12, 16, 61-65

5730

5 - 2 16 6 C 6 6 1

ANNUAL DISTRICT REPORT

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA, 1971

PART I, VANCOUVER FOREST DISTRICT

by

R. O. Wood and H. P. Koot[1/]

PACIFIC FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

VICTORIA, BRITISH COLUMBIA

INFORMATION REPORT BC-X-64

DEPARTMENT OF THE ENVIRONMENT

MARCH, 1972

1/ Forest Research Technicians, Forest Insect and Disease Survey, Victoria.

INTRODUCTION

This report outlines the status of forest insect and disease conditions in the Vancouver Forest District for 1971. It emphasizes the level of pest populations capable of sudden, damaging outbreaks.

Reports of forest pest outbreaks to the Forest Insect and Disease Survey by public or private cooperators assist in the interpretation of the general pest situation and in the estimation of population trends.

Regular field work in the District for 1971 began May 10 and ended October 29. Special surveys and time expended were as follows: approximately 13 hours in fixed-wing aircraft on aerial surveys in July and August; one week on a spruce budworm egg survey in the Pemberton Valley and near Hope in August; 10 hours of helicopter time in mapping black-headed budworm defoliation of western hemlock on Vancouver Island early in September; two weeks in October on a black-headed budworm egg survey on Vancouver Island.

A total of 739 insect and 74 disease collections were submitted in 1971. Map 1 shows the collection localities and drainage divisions.

The number of field collections containing larvae decreased on Vancouver Island as well as on the mainland section of the District in 1971; 57 and 56% of the beating collections, respectively, contained larvae.

Black-headed budworm infestations in western hemlock stands increased to 160,000 acres on Vancouver Island in 1971. Spruce budworm defoliation of Douglas-fir increased in the Pemberton Valley, and new areas were recorded east of Hope and along the Fraser River. The infestation of western hemlock looper continued at Coquitlam Lake and caused extensive defoliation of western hemlock and amabilis fir. Douglas-fir tussock moth defoliated Douglas-fir trees between Abbotsford and Cloverdale in the Fraser Valley.

Climatic injury to lodgepole pine and western red cedar was evident over extensive areas near Bute Inlet and in scattered localities in the Lillooet River Valley.

Details on individual insect and disease problems appear in subsequent sections.

