaby I.-Section Cove	4.00	L	M	O	L	L
81.	" Poole Inlet	3.07	L	L	O	L	L
82.	Harriet Hbr. Jedway	12.87	M	M	O	M	M
83.	P.L. 159, Moresby Island	0.06	VL	-	-	-	-
84.	P.L. 172, Moresby Island	7.06	L	-	-	-	-
85.	P.L. 173, Moresby Island	7.20	L	-	-	-	-
86.	P.L.'s 153 and 154, Moresby Island	1.33	L	-	-	-	-
87.	P.L. 172, Moresby Island	14.00	M	-	-	-	-
88.	P.L. 187-188, Copper Bay	5.50	L	-	-	-	-
89.	P.L. 120-123, Skidegate Narrows	0.04	VL	-	-	-	-
90.	P.L. 64, Alliford Bay	32.70	VH	-	-	-	-
91.	P.L. 121, Skidegate Narrows	2.06	L	-	-	-	-
92.	P.L. 120, Moresby Island	4.63	L	-	-	-	-
93.	T.L. 2587, Moresby Island	5.33	L	-	-	-	-
94.	P.L. 121, Skidegate Narrows	9.40	M	-	-	-	-
95.	T.L. 2587, Moresby Island	0.66	V.L.	-	-	-	-

Table 5

Comparative Egg Counts with Associated Larval Collections and Resulting Defoliation at Eight Localities. Queen Charlotte Islands.

Sample No.	Av. no. eggs 1958 10-inch branch	No. larvae 1959 3-tree beating sample	1959 defoliation	Av. no. eggs 1959 10-inch branch
46	1.0	-	medium	31.7
50	1.3	142	medium	3.4
31	2.8	400	light	8.1
38	4.8	-	medium	76.7
45	7.4	600	trace	4.5
49	12.9	210	heavy	0.6
63	16.3) *	369	heavy	2.8
	)			
	10.6)			
Average	7.2			18.3

* two samples from same area

High hazard areas for 1960

From the previous information it has been concluded that some areas are in danger of serious damage by the budworm.

Chemical control has been recommended to reduce this hazard in the following areas: South Bay - Alliford Bay, Copper Creek, and Gillatt Arm (Moresby Camp). The total area involved is shown below:

South Bay - Alliford Bay	19,890 acres
Copper Creek	6,100 "
Gillatt Arm	4,860 "
	30,850 "

It is proposed to spray these areas with D. D. T. in reduced dosage from that used to control a budworm outbreak on Vancouver Island in 1957. Spray will be applied from Avenger aircraft at the rate of 1/4 lb. D. D. T. to the acre.

In addition to the above areas, one or two 50 acre plots will be sprayed with a bacterial insecticide, Bacillus thuringiensis Berliner. This insecticide has very little toxicity to fish or humans and is currently being carefully studied as a replacement for D. D. T. in projects of this type.

The foregoing research work and assessment of results will be supervised by Mr. J. M. Kinghorn of the Division of Forest Biology. It is expected that the necessary ground work before and after the actual spraying will involve from one to three months' work.

Mainland area

The black-headed budworm population on the immediate coast of the mainland increased considerably in 1959. As it was not possible to cover this area during the optimum sampling period, the larval collections were not large when compared to the islands. Thirty collections averaged 7.5 budworm with a maximum of 62 larvae and pupae in one collection.

Defoliation, although light, indicated there had been a considerable larval population and as the numbers of pupae found were almost equal in numbers to pupal collections made in the fall of 1958 on the Queen Charlotte Islands, an increase in the black-headed budworm population can be expected in 1960.

Summary

In 1959 the black-headed budworm population in the West Prince Rupert District increased to infestation levels. In the Queen Charlotte Islands the population has reached a level where serious damage can occur in some areas in 1960. Egg counts on the islands indicate that the high population will continue into 1960 and chemical control has been recommended for areas of high hazard rating.

The mainland area had a high budworm population in 1959 which is expected to increase again in 1960.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

The hemlock looper remained at a low level in 1959 (Table 6). Collections containing this insect were more widespread and for the first time the survey recorded two occurrences of the hemlock looper on the Queen Charlotte Islands (Table 7). One collection at Crescent Point, Logan Inlet, contained two larvae and another collection on the Peel Inlet road contained one larvae. Both collections were made from hemlock in mid July.

Table 6

Population Fluctuation of the Hemlock Looper in the West Prince Rupert District, 1954 to 1959.

Year	Number of collections containing larvae	Average number of larvae per collection
1954	84	7.9
1955	65	4.9
1956	6	1.0
1957	2	1.0
1958	7	1.7
1959	9	1.2

Table 7

Location of Points where Hemlock Looper were found, West Prince Rupert District, 1959.

Location	Drainage division	Host	Number of larvae found
Skeena River (opposite Exstew River)	103	H	2
Dragon Lake	106	Ba	1
Dragon Lake	106	H	1
Khutzeymateen Inlet	106	D	1
Dragon Lake	106	Ba	1
Kwinhak Creek	106	H	1
Terrace	104	B	1
Crescent Point, Logan Inlet*	100	H	2
Peel Inlet Road*	100	H	1

* Queen Charlotte Islands (Moresby Island)

Striped Alder Sawfly, Hemichroa crocea (Fourc.)

The alder sawfly was present in large numbers over all the southern islands in the Queen Charlotte Group this season. While no figures on population or feeding are available, flights made over this area in the course of the budworm egg survey revealed that this insect was defoliating large areas of alder in the logged over area. Estimates place defoliation at approximately 90 per cent in many localities.

This sawfly continued to infest large areas on the lower Nass River in Drainage Division 106.

The alder sawfly is not considered to be of major concern at this time as it appears to be very host specific and the host tree, Alnus rubra Bong. recovers from attack by the insect with little apparent harm.

Hemlock Sawfly, Neodiprion spp.

The hemlock sawfly population appeared to remain static during 1959 (Table 8). Collections were widely scattered throughout the district. No defoliation was observed in any localities where collections were made.

Table 8

Hemlock Sawfly in the West Prince Rupert District, 1954 to 1959.

Year	Number of collections	Average number of larvae per collection	Range of larvae per collection
1954	60	1.1	1 - 24
1955	64	6.8	1 - 200
1956	60	10.6	1 - 66
1957	74	11.7	1 - 176
1958	20 *	13.6	1 - 111
1959	51	11.5	1 - 118

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

Forest Tent Caterpillar, Malacosoma disstria Hbn.

Forest tent caterpillars heavily infested the trembling aspen stands from Kitwanga east in the district this year. The areas of heaviest

feeding were on the Kitwanga Lake road and on the Kitwanga - Kispiox road. Patches there were 100 per cent defoliated. The trees leafed out again in most cases. Later in the season the trees were covered with empty pupal cases and eggs were found on all twigs examined.

It is expected that this population will show a marked increase in 1960.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

The western tent caterpillar continued to infest red alder, aspen, birch, cottonwood, willow, and various shrubs at Terrace during 1959. Defoliation was lighter than in 1958, but the number of webs increased considerably in occasional areas (Table 9).

In spite of the exceptionally high colony count on the Lakelse Lake road, it is possible that the infestation level is subsiding. There was a reduction in the number of pupae compared with 1958.

Table 9

Number of Western Tent Caterpillar Tents per Mile on one Side of Road

West Prince Rupert District, 1958 - 1959.

Area	Hosts in all areas	Number of webs	
		1958	1959
West Kalum Road	Red alder, birch	65	6
Remo Road	Cottonwood, willow	527	500
Lakelse Lake Road	and shrubs.	1,209	2,300

Spruce Budworm, Choristoneura fumiferana (Clem.)

Spruce budworm larvae were found in occasional collections in 1959. Eleven collections contained 20 larvae, an average of 1.8 per sample. Distribution and hosts are shown in Table 10.

In 1958 only two insects in two collections were found. An interesting point in 1959 was that the budworm found in D. D. 105 were "out of phase" with the two year cycle spruce budworm which is at infestation levels in the adjoining East Prince Rupert district. These larvae were in their last instars while those in the infestation areas around Babine were in their fourth instar.

Table 10

Location	Drainage	Host	Number of larvae
Woodcock	105	Ba	1
Wilson Creek	105	Ba	2
Cedarvale	105	Ba	2
Kitwanga Lake Road	105	H	2
Kitimat	102	H	2
Kitimat Highway	102	S	2
Hadenschild Creek	104	H	1
Dragon Lake	106	Ba-2 H-1	5
McClinton Bay Lagoon	101	S	3

Green-striped Forest Looper, Melanolophia imitata Wlk.

The green-striped forest looper occurred much more frequently in 1959 than in the years previous (Table 11).

Collections were made in drainage divisions 100, 101, 103, 104, 105, and 106. The largest single collection was in Skidegate Inlet and the same collection contained more than 1,500 Acleris variana (Fern.), 70 Zeiraphera diniana Gn., three Nyctobia limitaria Wlk., 14 Neodiprion spp. and six Ectropus crepuscularia Sch. The host in this case was hemlock. Collections were also recorded from Sitka spruce, white spruce, red cedar, and amabilis fir.

Table 11

Population Variation of Melanolophia imitata Wlk. in the West Prince Rupert District, 1956 - 1959.

Year	Number of collections containing green-striped forest loopers	Average no. of larvae per collection
1956	7	1.1
1957	3	1.0
1958	7	2.0
1959	33	2.8

Yellow-lined Forest Looper, Nyctobia limitaria Wlk.

The yellow-lined forest looper increased in numbers in 1959. Twenty-two collections, on hemlock, alpine fir, and Sitka spruce, averaged 3.0 larvae per three-tree beating sample. In 1958 the average was 1.8 larvae and in the years 1957 to 1954 the averages were 1.6, 1.5, 1.6, and 2.5 respectively.

Spruce Sawflies, Pikonema spp.

The spruce sawflies, Pikonema alaskensis Roh., and Pikonema dimmockii Dresson, increased in occurrence and numbers during 1959. Thirty-four collections averaged 5.0 larvae each compared to approximately two per collection in 1958, one in 1957, and four single larvae in 1956.

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

In 1959 the antique tussock moth occurred in eight collections which averaged 3.9 larvae each. In 1958 ten collections averaged 1.2 and in 1957 five collections averaged 1.0 larvae each. This insect was not recorded in 1956.

Green Spruce Looper, Semiothisa granitata (Guen.)

The green spruce looper continued to increase in numbers in 1959. Twenty-seven collections averaged 11.1 larvae each. A total of 300 larvae were collected in beating samples, the maximum number of 40 coming from hemlock. Samples were also made on black cottonwood, Sitka spruce, amabilis fir, alpine fir, and red cedar.

In 1958 twenty-seven samples averaged 3.3 larvae, and in 1957 three collections contained four larvae.

Grey Forest Looper, Caripeta divisata Wlk.

In common with most of the other forest insects, the grey forest looper increased in numbers this year. In 1958, 30 collections averaged 5.6 larvae each; in 1959, 24 collections averaged 12.2 larvae per collection. Collections contained from one to 50 larvae per three-tree beating sample and were widespread throughout the district.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The aspen leaf-miner infestation was more sporadic this year than in 1958. In very few areas did trees appear to be uniformly infested. In the vicinity of Terrace there were places where casual observations indicated the infestation had collapsed. Counts were made in five areas this year and the percentage of leaves infested is shown in Table 12.

Table 12

Percentage of Leaves Mined by the Aspen Leaf-miner, West Prince Rupert District, 1958 - 1959.

Location	Drainage	Percentage of leaves infested 1958	1959
Kitwanga	105	88	86
Skeena Crossing	105	87	80
Lakelse Road	104	64	40
Kitwanga Lake	105	94	40
Flint Creek	105	84	98

Aphid spp.

Aphids of many species were abundant in the district during 1960. Particularly large numbers of aphids were observed on the cones and new foliage of alpine fir. In many areas, from Cedarvale east, 100 per cent of the cones crop was affected.

STATUS OF FOREST DISEASES

There were no important or significantly different forest diseases recorded in the West Prince Rupert District during 1959. Several samples have been forwarded to Ottawa for identification and of the remaining material, only the following warrant mention.

Important Diseases.

Spruce Needle Rust

Needle rust caused by Chrysomyxa ledicola Lagerh. continued to infect immature Sitka spruce on the Queen Charlotte Islands in 1959. The disease was noted throughout drainages 100 and 101 wherever the alternate host, Labrador tea, Ledum groenlandicum Oeder, occurred. There is still no evidence of tree mortality although this disease has occurred in this location for several years.

A heavy infection of this disease was also recorded near Prince Rupert this year (W.P.R. 200). Small spruce in the swampy regions bordering McNeil(Green) River at Tyee were affected.

Willow Leaf Rust

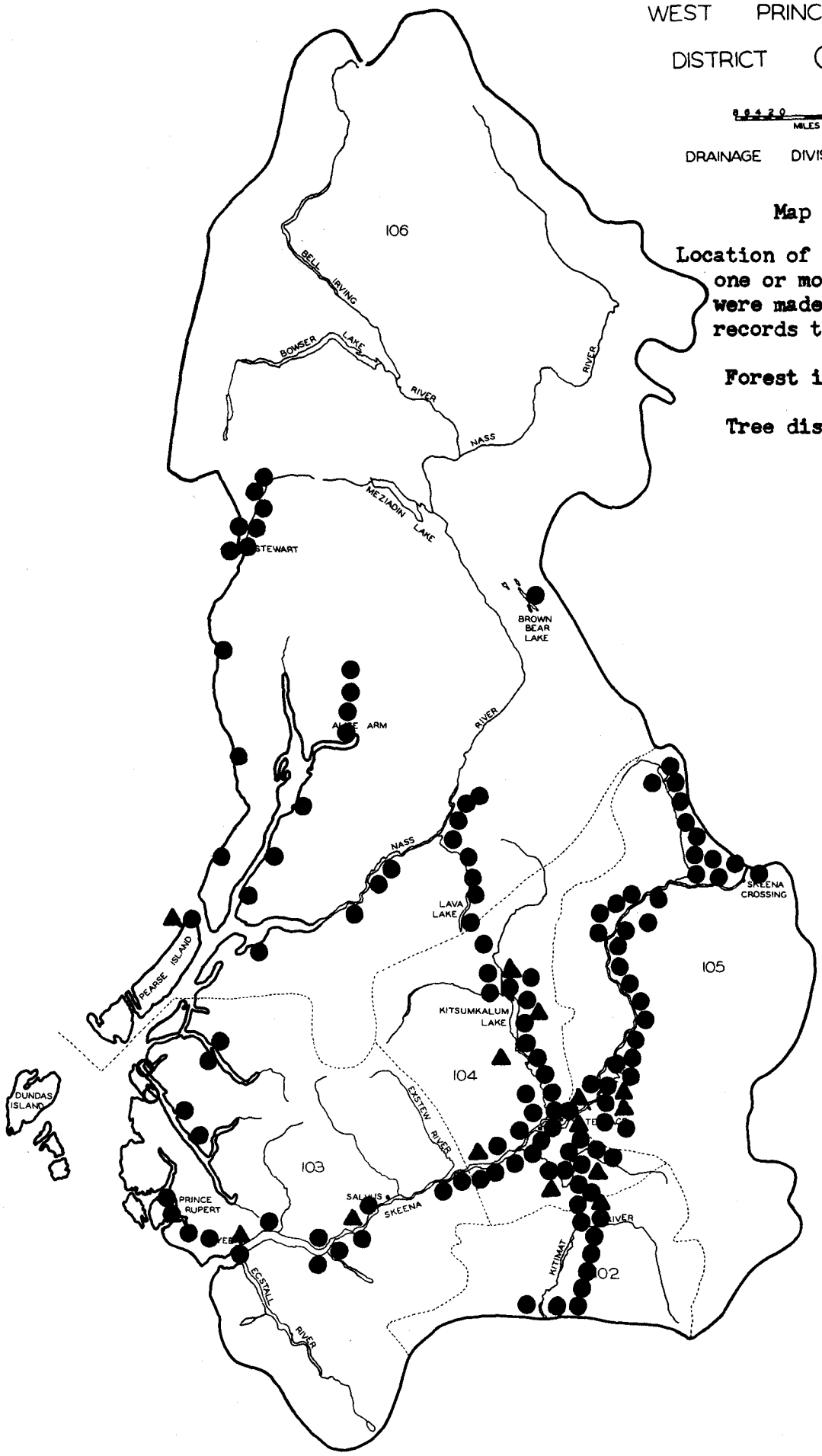
Willow leaf rust caused by Melampsora epitea Thum. was very common in the vicinity of Terrace this year. While this disease is capable of causing serious damage to Salix spp., the host is of little commercial value.

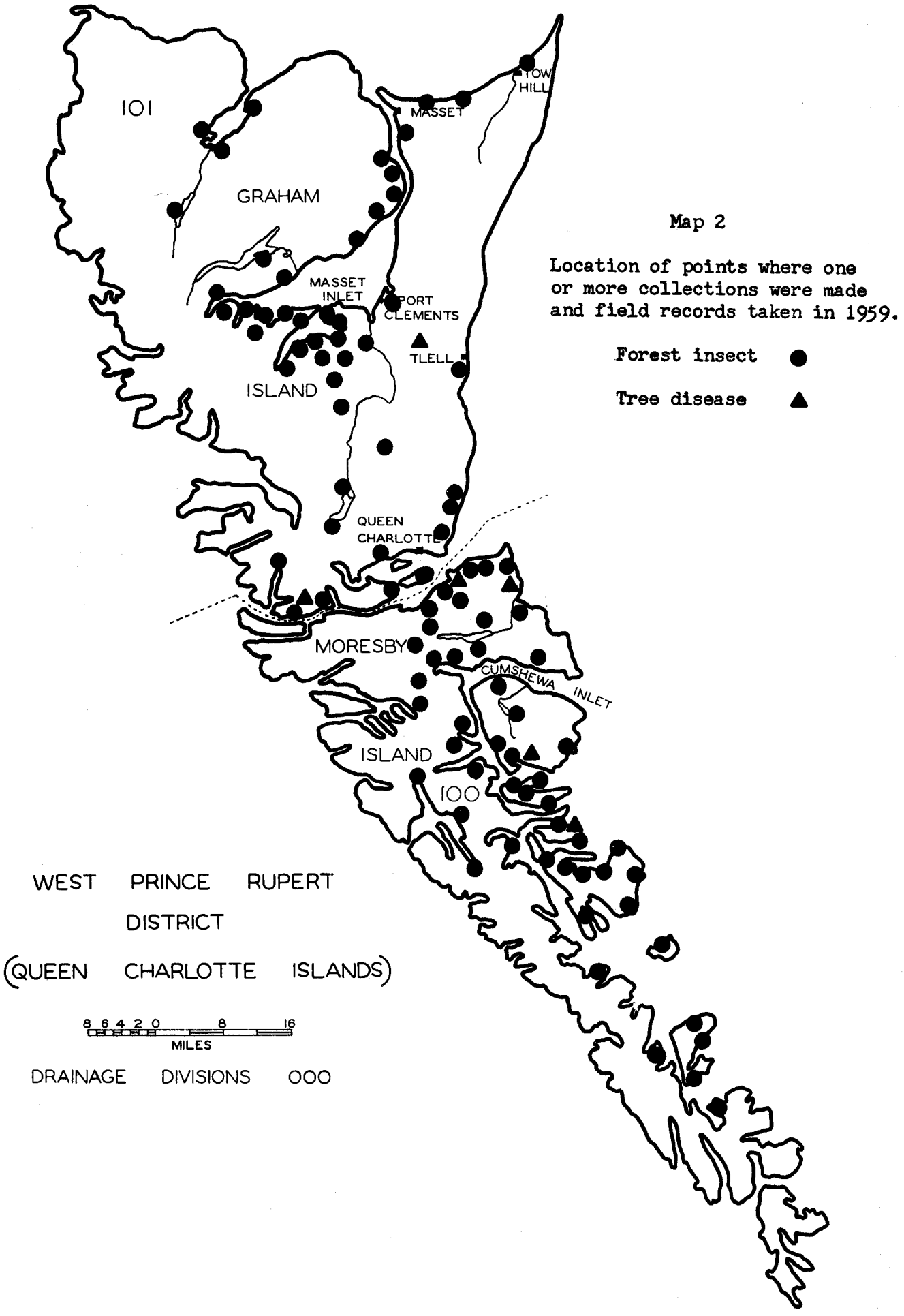
Exotic Plantations

Exotic plantations have been recently established in the district but no systematic observations have been made to date.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Alder, red	Didymosphaeria oregonensis Goodding	All drainages (100-106)	Superficial branch and stem canker.
Aspen, trembling	Hypoxylen pruinatum (Klotzsch) Cooke	Woodcock	Dieback, capable of serious damage.
Cottonwood, black	Marssonina populi (Lib.) P. Magn.	Queen Charlotte City	Leaf blotch.
Hemlock, western	Arceuthobium campylopodum Engelmann	Usk	Dwarf mistletoe.
	Caliciopsis sp.	Terrace	Branch canker.
	Fomes annosus (Fr.) Cooke	Terrace	Root rot.
	Dimerosporium tsugae Dearn.	Usk	Sooty mould of foliage
Maple, Douglas	Phleosporo aceris (Lib.) Sacc.	Terrace	Foliage disease.
Pine, lodgepole	Atropellis piniphila (Weir) Lohm. and Cash	Usk	Stem canker
	Peridermium harknessii J. P. Moore	Terrace	Blister rust causing galls.
	Peridermium stalactiforme Arth. & Kern.	Terrace	Blister rust causing long hip-cankers.
Spruce, Sitka	Retinocyclus abieties (Crouan) Groves & Wells	Terrace	Branch canker
Wintergreen	Chrysomyxa pirolata Wint.	Cedarvale	Serious spruce cone rust from alternate host.
	Pucciniastrum pyrolae Diet. ex Arth.	Cedarvale	Rust, other hosts unknown; possibly tree rust.


WEST PRINCE RUPERT
DISTRICT (MAINLAND)
MILES
DRAINAGE DIVISIONS 000
Map 1
Location of points where one or more collections were made and field records taken in 1959.
Forest insect
Tree disease
106
BELL IRVING
BOWSER LAKE
RIVER
NASS
RIVER
MEZIADIN LAKE
STEWART
BROWN BEAR LAKE
ARM
RIVER
NASS
LAVA LAKE
SKEENA CROSSING
105
PEARSE ISLAND
KITSUMKALUM LAKE
104
DUNDAS ISLAND
EXSTEW RIVER
103
PRINCE RUPERT
SKEENA
RIVER
KITIMAT
102
EGSTALL RIVER

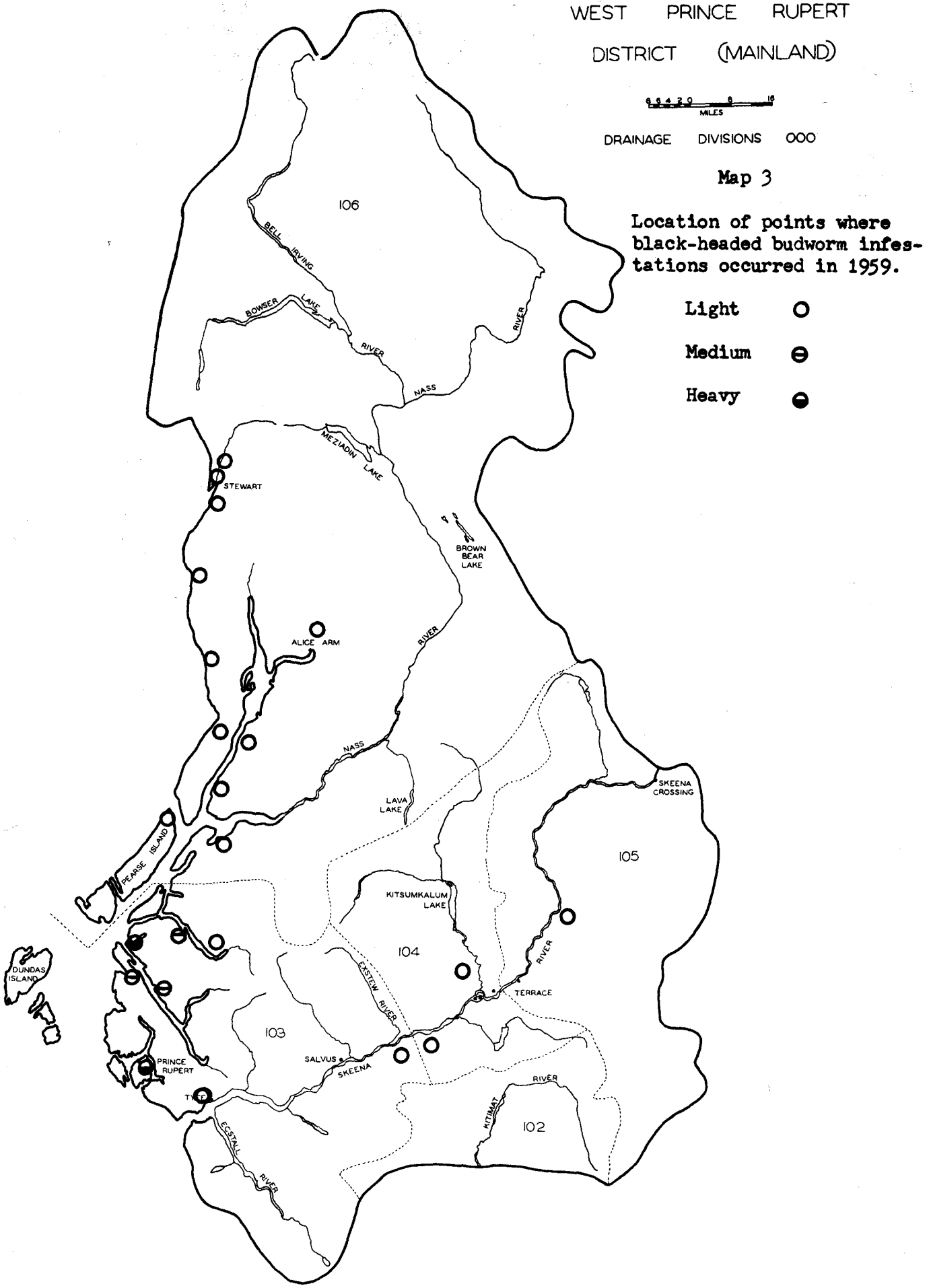


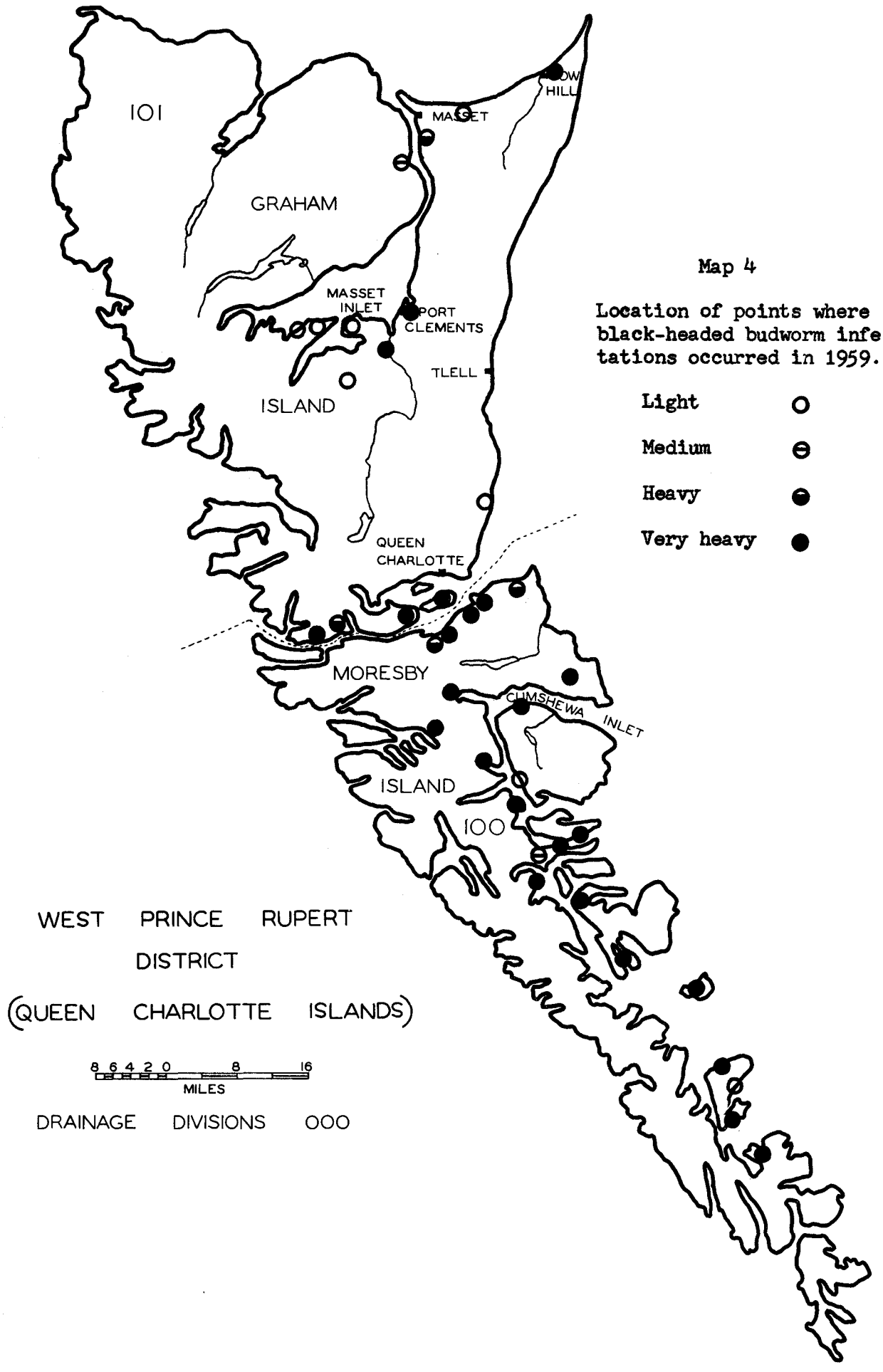
Map 2

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Tree disease ▲

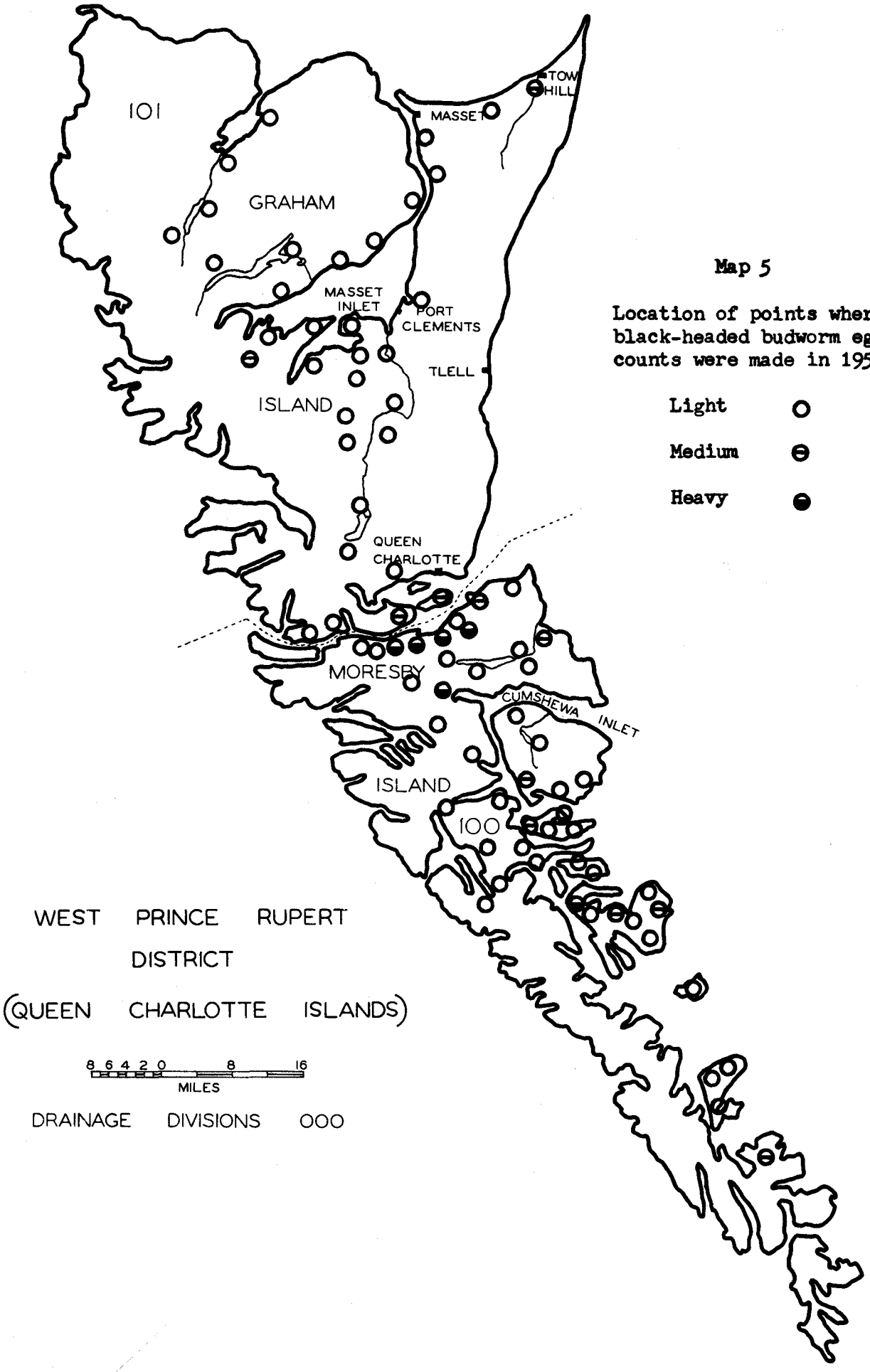

WEST PRINCE RUPERT
DISTRICT (MAINLAND)
0 8 4 2 0 8 16
MILES
DRAINAGE DIVISIONS 000
Map 3
Location of points where black-headed budworm infestations occurred in 1959.
Light
Medium
Heavy
106
BELL IRVING
BOWSER LAKE
RIVER
NASS
RIVER
MEZIADIN LAKE
STEWART
BROWN BEAR LAKE
ALICE ARM
RIVER
NASS
LAVA LAKE
SKEENA CROSSING
105
PEARSE ISLAND
KITSUMKALUM LAKE
104
DUNDAS ISLAND
EXSTEW RIVER
RIVER
TERRACE
103
PRINCE RUPERT
SALVUS
SKEENA
RIVER
KITIMAT
102
EGSTALL RIVER



Map 4

Location of points where black-headed budworm infestations occurred in 1959.

Light	O
Medium	⊖
Heavy	◒
Very heavy	●



Map 5

Location of points where black-headed budworm egg counts were made in 1959.

Light ○

Medium ⊖

Heavy ●

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

EAST PRINCE RUPERT DISTRICT

1959

FOREST BIOLOGY SURVEY

EAST PRINCE RUPERT DISTRICT

1959

D. G. Collis

INTRODUCTION

The annual survey of this district commenced on May 19 and ceased because of cabin construction work at the end of September. Forest insect and disease collections by hosts are shown in Table 1. The approximate locations of sample points are indicated on Map 1.

The tree species referred to in this report include:

alpine fir, Abies lasiocarpa (Hook) Nutt.

white spruce, Picea glauca (Moench) Voss.

lodgepole pine, Pinus contorta var latifolia Engelm.

trembling aspen, Populus tremuloides Michx.

western hemlock, Tsuga heterophylla (Raf.) Sarg.

western red cedar, Thuja plicata Donn.

Table 1

Collections by Hosts

East Prince Rupert District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, red	4	-	Alder, sitka	-	4
Douglas fir	3	2	Aspen, trembling	16	-
Fir, alpine	73	21	Birch, white	10	-
Fir, amabilis	7	-	Cottonwood, black	4	4
Hemlock, western	18	1	Maple, Douglas	1	-
Hemlock, mountain	3	-	No host	4	-
Pine, lodgepole	26	9	Miscellaneous	1	-
Spruce, black	1	-			
Spruce, white	98	8			
			Total	44	8
Total	233	41	Grand Total *	277	49

* Of the 277 collections, 252 were made by the writer and the remaining 25 by British Columbia Forest Service personnel.

The majority of the forest disease samples are as yet unidentified.

STATUS OF INSECTS

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

Infestations

Babine Lake

The insect was in the first year of its 2-year-cycle in 1959.

Aerial mapping was not attempted in 1959 because of an exceedingly heavy cone crop on alpine fir and white spruce trees, and a lighter degree of defoliation. There has been no indication of a population collapse in any locality visited, consequently it is assumed that there has been no reduction in the extent of the infestation. Ground checks have shown that a light population extends south-east along the westerly shore of Babine Lake to join up with the earlier infestation between Burns and Babine lakes. Consequently, what was previously considered two separate budworm problems is now one. A light population has also developed as far south as Wrights Bay on the east side of Babine Lake, a spread of 15 miles over previous records.

No extension of insect feeding was uncovered along the Babine River near its junction with the Skeena. Here the timber type changes to hemlock-cedar, and although the larvae did feed on the fringe hemlock there was very little penetration into the stand.

Larval Development

The weather for May and June was mainly wet and cold in the Bulkley Valley region. Budworm larvae were first observed on May 26, at Doris Lake, on a small sheltered alpine fir tree in a sunny location. White spruce buds had not begun to open at this time. Larval development had not advanced sufficiently for sampling to begin until June 8, and even then many of the white spruce buds were not open. For some reason, possibly the cool damp weather, a portion of the larval population did not hibernate, but continued to develop and complete their life cycle in one year. A few late instar larvae and one egg mass were found along the Cronin Mine road on July 30. Later in the year, egg masses were also observed at Doris and Pinkut lakes. It will not be known whether this constitutes a deviation from the 2-year-cycle until 1960.

Damage and Defoliation to Infested Timber.

Defoliation this season was the lightest recorded in the past four years. The persistent cool wet weather in May and June retarded the development of the budworm in relation to tree growth. The new buds outgrew the budworm feeding and it appeared by late June that defoliation would be fairly light, but at the end of July, when the area was re-visited, the timber had taken on the reddish colour of dead needles. The weather improved in July and the larvae destroyed a large percentage of the 1959 needles. As is typical of the budworm many needles which were not consumed were cut off and remained caught in webbing, to dry out and turn colour.

Records taken at 11 locations in the infestation in 1959 indicate that 72 per cent of the needles were destroyed, compared to 84 per cent in 1957. Seventy-five per cent of the current buds were destroyed in 1957, while in 1959 only 33.5 per cent were killed.

Tree Mortality

Tree mortality has been mainly confined to understory trees. One of the hardest hit areas is along the Bear Lake trail, where, in just over four chains, 120 of 179 trees examined were dead and the remaining 59 were killed back, usually to the bottom branches.

Mature trees are withstanding the annual defoliation with amazing tenacity. There are however, large mature white spruce and alpine fir trees which have suffered from 70 to 95 per cent total defoliation and some of these trees will probably succumb in time. There has been no mortality of overstory trees in any of the 12 budworm plots established to keep records of tree condition. At one location, about nine miles north of Fort Babine mature trees are dead and budworm feeding is a very probable cause of the mortality, but there is no annual record of insect populations and resultant damage.

Larval Populations

Egg surveys conducted in 1958 indicated a very large larval population for 1959. Counts in June of this year showed that larval numbers were double those of 1957. This larval increase was somewhat balances as the number of buds also doubled due to adventitious growth. In this way the percentage of current foliage lost by the trees through feeding may not have increased, but it does constitute a heavier loss of resources to a tree already suffering from past defoliation. Table 2 shows the rise in the number of buds and larvae per square foot of foliage on alpine fir trees.

A very heavy egg population was discovered on lodgepole pine in 1958, but apparently a relatively small proportion of the resultant larvae survived in 1959. Early instar larvae apparently have to mine pine blossoms for suitable food, but there was very little flowering on the pine in 1959, and larvae could only be found where pine blossoms existed.

Although the results of the egg survey of 1958 indicated a general increase in budworm numbers, and this proved correct, large egg counts do not necessarily indicate a large larval population in the same area the following year. * Table 3 shows a comparison of egg masses and larvae found at the same locations.

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* For example at Doris Lake egg masses averaged 14.0 per square foot and larval counts averaged 51, whereas at Bear Lake Trail where only 1.7 egg masses per square foot were found larvae averaged 60 per square foot.

Table 2

Number of Larvae and Buds per Square Foot of Foliage Surface.

Babine Lake

Location	No. larvae per sq. foot				No. buds per sq. foot		
	1956	1957	1958	1959	1957	1958	1959
Cronin Mine Road		54	25.8	112	55	104	96
Chapman Lake		44	14.3	82	45	124	174
Smithers Landing	16	37.7	18.6	70	31	95	118
Doris Lake		75.3	6.3	111	51	49	108
Junction Mine & Smithers Ldg. road	2.1	18.5	6.2	112	36	62	44
Babine Lk. opp. Old Fort			10.2	131	13	76	68
Babine Lk. opp. McKendrick Is.	7.8	17.9	5.5	133	27	48	84
Babine Lk. at Sunnyside			7.1	42	54	94	145
5 mi. on Bear Lk. trail	7.2		13.5	62	116	62	118
1/4 mi. on Bear Lk. trail	3.1		0.9	59	38	62	52
Babine Lk. opp. Fort Babine			3.0	39	60	42	49
Averages	7	41	10	87	48	74	96

Table 3

Egg Masses and Corresponding Number of Larvae per Square Foot of Foliage from the same Locations in 1958 and 1959.

