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ANNUAL DISTRICT REPORTS  
FOREST INSECT AND DISEASE SURVEY  
BRITISH COLUMBIA

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 BRITISH COLUMBIA

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ANNUAL DISTRICT REPORTS  
FOREST INSECT AND DISEASE SURVEY  
BRITISH COLUMBIA

1961

R. L. Fiddick

FOREWORD

Survey work was somewhat limited in several districts in 1961. Mechanical failure of the survey boat necessitated a more restricted program in South Prince Rupert. Sickness and a vacant ranger position hampered the work in the South and North Prince George districts.

A total of 5,207 forest insect collections and 662 forest disease collections was submitted to the Victoria and Vernon laboratories by ranger personnel. Insect and disease collections however constituted only part of the field work in which rangers were involved.

In early spring and fall detailed, time consuming projects such as damage appraisal, pupal sampling and egg counts and defoliation estimates in infestations occupied considerable field time.

Serious insect problems in 1961 included the infestation of saddle-backed looper, Ectropis crepuscularia Schiff., at Kitimat. Aerial spraying was carried out in this area to prevent excessive tree mortality. The pine butterfly infestation in Cathedral Grove between Parksville and Alberni was also sprayed. The grey forest looper, Caripeta divisata Wlk., a previously unimportant insect, was discovered in outbreak proportions in the Zymoetz River Valley near Terrace. Douglas-fir tussock moth populations increased in isolated areas in the Kamloops Forest District. The green-striped forest looper infestations on Vancouver Island collapsed after causing some damage in 1960.

Forest disease surveys were more demanding of the ranger's time in 1961 than in previous years.

In 1960 a Melampsora rust indistinguishable from Melampsora pinitorqua Rostr., the cause of pine twist rust in Europe, was discovered infecting seedling ponderosa pine at Telkwa in North Central British Columbia. (Ziller, W. G. 1960 Pine twist rust (Melampsora pinitorqua) in North America. Plant Dis. Repr. 45(5): 327-329). European white poplar, Populus alba L., a known alternate host of this rust in Europe was present in this nursery and was suspected of being the carrier of the rust and possible source of introduction.

These circumstances led to a major program in 1961 in an effort to determine the distribution of European white poplar in the Province. Ranger personnel recorded and examined white poplar and associated hard pines wherever they occurred. Usually two examinations were made in each case, one in the summer and another in the fall.

In only one instance was a Melampsora infection on white poplar found. This was at Hope, B. C. It was not possible to connect this rust to that causing the pine infection at Telkwa because M. pinitorqua can not be distinguished from some other native poplar rusts in its uredial and telial stages.

A survey to determine the incidence of Poria root rot on two different site types in young Douglas fir stands on Vancouver Island occupied two rangers during the month of October.

The introduction of exotic species into the province has increased many fold, particularly in the post war years. The possible introduction of foreign diseases with this material and the need for assessing the resistance of the introduced trees to native diseases and insects has been met by a regular examination of this material. Each year a representative sample of the plantations are carefully examined for insects and disease signs and symptoms by the forest insect and disease survey rangers.

Service and extension calls increased in 1961. A total of 99 calls resulted in field investigations which occupied 440 hours of ranger's time. Most of these extension calls were in the areas of Vancouver Island, Fraser Valley, and interior centers of concentrated population.

Forest insect and tree disease collections for each ranger district by various agencies are listed in Table 1.

Table 1

Forest Insect and Forest Disease Collections  
by Agencies

British Columbia and Yukon - 1961

Personnel involved		South Vancouver Island	North Vancouver Island	South Vancouver	North Vancouver	South Prince Rupert	West Prince Rupert	East Prince Rupert	East Kamloops	Central Kamloops	West Kamloops	West Nelson	Central Nelson	East Nelson	South Prince George	West Prince George	North Prince George	Yukon
Forest Biology Rangers Independently	Forest Insect	426	358	314	403	63	315	248	341	272	336	345	325	422	157	359	41	441
	Forest Disease	38	17	43	44		49	55	26	108	12	14	25	23	4	30		174
Forest Biology Rangers with Forest Service Personnel					8				7				7					6
Forest Service Personnel Independently		45	25	15	34	2	9	18	5	5	1	1		1		3		1
Other Co-operators		623*	12	13	2	3	11	3	2	1								1
Totals		1,132	412	385	447	68	384	324	381	386	349	360	357	446	161	392	42	622

\* Includes collections from light trap at Langford.

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1961

VANCOUVER FOREST DISTRICT

VANCOUVER ISLAND SECTION

FOREST INSECT AND DISEASE SURVEY

VANCOUVER FOREST DISTRICT

VANCOUVER ISLAND SECTION

1961

D. G. Collis

INTRODUCTION

The two rangers mainly responsible for forest insect and tree disease detection on Vancouver Island in 1961 were D. Collis in the South Vancouver Island District and N. E. Alexander in the North Vancouver Island District. The survey was hampered to some extent by forest closures.

The green-striped forest looper population on the West Coast all but collapsed and egg counts show that pine butterfly populations were drastically reduced. Fir engraver beetles were active in grand fir trees and tree mortality continued. The oak looper, in infestation around Christmas Hill just north of Victoria, intensified its feeding and defoliation was severe over a larger area than in 1960.

FOREST INSECT AND DISEASE SURVEY  
SOUTH VANCOUVER ISLAND DISTRICT

1961

## FOREST INSECT AND DISEASE SURVEY

## SOUTH VANCOUVER ISLAND DISTRICT

1961

D. G. Collis

## INTRODUCTION

The field season commenced in April and finished at the end of October. Insect sampling was initiated in mid-May and completed by the end of August, with the remainder of the season devoted to plot work, egg counts and root disease survey. Table 1 lists all the collections made in the South Vancouver Island District by hosts of which 404 were made by the writer. The remainder were submitted by various co-operators and the Langford Insectary staff. A total of 38 disease samples were submitted for study and identification. The distribution of collections is shown on Map 1.

Table 1

## Collections by Hosts

South Vancouver Island District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, Port Orford		1	Apple	3	
Cedar, western red	38		Arbutus	15	
Cedar, yellow		1	Ash	2	
Cypress	4		Alder, red	14	
Douglas fir	173	3	Cascara	5	
Fir, amabilis	23		Cherry	2	
Fir, grand	12	2	Cottonwood	4	2
Hemlock, mountain	1		Dogwood	11	
Hemlock, western	167	6	Elderberry, blue	1	
Larch, European	2	5	Elm	2	
Pine, jack		3	Hawthorn	2	
Pine, lodgepole	15	1	Maple, broadleaf	14	
Pine, Monterey		1	Oak, Garry	105	
Pine, ponderosa	3	3	Plum, wild	2	
Pine, red		1	Populus spp.	9	7
Pine, shore	2		Willow	20	1
Pine, western white	11	1	No host	324	1
Spruce, Colorado		1	Miscellaneous hosts	86	
Spruce, Sitka	22	1			
Spruce, white	1				
			Total	621	11
Total	474	27	GRAND TOTAL	1,095	38

Green-striped Forest Looper, Melanolophia imitata Wlk.

Larval feeding by this insect caused considerable defoliation and some tree mortality along Vancouver Island's west coast during 1960. However natural control factors resulted in a low larval population in 1961. The large numbers of 1960 larvae produced a fairly low overwintering pupal population <sup>1/</sup> and the spring moth emergence was very low. Seventy-five pupae were collected in early May 1961, from duff in the Millar Channel area north-east of Ahousat. Twenty-five of these were left in duff, in a cage at Tofino and the remaining 50 caged outside at the Langford Insectary. The Tofino cage was checked every day for a long period by the wife of the British Columbia Forest Products resident forester, but not a single adult emerged. These pupae were examined later and eight had been killed by parasites, four were damaged and died and the remaining 13 died of undetermined causes. From the caged pupae at Langford, four Melanolophia adults and 12 parasite adults eventually emerged. The parasites were mainly Gravenhorstia alaskensis Ashmead and Aoplus cestus Cress. If these results could be considered as typical only about five per cent of the 1960 pupae produced adults in 1961.

While searching in the duff for pupae on May 5, small orange fingers about one half inch long were observed protruding out of the duff. It was discovered that in every case these originated from a Melanolophia pupa. Several of these small pathogens were collected and later identified as Cordyceps militaris (Fr.) Link by Dr. W. Ziller. The small spore horns were plentiful in early May but appeared only in shaded locations at the end of the month.

#### Adult Flight

The adult flight was light in the areas checked and is believed to have been similarly light over the entire coast. The adult moth is quite an erratic flyer and when disturbed in flight will sometimes dive into the duff and prove extremely difficult to find. A maximum of five adults per chain were counted during the day. At night, using a Coleman gas lamp as an attractant, four adults appeared in five minutes, in the next five minutes no adults were attracted, and three in another five minutes for a total of seven adults in 15 minutes. The flight occurred at the end of May. At this time, the buds on hemlock and Douglas fir trees were open and foliage growth had started.

#### Egg Survey

The light moth flight was reflected in the small number of eggs found during an egg survey in June. Little positive information was thus gained about the moths egg laying habits. However it appears that the eggs are laid under moss and attached to the bark. On the foliage of twelve branches from two trees no eggs were found. The branch stems

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<sup>1/</sup> See Forest Insect and Disease Survey report, South Vancouver Island District, 1960.



were examined, and nine eggs were collected from 24 lineal feet of stem. One square foot sections of bark were cut from the tree trunk every ten feet, from d.b.h. to the top, and from 21 of these samples 10 eggs were found, all on the sections 50 feet or more above ground level and all under moss.

#### Larval Population

The reduction in larval numbers is clearly shown in Tables 2 and 3. The percentage of collections in the district containing larvae remained about constant, but the average number of larvae per sample decreased almost 5-fold. The reduction in the larval population is more clearly indicated in Table 3 where larvae from the same localities decreased almost 9-fold compared with 1960. Few of the field collected larvae were diseased and only six per cent were killed by parasites.

#### Damage

Larval feeding in 1961 was too light to be detected and 1960 defoliation, fortunately, was not generally severe in the South Vancouver Island District, although it occurred more generally than was realized in 1960. The areas where defoliation was still evident in 1961 includes Sydney Inlet just north of Hot Springs Cove and around Young Bay, the north and east sides of Flores Island, Obstruction Island, all of L493 on Millar Channel, both sides of Herbert Inlet to White Pine Cove, the east side of Fortune Channel and the lower Kennedy River. The damage consists mainly of top defoliation and crown thinning with some top kill on Obstruction Island and in L493 between Millar Channel and Herbert Inlet. Two plots were established in the latter area in the fall of 1960 and were re-examined late in 1961. A comparison of tree conditions is given in Table 4.

#### Summary

The population of the green-striped forest looper decreased to a low level in 1961. No defoliation is expected in the district in 1962. No tree mortality is expected as a result of defoliation in 1960.

Table 2

Number of Green-striped Forest Looper per Three-tree Beating Sample  
 Collected in the Respective Drainage Divisions of the  
 South Vancouver Island District, 1959 - 1961.

Drainage division	Total no. samples taken during larval period			No. samples containing green- striped forest looper			Average no. larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
001	40	18	10	1	4	2	1.0	1.0	1.0
002	75	85	114	13	16	10	3.2	3.8	2.4
003	52	48	76	33	13	34	11.5	11.0	4.9
004	16	31	0	5	5	0	2.8	1.4	-
005	51	71	74	40	59	44	46.5	58.9	11.2
Totals	234	254	274	92	97	90	24.9	35.8	7.6

Table 3

Number of Green-striped Forest Looper per Three-tree  
Beating Sample Collected at the Same Locations in the  
South Vancouver Island District, 1960 - 1961.

Location	Date 1960	No. larvae	Date 1961	No. larvae
Granite Creek (Nitinat River)	June 29	52	June 21	28
Henderson Lake	July 6	75	July 10	9
Lower Kennedy River	July 9	70	July 7	17
L624 Tofino Inlet	July 10	215	July 8	28
Robert Point (Meares Island)	July 11	80	July 7	4
Matlset Narrows	July 11	121	July 7	5
White Pine Cove	July 11	404	July 6	11
W. side Herbert Inlet	July 12	262	July 6	4
Bedingfield Bay	July 12	406	June 28	40
L. 493 Millar Channel	July 12	486	June 27	120
Shelter Inlet	July 12	71	July 6	6
Young Bay	July 12	147	July 5	4
N end, Sydney Inlet	July 13	58	July 6	0
Riley Cove	July 14	99	July 5	0
Totals		2,546		276

Table 4

Comparison of Defoliation and Top-kill Caused by the Green-striped Forest Looper in 1960 with Tree Conditions in 1961. South Vancouver Island.

Locality	<u>Per cent total defoliation</u>		<u>Per cent trees top-killed</u>	
	1960	1961	1960	1961
North of I. R.				
24 Millar Channel	32	14	4	10
Bedingsfield Bay	40	32	0	12

Pine Butterfly, Neophasia menapia Feld.

In 1960, adult butterflies were observed over a large portion of Vancouver Island with a very heavy flight occurring in Cathedral Grove. Egg counts made there in 1960 indicated that a larger population could be expected in 1961. Consequently a spray program was organized for 1961 to protect the high esthetic value of this overmature stand. This operation was carried out in June, 1961. When the adults commenced flying at the beginning of August, it was soon apparent that the Grove flight was just a fraction of what it had been in 1959 and 1960.

During the adult flight it seemed desirable to establish some basis for comparison between the different areas involved. Because of the butterflies' habit of fluttering around the tree crowns it is possible to roughly count the adults around any one tree. The method used was to pick a tree with the whole crown visible, then count rapidly the number of adults visible from the bottom to the top of the crown and then down again. The total was then divided by two. In each area, counts were taken from five trees and then averaged. Some of the counts are listed in Table 5. These figures are only a fraction of what would have resulted if counts had been made in Cathedral Grove in 1959 and 1960.

The number of adults increased in other localities compared with previous years and a more comprehensive egg survey was undertaken. The 1961 egg counts, along with the figures from past years are shown in Table 6. The results show that there should be no problem with this insect in 1962. No figures on larval parasitism were obtained, because where it had been possible to collect late instar larvae and pupae on the forest floor in 1960, very few were obtainable in 1961.

Defoliation was light in all areas where trees were felled for egg samples, but varied considerably between adjacent trees and by crown level. A few branches were up to 30 per cent defoliated while the rest of the tree showed almost no feeding. In Cathedral Grove on two adjacent trees one had suffered only five per cent defoliation in the upper crown and 25 per cent in the lower, while on the next tree the upper crown had lost 20 per cent of its needles through insect feeding and only six per cent in the lower crown.

Table 5

Average Number of Pine Butterfly Adults at Various Locations in the  
South Vancouver Island District, 1961.

Location	Average no. adults per tree
Register-MacMillan Park	21
North-West Bay, end Br. 143	12
Nanaimo Lakes, Br. M2	30
Nanaimo River, J 3 line	8
Copper Canyon, main rd. at C21	11

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

The volume of white pine killed by the mountain pine beetle continues to increase annually in the South Vancouver Island District with the heaviest mortality occurring south of Cowichan Lake. Another area of heavy kill is along the shores of Great Central Lake. Of 31 trees examined in two areas at the latter locality, seven were dead, 13 green infested and eight appeared healthy.

The Fir Engraver Beetle, Scolytus ventralis Lec.

Grand fir trees continued to die along the eastern side of Vancouver Island and mortality was particularly heavy in the Greater Victoria-Saanich Peninsula areas. Of a group of 35 grand fir trees near Sydney, 21 have been killed by the beetles and the remaining 14 trees all showed some signs of attack.

Removal of beetle killed grand fir trees in the Kinsman Gorge Park near Victoria was started in 1960 and has continued up to the present time with no indication that tree mortality is decreasing.

Two plots established in the Copper Canyon operation near Chemainus to record progressive tree mortality show that the kill there is gradual and probably a complex of over maturity, disease and insect attack. The annual inspection in the fall of 1961 showed that of 49 standing trees, one had died, two were dying, two had suffered top kill and one had very thin foliage. Of the two trees reported as dying, one had been placed in that category in 1960 and had been attacked by ambrosia beetles at that time.

Table 6

## Number of Sound Pine Butterfly Eggs.

South Vancouver Island, 1959, 1960, 1961.

Locality	Crown Section	1961 No. eggs per sq. ft.	1960 No. eggs per sq. ft.	1959 No. eggs per sq. ft.
Cathedral Grove	A	.23	11.25	10.73
	B	.42	10.14	9.74
	C	.15	23.31	4.23
	Totals	.25	15.14	7.44
Block 81 Cameron River	A	.16	.37	
	B	.31	.02	
	C	.16	.00	
	Totals	.21	.12	
Block 35 Cameron River	A	.00	1.45	
	B	.00	0.83	
	C	.12	1.31	
	Totals	.05	1.25	
Dunsmuir Creek, Nanaimo River	A	.14	3.72	
	B	.12	1.66	
	C	.00	.65	
	Totals	.09	2.14	
Copper Canyon	A	.00		
	B	.44		
	C	.06		
	Total	.17		
Nanaimo Lakes	A	.08		
	B	.21		
	C	.00		
	Total	.09		
Northwest Bay	A	.00		
	B	.51		
	C	.00		
	Total	.12		

Forest Tent Caterpillar, Malacosoma disstria Hbn.

A spot infestation of this insect occurred in Port Alberni between Third Avenue and the MacMillan, Bloedel and Powell River sawmill. In this small deciduous stand, many of the host trees were completely defoliated by June 13. The favoured host was hawthorn, but alder, maple and willow were also defoliated.

Douglas-fir Terminal Damage

Leader damage to Douglas fir plantations continued this season and showed a small increase over 1960 in four plots established that year (Table 7). If the figures from plot 1 are deleted, a considerable decrease is evident. Fortunately, 78 per cent of the damage at Bear Creek (Plot 1) was of the type where the leader tip only is missing and trees usually can soon overcome this condition. The agents responsible for this type of damage have not been determined but it is suspected that squirrels are removing the leader tips to eat the large terminal buds. When the whole or most of the leader is missing, the cause is often insect. Larvae of Dioryctria abietivorella (Grote) bore through the leader wall thus weakening it and then mine in the pith or cambium layer. It is often impossible to determine the exact cause of this type of damage once the leader is missing.

Table 7

Number of Douglas-fir Terminals Killed or Damaged by Various Causes.  
South Vancouver Island District, 1960, 1961.

Plot No.	Locality	No. Trees	Leaders killed or damaged	
			Fall 1960	Spring 1961
1	Bear Creek	94	18	46
2	Nitinat River	67	8	24
3	Shaw Creek	83	17	30
4	Above Bear Creek Camp	48	12	9
Total		292	55	109
Per cent			18.8	37.3

Silver-spotted Tiger Moth, Halisidota argentata Pack.

Unlike most insects, the silver spotted tiger moth remains active during the winter and its larval period is completed usually in May. The larvae are colonial feeders and make webs similar to those of the tent caterpillar with which they are often confused in late spring. The insects are easily separated because the Halisidota larvae are coniferous feeders while the others confine their activity to deciduous hosts. The number of webs increased nearly 5-fold compared with 1960 but defoliation was still very light. Table 8 demonstrates this increase over specified sections of road in the district.

Table 8

## Roadside Web Counts of Silver-spotted Tiger Moth Colonies.

South Vancouver Island District. 1959 to 1961.

Area surveyed	No. webs recorded			Webs per mile
	1959	1960	1961	1961
Victoria to Duncan	14	57	704	22.0
Duncan to Nanaimo	20	84	391	11.8
Nanaimo to Parksville	81	86	334	14.5
Parksville to Cameron Lk.	42	34	173	9.0
Duncan to Lake Cowichan	1	33	84	12.0
Lake Cowichan to Youbou	87	83	191	21.1

Oak Looper, Lambdina somniaria (Hulst)

The severe infestation in the Christmas Hill region north of Victoria continued in 1961. Feeding was intensified in the region bounded by Douglas Street, McKenzie Avenue, Quadra Street and Rogers Avenue to the point where the majority of oaks were completely stripped. Defoliation also occurred in appreciable area north of Rogers Avenue, east of Quadra and south of McKenzie Avenue, while light feeding took place west of Douglas Street.



The history of these outbreaks has been that while they are spectacular they subside after a few years and do little permanent damage to the oaks. Unfortunately this is not the case with the coniferous species intermingled in the stand. Douglas and grand fir trees have been severely defoliated and are dead or dying from 1960 feeding. Other Douglas fir were completely defoliated this year and will almost certainly die.

Larvae on Christmas Hill were present in uncountable numbers in 1961 and fed to some extent on all vegetation. Homes in the area became almost untenable because of the crawling larvae, webbing and falling frass. Insect mortality was fairly high; of one collection of 268 insects, 59 per cent died as larvae, 13 per cent as pupae and 28 per cent emerged as adults. Disease was the main factor in this mortality. This was the third year of high larval populations and natural control factors could destroy the infestation in 1962. Egg counts made in 1961 show an impressive total decline over the 1960 figures (Table 9). However, the low counts made near Rogers Avenue in 1960 produced a heavy larval population in 1961, so that considerable feeding may occur in 1962 unless other factors intervene.

Table 9

Number of Oak Looper Eggs per Half Square Foot of Moss from Six Oak Trees on Christmas Hill. South Vancouver Island District, 1960 and 1961.

Locality	Eggs found per half sq. ft.	
	1960	1961
Near Quadra Street	270	17
	520	40
	733	5
Near Rogers Avenue	26	12
	15	17
	19	3
Total	1,583	94

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Rather intensive sampling in suspected hemlock looper areas and regular sampling throughout the remainder of the district only produced 17 larvae from 13 locations.

Black-headed Budworm, Acleris variana (Fern.)

The low frequency which these larvae appeared in collections indicates that the population is remaining at a very low level. The average number of larvae per sample from 1958 to 1961 is 2.1, 1.8, 1.3, 1.0.

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

Only six of these geometrid larvae were found in 1961, compared with 87 in 1960.

Saddle-backed Looper, Ectropis crepuscularia Schiff.

One larvae of this species was found in 1961. In 1960, 22 were collected usually associated with Melanolophia imitata Wlk. and Nyctobia limitaria (Stkr.) on the West Coast. The agencies which diminished the Melanolophia population have apparently almost wiped out the other two species for the present.

Fall Webworm, Hyphantria cunea Harr.

This insect creates large unsightly webs on deciduous trees from mid summer on into the fall. In 1961, the feeding and web counts were the highest in many years. On some trees there were sufficient webs to join up so that whole trees were covered with webs and almost completely defoliated. Feeding was mostly restricted to the east coast of the District, north of the Malahat. The greatest number of webs were again evident just south of Ladysmith where 83 per mile were counted in 1960, and 167 in 1961 on the east side of the highway.

Balsam Woolly Aphid, Adelges piceae (Ratz)

No new areas of attack were located during 1961. The localized outbreak at Thetis Lake Park, Victoria, does not appear to have spread.

Satin Moth, Stilpnotia salicis (L.)

Two silver poplar trees were completely defoliated by satin moth larvae and all the other trees of this species examined in the Victoria area supported at least a few larvae.

A Weevil Damaging Fir Seedlings, Paraplinthus carinatus Boh.

During survival studies in Douglas fir plantations near Kennedy Lake, MacMillan, Bloedel and Powell River foresters discovered several seedlings which had been girdled or partly girdled either above or just below the soil level. One of the foresters involved had been trained in Germany and recognized the damage as similar to that caused in Germany by weevils. Careful examination of additional seedlings produced a few weevils which were identified as Paraplinthus carinatus Boh. Reported damage to date has been serious only in the Kennedy Lake plantation. Here, of 76 trees examined at random, 12 were completely girdled and 15 damaged to some extent. In the Franklin River Division 134 seedlings were examined in two plantations. Only one was dead from girdling and three were damaged. Inspections of other Douglas fir plantations near Kennedy Lake were negative.

A Weevil on White Pine, Scythropus elegans (Couper)

Noticeable feeding on white pine regeneration has occurred around the Cowichan Valley, the Koksilah area and near Port Alberni by this weevil. The damage is light, consisting mainly of chewed needle tips. Sufficient feeding has occurred however to give the trees a reddish tinge.

European Pine Shoot Moth, Rhyacionia buoliana (Schiff)

Many natural and planted pines in the district were examined in 1961. Only one pine shoot moth pupa was found at a nursery in Victoria. The trees had been sprayed and the pupa was dead.

## MISCELLANEOUS INSECTS

South Vancouver Island, 1961.

Insect	Host	No. of collections	Remarks
<u>Caripeta divisata</u> Wlk.	H, F, B, Pw	32	Looper, over whole district
<u>Choristoneura fumiferana</u> Clem.	H, F	2	Budworm, Alberni
<u>Epirrita autumnata</u> Gn.	H	7	Looper, Duncan, Alberni Bamfield
<u>Eupithecia</u> spp.	F, B, C	17	Looper, east side Vancouver Is.
<u>Gabriola dyaria</u> Tayl.	H	5	Looper, Alberni Inlet, Sooke
<u>Neocalcis californiaria</u> Pack	H, F, W	14	Looper, district wide.
<u>Neodiprion</u> spp.	F, H, Bg, Pl, S, C, Ba	38	Sawfly, district wide.
<u>Pikonema dimmockii</u> Cress.	Hm, S	5	Sawfly, Clo-oose, Tofino, Nanaimo
<u>Semiothisa</u> spp.	H, F, B, Pw	37	Loopers, district wide.

STATUS OF FOREST DISEASES

Important Diseases

An Outbreak of Cronartium comptoniae on Monterey and Bishop Pines.

Regular inspection by survey personnel uncovered a severe outbreak of Cronartium comptoniae Arth., the sweetfern blister rust on Monterey pine (Pinus radiata D. Don) in the North Vancouver Island District in May of 1961. <sup>1/</sup> This led to a thorough survey of the exotic pine plantations on Vancouver Island by forest pathologists.

In the South Vancouver Island District it was found that approximately 35 per cent of the 6,700 Monterey pines samples were infected as were 12 per cent of 2,200 Bishop pines (Pinus muricata D. Don) inspected.

Infection to date reached 98 per cent in one Monterey pine plantation and 75% in a Bishop pine plantation. Mortality has been less than one per cent, but, as most of the infections occurred on the main stem of these small diameter trees, considerable girdling and subsequent mortality may be expected.

The disease is spread by wind borne basidiospores from the alternate host Myrica gale L. making direct control impractical. This places the future of these exotic pine species as productive forest trees in a doubtful category. Table 10 shows the number of Monterey and Bishop pine plantations infected.

Table 10

Plantations of Monterey and Bishop Pines Infected by Cronartium comptoniae in the South Vancouver Island District, 1961.

Host	Total plantations examined	No. of plantations in infection classes				
		0	1-10	11-50	51-75	76-100
Monterey pine	8	1	4	1	1	1
Bishop pine	7	2	2	2	1	

<sup>1/</sup> See Status of Forest Disease in the North Vancouver Island report, 1961.

A Possible European Introduction, Melampsora pinitorqua Rostr.

Because of this threat to native pines, European white poplar and adjacent pines were closely examined in 1961. The inspections made by localities are listed in Table 11.

Table 11

Number of European White Poplar Areas Examined for Pine Twist Rust in Various Locations. South Vancouver Island District, 1961.

Locality	No. examinations	Results
Victoria	18	negative
Mill Bay	1	negative
Duncan	6	negative
Cowichan Lake	10	negative
Ladysmith	1	negative
Parksville	2	negative
Coombs	1	negative
Port Alberni	1	negative
Total	41	

A Dieback of Hemlock

Samples of a dieback disease on western hemlock in Cathedral Grove were found to be infected with a fungus, Diplodina sp. This is a new record for this pathogen on hemlock in British Columbia. Previously it had been identified only from willow in the province.

### Exotic Plantations

Fourteen plantations were examined by the writer during 1961. Anything of interest pertaining to the development of these trees is listed below.

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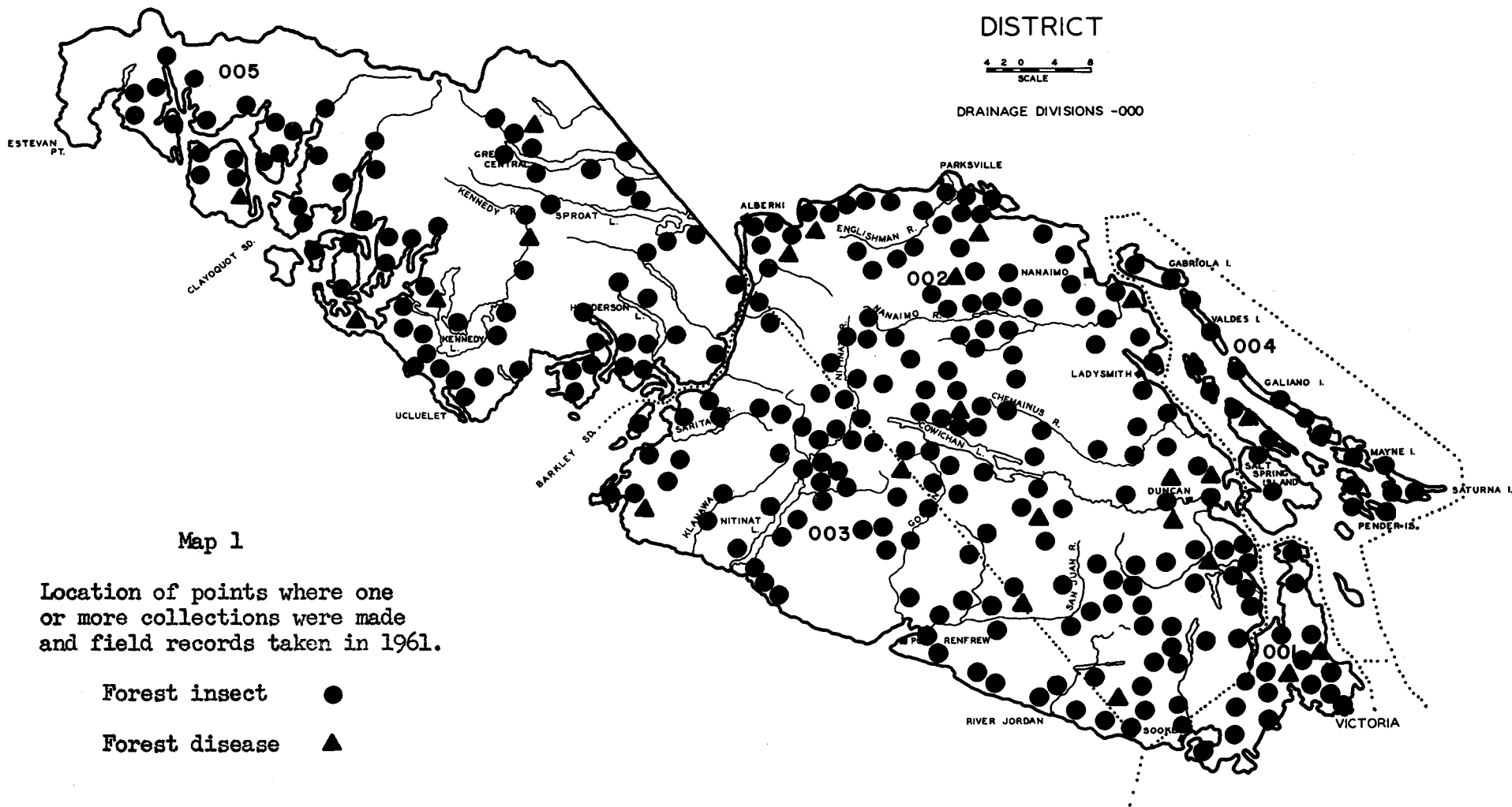
XP no.	Location	Exotic species	Remarks
28 A, B, & C	Robertson River	European larch	Most trees doing well but flat headed borer larvae still causing some damage.
31	Sutton Creek	White spruce	Trees healthy, growing slowly. Light <u>Adelges cooleyi</u> (Gill.) attack.
33	Sutton Creek	Jack pine	Mainly in good condition but a light needle disease infection; as yet undetermined.
63	Youbou	Ponderosa pine	Nineteen trees have died since the last inspection three years ago. A very severe steep rocky site.

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# SOUTH VANCOUVER ISLAND DISTRICT

4 2 0 4 8  
SCALE

DRAINAGE DIVISIONS -000

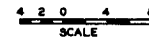


Map 1

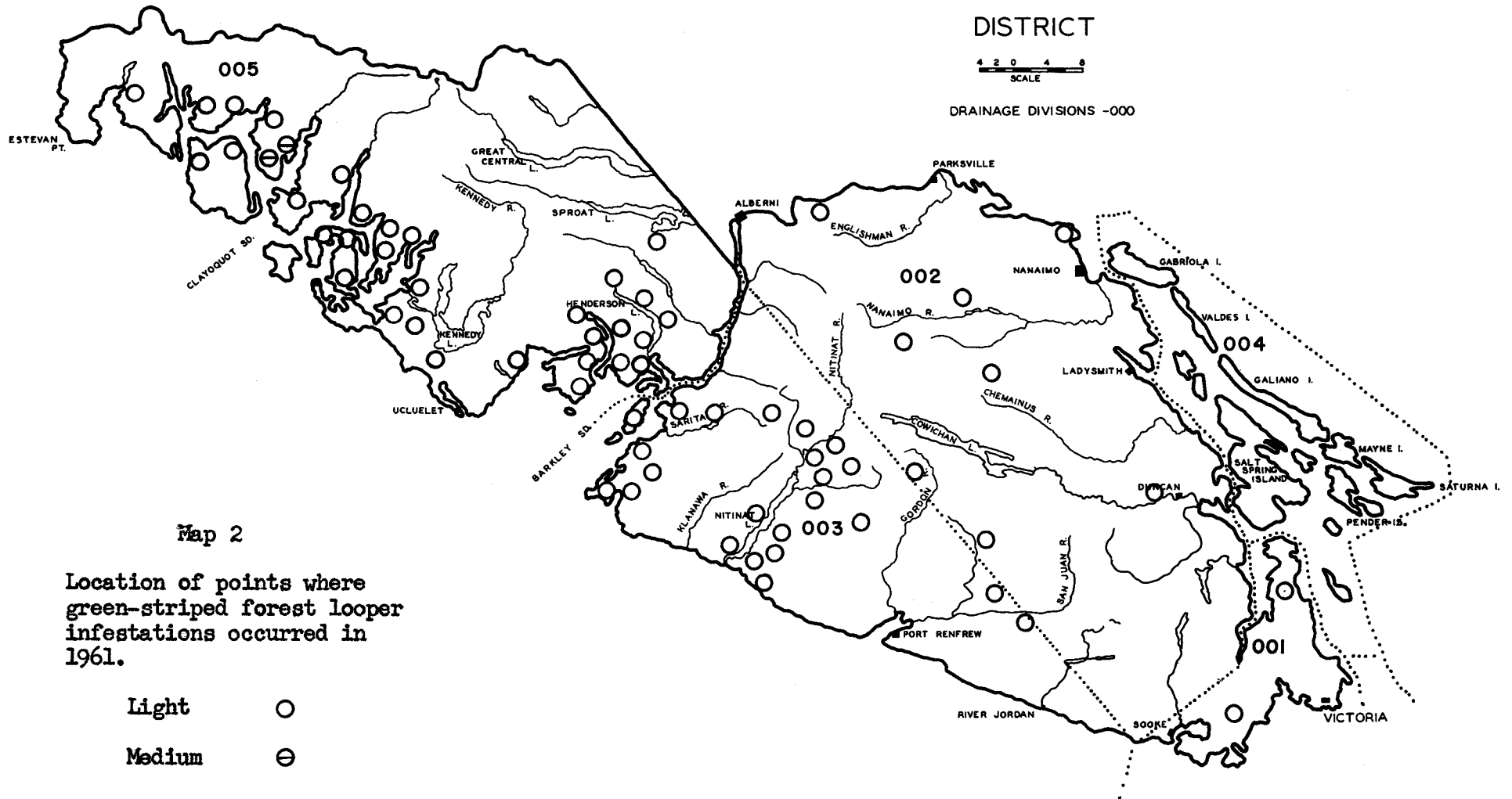
Location of points where one or more collections were made and field records taken in 1961.

- Forest insect     ●
- Forest disease    ▲

# SOUTH VANCOUVER ISLAND DISTRICT



DRAINAGE DIVISIONS -000



Map 2

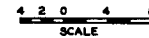
Location of points where  
green-striped forest looper  
infestations occurred in  
1961.

Light ○

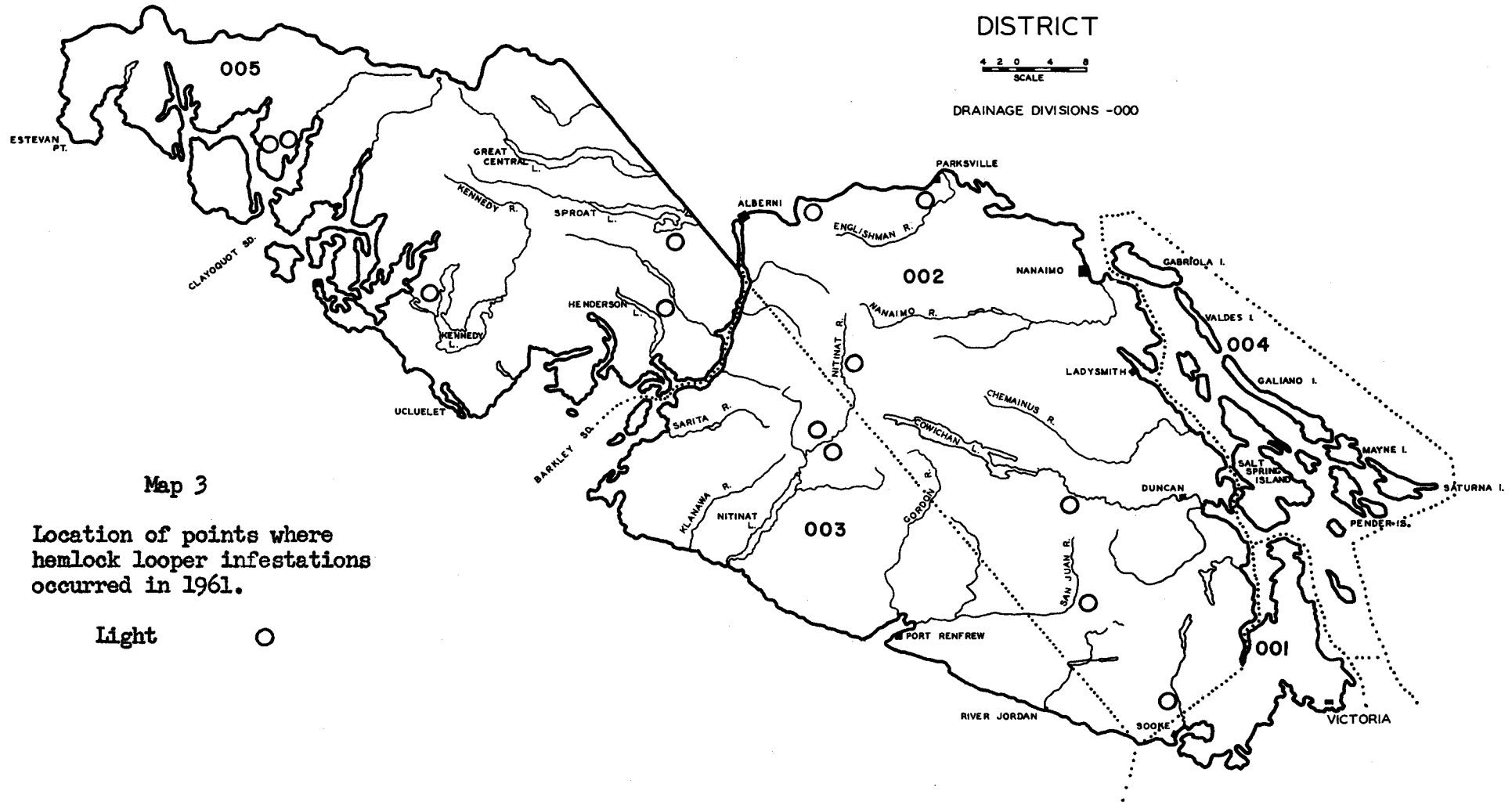
Medium ⊙



# SOUTH VANCOUVER ISLAND DISTRICT



DRAINAGE DIVISIONS -000



Map 3

Location of points where  
hemlock looper infestations  
occurred in 1961.

Light ○

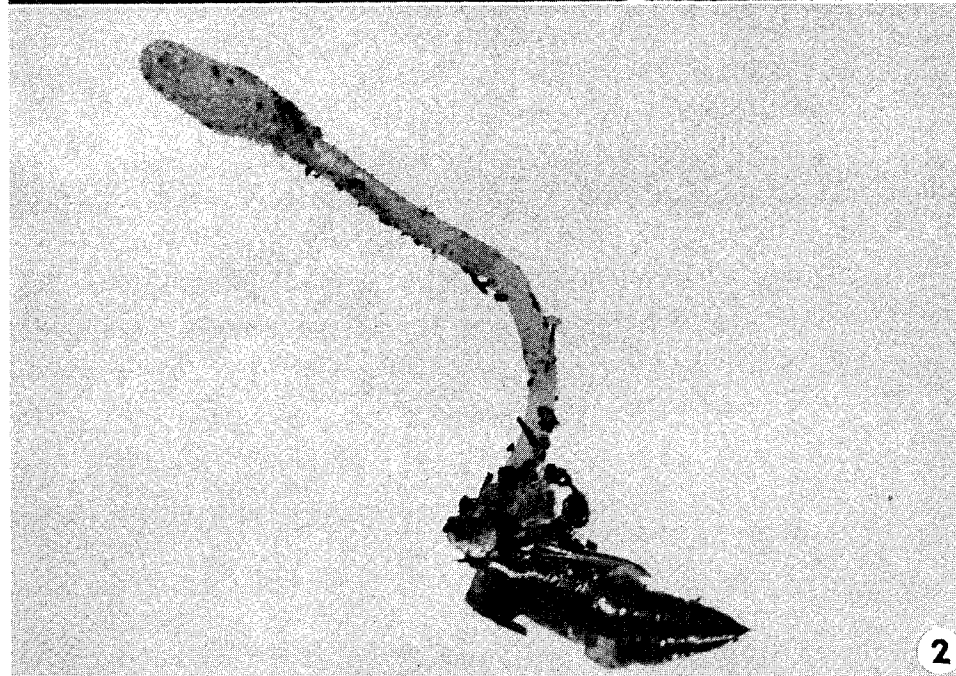


Fig. 1. Cordyceps militaris (Fr.) Link as it appears on the forest floor. Near Tofino, South Vancouver Island District, May 4, 1961. A. Craignyle.

Fig. 2. Cordyceps militaris (Fr.) Link showing development from a Melanolophia imitata Wlk. pupa. South Vancouver Island, May 4, 1961. A. Craignyle.

FOREST INSECT AND DISEASE SURVEY

NORTH VANCOUVER ISLAND DISTRICT

1961

## FOREST INSECT AND DISEASE SURVEY

## NORTH VANCOUVER ISLAND DISTRICT

1961

N. E. Alexander

## INTRODUCTION

The Forest Insect and Disease Survey of northern Vancouver Island commenced on May 10 and was completed on October 20. A total of 395 forest insect and 17 forest disease collections was made during this period. Table 1 lists collections by hosts and Map 1 shows the district and drainage boundaries and the locations of points where collections were made.

The green-striped forest looper infestation on the west coast collapsed prior to the 1961 larval season. There were no known areas of serious defoliation by this insect during the feeding season.

Some areas remained unsurveyed during the whole of the larval feeding period because of British Columbia Forest Service and Company fire season closures. This is reflected in both the over-all coverage of the district and the record of individual insect occurrence.

Table 1

## Collections by Hosts

North Vancouver Island District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, red	12	1	Alder, red	8	-
Douglas fir	70	1	Apple	1	-
Fir, amabilis	22	-	Arbutus	-	1
Fir, grand	5	1	Aspen, trembling	2	-
Hemlock, western	186	2	Cottonwood, black	-	1
Pine, lodgepole	12	4	Dogwood	1	-
Pine, radiata	-	1	Laburnum	-	1
Pine, Scots	1	1	Linden	1	-
Pine, white	6	1	Maple	2	-
Spruce, Sitka	44	-	Poplar spp.	2	-
Spruce, white	1	-	Poplar, balsam	1	-
			Poplar, silver	3	-
			Willow	6	-
			No host	5	1
			Miscellaneous	4	1
			Total	36	5
Total	359	12	GRAND TOTAL	395	17

## STATUS OF INSECTS

Green-striped Forest Looper, Melanolophia imitata Wlk.

The green-striped forest looper outbreak which reached a peak on the west coast of Vancouver Island during 1960 declined markedly in 1961. Collections were less widely distributed (Map 2), fewer larvae were collected, and no areas of current defoliation were observed.

The first collection to contain this insect was made on June 14 at Campbell River and the last collection was on August 23 at Coombs. A total of 276 larvae were taken in 51 collections, an average of 5.4 larvae per collection. This was a slight drop in average number of larvae from 1960 (Table 2). The drop would have been much more pronounced if collections had been made in D. D. 023 during the optimum sampling period of 1960.

As shown in Map 2, the insect occurred most frequently in D. D. 023 and in the Quatsino Sound region of D. D. 025. It is believed that the occurrence from Muchalat Inlet to Port Eliza would have continued north to Ououkinsh Inlet but it was not possible to sample the Kyuquot Sound region during the mid-larval season. Variance between drainages is shown in Table 2.

Very little is known of the population potentials of this insect but it was thought that enough pupae were present in the fall of 1960 (2.06 per sq. ft.) to establish a damaging population in 1961 if the pupae overwintered successfully and mating flights in late May were successful. A trip was made to the west coast late in May to observe the expected flight but very few adults were seen (see South Vancouver Island report). There was no emergence in a group of 25 pupae caged under field conditions at Tofino, and of 50 pupae reared at the Langford insectary, only 4 adult moths and 12 parasites emerged. In addition to the foregoing a parasitic fungus, Cordyceps militaris (Fr.) Link, (Ascomycete, Order Hypocreales) was found associated with the pupae. The precise role that this fungus played in the decline of this population is not known, but observations in the Tofino area indicate that it contributed to pupal mortality.

Mortality plots were established in several areas of heavy defoliation in the fall of 1960 and these plots were re-examined in the fall of 1961 (Table 3). Of the five plots established in 1960, one was logged and two others were relocated in 1961.

Defoliation from 1960 was evident in several areas in D. D. 023. The heaviest damage was on Bligh and Villaverde islands where considerable tree mortality occurred (Table 3). Feeding damage was also evident on Strange Island, the west side of Zeballos Inlet, Espinoza Inlet, Port Eliza, McKay Cove, Markale Point, Belstow Passage and, earlier in the season, considerable feeding was noted on the east side of Power Lake (Ououkinsh Inlet).

As mentioned earlier, no areas of current feeding were noted in 1961, and low populations are expected in 1962.

Table 2

Summary of Green-striped Forest Looper Found by Drainage Division,  
North Vancouver Island, 1959 - 1961.

Drainage division	Total number of samples taken during larval period			Number of samples containing larvae			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
021	124	72	55	22	34	2	3.2	3.8	1.5
022	42	60	37	12	23	2	2.3	3.0	1.0
023	59	-	49	41	-	34	25.0	-	6.9
024	55	46	17	44	21	1	14.8	4.3	1.0
025	42	88	15	35	58	12	24.5	9.3	1.3
026	5	6	4	4	5	0	3.7	2.8	0.0
Total	327	272	177	158	141	51	16.7	6.0	5.4

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

The hemlock looper population remained at a low level throughout the district during 1961. Distribution varied from 1960, when the largest populations were found in the Quatsino Sound area (D. D. 025). During 1961 the largest number of collections containing this insect were made in D. D. 023 with the largest collection, 13 larvae, coming from Port Eliza. A moth flight was noted near Port Eliza on October 17, but no eggs were found in samples taken there later in the fall.

A special trip was made into the Quatsino area early in 1961 to survey the Dahlstrom Pt. area where several large collections were made in 1960. Very few larvae were found. This trip was made possible through the excellent co-operation of Rayonier (Canada) Company, and the author would like to express his thanks.

The distribution of collections is shown on Map 3 and the summary of collections by drainage division is shown in Table 4.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm population remained at a very low level throughout the district. Only seven larvae were found in five collections in 1961. In view of the extremely low population, no egg survey was conducted in October.

The summary of collections by drainage divisions is shown in Table 5.

Table 3

Tree Mortality and Top-kill in Areas Defoliated by the Green-striped Forest Looper,  
West Coast Vancouver Island, 1961.

Location <sup>1/</sup>	No. of trees dead and total no. of trees by crown class				Per cent kill all classes	No. of trees top-killed and total no. of trees by crown class				Per cent top-killed all classes
	Dom.	Co-dom.	Int.	Supp.		Dom.	Co-dom.	Int.	Supp.	
Eelstow Passage (110 trees)	0/19	1/37	3/33	0/21	3.6	2/19	13/36	3/30	1/21	17.9
Port Eliza (101 trees)	0/31	3/18	0/32	0/20	3.0	12/31	8/15	12/32	4/20	36.7
Villaverde Island <sup>2/</sup> (65 trees)	1/3	19/32	12/17	11/13	64.6	2/2	8/13	5/5	1/2	72.7
McKay Cove <sup>2/</sup> (50 trees)	0/2	0/12	0/27	0/9	0.0	0/2	5/12	15/27	1/9	42.0

<sup>1/</sup> Plot at Ououkinsh Inlet destroyed by logging.

<sup>2/</sup> Plot relocated from 1960

Summary of Hemlock Looper Collections by Drainage Division,  
North Vancouver Island, 1959 - 1961.

Drainage division	Total number of samples taken during larval period			Number of samples containing larvae			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
021	30	57	33	2	2	4	1.5	1.0	1.3
022	0	60	2	0	1	0	0.0	2.0	0.0
023	34	-	44	15	-	17	2.3	-	3.0
024	45	46	2	6	5	0	1.7	1.0	0.0
025	43	88	32	6	14	2	5.3	9.0	3.0
026	0	6	0	0	0	0	0	0	0
Total	152	257	108	29	22	23	2.8	6.0	2.7

Table 5

Summary of Black-headed Budworm Collections by Drainage Division,  
North Vancouver Island, 1959 - 1961.

Drainage division	Total number of samples taken during larval period			Number of samples containing larvae			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
021	66	72	35	0	1	0	0	1.0	0
022	23	-	2	2	2	1	2.0	2.5	1.0
023	23	-	36	10	3	2	1.0	-	2.0
024	49	46	2	10	3	0	1.0	1.7	0
025	43	88	32	13	4	2	1.7	1.8	1.0
026	0	6	0	0	0	0	0	0	0
Total	217	272	107	27	10	5	1.4	1.8	1.4



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

There were no antique tussock moth larvae collected in 1961. The population which existed in 1960 on Drake Island (Quatsino Sound - D. D. 025) has disappeared. Samples taken on Drake Island twice during the season did not contain this insect.

Neodiprion spp., Sawflies from Hemlock

Sawfly populations from hemlock remained at a low level within the district during 1961. Sixty-two collections averaged 7.5 larvae, a very low figure for this insect. Samples were well distributed over the district with a somewhat higher frequency in D. D. 025 (Table 6). The first and last larvae appeared on May 26 and September 8 respectively.

Table 6

Summary of Neodiprion spp. Sawfly Collections by Drainage Division,  
North Vancouver Island, 1961.

Drainage division	Total number of samples taken during larval period			Number of samples containing larvae			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
021	119	135	84	11	23	10	1.6	16.0	3.4
022	71	72	46	8	13	11	2.1	2.0	2.9
023	59	51	57	19	4	13	4.3	2.0	5.0
024	49	46	24	20	16	6	14.9	4.7	4.2
025	42	88	66	25	29	21	9.4	3.8	14.8
026	5	6	4	0	0	1	0	0	2.0
<b>Total</b>	<b>335</b>	<b>398</b>	<b>281</b>	<b>83</b>	<b>85</b>	<b>62</b>	<b>7.8</b>	<b>6.6</b>	<b>7.5</b>

Pine Butterfly, Neophasia menapia Feld.

The pine butterfly population on north Vancouver Island appeared to decrease in 1961. This insect's habit of feeding in the upper crown level of dominant trees makes larval sampling virtually impossible. Estimates of population levels are largely based on adults in flight and egg samples.

Butterfly flights were reported in the Nimpkish Valley (D.D. 024) in July, 1961. The results of egg samples taken in this valley at Kaipit Creeek and Woss Lake are shown below. Samples are based on three branches from the upper third of the crown (A), and one branch each from the mid (B) and lower (C) thirds

of the crown.

	Woss Lake	Kaipit Creek
Number of trees samples	1 (Pw)	3 (F)
Total amount of foliage sampled (sq. ft)	21.5	120.8
Average no. of eggs per sq. ft. of foliage	12.2	0.5
No. of egg masses per sq. ft., by crown classes	A 0.6 B 0.3 C 1.8	0.03 0.04 0.02
No. of eggs per sq. ft., by crown classes	A 6.9 B 2.8 C 17.1	0.4 0.4 0.3
Total number of eggs in sample	260	66

The low number of eggs per square foot on Douglas fir show that the anticipated population increase did not develop. This is in line with the pine butterfly population in the south Vancouver Island district, where a general decrease occurred in all regions. The relatively high egg counts from white pine are not considered serious as the tree sampled was one of only a few pines left in a fringe along the lake shore.

A localized population in the MacMillan Park area was sprayed to prevent possible damage to this valuable stand. There were no other areas where this insect occurred in large numbers.

#### Yellow-lined Forest Looper, Nyctobia limitaria Stkr.

The yellow-lined forest looper continued to decline in numbers and distribution during 1961. Only four collections, each containing one larva, were made. This compares with 14 larvae in 10 samples in 1960, and 856 larvae in 92 samples in 1959.

#### Saddle-backed Looper, Ectropis crepuscularia Schiff.

In common with the other geometrids, the numbers of saddle-backed loopers were very low in 1961. Only 3 samples averaging 1.0 larvae each were collected in 1961 compared to five larvae in five collections in 1960, and 196 larvae in 35 collections in 1959. The larvae were all found on hemlock during 1961.

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

This insect continued to occur on the occasional deciduous tree in D.D. 021 in 1961. No infestations were reported.

Fall Webworm, Hyphantria cunea Harr.

The fall webworm population in 1961 was at the highest level recorded in several years. While this is not an economically important insect the unsightly webs cause considerable concern to property owners. In some cases the webs covered entire small trees which were 100 per cent defoliated.

In 1960 web counts made north of Courtenay averaged 42 webs to the mile. In 1961 webs averaged 262 to the mile. Webs were recorded on a wide variety of deciduous hosts and ornamental shrubs.

Spruce Gall Aphid, Adelges cooleyii (Gill.)

Very few fresh gall attacks of the spruce gall aphid were noted during 1961, but there were considerable numbers of the white nymphs present on Douglas fir, the alternate host. This condition was common throughout D.D. 021.

The Echo Lake plantation did not appear to have been attacked to any appreciable degree in 1961.

Fir Engraver, Scolytus ventralis Lec.

Occasional open-growing balsam in the easterly portions of D. D. 021 were killed by this beetle in 1961. No large areas were affected nor was the insect recorded in forest stands.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

There were no new areas of attack by this beetle recorded in 1961. Some trees in the Buttle Lake region were attacked but a survey undertaken in the fall to check the level of incidence indicated that a root rot fungus may be the primary cause of death. This is a difficult situation to assess and further field work is necessary to clarify the picture.

The beetle continued to kill individual trees in the upper Oyster River area.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

The silver-spotted tiger moth population continued to increase in 1961. The annual spring web count recorded 441 webs from Parksville north to Campbell River along Highway 19. This compares to 97 in 1960, and 65 in 1959. Webs were generally limited to the east coast (D.D. 021) but one colony was recorded at Gold River, Muchalat Inlet (D. D. 023).

From Parksville north to Campbell River the webs averaged 40 feet in height on the trees with a range of from six feet to 75 feet.

As in 1960, the larval colonies dispersed early in the season and damage was limited to the occasional defoliated limb.

Web counts and averages per mile are as follows:

Year	Average no. webs per mile	Total number of webs recorded
1959	0.9	65
1960	1.2	97
1961	5.6	441

Green Velvet Looper, Epirrita autumnata Harr.

This insect remained at a very low level within the district during 1961. Five samples averaged 1.2 larvae compared with averages of 2.7, 4.1, and 4.5 in 1960, 1959, and 1958 respectively.

Spruce Budworm, Choristoneura fumiferana Clem.

Only four larvae of the spruce budworm were found in four collections during 1961. This compares with two larvae found in 1960.

Sequoiae Pitch Moth, Vespamia sequoiae Hy. Edw.

This stem mining insect continued to appear on native lodgepole pine and exotic pines in the Campbell River area. Several attacks occurred in the Parksville - Qualicum region. The damage was confined to native lodgepole pine in the latter area.

Douglas Fir Terminal Damage

Leaders of immature Douglas fir suffered considerable damage in several areas of north Vancouver Island. There is no evidence to date to prove that this damage is the work of any single agency. Leaders and laterals are bent and broken but in examinations at Elk River (Mi. 35), John Hart Lake, Quinsam Lake, Merrill Lake, Bigtree Creek and Wolf Lake, no insects or pathogens were found associated with the damage.

A species of Dioryctria has been associated with this type of damage in the past but there were no positive samples of insect damage found in 1961.

Seventy-five trees were examined at John Hart Lake, 110 at Merrill Lake, and 75 at Wolf Lake. In each instance, 100 per cent of the trees examined had suffered some damage to either the terminal or the lateral branches.

MISCELLANEOUS INSECTS

North Vancouver Island District, 1961.

Insect	Host	No. of collections	Remarks
<u>Caripeta divisata</u> (Wlk.)	H, B, F, S	32	August 2 - September 17 all drainages. Av. 1.3 larvae per collection.
<u>Cheilosia alaskensis</u> Hunt.	H	1	Sapwood puncturing fly. Common at Miracle Beach. May 15. Plot established for further study.
<u>Eupithecia unicolor</u> Hulst	H, B, Bg, F, S	10	June 13 - July 18. Wide distribution.
<u>Gabriola dyari</u> Tayl.	H, F, B, Bg	8	May 19 - June 29.
<u>Nealcis californiaria</u> Pack.	H, F, Pl	14	Moth flight of this looper at Windy Point (024) on May 24.
<u>Pissodes sitchensis</u> Hopk.	S		No areas of new attack were noted in 1961.
<u>Stilpnotia salicis</u> Linn.	A, <u>P. alba</u>	4	Spot infestations in the Courtenay - Comox area. Larvae from June 1.
<u>Zeiraphera</u> sp.	S		No attacks were recorded in 1961.

## STATUS OF FOREST DISEASES

## Important Diseases

Brown cubical butt rot of Douglas fir, Buttle Lake.

Several areas of mortality in the Douglas fir stands surrounding Buttle Lake were thought to be the result of bark beetle attack. Examinations during 1961 have indicated that while in some cases this may be true, not all the damage is caused by beetles.

One of the factors contributing to the heavy losses in the stand is the presence of the fungus Polyporus schweinitzii Fr. This fungus causes a root and butt rot. As the trees affected are dominant stems in an over-mature stand, this decay is certain to have a weakening effect.

On October 21, 1961, a strip was run on the west side of Buttle Lake opposite T. L. 3969. There were 66 trees in the acre sampled, average diameter (excluding old snags) was 39.8 inches, maximum 72 inches, minimum 12 inches. Of the 66 stems, 13 were old snags which were not considered in calculations of volumes etc., 26 were normal, 3 were green infected with rot, and 24 were red or grey dead. Fruiting bodies of the decay fungus were evident on several of the living and dead stems.

There was a total volume (less snags) of 24,194 cu. ft. in the strip. Of this total, 13,130 cu. ft. was green normal, 1,190 green infected, and 9,874 dead. Expressed in per cent, better than 40 per cent of the strip volume was dead or dying. Only one tree in this strip had positive beetle attack and this tree was grey dead. It is doubtful that the beetles killed it. Two snags and one green tree had signs of Armillaria mellea (Vahl ex Fr.) Qué!., a mildly parasitic fungus.

In addition to the above strip area, several other locations were spot checked and each showed signs of P. schweinitzii. In the light of the above, it seems that the extensive stand losses are the result of a number of interacting pathogenic and physiological factors, each contributing to the natural decline of a stand which is past its prime.

## Sweetfern Blister Rust on Monterey Pine

On May 10, 1961, during the routine survey of exotic plantations, a very heavy blister rust infection was found in Monterey pine, Pinus radiata D. Don. The incidence of infection was 82 per cent, with the remaining 18 per cent of the stems dead from undetermined causes. Samples submitted to the Victoria laboratory were subsequently identified as Cronartium comptoniae Arth., a native rust which has as its alternate host sweet gale, Myrica gale L. As the rust cannot be distinguished in the field from Peridermium stalactiforme Arth. & Kern, a rust which alternates on Indian paint brush, the identity of the Cronartium was confirmed by cross inoculations which gave positive results on sweet gale and negative results on Indian paint, Castilleja sp.

This is thought to be the first record of Cronartium comptoniae infecting Pinus radiata <sup>1/</sup>. There have been no verified collections

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<sup>1/</sup> Molnar, A. C. 1961. An outbreak of Cronartium comptoniae on Monterey pines on Vancouver Island, British Columbia. Pl. Dis. Repr. 45: 854 - 855.

of this fungus prior to this date from its native host, lodgepole pine, on Vancouver Island. It is of scattered but uncommon occurrence throughout British Columbia.

The damage done by this rust takes the form of a girdling of the stem by the disease. Occurring on 5 - 8 year old stock, as it does in this area, it does not take long to completely encircle the stem. Considering the heavy incidence of stem attack in the areas examined, it is likely that severe mortality will occur and consequently the future of Monterey pine as a commercial venture is doubtful.

Examinations by forest pathology personnel indicate that the infections took place in the field locations and not in the nurseries from which the stock was obtained. Large areas of sweet gale were found within a half mile of most of the severely rusted pines but this host was not present near the nurseries.

Also present in the exotic plantation in which this disease was first found were the following species of pine: Pinus monticola, Pinus pinaster, Pinus nigra, Pinus exhinita x taeda, Pinus murray-banksiana, Pinus regida x taeda. None of these were infected.

Phomopsis sp., a fungus causing dieback on hemlock

A sample submitted from Dickson Lake, D. D. 021, on May 10, 1961, was identified at the Victoria laboratory as Phomopsis sp. This is the first known record of this genus on this host (not listed in Shaw <sup>1/</sup>).

This fungus is a virulent parasite, causing a stem dieback on the host. Trees showing similar symptoms to the sample tree are very common throughout D. D. 021. It is possible that this disease could be an important cause of mortality in immature hemlock but its presence must be verified in consistent occurrence with the symptoms.

Pine Twist Rust

A total of 22 field examinations of Populus alba L., European white poplar, were made during the 1961 season in a check for pine twist rust, a serious disease of pines caused by the fungus Melampsora pinitorqua Rostr. There were no records of its occurrence in this district.

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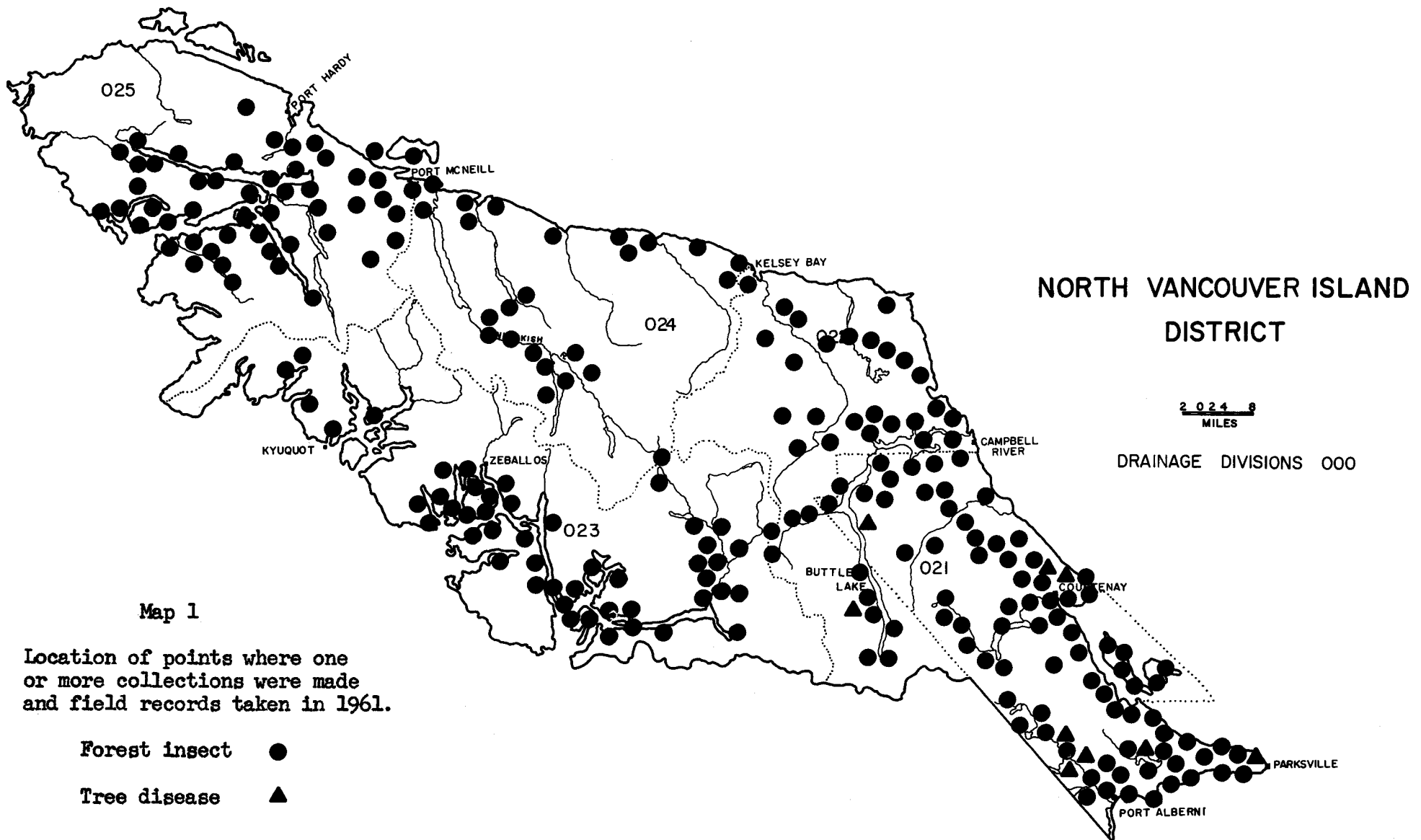
<sup>1/</sup> Shaw, C. G., 1958. Host Fungus Index for the Pacific Northwest 1. Hosts (and Fungi). State College of Washington.

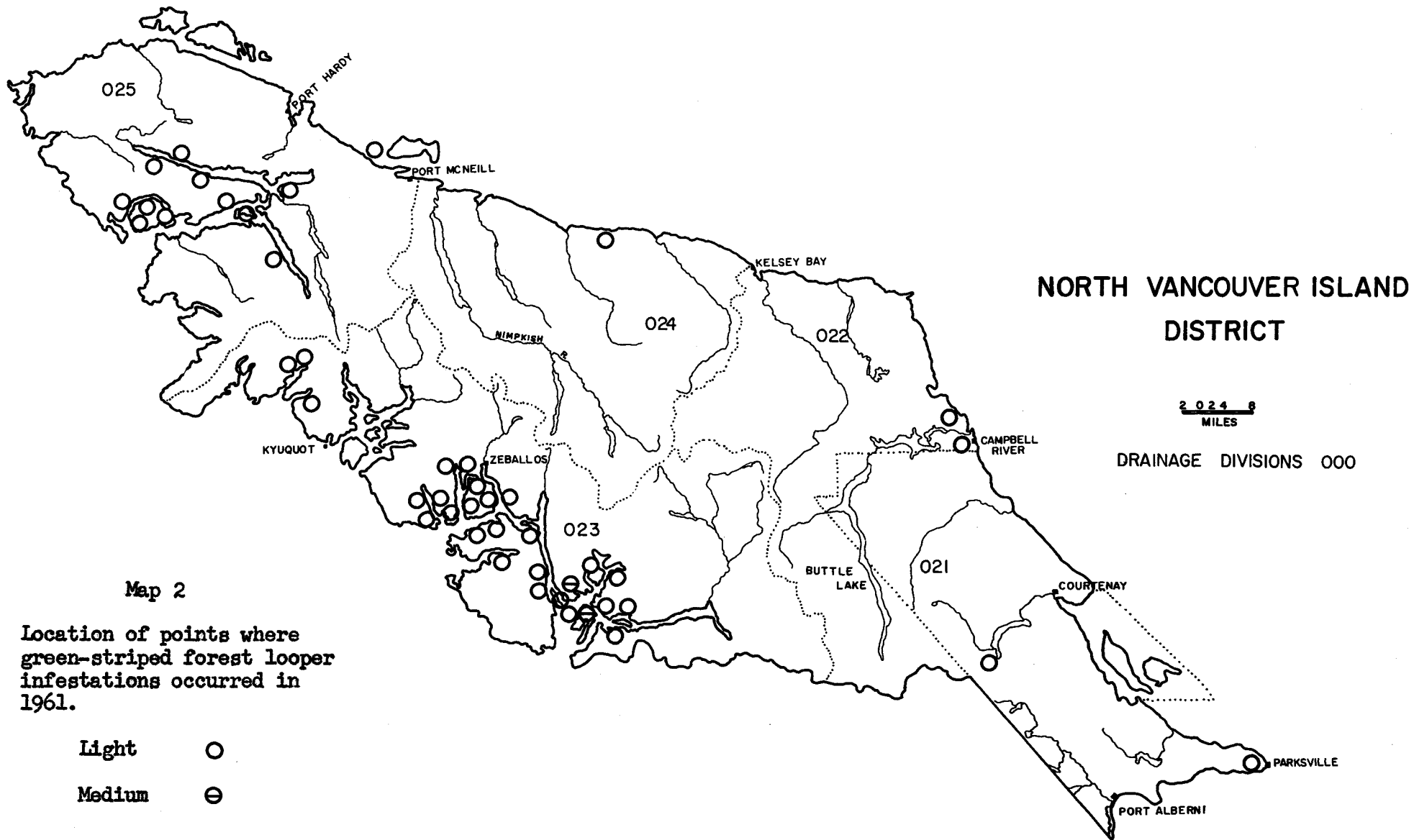
FOREST INSECT AND DISEASE SURVEY

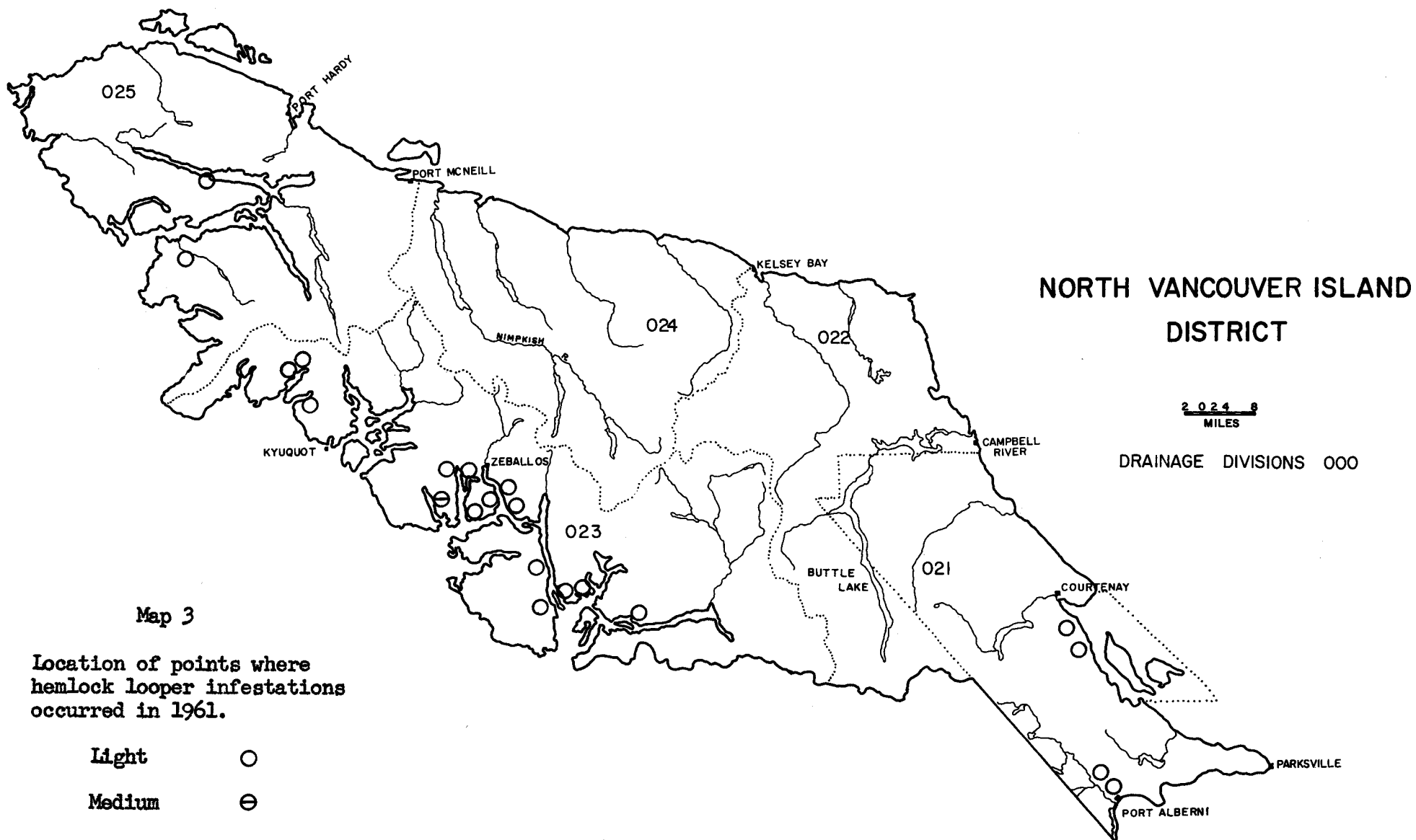
SOUTH PRINCE RUPERT DISTRICT

1961









FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1961

VANCOUVER FOREST DISTRICT

MAINLAND SECTION

FOREST INSECT AND DISEASE SURVEY

VANCOUVER FOREST DISTRICT

MAINLAND SECTION

1961

D. H. Ruppel

INTRODUCTION

During 1961 Forest Biology Rangers were assigned to districts as follows:

D. H. Ruppel - South Vancouver

S. J. Allen - North Vancouver

S. J. Allen replaced A. K. D. Jardine under the system of periodic rotation of rangers. Ruppel and Allen worked independently during mid-season but collaborated during the early and late parts of the season which lasted from April to October.