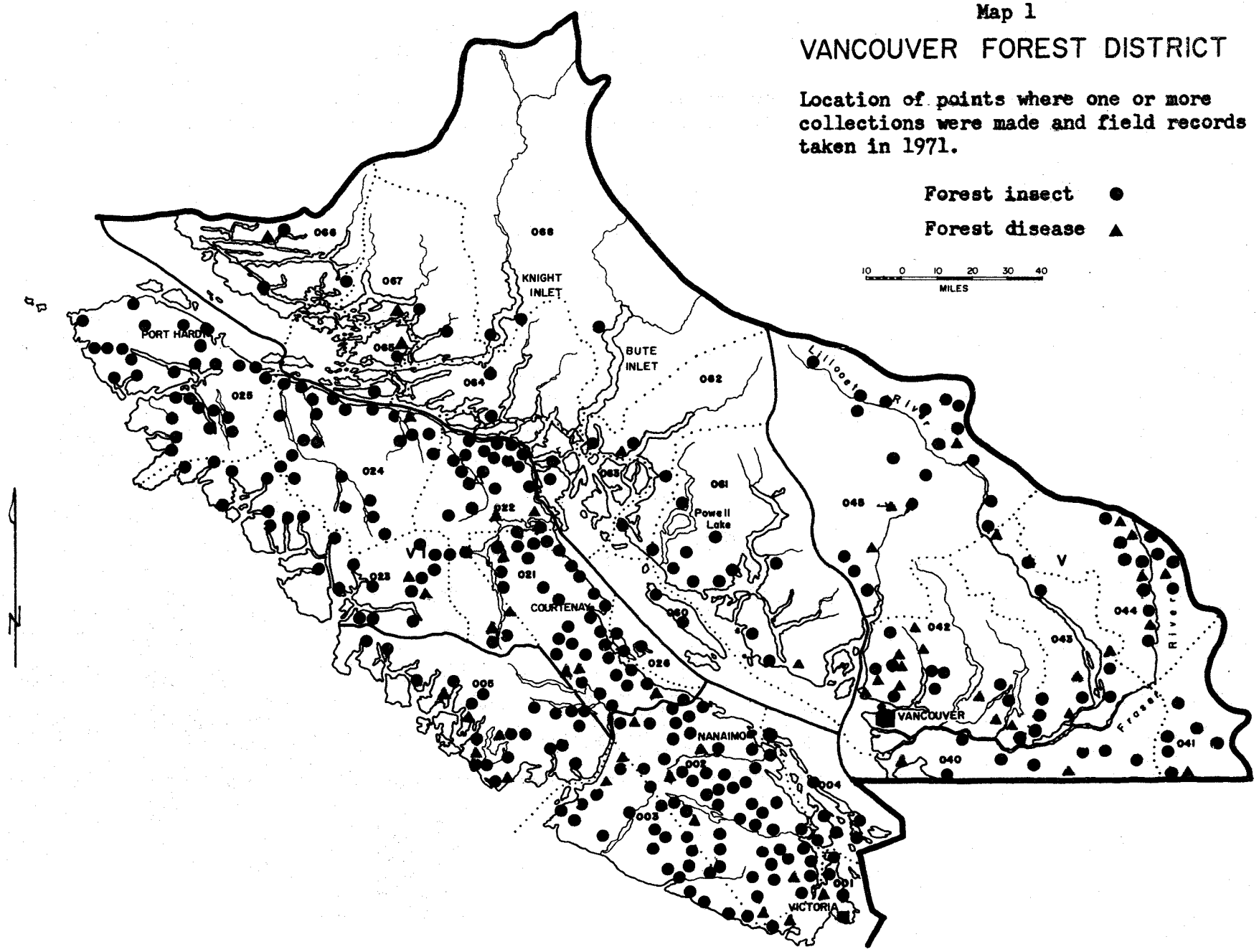
Map 1

VANCOUVER FOREST DISTRICT

Location of points where one or more collections were made and field records taken in 1971.

Forest insect ●

Forest disease ▲



FOREST INSECT CONDITIONS

Currently Important Insects

Defoliators

Black-headed budworm, Acleris gloverana

Black-headed budworm infestations in western hemlock and amabilis fir stands on Vancouver Island increased dramatically from about 2,500 acres in 1970 to 160,000 acres in 1971 (Maps 2 and 3). Defoliation of trees occurred up to 3,000 feet elevation from north of Nanaimo Lakes, south to Jordan River and west to Museum Creek. Approximately 80,000 acres of the defoliation was classified as moderate to severe. The most severe defoliation on southern Vancouver Island was in the Cowichan Lake and Loss Creek areas. There was also moderate to severe defoliation along both sides of Neroutsos Inlet near Port Alice on northern Vancouver Island.

Cool, wet weather retarded larval development until mid-July, but with improved weather conditions after mid-July, budworm development accelerated and defoliation became apparent in many areas. Larval populations increased substantially over last year in drainage divisions 002 and 003 on southern Vancouver Island and in 025 in the north. The average number of larvae per positive sample was 127, 82 and 96, respectively. There was a slight increase in drainage division 005 on the west coast. Populations on the mainland portion of the District declined in 1971. Table 1 shows a three-year comparison of black-headed budworm population on western hemlock in the Vancouver Forest District. The highest numbers of larvae obtained in 3-tree beating samples were as follows: Port Alice, 625; McLure Lake, 575, and Clapp Creek, 500. Larvae remained in a vigorous state throughout the summer although a polyhedral virus was found in a few late instar larvae. Parasites were present in significant numbers but their impact on the budworm population is not known.