Location	Host	Eggs per sq. ft. 1958	Larvae per sq. foot 1959
Junction Mine and Smithers Landing Road	Ba	3.8	122
1/4 mi. Bear Lake trail	Sw	1.7	60
	Ba	3.9	59
Opp. McKendrick Is.	Ba	4.3	133
Cronin Mine Road	Ba	3.3	112
North of Halifax	Sw	1.1	33
	Ba	4.4	-
West of Sunnyside	Ba	2.3	42
Opposite Old Fort	Ba	2.6	39
Hazelton trail	Sw	1.0	42
	Ba	0.9	33
5 mi. Bear Lk. trail	Sw	11.9	55
	Ba	14.6	62
N. end Chapman Lk.	Sw	5.5	88
	Ba	5.7	82
Doris Lake	Sw	14.0	51
	Ba	7.9	111
Smithers Ldg.	Sw	1.3	87
	Ba	3.3	70
Fulton Lk.	Sw	7.5	99
Average		4.4	73

Budworm activity has increased markedly in the area between Burns Lake and Babine Lake, where this insect has been found at various population levels since 1950. Light feeding took place over a wide area in 1959 and sufficient defoliation will probably occur in 1960 to cause some reddening of foliage. Table 4 shows the number of larvae found at two locations within this territory.

Table 4

Larvae per Square Foot of Foliage Found in the Area Between Burns and Babine lakes.

Location	Larvae per sq. ft.				
	1955	1956	1957	1958	1959
Pinkut Lake	9.0	9.1	4.9	6.1	38.0
Taltapin Lake			6.8	3.0	40.2

Summary

Judging by the information available at this time, almost complete loss of the 1960 growth can be expected from budworm feeding. Spruce and alpine fir trees generally have more new foliage and more buds than in the past three years. However, a shortage of new growth has been one of the main controlling factors over this population to date. Thus, this relatively large volume of potential new growth may only serve to make it possible for a higher percentage of larvae to reach the stage in development, where, they are able to feed on the older needles and bring the trees closer to 100 per cent defoliation.

Spruce Budworm Infestation on the West Side of the Bulkley Valley

This infestation, discovered in 1958, has the same characteristics as the Babine Lake outbreak. Forty-four larvae per square foot were found on white spruce foliage and 77 on alpine fir.

The extent of this infestation is not known; the moth flight in 1958 could have extended it considerably. There appears to be little in the way of natural barriers to prevent a spread of this infestation into the over mature balsam-spruce stands in the Morice Forest.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Up to the fall of 1959 this beetle had been responsible for the death of approximately 54.212,246 cubic feet of lodgepole pine in the area between Hagan Arm of Babine Lake and Takla Lake. Since 1956, the number of red tops

has been steadily declining each year. Of the total kill; 42,617,249 cubic feet lies in the Prince George Forest District and 11,594,997 in the Prince Rupert District. The area is more accessible from Babine Lake in the Rupert District, and the cruising upon which this estimate is based was done adjacent to Babine Lake, so the estimates of kill for the whole area appear in this report.

Black-headed Budworm, Acleris variana (Fern.)

Larvae were found at 18 locations as shown on Map 3 but averaged only 1.9 insects per collection. The maximum number of larvae in one sample was 10.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

These larvae were observed feeding on aspen in spot infestations from Hazelton along the Skeena River to the Shegunia River and along the north-east side of the Bulkley River as far south as Gramophone Creek, about four miles south of Moricetown. Adults were observed over a wider area and were flying around the aspen trees in high numbers. Fifty cocoons were examined near Moricetown from which 46 adults had emerged, two pupae were parasitized and two dead.

Very large populations can be expected in 1960.

Spruce Bark Beetles, Dendroctonus sp.

Bark beetles are responsible for the mortality of a considerable volume of white spruce in the district. The kill is very scattered, but often more frequent around old logging operations. Mortality appears heaviest along the Smithers Landing Road as far as the Chapman Lake burn. Here, on one acre, seven newly attacked trees and three old dead trees were counted. Some of these trees are overmature and suffer from root and butt rots. In the Southbank Ranger District near Uncha Lake, immature white spruce are being killed by bark beetles. The roots of some of these trees were dead before beetle attack; large galleries made by a boring insect wind through the cambium and sapwood of the roots and disease is also present. This condition has not been examined critically enough to determine if this is the reason for the beetle attacks on these young trees.

The Green Velvet Looper, Epirrita autumnata Harr.

Samples containing this geometrid came from 23 locations in the district. Of these, 14 were from the cicle lakes in Tweedsmuir Park and seven from Morice Lake. Thirty larvae constituted the largest collection and the 21 samples from the Circle and Morice lakes averaged six larvae each.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

This insect was active over the whole district again in 1959. Feeding was spotty in the Bulkley Valley as far south as Smithers, but heavy in all side valleys leading into this area and over the remainder of the district.

STATUS OF FOREST DISEASES

Important Diseases

Douglas Fir Needle Rust

Common on Douglas fir needles, this rust Melampsora albertensis Arth. (Caeoma occidentale) was found on the under side of Douglas fir cone scales, and is believed to be a new record of infection on this portion of the tree. The samples were collected along the north side of Francois Lake from open growing fir.

Spruce Needle Rust

White spruce reproduction around the west end of Francois Lake was often so heavily infected with Chrysomyxa ledicola Lagerh. that entire trees turned yellow. Lighter infection occurred in other areas of the district. The spring and early summer of 1959 was extremely wet.

Leaf Spot Disease

Large patches of aspen along the shores of Babine Lake and other areas were infected in 1957 with a leaf spot disease and suffered premature leaf fall. The causal agent of this disease has now been identified as Marssonina brunnea (Ellis & Everh.) Sacc.

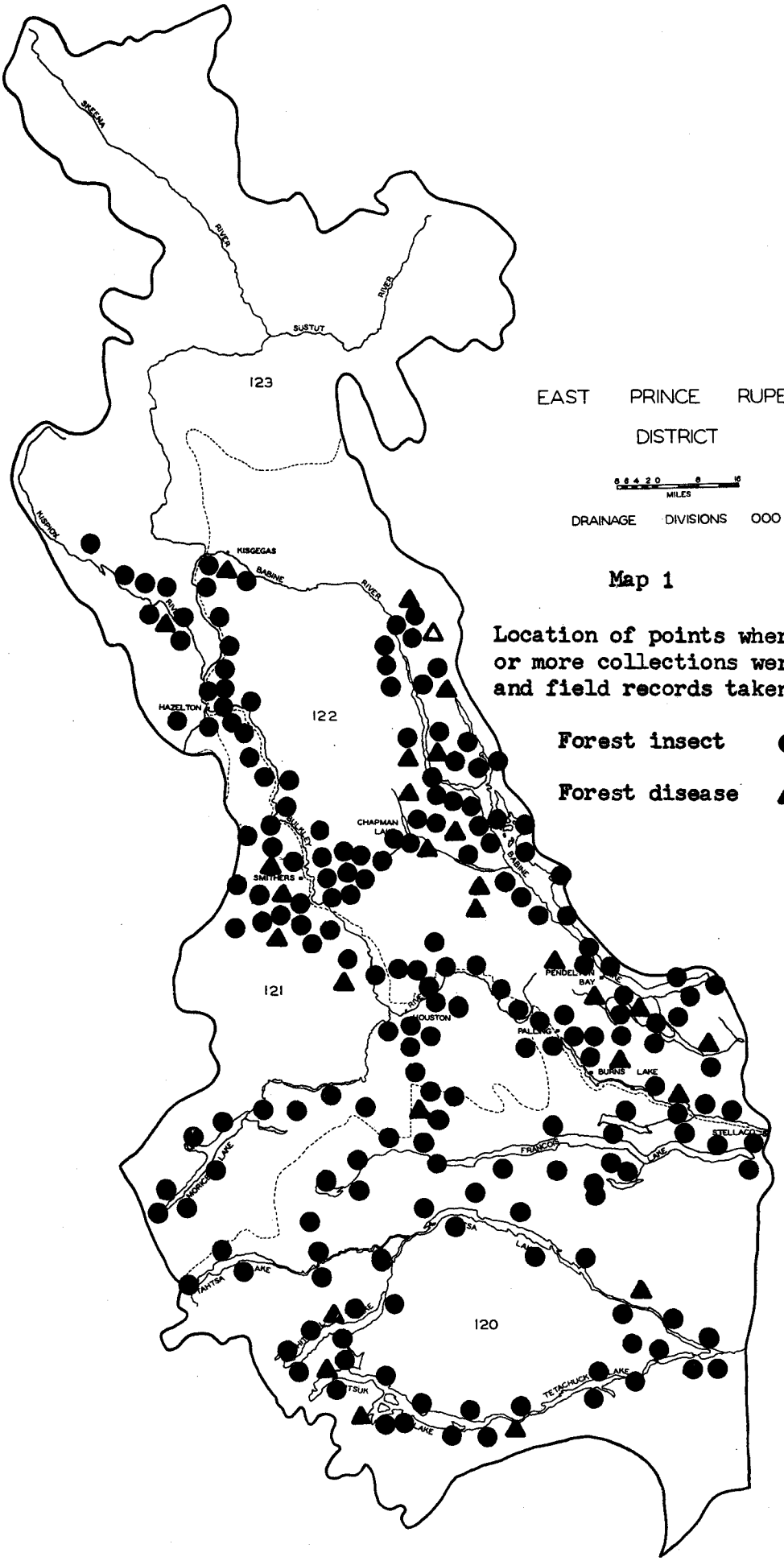
Disease Progress Plots

Stalactiforme canker on lodgepole pine

A plot comprising 75 small lodgepole pine trees was established in 1957 to record the effects of Peridermium stalactiforme Arth. & Kern on these close growing stands. At this time, 46 of the trees suffered from stem and branch infection and in two years the total now stands at 58. Ten of the plot trees have died as a result of the stem cankers and rodent gnawing.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Alder, Sitka	Didymosphaeria oregonensis Goodding	Babine Lake	Superficial branch and stem canker
Fir, alpine	Melampsora abieti-capraearum Tub.	Telkwa	Common foliage rust in this area.
Fir, alpine	Pucciniastrum epilobii Otth	Telkwa	Foliage rust
Fir, alpine	Dasyscyphus agassizii (Berk. & Curt.) Sacc.	Babine Lake	New host record. Not considered pathogenic
Fir, alpine	Cytospora sp.	Morice Lake	Probably causes canker and dieback.
Pine, lodgepole	Cronartium commondrae Peck.	Burns Lake	Blister rust causing fusiform canker.
Pine, lodgepole	Peridermium harknessii J. P. Moore	Burns Lake	Blister rust causing galls
Spruce, white	Fomes pinicola (Swartz ex Fr.) Cook	Smithers	Trunk rot; seems to be predisposing trees to beetle attack.
Willow	Uncinula salicis (D. C) Wint.	Francois Lake	Powdery mildew.

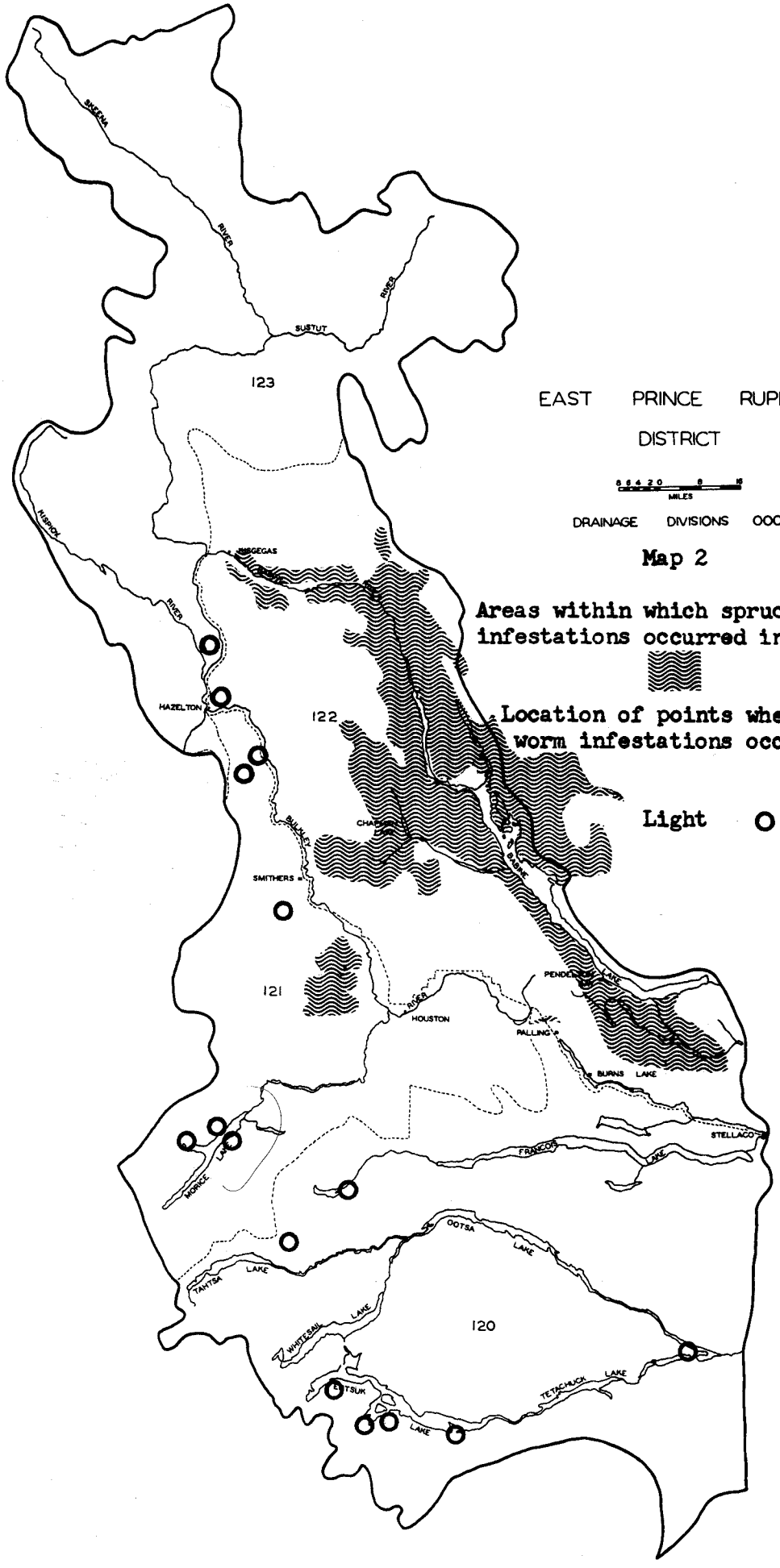


Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲



EAST PRINCE RUPERT

DISTRICT

6 4 2 0 6 12
MILES

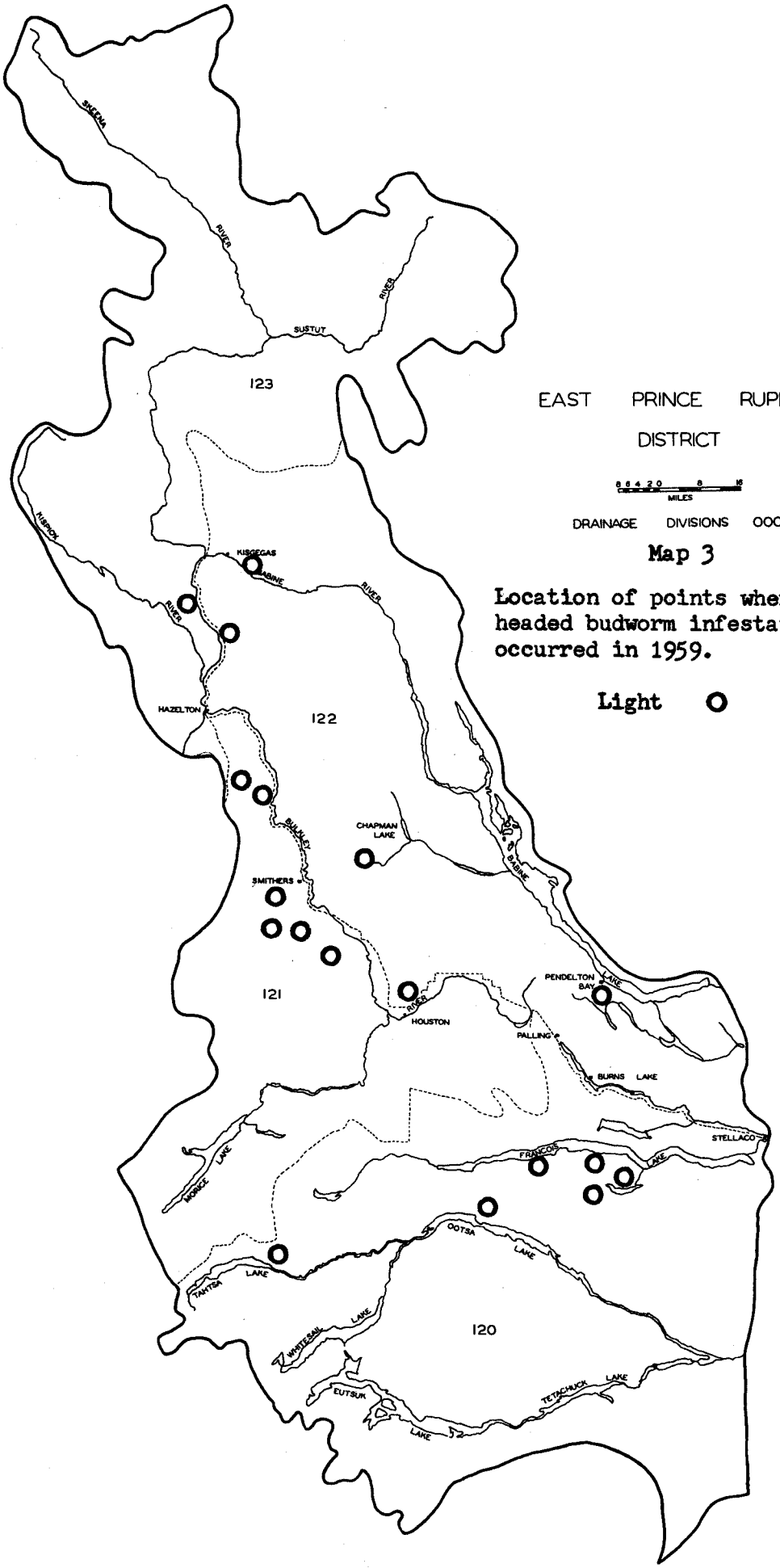
DRAINAGE DIVISIONS OOO

Map 2

Areas within which spruce budworm infestations occurred in 1959.

Location of points where spruce budworm infestations occurred in 1959.

Light O


SKEENA
RIVER
SUSTUT
RIVER
123
EAST PRINCE RUPERT
DISTRICT
8 6 4 2 0 8 16
MILES
DRAINAGE DIVISIONS 000
Map 3
Location of points where black-headed budworm infestations occurred in 1959.
Light
HAZELTON
KISPIOX
KISGEGAS
BABINE
RIVER
122
BULKLEY
CHAPMAN LAKE
SMITHERS
BABINE
121
HOUSTON
PENDELTON BAY
PALLING
BURNS LAKE
STELLACO
FRANCOIS LAKE
MORICE LAKE
OOTSA LAKE
TAHTSA LAKE
WHITESAIL LAKE
120
EUTSUK LAKE
TETACHUCK LAKE

ANNUAL REPORT OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA

1959

KAMLOOPS FOREST DISTRICT

FOREST BIOLOGY SURVEY

KAMLOOPS FOREST DISTRICT

1959

B. A. Sugden

INTRODUCTION

There was no change of rangers assigned to the Kamloops Forest District in 1959. The Forest Biology rangers were: W. E. Bitz, West Kamloops; C. B. Cottrell, Central Kamloops; and B. A. Sugden, East Kamloops Forest Biology Ranger District.

The cabin near Williams Lake, in the West Kamloops District, was used by the ranger and his family. A house trailer based at Kamloops was the field headquarters for the ranger in the Central Kamloops District.

Field work began in the District during April and continued until November. Most of the travel was by motor vehicles, although boats and aircraft was utilized as transportation for some phases of the survey. A total of 18 hours was used on aerial surveys in 1959.

Members of the family Scolytidae continued to kill more trees in the Kamloops Forest District than any other group of forest insects. Douglas-fir trees known to have been attacked by a most important member of this family, the Douglas-fir beetle, had not changed color by September. Most of the counts of dead Douglas fir made during the field season therefore will not include trees killed in 1959.

When surveyed this year, the infestation of one-year-cycle spruce budworm on Douglas fir near Lillooet had subsided. Another defoliator, satin moth, remained active but its population declined over much of its range in the Interior. Infestations of spotless fall webworm recurred in marginal chokecherry and black cottonwood, but defoliation was generally lighter than during 1958. Damage to the leaves of trembling aspen by the aspen leaf-miner continued throughout most of the District except on the Cariboo Plateau where fewer aspen were infested than during recent years. Populations of western hemlock looper, black-headed budworm and Douglas-fir tussock moth remained low.

Dead trees, particularly reproduction, resulting from the very dry summer in 1958 were observed in many sections of the District. A needle disease, Elytroderma deformans (Weir) Darker, continued to damage ponderosa pine.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST KAMLOOPS DISTRICT

1959

FOREST BIOLOGY SURVEY

WEST KAMLOOPS DISTRICT

1959

W. E. Bitz

INTRODUCTION

Forest Insect Survey field work began April 6 with field examinations of overwintering broods of the Douglas-fir beetle. Subsequent field trips were made to examine foliage-colour-change plots of beetle-killed Douglas-fir trees. The week of May 4 was spent on ranger cabin maintenance.

Regular survey work extended from June 1 to October 30. During the field season 371 forest insect collections and 11 forest disease collections were obtained. Table 1 shows the collections by host. Map 1 shows the distribution of collections and field records.

Table 1

Collections by Hosts, West Kamloops - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
cedar, western red	19		alder sp.	1	
Douglas fir	126	7	aspen, trembling	12	1
fir, alpine	5		birch spp.	3	
hemlock, western	14		cherry, choke	3	
juniper, common	19		cottonwood, black	1	
pine, lodgepole	60	1	willow sp.	9	
pine, ponderosa	35		miscellaneous	4	
spruce, Engelmann	60	2			
			Total	33	1
Total	338	10	Grand total	371	11

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The status of the Douglas-fir beetle has been determined annually since 1956 by two methods: by a cruise of strip plots in the winter-damaged area west of Lac la Hache, and by the Damage Appraisal Survey over most of the District.

In addition to obtaining tree mortality estimates, annual examinations of wintering beetle broods have been made before the spring flight.

Studies of foliage colour change on beetle-killed trees were begun in 1957 to facilitate the Damage Appraisal counts.

Damage Appraisal Survey

Douglas-fir tree mortality reached its highest point in the Damage Appraisal Survey of 1959. Mortality was determined by a count of all trees bearing red foliage; these were presumed to have been killed during the three-year period preceding the year of survey. A departure from this concept was experienced in 1958 when the currently attacked trees turned red by July and in many areas were indistinguishable from trees attacked in 1957. Additional inspections done in 1959 made possible an adjustment of the 1958 survey figures. Four three-year periods have been taken into account so far. These are listed in Table 2 showing the number of trees killed in each period. Map 2 shows the distribution of trees killed during the 1956-1958 period.

Table 2

Appraisal of Douglas-fir Trees Killed by Douglas-fir Beetle, by Three-year Periods as Determined in the years 1956 to 1959, West Kamloops District.

Three-year period	No. trees killed	Volume cubic feet
1953 - 1955	8,800	580,000
1954 - 1956	5,990	395,340
1955 - 1957	11,980	790,680
1956 - 1958	15,590	1,028,940

These data indicate an increase of 100 per cent in the 1955-1957 period. A further increase of 31 per cent is indicated in the 1956-1958 period.

Strip Plots in the Winter-damaged Forest

In 1959 the annual cruise of the mile-long strips at Helena and Place lakes was done for the fifth and last time. The purpose of the 16 strips has been accomplished, and six new strips have been established in more accessible locations near Lac la Hache. This year all Douglas-fir trees 16 inches d.b.h. and over on the old strips were tallied. Total depletion caused by bark beetles has been estimated. Unfortunately, most of the strips at Helena Lake had been disturbed by logging and could not be used to estimate depletion. The Place Lake area was undisturbed for the full five years and is the exclusive source of figures for depletion.

Table 3 shows the annual depletion in trees per acre from 1955 to 1959 inclusive.

Table 3

Number of Douglas-fir Trees per Acre Killed Annually by Douglas-fir Beetles on Strip Plots in Winter Damage Area West Kamloops District, 1955 - 1959.

	1955	1956	1957	1958	1959	Average
No. acres cruised	112	384	384	384	384	
No. trees killed per acre	0.71	0.34	0.62	0.17	0.11	0.39

The average for the five-year period was 0.39 trees per acre per year and total depletion was 1.95 trees per acre for the five-year period.

The most densely timbered strip contained 1,018 trees 16 inches d.b.h. and over and averaged 21 trees per acre. The average for all strips was 15 trees per acre. Table 4 shows the total number of trees tallied, number of trees killed and depletion for each strip. Average depletion per 48 acre plot was 9.8 per cent.

Table 4

Number of Douglas-fir Trees Tallied, Number Killed by Douglas-fir Beetle 1955 - 1959, and Percentage Depletion on Eight Plots, Place Lake, West Kamloops District, 1959.

Strip plot no.	No. trees on plot	No. trees killed	Per cent depletion
1	675	19	2.8
2	1,018	154	15.1
3	537	49	9.1
4	409	129	31.3
5	687	13	1.9
6	1,007	175	17.3
7	731	5	0.7
8	720	3	0.4
Average	723	68	9.8

Winter mortality of Beetle Broods

Examinations of overwintering callow adults have been made every spring since 1956. In 1959, log sections of currently attacked trees were taken at Lac la Hache shortly before the spring beetle flight. Beetle broods were examined to determine the effect of climatic conditions on brood development. Since the project was started in 1956, mortality has ranged from a low of 5.2 per cent in 1959 at Enterprise to a high of 93.4 per cent in 1956 at Lac la Hache. Table 5 shows the percentage mortality of beetle broods at various locations from 1956 to 1959.

Table 5

Percentage Mortality of Wintering Douglas-fir Beetle Broods at Three Locations, West Kamloops District, 1956 to 1959.

Location	1956	1957	1958	1959
Place Lake	-	51.6	12.9	-
Lac la Hache	93.4	23.9	8.2	18.3
Enterprise	-	-	-	5.2

The high mortality in 1956 was considered to be a direct result of the sudden and severe temperature drop in early winter. Conversely the low brood mortality in 1958 and 1959 is related to the mild winters in these two years.

Foliage Colour Change

In 1957 four plots of freshly attacked trees were established to study foliage colour changes. Two were located near Williams Lake and two near Clinton. The first change in foliage colour after beetle attack in May of 1957 at Williams Lake was noted in September when some trees began turning yellow. This stage developed in July at Clinton where the trees turned a sorrel colour by September. This lack of uniformity was evident among trees in a plot as well as between plots. Generally the advanced stage of discoloration was present on trees of a low vigour class. During the second summer after attack all trees had turned red. Many trees infested in 1958 turned red within two months and could not be distinguished from trees attacked in 1957. This rapid discoloration was believed due to the abnormally hot, dry summer of 1958.

From observations made so far it would appear that moisture and temperature are the biggest influence on colour changes.

The summer of 1959 was the third complete season after attack on the plots established for colour change study. At Williams Lake 30 per cent of the trees had lost all their foliage while at Clinton 75 per

cent were completely defoliated. Unless the trees still bearing red foliage lose it by the summer of 1960, the method of conducting the Damage Appraisal Survey in this district will have to be re-examined. Details of four categories of foliage loss are shown in Table 6.

Table 6

Foliage Loss to September 1959 on Douglas-fir Trees Killed by Douglas-fir Beetles in May 1957, at two Localities, West Kamloops District.

Locality	Percentage of trees on plot		
	Complete needle loss	Over 50 per cent needle loss	Under 50 per cent needle loss
Williams Lake	30	60	10
Clinton	75	25	0

Spruce Budworm, Choristoneura fumiferana (Clem.)

The severe infestation in the Lillooet area, active since 1956, has subsided completely. Intensive sampling combined with numerous inspections throughout the infestation yielded only 10 larvae. No sign of feeding on current foliage was seen in any of the previously heavily attacked areas. In addition an aerial survey showed no discoloration in areas heavily infected for the past two years.

Eight study plots established in 1956 were examined for new egg masses and foliage loss. No new egg masses were found and current foliage was undamaged. Although foliage appears thin at some locations, sufficient new foliage was noted to ensure resumption of normal growth. Only one area had suffered any serious damage; this was on the south shore of Seton Lake at Machute Creek. Up to 10 feet of top-kill had occurred on some second growth Douglas-fir trees over an area of about five acres. Adventitious budding was heavy only at Machute Creek where the top-kill occurred.

In the remainder of the District, one or two larvae per collection were obtained from Douglas fir, Engelmann spruce and lodgepole pine at widely separated points.

Pine Needle Fascicle Miner, Zelleria haimbachi Busck

Reduced activity by this sheath miner was found in the Spences Bridge area. At Twaal Creek, where 68 per cent of ponderosa pine terminals were damaged in 1958, only traces of attack were found in 1959. At nearby Venables Valley, the percentage of damaged terminals was reduced from 76 to 22 per cent.

Douglas-fir Tussock Moth, Hemerocampa pseudotsugata McD.

The spot infestation near Lillooet, active since 1956, has disappeared. Only three larvae were found, all on the west side of the Fraser River near Lillooet.

Black Pine Leaf Scale, Nuculaspis californica (Cole.)

The status of the small infestation near Lytton is unchanged from 1958. Heavy attack occurred over about 10 acres in Botanie Valley. Continuing infestation in diminishing intensity extends northward along Botanie Creek for about 2.5 miles. Needle drop is severe on a few small trees but no tree mortality has been found. Traces of this scale insect have also been found on ponderosa pine near Lillooet.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Widely separated attacks by this beetle continue on individual lodgepole pine trees. Attacks have been confined mainly to the winter damage area west of Lac la Hache. Only one group attack has been found so far; this was near Joes Lake where a group of 26 infested trees was noted in 1958.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The severe infestation of the past three years has lessened considerably. The areas of trembling aspen trees containing 100 per cent infestation are smaller and fewer than in 1958. Large areas are comparatively free of attack for the first time in four years.

Four permanent sample plots were established at representative points. These are used to follow the trend of the infestation and to study the characteristics of this leaf miner. Sampling was done by examining the leaves of two apical 12-inch branches from each of five trees per plot. The percentage of mined leaf surfaces and adult emergence rate are recorded in Table 7.

Table 7

Percentage of Aspen Leaf Surfaces Mined and Adult Leaf-miner Emergence per Leaf Surface at Four Sample Plots, West Kamloops District, 1959.

Location	Percentage leaf surfaces with mines	No. of adults produced per leaf surface
Cache Creek	21.7	0.01
Clinton	24.5	0.02
Williams Lake	16.8	0.03
Soda Creek	58.2	0.03

The low adult emergence rate indicates a light infestation in 1960.

A 100-cocoon sample was obtained at each plot to determine mortality occurring at this stage. Table 8 gives the details for each sample plot.

Table 8

Percentage Mortality of Aspen Leaf-miner Cocoons Due to Parasites and Other Causes at Four Sample Plots, West Kamloops District, 1959.

Location	Percentage mortality in cocoon stage	
	Parasites	Other Causes
Cache Creek	19	65
Clinton	14	64
Williams Lake	0	69
Soda Creek	4	68

The high mortality at the cocoon stage supports the forecast of a light infestation for 1960.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

A low but persistent population of these loopers was found in the Quesnel-Horsefly lakes region. In most of the areas examined that had western hemlock loopers, the forest type was a fringe growth of western red cedar and western hemlock. Larvae were found in all but three of 29 standard three-tree beating collections from cedar and hemlock. Table 9 shows the maximum and average number of western hemlock looper larvae from both hosts.

Table 9

Summary of Hemlock Looper Collections in the Quesnel-Horsefly Lakes Region, West Kamloops District, 1959.

Host	No. of collections	Max. no. of larvae in one collection	Av. no. of larvae per collection
western red cedar	16	11	2.4
western hemlock	13	9	3

These loopers were also collected consistently from Engelmann spruce and alpine fir in the same region.

Spruce Gall Aphid, Adelges cooleyi (Gill.)

A pronounced increase of this species was noted in 1959 in some areas. In the vicinity of Alexis Creek about 25 miles of roadside Douglas fir were severely infested. Other areas of heavy infestation on Douglas fir were at Soda Creek, 150 Mile House, Horsefly Lake and Lytton. Extensive gall formation was noted on Engelmann spruce over a wide area in the Bridge Lake vicinity.

Sawflies on Ponderosa Pine, Neodiprion spp.

A number of hand-picked colonies of sawflies were collected mainly in the Lillooet and Lytton areas. In addition, standard collections from ponderosa pine in June invariably contained larvae of both black-headed and tan-headed species.

Web-spinning Sawflies, Pamphiliidae.

Five hand-picked collections of these sawflies were obtained from ponderosa pine in the Lillooet and Ashcroft areas. Single specimens were collected from Engelmann spruce in other parts of the District.

Saddle-back Looper, Ectropis crepuscularia Schiff.

Low but persistent populations of this looper were collected in association with hemlock loopers in the Quesnel-Horsefly region. The average per collection was 3.5 larvae from western red cedar and 1.3 from western hemlock.

A Weevil on Douglas-fir Roots, Pissodes sp.

These weevils were collected from the roots and root crowns of damaged Douglas-fir trees at Cayoosh Creek near Lillooet. All trees containing die-back of the upper crown or large branches were found to contain larvae of this weevil. An examination of the roots of adjacent healthy trees failed to reveal any insects.

Black-headed Budworm, Acleris variana (Fern.)

Although distribution of this species was widespread on Engelmann spruce and Douglas fir, only single specimens were obtained.

Douglas-fir Needle-miners, Contarinia spp.

Continuing light infestations of these needle-miners was noted throughout the Douglas-fir stands.

Spotless Fall Webworm, Hyphantria cunea Drury

Only traces of this species were found at widely scattered intervals this year.

STATUS OF FOREST DISEASES

Important Diseases

Die-back of Douglas fir

Several areas in the Lillooet Ranger District previously described as containing Douglas-fir die-back were examined. No outward signs of the causal agent could be found but cambium necrosis was found on nearly all trees inspected. The symptoms such as upper crown die-back and flagging are similar to those associated with die-back caused by Phomopsis lokoyae Hohn. The damage was confined almost entirely to immature growth up to pole size and occurred on dry rocky sites. Some of the smaller trees up to five feet in height were dead, probably due to drought. It should be noted that this damage followed a protracted hot, dry spell in 1958.

Although similar damage appeared in many parts of the District, the important areas of discoloration are in the Lillooet area. The number of stems affected are shown by locality in Table 10.

Table 10

Number of Douglas-fir Trees Affected by a Die-back Disease in the Lillooet Area, 1959.

Location	No. acres	No. trees affected
Cayoosh	40	85
Fountain Creek	250	340
Pavilion	400	310
	Total	735

A Needle Cast of Pine Combined with Severe Drought

The full effect of the 1958 drought appeared in 1959 in a pure ponderosa pine stand of 100 acres near Clinton. All 38 trees on a one-quarter acre plot established in May 1958 were examined. All terminals were infected by the needle cast fungus Elytroderma deformans (Weir) Darker. Degree of infection varied from a trace to 100 per cent of new foliage. Only the last two years' foliage remained on the trees at this

time. Much of the foliage unaffected by the fungus was discoloured due to drought conditions. This discoloration became more obvious as the drought continued through the summer. By the spring of 1959, twenty-three per cent of the plot trees had died. Most mortality was confined to trees under four inches d.b.h. but by September trees up to 12 inches d.b.h. were dead and mortality had increased to 57 per cent of the stems on this plot. Foliage loss varied from 10 to 100 per cent in September, 1959. Only two trees lost their entire foliage. Table 11 shows foliage loss in four categories: 0-25, 51-75 and 76-100 per cent.

Table 11

Percentage Foliage Loss Caused by Needle Cast and Drought on Ponderosa Pine on Quarter-acre Plot, Clinton, 1959.

	Percentage foliage loss			
	0-25	26-50	51-75	76-100
No. of trees	4	7	17	10
Percentage of total	10	18	46	26

Decline of Engelmann Spruce

An extension call was made on July 20 to the property of B. C. McKilvington at Nimpo Lake in the Alexis Creek Ranger District. Nearly all Engelmann spruce trees on the 26-acre lot were in a weakened condition. A profuse growth of an orange coloured lichen was growing on all sizes of trees, the lower two-thirds of the trees being the most heavily affected. No signs of root rot or other types of disease could be found on the recently dead trees. A few indications of heart rot were found on some older trees but the rot was not present on the majority of dead stems. The more exposed growth on the shoreline was most severely affected. This may suggest that the weakened condition of the spruce growth was due to physiological causes.

Inspection of adjacent shoreline and several heavily wooded islands nearby revealed the same profuse lichen growth. In other spruce stands in this area only traces of this growth could be found.

Exotic Plantations

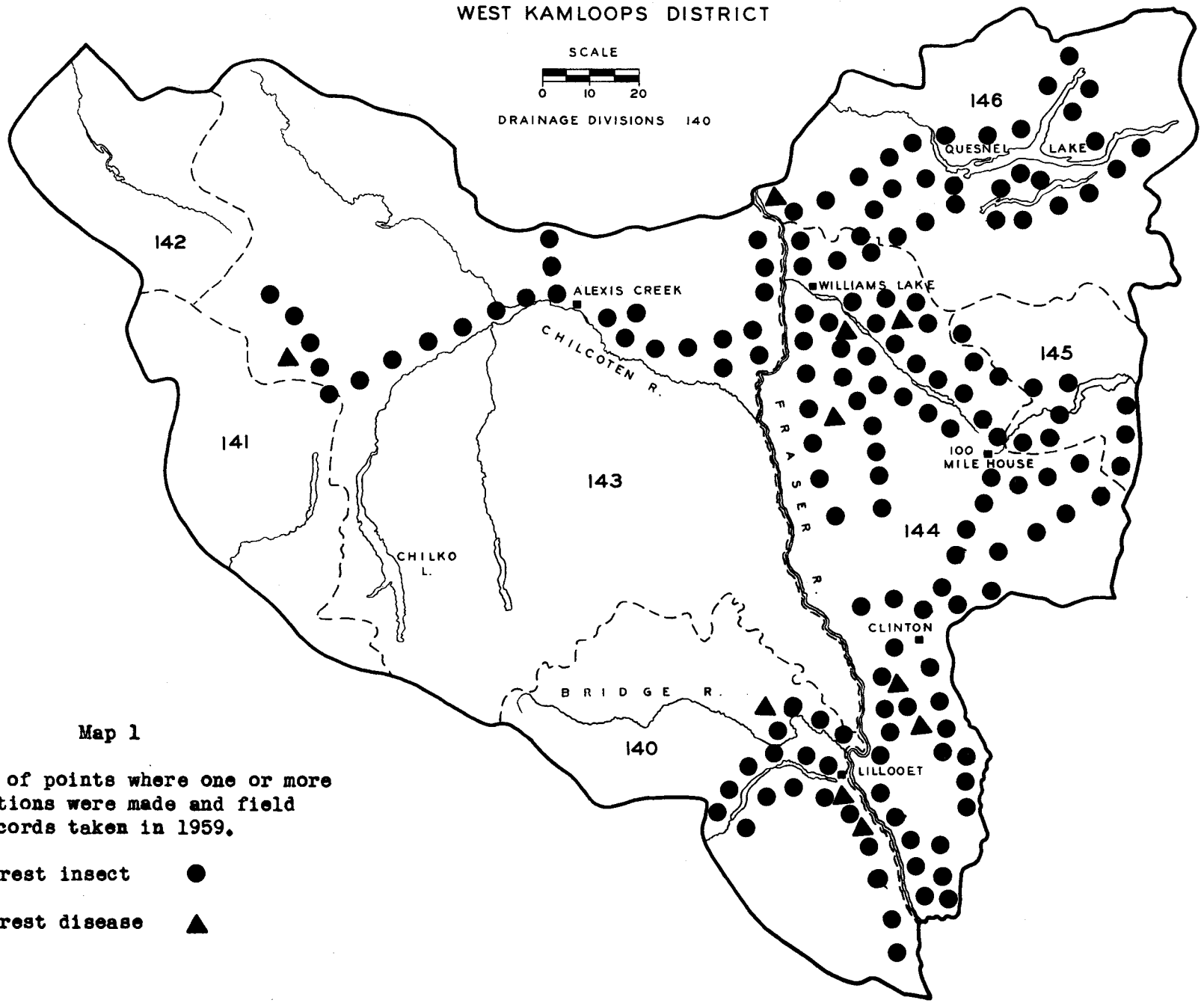
The exotic plantations established in 1957 near Clinton were severely affected by the 1958 drought. A total of 632 seedlings consisting of five species of pine and one species of larch were planted. Of these only two species of pine showed any sign of survival. These were Scots pine, Pinus sylvestris L. and red pine, P. resinosa Ait. Table 12 lists the various species and number of surviving seedlings as of September 1959.

Table 12

Summary of Disease Conditions on Exotic Plantations at Clinton, West Kamloops District, 1959.

Plot No.	Exotic species	No. seedlings planted	Surviving	Percentage dead from drought
XP 113	Scots pine	95	31	67
XP 122	Scots pine	250	0	100
XP 114	Red pine	95	22	76
XP 115	Pinaster pine	12	0	100
XP 120	Japanese black pine	15	0	100
XP 121	Japanese red pine	15	0	100
XP 116	European larch	50	0	100
XP 119	European larch	100	0	100

The total of 53 surviving seedlings represents eight per cent of the original plantings.