Balsam woolly aphid damage to amabilis fir was the most important problem in the Vancouver Mainland District and is described in an unpublished joint report at the end of this introduction.

Hemlock sawflies were widespread on western hemlock and amabilis fir in all areas surveyed, but no serious defoliation occurred. Alder sawflies were at a low level generally. Sawfly infestations on lodgepole pine subsided.

Douglas fir in the Pemberton and Boston Bar areas continued to make a good recovery from the effects of the recent spruce budworm infestations.

Increasing evidence of poplar and willow borer damage was found on hybrid poplars in the Fraser Valley.

Douglas-fir bark beetle populations decreased in the north Sechelt peninsula but increased at Boston Bar. Sporadic attacks continued south of Hope.

Mountain pine beetles continued to take a toll of diseased western white pine particularly south of Hope and north of Birken.

Fall webworms, feeding on a wide range of deciduous hosts, increased greatly in the Sechelt and Fraser Valley areas.

Western tent and forest tent caterpillar infestations continued in the lower Fraser Valley on deciduous hosts. No infestations were recorded in the Sechelt area but adults of both species were common.

Silver-spotted tiger moths increased on Douglas fir and other coniferous hosts from Gibson's Landing to Lund and were numerous in the Vancouver and Ladner areas.

Satin moth larvae, previously at a low level, increased in numbers on poplars in the lower Fraser Valley.

Spruce aphids caused heavy needle cast on Sitka and other spruce throughout much of the coastal area of the Vancouver District.

A wide search of European white poplar was made in the District for pine twist rust, an introduced rust alternating between certain poplars and two and three needle pines. A special crew was assigned to a full-time search in the Fraser Valley. The rust was not found on European white poplar trees or pine seedlings set out in flats for the purpose of attracting the rust. A rust on European white poplar at Hope has yet to be fully identified.

THE BALSAM WOOLLY APHID IN  
BRITISH COLUMBIA <sup>1/</sup>

by

D. H. Ruppel, S. J. Allen, and G. T. Silver

INTRODUCTION

The balsam woolly aphid was first discovered in British Columbia in 1958. It was decided in 1959 that any detailed research project undertaken would only duplicate programs underway in New Brunswick and in the north-west United States. Efforts have therefore been directed mainly to a survey approach designed to follow the annual trend of the infestation with its resulting tree mortality. A program of releases designed to introduce and establish predators which give promise of effecting control was started in 1960, and continued in 1961. The work is under the direction of Mr. J. W. E. Harris who is currently taking graduate work at Wisconsin University. In his absence, Dr. G. T. Silver has taken the responsibility of commenting briefly on his work to make the report more complete.

METHODS

Aerial surveys have been conducted annually since 1959, and have increased in scope until nearly five hours were spent in the air in 1961. Ground checks have been made annually in the region around Howe Sound by Forest Biology Rangers to ascertain stand condition. Doubtful material is identified by Dr. R. E. Balch at the Forest Entomology and Pathology Laboratory, Fredericton, N. B.

In 1961 twelve plots were established throughout the infestation area to follow the trend of the infestation.

A study of native predators was conducted by Mr. Harris in 1959 before predator releases started in 1960. Four species of predators were released in that year, and two more groups in 1961.

RESULTS

Range and Intensity

The known range of the balsam woolly aphid has increased each year since 1958. It now extends from Sechelt in the north around Howe Sound and includes the upper Capilano, upper Seymour, and Indian rivers, and the height of land east of Indian Arm as far as Coquitlam Lake (see map). The aphid is suspected of being present from Alouette Lake and Pitt Lake, northward up the Pitt River Valley to Garibaldi Park and west to Jervis Inlet south of Vancouver Bay. The area of the known infested area is approximately 660 square miles, and of the suspected area 1,250 square miles.

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<sup>1/</sup> An Extension Report prepared for the information of Forest Industry and B. C. Forest Service, and included here as a joint report for the mainland Vancouver Forest District.

In addition to the area shown on the map, the balsam woolly aphid has been found in Thetis Lake Park just outside of Victoria. Isolated infested trees have been found at Beacon Hill Park, and in Saanich. Careful examinations have failed to detect the insect anywhere else on Vancouver Island.

Twelve plots were established in 1961 to determine the intensity of attack to date, and also to act as trend plots to follow the pattern of damage. The results are shown in Table 1, and the locations of the plots are shown on the map. The damage indicated by these plots is not indicative of tree mortality to date, as areas of heavy tree mortality were purposely avoided as it was desirable to have a large number of living trees in the study plots.

The amabilis fir stems in the stands varied from 27 to 80 per cent. One of the conspicuous things was the preponderance of gout attack; only at Plot 5 in the Indian River Valley was there a heavy stem attack. These plots are scattered over a wide area which of course does not include all conditions. There is considerable stem attack in some areas in Mt. Seymour Provincial Park as well as at Grouse Mountain. Nevertheless, stem attack is relatively scarce.

Amabilis fir trees attacked by the balsam woolly aphid varied from 2.4 per cent to a high of 39.6 per cent. Some of the trees in the plots were of a size regarded as too small for attack. The amabilis fir in all plots was grouped and tallied by diameter classes (Table 2). No attacks were noted on 410 trees below eight inches d.b.h. Of the 285 trees eight inches and over 120 were attacked. The 15 stem attacks were on trees between eight and 26 inches d.b.h.; gout attacks were recorded on all sizes up to 52 inches d.b.h., the largest tree recorded.

Several other insects are associated with the balsam woolly aphid infestation. Another aphid, Pineus sp., with somewhat similar habits and damage symptoms, is present in some areas. It is not certain if this aphid is contributing to tree mortality. Since living aphids are not necessarily present when damaged trees are examined it is often difficult to obtain positive identifications. A bark beetle, Scolytus ventralis Lec., is believed responsible for some balsam mortality. A Pseudohylesinus sp. bark beetle is also associated with the balsam woolly aphid, but observations to date indicate that this beetle attacks only trees which are being killed and does not contribute to tree mortality itself.

Amabilis fir tree mortality as determined by aerial surveys for 1959 to 1961 in the Vancouver mainland Forest Districts is shown in Table 3. There are some discrepancies in the figures. In 1959 and 1960 tallies included dead and dying and apparently green infested trees; in 1961 only the dead and red-topped trees were tallied. In addition all localities listed were not surveyed each year because of flying conditions at the time of flight. However, tree mortality has apparently increased; over 8,300 dead trees were recorded in 1961. Tree mortality for the different locations is shown in Table 3. Areas in which tree mortality has reached heavy proportions are Cypress Creek and the Seymour River and Mountain region. Estimates indicate a minimum of 1,500,000 cubic feet or 9,750,000 board feet of amabilis fir killed to date. This estimate was based mainly on the aerial survey for number of trees, and volume was based on tree sizes in Table 2.



### Natural Control

Studies by Mr. Harris in 1959 showed that there were no native predators capable of exercising any worthwhile control. Accordingly the following species of introduced predators were released in 1960 at Seymour Mountain, Grouse Mountain, or Thetis Park, Vancouver Island; Laricobius erichsonii Rosenh., Aphidecta oblitterata L., Scymnus pumilis (Ws.), and Pullus implexus Muls. In 1961 only two species were released; L. erichsonii and A. oblitterata. These releases were all made in the Seymour Mountain release area used in 1960.

There is very little information available on survival or establishment of the released predators. Three adult Pullus implexus were found on June 15, 1961, and as this species was released only in 1960, this shows that at least some of this species survived the winter of 1960-61. Laricobius adults were observed in the release area in 1961 nearly three months after they were released so it is hoped that this species might establish itself. No Aphidecta or Scymnus have been recovered so their fate is unknown.

### DISCUSSION

The fate of a large volume of amabilis fir depends on the trend of the balsam woolly aphid infestation in the next few years. It is hoped that a combination of aerial surveys, trend plots, and random ground checks will be sufficient to eventually delimit the area of infestation and record the trend of the outbreak. One encouraging note is the gradual decrease noted in the large infestation in Washington and Oregon, but it must be kept in mind that this outbreak is subsiding after about 1/3 of the balsam in the infested stands was killed, and another 1/3 attacked. Tree mortality in British Columbia has so far been relatively light in comparison, except for several localities.

The balsam woolly aphid infestation in British Columbia is restricted mainly to the "gout" form of attack. There are several possible reasons for this. The stem attacks are usually found in fairly open stands, and much of the infested area is in fairly closed stands with a heavy canopy. Furthermore, as shown in Table 2, stem attacks are seldom found on large trees with heavy thick bark, and are usually found on trees less than 20 inches d.b.h. The gout form is found on all sizes, and as much of the amabilis fir in the Howe Sound area is mature and overmature timber, this latter form of attack is prevalent.

The stem form of attack is more serious, and can kill amabilis fir trees in from three to five years. The gout form kills more slowly and trees may live for years although attacks may be severe enough to cause heavy top-kill. Trees may also recover more readily from a gout attack.

There are no known means of chemical control which can be utilized to combat this insect. Predators, once established over large areas, can reduce the population and lessen the amount of tree mortality, but cannot be expected to destroy all the aphids. Unfortunately it requires a long time for predators, once established, to build up to high populations and expand throughout large areas. It could take up to eight years before it is definitely known whether or not some species are established, particularly if the predator prefers to

live in the upper crowns of infested trees. However, once established in a few localities, predators can then be collected locally and eventually established throughout the entire area. Although this type of control program could take 10 to 15 years the end results warrant the expenditure of time, and if successful much timber could be saved.

Tree mortality has been heavy, and can be expected to continue as there is no indication of a downward trend. A large percentage of host material is available, and a large amount of pole-sized amabilis fir will continue to provide a supply of suitable trees. The current program of predator releases will, if successful, provide some control in the future, but will be of little or no value at the present time. The best approach at the present appears to be to continue the program of surveys with the objective of detecting areas where tree mortality is heavy and where it might be advisable to recommend salvage logging.

#### RECOMMENDATIONS

1. An estimated 2,300 trees in the Cypress Creek watershed were dead (grey tops) in 1961, and 75 red tops were recorded, indicating that tree mortality is continuing. It would be advisable to consider logging as much of the amabilis fir in this region as soon as possible before the stand deteriorates further.
2. An estimated 2,470 trees have been killed in the Seymour River Valley. The heaviest tree mortality extends from about a mile below Seymour Lake to Orchid Creek. If tree mortality continues salvage logging should be considered.
3. The present program of aerial surveys, trend studies, and predator releases should be continued.

Table 1

Stand Composition by Number of Stems and Amabilis Fir Attacked by Balsam  
Woolly Aphids on Study Plots in the Vancouver Mainland Forest District. 1961.

Plot No.	Location	Area of plot in acres	No. of stems			Percentage A. fir	No. A. fir attacked				No. of A. fir killed
			Hemlock	Other spp. <sup>1/</sup>	Amabilis fir		Gout %	Stem %			
1	Cypress Creek	0.4	n.t. <sup>2/</sup>	n.t.	61	-	19	31.3	nil	-	0
2	Grouse Mtn.	1.2	n.t.	n.t.	48	-	19	39.6	nil	-	1
3	Rainy River	1.2	n.t.	n.t.	60	-	14	23.3	nil	-	0
4	Cypress Creek	0.6	82	9	80	46.8	14	17.5	nil	-	7
5	Indian River	0.3	13	nil	51	79.7	nil	-	13	25.5	1
6	Raffuse Creek	0.6	43	nil	80	65.0	5	6.2	nil	-	0
7	Brittania Cr.	0.2	51	3	55	50.5	5	9.1	nil	-	0
8	Seymour River	0.3	84	nil	110	56.7	11	10.0	nil	-	1
9	Seymour River	0.4	112	1	88	43.8	3	3.4	1	1.1	0
10	Woodfibre Cr.	0.4	56	3	82	58.2	6	7.3	nil	-	0
11	Dakota Creek	0.6	23	27	84	62.7	2	2.4	nil	-	1
12	McNair Creek	1.2	63	7	26	27.1	16	61.5	nil	-	5

<sup>1/</sup> Includes yellow cedar, Douglass fir and broadleaf maple.

<sup>2/</sup> n. t. = not tallied

Table 2  
 Combined Diameter Classes and Balsam Woolly Aphid Attacks on Amabilis  
 Firs in the Vancouver Mainland Forest District. 1961.

Diameter Class	No. of amabilis fir	Not attacked	Stem attack	Gout attack
- 1.9	53	53		
2.0 - 3.9	157	157		
4.0 - 5.9	132	132		
6 - 7.9	68	68		
8 - 9.9	66	60	1	5
10 - 11.9	47	46	0	1
12 - 13.9	42	36	3	3
14 - 15.9	51	37	2	12
16 - 17.9	37	29	4	4
18 - 19.9	30	20	1	9
20 - 21.9	30	17	1	12
22 - 23.9	24	11	2	11
24 - 25.9	30	11	1	18
26 - 27.9	11	4	0	7
28 - 29.9	12	6	0	6
30 - 31.9	7	3	0	4
32 - 33.9	6	2	0	4
34 - 35.9	1	0	0	1
36 - 37.9	1	0	0	1
38 - 39.9	1	0	0	1
40 - 41.9	3	2	0	1
42 - 43.9	2	1	0	1
44 - 45.9	3	0	0	3
46 - 47.9	0	-	-	-
48 - 49.9	0	-	-	-
50 - 51.9	1	0	0	1
Totals	815	695	15	105

Table 3

Mortality of *Amabilis fir* Due to Balsam Woolly Aphid, *Adelges piceae* (Ratz.) and other Causes as Determined by Aerial Surveys 1959-1961 in the Vancouver Mainland Forest District. 1961.

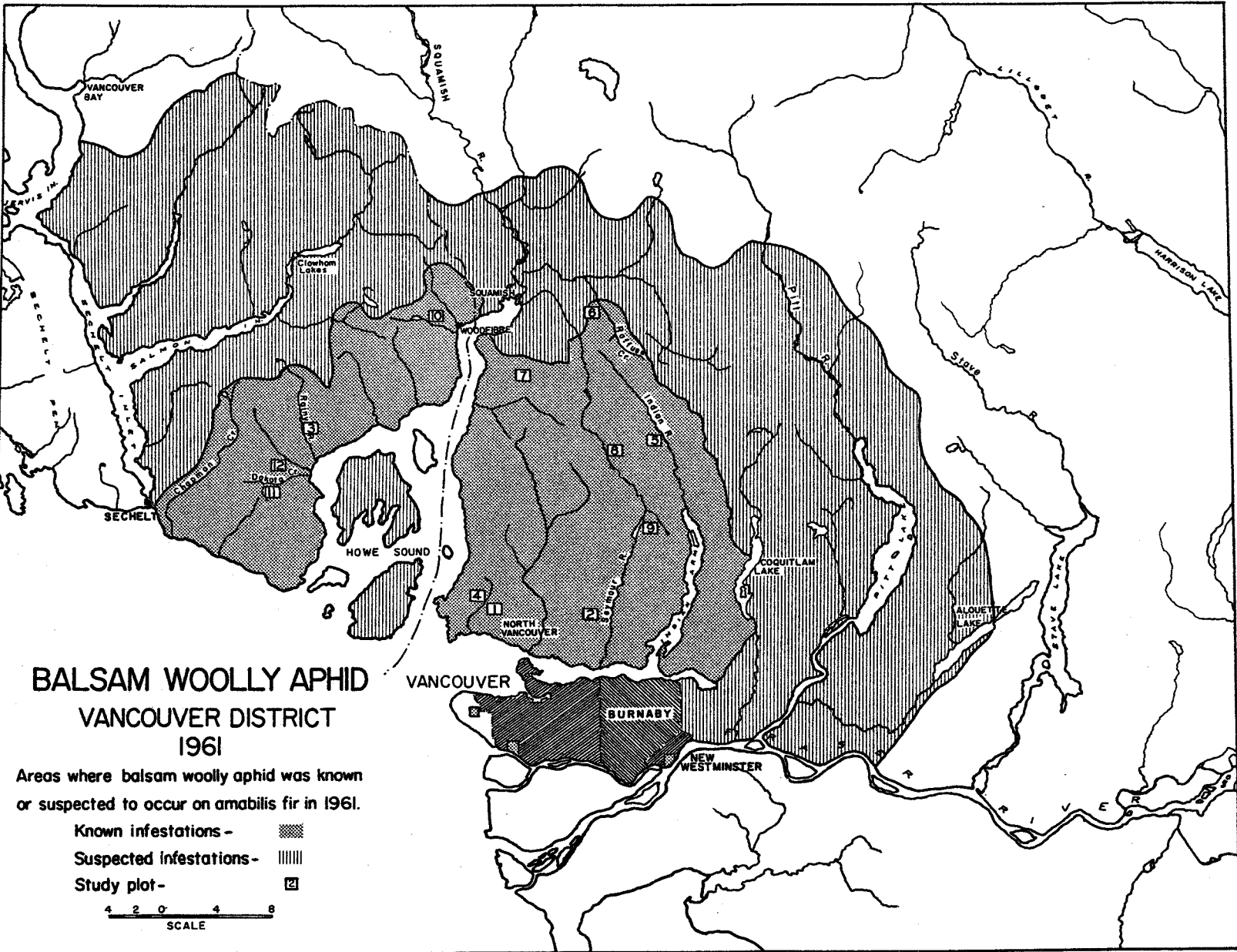
Area	Number of trees		Dead (grey and red-topped) trees
	Dead and dying (grey and red-topped) and apparently infested green trees		
	1959	1960	1961 <sup>1/</sup>
Chapman Creek	n.s. <sup>2/</sup>	few gout	n.s.
Dakota Creek	100	20 dead, numerous gout	140
McNair Creek	n.s.	75	46
Rainy River	250	190	260
McNab Creek	n.s.	120	75
Sechelt Creek	n.s.	n.s.	138
Potlatch Creek	100	125	180
Woodfibre Creek	n.s.	100	225
Mill Creek	n.s.	60	235
Cheekye River	n.s.	20 possible	n.s.
Mashiter Creek	n.s.	40- 50 possible	n.s.
Ring Creek	n.s.	20 possible	n.s.
Mamquam River	n.s.	n.s.	70
Raffuse Creek	n.s.	n.s.	185
Stawamus River	n.s.	90 possible	140
Britannia Creek	n.s.	n.s.	38
Furry and Downing creeks	n.s.	n.s.	105
Capilano R.-Eastcap Creek	n.s.	n.s.	225
Capilano R.-Hesketh Creek	n.s.	n.s.	115
Lower Capilano River	235	none	none (no mature B)

Table 3 - continued

Area	Number of trees		
	Dead and dying (grey and red-topped) and apparently infested green trees		Dead (grey and red-topped) trees
	1959	1960	1961 <sup>1/</sup>
Cypress Creek	2,000	2,500	2,375
Seymour Mountain (TV tower)	500	315 red top numerous gout	840
Seymour River	n.s.	650	-
Seymour R.-below reservoir	-	-	755
Seymour R.-along reservoir	-	-	640
Seymour R.-above reservoir	-	-	235
Lynn Creek - Grouse Mountain	720	245	n.s.
Indian River	n.s.	800 possible	500
Coquitlam L., south end	n.s.	n.s.	325
Coquitlam L., valley on E side	n.s.	n.s.	210
Coquitlam River	n.s.	n.s.	105
De Beck Creek	n.s.	n.s.	65
Pitt River - north of Pitt Lake to Homer Creek	n.s.	n.s.	44
N. Alouette River	n.s.	n.s.	70
Totals	3,905	5,370	8,341

<sup>1/</sup> The figures in this column include dead trees only

<sup>2/</sup> n.s. = no survey



FOREST INSECT AND DISEASE SURVEY

SOUTH VANCOUVER DISTRICT

1961



## FOREST INSECT AND DISEASE SURVEY

### SOUTH VANCOUVER DISTRICT

1961

D. H. Ruppel

#### INTRODUCTION

Field work in the South Vancouver District commenced in late April and lasted till early October. Acquisition of a four-wheel drive vehicle expedited survey work. The summer was somewhat drier than average following a mild winter. Some forest closures occurred but did not unduly interrupt the survey.

A total of 314 insect and 43 tree disease collections were made. Disease collections included those made in exotic plantations. Insect collections included negatives. Table 1 and map 1 detail collections by host and locality respectively.

Survey work included aerial surveys of the balsam woolly aphid and bark beetle areas. The pine twist rust survey absorbed a week or more of survey time and involved the inspection of more than 200 European white poplars.

#### STATUS OF INSECTS

##### Balsam Woolly Aphid, Adelges piceae (Ratz.)

The balsam woolly aphid is currently the most important insect causing damage to forests in south coastal British Columbia. An unpublished joint report on this insect and its damage to amabilis fir will be found at the end of the introduction to the Vancouver (mainland) Forest District.

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

Spruce budworm remained at a very low population level in the previous infestation areas at Boston Bar and Pemberton. No budworm larvae were collected in the Pemberton area from Douglas fir or other hosts. Only four larvae were found in the Boston Bar locale. Occasional larvae were found elsewhere in the district. Queen's Park in New Westminster again contained a small population on western hemlock, Norway spruce, and Engelmann spruce with a maximum collection of 21 larvae.

Study plots are being continued in the budworm infestation areas. Douglas firs which were heavily defoliated now have a good complement of foliage. No defoliation was discernible up to the end of August but there may be a heavier than usual needle cast of needles over three years old, probably due to drought conditions.

The spruce budworm is not expected to be an important problem in the South Vancouver District in 1962.

Table 1  
 Collections by Hosts  
 South Vancouver District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	29		Alder, red	5	1
Douglas fir	91	2	Apple, domestic	1	
Fir, alpine	3	1	Apple, ornamental		1
Fir, amabilis	26	3	Aspen, trembling		1
Fir, grand	5		Birch, western white	1	1
Hemlock, western	86		Cascara	1	2
Larch sp.	1		Cottonwood, black	3	3
Pine, lodgepole	16	1	Maple sp.	1	
Pine, Monteray		1	Maple, vine	5	
Pine, ponderosa	3		Peach, domestic		1
Pine, Scots		3	Pear, domestic	1	
Pine, western white	3	2	Poplar spp.	6	4
Pine, whitebark		1	Poplar, silver	1	5
Spruce sp.		1	Willow spp.	8	5
Spruce, Colorado	1		Miscellaneous	3	3
Spruce, Engelmann	4		No host	1	
Spruce, Norway	1				
Spruce, Sitka	8	1			
			Total	37	27
Total	277	16	Grand Total	314	43

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

The western hemlock looper populations remained at a low level in the District. Widely distributed samples contained 66 larvae in 22 collections or an average of 3.0 per collection. Five collections each at Coquitlam Lake and Stanley Park averaged 5.0 and 4.5 larvae respectively per collection. There was a high of 13 larvae in one collection at Stanley Park. The principal host was western hemlock with western red cedar, Douglas fir and grand fir following in that order.

No appreciable defoliation was observed and the insect is not expected to cause serious damage in 1962.

Green-striped Forest Looper, Melanolophia imitata Wlk.

Populations of this defoliator continued to decrease in all parts of the District except Drainage Division 041 where a slight increase was registered. Table 2 shows the population trend of green-striped forest looper by drainage divisions as determined by collections for western hemlock and other coniferous host species during the larval period. The larval period was taken as the dates on which the first and last larvae were collected. No collections were

made in drainage 044 during the larval period. The population in Stanley Park receded to a low level.

Populations of the green-striped forest looper are expected to be at a low level in 1962.

Table 2

Population Trend of Green-striped Forest Looper, Melanolophia imitata Wlk. by Drainage Divisions as Determined by Collections for Host Species During the Larval Period. South Vancouver District, 1961.

Drainage division	Total number of samples taken during larval period			Number of samples containing green-striped forest looper			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
040	30	16	10	28	4	0	0.9	0.4	0
041	5	11	29	0	2	8	0	0.3	0.83
042 <sup>1/</sup>	115	47	53	84	16	7	13.6	0.6	0.21
043	9	4	9	2	0	0	0.2	0	0
044	40	14	0 <sup>2/</sup>	8	6	0	0.5	0.6	0
045	27	31	32	4	3	1	0.3	0.1	0.03

<sup>1/</sup> Includes Stanley Park

<sup>2/</sup> No collections during larval period.

Douglas-fir Bark Beetle, Dendroctonus pseudotsugae Hopk. and Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Bark beetles are a continuing factor in the deterioration of Douglas fir and western white pine in the Skagit River, Silverhope Creek, Fraser River, and Nahatlatch River valleys and drainages and also Birkenhead River Valley and Blackwater Creek. A flight was made over the eastern section of the district in late September and six strips were subsequently run in the Skagit River drainage. Ground and visual checks were made in the Boston Bar and Birken areas during the summer.

The results of six cruise strips in the Skagit River Valley are shown in Table 3. All standing trees were tallied. Descriptions do not include white pine blister rust and pole blight on white pine or a white pitted rot,

Fomes pini (Thor ex Fr.) Karst., on pine and fir, all of which are very prevalent. No "green-infested" pines and few "green-infested" Douglas firs were found on the strips but were present near the strips. A large proportion of "green and healthy" trees represent regeneration under eight inches d.b.h.

Table 3

Bark Beetle Damage to Douglas Fir and Western White Pine along the Skagit River on Sample Strips Run in September, 1961, Including other Species.

South Vancouver District, 1961.

Strip	Dimensions in chains	Douglas fir				Western white pine				Other spp. <sup>2/</sup>	
		H	I	R	G <sup>1/</sup>	H	I	R	G	H	Dead
Snass Creek	1 x 10	103	9	4	64	5	0	1	37	158	1
2.5 Mis. SE of Snass Creek	1 x 12	114	0	0	13	40	0	6	27	76	13
0.5 mis. N of Skagit R. Bridge (nr. Klesilkwa R.)	1 x 10	289	0	0	64	10	0	0	9	133	1
9.0 mis. S of Silver Lake	1 x 10	151	0	0	4	10	0	2	86	436	1
1.5 mis. S of Skagit R. Bridge (nr. Klesilkwa R.)	1 x 10	120	0	2	40	9	0	4	23	160	1
Neopopekum Creek	1 x 10	251	0	0	7	30	0	1	16	255	1
Totals	1 x 62	1,028	9	6	192	104	0	14	198	1,218	18

<sup>1/</sup> H = Green and healthy (no beetle attack)

I = Green infested (current attack)

R = Red-topped (dead, 1960 attack)

G = Old grey (dead, attacked before 1960)

<sup>2/</sup> Other spp. included western hemlock, western red cedar, lodgepole pine, grand fir, Engelmann spruce and alpine fir.

Areas where bark beetle damage to Douglas fir and western white pine has occurred are shown in Table 4. Where no figures are given for number of trees, damage is more or less in accord with Table 3. The range of tree sizes in inches d.b.h. were: South of Hope - eight to 26; Hope to Boston Bar - 10 to 36; and Birkenhead Lake - eight to 30. A preponderance of trees were 12 to 14 inches d.b.h.

Table 4

Areas Where Douglas Fir and Western White Pine Trees have been Killed by Douglas-fir and Mountain Pine Beetles as determined by Aerial and Visual Checks.

South Vancouver District, 1961.

Location	Approx. area in acres	Mortality and tree spp.	Status of infestation
<u>1/</u> Birkenhead Lake	general	200 Pw	<u>2/</u> active
<u>1/</u> Blackwater Lake and Creek	general	250 Pw	active
Nahatlatch River	2,500	115 Pw & F	<u>3/</u> continuing
North Bend (Scuzzy Creek)	1,200	150 F	continuing
Chaumox	-	11 F	continuing
Nepopulchin Creek	1,200	50 F	continuing
Tsileuh Creek	1,200	100 Pw	<u>4/</u> inactive
Spuzzum Mountain	1,200	500 Pw	inactive
Yale Creek	-	200+ Pw	inactive
Emory Creek	600	Pw & F	inactive
Anderson River	2,500	F	continuing (scattered)
Stoyama Creek	500	F	continuing
Ainslie Creek	640	50 Pw & F	continuing
Silverhope Creek	3,000	Pw & F	continuing (in patches)
Lower Skagit River	4,300	Pw & F	continuing (in patches)
Upper Skagit River and Snass Creek	5,000	Pw & F	continuing (in patches)

- 1/ Checked visually
- 2/ Active = preponderance of recently attack trees.
- 3/ Continuing = infestation progressing slowly but steadily.
- 4/ Inactive = no recently attacked trees.

#### Conclusion

Douglas-fir bark beetles constitute a threat to Douglas fir in the Boston Bar area. Areas of excessive slash and cull logs, due in part to white pitted rot and recent fire damage, were heavily infested with beetles. Also infested were two areas of felled and bucked timber not scheduled to be removed within the year. Current attacks were found on standing green firs in several places but the extent of attacks will not be obvious till 1962.

Douglas-fir and mountain pine beetle infestations south of Hope and in the Birkenhead Lake area are a continuation of the deterioration of pine and fir on these sites due partly to disease and site conditions.

Inactive infestations north of Hope are listed for completeness of the records.

#### Western Cedar Bark Beetle, Phloeosinus punctatus Lec.

Examination of plots at Maple Bay (Cultus Lake) and Silverdale showed no additional damage to western red cedar from western cedar bark beetles. A very small amount of additional damage due to secondary wood borers was noted but these insects have also subsided. Examination will be made in 1962 to determine whether the 1961 drought conditions reactivated the infestation.

#### Poplar and Willow Borer, Sternochetus lepathi (L.)

This weevil continued to be a serious pest on native willows and, to a lesser degree, on black cottonwood. Many of the attacks observed on black cottonwood of four inches or less in d.b.h. in previous years have healed over with no immediate effect on the trees. A few stems have broken off at the point of attack and some trees have produced sucker growth from the root crown.

Weevil attacks were found in a nursery near Yarrow where various hybrid poplars, all crosses with Populus X canadensis, are being farmed for cuttings. Five per cent of 100 stools, or residual stumps, in one portion of the nursery were infested. The roots were four year old stock. The tops were not impaired for planting purposes but showed a tendency to break away from the stool. This condition could become worse if the infestation persists. The hybrid most heavily infested was "Robusta" but there was nothing to prove that others would not be susceptible at certain stages. A mass collection of adult weevils was obtained from the stems and foliage in mid August.

The infestation previously reported in a University of British Columbia forest at Haney decreased in 1961.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm remained at a very low population level. Five collections containing larvae averaged 1.4 per sample. A collection from Colorado spruce in Queen's Park, New Westminster, containing 14 larvae, was not included in the above average.

Alder Sawfly, Hemichroa crocea (Fourc.)

Feeding on red alder by this insect was observed at several places in the Fraser Valley and North Vancouver. No serious outbreaks occurred but the insect is subject to sudden fluctuations.

Forest Tent Caterpillar, Malacosoma disstria Hbn. and Western Tent Caterpillar Malacosoma pluviale Dyar

Light to heavy defoliation of deciduous trees, including fruit and ornamental species, was again caused by these pests in the lower Fraser Valley in 1961. Egg masses were numerous in late summer and fall indicating the probability of a heavy outbreak again in 1962.

Fall Webworm, Hyphantria cunea Harr.

The fall webworm infestation increased to severe proportions in many parts of the Fraser Valley and extended to Yale and Harrison Lake. Many deciduous trees were completely defoliated by late summer. Individual webs were smaller than in previous years but many of them coalesced as the season advanced. It is not known whether the change in size of webs indicates a peak in the population.

The number of webs on various deciduous hosts were counted by measured roadside counts in the Fraser Valley (Table 5). It was often impossible, driving in a vehicle at the prescribed speed, to count all webs at a given point.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

There was an increase in the population of this insect in the Vancouver area in 1961. Damage to Douglas fir, western hemlock, western red cedar, grand fir, spruce and lodgepole pine was not serious but the unsightly webs caused concern to property owners. Douglas fir is the preferred host of silver-spotted tiger moth but the host range appears to increase with the prevalence of the insect and webs were found on the above hosts.

Table 6 shows the number of colonies or webs of the insect on various coniferous hosts along measured strips in 1961. No web counts were made in 1960.

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

South Vancouver District, 1961.

Location	Miles travelled			No. of webs			Webs per mile		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
Pierdonville west	3.0	3.0	3.0	21	67	168	7.0	22.3	56.0
Pierdonville east <sup>1/</sup>	n.s. <sup>2/</sup>	2.5	2.5	-	310	220	-	124.0	88.0
Rosedale north	2.8	2.8	2.8	20	43	197	7.1	15.4	70.4
Chilliwack (Camp Rd)	7.4	7.4	7.4	27	52	553	3.6	7.0	74.7
Cultus Lake (S. E. side)	3.2	3.8	3.8	69	258	626	21.6	67.9	164.7
Yarrow east <sup>3/</sup>	3.5	3.6	3.6	80	97	415	22.9	24.2	115.3

<sup>1/</sup> Large amount of roadside stand cleared.

<sup>2/</sup> n. s. = no survey

<sup>3/</sup> Small amount of roadside stand cleared.

Table 6

Web Counts of Silver-spotted Tiger Moth, Halisidota argentata Pack., in the  
Vancouver area on Various Coniferous Hosts as Determined by Measured Strips.

South Vancouver District, 1961.

Location	Miles travelled	No. of webs	Webs per mile
Beach Grove - Twawassen	5.4	201	37.2
Stanley Park (Entrance to Brockton Pt.)	2.0	115	57.5
Stanley Park (Lumberman's Arch Prospect Pt. - Chilco Street)	4.0	6	1.5
West Vancouver (Marine Drive)	10.2	211	20.7



Coniferous Sawflies, Neodiprion spp.

The sawfly infestation on lodgepole pine reproduction at the northwest end of Chilliwack Lake continued in 1961 but declined in intensity. Early instar larvae were numerous the first week in June but the population had decreased by the first week in July. At this time damage was light and late instar larvae appeared sluggish and unthrifty. A mass collection submitted to the insectary suffered heavy larval mortality en route and at the insectary. Mortality of pupae was also heavy and only two adults were obtained from the 250 larvae submitted. The infestation appears to have subsided. No permanent injury was sustained by the host, lodgepole pine.

Sawflies were common in small numbers in samples from western hemlock and amabilis fir throughout the district. The highest numbers of larvae were obtained at higher elevations. At one point northeast of Cheakamus, at an elevation of 2,700 feet, over 900 larvae were taken in a collection from western hemlock. The heavy population density caused severe defoliation of 1960 and older foliage of hemlock and amabilis fir in a small area. Elsewhere defoliation was light.

Sawflies were common in small numbers on Douglas fir throughout most of the district.

European Pine Shoot Moth, Rhyacionia buoliana (Schiff.)

No European pine shoot moth was found during routine surveys in 1961.

A Small Leaf Rolling Larva, Archips rosana Linn.

The high population of this insect reported on deciduous species in the Fraser Valley in 1960 declined considerably in 1961, and no serious defoliation occurred.

Spruce Gall Aphid, Adelges cooleyii Gill.

Anticipated damage to Douglas fir foliage by this aphid did not materialize. Fir foliage in Stanley Park, the U. B. C. Forest at Haney, and near Tenas Lake showed no ill effects from the heavy population of aphid nymphs on current foliage in 1960. This aphid was not conspicuous on Douglas fir or spruce in 1961.

A Tenthredinid, Amauronematus sp.

During the past three years a sawfly population has been increasing on black cottonwood and hybrid poplars in the Fraser Valley. This species is not well known but appears capable of rapid buildup under suitable conditions. Defoliation was most noticeable in a poplar plantation but no serious damage resulted. The insect has also been collected from native willows.

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

The spot infestation of antique tussock moth on a group of Colorado spruce in Queen's Park persisted in 1961. Very few larvae were found elsewhere in the district.

Phantom Hemlock Looper, Nepytia phantasmaria (Hy. Ed.)

Populations of this looper remained at a low level. Douglas firs in Hope Municipal Park, apparently a residual stronghold of the insect, were also relatively free of the pest.

Spruce Aphid, Neomyzaphis abietina (Wlk.)

Spruce aphids caused light to heavy defoliation of old foliage on scattered Sitka spruce in the lower Fraser Valley. Most of the damaged trees are maintained for shade or ornamental purposes. Recovery after the previous outbreak in 1958 has been good since current growth is unaffected. However, some spruce succumbed to the 1958 attack and a few more may be killed as a result of the 1961 defoliation.

Since the spruce aphid begins feeding on the underside of needles very early in the spring after a mild winter, damage may be well advanced by the time it is noticed during the first warm days of spring. If control measures are to be effective the small green nymphs of the aphid must be detected by March or early April at the latest.

Aspen Leaf-miner, Phyllocnistis populiella Cham.

The leaves of aspens in scattered small stands in the Boston Bar and Pemberton areas were infested with aspen leaf-miner. The host is becoming more prevalent in the Fraser Valley, possibly as a result of removing the virgin forest and establishment of an open growing site.

A Poplar Leaf-miner, Phyllocnistis sp.

A species of poplar leaf-miners were present in small numbers on black cottonwood and the numerous poplar hybrids in the Fraser Valley.

Satin Moth, Stilpnotia salicis Linn.

Early instar satin moth larvae were common in the Fraser Valley in mid-August. Silver poplar leaves at Pierdonville and Haney were noticeably skeletonized by the young larvae which were also found at other points, mostly on the above host.

No quantitative samples were taken but casual examinations indicate an increase of satin moth damage on silver and other poplars in 1962.

## MISCELLANEOUS INSECTS

South Vancouver District, 1961

Insect	Host(s)	No. cols.	Remarks
* <u>Acantholyda</u> sp.	F, H, B	7	One larva per collection
<u>Achytonix praecuta</u> Sm.	Pl, F	3	Uncommon
* <u>Acronicta grisea</u> Wlk.	D	2	Uncommon
<u>Adelges tsugae</u> (Annand)	H	-	Present but not collected
<u>Anomogyna mustelina</u> Sm.	F, H, Pw	3	Uncommon
<u>Anthelia hyperborea</u> Hulst	H	1	Uncommon
* <u>Anthophila pariana</u> Cl.	D	1	Uncommon
* <u>Archips rosana</u> Linn.	W, apple	2	Low level
<u>Biston cognataria</u> Gn.	C	1	Uncommon
* <u>Campaea perlata</u> Gn.	H, F, Mv	3	Low level
* <u>Caripeta ?aequaliaria</u> Grt.	Pl	2	Uncommon
<u>Caripeta divisata</u> Wlk.	H, F, B, Bg	16	Increase - max. col. 9L
* <u>Cephalcia</u> sp.	Pl	1	Uncommon
* <u>Coniodes plumogeraria</u> Hulst	W	1	Rare
<u>Diacrisia virginica</u> Fabr.	Bracken	1	Uncommon
<u>Ectropis crepuscularia</u> Schiff.	H, C, B.	3	Very low level
<u>Enypia packardata</u> Tayl.	H	2	Uncommon
<u>Enypia venata</u> Grt.	H	1	Uncommon
<u>Epirrita autumnata</u> Gn.	H, Ba	2	Decrease
<u>Erranis vancouverensis</u> Hulst	W, Mv	3	Increase
* <u>Eucordylea atrupictella</u> Dietz.	H	1	Uncommon
<u>Eupithecia annulata</u> Hulst	F, S.	10	Five-fold increase in number of collections
* <u>Eupithecia longipalpata</u> Pack.	F	2	Rare

## MISCELLANEOUS INSECTS - continued

Insect	Host(s)	No. cols.	Remarks
* <u>Eupithecia l. bifasciata</u> Dyar	H	1	Uncommon
* <u>Eupithecia ornata</u> Hulst	Pl	1	Uncommon
* <u>Eupithecia ravocostaliata</u> Pack.	W	1	Uncommon
<u>Eupithecia unicolor</u> Hulst	H, C	3	Increase
* <u>Euura</u> sp.	W	1	Gall maker
* <u>Feralia comstocki</u> Grt.	F, H	7	Common, increase
<u>Feralia jocosa</u> Gn.	F, H	3	Common
<u>Gabriola dyari</u> Tayl.	H, F, B, S sp.	8	Common, increase
* <u>Halisidota m. angulifera</u> Wlk.	D	1	Uncommon
* <u>Hyalophora euryalus</u> Bdv.	F	1	Rare
* <u>Hydriomena furcata</u> Thun.	D	1	Rare
<u>Hydriomena irata</u> Swett.	D, H	3	Increase
* <u>Lithophane</u> sp.	H	1	Rare
* <u>Mindarus abietinus</u> Koch.	B	1	Aphid common on current foliage
<u>Neocalcis californiaria</u> Pack.	H, F, Pw	7	Decrease
<u>Nyctobia limitaria</u> Wlk.	F, H, B	3	Uncommon
<u>Orthosia hibisci</u> Gn.	W	1	Rare
* <u>Panthia portlandia</u> Grt.	F, H, Py, Pl	6	Common
<u>Pero behrensarius</u> Pack.	F, H, C	16	Eight-fold increase
* <u>Pero morrisonarius</u> Grossb.	Bg	1	Uncommon
*? <u>Phengomataea edwardsata</u> Hulst	Pl	1	Rare
<u>Pikonema alaskensis</u> (Roh.)	Se	1	Uncommon

Insect	Host(s)	No. cols.	Remarks
*? <u>Polia l. glaucopsis</u> Hamp.	C	1	Rare
* <u>Rheumaptera hastata</u> Linn.	D	1	Rare
* <u>Schizura concina</u> A & S	Apple	1	Low level
*? <u>Semiothisa continuata</u> Wlk.	C	1	Rare
* <u>Scoliopteryx libatrix</u> Linn.	Cot, W	2	Uncommon
<u>Syngrapha a. interalia</u> Ottol.	H	3	Decrease
* <u>Syngrapha ? r. nargentia</u> Ottol.	H	3	Uncommon
<u>Trichiosoma triangulum</u> Kby.	W, D	2	Low level
<u>Venusia pearsalli</u> Dyar	D	1	Uncommon
*? <u>Xylomyges</u> sp.	F	1	Rare
<u>Zale d. largera</u> Sm.	Pl	2	Low level
<u>Zeiraphera diniana</u> Gn.	F	1	Rare

\* 30 insects which were not collected or listed in 1960

Note: Eight lepidopterous spp. listed in 1960 were not found in 1961.

#### STATUS OF FOREST DISEASES

##### Important Diseases

##### Drought

There were no further symptoms attributable to the 1958 drought. Flagging on Douglas fir in the Fraser Valley declined without serious damage to the host.

There was a recurrence of drought conditions in 1961. The only symptoms noted were a heavier than usual and premature needle cast on conifers. Some Douglas firs in the drier areas of Pemberton - Boston Bar showed symptoms on all but the last three years' foliage. Many deciduous trees had discolored foliage by early August but no tree mortality due to drought was found.

### Pine Twist Rust

A Melampsora sp. on ponderosa pine, morphologically indistinguishable from the damaging European fungus, Melampsora pinitorquo Rostr., was the object of a widespread search in the Fraser Valley in 1961. The main introduction discusses the disease. The search was chiefly on the introduced European white poplar which was found to be very common in the Fraser Valley from Hope to Horseshoe Bay in West Vancouver, and in Squamish. Pines and poplars, suspected to be possible hosts, were found in close proximity to each other at many places. Native aspen is becoming quite common in the Fraser Valley, probably due to the removal of virgin timber and infection studies in 1961 demonstrated this tree to be susceptible to the rust found at Telkwa.

Numerous samples, including those taken by a special team assigned to the problem, failed to disclose any pine twist rust on the lower mainland although several Melampsora sp. specimens from European white poplars at Hope have not yet been verified by inoculations. In addition to the efforts of the special survey team, a week's time was expended by the regular survey and in excess of 200 silver poplars were examined.

### A Leaf Spot of European White Poplar

A leaf spot of European white poplar ?Pseudopeziza populi-albae Kleb., was common in the Fraser Valley. The disease, along with drought, was probably responsible for a heavy premature foliage cast by the host in early August. The disease is reported to cause shoot blight but no symptoms of shoot blight were noted.

### Willow Blight

A blight on willows caused by Physalospora miyabeana Fuk. and Fusicladium saliciperdum (All. & Tub.) Tub. is now known to be well established in the Fraser Valley. Golden and weeping willows were found infected. No infections by the above diseases have been found on native willows.

### Exotic Plantations

Examinations were made of 29 plots in various exotic plantations. A new plot was examined on Sumas Mtn. near Clayburn. In addition to the above, several nurseries and plantations of mixed poplar hybrids were visited.

### Deterioration of Scots Pine, Exotic Plantation No. 43

One hundred Scots pine were examined on XP43 at Green Timbers. Western gall rust, caused by Peridermium harknessii J. P. Moore was very prevalent in the plantation but of secondary importance. There was considerable chewing of bark, probably made more palatable due to the rust, resulting in girdling around galls on stems and branches by rodents, probably red squirrels. Principle damage to the stand has been bud nipping, probably by birds. The bud nipping has been the primary cause of deformed branches and leaders. Top breakage has been excessive and competing native species are overtopping the

pinus. The plantation was established in 1930. Trees ranged in size from 1.2 to 7.8 inches d.b.h. and from 15 to 35 feet in height. Tree form was tallied as follows:

Likely to make a 16 foot sawlog	- 2 per cent
Unlikely to make a 16 foot sawlog	- 30 per cent
Unmerchantable	- 64 per cent
Dead	- 4 per cent

The plantation appears to be a failure.

#### OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Birch, western white	<u>Fomes fomentarius</u> (L. ex Fr.) Kickx	Sardis	Causes a white mottled rot.
Cascara	<u>Puccinia coronata</u> Corda	Vancouver	Foliage rust.
Cottonwood, black	<u>Melampsora occidentalis</u> Jacks.	Devine, Snass Creek	Foliage rust of poplars
Fir, alpine	<u>Polyporus leucospongia</u> Cooke & Harkn.	Manning Park	Causes brown cubical rot. New host record.
Fir, amabilis	<u>Dasyscyphas agassizii</u> (Berk. & Curt.) Sacc.	Squamish	Saprophytic on top-killed trees.
Fir, amabilis	<u>Uredinopsis ?longimucronata</u> Faull	Skagit River	Needle rust.
Horse-chestnut	<u>Polyporus versicolor</u> L. ex Fr.	Vancouver	Causes a soft white spongy rot of dead sapwood. New host record.
Larch sp.	<u>Fomes roseus</u> (Alb. & Schw. ex Fr.) Cooke	Pitt Meadows	Causes brown cubical rot in heartwood. New host record.
Lilac	<u>Polyporus ? zonatus</u> Fr. poss. <u>P. versicolor</u> L. ex Fr.	Victoria	Causes decay. New host record for <u>Polyporus</u> spp.

OTHER NOTEWORTHY DISEASES - continued

Host	Organism	Locality	Remarks
Pine, Scots	<u>Poria subacida</u> (Peck) Sacc.	Alouette Lake	Causes a soft white spongy rot of dead sapwood. New host record.
Poplar hybrids (X Canadensis)	<u>Taphrina</u> sp.	Fraser Valley	Leaf curl of hardwoods.
	<u>Taphrina populina</u> Fr.	Fraser Valley	Leaf curl of hardwoods.
Willow sp. (native)	<u>Melampsora</u> <u>epitea</u> Thum.	Snass Creek	Leaf rust.



SOUTH VANCOUVER  
DISTRICT



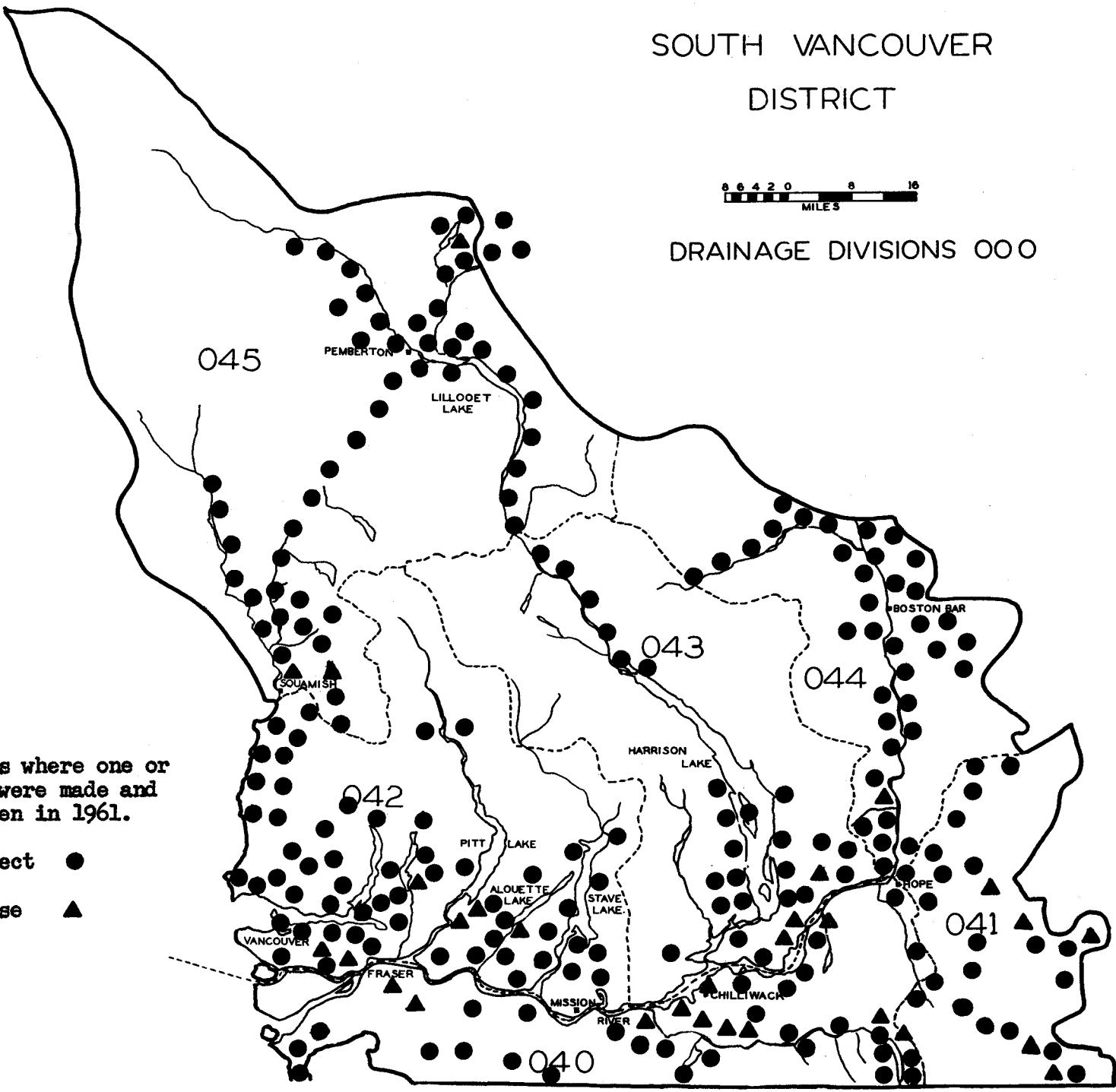
DRAINAGE DIVISIONS 000

Map 1

Location of points where one or more collections were made and field records taken in 1961.

Forest insect ●

Tree disease ▲



FOREST INSECT AND DISEASE SURVEY

NORTH VANCOUVER DISTRICT

1961

## FOREST INSECT AND DISEASE SURVEY

## NORTH VANCOUVER DISTRICT

1961

S. J. Allen

## INTRODUCTION

The 1961 survey of North Vancouver District commenced on May 4 and was completed on October 4. Balsam woolly aphid ground and aerial surveys and bark-beetle surveys were done in conjunction with the South Vancouver ranger and the report on the balsam woolly aphid infestation in North Vancouver District is combined with that of the South Vancouver District report in the Vancouver District (mainland) introduction.

A 21-foot boat was assigned for use in the district. This helped to increase the coverage of the coastal waterways. Due to the break-down of both motors of the motor-vessel, Forest Biologist, personnel from South Prince Rupert District used the boat for a period of two weeks in the North Vancouver District. The assistance and co-operation of B. C. Forest Service rangers and assistant rangers throughout the Vancouver coastal areas was very much appreciated.

Collections by host trees are shown in Table 1, and the distribution of samples is shown in Map 1.

Table 1

## Collections by Hosts

North Vancouver District, 1961.

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	36	-	Alder, red	27	6
Cypress, yellow	1	-	Apple	1	-
Douglas fir	80	8	Arbutus	4	1
Fir, alpine	2	-	Cascara	1	-
Fir, amabilis	33	4	Cherry	1	-
Fir, grand	5	1	Maple, broad-leaved	-	3
Hemlock, mountain	4	-	Willow	8	2
Hemlock, western	178	10	Miscellaneous	1	1
Pine, lodgepole	5	3	No host	7	-
Pine, shore	1	-			
Pine, western white	1	5			
Spruce	3	-			
Spruce, Sitka	48	-			
			Total	50	13
Total	397	31	GRAND TOTAL	447	44

## STATUS OF INSECTS

Sawflies, Neodiprion spp.

The larval period of this insect extended from June 3 to August 29 in 1961 with the majority found from June 21 to August 1. The largest larval collections were from western hemlock but other hosts included Douglas fir, amabilis fir, grand fir, mountain hemlock and Sitka spruce.

The population level of this species decreased in 1961. There were intermittent populations distributed throughout the District. Larvae were common in collections from drainage division 061, as in 1960, but the numbers of larvae per sample decreased considerably, (Table 2). Observations on defoliation in drainage divisions 065 and 066 indicated that heavy populations had been feeding in most areas sampled, but the number of larvae collected was relatively low. Defoliation ranged from five to 10 per cent of the 1960 foliage while some branch tips had lost up to 100 per cent of the 1960 foliage as well as some of the 1959 growth.

In the Sechelt and Jervis Inlet areas, larvae averaged 266.4 per sample in 1960 and 60.0 in 1961. This was not due to an over-all drop, but was caused by the sharp decrease of the heavy populations around Porpoise Bay in 1961. The population increased slightly in 1961 in the Jervis Inlet area.

Table 2

Summary of Neodiprion spp. Sawflies Found by Drainage Divisions.

North Vancouver District. 1959 - 1961.

Drainage Division	Total number of samples taken during larval period			No. of samples containing sawfly			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
060	3	-	16	1	-	3	3.0	-	1.3
061	41	41	105	31	28	49	31.6	198.0	27.9
062	8	8	15	2	4	12	4.0	4.5	29.2
063	10	8	19	3	3	3	1.0	3.3	1.0
064	10	5	38	9	2	7	22.1	1.5	1.1
065	10	5	26	8	4	12	14.0	10.0	43.3
066	10	-	33	6	-	6	17.2	-	7.7
067	2	-	10	1	-	8	46.0	-	5.3
068	1	-	0	0	-	3	0.0	-	3.0
Total	95	67	262	61	41	103	23.0	137.0	22.9

Hemlock Looper, Lambdina fiscellaria lugubrosa Hulst

Twenty-four hemlock looper larvae were collected in 15 samples in the North Vancouver District in 1961. Of these, 21 were found in Drainage Divisions 061 and 062, (Map 2, Table 3). In 1960, a total of 12 loopers was found in seven samples. Hosts were western hemlock and western red cedar.

Table 3

Summary of Hemlock Looper by Drainage Divisions,  
North Vancouver District, 1959 - 1961.

Drainage divisions	Total number of samples taken during larval period			No. of samples containing looper			Average no larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
060	0	0	20	0	-	1	-	0	1.0
061	46	41	122	6	7	9	1.5	1.7	1.9
062	8	2	18	1	0	3	1.0	0	1.3
063	8	9	16	1	0	0	1.0	0	0
064	12	4	28	2	0	2	1.5	0	1.0
065	14	4	26	1	0	0	2.0	0	0
066	11	-	25	0	-	0	-	-	0
067	2	-	10	1	-	0	4.0	-	0
068	1	-	7	0	-	0	-	-	0
Total	102	60	272	12	7	15	1.7	1.7	1.6

Green-striped Forest Looper, Melanolophia imitata Wlk.

A total of 35 larvae were found in 21 samples made in the Howe Sound to Toba Inlet and Seymour Inlet areas. In 1960, a total of 31 larvae were found in 20 samples. During the 1959 season, the B. C. Forest Service reported "many green loopers" in the Seymour Inlet area. The insect ranger had visited the area prior to the larval period so no positive samples were found. Table 4 summarizes the sampling results from 1959 to 1961. The principal host of this looper was western hemlock.

Table 4

Summary of Green-striped Forest Looper Found by Drainage Divisions,  
North Vancouver District, 1959 - 1961.

Drainage division	Total number of samples taken during larval period			No. of samples containing Looper			Average no. larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
060	4	-	18	3	-	6	1.3	-	2.5
061	58	43	107	35	16	14	4.3	1.7	1.3
062	8	0	16	3	0	1	1.0	0	1.0
063	10	14	3	6	2	1	4.5	1.0	1.0
064	22	6	10	5	1	0	1.2	1.0	0
065	12	6	18	8	1	0	5.7	1.0	0
066	9	-	26	4	-	0	6.5	-	0
067	1	-	10	1	-	0	1.0	-	0
068	1	-	7	0	-	1	0	-	3.0
Totals	125	69	215	65	20	23	4.1	1.5	1.7

Black-headed Budworm, Acleris variana Fern.

The black-headed budworm population remained low in 1961. Only 13 larvae were found in a total of eight samples, (Map 2, Table 5). This compared to three larvae in 1960 and nine in 1959. The largest collection, six larvae, was found at Princess Louisa Inlet in 1961. Hosts were western hemlock and Douglas fir.

Silver-spotted Tiger Moth, Halisidota argentata Pack.

The silver spotted tiger moth population increased in intensity and distribution in 1961. Webs were conspicuous during early May from Gibson's Landing to Lund along Highway 101. The heaviest attack was in the Sechelt to Halfmoon Bay area where 240 webs were counted along 10 miles of highway, an average of 24 webs per mile. Damage showed as branch tip defoliation which seldom resulted in die-back and usually was covered by new growth early in the summer. Table 6 lists the web counts made on Highway 101 from Langdale to Lund.

Table 5

Summary of Black-headed Budworm found by Drainage Divisions,  
North Vancouver District, 1959 - 1961.

Drainage division	Total number of samples taken during larval period			No. of samples containing budworm			Average no. larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
060	0	0	17	0	-	1	-	-	1.0
061	29	29	125	5	3	6	1.0	1.0	1.8
062	0	0	15	0	-	0	-	-	-
063	6	0	13	2	-	0	1.0	-	-
064	9	0	16	1	-	0	2.0	-	-
065	7	0	24	0	-	0	-	-	-
066	11	0	11	0	-	1	-	-	1.0
067	2	0	10	1	-	0	1.0	-	-
068	1	0	9	0	-	0	-	-	-
<b>Totals</b>	<b>65</b>	<b>29</b>	<b>240</b>	<b>9</b>	<b>3</b>	<b>8</b>	<b>1.1</b>	<b>1.0</b>	<b>1.6</b>

Table 6

Silver-spotted Tiger Moth Web-count, Highway 101,  
North Vancouver District, 1960 and 1961.

Road vicinity	Distance (miles)	1960		1961	
		Total webs	Webs/mi.	Total webs	Webs/mi.
Langdale to Earl Cove	53	27	0.5	565	10.7
Saltery Bay to Powell River	22.7	5	0.22	51	2.2
Powell River to Lund	15.6	3	0.19	82	5.3

Alder Sawfly, Hemichroa crocea Fourc.

The infestation of alder sawfly north of Wildwood was again active during 1961, but defoliation was much lighter than in 1960. During an examination around the first week in July defoliation was evident only by close examination of the foliage. Very few leaves contained egg niches of the first generation. By late August, the leaves appeared normal and there was no sign of feeding. Larvae were also found at Duck Lake east of Powell River. A total of 109 larvae were submitted.

Spruce Gall Aphid, Adelges cooleyi Gill.

Galls caused by this aphid were collected for distribution records from all areas. During 1961 new gall attacks on Sitka spruce were scarce, but a light population of the wingless colonizer and winged emigrant forms were found on Douglas fir and caused a small amount of needle distortion.

Spruce Tip Moth, Zeiraphera sp.

Larvae of this insect were found on amabilis fir reproduction on the west slope of Mount Elphinstone and in the areas south of Freda Lake north-east of Powell River. Most of this reproduction occurred at 1,500 to 3,000 feet elevations in logged over areas. Defoliation was confined to current foliage on the lateral branches. Feeding started about the time the buds flushed and continued into June and July. Some light defoliation was observed on Sitka spruce in the areas northwest of Powell River.

Fall Webworm, Hyphantria cunea Harr.

A heavy infestation of fall webworm occurred again in 1961 from Howe Sound to Lund and on the Redonda Islands. The heaviest attacks were found from Sechelt to Pender Harbour. Highway web counts made on July 14 at Ruby Lake and Sakinaw Lake approximated 107 and 183 webs in one mile respectively. By August 15 the webs had enveloped small alder trees, in many instances with as many as twelve webs per sapling. The principle hosts were red alder, willow, wild cherry and hawthorn, but the webs were also numerous on apple and pear and one was seen on a laurel hedge.

Douglas-fir Bark Beetle, Dendroctonus pseudotsugae Hopk.

Considerable damage by this bark beetle was observed in the Pender Harbour to Earl Cove area and along Agamemnon Channel in 1960. No red trees were observed in 1961, but some top kill and scattered dead trees were evident on the south side of the Pender Harbour - Sakinaw Lake summit along Highway 101. The overmature condition of Douglas fir in this area makes them susceptible to top-kill, dieback and bark beetles.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

An infestation on the east hillside of Gray Creek in the Porpoise Bay area continued in 1961. Ninety yellow and red trees and approximately 105 old grey trees were counted. The hillside appears to be a poor site and



the trees are scattered and scrubby.

Forest Tent Caterpillar, Malacosoma disstria (Dyar)

Although only one tent of 40 larvae was collected from an apple tree in 1961, a number of adults were observed on the side of the Peninsula Hotel near Gibson's Landing. Accompanying these adults were the following adult Lepidoptera: Stilpnotia salicis, Linn.; Halisidota maculata angulifera, Wlk. and Stannoctenis morrisata Hulst.

Antique Tussock Moth, Orgyia antiqua badia Hy. Edw.

Only two collections from western hemlock contained this tussock moth in 1961; one larva was collected at Parkdale and one colony of 10 larvae at Harbledown Island.

Gray Spruce Looper, Caripeta divisata Wlk.

This looper was found in the larval stage from July 19 until October 1. Larval numbers ranged from one to 19 per sample in 50 samples from western hemlock, Douglas fir, Sitka spruce and amabilis fir. Samples containing over 10 larvae were found in the following areas: Maurelle Island, 19; Raza Island, 12; and Theodosia Arm, 15. Several mature larvae were observed on understory trees in mature hemlock - amabilis fir stands during surveys in September and October in the Alphinstone and Woodfibre area.

Green Spruce Looper, Semiothisa sp.

Similarly to the grey spruce looper, Caripeta divisata Wlk., this looper occurred from mid-July until early September in 65 samples and averaged 3.0 larvae per sample. Samples numbering 10 and more larvae per sample were found in the following areas: Theodosia Arm, 20; Maurelle Island, 18; and Cortes Island, 10. Larvae were not found during late September and October as in the case of the grey spruce looper. The preferred hosts were western hemlock, Douglas fir, Sitka spruce and amabilis fir.

Spruce Aphid, Neomyzaphis abietina Wlk.

Intermittent areas of defoliated spruce were found on the south side of Cracroft Island from Forward Bay to the western end, at Alert Bay, Texada Island, Knight Inlet east of Protection Point and on the south side of Port Neville Inlet. Defoliation on Sitka spruce varied from 40 to 70 per cent on most trees but was not conspicuous due to the mixture of tree species in these stands. Only old foliage was attacked and the current year's growth appeared normal.

## Terminal damage

## Douglas fir

Terminal damage of Douglas fir was very light during 1961. The only damaged leaders observed were in reproduction areas from Howe Sound to Lund.

## Amabilis fir

Rodent damage to terminals of amabilis fir was evident at higher elevations. The top three to six inches of the terminal had been chewed off, leaving the tell-tale rodent tooth marked terminal stump. This condition was found on the south-west slope of Mount Elphinstone, Freda Creek, and at High Creek near Vancouver Bay, all above 1,500 feet elevation in amabilis fir - western hemlock reproduction. The attack ranged from 10 to 25 per cent of the amabilis fir in the stands examined and involved trees from four to 20 feet in height.

Foresters suspect silver thaw, squirrels and grouse as causal agents. The damage occurred sometime during the winter period, most probably in the spring at the time when the snow had fallen off the smaller trees. The new buds are the most likely food source on the woody terminal during this period. Two insects, a spruce tip moth Zeiraphera sp., which was found only on the lateral branches in this area and a species of Dioryctria which was not found in this area during the 1961 survey, had been suspected of causing some of this damage.

## MISCELLANEOUS INSECTS

North Vancouver District, 1961.

Insect	Host(s)	No. of collections	Remarks
<u>Adelges tsugae</u> Annand	H	3	Found at Cracroft Island and Gilford Island. None recorded in 1960.
<u>Choristoneura fumiferana</u> Clem.	F	2	Powell River and Texada Island. None recorded in 1960.
<u>Ectropis crepuscularia</u> Schiff.	H, C	3	Saddle-backed looper, capable of severe damage; Pender Harbour area; three found in 1960.
<u>Enypia packardata</u> Tayl.	H, B, Hm	9	Overwintering looper; Port Mellon to Loughborough Inlet. None recored in 1960.
<u>Eupithecia unicolor</u> Hulst	H, C.	12	Green cedar looper. Found throughout Sechelt Peninsula and Powell River - Lund area. Nine collections in 1960.

Insect	Host(s)	No. of collections	Remarks
<u>Malacosoma pluviale</u> Dyar	H, D, Bg	3	Western tent caterpillar; found singly at Hardwicke Island and Texada Island; two tents collected in 1960.
<u>Neocalcis californiaria</u> Pack.	H, C, B, F	10	Overwintering looper; Texada Island, Rainy River, Sechelt Peninsula and Powell River; thirteen samples positive in 1960.
<u>Nepytia phantasmaria</u> Stkr.	H	0	Phantom hemlock looper; eight larvae in 3 samples in 1960 of which one collection contained 6 larvae at Lausman Creek.

## STATUS OF FOREST DISEASES

## Important Diseases

## Leaf-wilt of Broad-leaved Maple (cause unknown)

Small groups of broad-leaved maple had a burnt and wilted appearance on the side hills and shoreline of several inlets from Jervis Inlet to Loughborough Inlet. The outer perimeters of the leaves had a scorched appearance. Samples were collected at Loughborough Inlet, Philips Arm and Narrows Inlet. There were no pathogenic fungi present on the leaves and it is unlikely that these were responsible. The symptoms did not provide a specific indication of cause but drought appeared to be the most likely explanation.

## Hemlock Cankers

Caliciopsis species were found on branch cankers of western hemlock at Sakinaw Lake, Toba Inlet and Powell River. Other signs were found on bacterial galls on hemlock at Lull Bay, Knight Inlet. The odd case resulted in die-back but in most instances slight branch distortion and cankers were the only damage symptoms found.

## Douglas fir Needle Cast

In 1961, no appreciable damage was found in any of the former areas affected by the Douglas fir needle cast, Rhabdocline pseudotsugae Syd. at Madeira Park, Wilson Creek, Halfmoon Bay, Lund and Westview.

## Pine Twist Rust Survey

During the special survey for this rust, Melampsora pinitorqua Rostr. in 1961, no signs or symptoms were found on either European white poplar Populus alba L., or lodgepole pine. A search throughout the townsites and rural areas of North Vancouver District uncovered only two localities where European white poplar was located, Port Mellon and Powell River. Neither of these groups of shade trees exhibited symptoms of the disease, nor did lodgepole pine in the near vicinities of both these groups.

## Flag canker of white pine

Some flagging of western white pine was noticed on Texada Island three miles north of Gillies Bay. Old insect galleries were found at the base of two of these branches and an organism identified as Atropellis sp. probably Atropellis pinicola Zeller and Goodd.

## Dieback of Willow

Cytospora sp. was associated with two samples of willow die-back submitted from the area on the south side of Mount Elphinstone near Roberts Creek.

## OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Alder, red	<u>Taphrina japonica</u> Kusano	Chapman Creek	Leaf curl affecting foliage in a confined group of trees.
Alder, red	<u>Tympanis alnea</u> (Pers.) Fr.	Halfmoon Bay	Die-back, cankers and resinosis. New record.
Fir, amabilis	<u>Dasyscyphus agassizii</u> Hahn.	Parkdale	Found on main stem and branches of dead tree and on necrotic areas of bark and cambium of over-mature living trees.
Fir, amabilis	<u>Nectria</u> sp.	Rainy River	Apparently saprophytic on dead tree. First record of species on host.
Fir, Douglas	<u>Phaeocryptopus gaeumannii</u> (Rhode) Petr.	Toba Inlet	Needle cast on 1959 foliage.
Fir, Douglas	<u>Dasyscyphus pseudotsugae</u> Hahn	Powell Lake	Branch canker of Douglas fir

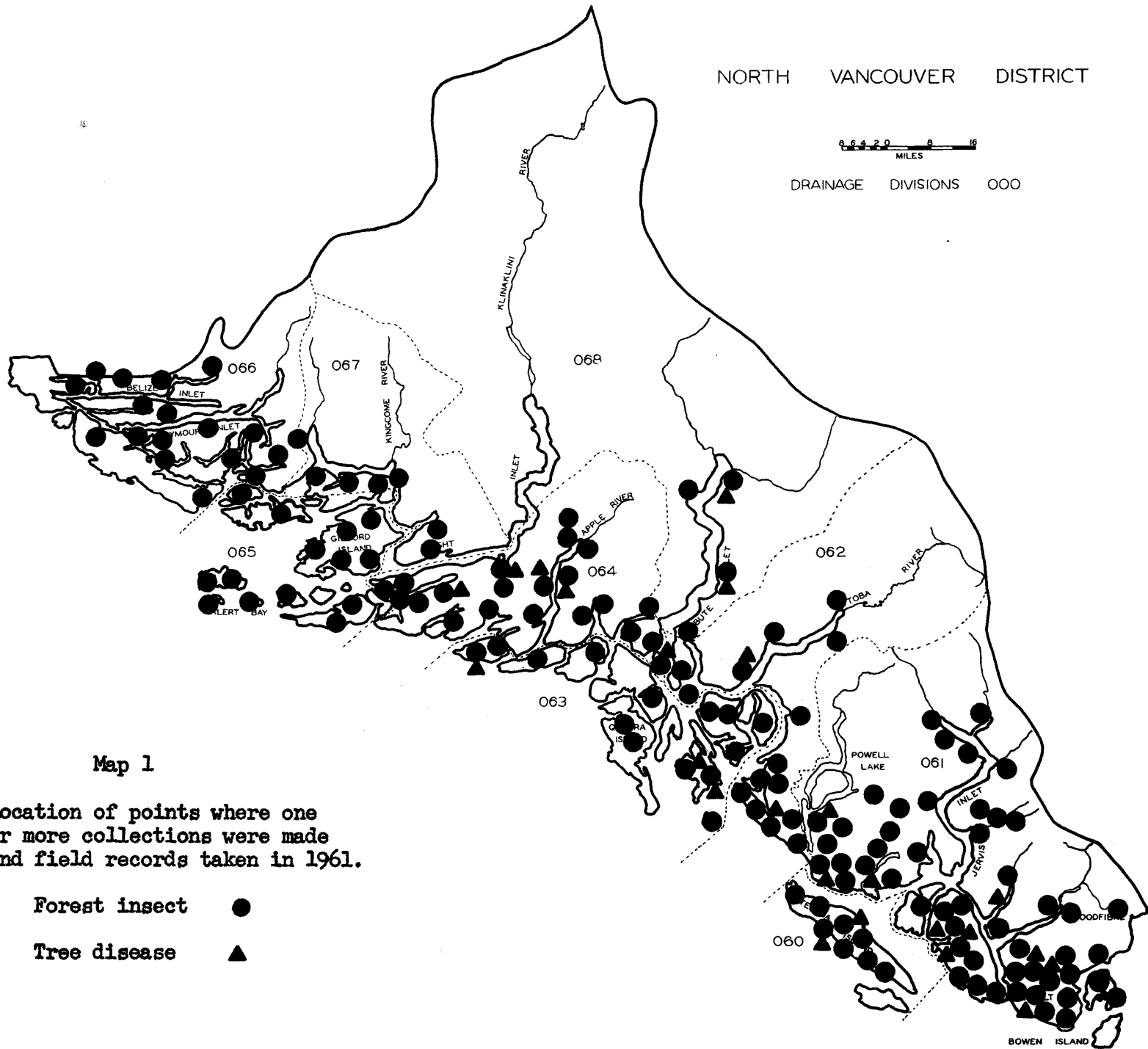
## OTHER NOTEWORTHY DISEASES - continued

Host	Organism	Locality	Remarks
Fir, Douglas	<u>Retinocyclus abietis</u> (Crouan) Groves & Wells	Texada Island	Branch galls, light incidence.
Pine, lodgepole	<u>Peridermium</u> <u>harknessii</u> J. P. Moore	Chapman Cr.	Branch galls, light incidence

NORTH VANCOUVER DISTRICT



DRAINAGE DIVISIONS 000



Map 1

Location of points where one or more collections were made and field records taken in 1961.