In addition to beating samples, intensive ground and aerial surveys were conducted to determine the extent of the outbreak and to assess the status of the insect. Areas of defoliation were delineated from fixed-wing aircraft in August and mapped in more detail from a helicopter early in September.

Counts of overwintering eggs were made on two 18-inch branches from the mid-crown of each of three trees at 40 locations, and defoliation estimates were made on 10 trees at each location. The highest numbers of eggs per branch were recorded at Nitinat River (Branch 47c), 102; Port Alice (south), 92; Dunsmuir Creek, 90, and Marshall Creek, 89. Table 2 gives a summary of black-headed budworm infestations on Vancouver Island, the estimated average defoliation of 10 trees, the average number of eggs per 18-inch branch, and the predicted defoliation hazard for 1972. The predicted defoliation is based on the number of eggs per 18-inch branch. The criterion is as follows: 1 to 26 eggs - light; 27 to 59 - moderate, and 60 or more - heavy.

Plots were established in nine areas to study the effects of defoliation over a period of years.

Table 1. Summary of black-headed budworm collections on western hemlock by drainage divisions, Vancouver Forest District

Drainage divisions	No. of samples during larval period			% samples containing larvae			Avg no. of larvae per positive sample		
	1969	1970	1971	1969	1970	1971	1969	1970	1971
001	2	0	0	50	-	-	1	-	-
002	48	24	25	67	83	76	32	32	127
003	34	8	14	62	100	71	10	25	82
004	0	0	0	-	-	-	-	-	-
005	17	17	11	24	29	46	2	1	6
021	42	14	14	7	14	21	2	1	2
022	30	17	20	20	6	45	2	1	2
023	22	16	13	32	56	69	6	12	8
024	22	9	4	9	33	50	10	4	13
025	84	44	26	43	59	50	3	31	96
026	0	0	0	-	-	-	-	-	-
1/									
040	12	4	7	75	100	57	10	7	3
041	6	12	9	83	58	22	33	3	3
042	45	30	32	62	73	34	46	78	19
043	16	17	5	63	18	0	12	2	-
044	1	3	7	0	100	14	-	3	1
045	5	19	17	100	42	12	30	96	3
060	3	0	0	0	-	-	-	-	-
061	2	27	18	0	67	15	-	9	4
062	1	4	2	0	0	0	-	-	-
063	3	4	5	0	0	0	-	-	-
064	6	5	5	0	0	40	-		1
065	1	1	2	0	0	0	-	-	
066	4	2	4	0	50	0	-	2	
067	2	3	2	0	0	0	-	-	
068	5	2	2	0	0	0	-		

1/ Mainland - from drainage division 040 to 068 inclusive.