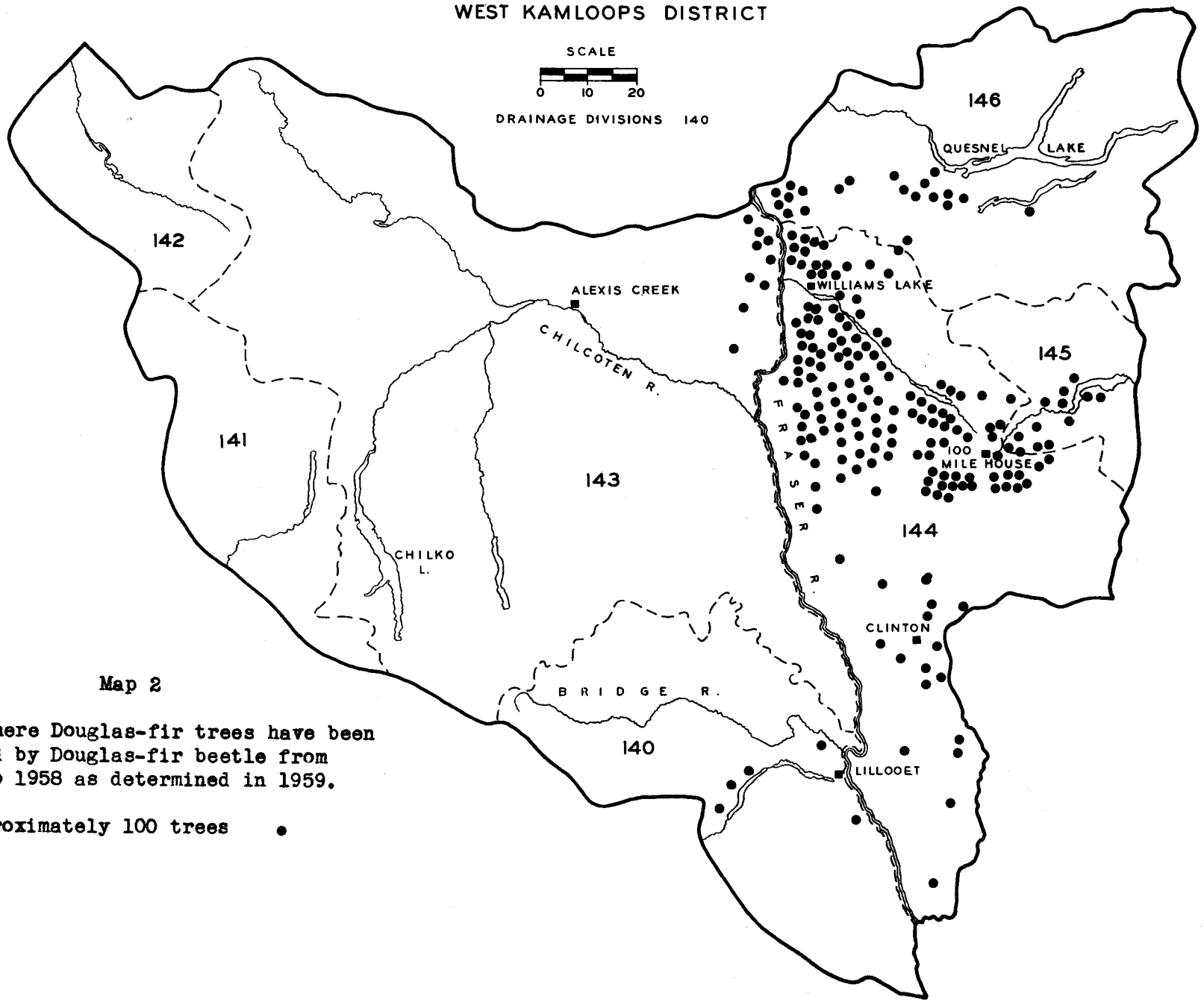


Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲



Map 2

Points where Douglas-fir trees have been killed by Douglas-fir beetle from 1955 to 1958 as determined in 1959.

Approximately 100 trees •

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

CENTRAL KAMLOOPS DISTRICT

1959

FOREST BIOLOGY SURVEY

CENTRAL KAMLOOPS DISTRICT

1959

C. B. Cottrell

INTRODUCTION

Field work in the Central Kamloops Forest Biology Ranger District began on May 6 and ended on November 25. Most of September and October was spent on survey work in other districts. During the field season 267 insect and 18 forest disease collections were taken. Table 1 shows the collections by hosts, and Map 1 shows the locations where one or more collections were made and field records taken in 1959.

Table 1

Collections by Hosts

Central Kamloops District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
cedar, western red	3	-	alder, mountain	1	-
Douglas fir	65	2	aspen, trembling	30	4
fir, alpine	9	3	birch, western white	3	-
hemlock, western	6	-	cherry, choke	11	-
juniper, common	1	-	cottonwood, black	6	-
juniper, Rocky Mountain	7	-	poplar, Lombardy	2	1
pine, lodgepole	31	1	saskatoon	2	-
pine, ponderosa	42	5	willow spp.	3	1
spruce, Engelmann	35	1	miscellaneous	10	-
			Total	68	6
Total	199	12	Grand total	267	18

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The 1959 Douglas-fir beetle attack appears to have been very light. No currently attacked standing trees were observed. Recently cut logs and stumps were heavily infested in Highland Valley and near Barriere.

In July of 1959 a count and estimate was made of red-topped Douglas-fir trees apparently killed during 1956-58. The loss of 184,990 cubic feet, shown in Table 2, was computed by multiplying the number of dead trees by the estimated average volume for beetle-killed Interior Douglas fir in each district.

Table 2

Douglas-fir Trees Killed by the Douglas-fir Beetle in the Period 1956 to 1958, as Determined in 1959, Central Kamloops District.

Locality	Number of dead trees	Average volume per tree (cubic feet)	Estimated volume of timber (cubic feet)
Arrowstone Hills	211	90	18.990
Tranquille Forest Reserve	575	100	57,500
Niskonlith Forest Reserve	493	80	39,440
Long Lake Forest Reserve	208	40	8.320
Campbell Range	226	50	11,300
Douglas Lake Region	391	80	31,280
Coldwater Valley	227	80	18,160
Total	2,331		184,990

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Two groups of mature red-topped white pine totaling 315 trees were killed along Barton Creek, north of Adams Lake. No recent attacks have been recorded in the Blue River area.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

A population of Engelmann spruce beetles appears to be building up in the spruce balsam forests east of Vavenby. No attacked standing trees were noted but stumps and logs were heavily infested. Beetle attacks have not been reported in this region before.

Beetles were also plentiful in decked logs near Sock Lake, north of Clearwater.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

During the 10-year period, 1949 to 1959, the western balsam bark beetle has attacked alpine fir throughout its range in the Central Kamloops District. Recent investigations have revealed that fungus lesions caused by a species of Ceratocystis are associated with Dryocoetes in several areas. An estimated 33,348,000 cubic feet has been killed north and north-east of Kamloops.

Acreages and volumes of dead timber, in Table 3, are estimates made from aerial surveys with the exception of McGillivray Lake where five one-chain by one-mile strips were established. The volume of dead alpine fir on the strips was 788 cubic feet per acre; other areas were estimated at 700 cubic feet. Map 2 shows where western balsam bark beetle infestations occurred from 1949 to 1959.

Table 3

Estimated Number of Acres Affected and Estimated Volume of Alpine Fir Killed by Western Balsam Bark Beetles in Association with Ceratocystis sp., from 1949 to 1959, Central Kamloops District.

Location	No. of acres affected	Volume killed (cubic feet)
Murtle Lake	1,200	840,000
Sock Lake	500	350,000
Adams River	1,300	910,000
Barriere Lake	3,200	2,240,000
Johnson Lake	3,800	2,660,000
Jamieson Creek	4,500	3,150,000
Whitewood Creek	5,000	3,500,000
Knouff Lake	4,500	3,150,000
McGillivray Lake	21,000	16,548,000
Total	45,000	33,348,000

Oregon Pine Engraver, Ips oregoni (Eich.)

An estimated 600 immature ponderosa pine have been killed at McLure. Most of the attacked trees, from four to eight inches in diameter, were infested by the Oregon pine engraver only, whereas most trees over eight inches were also attacked by the western pine beetle, Dendroctonus brevicomis Lec.

Approximately 70 immature ponderosa pine trees have been killed north of Pritchard.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

During July, 11 larvae were collected from coniferous hosts, three each from Engelmann spruce, western hemlock and Douglas fir and two from alpine fir. Although a small number, it is the highest total in the last four years and the first time that larvae have been collected from Douglas fir in the southern portion of the District.

Spruce Budworm, Choristoneura fumiferana (Clem.)

The results of random sampling indicate a sharp drop in larval populations of the one-year-cycle spruce budworm from 1958. In 1958, an average of one larva was taken every two Douglas-fir and Engelmann spruce collections. In 1959, one larva was taken in every three Engelmann spruce collections and one larva in every five Douglas-fir collections during the larval feeding period.

Black-headed Budworm, Acleris variana (Fern.)

In Highland Valley, where 50 larvae per Douglas-fir collection were taken in 1958, samples averaged two in 1959.

On the south slope of Mt. Lolo, Douglas-fir collections contained an average of 40 larvae in 1958 and only six in 1959.

Larvae were also scarce on other hosts throughout the District.

A Sawfly on Lodgepole Pine, Neodiprion sp.

Near Squilax, the infestation on lodgepole pine spread eastward to include one acre of reproduction, and westward to include five acres of pole-sized trees. Although defoliation was light in the original 20 acres attacked in 1958, the recently attacked trees were heavily defoliated.

On November 25, 100 branch terminals were examined for sawfly eggs. Only five egg clusters were found, containing a total of 95 eggs. The average number of eggs per cluster was 19; the number of eggs per needle averaged 11.9. In 1958, the average number of eggs per cluster was 69.3.

A Sawfly on Ponderosa Pine, Neodiprion sp.

There was a general increase in sawfly populations on open-growing ponderosa pine along the Thompson River. In addition to the continuing infestation at Savona, light defoliation was observed north and west of Kamloops, at Ashcroft, and near Lytton. Light defoliation was obvious by the first week in June, when a portion of all but the 1959 foliage had turned brown.

Satin Moth, Stilpnotia salicis (L.)

Satin moth infestations on trembling aspen and black cottonwood were much lighter than in 1958. Most of the aspen trees on two acres at Knutsford whcih had been 100 per cent defoliated for several years, were dead. Only one new infestation was noted in this region, in a large grove of aspen one mile south of Knutsford.

Cottonwoods and aspens on the banks of the South Thompson River near Pritchard were defoliated for the third successive year. Defoliation ranged up to 70 per cent on approximately 200 mature cottonwoods and from 25 to 50 per cent on the surrounding groves of immature aspen.

On a 50-acre alluvial flat, 15 miles north of Kamloops in the North Thompson Valley, five acres of mature aspen were 75 per cent defoliated.

In the old infestations at Campbell Lake, Harpers Ranch, and at Lac du Bois, larval activity was negligible.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The infestation at Barton Creek, northwest of Adams Lake, decreased in 1959. Defoliation of trembling aspen trees was estimated to be 45 per cent in the western 300 acres and 60 per cent in the eastern 400 acres. The infestation spread northward to include an additional 50 acres of aspen which were 35 per cent defoliated.

On June 25, late-instar larvae were heavily parasitized. Of 100 randomly selected larvae, 94 contained from one to 18 parasite eggs, mostly around the junction of the head and thorax. The average number of parasite eggs per larva was 3.6.

The results of egg counts indicate that the infestation has completely collapsed. On October 2, all the egg masses from nine randomly selected aspens were collected, as was done in previous years. In 1959, only one egg mass was found, compared with 115 in 1958. In the fall of 1957, 354 egg masses were collected. Preceding 1957, which was the peak year for defoliation, 412 egg masses were collected.

In the four years that egg counts have been taken, egg parasitism has ranged from 2.8 per cent to a high of 10.8 per cent in 1959. Larval parasitism was 17 per cent in 1958 and rose to 94 per cent in 1959.

Western Tent Caterpillar, Malacosoma pluviale Dyar

Occasional tents were observed on wild rose at Knutsford, and on trembling aspen and saskatoon at Lac du Bois.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The leaves of trembling aspen trees were infested throughout the range of aspen in the District. Leaf-miner counts were taken at seven localities. The leaves from 10 twelve-inch branches were taken, which averaged more than 500 leaves per sample. The number of infested leaf surfaces and the number of adults produced per leaf are shown in Table 4.

At each location 100 cocoons were randomly selected and examined for pupal mortality. Table 5 shows the percentage of cocoons which were parasitized or died from other causes.

Table 4

Percentage of Aspen Leaf Surfaces Mined and Number of Aspen Leaf-miner Adults Produced per Leaf Surface Central Kamloops District, 1959.

Location	Percentage of leaf surfaces with mines	Number of adults produced per leaf surface
Paul Creek	21.7	.06
Deadman River	87.3	.31
Cache Creek	58.5	.30
Campbell Range	50.0	.27
Robbins Range	81.8	.55
Fall Creek	69.9	.38
Coldwater River	50.2	.25

Table 5

Percentage Mortality of Aspen Leaf-miner Cocoons from 100-cocoon Samples at Seven Localities, Central Kamloops District, 1959.

Location	Percentage mortality in cocoon stage	
	Parasitized	Other causes
Paul Creek	9	2
Deadman River	26	0
Cache Creek	22	1
Campbell Range	10	2
Robbins Range	19	3
Fall Creek	0	2
Coldwater River	18	3

Poplar and Willow Borer, Sternochetus lapathi (L.)

There was little activity in the 250-acre willow infestation at Tranquille, as 95 per cent of the trees were dead. The weevil, however, spread eastward and severely attacked willows throughout the Brocklehurst and North Kamloops area. Scrub willow in fields and shade-tree willows in gardens were infested. To date no other host is known to have been attacked in Kamloops Forest District.

Spotless Fall Webworm, Hyphantria cunea Drury

An increase in fall webworm was evident along the Nicola River Valley from Merritt to Spences Bridge. It was the first time in several years that webs were numerous near Merritt. A seven-mile roadside "strip count" was made east of Spences Bridge where black cottonwood was the major host.

At Savona, the number of webs counted in a three-mile "strip count" decreased. In 1959, 238 webs were counted as compared with a total of 809 in 1958.

Table 6 shows the number of webs on various hosts, that were counted from a moving vehicle for seven miles near Spences Bridge, and Table 7 shows data for a similar strip at Savona, together with 1958 totals.

Table 6

Spotless Fall Webworm Strip Counts, Spences Bridge to Seven Miles Southeast along the Nicola River, Central Kamloops District, August 10, 1959.

	No. of webs per mile							
Mile	0-1	1-2	2-3	3-4	4-5	5-6	5-7	Average
black cottonwood	45	11	10	16	12	5	7	15.1
choke cherry	27	5	0	1	11	5	1	7.1
apple	0	7	0	0	0	0	5	1.7
saskatoon	0	0	6	0	0	3	2	1.6
Totals	72	23	16	17	23	13	15	25.6

Table 7

Spotless Fall Webworm Strip Counts, Savona Cut-off from East to West, Central Kamloops District, August 9, 1959.

Host	No. of webs per mile			
Mile	0-1	1-2	2-3	Average
choke cherry	116	14	0	43.3
black cottonwood	45	13	13	23.7
apple	7	5	0	4.0
Manitoba maple	3	6	0	3.0
Lombardy poplar	4	3	0	2.3
mountain alder	0	0	6	2.0
trembling aspen	3	0	0	1.0
1959 totals	179	41	19	69.3
1958 totals	524	135	150	269.7

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Small infestations in Engelmann spruce were noted at three widely separated points in the District. North of McMurphy, approximately 20 per cent of the immature trees on ten acres were attacked. At Upper Clearwater 50 or more open-growing spruce were infested. South of Tunkwa Lake the majority of spruce in five acres were attacked.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

North of Lower Nicola, a few immature ponderosa pines were severely attacked. On August 13, hundreds of pupae of a ladybird beetle, Chilocorus tricyclus Smith, were present on the trees. Light to medium infestations of pine needle scale on ponderosa pine were also noted at Nicola, Savona and on Dufferin Hill, west of Kamloops.

Several acres of lodgepole pine were lightly attacked near Barriere.

Western Winter Moth, Erannis vancouverensis (Hulst)

During late June, Mr. D. Arnott, of the Field Crop Insect Laboratory at Kamloops reported an infestation at Agate Bay on Adams Lake. The infested area covered approximately 10 acres of deciduous growth bordering a farm. Douglas maple was 50 per cent defoliated while western white birch, mountain alder and several species of willow were 30 per cent defoliated.

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

A small open-growing stand of immature lodgepole pine north of McLure, has been repeatedly attacked during the past several years. Of 25 trees over four inches d.b.h., 17 had been attacked from one to 16 times as evidenced by pitch masses on the main bole (Figure 1). By 1959, several trees had broken off at the base as a result of larval tunneling in the sapwood (Figure 2).

On June 5, 1959, all insects were in the larval stage (Figure 3), while on June 22, only one larva was observed; the remainder had pupated (Figure 4).

Jack Pine Needle Miner, Zelleria haimbacki Busck

The jack pine needle miner was one of the few insects which were more plentiful in the District in 1959 than in 1958. Although larvae are difficult to obtain in beating samples, one to three larvae were commonly taken in samples on open-growing ponderosa pine throughout the Thompson River valleys. In a hand-picked collection at Savona, 97 branch tips were examined at eye-level on one tree, 85 per cent of which contained one or, more rarely, two larvae. In other hand-picked collections, 7 per cent of 180 branch tips were infested on a tree at Merritt, 6 per cent out of 128 at Nicola and 3 per cent out of 63 at Barnhartvale.

A Ponderosa Pine Cone Borer, Dioryctria auranticella (Grote)

At each of five locations in the District, 50 mature ponderosa pine cones were examined for borers. The average percentage of infested cones in 1959 was 37.2, slightly higher than the 1958 average of 31.2. Table 8 shows the percentage of cones infested at five localities sampled.

At Little Shuswap Lake and at Tranquille, all larvae examined were dead although almost fully-grown; a few hymenopterous parasites were noted in some but not all cones.

Table 8

Percentage of Ponderosa Pine Cones Infested by Dioryctria auranticella in 50-cone Samples, Central Kamloops District, 1959.

Location	Percentage infested	
	1959	1958
Little Shuswap Lake	18	58
Savona	94	98
Mamette Lake	16	0
Nicola	36	0
Merritt	22	0

A Douglas-fir Cone Borer, Barbara colfaxiana Kft.

Douglas-fir cones were examined during July at five locations in the District. At each sample point 50 cones were randomly selected from five trees. The percentages of infested cones were: at Tranquille, six per cent; Barnhartvale, 34 per cent; Nicola, four per cent; Merritt, four per cent; and at Lytton, 14 per cent.

A Sawfly, Xyela sp.

The 1959 "Xyela counts" did not show any significant population change from 1958. Staminate flowers of ponderosa pine were examined during May and June at seven locations in the District. Table 9 shows the number of flowers examined and the percentage infested in 1959 and 1958.

Table 9

Number of Ponderosa Pine Staminate Flowers Examined and Percentage Infested by a Sawfly, Xyela sp., Central Kamloops District, 1959.

Location	No. flowers examined, 1959	Percentage infested	
		1959	1958
Heffley	384	73.4	82.8
Barnhartvale	540	20.7	23.3
Nicola	469	40.3	34.5
Merritt	638	18.3	13.7
Savona	572	78.7	83.6
Kamloops	319	19.7	16.5
Lytton	398	31.2	40.4
Average		37.9	39.1

Poplar Borer, Saperda calcarata Say

Immature and mature open-growing trembling aspens on arid sites along the Thompson River have been heavily attacked by this long-horned wood borer. The borers usually entered the trunk of the trees near branches. Injury later became conspicuous because of large swellings around the entrance hole. No attacks have been observed in aspens growing in coniferous forests.

Ugly-nest Caterpillar, Archips cerasivoranus (Fitch)

Although not as numerous as in the past three years, larvae defoliated road-side choke cherries at Lytton, Kamloops and Stump Lake during June.

An Aphid, Mindarus abietinus Koch

The current foliage of immature alpine fir on several square miles south of McGillivray Lake contained a high population of aphids. approximately one third of the new foliage was shrivelled and discoloured.

A Needle-feeding Scarabaeid, Dichelonyx sp.

During the first two weeks in June, Douglas-fir collections made in the vicinity of Kamloops, contained from 200 to 300 adults of these scarabaeids. Groups of three and four beetles were conspicuous at the junction of the new and old twig growth. Defoliation, though, was slight. At most times the temperatures were cool and the beetles appeared sluggish and did little feeding.

A Leaf-beetle, Trirhabda pilosa Blake

Leaf-beetle larvae continued to completely defoliate sagebrush, Artemisia tridentata Nutt., near Kamloops in 1959. The sagebrush most affected was that growing at higher elevations, approaching forested areas.

STATUS OF FOREST DISEASES

Important Diseases

Needle Cast on Ponderosa Pine

Approximately 100 pole-sized ponderosa pines died in 1959 two miles west of Kamloops, presumably as a result of the heavy infections in 1958 by the needle cast fungus, Elytroderma deformans (Weir) Darker, and the severe drought which occurred that year. Ponderosa pine trees with sparse foliage were noted between Merritt and Upper Nicola and in the vicinity of Barnhartvale.

A needle cast also caused by this fungus was noted on immature lodgepole pine over several square miles in Highland Valley.

Needle Rust of Alpine Fir

South of McGillivray Lake, a belt of immature alpine fir between 3,200 and 4,200 feet elevation was heavily infected by the needle rust fungus Pucciniastrum epilobii Otth. Only the current foliage was affected.

Needle Cast of Douglas Fir

A needle cast, possibly caused by Rhabdocline pseudotsugae Syd. was observed on numerous immature Douglas firs north of Le Jeune Lake. Most of the trees lost their 1958 foliage in the spring of 1959.

A Canker on Trembling Aspen

An unidentified orange canker on the trunks of trembling aspen trees was common in many aspen stands, especially in stands which had been repeatedly attacked by defoliating insects such as forest tent caterpillars, aspen leaf-miners and satin moth larvae.

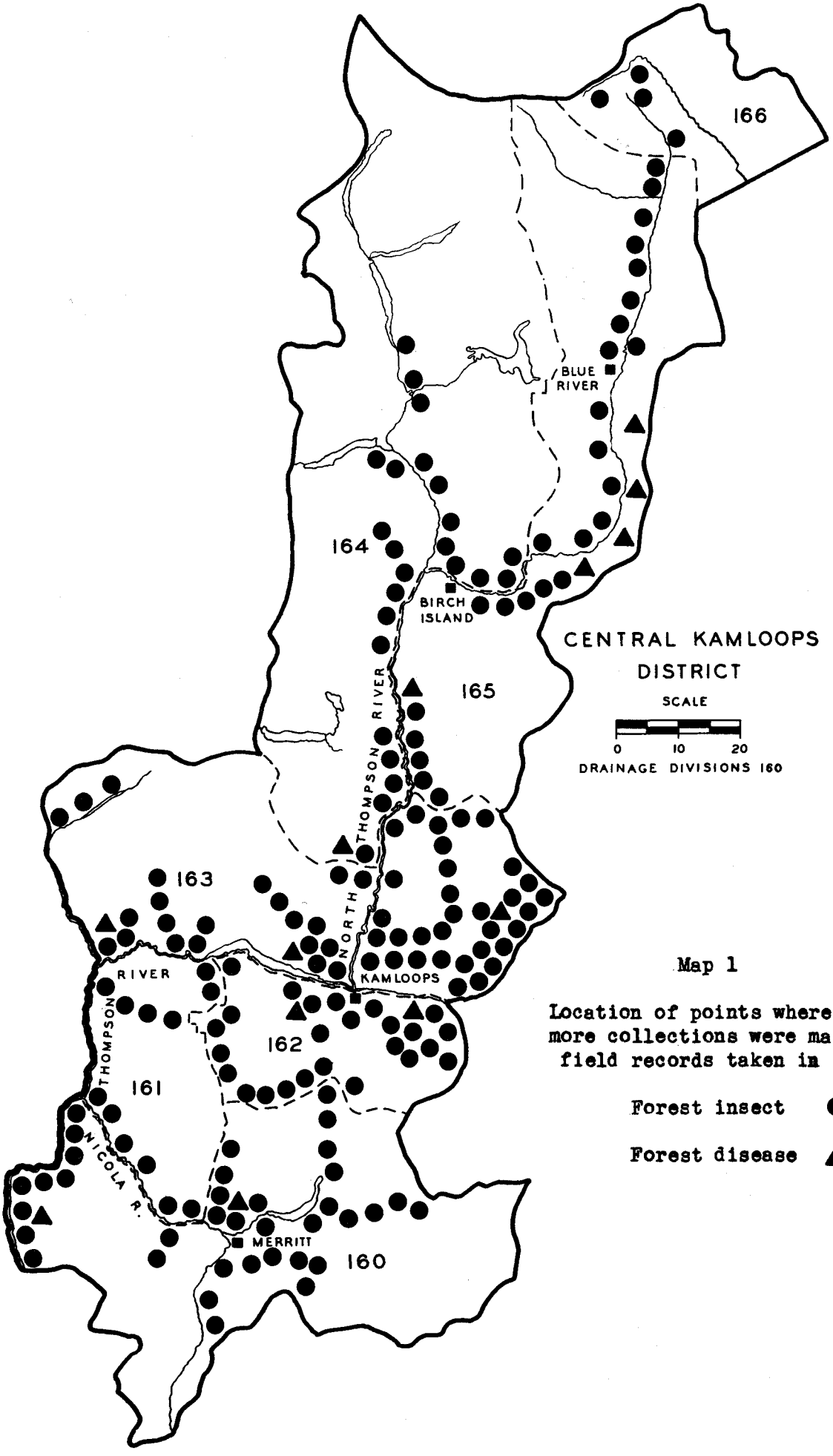
Mortality of Lombardy Poplar

In the spring of 1959, many immature Lombardy poplars in the vicinity of Kamloops died soon after their leaves appeared. The first symptom was the discoloration and curling of the leaves followed by cankers and eruptions in the bark of the stems. The disease agent has not been identified as yet.

Drought

Many immature and pole-sized Douglas-fir trees died along the North Thompson River Valley from Barriere to 10 miles north of Little Fort. It was estimated that from five to 10 per cent of the stand on both sides of the River were affected. A few immature Engelmann spruce and Rocky Mountain juniper have also died.

For 10 miles along the Thompson River from Lytton north, much of the Douglas-fir and ponderosa pine regeneration has died.

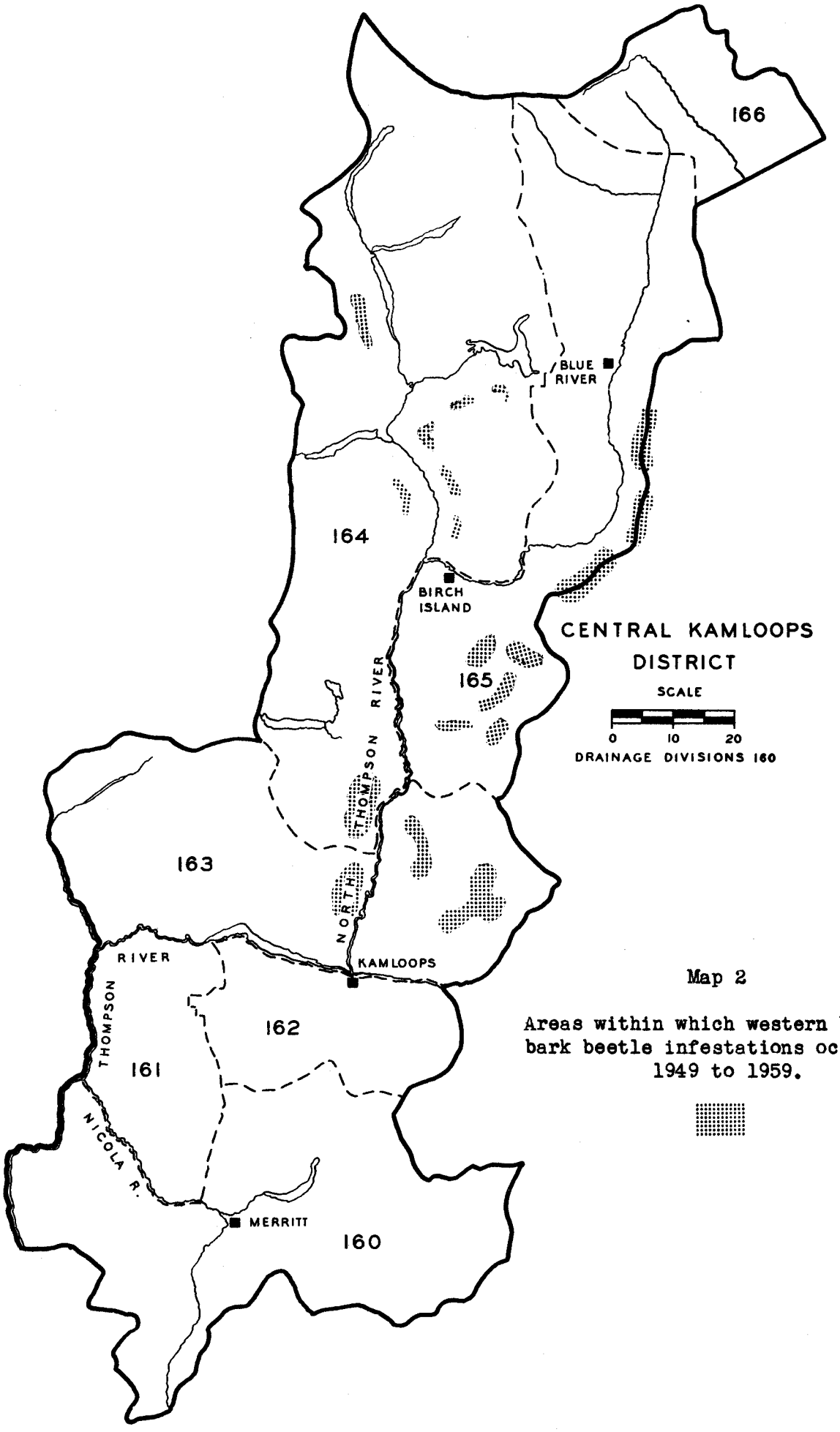


Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲



Map 2

Areas within which western balsam bark beetle infestations occurred, 1949 to 1959.

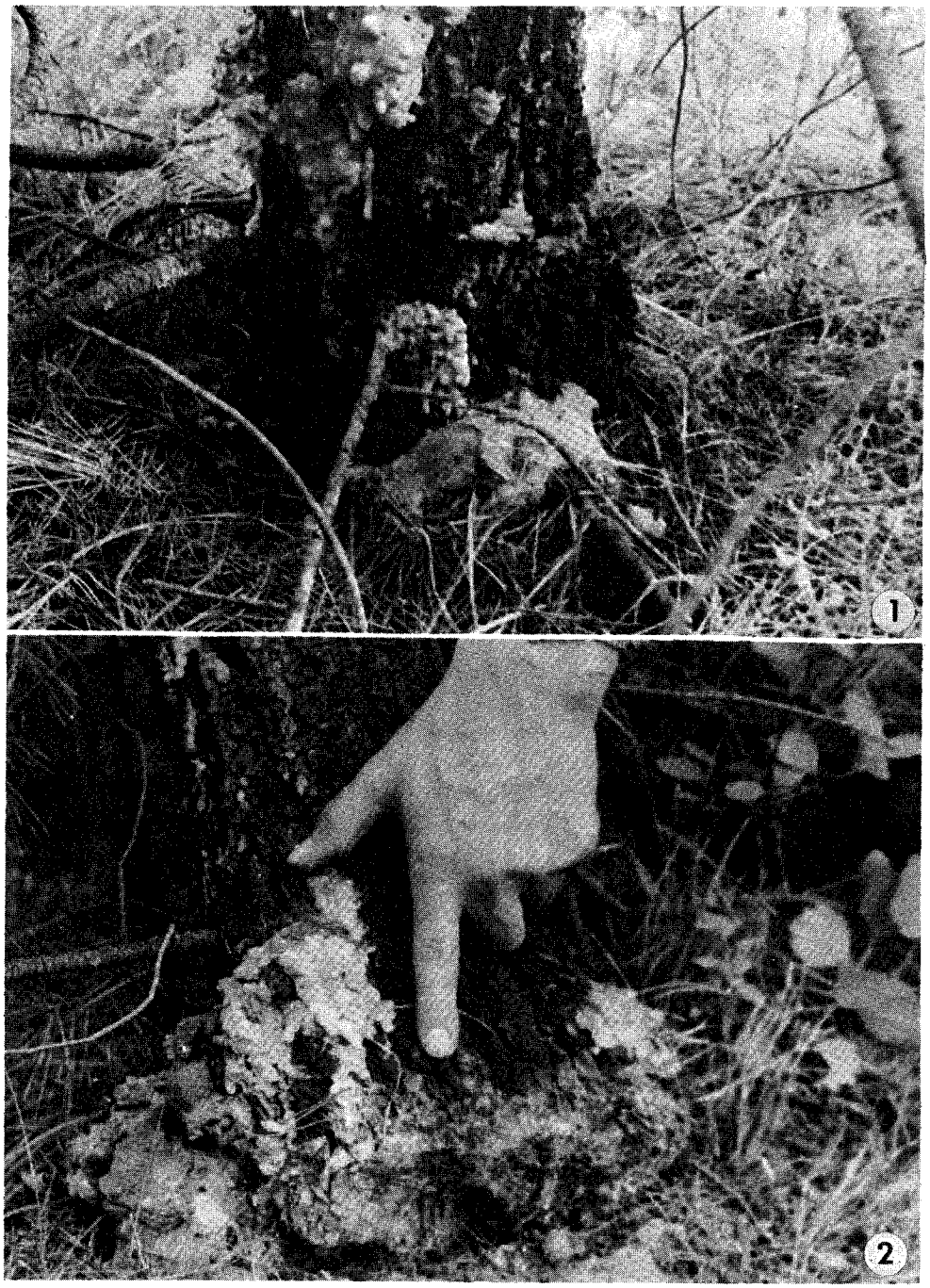


Figure 1. Pitch masses on lodgepole pine made by sequoie pitch moth, Vespamima sequoiae (Hy. Edw.) McLure, Central Kamloops District, June 22, 1959. D. W. Taylor.

Figure 2. Lodgepole pine broken at base as a result of girdling by sequoia pitch moth, Vespamima sequoiae (Hy. Edw.) McLure, Central Kamloops District, June 22, 1959. D. W. Taylor.

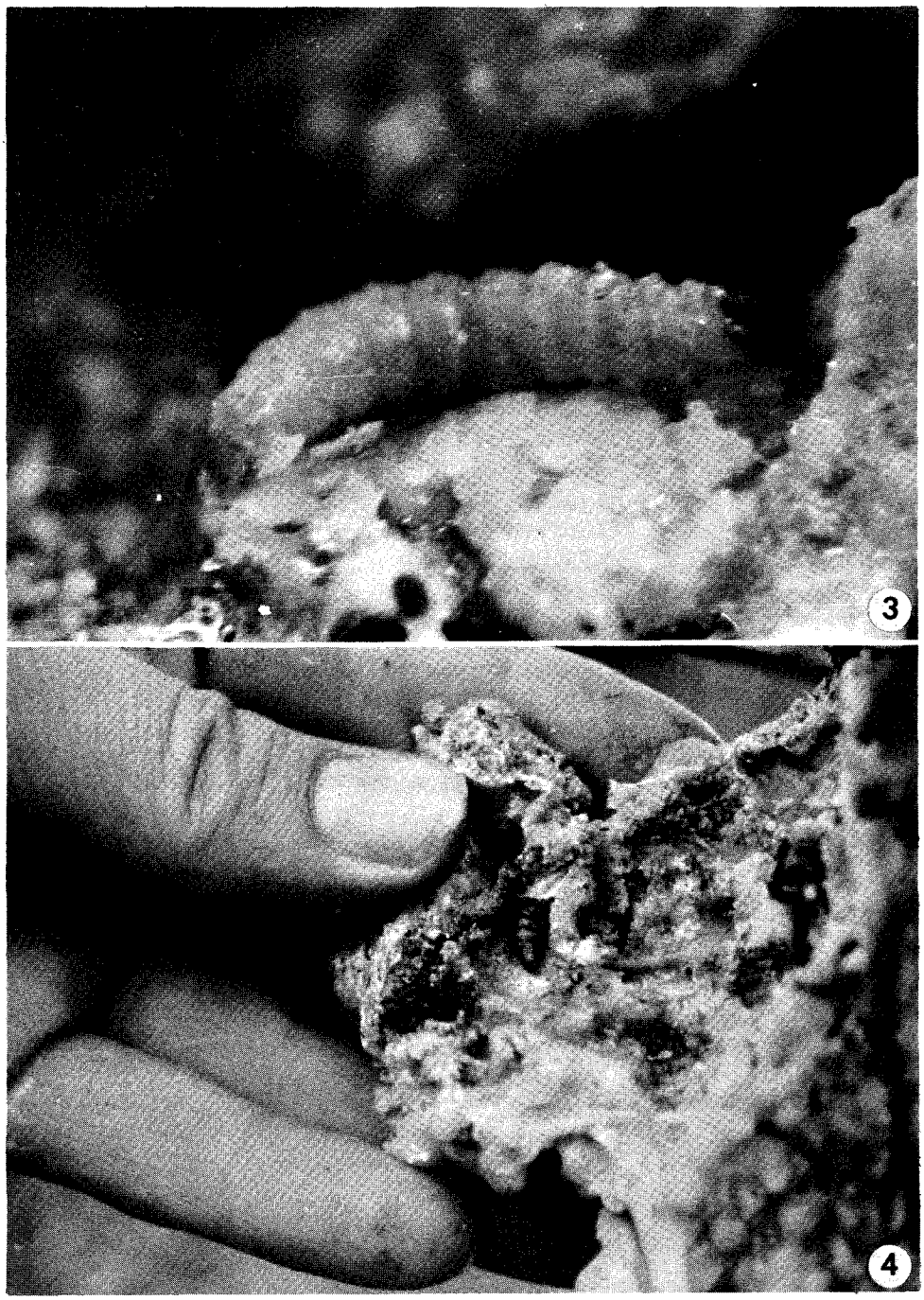


Figure 3. Pitch mass on lodgepole pine opened to show larvae of sequoia pitch moth, Vespamima sequoiae (Hy. Edw.) McLure, Central Kamloops District, June 22, 1959. D. W. Taylor.

Figure 4. Pitch mass on lodgepole pine opened to show pupa of sequoia pitch moth, Vespamima sequoiae (Hy. Edw.) McLure, Central Kamloops District, June 22, 1959. D. W. Taylor.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

EAST KAMLOOPS DISTRICT

1959

FOREST BIOLOGY SURVEY

EAST KAMLOOPS DISTRICT

1959

B. A. Sugden

INTRODUCTION

Field work in the East Kamloops District began during the second week in April and continued until the third week in November.

During 1959 a total of 309 insect and four forest disease collections were made. Table 1 contains a list of the host trees and the number of insect and forest disease collections from each species. Map 1 shows each location where one or more insect and forest disease collections or field records were obtained in 1959.

Table 1

Collections by Hosts

East Kamloops District - 1959.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
cedar, western red	3	-	alder spp.	8	-
Douglas fir	91	3	aspen, trembling	4	-
fir, alpine	3	-	birch spp.	7	-
hemlock, western	7	-	ceanothus spp.	8	-
juniper, Rocky Mountain	4	-	cherry, choke	7	-
larch, western	10	-	cottonwood, black	15	-
pine, lodgepole	29	-	ocean spray	5	-
pine, ponderosa	59	1	willow spp.	13	-
pine, western white	5	-	miscellaneous	14	-
spruce, Engelmann	17	-			
			Total	81	0
Total	228	4	Grand total	309	4

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Light populations of Douglas-fir beetle persisted in many sections of the District. The foliage of Douglas-fir trees known to have been attacked in 1959 had not changed color by September. Counts of red-top fir killed by the Douglas-fir beetle are shown in Table 2. The majority of the trees tallied were killed during 1957 and 1958. To obtain the volumes shown in the table the average volume of five infested trees was taken at each infestation examined.

Table 2

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

Location	Number of trees	Volume cubic feet
Lumby	136	12,552
Cherryville	108	8,856
Enderby	47	3,854
Salmon River	98	8,036
Falkland	167	13,694
Monte Lake	396	40,472
Sicamous	51	4,182
Mabel Lake	104	8,528
Princeton	91	7,462
West side of Okanagan Lake	113	9,286
Squilax	47	3,854
Mara	52	4,264
Total	1,360	125,040

Again this year a Douglas-fir tree was felled near Westwold during mid-April. The purpose was to attract Douglas-fir beetles to a selected site so that foliage color changes taking place after the trees had been killed by beetles could be recorded from the time of initial attack. The site was visited periodically until August. The initial attack occurred during the first week of June and by the third week the felled tree was heavily infested. A Douglas fir growing near the attractor tree was lightly infested on one side of the lower stem, however it seemed unlikely that the attack would kill the tree.

The felled tree was 95 feet in height with a d. b. h. of 16 inches. In November, one-foot cylinders of bark were removed every 10 feet and the Douglas-fir beetle galleries in the samples counted. The number of galleries per square foot for each bark section is shown in Table 3.

Table 3

Number of Douglas-fir Beetle Galleries per Square Foot Sample from a Douglas-fir Tree Felled in April near Westwold and Examined in November, 1959, East Kamloops District.