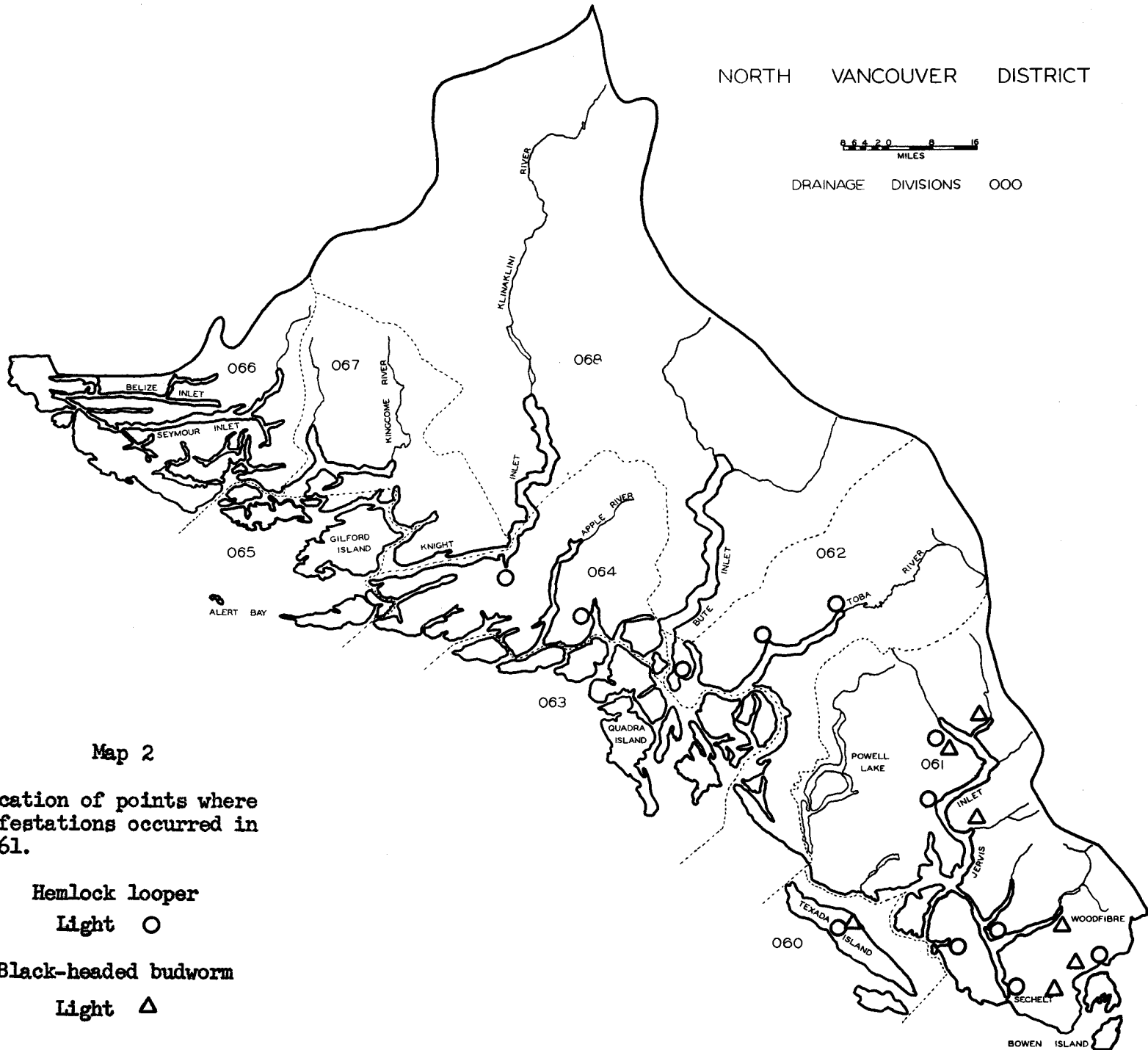
Forest insect ●

Tree disease ▲

NORTH VANCOUVER DISTRICT

0 4 2 0 4 8  
MILES

DRAINAGE DIVISIONS 000



Map 2

Location of points where  
infestations occurred in  
1961.

Hemlock looper

Light ○

Black-headed budworm

Light △

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1961

PRINCE RUPERT FOREST DISTRICT



FOREST INSECT AND DISEASE SURVEY

PRINCE RUPERT FOREST DISTRICT

1961

E. G. Harvey

INTRODUCTION

There was one change in personnel in the Prince Rupert Forest District in 1961. N. E. Alexander, who was moved to the North Vancouver Island District, was replaced by A. K. Jardine in the West Prince Rupert District. The Forest Biology Ranger districts and rangers responsible for the survey of each were:

- East Prince Rupert - E. G. Harvey
- South Prince Rupert - D. Ruth
- West Prince Rupert - A. K. Jardine

Most of the insect problems this year were in the West Prince Rupert District.

About 10,500 acres of timber at Kitimat were sprayed in 1961 to prevent extensive tree mortality by the saddle-backed looper.

The one-year-cycle spruce budworm defoliated trees over a large portion of the Kitimat-Lakelse Lake area.

Pseudohylesinus sp. beetles are attacking and killing amabilis fir trees in the Kitimat area. Elsewhere in the district bark beetle populations were at a low level.

The green spruce aphid caused heavy defoliation to Sitka spruce in the Queen Charlotte Islands and portions of the adjacent mainland.

The spruce tip moth caused considerable damage to regeneration in the Western District.

The outbreak of the forest tent caterpillar remained heavy over large areas of deciduous trees from Kitwanga in the West Prince Rupert District to the east of Smithers in the East Prince Rupert District.

The two-year-cycle spruce budworm population decreased in the Babine Lake region.

WEST PRINCE RUPERT  
DISTRICT (MAINLAND)



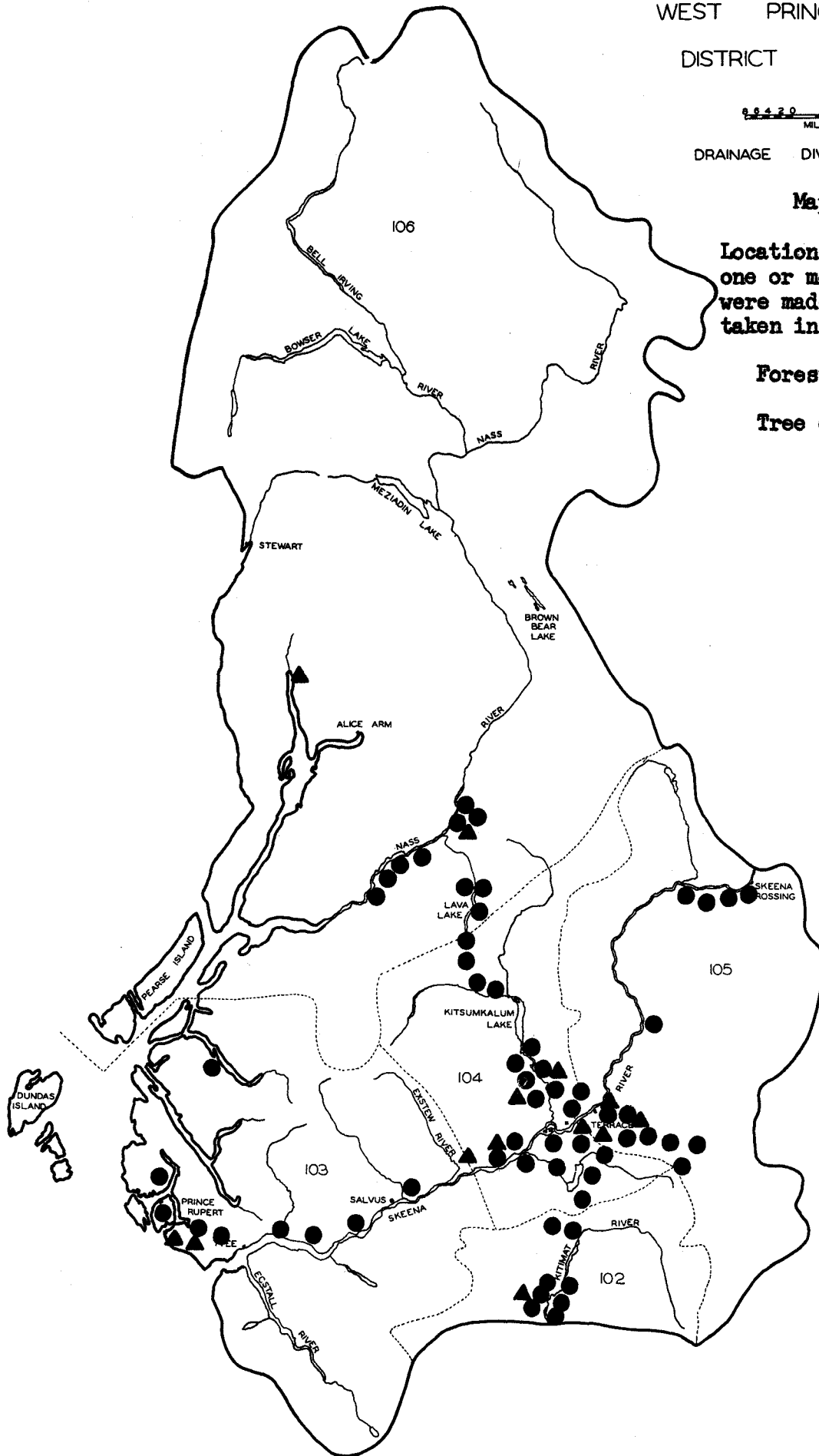
DRAINAGE DIVISIONS 000

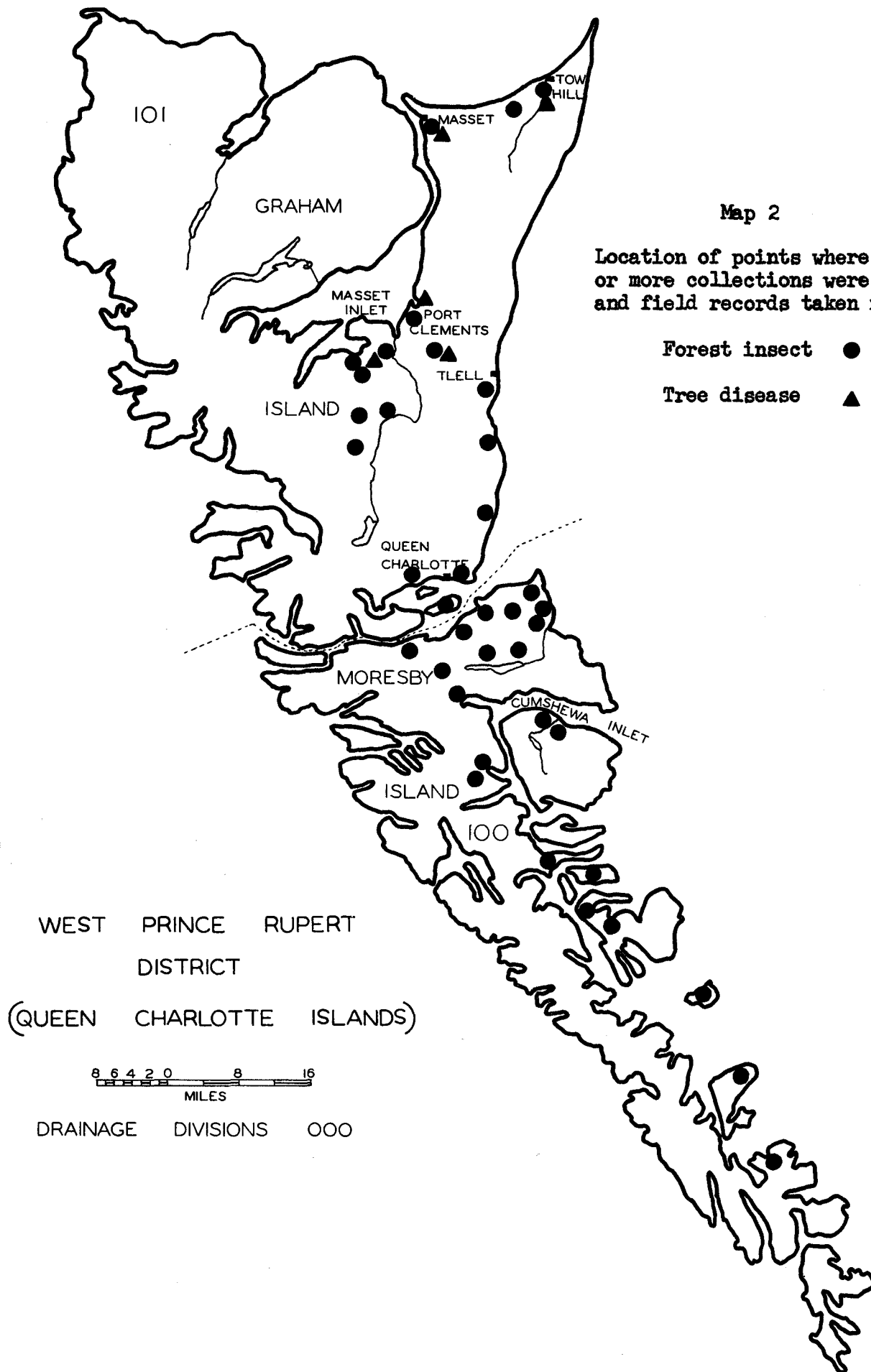
Map 1

Location of points where  
one or more collections  
were made and field records  
taken in 1961.

Forest insect ●

Tree disease ▲





WEST PRINCE RUPERT  
DISTRICT (MAINLAND)

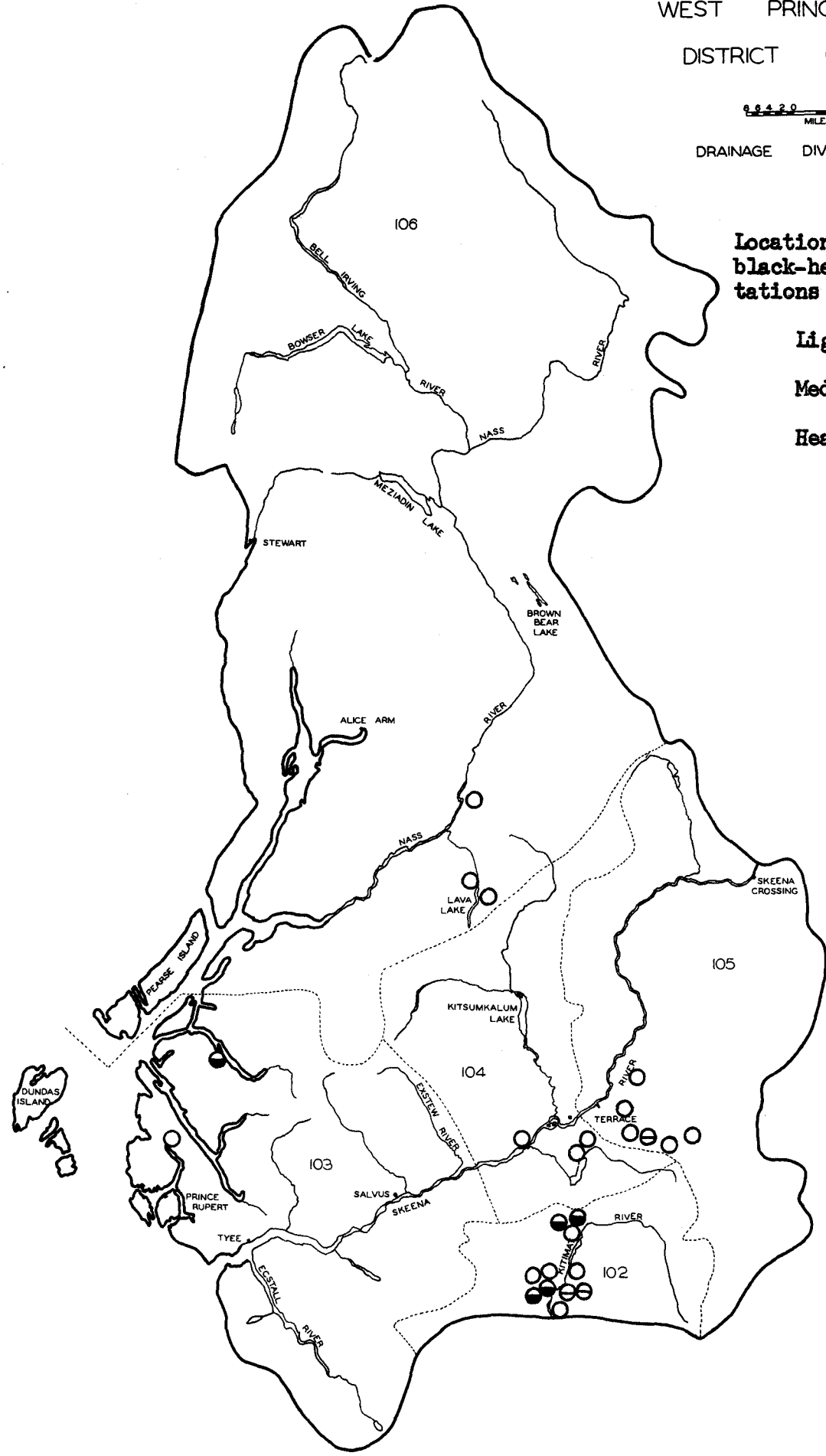


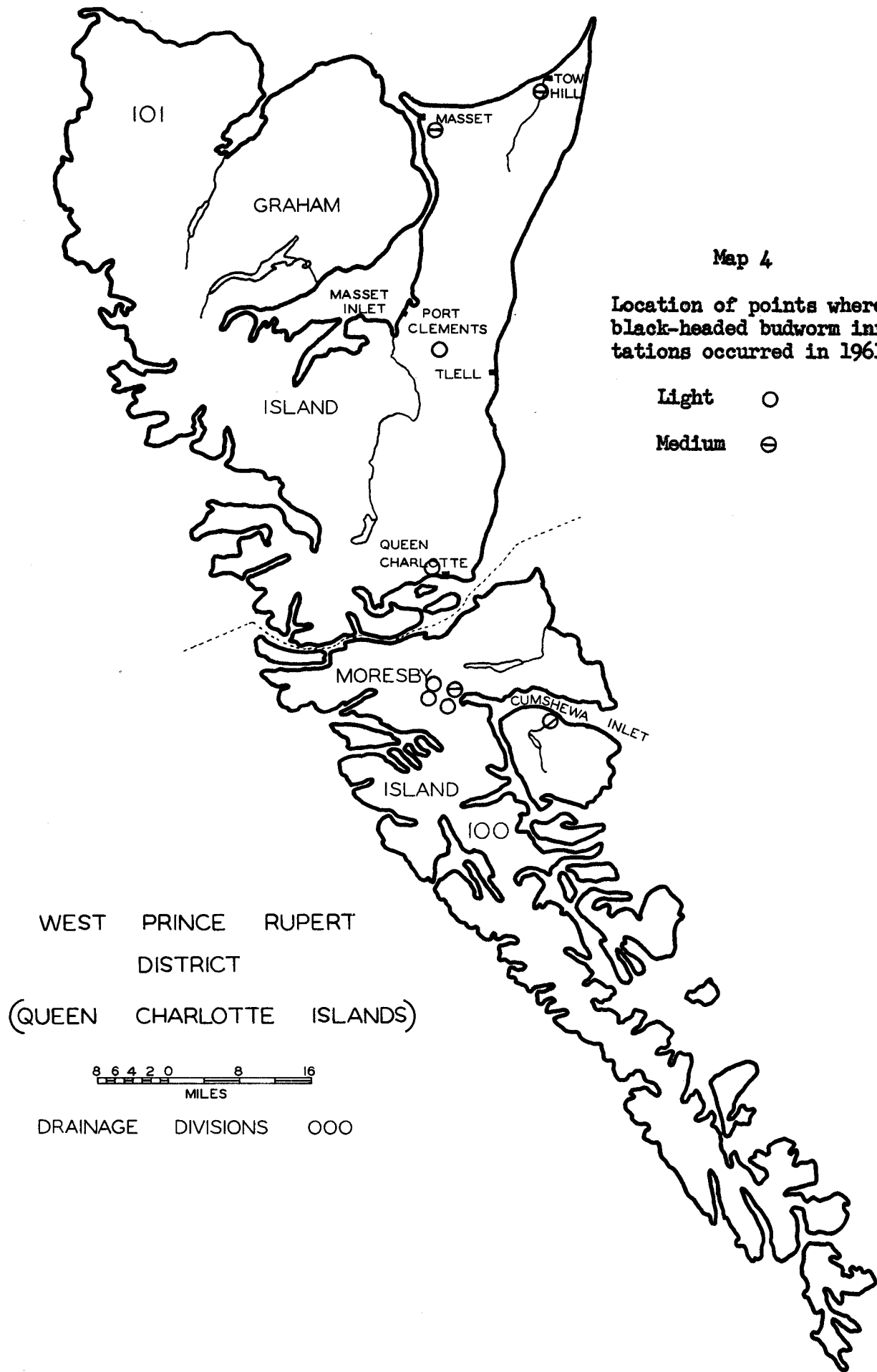
DRAINAGE DIVISIONS 000

Map 3

Location of points where  
black-headed budworm infes-  
tations occurred in 1961.

- Light ○
- Medium ⊖
- Heavy ●





Map 4

Location of points where black-headed budworm infestations occurred in 1961.

Light ○

Medium ⊖

WEST PRINCE RUPERT  
DISTRICT

(QUEEN CHARLOTTE ISLANDS)



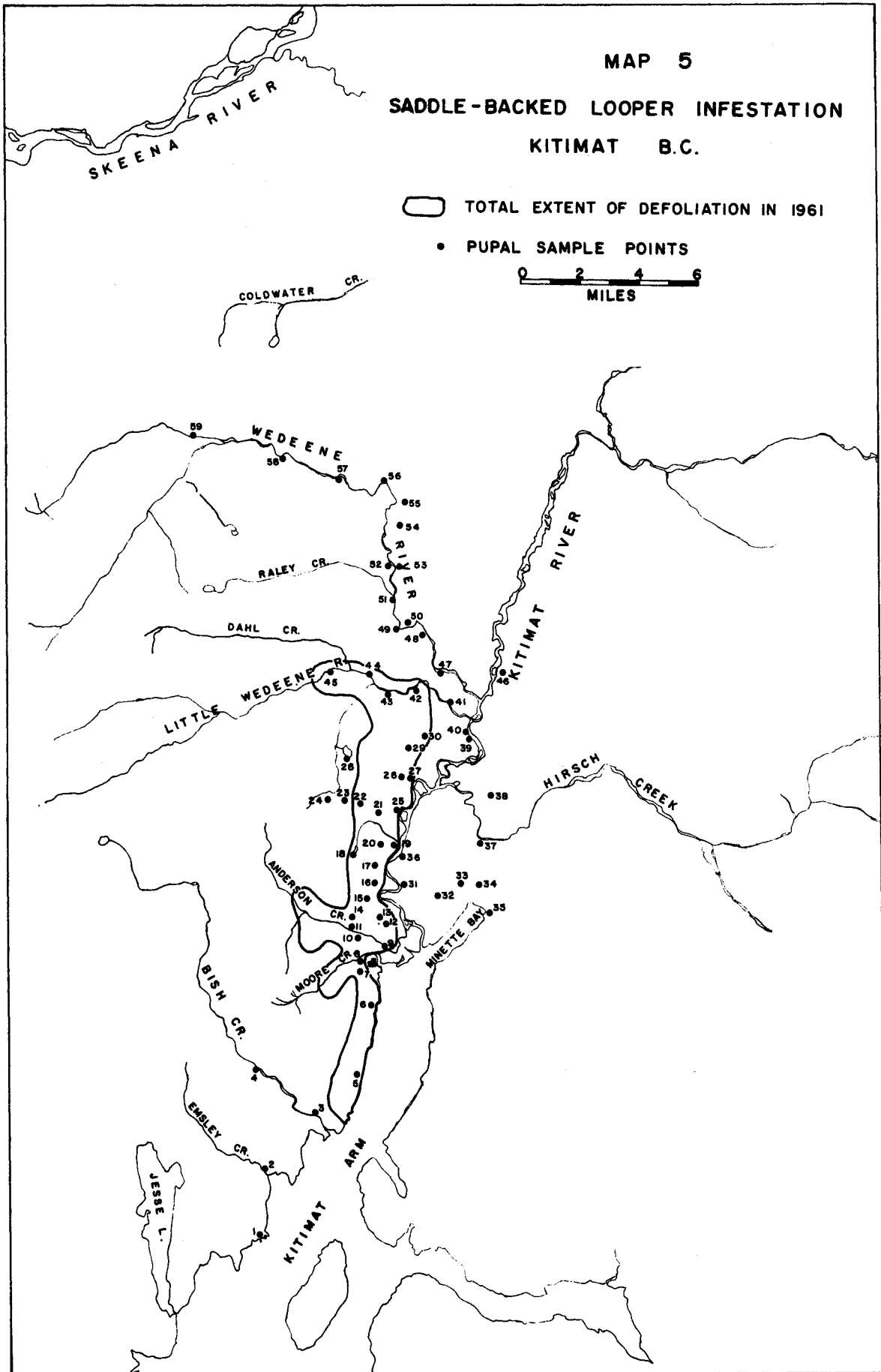
DRAINAGE DIVISIONS 000

MAP 5

SADDLE-BACKED LOOPER INFESTATION  
KITIMAT B.C.

○ TOTAL EXTENT OF DEFOLIATION IN 1961

● PUPAL SAMPLE POINTS



## FOREST INSECT AND DISEASE SURVEY

## SOUTH PRINCE RUPERT DISTRICT

1961

D. S. Ruth

## INTRODUCTION

The survey of the South Prince Rupert District commenced on June 22, with survey work in the Kitimat and Douglas Channel areas. On July 1st the M. V. Forest Biologist was forced to return to Victoria because of engine breakdown and was out of commission for the remainder of the season. An aerial survey from July 30 to August 2 covered some parts of the District, but the over-all survey was not as thorough as in previous years.

A total of 63 insect and two forest disease samples from the South Prince Rupert District were submitted to the Victoria laboratory. Insect and disease collections by hosts are shown in Table 1. The location of forest and tree disease collections are shown on Map 1.

Table 1

## Collections by Hosts

South Prince Rupert District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	3	0	Alder, red	3	0
Hemlock, western	31	0	Alder, Sitka	1	0
Spruce, Sitka	24	0	Willow spp.	1	0
			Pacific crab-apple		1
			Cottonwood, black		1
			Total	5	2
Total	50		Grand Total	63	2

## STATUS OF INSECTS

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm population decreased in almost all sections of the District in 1961 (Table 2). The largest sample, 72 larvae, was collected from western hemlock in a bay .03 miles south of Bish Creek on Douglas Channel. No feeding was visible. In another collection, made on hemlock in Jenny Inlet on Dean Channel, 24 larvae were found. The above areas were the only locations where larvae were collected in large numbers.

Table 2

## Summary of Black-headed Budworm Collections by Drainage Division

South Prince Rupert District 1959 - 1961.

Drainage division	Total number of samples taken during larval period on host species			Number of samples containing black-headed budworm			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
080	7	11	10	1	2	2	7.0	1.0	1.0
081	27	39	4	11	8	1	3.3	10.2	24.0
082	21	21	0	2	0	0	1.5	0.0	0.0
083	19	87	41	15	47	15	12.0	15.2	8.2
Total	74	158	55	29	57	18	7.9	14.0	8.3

The Green-striped Forest Looper, Melanolophia imitata Wlk.

The population level of the green-striped forest looper remained at approximately the same level as in 1960. (Table 3). Ten samples averaged 1.4 larvae per collection. Seven collections were made on the insect's preferred host, western hemlock, and three on Sitka spruce.

Table 3

## Summary of Green-striped Forest Looper Collections by Drainage Divisions

South Prince Rupert District, 1959 - 1961.

Drainage division	Total number of samples taken during larval period on host species			Number of samples containing green-striped forest looper			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
080	7	16	10	5	4	2	14.0	4.0	1.5
081	26	42	4	9	5	2	3.0	2.2	1.0
082	18	21	0	4	1	0	4.0	1.0	0.0
083	19	86	49	8	13	6	3.0	1.9	1.5
Total	70	165	63	26	23	10	5.4	1.5	1.4



Spruce Budworm, Choristoneura fumiferana (Clem.)

Although sampling was conducted in some areas after the peak larval period there was a small increase in the number of budworm per collection in 1961. In 1960, 28 collections from Sitka spruce averaged 2.9 larvae each. In 1961, 78 larvae were found in 18 samples, an average of 4.3 larvae per collection.

Spruce Tip Moth, Zeiraphera spp.

Feeding by spruce tip moths on the current foliage of Sitka spruce was evident in almost all locations where sampling was carried out. Particularly heavy feeding occurred in the Douglas Channel area where 70 to 80 per cent of the lateral buds were attacked. Due to the very early larval period only seven collections from Sitka spruce and two from western hemlock contained tip moths. Samples averaged 3.3 larvae each. In 1960, three collections on Sitka spruce averaged 2.1 larvae each.

Sawflies, Neodiprion spp.

Although found in all drainages with the exception of 082 the number of sawfly larvae collected were fewer than in 1960. One hundred and forty-two insects were found on Sitka spruce in 11 samples for an average of 12.9 larvae per collection. Ten collections from western hemlock averaged 4.4 larvae. In 1960, 44 collections on Sitka spruce averaged 20.1 larvae and 46 collections on western hemlock averaged 19.6 larvae per sample. The largest collection, containing 83 Neodiprion spp., was from Sitka spruce at Hartley Bay on Douglas Channel.

Alder Bark Beetle, Alniphagus aspericollis (Lec.)

One alder tree near the entrance to Kildala Arm, on Douglas Channel, was found infested with alder bark beetles. The attack was heavy, up to 25 holes per square foot were counted, and these extended from the base of the tree to within a few feet of the crown, a distance of approximately 50 feet. This is the first record of an attack by this species of bark beetle in drainage division 083.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa, (Hulst)

Only one collection containing four hemlock loopers was found in a sample from western hemlock in drainage division 081, in Jenny Inlet on Dean Channel. In 1960, 11 loopers were collected in five samples from hemlock.

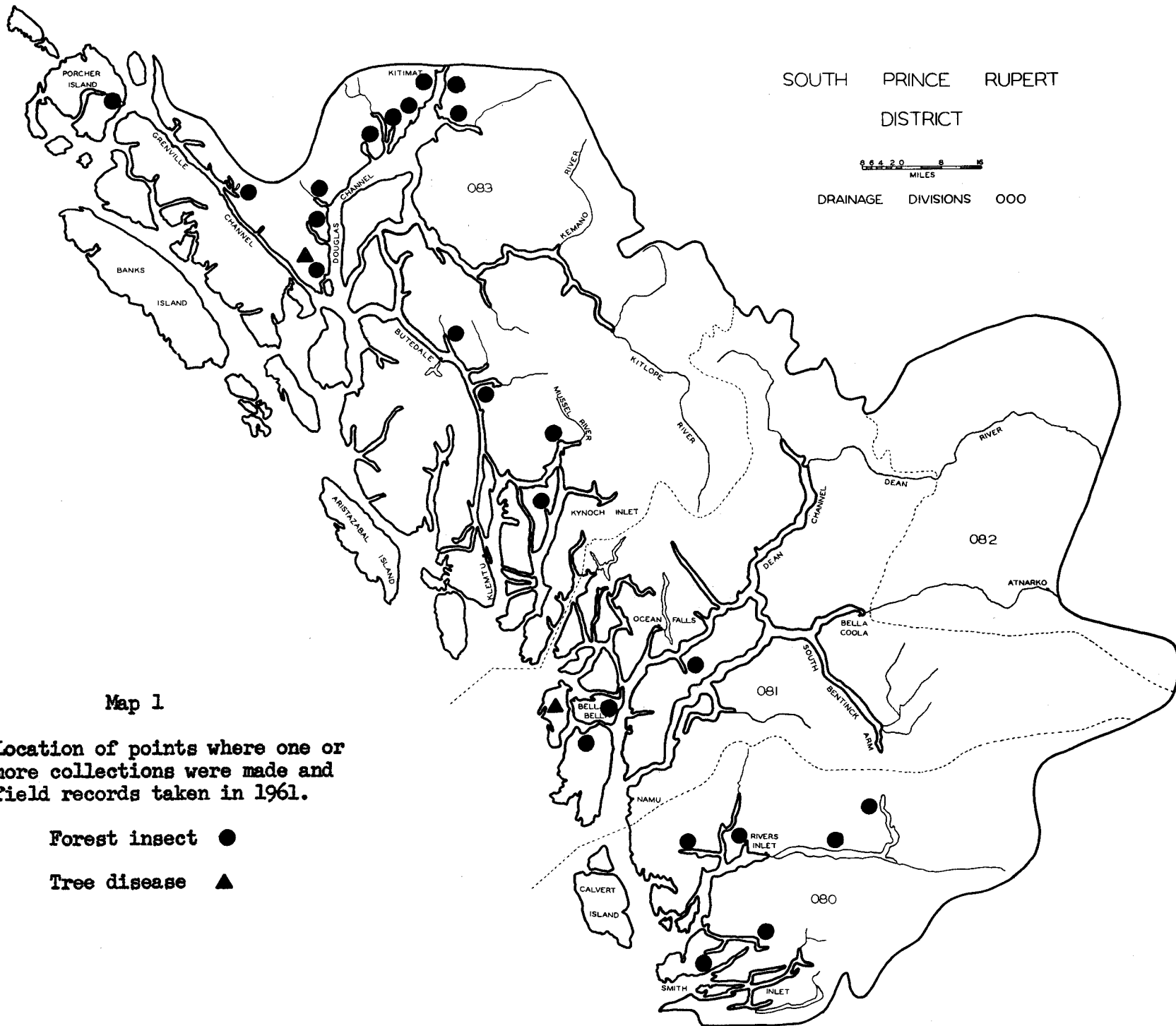
Spruce Aphid, Neomyzaphis abietina (Wlkr.)

Suspected areas of aphid attacks on Sitka spruce were observed during the aerial survey of the district. The foliage on spruce appeared very thin from the lower end of Owikeno Lake to Kilbella Bay on Rivers Inlet. Approximately 10 acres of spruce which was located adjacent to and south of the pulp mill at Ocean Falls, also appeared to be infested. Other attacks were noted on Dean Channel, Fraser Reach and Grenville Channel. In these areas defoliation was light and damage confined to small patches.

Saddle-backed Looper, Ectropis crepuscularia (Schiff)

Due to the spread of the Kitimat infestation heavy populations of saddle-backed loopers were found between the Kitimat dock and Emsley Cove, nine miles south on Kitimat Arm. Six collections made from western hemlock averaged 53.1 larvae per sample and five collections from Sitka spruce averaged 45.2. At the time collections were made larvae were in their early instars and feeding was light. Defoliation on ground cover was 15 to 20 per cent, and on overstory 5 to 10 per cent. In 1960 collections made in the above areas averaged 31.0 larvae per collection from western hemlock and 29.1 on Sitka spruce.

One mile north of Kitimat Mission eight larvae were collected in a sample from Sitka spruce, one larva on willow and 19 larvae from a collection made on alder. The only other area where this insect was found was Douglas Channel.



Map 1

Location of points where one or more collections were made and field records taken in 1961.

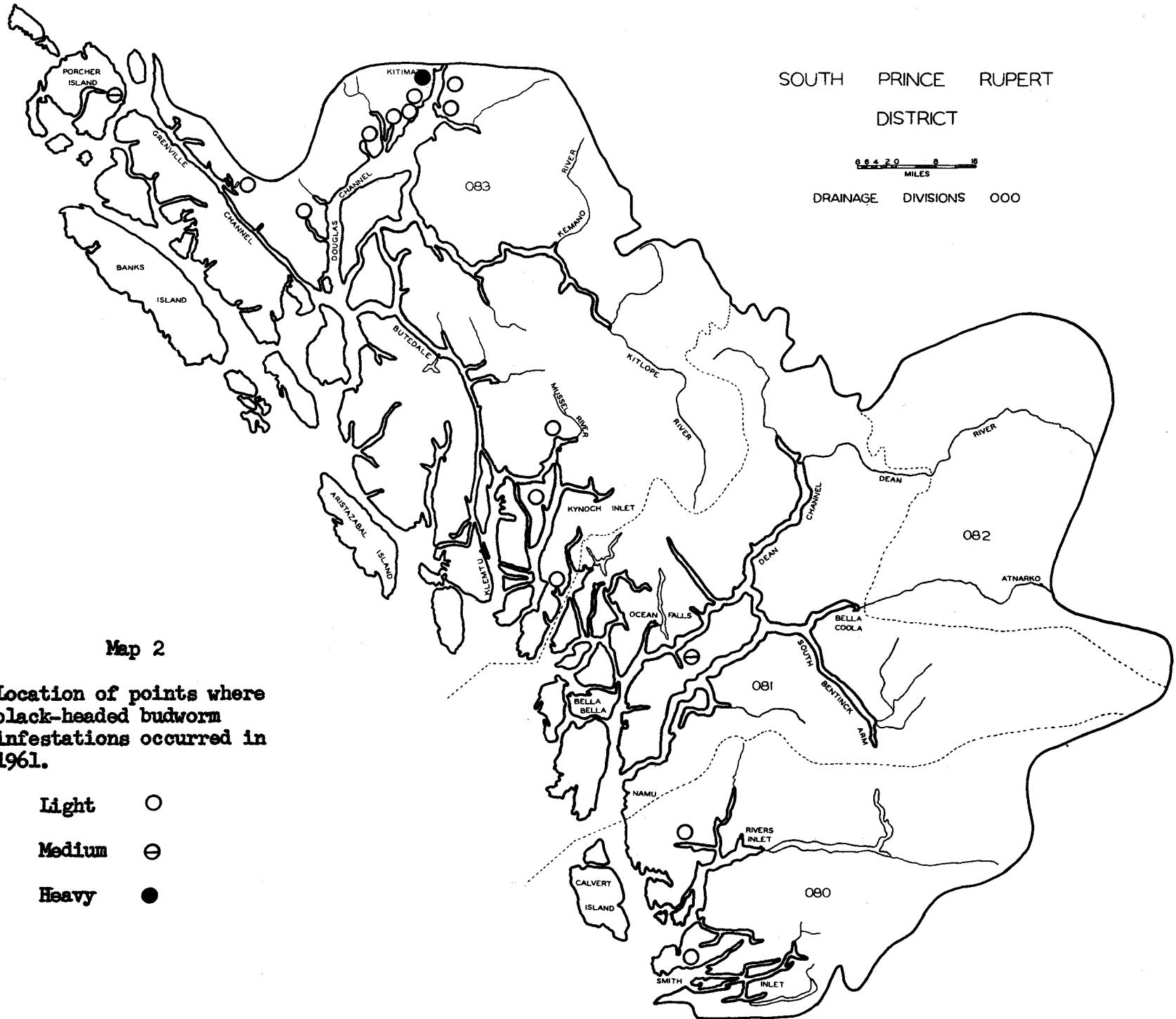
Forest insect ●

Tree disease ▲

SOUTH PRINCE RUPERT  
DISTRICT

0 0.4 0.8 1.2 1.6  
MILES

DRAINAGE DIVISIONS 000



Map 2

Location of points where  
black-headed budworm  
infestations occurred in  
1961.

Light ○

Medium ⊖

Heavy ●

FOREST INSECT AND DISEASE SURVEY

WEST PRINCE RUPERT DISTRICT

1961

FOREST INSECT AND DISEASE SURVEY

WEST PRINCE RUPERT DISTRICT

1961

K. Jardine

INTRODUCTION

Field work in the West Prince Rupert District commenced on May 18 and extended to October 19. Insect activity in the District increased considerably in 1961. The build up of several species of insects now pose serious threats to mature stands as well as regeneration, especially in the Queen Charlotte Islands. A complete report on each of these insects is contained within the text.

Leaf rusts were common on some species of poplar and willow in the mainland portion of the District. An unknown type of branch dieback on aspen was prevalent to some extent in all areas surveyed.

A needle rust on Sitka spruce was common again in stands on Graham Island and in many areas of the mainland portion of the District. No serious disease problems are expected in 1962.

A total of 335 insect and 49 disease samples was collected this season. 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.

STATUS OF INSECTS

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm infestation in the Queen Charlotte Islands continued to decline in 1961. No significant defoliation was observed at any locality. The decrease in this infestation was first evident in the summer of 1960 when larval populations declined. Egg counts in October, 1960 were 97 per cent below the counts made the previous year. The downward trend continued in 1961 with a reduction of both the percentage of collections containing larvae and the average number of larvae per sample. (D. D. 101 and 102, Table 2). The largest collection was at Tow Hill where 30 larvae were collected in one sample. (Map 4).

Although no eggs surveys were conducted in 1961 the population in the Queen Charlotte Islands is expected to continue to decline or remain at a low level in 1962.

Table 1  
Collections by Hosts  
West Prince Rupert District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, red	1		Alder, red	15	
Cedar	1	1	Aspen, trembling	14	6
Douglas fir	2		Birch,	5	
Fir, alpine	1	2	Elderberry	7	
Fir, amabilis	36	3	Maple, vine	1	
Hemlock, western	122	4	Dogwood, red osier	5	1
Larch, Japanese	1		Poplar, spp.	2	3
Pine, lodgepole	5	3	Poplar, lombardy	1	3
Pine, ponderosa	1	2	Poplar, silver	1	5
Spruce spp.	4		Willow	25	3
Spruce, black	1		Miscellaneous	5	6
Spruce, engelmann	1		No host	9	
Spruce, Sitka	68	6			
Spruce, white	1	1			
			Total	90	27
Total	245	22	Grand total	335	49

Extensive sampling of the coastal section of the mainland portion of the district in 1960 revealed a general increase in the black-headed population. Due to the breakdown of the survey boat it was not possible to re-check all these areas again in 1961. Two points where high larval populations existed in 1960 were sampled. One collection made on hemlock at McGregor point in Khutzeymateen Inlet in 1960 contained 154 larvae. In comparison, a collection made in the same area this year contained only 61 larvae. Another collection from hemlock at the head of Tuck Inlet contained only 18 larvae compared to 230 larvae in 1960. Although sampling was not extensive enough to make accurate predictions for 1962, these figures seem to indicate a downward trend in these areas.

Budworm were found consistently in samples throughout the remainder of the mainland portion of the district. Highest populations encountered were in and around the vicinity of Kitimat and in stands along the Kitimat highway as far north as the Kitimat River bridge. Eighteen collections made within this area averaged 24.4 larvae each. The largest collection, from western hemlock at Hirsch Creek, contained 97 larvae. Although the majority of the collections were made on western hemlock, larvae were also found on Sitka spruce and amabilis fir. Black-headed budworm larvae were found consistently in all collections made in the Copper River area. (Map 3). A number of moths were observed flying in this area between August 15 and 30. Egg counts made during the early part of September were low and did not seem to coincide with the number of moths observed. However since the adult flight period for this insect extends up to 40 days, it is possible that all the eggs had not been deposited at the time the egg counts were

made. Larval populations in the above mentioned areas have not reached infestation levels and no serious defoliation is expected in 1962. Table 2 summarizes the collections by drainages throughout the district.

Table 2

Summary of Black-headed Budworm Found by Drainage Divisions,  
West Prince Rupert District, 1959, 1960, 1961.

Drainage division	Total number of samples taken during larval period			Number of samples containing larvae			Average number of larvae per sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
100	24	30	20	23	27	4	275.8	94.9	6.9
101	35	47	23	16	30	6	19.5	15.4	10.8
102	6	19	32	2	6	18	2.0	9.7	24.4
103 <sup>2/</sup>	10	21	4	7	16	2	19.8	54.3	39.0
104	10	0	20	2 <sup>1/</sup>	0	6	2.0	0.0	3.5
105	9	1	36	2	0	17	1.0	0.0	6.1
106 <sup>2/</sup>	28	26	7	8 <sup>1/</sup>	20	1	5.5	26.0	.14
Totals	122	144	142	60	99	54	149.1	45.2	13.6

Drainages 100 and 101 - Queen Charlotte Islands.

<sup>1/</sup> Includes pupae

<sup>2/</sup> The averages indicated in Drainage Divisions 103 and 106 can not be considered indicative of the population in 1961 since insufficient samples were taken in these areas for a true comparison.

Saddle-backed Looper, Ectropis crepuscularia Schiff.

The severe outbreak of the saddle-backed looper at Kitimat continued in 1961. A chemical control project, was carried out after early spring surveys indicated that the pupal population had successfully survived the winter. Approximately 10,500 acres of the more heavily infested timber were sprayed between June 22 and July 12, with DDT at the rate of 1/4 lb. per gallon and two gallons per acre. The spray was applied by helicopter. Larval mortality was estimated at about 90 per cent.



## Extent and Intensity of the Infestation

The infestation developed into the predicted high intensity this year. Although there are no comparable figures for larval samples taken in 1960 and 1961, there was definitely a significant increase in the population. As a point of interest, a single branch sample taken from hemlock in the Anderson Creek area, contained over 3,500 first, second and third instar larvae. This condition existed in areas which were most heavily defoliated in 1960. The extent of the defoliation in 1961, as determined by aerial surveys and ground checks in September was estimated at over 16,000 acres, an increase of about 5,000 acres compared with 1960. The increase in area resulted from a spread northward to the Little Wedeene River, and southward along Kitimat Arm almost to Bish Creek. A considerable population of spruce budworm existed in most of the saddle-backed looper infestation area but it was not certain how much feeding could be attributed to this insect until ground checks were made. The defoliation caused by the two insects was then more clearly defined. The extent of the saddle-backed looper outbreak as well as the points sampled are shown in Map 5.

## Natural Control Factors

Parasitism was very heavy in 1961. The most conspicuous species was Dusona pilosa Wally, a large hymenopterous species which emerges from the last instar larvae and overwinters in the duff as a cocoon. The number of Dusona cocoons recorded during the pupal survey is shown in Table 3. In 1960, one Dusona cocoon was found for every 14.6 pupae; in 1961, 4.4 parasite cocoons were found for every pupa. This parasite is believed responsible for reducing the pupal counts to the low numbers recorded. At some points, assuming that larvae would have pupated had it not been for Dusona parasites, the pupal counts would have been doubled, and the over-all pupal population would have been much greater (total counts were 72 Ectropis pupae and 321 Dusona cocoons). It is therefore believed that this parasite exerted considerable pressure on the larval population which survived the spray. The parasite was numerous along Kitimat Arm where 52 cocoons were recovered at one sample locality containing 54 pupae, and 54 parasite cocoons were found at another point. Pupal parasitism was also relatively heavy. In 1960 about 25 per cent of pupae collected from Sand Hill were parasitized, nearly all attributed to one species tentatively identified as Aoplus cestus (Cresson). In 1961 along Kitimat Arm, the only locality where pupae were present in large numbers, over 50 per cent were parasitized. It is therefore certain that less than half the over-wintering pupae will produce moths.

A virus disease caused considerable larval mortality in 1961. As in the previous year, the effects of the disease was not observed until the late larval stages. There is no estimate of the percentage mortality attributed to this cause, but dead larvae were observed hanging from the understory throughout much of the infestation area.

### Population Trend

The population trend was determined mainly from comparative pupal counts. All the points sampled in 1960 were re-sampled in 1961, and additional points were added to detect any possible spread of the infestation. The method used for pupal counts was the same as developed for the 1960 survey. Two 1-foot-square duff samples were taken at a point mid-way between the base of the tree and the perimeter of the crown on the east and west sides of each of three trees in each locality. The average number of pupae in the six samples was assumed to provide an estimate of the average pupal population for that area. The counts are shown in Table 3.

The pupal population decreased greatly in 1961. The over-all average of the 33 plots sampled in 1960 was only 0.09 pupae per square foot in 1961, a decrease of over 97 per cent. The decrease in the spray area, where the pupal counts were high in 1960, was even greater. Only one pupa was found in 90 one-square-foot duff samples in the operational spray area; comparable samples in 1960 averaged 7.8 pupae per square foot.

### Stand Condition

The stands from Kitimat Arm almost to the Little Wedeene River have been heavily defoliated. Defoliation in 1961 was very light within the sprayed area; tree mortality has been attributed to the 1960 defoliation. Very heavy feeding occurred in portions of the new infestations in 1961, particularly along Kitimat Arm south of the spray zone. Here the understory and ground cover were 95 per cent defoliated, and the overstory trees lost an average of 75 per cent of their total foliage; some tree mortality may occur on about 1,500 acres. Defoliation in the new area to the north was lighter as a portion was sprayed when the heavy larval population was detected in early June.

During the aerial survey damage and tree mortality throughout the infestation area was estimated and mapped on a relative basis using Anderson Creek as a guide. This area was given an index of 80, and other regions were rated in relation to the apparent comparative damage. Ocular damage estimates were made at sample points throughout the region to confirm the aerial observations.

Defoliation estimates and tree mortality were recorded on the plots established in 1960. Unfortunately most of the plots were not located in areas of heavy tree mortality. The stand condition for the different plots is shown in Tables 4 to 8. The heaviest mortality occurred at Anderson Creek where four out of seven dominant and co-dominant hemlock trees and nearly all the intermediate and suppressed trees were killed. Tree mortality in the intermediate and suppressed classes was heavy on Sand Hill (Table 6) and trees of all classes on the southern slope of Sand Hill were killed (Table 8).

A light saddle-backed looper population is anticipated in 1962. Even allowing for parasitism and other mortality factors, there will be a heavy moth emergence along Kitimat Arm. However, it is anticipated that due to prevailing wind currents and topographic factors large number of moths emerging here will disperse northward into the area sprayed in 1961. Larval parasites, along with disease, are believed numerous enough to reduce the population to a low level.

Both the spruce budworm, Choristoneura fumiferana (Clem.), and a species of bark beetle Pseudohylesinus spp., which were common throughout the infestation area, are dealt with separately in the District report.

Table 3

Location of Sample Points, Defoliation Estimates and Number of Saddle-backed Looper Pupae per Square Foot at each Locality.

West Prince Rupert District, Kitimat, 1961.

Sample number	Locality	Per cent defoliation 1961			Av. number pupae per sq. ft.		Number <u>Dusona</u> cocoons
		over story	under story	ground cover	1960	1961	
1	Elmsley South	0	0	0	-	0	0
2	Emsley Creek	T	0	0	-	0	0
3	Bish Creek 1 mi. from mouth	0	0	T	-	0	0
4	Bish Creek 3 mi. from mouth	0	0	T	-	0.17	0
5	Kitimat Arm	75	95	95	-	9.0	52
6	Kitimat Arm Bl. 89	60	90	90	4.3	0.17	54
7	South of Moore Cr.	90	100	100	12.1	0	1
8	Moore Creek, Ski Trail	75	95	95	-	0	1
9	East of Smeltersite Bl. 89	30	T	30	-	1.2	8
10	South of Anderson Cr.	-	-	-	-	0	1
11	North of Anderson Cr.	90	100	80	12.3	0	0
12	Power line north of Anderson Cr. east side	5	10	5	-	0	0
13	Power line north of Anderson Cr. west side	T	5	T	-	0	0
14	1/2 mi. N Anderson Cr.	80	95	40	4.3	0	1

Table 3 - continued

Sample number	Locality	Per cent defoliation			Av. number pupae per sq. ft.		Number <u>Dusona</u> cocoons
		over story	under story	ground cover	1960	1961	
15	W of Kitimat R. Bl. 6053	-	-	-	16.2	0	0
16	Spruce budworm sample only						
17	Sandhill				11.9	0	0
18	South end Goose Lake	90	80	40	14.5	0	0
19	Radley Park				6.0	0	0
20	Service Center <sup>1/</sup>				10.3	0.094	182
21	Base of Clague Mtn. trail	50	40	40	-	0	1
22	Clague Mtn. trail 800'	25	90	100	5.0	0	0
23	Clague Mtn. trail 1,600'	0	0	0	3.7	0	0
24	Clague Mtn. trail 2,100'	15	10	25	0	0	0
25	Bl. 6071 - W. side of railway	25	50	40	0.2	0.83	6
26	3 mi. N. of Kitimat Stn. 1,000' west of RR	15	20	5	0.5	0	0
27	3 mi. N. of Kitimat Stn.	10	20	60	0.17	0.17	1
28	Bowbyes Lake	10	20	20	6.3	0.17	0
29	CNR mile 35.4	5	10	5	-	1.17	4
30	CNR mile 34.9	10	10	20	-	1.5	1
31	Bl. 6046	0	0	0	0.8	0	0
32	Bl. 307	0	0	0	0	0	0
33	Bl. 6013	0	0	0	0	0	0
34	Bl. 6021	0	0	0	0	0	0
35	Bl. 308 Minette Bay	0	0	0	0	0	0

<sup>1/</sup> 202 samples

Table 3 - continued

Sample number	Locality	Per cent defoliation			Av. number pupae per sq. ft.		Number <u>Dusona</u> cocoons
		1961	1961	1961	1960	1961	
		over story	under story	ground cover			
36	Bl. 6016 Kitimat River	0	0	5	0	0.34	3
37	Bl. 6154 S. of Hirsch Cr. bridge	T	T	5	0	0	0
38	Bl. 6187 2 mi. N. of Hirsch Cr. bridge	10	5	5	0	0	0
39	Bl. 6103 W. of Kitimat River	T	0	T	0.5	0	0
40	Bl. 6113	T	T	5	0	0.5	0
41	Little Wedeene River SE corner of 6132	T	15	10	0	0.17	0
42	Little Wedeene River	35	20	50	-	0.83	2
43	Little Wedeene River L 12105	25	30	75	0.17	0.17	0
44	Little Wedeene River	25	10	20	-	0.17	0
45	Little Wedeene River	T	10	10	-	0	0
46	Nalbeelah Creek	T	T	T	0	0	1
47	Wedeene R. Bl. 6149	0	T	5	0	0.17	0
48	Wedeene R. T.L. 12108	15	10	10	0	0	0
49	Wedeene R.	T	5	10	-	0	0
50	Wedeene R. mi. 30	T	T	T	-	0	0
51	Raley Creek	0	T	0	-	0.17	0
52	Wedeene R.	10	T	10	-	0	0
53	Wedeene R. mi. 28	T	T	T		0	1
54	Wedeene R. mi. 27	T	T	T	-	0.17	1
55	Wedeene R. mi. 26	T	5	T	0	0.17	0
56	Wedeene R.	0	0	0	-	0	0
57	Wedeene R.	0	0	0	0	0	0
58	Wedeene R.	10	T	0	-	0	0
59	Wedeene R.	0	0	0	-	0	0

Table 4

Ocular Estimate of Per Cent Defoliation Caused by Saddle-backed Looper  
in Fume Plot 1, Approximately One Mile North of Kitimat Station.

Kitimat, B. C. September, 1961.

Tree species	Crown class	No. trees living 1960	Av. defoliation 1960	No. trees 100% defoliated 1960	No. trees dead 1961	Av. defoliation by crown levels - 1961		
						top 1/3	mid 1/3	lower 1/3
Hemlock	Dom.	3	5	0	0	15	7	3
	CoD.	4	9	0	0	38	15	10
	Int.	14	7	0	1 <sup>1/</sup>	16	15	7
	Supp.	16	6	0	0	17	14	15
Cedar	Int.	1	0	0	0	0	0	0
	CoD.	1	0	0	0	0	0	0
						<u>Current</u> <sup>2/</sup>	<u>Total</u>	
Balsam	Dom.	7	3	0	0	82	24	
	CoD.	4	3	0	0	65	18	
	Int.	4	2	0	0	70	23	

<sup>1/</sup> Logged

<sup>2/</sup> Spruce budworm defoliation

Table 5

Ocular Estimate of Per Cent Defoliation and Tree Mortality

Caused by Saddle-backed Looper in Fume Plot 2.

Anderson Creek, Kitimat, B. C. September, 1961.

Tree species	Crown class	No. trees living 1960	Av. defoliation 1960	No. trees 100% defoliated 1960	No. trees dead 1961	Av. defoliation by crown levels - 1961		
						top 1/3	mid 1/3	lower 1/3
Hemlock	Dom.	4	51	0	2	3	8	13
	CoD.	3	52	0	2	10	20	30
	Int.	5	81	3	4	T	T	5
	Supp.	4	100	4	4	-	-	-
		<u>16</u>			<u>12</u>			
Balsam	Dom.	1	80	0	0	30	10	100
	CoD.	7	29	0	0	7	13	27
	Int.	5	91	2	5	-	-	-
	Supp.	11	100	11	11	-	-	-
		<u>24</u>			<u>17</u>			
Cedar	Dom.	1	3	0	0	0	0	0
	CoD.	3	4	0	0	0	0	0
	Int.	2	30	0	0 <sup>1/</sup>	0	5	10
	Supp.	1	30	0	1	-	-	-
		<u>7</u>			<u>1</u>			

<sup>1/</sup> One cedar not fed on in 1961 dying - cause unknown.

55% defoliation in 1960.

Table 6

Ocular Estimate of Per Cent Defoliation Caused by Saddle-backed Looper  
in Fume Plot 3. Sand Hill, Kitimat, B. C. 1961.

Tree species	Crown class	No. trees living 1960	Av. defoliation 1960	No. trees 100% defoliated 1960	No. trees dead 1961	Av. defoliation by crown levels - 1961			Total
						top 1/3	mid 1/3	lower 1/3	
Hemlock	Dom.	12	16	0	0	2	9	21	
	CoD.	21	33	0	0	6	14	25	
	Int.	43	60		13				
	Supp.	46	93		37				95
Balsam	Dom.	3	45	0	0	T	8	13	
	CoD.	3	83	1	2	5	10	20	
	Int.	1	15	0	0	5	20	30	20
	Supp.	4	81		1				47
Cedar	Supp.	1	100	1	1				
Pl.	Dom.	1	0	0	0	0	15	40	

Table 7

Ocular Estimate of Per Cent Defoliation Caused by Saddle-backed Looper in Fume Plot 4  
200 Yards West of Goose Creek R. R. Crossing. Kitimat, B. C. September, 1961.

Tree species	Crown class	No. trees living 1960	Av. defoliation 1960	No. trees 100% defoliated 1960	No. trees dead 1961	Av. defoliation by crown levels - 1961			
						top 1/3	mid 1/3	lower 1/3	
Hemlock	Dom.	No trees							
	CoD.	4	26	0	0	T	5	5	
	Int.	6	32	0	2	T	1	3	
	Supp.	No trees							
Balsam <sup>1/</sup>	Dom.	10	10	0	0	47	49	18	
	CoD.	8	10	0	0	63	48	14	
	Int.	1	8	0	0	40	30	5	

<sup>1/</sup> Nearly all defoliation on balsam attributed to spruce budworm.



Table 8

Ocular Estimate of Per Cent of Defoliation Caused by Saddle-backed Looper  
in Random Plot 1, Sand Hill, Kitimat, B. C. September, 1961.

Tree species	Crown class	No. trees living 1960	Av. defoliation 1960	No. trees 100% defoliated 1960	No. trees dead 1961	Av. defoliation by crown levels - 1961		
						top 1/3	mid 1/3	lower 1/3
Hemlock	Dom. & CoD.	19	85	2	7	49	85	97
	Int. & Supp.	11	100	10	11	-	-	-
Balsam	Supp.	3	100	3	3	-	-	-

Table 9

Ocular Estimate of Per Cent of Defoliation Caused by Saddle-backed Looper  
in Random Plot 2, Sand Hill, Kitimat, B. C. September, 1961.

Tree species	Crown class	No. trees living 1960	Av. defoliation 1960	No. trees 100% defoliated 1960	No. trees dead 1961	Av. defoliation by crown levels - 1961		
						top 1/3	mid 1/3	lower 1/3
Hemlock	Dom. & CoD.	12	54	0	0	26	56	87
	Int. & Supp.	18	98	13	16	83	93	98
Balsam	Dom. & CoD.	3	20	0	0	5	13	20
	Int. & Supp.	14	98	11	14	-	-	-
Cedar	Supp.	1	80	0	1	-	-	-
	Dom.	2	0	0	0	0	0	0

Spruce Budworm, Choristoneura fumiferana (Clem.)

There has been a slow but steady increase in the spruce budworm population in the district since 1959. The largest increase occurred in Drainage Division 102 in the vicinity of Kitimat and north to the Wedeene River. Spruce budworm larvae were numerous in collections made in the Kitimat area in 1961, and considerable defoliation occurred on overstory and understory trees. The largest collection made on amabilis fir in this area contained 333 larvae. The increase in larval populations compared with previous years is shown in Table 10. An aerial survey was made over the known and suspected areas of defoliation on August 24. Light defoliation was observed from Lakelse Lake south to the Little Wedeene River where heavy current defoliation occurred. This was the northern extremity of the Ectropis infestation and feeding observed between the Little Wedeene River and Bish Creek along Kitimat Arm could not be distinguished from Ectropis feeding. However, ocular estimates of defoliation were made in conjunction with the saddle-backed looper pupal survey (Table 11). These show that amabilis fir were heavily defoliated from the Little Wedeene River south to Service Center. The large number of eggs found in the sprayed area indicate that the DDT had little or no effect on the population of budworm that existed previous to its application. (Table 11).

Heavy defoliation can be expected again in 1962 in all areas of high egg counts. Light defoliation will probably occur again over the known areas of light defoliation.

Table 10

Trend of Spruce Budworm Populations in the  
West Prince Rupert District, 1958 to 1961.

Year	Number of collections containing budworm	Average number of larvae per collection	Range of larvae per collection
1958	2	1.0	1
1959	11	1.8	1 - 5
1960	35	7.2	1 - 149
1961	37	32.0	1 - 333

Table 11

Location of Sample Points where Spruce Budworm Defoliation Estimates and Egg Counts were made on Amabilis Fir in 1961. Kitimat, B. C.

Sample number	Locality	Spruce budworm defoliation estimates in per cent		No. spruce budworm egg masses per 100 sq. ft.
		Current	Total	
1	Emsley south	0	0	-
2	Emsley Creek	T	T	-
3	Bish Cr. 1 mi. from mouth	-	-	9
4	Bish Cr. 3 mi. from mouth	22	22	-
11	Anderson Cr.	-	-	22
16	1/2 mi. S. of Sand Hill	-	-	21
18	South end of Goose Lake	28	17	-
19	Radley Park	-	-	-
20	Service Center	100	35	356
25	Bl. 6071 west side of R. R.	-	-	133
26	3 mi. N. of Kitimat Stn. 1,000' W. of R. R.	-	18	-
27	3 mi. N. of Kitimat Station	-	18	-
28	Bowbyes Lake			
41	Little Wedeene R., SE corner 6132	24	18	
42	Little Wedeene R.	23	20	-
43	Little Wedeene R. L 12105	61	40	37
44	Little Wedeene R.	55	37	-
45	Little Wedeene R.	14	18	-
46	Nalbellah Cr.	-	-	6
47	Wedeene R. Bl. 6149	0	0	8
48	Wedeene R. TL 12108	40	28	-
49	Wedeene R.	T	8	-
50	Wedeene R. mi. 30	-	-	-
51	Raley Cr.	0	0	-

Table 11 - continued

Sample number	Locality	Spruce budworm defoliation estimates in per cent		No. spruce budworm egg masses per 100 sq. ft.
		Current	Total	
52	Wedeeene R.	45	30	-
53	Wedeeene R. mi. 28	-	-	-
54	Wedeeene R. mi. 27	-	-	-
55	Wedeeene R. mi. 26 on R. R.	-	-	15
56	Wedeeene R.	T	T	-
57	Wedeeene R.			4
58	Wedeeene R.	37	29	-
59	Wedeeene R.	T	T	-

#### Spruce Terminal Damage, Zeiraphera sp.

Spruce terminal damage was very heavy in the Queen Charlotte Islands in 1961. Larvae collected and forwarded to the insectary were tentatively identified as Zeiraphera sp. Both terminal and lateral attacks by this insect appear to extend over most of the forested area of the Queen Charlotte Islands. Lateral attacks were more common but caused less damage to the trees. The heaviest attacks are confined to spruce reproduction stands around Sandspit and Skidegate Lake, including Skidegate Inlet and Cumshewa Inlet. Study plots established throughout these areas in 1960 were examined again in 1961. The results of these examinations indicate a decided increase in the number of terminal attacks compared with 1960. (Table 12). Since little is known of the habits of this insect no attempt has been made to predict the population trend for 1962.

Lateral attacks by Zeiraphera sp. on Sitka spruce were common to some extent throughout all areas surveyed in the mainland section of the District in 1961. Heaviest attacks observed were on mature spruce in the Kitimat and Minette Bay area. A few terminal attacks identical to those found in the Queen Charlotte Islands were found on young spruce in the vicinity of Terrace. Several similar attacks were observed along the airport road and a single attack was found along the old Remo road.

A total of 18 samples made in the mainland section of the District this year contained an average of 5.7 larvae per sample.

Table 12

## Summary of Sitka Spruce Terminal Damage. Queen Charlotte Islands, 1961.

		Plot 1	Plot 2	Plot 3	Plot 4	Total
Number of trees with terminal damage	1961	25	62	24	14	125
	1960	5	5	1	18	29
	1959	19	7	17	35	78
	1958	18	7	13	18	56
	1957	19	8	3	14	44
	Earlier	15	20	3	13	51
Number of trees with lateral damage	1961	43	71	36	8	158
	1960	53	72	39	24	188
	Earlier	53	72	37	17	179
Total number trees		58	77	40	49	224
Height of trees	Average	10	8	9	6	
	Range	3-5	3-15	4-24	3-9	

## Location of plots:

1. Near East Narrows on Moresby Island.
2. Sandspit - 1.5 miles from Northern Pulpwood Store on road behind store.
3. Skidegate Lake - 1.6 miles from Skidegate Lake bridge on road towards Copper Bay.
4. North side of Maude Island.

The Grey Forest Looper, Caripeta divisata Wlk.

The first indication that this geometrid was capable of developing into a threat to forest stands was observed this year in a stand of mature hemlock in the Zymoetz (Copper) River Valley. Several samples made during the last week in July contained above normal numbers of larvae. A close watch was maintained in this area and sampling showed that as the larvae reached maturity light feeding was visible on the lower crowns of the larger trees with more extensive feeding on the understory hemlock and balsam. Table 13 lists the number of larvae found in 3 tree beating samples in the infestation area. On August 18 co-dominant hemlock were felled and examination showed that there was a considerable loss of both old and current foliage, giving the trees a definitely thin appearance. Defoliation extended from the valley bottom up the hillside to an elevation of 1,500 feet. On August 29 a helicopter aerial survey was made possible by the Columbia Cellulose Company over the known and suspected areas of infestation. Very light feeding was visible in all stands observed between management licence No. 1 along the south side of the river as far east as the junction of the Copper and Kitnayaka rivers and south along the Clore River to a point midway between Moraine and Elf creeks. Young understory hemlock and balsam examined at these latter locations had lost up to 40 per cent of their current growth.

Two plots were established in the outbreak area on August 19 to study the trend of the infestation and appraise the tree damage. Ocular estimates were made on percentage defoliation for each of the 50 trees in each plot. The results are shown below.

Location of plot	Plot number	Number of trees	Tree sp. in per cent			Average percentage of defoliation by crown levels			Average defoliation
			H	B	C	top 1/3	mid 1/3	lower 1/3	
3.5 miles E. of hwy 16	1	50	94	2	4	10	16	21	18
5 miles E of hwy 16	2	50	88	4	8	10	16	18	15

These figures indicate that feeding was heaviest on the lower crown levels. The average defoliation of understory trees was estimated at 18 per cent, showing that equally heavy feeding occurred on them. Pupal counts made at four locations in October were low, averaging only 0.19 pupae per square foot from 72 one foot square duff samples. It is possible that the insect pupates in locations other than the duff.

There was a high percentage of mortality in larvae sent to Victoria for mass rearing. Although only 10 per cent of the larvae died of parasites, of particular interest is the fact that the majority of the larvae died possibly from a virus disease. This is not considered indicative of field conditions since numbers of larvae are shipped in one container and one infected larva could spread the disease to all the others in the collection. A pupal population of 0.19 per square foot is not considered high enough to present a threat to the hemlock stands in 1962. However it is quite possible that the present population could increase to more damaging levels even though there is strong evidence of natural control.

Also associated with this insect were above normal numbers of the green spruce looper, Semiothisa granitata Gn., and small numbers of the black-headed budworm, Acleris variana (Fern.).

Grey forest looper larvae were common in hemlock collections along the Tseax River between Lava Lake and the Nass River. The largest collection in this area, 30 larvae, was made in a mature hemlock stand 1.3 miles east of Skoglunds camp. Light defoliation was noticeable on the understory trees at this location. Although a moth flight of this geometrid was observed in the vicinity of Dragon Lake in 1960, no larvae were found in samples made this year. A collection from hemlock along the Beam Station road south of Terrace, contained 46 larvae. Map 6 shows the collection points of Caripeta larvae throughout the district. No great increase in the populations is expected in 1962.

Table 13

Number of Caripeta Larvae per 3-tree Beating Sample from Collection Points  
in Drainage Division 105.

Locality	No. of larvae per 3-tree beating sample
Zymoetz River 2.5 mi.	184
Zymoetz River 2.5 mi.	50
Zymoetz River 5 mi.	60
	141
Zymoetz River 5 mi.	184
Zymoetz River 7.5 mi.	100
Zymoetz River 8 mi. creek	75
	96
	92
	40
	200
	200
Zymoetz River Dardanelles Cr.	40
Zymoetz River 10 mi.	108
Clore River <sup>1/</sup>	Heavy feeding on understory
Kitnayakwa R. <sup>1/</sup>	Light to medium feeding on understory

<sup>1/</sup> Aerial survey - no samples taken

Western Winter Moth, Erannis vancouverensis Hulst

A localized outbreak of this geometrid was discovered in a stand of immature hardwood along the Terrace airport road. This is the first occurrence of this insect in infestation proportions recorded in the West Prince Rupert District. Heavy feeding occurred mainly on vine maple, willow and red osier dogwood. Many other species of deciduous trees in the vicinity were also defoliated. Although this insect prefers deciduous hosts, it has been found on western hemlock and amabilis fir. Parasitism was light, but there was a high incidence of a virus disease which caused considerable larval mortality. A large winter moth flight was observed in the vicinity of Terrace during October, suggesting that the outbreak could continue in 1962.

Spruce Gall Aphid, Adelges cooleyii Gill.

There has been some doubt for the past several years as to whether galls found on Sitka spruce in the West Prince Rupert District, were caused by Adelges cooleyii since this aphid requires Douglas fir as an alternate host. There are no natural stands of Douglas fir in the district. In 1960 a special survey was conducted in the district to find the extent and intensity of damage caused by the Cooley gall aphid. The findings of this survey were recorded in the 1960 annual District Ranger Report. The survey for the spruce gall aphid continued in 1961. Large numbers of galls were found on spruce seedlings in numerous areas on the Queen Charlotte Islands and the mainland portion of the district. The galls, similar in appearance to Adelges cooleyii, were identified as Pineus similis Gillette.

No spruce gall aphid have been found in the Queen Charlotte Islands where a large percentage of the timber is Sitka spruce. The aphid has been detected in only a few localities on the mainland section of the District to date. Attacks on individual Douglas fir and Sitka spruce were found in the vicinity of Terrace in 1960, and a few light attacks were also observed again in 1961 on both hosts in that area. One small Douglas fir seedling in XP 126 B a Douglas fir plantation in the Kitsumkalum Valley was heavily attacked by Adelges cooleyii. The only other location where an attack occurred was on a young white spruce at Seely Lake.

An aphid attack on young Sitka spruce at Terrace which was thought to be Adelges cooleyii, was identified as Pineus coloradensis Gill. This is believed to be the first record of attack by this aphid in the district. Recognizable damage was only a slight gall like swelling. This aphid is usually found on pines.

The Green Spruce Aphid, Neomyzaphis abietina (Wlkr.)

A severe and extensive outbreak of this aphid occurred in the Queen Charlotte Islands and along the coastal portion of the mainland section of the district in 1961.

The aphid was first observed on young Sitka spruce in the Sandspit area on May 18. At this time there was noticeable defoliation on some of the trees. When this area was re-examined on June 16 there was a heavy attack, many of the young trees were quite heavily defoliated and the mature trees were showing signs of thinning and discoloration.

A general survey of the islands which commenced on July 5 revealed that the aphid outbreak was widespread and causing heavy defoliation. Many of the mature spruce in Sandspit and Queen Charlotte City areas had lost all their old growth. Equally heavy attacks were found as far south as Tanu Island and as far north as Masset (Map 7).

Although the aphid feeds mainly on the old growth, a considerable percentage of 1961 growth was also lost as a result of these attacks. Attacks occurred on all size trees in all types of stands. Unusually hot dry weather during the attack period hastened the needle drop and added to the general weakening of the trees.



Eggs of another aphid, Cinara sp. were commonly found on the current growth of Sitka spruce in many areas examined but were more prevalent in the Sandspit area.

An outbreak of the Green Spruce Aphid similar in intensity to that on the Queen Charlotte Islands also occurred in the vicinities of Prince Rupert and Port Edward. Heavy defoliation was recorded as far north as Khutzeymateen Inlet (Map 7). A few immature Sitka spruce in Prince Rupert were severely defoliated (Figures 1 and 2).

Most aphid outbreaks are very short-lived and the Neomyzaphis infestation may subside or disappear in 1962.

#### A Gall Aphid, Pineus similis Gillette

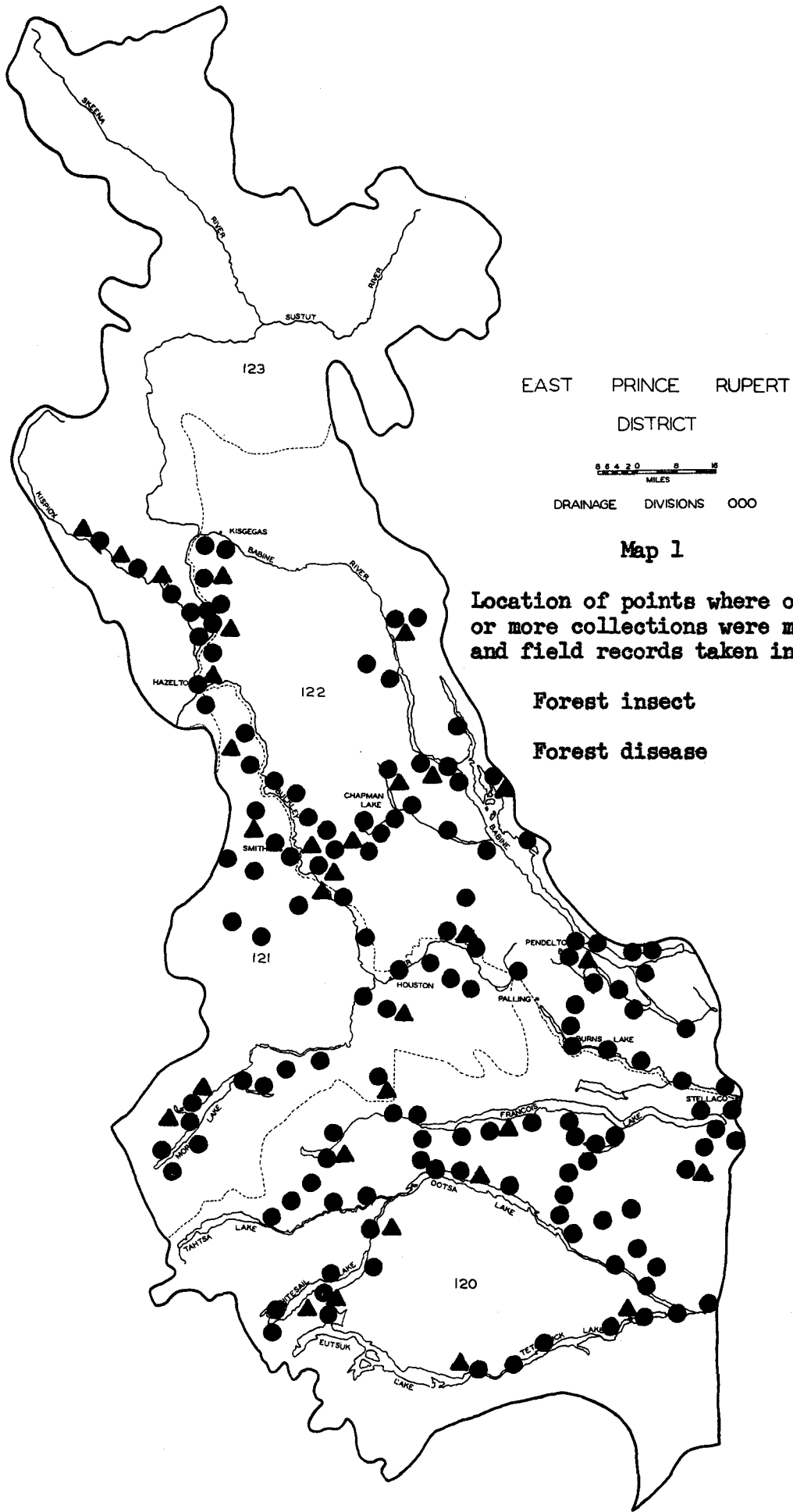
Several small localized outbreaks of Pineus similis were discovered in the District in 1961. Although the insect has been in the District for some time it was not positively identified until this year. This is a new record for the coastal area. Since this aphid and Adelges cooleyii (Gill.) are similar in appearance and type of damage caused, it is impossible to separate them without close examination. Attacks by Pineus similis are mostly confined to very small trees and seedlings and the attacks are quite heavy on the current growth. In a few extremely severe cases aphids were even found on the roots of young spruce seedlings. At present there is no known alternate host for Pineus similis. Table 15 shows areas where this aphid was recorded and intensity of attack.