Table 2. Summary of black-headed budworm infestations on Vancouver Island, 1971

Location	Avg no. eggs per 18-inch branch		% total defoliation 1971	Defoliation hazard for 1972
	1970	1971		
Nanaimo R (N. fork)	20	28	20	moderate
Fleece Cr	-	57	50	moderate
Sadie Cr	-	15	30	light
Bell Cr	35	56	45	moderate
Jump Cr	37	47	35	moderate
Vaughn Cr	29	43	30	moderate
Marshall Cr	57	89	25	heavy
William Cr	-	8	5	light
Green Cr	-	25	5	light
Dunsmuir Cr	-	90	30	heavy
Indian L	-	49	20	moderate
Acres of above defoliation classes:		light - 12,500; moderate to heavy - 18,500.		
Cottonwood Cr	54	21	40	light
Cottonwood Cr (regeneration)	-	21	20	light
McKay Cr	-	42	40	moderate
McKay Cr (Br. K4)	-	8	1/	light
Shaw Cr	-	13	25	light
Shaw Cr (regeneration)	-	31	10	moderate
Hinne Cr	-	24	10	light
McLure L	19	11	10	light
Nixon Cr	-	8	10	light
Jims Cr	-	16	20	light
Nitinat R (Br. 47)	-	41	20	moderate
Nitinat R (Br. 47c)	-	102	25	heavy
Museum Cr	20	55	25	moderate
Sherk L	-	70	20	heavy
Acres of above defoliation classes:		light - 32,900; moderate to heavy - 15,300.		
Loss Cr (mile 6)	30	46	55	moderate
Loss Cr (mile 2)	-	26	25	light
Jordan R (reservoir)	-	38	25	moderate
Clapp Cr	44	14	60	light
Bear Cr	-	28	45	moderate
Three Arm Cr	-	12	30	light

Table 2. (Concluded)

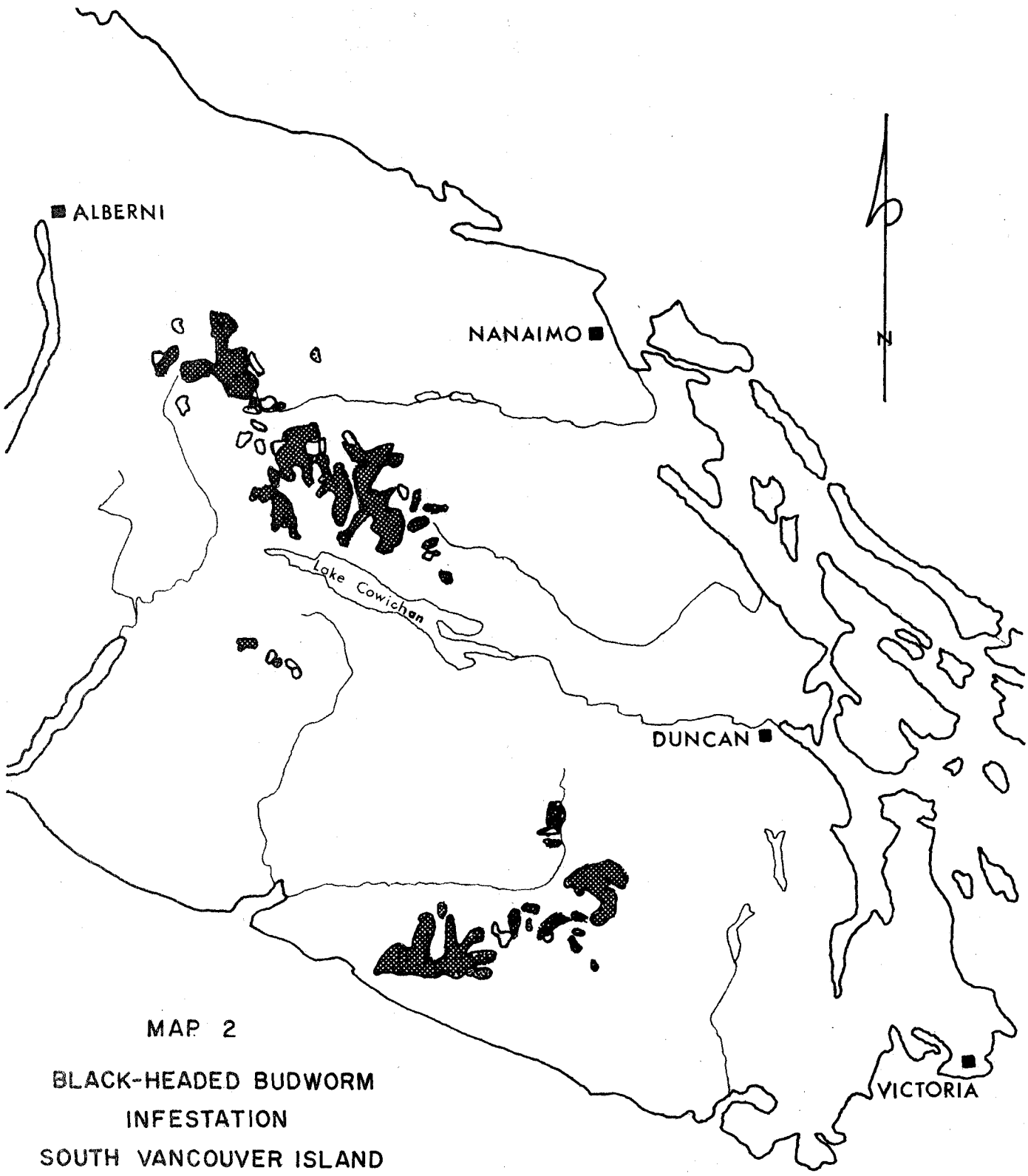
Location	Avg no. eggs per 18-inch branch		% total defoliation 1971	Defoliation hazard for 1972
	1970	1971		
Hemmingsen Cr	-	19	25	light
Jordan R (Br. J950)	-	22	15	light
NW Weeks L (Br. 520)	-	41	25	moderate
Floodwood Cr	-	13	5	light
Cedarn Cr	-	13	1/	light
Garbage Cr	-	5	1/	light
Allan Cr	-	30	35	moderate
Acres of above defoliation classes:			light - 27,800; moderate to heavy - 46,000.	
Port Alice (south)	-	92	2/	heavy
Port Alice (north)	-	44	2/	moderate
Port Alice (regeneration)	-	52	30	moderate
Teeta Cr	-	52	5	moderate
Yreka Cr	-	70	10	heavy
Acres of above defoliation classes:			light - 3,500; moderate to heavy - 1,725.	