No. of feet from butt	Diameter (inches)	No. of galleries per square foot
0	16	3.08
10	14	4.33
20	12	4.45
30	11	2.94
40	10	5.82
50	9	3.04
60	7	2.65

Callow Douglas-fir beetles were noted in each bark section although some of the broods had died in the larval stage. There was very little competition from buprestid larvae in the samples during 1959.

Douglas-fir beetles were active on the site of a forest fire that occurred in late May, 1958, near Falkland. Douglas-fir trees living but damaged by the fire on the perimeter of the burn, were infested.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Increased mountain pine beetle activity occurred in the Mabel Lake, Trinity Valley and Douglas Lake districts during 1959. Table 4 contains the tree species, number of trees and volume killed by the mountain pine beetle.

Table 4

Number of Trees and Volume killed by Mountain Pine Beetle in East Kamloops District During 1958 and 1959.

	Pine species	Number trees killed	Volume cubic feet
Mabel Lake and Trinity Valley	western white	546	31,668
Douglas Lake	ponderosa	112	12,544
Douglas Lake	lodgepole	97	1,261
Totals		755	45,473

Two strips one chain wide and totalling 60 acres, were cruised near Mabel Lake on Timber Berth 237. Table 5 shows the condition of the western white pine on this area.

Table 5

Number and Percentage of Stems of White Pine Killed by Mountain Pine Beetle in 1959, 1958 and prior to 1958, on 60 Acres Cruised on T. B. 237 Mabel Lake, East Kamloops District, 1959.

Condition of trees	Number of trees	Percentage of stems
not attacked	44	24.2
beetle killed in 1959	63	34.6
beetle killed in 1958	57	31.3
beetle killed prior to 1958	18	9.9

Mountain pine beetle activity in this area has increased, since 65.9 per cent of the white pine has been killed during the last two years.

Western Pine Beetle, Dendroctonus brevicomis Lec.

The western pine beetle populations remained low. During the years 1957, 1958 and 1959, 126 ponderosa pines, with a total volume of 14,112 cubic feet, have been killed. The mountain pine beetle has been associated with infestations of the Oregon pine engraver, Ips oregoni (Eich.) in 1958 and 1959. Some of the pole-sized pine attacked by the latter species has been infested on the lower five feet of the stem by the western pine beetle. Signs of woodpecker activity were common on many of the trees infested by the western pine beetle.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

A light population of Engelmann spruce beetle was discovered on a logging operation on White Rocks Mountain. Recent cull logs and stumps had been infested. A total of 18 standing spruce and three lodgepole pine had been partially attacked on the lower portions of the trunk from ground level to a height of five feet.

Red Turpentine Beetle, Dendroctonus valens Lec.

The red turpentine beetle has been associated with the mountain pine beetle, western pine beetle and Oregon pine engraver in many parts of the District. It infests the lower boles of ponderosa pine that have been attacked previously by other scolytids. Occasionally ponderosa pine trees

were noted that had been infested solely by this species. The beetles has confined their attacks to the root collars but it appeared unlikely that tree mortality would result.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

Since 1957 the western balsam bark beetle has killed 411 alpine fir trees near Bolean Lake and 520 trees of the same species near the headwaters of Scotch Creek. These infestations continued during 1959.

Oregon Pine Engraver, Ips oregoni (Eich.)

During the summers of 1957, 1958 and 1959 infestations of Oregon pine engraver occurred in many parts of the District. Most of the damage was on privately owned land or Indian reserves in the upper Okanagan Lake, Hullcar and Knob Hill districts of the North Okanagan. All the infestations bordered on recent logging or land clearing operations, where the accompanying debris consisted mostly of ponderosa pine limbs, tops and stumps which had been heavily infested. Apparently the resulting populations had emerged and attacked the adjoining stands of young pine. A total of 1,066 ponderosa pine, with an average d.b.h. of six inches had been killed between the years 1957 and 1959. During this period, highest tree mortality occurred in 1958.

Western pine and red turpentine beetles were associated with Ips in many infestations. Three half-acre plots were established to determine whether Ips alone were responsible for tree mortality or if they required the assistance of the other species. Table 6 shows the percentage of young trees killed by each species of beetle independently and by combined attacks.

Table 6

Percentage of Ponderosa Pine Stems on Three Half-acre Plots Attacked by Ips oregoni (Eich.) alone, by Dendroctonus alone or by Ips and Dendroctonus spp. combined, East Kamloops District, September, 1959.

Location of plots	Ips sp. alone		Dendroctonus spp. alone		Ips sp. and Dendroctonus spp.	
	Trees killed	Trees living	Trees killed	Trees living	Trees killed	Trees living
Salmon River Indian Reserve	26	9	0	4	24	19
Knob Hill	55	6	0	0	12	0
Okanagan Centre	31	0	0	0	20	0

Table 6 indicates that more trees were killed by Ips alone than by either Dendroctonus spp. alone or by Ips and Dendroctonus sp. combined. Map 2 shows the distribution of Oregon pine engraver infestations in the period 1957 to 1959.

Satin Moth, Stilpnotia salicis (L.)

Except for a grove of aspen at the south end of Duck Lake which was completely defoliated, this species caused little defoliation in the District in 1959. At the sites of many of the 1958 infestations very few larvae were found. At Duck Lake, mass collections of larvae were taken during three periods of their development, and of pupae just prior to the emergence of the adults for parasite investigations.

Counts of overwintering satin moth larvae were made at Duck Lake and Shuswap. At each locality, three black cottonwood over 12 inches d.b.h., were selected in a grove where satin moth were active. Samples consisted of square-foot areas of bark surface spaced at two-foot intervals on the south side of each tree, from one foot above ground level to a height of seven feet. All hibernacula on these samples were tallied. Comparisons of larval counts for the years 1958 and 1959 are shown in Table 7.

Table 7

Numbers of Hibernating Satin Moth Larvae per Square Foot of Bark Surface, in Three Square-foot Samples from Each of Six Black Cottonwood Trees at Shuswap and Duck Lakes, East Kamloops District, 1958 and 1959.

Tree no.	Location	D.B.H. of tree (inches)	Average no. of larvae per square foot	
			1958	1959
1	Shuswap	16	51	1
2	Shuswap	14	26	0
3	Shuswap	14	33	3
4	Duck Lake	12	30	26
5	Duck Lake	14	31	45
6	Duck Lake	13	27	38

No defoliation is expected in 1960 on the plot at Shuswap as the overwintering larval population is very small. At Duck Lake there is a moderately high population so defoliation could be severe in 1960.

During 1959 it was noted that on severely defoliated trees the satin moth larvae spun their cocoons in groups of leaf petioles; this is shown in Figure 5.

At Duck Lake, starlings, Sturnus vulgaris L., were observed eating satin moth adults.

Spruce Budworm, Choristoneura fumiferana (Clem.)

The one-year-cycle spruce budworm was present in many parts of the District, but the population appeared to be very low. More larvae were collected from Douglas fir than from any other host tree in 1959.

Little evidence of two-year-cycle budworm activity was found in the sub-alpine forests surveyed. Buds of Engelmann spruce and alpine fir were examined near Bolean Lake, Upper Whiteman Creek, Monashee and Adams Plateau.

Black-headed Budworm, Acleris variana (Fern.)

The population of black-headed budworm remained low throughout the District in 1959.

Douglas-fir Tussock Moth, Hemerocampa pseudotsugata McD.

Larvae of the Douglas-fir tussock moth were collected only once this year. The collections was made from Douglas fir on the western side of Vaseaux Lake.

Oregon Fir Sawyer, Monochamus oregonensis Lec.

Larvae of the Oregon fir sawyer severely damaged standing dead Douglas-fir trees that had been killed by a forest fire on May 24, 1958 near Falkland. About 60 per cent of the fire-damaged trees had been attacked by these round-headed borers. A salvage operation was abandoned, mainly because of the high proportion of trees devalued by borer activity. Many galleries penetrated to a depth of five inches in the larger diameter samples examined. Galleries frequently went right through samples of five inches diameter or less.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

In 1959, pine needle scale caused very light damage to ponderosa pine needles in the marginal stands near Naramata. During mid-June young scale nymphs were numerous on the 1959 needles, however, many of them died shortly after becoming established. Infestations at Summerland, Winfield, Okanagan Centre, Kelowna and Vernon remained active. In September samples of foliage were collected at random from Naramata, Summerland and Winfield, and four needles from each of three samples were examined to determine the condition of the scales. Only the scales established on the inner surfaces of the 1959 needles were counted. Data obtained from these samples are contained in Table 8.

Table 8

Number of Pine Needle Scales Examined and Percentage Mortality on Samples of 12 Current Needles of Ponderosa Pine from Each of Three Locations, East Kamloops District, September, 1959.

Location	Average length of needles (inches)	Number of scales examined	Percentage mortality
Naramata	4.69	1,377	97
Summerland	4.38	658	9
Winfield	4.10	676	51

The Table shows very heavy mortality of pine needle scale at Naramata. It will be noted that about twice as many scales were recorded there as from the other areas sampled, even though the degree of infestation for the three sites appeared to be equal. Due to the heavy mortality of young nymphs at Naramata, immature males must have been included in the count; whereas at Summerland and Winfield the majority of scale recorded were mature females. The assumption that sex ratio was one to one (C. E. Brown, the Canadian Entomologist, Vol. XCI, No. 9) and that the male scale drops after the adult emerges, may explain the much larger number of scales recorded at Naramata than at the other two localities where mortality was lower.

Some recovery of young ponderosa pine was evident in the formerly severely infested stands near Naramata. Evidence of this was the increase in the length of the 1959 needles (Figure 3).

Black Pine Leaf Scale, Nuculaspis californica (Cole.)

There has been a decline in the population of black pine leaf scale throughout the marginal pine stand extending from Naramata south to Skaha Lake. Predation, parasitism, and competition within the species and with the pine needle scale, were mainly responsible. A total of 1,162 ponderosa pine, ranging from two to 26 inches, have died from continuous infestation by the black pine leaf scale in the Penticton district since 1956.

Samples of ponderosa pine foliage, infested with black pine leaf scale, were taken near Naramata, and Skaha Lake. The inner surface of four needles from each of three samples from these localities were examined to determine the condition of the scale. Data obtained from these samples are contained in Table 9. This infestation is expected to continue in 1960.

Table 9

Number of Black Pine Leaf Scales Examined and Percentage Mortality on 12-needle Samples of Ponderosa Pine Needles, East Kamloops District, September, 1959.

Location	Average length of needles (inches)	Number of scales examined	Percentage mortality
Skaha Lake	5.06	130	29
Naramata	3.31	820	58

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The infestations of aspen leaf-miner remained active in many groves of trembling aspen throughout the District. A decline in population of this species was apparent in the Glenemma Range and lower Salmon River Valley districts. During the latter part of July four plots were established in groves of trembling aspen infested by the aspen leaf-miner. On each plot all the leaves were examined on two one-foot branch samples from each of five trees. Records were kept of the number of infested and non-infested leaves on each sample. In addition 100 infested leaf surfaces and 100 cocoons were examined and the number and condition of the cocoons recorded. Tables 10 and 11 contain information obtained from the samples.

Table 10

Percentage of Aspen Leaf Surfaces Mined by Aspen Leaf-miner and Number of Adults Produced per Leaf Surface in Samples from Four Localities, East Kamloops District, 1959.

Location	Percentage of leaf surfaces with mines	Number of adults per leaf surface
Carlin	82	.24
Phillips Lake	71	.19
Falkland	74	.16
Glenemma Range	32	.08

Table 11

Percentage Mortality of Aspen Leaf-miner Cocoons in 100-cocoon Samples, East Kamloops District, 1959.

Location	Percentage mortality in cocoon stage	
	Parasitized	Other causes
Carlin	25	2
Phillips Lake	18	4
Falkland	16	5
Glenemma Range	34	11

Adults of the aspen leaf-miner were abundant in many localities from mid-July to mid-August. Severe to moderate damage to the leaves of trembling aspen may be expected in 1960.

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

There was a light cone crop on ponderosa pine throughout most of the District in 1959. Cones infested by a cone-borer were common, particularly in marginal pine of the South Okanagan Valley. Twenty second-year ponderosa pine cones selected at random from the same trees in each locality have been examined annually since 1957. The percentages of cones infested during 1957, 1958 and 1959 are shown in Table 12.

Table 12

Percentage of Second-year Cones of Ponderosa Pine Infested by Dioryctria auranticella, East Kamloops District, 1957, 1958, and 1959.

Location	Percentage of cones infested		
	1957	1958	1959
Glenemma Range	73	76	54
Winfield	68	74	71
Keremeos	48	52	38
Oliver	45	68	73
Richter Pass	70	72	62
Anarchist Mountain	62	36	29

The percentage of cones infested during 1957, 1958 and 1959 does not indicate a population trend of this cone insect due to variability of the annual cone crop. Table 12 shows a decline in the percentage of cones infested in all sampled localities except Oliver, where an increase has continued since 1957. Predation by Clark's nutcrackers, Nucifraga

columbiana (Wilson) may be an important factor affecting populations of D. auranticella. Flocks of these birds were observed opening infested cones and in some localities apparently had destroyed a high percentage of the larvae.

Douglas-fir Cone Moth, Barbara colfaxiana Kearf.

The Douglas-fir cone moth caused widespread damage to the cone of Douglas fir in 1959. In sampling for cone damage 20 cones were examined on each of three trees at each site. The percentages of cones infested by the Douglas-fir cone moth at seven localities sampled are shown in Table 13.

Table 13

Percentage of Douglas-fir Cones Infested by the Douglas-fir Cone Moth at Seven Localities, East Kamloops District, 1959.

Location	Percentage of cones infested
Craigellachie	37
Canoe Point	16
Grandview Bench	55
Sweetsbridge	8
Keremeos	62
Princeton	23
Anarchist Mountain	41

Occasionally one of the three sample trees had approximately 90 per cent of the cones infested while the percentage of infested cones on the other two sample trees was much lower. There was generally a good cone crop on Douglas-fir trees over most of the District in 1959.

Jack Pine Needle-miner, Zelleria haimbachi Busck

There was a light to medium infestation of jack pine needle-miner on four acres of ponderosa pine on a bench along the west side of Vaseaux Lake. Reproduction pine up to eight feet in height were more severely infested than the larger trees. Three pines averaging three inches d.b.h. and seven feet in height were examined; 78 per cent of the branch tips and leaders had been infested. Light damage occurred where there were one or two larvae of Z. haimbachi per branch tip, while three or more larvae usually killed most of the current young needle crop of the branch tip.

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

There were few staminate flowers on ponderosa pine in 1959. To determine the degree of infestation of staminate flowers, sampling was continued on the same sites and trees as in 1957 and 1958. At each site three flower clusters were examined on the north, south, east and west sides of the lower third of the crown of each of the three selected trees. A total of 36 flower clusters were examined on each plot. Table 14 shows the percentage of flowers infested in seven localities in 1957, 1958 and 1959.

Table 14

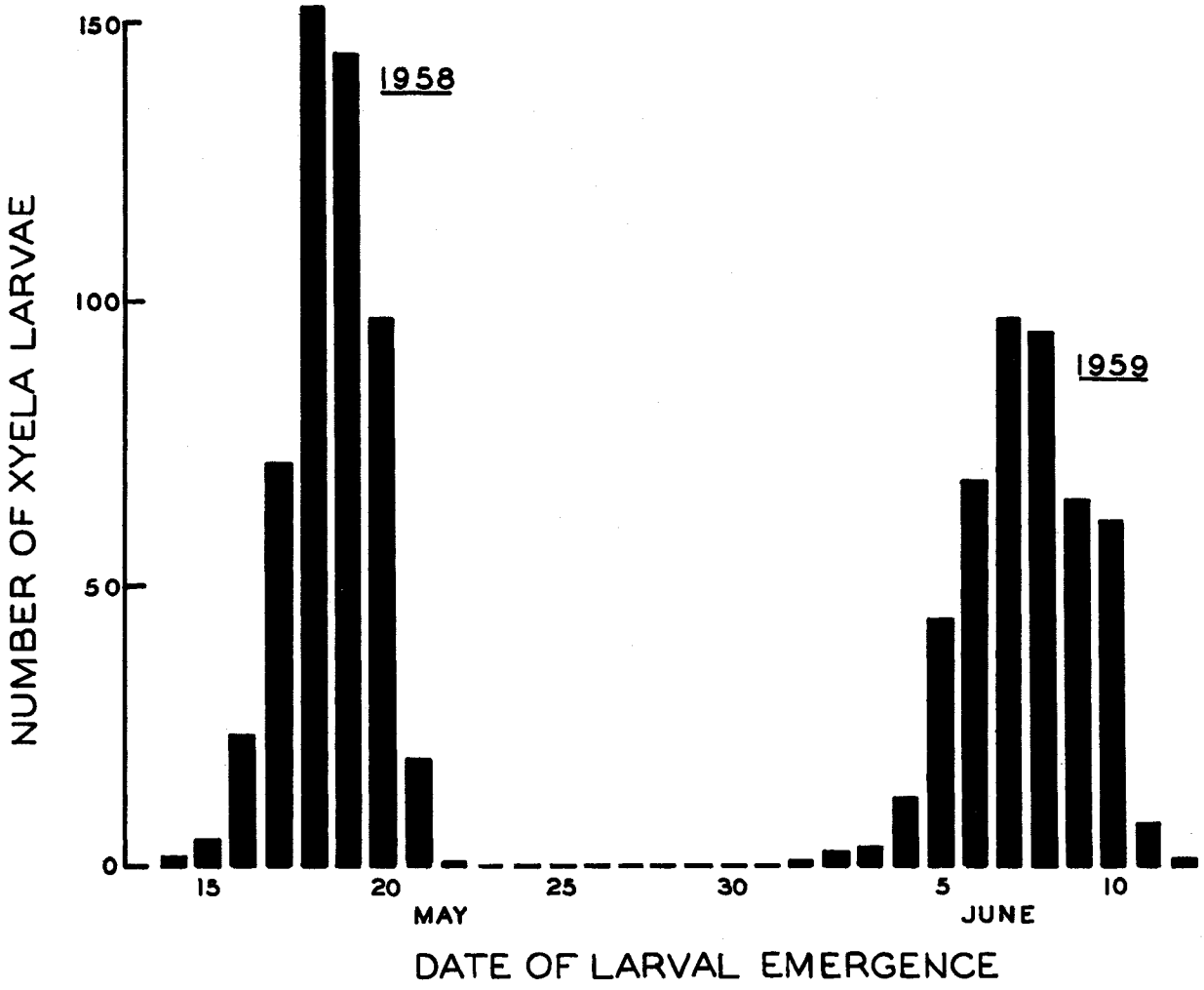
Percentage of Ponderosa Pine Staminate Flowers Infested by Xyela sp. at Seven Localities, East Kamloops District, May, 1957-1959. (36 Flower Clusters Examined per Plot)

Location	Percentage of flowers infested		
	1957	1958	1959
Pritchard	45	87	31
Westwold	55	no flowers	no flowers
Glenemma Range	92	82	64
Winfield	39	56	no flowers
Kelowna	26	49	18
Oliver	94	73	68
Aspen Grove	14	11	no flowers

The Table indicates a decline in the percentage of samples infested by Xyela sp. It also shows a scarcity of staminate flowers on ponderosa pine in 1960, in three localities.

During early May 1958, two plots were established at Glenemma Range to determine date, duration and rate of emergence of Xyela larvae. At each plot three trees were sampled by hanging four cylindrical traps measuring five inches in diameter and seven inches in depth on each tree. The traps were located at the cardinal points in the lower crown. The plots were visited daily and the number of Xyela larvae that had emerged from flowers and dropped into each trap, recorded. Graph 1 shows the number of larvae recorded daily during the emergence period, for 1958 and 1959.

Larval emergence did not begin in 1959 until June 1, 18 days later than in 1958. The duration of larval emergence was longer by three days in 1959 even though fewer larvae were trapped. This variation may be attributed to the abnormally cool spring in 1959. The larval emergence period during 1959, as in 1958, coincided with the maturing of the staminate flowers.



GRAPH 1 · NUMBER OF XYELA SP. LARVAE THAT DROPPED INTO TRAPS FROM STAMINATE FLOWERS OF PONDEROSA PINE - GLENEMMA RANGE - EAST KAMLOOPS DISTRICT - MAY 14 TO 22, 1958; AND JUNE 1 TO 12, 1959.

A Web-spinning Sawfly on Ponderosa Pine, Pamphiliidae

Larvae of a web-spinning sawfly were numerous on ponderosa pine in the South Okanagan Valley. Infested trees were usually bordering on rangeland or in open-growing stands. Thirty per cent of the branch tips in the lower crowns of some trees were infested. It was observed that one larva on the current growth of a branch tip destroyed up to 75 per cent of the partly developed needles.

A Sawfly on Ponderosa Pine, Neodiprion sp.

Colonial larvae of a sawfly were present throughout most of the range of ponderosa pine in the District. Damage was light and usually restricted to one branch. The larvae fed mostly on the 1958 needles.

A Sawfly on Lodgepole Pine, Neodiprion sp.

Colonial sawfly larvae caused light damage to lodgepole pine in 1959. Several small trees, growing on a bench south of Squilax, were almost completely defoliated except for the 1959 needles. None of the infested trees exceeded three feet in height and only one colony of sawflies appeared to be responsible for the damage on each tree examined.

Cecidomyids (including Retinodiplosis sp.) Infesting the Twigs and Candles of Ponderosa and Lodgepole Pines.

During 1958 cecidomyid larvae continued to infest the twigs and candles of ponderosa and lodgepole pines. Three plots were established to assess the damage caused by the infestations. Three trees were sampled on each plot, two trees 15 feet or over and one tree under nine feet. Samples were taken from the larger trees at the mid and lower crowns, and the smallest trees was sampled only in the upper crown. A sample consisted of two one-foot twigs from the cardinal points of each tree, giving totals of 16 samples from each of the larger trees and eight from the small tree. Forty samples were examined on each plot. Table 15 contains information obtained from the three plots..

Cecidomyid larvae infesting ponderosa pine trees were found at the base of 1958 needles, under the bark at the end of the 1958 twigs and in the candles of the 1959 growth. On lodgepole pine the larvae were more numerous in the 1959 candles than in the 1958 twigs. Severe infestation resulted in death of candles and twigs and malformation of twigs. (Figures 1 and 2)

Table 15

Number of Cecidomyid Larvae, Number of Twigs and Candles of Ponderosa and Lodgepole Pines Infested and Killed by Cecidomyid Larvae in 40-twig Samples from Each of Three Plots, East Kamloops District, May, 1959.

Location	Twigs				Candles		
	Tree species	No. infested	No. dead	No. larvae	No. infested	No. dead	No. larvae
Monte Creek	ponderosa pine	18	-	32	6	-	8
Squilax	ponderosa pine	32	11	136	11	4	17
Squilax	lodgepole pine	8	-	9	29	7	99

A Pitch Nodule Maker, Petrova sp.

The larvae of a pitch nodule maker were common in Salmon Arm and Squilax districts. They occurred mainly on lodgepole pine but were also observed on ponderosa pine. Damage was light. Near Salmon Arm the upper quarter of one small lodgepole pine was killed by Petrova sp.

Douglas-fir Needle Miners, Contarinia spp.

The populations of Contarinia spp. were low throughout the District, except on several Douglas-fir trees near Celista, Magna Bay, Vernon and Monte Creek. Damage ranged from 10 to 15 per cent except at Vernon where approximately 30 per cent of the 1959 needles had been mined on a few large trees.

A Flea Beetle on Alder, Altica sp.

The leaves of alder trees, on about 15 acres south of the Kelowna City Airport, were severely damaged by a flea beetle. Leaf skeletonization ranged from 20 to 100 per cent. Larvae were numerous during the second week of August. Damage to the leaves of alders also occurred in the Trepanege Creek Valley, but skeletonization was not severe.

Spotless Fall Webworm, Hyphantria cunea Drury

Spotless fall webworm larvae again defoliated chokecherry and black cottonwood in 1959. Trees and shrubs along roads and on open rangeland were favoured over those growing in more sheltered sites. Although webs were numerous they were smaller than those observed in 1958. Defoliation was also less severe during 1959.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Though widely distributed on Douglas-fir, western hemlock and Engelmann spruce trees, larvae of the western hemlock looper were not numerous in 1959.

STATUS OF FOREST DISEASES

Important Diseases

Root Rot of Douglas Fir

Root rot caused by Poria weirii Murr. was found at widely separated areas during 1959. Groups of blow-down were examined at Six Mile Creek, Pillar Lake, Knob Hill, Mabel Lake and Trinity Valley. A strip 20 chains by one chain was cruised on the southeast side of Knob Hill. On the strip, 29 red-top, 47 snag and 15 blow-down Douglas fir were tallied. All the Douglas-fir trees that were blown down had Poria weirii symptoms. None of the dead trees bore much evidence of Douglas-fir beetle activity.

A Needle Cast of Pine

A needle fungus, Elytroderma deformans (Weir) Darker, has seriously infected the foliage of ponderosa pine on about 80 acres of Terrace Mountain and 100 acres on the east side of Okanagan Lake, about 15 miles south of Vernon. Many of the infected trees had retained only 1958 and 1959 needles, most of which were stunted and of poor color.

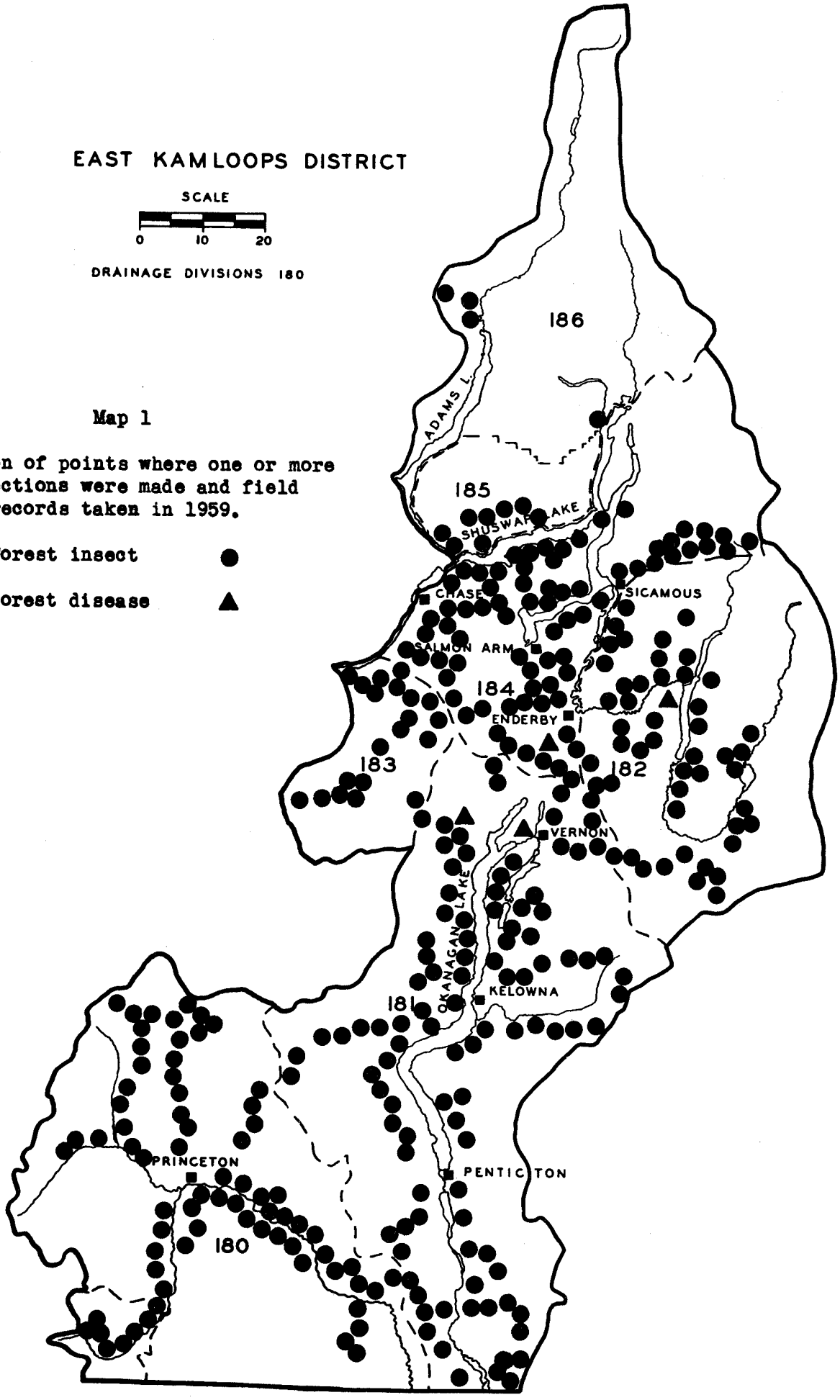
Exotic Plantations

Three exotic plantations, located near Westwold and Pritchard, were examined in 1959. No disease or insect damage was found. Table 16 shows the condition of the trees on the plot.

Table 16

Summary of Disease Conditions on Exotic Plantations

XP Number	Location	Exotic species	Remarks
59	Westwold	Scots pine, western larch, white spruce	Condition of trees normal
60	Westwold	American elm	One tree only on plot; apparently normal
62	Pritchard	Scots pine	One tree only on plot; normal.



Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲

EAST KAMLOOPS DISTRICT

SCALE

0 10 20

DRAINAGE DIVISIONS 180

Map 2

Distribution of Ponderosa Pine
Infested by Ips oregoni in 1957 - 1959

20 trees ●

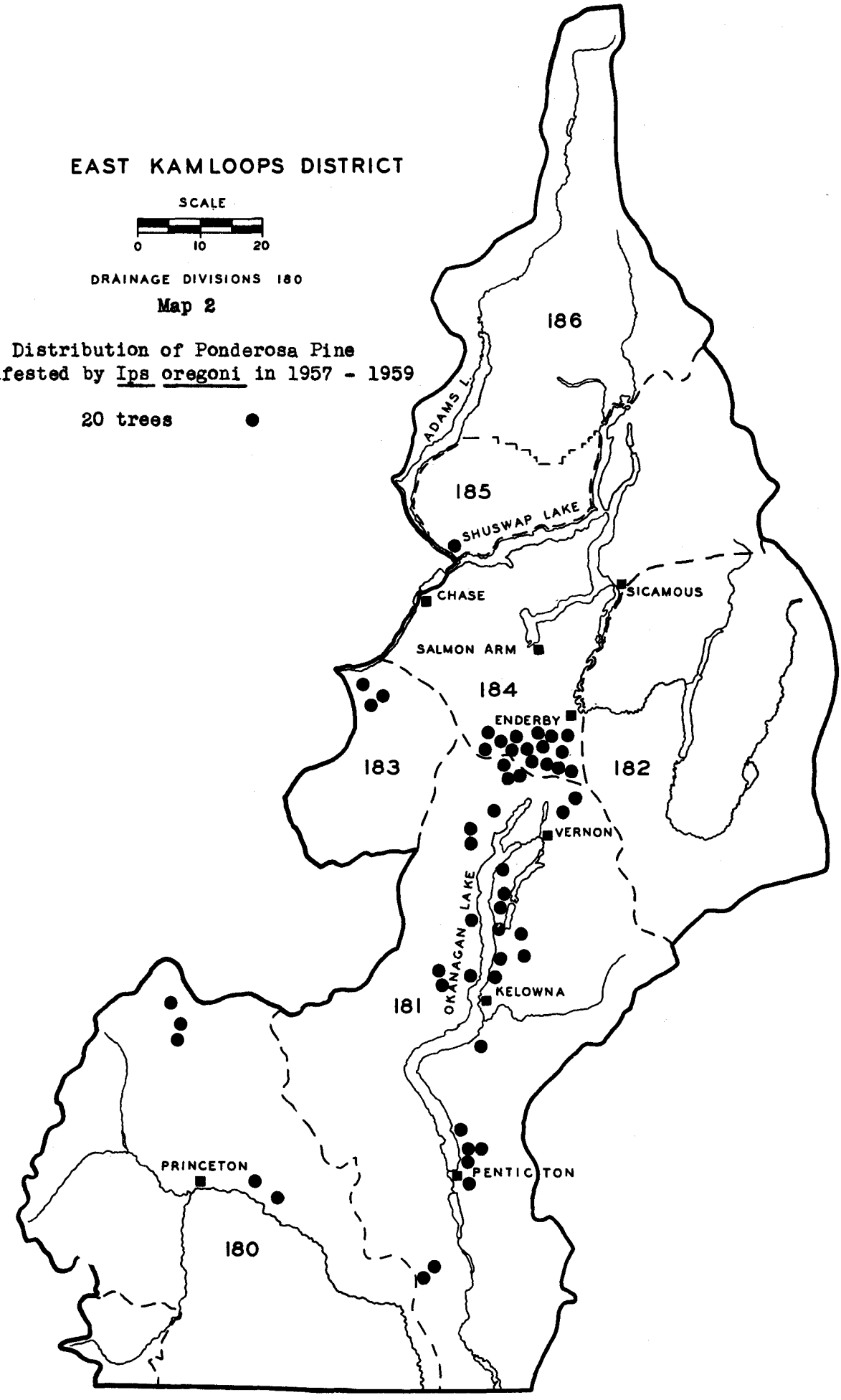


Figure 1. Candle of lodgepole pine infested by Retinodiplosis sp. Arrows indicate the position of a cocoon and a larva. Squilax, East Kamloops District, April 20, 1959.

J. C. Holms.

Figure 2. Small branch of ponderosa pine showing malformation caused by infestation of Retinodiplosis sp. Squilax, East Kamloops District, April 20, 1959.

J. C. Holms.

Figure 3. Ponderosa pine twigs showing recovery in 1959 from infestation of pine needle scale, Phenacaspis pinifoliae (Fitch), which caused severe dwarfing and needle drop in previous years. Naramata, East Kamloops District, August 6, 1959.

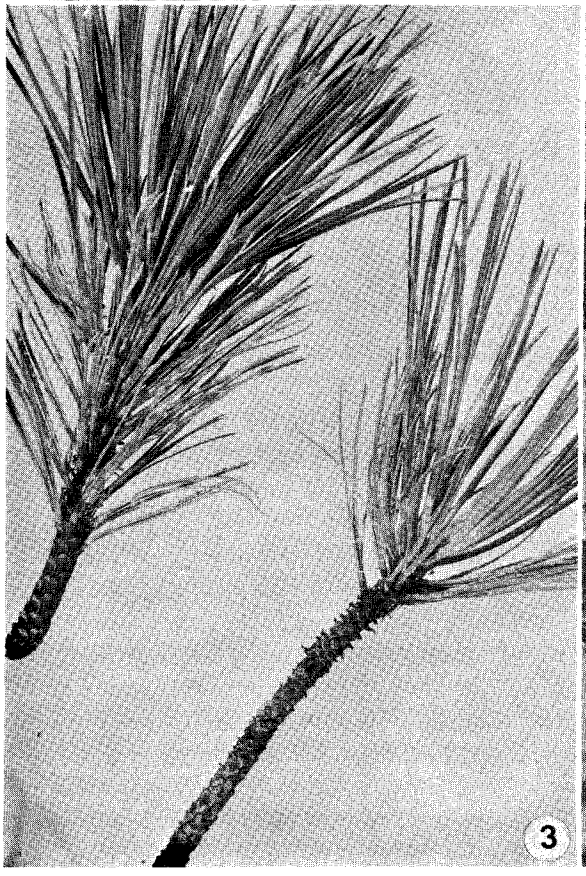
J. C. Holms.

Figure 4. Petrova sp. on ponderosa pine. Larva in larger pitch mass pupated in 1959; larva in smaller pitch mass would not have pupated until 1960. Squilax, East Kamloops District, April 20, 1959.

J. C. Holms.


1


2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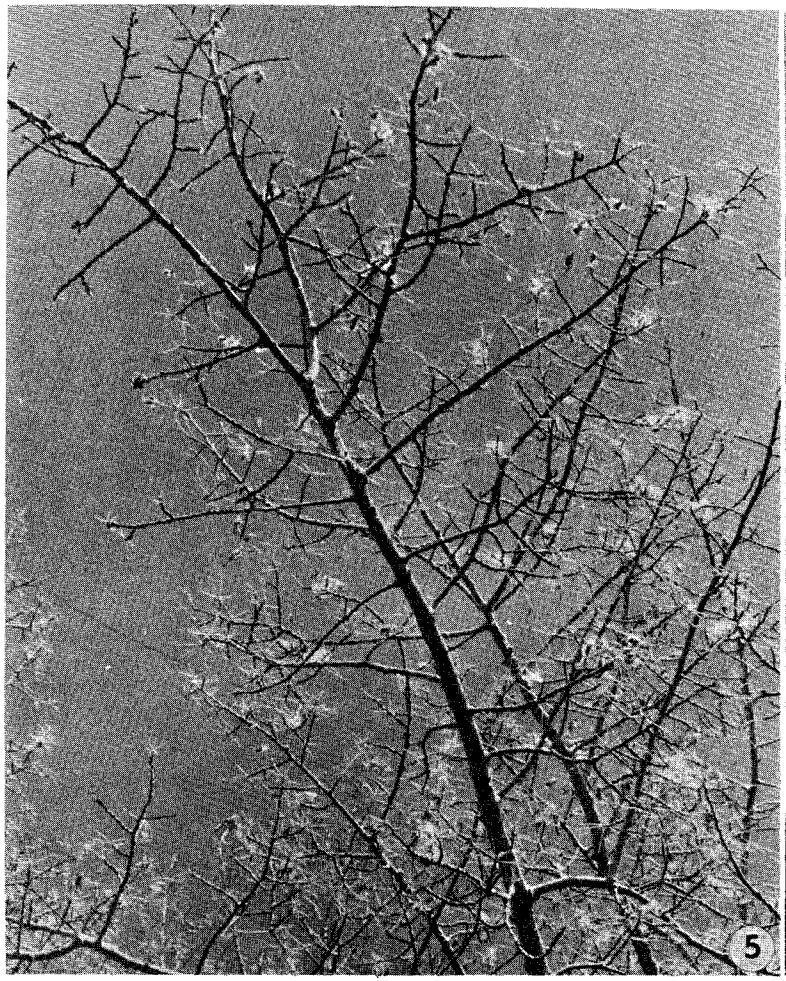


Figure 5. Satin Moth, Stilpnotia salicis (L.) cocoons in a trembling aspen tree near Duck Lake, East Kamloops District, June 28, 1959. J. C. Holms.

Figure 6. Mine under the bark of willow made by the larva of Marmara sp. Larva is visible under the bark. Lavington, East Kamloops District, May 7, 1959. J. C. Holms.

ANNUAL REPORT OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA

1959

NELSON FOREST DISTRICT

FOREST BIOLOGY SURVEY

NELSON FOREST DISTRICT

1959

J. Grant

INTRODUCTION

In 1959 the only change in Forest Biology Ranger personnel was in the Central Nelson District, where R. O. Wood succeeded D. H. Ruppel, who was transferred to the Victoria Forest Biology Laboratory in August, 1958. R. J. Andrews and J. Grant conducted the Forest Biology Survey in the East Nelson and West Nelson districts respectively.

With the exception of most of July, the weather during the 1959 field season was unusually cool and wet. In the early part of the season, insect development was from two to three weeks later than in 1958, and access to the higher elevations was hampered by the late spring "run-off".

The mountain pine beetle continued its depredations in the white pine stands of the Interior Wet Belt, and in lodgepole pine in both the East and West Nelson districts. Engelmann spruce beetle infestations were reduced in size and severity in 1959 and damage was the lightest in several years. Douglas-fir beetles have apparently increased slightly in the West Nelson District, and minor damage was reported in the East Kootenay. The western balsam bark beetle continued its attacks in many alpine fir stands in the West Nelson District.

There were no important outbreaks of defoliating insects in 1959. The black-headed budworm was scarcer than in 1958, and hemlock sawflies caused only minor defoliation in a few localities. Two aspen defoliators, the forest tent caterpillar and the large aspen tortrix, increased to infestation level near Golden, and the epidemic of aspen leaf-miners continued in aspen stands over much of the District.

A ponderosa pine midge increased greatly in the southern East Nelson District, and caused conspicuous flagging of branch tips in stands bordering the Kootenay River.

Douglas-fir needle cast was again prevalent in 1959, in parts of the West and East Nelson districts. Larch needle cast infections subsided in most regions although heavy discoloration recurred in Central Nelson District.

Injury attributed to the abnormally dry weather in 1958 became apparent in 1959. Branch flagging, top-kill, and tree mortality of Douglas fir, grand fir and western red cedar was most severe in the Kootenay Lake region. Most of the damage occurred in stands that were over-stocked or growing on shallow soil and rock ledges.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST NELSON DISTRICT

1959

FOREST BIOLOGY SURVEY

WEST NELSON DISTRICT

1959

J. Grant

INTRODUCTION

Field work began in the West Nelson District on May 10 and ended on September 17. Three hundred and fifteen forest insect collections, and 14 forest disease samples were taken during the season; they are listed by host in Table 1. Map 1 shows localities where one or more collections or field records were taken in 1959.

Table 1

Collections by Hosts

West Nelson District, 1959.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
cedar, western red	10	-	alder, mountain	3	-
Douglas fir	46	5	alder, Sitka	3	-
fir, alpine	16	1	apple	1	-
fir, grand	12	-	aspen, trembling	9	2
hemlock, western	24	1	birch, fountain	3	-
juniper, Rocky Mountain	2	-	birch, white	5	-
larch, western	32	-	cherry, bitter	2	-
pine, lodgepole	26	1	cherry, choke	5	-
pine, ponderosa	50	-	cottonwood, black	4	-
pine, western white	14	-	saskatoon	3	-
pine, whitebark	-	1	willow spp.	9	-
spruce, Engelmann	16	3	miscellaneous	20	-
			Total	67	2
Total	248	12	Grand total	315	14

STATUS OF INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

An infestation of the mountain pine beetle was discovered in 1959, along the new forest access road in the Upper Kettle River Valley. The heaviest mortality of lodgepole pine had occurred between Mohr Creek and Winnifred Creek but fringes of the infestation extended as far

north as Bruer Creek and southward to Damfino Creek. An aerial survey revealed that the infestation was confined to the Kettle River Valley and did not extend up the tributary streams. A total of 1,100 trees were judged to have been killed in the period 1955 to 1958. Smaller numbers of weathered grey trees in the vicinity of red-tops indicated that the infestation had been present for six or more years.