#### Sitka Spruce Weevil, Pissodes sitchensis Hopk.

Attacks by this weevil are restricted to the mainland portion of the district. Although there has been no heavy damage at any location, attacks have been observed in an increasing number of localities. Leader attacks were recorded on young spruce trees ranging from 5 feet to 20 feet in height at Spencer Lake in the Nass River Valley, 2.5 miles north of Lakelse River along the Columbia Cellulose road, Hirsch Creek, and along the south bank of the Wedeene River north of Kitimat. Many attacks observed were on trees 60 to 80 feet tall. Such attacks were noticed between the Exstew River and Esker Creek along the Skeena River and several similar attacks were found approximately 5 miles west of the road fork along the Nass River.

#### Green Spruce Looper, Semiothisa granitata (Guen.)

There was a noticeable increase in both numbers and distribution of the green spruce looper in the West Prince Rupert District in 1961. A total of 42 collections averaged 10.6 larvae each, compared with 12 collections averaging 3.2 larvae in 1960. Considerable numbers of Semiothisa were found in association with the grey forest looper, Caripeta divisata Wlk., in the Copper River outbreak area where 23 collections averaged 11.7 larvae each. No green spruce looper were found in the Queen Charlotte Islands.



FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1961

KAMLOOPS FOREST DISTRICT

Table 15

Known Areas and Intensity of Attacks by Pineus similis Gillette in 1961.

Location	Size of trees	Intensity of attack
<u>Mainland section</u>		
Kitimat above service center	seedlings	Heavy
Kitimat 2 mi. north of stn.	seedlings	Heavy
Beam station road	seedlings	Heavy
3 mi. west of Exstew	seedlings	Heavy
Mi. 4 West Kalum road	seedlings	Heavy
Kloiya Bay	4 ft.	Medium
Terrace	4 ft.	Medium
<u>Queen Charlotte Islands</u>		
Marie Lake Br. 30	seedlings	Heavy
Mosquito Lake	seedlings	Medium
Sandspit	seedlings	Heavy
Skidegate Lake	seedlings	Heavy
Copper Bay	seedlings	Heavy
Louise Island	seedlings	Heavy
Maude Island	seedlings	Heavy

Woolly Aphid on Amabilis Fir, Pineus sp.

On 1960 an amabilis fir at Kitimat was found infested by a woolly aphid which has been tentatively identified as Pineus sp. This species differs from Adelges piceae in that it does not cause gout.

Further examinations in the Kitimat area in 1961, revealed that many amabilis firs in the heaviest saddle-backed looper infestation area were attacked by Pineus sp. on both stems and branches. The attacks were in the form of cottony tufts, sparsely scattered over the bark. Light to medium attacks were observed on all sizes of trees. Young understory balsam in the Sandhill area which had suffered almost total defoliation by the saddle-backed looper, were quite heavily attacked.

Hemlock Aphid, Adelges tsugae (Annand)

Along with the many other species of aphids present in the saddle-backed looper infestation at Kitimat, was the hemlock aphid Adelges tsugae (Annand). All hemlock examined in the Sandhill area were attacked. Stems, branches and foliage of the upper crowns were covered with cottony encrustations. These trees have suffered heavy defoliation by the saddle-backed looper and many are in an extremely weakened condition. Light attacks were found on young hemlock in the vicinity of Sandspit in the Queen Charlotte Islands.

Aspen Leaf-miner, Phyllocnistis populiella Chamb.

The leaf miner outbreak in the West Prince Rupert District continued with approximately the same incidence and intensity as in 1960.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The extensive outbreak of tent caterpillar continued in 1961 with a decided increase in intensity and area. Defoliation of aspen began just west of Cedarvale and continued along the north and south banks of the Skeena River to the eastern extent of the District, continuing on into the East Prince Rupert District. The majority of aspen within this area was almost completely defoliated. Alder, willow and birch were also fed on quite heavily. Larvae were found feeding on lodgepole pine and Sitka spruce at Skeena Crossing. Approximately 10 to 15 per cent current defoliation occurred on lodgepole pine. Feeding on these coniferous trees occurred in areas where most of the deciduous foliage had been consumed. An examination of the infestation area when the larvae had almost completed pupation, revealed many limp carcasses hanging from the trees, indicating that a virus disease was present. This may reduce the population in 1962.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Populations of this looper continued at a low level in the mainland section of the district in 1961. A total of five collections averaged 1.2 larvae each. No larvae were found in the Queen Charlotte Islands.

Yellow Lined Forest Looper, Nyctobia limitaria Wlk.

Larvae of this geometrid were found in approximately the same numbers as in the previous year. Twenty-seven collections averaged 2.3 larvae each, compared with averages of 3.6 in 1960, 3.0 in 1959, and 1.8 in 1958.

The Elderberry Cutworm, Zotheca tranquilla viridula Grt.

An extensive outbreak of this cutworm occurred in the mainland section of the district in 1961. Most of the elderberry in and around the vicinity of Terrace, was heavily defoliated. Although the preferred host was elderberry, feeding occurred on salmonberry and other deciduous ground cover. The outbreak extended along both banks of the Skeena River. Heavy defoliation was observed up to 20 miles west of Terrace and east as far as the Copper River. Light to medium feeding occurred throughout the Kitsumkalum Valley to the Nass River, where heavy feeding was again observed on elderberry for a considerable distance along both banks. Light feeding was also observed in the vicinity of Hirsch Creek near Kitimat. Since there was very little parasitism and no disease found in larvae sent to Victoria, defoliation will likely occur again in 1962 in all locations mentioned.

Alder Sawfly, Hemichroa crocea (Fourc.)

Sporadic outbreaks of alder sawfly have occurred at various locations in the Queen Charlotte Islands for the past several years with little or no resulting damage. Very little feeding occurred in 1960. In 1961 alder on the north end of Louise Island between Mathers Creek and Carmichael Passage and along the south bank of Cumshewa Inlet was almost completely defoliated.

Bark Beetles, Pseudohylesinus spp.

Amabilis fir trees throughout the saddle-backed looper infestation at Kitimat and northward to the Wedeene River Valley were attacked and killed by Pseudohylesinus spp. beetles. Red topped trees were present throughout the entire area, and in some areas from Anderson Creek to the Wedeene River two or three red-topped trees per acre were observed. The beetle population is apparently increasing. A large number of suitable host trees have been heavily defoliated by saddle-backed looper and spruce budworm, and with heavy spruce budworm defoliation expected in some areas in 1962, tree mortality from beetle attack can be expected to increase. Wood borers are also attacking the beetle killed trees. Although these borers do not attack and kill healthy trees their presence hastens the deterioration of the trees already killed.

Poplar and Willow Borer, Sternochetus lepathi (L.)

A small localized outbreak of the poplar and willow borer was discovered in an area of reproduction between Terrace and the Skeen River bridge. Willow up to four inches d.b.h. were girdled and killed. Attacks on young cottonwood saplings were common, but the damage was lighter. A single attack was found on willow at Skeena Crossing. This is the first record of this weevil in the West Prince Rupert District.

A Curculionid, on Aspen, Cottonwood and Willow

Attacks by an unknown species of weevil were found in the district this year. Heavy girdling occurred on several young cottonwood saplings along the Tseax River road in Drainage division 106. Although no mortality was noticed there was considerable damage and deformity. Comparable attacks were found on young aspen saplings along the East Kalum road and on aspen and willow at the south east end of Kitsumkalum Lake on the west road. Efforts to rear adults for identification were unsuccessful.

A Scolytid, Pseudohylesinus granulatus Lec.

Several mature amabilis fir along the west Kalum road opposite Br. 25 were attacked heavily by this bark beetle. A few dead trees were observed in the area but it was not definitely established that death was due to Pseudohylesinus attacks.

Tenthredinid sp. on Willow and Aspen

Willow and aspen within a half mile area in the Copper River Valley suffered light to medium defoliation by an undetermined sawfly. The same species caused light defoliation to willow along the Minette Bay road west of Kitimat and in the Nechako area north of Kitimat.

Tip and Leader Damage to Young Amabilis Fir

A considerable amount of leader and tip damage occurred to young amabilis fir in the mainland section of the district in 1961. Terminal buds were killed and branch tips were completely missing. Small weevil like grubs were found in some of the buds. These insects have not yet been identified. The resulting damage to the trees has been stunting of growth and multiple leaders.

The Green-striped Forest Looper, Melanolophia imitata Wlk.

The population of this insect remained at a low level in 1961, in the West Prince Rupert District (Table 16). The largest collection of 25 larvae was made on western hemlock in the Copper River Valley.

Table 16

Summary of Collections of Green-striped Forest Looper in the  
West Prince Rupert Forest District, 1956 to 1961.

Year	Number of Collections containing loopers	Average number of larvae per collection
1956	7	1.1
1957	3	1.0
1958	7	2.0
1959	33	2.8
1960	28	3.0
1961	24	3.6

Spotted Tussock Moth, Halisidota m. angulifera Wlk.

No damage by this insect has been recorded in the West Prince Rupert District since 1958, when defoliation occurred on Vaccinium spp. at Fords Cove in the Portland Canal and alder and willow were heavily defoliated in the Copper River and Kitimat areas. In 1961 the populations increased and heavy defoliation occurred on alder, willow and ground cover shrubs between Lakelse Lake and Kitimat. Heavy defoliation was observed on these hosts one mile south of St. Croix Creek on Highway 16.

A dagger moth larvae, Acronicta d. hesperida Sm., associated with this insect in large numbers also caused considerable defoliation.

A Chrysomelid, on Cottonwood

Larvae of this beetle caused considerable defoliation to young cottonwood saplings between Terrace and the Skeena River bridge and approximately one mile south of Highway 16 on the east bank of the Copper River. The insect was common in most reproduction stands examined in the mainland section of the district.

A Woolly Aphid, on Lodgepole pine

An unidentified woolly aphid was common on lodgepole pine throughout much of the West Prince Rupert District in 1961. Heaviest attacks were found around Kitimat, Terrace, and along the Beam Station road. The aphids were found mainly on the current growth but in many cases entire branches and stems were attacked. At present the insect does not seem to be causing any visible damage to the trees.



Geometrid, Rheumaptera hastata (Linn.)

A large flight of Rheumaptera hastata moths was observed on June 13 along the East Kalum road between mile 7 and 10. Another comparatively large flight of the same species was observed in the vicinity of Dragon Lake and along the Aiyansh cut off up to the Nass River. Sampling in these areas failed to produce any larvae and no feeding was observed at any location.

A Spingid, Celerio g. intermedia Kby.

Fireweed along a one mile stretch of highway at Nalbeelah Creek along the Kitimat Highway was heavily defoliated. Light to medium feeding was also observed on fireweed at Deep Creek on the East Kalum road.

A Geometrid on False Azalea

An unidentified geometrid caused light to medium defoliation to false azalea throughout the grey forest looper infestation area in the Copper River Valley. Although of little importance the feeding does add to the general damage in the area where several other species of insects are building up on the coniferous overstory.

Sawfly from Conifers, Neodiprion spp.

Sawfly larvae were common and widespread in collections made on hemlock, spruce and balsam in the West Prince Rupert District in 1961. They were more common in collections made in the Queen Charlotte Islands than in the mainland section of the district. A small localized outbreak of Neodiprion was discovered on lodgepole pine between Port Clements and Tlell on Graham Island. Some young pines lost from 10 to 15 per cent of their current growth. The outbreak is in "scrub" timber which has little economic value. Forty-nine collections made in the district averaged 11.8 larvae per collection.

MISCELLANEOUS INSECTS

West Prince Rupert District

Insect	Host	No. of collections	Remarks
<u>Acantholyda</u> sp.	H, S	6	Defoliator, web spinning sawfly. Increasing in numbers in the Queen Charlotte Islands.
<u>Enypia venata</u> Grt.	H, S, B.	4	Defoliator, increasing in numbers in the Kitimat area.

## MISCELLANEOUS INSECTS - continued

Insect	Host	No. of collections	Remarks
<u>Epirrata autumnata</u> Gn.	H, S, B	7	Defoliator, found in small numbers in the vicinity of Kitimat and Queen Charlotte Islands.
<u>Epirrita pulchraria</u> Tayl.	Sw, S, H	7	Defoliator, common in collections in the Queen Charlotte Islands.
<u>Gabriola dyaria</u> Tayl.	H, S, B	17	Defoliator, common in collections throughout the south-eastern section of the district.
<u>Hydriomena irata</u> Swett	H, B	15	Defoliator, increasing in numbers in the vicinities of Kitimat and Copper River.
<u>Panthea portlandia</u> Grt.	H	9	Cutworm, coniferous defoliator, increasing in numbers in the Copper River area.
<u>Syngrapha interalia</u> Ottl.	S, H, B	7	Defoliator, common in all collections around Terrace and Kitimat.

## STATUS OF FOREST DISEASES

## Important Diseases

## Pine Twist Rust

The discovery of a rust indistinguishable from the European pine twist rust Melampsora pinitorqua Rostr. at Telkwa in the East Prince Rupert District led to the examination of European white poplars for signs of Melampsora infections. Considerable time was spent making examinations especially in the vicinity of Terrace. Ponderosa pine, which was infected at Telkwa, as well as other hard pines, were examined regularly for signs of this disease. No positive infections have been found to date.

## Foliage Diseases

Heavy infections of the willow leaf rust Melampsora epitea Thum. were recorded on willow throughout the Kitsumkalum Valley north of Terrace and at several locations in the vicinity of Kitimat. Although damage was extensive at some localities, no mortality was observed. The coniferous host of this rust are true firs.

Yellow Leaf Blister, Taphrina populina Fr. was common on lombardy poplar in the vicinity of Terrace this year. Many young trees examined were heavily infected. The damage resulting from this disease consists of small blister like eruptions on the leaves accompanied by a slight discoloration.

Damage to Sitka spruce caused by a spruce needle rust Chrysomyxa ledicola Lagert. continued in the West Prince Rupert District in 1961. The heaviest area of infection under observation for the past several years, a stand north of Port Clements on Graham Island, still remains the same as in previous years with a heavy infection but no mortality. Scattered occurrences of this rust were also noticed at other locations on Graham Island but the infections were light in comparison. A heavy infection of this disease was discovered on young Sitka spruce along the East Kalum road north of Terrace. Again no mortality was observed.

#### Canker Diseases

Stem and branch canker diseases caused by unknown fungi were common on many species of deciduous trees in the Terrace area this year. The more prevalent of the two types of damage observed was a girdling canker killing only the branches. In more severe cases stems were girdled resulting in the death of the entire tree. Damage was observed on young aspen, cottonwood and apple trees in private yards.

A fungus, Cytospora sp. has caused extensive damage to both native and exotic poplars in the district but did not appear to be related to the cankering described above.

#### Exotic Plantations

All exotic plantations were re-examined again this year and no serious disease conditions were observed. A canker disease found on young Populus X canadensis 'Regenerata' in Xp-133 at Exstew was caused by Melanconium sp.

A single infection of a branch canker disease on silver poplar caused by Melanomma sp. was recorded in a plantation at Port Edward this year. This is a new British Columbia record.

Many young trees in plantations in the Kitsumkalum Valley are suffering from deformity caused by heavy snow and also by animal browsing.

## OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Cherry, choke	<u>Dibotryon</u> <u>morbosum</u> (Schw.) Theiss. and Syd.	Spencer Lake	Black Knot of cherry
Fir, alpine	<u>Tympanis</u> <u>abietina?</u> Groves	Spencer Lake	Type of canker killing tips of branches of young trees, common in this area.
Fir, amabilis	<u>Pucciniastrum</u> (?) <u>goeppertianum</u> (Kuhn) Kleb. and <u>Uredinopsis</u> sp.	Kalum Valley	Rust, heavy infections on current growth in this area.
Hemlock, western	<u>Uraecium</u> <u>holwayi</u> (Arth.) Arth.	Port Clements Queen Charlotte Islands	Rust, light infections common in the Port Clements Juskatla area on young hemlock.
Hemlock, western	<u>Retinocyclus</u> <u>olivaceus</u> Fuckel	Copper River Valley	Branch canker single infection. New record.
Pine, ponderosa	<u>Elytroderma</u> <u>deformans</u> (Weir) Darker	Masset Queen Charlotte Islands	Needle cast, light infection.

WEST PRINCE RUPERT  
DISTRICT (MAINLAND)



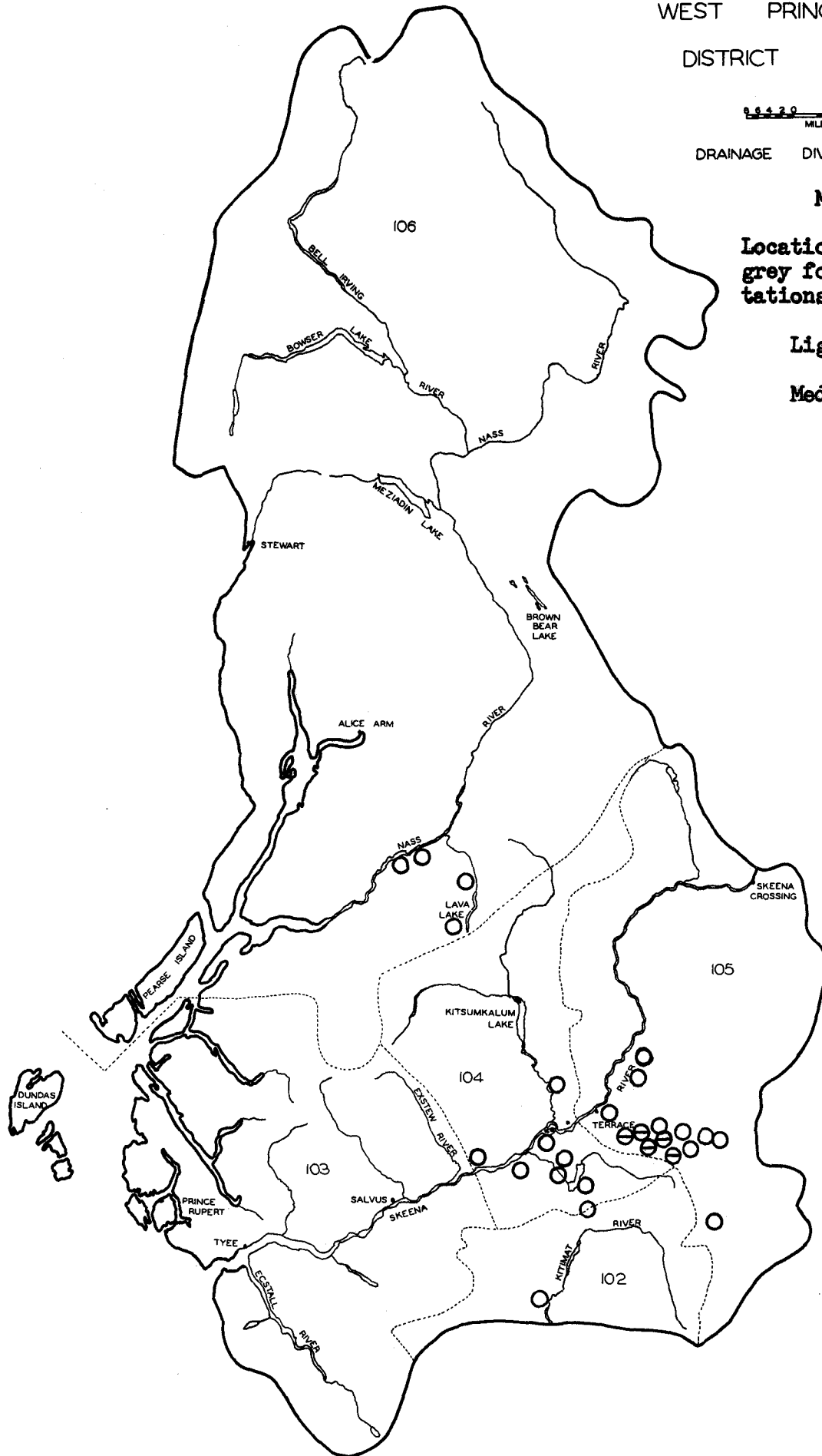
DRAINAGE DIVISIONS 000

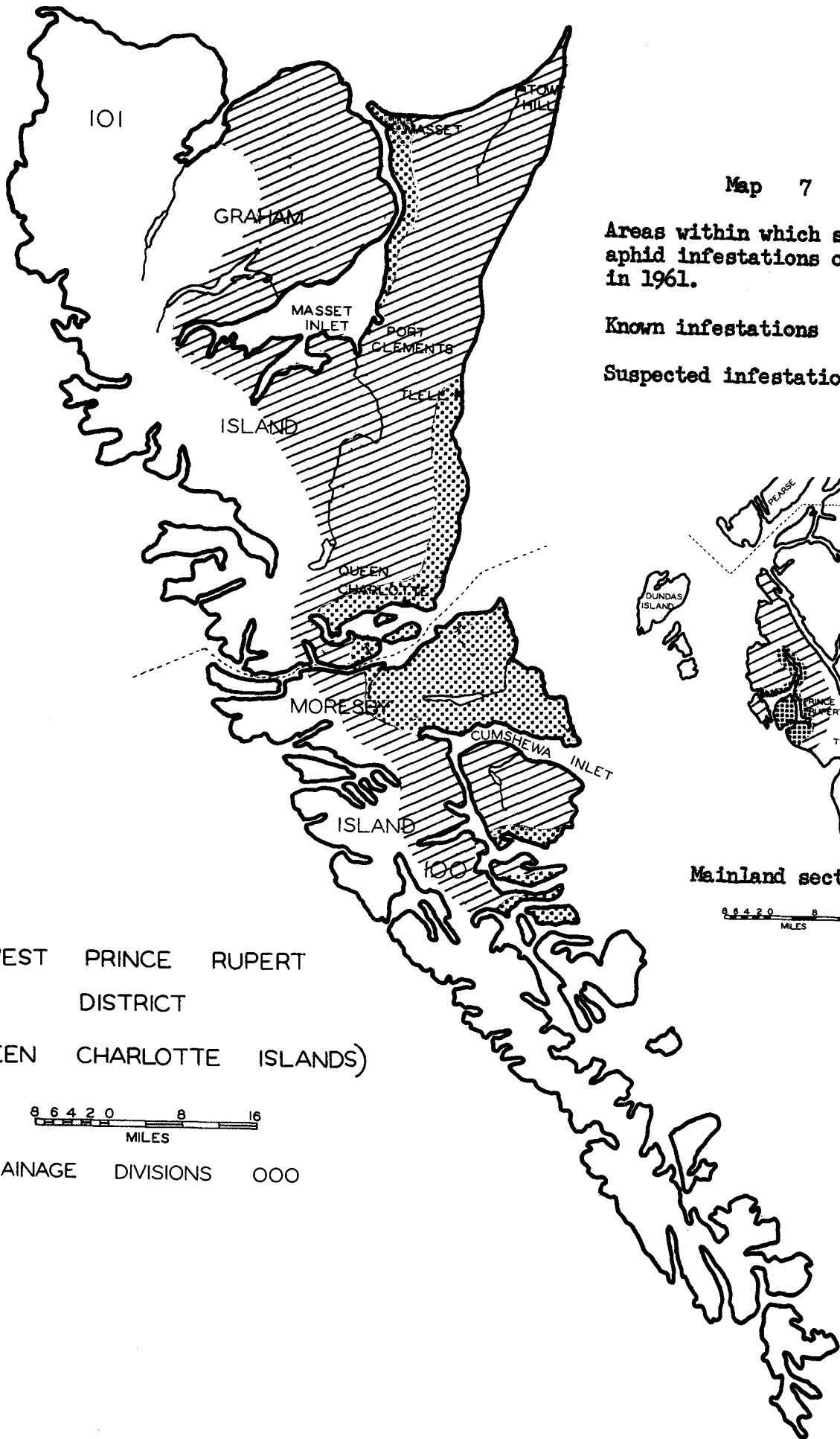
Map 6

Location of points where  
grey forest looper infestations  
occurred in 1961.

Light ○



Medium ⊖





Map 7

Areas within which spruce aphid infestations occurred in 1961.

Known infestations   
 Suspected infestations 

Mainland section

8 6 4 2 0 8 16  
MILES

WEST PRINCE RUPERT  
 DISTRICT  
 (QUEEN CHARLOTTE ISLANDS)

8 6 4 2 0 8 16  
MILES

DRAINAGE DIVISIONS 000



Fig. 1 and 2. Defoliation of Sitka spruce caused by the spruce aphid, Neomyzaphis abietina Wlkr. Prince Rupert, B.C. August, 1961. K. Jardine.

FOREST INSECT AND DISEASE SURVEY

EAST PRINCE RUPERT DISTRICT

1961



## FOREST INSECT AND DISEASE SURVEY

## EAST PRINCE RUPERT DISTRICT

1961

E. G. Harvey

## INTRODUCTION

Because of the cold weather field work in the East Prince Rupert District did not commence until late May. Extensive field work in the West Prince Rupert District occupied part of July, September and October. A total of 269 forest insect and 55 forest disease collections was made. These are shown, by hosts, in Table 1. The locations of sample points are shown in Map 1.

Table 1

## Collections by Hosts

East Prince Rupert District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	1	1	Alder, red	3	
Douglas fir	2		Alder, Sitka	2	1
Fir, alpine	46	12	Aspen, trembling	35	10
Fir, amabilis	1	1	Birch	4	1
Hemlock, mountain	4		Chokecherry	1	1
Hemlock, western	13		Cottonwood, black	3	1
Juniper		1	Maple	1	
Pine, lodgepole	33	2	Poplar, silver		1
Pine, western white		1	Willow	19	2
Spruce, black	3		Miscellaneous	3	6
Spruce, blue		1	No host	5	
Spruce, Sitka	5				
Spruce, western white	85	13			
			Total	76	23
Total	193	32	Grand Total	269	55

## STATUS OF INSECTS

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

As this is the first year of the two-year-cycle with defoliation light and inconspicuous, the outbreak could not be mapped from the air. The extent of the infestation is therefore presumed to be the same as in 1960. Although the total area of infestation more than doubled in 1960, most of this increase was in the Prince George District with only a slight expansion

occurring in the East Prince Rupert District.

Study plots in the Babine Lake region, which were mainly in the older portions of the infestation, were examined in late May and early June and larval counts made to determine the population level and trend. The average number of larvae per square foot of foliage surface decreased significantly in 10 out of 12 plots compared with 1959, the last comparable year (Table 2). There was a slight increase along the Cronin Mine Road, and a large increase at the Suskwa River Trail plot.

The percentage of tips infested also decreased in all areas except the Suskwa River Trail, where the heaviest tip damage was recorded in 1961.

Defoliation should be light in most areas of the district in 1962, but heavy feeding can be expected along the Suskwa River Trail and the Cronin Mine Road. Feeding in the latter area could be quite localized as the population in the plot at the junction of the Cronin Mine and the Smithers Landing roads, just two miles away, was very low.

General stand conditions follow a uniform pattern. In all areas the overstory spruce and balsam have been heavily defoliated, with some top kill and a large number of dead tips present on all trees. However, trees in most areas are putting out large numbers of adventitious buds, and tree recovery is apparent on the basis of an increased quantity of new foliage growth compared with past years. Reproduction has been heavily damaged with much mortality in some areas and top-kill in all areas, but some small trees which were completely stripped in 1960 are putting out buds and may recover.

One of the areas which has suffered some of the heaviest damage is along the Cronin Mine Road where the budworm population is still at a high level. Continued defoliation can be expected to result in the death of some overstory trees and increase the percentage of reproduction killed. The decrease in the percentage of tips mined in 1961 may help the trees withstand the heavy defoliation expected in 1962.

#### Green Velvet Looper, Epirrita autumnata Harr.

This looper was found over a very wide area of the district in 1961, appearing in 25 collections, with an average of 4.7 larvae per collection. In 1960 seven collections averaged 10 larvae each, but the largest number in any one sample, 28, was the same for both years, and collected at the same locality on the Smithers Landing road. The looper was found on a wide variety of hosts, including alpine fir, white spruce, Sitka spruce, western hemlock, mountain hemlock, lodgepole pine and black cottonwood.

#### Forest Tent Caterpillar, Malacosoma disstria Hbn.

The two separate infestations in 1960, at Hazelton and Moricetown, expanded in 1961 into one continuous outbreak. Defoliation started to the west of Kitwanga in the West Prince Rupert District, and extended east and north to Hazelton and up the Skeena and Kispiox River valleys for about 25 to 30 miles. To the south and east of Hazelton the outbreak extended beyond Smithers nearly to the Dominion Experimental Farm. A small area was also infested at Forestdale, but only a few trees showed heavy defoliation.

The forest tent caterpillar also attacked Sitka spruce trees along the Skeena River, about 10 miles north of Hazelton. Up to 75 per cent of the current year's growth was defoliated, but the older needles were untouched. Deciduous trees in the area were completely denuded.

Table 2  
Comparative Number of Two-year-cycle Spruce  
Budworm Larvae and Number of Tips Infested  
Babine Lake. 1959 and 1961.

Locality	Host	No. larvae per sq. ft.		Percentage decrease (-) / increase (+)		Per cent tips infested		Percentage decrease (-) / increase (+)	
		1959	1961			1959	1961		
Pinkut Lake	Sw	39.1	8.0	-	80	72	8	-	89
Jctn. Cronin Mine Rd and Smithers Ldg. Rd	Sw	-	3.5			-	3		-
	Ba	112.0	0.2	-100		-	0		0
Nilkitkwa R trail	Sw	59.3	27.1	-	54	89	32	-	64
	Ba	61.1	21.6	-	66	73	24	-	67
Opp. McKendrick Is.	Ba	134.5	32.5	-	76	88	25	-	72
Cronin Mine Road	Sw	83.9	95.7	+	14	65	37	-	43
	Ba	82.9	98.9	+	19	68	49	-	28
Suska R. trail	Sw	41.0	88.8	+	117	66	79	+	20
	Ba	33.0	52.0	+	58	35	44	+	26
Chapman L.	Sw	73.4	12.1	-	84	63	10	-	84
	Ba	84.5	8.9	-	89	42	8	-	81
Babine L. opp. Old Fort	Ba	117.4	39.0	-	67	92	37	-	60
Doris L.	Sw	51.3	17.2	-	66	51	7	-	86
	Ba	117.9	10.0	-	92	74	8	-	89
Smithers Landing	Sw	86.6	37.4	-	57	66	38	-	42
	Ba	70.6	37.0	-	48	71	15	-	79
Taltapin L.	Sw	29.3	5.4	-	82	84	16	-	81
	Ba	40.8	12.2	-	70	90	14	-	84
Fulton Lake	Sw	99.5	18.2	-	82	94	24	-	74
	Ba	88.9	12.3	-	86	99	12	-	88

Of 208 larvae and pupae collected in the Hazelton-Kispiox area, 106 or 51 per cent, died of parasites. This heavy mortality is still not sufficient to control the population.

Egg counts were very high in the Kispiox Valley and near Moricetown, but decreased slightly at Hazelton and were comparatively low at Smithers, on the outer edge of the infestation (Table 3). Heavy defoliation is expected in the same general areas in 1962.

Table 3

Numbers of Forest Tent Caterpillar Egg Masses taken from each of Three Trees at Four Localities in the Infestation.

Location	Tree 1		Tree 2		Tree 3		Average	
	1960	1961	1960	1961	1960	1961	1960	1961
Hazelton	160	13	43	27	79	151	94	64
Kispiox Valley		62		169		149		127
Moricetown	60	237	110	340	100	188	90	255
Smithers		25		46		32		34

Black-headed Budworm, Acleris variana (Fern.)

Numbers of this insect increased markedly in the district in 1961. Only three larvae were found, singly in collections in 1960, compared to 54 in 11 collections in 1961. The largest number, 28 larvae, was found in an alpine fir collection at McBride Lake.

Green-striped Forest Looper, Melanolophia imitata Wlk.

Nineteen larvae, in eight collections, were found in the district, compared to none in 1960.

Saddle-backed Looper, Ectropis crepuscularia Schiff.

The saddle-backed looper population remained at a low level in 1961. Only 10 larvae were collected in six samples.

Spruce Sawflies, Pikonema spp.

Spruce sawflies were commonly found in collections throughout the district but no large numbers were found in any one sample. P. dimmockii (Cress.) averaged 3.4 larvae in each of 24 collections, and 19 collections containing P. alaskensis (Roh.) averaged 2.8 larvae.

Spruce Bark Beetles, Dendroctonus spp.

Spruce bark beetles were found attacking green, standing trees in only one area in 1961. About a dozen spruce trees were freshly attacked at the eastern end of Taltapin Lake, adjacent to an area which had been logged during the winter of 1960-61. Logs dumped in the eastern end of the lake were heavily infested.

Lodgepole Pine Weevil, Pissodes radiatae Hopk.

Weevil attack was common on lodgepole pine throughout most parts of the district in 1961. The heaviest outbreak occurred in a pure lodgepole pine stand located between Telkwa and the Dominion Experimental Farm near Smithers. In one 1/10 acre plot containing 122 trees the terminal or lateral branches at the top of 37 trees were attacked. The weevil was identified from reared specimens as Pissodes radiata Hopk.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The population level of the aspen leaf miner was at a high level throughout the range of the host tree in the district.

Cone Insects

Cones of white spruce throughout the district were heavily infested with larvae of several cone insects. The only species which has been identified from several of the white spruce cone collections was Laspeyresia youngana (Kft.)

A collection of alpine fir cones contained larvae of Cecidomyids, Phytophagus sp. and Dioryctria abietivorella (Grote). Identifications are incomplete as all adults have not emerged from the cones.

MISCELLANEOUS INSECTS

East Prince Rupert, 1961

Insect	Host	No. of collections	No. of larvae	Remarks
<u>Campaea perlata</u>	Gn. A, Cot, D, W, H, Ba	10	88	None found in 1960 but widespread in 1961.
<u>Caripeta divisata</u> Wlk.	H, Pl, Sw	4	7	None found in 1960
<u>Enypia venata</u> Grt.	H, S, Sw, Ba	8	22	Only 1 larva found in 1960
<u>Epirrita pulchraria</u> (Tayl.)	Ba, Hm, S, Sw	7	11	None found in 1960
<u>Orgyia a. badia</u> (Hy. Ed.)	W, D, Ba, H	6	46	Only 1 larva found in 1960.

## STATUS OF FOREST DISEASES

### Important Diseases

#### Pine Twist Rust

This rust, first discovered on yellow pine seedlings in the Telkwa nursery in 1960, received top priority attention in 1961. All European white poplar trees, suspected as being the alternate host to the rust, were recorded and examined regularly. All yellow pine trees known to be in the district were also examined. Other poplar, aspen and cottonwood trees were examined for rust.

Yellow pine seedlings set out to invite infection at the Telkwa nursery became infected with a Melampsora rust indistinguishable from M. pinitorqua Rostr. The infection was lighter than in 1960, probably due to weather conditions. None of the other seedlings set out in that general area became infected, even though some were only about a mile from the nursery.

Inoculation studies demonstrated that trembling aspen is susceptible to this rust.

No Melampsora rust was found on any of the European white poplar in the district, but was common on aspen. Some of this was confirmed to be M. albertensis Arth. by inoculation experiments, but some may have been the pine-infecting Melampsora. It is now suspected that the pine infection is coming from aspen. Aspen is the commonest and most plentiful broad-leaved tree in the district, whereas there are only 11 known European white poplar trees. These are all located around Smithers and Telkwa, and were examined almost every week during the summer.

#### Ink Spot of Aspen

Trees near Euchu Lake which were infected in 1960 by this disease appeared green and healthy in 1961. Close examination revealed a few infected leaves on some of the trees in the area. Some of these leaves were collected and were set out in natural conditions in an endeavour to obtain the perfect stage fruiting bodies next spring, for specific identification of the causal agent which has a Sclerotium imperfect state.

#### A Spruce Cone Rust

A rust, caused by Chrysomyxa pirolata Wint. was common on white spruce cones throughout most of the district in 1961. In some areas infection was so heavy that the tops of the trees appeared yellow. The alternate host plant, Pyrola asarifolia Michx. was found to be heavily infected also.

A new world host record for this rust was found on the Dominion Experimental Farm near Smithers where cones of Colorado blue spruce were infected.

## Red Ring Rot

A new herbarium host record was made with the collection of the fungus Fomes pini (Fr.) Karst. from alpine fir at Morice Lake. Several trees were infected.

## Douglas Fir Needle Rust

The alternate host of this rust, trembling aspen, were lightly infected with the rust, Melampsora albertensis Arth. It was found from Kispiox Valley through to Burnes Lake. Douglas fir is very scarce in this region.

## OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Birch	<u>Fomes igniarius</u> (L. ex Fr.) Kickx	Kispiox River	Causing white trunk rot of living trees.
Chokecherry	<u>Dibotryon morbosum</u> (Schw.) Theiss. & Syd.	Hazelton	Black knot of cherry
Fir, alpine	<u>Peridermium</u> <u>holwayi</u> Syd.	Nilkitkwa River	Causing needle rust. Light.
Fir, alpine	<u>Pucciniastrum</u> <u>epilobii</u> Otth.	Skeena River	Causing needle rust. Light.
Juniper, common	<u>Gymnosporangium</u> <u>clavariiforme</u> (Pers.) DC	Hagan Arm of Babine Lake	Rust swellings on juniper.
Pine, lodgepole	<u>Arceuthobium</u> <u>americanum</u> Nutt. ex Engelm.	Whitesail reach	Dwarf mistletoe. Common.
Pine, lodgepole	<u>Peridermium</u> <u>stalactiforme</u> Arth. & Kern.	Donalds Landing	Rust on stem. Common.
Saskatoon	<u>Apiosporina</u> <u>colinsii</u> (Schw.) Hohn.	Smithers	Brooms common on bushes in area.
Spruce, W. white	<u>Chrysomyxa ledicola</u> Lagerh.	Nadina River	Needle rust. Light.
Spruce, W. white	<u>C. weirii</u> Jacks.	Telkwa, Nilkitkwa R	Needle rust. Light.
Spruce, W. white	<u>Peridermium</u> <u>coloradense</u> (Diet.) Arth. & Kern	Nadina River	Rust broom. Common throughout host range.

OTHER NOTEWORTH DISEASES - continued

Host	Organism	Locality	Remarks
Willow	<u>Melampsora epitea</u> Thum.	Kispiox River	Rust. Common on host in district.
Willow	<u>Rhytisma salicinum</u> (Pers.) Fr. & Fr.	Grassy Plains	Tar spot, common throughout host range.



FOREST INSECT AND DISEASE SURVEY

KAMLOOPS FOREST DISTRICT

1961

J. Grant

INTRODUCTION

There were two changes in ranger personnel in the Kamloops Forest District in 1961; T. A. D. Woods replaced W. E. Bitz in West Kamloops and J. Grant was assigned to East Kamloops, replacing B. C. Sugden. C. B. Cottrell conducted the survey in Central Kamloops.

The 1961 field season was notable for an early spring and above normal temperatures from mid-May to mid-September. The fire hazard was high and more timber than usual was burned in the Kamloops Forest District.

The Douglas-fir beetle killed more merchantable timber in 1961 than any other insect; losses were heaviest in the Cariboo and Chilcotin districts. Many of the trees attacked in May had begun to turn red by the end of July, thus facilitating detection, and in some cases, permitting the initiation of measures for the removal of the infested trees before the 1962 flight period. Reduced visibility caused by smoke haze hampered the aerial survey of bark beetle damage in the West Kamloops District.

Infestations of the mountain pine beetle continued at many localities, chiefly in western white pine and lodgepole pine stands. Populations of other bark beetles were at a comparatively low level.

For the first time in more than 10 years, infestations of the Douglas-fir tussock moth developed at several points in the North Okanagan. Damage was confined to localized infestations in 1961 but a general population increase indicated by sampling in the Okanagan and Similkameen valleys and in the Lillooet area may presage more extensive outbreaks in 1962.

Ambrosia beetles were more troublesome in 1961 than for several years. The heaviest infestations involved five million f.b.m. of saw logs near Blue River, and one and a half million f.b.m. of peeler logs at Malakwa.

A resurgence of satin moth infestations resulted in heavy defoliation of trembling aspen groves between Merritt and Kamloops, and for the first time since this insect's arrival in the North Okanagan, aspens in a mixed stand east of Enderby were denuded.

Needle cast infections on ponderosa pine were not as severe in 1961 as in recent years, although conspicuous discoloration was evident near Kamloops and in parts of the Okanagan Valley. Larch needle cast was prevalent in parts of the Shuswap River drainage.

FOREST INSECT AND DISEASE SURVEY

EAST KAMLOOPS DISTRICT

1961

An extensive survey in connection with the possible introduction of the pine twist rust was undertaken in 1961. White poplars, the alternate hosts for this disease of pines, were examined in many localities but no infections were discovered.

## FOREST INSECT AND DISEASE SURVEY

## EAST KAMLOOPS DISTRICT

1961

J. Grant

## INTRODUCTION

The 1961 field season was favoured by an early spring and a warm summer; field work began on April 5 and ended on November 14. A total of 355 forest insect collections and 26 forest disease collections were taken by Department of Forestry personnel and cooperators. Hosts are listed in Table 1 and collection localities are shown in Map 1. Twenty-one permanent sampling stations and three mortality plots were established during the season.

Table 1

## Collections by Hosts

East Kamloops District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	5	-	Alder, mountain	3	-
Douglas fir	90	4	Alder, Sitka	4	-
Fir, alpine	19	2	Aspen, trembling	19	7
Fir, amabilis	5	-	Birch, water	2	1
Fir, grand	1	-	Birch, western white	9	-
Hemlock, western	22	-	Cherry, bitter	4	-
Juniper, Rocky Mountain	4	1	Cherry, choke	6	-
Larch, western	7	-	Cottonwood, black	6	1
Pine, lodgepole	23	-	Maple, Douglas	2	-
Pine, ponderosa	49	3	Poplar spp.	4	-
Pine, western white	6	-	Willow spp.	14	1
Pine, whitebark	1	-	Miscellaneous	30	3
Spruce, Engelmann	20	2			
			Total	103	13
Total	252	13	Grand total	355	26

## STATUS OF INSECTS

**Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.**

Discoloration of trees attacked by the Douglas-fir beetle in 1961 was first observed on August 1. Although some infested trees remained green as late as October, it was possible to determine more accurately the severity of beetle attack, than in years when no discoloration of currently-infested trees was evident.

The most severe infestations were confined to a few chronic areas. The heaviest losses occurred in the north-western part of the District where, although damage was less spectacular than the Ingram Creek infestation of 1959, a number of discrete populations killed a substantial volume of timber. Infestations in the Princeton Ranger District were more widespread than in the Falkland-Monte Creek area but they involved comparatively small groups of trees. Current infestations declined in most of the Lumby district, but groups of 50 to 100 freshly infested trees were observed near Harris Creek. Except for a persistent but reduced population in Bear Creek Valley, Douglas-fir beetles caused negligible damage in the central and southern Okanagan Valley. Table 2 shows the number and volume of Douglas-fir trees killed by bark beetles in the period 1958 to 1960, as determined by ground and aerial surveys in 1961.

Table 2

Douglas-fir Trees Killed by the Douglas-fir Beetle in the Period 1958 to 1960, as Determined in 1961, East Kamloops District

Locality	Number of trees	Volume (cu.ft.)
Adams Lake	50	3,500
Chase-Monte Creek	40	2,800
Upper Salmon River-Westwold	290	29,000
Monte Lake-Monte Creek	150	10,500
Ingram Creek-Woods Lake	1,200	78,000
Pinaus Lake	220	14,300
Falkland-Chase	200	13,200
Enderby-Mabel Lake	170	10,200
Mara Lake-Three Valley	80	5,600
Sugar Lake-Cherryville	190	13,300
Harris Creek-Mabel Lake	370	25,900
Winfield-Mission Creek	80	4,800
West side Okanagan Lake	270	16,200
Penticton-Kerameos	250	15,000
Peachland	40	2,400
Princeton-Aspen Grove	320	22,400
Copper Mountain-Manning Park	90	6,300
Total	4,010	273,400

Trees killed in 1961 were not included in Table 2, because many of them had not begun to fade before the survey was completed. Volumes were calculated by determining the average for beetle-killed trees in as many localities as possible.

Six plots of 1961-attacked trees were established, for recording foliage colour change and needle loss in the ensuing years. Both discoloration and needle loss were observed at all localities in 1961, presumably because of the warm, dry summer; there was, however, a marked variation in the progress of these symptoms. While some infested trees were conspicuously discolored and shedding foliage by August 1, others were still green on October 18. Loss of foliage ranged from nil to 85 per cent, and was generally much heavier than usually occurs during the year of attack.

A trap-tree program was undertaken in Bear Creek Valley by Kelowna Sawmills to attempt to check the spread of bark beetles from a stand which was about to be logged. Groups of 10 trap trees were felled on May 8 at each of four localities in the cutting permit area; they were spaced at about half-mile intervals. On June 5, two trap trees at each plot were examined to determine the density of the bark beetle population; square-foot samples of bark were examined on the upper and lower log surfaces, near the butt and near the upper extremity of attack. The average number of galleries per square foot ranged from 4.6 at the two central plots to 8.9 per square foot at the most westerly location. Except for a few trap trees that were not sufficiently shaded, the operation was successful in attracting a great number of beetles. Examination of 50 galleries at each plot showed that less than 10 per cent of the parent beetles had re-emerged for the second attack on June 5. Progeny in the three upper plots was still in the egg stage but in the most easterly plot, which was in the warmest location, larval galleries were up to three quarters of an inch in length. The trap trees were removed during the summer.

A spray program was conducted by Kelowna Sawmills personnel from September 14 to September 18, to control bark beetle broods in slash resulting from the trap tree cutting, and from logging which began in June. Spray consisting of one part of an emulsion of 3.75 lbs. ethylene dibromide, three per cent Triton X151 and one imperial gallon of diesel oil to four parts water was applied with a hose-equipped orchard sprayer and a manual spray pump. Control material was marked before the operation, and was left unsprayed. On October 19, 27 square-foot samples of sprayed bark and an equal number of samples from the control material were examined. Results are shown in Table 3.

Table 3

Mortality of Douglas-fir Beetle in Sprayed and Unsprayed Douglas-fir Slash, Bear Creek, Oct. 19, 1961

Type of material	Sample area (sq.ft.)	Percentage mortality	
		Sprayed samples	Unsprayed samples
Stumps	14	60.0	0
Butts and cull logs	26	32.7	0
Tops	14	49.5	0.4

Allowing for uneven population distribution in the three types of material, the average mortality was calculated at 50.1 per cent. The low effectiveness of the operation was attributed largely to unfavorable weather conditions following application of the chemical; temperatures were cooler than 70° F., which is considered a minimum for obtaining best results.

In samples examined on October 19, teneral adults comprised 83.1 per cent, pupae 6.1 per cent and larvae 10.8 per cent of the 1961 generation. Populations were very low in slash laid down after mid-July.

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

Douglas-fir tussock moth infestations developed at several points in the North Okanagan in 1961, and sampling indicated a marked upward trend in populations in the South Okanagan and Similkameen valleys, although no damage was observed there. No larvae were collected in the Shuswap Lake area or the South Thompson Valley.

The first infestations were reported in the last week of June; most were in farmlands near Armstrong where Douglas-fir shade trees, wood lots and forest remnants were defoliated. In most cases, severe damage was confined to the upper crowns, but it is expected that some trees will suffer top-kill and a few may die. A noteworthy feature of some of the 1961 infestations in the Vernon and Armstrong districts, was that they had developed on trees which had been partly defoliated during the last severe outbreak which occurred in 1947 to 1949. As female moths are wingless and many of the trees or groups of trees were widely separated from other stands, it appears that a few of the insects survived after the population collapse of 1949 and 1950.

Three infestations were apparent in July, all in the vicinity of the north end of Okanagan Lake. They were more extensive than those in agricultural areas, the extent of visible defoliation in each covering about 20 acres. Two of the infestations were on Okanagan Indian Reserve No. 1 on the east side of the north arm of Okanagan Lake, and were about one mile apart; the third was south of Okanagan Landing. Features shared to a great extent by the three infestations were: aspect (north to north-west); slope (moderate to steep); elevation (1500 to 2000 feet); stand composition (predominantly or exclusively Douglas fir); stand form (predominantly pole-sized with little or no fir understory; and stand density (close growing except on the fringes). The heaviest defoliation in these infestations occurred in the densest parts of the stands, in contrast to many of the 1961 "spot" infestations, which were often confined to small isolated groups or exposed, individual trees. The southern Indian Reserve infestation and the one at Okanagan Landing were near the lower edges of quite steep forested slopes, while the northern Indian Reserve infestation was nearer the top of a ridge and extended to the open-grown trees along the upper forest edge.

The infestations were first sampled on July 13 and 14, when the major part of defoliation had been completed and most of the larvae were in the last instar. No cocoons were found, indicating that development was later than at Armstrong, where the first cocoons containing prepupal larvae were collected on June 30. Although no diseased larvae were found in July, larvae which had apparently been killed by a virus were found at all three localities in the second week of August. Larval mortality caused by disease and parasitism was believed to be light, but no accurate information was obtained.

Between August 8 and 10, after adult emergence and egg laying were completed, a cocoon survey was made at the three infestations to determine pupal mortality. Four hundred cocoons were collected from the lower branches and tree trunks of Douglas firs at each locality, 200 from the heavily defoliated trees and 200 from about the fringe of the infestation. An additional 200 cocoons were collected at Okanagan Landing from leaves of deciduous understory growth, chiefly Rocky Mountain maple and choke-cherry. Cocoons were dissected and the pupae sexed by antennal characters and classified as "successfully emerged", "parasitized (Hymenoptera)", "parasitized, (Diptera)", "parasitized, (undetermined)", "diseased", and "dead, other causes." It was possible to sex 78 per cent of the pupae; in the remainder the larvae had either died before pupation, or sexual characters had been destroyed by dipterous larvae. Table 4 shows the results of these examinations.

Table 4  
Percentage Emergence, Sex Ratio, and Mortality of Douglas-fir  
Tussock Moth in Cocoon Samples at Three Localities, East  
Kamloops District, August, 1961

Locality	No. cocoons examined	Sex ratio (per cent female)	Successful emergence	Mortality	
				Para-sitized	Disease and other causes
Indian Reserve (North)	404	62	40	40	20
Indian Reserve (South)	400	64	33	48	19
Okanagan-Landing (Douglas-fir samples)	435	62	57	28	15
Okanagan Landing (on deciduous leaves)	200	2	76	15	9



The very low percentage of female cocoons on deciduous foliage indicates that female larvae are selective as regards cocooning sites; as adult females are flightless and lay the eggs on the cocoon, progeny of females that had cocooned on deciduous foliage would probably have less chance of survival than larvae hatching on the host tree.

Dipterous parasites were 2.5 times as numerous as were Hymenoptera, however some may have been scavengers in dead pupae. The only dipterous parasite identified to date was Pseudosarcophaga affinis (Fall.). The most numerous group of hymenopterous parasites was ichneumonids, which emerged from the host pupae; braconids and chalcids were comparatively scarce. Scavenging dermestid larvae were found in many of the cocoons and in a few cases, were feeding on the egg masses.

Three mortality plots, one at each infestation, were established to provide data on survival of heavily defoliated trees. One hundred trees in rectangular plots laid out across the centres of heaviest defoliation were tagged, measured, and data on crown class, crown length, crown density and percentage defoliation recorded. Average d.b.h. per plot was 6.6 inches at Indian Reserve (North), 7.5 inches at Okanagan Landing, and 8.9 inches at Indian Reserve (South). Percentage of trees completely defoliated ranged from 34 at Okanagan Landing to 44 on Indian Reserve (North); most of the denuded trees were in the suppressed and intermediate crown classes.

In order to obtain information on the distribution of cocoons and egg masses on the trees, a sampling program was carried out in October. Two trees were felled in the area of heaviest defoliation at each infestation, and two near the perimeter. Defoliation ranged from 70 to 100 per cent on the heavily defoliated trees, and from 0 to 15 per cent on the trees at the fringes. Data relating to size, crown class etc. were recorded. The crown length was measured and the crown divided into upper, mid and lower thirds; the bole length from the ground to the first live branch was measured and similarly divided into thirds. The dead branches on this portion of the tree are referred to as "dead crown" for want of a more concise term. Three branches from each third of both the living and dead crown were taken at random, measured, and examined for cocoons which were later dissected and classified. Square-foot bark samples on the bole were examined at 10-foot intervals beginning at breast height. Figures were analyzed by S. F. Condrashoff and the resulting data are shown in condensed form in Table 5. As conditions at the three localities were generally uniform, the results of the analysis have been combined.

Egg masses were most numerous in the upper crowns of lightly defoliated trees, and in the lower crowns of those that had been heavily defoliated; the latter distribution pattern may be explained by the fact that in the heavily defoliated trees, the lower branches were often the only ones bearing green foliage.

An examination of 15 egg masses by E. Pottinger showed that the average number of eggs per mass was 195, with a range from 137 to 283. Egg population densities on lightly defoliated trees therefore range from 117 per square foot in the upper crown to 31 per square foot in the mid-crown; these calcu-

lations do not take into account the eggs present on the dead branches, which may be expected to contribute further to larval populations in 1962.

Unless there is severe mortality of overwintering eggs, or of early instar larvae in 1962, heavy defoliation and expansion of existing infestations may be expected.

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Scattered but generally localized infestations occurred in white, lodgepole, and to a very limited degree, in ponderosa pine stands in 1961. The most extensive recent losses have occurred in white pine stands in the Skaist Creek and upper Skagit valleys in Manning Park, but severe blister rust infections in that area made an accurate assessment of bark beetle damage difficult. An examination of 42 dead white pine indicated that some of the trees had been infested by beetles after blister rust infections had reached an advanced stage; others had been vigorous at the time of bark beetle attack. It is probable that the abundance of rust-weakened trees had fostered an aggressive beetle population which has killed many healthy trees as well as the infected ones. In the western valleys of Manning Park, approximately 900 "old grey" trees and 320 red tops were counted in September. It was not possible to distinguish between the 1961-attacked trees with fading foliage and trees with discolored foliage resulting from bole infections of blister rust.

An infestation in immature white pine in the Upper Shuswap Valley between Kate and Spectrum creeks was reported by the British Columbia Forest Service in 1961. Losses had occurred for several years in a mixed stand extending for two miles along the lower slopes, and the attack was continuing. Many of the dead and infested trees showed symptoms of "pole blight", and their weakened condition had undoubtedly increased their susceptibility to bark beetle attack. A salvage operation will begin early in 1962.

A number of smaller infestations were observed in white pine stands in the Shuswap drainage. The largest single group was about eight miles north of Craigellachie in the Perry River Valley where 190 grey trees and 104 red-tops were counted from the air in September. Sixteen trees with fading foliage were believed to have been killed in 1961. The infestation near Noisy Creek declined in 1961.

Infestations in lodgepole pine were of little importance. A low population persisted in an estimated 40-acre stand on Hayes Creek, northeast of Princeton; it was first reported in 1956. Scattered pole-sized red-tops were noted near Heckman Creek and the North Fork of Cherry Creek, Lumby district. The infestation in lodgepole and ponderosa pines near Long Lake, upper Salmon River Valley, was much reduced in 1961.

Table 6 shows the approximate number of pine trees killed by the mountain pine beetle in 1959 and 1960.

Table 5

Analysis of Douglas-fir Tussock Moth Cocoon Samples at Three  
Localities, East Kamloops District, 1961

	Light defoliation				Heavy defoliation			
	Living crown			Dead crown	Living crown			Dead crown
	Upper third	Mid third	Lower third		Upper third	Mid third	Lower third	
Total branch sample area (sq. ft.)	66	128	135	164	77	111	122	77
No. cocoons per 100 sq. ft.	189	74	80	37	156	193	223	210
Sex ratio (per cent females)	60	45	69	33	39	38	43	50
No. egg masses per 100 sq. ft.	60	16	28	12	26	28	36	31
Male cocoons								
Per cent successful emergence	77	64	53	87	65	51	51	43
Per cent mortality - parasitism	18	32	40	14	31	38	43	53
Per cent mortality - other causes	5	4	7	0	4	11	6	4
Female cocoons								
Per cent successful emergence	74	54	60	58	49	43	51	35
Per cent mortality - parasitism	21	31	34	36	44	47	43	56
Per cent mortality - other causes	8	0	4	0	5	3	0	4
Total area bark samples (sq. ft.)	(	19	)	20	(	18	)	19
No. cocoons per 100 sq. ft.	(	16	)	40	(	139	)	100
No. egg masses per 100 sq. ft.	(	0	)	0	(	16	)	

Table 6

Number of Trees and Volume Killed by Mountain Pine  
Beetles in East Kamloops District, 1959 and 1960

Locality	Pine species	No. of trees killed	Volume (cu. ft.)
Mabel Lake-Wap R.	white	435	26,100
Sugar Lake	"	60	4,200
Spectrum Creek	"	250	4,000
Perry River	"	104	6,240
Adams Lake	"	322	19,320
Sicamous-Malakwa	"	60	3,600
Ross Creek	"	40	2,400
Manning Park	"	320	12,800
Cherryville	lodgepole	50	1,500
Hayes Creek	"	50	1,500
Hayes Creek	ponderosa	34	3,740
Douglas Lake	"	16	670
Douglas Lake	lodgepole	12	240
Totals		1,753	86,300

Volumes were derived by measuring infested trees in as many of the infestations as were accessible. The wide range in volume per tree of white pine is explained by the fact that young stands are subject to attack, as well as mature and overmature trees.

Western Pine Beetle, Dendroctonus brevicomis Lec.

Western pine beetles killed about 20 scattered ponderosa pines on the rocky slopes north of Cherryville, and several groups of less than a dozen mature trees in the Aspen Grove and Tulameen areas. Elsewhere attacks were of a secondary nature; they were found sparingly in trees killed by mountain pine beetles, and in individual trees weakened by other agents.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

The only infestation of the Engelmann spruce beetles known to be active in 1961 was in an overmature 30-acre stand near Lightning Lake, Manning Park. Less than 100 trees, mostly of very large size, had been killed in the past five or six years. Average d.b.h. of 36 trees was 33 inches.

A foliage colour change plot consisting of seven currently infested

trees was established in September. Several trees had survived a partial attack affecting one side of the bole in 1960, but had succumbed to the 1961 attack. On September 21, groups of up to 20 beetles were found in overwintering galleries around the root collars of these trees. Foliage fading and needle loss were barely noticeable on trees first attacked in 1961, but those which had been killed in 1960 had lost up to 85 per cent of their foliage.

Bark beetles had killed about 35 mature spruce trees at an elevation between 5000 and 6000 feet in the upper valley of Hampton Creek, Manning Park. This localized outbreak apparently developed from standing trees that had been killed by fires during road-building operations in 1956. Scattered recently-killed trees were noted at Flash Lake and on the lower slopes of Frosty Mountain in Manning Park.

An estimated 200 mature Engelmann spruce trees adjacent to a logged area northwest of Brenda Lake were killed by bark beetles between 1956 and 1960 but the population had subsided in 1961. This locality is about 28 miles northwest of Peachland at an elevation between 5000 and 5700 feet.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

Aerial surveys in 1961 revealed several previously unreported infestations of balsam bark beetles. The largest outbreak was situated along the north slope of Hunters Range in the Yard Creek drainage, where approximately 60 per cent of the alpine fir over six square miles had been killed. The infestation subsided in 1961. Scattered groups of infested trees were seen above Sicamous Creek and 30 per cent of the alpine fir had been killed on a ridge southeast of Owlhead Creek in the same general area.

An outbreak which apparently began quite recently was active on the plateau west of the north end of Okanagan Lake. Numerous small groups of red-tops totalling about 400 trees were scattered from the vicinity of Bouleau Lake south to the headwaters of Shorts Creek.

Small groups of alpine fir, mostly killed several years ago, were numerous west of Ideal Lake and south of Aberdeen Lake in the Grizzly Hills Provincial Forest, and over about 12 square miles on Cherry Ridge near Sugar Lake. At the latter locality at an elevation of 4700 feet, prepupal larvae predominated in trees examined on June 29. A few teneral adults and pupae were found. Lesions surrounding beetle galleries indicated that the insect was associated with the fungus Leptographium sp.

The infestation at Bolean Lake continued on a reduced scale in 1961.

An Ambrosia Beetle, Trypodendron lineatum (Oliv.)

Ambrosia beetles attacked peeler logs in a stock pile at Malakwa in early May. Most of the 1.5 million f.b.m. were Douglas fir, with lesser amounts of hemlock and spruce. Damage was first detected on May 5, when the beetles had already penetrated into the sapwood. The most heavily infested logs were those at the shaded ends of the decks, where there were up to 50 entrance holes per square foot. The lower sides of logs on top of the decks, and the ends of logs up to at least eight feet inside the piles were also attacked.

A sprinkler system, thermostatically controlled to operate at temperatures of 60° F. or over had been in use to prevent checking, but even where the maximum water flow was received, it had apparently been ineffective in deterring attack. Over much of the deck surface, the sprinkling was not heavy enough to thoroughly soak the logs.

Two million f.b.m. of logs at a second mill site at Malakwa were infested by ambrosia beetles early in May and a few adults were in flight on the afternoon of May 9. Douglas-fir, Engelmann spruce, western hemlock and a few alpine fir logs were infested but as they were not intended for peeler use the loss was not considered serious by the mill operator.

Oregon Pine Engraver, Ips oregoni (Eich.)

In 1961 an infestation of the Oregon pine engraver developed in an immature stand of ponderosa pine between Carr's Landing and Okanagan Centre. Slash resulting from logging during the winter of 1960-1961 had provided an abundance of breeding material, in which the adults were observed excavating galleries on April 24. Presumably a high population emerged from slash during the summer and infested between 200 and 300 young trees nearby. Most of the broods in the standing trees emerged before or during the autumn, but a few teneral adults were found on November 14. The average d.b.h. of the infested trees was 4.5 inches, with a range from two to 12 inches.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Several infestations persisted in the Okanagan Valley, the most severe damage occurring in marginal ponderosa pine stands. In the South Okanagan the trend towards tree recovery noted in 1960, continued in most areas but sampling indicated that some of the scale populations may be increasing. The heaviest infestations noted in 1961 were at West Summerland, Glenmore, Penticton, Carr's Landing, East Kelowna, Whiteman Creek, and near Vernon.

In October and November, samples of ponderosa pine foliage were collected at random in infestations at Penticton, West Summerland, Carr's Landing and Vernon. Scales on the inner surface of four needles from three samples at each locality were examined to determine mortality. Results are summarized in Table 7.

Table 7

Percentage Mortality of Pine Needle Scale on Samples of 12  
Ponderosa Pine Needles from each of Four Localities,  
East Kamloops District, 1961

Locality	Av. length of needles (inches)	No. scales examined	Percentage scale mortality
Penticton	5.7	84	26
West Summerland	3.7	86	59
Carr's Landing	4.4	254	23
Vernon	4.4	72	19

In the majority of cases, the cause for scale mortality could not be determined. At Carr's Landing predation of a coccinellid Microweisia sp., accounted for 31 per cent of the mortality, and beetles were present on foliage samples taken on November 14. No evidence of parasitism was found at any of the localities sampled.

A light infestation of pine needle scale was found on the crowns of pole-sized Douglas-fir trees cut in connection with Douglas-fir tussock moth studies on the east side of the north arm of Okanagan Lake.

#### Black Pine Leaf Scale, Nuculaspis californica (Cole.)

Infestations of the black pine leaf scale persisted near West Summerland, and at several points from Naramata south to Skaha Lake. Near West Summerland and at Penticton, infestations of this species were mixed with those of the pine needle scale but at Skaha Lake the latter species was not found. Table 8 shows results of sampling at three localities; methods employed were the same as is described in the pine needle scale section of this report.

Table 8

Percentage Mortality of Black Pine Leaf Scale on Samples of 12  
1961 Ponderosa Pine Needles from each of Three Localities,  
East Kamloops District

Locality	Av. length of needles (inches)	No. scales examined	Percentage scale mortality
West Summerland	3.7	121	29
Penticton	5.7	355	12
Skaha Lake	5.1	202	10

The cause of mortality was not determined, but tables 7 and 8 indicate that more pine needle scales and black pine leaf scales died on dwarfed needles than on the healthier trees. Parasitism and predation of black pine leaf scale were negligible factors.

A few black pine leaf scales were found in a pine needle scale infestation at Carr's Landing, and on a ponderosa pine tree at Monte Creek. The latter is believed to be the most northerly locality in which this insect has been collected.

#### Satin Moth, Stilpnotia salicis (L.)

Mature and pole-sized trembling aspens in mixed forest above Ashton Creek in the Enderby district were heavily defoliated by satin moth larvae in 1961. The affected stand extended for about one half mile along a southern exposure at elevations from 2900 to 3100 feet. Most of the trees were completely stripped in June 9, and pupation had begun.

Lakeshore cottonwoods at Okanagan Centre were partially defoliated in late May and June, and the feeding of early-instar larvae caused pronounced discoloration of the same trees in late summer. A group of hybrid poplars near Swan Lake was heavily defoliated, and a few white poplar shade trees in Vernon and Rutland were infested. No damage was noted at Shuswap, or at Duck Lake, where black cottonwoods had been repeatedly defoliated prior to 1960; sampling of overwintering larvae was discontinued at these two localities.

A search was conducted at the 1961 infestations to determine whether or not the introduced parasite Meteorus versicolor (Wesm.) had reached the area. This parasite was abundant at the Ashton Creek infestation, and adults emerged within a few hours from cocoons collected there on June 9. Cocoons were scarce at Swan Lake and Okanagan Centre, and none was found at Rutland, on heavily infested white poplars, nor at Duck Lake, where satin moths were scarce.

Leaf skeletonizing caused by satin moth larvae produced noticeable discoloration of some poplar shade trees in the north and central Okanagan in late summer, indicating that heavy but localized defoliation may occur in 1962.

#### Douglas-fir Needle Miners, Contarinia spp.

Infestations of the needle miner, Contarinia pseudotsugae Condr., increased in severity in 1961 in many dry-belt localities. Douglas firs at Okanagan Mission, Fintry, Whiteman Creek and about the head of Okanagan Lake had miners in up to 80 per cent of their needles, and the Christmas tree harvest on parts of Okanagan Indian Reserve No. 1 was reduced. Young open-grown firs along the Similkameen River Valley between



Hedley and Princeton were noticeably discolored. Light infestations causing damage to 10 per cent or less of the current year's foliage was widespread at lower elevations in the District. Contarinia constricta Condr. attacked 50 to 60 per cent of the current year's needles on Douglas firs near Larkin.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Aspen leaf miner populations remained at a high level in aspen stands throughout the District in 1961. Plots at five localities were sampled to determine percentage of leaves infested, and the number of adults produced from the 1961 generation. Three plots had been established in 1959, and two, on the McCulloch road and near Aspen Grove, were established in 1961. Data shown in tables 9 and 10 were obtained by examining leaves from two 12-inch branches from each of five trees at each plot. Comparable figures for 1959 and 1960 are included.

Table 9

Aspen Leaf Surfaces Mined and Number of Adults Produced in Samples, East Kamloops District, 1959 - 1961

Location	Percentage of leaf surfaces with mines			Number of adults per leaf surface		
	1959	1960	1961	1959	1960	1961
Carlin	82	41	91	0.24	0.11	0.26
Phillips Lake	71	86	94	0.19	0.32	0.02
Falkland	74	14	66	0.16	0.01	0.04
McCulloch road	-	-	19	-	-	0.02
Aspen Grove	-	-	33	-	-	0.08

Table 10

Mortality of Aspen Leaf Miner in 100-cocoon Samples, East Kamloops District, 1959 - 1961

Location	Percentage mortality					
	Parasitism			Other causes		
	1959	1960	1961	1959	1960	1961
Carlin	25	29	82	2	4	15
Phillips Lake	18	21	62	4	12	11
McCulloch road	-	-	66	-	-	13
Falkland	16	36	76	5	3	15
Aspen Grove	-	-	7	-	-	25

Although parasitism increased by more than 100 per cent in 1961 at the three localities previously sampled, the number of adults produced at the Carlin and Falkland plots also increased. It is expected that infestations will continue in 1962.

Spotted Pine Sawyer, Monochamus maculosus Hald.

Observations of wood borers were continued in 1961 at O'Keefe and Carr's Landing, where ponderosa pines killed by fire on July 7, 1960 had been infested. Five fire-killed trees were felled at O'Keefe on April 6, 1961 and one-foot-long blocks cut from the basal, central and upper boles; these blocks were split open to determine the extent of predation by woodpeckers. Seventy-six per cent of the 140 prepupal larvae in pupal cells in the samples had been removed by woodpeckers. Most of the predation was attributed to the Arctic 3-toed woodpecker Picoides arcticus (Swainson) and the hairy woodpecker, Dendrocopus villosus (L.).

Rearing of caged logs indicated that over 95 per cent of the Monochamus in fire-killed ponderosa pine at the two fires were M. maculosus Hald., and less than five per cent were M. oregonensis Lec. The latter species was the first to emerge from caged material.

Emergence of Monochamus spp. from marked trees ranged from May 30 to July 25 at O'Keefe, and from June 13 to August 22 at Carr's Landing. The slower development at the latter locality may have been due to a cooler microclimate resulting from greater elevation.

Jack Pine Needle-miner, Zelleria haimbachi Busck

A heavy infestation in regeneration lodgepole pine occurred in 1961 at Yard Creek, in the Sicamous district. Up to 100 per cent of the 1961 foliage was infested. The trees ranged from three to six inches d.b.h. and the affected stand covered about 20 acres. Larval parasitism had severely reduced the Zelleria population but a few pupae of the latter were found on July 7. Damage is not expected to be as heavy in 1962.

Populations of the jack pine needle miner were lower in ponderosa pine stands of the South Okanagan Valley in 1961.

Spotless Fall Webworm, Hyphantria cunea (Drury)

The large "tents" of the fall webworm were again conspicuous features of the landscape in the warmer parts of the District in 1961. A particularly severe infestation was observed in the Mission Creek Valley south of Rutland. By July 26, cottonwood trees up to 50 feet in height were completely defoliated, and their branches enveloped in webbing.

Spruce Spider Mite, Oligonychus ununguis (Jacot.)

A severe infestation of the spruce spider mite caused conspicuous discoloration of pole-sized and mature Douglas-fir stands from Okanagan Landing south to Otter Bay, on the east side of Okanagan Lake. The only needles not affected were the current year's growth.

In late June, webbing spun by mites was abundant on the lower crowns of mature Douglas firs above Chase and at two localities near Anglemont. A few Rocky Mountain junipers growing near the infested firs were also affected. By October, most of the webbing had disappeared and no injury to any of the trees was visible.

Alder Sawfly, Hemichroa crocea (Fourc.)

Mountain alders in a 20-acre stand of mixed deciduous growth at Winfield were heavily defoliated. By June 12, most of the sawfly larvae were in the last instar.

Spruce Budworm, Choristoneura fumiferana (Clem.)

The one-year cycle spruce budworm increased slightly in 1961, but it was still quite scarce. One quarter of the 52 random three-tree beating collections taken from Douglas fir during the budworm larval period (May 23 to July 10) contained one or more larvae. Average per positive collection was 1.6 larvae.

No specimens of the two-year-cycle budworm were collected in 1961 and no damage was noted.

Black-headed Budworm, Acleris variana (Fern.)

Only a few black-headed budworms were collected in 1961. Hosts, in order of frequency, were western hemlock, alpine fir, and Douglas fir.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Populations apparently increased in the northern part of the District in 1961, and willows in parts of the Enderby and Salmon Arm ranger districts were heavily infested. Near Gardom Lake, most of the willows in mixed forest were attacked in 1961, and many which had leafed out in the spring were dead or dying by midsummer.

This borer was scarce in the southern and western districts. Damage was noted near Oliver, Hedley, Tulameen and Manning Park. None was found in the Aspen Grove area.

A Scolytid in Black Cottonwood, probably Cryphalus sp.

Dieback of black cottonwoods caused by a small bark beetle was found at Westwold, Squilax, Ellison, Okanagan Centre, and near Princeton. The most severe damage occurred at Westwold where the upper third of some 60-foot trees had been killed. A pole-sized tree growing on the lake shore at Squilax had several branches in the lower crown killed back to the stem.

European Pine Shoot Moth, Rhyacionia buoliana (Schiff.)

Two infested leaders and an empty pupal case were collected from two small mugho pines in the business district of Kelowna. No evidence of shoot moths was found in any of the nurseries in the District.

Spruce Gall Aphid, Adelges cooleyi (Gill)

Infestations of the spruce gall aphid were heavy on Douglas fir in parts of the North Okanagan in May and June, but galls were comparatively scarce on Engelmann spruce in the localities sampled. A measure of infestation on spruce was obtained by examining four branches selected at random from each of three trees, and counting the number of galls and the number of healthy branch tips. Table 11 shows the percentage of tips infested at eight localities.