1/ Defoliation estimates not made due to snowfall and poor light.

2/ Defoliation estimates not made because damage by other agents complicated symptoms.

No tree mortality has occurred during the present outbreak, although some top-kill of mature trees and mortality of understory trees in areas of heavy defoliation may be expected. High populations and more intensive defoliation is likely to occur throughout most of the damaged stands north of Cowichan Lake, while a decline is expected south of Cowichan Lake. Expansion of the infestations in the Port Alice region is expected in 1972. Adverse weather conditions, disease or parasitism could still cause the populations to collapse next year.

In the mainland section of the District there were only two small areas of defoliation noted in 1971; 125 acres at Furry Creek and 100 acres at Britannia Creek. However, egg samples at Furry Creek and near Stawamus River yielded only one egg per 18-inch branch, and damage is unlikely in these areas in 1972.



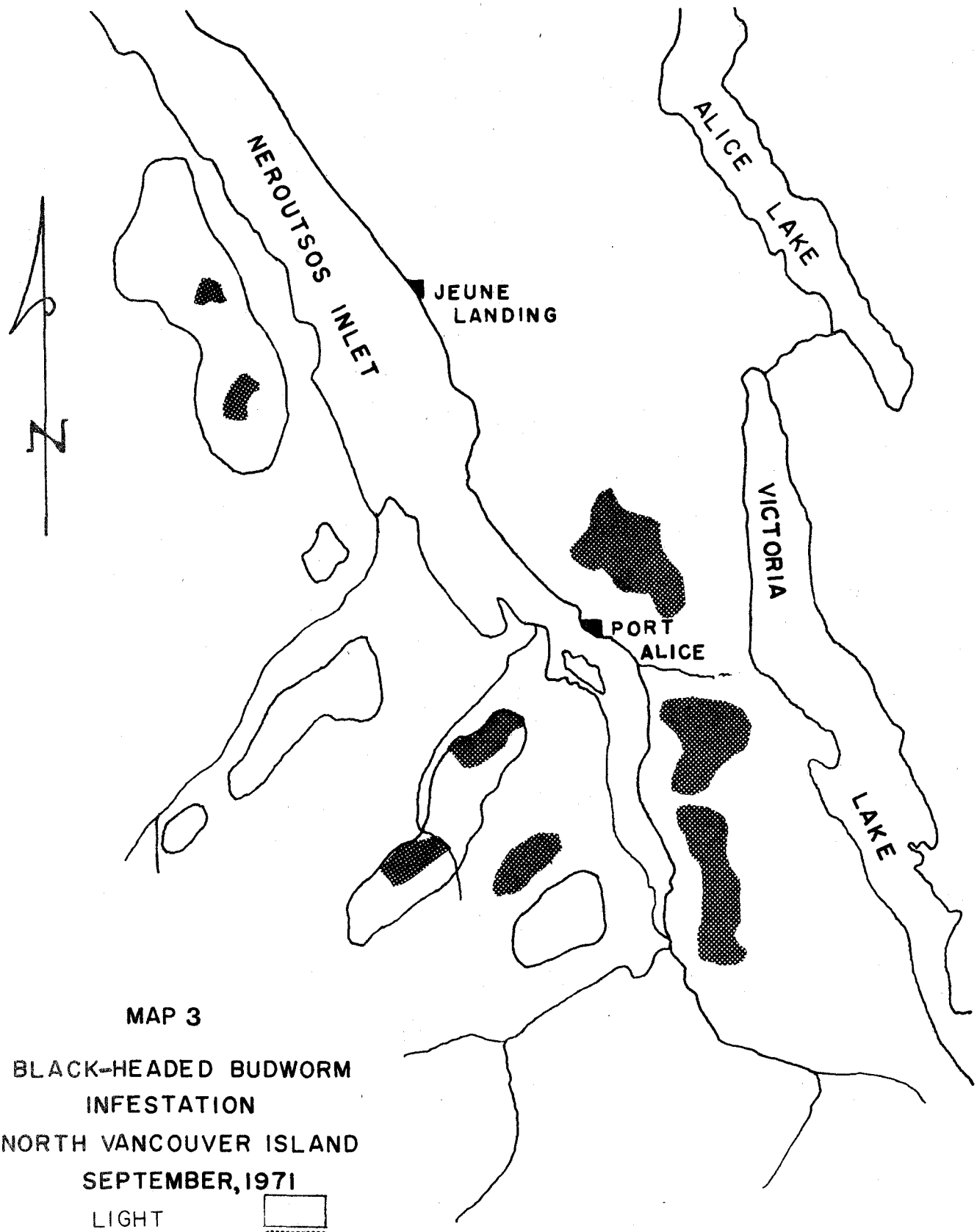
MAP 2

BLACK-HEADED BUDWORM
INFESTATION
SOUTH VANCOUVER ISLAND
SEPTEMBER, 1971

LIGHT

MED.-HEAVY

8 MILES



MAP 3

BLACK-HEADED BUDWORM
INFESTATION
NORTH VANCOUVER ISLAND
SEPTEMBER, 1971

LIGHT

MED.-HEAVY

Spruce budworm, Choristoneura occidentalis

Infestations of spruce budworm on Douglas-fir continued in the Pemberton Valley in 1971, and new outbreaks were recorded in the Birkenhead Lake - Blackwater Creek region, along the Fraser River between Hope and Boston Bar and southeast of Hope at Tashme.

Larval development was retarded by adverse weather conditions in some areas until mid-June. At Railroad Creek, very few larvae were found in beating collections on June 9, but a high percentage of buds were infested. By late June, weather conditions had improved and defoliation became apparent by mid-July. Presence of a polyhedral virus was detected at Railroad Creek when the budworm larvae were almost full grown. However, its significance was not determined.

Budworm outbreaks were mapped from the air on July 28. Defoliation of Douglas-fir was light over 7,550 acres, moderate over 18,165 and heavy over 2,275 for a total of 27,990 acres (Map 4). Included in the total are 4,975 acres of light to moderate defoliation of alpine and amabilis fir at Salal Creek. Table 3 lists the areas of defoliation by category and shows a comparison with 1970 data, where possible.

Table 3. Areas of spruce budworm defoliation of Douglas-fir, Vancouver Forest District, 1970 and 1971

Location	No. acres of defoliation					
	light		moderate		heavy	
	1970	1971	1970	1971	1970	1971
Salal Cr[1/]	-	2,650	1,200	2,325	-	
Pebble Cr	220	775	1,635	475	-	-
North Cr	-	-	-	2,500	-	-
Railroad Cr	-	-	2,890	1,575	835	475
Gingerbread Cr	-	-	2,970	1,400		-
Wolverine Cr	-	-	-	1,100	-	-
Owl Cr	-	300	-	-	-	-
South Cr	-	-	-	200		425
Ryan R	-	-	690	625	-	-
Rutherford Cr	200	-	200	1,565	-	-
Soo R	-	-	480	1,100	-	-
NE of Pemberton	-	-	400	1,250	-	-
Birkenhead L	-	1,100		-	-	-
Blackwater Cr	-	1,725		1,100	-	-
Haylmore Cr	-	475	725	1,100	-	625
Gates R	-	475	-	300	-	-
Tsileuh Cr	-	-	-	625	-	-
Spuzzum Cr	-	-		925		-
Choate	-	-	-	-	-	450
Tashme	-	50	-	-	-	300
Totals	420	7,550	11,190	18,165	835	2,275
Grand Totals	1970 - 12,445		1971 - 27,990			

[1/] Hosts - alpine and amabilis fir

Egg sampling was conducted in mid-August at 10 locations in the District. Samples consisted of two full-length branches from mid-crown of two dominant or co-dominant trees at each location. In all but a few instances, the eggs had hatched but empty egg masses were recorded as being healthy. Defoliation estimates were made on 10 trees, and 50 buds were examined on the branches at each plot. Table 4 shows the number of egg masses per 100 square feet of foliage in 1970 and 1971 and the estimated percent defoliation at each plot in 1971.