The infestation ranged in elevation from 2,900 feet on the valley floor at Damfino Creek, to about 4,500 feet on the slopes between Winnifred and Mohr creeks. The stand consisted largely of mature lodgepole pine, with lesser quantities of Engelmann spruce and alpine fir. Growth conditions appeared to be poor, particularly in the valley bottom; many of the infested pines at Mohr Creek had severe resinosis about the root collars, caused by a pine root weevil, Hylobius sp. A root rot believed to be Armillaria mellea (Vahl ex Fr.) Quél. had killed several spruce and alpine fir in the understory, and may have been partly responsible for the poor condition of some of the pine.

It is expected that the status of this infestation will not change appreciably in 1960. It was noted, however, that in the southern part of the infestation, most of the lodgepole pines are smaller than the average size usually considered susceptible to bark beetle attack.

Mountain pine beetles have killed an estimated 300 lodgepole pine on Boundary Creek, in Boundary Sawmills Tree Farm License. This infestation, which is scattered over an area four miles long and one half mile wide, appears to have made little progress in the last two years. On August 13, 1959, no heavily infested trees could be found and in many instances trees had been attacked for two or three years before being killed.

The local infestation on Windfall Creek has diminished in size and no freshly attacked trees were observed in 1959.

Mountain pine beetle infestations in western white pine stands were not extensive. The infestation in pole-sized trees above Graham Landing continued in 1959. Twelve green-infested trees averaging 18 inches d. b. h. were counted eight miles east of Crawford Bay, where 22 trees had been killed in 1958. Eight mature white pines were killed near the confluence of Gable Creek and Granby River.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Douglas-fir beetle damage in the West Nelson District has increased in the past three years, although it has been much lighter than in the Douglas-fir stands of the Kamloops Forest District. The majority of infested trees has been in the vicinity of logging operations in the region west of the Columbia River.

Douglas-fir beetle damage for the period 1956 to 1958 was determined in 1959 by counting, from vantage points and aircraft, all red-top Douglas-fir trees showing characteristics of bark-beetle attack. Trees killed in 1959, most of which had not begun to turn

colour by the time the survey was made in August, were not included. Table 2 shows the locality, the number of trees and volume of timber killed by the Douglas-fir beetle in the period 1956-1958.

Table 2

Number and Volume of Douglas-fir Trees Killed by Douglas-fir Beetle in the West Nelson District in the Period 1956 - 1958, as Determined in 1959.

Locality	Region no.	Compartment no.	No. of trees	Volume cubic feet
Greenwood	15	10	152	10,944
Rock Creek - Midway	15	11, 12	42	2,772
Upper Kettle River	15	14	30	600
Upper Kettle River	24	1, 17	101	6,666
Westkettle River	24	2, 3, 6	109	6,949
Edgewood	23	2	16	912
Pend d'Oreille River	17	23	18	1,026

Volume of beetle-killed trees was determined by measuring representative trees wherever possible. The average volume of 64 cubic feet per tree was somewhat less than the average for beetle-killed Douglas fir in the Kamloops Forest District.

No heavily-infested trees were found in a group of 48 dead Douglas firs, north of Greenwood, in which five trees had been killed in 1957, 26 in 1958, and 17 in 1959. Bark on the lower bole of some trees was almost free of beetle galleries, indicating that the bark-beetle attack may have been secondary to some other agency which had reduced the trees' vitality. Effects of the 1958 drought were considered, but as there were healthy larch trees growing among the dead fir, it seemed unlikely that a moisture deficiency had been responsible.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

No fresh damage was observed in 1959. An old, localized infestation at the headwaters of Camp Run Creek near Creston was visited; an estimated 50 per cent of the mature Engelmann spruce on 160 acres had been killed before 1955.

Scattered beetle-killed trees were noted in a mature stand on the southwest side of Mount Rykerts and at the upper end of Archibald Creek Valley.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

An effort was made in 1959, by means of aerial reconnaissance and ground surveys, to assess the losses caused by the western balsam bark beetle in the past 12 years. The two most extensive infestations, near Mount Moore and at the headwaters of the Westkettle River, have almost died out but numerous smaller infestations persist in the mountains between Lower Arrow Lake and the District's western boundary. The localities where infestations have occurred in the last 10 years are shown on Map 2., Table 3 shows, by locality, the number of alpine fir trees and estimated volume believed to have been killed in the years 1948 and 1958. The two major infestations may have begun before 1948 but undoubtedly the greatest mortality occurred within this period. In the smaller groups, trees were counted and the volume calculated from British Columbia site-class tables. In the larger infestations the area and percentage of stand mortality was estimated and applied to the estimated stand volume of 500 cubic feet of alpine fir per acre.

Table 3

Number of Alpine Fir Trees and Estimated Volume Killed by Western Balsam Bark Beetles 1948 - 1958 inclusive, West Nelson District, as Determined in 1959.

Locality	Region no.	Compartment no.	No. of trees	Area (sq. mi.)	Volume (cubic feet)
Granby River	15	8	350	small groups	10,150
Granby River	15	9	925	small groups	26,825
Inonoaklin River	23	3	200	small groups	8,200
Kettle River	24	15	400	small groups	16,400
Mt. Moore	24	8, 10	75% of stand	16	3,840,000
Westkettle River	24	8	40% of stand	2	256,000
Total					4,157,575

Lesions believed to have been caused by a fungus, Ceratocystis sp., surrounded many of the bark beetle galleries in freshly-attacked alpine fir trees in the upper Inonoaklin Valley. It is probable that this tree disease was associated with Dryocoetes in other infestations in the West Nelson District.

Western Pine Beetle, Dendroctonus brevicomis Lec.

One ponderosa pine 30 inches d.b.h. and two slightly smaller trees near Midway were killed by western pine beetles. This was the first record of damage caused by this bark beetle in the District, in recent years.

Oregon Pine Engraver, Ips oregoni (Eich.)

A group of 32 ponderosa pines averaging eight inches d.b.h. was killed by these engraver beetles near Christina Lake in 1958. The Ips attack was confined to the tree crowns but western pine beetles, Dendroctonus brevicomis Lec. and red turpentine beetles, D. valens Lec. had infested the lower boles of the larger trees.

Other localities where ponderosa pines that had been killed in 1958 were noted in 1959 were Grand Forks, Cascade, and Midway. A total of about 60 trees averaging six inches d.b.h. had been killed. No fresh red-tops were noted near Westbridge where approximately 150 young pine were killed in 1957.

Black-headed Budworm, Acleris variana (Fern.)

Populations of this insect were generally lower than in 1958, except for a small area in the upper end of Crawford Creek Valley. Two three-tree beating samples taken from western hemlock in this locality on July 26, each contained 19 larvae.

A Hemlock Sawfly, Neodiprion sp.

No extensive defoliation of western hemlock was observed in 1959, although there were several light infestations. On July 15, 361 larvae were taken in one collection at Leadville Creek; they were less than half grown. This locality was not visited again in 1959. The hemlock sawfly population was quite high in the overmature stands in Crawford Creek Valley; four collections taken on July 26 at locations between Mile 6 and Mile 9 yielded 49, 68, 306 and 364 larvae respectively. Seventy-six larvae were taken in one collection at Mile 5.5, Duhamel Creek road, and 477 larvae in one collection five miles east of Apex on July 28. The altitude at the latter locality was 4,000 feet and the larvae were only half grown.

Sawflies on Douglas Fir, Neodiprion spp.

Neodiprion larvae were not as numerous near Kuskanook in 1959 as they were in 1957 and 1958, and there was no noticeable defoliation of Douglas firs. Fifty-six per cent of the three-tree beating collections taken throughout the District from Douglas fir, in June and July, contained one or more Neodiprion larvae.

Larch Shoot-borer, Argyresthia laricella Kft.

A survey to determine the distribution of the larch shoot-borer was undertaken in 1959, following the first detection of the insect in the District early in the season. A visual examination of sapling and small pole-sized trees was the only method employed, and no effort to accurately assess the borer population was made.

The shoot-borer was found in almost all larch stands examined, excepting most of the southwestern part of the District. Here it was detected at elevations of 3,000 feet and above, but not in the lower valleys. In the Kootenay and Columbia valleys mined shoots were found at elevations as low as 1,800 feet.

The larch shoot-borer is apparently of minor importance at present. The highest populations were at Kerr Creek near Midway, and near Wynndel where an average of slightly more than one shoot per tree was infested. In both localities predators, presumably chickadees, had opened most of the mines and eaten the borers.

A Pine Shoot-borer, Eucosma sonomana Kft.

There was no appreciable change in the status of this borer in the ponderosa pine stands near Cascade in 1959. Larval development was about three weeks later than in 1958; on July 7 it was estimated that 25 per cent of the larvae had emerged from the mined shoots.

On August 12, a strip five chains long and two chains wide was run through an open ponderosa pine stand near Cascade, to determine the prevalence of Eucosma attack in young trees of different sizes. Results of this tally are shown in Table 4.

Table 4

Number of Ponderosa Pine Shoots Infested by a Shoot-borer on Trees in Three Height Classes on a 5 x 2 Chain Plot, Cascade, West Nelson District, August, 1959.

Tree Height Class in feet	No. of infested terminals per tree				
	none	one	two	three	four
4 to 8	15	6	2	0	0
10 to 14	21	7	10	1	0
16 to 20	2	0	3	0	1
Total	38	13	15	1	1

Table 4 shows that 44 per cent of the 68 trees tallied were infested by borers in 1959.

A local but unusually heavy infestations was observed near Kettle Valley, on the Nicholson Creek road. Borers had killed 17 branch terminals on one 25-foot ponderosa pine in 1959, and four other trees in the vicinity each had an average of seven dead shoots.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

There were few notable changes from 1958 levels, in the infestations of aspen leaf-miners in the District. Again in 1959, all aspen stands in the Edgewood Ranger District were heavily infested, and conspicuous discoloration was noted as far south as Crawford Bay on Kootenay Lake. According to sampling data, populations increased slightly at Grand Forks and Creston but remained unchanged near Greenwood.

Four plots were established to obtain information on the biology of the leaf-miner and to determine the severity of infestations. Two branches were clipped from each of five aspen trees at each plot, and the leaves examined. The percentage of leaf surfaces infested at each locality, and the number of adult leaf-miners produced per leaf surface are shown in Table 5. All examinations were conducted after adult emergence was complete.

Table 6 shows cocoon mortality caused by parasitism and other factors, in 100-cocoon samples from each of the four plots.

Table 5

Percentage of Leaf Surfaces with Mines, and Number of Adult Aspen Leaf-miners Produced per Leaf Surface at Four Plots, West Nelson District, 1959.

Locality	Percentage of leaf surfaces with mines	No. of adults produced per leaf surface
Greenwood	43.2	.14
Grand Forks	31.4	.10
Barnes Creek	73.9	.18
Crawford Creek	24.6	.10

Table 6

Mortality of Aspen Leaf-miner Cocoons Caused by Parasitism and Other Factors in 100-cocoon Samples at Four Plots, West Nelson District, 1959.

Locality	Percentage mortality	
	parasites	other causes
Greenwood	3	4
Grand Forks	6	20
Barnes Creek	18	7
Crawford Creek	5	14

Although Table 5 shows that the Barnes Creek infestation, which has been heavy for several years, produced the greatest number of leaf-miner adults in 1959, Table 6 indicates a much higher parasite population there than in the other localities. It is expected that infestations of the aspen leaf-miner will continue in 1960.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

This defoliator apparently increased slightly in 1959; 21 per cent of all random collections taken during the feeding period, from conifers other than lodgepole and ponderosa pines, contained one or more larvae. The only noteworthy population was in the vicinity of Crawford Creek, where on July 25, 22 larvae were taken in one three-tree beating collection, and three additional samples yielded an average of six larvae. The forest type consisted of overmature western hemlock, western red cedar, Engelmann spruce, and western white pine.

False Hemlock Looper, Nepytia canosaria Wlk.?

This species was widely distributed but it was not numerous anywhere. Eight larvae were taken in a single collection from Douglas fir at Myncaster on July 9, and five larvae in one collection from the same host near Midway. Although Douglas fir seems to be the preferred host of this species, larvae were collected from grand fir in the Creston region and from western hemlock near Edgewood.

An Aphid on Grand Fir, Cinara occidentalis (Davidson)

Many of the grand firs in Creston Ranger District and near Fruitvale were heavily infested with this aphid in 1959. Damage was particularly severe in pole-sized stands near West Creston where the foliage of trees ranging from 10 to 18 inches d.b.h. was sticky with "honeydew" exuded by the aphids and the ground beneath the trees was blackened. On July 23, larvae, pupae and teneral adults of the coccinellid, Neomysia montana Casey, were found on the infested trees, and syrphid larvae were observed preying on the aphids.

A few colonies of this aphid were collected from grand fir near Rossland and in the Big Sheep Creek Valley.

A Douglas-fir Cone Moth, Barbara colfaxiana Kft.

The Douglas-fir cone crop was heavier in 1959 than in the past three years, but damage caused by cone moths reduced seed production in some areas. Forty-one per cent of the cones in a 50-cone sample taken near Cascade and 84 per cent in a similar sample taken between Brilliant and Robson were infested. The sampling procedure consisted of picking all cones from randomly selected branches of open-grown Douglas firs at each locality, until a total of 50 cones was obtained.

Flea Beetles, Altica spp.

Foliage of mountain alders in many widely separated localities was severely skeletonized by flea beetles in 1959. Boundary Creek Valley near Greenwood, Beaver Creek Valley near Beaverdell, Jewel Lake, Eholt, and the Granby River Valley were localities in the western part of the District where defoliation was severe. Damage was general in most of the mountain alder growth bordering streams in the Creston area. Altica larvae on alder foliage are shown in Figure 1.

Flea beetles damaged the foliage of cottonwoods along the south shore of Kootenay Lake, and at Camp McKinney. (Figure 2).

A Grand Fir Needle-miner, Recurvaria sp. (undescribed)

Light infestations of needle-miners were discovered in pole-sized grand fir stands near Boswell and West Creston. The larvae, which had overwintered in 1958 needles, continued to mine the 1958 foliage in 1959. Preferred sites were where the foliage of adjacent twigs overlapped, and the mined needles were loosely tied with silk. It was believed that at Boswell, the larvae were almost fully grown on June 15, 1959; adults emerged in the insectary.

A Pine Root Weevil, Hylobius sp.

Mature lodgepole pines that had been infested recently by mountain pine beetles near Mohr Creek had been subjected to repeated attacks by Hylobius sp. The feeding of larvae around the root collar had caused extensive pitch flow and had presumably weakened the trees.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

No extensive infestations of pine needle scale were observed in 1959. A few individual trees and groups of lodgepole pine were infested in the Beaverdell, Kettle Valley, and Grand Forks districts. A predator of scales, Microweisia sp., was common on infested pines near Gable Creek and Jewel Lake.

Douglas-fir Needle-miners, Contarinia spp.

No noteworthy infestations were observed in 1959, although low populations persisted in most Douglas-fir stands.

Poplar and Willow Borer, Sternochetus lapathi (L.)

No change in the status of this pest was detected in 1959. Infested cottonwoods were frequently noted in the Creston and Grand Forks districts, and infested willows were of general occurrence. Sitka alders at an elevation of 5,200 feet near the Cascade Highway, and at 4,700 feet near Rossland, were infested with these borers.

It was observed at Christina Lake that in a stand of cottonwood reproduction which had been heavily infested by borers in 1957 and 1958, those trees which had attained a diameter of four inches or more, suffered less damage than the smaller ones. Many of the weevil tunnels were healed over in 1959 by the increasingly rapid growth of the more vigorous trees.

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

Cicadas were scarce in 1959 and oviposition damage to trees and shrubs was negligible. Adults of Platypedia areolata (Uhl.), the more common species in 1958 in the Grand Forks district, were seldom seen.

Larch Sawfly, Pristiphora erichsonii (Htg.)

A careful search in many of the larch stands of the District failed to produce any evidence of this insect's presence in 1959.

A Woolly Aphid on Western Larch, Adelges oregonensis Annand

The infestation of woolly aphids on western larch between Rock Creek and Camp McKinney was much reduced in 1959.

STATUS OF FOREST DISEASES

Important Diseases

Douglas-fir Needle Cast

Rhabdocline pseudotsugae Syd. caused widespread discoloration of Douglas-fir stands for the second consecutive year. Heavy infections were general between Grand Forks and Greenwood, in the Westkettle River Valley, the Granby River Valley, and near Rossland. Infections were lighter in the eastern part of the District, although foliage discoloration was noted at Sanca Creek and near Rykerts in the Creston Ranger District.

Drought

Damage to several tree species in the Nelson and Creston Ranger districts was attributed to the unusually dry weather in 1958. Symptoms ranged from flagged branches and dieback of the upper crown, to the death of the entire tree. Injury was most prevalent in trees growing on rock outcrops, in shallow soil on rock ledges, and in over-crowded stands. Grand fir was the tree species most severely damaged in the Creston District; individuals and groups of trees up to nine inches d.b.h. had been top-killed or killed outright, but flagged branches were not observed. An engraver beetle, Scolytus ventralis Lec. had attacked the lower bole of some of the top-killed trees.

Tree mortality and varying degrees of injury were noted in Douglas-fir stands along the slopes above the west arm of Kootenay Lake, and in the Kootenay River Valley between Taghum and Brilliant. Douglas firs in the Creston district were not severely damaged, except for a number of mistletoe-infected trees south of Boswell.

Western red cedars in overcrowded stand on upland sites were apparently very susceptible to drought, and mortality was heavy in several localities on the east side of Kootenay Lake. The dead trees ranged from two to six inches d.b.h.

There was a significant absence of drought symptoms in coniferous stands in the valleys of the western part of the District, where the climate is normally drier than in the Columbia and Kootenay River valleys. Presumably the frequent drought conditions in this area have permitted the establishment of only the hardier species such as ponderosa pine, on marginal sites.

Needle Cast of Ponderosa Pine

Severe browning of foliage caused by Elytroderma deformans (Weir) Darker recurred in several localities in the Grand Forks and Kettle Valley districts. One of the heavier infections occurred in a ponderosa pine stand two miles north of Midway; repeated damage had resulted in the death of some of the lower branches. Other localities where needle cast infections occurred were Rock Creek, between Westbridge and Beaverdell, and six miles east of Grand Forks.

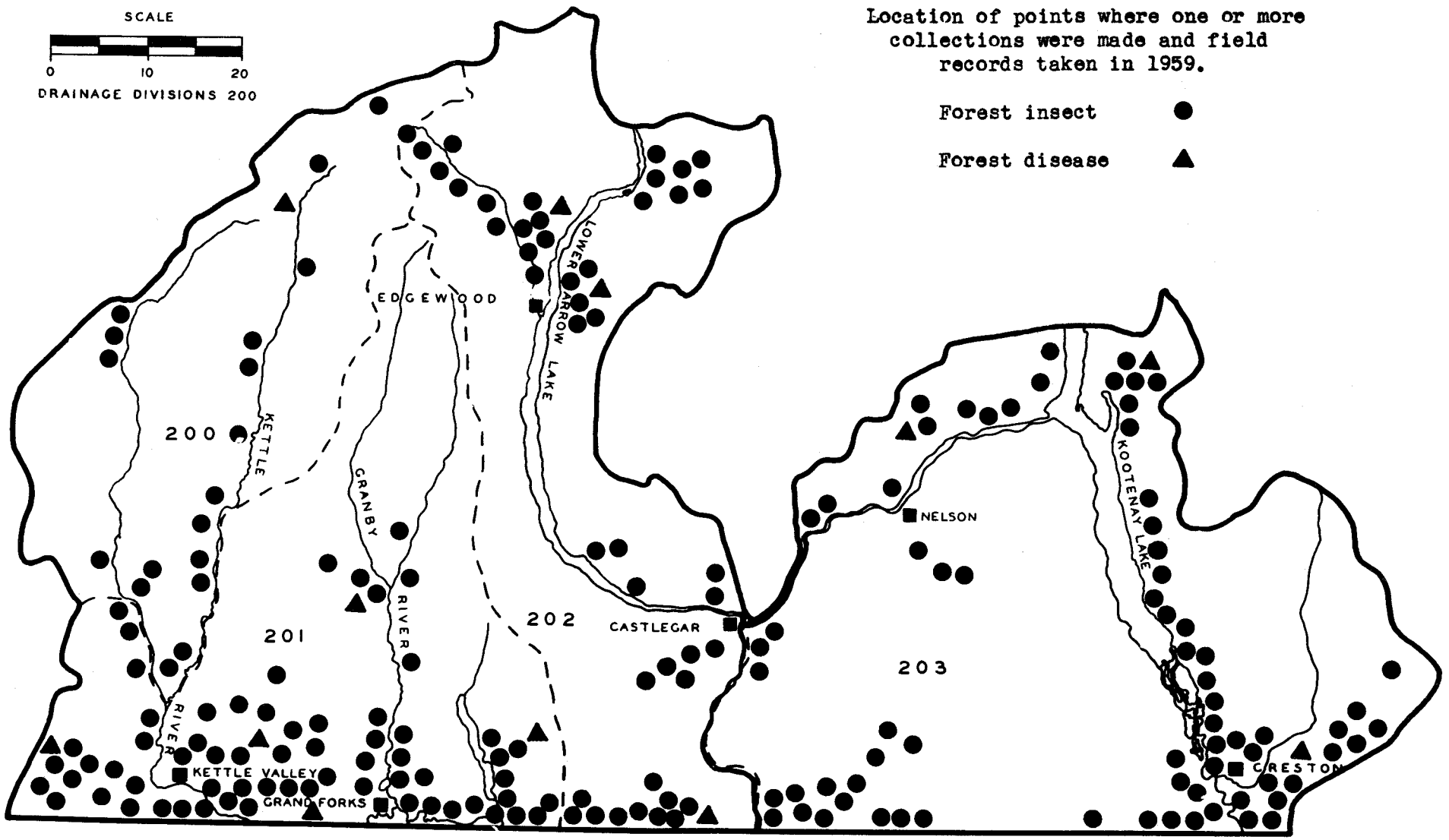
Lodgepole pines over approximately one square mile southwest of Rossland were discoloured by a needle cast disease, but the causal agent was not definitely determined.

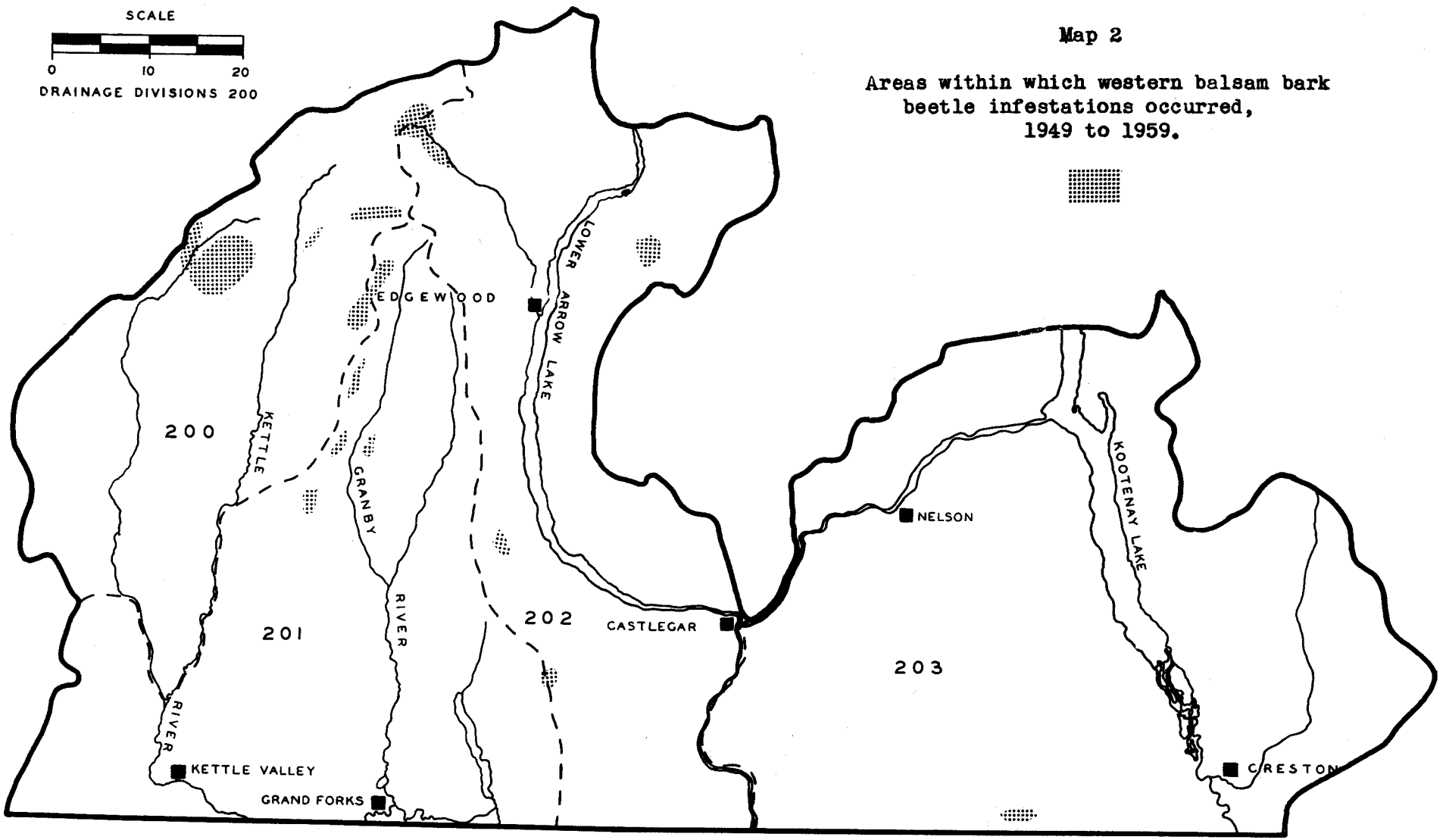
Needle Cast of Western Larch

Infections of Hypodermella laricis Tub. were not as severe as in 1958, in Creston Ranger District. Light infections persisted in Big Sheep Creek Valley and in several larch stands in the Kettle Valley and Edgewood districts.

Dwarf Mistletoe on Western Larch

A new locality record for larch mistletoe, Arceuthobium campylopodum f. larcis Jones was established in 1959, with the discovery of a heavy but apparently local infection in a two-storied stand of western larch near Camp McKinney. This parasite had not been observed previously west of the Greenwood area. Several dwarf mistletoe plants were found on alpine fir near Fife, and a single plant on an understory Engelmann spruce near Edgewood.


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 1959.
Forest insect
Forest disease
EDGEWOOD
LOWER ARROW LAKE
KETTLE
GRANBY
RIVER
KOOTENAY LAKE
200
201
202
203
NELSON
CASTLEGAR
KETTLE VALLEY
GRAND FORKS
CRESTON



Map 2

Areas within which western balsam bark beetle infestations occurred, 1949 to 1959.

Figure 1. Larvae of leaf-eating beetle, Altica sp. on mountain alder. Greenwood, West Nelson District, August 13, 1959.

J. Grant

Figure 2. Larvae of leaf-eating beetle, Altica sp. on black cottonwood. Camp McKinney, West Nelson District, August 5, 1959.

J. Grant

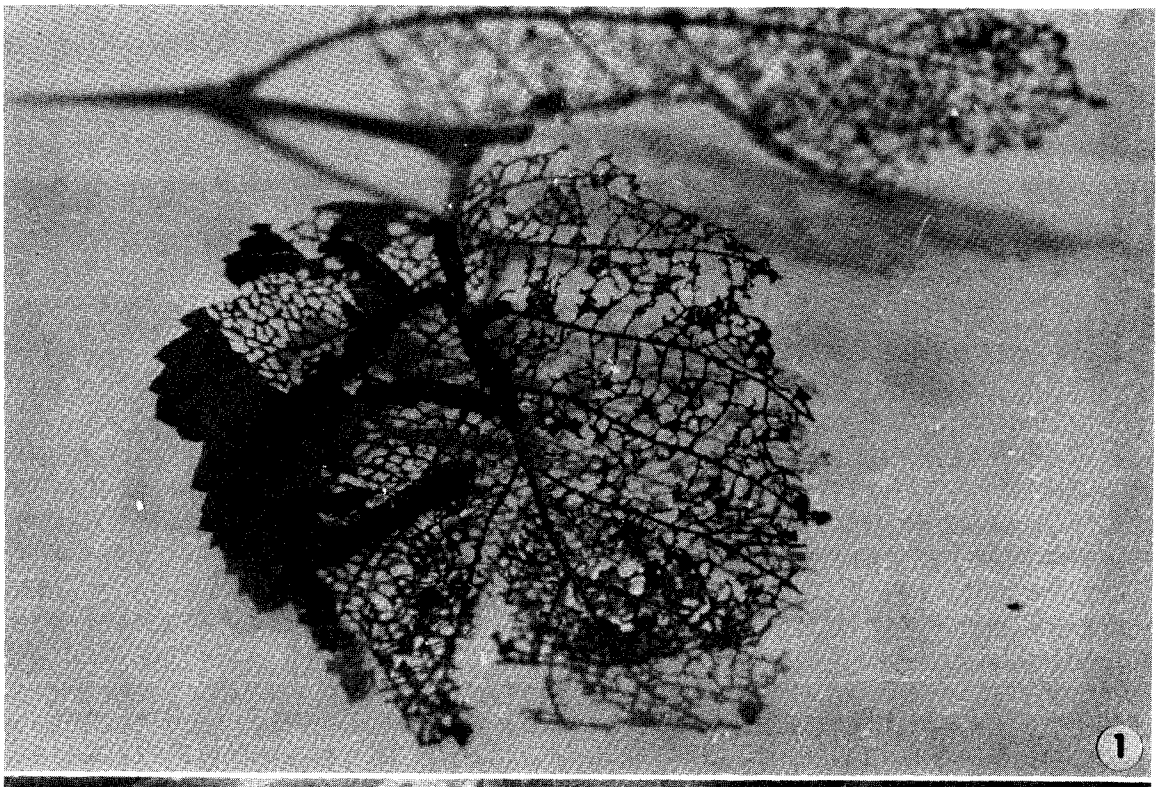

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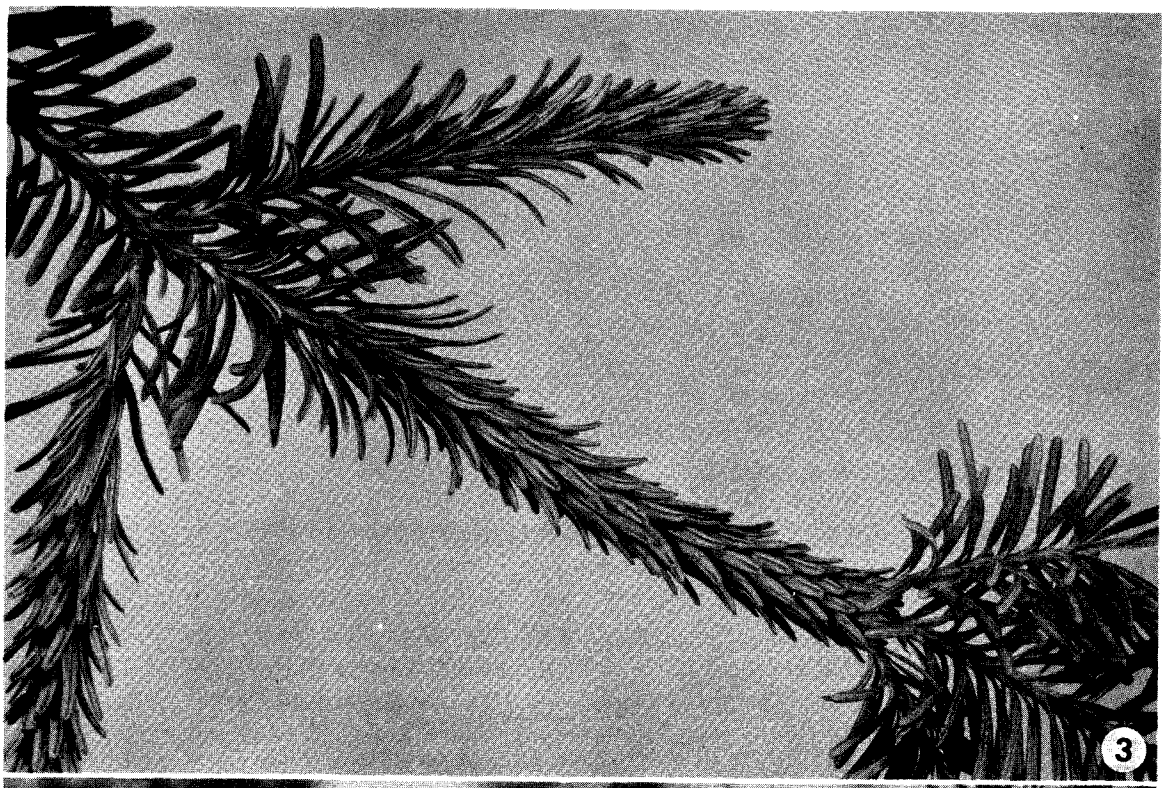
Figure 3. Deformed foliage of alpine fir caused by larvae of cecidomyid. Edgewood, West Nelson District, July 2, 1959.

J. C. Holms.

Figure 4. Female plant of dwarf mistletoe, Arceuthobium campylopodum (Engelm.) on alpine fir. Fife, West Nelson District, August 4, 1959.

J. Grant.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ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

CENTRAL NELSON DISTRICT

1959

FOREST BIOLOGY SURVEY

CENTRAL NELSON DISTRICT

1959

R. O. Wood

INTRODUCTION

Survey work began in the Central Nelson District during the third week of May and continued until the end of September. Five days of this period were spent on cabin maintenance and painting at the New Denver Ranger cabin, and three weeks were occupied in assignments in other ranger districts. Four weeks of October were spent assisting in a Douglas-fir decline study in the Central and West Nelson districts.

Three general reconnaissance flights totalling four hours were made over parts of the Revelstoke, Nakusp, and Slocan ranger districts.

The 312 forest insect and 25 forest disease collections submitted are listed by hosts in Table 1. Location points of these collections are shown on Map 1.

Table 1

Collections by Hosts

Central Nelson District - 1959.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
cedar, western red	12	1	alder spp.	6	1
Douglas fir	60	5	aspen, trembling	4	-
fir, alpine	11	2	birch, western white	10	-
fir, grand	2	-	cottonwood, black	3	2
hemlock, mountain	2	-	maple, Douglas	3	1
hemlock, western	72	7	willow spp.	13	2
larch, western	16	-	miscellaneous	6	2
pine, lodgepole	14	1			
pine, ponderosa	1	-			
pine, western white	47	1			
spruce, Engelmann	29	-			
yew, western	1	-			
			Total	45	8
Total	267	17	Grand total	312	25

STATUS OF INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Infestations of this beetle were prevalent in many parts of the Central Nelson District in white pine and lodgepole pine in 1959. Numerous areas of "red top" pine were apparent, and "spot checks" in some of these areas confirmed the presence of beetles; disease symptoms such as blister rust and root rot were also present at each location where a spot check was made. It was not estimated what percentage of tree mortality was caused primarily by the insects. Table 2 gives the number and general location of "red top" white pine observed from aircraft and from vantage points along the roads. Trees which were attacked in 1959, and which had not turned colour, were not included in this count. Areas of heaviest infestation were on the east and west shores of Upper Arrow Lake, along the Columbia River from Revelstoke to Downie Creek, and in the Slocan Lake area.

On a pathology plot above Silverton, many of the pole-sized white pine were heavily infested with mountain pine beetles in 1959. Only a few "red top" trees resulting from previous years' attack were noticeable in the area.

Table 2

Number of Western White Pine Trees Killed by Mountain Pine Beetles 1956 to 1958 inclusive, as Determined by Aerial Surveys, Central Nelson District - 1959.

Location	Number of trees	Remarks
Boat Encampment	180	mature and overmature
Revelstoke to Downie Creek	715	mature and pole size
Both sides of Upper Arrow Lake (Nakusp to Beaton)	1,620	mature and pole size
Lardeau River (Beaton to Lardo)	325	mature and pole size
Slocan Lake	775	mostly pole size
Total	3,615	

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

One collection of the Engelmann spruce beetle was submitted by a co-operator from Watson Creek on Number 3 Forest Management License, and was the only record for this insect in 1959.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

These beetles were present in small numbers, in scattered Douglas-fir trees, at Lemon Creek, Slocan Lake, and in the vicinity of Lardo.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The aspen leaf-miner epidemic continued throughout the range of trembling aspen in the Central Nelson District in 1959. Table 3 shows the percentage of leaf surfaces mined at four sample plots; the figures are based on examination of three 12-inch branch tips from each plot. The average number of leaves examined at each locality was 180.

Table 3

Percentage of Trembling Aspen Leaf Surfaces Infested by Aspen Leaf-miner at Four Localities in the Central Nelson District, 1959.

Locality	Percentage of leaf surfaces infested
Jordan River	98
8.5 miles south of Revelstoke	95
Winlaw	96
Summit Lake	93

Table 4 gives the percentage of cocoon mortality in 100-cocoon samples at two sample points.

Table 4

Percentage Mortality of Aspen Leaf-miner Cocoons in 100-cocoon Samples at Two Localities in the Central Nelson District, 1959.

Locality	Percentage mortality in cocoon stage	
	Parasitized	Other causes
8.5 miles east of New Denver	1	3
8 miles south of Revelstoke	17	0

A Cottonwood Leaf-miner, Phyllocnistis sp.

Leaves of cottonwoods were mined by this insect in all locations examined. Infestations were much lighter than those of the aspen leaf-miner. No "leaf counts" were undertaken.

A Hemlock Sawfly, Neodiprion sp.

Of the 72 collections made from western hemlock in 1959, 33 per cent contained larvae of this sawfly. A medium infestation occurred along Woodbury Creek road, and on July 31 collections of larvae from standard three-tree samples ranged from 138 to 219. Defoliation of hemlock in this logged area was noticeable but light. A microscopic examination of 100 larvae showed that two per cent were parasitized by a tachinid. Neodiprion larvae were present in other widely scattered areas, in light infestations. Table 5 gives the sample points where the insect was present, 50 or more per collection.

Table 5

Locations where Larvae of a Hemlock Sawfly Numbered 50 or More per Collection, Central Nelson District, 1959.

Locality	Date	No. of larvae per three-tree sample
Mile 94, Big Bend	July 14	99
Mile 86, Big Bend	July 15	74
Mile 68, Big Bend	July 15	90
Revelstoke National Park	July 16	65
Caribou Lake (north of Arrowpark)	July 3	145
Wilson Creek (Roseberry)	Aug. 6	51
Mile 15, Keen Creek Road	July 29	58
Woodbury Creek	July 31	138 to 219

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Populations of this insect were very light in 1959, but were spread over a large area. The highest number of larvae per three-tree sample was at Keen Creek, where seven ultimate-instar larvae were collected from western hemlock on July 29. Small numbers of loopers were taken from spruce and hemlock along the Big Bend highway as far north as Mile 86, whereas in 1958 no larvae were collected north of Revelstoke.

Black-headed Budworm, Acleris variana (Fern.)

Foliage damage caused by Acleris variana was not noticeable in 1959, and only six larvae were collected during the field season. Hosts for this insect were Douglas fir and alpine fir.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Only two spruce budworm larvae were collected: one from western hemlock at Shelter Bay, and one from white pine at Kaslo.

False Hemlock Looper, Nepytia canosaria Wlk.?

Hosts for this insect were alpine fir, Douglas fir, and western hemlock; four samples contained a total of five larvae. Three larvae were found in their early instars in June at Box Lake, south-east of Nakusp, and at Cranberry Creek and Beaton in the Upper Arrow Lake area.

A Douglas-fir Cone Moth, Barbara colfaxiana Kearf., and a Cone Pyralid, Dioryctria abietivorella (Grote)

The 1959 cone crop on Douglas fir in the Central Nelson District was medium over most of the sampled areas, but was heavy in the southern part of the District, particularly in the vicinity of Brilliant. Samples consisting of 50 Douglas-fir cones each were from two to 58 per cent infested by Barbara colfaxiana and Dioryctria abietivorella. Table 6 gives the locality and percentage of infestation of each sample. Douglas-fir cones at Brilliant contained larvae of an undetermined insect. One 50-cone sample from eight miles south of Revelstoke was 80 per cent infested by Barbara colfaxiana Kearf., as determined by Mr. A. Hedlin.

By August 4, the majority of B. colfaxiana Kearf., at New Denver had pupated.

Table 6

Percentage of Douglas-fir Cones (50 per Sample) Infested by Cone Borers at Five Localities in the Central Nelson District, 1959.

Date	Locality	Percentage uninfested cones	Percentage of cones infested by		
			Undetermined insect	Dioryctria abietivorella	Barbara colfaxiana
July 10	Lemon Creek	77	-	-	23
July 28	Lardo	56	10	32	2
Aug. 4	New Denver	42	-	4	54
Aug. 13	Beaton	98	2	-	-
Aug. 14	Johnson's Landing (Kootenay L.)	96	-	2	2

Cecidomyidae Infesting Cedar Cones

The cone crop on western red cedar in the Central Nelson District was very heavy in some areas, while in others it was non-existent, in 1959. Four 50-cone samples taken from some of the heavy crop areas disclosed a heavy infestation of midge larvae. On an average, infested cones contained three larvae per cone, but some had as many as seven. Table 7 gives the sample points and degree of infestation by this insect.