Table 11

Percentage of Engelmann Spruce Branch Tips Infested  
by the Spruce Gall Aphid, East Kamloops District, 1961

Locality	Elevation	Date	Percentage tips infested
Whipsaw Creek	4000	July 20	15
Erris	3000	July 22	8
Peachland Creek	3800	July 27	8
Camp McKinney road	3400	Aug. 24	10
Keremeos Creek	5200	Aug. 25	7
Beaconsfield Mtn.	7000	Aug. 25	1
Tulameen	2900	July 21	22
Flash Lake	4200	Sept. 21	18

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

The ponderosa pine cone crop was very light in 1961 and sufficient mature cones for sampling were obtained in only three localities.

At Winfield, 17 per cent of the cones in a 23-cone sample contained D. auranticella larvae, and at Princeton, 15 per cent were infested in a 20-cone sample. At the latter locality, one cone contained a larva of D. abietivorella (Grote). No Dioryctria damage was found in a 20-cone sample taken at Faulder.

Douglas-fir Cone moth, Barbara colfaxiana Kearf.

The Douglas-fir cone crop was moderate to heavy in most parts of the District in 1961. Samples consisting of 50 or 80 cones, depending on availability, were sliced open and examined for cone insects. Table 12 shows the percentage of cones infested by the Douglas-fir cone moth at four localities.

Table 12

Percentage of Douglas-fir Cones Infested by the Douglas-fir Cone Moth at Four Localities, East Kamloops District, 1961

Locality	Date	No. cones examined	Percentage infested
Olalla	July 19	80	64
Kirton	July 22	50	2
Armstrong	July 23	50	82
Fairview	Aug. 25	80	6

Two per cent of the cones at Armstrong and 52 per cent at Fairview were infested with a cone-boring pyralid, Dioryctria abietivorella (Grote).

Forest Tent Caterpillar, Malacosoma disstria Hbn.

A slight increase in the forest tent caterpillar populations was evident in 1961. No defoliation was observed, but larvae were collected at several localities in the North Okanagan. Last-instar larvae were collected at Vernon on June 1.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Hemlock looper larvae were collected frequently in the wet-belt forest in the northern part of the District. Sixty per cent of the 19 three-tree beating collections from western hemlock taken during the larval period (June 1 to August 15) contained larvae. The average number per positive collection was three; the maximum taken in one collection was six. The hemlock looper was quite scarce on other hosts.

False Hemlock Looper, Nepytia canosaria Wlk.?

During the larval feeding period (May 31 to July 20), 56 per cent of the 57 three-tree collections taken from Douglas fir contained larvae of the false hemlock looper. The average number per collection was 4.3, and the maximum was 20, in a sample taken near Summerland.

Cecidomyiids Infesting Ponderosa and Lodgepole Pines, Cecidomyiidae

Cecidomyiids caused very light damage to leaders and candles of pines growing at Squilax and Monte Creek in 1961. Infested material was collected near Salmon Arm on April 5, but no quantitative data were obtained.

Sawflies on Douglas Fir, Neodiprion spp.

Of the 62 quantitative Douglas-fir beating collections taken during the larval period (May 23 to July 31), 56 per cent contained Neodiprion larvae. Only minor defoliation was observed.

A Sawfly on Western Hemlock, Neodiprion sp.

Only five quantitative collections from western hemlock yielded Neodiprion larvae in 1961. All were taken before the end of June.

A Flea Beetle on Alder, Altica sp.

Populations of alder flea beetles declined in 1961.

A Leaf Beetle on Poplar, Chrysomela scripta Fab.

No defoliation was observed near Winfield, where damage had occurred in 1960.

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

As the plots at Glenenna Range were abandoned in 1961, no data on emergence of Xyela sp. were obtained which could be compared with records of previous years. A plot was established closer to Vernon, in the BX district. Four containers were hung at cardinal compass points on the lower branches of three trees. They were examined daily during the larval emergence period, and the number of larvae in each trap recorded. Emergence began on May 22 and ended on May 31; the peak occurred on May 26, when 254 larva fell into the traps.

A Woolly Aphid on Lodgepole Pine, Adelges sp.

The site of a 1960 infestation of woolly aphids on lodgepole pine near Three Brothers Game Reserve was not visited in 1961.

Larch Shoot-borer, Argyresthia laricella Kft.

Larch shoot-borer were quite common in a young larch stand eight miles southeast of Vernon. Trees 12 feet in height averaged about one infested shoot per tree.

A Needle-mining Olethreutid, Rhyacionia subcervinana Wlshm.

In late May, mined needles which had been cut off and capped with silk were collected from ponderosa pines growing along EX Creek, east of Vernon (Fig. 1). Moths which were identified as Rhyacionia subcervinana Wlshm. emerged from the "tubes." As many as 12 needle bundles per branch tip had been mined.

MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
<u>Chionodes retiniella</u> B. & Bsk.	Py	3	needle miner
<u>Datana ministra</u> Dru.	Rosaceae, Bi	0	locally abundant
<u>Enypia venata</u> Grt.	Ba, Bam, H, Se	5	40 larvae in one Ba collection, Winfield
<u>Gabriola dyari</u> Tayl.	F, Se	9	increase in 1961
<u>Griselda radicana</u> Wlshm.	F	15	increase in 1961
<u>Melanolophia imitata</u> Wlk.	F, H, L, C, Pw	59	abundant
<u>Nymphalis antiopa</u> (L.)	A, W	1	locally abundant, Shuswap Lake
<u>Operophtera bruceata</u> Hlst.	Douglas Maple	2	light defoliation, Vernon
<u>Phaeoura mexicanaria</u> (Grote)	Py	1	rare
<u>Schizura concinna</u> A.S.	-	0	decrease from 1960
<u>Tortricidea testacea</u> Pack.	Dt, Bi, Saskatoon	3	uncommon

STATUS OF FOREST DISEASES

A Needle Cast of Ponderosa Pine

A severe infection of Elytroderma deformans (Weir) Darker occurred on several hundred acres of ponderosa pine on a north slope above Carr's Landing, at elevations between 2500 and 3000 feet. In April it was estimated that over 90 per cent of the 1960 foliage of young ponderosa pines had been killed. Other heavy infections were noted near Glenemma, Westwold and Whiteman Creek.

Two plots established in 1960 at Glenemma and near Carr's Landing to obtain data on progress of Elytroderma infections and their effect on the stands, were visited in August, 1961. The percentage of foliage infected and the presence of brooms, dead branches, short needles and infections in the upper half of the tree crowns were recorded. Table 13 summarizes the data obtained in 1961.

Table 13

Elytroderma deformans (Weir) Darker, Infections at Two Plots, East Kamloops District, 1960 and 1961

Locality	No. trees living 1960	Percentage of trees - 1961			
		Increased infection	Decreased infection	No change	Dead
Carr's Landing	72	36	42	14	8
Glenemma	56	60	21	17	2

The Carr's Landing plot is not in the locality where heavy infections occurred in 1961. Except for the denser parts of this plot, infections were reduced in severity in 1961 and mortality was confined to suppressed saplings.

Needle Cast of Western Larch

Needle cast of western larch caused by Hypodermella laricis Tub. was prevalent at Grandview Bench between Salmon Arm and Grindrod, near Tappen, and at Trinity Valley, Mabel Lake, and Sugar Lake. Browning of foliage was heaviest on understory and on the lower crowns of mature and pole-sized trees. As the upper crowns of the overstory were relatively free of infection, discoloration of stands was not visible from a distance.

Root Rot of Douglas Fir

Severe depletion of a residual Douglas-fir stand six miles east of



Winfield was attributed to infections of Poria weirii Murr. and Armillaria mellea (Vahl ex Fr.) Quél. The affected area was about 80 acres in extent, and had been logged about 1951. On September 7, 1961 a half-mile strip one-half chain wide was cruised, and the trees classified as healthy, fading, red, grey, or fallen. Slightly more than 38 per cent of the 596 trees tallied were dead, and 1.2 per cent were dying. Table 14 shows distribution of mortality by diameter class.

Table 14 shows that 61 per cent of the mortality occurred in the four to six inch diameter class, which comprised less than 50 per cent of the stems.

Table 14

Percentage Mortality of Douglas Fir Caused by Root Rot Infections on a 40 x  $\frac{1}{2}$  Chain Strip, Winfield, East Kamloops District, 1961

Diameter class (inches)	Percentage of total stems	Percentage of total mortality
2	26	21
4	25	31
6	24	30
8	17	13
10	6	4
10+	2	1

#### Dwarf Mistletoe on Douglas Fir

A stand of Douglas fir infected by dwarf mistletoe Arceuthobium douglasii Engelm. was discovered on Sicamous Creek near the north end of Mara Lake. The nearest previously known infection was near Vernon, 40 miles to the south.

#### Dwarf Mistletoe on Western Larch

Infections of dwarf mistletoe Arceuthobium campylopodum f. laricis Jones on western larch were noted near Mica Creek, east of Osoyoos Lake, east of Vaseaux Lake in McIntyre Creek Valley, and seven miles southeast of Vernon. The majority of western larch stands in the East Kamloops District appear to be free of dwarf mistletoe infections.

#### A Foliage Disease of Aspen

A foliage disease of trembling aspen, the causal agent of which

has been tentatively identified as Marssonina sp., was prevalent over wide areas of the District in 1961. The most extensive outbreak was in the North Okanagan, where aspen stands in Equesis and Irish Creek valleys and in the vicinity of O'Keefe were damaged. Near the head of Okanagan Lake some infected stands shed their leaves during July and produced fresh foliage in August. Infections were also observed near Salmon Arm, Princeton and on Anarchist Mountain.

#### A Saprot Fungus

A fresh conk of a saprot fungus Polyporus volvatus Peck was collected on April 24, 1961 from the bole of a ponderosa pine that had been killed by fire on July 7, 1960.

#### Bud Necrosis of Engelmann Spruce

Engelmann spruce seedlings planted on an experimentally burned area near Arthur Lake were examined September 17, 1961, in an attempt to determine the cause of multiple leader growth. Of two hundred trees ranging from two to six feet in height, 31.5 per cent had two or more leaders resulting from the death of the terminal bud. In some cases the end of the main leader was also dead or damaged. No evidence of insect injury or disease agents was found. It is believed that the plantation stock may not be suited to adverse climatic conditions at this elevation (4700 feet) and that the injury may result from failure of the trees to "harden off" before autumn.

#### Pine Twist Rust

A survey of white poplars and hard pines was made in 1961 to determine whether or not pine twist rust caused by Melampsora pinitorqua Rostr. was present in the District. No infected trees were found.

#### Dwarf Mistletoe on Lodgepole Pine

Lodgepole pine saplings at Ingram Creek were heavily infected by Arceuthobium americanum Nutt. (Fig. 2)

#### Exotic Plantations

Three exotic plantations were visited in 1961. Table 15 shows the results of these examinations.

Table 15

Condition of Trees in Exotic Plantations, East  
Kamloops District, 1961

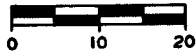
XP No.	Locality	Tree Species	Remarks
59	Westwold	3 Scots pine	have survived porcupine damage. No fresh attack by red turpentine beetle
		1 western larch	condition normal
		1 white spruce	condition normal
60	Pritchard	8 Scots pine	5 died or killed by mountain pine beetle, 1960 or previous. 3 living
		12 ponderosa pine	4 killed by mountain pine beetles or died from unknown causes, 1960 or previous; 1 infested by mountain pine beetle, 1961; 1 badly damaged by porcupine, 1961; 6 healthy.

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Water birch	<u>Polyporus cinnabarinus</u> Jackq. ex Fr.	Vernon	new host record
Willow	<u>Melampsora epitea</u> Thum.	Terrace Mtn.	rust on twigs
Ponderosa pine	<u>Arceuthobium americanum</u> Nutt.	Hayes Creek	unusual host
<u>Gayophytum nuttallii</u>	<u>Puccinia pulverulenta</u> Grev.	Oliver	new Canadian host record

# EAST KAMLOOPS DISTRICT

SCALE

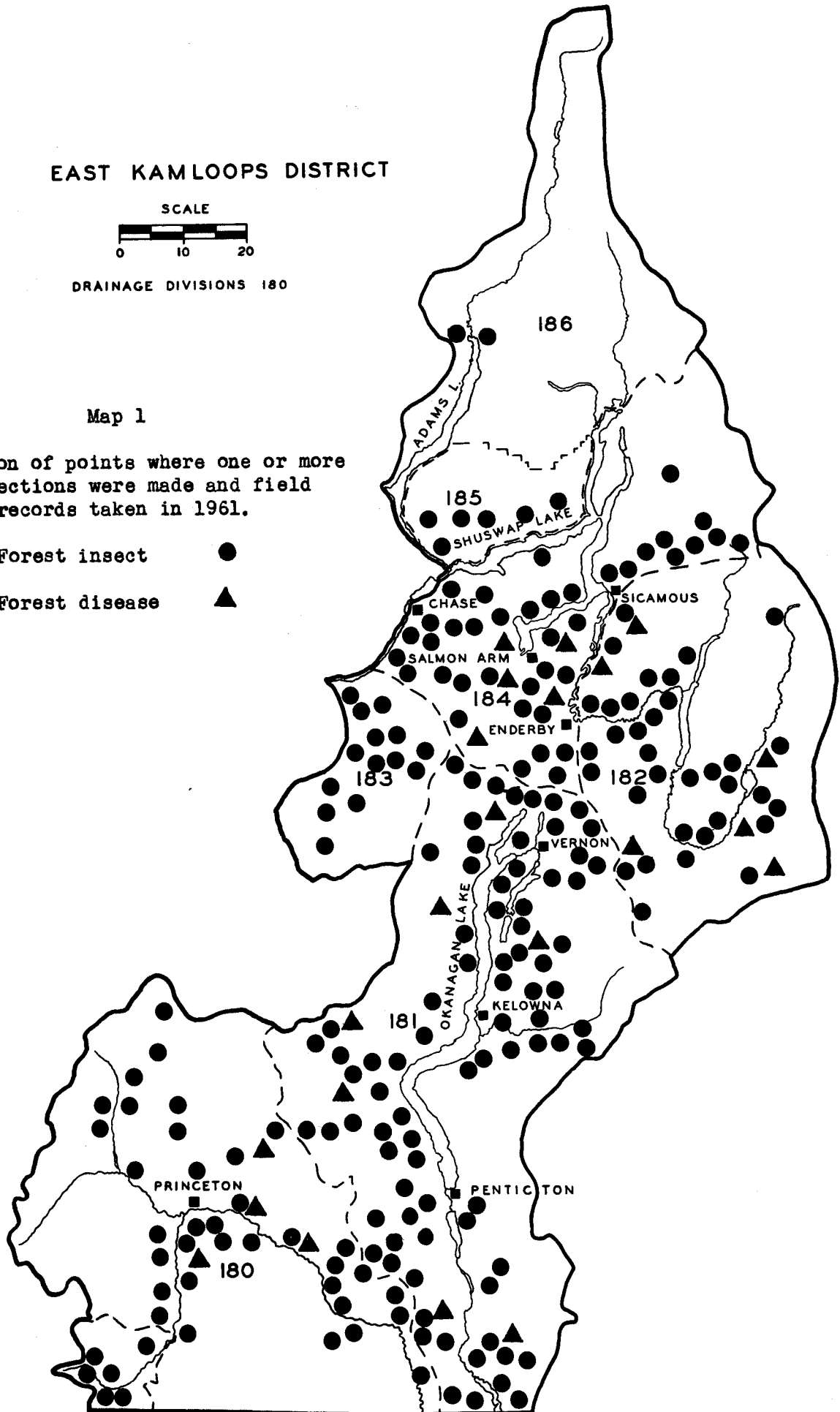


DRAINAGE DIVISIONS 180

Map 1

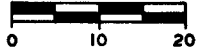
Location of points where one or more collections were made and field records taken in 1961.

- Forest insect      ●
- Forest disease    ▲



# EAST KAMLOOPS DISTRICT

SCALE



DRAINAGE DIVISIONS 180

Map 2

Points where Douglas-fir trees have been killed by Douglas-fir beetle from 1958 to 1960 as determined in 1961.

- Approximately 10 trees ●
- Approximately 100 trees ●
- Approximately 1000 trees ●

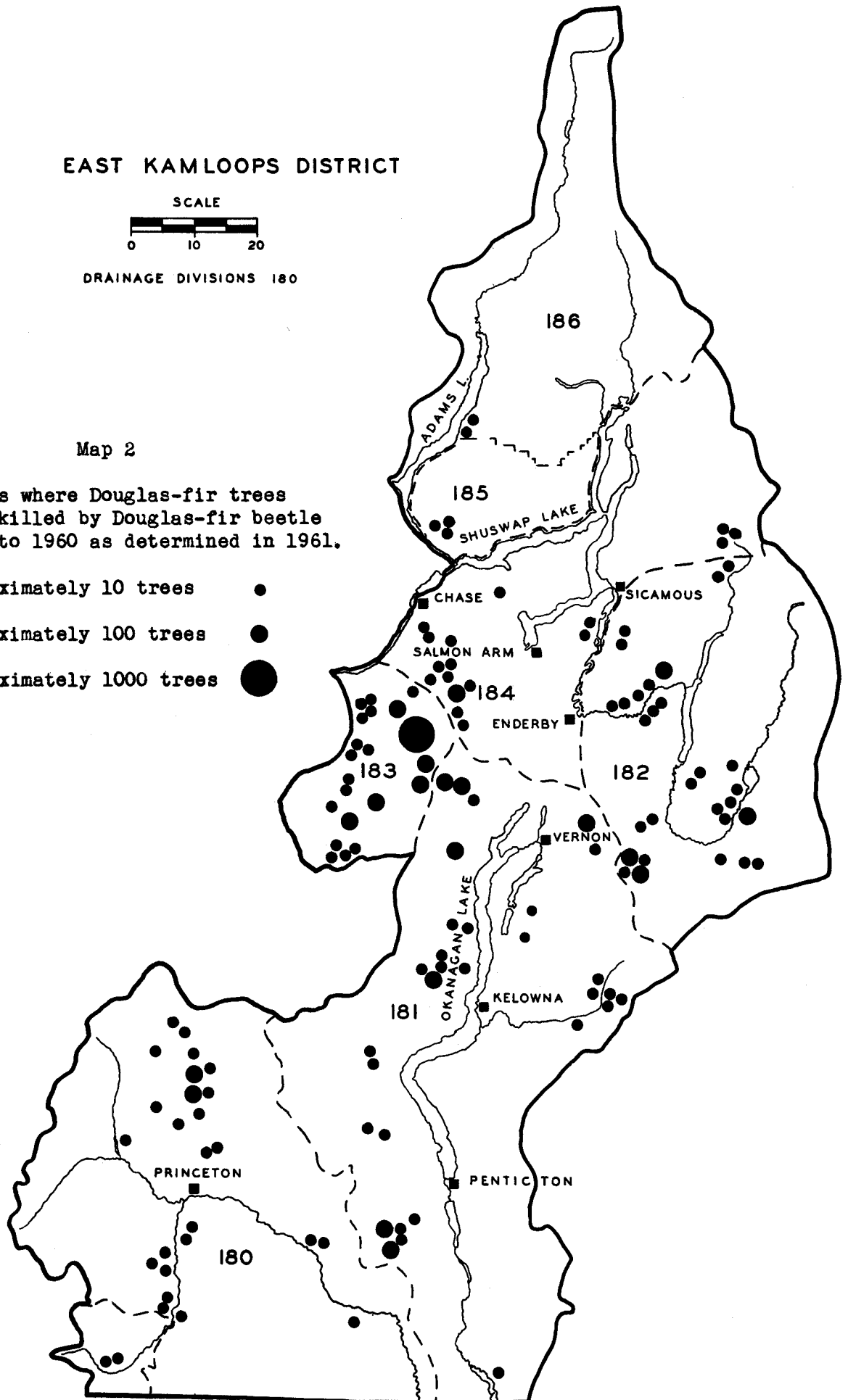




Fig. 1. Pupation tubes of Rhyacionia subcervinana (Wlsh.) on ponderosa pine. The needle bundles are mined, cut off, and the ends sealed with silk. Vernon, East Kamloops District. May 29, 1961. N. Geistlinger



Fig. 2. Dwarf mistletoe, Arceuthobium americanum Nutt., on stem of lodgepole pine sapling. Ingram Creek, East Kamloops District. July 5, 1961. N. Geistlinger

FOREST INSECT AND DISEASE SURVEY

CENTRAL KAMLOOPS DISTRICT

1961

FOREST INSECT AND DISEASE SURVEY

CENTRAL KAMLOOPS DISTRICT

1961

C. B. Cottrell

INTRODUCTION

Field work in the Central Kamloops Forest Biology Ranger District began on April 19 and ended October 25. During the summer however, six weeks were spent outside the District, five weeks in South Prince George and one week, August 14 to 18, on the Douglas-fir damage appraisal in the West Kamloops Forest Biology Ranger District. Times spent in South Prince George were: June 19 to 23; July 17 to 21; August 21 to 31, and September 26 to 30. Flying time in the Prince George Forest District was eight hours, and 14 hours in the Kamloops Forest District.

Throughout the field season 278 insect and 14 forest disease collections were taken in the Central Kamloops District. During the summer a search was conducted for pine twist rust although none was found. One hundred thirteen locations were noted where white poplar trees occurred, of which 80 were visited. A total of 896 trees were tallied. In addition 14 locations were visited by Forest Pathology personnel.

Table 1 shows the collections by hosts. Map 1 shows the locations where one or more collections were made and field records taken in 1961.

Table 1

Collections by Hosts

Central Kamloops District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	2	-	Alder, mountain	7	-
Douglas fir	85	-	Aspen, trembling	14	2
Fir, alpine	4	2	Birch spp.	6	2
Hemlock, western	8	-	Cherry, choke	4	-
Juniper, Rocky Mtn.	9	1	Cottonwood, black	10	1
Pine, lodgepole	22	1	Poplar, white	2	94
Pine, ponderosa	41	1	Willow spp.	11	2
Spruce, Engelmann	25	2	Miscellaneous	28	-
			Total	82	100
Total	196	7	Grand total	278	108



## STATUS OF INSECTS

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Some 1961 Douglas-fir beetle-attacked trees turned red in September 1961. A total of 423 red-topped trees in the Tranquille and Long Lake forest reserves were counted from the air on September 8. Notable areas were: Back Valley, 82 trees; Tranquille Valley, 125 trees; and Campbell Range, 106 trees.

In September 1961, Douglas-fir trees apparently killed in the period 1958 to 1960 were counted. (Table 2). Volume estimates are based on measurements of 25 trees in each sample area. A total of 5,569 trees were killed with an estimated volume of 438,760 cubic feet.

Table 2

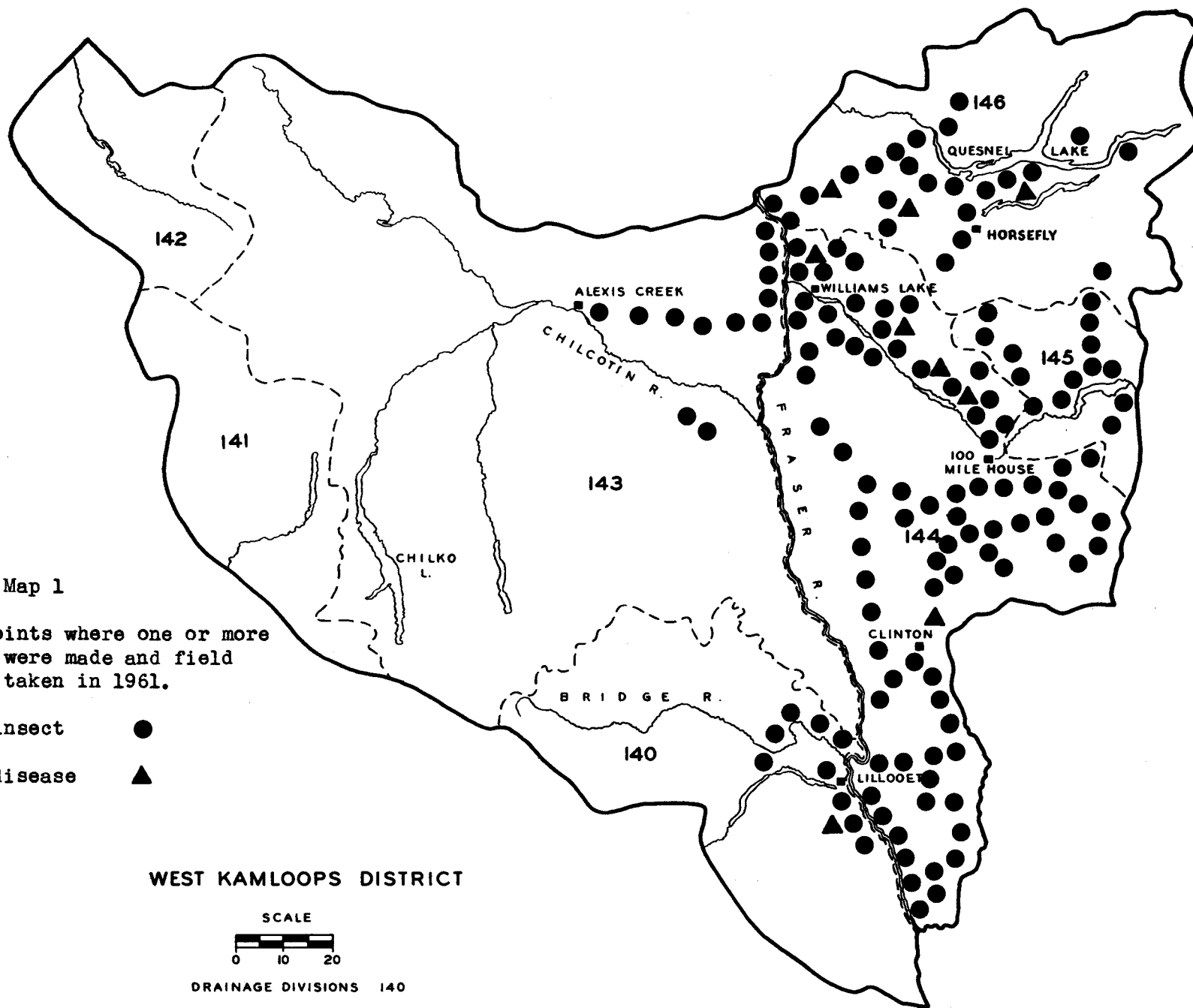
Douglas-fir Trees Killed by the Douglas-fir Beetle  
from 1958 to 1960, as Determined in 1961,  
Central Kamloops District

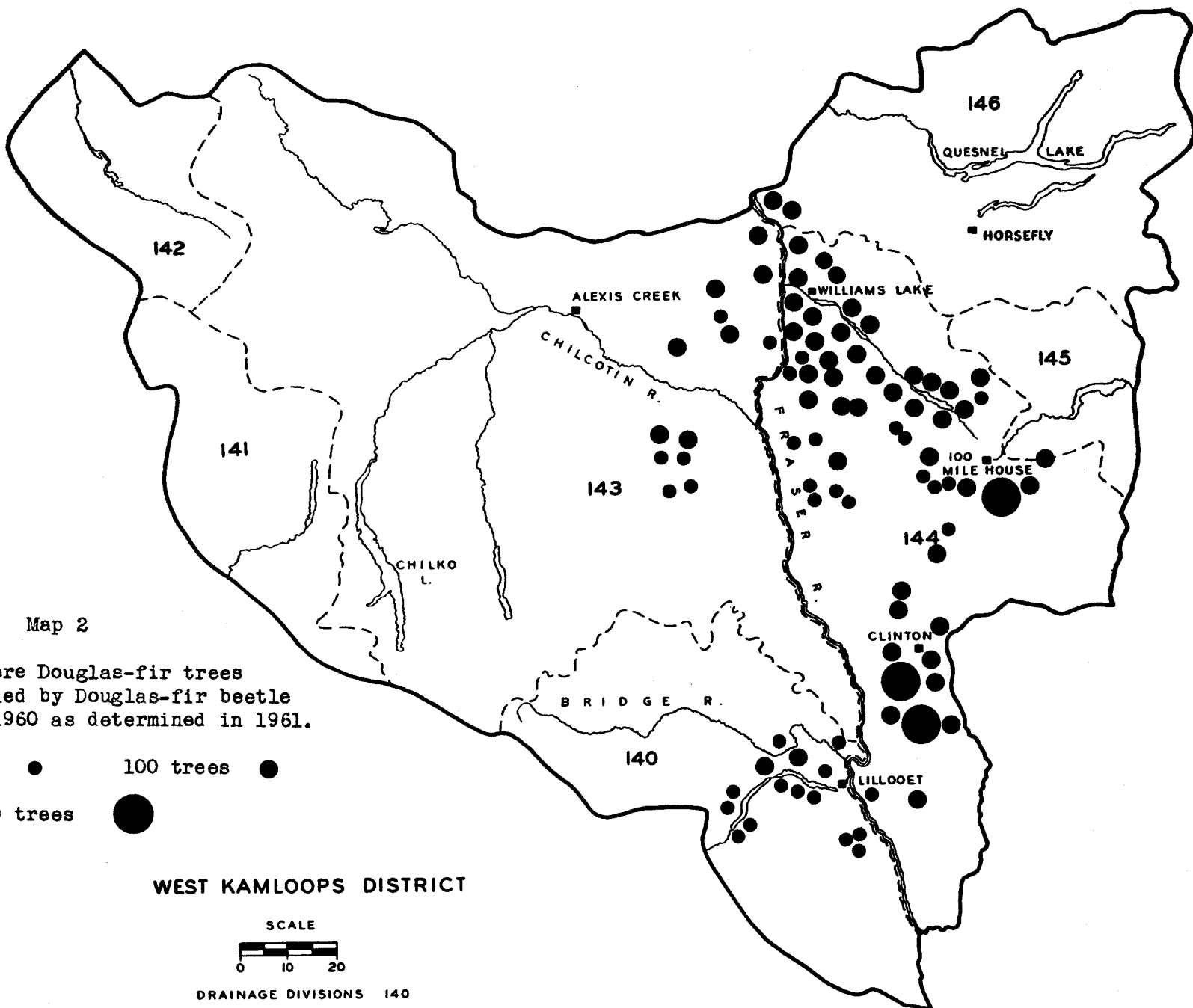
Locality	No. of dead trees	Av. volume per tree (cubic feet)	Est. volume of timber (cubic feet)
Arrowstone Hills	651	90	58,590
Tranquille Forest Res.	835	100	85,500
Niskonlith Forest Res.	1130	80	90,400
Long Lake Forest Res.	640	40	25,600
Highland Valley	1098	90	98,820
Monte Hills	525	50	26,250
Salmon Lake Region	312	80	24,960
Kane Valley	358	80	28,640
<b>Total</b>	<b>5569</b>		<b>438,760</b>

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

In 1961 a previously unknown infestation of mountain pine beetles attacking western white pine was found at North Barriere Lake. Two hundred and seventy-one mature trees had been killed prior to 1961 and 88 trees were freshly attacked. Elsewhere in the district few attacked white pine were found. The infestation along Barton Creek at the north end of Adams Lake has collapsed and only 23 currently-attacked trees were counted in the North Thompson Valley.

At Chapperon Lake, the mountain pine beetle was associated with the





FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1961

NELSON FOREST DISTRICT

Oregon pine engraver in an attack on immature ponderosa pine, however, the mountain pine beetle appeared to be secondary.

The mountain pine beetle killed an estimated 6,500 mature lodgepole pines south-east of Dardanelles Lake in the Monte Hills Forest Reserve. The dead trees were scattered over an area approximately half a mile wide and four miles long near the 4000 foot level. Most of the trees were killed in the past five years.

In the Scottie Creek Valley, 45 lodgepole pine were killed in 1961.

Western Pine Beetle, Dendroctonus brevicornis Lec.

Very few ponderosa pine trees have been killed by the western pine beetle in the past five years. In 1961 two small infestations were noted. Forty-one mature pine were killed in the Deadman River valley and 10 trees died in the Heffley Creek Valley on the north slope of Mt. Lolo.

Red Turpentine Beetle, Dendroctonus valens Lec.

Approximately 40 eight to 12 inch diameter ponderosa pine trees were heavily attacked by red turpentine beetles on the Little Shuswap Indian Reserve at Squilax. Attacks were scattered on the lower bole and were especially heavy at the base of the trees. Most of the trees will probably die.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Decked Engelmann spruce logs were lightly attacked by Engelmann spruce beetles in late May and early June at Froth Creek, 13 miles south of Blue River, and at Thunder River, 12 miles north of Blue River. No standing trees have been known to have been attacked in the North Thompson Valley.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

The number of alpine fir trees killed by the western balsam bark beetle has decreased in recent years. However, a few trees are killed annually at the sites of old infestations. Table 3 shows the number of alpine fir presumed killed in 1960, as the foliage turned red in 1961, in the Niskonlith and Tranquille forest reserves. Counts were made from the air.

Western balsam bark beetles are often associated with a lesion-causing disease, Ceratocystis sp.

Table 3

Number of Alpine Fir Killed by the Western Balsam  
Bark Beetle in 1960, Central Kamloops District

Location	No. trees killed
<b>Niskonlith Forest Reserve</b>	
Barriere River	25
North Barriere Lake	215
East Barriere Lake	75
Fennel Creek	45
Knouff Lake	675
	1,035
<b>Tranquille Forest Reserve</b>	
Peterson Creek	250
Skull Creek	150
Whitewood Creek	100
Tsintsunko Lake	25
	525
<b>Total</b>	1,560

Oregon Pine Engraver, Ips oregoni (Rich.)

An estimated 2,300 immature ponderosa pine north of Chapperon Lake were killed by the Oregon pine engraver, associated with the mountain pine beetle. The trees which varied from three to 13 inches d.b.h., were in 14 similarly sized groups within a four square mile area. The beetles probably originated in nearby fire-killed pine.

Ambrosia Beetles, Trypodendron spp.

There was a large population of ambrosia beetles at Froth Creek, 13 miles south of Blue River in the North Thompson Valley. A few adult beetles were caught in flight on April 26 in the Valley bottom, 2,100 feet in elevation. Following April 26, temperatures rose to over 60° F. for four or five days. Sometime in early May approximately five million board feet of Engelmann spruce felled in the winter of 1960-61 and decked at the 2800 foot level were lightly attacked. Temperatures were generally below 60° F. from mid-May to May 25 and no fresh attacks were observed; after May 25 temperatures reached the 70's and a moderate to heavy beetle flight was in progress for four days.

The logging company concerned sprayed the logs on May 16, mid-way through the heavy attack period. A mixture of benzine hexachloride, diesel

fuel and water was applied with a one and a half inch fire hose and pump. Many beetles were killed while resting on the exterior of the logs and many which had tunneled into the wood up to one inch in depth were killed. Beetles which had tunneled deeper and which were not immediately affected by the spray may have been destroyed when many of the logs were dumped into the river and later sawn into lumber.

There were from 35 to 50 attacks per square foot on Engelmann spruce logs decked at Grizzly Lake and Thunder River. There was also a very light attack on Engelmann spruce at McGillivray Lake where logs contained less than one entrance hole per square foot.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Collections from a small stand of overmature western hemlock near Pyramid contained an average of seven larvae compared with an average of four larvae in 1960. Very light defoliation, noticeable on understory hemlock, was caused by a combination of western hemlock looper and the saddle-back looper, Ectropis crepuscularia Schiff.

Only three larvae were collected in over 80 Douglas-fir collections made in the District during the summer.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Larval populations of the one-year-cycle spruce budworm remained at a low level in the Central Kamloops District. During the larval feeding period in 1961, 52 Douglas-fir collections were made which contained an average of one larva. This is an increase from 0.2 in 1960 but is due mostly to one collection north of Le Jeune Lake which contained 28 larvae. The average number of larvae per Engelmann spruce collection was 0.3 in 1961 compared with 0.2 in 1960.

Defoliation caused by the two-year-cycle spruce budworm was up to 25 per cent on alpine fir and up to five per cent on Engelmann spruce along the mountain ridge west of the North Thompson River from Kamloops to Clearwater. Along the mountains on the east side of the North Thompson River there was only a trace of defoliation. Three plots to record future defoliation were established at McGillivray Lake, at Grizzly Lake and along Jamieson Creek.

Black-headed Budworm, Acleris variana (Fern.)

The black-headed budworm population was very low throughout the District. Of 70 random Douglas-fir collections made in June and July, only seven contained larvae. The largest number of larvae in one collection was five. Collections from Engelmann spruce, western hemlock and alpine fir were similarly low.

Satin Moth, Stilpnotia salicis (L.)

Satin moth larvae caused light to heavy defoliation on trembling aspen, black cottonwood and white poplar along the South Thompson River from Chase to Kamloops and from Kamloops south to Aspen Grove. The heaviest defoliation occurred between Knutsford and Stump Lake where 153 groves of aspen and cottonwood were from 50 to 100 per cent defoliated. Defoliation was light from Stump Lake to Merritt and west to Lower Nicola. Defoliation was heavy for several miles south of Merritt and then moderate to Aspen Grove. Four new groves were moderately defoliated between Pritchard and Squilax, and hundreds of white poplars, Populus alba L., were lightly attacked on Adams Lake Indian Reserve opposite Chase.

Tree mortality is evident in many of the defoliated aspen groves surrounding Stump Lake, where sporadic defoliation has occurred since 1955. However, most of the dead trees were also severely attacked by the poplar borer, Saperda calcarata Say, and the carpenter worm, Prionoxystus robiniae (Peck). The same applies to other aspen trees killed in recent years in satin moth infestations at Campbell Lake, Lac du Bois and Knutsford.

Table 4 lists the number of aspen and cottonwood groves which were 25 per cent or more defoliated. Attacked groves ranged in size from 25 to 1000 trees but the majority of groves contained approximately 300 trees.

Table 4

Number and Location of Trembling Aspen and Black Cottonwood Groves Defoliated by Satin Moth, Central Kamloops District, 1961

Location	No. aspen groves defoliated	No. cottonwood groves defoliated
Pritchard	1	1
Squilax	1	1
Knutsford	5	0
Rose Hills	18	0
Brigade Lake	23	0
Shumway Lake	13	0
Napier Lake	19	0
Stump Lake	70	5
Nicola	3	1
Merritt	15	0
Lower Nicola	2	0
Aspen Grove	13	0
Totals	183	8



Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Occasional larvae were taken throughout the District in collections from trembling aspen, western white birch, scrub birch and wild rose. Larvae were numerous on mountain alder and willow south of Albreda. At Knutsford, 21 "tents" were counted on 250 wild rose bushes.

Spotless Fall Webworm, Hyphantria cunea Drury

There was a decrease in the number of fall webworm "tents" throughout the District including the areas where annual strip counts are taken. On August 10, the number of tents were counted on various hosts from a slow-moving vehicle for three miles at Savona and for seven miles at Spences Bridge as shown in Tables 5 and 6.

Table 5

Spotless Fall Webworm Strip Counts, Savona Cut-off from East to West, Central Kamloops District, August 10, 1961

Host	No. of webs per mile			Average per mile	
	Mile	0-1	1-2		2-3
Choke cherry		28	5	0	11.0
Black cottonwood		12	0	1	4.3
Apple		3	0	0	1.0
Lombardy poplar		0	0	1	0.3
1961 totals		43	5	2	16.7
1960 "		64	30	9	34.3
1959 "		178	41	19	69.3
1958 "		524	135	150	269.7
1957 "		278	79	34	130.7
1956 "		101	16	15	44.0

Table 6

Spotless Fall Webworm Strip Counts, Spences Bridge to Seven Miles Southeast along the Nicola River, Central Kamloops District, August 10, 1961

Host	Mile	No. of webs per mile							Average per mile
		0-1	1-2	2-3	3-4	4-5	5-6	6-7	
Black cottonwood	37	0	6	9	46	8	8	16.3	
Choke cherry	19	0	0	0	17	17	6	8.4	
Mountain alder	0	0	3	0	3	0	0	0.9	
Saskatoon	0	1	0	0	0	1	0	0.3	
Wild rose	0	0	2	0	0	0	0	0.3	
1961 totals	56	1	11	9	66	26	14	26.1	
1960 totals	146	9	42	23	31	14	28	41.9	

There has been an estimated five per cent annual loss of the available host material at Savona since the strip count was started in 1956. Land clearing accounted for the loss of host material.

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

Since tussock moth infestations on Douglas fir have been reported in the neighbouring East Kamloops District, an effort was made to locate any possible outbreaks in the Central Kamloops District. Special attention was given to areas in which infestations occurred between 1947 and 1949, however not a single larva was collected during the summer.

A Sawfly on Lodgepole Pine, Neodiprion sp.

There was light defoliation on several acres of reproduction lodgepole pine on the Little Shuswap Indian Reserve near Squilax. Heavy defoliation was recorded at this site in 1957. On October 31, 1961 Neodiprion egg clusters were collected from 10 seven-foot lodgepole pines. As shown in Table 7, the number of egg clusters per tree varied from zero to nine averaging 2.3, while the number of eggs per cluster varied from 18 to 96, averaging 49.3. This number of eggs might be expected to result in a population of 113 larvae per tree if there were no over-wintering mortality. In 1956 egg counts indicated a population of 308 larvae per tree and the defoliation in 1957 was up to 90 per cent.

Table 7

Neodiprion Egg Counts from Lodgepole Pine Sampled near Squilax,  
Central Kamloops District. October 31, 1961

Tree no.	Total no. egg clusters per tree	Av. no eggs per cluster	Av. no eggs per needle
1	4	52	6.9
2	5	41	6.5
3	1	77	8.6
4	2	38	8.3
5	0	0	0
6	9	47	6.2
7	0	0	0
8	1	51	7.3
9	0	0	0
10	2	50	4.1
Average	2.3	49.3	6.3

A Sawfly on Ponderosa Pine, Neodiprion sp.

Random samples and observations made at permanent sampling points indicate a light population in the ponderosa pine forest along the Thompson River.

A Sawfly on Douglas fir, Neodiprion sp.

Neodiprion sp. sawflies caused light defoliation to immature Douglas-fir trees in the Chase Forest Ranger District. Feeding was most conspicuous north of Squilax. The largest collection contained 102 larvae. The average number of larvae per collection in the Central Kamloops District was 50 as compared with an average of 14 larvae in 1960.

Ugly-nest Caterpillar, Archips cerasivoranus (Fitch)

Ugly-nest Caterpillars appeared more frequently than in 1960. Larval tents were common on choke cherry from Kamloops to Birch Island, at Lytton and in the Nicola Valley from Spences Bridge to Merritt.

A Leaf Roller, Archips rosana Linn.

An estimated 10 per cent of the leaves of choke cherry, hazel, saskatoon and broad-leaved maple were "rolled" by this insect in the Fraser Canyon from Lytton to Falls Creek. This is a decrease from 1960 when an estimated 35 per cent of the leaves were rolled.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Willow trees in the valley bottom along the North Thompson River were heavily attacked by the poplar and willow borer. Attacks at Barriere, Little Fort and Avola were especially numerous. The infestation at Avola constitutes a new northern distribution record.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Aspen leaf miner populations decreased in the Central Kamloops District with the exception of the North Thompson Valley. Although approximately 50 per cent of the trembling aspen leaves at the Cache Creek and Coldwater River plots were infested, larval mortality was so high that it was difficult to obtain the required 100-cocoon samples. Parasitism increased greatly in most of the cocoon samples. The number of infested leaf surfaces and the number of adults produced per leaf surface are shown in Table 8. Table 9 shows the percentage of mortality in 100 randomly selected cocoons at each location.

Table 8

Aspen Leaf Surfaces Mined and Number of Adults Produced  
per Leaf Surface, Central Kamloops District, 1960 and 1961

Location	Percentage of leaf surfaces with mines		No. of adults produced per leaf surface	
	1960	1961	1960	1961
Paul Creek	56	86	0.30	1.09
Deadman River	73	67	0.37	0.07
Cache Creek	47	43	0.21	0.01
Campbell Range	20	16	0.10	0.09
Coldwater River	81	49	0.60	0.01

Table 9

Mortality of Aspen Leaf Miner in 100-cocoon Samples,  
Central Kamloops District, 1960 and 1961

Location	Percentage mortality			
	Parasitism		Other causes	
	1960	1961	1960	1961
Paul Creek	0	6	9	2
Deadman River	18	54	9	3
Cache Creek	21	62	1	3
Campbell Range	25	5	9	9
Coldwater River	25	80	4	4

#### A Leaf Miner, Lyonetia sp.

Western white birch leaves south of Albreda for five miles along the Albreda River Valley were heavily mined. By June 20, larvae had spun cocoons under the leaves of all deciduous trees available; there were as many as 20 cocoons under one leaf. This is a continuation of a large infestation in the South Prince George District.

#### Douglas-fir Needle-miners, Contarinia spp.

A light population of Contarinia pseudotsugae Cond., was present throughout the range of Douglas fir in the District, although in slightly lower numbers than 1960. Counts were made at a few locations and are given as the percentage of needles infested: Louis Creek, 27; Tranquille, 25;

Red Lake, 17; Lytton, 23; Campbell Range, 12; and Pritchard 5.

A very light population of C. constricta Cond., was common over most of the District on Douglas fir.

Poplar Borer, Saperda calcarata Say

The poplar borer continued to attack open-growing trembling aspens at numerous locations in the Thompson and Nicola river valleys. In one grove of aspen, north of Kamloops, 110 of 171 trees have been severely attacked in the past four or five years, and the tops of 17 trees have been killed. The diameters of infested trees varies from three to 14 inches. At Knutsford 124 aspens have been attacked in a grove containing 256 trees; 14 trees were dead and four had dead tops.

Many aspen trees at Campbell and Stump lakes which have been repeatedly defoliated by satin moth larvae, have also been severely infested by poplar borers. Most trees that died were attacked by both insects.

In most groves of aspen infested by the poplar borer, a carpenter worm believed to be Prionoxystus robiniae (Peck) is frequently found, although in smaller numbers.

Oregon Fir Sawyer, Monochamus oregonensis Lec.

Sawyer beetles heavily infested Engelmann spruce and lodgepole pine trees damaged by fire in June 1961 along Jamieson Creek Valley. Adults were observed in flight from June 21 to August 9.

Attacks on Engelmann spruce logs were also noted at Thunder River, Clearwater, Barriere and McGillivray Lake. Lesser numbers of another cerambycid, Tetropium sp., were also noted at these localities.

Sequoia Pitch Moth, Vespa mima sequoiae (Hy. Edw.)

Sequoia pitch moth larvae killed 22 lodgepole pine trees in 10 acres of reproduction near Squilax. A few immature lodgepole pines are attacked annually in the McLure and Clearwater infestations.

Green-striped Forest Looper, Melanolophia imitata Wlk.

There was an increased number of Melanolophia imitata larvae in Douglas-fir collections although no defoliation was attributed to them. In 1961 during June and July, 72 collections were made of which 38 per cent contained an average of 2.3 larvae. In 1960 in the same period, 64 collections were made and six per cent contained an average of 1.5 larvae.

False Hemlock Looper, Nepytia canosaria Wlk?

The occasional Douglas-fir collection contained up to 10 larvae in the Chase and Kamloops Forest Ranger districts. Otherwise larvae were scarce.

A Geometrid, Semiothisa granitata Gn.

During July and early August, 30 random Douglas-fir collections contained an average of 11 larvae; the largest collection contained 35 larvae and only two collections were negative. Larvae were also common on Engelmann spruce, alpine fir and western hemlock.

A Geometrid, Hydriomena renuciata Wlk.

Most of the leaves of mountain alders in the Adams and North Thompson valleys were attacked by a geometrid, Hydriomena renuciata Wlk., in association with lesser numbers of another geometrid, Rheumaptera sp. The upper surfaces of the leaves were skeletonized and rolled in June and by July had turned brown.

A Noctuid, Scoliopteryx libatrix Linn.

Thousands of willow were defoliated by this noctuid in the North Thompson Valley from Avola to Albreda, a distance of more than 60 miles. Willow is common along the roadside, riverbank and on the Trans-Mountain Pipeline right-of-way. By late June the upper crowns of 30-foot high willows were severely defoliated. A maximum of 50 last instar larvae were taken from individual trees.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Pine needle scale continued to attack immature ponderosa pine for several miles along the Mamette Lake road, north of Lower Nicola. A few trees were severely attacked but most trees were lightly infested. A light attack persists on lodgepole pine near Barriere.

A Sawfly, Xyela sp.

Examinations of ponderosa pine staminate flowers showed a large increase in Xyela sawfly populations at five of seven sample points. The average percentage of infested flowers was 58 compared with 25 in 1960 as shown in Table 10.

Along with the increase in the percentage of infested flowers was an increase in the number of flowers, 452 at each location in 1961 com-

pared with 320 in 1960. Each year four flower clusters are examined from each of three trees at each sample point. Table 11 shows the number of flowers examined and percentage infested from 1958 to 1961, indicating the possibility of a relationship between the abundance of flowers and large populations of Xyela sawflies.

Table 10

Percentage of Ponderosa Pine Staminate Flowers Infested by Xyela sp., Central Kamloops District, 1960 and 1961

Location	Percentage flowers infested	
	1960	1961
Heffley	77	83
Kamloops	2	48
Savona	65	73
Barnhartvale	10	20
Nicola	18	93
Merritt	9	71
Lytton	7	52
Average	25	58

Table 11

Average Number of Ponderosa Pine Staminate Flowers Examined and Percentage Infested at Seven Locations, Central Kamloops District, 1958 to 1961

Year	1958	1959	1960	1961
Av. no. flowers examined	483	474	320	452
Av. percentage flowers infested	39	38	25	58

A Leaf Beetle, Pachybrachys sp., poss. liebecki Fall.

A small number of leaf beetles were found on immature black cottonwoods for five miles along the Nicola River, south of Spences Bridge. Defoliation was estimated at one per cent in 1961 compared with 10 per cent in 1960.

Mourning-cloak Butterfly, Nymphalis antiopa (L.)

Larvae of the mourning-cloak butterfly were common in the North Thompson Valley in June. At Blue River larval colonies were very numerous and many road-side willows were entirely defoliated.

A Weevil, Scythropus sp.

Damage to the 1960 needles of ponderosa pine was very common in the Thompson Valley from Kamloops to Savona. This weevil causes minor damage annually but is seldom as noticeable as in 1961.

A Leaf Beetle, Calligrapha bigsbyana (Kby.)

Small infestations of this leaf beetle occurred on willow at Monte Creek and Blue River.

Sage-brush Sheep-moth, Pseudohazis hera pica Wlk.

Sheep-moth larvae were often found on sagebrush, Artemisia tridentata Nutt. in the Thompson Valley from Kamloops to Savona but appeared in fewer numbers than in 1960.

Cooley Spruce Gall Aphid, Adelges cooleyi (Gill.)

Adelgids were commonly found on Douglas-fir in most of the southern portion of the District but were only occasionally heavy.

There was a decrease in the number of aphid galls noted on Engelmann spruce. Estimates of the percentage of terminals infested were: Avola, 1; Hyas Lake, 4; McGillivray Lake, 0; McGillivray, 10; Pinantan, 2; Louis Lake, 0; Red Lake, 23; Goose Lake, 20; Tunkwa Lake, 2; and Divide Lake, 1.

OTHER NOTEWORTHY INSECTS

Insect	Host	Number of collections	Remarks
<u>Achytonix praeacuta</u> Sm.	F, Se	9	slight increase in occurrence
<u>Agnopteryx rosaciliella</u> Busck	devil's club	1	heavy defoliation at Gosnell
<u>Caripeta divisata</u> (Wlk.)	F, H, Se	13	increase on F



Insect	Host	Number of collections	Remarks
<u>Dioryctria auranticella</u> (Grote) Py		5	scarce, as were ponderosa pine cones
<u>D. pseudotsugella</u> Munroe	F	2	decrease
<u>Eucordylea atrupictella</u> Dietz.	F, Se, Pl	10	slight increase
<u>Eupithecia annulata</u> Hlst.	F, Se	17	increase
<u>E. luteata bifasciata</u> (Dyar)	F, Se	9	increase on Se
<u>Feralia comstocki</u> Grt.	F, H	15	increase
<u>F. jocosa</u> Gn.	F, H	14	increase
<u>Gabriola dyari</u> Tayl.	F, H	2	decrease
<u>Griselda radicana</u> Wlshn.	F, Se	19	increase on F only
<u>Hypagyrtis piniata</u> Pack.	F, Pl	3	unchanged
<u>Pero behrensarius</u> Pack.	F	25	increase, up to 10 larvae per coll.
<u>Phyllocnistis</u> sp.	white poplar	2	light to medium infestation throughout Thompson Valley
<u>Pikonema alaskensis</u> (Roh.)	Se	10	increase
<u>P. dimmockii</u> (Cress.)	Se	7	unchanged
<u>Polygonia f. rusticus</u> Edw.	false azalea	3	defoliation from Blue R. to Clemina
<u>P. satyrus</u> Edw.	stinging nettle	2	heavy defoliation at Pyramid
<u>Protoboarmia p. indicataria</u> Wlk. F		6	unchanged
<u>Semiothisa</u> n. sp.	Pl	6	31 larvae in one collection, Jamieson Cr.
<u>S. adonis</u> B. & McD.	Py, Pl	11	increase

Insect	Host	Number of collections	Remarks
<u>S. setonana</u> B. & McD	Js	3	increase
<u>Stenoporpia satisfacta</u> B. & McD.	F	1	unchanged
<u>Synaxis jubararia</u> Hlst.	F, H	11	slight increase
<u>Trirhabda pilosa</u> Blake	Sagebrush	2	decrease
<u>Zale d. largera</u> Sm.	Pl	2	unchanged
<u>Zeiraphera fortunana</u> Kft.	Se	0	decrease
<u>Zelleria haimbachi</u> Busck	Py, Pl	8	decrease

#### STATUS OF FOREST DISEASES

##### Important Diseases

##### Pine Twist Rust

Negative results were obtained from a search for pine twist rust caused by Melampsora pinitorqua Rostr. White poplar, Populus alba L. and trembling aspen, Populus tremuloides Michx. were spot-checked throughout the District.

An intensive examination of white poplar trees was possible due to its limited distribution, mainly on private property in the Thompson Valley. A few trees were found as far north as Avola in the North Thompson Valley. Single or groups of white poplar totalling 896 trees plus numerous "suckers" were recorded at 113 locations. One or more trees at each of 80 locations were examined.

Owing to the abundance of trembling aspen in the District it was only possible to examine a small percentage of trees. However, numerous trees were examined while carrying out other duties. In one instance, while assisting S. F. Condrashoff in aspen leaf miner plot work, approximately 35,000 aspen leaves were examined between July 4 and 7.

##### Needle Cast on Ponderosa Pine

Infections of a ponderosa pine needle cast caused by Elytroderma deformans (Weir) Darker, were light throughout the Central Kamloops district with the exception of the Kamloops area. On Dufferin Hill, west of Kam-

loops, the foliage of numerous immature ponderosa pine appeared in very poor condition in the spring of 1961. The heavy foliage discoloration gradually disappeared as the growth of the 1961 foliage progressed and the dead needles shed. A few trees, however, died.

Two plots established in 1960 at Lower Nicola and Kamloops were examined on August 8, 1961. At Lower Nicola, the foliage infection varied from 20 to 100 per cent and averaged 63 per cent as compared with 58 per cent in 1960. Of 33 pines examined, 100 per cent had brooms or deformed branches compared with 80 per cent in 1960. At Kamloops, foliage infection varied from 10 to 100 per cent and averaged 65 compared with 55 in 1960. Of 71 pine trees examined, 99 per cent had brooms and dead branches compared with 45 per cent in 1960. Table 12 shows the number of trees in each category.

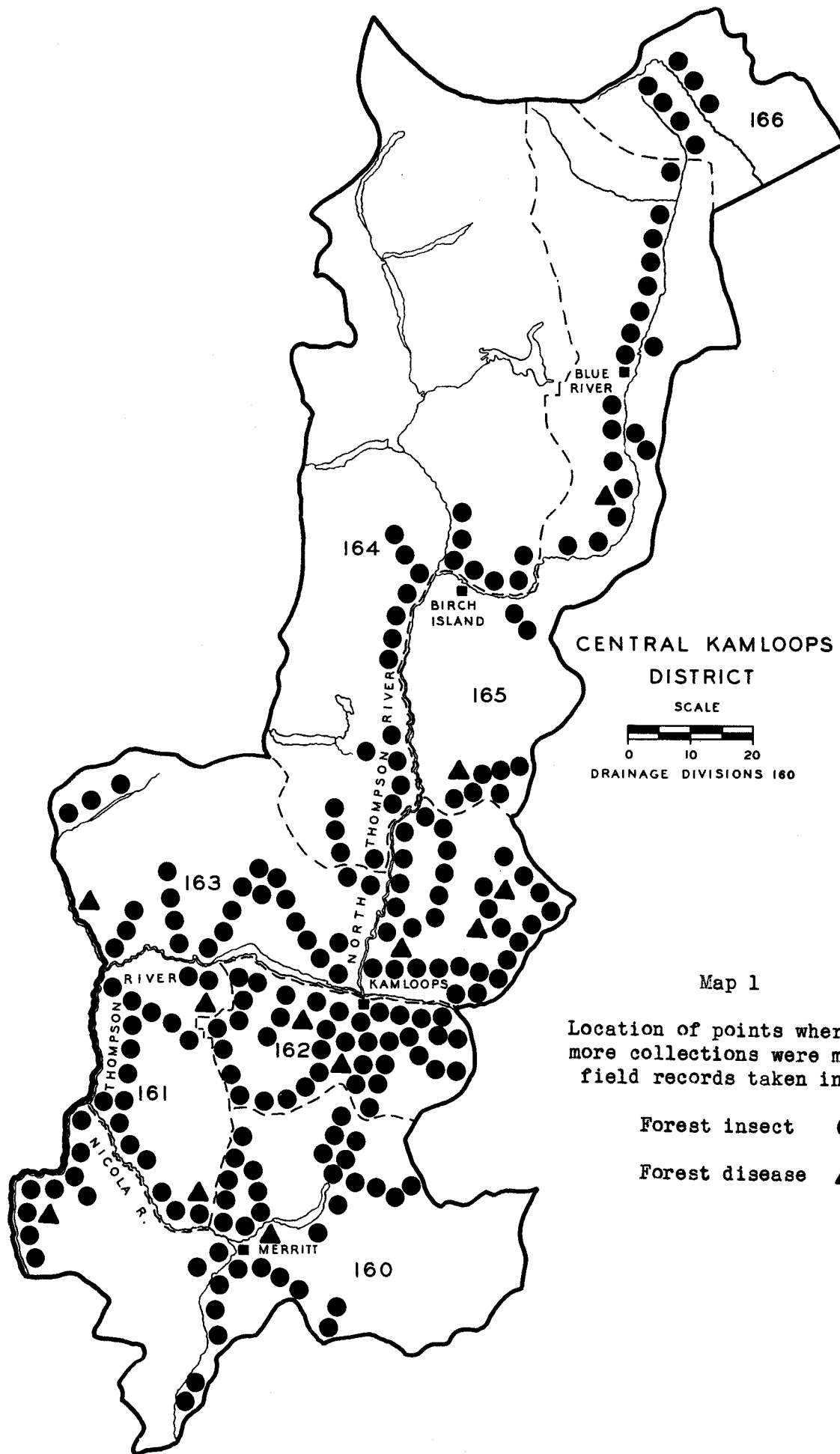
Table 12

Needle Cast Damage on Ponderosa Pine in Two Plots, Central Kamloops District, 1960 and 1961

Est. percentage foliage infection	No. of trees			
	Lower Nicola		Kamloops	
	1960	1961	1960	1961
0	0	0	1	0
10	1	0	7	1
20	2	2	7	5
30	2	1	6	5
40	6	2	11	5
50	5	8	6	8
60	4	6	7	11
70	4	4	4	9
80	5	5	4	9
90	1	1	8	4
100	3	4	10	14
Totals	33	33	71	71
Av. per cent infection	58	63	55	65

Injury to Babylon Weeping Willow

In June and July 1960, numerous dead and damaged Babylon weeping willow, *Salix babylonica* L. were noted in the District. The cause of the injury was thought to be a combination of a disease pathogen and severe frosts. The 1960 damage was not visible in the summer of 1961 since the trees were on private property and most dead trees and dead branches had been removed. No new damage was observed in 1961.

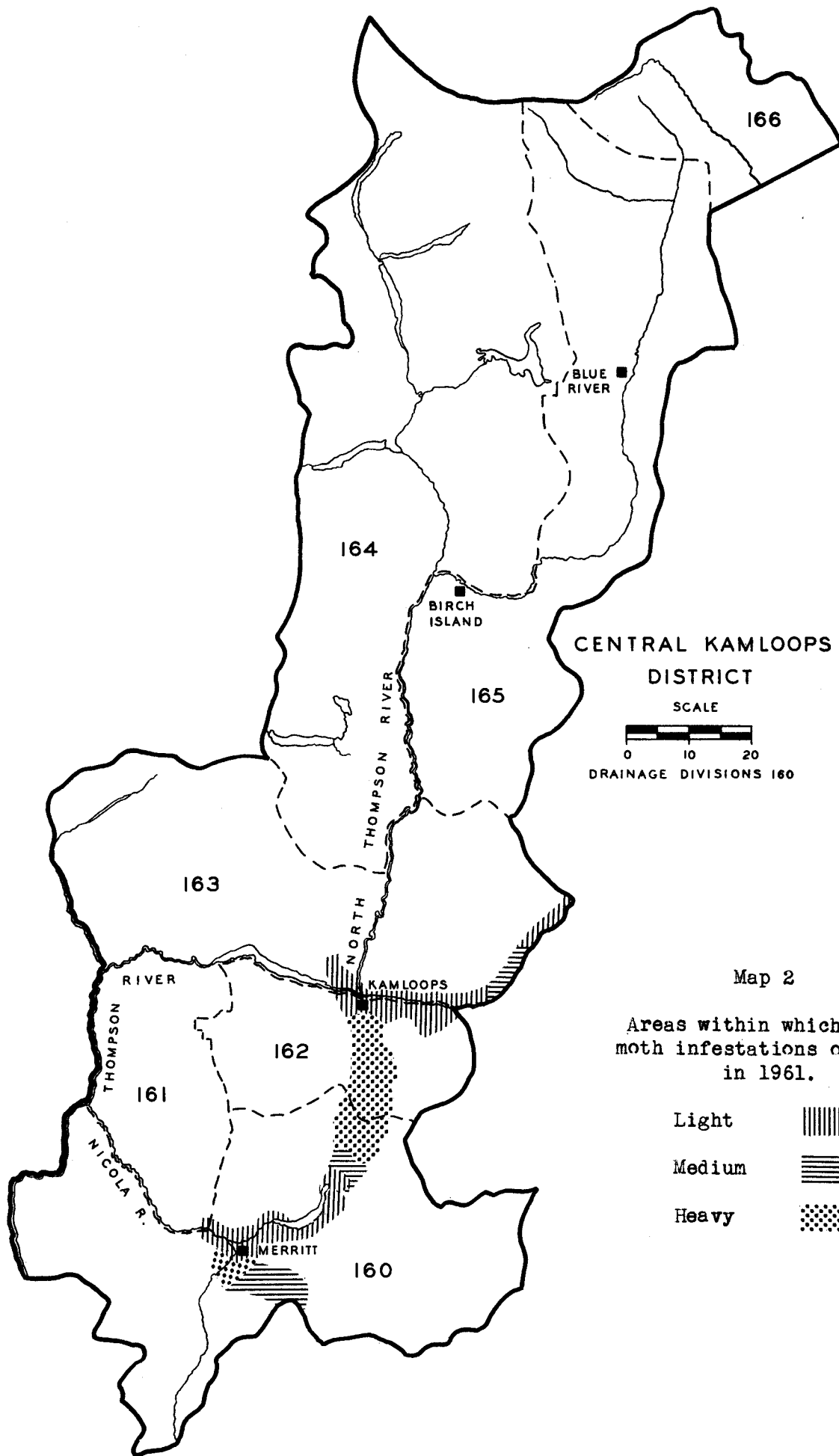


CENTRAL KAMLOOPS  
DISTRICT  
SCALE  
0 10 20  
DRAINAGE DIVISIONS 160

Map 1

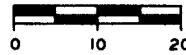
Location of points where one or more collections were made and field records taken in 1961.

- Forest insect ●
- Forest disease ▲



CENTRAL KAMLOOPS DISTRICT




SCALE



DRAINAGE DIVISIONS 160

Map 2

Areas within which satin moth infestations occurred in 1961.

- Light 
- Medium 
- Heavy 

FOREST INSECT AND DISEASE SURVEY

WEST KAMLOOPS DISTRICT

1961

FOREST INSECT AND DISEASE SURVEY

WEST KAMLOOPS DISTRICT

1961

T. A. D. Woods

INTRODUCTION

Field work in 1961 began on April 10, with a trip to Lac la Hache to gather information on mortality of overwintering broods of the Douglas-fir beetle. A considerable portion of the field season was devoted to the survey of the Douglas-fir bark beetle. A total of eight hours flying time was used on a tree damage appraisal. Field work ended on October 13 after a trip to the Farwell Creek area.

A total of 337 insect and 12 forest disease collections were taken between May 16 and October 5. Table 1 shows the collections by hosts and Map 1 shows the location where one or more collections and field records were taken in 1961.

Table 1

Collections by Hosts,

West Kamloops District, 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	5	-	Alder spp.	5	1
Douglas fir	111	2	Aspen, trembling	10	2
Fir, alpine	6	-	Birch, spp.	5	-
Hemlock, western	1	-	Cherry, choke	2	-
Juniper, common	3	-	Cottonwood, black	2	1
Juniper, Rocky Mtn.	11	-	Poplar, Lombardy	4	-
Pine, lodgepole	60	1	Willow spp.	18	1
Pine, ponderosa	21	-	Miscellaneous	10	3
Spruce, Engelmann	63	1			
			Total	56	8
Total	281	4	Grand total	337	12

## STATUS OF INSECTS

### Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Investigations of the Douglas-fir beetle in the West Kamloops District were similar to those carried out in 1960. The following is a resumé of the procedures used to ascertain the beetle's presence and activity.

Aerial survey of the District was limited in 1961 and only three flights totalling eight hours were made. The total number of trees killed in 1958-1960 as determined by the Annual Damage Appraisal, was less than in the previous three-year period 1957-1959.

The six 48-acre strip plots that were established at Lac la Hache in 1959 were cruised in August, 1961.

For the sixth consecutive year brood mortality studies were carried out in mid-April.

Foliage colour change studies were continued and a new plot was established at Lac la Hache. A new method of inducing attacks in standing healthy trees was tried. Instead of felling a trap tree, caged beetles were used to induce an attack.

### Tree damage appraisal survey

The total number of trees killed in 1958-1960 as determined by the 1961 survey was approximately 50 per cent lower than the figure for the period 1957-1959 as reported in 1960 (Table 2).

The reduced total in 1961 may be attributed in part to three factors which adversely affected detection: (1) because of the hot dry season in 1958, many trees killed that year dropped their foliage before 1961 and could not be detected, although normally they would have been included in the 1961 counts of red trees; (2) smoke haze seriously reduced visibility for both ground and aerial surveys; and (3) flying time was reduced and not all the District could be covered. The flying for the damage appraisal had to be completed by September 15, as later it would have been difficult to distinguish between the 1960 and 1961 attacked trees.

Table 2 is based on all available counts of Douglas-fir trees with red foliage. These were presumed to have been killed during six overlapping three-year periods from 1953 to 1960 inclusive.

The total volume killed is based on figures developed from measurements of representative trees in areas of heavy beetle attack. Seven volume figures ranging from 50 to 75 cubic feet per tree were used.



Table 2

Number and Volume of Douglas-fir Trees Killed by Douglas-fir Beetles by Three-year Periods as Determined in 1956 to 1961 Inclusive, West Kamloops District

Period	Year of survey	No. of trees killed	Volume (cu. ft.)
1953 - 1955	1956	8,800	602,800
1954 - 1956	1957	5,990	410,300
1955 - 1957	1958	11,980	820,600
1956 - 1958	1959	15,590	1,067,900
1957 - 1959	1960	28,970	1,968,200
1958 - 1960	1961	14,062	952,073

#### Strip plots

The six Douglas-fir tree mortality strips established in the Lac la Hache area in 1959, were cruised August 15 to 17, 1961. The purpose of these strips is to obtain information on bark beetle population fluctuations based on the number of trees attacked in a given area, and to record data on colour change of infested trees. The strips also serve as ground check areas for aerial surveys.

One plot, believed to have been logged and therefore not cruised in 1960, was located and cruised in 1961; adjustment was made for the five trees killed on this plot in 1960. Previous to 1961 all attacked trees were assumed to have died the same year, but it was evident from this year's cruise that some of the lightly attacked trees had survived. Therefore adjustments to take the survivors into account will make a difference in each year's table. An example is the nine 1959-attacked trees that survived a light attack. This will lower the total number of trees killed in 1959 from 36 to 27 and will change the number of trees killed per acre for that year from 0.13 to 0.09. Forty-five of the 46 currently infested trees found in 1961 were located on the strips at stations 2, 5 and 13 situated west of Lac la Hache.

Cruise figures for the last three years show that stand depletion due to bark beetle attack in the six strip plots averaged .09 trees per acre in 1959, .03 trees in 1960, and .16 trees in 1961. An average of 10.3 cubic feet of timber per acre was destroyed in 1961.

#### Winter mortality of beetle broods

For the sixth consecutive year, a study of overwintering beetle broods to determine mortality of teneral adults caused by weather, was conducted in April, 1961. The three localities were the same as were sampled in 1960; 100 Mile House, Lac la Hache and Williams Lake.

Four trees at each point were felled and samples taken at 10-foot intervals from the stump up the bole until no further attacks were found. Samples of four 6 x 24 inch pieces of bark, one from each cardinal direction were examined and the number of dead teneral adults recorded. Table 3 gives the annual brood mortality for five locations from 1956 to 1961.

Table 3

Percentage Mortality of Overwintering Douglas-fir Beetle  
Broods, West Kamloops, 1956 to 1961

Location	1956	1957	1958	1959	1960	1961
Place Lake	-	51.6	12.3	-	-	-
Enterprise	-	-	-	8.8	-	-
Lac la Hache	93.4	23.9	7.8	14.4	27.2	11.8
100 Mile House	-	-	-	-	40.3	34.7
Williams Lake	67.0	-	-	-	31.6	9.2
Average	85.0	37.7	10.5	11.7	33.5	13.2

#### Foliage colour change

As 1961 was the first year that information on the colour change pattern was recorded by new personnel, a summary of conditions from 1959 to 1961 follows:

A plot composed of 10 currently infested trees was set up at Soda Creek on October 10, 1959. Eight trees were normal green, two others were fading and one of the latter had lost 20 per cent of its foliage. When this plot was examined in 1961 some of the tags had been destroyed so that only seven trees remained on which to make observations. In September 1961 there were four green trees, of which three had sustained a partial 1961 attack; the other three were red and foliage loss ranged from 20 to 100 per cent. In September 1960, a plot containing six currently attacked trees was established at Clinton. At that time there were five green trees with 10 to 20 per cent of their foliage lost and one red tree with 60 per cent needle drop. When the plot was examined on October 4, 1961, all trees were red and all but one had lost between 70 and 100 per cent of their foliage.

A new plot of 10 trees was set up at Lac la Hache in 1961. Six of the trees on this plot were known to have been attacked between May 18 and June 2, 1961. The other four were attacked sometime between June 2 and 31. By August 18, four had faded and had lost two to 10 per cent of their foliage. On October 3, two trees were red and four had faded. The

other four trees were still normal green. Needle loss on the red and fading trees was between five and 10 per cent.

A new method of inducing attacks in standing trees, for the purpose of colour change studies, was tried at Lac la Hache. Beetles were collected in early May, sexed, and the virgin females were caged on the trees. The caging of the beetles was done by Dr. L. McMullen and his staff on May 25, 1961. Ten trees between 18 and 31 inches d.b.h. were selected, six of which had 20 beetles under four wire screen cages attached to their stems. The other four trees had 40 females caged under eight screens. When the trees were examined on June 1, all but one had been attacked by the caged females. An attack outside the cages had occurred on one tree. By June 23 two more trees had been lightly attacked. On July 31, another tree was found attacked and all trees were still green. When the final examination was made on October 3, the first tree that had been infested had turned red and lost 15 per cent of its foliage. The other three trees were still green with no needle drop apparent. The beetles that had attacked these trees may have been drowned out.

This system of inducing attacks will be used again in 1962. The advantage of this technique is that specific areas can be picked for study therefore eliminating the possibility of losing the plot because of logging. The only problem so far encountered is one of exposure. The caged beetles on the south and west sides of the trees will have to be given some protection as many died from direct sunlight. Also some deaths resulted from predation by ants.

Foliage of 1960-attacked trees was red by mid June 1961. Generally throughout the District foliage of 1961-attacked trees was fading by the end of July. The dry hot weather of 1961 will probably have the same effect as that caused by similar conditions in 1958, when most of the beetle-killed trees lost their foliage in two years instead of three.

#### Bark Beetles in Ponderosa Pine, Dendroctonus spp.

A group of 30 ponderosa pine trees attacked by bark beetles was found on July 19, 1961 at Fly Creek, 12 miles east of 70 Mile House. From the appearance of the bark and foliage it was assumed they had been killed over the past three years. No new attacks were recorded at that time. Upon further examination of the stand on October 4, thirty-three 1961-attacked trees were marked. The diameter range was 12 to 33 inches. Three of these trees had sustained a partial attack in 1960. Ten were just starting to fade and the others were either red or turning sorrel.

A double attack by the mountain pine beetle Dendroctonus monticolae Hopk. was indicated as some trees contained large larvae and teneral adults; others had short galleries and small larvae present.

One tree found in October had only boring dust to indicate an attack.

When some of the bark was stripped away, beetles tentatively identified as D. brevicomis Lec. were found still working through the bast. Other pairs, believed to be Ips emarginatus (Lec.) had only two to three inch galleries started. The red turpentine beetle Dendroctonus valens Lec. was also collected from the root collars of a few trees.

In the Clinton area, scattered ponderosa pine infested by bark beetles in 1961 were fading by October. As no mountain pine beetle activity has been reported in this area in the past two years, it is assumed the population is increasing. In two cases, right-of-way clearing was presumably the cause of attacks on two trees. The felled trees dried out too fast to be attractive, but adjacent trees had been attacked.

#### Engraver Beetles in Lodgepole Pine, Ips sp.

Adult beetles tentatively identified as the Oregon pine engraver Ips oregoni (Eichh.) were taken from fallen and standing lodgepole pine east of 150 Mile House. The area had been selectively logged for both pine and Douglas fir. Some of the standing trees had been damaged by logging equipment. Of 10 standing trees examined, three were heavily attacked as were five of the 10 fallen trees.