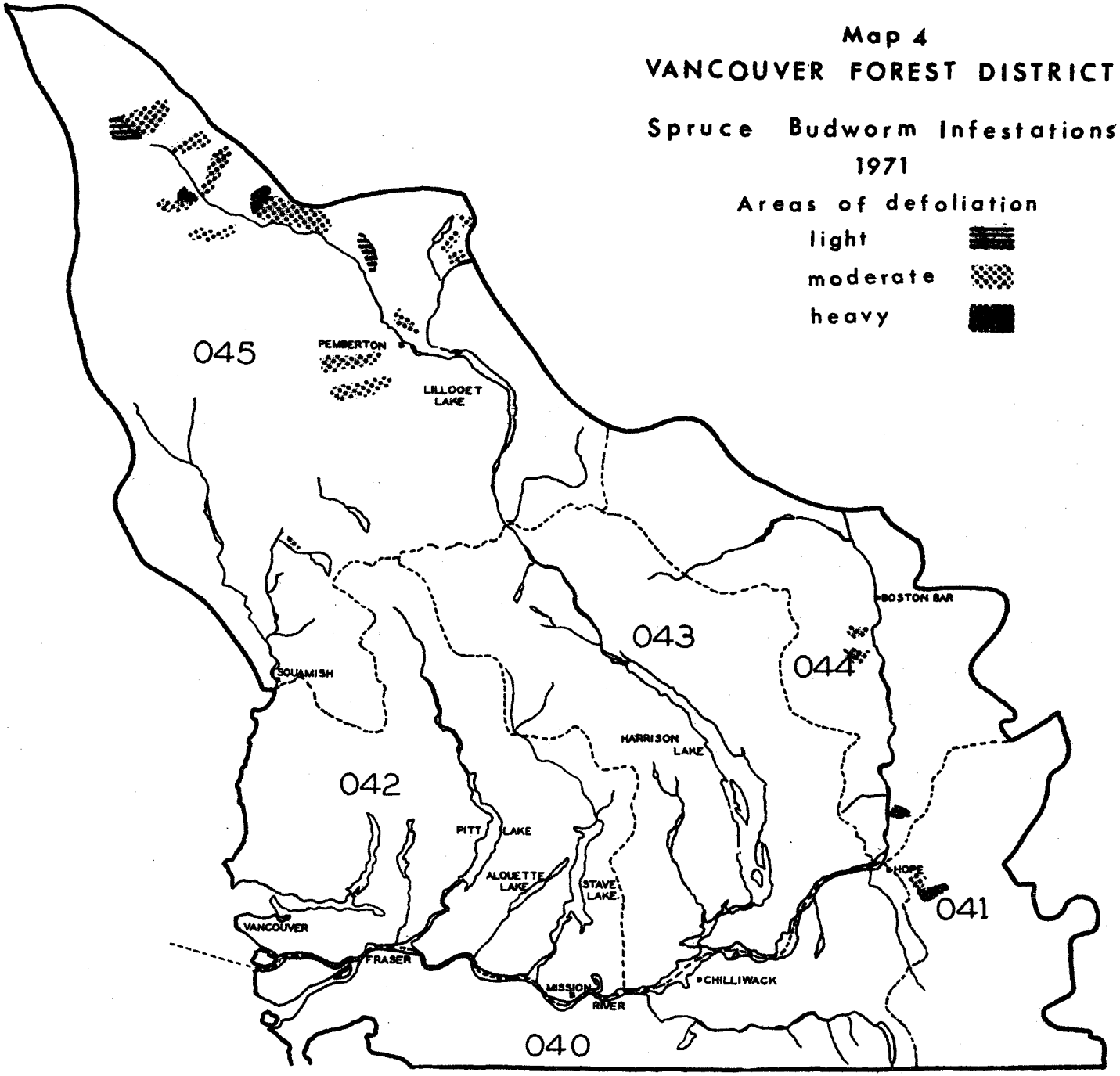

Map 4
VANCOUVER FOREST DISTRICT
Spruce Budworm Infestations
1971
Areas of defoliation
light
moderate
heavy
045
PEMBERTON
LILLOOET LAKE
043
044
BOSTON BAR
SQUAMISH
HARRISON LAKE
042
PITT LAKE
ALOUETTE LAKE
STAVE LAKE
HOPE
041
VANCOUVER
FRASER
MISSION
CHILLIWACK
RIVER
040

Table 4. Spruce budworm egg sampling and defoliation estimates on 10 Douglas-fir trees, Vancouver Forest District

Location	Avg no. egg masses per 100 ft^2 foliage		% total defoliation in 1971
	1970	1971	
Salal Cr[1/]	347	115	30
Railroad Cr	450	47	45
Ryan R	240	268	40
South Cr	-	95	50
Gingerbread Cr	150	121	55
Rutherford Cr	84	94	45
Blackwater Cr	-	31	10
Haylmore Cr	24	76	15
Gates R	-	71	65
Tashme	-	297	35

1/ Host - alpine fir

A few diseased larvae were found at Railroad Creek in 1971 and disease may have caused the reduction in the number of eggs found on branch samples in that area.

Egg samples taken in 1970 and resultant defoliation in 1971 indicate that 80 egg masses per 100 square feet of foliage can result in moderate to heavy defoliation the following year. The number of egg masses found at most sample plots in 1971 was sufficient to provide a moderate to high population in 1972. Therefore, it is expected that infestations will continue if weather conditions are suitable in 1972, and will probably increase in size and intensity in the Blackwater Creek area and north and southeast of Hope.