Table 7

Percentage of Western Red Cedar Cones (50 cone samples) Infested by a Cecidomyid Larva at Three Localities, Central Nelson District, 1959.

Date	Locality	Percentage of cones infested
Aug. 13	Trout Lake	84
Aug. 21	New Denver	62
Aug. 27	St. Leon	88

Cecidomyidae Infesting Western Hemlock Cones.

A few western hemlock cones examined at St. Leon on August 27 contained larvae of Cecidomyidae.

Western Tent Caterpillar, Malacosoma pluviale Dyar

Several ultimate-instar larvae were found feeding singly on alder near Sandon on June 22. No tents were observed.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

On June 25, a few colonies of forest tent caterpillars were observed on mountain alder at Marblehead, eight miles north of Lardo. At a later visit to the area, the larvae had disappeared, and no cocoons, adults or egg masses were found.

A Leaf Blotch-miner, Lyonetia sp.

Birch and willow leaves were attacked in varying degrees in many areas of the District by this insect. The heaviest infestations were near Ainsworth and at Crescent Valley.

Pine Sawyer Beetle, Monochamus oregonensis Lec.

On July 21, at Greenslide, south of Revelstoke, 30 adults of this species were observed on the exposed surfaces of a deck of 25 white pine logs. Numerous adults were in flight at this location. Some larvae were collected from standing white pine at Trout Lake.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Adults and larvae of this weevil were collected at several points in the Central Nelson District in 1959. A light infestation occurred at Summit Lake, southeast of Nakusp: other areas where the insect was present were, Koch Creek on Number 3 Forest Management License, Carpenter Creek near New Denver, and south of Revelstoke at Sidmouth. Willow was the only host recorded.

Ambrosia Beetles, Trypodendron lineatum (L.), Gnathotrichus retusus Lec., and Trypodendron retusum (L.)

Several adults of Trypodendron lineatum (L.) and Gnathotrichus retusus Lec. were collected from birch trees along the Koch Creek road on June 10. The host trees had all been damaged by road building equipment; no beetles were found in healthy trees. On June 5, Trypodendron retusum (L.) adults were collected from trembling aspen at Jordan River. Affected trees were living, but were in an unhealthy state.

Pine Root Weevil, Hylobius sp.

A few sapling and immature white pine at Kuskanax Creek, north of Nakusp, were attacked by this root weevil. Some trees which had evidence of old attacks were still living, while othere were dead. The weevil was probably the cause of some of the white pine mortality, since as many as six larvae were taken from around the root collar of a single tree two inches d.b.h. The larvae,collected on June 24, were in the ultimate instar.

Western Red Cedar Bark Beetle, Phloeosinus punctatus Lec.

Adults and larvae of this species were found in a standing western red cedar west of Slocan on August 19. The host tree was 15 inches d.b.h., and had complete reddening of foliage, probably caused by the heavy infestation of beetles. Other adults were found in cedar-pole slash at Silverton Creek.

A Weevil in Western Red Cedar, Hexarthrum sp.

Adults and larvae of a small weevil were collected from old growth western red cedar at a shingle-mill site southwest of Revelstoke on July 17. Specimens submitted to the Entomological Research Institute at Ottawa, were identified as a species of Hexarthrum. The insect was found only in

the heartwood, and in the upper third of the tree; the damage resembled that caused by powder post beetles. The weevil has been active in some locations along the Big Bend highway, and evidence of its activity was observed at a small shingle mill at Mile 46, although only dead adults were found. Figure 1 shows damage caused by Hexarthrum sp. in a log of old growth western red cedar near Revelstoke. Figure 2 shows a shingle sawn from a tree attacked by these weevils.

STATUS OF FOREST DISEASES

Important Diseases

Brown Stringy Trunk Rot

Western hemlock along the Illecillewaet River were infected by Echinodontium tinctorium, Ellis & Everh. and numerous fruiting bodies were observed. Other areas where the disease was present, also on western hemlock, were Mile 11, Big Bend highway, Shelter Bay on the Upper Arrow Lake, and at Fosthall Creek north of Arrowpark.

Red Ring Rot in Western Hemlock

Fruiting bodies of Fomes pini (Thore ex Fr.) Karst were noted on western hemlock along the Illecillewaet River, Mile 11 Big Bend, and at Greenslide, south of Revelstoke.

Shoestring Root Rot

A root rot caused by Armillaria mellea (Vahl ex Fr.) Quél. was quite common on most species of coniferous trees at Trout Lake, Nakusp and New Denver. Many of the host trees had been attacked by bark beetles, and most of these attacked trees were dead. The trees infected with root rot were noticed during a Douglas-fir decline survey in the areas mentioned.

Yellow Laminated Root Rot of Douglas Fir

A small stand of Douglas fir at Carpenter Creek, east of New Denver, had evidence of yellow laminated root rot caused by Poria weirii Murr.; several trees with an average d.b.h. of about 10 inches had blown down. The spread of infection appeared to have subsided, and surrounding trees were apparently healthy.

Larch Needle Cast

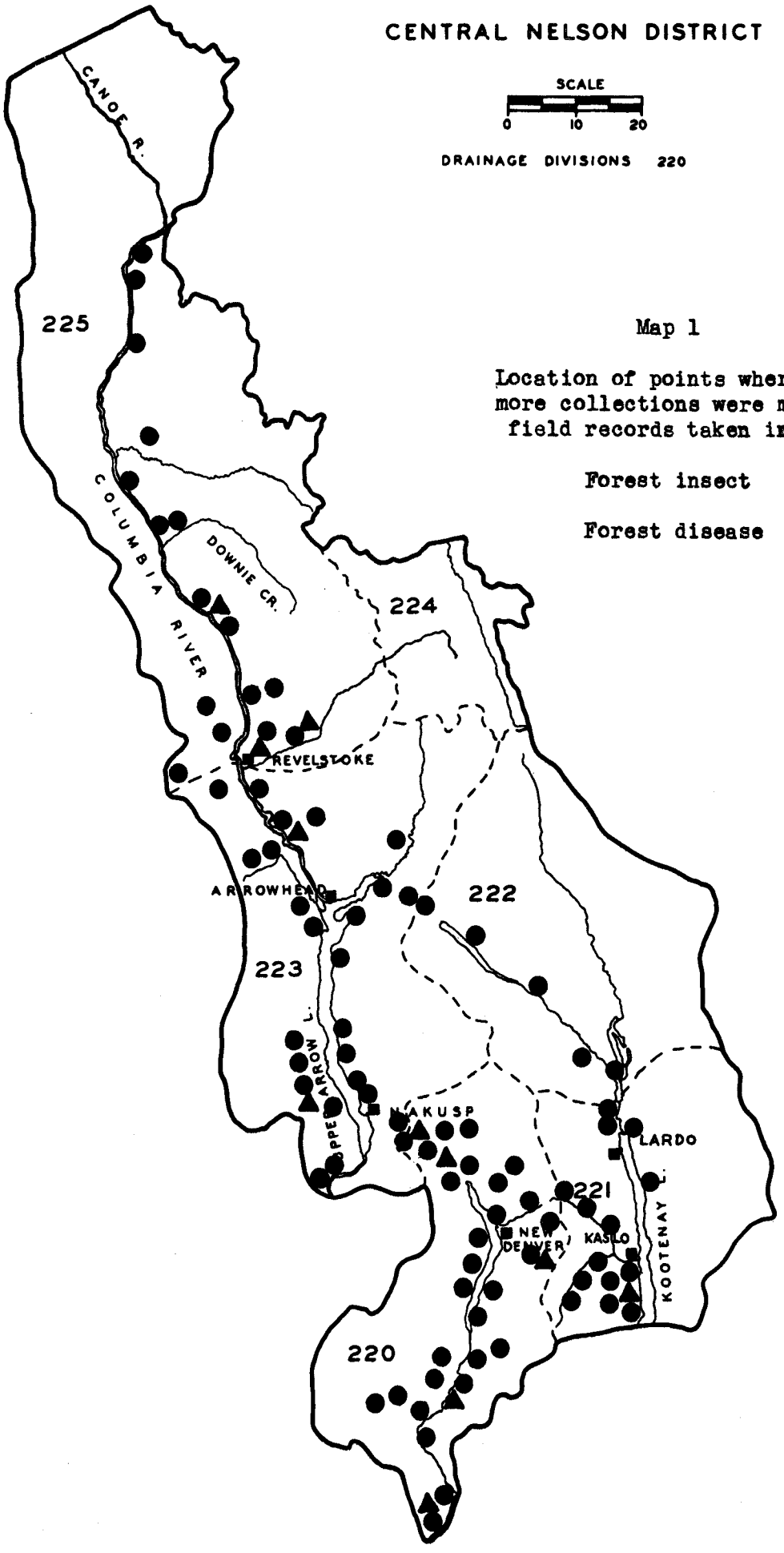
Hypodermella laricis Tub. infection was evident in varying intensity throughout most of the range of western larch in the Central Nelson District in 1959. Areas of heaviest infection were between New Denver and Kaslo, and north of Kaslo to Lardo. Infections of medium severity occurred along Koch Creek on Number 3 Forest Management License.

Drought

Flagging and, in some cases, complete reddening of foliage on western red cedar was noted in many areas in the Central Nelson District in 1959. This condition was most noticeable around Slocan Lake. In early August, one small tree was uprooted near Slocan, and a microscopic study of the roots showed a drying and shrivelling of the root tips. This condition may have been caused by the drought of 1958.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Douglas fir	Melampsora albertensis Arth.	Mackinson Flats (Upper Arrow Lake)	A leaf rust occurring on several poplars, most common on aspen. Alternate host is Douglas fir.
Cottonwood, black	Taphrina populi-salicis Mix	Ainsworth	A leaf disease causing leaf blisters and curl.
Hemlock, western	Caliciopsis sp.	Box Lake (Nakusp)	Twig and branch canker



Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲

Figure 1. Damage caused by a weevil, Hexarthrum sp., in log of old growth western red cedar, Revelstoke, Central Nelson District, July 1959. J. C. Holms.

Figure 2. Damage to sawn shingle caused by Hexarthrum sp. in old growth western red cedar, Revelstoke, Central Nelson District, July 1959. J. C. Holms.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

EAST NELSON DISTRICT

1959

FOREST BIOLOGY SURVEY

EAST NELSON DISTRICT

1959

R. J. Andrews

INTRODUCTION

Survey work in the East Nelson District started on May 29 and continued to September 20. Four hours of flying time contracted by the Vernon Laboratory were used in general reconnaissance flights and two hours contracted by the B. C. Forest Service, were used for survey of mountain pine beetle depredations in the Invermere Ranger District.

Totals of 360 forest insect and 13 forest disease collections were taken in the District by Forest Biology rangers and co-operators. Table 1 shows the forest insect and forest disease collections by hosts. Distribution of the collections is shown on Map 1.

Table 1

Collections by Hosts

East Nelson District, 1959.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
cedar, western red	1	-	alder spp.	9	-
Douglas fir	82	2	aspen, trembling	14	2
fir, alpine	20	4	birch spp.	9	-
hemlock, western	15	-	cherry, choke	5	-
juniper, common	4	-	cottonwood, black	3	-
juniper, Rocky Mountain	14	-	willow spp.	12	-
larch, eastern	2	2	miscellaneous	8	-
larch, western	27	-			
pine, lodgepole	52	1			
pine, ponderosa	36	-			
pine, western white	2	-			
spruce, Engelmann	44	2			
yew, western	1	-			
			Total	60	2
Total	300	11	Grand Total	360	13

STATUS OF INSECTS

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Two areas, heavily infested in 1958, were re-examined in July 1959. The inspection of the stand at Bighorn Creek revealed a negligible population. At Grave Creek the resumption of logging operations has alleviated the bark beetle danger in this area.

At Forster Creek, a block of timber, estimated at 400,000 f.b.m., situated between two logged-off areas suffered 25 per cent damage. In September an inspection of the trees and root collars for over-wintering beetles revealed a light population.

An examination of the timber at the headwaters of Coal Creek, made at the request of the Crowsnest Coal Company, revealed that Engelmann spruce beetles had caused light losses in this area in the past four years. However, current attack was found to be negligible. Early salvaging of the beetle-killed trees was recommended.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

As in 1958, losses of lodgepole pine in the Invermere Ranger District were light.

Two infestations in Canal Flats Ranger District were discovered during an aerial survey. At the junction of Coyote Creek and Lussier River an estimated 30 per cent of mature lodgepole pine on 100 acres had been infested in 1958. Near the junction of Elk Creek and White River an estimated 20 acres were infested.

Other areas of beetle-killed lodgepole pine observed by aerial survey were Tepee Creek where 200 "red top" trees were counted, and Couldrey Creek in the Flathead River Valley where there were 25 "red top" pines.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Populations of the Douglas-fir beetle appeared to be increasing although losses continued to be light. Small groups of "red tops" were noted in four localities. At Horsethief Creek and at Roosville, logging operations in the vicinity were the probable cause of the population increase. However near Diorite Creek and in the Wigwam River Valley small patches of undisturbed trees were attacked by the Douglas-fir beetle.

Engraver Beetles, Ips spp.

Sixteen per cent of the ponderosa pine in a stand near Skookumchuck were windthrown. Eighty-four per cent of the downed trees were infested with Ips plastographus Lec. and Ips probably oregoni (Eich.). Diameters

of trees in the open-growing stand range from eight to 20 inches. No salvage operations of the windthrown and infested timber have been carried out, and the danger of attack to the standing trees has been increased.

Two groups of dead ponderosa pine were observed in the Elko Ranger District. Near Edwards Lake 12 trees were attacked by Ips probably oregoni (Eich.) and 111 dead trees were counted two miles east of Baynes Lake. The diameters of the trees ranged from three to six inches.

A Cecidomyid Infesting Ponderosa Pine Twigs

A survey of damage to ponderosa pine caused by this midge showed a near epidemic increase in East Cranbrook, Canal Flats and Elko Ranger districts. The heavy flagging resulting from the death of infested branch tips was consistent in these four localities. Examination of the tips revealed a population of from four to 20 insects in the branch terminals. The length of dead or infested tips ranged from two to four inches. Some ponderosa pine in these localities had multiple tops and gnarled branches, presumably from repeated cecidomyid attacks.

All of the most heavily infested stands had several features in common. In all cases, they were open-growing, and bordered the Kootenay River; ground cover consisted mostly of antelope bush Purshia tridentata DC. The strip at Wardner went through several close-growing groups of ponderosa pine, where it was noted that the midge infestation was much lighter than in the open stands. A possible conclusion is that stand density, site, and soil composition are important factors affecting midge population.

Centres of high populations were at Ta Ta Creek, three miles south of Springbrook, Wardner, and five miles west of Baynes Lake. Strips one half mile long by one chain wide were run in these locations to determine the percentage of trees infested. Plots were established within the strips and sample trees were divided into three classes: one to three inches d.b.h., three to five inches d.b.h., and five inches and over. One branch sample was taken from each cardinal point from fifteen trees in each plot and the total number of tips and the number of infested tips were counted.

The number of infested trees in strips run in four localities is shown in Table 2. The midge's preference for small trees and the high percentage of trees attacked are the outstanding features of the infestation.

Table 3 shows the number of infested terminals on trees in three diameter classes at four localities as well as the heavy incidence of attack on the smaller trees. A continued high population may be expected in 1960.

Table 2

Number of Ponderosa Pine Trees in Each of Five Diameter Classes and Percentage of Stems Infested on Strips (40 x 1 Chain) in Four Localities East Nelson District, May, 1959.

	Ta Ta Creek		Springbrook		Baynes Lake		Wardner	
D.B.H. inches	No. of trees on strip	Percentage infested	No. of trees on strip	Percentage infested	No. of trees on strip	Percentage infested	No. of trees on strip	Percentage infested
2-4	186	93.5	120	91.8	51	96.1	46	71.7
5-7	47	74.4	29	75.8	53	95	66	57.5
8-10	20	30	26	3.8	33	81.8	39	53.8
11-13	10	0	16	0	6	0	7	0
14-16	12	0	5	0	4	0	5	0
Total percentage infested		81.8		71.5		85.7		60.1

Table 3

Number of Ponderosa Pine Terminals Examined and Percentage Infested by a Midge in Samples from 15 Trees in Three Diameter Classes at Four Localities, East Nelson District, 1959.

Locality	1 to 3 inches D.B.H.		3 to 5 inches		5 inches and over	
	No. of terminals examined	Percentage infested	No. of terminals examined	Percentage infested	No. of terminals examined	Percentage infested
Ta Ta Creek	155	84	376	64	424	7
Springbrook	187	88	475	69	374	8
Wardner	114	54	187	25	464	6
Baynes Lake	165	56	263	44	386	12

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

The plots established in 1958 at Hawkins Creek and Michel Creek were re-examined in 1959. A decline in attack was evident in both localities although the marked difference was at Hawkins Creek, where the incidence of attacks dropped from 34 per cent in 1958 to 12 per cent in 1959. The corresponding figures for Michel Creek were 45.4 per cent and 42 per cent. An outstanding feature of the current year's depredations was the absence of lateral attack.

Table 4 shows the number of Engelmann spruce trees infested by the Engelmann spruce weevil in the two plots, and the distribution of attack within the sample trees.

Table 4

Number of Engelmann Spruce Trees Showing no Signs of Attack by Engelmann Spruce Weevil, 1959 Attack Only, Old Attack Only, and Distribution of New Attack in Terminal and Laterals of 100 Trees on Each of Two Plots, East Nelson District, 1959.

Locality	Number of stems			Number of new attacks	
	Not attacked	*1959 attack only	1958 and old attack	*On terminals	On laterals
Hawkins Creek	32	12	68	13	1
Michel Creek	31	42	69	52	0

* The variance of figures in "terminal attack" and "1959 attack only" is due to multi-terminal growth on some trees.

A Pine Tube Moth, Argyrotaenia pinatubana Kft.

During 1959 there was a marked decline in the damage caused by this lodgepole pine needle miner in the infestation between Kimberley Airport and Canal Flats.

In sampling for damage appraisal, five 10-inch branch samples were taken from five trees in each locality. Table 5 shows a comparison of the number of tubes on branch samples in three plots, in 1958 and 1959. A population decline is indicated at each of the localities.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

A light to medium population of the forest tent caterpillar was observed seven miles north of Nicholson. Light defoliation was apparent in July. A count of colonies on aspen trees bordering the road revealed an average of 27 colonies per mile. The highest number of colonies in a four-mile strip was 60. This area is the site of a previous infestation of the forest tent caterpillar which collapsed in 1954.

Table 5

Comparison of the Number of Tubes Made by Larvae of a Pine Tube Moth on Branch Samples from Lodgepole Pine in Three Plots, East Nelson District, 1958 and 1959.

No. of Tubes	11 Mi. N. of Springbrook		Kimberley Airport		Premiere Lake Road	
	1958	1959	1958	1959	1958	1959
Total on five branches	101	66	171	36	79	25
Per branch	20.1	13.1	34.1	7.1	15.8	5

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

In the area immediately adjacent to the forest tent caterpillar infestation at Nicholson, heavy defoliation by the large aspen tortrix was prevalent. The centre of intensity was two miles north of Nicholson. Estimated defoliation ranged from 25 to 35 per cent.

Western Tent Caterpillar, Malacosoma pluviale Dyar

A decline of population was evident on a roadside strip and plot at two locations in the East Nelson District. The number of tents was counted on a strip 40 chains long by one chain wide, near Fort Steele Junction and on a one-acre plot one mile south of Elko. The examination of the Fort Steele area has been carried out since 1957 and the one-acre plot was established in 1958.

A total of 225 tents was counted at the Fort Steele Junction in 1959, a decline of 360 tents from the previous year. In 1958 612 tents were counted at the Elko plot, while this year's examination revealed a total collapse of the population. The hosts in both areas were antelope bush, Purshia tridentata DC.; wild rose, Rosa sp. and saskatoon, Amelanchier sp.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Large populations of pine needle scale were evident in 1959 near Bull River and Yahk. Discoloured lodgepole pines were noted from the air in the Bull River area. An examination of two "patches" of approximagely 10 acres revealed a heavy population of scale on pine averaging seven inches in diameter.

At Yahk, seven miles of roadside lodgepole pines were severely infested. In many cases 95 per cent of the old foliage has dropped. The pines in this area appeared generally to be in poor condition resulting from repeated attacks of the scale. In each of these localities a predator of the scale insect, Chilocorus tricyclus Smith was abundant.

Elsewhere in the District, populations have decreased on Douglas fir and lodgepole pine.

Douglas-fir Cone Borer, Barbara colfaxiana Kft.

The cone crop on Douglas fir suffered considerable damage from mining activities by the larvae of this olethreutid. Twenty cones from each of five trees were examined in five localities. The percentages infested were as follows: Skookumchuck, 65; Dutch Creek, 51; Elko, 55; Waldo, 75; and St. Mary Lake, 44.

A Poplar Leaf Blotch Miner, Lithocolletis sp.

An examination of aspen leaves from the infestation south of Wasa Lake revealed a sharp decline of population. Of 301 leaves counted, seven per cent were infested.

A Birch Leaf Blotch Miner, Lyonetia sp.

The heavy infestation on birch from Bush River to Cumming River continued unabated. From 90 to 100 per cent of the birch leaves were turning brown and dropping by the last week in July.

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

Leaf-eating chrysomelids were unusually abundant in 1959. Severe skeletonizing of mountain alder by Altica sp. at Estella Mine Road, Canuck Creek, and Wildhorse Creek was outstanding.

In May large populations of Galerucella sp. adults were feeding on trembling aspen from Kimberley north to Nicholson. Later, in August and September, severe browning of willow foliage was common throughout the District.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The heavy infestation along the Big Bend Highway from Donald Station to Kinbasket Lake continued in 1959. Elsewhere in the District populations remained at a low level.

A Spruce Needle Miner, Recurvaria sp.

A heavy population of this miner persists in six Engelmann spruce trees at Wasa Lake bridge.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Six Engelmann spruce trees at Wasa Lake bridge were again heavily

attacked. One tree, six inches in diameter, has been 80 per cent defoliated.

This recurrent infestation was first reported in 1954.

A Needle Mining Xyelid

Four miles south of Waldo and near Skookumchuck, bulb-shaped needle fascicles were noted on the current year's growth of ponderosa pine. These deformities were caused by Xyelid larvae burrowing in the centre of the needle clusters. The average current year's lateral growth on these sites is from two to four inches long and contains approximately 38 fascicles. An average of three fascicles per branch tip was infested at both localities.

This is the first record of attack by this xyelid in Forest Insect Survey Reports.

Ugly-nest Caterpillar, Archips cerasivoranus (Fitch)

Western chokecherry bushes at Ta Ta Creek and Fairmont were again lightly infested with this tortricid. At Elko a medium population on four bushes caused 25 per cent defoliation.

Poplar and Willow Borer, Sternochetus lapathi (L.)

This curculionid was common throughout the District on willows.

Larch Shoot Borer, Argyresthia laricella Kft.

Small numbers of western larch shoots infested with this species have been found in three localities: Findlay Creek Road, Estella Mine Road, and the Canuck Creek area. All collections were taken above the 3,000 foot elevation level.

Spotless Fall Webworm, Hyphantria cunea Drury.

A total of 21 tents on western chokecherry was counted along a half mile roadside strip near the Bull River Power Plant.

A trace of this insect was also found near Elko with a count of three tents in a half mile strip.

False Hemlock Looper, Nepytia canosaria Wlk.?

Random beating samples, at the site of the 1948 infestation near Invermere, yielded from five to 10 larvae. In all collections the host was Douglas fir. While these numbers do not denote a dangerous population,

a marked increase from previous years' collections was noted.

Jack Pine Needle Miner, Zelleria haimbachi Busck

Near Wardner an examination of random terminals of ponderosa pines ranging in diameter from two to 10 inches was undertaken. Of a total of 158 terminals inspected, 40 per cent were infested by this species.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Four locations where thid defoliator occurred in small numbers were: Moyie River, Bull River, St. Mary Lake, and Lumberton. Collections at these locations ranged from one to 10 larvae per three-tree beating sample, an increase over last year's figures. While Engelmann spruce was the preferred host, larvae were found also on alpine fir and western hemlock.

STATUS OF FOREST DISEASES

Important Diseases

Needle Blight of Douglas Fir, Rhabdocline pseudotsugae Syd.

The heavy recurrent infection by this disease on regeneration and immature Douglas fir continued in East Cranbrook, Canal Flats, Invermere , and Spillimacheen ranger districts.

Drought

In all stands of alpine fir, varying degrees of damage to terminal growth was prevalent. It was noted in some areas that both 1958 and 1959 growth had turned red. The cause of this condition was believed to be the abnormally dry weather conditions during 1958.

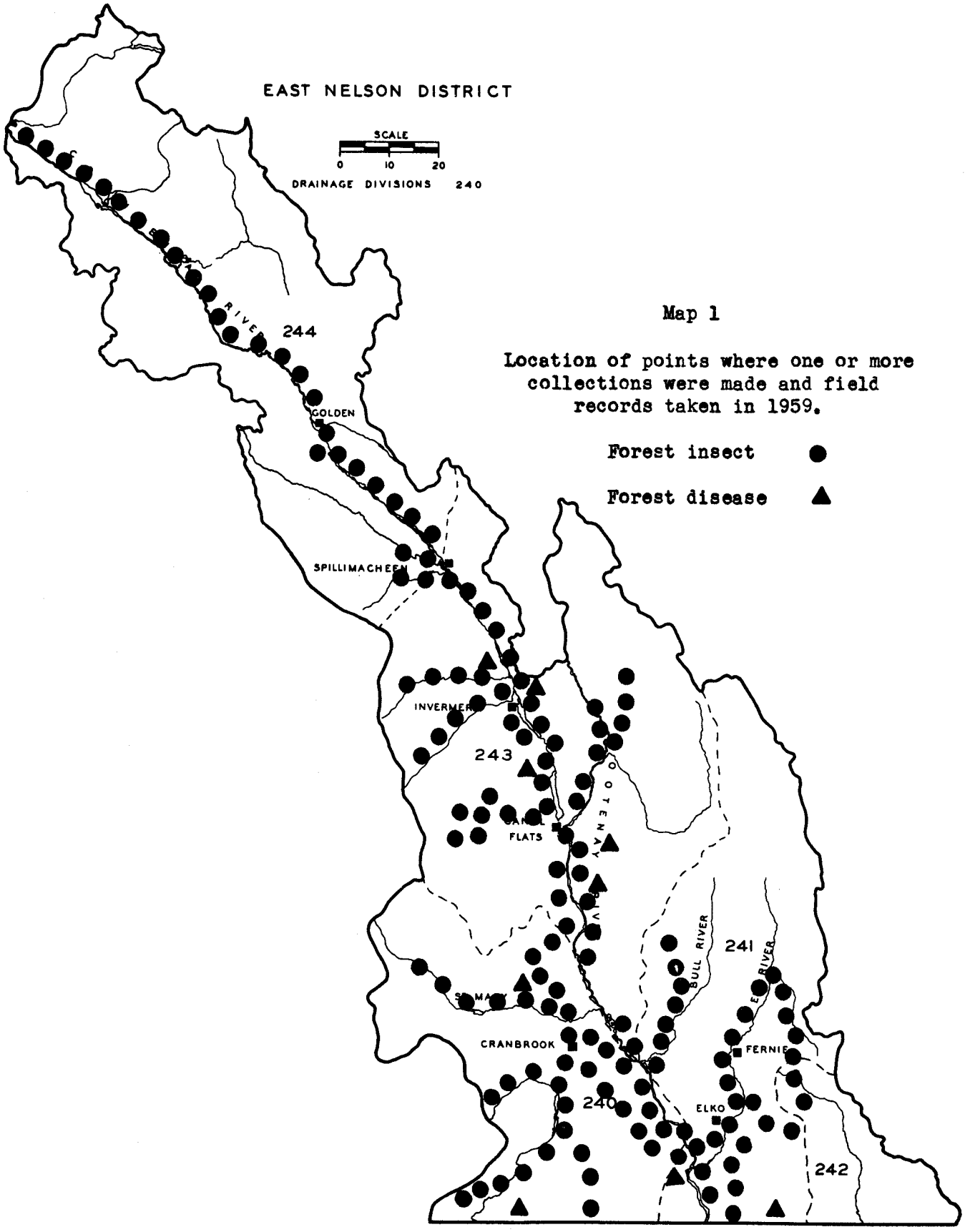
A Dieback of Douglas Fir

An inspection of plots established in 1958 disclosed a very little new infection. The development of established infection persisted. In many cases the progressive dying back of branches stopped at the main stem.

Exotic Plantations

An inspection of the exotic plantations in the District showed high mortality from drought. Five plots at lower elevations in the District have been completely killed by this climatic condition. Table 6 lists the plots by numbers and percentage mortality as found in 1959.

Number	Location	Tree species	Mortality per cent
XP - 136	Cranbrook	European larch	100
XP - 137	Cranbrook	Scots pine	90
XP - 138	Cranbrook	Scots pine	100
XP - 139	Cranbrook	European larch	0 - 5
XP - 140	Cranbrook	Scots pine	100
XP - 141	Cranbrook	Scots pine	100
XP - 142	Cranbrook	European larch	0 - 5
XP - 143	Cranbrook	Scots pine	0 - 3

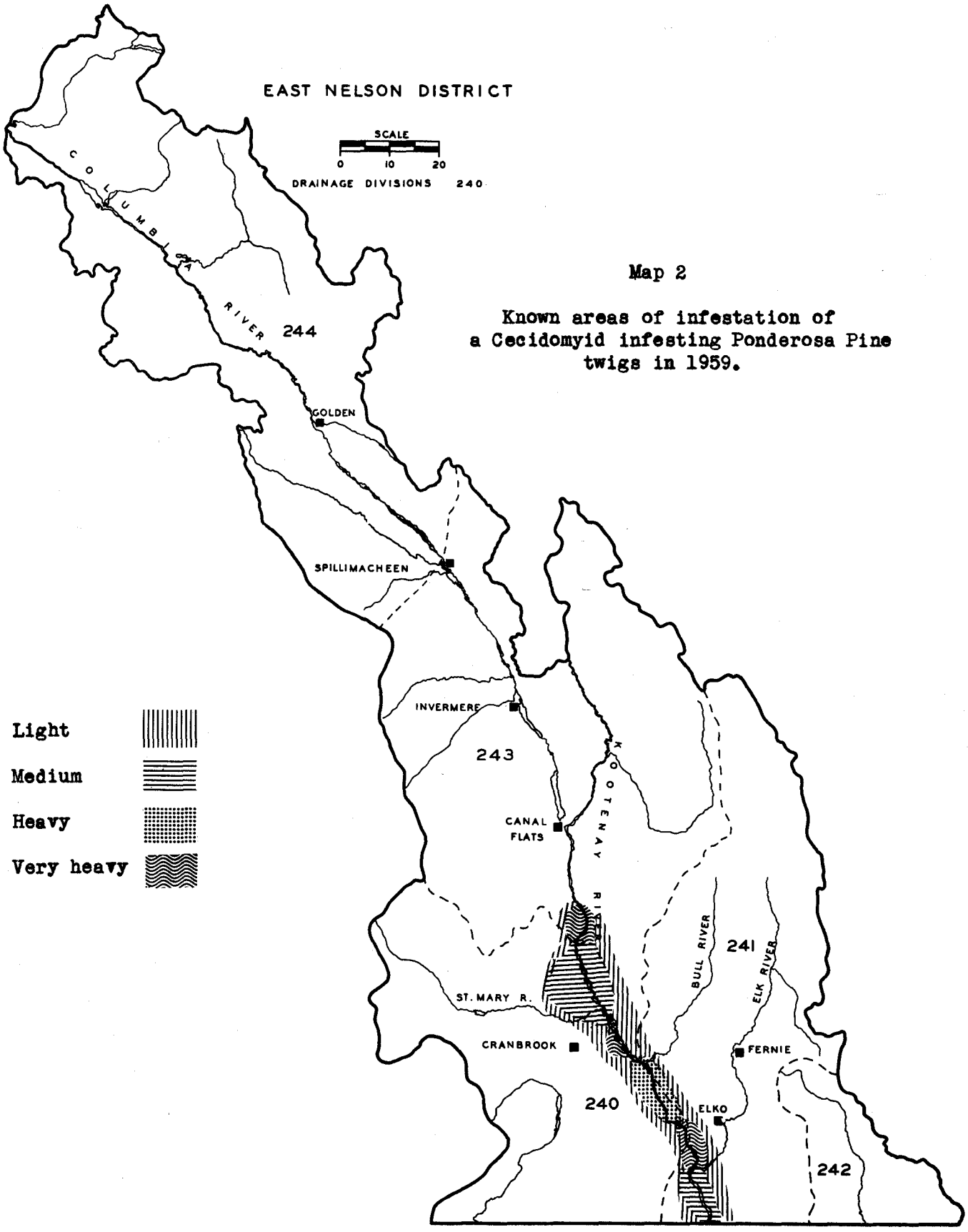


Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲



Map 2

Known areas of infestation of a Cecidomyid infesting Ponderosa Pine twigs in 1959.

ANNUAL REPORT OF FOREST BIOLOGY RANGERS

BRITISH COLUMBIA

1959

PRINCE GEORGE FOREST DISTRICT

FOREST BIOLOGY SURVEY

PRINCE GEORGE FOREST DISTRICT

1959

D. W. Taylor

INTRODUCTION

The Prince George Forest Biology Ranger districts were surveyed in 1959 by four rangers. The Yukon and North Prince George districts were covered by J. Y. Obana and T. A. D. Woods, and the West and South Prince George districts by E. V. Morris and D. W. Taylor respectively. In each of the northern areas a truck and trailer was used; in the west and south districts cabins served as headquarters.

Access to lake areas was gained by the use of a dinghy and outboard motor. Rangers E. V. Morris and D. W. Taylor co-operated on a 400-mile boat trip. As in previous years the primary insect pest was the two-year-cycle budworm. Sampling in the Takla and Trembleur Lake districts revealed a notable spread, northward and southward, of this defoliator. A slight increase in both area and intensity was recorded in the Fraser and Willow River valleys of South Prince George. Increased activity was noted in the Lower Liard River Valley, in an area where the one-year-cycle spruce budworm was well established.

The forest tent caterpillar infestation remained severe within its original boundaries near McBride, while another aspen defoliator, an unidentified tortricid, expanded its infestation from the McBride area northwest to Penny, within the confines of the Fraser River Valley.

No increase in the mountain pine beetle was evident but a gradual shift of population southward was apparent at Takla Lake. Little information was gathered, in 1959, on the Douglas-fir beetle. Due to prevailing low temperatures throughout much of the season, very little foliage colour change took place on trees attacked in 1959.

An intensive study of the Oregon fir sawyer, Monochamus oregonensis Lec. was carried out in the West Prince George District fire-killed areas.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

SOUTH PRINCE GEORGE DISTRICT

1959

FOREST BIOLOGY SURVEY

SOUTH PRINCE GEORGE DISTRICT

1959

D. W. Taylor

INTRODUCTION

Sampling for the 1959 survey was begun on May 28 and finished on August 31. In September an investigation of wood-borer damage in fire-killed timber was carried out north of Prince George. A trip to McBride was made in October to collect egg masses of the forest tent caterpillar. An eight-day boat trip was made in early August with Ranger E. V. Morris, in the West Prince George District to survey the Stuart Lake - Takla Lake chain.

A total of 279 insect and nine forest disease collections was made in 1959. Collections of forest insects and disease are listed by host in Table 1. Map 1 shows the distribution of insect and forest disease collections taken during the season.

Table 1

Collections by Hosts

South Prince George District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Douglas fir	31	2	aspen, trembling	11	1
fir, alpine	53	2	birch, white	15	-
hemlock, western	8	-	cottonwood, black	10	-
pine, lodgepole	25	1	willow spp.	20	1
spruce, black	11	-	miscellaneous	29	1
spruce, white	66	-			
			Total	85	3
Total	194	6	Grand total	279	9

STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

First evidence of 1959 attacks by this pest was collected on June 3, about three miles south of Giscome. A small "cold-deck" of Douglas-fir logs averaging 14 inches d.b.h. had been cut between April 10 and 15, and left lying in the woods. By June 3 these logs had bark beetle galleries up to four inches in length; each gallery contained some eggs. The few standing green Douglas firs nearby showed no signs of attack. The stand consisted primarily of large white spruce trees with a few Douglas firs scattered throughout.

The next observation of this beetle was made on June 11, following three fires which occurred around May 16 in the Buck Ridge area near Macalister. These stands are primarily Douglas fir with scattered white spruce. The fires were very hot in small but irregular areas. The bark of the larger Douglas firs, 18 to 24 inches d.b.h., was badly burned for 15 feet up the stem, and the sapwood of some smaller trees was severely scarred at the base although the foliage remained unburned. On most of the larger trees the foliage had turned red by June 11. Thirty per cent of the larger trees with scorched trunks but retaining green foliage contained bark beetles, many of which had entered through severely burned bark. Where the cambium was burned no bark beetles or entrance holes were found.

A study was made in the "Windt" fire, near Diamond Island, and the following points were noted. Seventy per cent of the fir trees over 10 inches in diameter were infested, some in the root collar. These trees were burnt 12 to 18 feet up the stem. Thirty-seven beetles were counted on the inner surface of a one square foot section of bark 2.5 inches thick which was removed from a tree 16 inches d.b.h. Judging by the adults at the tunnel ends, no fall flights had occurred by August 27. Nine parasites, Coeloides sp., were seen and the stages of the beetles ranged from larvae to yellow-brown and darker brown adults. Very few parent adults were found. Out of 100 adults collected on August 27, from two square feet of scorched bark, 68 per cent were tenerals and 32 per cent were parent adults.

On August 13, when counts were made of red-topped Douglas-fir trees in the Fraser River Valley, four groups totalling 186 infested trees were counted on the east slope of the valley. On the west slope, in 85 square miles viewed, the total number of red-topped trees was 312. Due to the absence of colour change in 1959-attacked trees, those trees tallied are presumed to have been killed in 1956-1958. Because some trees had dropped their needles the 1959 total of 312 trees is 231 less than a similar survey made in 1958.

Adopting a Forest Service standard of an average 110 cubic feet of timber per tree, the above-mentioned totals indicate a loss of 54,780 cubic feet. Some 600,000 cubic feet of beetle-killed Douglas fir were salvaged by Western Plywood Company in the Lazaroff Lake area during 1958.

At Churchill Mountain, on July 24, a half-acre plot was established in a stand of Douglas fir and white spruce which contained 24 trees previously killed by Douglas-fir beetles, and a number of currently infested

stems. Thirty-two Douglas-fir trees on the plot, averaging 21 inches d.b.h., were tagged and their condition recorded. Twelve trees, or 37.5 per cent had been killed prior to 1958; 11 trees or 34.4 per cent contained broods and parent adults, and 9 trees, or 28.1 per cent, were healthy. The first report of an infestation in this area was in 1954.

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

Infestations of this beetle were not frequent in 1959. On June 3 beetles were present in a cold-deck of logs near Giscome and in the surrounding woods. Spruce stumps ranging from 15 to 30 inches d.b.h. along one right-of-way, were invariably heavily attacked by this beetle. The highest concentration of attack recorded was four entrance holes per square foot. These trees were cut in December, 1958 and their stumps were attacked in late May. One 15-inch stump contained tunnels 1.5 inches long, with an average of 20 eggs per gallery.

The only area where a continuous attack appears to be in progress is along the Swift River Access Road east of Quesnel. A small but persistent population has killed trees on the edge of the roadway and, to a lesser extent, in the adjacent mature white spruce stands. This injury to right-of-way trees has been recurring throughout the District where roadways have been cut through white spruce forests.

Spruce Budworm, Choristoneura fumiferana (Clem.)

In 1958 the primary feature of this defoliator was the erratic distribution of the populations. In 1959 some of the infestations were greatly reduced while those in the Willow River Valley increased and became eastablished within this valley. Map 2 shows the extent of the current infestation.

Table 3 gives the results of sampling on four plots, three of which were established in the more recently damaged areas and one which was retained in the old outbreak area near Barkerville. The Antler Creek plot was logged in 1959 and is of no further use. The sampling method used was as follows: six alpine fir trees were selected at each plot, and one 18-inch branch was removed from the mid-crown of each tree. The buds from these branches were examined and the total number of infested buds, adventitious buds, and the number of larvae found in each sample were recorded. The percentage of buds that were adventitious ranged from 0 to 3.9 at the four locations.

Table 3 indicates that moderate to heavy defoliation may be expected during the heavy-feeding or "flight year", 1960 in three of the above areas.

Budworm damage was seen along the Church Sawmill Road in the McGregor River country, the Torpy River Valley adjoining the McGregor, and along the Swift River Access Road near Cottonwood. In the first two areas an estimated 10 per cent of the buds had been killed, while

in alpine fir-white spruce stands in the Swift River - Sovereign Creek valleys, 40 per cent of the 1959 growth was defoliated.

Table 3

Percentage of Alpine Fir Buds Infested by Spruce Budworm Larvae and Number of Larvae Present in Branch Samples at Four Localities in the South Prince George District, 1959.

Location	Date	Total no. buds per sample	Percentage infested buds	Total no. of larvae
Barkerville	July 9	173	6.3	2
Genevieve Lake	July 10	742	60.7	56
Strathnaver	July 6	414	49.7	69
Willow River - George Mountain	July 21	297	59.5	0

Forest Tent Caterpillar, Malacosoma disstria Hbn.

In 1959 forest tent caterpillars again defoliated trembling aspens over seven square miles near McBride. Investigations have shown that the defoliation around the northern perimeter of this area, attributed to tent caterpillar in 1958, was caused by an unidentified leaf roller which feeds in early spring.