Other collections of Ips sp. poss. oregoni were taken from lodgepole pine at Bosk and Meadow lakes.

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

Seven random sample plots were set up in 1960 at representative points throughout the former infestation area around Lillooet. These were examined on August 9, 1961 and no trace of either the budworm or its damage was found. In other parts of the District, spruce budworm larvae were taken in six Douglas-fir, five spruce and five lodgepole pine collections. Sampled areas for the above tree species were Cache Creek-Lytton, Williams Lake-Horsefly and east of Lac la Hache respectively. The average of one larva per collection was low compared with former years.

#### Douglas-fir Tussock Moth, Orgyia pseudotsugata (McD.)

With the increase in tussock moth populations in other districts, a close check was made to see if any past infestations had recrudesced. No larvae were found at any of these localities.

A light population was found at Mile 10 on the Texas Creek road, south of Lillooet where twenty-five larvae were taken in a standard three-tree sample. As a further check, one extra Douglas-fir was sampled and 14 more larvae were collected. No defoliation was visible in August when the spot was re-examined.

The tussock moth was taken in only one other sample. A single larva was collected from Douglas fir six miles north of the Fountain Valley turn-off.

Wood Borers, Monochamus spp.

A one-quarter-acre plot was established in a stand of fire-damaged Douglas fir, lodgepole and ponderosa pine to determine the incidence of attack by wood-boring Cerambycids. The plot was located six miles south west of Clinton, in the "Lan" fire which burned from June 18 until July 20, covering 3,544 acres. The area had been selectively logged with Douglas fir, the predominant species, and the two pines composing about 15 per cent of the stand.

The fire had not severely damaged the thick barked Douglas fir which may account for the light attack on this tree species. The greatest number of attacks by Monochamus oregonensis Lec.? on the nine attacked Douglas fir was eight per tree on the lowest six feet of the stem. The four lodgepole pine had from 51 to 123 attacks per tree for the same six foot area. Both M. oregonensis and M. maculosus Hald. are suspected of attacking this tree species. Outside the plot, ponderosa pine were attacked by a wood borer possibly M. maculosus. In every instance the wood borer larvae had penetrated approximately one inch into the wood by September 14, 1961.

Black-headed Budworm, Acleris variana (Fern.)

Only two black-headed budworm pupae from Douglas fir and one larva from alpine fir were collected in 1961. The widely scattered sample points were Kelly Lake, Lone Butte and Bosk Lake. Only two larvae were collected in 1960.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

This looper was collected only from Douglas fir in 1961. Single larvae were taken in five samples in the Williams Lake area. None were collected in the Quesnel Lake region.

False Hemlock Looper, Nepytia canosaria Wlk.?

Nineteen larvae were taken in six Douglas-fir collections in 1961. In 1960 only three collections contained this pest. The areas where samples were made in the two years differed only slightly: Cache Creek and Botanie Valley for the 1961 collections; Ashcroft and Lillooet for the 1960 samples.

Saddle-backed Looper, Ectropis crepuscularia Schiff.

Seven larvae were taken in three deciduous host collections made in

the Horsefly area. No larvae were collected in the Quesnel Lake area in 1960 or 1961. An average of 3.5 larvae per collection was obtained from western red cedar in 1959.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

No great change in this miner's population occurred in 1961. A few changes were noted in specific areas. At Williams Lake 24 to 28 per cent of the trembling aspen leaves were infested in 1959 and 1960, compared with 97 per cent in 1961. Lac la Hache also had an increase from 65 per cent in 1960, to 100 per cent in 1961. Less than five per cent of the leaves were mined in 1959 and 1960 in the Chilcotin region at Alexis Creek. Eighty-five per cent of the leaves at Riske Creek were infested in 1961.

The four sample plots established in 1959 were not used in 1961, but the 1961 figures are still comparative as the four new plots are located in the same general areas. The leaves of two branches from each of five trees per plot were examined. Table 4 compares the number of leaves containing mines and number of adults produced per leaf surface for 1959 through 1961.

Table 4

Aspen Leaf Surfaces Mined and Number of Adults Produced per Leaf Surface, West Kamloops District, 1959 - 1961

Location	Percentage leaf surfaces with mines			No. adults produced per leaf surface		
	1959	1960	1961	1959	1960	1961
Cache Creek	21	21	37	0.01	0.06	0.05
Clinton	24	17	13	0.02	0.01	0.01
Williams Lake	16	16	89	0.03	0.02	0.16
Soda Creek	28	68	83	0.03	0.21	0.05

Table 5 shows the results of examinations of a 100 cocoon sample per plot. The percentage mortality from parasites and other causes is compared for the years 1959 to 1961.

Table 5

Mortality of Aspen Leaf Miners in 100-cocoon Samples, West Kamloops District, 1959 - 1961

Location	Percentage mortality in cocoon stage					
	Parasites			Other causes		
	1959	1960	1961	1959	1960	1961
Cache Creek	19	22	40	65	47	13
Clinton	14	16	47	64	38	19
Williams Lake	0	19	29	69	51	9
Soda Creek	4	39	54	68	34	4

Jack Pine Needle Miner, Zelleria haimbachi Busck

In both 1959 and 1960, the number of miners present in ponderosa pine samples was very low. The same holds true for 1961, as larvae were only taken in hand picked collections and were not readily found. Twenty-five tips from each of four trees were examined to determine the percentage mined. Table 6 indicates the scarcity of miners in the southern portion of the West Kamloops District.

Table 6

Ponderosa Pine Tips Mined by the Jack Pine Needle Miner, West Kamloops District, June, 1961

Locality	Percentage tips mined
Mile 3 Botanie Creek Road	0
5 miles northwest Lytton	1
9 miles west Lytton	5
Venables Valley	1
Mile 2 Lower Hat Creek Road	1

Spotless Fall Webworm, Hyphantria cunea Drury.

During 1961 the spotless fall webworm was found only in the Fraser Canyon, specifically near Lillooet. The occasional tent was found throughout this region with the highest numbers located on the Texas Creek road and on the east bank of the Fraser River south of Lillooet.

This insect was last reported active north of Williams Lake and near Lillooet in 1958.

Total and average number of webs per mile appear in Table 7.

Table 7

Spotless Fall Webworm Tent Counts, West Kamloops District,  
August 9, 1961

Host	No. webs per mile							Average
	1-2	2-3	3-4	4-5	5-6	6-7	7-8	
<u>Texas Creek</u>								
Birch	-	-	3	0	0	1	5	1.8
Black cottonwood	-	-	2	0	2	1	1	1.2
Choke cherry	-	-	0	2	1	1	3	1.4
Domestic apple	-	-	0	0	12	2	0	2.8
Saskatoon	-	-	0	4	1	0	0	1.0
Willow	-	-	1	8	0	0	0	1.8
<b>Totals</b>			6	14	16	5	9	10.0
<u>Lillooet</u>								
Trembling aspen	0	1	0	0	0	-	-	0.2
Black cottonwood	2	0	0	0	1	-	-	0.6
Choke cherry	0	1	0	0	13	-	-	2.8
Saskatoon	0	1	0	0	0	-	-	0.2
<b>Totals</b>	2	3	0	0				3.8

The Poplar Borer, Saperda calcarata Say

Immature trembling aspens at four localities have been lightly attacked by the poplar borer. Only a few scattered trees at Williams Lake, 158 Mile House, and four miles north of Clinton, were attacked.

Attacks by the beetle caused damage to a small grove of trees near Wright Station at the north end of Lac la Hache. All identifications were based on larvae.

Wood Borers in Black Cottonwood

Examination of a black cottonwood tree on October 4, 1961 revealed an attack of two types of wood borers. The tree was growing beside an old irrigation canal located on the Bonaparte Indian Reserve, about three miles



northwest of Cache Creek. Its foliage was yellow and the entire tree appeared unthrifty as if drought damaged.

The first indication that it was not dying as a result of drought was the masses of sawdust sticking to the stem. A cerambycid borer thought to be Saperda calcarata Say was found. In the one 10-foot log taken from the tree, seven larvæ were extracted. When some of the branches were examined, spiral galleries of a buprestid, probably Agrilus anxius Gory, were found. No specimens were recovered, but the damage was characteristic of this beetle.

Spruce Gall Aphid, Adelges cooleyi (Gill.)

The following sampling method was used for spruce gall aphid. Twenty-five tips from each of four Engelmann spruce were examined and percentage infested recorded. Occurrence on Douglas fir was estimated as light, medium or heavy. This also was determined by examining four trees. Table 8 shows the locality and the percentage spruce tips infested by the aphid as well as occurrence on its alternate host, Douglas fir.

Table 8

Engelmann Spruce Tips Infested and Occurrence on Douglas fir of the Spruce Gall Aphid, West Kamloops District, 1961

Location	Percentage tips infested	Incidence on Douglas fir
Soda Creek	23	nil
Quesnel Lake	28	light
Riske Creek	10	nil
Fish Creek	11	nil
Lac la Hache	24	light
Sheridan Lake	18	light
Twall Creek	25	light
Average	20	

A Leaf Roller on Birch, Allononyma vicarialis Zell.

Two infestations, each covering five acres, were reported at Oregon Jack Creek and north of Cache Creek in 1960. No larvæ were collected in these areas in 1961.

A new area where this leaf roller was active in 1961, was along a one half mile section of creek bottom in Venables Valley. Young birch bushes had 10 per cent of their leaves skeletonized.

Douglas-fir Needle Miners, Contarinia spp.

A light population of Douglas-fir needle miners persisted throughout the range of Douglas fir in the District. C. cuniculator Cond., not recorded as having been found in the District before, was collected at Texas Creek and on the Bridge River Road near Apple Spring Creek.

Poplar Leaf Beetles, Pachybrachys spp.

In 1960, Lombardy poplar and black cottonwood trees around Spences Bridge were defoliated by a leaf beetle, Pachybrachys probably liebecki Fall. The same location was examined on May 24, 1961. The beetle population was lower than in 1960, and defoliation was confined to the sucker growth at the base of big trees of both species. A second species of chrysomelid, Pachybrachys sp. was also collected.

A Sawfly, Kyela sp.

Two plots established in ponderosa pine stands were examined late in May, 1961. Damage was light. Only 25 per cent of the flowers at the plot west of Lytton were damaged. At Venables Valley the infestation was even lighter with only 11 per cent of the flowers infested.

Mourning Cloak Butterfly, Nymphalis antiopa (Linn.)

Total defoliation of ten willow bushes was caused by larvae of this butterfly at Mile 107-108 Cariboo Highway. The damage was not noticed until late in the season. Identification was made from cast larval skins.

MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
<u>Caripeta aequaliaria</u> Grt.	P1	1	150 Mile House; not collected in 1960
<u>C. angustiorata</u> Wlk.	P1	3	no change
<u>C. divisata</u> Wlk.	F, P1	11	increase
<u>Dioryctria pseudotsugella</u> Munroe	F	2	decrease
<u>Eucordylea atrupictella</u> Dietz	F	3	83 Mile House Clinton; not collected in 1961

Insect	Host	No. of collections	Remarks
<u>Eupithecia annulata</u> Hlst.	F, Se	6	no change
<u>E. filmata</u> Pears.	Se	1	decrease
<u>Feralia comstocki</u> Grt.	F, Se	10	increase
<u>F. jocosu</u> Gn.	F, Se	6	increase
<u>Griselda radicana</u> Wlshm.	F	2	decrease
<u>Hypagyrtis piniata</u> Pack.	Pl	4	Williams Lake, Eagan Lake, 100 Mile House, Jesmond
<u>Melanolophia imitata</u> Wlk.	F	7	no change
<u>Neodiprion</u> sp.	F	30	increase
<u>Neodiprion</u> sp.	Pl	17	general
<u>Neodiprion</u> sp.	Se	21	increase
<u>Nyctobia limitaria</u> Wlk.	Ba, F, Se	8	increase
<u>Panthea portlandia</u> Grt.?	F, Pl, Se	10	increase
<u>Pero behrensarius</u> Pack.	F	9	increase
<u>Pikonema alaskensis</u> Roh.	Se	18	increase
<u>P. dimmockii</u> Cress.	Se	30	increase
<u>Protoboarmia porcelaria</u> <u>indicataria</u> Wlk.	F	5	Williams Lake; limited in distribution
<u>Semiothisa granitata</u> Gn.	F, Pl, Se	42	increase
<u>Semiothisa</u> n. sp.	Pl	5	Williams Lake, 70 Mile House; new species distribution records
<u>Zale duplicata largera</u> Sm.	Pl	6	increase
<u>Zeiraphera pseudotsugana</u> Kft.	F	2	Beaver Lake, Spout Lake; uncommon

STATUS OF FOREST DISEASES

Important Diseases

A Needle Cast of Ponderosa Pine

Two plots were established in 1960 to follow the trend of damage to ponderosa pine caused by Elytroderma deformans (Weir)Darker. In 1960, at the Lower Hat Creek plot, 24 per cent of the 1959 growth had some degree of infection, while in 1961 in the same plots, 38 per cent of the 1960 growth had been infected. At the Clinton plot in 1960 and 1961, 51 and 45 per cent of the needles had been damaged.

EXOTIC PLANTATIONS

A portion of the 1200 scots pines, planted at Knife Creek (XP183) in the spring of 1960, were checked in September 1961. Conditions on XP183 were very good. Eighty per cent survival was recorded by the British Columbia Forest Service Research Division in the fall of 1960.

The seedlings in the plantations near Clinton were examined twice in 1961. Drought was the only cause of death to any plants. The survival rate in 1961 was 19 per cent and 11 per cent for XP113 and XP114 respectively.

Conditions of trees on Exotic Plantations at Clinton, 1959-1961 were as follows:

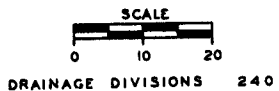
Plot No.	Tree species	No. seedlings planted, 1957	No. seedlings surviving			Percentage killed by drought		
			1959	1960	1961	1959	1960	1961
XP113	Scots pine	95	31	26	18	67	73	81
XP114	Red pine	95	22	17	10	76	82	89

OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Alder	<u>Taphrina occidentalis</u> Ray	Quesnel Lake	deformation of fruit
Aspen, trembling	<u>Melampsora albertensis</u> Arth.	Mile 134, Cariboo Hy.	needles and leaf rust

Host	Organism	Locality	Remarks
Cottonwood, black	<u>M. occidentalis</u> Jacks.	San Jose River	leaf rust
Pine, lodge- pole	<u>Elytroderma deformans</u> (Weir) Darker	Big Bar Lake Road	needle cast
Saskatoon	<u>Apiosporina collinsii</u> (Schw.) Hohn.	Texas Creek Road	witches' broom
Spruce, Engelmann	<u>Gymnosporangium clavipes</u> Cooke & Peck	Soda Creek	gall rust
Spruce Engelmann	<u>Chrysoomyxa arctostaphyli</u> Diet.	Soda Creek	rust causing witches' broom

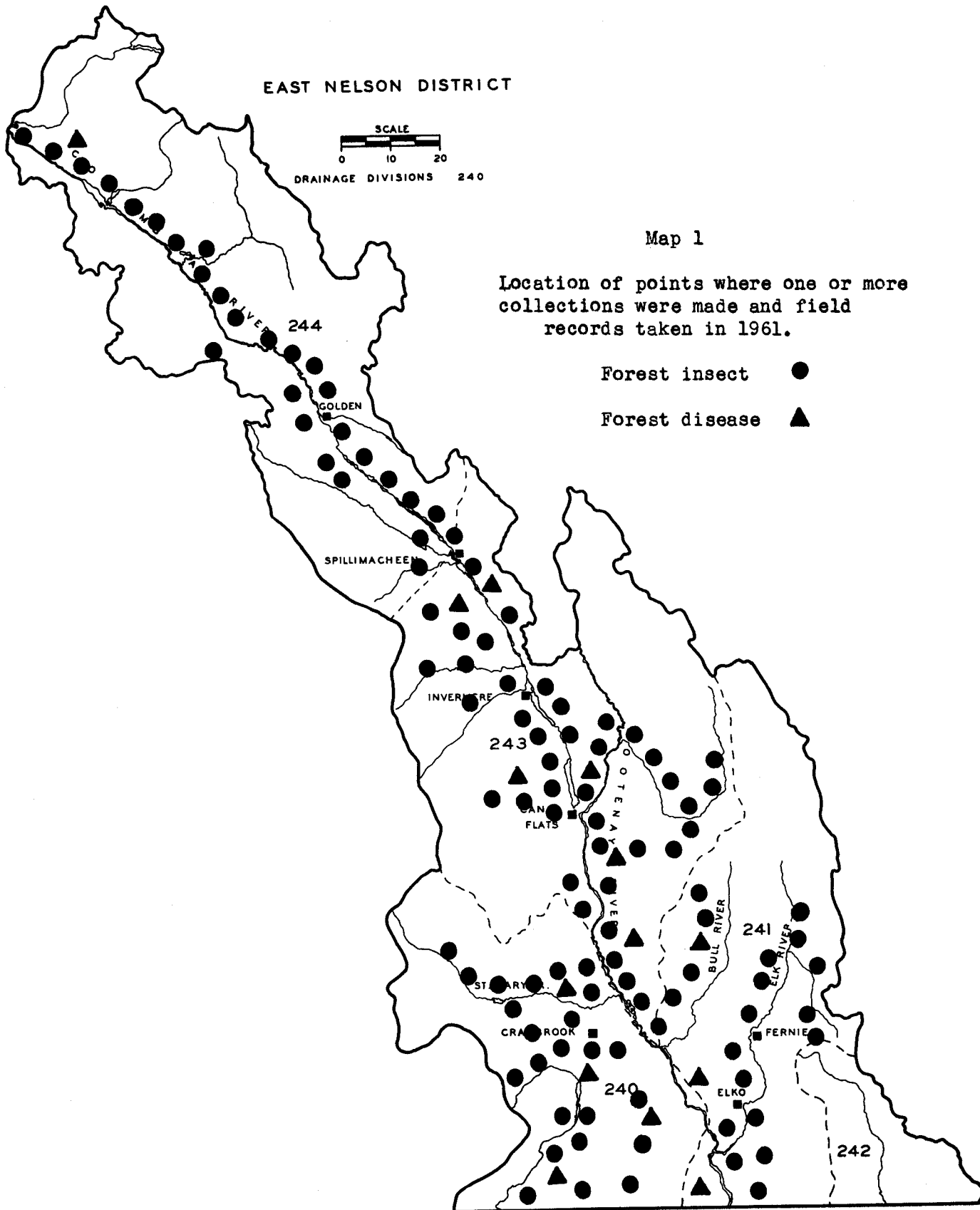
EAST NELSON DISTRICT



Map 1

Location of points where one or more collections were made and field records taken in 1961.

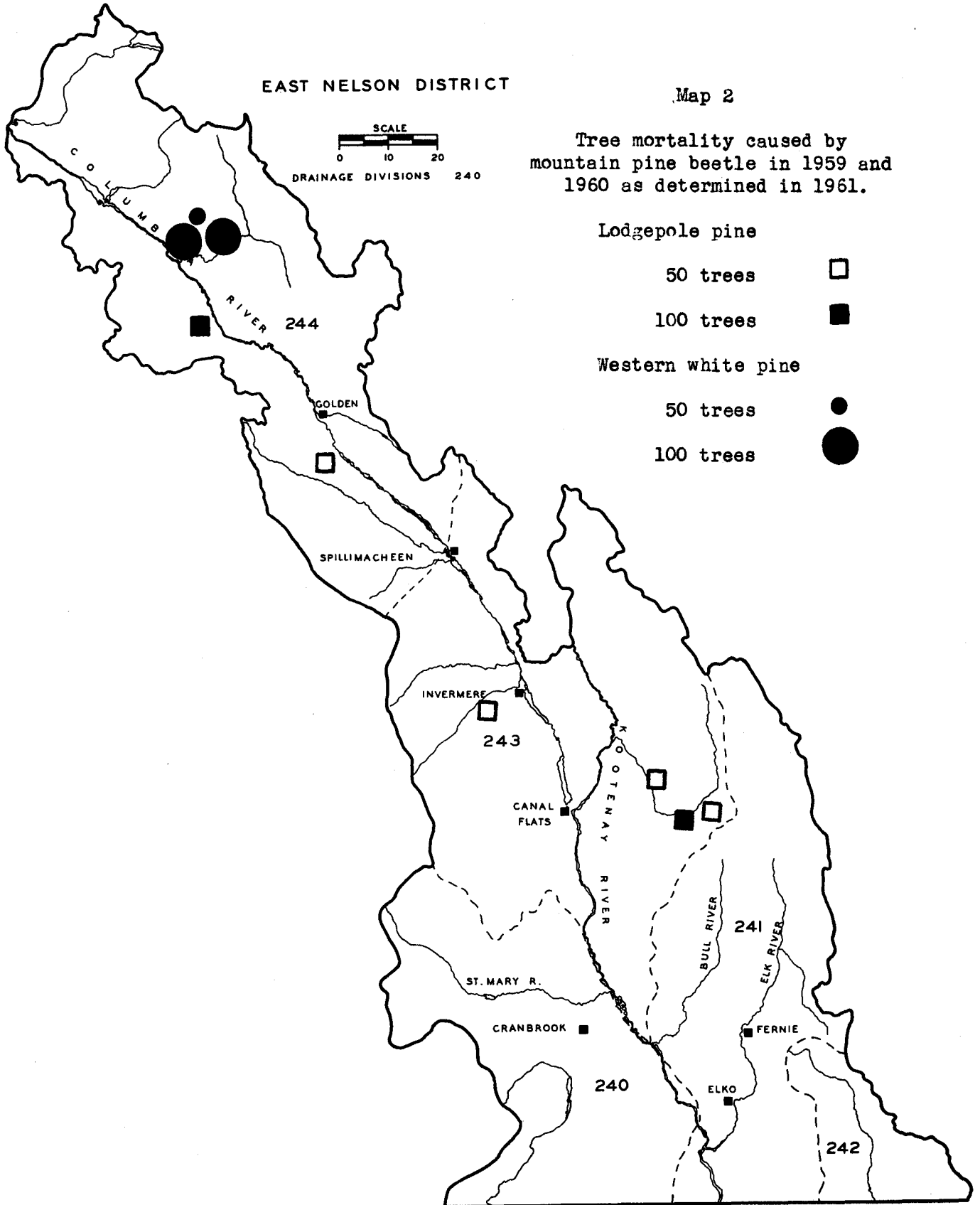
- Forest insect ●
- Forest disease ▲



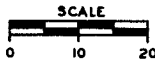
EAST NELSON DISTRICT

Map 2

Tree mortality caused by mountain pine beetle in 1959 and 1960 as determined in 1961.






EAST NELSON DISTRICT

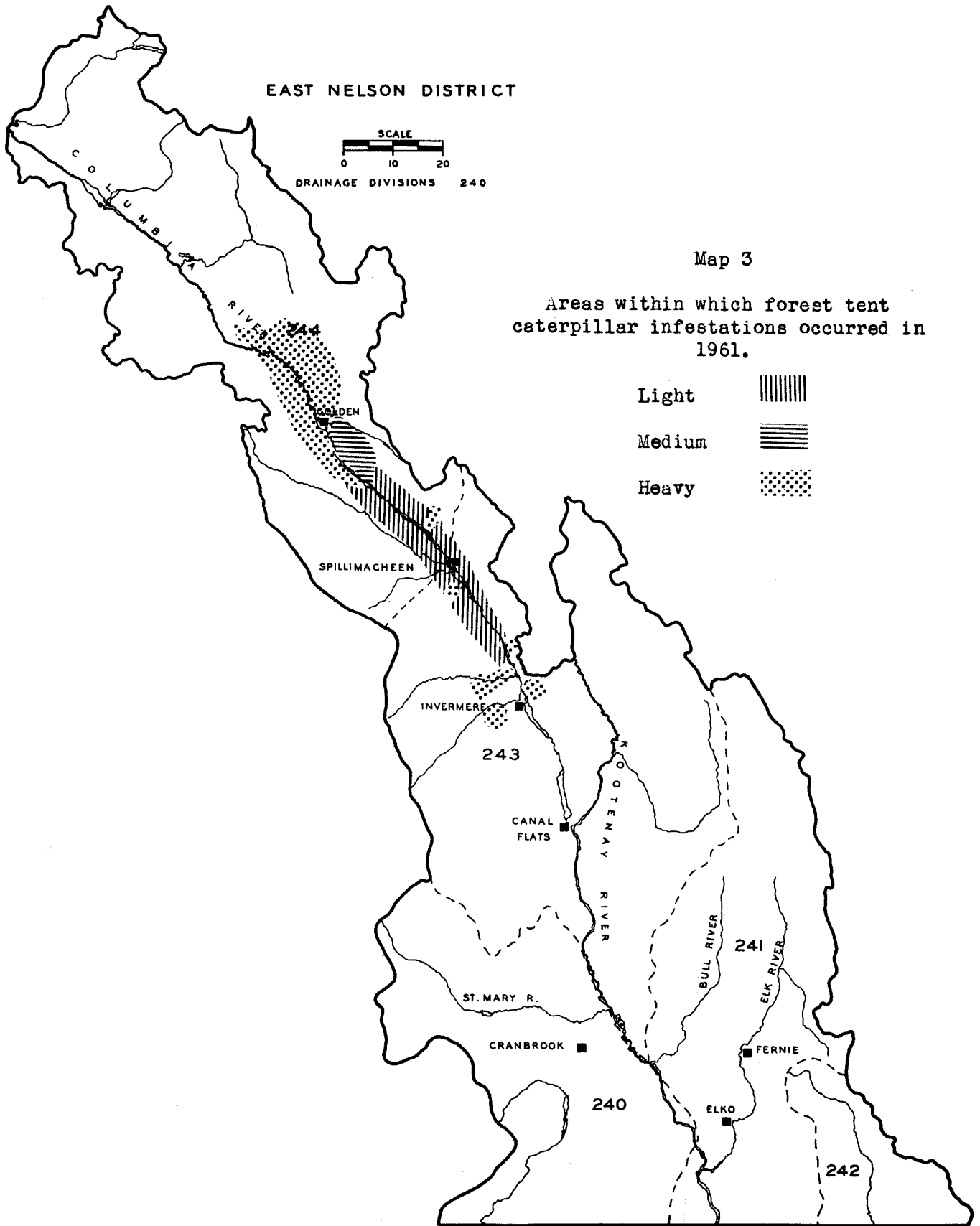


DRAINAGE DIVISIONS 240

Map 3

Areas within which forest tent caterpillar infestations occurred in 1961.

- Light 
- Medium 
- Heavy 





FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA

1961

PRINCE GEORGE FOREST DISTRICT

FOREST INSECT AND DISEASE SURVEY

NELSON FOREST DISTRICT

1961

D. W. Taylor

INTRODUCTION

The Nelson Forest District was surveyed in 1961 by three rangers: R. J. Andrews, R. O. Wood and D. W. Taylor. Their respective districts were East, Central and West Nelson. Fifty-eight permanent sample plots were established throughout the Nelson Forest District.

The mountain pine beetle was estimated to have killed a total of about 2,500 white pine trees in the Nelson Forest District in the past three years. In Central Nelson 2,200 widely scattered white pines were killed, while East Nelson had a total of 300. Mortality of lodgepole pines in the three districts totalled about 1,400 trees, the majority of which were in the Kettle River Valleys of West Nelson District and the Whiteswan Lake area in East Nelson.

Douglas-fir needle miner infestations seriously reduced the quality of Christmas trees in parts of the East Nelson District in 1961, curtailing the annual cut.

As in 1960, activity of the more important defoliators remained generally low, however the forest tent caterpillar caused varying amounts of damage to 500 square miles of aspen stands in the Columbia River drainage of the East Nelson District and, to a much lesser extent, to aspen stands near Warfield. The western tent caterpillar caused little damage to open bush hosts but its presence was noted over the whole Forest District.

Foliage diseases of conifers declined in 1961; Douglas-fir and larch needle cast infections were reduced in both extent and severity.

FOREST INSECT AND DISEASE SURVEY

WEST NELSON DISTRICT

1961

FOREST INSECT AND DISEASE SURVEY

WEST NELSON DISTRICT

1961

D. W. Taylor

INTRODUCTION

From May 30 to September 30, 34 insect and 14 disease collections were made by Survey personnel. Seventeen permanent sample plots were established in the District. Table 1 lists insect and disease collections by hosts. Map 1 gives the locations where one or more collections or field records were made.

Table 1

Collections by Hosts

West Nelson District, 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	16	-	Alder, mountain	8	1
Fir, Douglas	81	3	Alder, Sitka	-	-
Fir, alpine	18	-	Aspen, trembling	8	1
Fir, grand	8	1	Birch, western white	8	1
Hemlock, western	29	-	Cottonwood, black	10	-
Juniper, common	2	1	Elder, blueberry	1	-
Larch, western	23	-	Maple, Douglas	1	-
Pine, lodgepole	32	-	Willow spp.	10	-
Pine, western white	21	1	Miscellaneous	24	3
Pine, ponderosa	10	1			
Spruce, Engelmann	36	1			
			Total	70	6
Total	276	8	Grand total	346	14

## STATUS OF INSECTS

### Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The number of red Douglas-fir trees counted in 1961 was 249, or 729 less than in 1960. Normal activity i.e. populations in stumps and slash after logging remained in evidence throughout the District.

A trap tree programme was initiated by Boundary Sawmills at six points in the Windfall and Boundary Creek watersheds, where bark beetle attacks had occurred in 1960. The total number of trees felled was 340; they were cut in early May 1961. A detailed check of trap trees was made on September 21. It was found that large numbers of buprestids had infested the lower 60 feet of the trunk leaving little room for bark beetle work. Bark samples showed the tunnels to be at least three quarters of the way around the circumference of the tree. No samples were taken on the under side of the logs lying on the ground. In general bark beetles had attacked beyond the point 60 feet from the stump. The average number of tunnels per square foot among the trap logs at Windfall Creek was seven. Both parent and callow adults were found and the average number of callow adults found in three one-foot square samples of bark was 16. None of the above mentioned logs were to be treated in any way, as it was intended to remove them from the woods in the October logging period. A similar action was planned for trap logs laid out across the main valley in Boundary Creek where the logs yielded an average of six parent adults per square foot, and a few teneral. At all plots the presence of clerid predators and Coeloides parasites was commonly noted.

Observations at Windfall Creek on May 5 showed that 42 trees, attacked in 1960, ranged in appearance from "healthy green", through sorrel and red, to those with no needles remaining. Near Beaverdell Creek on September 22 two groups of Douglas firs, totalling 35 trees, were examined. One 12-inch d.b.h. tree had signs of 1961 attack but appeared to have been successful in pitching out the beetles. The remaining trees were red and had lost 10 per cent of their needles. Bark sampling and visual checks showed no current beetle activity on the stem of the remaining red trees. Table 2 shows by locality, region and compartment, the number of trees and volume killed by Douglas-fir beetles in the period 1958-1960 inclusive as determined in 1961.

Table 2

Number and Volume of Douglas-fir Trees Killed by Douglas-fir Beetles in the West Nelson District, 1958 to 1960 as Determined in 1961

Locality	Region	Compartment	No. of trees	Volume (cu.ft.)
Beaverdell Cr.	24	6	35	1,085
Beaverdell Cr.	24	6	16	496
Cuellete Cr.	24	1	25	1,000
Jewel Cr.	15	10	5	155
Jewel Lake	15	10	12	372
Wallace Cr.	15	10	11	792
Boundary Cr.	15	10	42	3,024
David Cr.	15	14	6	360
Blythe Cr.	15	12	17	1,020
Fiva Cr.	15	12	50	3,000
Phoenix	15	10	7	217
Hypolyte Cr.	15	10	15	465
July Cr.	15	3	8	248
Totals			249	12,234

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

As in 1959 and 1960, the major mountain pine beetle activity in lodgepole pine was centered around the Upper Kettle River and Boundary Creek. A total of 819 red trees was counted or estimated in a combined ground and aerial survey. Six lodgepole pines, infested in 1961, were found near Split Creek, Upper Kettle River, and three were seen near Wallace Creek, Boundary Creek area, indicating a probable continuance of the infestations in those areas.

Map 2 shows the location of the various groups of trees infested and the approximate number in each group.

Table 3 gives the locality, region and compartment, the number of red trees, and, allowing an average of 20 cubic feet of wood per tree, gives the volume lost to the stands.

Table 3

Number and Volume of Lodgepole Pine Trees Killed  
by Mountain Pine Beetles in the West Nelson District in 1960  
as Determined in 1961

Locality	Region	Comp- artment	No. of trees	Volume (cu.ft.)
Boundary Creek	15	10	11	363
Arlington Lakes	24	7	40	880
Damfino Creek	24	10	200	4,400
Mohr Creek	24	12	568	18,744
Totals			819	24,387

Forest Tent Caterpillar, Malacosoma disstria Hbn.

An infestation of the forest tent caterpillar was reported near Warfield in 1961. Two main areas of defoliation were situated a few hundred feet up the hillside from Milkbranch Creek and Tiger Creek. Each covered about 40 acres of trembling aspen and mountain alder trees. A third area of approximately 10 acres was on the side of Talus Hill northwest of Warfield. An analysis of data on forest tent caterpillar egg masses collected from three trembling aspen trees at Warfield September 7, 1961 is shown as follows:

Crown class	Crown length (ft.)	Total no. 1961 masses	Av. no. eggs in five masses	Percentage			
				Living larvae	Dead larvae	Undevel- oped eggs	Para- sitized eggs
Cod	24	31	160	78.1	1.2	12.5	8.2
Cod	30	33	148	73.9	1.2	8.5	16.3
D.	27	62	187	83.6	1.1	10.2	4.9
Average				78.9	1.2	10.4	9.4

Egg masses were also taken from a representative mountain alder in the stand. Egg studies revealed lower percentages of egg mortality than in those from aspens but it was noted that on the mountain alder there were only three 1961 egg masses whereas there were 11 older masses. It was also observed that the aspens had re-leaved to a much greater extent than the alders.

Western Tent Caterpillar, Malacosoma pluviale (Dyar)

Tents of this caterpillar were scattered over the District. Distribution notes were made at the following places: Mohr Creek, Red Mountain, Violin Lake Road, Sirdar and Wauchope Creek, Monashee. The insect was on the fringe of a heavy forest tent caterpillar infestation on the Violin Lake Road but no damage of any consequence was seen.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Aspen leaf miner infestations continued in 1961 in almost every area, however, it was possible in the eastern part of the District to find uninfested trees or groups of trees. Four plots were sampled using the usual 10 branches per plot. Table 4 gives a comparison of the percentage of leaf surfaces mined during the period 1959-1961 inclusive and also compares the number of adults produced per leaf surface. Table 5 shows mortality in the cocoon stage resulting from parasitism and other causes.

Table 4

Percentage of Aspen Leaf Surfaces Mined and Adult Aspen Leaf Miners Produced per Leaf Surface, West Nelson District, 1959 - 1961 Inclusive

Locality	Percentage of leaf surfaces with mines			No. of adults produced per leaf surface		
	1959	1960	1961	1959	1960	1961
Greenwood	43	56	17	0.14	0.18	0.85
Grand Forks	31	33	13	0.10	0.22	0.01
Phoenix	-	-	28	-	-	0.03
Crawford Creek	-	-	7	-	-	0.02

Table 5

Mortality of Aspen Leaf Miners in Cocoons in 100-cocoon Samples, West Nelson District, 1959-1961

Locality	Percentage mortality					
	Parasitism			Other Causes		
	1959	1960	1961	1959	1960	1961
Greenwood	3	1	8	4	9	6
Grand Forks	6	1	8	20	10	2
Phoenix	-	-	6	-	-	1
Crawford Creek	-	-	16	-	-	3



A Pine Shoot Borer, Euosma sonomana Kft.

This insect again caused flagging of ponderosa pine branches in the Cascade Station area of the Kettle Valley and on the north slopes near the Kettle River School. Damage was noticeable but not alarming.

Spotless Fall Webworm, Hyphantria cunea (Drury)

The fall webworm occurred in small numbers over the whole southern portion of the West Nelson District with intensive attacks being centered near Rock Creek, Grand Forks and Creston. Web counts were made along both sides of the road travelling in a moving vehicle. Webs were counted or observed on chokecherry, alder and domestic apple. The locality, length of sample strip, number of webs counted and number of webs per mile are shown as follows:

Locality	No. of miles	No. of webs	No. of webs per mile
Rock Creek-Westbridge	8	60	7.5
Grand Forks-Christina Lake	13	147	11.3
Creston-Sanca	4	59	14.8

These web-counts were made while the webs were still individuals. Later in the summer they fused to encompass whole bushes and local people stated that the resulting "envelopes" were much larger than in 1960. Webs were also observed at Needles and McRae Creek.

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

Twenty lodgepole pines near Eholt were heavily infested by this pitch moth. Pitch masses were distributed from ground level to 12 feet up the stems. The colour of the pitch masses was used to distinguish between 1960 and 1961 attacks. A one by five chain strip was laid out and all trees were tallied for damage. This plot was in a localized group of lodgepole pine trees containing 95 per cent lodgepole pine and five per cent Douglas fir. Elsewhere the stand was almost pure Douglas fir.

An analysis of the information gathered from the plot showed the following: average d.b.h. of trees, six inches; average d.b.h. of infested trees, nine inches; 26 per cent of 79 trees were infested, 15 per cent of the total number of trees were infested in 1961. The average number of attacks per tree in 1960 was six while the average number for 1961 was five. Observations indicated that a tree, once attacked, was favoured by succeeding generations. A forked tree of 16 inches d.b.h. had 50 attacks on or immediately above the root collar.

Yellow-necked Caterpillar, Datana ministra (Drury)

Although this insect was scarce in general beating collections, dispersal of larvae from birch hosts to other hosts in more shaded areas was noted near the ranger cabin at Christina Lake. The birch trees had been 95 per cent defoliated by mid July. This movement was also seen at Cascade Station, the hosts there being saskatoon bushes.

Unknown Birch Leaf Skeletonizer

Birch trees on a steep hillside near Genelle, on the east side of the Columbia River were observed, on September 7, to be completely brown. On September 14 the area was examined and found to occupy about two square miles. The leaves were almost completely skeletonized and the damage was present on all birches from the river level to about 800 feet up the valley side. This form of damage also occurred on birches and fruit trees in and west of the town of Castlegar.

Cooley Spruce Gall Aphid, Adelges cooleyi (Gill)

In general the stage of the aphid on Douglas fir remained low in quantity throughout the area, however both the Douglas-fir and Engelmann spruce stages were found concentrated on individual trees rather than over whole areas. Examinations at 22 points resulted in a rating of less than five per cent infested branch tips on spruce hosts. These were tallied from Conkle Lake Road in the west to Balfour in the east. Only one area had a small number of Engelmann spruce trees with enough damage to be immediately noticeable. This was nine miles up the Granby River where a few 12-inch spruce trees had up to nine per cent of the branch tips damaged by 1961 attacks.

Douglas-fir Needle Miners, Contarinia spp.

It is believed that these miners did not cause extensive damage to Douglas-fir needles in 1961. No visits were made to the District late in the season when the damage would have been more obvious.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Curled leaders, caused by this weevil, were seen at Mile 65 and Kettle Crossing, on the Monashee Pass road and at Rossland and Boundary Creek. At Kettle Crossing, 26 per cent of 50 spruce trees from 12 to 40 feet high had terminal or lateral damage or both. Most damage appeared to have occurred in 1959 or 1960.

Engraver Beetles, Ips spp.

Engraver beetles killed the top 15 to 30 feet of 12 ponderosa pine trees averaging 18 inches d.b.h. and 80 feet high. Six of the trees

were near the Danville junction, three miles west of Grand Forks and six more were spread along the Kettle River bank, southwest of the town. A further survey showed this form of damage extended, in much more serious proportions, at least five miles south into the United States.

Evidence of Ips attacks was observed on yellow pine at Phoenix Mountain and Ingram Creek, and on white pine at Champion Lakes on June 1.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Hemlock looper larvae were found on Douglas fir, Engelmann spruce, western larch, and western hemlock. These collections were widely scattered over the whole District. No population increase was noted in any area.

Pine Needle Scale, Phenacaspis pinifoliae (Fitch)

Specimens of this needle scale were found near Ainsworth, Sirdar and on the Buck Lake Road near Beaverdell. The Ainsworth collection came from a lodgepole pine host and the Sirdar collection from yellow pine regeneration.

Green Spruce Looper, Semiothisa granitata Gn.

The appearance of this looper in collections increased in 1961 over 1960. Table 6 shows the total number of conifer collections taken, the percentage of those collections containing larvae and the average number of larvae per positive collection. The larval period was established as from June 29 to September 27.

Table 6

Three-tree Beating Collections Containing the Green Spruce Looper on Coniferous Hosts, West Nelson District 1960 to 1961

Host	Total no. of collections taken during larval period		Percentage of collections containing larvae		Av. no. larvae per positive collection	
	1960	1961	1960	1961	1960	1961
Alpine fir	8	13	25	46	2	3
Douglas fir	17	62	47	61	4	4
Engelmann Spruce	8	24	50	54	2	2
Grand fir	8	5	50	60	2	2
Hemlock	15	26	20	46	5	4
White pine	12	3	16	33	4	0.3
Western red cedar	6	13	16	15	2	2

The above figures indicate the population to be more widespread than in 1960, though no intensification of larval population is evident.

### Cone Insects

The purpose of cone sampling in 1961 was to determine whether or not cones had been damaged, regardless of the species attacking them. Table 7 shows the results of random samples taken throughout the District by locality, host, number of cones used in each sample, number of trees from which the cones were taken and the percentage of these cones damaged by insects. Many late season samples precluded identifications being made. Cones from Douglas fir and Engelmann spruce were the most heavily infested, with the probable pests being Dioryctria sp. and Laspeyresia sp. respectively.

Table 7

Locality, Host, Number of Trees Sampled, Number of Cones and Percentage of Damaged Cones in the West Nelson District, 1961

Locality	Host	No. of trees sampled	No. of cones	Percentage of cones infested
Kettle River	Ba	1	40	30
Monashee	Ba	1	40	0
Needles	C	4	40	2
Burton	F	1	40	67
Greenwood	F	1	25	44
Meadows	F	1	40	70
Meadows	Pl	4	40	0
Salmo	Pw	1	8	37
Ymir	Py	2	8	0
Conkle Lk. Rd.	Se	4	20	45
Kidd Creek	Se	4	40	10
Monashee	Se	4	40	78

### MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
<u>Acleris variana</u> (Fern.)	F, H, Se	4	trace, widespread
<u>Anoplonyx occidens</u> Ross	L	12	av. 10 per collection
<u>Caripeta divisata</u> Wlk.	Ba, F	7	Windfall, Salmo, Phoenix, Kettle R., Sanca

Insect	Host	No. of collections	Remarks
<u>Choristoneura fumiferana</u> (Clem.)	F, Pl	2	scarce
<u>Ectropis crepuscularia</u> Schiff.	Ba, H	2	two larvae, Phoenix, Crawford Creek
<u>Melanolophia imitata</u> Wlk.	Ba, F, Se, Bg, L, C, H	47	District-wide, common
<u>Neodiprion</u> spp.	Se, Pl, H, Py	22	*primarily west half
<u>Nepytia canosaria</u> Wlk.?	F	9	in 12 per cent of F collections
<u>Orgyia a. badia</u> Hy, Edw.	Dt, Se, H	3	in conjunction with <u>M. disstria</u> Hbn. at Warfield
Pamphiliidae	Ba, Se, Bg, Pl, Py	7	Phoenix, Nelson, Kettle River
<u>Panthea portlandia</u> Grt.?	F, Se, L, Pl, H	14	light, widespread
<u>Petrova</u> spp.	Pl	2	11 attacks on two trees, Remac
<u>Pikonema</u> spp.	Se	14	*western half
<u>Semiothisa sexmaculata</u> Pack	L	19	average 16 larvae per collection, District- wide
<u>Xylomyges perlubens</u> Grt.	F, L, Pl, C	5	widespread as to timber type
<u>Zale d. largera</u> Sm.	Pl	13	prominent on Pl in *west half

\*West of Cascade-Lower Arrow Lake line

#### STATUS OF FOREST DISEASES

##### Larch Needle Cast

The typical scorched appearance in larch stands, caused by Hyperdermella laricis Tub., was not in evidence in the previously infected areas in 1961. Larches at Creston, Ivanhoe Ridge (Rossland) and

Boundary Creek Valley showed no needle damage despite having considerable browning in March of 1961, caused by retention of the previous year's dead foliage. One group of about 30 pole-sized larch trees near Waneta Dam were noted as completely red due to the infection. These formed a solid, single group.

#### Douglas-fir Needle Cast

Areas of Douglas fir throughout the District showed very little damage by Rhabdocline pseudotsugae Syd. in 1961. No localized patches of any appreciable intensity were found.

#### Shoestring Root Rot

Douglas-fir trees, with symptoms of this disease were found at Kootenay Lake, Duhamel Creek, West Kettle Valley, east and west Christina Lake, July Creek, Monashee, Rhone, and Phoenix Mountain. Five yellow pine trees near Wallace Creek (Boundary Creek) were affected by bark beetles and this root rot.

#### White Pine Blister Rust

Cronartium ribicola J. C. Fisch. remains notably active in two areas, at Salmo River Valley near Hall Creek and at Crawford Creek. The former location revealed many old and currently infected trees scattered throughout the valley sides while the latter had a group of 20 infected trees or more within a two acre area approximately five miles up, on the south side.

#### Dwarf Mistletoe on Lodgepole Pine

Flowering of Arceuthobium americanum Nutt. was noted on sapling lodgepole pines along the Conkle Lake road and near the junction of Boundary and Windfall creeks. In neither case were there large numbers of stems affected.

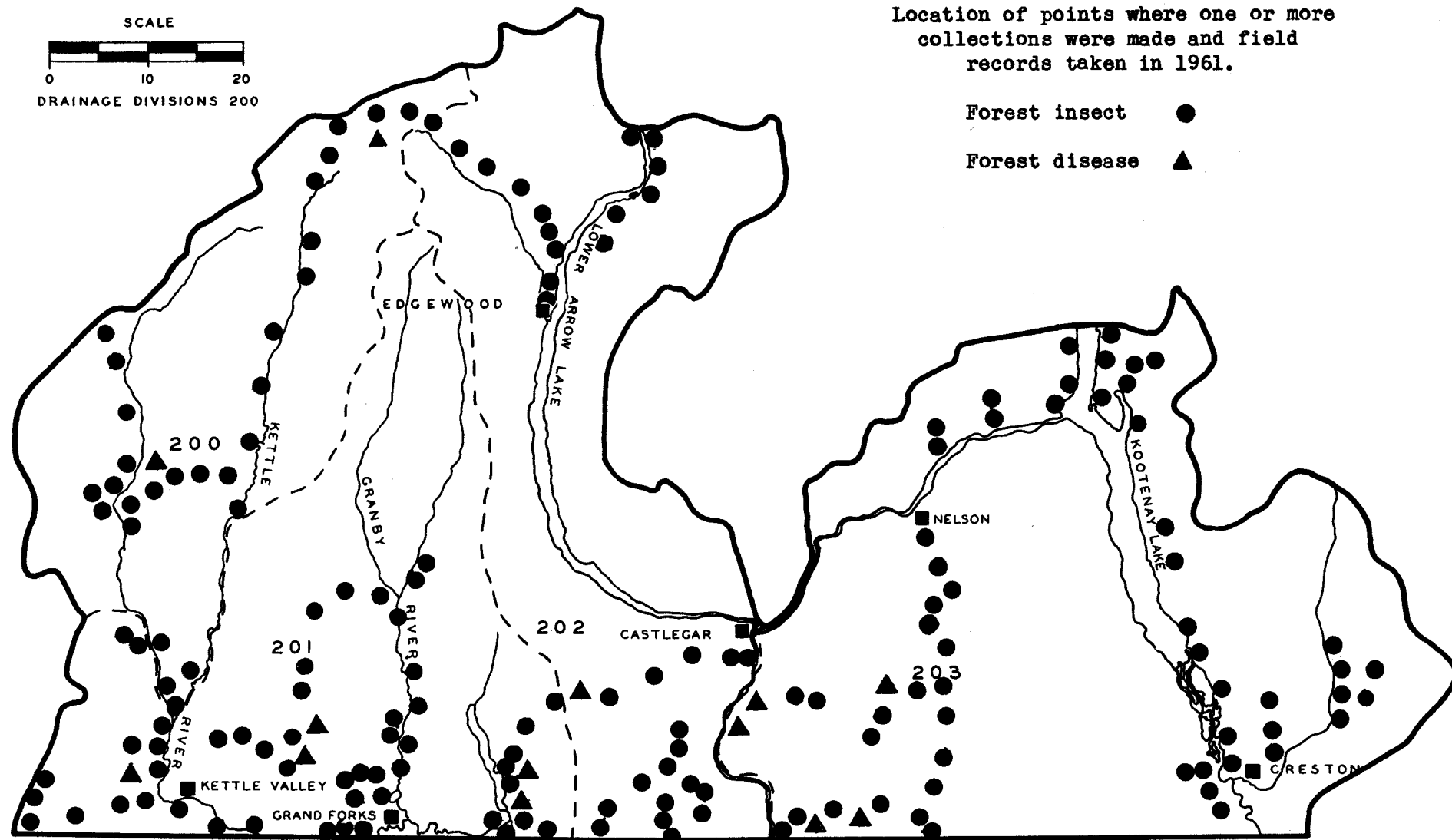
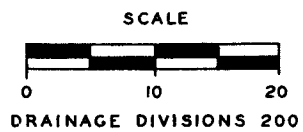
#### Porcupine Damage

Lodgepole pine which averaged 40 feet in height and five inches d.b.h., three miles north of Melway, suffered severe damage from both stripping attributed to porcupines. An estimated five per cent of the trees over a three acre area had dead tops.

## OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Columbian hawthorn	<u>Gymnosporangium betheli</u> Kern	Pend d'orielle	alternate hosts for juniper rust. Three bushes
Common juniper	<u>G. clavariforme</u> (Pers.)	Boundary creek	juniper rust. Frequent in District
Douglas fir	<u>Caliciopsis pseudotsugae</u> Fitzp.	Christina Lake	twig and branch canker
Mountain alder	<u>Polyporus hirsutus</u> Wulf ex Fr.	Kettle River	new record
Saskatoon	<u>Gymnosporangium clavipes</u> Cooke & Peck	Monashee	alternate host for juniper rust
Western white pine	<u>Dasyscyphus agassizii</u> (Berk, & Curt.) Sacc.	Salmo	twig and branch canker

WEST NELSON DISTRICT





Map 2

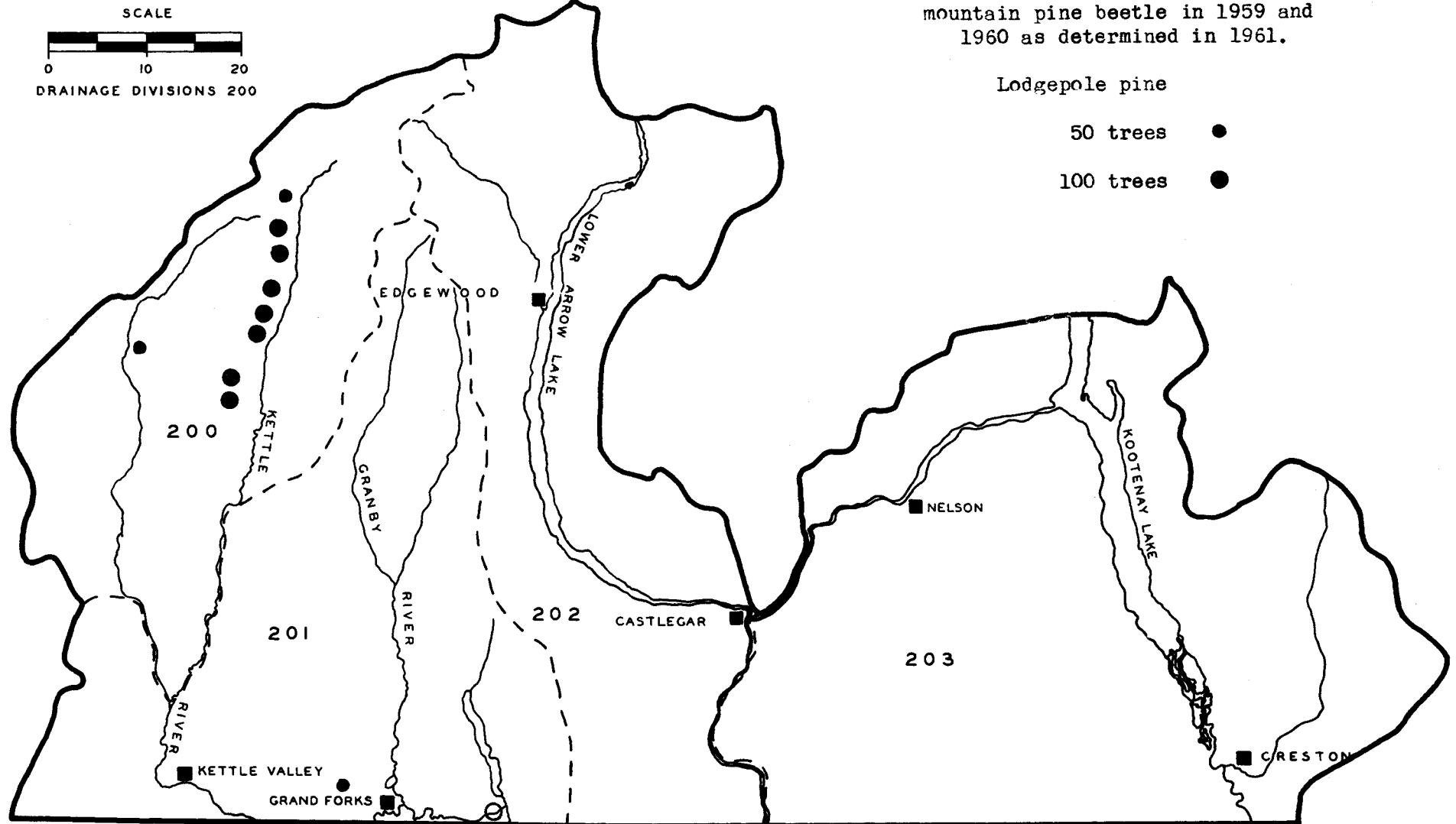
WEST NELSON DISTRICT

Tree mortality caused by  
mountain pine beetle in 1959 and  
1960 as determined in 1961.

Lodgepole pine

50 trees ●

100 trees ●



FOREST INSECT AND DISEASE SURVEY

CENTRAL NELSON DISTRICT

1961

ANNUAL REPORT  
FOREST INSECT AND DISEASE SURVEY

CENTRAL NELSON DISTRICT

1961

R. O. Wood

INTRODUCTION

The first two weeks of May 1961 were spent assisting in the moving of the Wasa Lake Ranger Cabin. Field work in the Central Nelson District extended from May 15 to September 22 during which time three weeks were spent in the West Nelson District and one week on sick leave. Two weeks of survey work were conducted in the Central Kamloops District in September and October.

Sixteen permanent sample points were established and sampled from one to five times during 1961.

The 332 forest insect and 25 forest disease collections submitted are listed by hosts in Table 1; location points of collections are shown on Map 1.

Table 1  
Collections by Hosts  
Central Nelson District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	31	2	Alder spp.	5	-
Douglas fir	59	4	Aspen, trembling	6	-
Fir, alpine	9	-	Birch, western white	8	1
Fir, grand	1	-	Cottonwood, black	3	-
Hemlock, western	82	3	Maple, Douglas	2	-
Larch, western	8	-	Willow spp.	16	1
Pine, lodgepole	17	1	Miscellaneous	14	9
Pine, ponderosa	2	-			
Pine, western white	41	2			
Pine, whitebark	1	-			
Spruce, Engelmann	19	2			
Yew, western	8	-			
			Total	54	11
Total	278	14	Grand total	332	25

## STATUS OF INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Flying time for the annual tree damage appraisal in the Central Nelson District totalled eight hours; Table 2 gives the number and location of red-topped western white pines counted. Map 2 shows the distribution of white pine tree mortality plus about 150 lodgepole pine trees killed at Enterprise Creek.

Table 2

Number of Western White Pine Trees Killed by Mountain Pine Beetles 1958-1960 Inclusive, as Determined by Aerial Surveys, Central Nelson District - 1961

Location	Number of trees	Remarks
West side Upper Arrow Lake	65	pole-size
NW of Arrowpark	32	"
Arrowpark Creek	146	"
Cusson Creek	40	mature and pole-size
Fosthall Creek	250	mature
North of Vanstone Creek	120	pole-size
Pingston Creek	160	mature and pole-size
Shelter Bay and south	80	pole-size
NW of Arrowhead	6	"
Drimmie Creek	180	mature and pole-size
Nakusp to St. Leon	80	pole-size
St. Leon to Galena Bay	105	"
Galena Pass	110	mature and pole-size
Beaton	12	mature
Halfway Creek to Asher Creek	265	mostly mature
SW side of Trout Lake	28	mature
SE of Gerard	5	pole-size
North end of Duncan Lake	16	mature and pole-size
Lardeau River (Howser Crossing)	24	pole-size
Lost Ledge Creek	65	mostly mature
SW of Retallack	6	pole-size
Silverton	120	mature and pole-size
Enterprise Creek	150	mostly mature
Hoben Creek (Slocan Lake)	8	pole-size
Sharp Creek	20	pole-size
Slewiskin Creek	50	mature and pole-size
<b>Total</b>	<b>2,143</b>	

In September a special survey was carried out in an attempt to establish an average diameter and tree height for beetle-killed white pine

in the District. Eight locations were visited and at each location the d.b.h. of 20 trees were taken and the heights of five trees were measured with an abney level. An effort was made to include all size classes of trees in these measurements. Results of this survey are found in Table 3.

Table 3

Average Size of Beetle-killed Western White Pine as Determined in 1961 by Measuring the Diameters of 20 Trees and Heights of Five Trees at Eight Locations in the Central Nelson District

Location	Average d.b.h. (inches)	Average tree height (feet)
Jordan River	14.4	100
Mile 42, Big Bend Highway	12.5	90
Greenslide	13.7	103
Cranberry Creek	13.3	98
Shelter Bay	11.8	86
Galena Pass	17.1	112
Silverton	14.3	86
Nakusp	12.5	91
Average	14.0	96.0

In the 1960 Central Nelson Annual Report the average size of beetle-killed western white pine was estimated at 14 inches d.b.h. and 84 feet high with a volume of 31 cubic feet per tree. This estimate was too low as shown in Table 3 and should have been 14 inches diameter and 96 feet high with a volume of 39 cubic feet per tree (British Columbia Forest Service Preliminary Site-Class Table for Mature Western White Pine.) This would increase the estimated loss in 1957-1959 from 74,500 to 93,873 cubic feet. The estimated loss for 1958-1960 is considerably lower at 73,967 cubic feet.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Timber cruisers for Celgar Ltd. reported an outbreak of spruce beetle in the Shelter Bay region of Upper Arrow Lake in 1961. This area was visited briefly in 1960 and it was believed the infestation had subsided. Logging roads being constructed in this locality in 1961 will make possible a more thorough investigation in 1962.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

No 1960 bark beetle-attacked Douglas-fir trees were observed in the Central Nelson District in 1961.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

Five permanent sample plots for aspen leaf miner population studies in the Central Nelson District showed from 28.8 to 92.1 per cent of the aspen leaf surfaces infested in 1961. An average of 354 leaves were examined at each plot. The examinations showed a general decline in populations from the 1960 level with the most noticeable decrease at Summit Lake. Table 4 shows a comparison of the populations in 1960 and 1961 at four locations in the District; Table 5 gives the percentage mortality at sample plots in 1960 and 1961.

Table 4

Aspen Leaf Surfaces Mined and Number of Adults Produced per Leaf Surface, Central Nelson District 1960 and 1961

Locality	Percentage of leaf surfaces with mines		Number of adults produced per leaf surface	
	1960	1961	1960	1961
4 miles north of Revelstoke	98	74	0.58	0.55
8.5 miles south of Revelstoke	99	92	0.41	0.39
Summit Lake (south of Nakusp)	96	29	0.6	0.04
8.5 miles east of New Denver	85	63	0.54	0.46
Winlaw	-	43	-	0.14

Table 5

Mortality of Aspen Leaf Miner in 100-Cocoon samples at Five Localities in the Central Nelson District, 1960 and 1961

Locality	Percentage mortality			
	Parasitized		Other causes	
	1960	1961	1960	1961
4 miles north of Revelstoke	-	16	-	0
8.5 miles south of Revelstoke	33	34	1	0
Summit Lake (south of Nakusp)	10	13	2	0
8.5 miles east of New Denver	13	11	3	2
Winlaw	-	14	-	2

An Ambrosia Beetle, Trypodendron lineatum (Oliv.)

Heavy infestations of this insect in felled timber were reported by Celgar Ltd. in the Cranberry Creek area of Upper Arrow Lake. Decked

western hemlock logs at Victor Creek were examined on June 23, and ambrosia beetles were found in initial stage of attack; these logs were at an altitude of 2300 feet. At another deck, hemlock logs attacked in 1960 had 46 holes per square foot, with a penetration of 1.5 inches. On September 18 an average of 42 holes per square foot were noted on beetle-killed western white pine in the Jordan River area northwest of Revelstoke.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Larval collections of the western hemlock looper in most parts of the District remained about the same as 1960, but an increase was noted along the Big Bend Highway (DD 225). Here eight out of 12 collections contained an average of 2.5 larvae each. Table 6 compares quantitative three-tree beating collections from western hemlock as determined from samples taken from the first of June to the end of July.

Table 6

Three-tree Beating Collections of Western Hemlock Looper from Western Hemlock, Central Nelson District, 1960 and 1961

Drainage division	Total collections during larval period		Percentage of collections containing larvae		Av. no. of larvae per positive sample	
	1960	1961	1960	1961	1960	1961
220	14	11	7	18	1.0	1.5
221	8	10	0	0	0	0
222	3	4	0	0	0	0
223	6	14	33	28	4.0	1.0
224	0	1	0	0	0	0
225	14	12	50	67	1.7	2.5
Totals	45	52	22	27	2.1	1.9

False Hemlock Looper, Nepytia canosaria Wlk.?

Collections of this insect in 1961 remained at about the same level as those of 1960. Four positive three-tree beating samples from Douglas fir contained an average of one larva per collection; four positive collections from western hemlock also had an average of one larva per sample. Location of these samples were Johnson's Landing, Lardo, Slocan Lake, Box Lake, Halfway Creek and Cranberry Creek.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Fifteen collections from Douglas fir during June 1961, produced an average of 0.4 spruce budworm larvae per sample. This is an increase from 1960 when none was collected from Douglas fir. Most of the larvae found in 1961 were from Revelstoke to Boat Encampment; one was collected north of Nakusp at Halfway Creek. Collections from other hosts were as follows: three larvae from western hemlock along the Big Bend Highway and at Arrowpark Lake; three from alpine fir at Enterprise Creek.

Black-headed Budworm, Acleris variana (Fern.)

Four black-headed budworm larvae were collected from western hemlock at Trout Lake and Kuskanax Creek.

Green Spruce Looper, Semiothisa granitata Gn.

Populations of the green spruce looper in 1961 showed a definite increase from 1960 on most coniferous hosts. Table 7 compares the collections taken from western hemlock in 1960 and 1961 in the Central Nelson District during the larval period of the insect (July 1 to September 7).

Table 7

Three-tree Beating Collections of Green Spruce Looper from Western Hemlock, Central Nelson District, 1960 and 1961

Drainage division	Total collections during larval period		Percentage of collections containing larvae		Av. no. of larvae per positive sample	
	1960	1961	1960	1961	1960	1961
220	6	15	16	46	0.2	4.1
221	9	9	33	77	1.0	5.3
222	5	10	40	70	0.6	2.4
223	7	10	14	100	1.7	5.7
224	0	1	0	100	0	3.0
225	13	11	15	100	0.2	12.7
<b>Totals</b>	<b>40</b>	<b>56</b>	<b>22</b>	<b>76</b>	<b>2.9</b>	<b>6.6</b>

A Hemlock Sawfly, Neodiprion sp.

Numbers of sawfly larvae found on western hemlock in 1961 were about the same as 1960. The populations of 1960 and 1961 as determined from



three-tree beating samples of western hemlock taken from June 1 to August 15, are shown below:

Total collections during larval period		Percentage of collections containing larvae		Average number of larvae per positive sample	
1960	1961	1960	1961	1960	1961
57	71	28	21	37.6	34.5

Wood Borers, Cerambycidae

Salvage logging on a 1960 fire-damaged site west of Slocan City was abandoned due to wood borer damage. There was an estimated 50 per cent loss to timber after sawing and planing. On August 22 an examination of a dressed 12 foot piece of lumber two by four inches showed 57 beetle holes. The insects causing the damage were not identified.

Poplar and Willow Borer, Sternochetus lapathi (L.)

Special efforts to determine the presence of the poplar and willow borer north of Revelstoke along the Big Bend Highway failed to locate any sign of attack. Evidence of borer activity was observed at many scattered points throughout the remainder of the District.

A Weevil in Western Red Cedar, Hexarthrum sp.

No collections of this weevil were made in the Central Nelson District in 1961. There were reports of damage at a shingle mill site at Mile 34, Big Bend Highway, but repeated visits to the area failed to disclose any specimens. It is believed that many of the overmature cedar stands in the District are probably infested to a certain degree by the weevil, but because their presence is difficult to ascertain in standing timber it is necessary to use mill sites as a means of making this determination. To date the only location where living adults or larvae have been collected is in the Begbie Lake area near Revelstoke, as reported in the 1960 Annual Report for the District.

A Cone Pyralid, Dioryctria abietivorella (Grote)

Although 1961 was generally a moderate cone crop year for Douglas fir in the District, there were a few localities where cones were very plentiful. Table 9 gives the results of examinations of 60-cone samples at three loc-

ations; these samples consisted of 20 cones from each of three trees. As shown in the table the cones were infested with dipterous larvae as well as Pyralidae.

Table 9

Percentage of Douglas-fir Cones (60 per Sample) Infested by  
Cone Insects at Three Localities in the Central  
Nelson District, 1961

Date	Locality	Uninfested cones	Infested by <u>Dioryctria</u> <u>abietivorella</u>	Infested by Diptera
Aug. 16	Mile 7, Enterprise Creek	59	0	41
Aug. 17	Kaslo	45	50	5
Aug. 22	Thrums	41.7	58.3	0

Cecidomyiidae in Western Red Cedar Cones

Cedar cones in the Central Nelson District were again infested with these midge larvae, although the population was lighter than in 1960. Examinations of 50-cone samples showed six per cent of the cones infested at St. Leon; at New Denver there was a reduction from 98 per cent of the cones infested in 1960 to 10 per cent in 1961.

Douglas-fir Needle Miners, Contarinia spp.

Populations of these needle miners were generally distributed over most of the range of Douglas fir in the District in 1961. Collections of infested needles from Douglas fir at four locations showed the following distribution: Contarinia pseudotsugae Condr. at Slocan Lake, Revelstoke and Arrowhead; Contarinia cuniculator Condr. at Kaslo; Contarinia sp. at Enterprise Creek.

Spruce Gall Aphid, Adelges cooleyi (Gill)

Seven locations in the Central Nelson District were visited to determine populations of the spruce gall aphid in 1961. At each location 20 branch tips were counted on each of three Engelmann spruce trees and the intensity of attack was categorized as follows: Light - up to 10 per cent of tips infested; Medium - 15 to 45 per cent of the tips infested; Heavy - over 45 per cent of tips infested. Table 10 gives the results of the examinations.

Table 10

Intensity of Spruce Gall Aphid Attack on Engelmann Spruce  
Branch Tips at Seven Locations, Central Nelson District, 1961

Date	Location	Intensity of Attack
June 14	Mile 29, Big Bend Highway	Light
June 15	Mile 72, Big Bend Highway	Light
June 15	Mile 97, Big Bend Highway	Medium
July 5	Mile 9, Enterprise Creek Rd.	Medium
July 25	Mile 7, Keen Creek Rd.	Light
Aug. 2	Downie Creek	Light
Aug. 2	Bigmouth Creek	Medium

Western Tent Caterpillar, Malacosoma pluviale Dyar

This caterpillar increased in numbers along the Big Bend Highway from Revelstoke to Boat Encampment. The heaviest area of infestation occurred at Downie Creek where numerous tents were observed on birch, willow and alder; larvae were estimated to be in their fourth or fifth instar on June 14. Defoliation was not serious in this part of the District in 1961. Larvae were found in very low numbers throughout scattered areas of the remainder of the District.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

No larvae of this defoliator were collected in 1961. A few egg masses were found on bitter cherry four miles south of Silverton August 16.

Spotless Fall Webworm, Hyphantria cunea Drury

This insect made its first known appearance in the Central Nelson District in recent years. A few webs were observed in the southern tip of the District on mountain alder on July 19.

A Leaf Blotch Miner, Lyonetia sp.

Leaves of western white birch in the Trout Lake area were very heavily infested with this insect and some leaf dropping was noticed in that region on June 22. In the remainder of the District willow leaves were generally heavily attacked throughout the range of this tree species, with light attacks common on western white birch and saskatoon.

A Pitch Nodule Maker, Petrova sp.

New damage caused by this insect in the Slocan Valley seemed to be considerably less than in 1960 but was obvious at Glendevon north of Arrowpark. Numerous pitch nodules on dead lodgepole pine branch terminals were noticed in this locality on July 14; many had empty pupal cases protruding from them. Examination of a number of pitch masses failed to disclose any larvae.

Jack Pine Needle Miner, Zelleria haimbachi Busck

Five plots established in 1960 for determining needle-miner populations on lodgepole pine tips showed from two to 50 per cent of the tips infested with larvae (Central Nelson 1960 Annual Report). The plots were re-examined in 1961, but only one larva, at Evans Creek, was found.

OTHER NOTEWORTHY INSECTS

Insect	Host	Number of collections	Remarks
<u>Anomogyna mustelina</u> Sm.	H, F, C, Pw	6	very scattered
<u>Anoplonyx laricivorus</u> Ross	L	3	south Slocan and Kootenay Lake
<u>A. occidentis</u> R. & M.	L	4	south Slocan and Arrowpark
<u>Argyresthia laricella</u> Kft.	L	2	Halfway Creek and along Kaslo-Lardo road
<u>Campaea perlata</u> Gn.	F, C, Pw, W, Biw	9	heaviest on western white birch at Koch Creek
<u>Caripeta divisata</u> Wlk.	Se, F, H, Pw, Y, Ba	24	most common on western hemlock
<u>Cosymbia p. griseor</u> McD.	A, Biw	4	Box Lake, Downie Creek, Koch Creek
<u>Ectropis crepuscularia</u> Schiff.	C, Pw, H, F, Ba, A, Biw	12	collections very scattered
<u>Epirrita autumnata</u> Harr.	Ba	1	Lemon Creek
<u>Eucordylea atrupictella</u> Dietz	Se	1	population about the same as 1960

Insect	Host	Number of collections	Remarks
<u>Eupithecia l. bifasciata</u> Dyar	H, F	8	larvae collected from scattered localities
<u>Feralia comstocki</u> Grt.	F, Pw, H, Ba	10	fairly common
<u>F. jocosa</u> Gn.	F, H	8	most common along Big Bend Highway
<u>Gabriola dyari</u> Tayl.	H, F	4	population still very low
<u>Hyperetis amicarua</u> H.S.	A, Biw	2	Koch Creek; Box Lake
<u>Hypagyrtis nubecularia</u> Gn.	F, C, L, Se, Pw, H	12	more numerous than in 1960
<u>Melanolophia imitata</u> Wlk.	Ba, H, Pw, C, L, F	35	no change in population from 1960
<u>Monochamus oregonensis</u> Lec.	in flight	1	south of Slocan City
<u>Nematocampa filamentaria</u> Gn.	F, C, H	10	common defoliator
<u>Pikonema alaskensis</u> (Roh.)	Se	3	Slocan Lake
<u>P. dimmockii</u> (Cress.)	Se	6	Slocan Lake and Big Bend Highway
<u>Panthea</u> spp.	Se, H, Pw, F, Py, Pl	14	increase in numbers from 1960
<u>Protoboarmia p. indicataria</u> Wlk.	C, Pl, L, F, Y, Pw, H	43	very common defoliator
<u>Rheumaptera</u> sp.	False Azalea	1	many webbed leaves along Big Bend Highway
<u>Semiothisa sexmaculata</u> Pack	L	5	one collection from Thrums produced 76 larvae

## STATUS OF FOREST DISEASES

### Important Diseases

#### Douglas-fir Needle Blight

Douglas-fir saplings at various locations on the west side of Slocan Lake had symptoms of the needle cast caused by Rhabdocline pseudotsugae Syd. Severity of the disease in this area was classed as light.

#### White Pine Blister Rust

Whitebark pines in the Lemon Creek watershed were infected with the organism Cronartium ribicola J. C. Fisch. These trees were at an elevation of 6500 feet which is believed to be an altitude record for the disease in the Central Nelson District.

#### Western Gall Rust

A stand of lodgepole pine at an altitude of 1500 feet above the Illecillewaet River northeast of Revelstoke was heavily infected by Peridermium harknessi J. P. Moore. Twenty-eight galls resulting from the disease were counted on one six-inch d.b.h. tree on June 13.

#### Pine Twist Rust

In connection with the possible introduction of a rust caused by Melampsora pinitorqua Rostr. on hard pines and white poplar, extensive survey work was done in 1961 to determine the distribution of white poplar trees in the Central Nelson District. The trees were found in only three areas: Silverton, Nakusp and Revelstoke. Repeated visits to these areas throughout the season failed to reveal any signs of the rust.

#### Exotic Plantations

##### Plantation XP167 - Marble Head (Lardeau District)

The Populus spp. and varieties at this location seem to be well established and most are growing satisfactorily. Information regarding the plot is shown in Table 11.

##### Plantation XP168 - Kootenay Lake (Lardeau District)

This plantation was replanted in the spring of 1961 but suffered extensive damage from flood waters later in the season. No detailed report on tree mortality could be made in absence of information concerning tree species.