Western hemlock looper, Lambdina fiscellaria lugubrosa

The outbreak of hemlock looper at Coquitlam Lake increased to 625 acres in 1971: 150 acres of heavy defoliation and 475 acres of light to moderate defoliation. Damage was confined to the south end of the east side of the lake and to the east side of the small island. There was extensive tree mortality on the 150 acres of heavy defoliation. Western hemlock and amabilis fir suffered the most serious damage, although western red cedar was also heavily defoliated.

There were up to 1,000 larvae per sample within the confines of the infestation in July, and up to 100 on the west side of the lake where previously very few larvae had been found. The average number of larvae per sample in the Coquitlam Lake area was 250 on western hemlock and 150 on western red cedar. Parasitism was negligible in mass collections of larvae submitted in July to the Victoria Insectary. In other parts of the District, populations of hemlock looper were low.

Egg sampling was conducted at two locations on the east side and one on the west side of Coquitlam Lake in October. Half-square-foot moss samples were taken at the butt and at 10-foot intervals along the trunk on each of three trees at each location. In 55 samples, the number of eggs per sample ranged from 2 to 142, with an average of 38, a decrease from the average of 53 recorded in 1970. On the west side of the lake, where there was no significant defoliation, there was an average of 31 eggs per sample.

In August, a collection of pupae from the Coquitlam Lake infestation was submitted to the Insect Pathology Research Institute in Sault Ste. Marie. Two potentially important fungus diseases, Isaria sp. and Beauvaria sp. were present in the collection, but at a low level.

The hemlock looper infestation at Coquitlam Lake is expected to continue and will probably spread to the west side of the lake in 1972.

Douglas-fir tussock moth, Orgyia pseudotsugata

An outbreak of tussock moth in the Fraser Valley in 1971 is the first survey record of the insect in the mainland section of the District. Scattered Douglas-fir trees from Abbotsford to Cloverdale were infested; moderate to severe defoliation occurred at Clearbrook.

Defoliation became noticeable in July, and one tree of about 20 inches dbh was more than 90% defoliated by the end of August. In late August, larvae were numerous on trees, understory shrubs and the sides of buildings in the town of Clearbrook. The number of eggs present in October indicates a continuation of the infestation in 1972.

Although there were a few larvae infected with a polyhedral virus in Clearbrook, the virus is not expected to control the tussock moth population in 1972. The municipality is planning a control program for 1972.

On Vancouver Island, there was light defoliation of a few Douglas-fir trees in the Glanford Road and Gorge Golf Course areas in Victoria.

Other Noteworthy Insects

False hemlock looper, Nepytia phantasmaria

Numerous pupae were found at Coquitlam Lake in October in the hemlock looper infestation, and 41 pupae were sent to the Insect Pathology Research Institute at Sault Ste. Marie. Of these, 10 emerged successfully and two fungus diseases, Isaria sp. and Beauvaria sp., accounted for 23 and 10%, respectively, of the pupal mortality. The remainder were killed by an unidentified fungus.

In other parts of the District, the populations were low and no damage by this insect is forecast for 1972.

Springtails, (Collembola), Bourletiella hortensis and Isotomurus palustris

These species were numerous in nurseries at Green Timbers and Surrey on the Mainland on May 19. The insects feed on seedlings when the cotyledons emerge from the ground. Both species were easily collected from the soil surface with an aspirator; soil samples in the same area were negative. B. hortensis was also found at Duncan and Koksilah Nurseries on Vancouver Island on April 7.

The extent and significance of feeding by these insects is not known.

Table 5. Other insects of current minor significance

Insect	Host	Locality	Remarks
Adelges cooleyi Cooley spruce gall aphid	Douglas-fir, Sitka spruce	Campbell R, Chef Cr, Seymour R	Sucking insect. Light attack on Douglas-fir seedlings.
Barbara colfaxiana Douglas-fir cone moth	Douglas-fir	Nanaimo Lakes	Cone insect. Almost 100% of cones examined were infested.
Dendroctonus ponderosae Mountain pine beetle	Western white pine, lodgepole pine	Birkenhead L, Haylmore Cr	Bark beetle. Fifty white pine killed at Birkenhead L and 200 lodgepole pine at Haylmore Cr.
Dendroctonus pseudotsugae Douglas-fir beetle	Douglas-fir	Railroad Cr, Spuzzum Cr	Bark beetle. Some attack on windfall trees at Railroad Cr; 150 red-tops at Spuzzum Cr.
Ectropis crepuscularia Saddleback looper	Western hemlock, Douglas-fir, western red cedar	General	Defoliator. Very low population.
Halisidota argentata Silver-spotted tiger moth	Douglas-fir	Victoria to Courtenay	Defoliator. Slight increase in population from 1970.
Hyphantria cunea Fall webworm	Miscellaneous deciduous hosts	Agassiz to Haney, West Vancouver to Squamish, Yarrow, Duncan to Nanaimo, Victoria to Sooke	Defoliator. Highest populations near Agassiz and Yarrow.
Malacosoma pluviale Western tent caterpillar	Red alder, willow	Capilano R Rd., West Vancouver, Gulf Islands, Hornby and Denman Islands	Defoliator. Scattered tents noted; no extensive defoliation.