Tent caterpillars, infesting 100 per cent of the aspen trees in the original area, caused 60 per cent defoliation 1959. On June 24, ultimate instar larvae were found on aspen, cottonwood, birch, and willow as well as all species of roadside ground cover. No parasite eggs were seen on these larvae. Indications are that the 1960 population will be large. Table 4 gives the results of the standard egg sampling procedure carried out each year, viz. all egg masses, from three randomly selected trees, at three different points in the infested area, were collected and the eggs examined and classified. A comparison is made in Table 5 using figures gathered over the three-year period, 1957 to 1959 inclusive.

Western Tent Caterpillar, Malacosoma pluviale Dyar, var.

On June 18, 1959, a number of club-like tents were seen on roadside willows and cottonwoods along the mainline logging road near Lazaroff Lake, Cinema, B. C. (Fig. 1). These were formed by larvae of the western tent caterpillar. By July 7, 1959, no evidence of feeding by these larvae existed, except broken off leader stalks on the original hosts. This was the first time larvae or tents had been seen in this area since 1956 dwarf birch were severely defoliated.

Table 5

A Summary of Egg Surveys of the Forest Tent Caterpillar during 1957-1959 Inclusive, McBride, B. C.

Date	Total no. egg masses	Average no. masses per tree	Percentage			
			Living larvae	Dead larvae	Undeveloped eggs	Parasitized eggs
1957	101	11.3	91.2	0.4	7.9	0.6
1958	268	22.3	90.0	0.4	9.0	0.5
1959	324	36.0	88.7	1.6	8.0	1.7

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Single specimens of the hemlock looper were collected at four points in the northern portion of this District. Two were from western hemlock and one each from alpine fir and white spruce.

Black-headed Budworm, Acleris variana (Fern.)

Six collections, from white spruce, alpine fir, and western hemlock, contained a total of nine larvae.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

This weevil was distributed generally throughout the stands of timber containing young white spruce trees.

A 1 x 10 chain plot was established in one of the more severely infested areas in the Willow River watershed. In most cases tips which were infested were on relatively open-growing trees. The average height of the plot trees was 20 feet while the average height of the infested trees was 17 feet. All white spruce trees within this plot were examined for Pissodes damage and the results were as follows. Of 196 spruce trees on the plot, 10 trees (five per cent) had damaged terminals in 1959; six trees (three per cent) had damaged terminals which had been laterals in 1958 and which had replaced damaged terminals as leaders in 1959. These were re-attacked. Of 32 trees affected over all periods, 15 (46 per cent) had infested branches in 1959, and in the same period there were three instances of multiple-attack on leaders or laterals which were of similar length and growing in groups.

Single attacks on regeneration trees were common throughout the District.

Table 4

Analysis of Forest Tent Caterpillar Egg Masses
Collected from Trembling Aspen Trees at Tete Jaune, B. C.,
October 21, 1959

Tree no.	D.B.H. (inches)	Tree height (feet)	Crown length (feet)	Total no. 1959 egg masses	Average no. eggs in 5 masses	Percentage			
						Living larvae	Dead larvae	Undeveloped eggs	Parasitized eggs
S1	6	42	15	27	122.4	88.6	1.3	9.5	.6
S2	6	45	35	43	126.0	89.7	2.2	6.0	2.1
S3	5	42	18	64	118.0	88.3	0.7	7.6	3.4
C1	4	39	25	30	100.4	87.4	0.2	9.8	2.6
C2	5	43	18	54	128.4	92.8	1.6	4.5	1.1
C3	3	39	24	19	90.0	86.0	0.9	11.8	1.3
N1	6	42	24	42	129.2	90.9	2.3	5.9	0.9
N2	5	39	27	35	140.8	82.2	4.3	11.5	2.0
N3	5	33	19	10	116.4	92.1	1.2	5.5	1.2
Averages 1959 (3 plots)				324		88.7	1.6	8.0	1.6

Hemlock Sawfly, Neodiprion sp.

Only single larvae of this sawfly were obtained in collections during 1959.

A Cecidomyid Infesting Lodgepole Pine Twigs, Cecidomyidae

Typical "crooks" on lodgepole terminals caused by cecidomyids, were seen in the District. Small orange larvae were collected from the twigs in May and October.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The extent of infestation of this leaf-miner remained universal throughout the District, however the intensity of attack appeared to lessen slightly in 1959.

A standardized system of leaf sampling based on five trees per area and two branch units per tree was followed in 1959, to study this miner. Table 6 shows the percentage of leaf surfaces infested in the five samples, and the number of adults produced per leaf surface.

Table 6

Percentage of Aspen Leaf Surfaces Infested and Number of Aspen Leaf-miner Adults Produced per Leaf Surfaces, South Prince George District, 1959.

Locality	Percentage of leaf surfaces with mines	No. adults produced per leaf surface
Prince George	14.1	.08
Prince George	31.0	.21
Dragon	57.6	.59
Kersley	17.6	.11
Marguerite	16.7	.09

Table 7 shows the percentage of mortality due to parasitism and other factors in each of five 100-cocoon samples.

Mourning Cloak Butterfly, Nymphalis antiopa (L.)

Despite the heavy infestations of 1958, only one larva was collected in 1959. A small number of mourning cloak and other brush-footed butterfly adults were seen.

Table 7

Percentage Mortality of Aspen Leaf-miner Cocoons in 100-cocoon Samples, South Prince George District, August, 1959.

Locality	Percentage of cocoon mortality	
	Parasitism	Other causes
Prince George	5	26
Prince George	3	9
Dragon	2	15
Kersley	6	26
Marguerite	4	27

The conditions of mortality represented in Table 7 are similar to those found over the whole District.

STATUS OF FOREST DISEASES

Important diseases

Red Heart Rot

The sporophores of Stereum sanguinolentum (Alb. & Schw. ex Fr.) Fr. were collected or noted in many areas where alpine fir logs had been lying on the ground for three or more years following logging.

Die-back of Alpine Fir Branches

Flagging of branch tips continued throughout the District, occurring most commonly on pole-sized alpine fir tree situated in a mixed stand of alpine fir and white spruce. Scleroderis abieticola Zeller & Gooding was isolated into culture from diseased tissue and may be the cause of this disease.

Rust Diseases

Blister rust damage was noted in almost all regeneration stands containing lodgepole pine. At Giscome, both the galls of Peridermium harknessii J. P. Moore and the hip cankers of Peridermium stalactiforme Arth. & Kern were observed. Near Shelley a number of small black spruce trees had the typical symptoms of Peridermium coloradense (Diet.) Arth & Kern (Fig. 2).

Needle Rust of Alpine Fir

The characteristic aecial pustules of needle rusts were frequently observed on alpine fir hosts near Genevieve Lake, the only area in which they were found.

Exotic Plantations

The annual examinations of experimental plots on exotic plantations were carried out in 1959 as road or trail conditions permitted. No disturbances of any serious nature were noted. Despite the close proximity of lodgepole pine infected with Peridermium stalactiforme Arth. & Kern to many of the exotic species in the plot at Prince George Experimental farm no sign of infection by this rust has yet been noted on these trees.

Table 8 is a brief summary of disease conditions as observed in the plantations at the time of the examination.

Table 8

Summary of Disease Conditions on Exotic Plantations
South Prince George District, 1959.

XP number	Location	Exotic species	Remarks
XP- 50	Aleza Lake Exp. Station	Scots pine	Growth normal two browsed. Disease negative
XP-117	Prince George Exp. farm	mixed conifers	Growth normal disease negative
XP-118	Prince George Exp. farm	mixed hardwoods	Growth normal disease negative
XP-135	Giscome mill	silver maple	Growth normal suppressed disease negative

Study of the Plot (XP-49) on the west side of the Fraser River, north of Quesnel has been discontinued.

No disease progress plots were established and no other noteworthy diseases were recorded.

Figure 1. Tent of Malacosoma pluviale var., typical of those found in a relatively new infestation at Lazaroff Lake, South Prince George District, June 1959.

D. W. Taylor

Figure 2. Symptoms of Peridermium coloradense (Diet) Arth. & Kern on black spruce, Shelley, South Prince George District, July, 1959.

D. W. Taylor


1

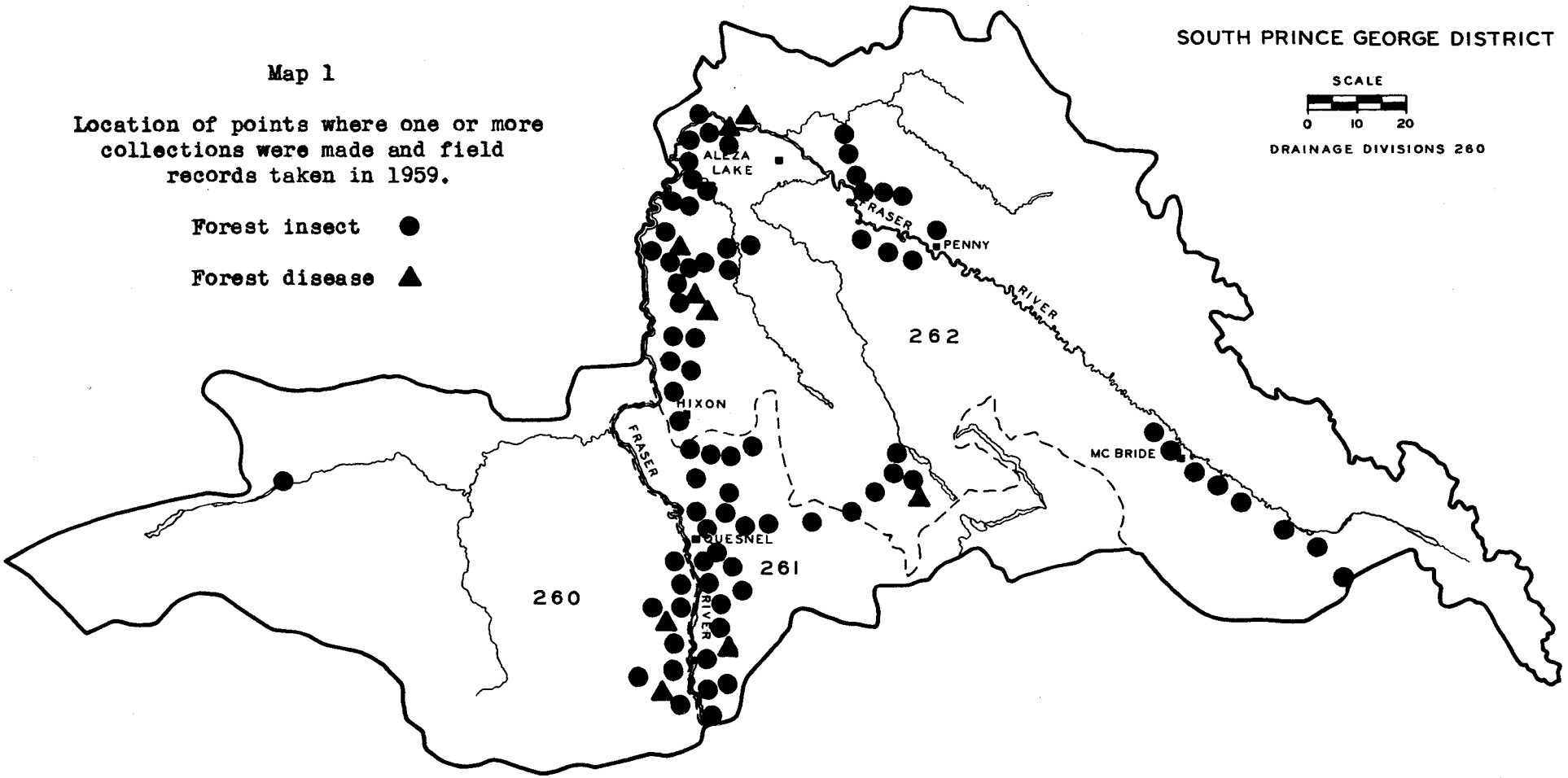

2

Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

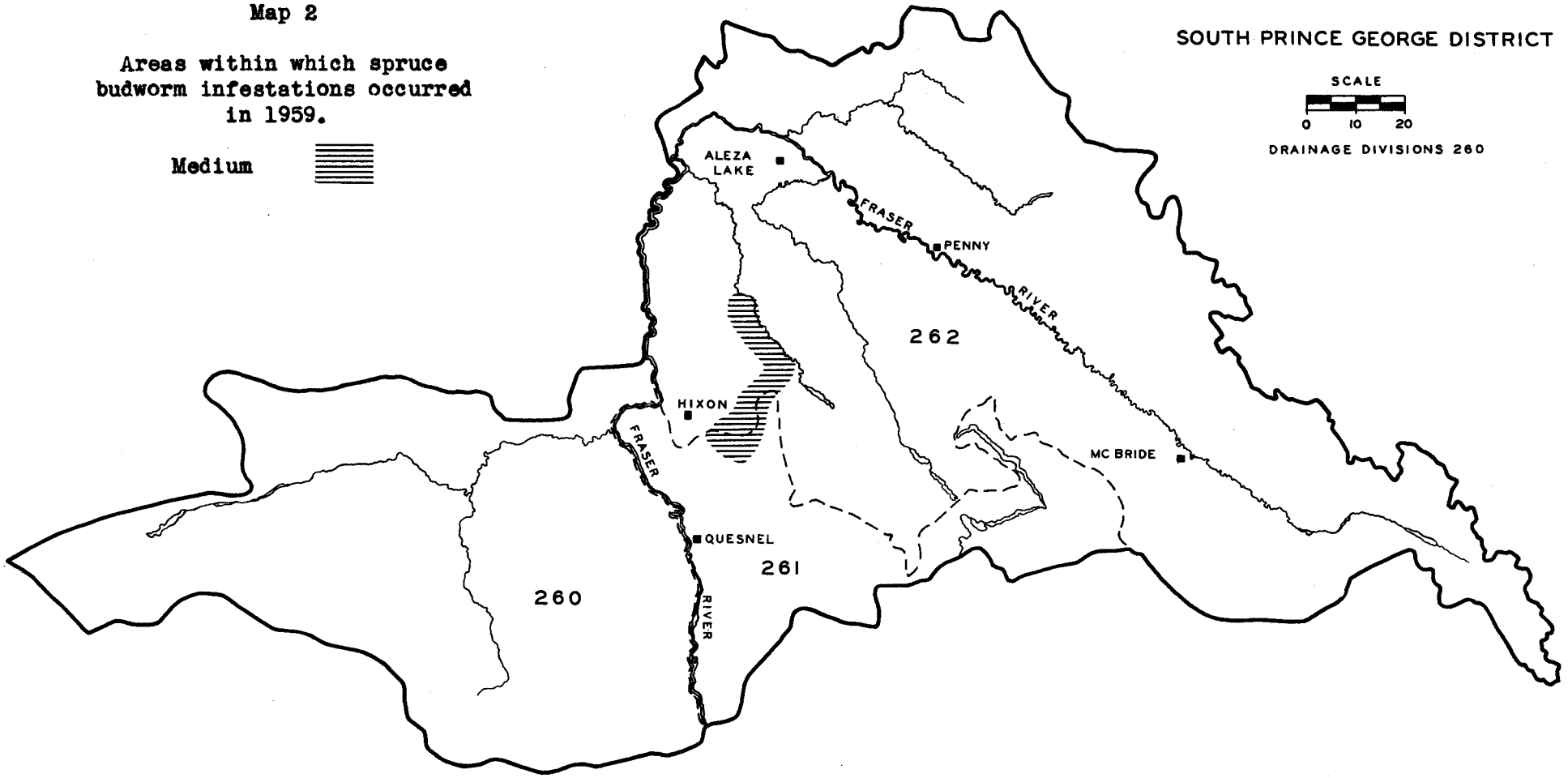
Forest disease ▲



Map 2

Areas within which spruce budworm infestations occurred in 1959.

Medium



ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

WEST PRINCE GEORGE DISTRICT

1959

FOREST BIOLOGY SURVEY

WEST PRINCE GEORGE DISTRICT

1959

E. V. Morris

INTRODUCTION

Field work started on June 1 and continued through to October 3 in the West Prince George District. A total of 346 forest insect and 12 forest disease collections were made throughout the season. With the assistance of the South Prince George ranger a 10-day trip by boat was made to the Takla Lake watershed. One week was spent in the West Kamloops District on a bark beetle cruise. Three weeks in September were spent in wood-borer studies in the West Prince George District.

Collections by hosts are shown in Table 1 and points at which collections were made are shown on Map 1.

Table 1

Collections by Hosts

West Prince George District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Douglas fir	26	-	alder spp.	8	-
fir, alpine	39	-	aspen, trembling	25	4
juniper, common	1	-	birch spp.	8	-
larch, eastern	1	-	cottonwood, black	11	-
pine, lodgepole	72	4	willow spp.	24	-
spruce, black	19	1	red-osier dogwood	1	-
spruce, white	111	3			
			Total	77	4
Total	269	8	Grand total	346	12

STATUS OF INSECTS

Spruce Budworm, Choristoneura fumiferana (Clem.)

The two-year-cycle spruce budworm increased at all permanent sample stations in the West Prince George District. It was more numerous on

alpine fir and less common on white spruce at these sample plots. At Takla Lake the infestation was heavier than in 1958 and had spread to the north end of the lake on the west shore. The infestation on the east shore extended from Takla Narrows to the north end of the lake. The general area in which the Takla Lake infestation has been located is shown on Map 2.

The spruce budworm plots at Big Creek and Tudyah Lake were sampled in late June. One 18-inch branch sample was taken from the southern mid-crown of each of the six tagged alpine fir trees at each plot. The greatest width of each branch sample was measured and recorded. The total number of buds were counted on each branch sample and classified as follows: non-infested, infested, killed prior to 1959. The number of adventitious buds present was recorded. Buds damaged were classed as infested, even when no larvae were present.

Table 2 gives the percentage of buds infested in branch samples for the non-flight years 1955, 1957, and 1959.

Table 2

Percentage of Alpine Fir Buds Infested by Spruce Budworm in Samples Taken at Four Localities in the West Prince George District, 1955, 1957 and 1959.

Locality	Percentage of buds infested		
	1955	1957	1959
Tudyah Lake	69	28	30
Big Creek	86	19	47
Bivouac Creek	-	-	86
Takla Narrows	-	-	69

The populations in 1959 at the Tudyah Lake and Big Creek plots where sampling has been carried on since 1955, increased over the 1957 level but are still below 1955.

Table 3 shows the total number of buds counted, the percentage infested, and the percentage killed prior to 1959. The percentage of buds that were adventitious is as follows, Big Creek 3.8 and Tudyah Lake 4.9. Estimates for defoliation were not made in the fall of 1959.

Table 3

Total Number of Buds Examined, Percentage of Buds Infested and Buds Killed Prior to 1959 on Alpine Fir Branch Samples at Two Sample Plots in the West Prince George District, June, 1959.

Locality	No. of buds examined	Percentage	
		Buds infested	Buds killed prior 1959
Big Creek	742	46.7	21.2
Tudyah Lake	1,161	30.0	26.0

Oregon Fir Sawyer, Monochamus oregonensis Lec.

This sawyer beetle caused considerable damage to merchantable white spruce timber that had been burned in 1958 in the West Prince George district. Surveys were carried out in five localities to determine the amount of damage done to fire-killed white spruce, and to obtain information on the life history of the borer. Table 4 shows the name of fire, locality, duration of fire, number of acres burned and volume of timber killed in five fires which occurred in 1958 in the West Prince George District.

Table 4

Data on Fires where Monochamus was Studied, West Prince George District, 1959.

Name of Fire	Locality	Date 1958	Acres burned	Volume loss M. f. b. m.
Fy	29 mi. south of Prince George	May 21-30	635	125
Lin	Mi. 45 Hart Highway	May 20-29	3,022	8,480
Fir	Mi. 69 Hart Highway	June 5-26	4,036	59,360
Straw	Hart Highway	July 15 - Aug. 12	13,284	210,000
Tudyah	Mi. 96 Hart Highway	July 18-21	-	-

On June 1, 11 white spruce logs two feet in length were put into rearing cages; two each from the "Lin", "Fir" and "Straw" fires, and five from the "Fy" fire. Sixteen Monochamus adults emerged from the "Fy" logs between June 5 and 17, and four emerged from the "Lin" logs between July 2 and 4. None emerged from the "Straw" or "Fir" material, although there were still larvae in these logs in September.

Investigations were carried out in September in the "Lin", "Fir", and "Tudyah" fires. On each fire, ten white spruce trees in each of the three burn classes, "light", "medium", and "heavy", were felled. The basal 50 feet were cut into one-foot blocks at five-foot intervals. The blocks were peeled and examined for entrance and exit holes of Monochamus and other wood-borers. Infested blocks were split to determine the depth of penetration and the number of larvae still present.

Table 5 shows the average number of Monochamus entrance and exit holes in samples in three burn categories, from each of the three fires.

Table 5

Average Number of Monochamus Entrance and Exit Holes per Square Foot in Basal 50 Feet of White Spruce Killed by Fire in 1958, Prince George Area. Ten Sample Trees from each of Three Bark Burn Classes, at Each Locality, September, 1959.

Name of Fire	Date 1958	Light burn		Moderate burn		Severe burn		Average	
		Entrance	Exit	Entrance	Exit	Entrance	Exit	Entrance	Exit
Lin	May 20	0.94	0.27	2.70	1.03	0.21	0.08	1.29	0.47
Fir	June 5	0.48	0.11	3.38	0.98	0.10	0.05	1.24	0.36
Tudyah	July 18	0.01	0	0.15	0	0	0	0.05	0

Table 5 shows that the heaviest infestation of borers occurred in moderately burned trees in fires that occurred in May and June.

The average maximum penetration of Monochamus burrows measured at the "Fy" fire in May 1959 was 3.6 inches for light, 3.3 inches for moderate, and 2.7 inches for severe bark burn. The maximum penetration of all logs measured was 6.2 inches in a light bark burn class. The average maximum penetration measured at the "Lin" fire was 2.8 inches and the maximum was 4.5 inches in a moderately burned sample. Average maximum penetration for the "Fir" fire was 2.9 inches and maximum depth recorded was 5.0 inches in a moderately burned tree. The measurements for the "Lin","Tudyah", and the "Fir" fires were made in September, 1959.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

There was no increase over last year's level in the infestation on

Stuart Lake. A total of 175 "red-topped" trees was counted on the south shore of the lake with the biggest concentration opposite Tachie Village. Ten fir trees along a road slash in the Mapes district were attacked by this beetle. No other damage was observed throughout the rest of the District.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The mountain pine beetle attack on lodgepole pine at Takla Lake has spread farther south on the west shore of the lake, where a total of 538 "red-topped" trees were counted in an area of 5,632 acres. To determine the volume loss, "red-topped" trees were counted, and the total multiplied by the average volume per tree, which was estimated to be 250 f.b.m. Total volume killed in this area in the period 1956 to 1958 is believed to be about 134,500 f.b.m. Judging from previous figures for this area, the infestation appeared to be subsiding in 1959.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The infestation of aspen leaf-miner was general throughout the West Prince George District in 1959. Three sample plots were established in 1959 to determine the population density of this insect.

In early August three sample plots were established; five sample trees three inches d.b.h. were tagged at each locality. Two apical branches 12 inches long were cut from the lower crown, one from the exposed side and the other from the least exposed side. All leaves were picked off the branches and placed in a container, then the leaves were picked out of the container at random until 100 infested surfaces were obtained. All of the mines and cocoons on the 100 infested surfaces were counted and recorded. The leaves were returned to the container and mixed again; this time leaves were drawn out until 100 cocoons were obtained. The cocoons were dissected and classified as emerged, parasitized, dead and otherwise destroyed.

Table 6 gives the percentage of leaf surfaces infested, and the number of leaf miner adults produced per leaf surface, from a five-tree sample at each plot. Table 7 shows the percentage mortality in the cocoon stage caused by parasitism and other factors in 100-cocoon samples at three localities.

Table 6

Percentage of Aspen Leaf Surfaces with Mines, and Number of Aspen Leaf-miner Adults Produced per Leaf Surface, West Prince George District, August 14, 1959.

Locality	Percentage of leaf surfaces with mines	No. of adults produced per leaf surface
Mile 8 Hart Highway	27.4	.07
Mile 12 Hart Highway	28.5	.09
Mile 8 Old Summit Lake Road	16.2	.07

Table 7

Percentage Mortality of Aspen Leaf-miner Cocoons in Three 100-cocoon Samples, West Prince George District, August 14, 1959.

Locality	Percentage mortality in cocoon stage	
	Parasitized	Other causes
Mile 8 Hart Highway	8	60
Mile 12 Hart Highway	5	61
Mile 8 Old Summit Lake Road	4	64

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

No defoliation of aspen was caused by this insect in the District in 1959. The infestation in the Salmon River Valley has completely disappeared.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Random beating samples taken in larch bogs at Cluculz Lake and along the Isle Pierre Road did not produce any larvae of this sawfly.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

The light infestation in white spruce reproduction at Summit Lake and Chief Lake remained about the same as in 1958. Eight collections were sent to Dr. S. G. Smith at the Sault Ste. Marie Laboratory, from these locations.

Green-headed Spruce Sawfly, Pikonema dimmockii Cress.

This sawfly was distributed generally over the District in 1959. An average of less than two larvae per three-tree sample was collected. White spruce was the favoured host but one larva was collected from black spruce in the Endako district. The population remained unchanged from 1958.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

The population remained unchanged from 1958. Collections were made in most parts of the District, but the numbers of this insect remained low throughout the summer.

Green Spruce Looper, Semiothisa granitata Gn.

This insect was quite common throughout the District. Larvae first appeared in late July and continued through August. The favoured host was white spruce, but larvae were also found on Douglas fir, lodgepole pine, alpine fir and black spruce. It was found as far north as Bulkley House on Takla Lake. No damage was caused in 1959.

Conifer Sawflies, Neodiprion spp.

These sawflies were found in small numbers throughout the District with an average of two larvae per three-tree sample. A colony of 10 larvae was collected from Douglas fir near Punchaw, and a colony go 25 larvae from lodgepole pine near Isle Pierre in July.

Black-headed Budworm, Acleris variana (Fern.)

This budworm remained at a low population level during 1959. Collections averaging one larvae per three-tree beating sample were taken in the Francois Lake and Punchaw districts. One larva from white spruce was collected at the Osilinka River above Usilika Lake. The favoured hosts of this tortricid were white spruce and alpine fir.

Coneworm, Dioryctria abietivorella D.-S.

One specimen of this coneworm was found in a pitch nodule on the stem of a one-inch d.b.h. lodgepole pine in the Punchaw area.

A Pitch Nodule Maker, Petrova sp.

Three Petrova larvae were collected from lodgepole pine saplings, at Mile 4 on the Lower Mud River Road, Punchaw Road and on the Old Summit Lake Road.

STATUS OF FOREST DISEASES

Important Diseases

Needle Rust on White and Black Spruce

Witch's brooms caused by Peridermium coloradense (Diet.) Arth. and Kern were quite common in most parts of the District on white and black spruce. This rust was fairly heavy in the Beaverley and West Lake districts.

Decay of Aspen

Decay caused by Fomes igniarius (L. ex Fr.) Kickx was found at a few localities throughout the District. No severe damage was attributed to this rot.

A Disease on Aspen

On the North Arm of Stuart Lake and in the Shelley district aspen foliage was turned brown by an unknown disease, which caused the leaves

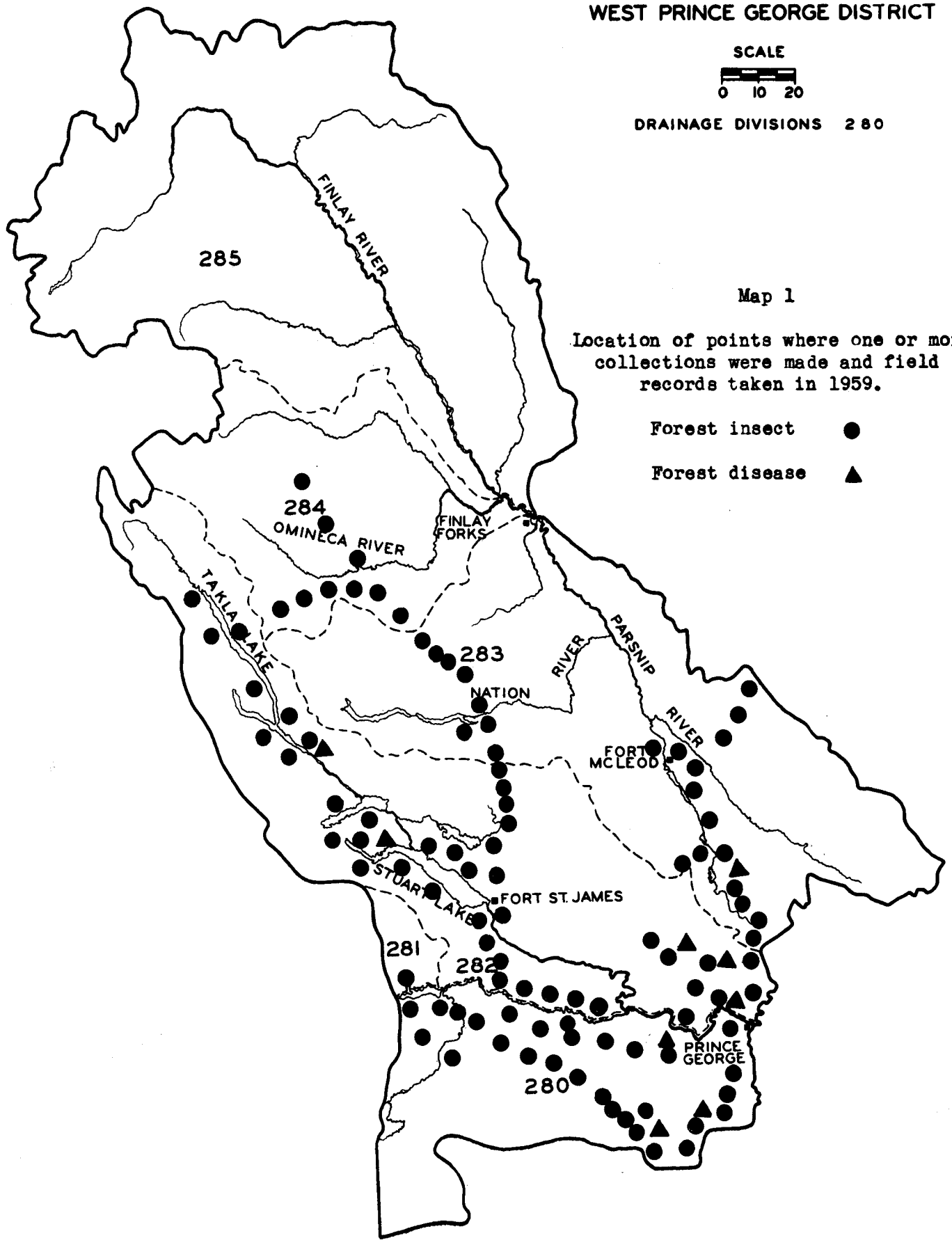
to die in the upper crown. Samples were sent to the Forest Pathology Laboratory at Victoria for identification.

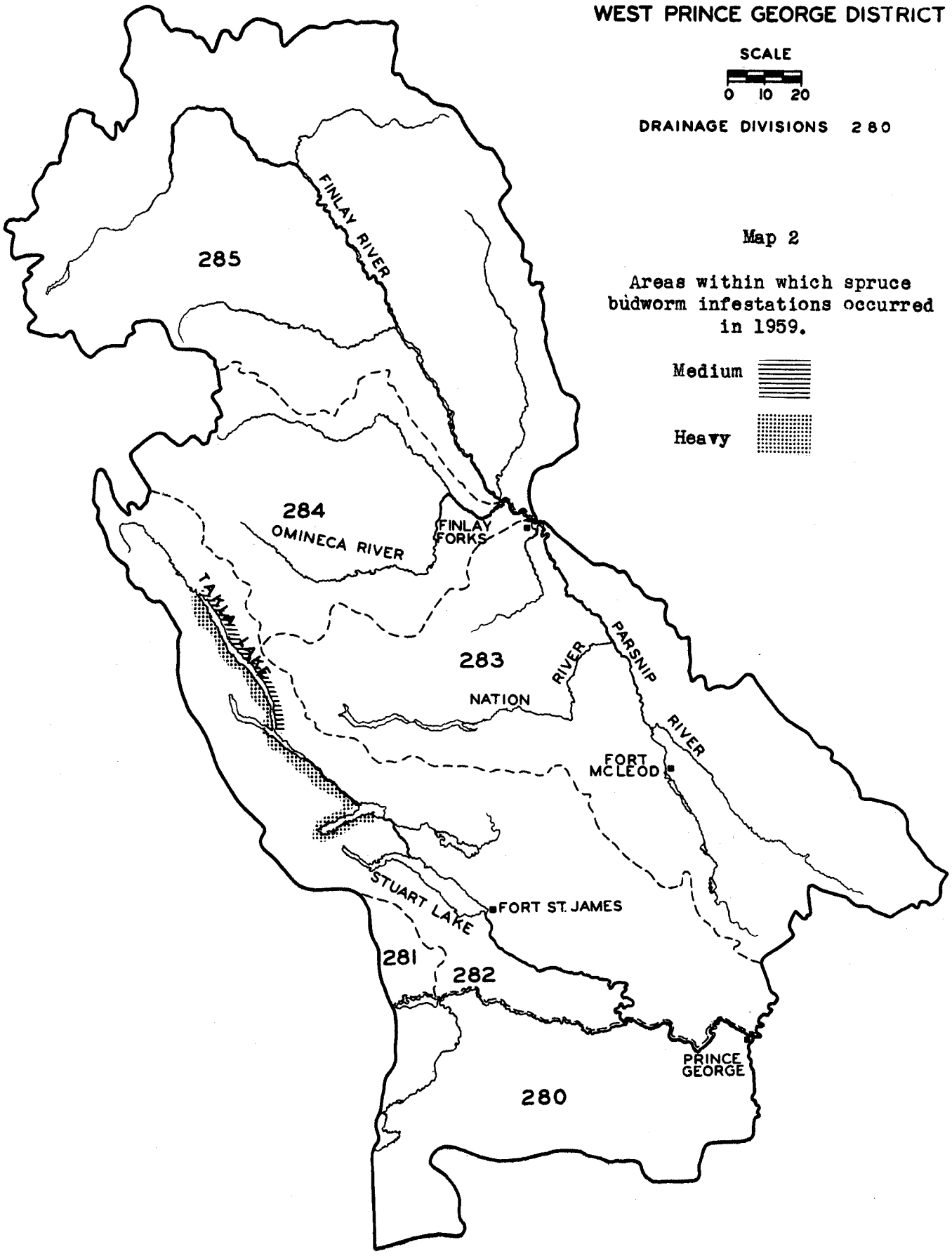
Cone Rust on White and Black Spruce

Light infections of cone rust caused by Chrysomyxa pirolata Wint. were found on two white spruce trees on the Middle River. A black spruce tree in the Punchaw district was also infected by this disease.

Dwarf Mistletoe on Lodgepole Pine

Dwarf mistletoe Arceuthobium americanum Nutt., was quite common on lodgepole pine along the Manson Creek Road, at Mud River and on the Vanderhoof Highway two miles west of Prince George.


WEST PRINCE GEORGE DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 280
285
FINLAY RIVER
Map 1
Location of points where one or more collections were made and field records taken in 1959.
Forest insect
Forest disease
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 DISTRICT
SCALE
0 10 20
DRAINAGE DIVISIONS 280
Map 2
Areas within which spruce budworm infestations occurred in 1959.
Medium
Heavy
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

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

NORTH PRINCE GEORGE DISTRICT

1959

FOREST BIOLOGY SURVEY

NORTH PRINCE GEORGE DISTRICT

1959

T. A. D. Woods

INTRODUCTION

Field work in the North Prince George District began on May 31 and terminated on August 27.

In previous reports the term "Dease Lake Road" included both the Dease Lake and Cassiar roads. In this report the Cassiar Road is defined as the road which extends from the British Columbia - Yukon boundary to Cassiar townsite. The Dease Lake Road commences at the Cassiar "Turnoff" and extends to the southern end of Dease Lake.

Two new areas were investigated in 1959; one was the Beatton River Road which leaves the Alaska Highway at Mile 73 and extends northeast 60 miles to Beatton River. The Wapiti River Road referred to in this report is a new road extending south from the Monkman Pass Road in the southeast corner of the District.

Table 1 shows the number of forest insects and disease collections by hosts. Map 1 shows the localities where one or more collections or field records were taken.

Table 1

Collections by Hosts

North Prince George District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
fir, alpine	15	4	alder spp.	33	-
juniper, common	3	-	aspen, trembling	32	1
larch, eastern	32	-	birch, dwarf	11	-
pine, lodgepole	61	2	birch, white	11	1
spruce, black	35		cottonwood, black	8	-
spruce, white	112	2	willow spp.	20	2
			miscellaneous	9	-
			Total	124	4
Total	258	8	Grand Total	394	12

STATUS OF INSECTS

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

Damage attributed to the spruce budworm in the Smith River region, Mile 514 Alaska Highway, was first noted in 1957. At that time a light to medium population extended from Mile 489 to 530. There was a slight decrease in the larval population in this area in 1958. The Smith River infestation was examined four times in 1959: June 19 and 28, August 6 and 31. Hosts were white spruce, eastern larch, alpine fir, and lodgepole pine. It was noted at these times that the population level had reached a new high.

Larval sampling was carried out on June 19, 1959, to determine the population at nine points within the Smith River infestation. Standard three-tree beating samples were taken from white spruce trees, 1 1/2 inches d.b.h., and 15 to 20 feet in height. Table 2 gives the number of larvae collected at nine points.

Table 2

Number of Spruce Budworm Larvae Collected from White Spruce in Three-tree Beating Samples at Nine points on the Alaska Highway, North Prince George District, June, 1959.

Locality (mileposts) Alaska Highway	No. of larvae collected
494	1
502	14
509	20
514	500
516	140
522	22
528	7
533	7
538	4

At Mile 514 a beating sample from one lodgepole pine yielded 50 larvae, and a collection from three reproduction-sized eastern larch also yielded 50 larvae. On July 2, single budworm larvae were collected from black spruce and eastern larch trees at the following localities: black spruce at Miles 330.5, 340.4, and eastern larch at Miles 330.5, 290.0. On June 18, at Mile 502, one per cent of the immature cones of one white spruce tree had been damaged by young budworm larvae.

Three methods were used to ascertain defoliation in 1959. The first was to count defoliated tips using one 18-inch branch sample from each of three white spruce trees at 11 localities. Sample trees were approximately one and one half inches d.b.h., and from 15 to 20 feet in height. Table 3 gives the localities, total number of tips counted, and percentage damaged by spruce budworm.

Table 3

Percentage of White Spruce Tips Defoliated by Spruce Budworm at Eleven Localities on the Alaska Highway, North Prince George District, August, 1959.

Locality (mileposts) Alaska Highway	Percentage tips defoliated
497	5.8
502	44.5
506	36.5
509	50.2
512	72.5
514	98.7
516	98.8
522	38.7
528	7.2
532	8.5
538	5.3

In August an estimate was made of defoliation at five points along the Alaska Highway. Table 4 gives the average estimated percentage damage to both current and old foliage for 10 white spruce trees per location in the Smith River infestation.

Table 4

Estimated Percentage Defoliation of 10 White Spruce Trees at Five Points along the Alaska Highway, North Prince George District, August, 1959.

Locality (mileposts) Alaska Highway	Estimated Percentage defoliation
494	0
502	7
514	92
528	2
538	0

In June at Mile 514 it was estimated that 40 per cent of the buds of three eastern larch trees had been destroyed; one lodgepole pine had lost 80 per cent of the new growth. At the same locality in August, three eastern larch had lost all foliage and were putting forth adventitious growth.

On August 31, branch samples were collected at five localities in the Smith River infestation by Dr. G. T. Silver and R. L. Fiddick and examined by the writer. Damage to branch tips was classified as follows: (a) tips completely defoliated and buds killed; (b) tips completely defoliated but buds not killed; (c) tips 70 per cent defoliated; (d) tips 40 to 70 per cent defoliated and (e) tips which were up to 40 per cent damaged.

Table 5 shows the results of examinations to determine the percentage of damage in five categories at five localities in the Smith River infestation.

Table 5

Percentage Defoliation of White Spruce Tips by Spruce Budworm at Five Localities in the Smith River Infestation, 1959.

Locality (mileposts) Alaska Highway	Defoliation				
	100 per cent with buds killed	100 per cent with buds living	70 per cent	40 - 70 per cent	0 - 40 per cent
495	18.9	0.7	3.0	8.9	68.5
502	89.9	2.4	0.7	1.4	5.5
514	90.4	2.5	1.4	0	5.7
528	22.0	8.6	7.3	20.6	41.3

The same white spruce samples used to calculate percentage of defoliation were also used to determine the number of egg masses per 100 square feet of foliage surface. A total of 25 branches was examined. Table 6 shows the branch area, number of egg masses per branch, and average number of egg masses per 100 square feet of foliage surface.

Budworm damage in the summer of 1960 is expected to be high. This assumption is based on past studies which have shown that where there were 200 or more egg masses per 100 square feet of foliage surface, damage was heavy the following year.

Table 6

Total Branch Area, Total Number of Egg Masses per Branch, and Average Number of Egg Masses per 100 Square Feet of Foliage Surface, Smith River Infestation, August, 1959.