Table 11

Exotic Plantation Examination - Marblehead, Central Nelson  
District, 1961

Tree species	Number of trees	Per cent		
		Mortality	Killed-back (recovery from roots)	Healthy
<u>P. petrowshyana</u>	10	-	-	100
<u>P. sargentii</u>	10	10	-	90
<u>P. vernirubins</u>	11	-	-	100
<u>P. griffin #7</u>	11	-	-	100
<u>P. brooks #10</u>	10	10	-	90
<u>P. brooks #1</u>	10	-	10	90
<u>P. f.n.s. 44-52</u>	19	21.1	5.2	73.7
<u>P. tristis</u>	17	5.8	-	94.2
<u>P. gelrica</u>	16	12.5	-	87.5
<u>P. regenerata</u>	16	6.2	-	93.8
<u>P. robusta var. bachellieri</u>	16	6.2	12.5	81.3
<u>P. robusta var. issendorf</u>	15	-	-	100

## OTHER NOTEWORTHY DISEASES

Host	Organism	Locality	Remarks
Douglas fir	<u>Caliciopsis pseudotsugae</u> Fitzp.	Lemon Creek and Nakusp	associated with bacter- ial galls
Lodgepole pine	<u>Coleosporium asterum</u> (Diet.) Syd.	New Denver	needle rust

# CENTRAL NELSON DISTRICT

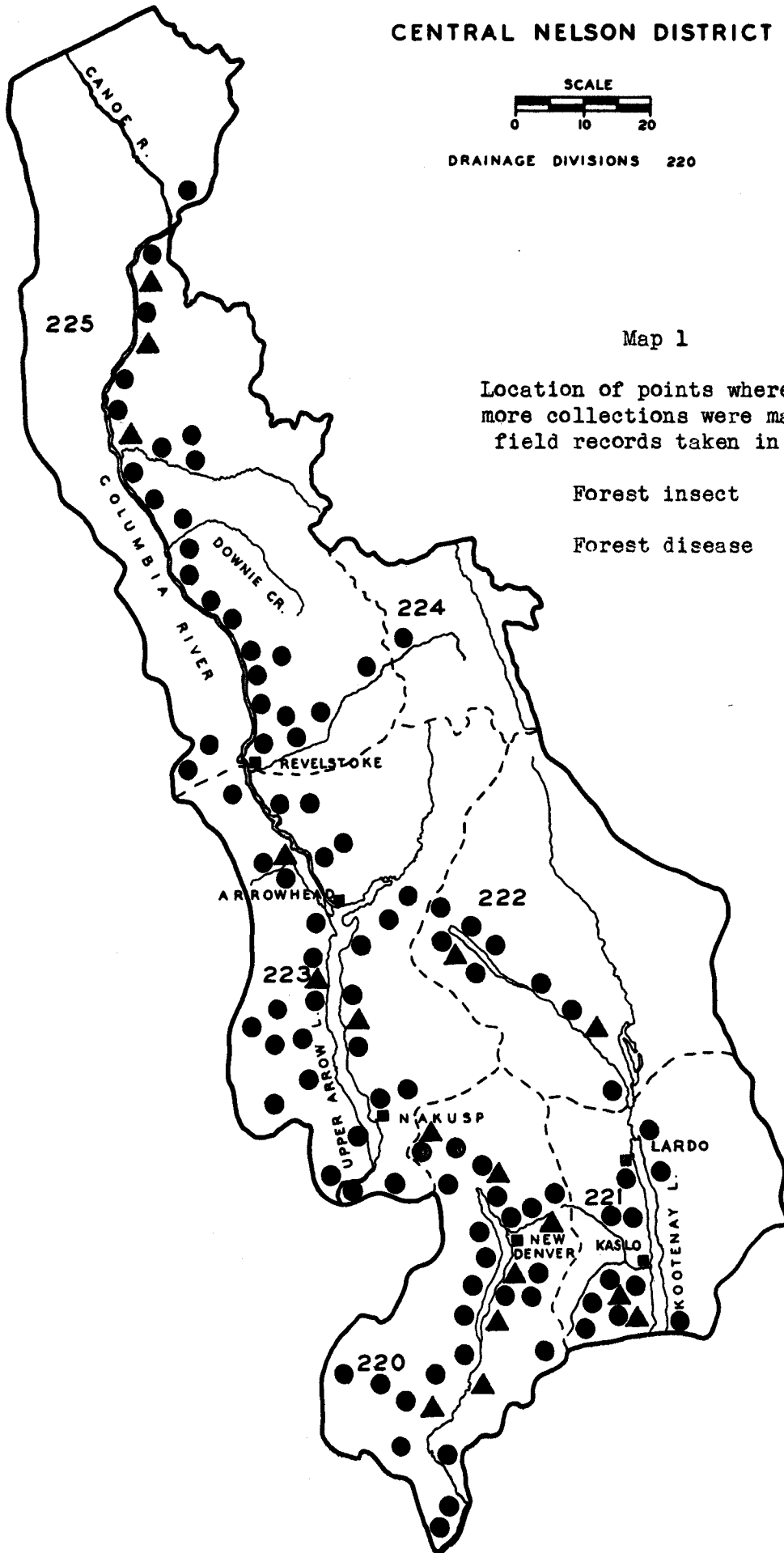


DRAINAGE DIVISIONS 220

Map 1

Location of points where one or more collections were made and field records taken in 1961.

Forest insect ●  
Forest disease ▲





# CENTRAL NELSON DISTRICT



DRAINAGE DIVISIONS 220

Map 2

Tree mortality caused by mountain pine beetle in 1959 and 1960 as determined in 1961.

Lodgepole pine

50 trees



100 trees



Western white pine

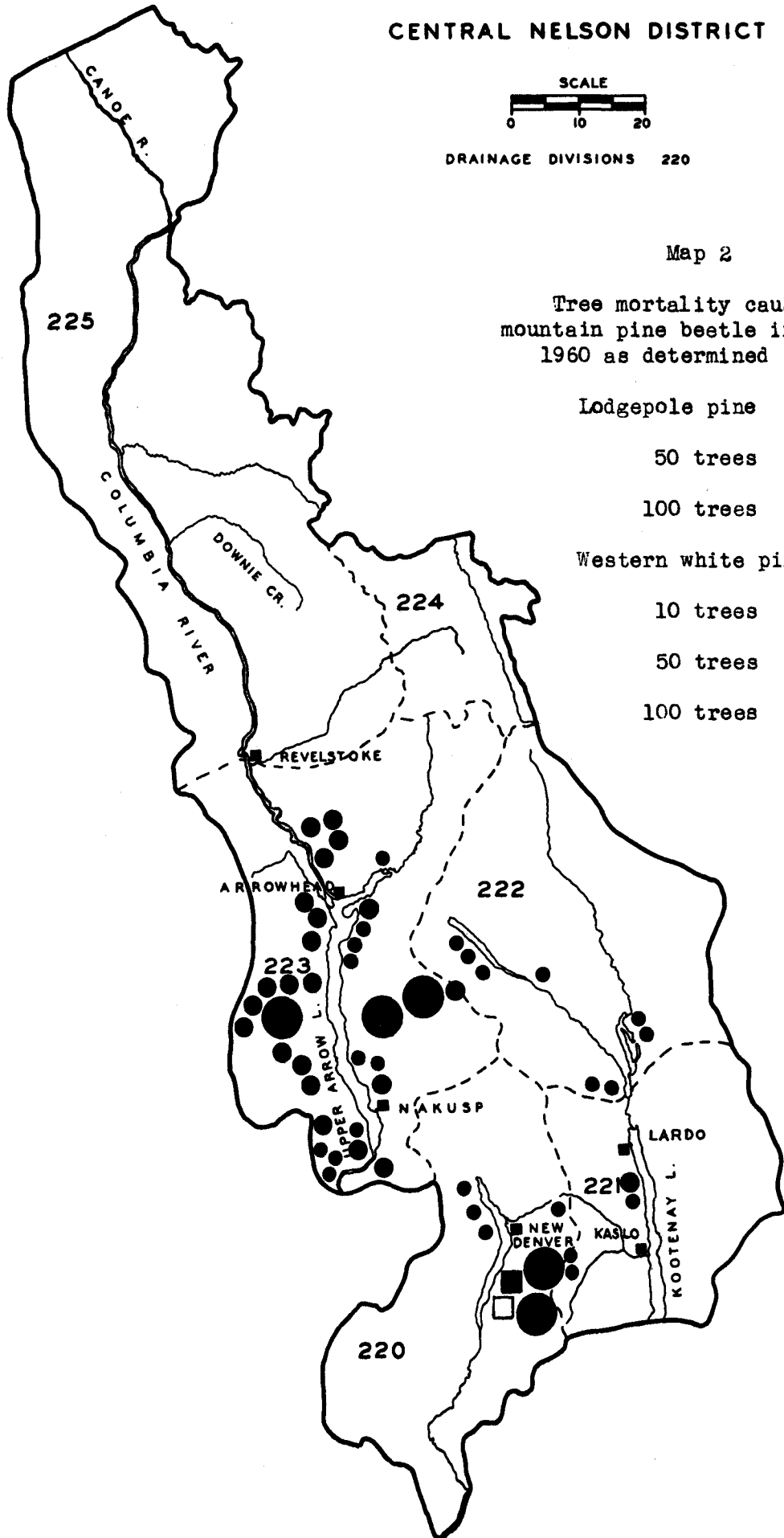
10 trees



50 trees



100 trees



FOREST INSECT AND DISEASE SURVEY

EAST NELSON DISTRICT

1961

## FOREST INSECT AND DISEASE SURVEY

## EAST NELSON DISTRICT

1961

R. J. Andrews

## INTRODUCTION

Work in the East Nelson District started on April 18 with the moving of the ranger cabin. Three additional rangers were assigned to the project and with the contractor, work was completed by the second week of May.

Survey sampling was started on May 23 and continued till September 15. Four hours of flying time contracted by the Vernon Laboratory were used in the forest tent caterpillar and mountain pine beetle surveys along the Columbia River Valley from Invermere to Bush River.

Totals of 423 forest insect and 23 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 host. Distribution of the collections is shown on Map 1.

Table 1

## Collections by Hosts

East Nelson District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	9	-	Alder spp.	15	2
Douglas fir	127	9	Aspen, trembling	18	2
Fir, alpine	27	2	Birch spp.	17	-
Hemlock, western	19	1	Cherry, choke	3	-
Juniper, Rocky Mountain	13	-	Maple, Douglas	2	-
Larch, western	14	1	Willow spp.	31	1
Pine, lodgepole	20	1	Cottonwood spp.	4	1
Pine, ponderosa	9	-	Miscellaneous	39	2
Spruce, Engelmann	56	1			
			Total	129	8
Total	294	15	Grand total	423	23

STATUS OF FOREST INSECTS

Mountain Pine Beetle, Dendroctonus monticolae Hopk.

Ground surveys of four infested areas in the District revealed one locality with an increasing population.

The Coyote Creek infestation, estimated at four square miles, showed 130 red-top lodgepole pine. Observation and ground surveys in a portion of the infestation revealed that previous to the 1960 generation 67 trees had been attacked and killed. In 1960 there were 61 attacked trees of which 52 per cent had faded in 1961. In 1961 there were 60 attacked trees, some of which will fade next spring.

At Elk Creek a ground survey revealed that 90 trees had been attacked previous to 1961 of which 83 per cent had been killed. In 1960, 30 trees were successfully attacked and had faded. In 1961, 54 trees were attacked, some of which will fade next spring. Here again only a portion of the infestation was examined.

Twenty red-top lodgepole pine were counted at a recent outbreak near Parson. A ground survey revealed that of 33 trees attacked in 1960, 29 had faded. There were 121 trees attacked in 1961, some of which will fade next spring. The whole of the infestation was examined at this locality and the estimated area was less than five acres.

At Bush River a ten acre block, encompassing the largest portion of the infested white pine was cruised and the data obtained are shown as follows:

Total volume (cu.ft.)	Av. vol. per acre (cu. ft.)	Average d.b.h. (inches)	Percentage infested			
			Healthy	Old grey	Red	1961 attack
43,790	4,379	14	10	44	26	20

The stand composition near the valley bottom was western red cedar, white pine and Engelmann spruce, with white pine predominating. On the slope, the stand gradually changed to white pine, lodgepole pine and Engelmann spruce. The shape of the infestation was noteworthy in that the new attack each year progressively worked up the slope into smaller diameter trees. The diameters of attacked trees at the valley floor ranged from 16 to 24 inches while the 1961-attacked trees on the slope were mostly under 12 inches. By August 22, parent adult emergence from white pine had been completed, indicating two flights in 1961. Larvae were in approximately the second instar and parent adults were excavating new galleries in other trees examined.

Red-topped trees were counted at two localities but no ground survey was carried out. These were at Redgrave, with 100 infested lodgepole pines, and Toby Creek with 10.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Populations of this beetle remained at a very low level throughout the District. Inspection of logging slash and surrounding standing timber that contained a potentially dangerous population revealed no new attack near Forster Creek.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Populations of Douglas-fir beetle were low throughout the District. Fifty red-topped trees were counted near the Wigwam River. Logging operations had started in this locality in 1961, resulting in a lower count than in the previous year.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The expected heavy defoliation of trembling aspen from Nicholson to Donald station was substantiated by a damage appraisal flight over the area. Several new areas of heavy defoliation were also mapped from Invermere to Nicholson. This area, while not showing continuous defoliation, supported a potentially high population feeding on willow, rose and regeneration trembling aspen understory.

Near Toby Creek, in the Invermere Ranger District, five infested patches ranging from one to 20 acres were noted. From Radium to Parson five additional areas of from five to 20 acres were observed. A continuous but staggered belt of defoliation starting at Parson and extending to Donald Station was mapped on both sides of the Columbia River.

The count of egg masses for possible prediction of 1962 defoliation and for egg parasitism was made in seven localities. Each of the localities sampled had noticeable to heavy defoliation in 1961.

A sequential sampling method developed by R. F. Shepherd of the Calgary Laboratory was used as well as the standard felling of three trees used in British Columbia. The sequential sampling method was devised for use in the Prairie Provinces and some changes were made to apply it here. The method required the use of pole clippers and the cutting of two branches from the top four branches of the tree, exclusive of the terminals. These were to be branches which extended to the top of the canopy. The outer 18 inches were cut off and the number of egg masses counted. The use of pole clippers was found to be impracticable in a dense and higher growing stand; this necessitated the felling of more trees where determination could not be met in the standard three-tree felling. In two cases only was it necessary to fell more than the three trees.

At Brisco, three dominant trees randomly selected, were felled and the two methods applied to determine predicted defoliation severity. The count

Table 2

Analysis of Forest Tent Caterpillar Egg Masses Collected from Trembling  
Aspen Trees, East Nelson District, 1961

Locality	Tree d.b.h. (in.)	Tree height (ft.)	Crown length (ft.)	Total no. 1961 egg masses	Av. no. eggs in five masses	Percentage			
						Living larvae	Dead larvae	Undevel- oped eggs	Parasitized eggs
Donald Station	8	70	45	144	158	87.4	0.7	8.6	3.2
	5	45	24	29	137	90.5	0.3	6.2	3.0
	6	51	30	48	123	93.8	0.1	4.7	1.3
Nicholson Plot #1	5	45	12	82	127	98.1	0	1.8	0
	7	42	20	118	153	97.2	0.3	2.5	0
	5	45	27	167	131	95.9	0.6	3.0	0.5
Nicholson Plot #2	5	45	20	63	136	97.4	0.3	2.3	0
	5	45	27	165	119	89.1	0.3	10.6	0
	6	61	20	141	134	92.6	0.3	6.7	0.4
Farson	7	81	24	151	171	94.2	0.2	2.3	3.3
	8	84	21	131	175	86.9	1.6	11.1	0.4
	7	69	21	96	165	97.9	0.6	1.5	0
Brisco	5	81	30	43	147	93.5	0	6.1	0.4
	5	42	18	11	135	82.2	0.9	10.8	6.1
	7	51	30	84	177	89.6	1.1	3.7	5.6
Horsethief Ranch Road	6	42	21	192	119	88.9	0.2	6.8	4.1
	6	45	21	127	129	91.2	0.9	4.0	3.9
	5	33	21	294	105	89.8	0.2	8.9	1.1
South Toby Creek	7	63	27	176	145	83.9	0.1	12.9	3.1
	6	48	21	175	120	87.9	0	9.8	2.3
	6	57	18	109	146	87.5	0.8	9.0	2.7
Averages				1961	140.5	91.2	0.45	6.3	1.9
				1960	165.1	92.6	0.17	6.4	0.7

of egg masses on all the branches pointed to heavy 1962 defoliation, yet the count of egg masses on the two branch samples on the three trees indicated further sampling was needed. An additional 10 trees had to be felled before the number of egg masses coincided with the "moderate defoliation" category. Table 2 shows the data collected from the standard three-tree method and Table 3 shows the data collected from the sequential sampling method.

Table 3

Predicted Forest Tent Caterpillar Defoliation Severity Based on a  
Sequential Sampling Method, East Nelson District, 1961

Locality	Av. tree d.b.h. (inches)	Av. tree height (ft.)	Av. crown length (ft.)	No. of trees sampled	Predicted defoliation
Donald	6	55	33	4	heavy
Nicholson (Plot 1)	5	44	19	1	heavy
Nicholson (Plot 2)	5	50	22	3	heavy
Parson	7	78	22	1	heavy
Brisco	7	55	26	13	moderate
Horsethief Ranch Road	6	40	21	3	heavy
Toby Creek	8	56	22	1	heavy

Douglas-fir Needle Miners, Contarinia spp.

Douglas-fir needle miners reached epidemic proportions in the Invermere Ranger District in 1961. From 15 to 90 per cent of the current year's needles were infested. The approximate range of the infestation was from Brisco to Fairmont and was restricted by elevation on the slopes of the valley. Regeneration Douglas fir were most noticeably hit and the cutting of Christmas trees was greatly reduced because of defoliation. A representative of one of the leading companies in this area estimated that the annual yield of 60,000 trees from their holdings of 30,000 acres would be reduced to 5000 trees in 1961, because of needle miner damage. There has been no set criterion of acceptability of trees in the industry, hence there was a varying incidence of infested trees at different lots.

Through competition and production of better quality trees, a standard method of grading must eliminate the possibility of damaged trees, such as are found in the Invermere District, entering the export market to the United States. The 1957 export data for this growing industry show that British Columbia trees were shipped to 28 states extending from the Pacific Ocean to the Atlantic, and south to the Gulf of Mexico. The total value of Christmas trees exported in 1960 from permit cutting areas in the Invermere Ranger District was more than three times greater than in 1953.

A continuing surveillance of the damaged areas will be made in the following years to determine the spread and population fluctuations of the Douglas-fir needle miner. Table 4 shows the number and value of Christmas trees shipped from cutting permit areas in the Invermere Ranger District in 1960 and 1961.

Table 4

Number of Christmas Trees Cut in 1960 and 1961 in Permit Areas, Showing Decrease in Cut and Estimated Monetary Loss Caused at least in part by a Douglas fir Needle Miner in 1961

Year	Hofert		Kirk		Emerald		Others		Total	
	No. trees shipped	Approx. value (dollars)	No. trees shipped	Approx. value (dollars)	No. trees shipped	Approx. value (dollars)	No. trees shipped	Approx. value (dollars)	No. trees shipped	Approx. value (dollars)
1960	95,000	38,000	204,023	81,608	139,774	55,908	56,628	22,651	495,425	198,167
1961	68,418	27,366	25,264	10,105	98,790	39,515	40,202	16,080	232,674	98,066
Decrease	26,582	10,634	178,759	71,503	40,984	16,393	16,426	6,571	262,751	105,101

In converting the number of Christmas trees to dollars, an average of four trees per bale at \$1.60 was used.



Table 5 shows, by ownership category, the number of trees and percentage of total cut in the Invermere District for the same period.

Table 5  
Christmas Trees Cut in Invermere Ranger District,  
1960 and 1961

Land ownership	1960		1961	
	No. of trees	Percentage	No. of trees	Percentage
Private lands	66,619	13	47,083	21
Company lands	271,295	55	95,562	41
Indian Reserve	47,462	10	30,424	25
Christmas Tree Permit Areas	107,062	22	59,605	13
<b>Total</b>	<b>492,438</b>	<b>100</b>	<b>232,674</b>	<b>100</b>

Aspen Leaf Miner, Phyllocnistis populiella Cham.

A further increase of population has been noted throughout the southern portion of the District. In 1958 the annual count of leaves revealed an average of 8.3 per cent infested. The average for 1961 was 64.6 per cent. Tables 6 and 7 shows the data obtained from four plots in the East Nelson District.

Table 6  
Percentage of Aspen Leaf Surfaces Mined and Adult Aspen Leaf-  
Miners Produced per Leaf Surface, East Nelson District, 1961

Locality	Percentages of leaf surfaces infested	Average no. adults produced per leaf surface
St. Mary Lake	39	0.10
Moyie Lake	85	0.29
Morrissey	40	0.20
Findlay Creek	4	0.02

Table 7

Mortality of Aspen Leaf Miner in Cocoons at Four Localities,  
East Nelson District, 1961

Locality	Percentage mortality in cocoon stage	
	Parasitized	Other causes
St. Mary Lake	11	7
Findlay Creek	6	6
Morrissey	6	4
Moyie Lake	19	4

Oregon Fir Sawyer, Monochamus oregonensis Lec.

A report of insect activity in a burned-over Engelmann spruce stand was received from a mill hand working in the Upper Kootenay Public Working Circle. A visit to the area revealed a medium to light population of the Oregon fir sawyer in the "moderate" burn class.

According to the British Columbia Forest Service at Canal Flats, the fire had started July 14, 1960. Salvage logging has started and will be carried out throughout the burned area.

The method of sampling was to strip three feet of bark from the stem, centered at about breast height, and record the number of entrance holes in the wood. Data obtained from the moderate burn class of Engelmann spruce and alpine fir trees examined were as follows:

Host	No. of trees examined	Av. no. of entrance holes per sq. ft.
Se	5	0.19
Ba	5	0.38

A Leaf-tier, Pseudexentera improbana oregonana Wlshn.

A continuing high incidence of rolled leaves was evident on trembling aspen near Windermere Lake. A leaf count was taken to ascertain the damage and population. Inspection of the rolled leaves at two plots disclosed that the number of leaves rolled did not indicate the number of larvae present, as the incidence of uninhabited rolled leaves was high. Only 11 and 58 per cent of rolled aspen leaves at two localities near Fairmont were inhabited. This will have to be taken into consideration in the following table showing the percentage of leaves rolled at six localities near Windermere Lake.

Table 8

Percentage of Trembling Aspen Leaves Rolled by a Leaf-tier,  
East Nelson District, 1961

Location	Percentage of rolled leaves
2 Mi. N. of Dutch Creek	58
9 Mi. N. of Dutch Creek	5
12 Mi. N. of Dutch Creek	5
14 Mi. N. of Dutch Creek	5
2 Mi. N. of Fairmont	26
2 Mi. S. of Fairmont	39

#### Mite Damage on Trembling Aspen

Mite damage was first reported to the Invermere office of the B. C. Forest Service by the Auto Court owners near Windermere Lake. A survey revealed a wide variance of damage. Up to 75 per cent of the leaves on the lower portion of the crowns of some trembling aspens were infested and partially blackened by the spider mite. Damage was such that one tree could have severe discoloration while the tree next to it had slight or no damage symptoms. Heavy egg deposits were noted on the blackened portion of the leaf in the early part of June. By mid-June emergence of a noticeably smaller population had taken place. The peak of population was expected in mid summer, however, when trees were inspected in July no new damage symptoms were noted.

Table 9 shows the locations and amount of damage found on trembling aspen near Windermere Lake.

Table 9

Location and Range of Damage Caused by Spider  
Mites on Trembling Aspen, East Nelson District, 1961

Location	Range of damage per cent
8 Miles S. of Invermere	10 - 40
14 Miles N. of Dutch Creek	50 - 75
12 Miles N. of Dutch Creek	0 - 15
5 Miles N. of Dutch Creek	10 - 40
Lillian Lake	40 - 60
Edgewater Junction	0 - 20
Brisco	20 - 50
Horsethief Creek	0 - 50

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

The annual inspection of the two plots revealed an increase of attack at Michel Creek and a near total collapse of population at Hawkins Creek. Out of 97 trees examined at the Michel Creek plot, only seven per cent had been attacked in 1960, 39 per cent had been attacked both in 1960 and 1961, 33 per cent had been attacked only prior to 1960, and 21 per cent had never been infested.

At Hawkins Creek, one regeneration Engelmann spruce was found attacked and the plot was abandoned. Five collections of infested terminals from near the Hawkins Creek plot were sent to R. E. Stevenson of the Calgary Laboratory for identification of parasites. Table 10 shows the identification results of the collections sent to Calgary.

Table 10

Parasitism of the Engelmann spruce Weevil on Infested Regeneration Engelmann Spruce, Hawkins Creek Area, 1961

No. of terminals infested	Insect species			
	<u>Pissodes engelmanni</u>	<u>Lonchaea corticus</u> Tayl.	<u>Eurytoma pissodes</u> Gir.	<u>Dolichomitius</u> sp.
	Hopk.	(Diptera)	(Hymenoptera)	(Hymenoptera)
3	2 adults	50 + larvae	3 larvae	-
3	2 adults	70 + larvae	1 larva	-
3	3 adults	30 + larvae	18 larvae	-
2	4 adults	10 + larvae	1 larva	-
8	4 adults	15 larvae	5 larvae	2 cocoons

False Hemlock Looper, Nepytia canosaria Wlk.?

Light populations of this species were present on Douglas fir in three drainage divisions of the East Nelson District. The incidence of the false hemlock looper in quantitative Douglas fir collections from June 8 to August 8 in 1959, 1960 and 1961 is shown below:

Drainage Division	No. of samples taken during larval period			Percentage of samples containing larvae			Av. no. of larvae per positive sample		
	1959	1960	1961	1959	1960	1961	1959	1960	1961
	240	21	15	17	9.5	6.6	12.7	5.0	7.0
241	-	5	25	-	0	28.0	-	0	3.1
243	26	45	41	23.0	17.7	20.0	6.8	1.5	2.5

Western Tent Caterpillar, Malacosoma pluviale Dyar.

The annual roadside count of tents on a half mile strip near the Fort Steele junction revealed a slight increase of population. In previous years the count was made on one side of the road and doubled; this year the number of tents from one side only was used.

An additional strip was run near Wardner, where a light population was evident. The number of tents and the percentage of elongate and compact tents in each strip are as follows:

Location	Total no. tents	Percentage	
		elongate	compact
Fort Steele	143	58	42
Wardner	60	70	30

A count of 100 tents and the measurement of the heights of the two types of tents was made. No set pattern between the two types could be distinguished. The average height of the host Purshia tridentata D. C. ranged from three to four feet and the corresponding heights of the tents, both elongate and compact, ranged from 20 to 28 inches.

Western tent caterpillar damage symptoms were more numerous elsewhere in the District. At the south end of Kinbasket Lake a light population was noted on willow. Five miles east of the road near the Bush River a light population was found on water birch and near Golden a light population was intermingled with the forest tent caterpillar infestation.

Green Spruce Looper, Semiothisa granitata Gn.

A marked increase in the number of collections containing the green spruce looper and also in the number of larvae per collection, was noted throughout the District in 1961. The favoured host was Douglas fir, with a maximum of 63 larvae in a three-tree sample. The average number of larvae from nine western hemlock collections was five, and seven collections from Engelmann spruce yielded 22 larvae. The incidence of green spruce loopers in quantitative Douglas-fir collections in 1960 and 1961 is shown below:

Drainage division	No. of samples taken during larval period		Percentage of samples containing larvae		Av. no. of larvae per positive sample	
	1960	1961	1960	1961	1960	1961
240	7	21	18.5	76.1	3.5	11.6
241	5	25	80.0	84.0	5.2	11.0
243	38	33	44.7	69.6	2.0	6.7

A Leaf Blotch Miner, Lyonetia sp.

The infestation of a leaf blotch miner on birch was again heavy from Bush River to Cummings River. Larvae were emerging from the blisters and dropping to the understory to pupate during the first week in June.

A Sawfly on Douglas fir, Neodiprion sp.

The number of collections of this sawfly decreased two per cent from 1960, but the average number of larvae per positive sample rose slightly in 1961.

A Sawfly on Hemlock, Neodiprion sp.

Populations of this sawfly were light in 1961. An average of 45 larvae was collected in five random samples of western hemlock.

A Pine Tube Moth, Argyrotaenia tabulana Freem.

Small numbers of larvae were collected off lodgepole pine from Kimberley Airport to Canal Flats.

Spruce Gall Aphid, Adelges cooleyi (Gill)

Ocular estimates of the percentage of infested tips were made at eight locations within the District. At two locations, Lamb Creek and near Sparwood, medium populations, estimated at 20 and 25 per cent respectively, had infested Engelmann spruce branch tips. All other areas had light populations.

Spotless Fall Webworm, Hyphantria cunea (Drury)

A light population was evident on chokecherry near Bull River.

A Leaf-eating Beetle, Chrysomela alnicola interna Brown

Near Doctor Creek, a heavy population of beetles was found defoliating two miles of creekside alder. Larval feeding had not begun on June 14.

Hemlock Looper, Lambdina fiscellaria lugubrosa (Hulst)

Small numbers of larvae were taken from Douglas fir in 1961. Nine locations in the southern portion of the District yielded 1.1 larvae per sample. Other hosts producing single larva collections were: western red cedar, alpine fir, Engelmann spruce and western larch.

Green Striped Forest Looper, Melanolophia imitata Wlk.

An average of 2.8 larvae per sample was taken from 21 Douglas-fir collections in 1961. The number of positive collections increased 300 per cent over 1960.

Spruce Budworm, Choristoneura fumiferana (Clem.)

Single larvae were collected from Douglas fir at seven localities in 1961.

Black-headed Budworm, Acleris variana (Fern.)

Only a few larvae were collected in 1961.

## MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
<u>Achytonix praeacuta</u> Sm.	F	18	common; 1960 collections, 4
<u>Archips cerasivoranus</u> (Fitch)	Chokecherry	2	three bushes completely defoliated at Elko
<u>Caripeta divisata</u> Wlk.	F, H	14	increase over 1960; highest single yield 8 larvae
<u>Dioryctria pseudotsugella</u> Grt.	F	2	decrease from 1960
<u>Dioryctria reniculella</u> (Grote)	Se	2	decrease from 1960; highest yield 3 larvae
<u>Enypia griseata</u> Blkmre.	F, Se	10	common throughout Canal Flats Ranger District
<u>Eupithecia annulata</u> Hulst	F	10	increase over 1960
<u>Eupithecia luteata</u> <u>bifasciata</u> Dyar	Ba	1	decrease from 1960
<u>Feralia comstocki</u> Grt.	Ba, F	10	common on regeneration F at Elko, Newgate, Galloway, St. Mary Lake

Insect	Host	No. of collections	Remarks
<u>Griselda radicana</u> Wlsh. M.	Se, F	4	decrease from 1960
<u>Nematocampa filamentaria</u> Gn.	F, H, C	14	common
<u>Nymphalis antiopa</u> L.	W	1	light population; first collection since 1959
<u>Orgyia antiqua badia</u> Edw.	Ceanothus soopolallie	5	light population near Moyie River road
Pamphiliidae	F, Se, Pl	5	decrease from 1960
<u>Panthea</u> sp.	F	15	increase from 1960
<u>Pero behrensarius</u> Pack.	F, L	14	common on F. in- crease from 1960
<u>Pikonema alaskensis</u> Roh.	Se	5	decrease from 1960
<u>Pikonema dimmockii</u> Cress.	Se	12	common throughout
<u>Pleroneura borealis</u> Felt.	Ba	5	common near Findlay Creek and Lussier River
<u>Semiothisa setonana</u> McD.	Js	4	increase in number of larvae per collection over 1960
<u>Semiothisa sexmaculata</u> Pack	L	6	increase in number of collections over 1960
<u>Stenoporpia satisfacta</u> B. & McD.	F	8	increase over 1960
<u>Syngrapha selecta</u> Wlk.	Se, F, H	11	common throughout
<u>Xylomyges hiemalis</u> Grt.?	F	5	increase over 1960
<u>Zale duplicata</u> Sm.	Pl	4	increase over 1960

## STATUS OF FOREST DISEASES

## Douglas-fir Needle Rust

Heavy infections of Melampsora albertensis Arth. on trembling aspen foliage were extensive throughout the southern portion of the District. "The



rust is frequent in the Rocky Mountain regions, often becoming locally epidemic on young trees, but within a season or so it subsides with little apparent effect on the host." (Boyce, Forest Pathology, p. 189).

#### A Douglas-fir Needle Rust

This rust caused by Melampsora occidentalis Jacks. was common throughout the District during late summer. Infection was most prominent on regeneration black cottonwood.

#### A Spruce Cone Rust

This rust caused by Pucciniastrum americanum (Farl.) Arth. was found in Engelmann spruce cones near Gold Creek. Usually only the needles of Engelmann spruce are infected. The rust is not known to cause appreciable damage.

#### Drought

Flagging of Douglas-fir tips was common near Wardner and Edgewater. The trees in these areas are naturally slow growing and the deficiency of moisture is revealed earlier in a particularly dry year such as 1961.

#### Douglas-fir Needle Blight

Infection caused by Rhabdocline pseudotsugae Syd. has decreased in the East Nelson District. Inspection of Christmas trees at the collecting yards revealed light infection.

#### A Dieback on Douglas Fir

Light infection of Douglas-fir terminals was common in the plot areas established at Waldo, Premiere Lake, Canal Flats and Invermere to record the advancement of dieback. Comparison of plot areas with more favourable growing sites revealed a rise in damage symptoms under near drought conditions.

FOREST INSECT AND DISEASE SURVEY

PRINCE GEORGE FOREST DISTRICT

1961

B. A. Sugden

INTRODUCTION

During 1961 Forest Biology rangers assigned to the Prince George Forest District were: J. C. Holms, Yukon; E. G. Pottinger, North Prince George; E. V. Morris, West Prince George; B. A. Sugden, South Prince George. Ranger Pottinger joined the staff of the Forest Entomology and Pathology Branch at Vernon in mid-July and reported for work in the Prince George District on July 29.

The insect damage appraisal survey was supervised by Ranger C. B. Cottrell in the West, South and North Prince George districts during the latter part of August. Mr. Cottrell also assisted with the forest tent caterpillar survey in the South Prince George District.

A total of eight hours of aerial surveys was logged in 1961. The bulk of the flying time was used to obtain information for the annual insect damage appraisal.

The infestations of two-year-cycle spruce budworm are expected to remain active in the District during 1962. Heaviest defoliation may occur in the vicinity of Tudyah Lake, Pine Pass and Strathnaver. Throughout the remainder of the District damage is expected to range from light to medium.

During 1961, as in the past, members of the genus Dendroctonus were among the most notorious killers of merchantable timber. In the forests bordering the Fraser River between Quesnel and Macalister, infestations of Douglas-fir beetle recurred, while small outbreaks were reported from Douglas-fir stands in the Fort St. James Ranger District. Infestations of mountain pine beetle were reported in stands of lodgepole pine from widely separated localities. However the most severe infestations continued to occur in the western section of the District. Populations of Alaska spruce beetle remained low and were usually confined to spruce blowdown and log decks.

Trembling aspen, black cottonwood and willow were again severely defoliated by forest tent caterpillars in the McBride Ranger District. Egg surveys indicate that in 1962 the infestation will extend over approximately 200,000 acres.

Infestations of the aspen leaf-miner remained active in groves of trembling aspen throughout, though a population decline was evident in some sections of the District.

FOREST INSECT AND DISEASE SURVEY

SOUTH PRINCE GEORGE DISTRICT

1961

## FOREST INSECT AND DISEASE SURVEY

## SOUTH PRINCE GEORGE DISTRICT

1961

B. A. Sugden

## INTRODUCTION

Survey work began in the South Prince George District on May 30 and continued until September 1. During the field season, 157 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 made from each species. Map 1 shows the locations where one or more insect and forest disease collections or field records were obtained in 1961.

Table 1

## Collections by Hosts

South Prince George District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Douglas fir	23	-	Alder spp.	5	-
Fir, alpine	22	-	Aspen, trembling	26	-
Hemlock, western	3	-	Birch, western white	6	-
Juniper, Rocky Mtn.	1	-	Cottonwood, black	5	-
Pine, lodgepole	14	2	Willow spp.	21	1
Spruce, Engelmann	6	-	Miscellaneous	4	-
Spruce, white	21	1			
			Total	67	1
Total	90	3	Grand total	157	4

## STATUS OF INSECTS

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

The two-year-cycle spruce budworm, on alpine fir and white spruce, remained active in the area between the Fraser and Bowron rivers south of Prince George in the Willow, Naver and Ahbau river valleys. As 1961 was a non-flight year and the larval feeding period short, damage was not severe. Some discoloration was apparent, particularly on understory alpine

fir after the damaged needles had become dry.

Study plots in the South Prince George District were re-examined during early June to determine the spruce budworm population level. Table 2 contains the number of larvae per square foot of foliage for 1961 and comparative percentage of tips infested in 1959 and 1961.

Table 2

Number of Two-year-cycle Spruce Budworm Larvae per Square Foot of Alpine Fir Foliage in 1961 and Comparative Percentage of Tips Infested in 1959 and 1961, South Prince George District

Locality	No. of larvae per sq. ft. 1961	Per cent tips infested	
		1959	1961
Barkerville	2.0	6	6
Hay Lake	12.5	-	43
George Mtn. (Willow River)	22.0	60	44
Strathnaver	29.5	50	49
Genevieve Lake	18.5	-	35

The percentage of tips infested on the plots with complete records remained about constant with the exception of George Mtn. where a decrease was noted. The plots at Hay Lake and Genevieve Lake were not established until 1960 so no information was available for comparison.

Spruce budworm damage will recur in the South Prince George District in 1962 but it is expected to be less severe than in 1960. There may be medium to heavy damage near Strathnaver. Throughout the remainder of the infestations, defoliation should range from light to medium. Most overstory trees that were heavily defoliated in 1960 showed fair to good recovery in 1961. Adventitious buds were present on trees that had been severely defoliated. Understory alpine fir were more adversely affected by heavy defoliation than were the dominant and co-dominant trees. Heavy defoliation has resulted in the loss of annual increment to the overstory and loss of increment, malformation and some mortality of the understory alpine fir and white spruce trees.

#### Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

Damage by the Douglas-fir beetle was confined almost entirely to the Douglas-fir forests bordering the Fraser River from Red Rock south to Macalister. Many of the firs attacked in 1961 had turned red by the end of August, when an aerial survey of Douglas-fir beetle damage was made.

Table 3 shows, by locality, the number of trees and the volume killed from 1958 to 1960 inclusive.

Table 3

Number and Volume of Douglas-fir Trees Killed by Douglas-fir Beetle, South Prince George District, 1958 to 1960 as Determined in 1961

Locality	No. of trees	Volume (cu. ft.)
Cottonwood Canyon	15	990
Charleson Creek	15	990
Red Rock	5	330
Tako Creek	70	4,620
Lazaroff Lake	127	8,382
Higdon Creek	50	3,300
Hixon	325	21,450
Saunders	147	9,702
Whittier Creek	40	2,640
Cuisson Creek	28	1,848
Castle Rock	101	6,666
Macalister	70	4,620
Marguerite	214	14,124
Alexandria	13	858
Australian	42	2,772
Cuisson Lake	85	5,610
<b>Total</b>	<b>1,347</b>	<b>88,902</b>

During the period 1957 to 1959, a total volume of 82,500 cubic feet of Douglas fir was killed. There was only a small increase of 6,402 cubic feet killed, from 1958 to 1960. An average of 66 cubic feet per tree was used to compute the volume of beetle killed timber. Red topped Douglas-fir trees killed in 1961 were not included in the damage appraisal. Groups of these, totalling 85 and 60 trees, were counted near Narcosli Creek and Macalister respectively.

#### Mountain Pine Beetle, Dendroctonus monticolae Hopk.

There was very little mountain pine beetle activity in the District. Approximately 20 mature lodgepole pine near Tabor Lake and three groups of pine totalling 38 trees in the Narcosli Creek Valley, were killed in 1960. There was also a group of five lodgepole pine infested along the upper Willow River. The roots of these trees had been injured during construction of a logging road. The beetles were still in the host trees on June 4, 1961.

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

Small populations of Alaska spruce beetle were active along the upper Willow River and in the vicinity of Genevieve and Hay lakes. The light, sporadic attacks were confined to decked spruce logs and blowdown.

An Engraver Beetle, Ips sp.

White spruce blowdown, bordering a logging road along the upper Willow River, were heavily infested by an Ips sp. probably engelmanni Sw. Parent beetles, eggs and larvae were in the galleries during the first week in June. Salvage of the infested trees was planned by the British Columbia Forest Service for midsummer.

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

Throughout most of the District populations of western balsam bark beetle remained at a very low level. A total of 150 alpine fir was recorded, most of which had been killed in 1960. The damage occurred at three locations, Lazaroff Lake, 100 trees; Nelsonkenny Lake, 20 trees and near Hixon, 30 trees.

Forest Tent Caterpillar, Malacosoma disstria Hbn.

The infestation of forest tent caterpillar, active since 1957 near McBride, increased in size and intensity during 1961. Severe defoliation of trembling aspen, black cottonwood and willow extended from McBride south-east to Valemount, a distance of about 60 miles. The infestation, confined to the valleys bordering the Fraser and McLennan rivers, varied from three to four miles in width. By mid-June most of the forest tent caterpillars were in the cocoon stage.

An egg survey, to determine the potential tent caterpillar population for 1962 was made in late September by Rangers C. B. Cottrell and R. O. Wood. Table 4 contains an analysis of the egg survey.

The information obtained from the egg samples indicates a very large population potential for 1962. Additional egg surveys were made beyond the southeastern and northwestern fringes of the infestation to determine if the infestation would increase in size in 1962. It was found that there will be an increase of at least 10 miles in either direction. (See Map 2). An average of 156 egg masses per tree was recorded in these new areas where little evidence of defoliation was observed in 1961. The potential population is very high and should it develop favourably, severe defoliation will result.

Table 4

Analysis of Forest Tent Caterpillar Egg Masses from  
Trembling Aspens, McBride Area, September, 1961

Tree no.	Tree class	Crown length (ft.)	Total no. 1961 egg masses	Av. no. of eggs per mass	Percentage			
					Living larvae	Dead larvae	Undevel. larvae	Paras. eggs
M1	Dom.	24	120	134	95.1	0.1	4.7	0.1
M2	Co-dom.	14	34	122	96.0	0.6	3.1	0.3
M3	Co-dom.	16	107	128	87.7	0.8	11.3	0.2
D1	Dom.	30	25	82	86.6	1.2	9.8	2.4
D2	Dom.	30	168	143	94.8	0.6	2.9	1.7
D3	Co-dom.	18	73	110	97.6	0.3	1.9	0.2
C1	Co-dom.	13	64	144	89.4	0.6	10.0	0.0
C2	Dom.	19	169	148	95.9	1.1	2.2	0.8
C3	Co-dom.	16	208	132	89.9	0.6	8.9	0.6
Averages			107.5	127.0	92.8	0.6	6.0	0.6

Table 5 contains a comparative summary of the forest tent caterpillar egg surveys from 1957 to 1961.

Table 5

Summary of Egg Surveys of the Forest Tent Caterpillar,  
McBride Area, 1957 to 1962, Inclusive

Year	Av. no. of egg masses per tree	Percentage			
		Living larvae	Dead larvae	Undeveloped eggs	Parasitized eggs
1957	11.3	91.2	0.4	7.9	0.6
1958	22.3	90.0	0.4	9.0	0.5
1959	36.0	88.7	1.6	8.0	1.7
1960	20.0	84.6	0.4	9.7	5.3
1961	107.5	92.8	0.6	6.0	0.6

During the period, 1949 to 1953, forest tent caterpillar caused heavy defoliation in the Yardley Lake, Woodpecker and Dragon Lake districts. Egg sampling was conducted during late August to determine the 1961 population



and the potential population for 1962.

A total of 15 aspen trees was felled and examined. Only two egg masses were found; these were in the vicinity of Woodpecker. Egg dissection showed no parasitism. It is expected that the population of forest tent caterpillars will remain low in the Yardley Lake, Woodpecker and Dragon Lake districts during 1962.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The infestations of aspen leaf miner have remained active in groves of trembling aspen throughout the District. Plots established and sampled in 1960 were sampled again this year. Tables 6 and 7 contain information obtained from these plots.

Table 6

Aspen Leaf Surfaces Mined and Number of Adults Produced in Samples, South Prince George District, 1960 and 1961

Location	Percentage of leaf surfaces with mines		No. of adults per leaf surface	
	1960	1961	1960	1961
Prince George	51	92	-	0.77
Cale Creek	62	64	-	0.06
Stone Creek	58	94	-	0.04
Woodpecker	73	81	-	0.11
Hixon	71	93	-	0.10

Damage was severe on all the plots and by the third week in July infested leaves had dried and were beginning to drop. Larval and pupal mortality was high, except on a plot near Prince George. However adult emergence was sufficiently large that infestations may be expected again in 1962.

Table 7

Mortality of Aspen Leaf miner in 100-cocoon Samples, South Prince George District, 1960 and 1961

Location	Percentage mortality			
	Parasitism		Other causes	
	1960	1961	1960	1961
Prince George	3	12	2	6
Cale Creek	9	67	2	20
Stone Creek	19	79	6	13
Woodpecker	9	76	3	8
Hixon	4	71	0	12

A Sawfly on Douglas fir, Neodiprion sp.

Neodiprion sawfly larvae were collected more often from Douglas fir during June than were the larvae of any other defoliator of this tree species. Sawfly larvae appeared in 60 per cent of the collections with an average of nine larvae per positive sample.

Western Hemlock Looper, Lambdina fiscellaria lugubrosa (Hlst.)

Populations of western hemlock looper remained low, though larvae were more common than in 1960. Table 8 shows a comparison of the populations as represented by three-tree beating samples from white spruce, western hemlock, alpine fir and Douglas fir during the larval period June and July.

Table 8

Collections of Western Hemlock Looper in Three-tree Beating Samples from Conifers, South Prince George District, 1958 to 1961

Year	No. collections taken during larval period	Percentage of collections containing larvae	Av. no. larvae per positive sample
1958	72	9.1	1.4
1959	49	7.1	1.0
1960	27	7.4	1.0
1961	75	10.7	1.8

Oblique-banded Leaf Roller, Choristoneura rosaceana (Harr.)

The 100-square mile outbreak of the oblique-banded leaf roller on aspen, in the upper Fraser River Valley south east of McBride, has subsided. An infestation of forest tent caterpillar was active in the same area and unsuccessful competition with this species may have been partly responsible for the disappearance of the leaf rollers.

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

The decline of Engelmann spruce weevil population reported in 1960 has continued. Little current damage was observed in 1961.

Saddle-backed Looper, Ectropis crepuscularia Schiff.

The saddle-backed looper was fairly common in collections from broad-

leaved and coniferous hosts. It did not occur in large numbers. Table 9 shows a comparison of populations as represented in three-tree beating samples from conifers during the years 1958 to 1961, during June and July, the larval period.

Table 9

Collections of Saddle-backed Looper in Three-tree Beating Samples from Conifers, South Prince George District, 1958 to 1961

Year	No. collections taken during larval period	Percentage of collections containing larvae	Av. no. larvae per positive sample
1958	40	5.0	1.0
1959	108	13.9	1.7
1960	84	5.9	1.2
1961	75	21.3	1.3

Douglas-fir Needle Miner, Contarinia spp.

Little Douglas-fir needle miner activity was noted in the District in 1961. There was a small population in the needles of regeneration fir between Macalister and Quesnel but damage was negligible.

Birch Leaf-miner, Lyonetia sp.

The leaves of western white birch were severely infested over 180 square miles in the McBride Ranger District. The infestation extended in the valleys and on the lower hillsides, north from Clemina to Tete Jaune Cache and from McBride south east to Mount Robson Provincial Park. Birch trees attacked by the miner were conspicuous because heavy infestation caused the leaves to turn a pale orange color. Most of the birch leaf-miners had pupated by the end of June, though a few larvae were still active at that time. This species may be somewhat gregarious prior to pupation as certain sites contained hundreds of cocoons.

Green Velvet Looper, Epirrita autumnata Harr.

Green velvet looper larvae were common in the District in 1961. They appeared more often, in coniferous collections, than any other species of geometrid. A total of 22 collections was made from alpine fir, 50 per cent of which contained larvae of the green velvet looper. The average number of larvae per positive collection was 1.8. Alpine

fir appeared to be the favoured host but larvae were also collected from white spruce, alder and black cottonwood during the larval period June to July.

Spruce Gall Aphid, Adelges cooleyi (Gill)

Galls made by the spruce gall aphid were observed in many localities on white spruce. Young trees up to 12 feet in height were most seriously affected. All the galls were counted on three trees at each location and the percentage of infested branch tips determined. Populations were indicated by the degree of infestation; zero to 15 per cent, light; 16 to 45 per cent, medium and above 45 per cent, heavy. Estimates of some spruce gall aphid populations are shown in Table 10.

Table 10

Location and Estimated Population of Spruce Gall Aphids on White Spruce, South Prince George District, 1961

Location	Population (estimated)
Stone Creek	light
Wingdam	medium
Buck Ridge	medium
Narcosli Creek	light

Sporadic populations of spruce gall aphids were active in the Douglas-fir forests of the Fraser River Valley between Quesnel and Marguerite. Noticeable discoloration of Douglas-fir needles occurred at Buck Ridge and Alexandria over a small area.

Bark Aphids, Cinara spp.

Regeneration white spruce, 10 to 20 inches in height, were frequently infested by colonies of a bark aphid. During early and mid June most of the aphids in the colonies were in the nymph stage. The population of Cinara spp. on spruce and alpine fir was generally high throughout the District in 1961.

Black-headed Budworm, Acleris variana (Fern.)

Populations of black-headed budworm remained low. No larvae were collected in the District during 1961.

## OTHER NOTEWORTHY INSECTS

Species	Host	Number of collections	Remarks
<u>Achytonyx praeacuta</u> Sm.	Sw	1	uncommon
<u>Clepsis persicana</u> Fitch.	F, Ba, Se	6	more common on F than other conifers
<u>Nyctobia limitaria</u> Wlk.	Ba, Sw	8	more plentiful in 1961 than in 1960

## STATUS OF FOREST DISEASES

## Important Diseases

## Needle Rust on White and Black Spruce

Damage from a rust to black and white spruce, caused by Peridermium coloradense (Diet.) Arth. and Kern occurred sporadically throughout the District. Brooming was particularly common on black spruce growing in the meadows south east of Moose Lake near the headwaters of the Fraser River.

## A Rust on Lodgepole pine

A stem rust, caused by Peridermium stalactiforme Arth. and Kern was noted often affecting reproduction lodgepole pine between Quesnel and Macalister. Some mortality had resulted from severe infection.

## A Rust on the Leaves of Willow

A rust on the leaves of willow, caused by Melampsora paradoxa Diet. and Holw., was widely distributed in the District during 1961. Some shrubs had almost all of their leaves affected.

FOREST INSECT AND DISEASE SURVEY

WEST PRINCE GEORGE DISTRICT

1961

## FOREST INSECT AND DISEASE SURVEY

## WEST PRINCE GEORGE DISTRICT

1961

E. V. Morris

## INTRODUCTION

May 1 to 12 was spent in the East Nelson District assisting with the moving of the Wasa Lake ranger cabin.

Field work commenced on May 15 and continued to September 15. A total of 362 forest insect and 30 forest disease collections were made by Forest Biology and British Columbia Forest Service personnel during the field season. Six hours flying time was spent on bark beetle surveys in the Fort St. James Ranger District.

One week was spent in the North Prince George District assisting on survey work.

Table 1 shows the forest insect and forest disease collections by host. Map 1 shows the distribution of the collections and field records.

Table 1

## Collections by Hosts

West Prince George District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Douglas fir	27	0	Alder spp.	16	1
Fir, alpine	44	3	Aspen, trembling	50	4
Pine, lodgepole	67	6	Birch spp.	6	0
Spruce, black	14	4	Cottonwood, black	10	0
Spruce, white	93	4	Willow spp.	24	3
Larch, eastern	4	0	Miscellaneous	7	5
			Total	113	13
Total	249	17	Grand total	362	30

## STATUS OF INSECTS

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

Study plots in the West Prince George District were re-examined during early June 1961, to determine the spruce budworm population level. The average number of larvae per square foot of foliage sampled in 1961 can not be compared to that sampled in 1959 because most of the sampling in 1959 took place after the larvae had completed their feeding and had retired to hibernacula. However comparisons can be made with the percentage of tips infested on the Tudyah Lake and Big Creek plots which were sampled in 1959. The percentage of tips infested at the Big Creek plot declined by 23 per cent and at Tudyah Lake increased by 57 per cent. (Table 2)

Table 2

Number of Two-year-cycle Spruce Budworm Larvae per Square Foot in 1961 and Comparative Percentage of Tips Infested in 1959 and 1961, West Prince George District

Locality	Host	No. of larvae per sq. ft.	Per cent tips infested	
			1959	1961
Tudyah Lake	Ba	24.1	30	53
Big Creek	Ba	8.6	47	24
Davie Lake	Ba	1.1	-	3
Pine Pass	Ba, Sw	24.3	-	58

Damage resulting from the heavy feeding of spruce budworm larvae in 1960 was evident on all plots examined. No dead trees or trees with dead tops were noted in the overstory, though defoliation on many was severe. The most serious damage occurred on the understory alpine fir ranging from three to 15 feet in height. Many of these trees had a very light complement of needles or had developed multiple leaders. Mortality plots were put in at two localities in the West Prince George District to assess the damage on alpine fir and white spruce understory trees caused by spruce budworm feeding. One hundred alpine fir and white spruce trees were tagged at each of the two localities and the following information recorded: tree number, diameter, height, percentage of feeding on 1961 growth, percentage of defoliation on older foliage and condition of tree as to dead top, dead branches, and chance of survival.



Table 3

Average Spruce Budworm Defoliation and Defoliation on Older Foliage on 100 Understory Alpine Fir and White Spruce Trees at Each of Two Plots, West Prince George District - 1961

Locality	Average diameter	Average height	Average percentage defoliation	
			1961 growth	On 1960, and older foliage
Tudyah Lake	2.0	11.2	68	26
Big Creek	2.0	7.6	63	13

The heaviest feeding occurred at the Tudyah Lake Plot. It was estimated that 10 per cent of the trees at Tudyah Lake, and five per cent at Big Creek may die in 1962.

Although spruce budworm damage in the West Prince George District will recur in 1962 it is expected to be lighter in most localities than in 1960. Medium to heavy defoliation may occur in the Tudyah Lake and Pine Pass districts. Most overstory trees that were heavily defoliated in 1960 show fair to good recovery in 1961. Adventitious buds were present on trees that had been severely defoliated. Heavy defoliation has resulted in loss of annual increment to dominant trees and loss of increment, malformation and some mortality of the understory alpine fir and white spruce.

#### Mountain Pine Beetle, Dendroctonus monticolae Hopk.

An aerial survey for red-top lodgepole pine in the Fort St. James Ranger District was made in the latter part of August. The mountain pine beetle infestation in lodgepole pine in the Takla Lake area remained about the same as in 1960 with a slight increase in the Bivouac Creek area. Three new infestations were found at the following localities: Kloch Lake (175 red-tops) Kuzkwa River (730 red-tops) and the north end of Tezzeron Lake (64 red-tops). Table 4 gives the general location, number of red-top lodgepole pine and the estimated volume of timber killed at each locality.

The total estimated volume of lodgepole pine timber killed by mountain pine beetle in the Fort St. James ranger district for 1959 and 1960 was 93,000 cubic feet. An average volume of 31 cubic feet per tree was used to determine the total volume of timber killed.

Table 4

Lodgepole Pine Trees Killed by Mountain Pine  
Beetle, 1959 and 1960, as Determined by Aerial Surveys, West  
Prince George District - 1961

Locality	Number of trees	Estimated volume of timber (cu. ft.)
Camsell Creek	5	155
Nancut	15	465
Leo Creek	60	1,860
Bivouac Creek	1,420	44,020
Northwest Arm, Takla Lake	143	4,433
Sinta Creek	20	620
Natowite Lake	315	9,765
South of Natowite Lake	65	2,015
Kloch Lake	175	5,425
Kuzkwa River	730	22,630
Tezzeron Lake	64	1,984
<b>Total</b>	<b>3,012</b>	<b>93,000</b>

Map 2 shows the locations and the number of red-top lodgepole pine trees counted by aerial surveys in the West Prince George District in 1961.

Douglas-fir Beetle, Dendroctonus pseudotsugae Hopk.

The Douglas-fir beetle infestation in the Fort St. James Ranger District appeared to have subsided in 1961. Small groups of red-top Douglas fir were counted along the southwest shore of Stuart Lake with the largest concentration opposite Tachie Village. An aerial survey for red-tops was made in the Fort St. James Ranger District in the latter part of August. Table 5 gives the locality, number of red-top Douglas fir counted and the estimated volume of timber killed at each locality.

All the locations where red-top Douglas fir were counted were close to or bordering on logging operations. The total estimated volume of timber killed by the Douglas-fir beetle in the Fort St. James Ranger District was 26,000 cubic feet. A figure of 70 cubic feet per tree was used to calculate the volume killed.

Table 5

Douglas-fir Trees Killed by Douglas-fir Beetle, 1958  
to 1960, as Determined by Aerial Surveys, West Prince George District,  
1961

Locality	Number of trees	Estimated volume of timber (cu. ft.)
Southwest shore Stuart Lake	103	7,210
Opposite Pinchi (Stuart Lake)	19	1,330
Opposite Tachie Village	106	7,420
Nancut	7	490
Tezzeron Lake	60	4,200
Murray Ridge	25	1,750
Pope Mountain	55	3,750
Total	375	26,000

Western Balsam Bark Beetle, Dryocoetes confusus Sw.

Red-top alpine fir trees attacked by this scolytid were counted from the air at several localities in the Trembleur and Takla lakes area. The heaviest concentration of dead trees was at O'Ve-ell Creek where 150 trees were counted. Table 6 gives the locality, number of trees and estimated volume killed by the western balsam bark beetle from 1956 to 1960 based on the assumption that the red-top trees hold their needles for five years.

Aerial surveys of the Fort St. James Ranger District revealed large numbers of grey alpine fir over fairly extensive areas. It was estimated that there were approximately five grey alpine fir trees per acre distributed over 21,400 acres in the vicinity of Trembleur and Takla lakes. Using a figure of 30 cubic feet per tree the average volume of timber killed per acre was calculated at 150 cubic feet. It was estimated that about 3,210,000 cubic feet of alpine fir had been killed in this area prior to 1956.

In September it was determined that the western balsam bark beetle had been the primary cause of the tree mortality.

Table 6

Alpine Fir Trees Killed by Western Balsam Bark Beetle, 1956 - 1960  
as Determined by Aerial Surveys, West Prince George District - 1961

Locality	Number of trees	Estimated volume of timber (cu. ft.)
Nancut	45	1,800
South side Trembleur Lake	115	4,600
Baptiste Creek	35	1,400
Vadicor Creek	80	3,200
O'Ve-ell Creek	150	6,000
Grostete Creek	100	4,000
Northwest Arm Takla Lake	40	1,600
Elliot Lake	10	400
Takatoot Lake	10	400
Kloch Lake	60	2,400
<b>Total</b>	<b>645</b>	<b>25,800</b>

Oregon Fir Sawyer, Monochamus oregonensis Lec.

Plots established in 1960 in white spruce killed by fire in 1958 at the Lin and Fir burns along the Hart Highway were re-examined for new emergence holes in 1961. In May 1960, 50 white spruce trees at each of the two fires had been classified as to the severity of burn into three classes: severe, medium and light. A section three feet long on the bole, centering about breast height, was marked out with red ribbon. The bark was completely removed from the sample section and each of the Monochamus entrance and exit holes marked and recorded. The plots were re-examined in July and September of 1960 for new exit holes. Up to the end of September 1960, 51 per cent of the Monochamus that entered wood had emerged from the "Fir" fire and 47 per cent at the "Lin" fire.

Two new emergence holes were found on medium burn class trees at the "Lin" fire on July 27, 1961 but no new emergence holes were found at the "Fir" fire. The final data on both of the fires is contained in Table 7; percentage of emergence is based on the total number of entrance holes recorded.

Examination of white spruce log decks cut in the winter of 1960 and 1961 at various locations throughout the District revealed no Monochamus activity.

Table 7

Oregon Fir Sawyer Emergence from White Spruce Killed  
by Fire in 1958, West Prince George District

Name of fire	Burn class	No. of trees sampled	Total entrance holes	Percentage emergence		
				1959	1960	1961
Fir	Light	10	4	0	0	0
	Medium	20	86	11	23	0
	Severe	20	94	34	25	0
Average			62	23	24	0
Lin	Light	10	100	9	23	0
	Medium	20	167	17	18	1
	Severe	20	104	30	7	0
Average			124	18	16	1

Average percentage of mortality at the "Fir" fire was 54 and at the "Lin" fire 64.

An Engraver Beetle, Ips engelmanni Sw.

Decked white spruce logs at several millsites throughout the District showed medium to heavy populations of an engraver beetle, tentatively identified as Ips engelmanni Sw. All logs decks checked for beetle activity were cut in the winter of 1960-1961. The heaviest attacks were found on surface logs in the decks at the Pas Lumber Company's millsite on the Upper Parsnip River. No living white spruce trees were infested.

Round Headed Borer, Tetropium sp.

Round headed borers were numerous in white spruce log decks at several millsites throughout the District. The heaviest attack was on the surface logs in the decks examined. At the request of the Pas Lumber Company, white spruce log decks at their millsite on the upper Parsnip River were examined on May 29 and throughout the summer to determine the amount of borer damage. The decked logs with a total volume of 12.5 million board feet, were cut in the winter of 1960-1961. Twenty logs with an average length of 36 feet and an average diameter of 16 inches were picked at random from the surface logs in the decks. A one-foot-square bark sample was removed from the middle portion of the logs and the number of Tetropium larvae counted. The average number of larvae per square foot

was 6.3. All of the larvae were mining under the bark, and none had attempted to enter the wood. On later examinations it was found that the larvae had bored about 1/4 of an inch into the sapwood and then returned to the surface and continued feeding under the bark. No damage was caused to the logs throughout the summer as far as milling purposes were concerned.

Black Spruce Borer, Asemum atrum Esch.

About 50,000 cubic feet of spruce over approximately 40 acres in 14 seed source strips on T.S. 699-58 (expired) near Summit Lake blew down during the fall of 1960 and the spring of 1961. Fourteen out of 30 trees examined were attacked by the black spruce borer. The larvae which are about one inch long when full grown mine under the bark, then bore into the sapwood making oval shaped tunnels which may extend into the heartwood. Although the black spruce borers were the most numerous larvae found, a light attack by Ips sp. was noted in most trees.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The aspen leaf-miner infestation increased at all sample points this year compared with 1960. For sampling, two apical branches 12 inches long were cut from the lower crown of five sample trees at each of the seven plots. Table 8 compares the infestation of leaf surfaces and the production of leaf-miner adults at each plot from 1959 - 1961. Table 9 shows mortality in the cocoon stage, in 100-cocoon samples taken at five localities.

Table 8

Percentage of Aspen Leaf Surfaces Mined and Number of Aspen Leaf-miner Adults Produced per Leaf Surface North Prince George District, 1959 - 1961

Locality	Percentage of leaf surfaces with mines			No. of adults produced per leaf surface		
	1959	1960	1961	1959	1960	1961
Mile 8 Hart Hwy.	27	72	89	0.07	0.59	0.53
Mile 12 Hart Hwy.	28	52	91	0.09	0.04	0.77
Mile 8 Summit L. Rd.	16	48	67	0.07	0.33	1.60
Shelley Rd. #1	-	72	86	-	0.53	1.65
Shelley Rd. #2	-	73	97	-	0.57	0.95
Mile 82 Hart Hwy.	-	-	89	-	-	0.51
Mile 110 Hart Hwy.	-	-	95	-	-	0.65

Table 9

Mortality of Aspen Leaf Miner in Cocoons Based on 100-cocoon Samples at Seven Plots, West Prince George, 1959-1961

Locality	Percentage mortality					
	Parasitism			Other causes		
	1959	1960	1961	1959	1960	1961
Mile 8 Hart Hwy.	8	10	22	60	6	17
Mile 12 Hart Hwy	5	9	19	61	10	8
Mile 8, Summit L. Rd.	4	4	18	64	8	12
Shelley Road #1	-	4	26	-	15	10
Shelley Road #2	-	10	25	-	7	3
Mile 82 Hart Hwy.	-	-	34	-	-	16
Mile 110 Hart Hwy.	-	-	12	-	-	11

A Pitch Nodule Maker, Petrova sp.

A pitch nodule maker was found occasionally at Bear Lake on lodgepole pine reproduction. Damage was not observed on lodgepole pine in other parts of the District visited.

A Cone Pyralid, Dioryctria abietivorella D.-S.

Populations of cone borers on lodgepole pine remained at a low level throughout the District.

Poplar Borer, Saperda calcarata Say.

Trembling aspen at Sinkut, Fort Fraser, and Mile 18 Hart Highway were infested by the poplar borer. At Sinkut three trees were infested, at Fort Fraser, two, and at Mile 18 Hart Highway, 12. The infested area of one trembling aspen tree at Mile 18 Hart Highway was screened in with wire mesh to determine the emergence dates of the beetles; no emergence had occurred up to September 15 of 1961.

Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

The number of larvae of this sawfly collected from white spruce in 1961 indicated a slight increase from the 1960 level. The incidence of Pikonema alaskensis Roh. in 3-tree beating collections from white spruce taken during the larval period June 12 to August 24 for 1959-1961 is as follows:

No. of collections made during larval period			Percentage containing larvae			Av. no. of larvae per positive sample		
1959	1960	1961	1959	1960	1961	1959	1960	1961
76	52	67	35	21	29	2.2	1.1	1.6

Green-headed Spruce Sawfly, Pikonema dimmockii Cress.

This sawfly was distributed generally over the District in 1961 and increased slightly from the 1960 level. The incidence of Pikonema dimmockii Cress. in three-tree beating collections from white spruce taken during the larval period June 12 to August 24 for 1959 - 1961 is shown in table.

No. of collections made during larval period			Percentage containing larvae			Av. no. of larvae per positive sample		
1959	1960	1961	1959	1960	1961	1959	1960	1961
76	52	67	33	23	29	1.4	1.6	2.0

Green Spruce Looper, Semiothisa granitata Gn.

The green spruce looper increased in all localities sampled in 1961. The preferred hosts were white spruce, Douglas fir and lodgepole pine. As many as 16 larvae were taken in one collection from lodgepole pine in the Blackwater district. The incidence of S. granitata Gn. in three-tree beating collections from white spruce taken during the larval period, July 15 to September 9, for 1960 and 1961 is shown in table below.

No. of collections made during larval period		Percentage containing larvae		Av. no. of larvae per positive sample	
1960	1961	1960	1961	1960	1961
42	50	28.5	66.0	1.7	4.8

Engelmann Spruce Weevil, Pissodes engelmanni Hopk.

Five per cent of the leaders on white spruce reproduction at Summit Lake were infested by the Engelmann spruce weevil. This was a slight decrease from the 1959 and 1960 levels. Single infested trees were common



throughout the District. The attack along the Sutherland River road remained about the same as in 1960 with five per cent of the white spruce reproduction infested.

Mourning Cloak Butterfly, Nymphalis antiopa (L.)

Three trembling aspen trees in the Beaverley district were lightly defoliated by mourning cloak butterfly larvae. Willow bushes along the Hart Highway at Mile 40 were lightly defoliated. No other damage by this insect was noted throughout the District.

Engelmann Spruce Beetle, Dendroctonus engelmanni Hopk.

Three windthrown white spruce trees near the Tudyah Lake budworm plot were lightly attacked by the Engelmann spruce beetle. White spruce logs decked at Fleming Sawmills at Chief Lake had been lightly infested. No other activity by this bark beetle was noted in the District.

Green Larch Looper, Semiothisa sexmaculata Pack.

The upper crowns of Eastern larch reproduction at Tamarack and Cluculz lakes were lightly defoliated by the green larch looper. A total of 60 larvae was collected from a three-tree beating sample at Tamarack Lake and 47 larvae from the Cluculz Lake stand.

Black-headed Budworm, Acleris variana (Fern.)

Black-headed budworm were collected from white spruce and alpine fir at several localities in 1961. A total of five random three-tree beating samples contained this budworm. The largest number of larvae in a single collection was three; they were taken from white spruce in the Blackwater district. Single larvae were taken at the following localities: Baldie Hughes Airforce Base, Summit Lake, Mile 63 Hart Highway, and Pilot Mountain Lookout. No black-headed budworm larvae were collected in 1960.

Douglas-fir Needle Miners, Contarinia spp.

Douglas-fir reproduction at Mile 38 Hart Highway was lightly infested by Douglas-fir needle miners. Ninety-six per cent of the infested needles contained C. pseudotsugae Condr., two per cent C. cuniculator Condr. and two per cent C. constricta Condr. Light populations infested Douglas-fir reproduction at Cluculz Lake and in the Blackwater district. Needle damage was not observed in the remainder of the District.

Spruce Gall Aphid, Adelges cooleyi (Gill.)

The spruce gall aphid was common on white spruce trees in all areas where Douglas fir grows in association with or close to white spruce stands. Three white spruce trees were sampled at random at each locality. A branch from each of the three trees was examined and degrees of infestation were classified as follows: Light, 0-20 per cent of tips infested; medium, 20 to 50 per cent and heavy, 50 to 100 per cent.

Table 10 gives the degree of infestation at 15 localities sampled in 1961.

Table 10

Spruce Gall Aphid Infestations on White Spruce, West  
Prince George District - 1961

Locality	Elevation	Degree of infestation
Isle Pierre	1900	Medium
Sinkut Lake	2400	"
Bear Lake	2300	Light
Blackwater Road	2600	Medium
Miworth	1900	"
Punchaw Lake	2200	"
Mile 68 Hart Highway	2300	"
Lily Lake	2200	"
Fraser Lake	2200	"
Lower Mud River	2000	Light
Punchaw Ranch	2200	Medium
Naltesby Lake	2600	"
Eulatazella Lake	2600	"
Wright Creek	2200	Light
Cluculz Lake	2600	Light

Spotted Tiger Moth, Halisidota maculata Wlk.

Spotted tiger moth larvae were observed feeding on willow bushes. Twenty larvae were counted on a single willow bush in the Beaverley district, and a similar number along the Hart Highway at Mile 32; at Mile 40 where as many as 15 larvae were counted feeding on roadside willows, defoliation was light.

## MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
<u>Acronicta impleta</u> Wlk.	W	1	very scarce
<u>Argyrotaenia tabulana</u> Free.	Pl	2	not found in 1960
<u>Caripeta angustiorata</u> Wlk.	Pl	15	found throughout District
<u>Caripeta divisata</u> Wlk.	Sb, Ba, Sw, Sw, F, Pl	17	higher population in 1961
<u>Clepsis persicana</u> Fitch	Ba, Sw	2	not common in collections
<u>Ectropis crepuscularia</u> Schiff.	Le, W, D, F, Pl, Ba	9	found throughout District
<u>Epirrhanthis substriataria</u> Hlst.	F, A, W	8	down from 1960
<u>Epirrita autumnata</u> Gn.	W, D, F, Ba, Sw	18	collected throughout District
<u>Eupithecia albicapitata</u> Pack.	Sw	1	a cone feeder, not found in 1960
<u>Eupithecia l. bifasciata</u> Dyar	Sw, Sb, Ba, Le	12	increase over 1960
<u>Gluphisia septentrionis</u> Wlk.	A	3	not collected in 1960
<u>Lambdina f. lugubrosa</u> (Hlst.)	Ba, D	2	decrease from 1960
<u>Neodiprion</u> spp.	Pl, F, Ba, Sw	27	up to 15 larvae per collection from Pl
<u>Notodonta simplaria</u> Graef.	A	1	not found in 1960
<u>Nyctobia limitaria</u> Wlk.	F, Sw, Ba	6	Summit Lake, McLeod's Lake, Punchaw
<u>Operophtera bruceata</u> Hlst.	W, D	5	increase over 1960
<u>Pero behrensarius</u> Pack.	Sw	1	decrease from 1960

Insect	Host	No. of collections	Remarks
<u>Syngrapha epigaea</u> Grt.	Cot	1	not found in 1960
<u>Zeiraphera</u> sp.	Ba	1	very scarce

## STATUS OF FOREST DISEASES

### Important Diseases

#### Needle Rust on White and Black Spruce

Witches' brooms on white and black spruce, caused by Chrysomyxa arctostaphyli Diet. were common at several localities throughout the District. The heaviest infections on white spruce were along the Blackwater road from Punchaw Ranch to the Sob Lake turnoff. Black spruce along the Manson Creek road from the Pinchi Lake turnoff to Mile 50 were moderately affected by this disease. Several collections were sent to the Forest Pathology Unit in Victoria for inoculation studies.

#### Lodgepole Pine Stem Canker

Several areas were found where branches of lodgepole pine reproduction were infected by the stem canker fungus Atropellis piniphila (Weir) Lohm. and Cash. The heaviest infections were in the Lower Mud River Valley where 12 diseased lodgepole pine were counted and along the Finmoore road where there were eight. Infections were also found in the Punchaw Lake area.

#### A Needle Rust on Lodgepole Pine

The needles of a lodgepole pine seedling were infected by a rust disease caused by Coleosporium asterum (Diet.) Syd. at Mile 1, Sutherland River road. Infections by this rust were not found elsewhere in the District.

#### Flagging on Alpine Fir Branches

A disease of alpine fir, which causes the branches to die back, was again common in stands along the Hart Highway, at Summit Lake and McLeod's Lake. Several collections have been sent to the Pathology Unit in Victoria. The causal agent has not been determined.

### A Rust on Willow Leaves.

An orange rust on willow leaves caused by Melampsora epitea Thum., was common in the Punchaw Ranch district, Mud River and Sob Lakes areas. At the Punchaw Ranch up to 75 per cent of the leaves were infected on willow bushes bordering the road. This rust alternates its spore stages between willow species and various true firs and spruce.

### Dwarf Mistletoe on Lodgepole pine

Dwarf Mistletoe, Arceuthobium americanum Nutt., was common throughout the Prince George Ranger District on lodgepole pine. At Bear Lake, 15 per cent of the lodgepole pine reproduction was infected.

### OTHER NOTEWORTHY DISEASES

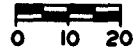
Host	Organism	Locality	Remarks
Spruce, white	Hypodermataceae	Mile 36 Hart Hwy.	Foliage disease tentative identification
Soopolallie	<u>Puccinia caricis shepherdiae</u> J.J. Davis	Miworth	leaf rust
Alpine fir	<u>Arceuthobium americanum</u> Nutt.	Summit Lake	needle rust
Rosa sp.	<u>Phragmidium</u> sp.	Punchaw Ranch	heavily infested

### White Poplar Survey

Ten localities were recorded where European white poplar trees occur in the West Prince George District. All of these localities were in the city of Prince George and were recorded during a special survey prompted by the discovery at Telkwa, B. C. of a rust on ponderosa pine indistinguishable from Melampsora pinitorqua Rostr. the cause of pine twist rust in Europe. White poplar is an alternate host of pine twist rust in Europe.