Table 5. (Concluded)

Insect	Host	Locality	Remarks
Melanolophia imitata Green-striped forest looper	Western hemlock, Douglas-fir	General	Defoliator. Only 6 larvae collected in District.
Neodiprion spp. Conifer	Most conifers	General	Defoliator. On western hemlock, 35% of collections were positive with average of 5 larvae.
Neophasia menapia Pine butterfly	Douglas-fir	South Vancouver Island	Defoliator. Numerous adults in flight.
Pissodes strobi Spruce weevil	Norway spruce	UBC Forest (Haney)	Terminal borer. Four trees infested.
Pyrrhalto carbo Pacific willow leaf beetle	Red alder	Squamish	Defoliator. Heavy defoliation along power line right-of-way.
Rhyacionia buoliana European pine shoot moth	Lodgepole pine, Mugho pine	Vancouver, Victoria	Shoot borer. Some planted trees infested.
Trypodendron spp. Ambrosia beetles	Mixed conifer sawlogs	Earl Cr	Wood borer. Heavy adult flight reported by B.C.F.S.

FOREST DISEASE CONDITIONS

The organisms currently causing tree mortality, growth loss and quality reduction attributed to diseases are dwarf mistletoes and stem and root rot fungi. These organisms, once established in a stand, persist for many years. They usually intensify at a slow rate, making annual summaries of their status repetitious; for this reason, the following report may omit some of the more important diseases. Emphasis is placed on new outbreaks, the status of the annually varying foliage diseases and abnormal weather conditions, i.e., frosts, drought, snow damage, etc., that immediately affect tree appearance and often cause dieback and mortality. Other aspects of the Disease Survey dealing with mortality, growth loss and factors influencing the occurrence of the more important diseases are summarized elsewhere.

Currently Important Diseases

Stem Diseases

Dwarf mistletoes, *Arceuthobium* spp.

Records on distribution of *A. tsugense* on western hemlock were updated in 1971. Examinations to determine the intensity of infection were made in areas where signs of damage by dwarf mistletoe were observed. In areas surveyed by aircraft, plots of 10 trees were examined and in areas surveyed by road access, plots consisted of 50 trees. The location of plots and the percentage of trees infected in the plots was as follows: Kingcome Inlet - 90%; Knight Inlet - 80%; Sechelt - 88%; Harrison Lake (west side) - 50%, and Silver-Skagit Road - 42%. Distribution records were also taken from single trees at Mereworth Sound, Toba Inlet and Tranquil Inlet.

Plots of 50 lodgepole pine trees were examined for *A. americanum* along the Blackwater Creek road west of D'Arcy and along the Lillooet River near Gowan Creek. Sixty and 64%, respectively, of the trees were infected.

Non-infectious diseases

Climatic injury

Lodgepole pine and western red cedar trees with reddened foliage were noted in a number of areas in the District in 1971. The condition, attributed to winter drying, was present over an estimated 30 square miles along the Homathko River at the head of Bute Inlet, along Jervis Inlet northeast of Cascade Point and over 500 acres at Pebble Creek in the Lillooet River area. Scattered patches of up to 100 acres occurred northwest of Pemberton and north of Mt. Currie.

Exotic Plantations

Twelve plantations on the Mainland and 28 on Vancouver Island were examined in 1971. No new problems were encountered. Snow press, causing deformity and breakage, was prevalent in many plantations. All of the red and Scots pine trees in two plantations at Green Timbers have died over past years, at least partly because of suppression. A needle cast disease, Lophodermium pinastri, was found on 2% of the Scots pine and 16% of the Corsican pine trees examined in UBC Forest. A twig canker caused by Sydowia polyspora, was found on 8 of 39 Bishop pine trees near Caycuse. A needle cast, Rhabdocline pseudotsugae, heavily infected 9 out of 25 Douglas-fir trees at Kennedy Lake.

Table 6. Other diseases of current minor significance

Organism	Host	Locality	Remarks
Botryosphaeria tsugae	Western hemlock	Bear Cr (Harrison L)	Dieback disease; no significant damage.
Caliciopsis pseudotsugae	Western hemlock	Nahatlatch R	A canker disease; light infection.
Dermea pseudotsugae	Douglas-fir	Lund	A canker and dieback disease; moderate infection over localized area.
Diaporthe lokoyae	Douglas-fir	Seymour R	A canker and dieback disease; most infected trees will probably recover.
Didymascella thujina	Western red cedar	Capilano R	A leaf blight; light infection.
Discocainia treleasei	Western hemlock	Lost Cr	Dieback disease; moderate infection over localized area.
Hendersonia pinicola	Lodgepole pine	Coombs	Needle blight; found in association with Lophodermella concolor.
Lachnellula pseudotsugae	Douglas-fir	Boston Bar	A perennial canker; light to moderate infection.
Lophodermella concolor	Lodgepole pine	Coombs	Common needle cast; moderate infection on 25 trees examined.
Polyporus schweinitzii	Douglas-fir	Campbell R	Causes brown cubical rot. Common in Elk Falls Park.
Rhabdocline weirii	Douglas-fir	Boston Bar, Ash R	A needle cast; light infection.
Sydowia polyspora	Douglas-fir	Seymour R, Nitinat R	Canker and dieback disease; light to moderate infection in plantations.