Locality (mileposts) Alaska Highway	No. branches examined	Total branch area (sq. ft.)	Total no. egg masses	Av. no. egg masses per 100 sq. ft. of foliage surface
494	4	8.85	8	90
502	6	10.29	94	914
514	7	16.20	126	777
528	4	8.78	12	137
538	4	19.4	17	876

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

Two-year-cycle budworm damage to white spruce and alpine fir tips was noted at six localities on the Hart Highway. Percentage of buds damaged at six localities on the Hart Highway, in 1959, is as follows: Azouzetta Lake and Coyote Creek, five; Wolf Creek and Lynx Creek, 20; four miles northwest of Wolf Creek, 30; and Silver Sands Creek, 40. The damage was heavier than in 1958 when it was reported that five to 10 per cent of white spruce and alpine fir tips had been damaged.

Bruce Spanworm, Operophtera bruceata Hlst.

Considerable damage to trembling aspen foliage has been caused by this geometrid since 1957. The general localities affected are Little Prairie, east to the Dawson Creek-Pouce Coupe area and north along the Alaska Highway to Mile 95.

The damage caused by this looper was generally less than in 1958, but there was considerable defoliation of aspen groves in the southern part of the District.

The following is a resume of the damage caused by the spanworm in certain localities. No larval population counts were taken: defoliation was estimated.

Little Prairie - A grove of aspen trees five miles east of Little Prairie was 75 per cent defoliated.

Dawson Creek - Black cottonwood and willow buds 10 and 14 miles west of Dawson Creek were completely destroyed before opening. Aspens were 25 per cent defoliated.

Dawson Creek - Pouce Coupe -	Aspen trees within this area sustained 50 per cent defoliation
Fort St. John -	One-third of the crowns of aspens were completely stripped. White spruce, willow, and rose buds were attacked. A few trees at Mile 9 Alaska Highway were completely stripped.
Mileposts Alaska Highway -	
Mile 12	Ninety per cent of the leaves of 10 trees were severely damaged.
Mile 18	Fifty per cent of the leaves of six trees were damaged.
Mile 54 to 55.5	Eighty per cent of the trees were 100 per cent defoliated.
Mile 61	The upper one-third of the crowns of groups of 20 trees were completely stripped.
Mile 94 to 95	Five groups of 20 trees sustained 80 per cent damage.
Hudson Hope Road	
Mile 0.5 to 1.5	Fifty trees in each of three localities were 100 per cent defoliated.

First larvae were collected on June 2 and the last on July 5. These dates are much later than in 1958, when full-grown larvae were collected between May 31 and June 7.

An adult carabid, Calosoma frigidum Kby., was observed preying on spanworm larvae on July 2, five miles northeast of Little Prairie. (Figure 1) Eighteen beetles were counted in 10 trees.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The infestation of aspen leaf-miner which has persisted for the last 10 years in the Liard River Valley continued in 1959, but there was a general reduction in activity over the whole District. Aspens at eight localities from Fort Nelson south were examined in 1959; it was estimated that two per cent of the leaves were infested, compared with 10 per cent in 1958. From Fort Nelson north to Muncho Lake the population was also below that of 1958. In 1958 up to 10 per cent of the leaves were infested by the miner but in 1959 the average was four per cent. Miner populations were reduced by approximately 30 per cent on the fringes of the heavily infested area. Fringe areas extended from Muncho Lake to Mile 479 Alaska Highway, and Miles 571 to 627 where in 1958, 80 per cent of the leaves of most trees were infested. Random counts of 50 leaves were taken from

reproduction sized trees in 1959 from Miles 479 to 571 Alaska Highway; these showed a decrease of from 10 to 20 per cent from the 1958 level of 100 per cent of the leaves infested.

Information on the population level and survival of the leaf-miner was obtained by examination of the leaves on two 12-inch branches from each of five aspen trees over three inches in diameter in each locality. Results of these examinations are shown in Tables 7 and 8.

Table 7

Percentage of Leaf Surfaces with Mines, and Number of Adults Produced per Leaf Surface at Four Localities, North Prince George, 1959.

Locality	Percentage of leaf surfaces with mines	No. of adults produced per leaf surface
Prochniak Creek	11.68	.01
Smith River	68.28	.09
Hyland River	55.40	.19
Mile 45.5 Cassiar Road	30.11	.03

Table 8

Percentage Mortality of Aspen Leaf-miner Cocoons in 100-cocoon Samples from Four Plots, North Prince George District, 1959.

Locality	Percentage mortality in cocoon stage	
	Parasitized	Other causes
Prochniak Creek	43	7
Smith River	33	15
Hyland River	39	7
Mile 45.5 Cassiar Road	78	9

A Leaf-miner on Willow, Phyllocnistis sp.

A miner infesting willow leaves was first noted in 1958 at Miles 524, 546, 588 and 594 on the Alaska Highway, and at Mile 21, Cassiar Road. The average degree of infestation for three of these locations was 27 per cent.

In 1959 between August 6 and 11, 26 localities were investigated for evidence of this miner. These were Miles 488 to 624 Alaska Highway and 19 to 80 Cassiar Road. Using 50 leaves selected at random from roadside willows, it was found that the miner had infested an average of four per cent of the leaves at 15 points. No evidence of the miner was found at the other 11 localities.

Black-headed Budworm, Acleris variana (Fern.)

Seven collections from spruce and alpine fir averaged one larva each compared with an average of 9 larvae from 11 collections in 1958. Collections this year were made from July 8 to July 27, which might have been late as larvae were pupating by June 18 in 1958.

Larch Sawfly, Pristiphora erichsonii (Htg.)

Twenty-seven per cent of the 30 collections taken from larch in 1959 contained the larch sawfly; this was an increase of 16 per cent over 1958.

Seven of the collections containing the sawfly were made in the southern half of the District. Localities were: the vicinity of Little Prairie; near the Wapiti River "Turn-off"; and at Mile 28.4 and 153 Alaska Highway. The single northern sample was taken at Mile 35 on the Cassiar Road. The only noticeable damage occurred at Mile 28.4 Alaska Highway, where several branch tips of one tree were stripped.

Spruce Tip Moth, Zeiraphera fortunana Kft.

Larvae of this tip moth were obtained in nine white spruce collections at scattered points in the District: Wapiti River, Mile 65, and 246 to 538 Alaska Highway. Five larvae were the greatest number taken in a single collection in 1959, compared with 19 larvae in 1958. A single larva was collected from black spruce at Mile 280 Alaska Highway.

A Spruce Gall Midge,? Rhabdophaga swainei Felt

No quantitative survey of this gall midge's activity was carried out in 1959. Populations throughout the District persisted at a low level. The midge was taken in two samples from white spruce along the Alaska Highway: Mile 223 on June 10 and Mile 214 on July 9. In 1958 examination of current year's buds on 18-inch branch samples at 14 localities showed a variation of from 0 to 10 per cent of the buds infested.

Green Larch Looper, Semiothisa sexmaculata Pack.

Only 19 per cent of the 32 beating samples taken from eastern larch contained the larch looper whereas, in 1958, 43 per cent of

30 collections contained this species. The insect appeared to be distributed generally over the range of larch.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

A total of 80 larvae of the yellow-headed spruce sawfly were collected at 33 localities. Hosts were white and black spruce, with 10 larvae being the greatest number in any one sample. This sawfly was not collected in the Monkman Pass area or on the Dease Lake Road.

Green-headed Spruce Sawfly, Pikonema dimmockii Cress.

In 1959, 44 larvae were obtained in 28 collections from both white and black spruce, with an average of 1.5 larvae per collection. In 1958 only two specimens of the green-headed spruce sawfly were collected.

An Alpine Fir Twig Sawfly, Pleroneura borealis Felt

This sawfly damaged the buds of reproduction alpine fir at Mile 345.7 Alaska Highway. Thirty-five per cent of the buds of one tree were infested and 10 to 20 per cent of the buds of six other trees had been attacked.

No evidence of the sawfly was found at Mile 353 in 1959 where a moderate attack occurred in 1958. Examinations of alpine fir at Mile 83, Cassiar Road revealed no damaged buds.

Willow Leaf Blotch-miner, Lyonetia saliciella Busck

In 1959 an extensive survey was carried out to determine the severity of blotch-miner attack on willows in the North Prince George District.

The examinations were conducted between August 6 and 21 at approximately-10-mile intervals between miles 488 and 624 Alaska Highway and Miles 19 to 80 on Cassiar Road. Information is given for 14 localities where 50-leaf random counts were made; the other 12 examinations were visual estimates. The collection points within the area examined have been grouped into five regions with percentage of infested leaves given for these areas. Table 9 gives the number of points sampled for each area, and percentage of leaves infested.

The figures in Table 9 indicate a decrease from the 1958 estimate which ranged from 15 to 90 per cent leaves infested for approximately the same areas.

Table 9

Number of Points Sampled and Percentage of Willow Leaves Infested by the Willow Leaf Blotch-miner at Five Localities, North Prince George District, 1959.

Locality	Points sampled	Percentage of leaves infested
Liard River	2	24
Coal River	4	21
Contact Creek	4	8
Lower Post	2	11
Cassiar Road	2	18

A Blotch-miner on Trembling Aspen, Lithocolletis sp.

Twenty-six examinations were made along the Liard River to Lower Post, and along Cassiar Road. A random sample of 50 leaves taken from roadside reproduction-sized aspens was used to determine the percentage leaves infested by this gracillarid. The heaviest attacks, about 40 per cent, were recorded at 12 points between Miles 491 and 547 Alaska Highway.

Conifer Sawflies, Neodiprion spp.

Three collections of one to two larvae were taken from lodgepole pine in the Wapiti River area. Two larvae were collected from lodgepole pine on the Hudson Hope Road. Three collections of one to two larvae were taken from white spruce and lodgepole pine near Azouzetta Lake, Little Prairie and Dawson Creek. Collections were made on July 23, August 20, and between June 2 and 17 respectively.

A Lepidopterous Shoot-borer

A lepidopterous borer infesting willow shoots was scarce in the District in 1959. Only one or two mined shoots were found.

A shoot-borer causing similar damage, a wilted appearance to under-developed leaves, was observed at Liard River Hot Springs on red osier dogwood and western choke cherry.

A Cerambycid Attacking the Root Collar of Trembling Aspen

Wood-boring larvae identified as cerambycids were collected on the root collars of three aspen trees at Mile 15.3 Hudson Hope Road. The only indication of attack was boring dust just below ground level.

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE

North Prince George District

Insect	Host	Locality	No. of Collections
Agonopterix gelidella Busck	Cot	Mile 363	1
Agonopterix pallidella Busck	Bi	Fort Nelson	2
Anacamptodes emasculata Dyar	D	Hudson Hope	2
Anagoga occiduaria Wlk.	D	Peace River Liard River	2
Anomogyna nr. homogena McD.	Sw	Mile 538	1
Anomogyna perquiritata Morr.	Sw	Pouce Coupe Lynx Cr.	2
Anoplonyx canadensis Hgtn.	Le	Fort Nelson	2
Anoplonyx laricivorus Roh. and Midd.	Le	Fort Nelson Cassiar Road	7
Aphania tertiana McD.	Cot	Muskwa River	1
Archips persicana Fitch	Le, W, D, Cot, Bi	Peace River Fort Nelson Liard River	8
Archips rosana Linn.	W	Mile 174	1
Arge clavicornis (F.)	D,Bi	Peace River Fort Nelson Liard River	15
Argyrotaenia tabulana Free.?	Pl	Hudson Hope	1
Brephos infans Moesch.	Bi Big	Moberly Lake Peace River	3
Campaea perlata Gn.	Sw, D, W, Bi	Peace River Fort Nelson Liard River	12
Caripeta angustiorata Wlk.	Pl	Hudson Hope	2
Cimbex americana Leach	W	Mile 56	1
Deuteronomos magnarius Gn.	Bi	Mile 338	1
Dioryctria reniculella Grt.	Sw	Mile 533	1

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE - continued

Insect	Host	Locality	No. of Collections
Dysstroma citrata Linn.	Le Big	Fort Nelson Liard River	2
Ectropis crepuscularia Schiff.	A, D, Big	Moberly Lake Peace River	2
Enargia infumata Grt.	A	Peace River Fort Nelson	2
Epicnaptera americana Harr.	D, W, A	Peace River Beatton River	4
Epinotia lindana Fern.	red osier dogwood	Liard River Hot springs	1
Epinotia medioplagata Wlshm.	W	Mile 443	1
Epinotia solandriana Linn.?	D Cot	Fort Nelson Liard River	2
Epirrita autumnata omissa Harr.	Saskatoon Big, D	Boulder Creek Liard River	3
Eucordylea atrupictella Dietz	Sw	Silver Sands Hudson Hope	2
Eufidonia notataria Wlk.	Pl	Hudson Hope	2
Eupithecia annulata Hlst.	Sw	Moberly Lake Liard River	2
Eupithecia filmata Pears.	Sw	Hudson Hope Crassier Creek	2
Eupithecia luteata bifasciata Dyar	Sb, Le Ba	Wolf Creek Fort Nelson Liard River	4
Eupithecia niphadophilata Dyar	Jc	Liard River	3
Feralia comstocki Grt.	Sw	Moberly Lake Peace River Hudson Hope	4
Feralia jocosa Gn.	Sw	Mile 85	1

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE - continued

Insect	Host	Locality	No. of Collections
Griselda radicana Wlshm.	Sw	Lynx Cr. Wolf Cr.	2
Hydriomena furcata Thun.	W,A	Peace River Fort Nelson Liard River	9
Hypagyrtis nubecularia Gn.	Bi Big	Fort Nelson	2
Hypagyrtis piniata Pack.	Sw	Liard River	2
Hyperetis amicaria H. - S.	D	Mile 79	1
Incisalia eryphon Bdv.	Pl	Hudson Hope	1
Itame anataria Swett	A,W,D, Big, Bi Prunus sp.	Peace River Fort Nelson Liard River	9
Itame loricaria Evers.	A, W, Cot Saskatoon	Peace River Fort Nelson Liard River	6
Lexis bicolor Grt.	Sw, Sb, Pl	Fort Nelson Liard River	6
Lygris xylina Hlst.	Big	Mile 449	1
Malacosoma disstria Hbn.	D	Progress Fort Nelson	2
Notolophus antiqua badia Hy. Edw.	Sb D	Fort Nelson	3
Pandemis canadana Kft.?	W Saskatoon	Peace River Liard River	3
Panthea spp.	Pl, Sb, Le	Hudson Hope Beatton River Fort Nelson Cassiar Road	5
Parasemia parthenos Harr.	clover	Mile 20	1
Parorgyia grisefacta (Dyar)	Sw, Sb Ba	Peace River Fort Nelson	4

DISTRIBUTION OF MISCELLANEOUS INSECT LARVAE - continued

Insect	Host	Locality	No. of Collections
Petrova albicapitana Busck	Pl	Fort Nelson	2
Plagodis phlogosaria approximaria Dyar	D	Mile 79	1
Protoboarmia porcelaria indicataria Wlk.	Sw, Le	Peace River Liard River	2
Selenia alciphearia Wlk.	D	Mile 73	1
Semiothisa neptaria Gn.	D	Mile 303	1
Spodolepis substriataria Hlst.	A	Mile 145	1
Syngrapha alias interalia Ottol.	Sw D	Liard River	3
Syngrapha selecta Wlk.	Sw	Mile 303	1
Syngrapha sp.	Sw, Sb W	Fort Nelson Liard River	7
Trichiosoma triangulum Kby.	A, W, D	Peace River Stony Lake	5
Zeiraphera diniana Gn.	Le	Liard River	3
Zenobia pleonectusa Grt.	A, Cot	Fort Nelson Liard River	4

DISTRIBUTION OF MISCELLANEOUS ADULT INSECTS

North Prince George District

Insect	Host	Locality	No. of Collections
Adalia frigida Schn.?	Pl, Sw, W, A, Big	Peace River Fort Nelson Liard River	5
Adoxus obscurus Linn.	D, Bi	Fort Nelson	2
Anatis ocellata mali Say	Sb, Pl	Beatton River Fort Nelson Liard River	3

DISTRIBUTION OF MISCELLANEOUS ADULTS INSECTS - continued

Insect	Host	Locality	No. of Collections
Anisocalvia 12-maculata Gebl.	Sw	Mile 330	1
Anisocalvia 14-guttata Linn.	Ba, D, Cot	Fort Nelson	3
Anoplodera sexmaculata Linn.	A	Mile 320	1
Anthaxia sp.	A	Mile 18	1
Asemum atrum Esch.	Pl, A	Liard River Fort Nelson	2
Buprestis nuttalli Kby.?	A	Mile 108	1
Cephaloon tenuicorne Lec.?	Pl	Mile 145	1
Chrysobothris sp.	A	Mile 45 Cassiar River	1
Chrysomela alnicola alnicola Brown?	D	Mile 290	1
Coccinella hieroglyphica tricuspis Kby.	Cot, Big	Mile 363	2
Coccinella nivicola monticola Muls.	Le	Wapiti River	1
Coccinella transverso-guttata Fald.	Pl, Sb, A, Big	Groundbirch Fort Nelson	4
Coccinella trifasciata Linn.	Big	Mile 363	1
Cyphon variabilis Thunb.?	Pl	East Pine	1
Dicerca sp.	Sw, Pl, A	Pouce Coupe Hudson Hope Peace River Fort Nelson	4
Dichelonyx backii Kby.?	Sw Pl	Hudson Hope Gold Bar Liard River	4
Dyslobus sp.	W	Boulder Creek	1

DISTRIBUTION OF MISCELLANEOUS ADULT INSECTS - continued

Insect	Host	Locality	No. of Collections
Epuraea avara (Rand.)	Saskatoon	Boulder Creek	1
Evodinus vancouveri Csy.	W	Lynx Cr.	1
Hippodamia 13-punctata tibialis Say	Pl	Mile 108	1
Hylobius confusus Kby.	Ba, Cot	Fort Nelson	2
Hylobius pinicola (Coup.)	Le	Mile 55 Cassiar Road	1
Lepyrus sp.	A	Mile 421	1
Lucidota sp.	Le	Liard River Mile 55 Cassiar Road	2
Magdalis sp.	Pl	Liard River	2
Melanophila drummondi Kby.	Sb, Sw	East Pine Mile 119	2
Mulsantina sp.	Pl, Sw, Ba, Big	Peace River Fort Nelson Liard River	12
Mulsantina n.s.	Sw, Pl	Hudson Hope Liard River	3
Mulsantina hudsonica Cay.	Sw, Pl	Peace River Hudson Hope Liard River	4
Neoclytus muricatulus Kby.	Sw	Hudson Hope	1
Orsodacne atra Ahr.	Saskatoon	Boulder Creek Mile 18	2
Ostoma nigrina Csy.	Pl	Mile 56	1
Pidonia scripta Lec.	Sw	Hudson Hope	1
Podabrus sp.	Sb, Pl D, A	Peace River Fort Nelson Liard River	6
Stenotrachelus aeneus F.	Sw	Mile 64	1

DISTRIBUTION OF MISCELLANEOUS ADULTS INSECTS - continued

Insect	Host	Locality	No. of Collections
Syneta hamata Horn?	W, Bi	Peace River	2
Syneta pilosa Brown?	Sw, Le Ba	Fort Nelson	5
Xylotrechus undulatus Say	Cot	Muskwa River	1

STATUS OF FOREST DISEASES

Important Diseases

Red Belt

Damage typical of the "Red Belt" condition was noted at the 3,000 foot level, Mile 481 Alaska Highway. Lodgepole pine trees in a one-quarter mile long swath on the southeast side of the valley were affected.

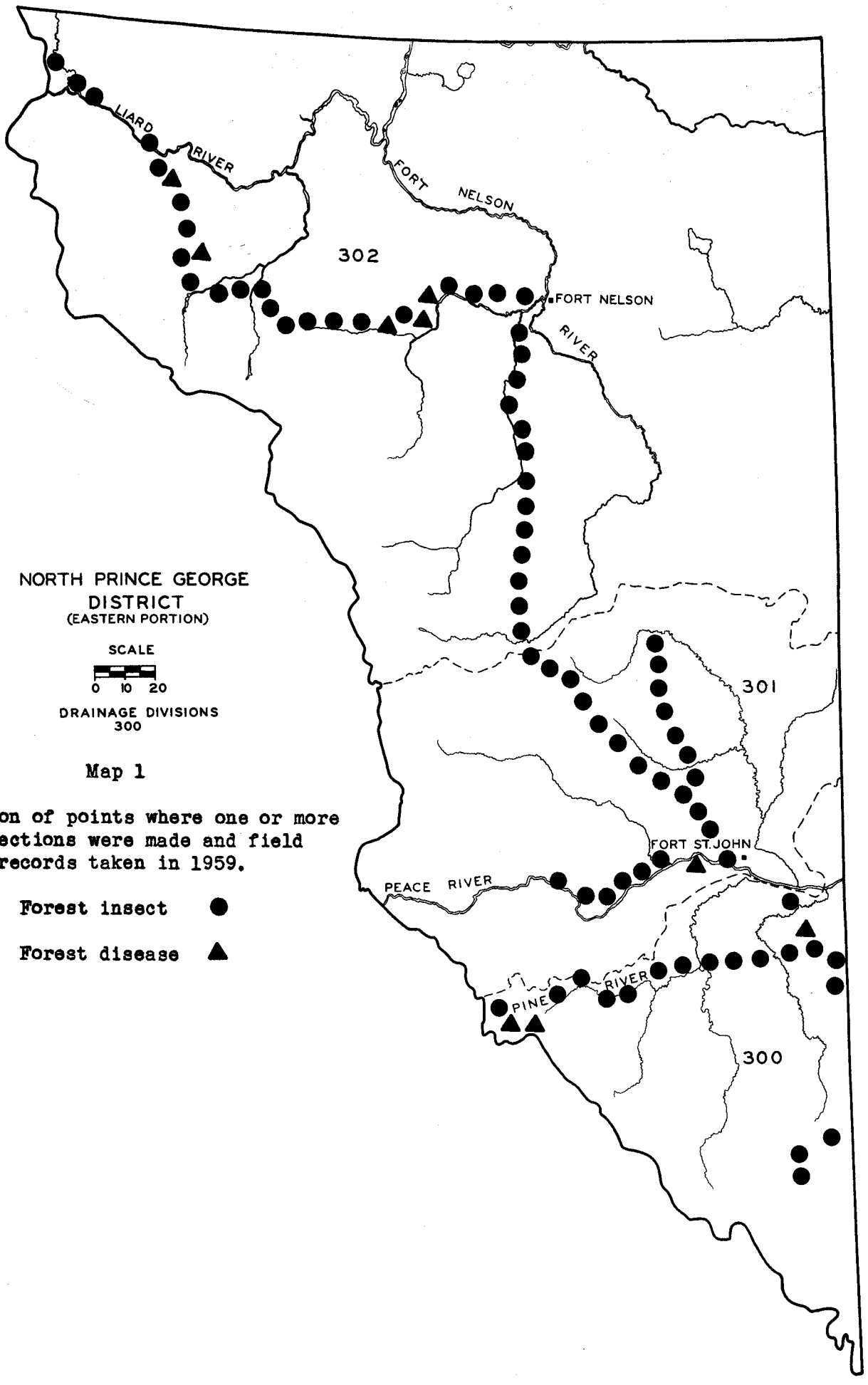
Two other patches of winter-damaged pines at the same elevation were noted at Mile 471 Alaska Highway. There, approximately 150 trees scattered in groups on the northwest side of the valley and a group of 50 trees on the northeast slope were damaged.

Exotic Plantations

On June 4th the exotic plantation at Groundbirch (XP51) was examined. Persons unknown had cut down two lodgepole pine trees on the plantation site which resulted in damage to two seedlings. Two other were browsed by either deer or rodents. A caterpillar tractor had been through the front edge of the plot knocking down the two front corner posts and the track of the tractor had crushed five seedlings. No insects or disease agents were found.

Other Noteworthy Diseases

Host	Organism	Locality (mileposts) Alaska Highway	Remarks
Birch, white	Tubercularia vulgaris Tode ex Fr.	343	canker disease
Fir, alpine	Peridermium holwayi Syd.	353	needle rust
Pine, lodgepole	Coleosporium asterum (Diet.) Syd.	Dawson Creek	needle rust
	Peridermium harknessii J. P. Moore	353	gall rust
Willow	Melampsora epitea Thüm.	450	foliage rust



NORTH PRINCE GEORGE
DISTRICT
(EASTERN PORTION)

SCALE

0 10 20

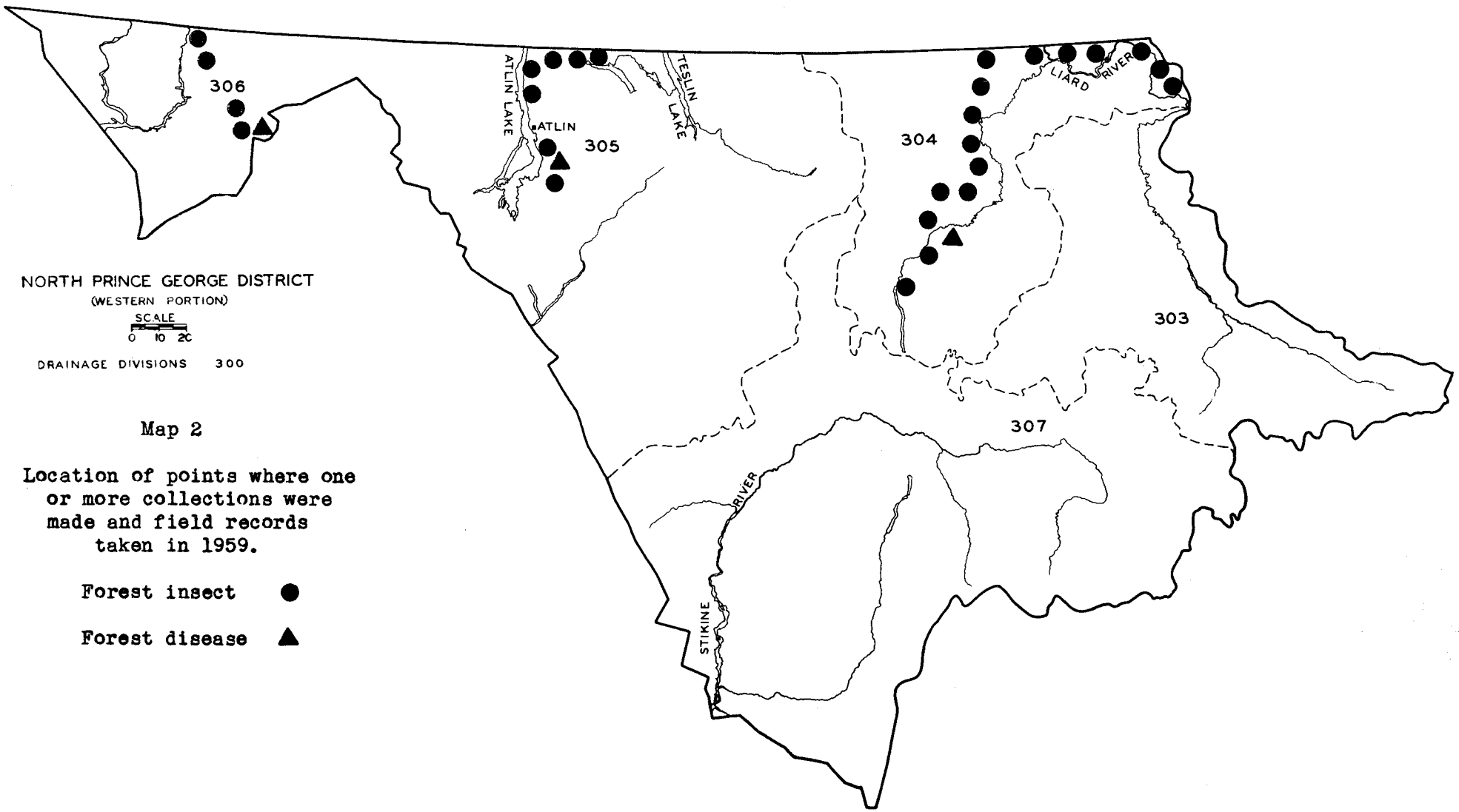
DRAINAGE DIVISIONS
300

Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲



NORTH PRINCE GEORGE DISTRICT
(WESTERN PORTION)
SCALE
0 10 20

DRAINAGE DIVISIONS 300

Map 2

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲

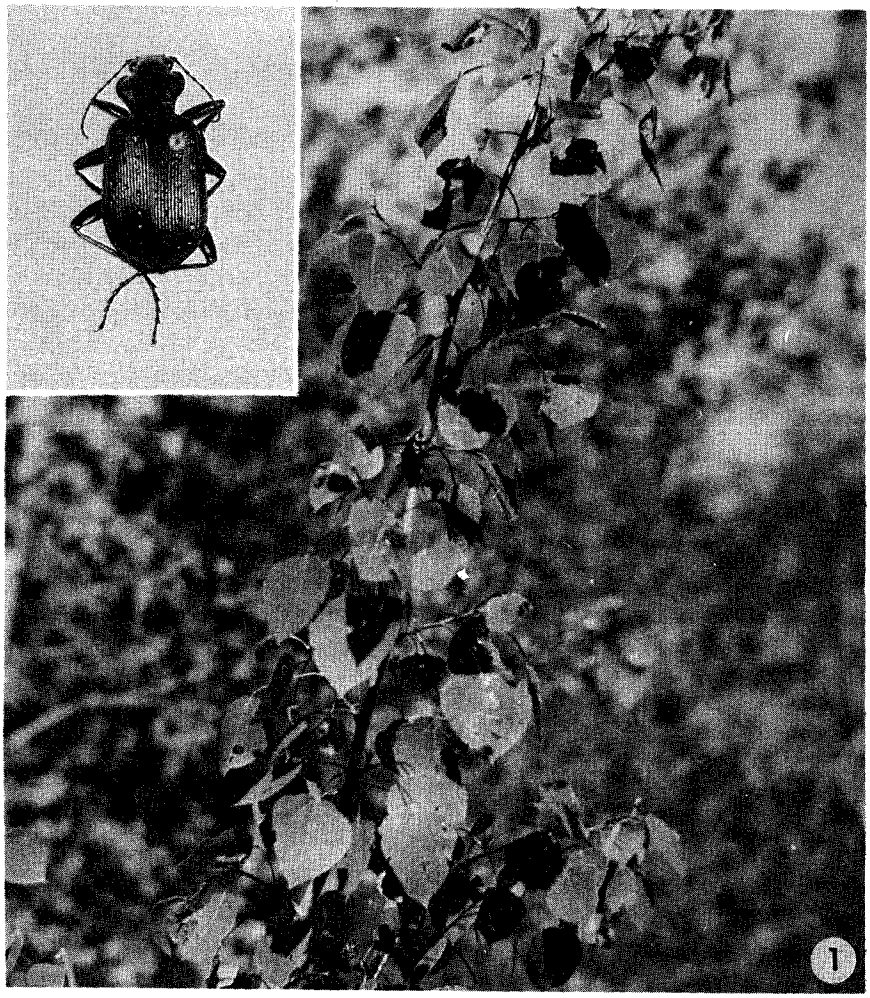


Figure 1. Calosoma frigdum Kby., a predator of the Bruce spanworm, Operopthera bruceata Hlst. Little Prairie, North Prince George District, June 2, 1959. T. A. D. Woods.

ANNUAL REPORT OF FOREST BIOLOGY RANGER

for

YUKON DISTRICT

1959

FOREST BIOLOGY SURVEY

YUKON DISTRICT

1959

J. Y. Obana

INTRODUCTION

The Forest Insect and Disease Survey in the Yukon Forest Biology Ranger District began on June 26 and terminated on August 21. As in the past years, only the areas accessible by roads in Yukon Territory and Atlin Ranger District were surveyed. However, aerial flights, through the courtesy of the Yukon Forestry Division, were made over some of the more heavily timbered areas in the Yukon. A house trailer stationed at the Yukon Forestry Division in Whitehorse was used as headquarters.

Table 1 shows the host trees and the number of insect and forest disease collections made from each. Map 1 shows the localities where collections and field records were taken.

Table 1

Collections by Hosts

Yukon District - 1959

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest disease
fir, alpine	3	-	alder, mountain	9	-
hemlock, western	6	-	alder, Sitka	8	-
juniper, common	3	-	aspen, trembling	12	-
larch, eastern	3	-	birch, dwarf	9	-
pine, lodgepole	26	2	birch, water	1	-
spruce, black	8	1	birch, white	5	-
spruce, Sitka	3	-	cottonwood, black	7	1
spruce, white	45	3	poplar, balsam	4	-
			willow	28	5
			miscellaneous	4	3
			Total	87	9
Total	97	6	Grand total	184	15

STATUS OF INSECTS

Spruce Seedworm, Laspeyresia youngana Kft.

Nearly all white spruce stands had a very heavy crop of cones in 1959 and cone samples were taken at four localities. The samples were all collected in early August and only the larvae of the spruce seedworm were present in the infested cones. A sample consisted of 50 cones picked at random from one tree. Table 2 shows the percentage of infested cones.

Table 2

Percentage of White Spruce Cones Infested by the Spruce Seedworm, Yukon District, August, 1959.

Locality	Percentage infested
McKee Creek, B. C.	46
Mile 867, Alaska Highway, Y. T.	26
Mile 976, Alaska Highway, Y. T.	28
Carcross, Y. T.	74

An Engraver Beetle in Lodgepole Pine, Ips sp.

Only a few scattered lodgepole pine trees near the Minto sawmill were attacked in 1959. However, during the past few years a number of trees have been killed. Most of the beetles attacking the living trees probably emerged from the slash and slabs from the sawmill.

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

This insect continued to heavily defoliate trembling aspen trees in the infestation three miles north of Carmacks. The area of the infestation has increased and now covers an estimated 500 acres. The average defoliation was estimated to be about 70 per cent.

Light to moderate defoliation of trembling aspen trees was caused by this insect in the infestation at Mile 1205 Alaska Highway, Y. T.

The percentage of parasitism appeared to be very high. Most of the moths had emerged when both areas were surveyed in early July.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The aspen leaf-miner infestation in the Watson Lake District increased in 1959 and appeared to be spreading westward along the Alaska Highway. Two

permanent sample plots were established in 1959, one at Watson Lake and the other at Rancheria River. Two 12-inch branches were cut from each of five trees at each plot, and the leaves examined. Tables 3 and 4 show the results of the examination of leaf samples taken at the two plots.

Table 3

Percentage of Aspen Leaf Surfaces with Mines, and Number of Aspen Leaf-miner Adults Produced per Leaf Surface at Two Plots, Yukon District, August, 1959.

Location	Percentage leaf surfaces with mines	No. of adults produced per leaf surface
Watson Lake	54	0.28
Rancheria	28	0.13

The adult emergence indicates that infestations may be expected to continue in 1960.

A 100-cocoon sample was obtained at each plot to determine mortality occurring at this stage. The results are shown in Table 4.

Table 4

Percentage Mortality of Aspen leaf-miner Cocoons Due to Parasites and other Causes at Two Sample Plots, Yukon District, 1959.

Location	Percentage mortality in cocoon stage	
	Parasites	Other causes
Watson Lake	25	4
Rancheria	33	6

A Lodgepole Pine Weevil, Pissodes sp.

An undetermined species of Pissodes was found infesting the leaders of reproduction lodgepole pines in the area around Whitehorse, Y. T., Mile 774 Alaska Highway, B. C. and Mile 10 Atlin Road, Y. T. Although the infestation was light, it had increased considerably since last year. Dead leaders were also observed in reproduction pine stands in other areas in the Yukon but the damage was very light.

Birch Leaf-rollers, Rheumaptera spp.

The birch leaf-roller population in the Dawson area continued to decline in 1959. Defoliation was light. The two species of Rheumaptera found in the area are R. hastata L. and R. albodecorata Blckmre.

Willow Leaf-miner, Lyonetia saliciella Busck

In the infestation at McKee Creek, west of Atlin, B. C. the population remained unchanged in 1959. The leaves of willow bushes in an area of about 250 acres were severely mined.

Black-headed Budworm, Acleris variana (Fern.)

Very few larvae were collected in 1959 and the population was at a low level in all areas in the Yukon.

Round-headed Borer, Monochamus sp.

Although adult Monochamus sp. have been seen at various localities, no evidence of this beetle's activities has been found in any of the 1958 fires. Lodgepole pine and white spruce trees in 1958 burns at Mile 710, Alaska Highway, Y. T., Mile 756 Alaska Highway, B. C., Mile 18 Atlin Road, Y. T. and Squanga Lake, Y. T. were examined and no infested trees were found.

STATUS OF FOREST DISEASES

Blister Rust on Lodgepole Pine

Cronartium comandrae Peck was found infecting reproduction lodgepole pine trees at Mile 660 to 664 Alaska Highway, Mile 830 Alaska Highway, Mile 905 Alaska Highway and Mile 2 Mayo Road, Y. T. Although infection was light, the rust was found in all reproduction pine stands examined. Dead pine trees, presumably killed by this rust, have been detected in all reproduction pine stands in the Whitehorse District.

Needle Rust on White and Black Spruce

Witches' brooms caused by Peridermium coloradense (Diet.) Arth. & Kern continued to cause light damage in the District.

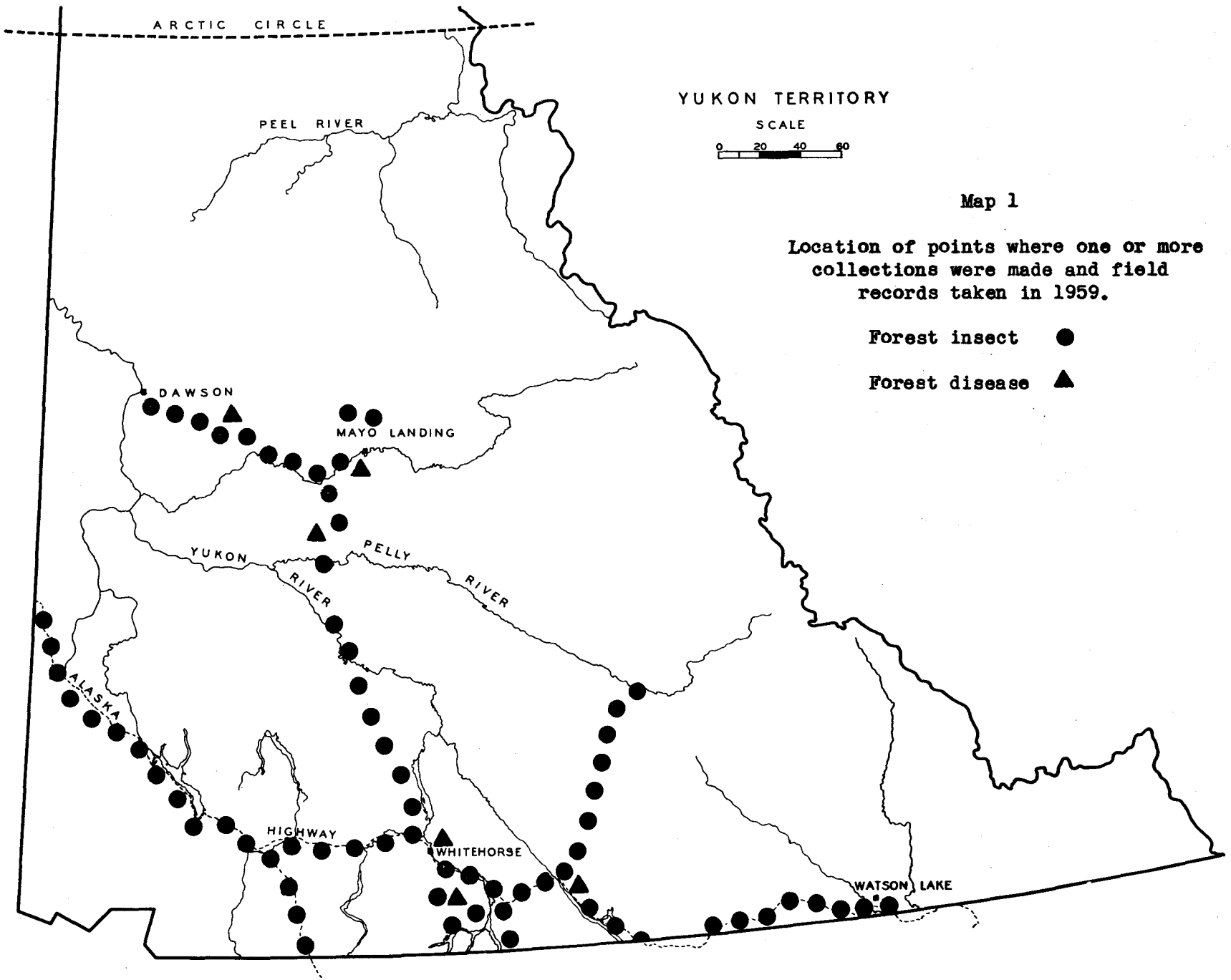
Hemlock canker

Cankers on the underside of western hemlock branches were collected by Mr. A. Funk at Mile 42 Haines Road. An unidentified cerambycid beetle was also found and may have chewed the bark off the branches, introducing infections.

Other Noteworthy Diseases

1959

Host	Organism	Locality	Remarks
Comandra livida	Cronartium commandrae Peck	Mi. 830 Alaska Highway, Y. T.	C. livida is the alternate host of this pine blister rust.
Picea glauca	Chrysomyxa ledicola Lagerh.	Miles Canyon, Whitehorse	Rust fungus causing yellowish needle discoloration and foliage drop.
Picea mariana	Chrysomyxa ledicola Lagerh.	Little Salmon Lake, Y. T.	Rust fungus causing yellowish needle discoloration and needle drop.
Populus trichocarpa	Taphrina populi-salicis Mix	Mi. 38, Haines Road, B. C.	Causes leaf blister
Salix sp.	Rhytisma salicinum (Pers.) Fr.	Mi. 177, Mayo Road, Y. T.	Causes thick tar spots on leaves



Map 1

Location of points where one or more collections were made and field records taken in 1959.

Forest insect ●

Forest disease ▲