WEST PRINCE GEORGE DISTRICT

SCALE



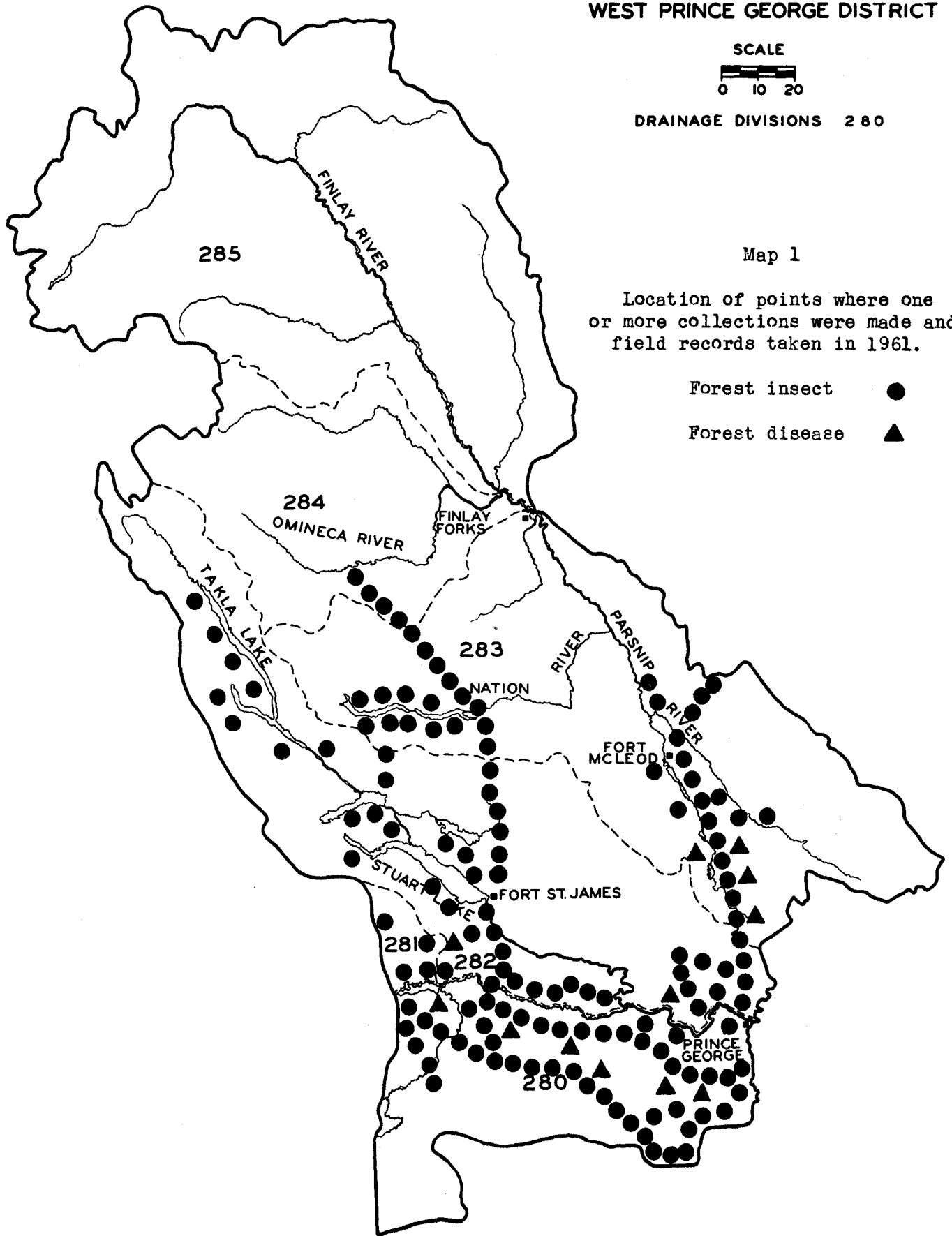
DRAINAGE DIVISIONS 280

Map 1

Location of points where one or more collections were made and field records taken in 1961.

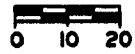
Forest insect ●

Forest disease ▲



# WEST PRINCE GEORGE DISTRICT

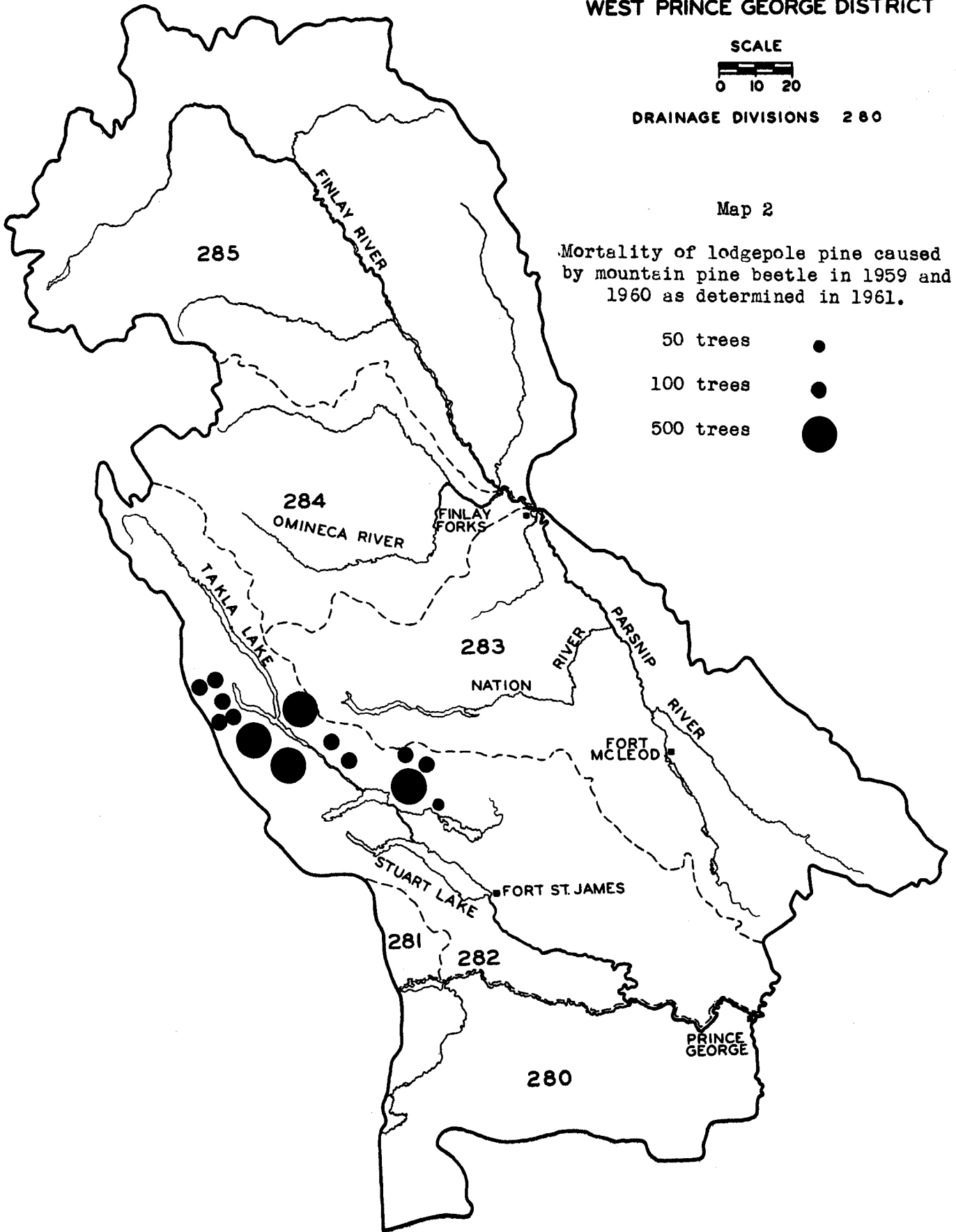
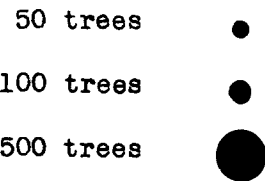
SCALE



DRAINAGE DIVISIONS 280

Map 2

Mortality of lodgepole pine caused by mountain pine beetle in 1959 and 1960 as determined in 1961.



FOREST INSECT AND DISEASE SURVEY

NORTH PRINCE GEORGE DISTRICT

1961



## FOREST INSECT AND DISEASE SURVEY

## NORTH PRINCE GEORGE DISTRICT

1961

E. G. Pottinger

## INTRODUCTION

As the ranger position for the North Prince George District was not filled until July, the field season was very limited in 1961. The writer worked seven weeks in the West Prince George District with Ranger E. Morris, beginning in late July and ending in mid-September. As a result, the total time spent in the North Prince George District was one week.

Table 1 shows the number of forest insect collections by host. Maps 1 and 2 show the locations where the collections were made and field records taken.

Table 1

## Collections by Hosts

North Prince George District - 1961

Coniferous hosts	Forest insects	Broad leaved hosts	Forest insects
Fir, alpine	3	Alder spp.	2
Larch, eastern	1	Aspen, trembling	15
Pine, lodgepole	3	Cottonwood, black	2
Spruce, black	2	Willow spp.	3
Spruce, white	11		
		Total	22
Total	20	Grand total	42

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

Damage caused by the spruce budworm in the Smith River region, Alaska Highway, was first noted in 1957. Although the larval population suffered a slight decrease in 1958 it reached a new high in 1959 and continued in 1960. In 1961, the number of egg masses increased at the perimeter of the infestation and decreased toward the centre, compared with 1960. The only noticeable feeding was at mile 514, Alaska Highway where light defoliation occurred

on white spruce averaging four to five inches in diameter.

Table 2 shows the analysis of egg masses from the Smith River spruce budworm infestation.

Table 2

Spruce Budworm Egg Mass Populations in Four-branch Samples at Six Localities in the Smith River Spruce Budworm Infestation, 1960 and 1961

Locality (mileposts) Alaska Highway	Branch area (sq. ft.)		No. egg masses		Av. no. egg masses per 100 sq. ft. of foliage surface	
	1960	1961	1960	1961	1960	1961
494	12.9	3.7	10	13	77.5	351.4
502	6.4	3.5	38	4	593.7	114.3
506	6.9	3.3	38	5	550.7	151.5
514	7.5	2.9	42	8	560.0	275.9
528	5.6	3.2	50	19	892.8	593.7
538	4.9	2.9	4	4	81.6	137.9

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

Information concerning the two year spruce budworm was limited to the Link Creek plot at Pine Pass.

Two per cent of the white spruce and alpine fir buds in this area were infested, compared with 20 per cent in 1959 when the larvae were in a similar stage of development.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The population density of this miner continued to decrease slightly in 1961. This corresponded with a steady reduction over the last four years.

Plots sampled in 1959 and 1960 were re-examined in 1961 and the intensity of the infestation for the last two years is compared in tables 3 and 4. The data in these tables were obtained by examining the leaves on two apical 12-inch branches from the lower crown of each of five trees at each plot.

Table 3

Percentage of Aspen Leaf Surfaces Mined and Number of Adult Leaf Miners Produced in Samples, North Prince George District, 1960 and 1961

Plot locality	Percentage of leaf surfaces with mines		No. of adults produced per leaf surface	
	1960	1961	1960	1961
Prochniak Creek	4.3	4.3	0	0.09
Smith River	50.9	11.5	0.05	0.06
Hyland River	25.2	26.9	0.02	0.03
Mi. 45.5 Cassiar Rd.	4.4	0.7	0.02	0

Table 4

Mortality of Aspen Leaf Miners in Cocoons, Based on 100-cocoon Samples from Four Plots, North Prince George District, 1960 and 1961

Location	Percentage mortality in cocoon stage			
	Parasitized		Other causes	
	1960	1961	1960	1961
Prochniak Creek	15	33	28	33
Smith River	49	38.5	12	7.7
Hyland River	70	46.2	7	14.0
Mi. 45.5 Cassiar Rd.	44	-	22	-

Forest Tent Caterpillar, Malacosoma disstria Hbn.

An infestation of forest tent caterpillar, located one mile south of the Peace River Bridge on the Alaska Highway, was reported for the first time in 1961. The infestation covered at least four and a half square miles. When the area was visited in September, the trembling aspen trees had leafed out since the attack, indicating that there had been heavy defoliation.

Egg masses were collected at this location by felling three representative aspen trees at two points and removing all masses present for further study. No old egg masses were present on any of the trees examined.

The information in Table 5 was obtained from the dissection of five randomly chosen egg masses from each of the six trees.

Table 5

Analysis of Forest Tent Caterpillar Egg Masses Collected from Trembling Aspen Trees, North Prince George District, 1961

D.B.H. (in.)	Tree ht. (ft.)	Crown length (ft.)	Av. no. eggs in five masses	Percentage			
				Living larvae	Dead larvae	Undeve- loped eggs	Para- sitized eggs
5	48	10	137.2	77.6	3.2	18.5	0.74
7	52	15	115.4	77.5	0	22.5	0
4	42	15	124.0	91.8	0.5	7.3	0.48
5	53	18	116.2	80.3	0	19.2	0.50
3	39	10	* 64.0	44.4	0	55.6	0
6	54	18	122.8	85.1	0	14.6	0.30
Averages			113.27	76.1	.62	22.9	.34

\* This tree had only one egg mass

Dead Alpine fir, possibly caused by Western Balsam Bark Beetle Dryocoetes confusus Sw.

An area of eight and a half square miles containing dead alpine fir was noted at Pine Pass in September 1961. It was estimated that on the north and west sides of the Pine River the dead trees averaged five per acre. It was possible to observe 5500 acres from the highway or a total of approximately 27,500 dead trees comprising about 825,000 cubic feet of timber. In all likelihood, this infestation extends beyond the area visible from the Hart Highway. A number of greyish trees, apparently attacked at an earlier date, were also observed but they were not counted.

Oregon Fir Sawyer, Monochamus oregonensis Lec.

A fire occurred in the Stewart Lake area, northwest of Groundbirch in early May 1961. Standing and fallen fire-killed timber was inspected on August 2 for insect activity.

The majority of the 45 trees examined were white spruce. Bark was removed to shoulder height on standing trees and at intervals from butt to crown on fallen timber. Only one Monochamus larva was found.

According to the British Columbia Forest Service, a total of 23,393 acres was burned and 14,494,000 cubic feet of white spruce, pine and alpine fir are salvageable.

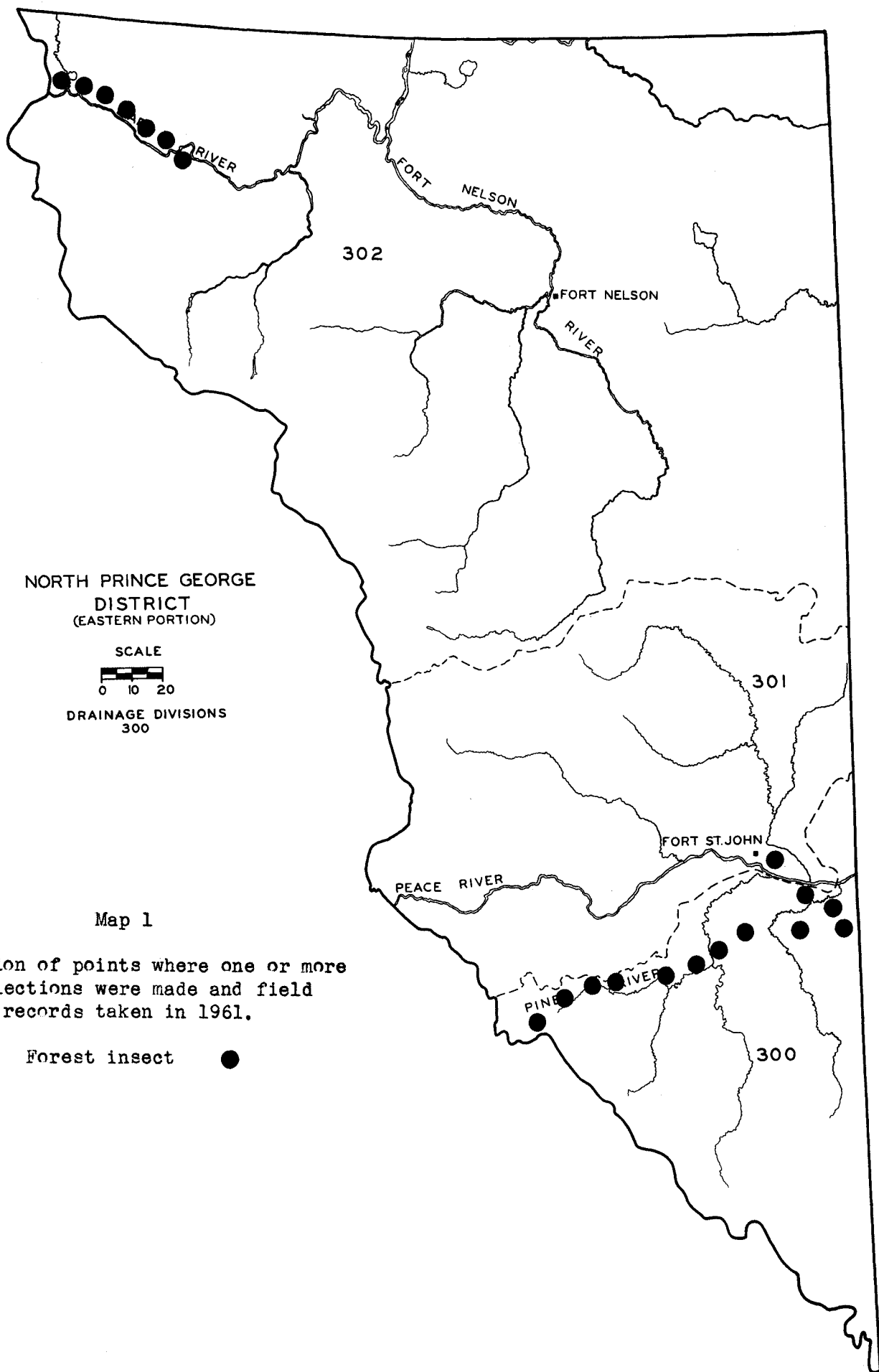
## MISCELLANEOUS INSECTS

Insect	Host	No. of collections	Remarks
<u>Anacamptodes emasculata</u> Dyar	D	1	new host
<u>Biston cognataria</u> Gn.	W, A, D	4	more plentiful than in 1960
<u>Caripeta divisata</u> Wlk.	Pl, Ba	2	last collected in 1958
<u>Halisodota maculata</u> Harr.	D, W	3	rare in North Prince George District
<u>Ichthyura</u> sp.	A	1	no record in N.P.G. since 1958
<u>Schizura unicornis</u> A. & S.	D	1	rare in N.P.G.
<u>Semiothisa hebetata</u> Hlst.	A	1	rare
<u>S. granitata</u> Gn.	Sw, Ba, Pl	3	common on conifers
<u>S. sexmaculata</u> Pack	Le	1	abundant

## STATUS OF FOREST DISEASES

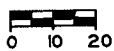
## Exotic Plantations

On August 1, 1961, the Exotic Plantation at Groundbirch (XP51) was examined. Very little information was obtainable as the plot had suffered much damage in the last several years. Few of the original stakes remained since the Hart Highway road allowance had been widened. As a result the Pinus sylvestris L. which were planted were difficult to locate, and most of those found were either browsed or mechanically damaged.



NORTH PRINCE GEORGE  
DISTRICT  
(EASTERN PORTION)

SCALE

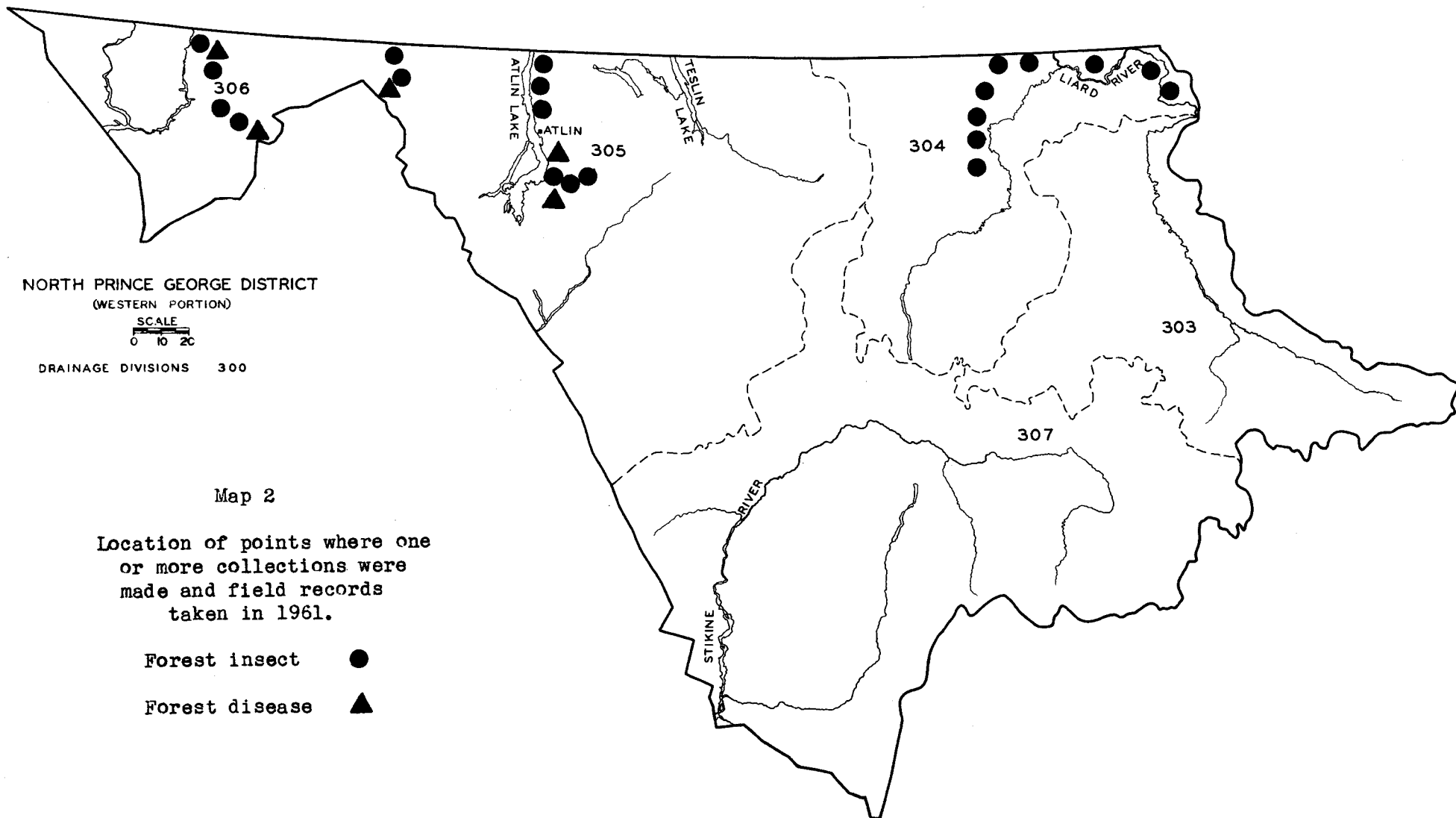


DRAINAGE DIVISIONS  
300

Map 1

Location of points where one or more  
collections were made and field  
records taken in 1961.

Forest insect ●



FOREST INSECT AND DISEASE SURVEY

YUKON DISTRICT

1961



## FOREST INSECT AND DISEASE SURVEY

## YUKON DISTRICT

1961

J. C. Holms

## INTRODUCTION

The Forest Insect and Disease Survey in the Yukon Forest Biology Ranger District began on May 28 and terminated on September 8. The areas accessible by roads in Yukon Territory and Atlin Ranger District were surveyed and a helicopter flight was made through courtesy of the Yukon Forestry Division. A house trailer stationed at the Yukon Forestry Division in Whitehorse was used as headquarters.

Contact was made August 4 at Haines with Mr. D. Crosby, Entomologist with the U.S. Forest Service at Juneau, Alaska. Fort McPherson (Aklavik) Road will be completed to Chapman Lake, which is 75 miles north of Mile 88, Dawson Road, by 1962. The road was open to Mile 70 in 1961. Twenty Forest Insect Survey permanent sampling stations were established during the 1961 field season in the Yukon.

Table 1 shows the host trees and the number of insect and forest disease collections made from each host. Map 1 shows the localities where collections were made and field records taken.

Table 1

## Collections by Hosts

Yukon District - 1961

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Fir, alpine	25	16	Alder, mountain	16	8
Hemlock, western	11	3	Alder, Sitka	2	6
Juniper, common	3	1	Ash, Sitka mountain	3	-
Larch, eastern	2	3	Aspen, trembling	45	14
Pine, lodgepole	52	14	Birch, dwarf	16	6
Spruce, black	15	1	Birch, white	24	14
Spruce, Sitka	12	6	Cottonwood, black	17	3
Spruce, white	121	32	Dogwood, red osier	1	-
			Maple, Douglas	1	-
			Poplar, balsam	14	1
			Willow spp.	39	33
			Miscellaneous	29	13
			Total	207	98
Total	241	76	Grand total	448	174

## STATUS OF INSECTS

Spruce Seedworm, Laspeyresia youngana Kft.

A light cone crop was present on white spruce in the southern Yukon, and around Atlin and Bennett, B. C. while a heavy crop occurred in the areas surveyed in the central Yukon. Samples, consisting of 80 cones picked at random from four trees were taken at four localities in late July. From 89 to 97 per cent of the cones were infested and it was estimated that an average of 60 per cent of the seeds were eaten by seedworms. A small degree of larval parasitism of the seedworm was evident. Table 2 shows the percentage of cones infested for 1959, 1960 (50-cone samples) and 1961 (80-cone samples)

Table 2

Percentage of White Spruce Cones Infested  
by the Spruce Seedworm, Yukon District, 1959 - 1961

Locality	Percentage infested		
	1959	1960	1961
McKee Creek, B. C.	46	96	97
Mile 867, Alaska Hiwhway, Y.T.	26	26	94
Mile 976, " " " "	26	60	94
Carcross, Y. T.	74	92	89

Smaller Western Pine Engraver, Ips latidens (Lec.)?

The number of lodgepole pine killed by the smaller western pine engraver in association with the lodgepole pine beetle, Dendroctonus murrayanae Hopk. increased slightly in the Annie Lake Road area in 1961. The beetles were moving back to a small extent into the trees bordering the golf course fairways, north of Mile 1, Annie Lake Road. Along the road itself, infested trees remain scattered singly and in small groups, and were relatively exposed or marginal.

The smaller western pine engraver continued to infest lodgepole pine in the Whitehorse area and bordering McClintock River Road. Light damage was also found in lodgepole pine at Mile 131, Mayo Road. The pine engraver at this location was not associated with the lodgepole pine beetle.

The population of Ips latidens (Lec.)? was low in 1961 and should continue at a low level in 1962.

Lodgepole Pine Beetle, Dendroctonus murrayanae Hopk.

The lodgepole pine beetle continued to cause light damage to standing, scattered lodgepole pine along the Annie Lake Road and around the perimeter of the adjacent golf course. This beetle was generally associated with the smaller western pine engraver. Light damage to scattered lodgepole pine occurred in the Whitehorse area and along McClintock River Road. At Mile 131, Mayo Road, adults were found at the root collar of two trees.

Large Aspen Tortrix, Choristoneura conflictana (Wlk.)

This tortrix caused light defoliation of trembling aspen at the Carmacks infestation. The area of the infestation has expanded and now extends from Mile 104 to 107, Mayo Road; small numbers of larvae and pupae were present in bound leaf cells on June 26.

As in 1960, four feet were cut from the top of each of five trees at Carmacks. The sampled trees averaged two and one-half inches d.b.h., and 26 feet in height. Table 3 shows the results of examinations for defoliation in 1960 and 1961.

Table 3

Defoliation of Trembling Aspen by Large Aspen  
Tortrix, Carmacks, Y.T., August 1960 and 1961

Tree number	No. of leaves examined		Percentage of leaves 20-100% devoured	
	1960	1961	1960	1961
1	672	677	44	6
2	831	932	69	7
3	998	1141	36	6
4	571	744	63	8
5	563	1007	53	10
Totals	3635	4501	Av. 53	7

Two egg masses were found during the examination as well as 16 vacated leaf pupal cells, one apparently successfully emerged pupa, and one parasitized pupa. Parasitism was heavy and the population may decline to a low level in 1962. The Beaver Creek (Mile 1202) infestation collapsed in 1961.

A Gelechiid on Trembling Aspen

Two gelechiid larvae were found in 16 vacated tortrix leaf pupal cells examined in the trembling aspen sample taken at the large aspen tortrix infestation north of Carmacks, August 12, 1961. Twenty-nine of these same grey gelechiid larvae were found in 142 deserted tortrix leaf pupal cells examined in 1960.

Aspen Leaf Miner, Phyllocnistis populiella Cham.

The aspen leaf miner population decreased in intensity at the Watson Lake and Rancheria River permanent sample plots. A new plot was established at Mile 782, Alaska Highway, Y.T. As in the previous two years, samples consisting of two 12-inch branches were cut from each of five tagged trees at each plot and the leaves examined to obtain the data shown in the following tables.

Table 4

Percentage of Aspen Leaf Surfaces with Mines, and  
Number of Leaf-miner Adults Produced per Leaf Surface,  
1959 to 1961. Yukon District

Location	Percentage leaf surfaces with mines			No. of adults produced per leaf surface		
	1959	1960	1961	1959	1960	1961
Watson Lake, Y.T.	54	78	40	0.28	0.14	0.09
Rancheria River	28	42	7	0.13	0.06	0.09
Mile 782, Alaska Highway, Y.T.	-	-	4	-	-	0.04

The adult emergence indicates that infestations may be expected to decrease in 1962.

A 100-cocoon sample was obtained at each plot to determine mortality occurring at this stage. Mortality of aspen leaf-miners in cocoons in August 1959, 1960 and September 1961 in the Yukon District is as follows:

Location	Percentage mortality					
	Parasitism			Other causes		
	1959	1960	1961	1959	1960	1961
Watson Lake	25	62	33	4	6	9
Rancheria River	33	58	12	6	8	31
Mile 782, Alaska Highway	-	-	30	-	-	10

Adult aspen leaf-miners were laying eggs on unfurling leaves from May 28 to May 31 at Watson Lake and at Mile 642, Alaska Highway, Y.T. At that time adults were found perching on white and black spruce. After mid-June, aspen leaf-miner larvae were found lightly infesting trembling aspen at Mile 1015, Alaska Highway and Snag Road, Y. T.

Aspen leaf-miner adults were found perching in large numbers on white spruce during the evening of July 20, at Watson Lake.

A Birch Leaf Blotch-miner, Gracillaria serotinella Ely

Light damage caused by this insect has been noted throughout the range of white birch in the Yukon area surveyed.

Larvae and vacated mines in white birch leaves were observed on Snag Road and at Mile 1188, Alaska Highway, Y.T. on June 21. Three to six per cent of the leaves were infested bordering Snag Road. Vacated, mined leaves were found west of Dawson on July 12 and at Watson Lake on July 20. A few larvae were present in white birch leaves on July 10 at Stewart River crossing. White birch branch tip samples were taken at two locations on the Dawson Road in mid-August. At that time the insects had vacated the leaves. Each of the two samples consisted of 10 two-foot branch tips from the five to 10 foot level. One branch was cut from the shaded and one from the exposed side of each of five sample trees at the two locations. The two samples from two sites were taken in an attempt to determine the extent of damage caused by the blotch-miner.

The percentages of white birch leaves infested by Gracillaria serotinella Ely, on Dawson Road, Mid-August 1960 and 1961, are as follows;

Locality	No. of leaves examined		Percentage of leaves infested	
	1960	1961	1960	1961
Mile 45	1003	1012	0.1	2.0
Mile 101	964	1103	8.5	6.0

A Leaf Blotch-miner, Lithocolletis sp. on Trembling Aspen

Damage caused by this insect was again evident to some extent on trembling aspen throughout much of the tree's range in the area surveyed. As in 1960, two plots were sampled near the Mayo Road. A sample consisted of five 12-inch branch tips from five trees. All the leaves from each sample were put into a container and the 100 leaves yielding information were picked at random. The percentages of two 100-leaf samples infested by a trembling aspen leaf blotch-miner on the Mayo Road, mid-August 1960 and 1961, Yukon District are as follows:

Locality	Percentage of leaves infested	
	1960	1961
Mile 215	19.0	9.0
Mile 168	1.0	43.0

At the time of the 1961 examination, larvae, pupae and vacated pupae were present. Some leaves had up to six blotches on the under surfaces at Mile 168, Mayo Road. Fewer blotches were found at Mile 215, where no blotch-miners had emerged at the time of the examination.

#### One-year-cycle Spruce budworm, Choristoneura fumiferana (Clem.)

Three spruce budworm larvae from two 3-tree beating samples were taken June 16 and June 28, at Mile 1003, Alaska Highway and Mile 215, Mayo Road, respectively. Three pupae were taken in a white spruce beating June 28 at Mile 215, Mayo Road. A total of seven empty pupal cases in two white spruce beating samples were taken June 19 at Haines Junction and August 29 at Mile 1061, Alaska Highway.

#### Birch Leaf-rollers, Rheumaptera spp.

Numerous birch leaf-roller adults were observed in flight at Haines, Alaska and vicinity, June 13. One larva was found in a mountain alder beating sample, August 4, near Haines, while one larva was taken in a hand-picked white birch branch tip sample, August 16, Mile 45, Dawson Road.

#### Willow Leaf-miner, Lyonetia salicicola Busck

The McKee Creek infestation west of Atlin, B. C. continued in 1961 but caused only light damage to willow. The leaves of willow were also lightly infested at scattered points in the Yukon.

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

Three black-headed budworm larvae, from three white spruce beating samples, were found in late June and early July, in the Mayo area and near Stewart River Crossing.

#### Yellow-headed Spruce Sawfly, Pikonema alaskensis Roh.

Yellow-headed spruce sawfly larvae were collected in the Yukon, northwestern B. C., and at Haines and Skagway, Alaska. The majority of

SOUTH PRINCE GEORGE DISTRICT



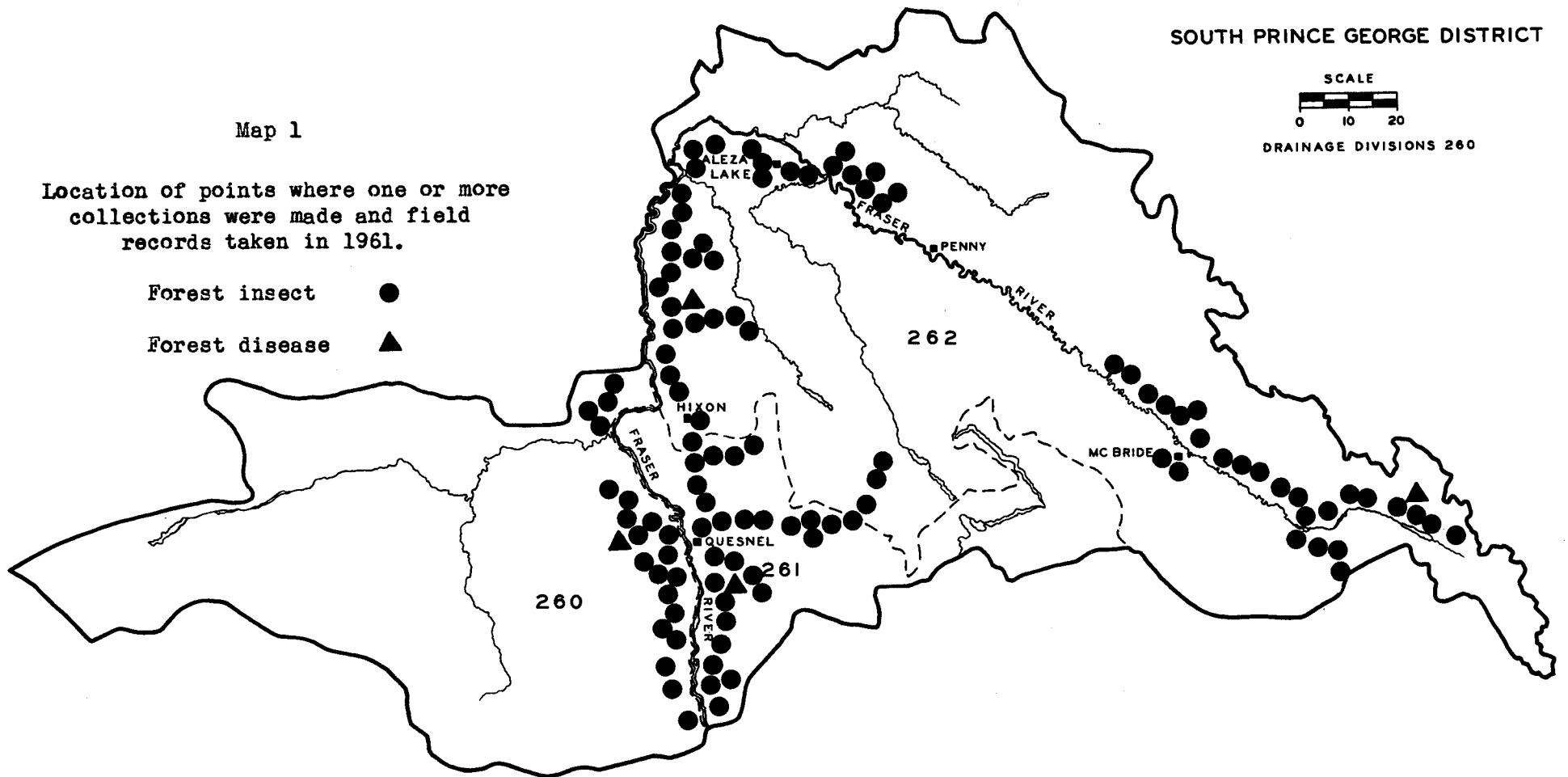
DRAINAGE DIVISIONS 260

Map 1

Location of points where one or more collections were made and field records taken in 1961.

Forest insect ●

Forest disease ▲



Map 2

Area within which forest tent caterpillar infestations occurred in 1961 and predicted area of infestation in 1962 as determined by egg surveys.

1961

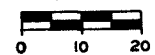


1962

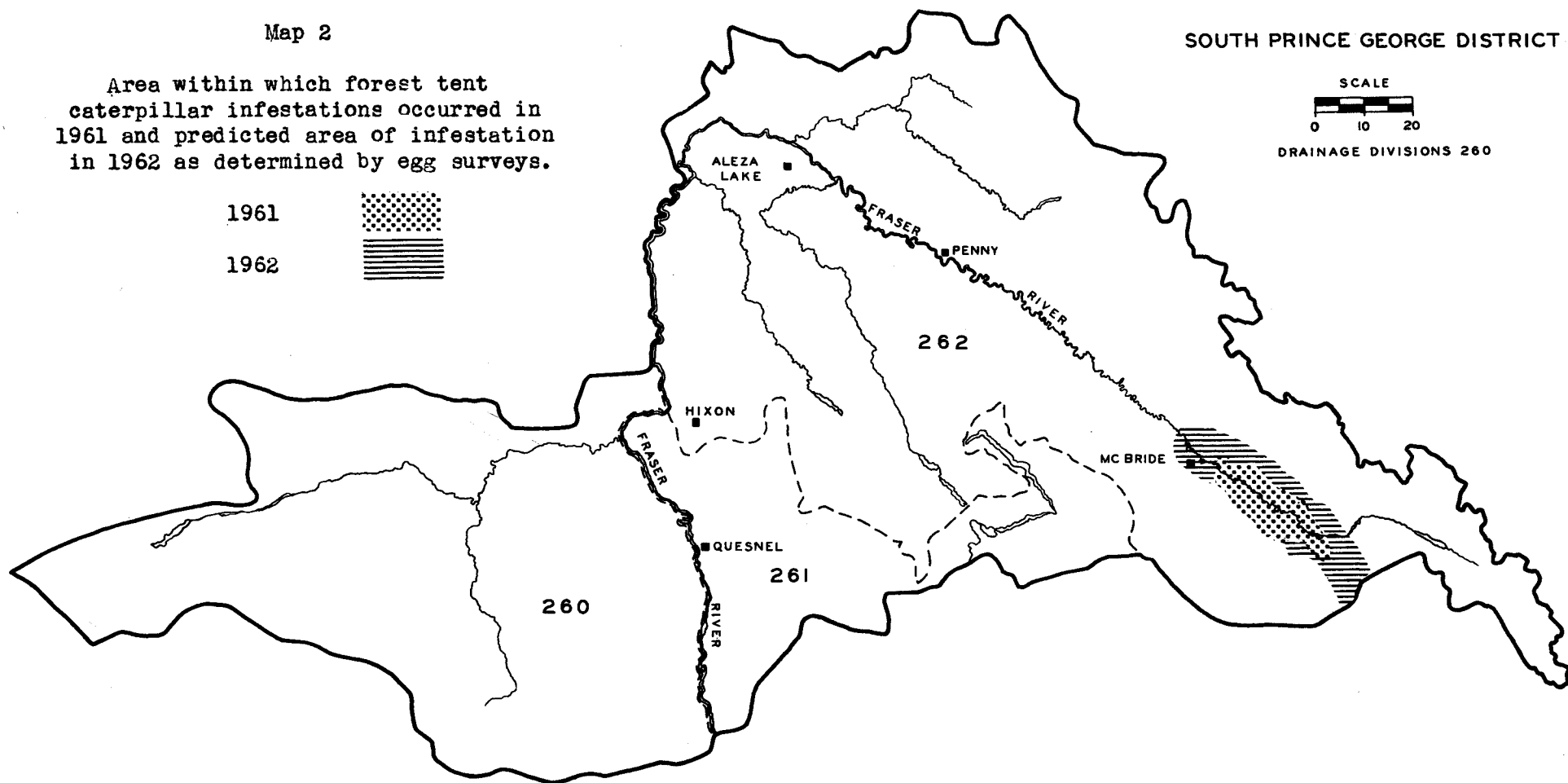


SOUTH PRINCE GEORGE DISTRICT

SCALE



DRAINAGE DIVISIONS 260





the larvae were on white spruce, while some larvae were collected from black and Sitka spruce. Larvae were found in beating samples from June 28 to August 29, 1961. The greatest number of larvae found in any one beating collection was 18. It was taken from white spruce near Champagne, Y.T. on July 31. The number of larvae found in three-tree beating collections in Yukon District is shown below.

No. of collections made during larval period		Percentage containing larvae		Av. no. of larvae per positive sample	
1960	1961	1960	1961	1960	1961
38	54	39.7	53.7	1.7	3.2

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

Larvae of the green-headed spruce sawfly were collected over the same range as the yellow-headed spruce sawfly. They were collected from June 28 to August 22, the majority from white spruce, while some were found on black and Sitka spruce. The largest number of larvae found in any one beating was 10 on white spruce at Mile 12, Dawson Road on July 4, 1961. Comparison of collections containing the green-headed spruce sawfly in 1960 and 1961 is shown below:

No. of collections made during larval period		Percentage containing larvae		Av. no. of larvae per positive sample	
1960	1961	1960	1961	1960	1961
38	54	16	39	1.3	2.1

A Maggot, Pegohylemyia anthracina Czerny., in White Spruce Cones

This maggot caused varying degrees of damage to white spruce seed at four points sampled in northern B. C. and the Yukon in 1961. A sample, where possible, consisted of 80 cones from four trees at each of the four localities. The degree of infestation for the four 80-cone samples ranged from 0 to 20 per cent in 1961, compared with a range of 16 to 52 per cent from four 50-cone samples in 1960.

A Leaf-miner, Phyllocnistis sp. on Black Cottonwood

This insect continued to cause light damage to black cottonwood throughout much of the tree's range in the area surveyed in the Yukon and northwestern B. C.

A Willow Leaf Beetle, Gonioctena notmani Schaeff.

About 80 larvae were collected in a willow beating at Mile 45, Dawson Road. Defoliation was light to medium and attack was evident on every bush observed at that site. By July 4, larvae were pupating just beneath the ground surface under a thin moss layer and prepupal beetle larvae were found in individual cells. Some numbers of adults were present on the willow foliage.

The infestation at Bonanza Creek southeast of Dawson increased in length by 1.5 miles in 1961, and was continuous along the road from Mile 10 to Mile 18. Nearly 200 larvae were beaten from three small willows on July 5 at Mile 14.5 where defoliation was heavy; most of the leaves had been either partly or completely devoured. A few bushes at this point were completely defoliated. Numerous larvae were found pupating in cells just beneath the ground surface. Moderate numbers of adults were present on willow on July 5. This infestation is expected to continue in 1962.

A Trembling Aspen Leaf Beetle, Gonioctena americana Schaeff.

About 50 larvae were beaten from three young (one-half inch average d.b.h.) trembling aspen at Mile 8.4, Fish Lake Road, near Whitehorse, July 1. Ten adults were found in the same collection. The infested area at this site covered about 10 acres and defoliation was light. Larvae were dropping to the ground to pupate on July 1, although many others were still feeding. The larvae seemed to prefer the lower crown where defoliation was most noticeable. The elevation of this site was about 4000 feet.

Light defoliation of reproduction and immature pole-sized aspen was found along Bonanza and Quartz Creek roads during mid-August. Seven adults were collected in a trembling aspen beating sample on Quartz Creek Road, August 22. No larvae were present at that time.

Oregon Fir Sawyer, Monoctonus oregonensis Lec.

Numerous adults were observed on decked white spruce logs at Ewing's mill site, Mile 218, Mayo Road, from June 28 to July 10. Single female and male beetles as well as copulating pairs were present on the logs. Females, usually attended by males, were observed chewing egg niches in the bark; the lower half of the logs was preferred. One female under observation spent half an hour ovipositing in an egg niche before she and

an attending male moved away.

Oregon fir sawyer adults were reported from Dawson and in the Watson Lake area the week of July 17 to 23. One male was found perching in a black spruce at Watson Lake on July 20. One male was caught in flight at Whitehorse on July 29 and one perching male was collected in a lodgepole pine beating sample, Mile 197, Mayo Road on August 10.

Five adults (three male and two female) were seen August 10 on decked white spruce logs at Ewing's mill. The adults were inactive at that time.

No new Oregon fir sawyer beetle infestation has been observed in any of the Yukon burns.

#### A Round-headed Borer, Saperda moesta Lec. in Poplar

Copulating pairs of Saperda moesta Lec. were common on leaves and stems of regeneration black cottonwood at Mile 106, Mayo Road, June 30. Damage in the form of gall-like stem swellings was observed. Pupae and larvae were present in short galleries in the stem pith inside the galls.

Nearly every regeneration cottonwood was infested to some degree at this site. Tree mortality was very light, although there were a few dead branches and some dead upper crowns on the small trees. Small numbers of larvae were found in stem and branch swellings on July 24 at Mile 12, Carcross Road, causing light damage to regeneration black cottonwood. Exit holes were visible on a few swellings and one adult was present on a stem at that time. Light damage to regeneration balsam poplar stems was seen at Mile 11, Hunker Creek Road on August 17. Larvae were present in the galls.

In late August larvae in feeding galleries and pupal cells were found near Haines Junction, Mile 1104, and Mile 1171 (White River flats). Old and recent damage was evident in a number of cases. Tree and branch mortality was light, due to the low population of this insect which resulted in damage to only a small area of the cambium.

#### A Scolytid, Cryphalus nitidus (Sw) in Willow

Willows attacked by this scolytid were observed on Aishihik, Bonanza, Hunker, Sulphur, Fort McPherson roads, and at Dawson and Carmacks in 1961. Numerous adults were present in willow stems during mid-July in the Dawson area. In some instances damage extended from the top of a willow stem to the base, where tunnels were so numerous that the stem was girdled. Infested stems died from the top down. Only a small number of stems were usually attacked in each clump.

Alaska Spruce Beetle, Dendroctonus borealis Hopk.

Mortality of mature white spruce caused by the Alaska spruce beetle along the Haines Road was first reported in 1943. The population collapsed in 1948. At the present time the population is at a very low level. Only small numbers of adults, eggs and pupae were found in 1961 in the Yukon at Whitehorse and at Mileposts 976, 1048, 1093, Alaska Highway. There was light damage at the root collars of scattered mature white spruce and occasionally spruce weakened by other agents were infested.

Old beetle-killed trees bordering the B. C. and Yukon sections of the Haines road were very numerous, mortality having occurred from Mile 72 to 133, with gaps where spruce was non-existent. White spruce stands were most dense on the valley floor and extended up the mountain sides to a height of 3000 feet along Haines Road. It was estimated that the total area containing beetle-killed spruce along the Haines Road was 435 square miles. In this area, white spruce stands covered 145 square miles or 92,800 acres. Spruce were killed over a total area of about 48,000 acres. The average number of dead white spruce trees per acre was estimated at 27, making a total of 1,576,061 beetle-killed trees with an estimated volume of 31,501,220 cubic feet. An average volume of 20 cubic feet per tree was used to determine the total volume of timber killed.

A Twig-boring Scolytid, Myeloborus prob. fivazi Blckm. in Lodgepole Pine.

This scolytid has caused light twig damage throughout much of the range of lodgepole pine in the Yukon. The scolytids attack the twigs causing flagging on both young and old trees. A few small trees have been killed.

The entrance tunnel in infested pine twigs was indicated by a small pitch tube. The pith was entirely destroyed in some twigs, the gallery extending up to five inches in length from the pitch tube to the base of the candle. Some twigs had two pitch tubes with adults and larvae in the pith gallery in June. Adults were present in twigs in August. Figure 1 shows an adult in an excavated lodgepole pine twig.

MISCELLANEOUS INSECTS

Yukon District

Insect	Host	Collections	Remarks
<u>Actebia fennica</u> Tausch.	Sw, A	2	Mile 953 A.H. large numbers of larvae in mid June

Insect	Host	Colls.	Remarks
<u>Anoplonyx canadensis</u> Hgtn.	Le	1	Mile 681 A.H.
<u>A. luteipes</u> (Cress.)	Le	1	Mile 658 A.H.
<u>Arge clavicornis</u> (F.)	Biw, W, Big, Dt	18	widely distributed
<u>Campaea perlata</u> Gn.	Sw, Biw, A, Dt W, red osier dogwood	17	widely distributed
<u>Cerura</u> probably <u>occidentalis</u> Lint.	A, Cot	2	rare in Yukon; Mile 106 Mayo Road Mile 8 Hunker Ck. Rd.
<u>Dioryctria abietivorella</u> D. & S.	Pl, cones	1	Bennett, B. C.; unusual host
<u>Hydriomena furcata</u> Thun.	W	5	widely distributed
<u>Nematus mendicus</u> Walsh	Big, Biw, Dt	9	widely distributed
<u>Neodiprion</u> spp.	H, S	3	Mile 42, 49 Haines Rd., B. C.
<u>Operophtera bruceata</u> Hlst.	A, Big, H, W	3	Mile 103 Haines Rd. Mile 1030 A.H. Whitehorse
<u>Orgyia antiqua badia</u> Hy. Edw.	Biw, D	2	Mile 196 Mayo Rd.
<u>Pheosia rimosa</u> Pack.	A	1	Mile 960 A.H.; first Yukon Record
<u>Semiothisa granitata</u> Gn.	Sw	1	Haines Junction
<u>S. sexmaculata</u> Pack.	Le	2	Mile 658, 681 A.H.
<u>Smerinthus cerisyi</u> Kby.	-	0	not collected in 1961
<u>Syngrapha selecta</u> Wlk.	Sw	1	Mile 19 Tagish Rd.
<u>Trichiosoma triangulum</u> Kby.	A, Biw, Cot, Dt, W, Sitka mountain ash	15	widely distributed

## MISCELLANEOUS INSECT ADULTS

## Yukon District

Insect	Host	Colls.	Remarks
<u>Anatis mali</u> (Say)	Dt	2	Dawson
<u>Asemum atrum</u> Esch.	A	1	Whitehorse; perching record
<u>Drasterius debilis</u> Lec.?	H, Pl, Sb, Sw	5	widely distributed
<u>Grammoptera subargentata</u> Kby.	Bpo	1	Haines Junction
<u>Hoppingiana hudsonica</u> Lec.	A, Big, Dt, Pl, Sb, Sw, W	42	widely distributed
<u>Lepyrus gemellus</u> Kby.	W	3	Mile 1109 A. H. Carcross, Mile 214 Mayo Rd.
<u>Mulsantina hudsonica</u> Csy.	Pl, Sb, Sw	10	widely distributed
<u>Nymphalis antiopa</u> Linn.	in flight	1	Mile 1171 A.H.; no larvae collected
<u>Phratora purpurea pur-</u> <u>purea</u> Br.?	Biw, Big	3	Mile 1188 A.H. Mile 5 Snag Rd., Mile 18 Bonanza Ck.Rd. leaf-eating beetle
<u>Tetropium velutinum</u> Lec.	Sw	1	Mile 218 Mayo Rd., on logs
<u>Xylotrechus obliterated</u> Lec.	Sw, Cot	2	Mile 995 A.H. Mile 12 Carcross Rd.
<u>X. undulatus</u> Say.	Sw, in flight	6	Champagne, Whitehorse, Mile 218 Mayo Rd., Mile 24 Dawson Rd.
<u>Zeugophora</u> spp.	A, Bpo	2	Mile 642 A.H. Dawson; leaf-eating beetles

STATUS OF FOREST DISEASES

Important Diseases

Blister Rust on Lodgepole Pine

Infections of Cronartium comandrae Peck continued to cause light mortality in regeneration lodgepole pine stands in the Yukon at Mile 898 Alaska Highway, on Carcross Road, Whitehorse area, and on McKee Creek Road, B. C.

Needle Rust on White and Black Spruce

This rust caused by Chrysomyxa arctostaphyli Diet. continued to inflict light damage on white and black spruce in the Yukon and north-western B. C. It was reported by Yukon Forestry Warden, Mr. T. Kennedy, at Teslin, Y.T., to have increased in that area over the last few years.

?Climatic Injury to Lodgepole Pine

The area of dead and dying lodgepole pine at Bennett, B. C. remained practically unchanged in 1961; its extent was .75 square miles. A few new branches were dying near the bases of partly living trees.

?Climatic Injury to Alpine Fir

Dying of alpine fir twig tips continued, although to a lesser degree, at Calumet, Clear Creek and Canol roads, in Keno Hill area, and near Bennett, B. C., in 1961; Affected twig tips ranged from one to five per cent on Canol Road to 44 per cent at Calumet. Clear Creek alpine fir occurs from Mile 6 to Mile 20 ranging from 2300 feet to timberline at 4200 feet. Heaviest damage occurred at Mile 9 Clear Creek Road.

As in 1960, two samples, each consisting of ten 12-inch branch tips from five trees were taken at Calumet and on Clear Creek Road to determine twig tip mortality. The average d.b.h. of the trees sampled was three inches, branch samples being cut from the five to ten foot level. Percentage of alpine fir twig mortality caused by climatic injury, August 1960 and 1961 in the Yukon is as follows:

Locality	Number of twigs examined		Percentage of dead twigs	
	1960	1961	1960	1961
Calumet	356	230	45.2	43.9
Mile 9, Clear Creek Road	367	332	42.5	21.4

A Willow Leaf Rust

A willow leaf rust caused by Melampsora epitea Thum. occurred throughout the Yukon, northwestern B. C. and at Skagway and Haines, Alaska. All of the leaves of some bushes were heavily infected, however, the majority of the willow affected suffered only light damage. True firs and spruces are the coniferous hosts of this rust.

Damage Caused by Varying Hares

Varying hare damage to regeneration white spruce, lodgepole pine and poplars was widespread in 1961 in the Yukon and northwestern B. C. The branches of the young spruce and pine were often bitten off, leaving only the main stem while on others the bark was removed from the main stem to a height of three feet above the ground.

Figure 2 shows varying hare damage to young trembling aspen near Carmacks, Y. T.

OTHER NOTEWORTHY DISEASES

1961

Host	Organism	Locality	Remarks
alder	<u>Peniophora aurantiaca</u> (Bres.) Hohn. & Litsch.	Dawson, Y.T; Bennett, B.C.	a rot fungus
?alder, green	<u>Taphrina japonica</u> Kusano ?	Dawson, Y.T.	causes leaf blisters
alder, green	<u>Cytosporina</u> sp.	Mile 762 A.H., B. C.	causes die-back of stems
	<u>Daedalia unicolor</u> (Bull.) Fr.	Dawson, Y.T.	causes a heart rot of living hardwoods
aspen, trembling	<u>Melampsora medusae</u> Thum.?	widespread	causes a coniferous needle rust
	<u>Polyporus pargamenus</u> Fr.	Mile 3 Dawson Rd., Y.T.	causes white pocket rot of dead sapwood of hardwoods

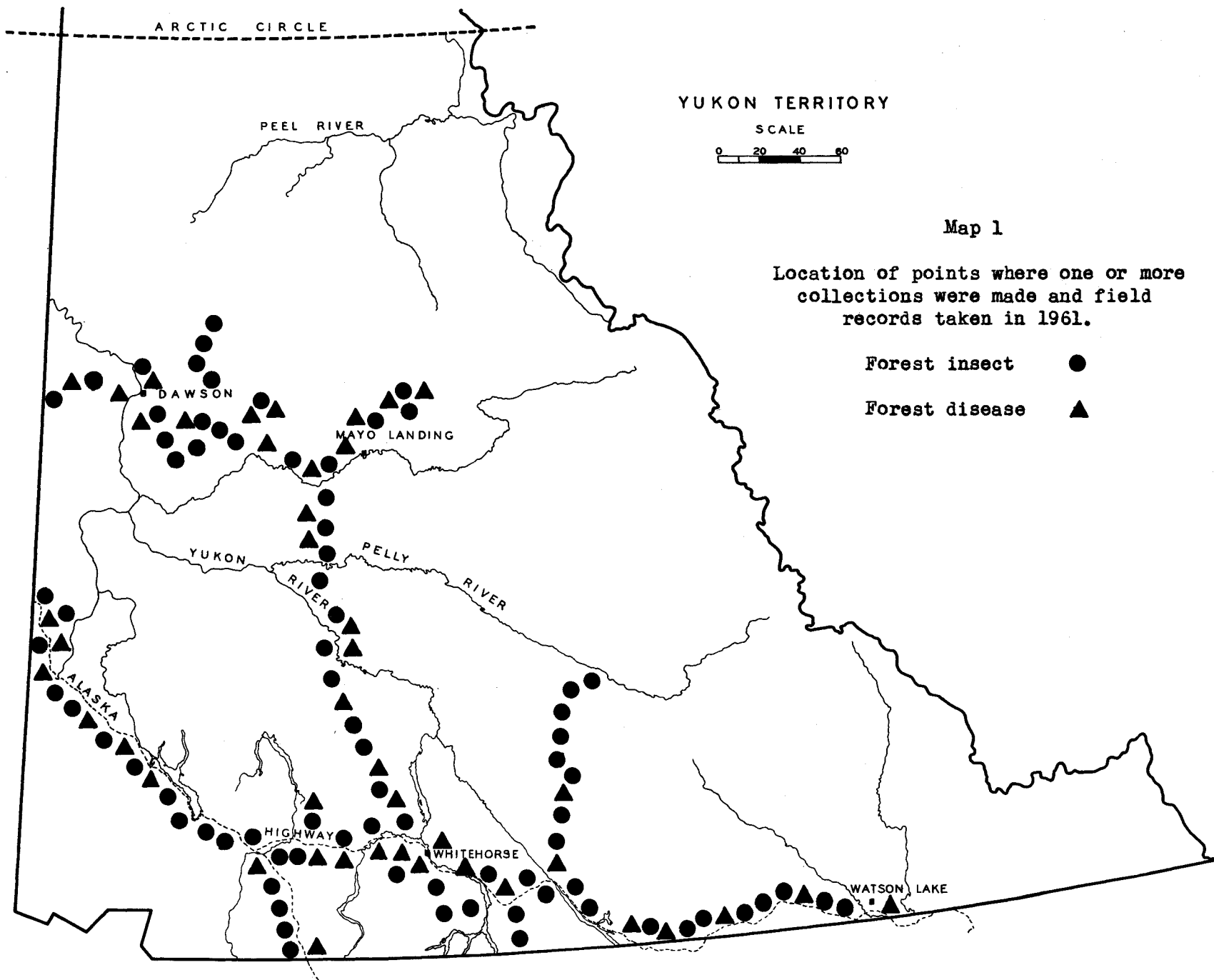


Host	Organism	Locality	Remarks
aspen, trembling	<u>Polyporus subchartaceus</u> (Merrill) Overholts	Mile 12 Dawson Rd., Y. T.	causes a decay of dead sapwood
	<u>Stereum purpureum</u> (Pers. ex Fr.) Fr.	Dawson, Y.T.	causes leaf wilt and die-back
birch, scrub	<u>Melampsoridium betulinum</u> (Fr.) Kleb.	Mile 48 Boundary Rd.; Dawson; Mile 1151, 1214 A.H., Y.T.	causes a leaf rust
birch, white	<u>Fomes fomentarius</u> (L. ex Fr.) Kickx	Mile 55 Canol Rd.; Mile 198 Mayo Rd.; Mayo; Dawson, Y.T.	causes a rot
	<u>Fomes igniarius</u> (L. ex Fr.) Kickx	Mile 55 Canol Rd.; Mile 6 Clear Cr. Rd.; Mayo; Dawson, Y.T.	causes white trunk rot or white heart rot
	<u>Melampsoridium betulinum</u> (Fr.) Kleb.	Mile 101 Dawson Rd.; Snag, Y.T.	causes a leaf rust
fir, alpine	<u>Cytospora</u> sp.	Mile 11 Canol Rd., Y.T.	browning of branch tips and foliage
fir, alpine	<u>Melampsorella caryophyllacearum</u> Schroet.	Calumet, Y.T.	needle rust causing "witches' brooms"
	<u>Peridermium holwayi</u> Syd.	Mile 18 Clear Cr. Rd.; Mile 6 Canol Rd., Y.T.	needle rust
	<u>Pucciniastrum epilobii</u> Oth.	Mile 51 Canol Rd., Y.T.	needle rust

Host	Organism	Locality	Remarks
fireweed	<u>Pucciniastrum epilobii</u> Otth	Mile 932 A. H., Y.T.	causes needle rust on alpine fir
hemlock, west- ern	<u>Dimerosporium tsugae</u> Dearn.	Mile 45 Haines Rd., B.C.	causes a sooty mold on needles
	<u>Herpotrichia nigra</u> Hartig	Mile 45 Haines Rd., B. C.	causes brown felt blight
juniper, dwarf	<u>Gymnosporangium tremel- loides</u> Hartig	Bennett, B. C.	causes a leaf rust
Labrador tea	<u>Chrysomyxa ledicola</u> Lagerh.	Mile 115 Mayo Rd., Y.T.	causes spruce needle rust
pine, lodge- pole	<u>Dasyscyphus fuscasang- uineus</u> Rehm	Bennett, B. C.	a saprophyte
poplar, balsam	<u>Ganoderma applanatum</u> (Pers. ex Wallr.) Pat	Dawson, Y.T.	causes rot of usually dead timber
	<u>Venturia populina</u> (Vaill.) Fabric.	Mile 18 Aishihik Rd., Y.T.	causes leaf wilt and a dieback
rose, wild	<u>Phragmidium fusiforme</u> Schroet.	Mile 91 Mayo Rd., Y.T.	causes a leaf rust
	<u>Phragmidium rosae- arkansanae</u> Diet.	Mile 960 A.H., Y.T.	causes a leaf rust
spruce, black	<u>Chrysomyxa woronini</u> Tranz.	Mile 18 Clear Cr. Rd., Y.T.	causes a branch tip needle rust
spruce, Sitka	<u>Fomes pini</u> (Thore ex Fr.) Karst.	Mile 49 Haines Rd., B.C.	a wood destroy- ing stem fungus of living trees
fir, alpine	<u>Fomes pinicola</u> (Swartz ex. Fr.) Cooke	Mile 49 Haines Rd., B. C.	causes brown cubical rot of heartwood and sapwood of dead trees
spruce, white	<u>Chrysomyxa ledicola</u> Lagerh. Otth.	widespread	causes a spruce needle rust

Host	Organism	Locality	Remarks
spruce, white	<u>Chrysomyxa ledi</u> de Bary var.	Mile 940 A.H., Y.T.	causes a spruce needle rust
	<u>Chrysomyxa pirolata</u> Wint.	Atlin, B. C.	causes a cone rust of spruces
	<u>Chrysomyxa woronini</u> Tranz.	widespread	causes a branch tip needle rust
	<u>Fomes pini</u> (Thore ex Fr.) Karst.	Mile 1051 A.H., Y.T.	a wood destroying stem fungus of living trees
	<u>Fomes pinicola</u> (Swartz ex. Fr.) Cooke	Mile 118 Mayo Rd.; Haines Junction; Mile 99 Haines Rd.; Mile 1151 A.H., Y.T.	causes brown cub- ical rot of heart- wood and sapwood of dead trees
	<u>Lenzites? saepiaria</u> (Wulf. ex Fr.) Fr.	Mile 1144 A.H., Y.T.	causes a brown pocket rot of dead coniferous sapwood
	<u>Polyporus abietinus</u> Dicks. ex Fr.	Mile 118 Mayo Rd., Y.T.	causes a white pocket rot of dead coniferous sapwood
	<u>Polyporus volvatus</u> Pk.	Mile 218 Mayo Rd., Y.T.	causes a greyish rot of dead sap- wood
tamarack	<u>Dothiorella</u> sp.	Mile 681 A.H., Y.T.	causes a wilt or die-back
willow	<u>Cytospora</u> sp.	Dawson, Y.T.	causes willow die-back
	<u>Daedalea confragosa</u> (Bolt) Fr.	Dawson, Y.T.	causes a rot of deciduous dead sapwood
	<u>Daedalea unicolor</u> (Bull.) Fr.	Dawson, Y.T.	causes a heart rot of living hardwoods

Host	Organism	Locality	Remarks
willow	<u>Darluca filum</u> (Biv.- Bern. ex Fr.) Cast. on <u>Melampsora epitea</u> Thüm.	Mile 91 Mayo Rd., Y.T.	a hyperparasite parasitic on rust fungi
	<u>Exidia glandulosa</u> Fr.	widespread	a saprophyte on hardwoods
	<u>Melampsora "deformans"</u> Leppik	Johnson's Cross- ing; Mile 93, 118 Mayo Rd.; Dawson Y.T.	causes a witches' broom on willow
	<u>Rhytisma salicinum</u> (Pers.) Fr.	Mile 849, 980 A.H.; Whitehorse; Mile 101 Dawson Rd., Y. T.	causes tar spots on leaves



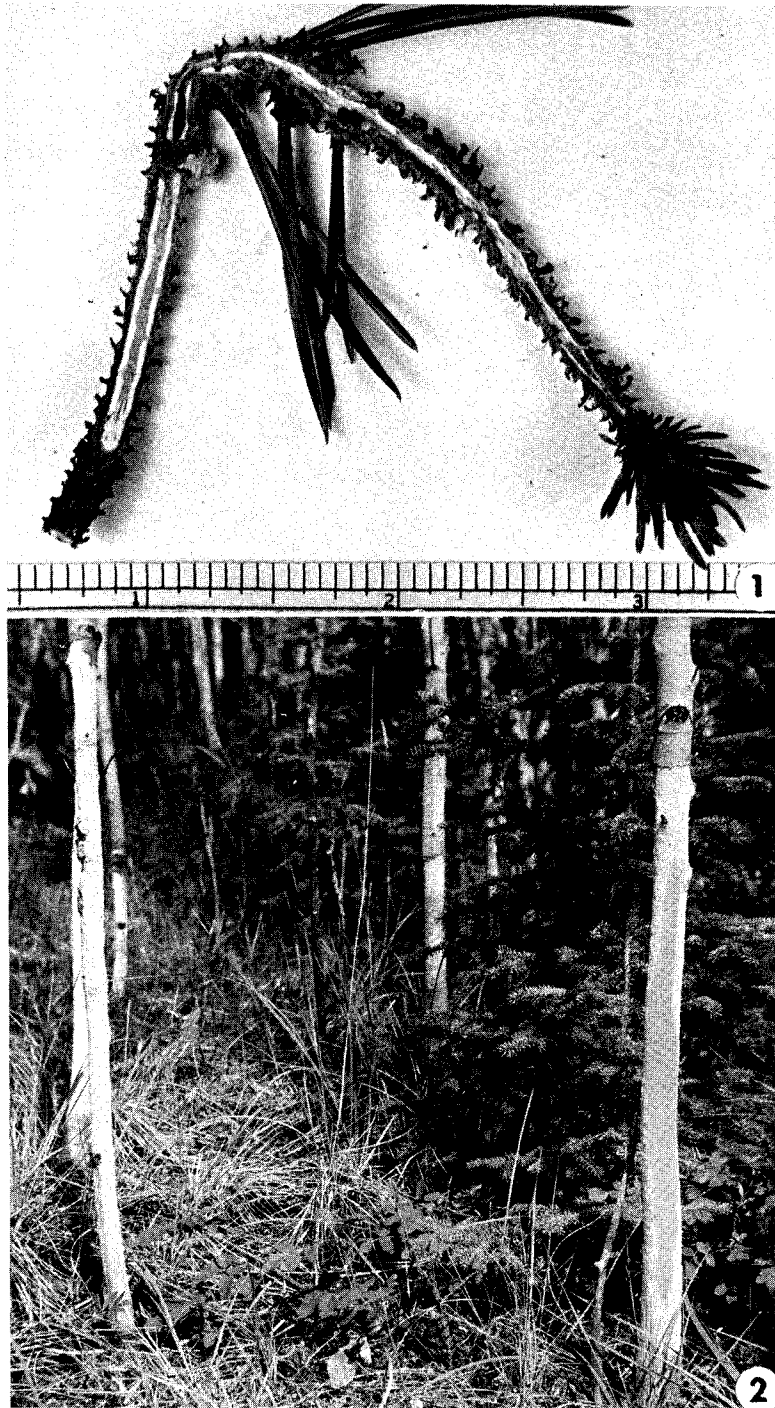
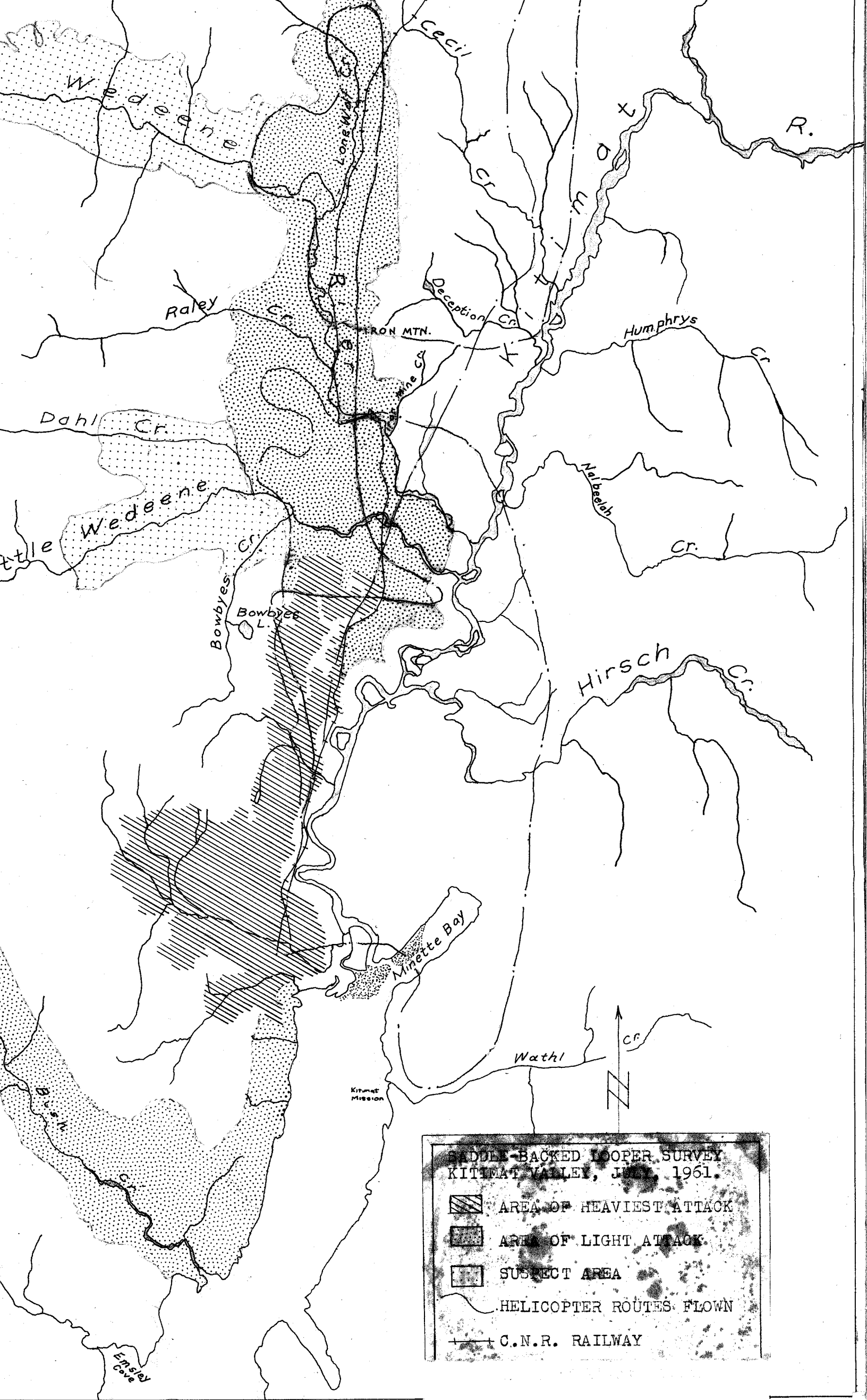







Fig. 1. Exposed gallery and adult of a twig borer. Myeloborus fivazi Blkm., in lodgepole pine, showing characteristically deformed twig and pitch tube. Atlin, B.C. June 10, 1961. J.C. Holmes.

Fig. 2. Young trembling aspens damaged by varying hare, Lepus americanus Erx. Carmachs, Yukon Territory. August 8, 1961. J.C. Holmes.



**SADDLE-BACKED LOOPER SURVEY**  
**KITIMAT VALLEY, JULY, 1961.**

-  AREA OF HEAVIEST ATTACK
-  AREA OF LIGHT ATTACK
-  SUSPECT AREA
-  HELICOPTER ROUTES FLOWN
-  C.N.R. RAILWAY