ANNUAL DISTRICT REPORT

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA, 1969

PART V, KAMLOOPS FOREST DISTRICT

by

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INTRODUCTION

This report outlines the status of forest insect and disease conditions in the Kamloops Forest District for 1969 and, where possible and meaningful, attempts to forecast pest population trends. It places regular stress on the level of pest populations capable of sudden, damaging outbreak. Data on the occurrence and intensity of other pests, characterized by more insidious, but often, greater ultimate losses, are reported herein occasionally but such information is frequently more meaningfully presented in specific reports distributed by this laboratory.

Reports of forest pest outbreaks to the Forest Insect and Disease Survey by public or private cooperators helps greatly in the interpretation of the general pest situation and improves our ability to guage population trends.

Regular field work in the District this season began April 8 and ended November 4. Special surveys were as follows: D. Beddows of the Prince George Forest District spent four days in April examining exotic pines for European pine shoot moth in nurseries and garden shops; eight days were spent in August on a survey of intensity of dwarf mistletoe on Douglas-fir and lodgepole pine in the eastern and western parts of the District; twenty-one hours of flying time were used in aerial surveys in August, some of which was contributed by the B. C. Forest Service or by private industries.

Insect and disease collections are shown, by host, in Table 1; collection localities and drainage divisions are shown on Map 1. The principal problems in each drainage division are shown in Table 2. The abbreviations used for host trees in the report are given in Appendix I.

Numbers of larval defoliators found in field collections decreased slightly this year: 65%, 77% and 84% of beating collections in the western, central and eastern parts of the District, respectively, contained larvae. Details on individual insect and disease problems follow in subsequent sections.

Infestations of spruce bark beetle became apparent near Quesnel, Dunsapie and Lambly Lakes in 1969. The number of Douglas-fir killed by Douglas-fir beetles decreased in the eastern and central parts of the District, but there were an estimated 10,000 red-tops from east of Williams Lake airport southwest to Dog Creek. Mountain pine beetle damage in pine stands continued on a reduced scale in a number of areas. There was a marked increase in alpine fir mortality caused by the Dryocoetes-Ceratocystis complex in the central and eastern sections of the District.

One-year-cycle spruce budworm caused heavy defoliation of Douglas-fir on Mission Mountain near Shalalth. The tent caterpillar infestation near Wells Gray Park continued at a high level. A small infestation of a conifer sawfly occurred on Douglas-fir near the north end of Okanagan Lake. Populations of other defoliators were at a low level in 1969.

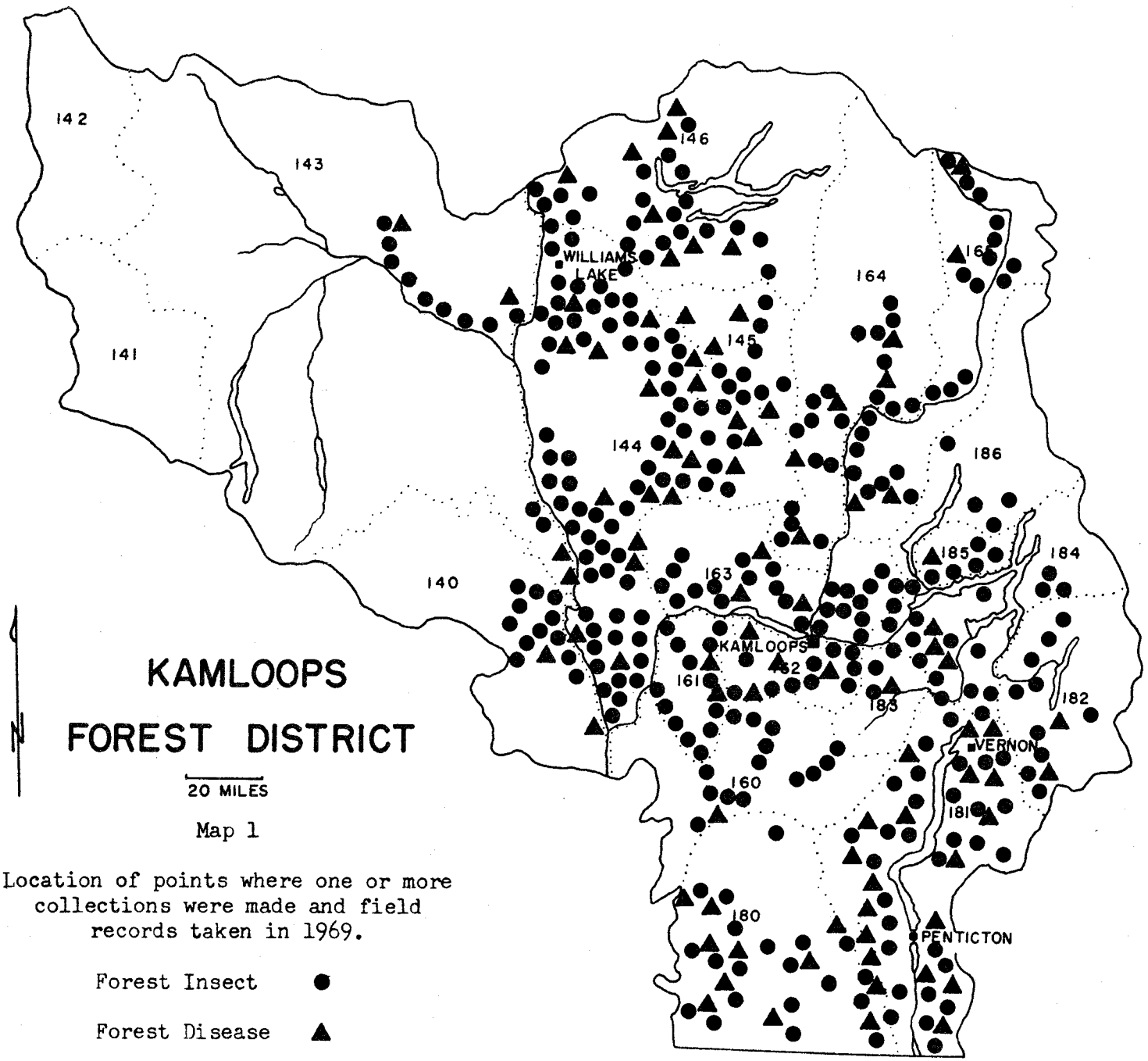
Table 1. Collections by hosts, Kamloops Forest District, 1969

Coniferous hosts	Forest insects	Forest diseases	Broad-leaved hosts	Forest insects	Forest diseases
Cedar, western red	13	1	Alder species	6	0
Douglas-fir	242	39	Aspen, trembling	18	2
Fir, alpine	26	2	Birch species	5	1
Hemlock, western	31	0	Chokecherry	2	0
Juniper species	26	0	Cottonwood, black	3	1
Larch, western	26	2	Willow species	4	0
Pine species	2	0			
Pine, lodgepole	81	77			
Pine, ponderosa	80	4			
Pine, western white	3	0			
Spruce species	0	3			
Spruce, Engelmann	142	5			
Totals	672	133	Totals	38	4
			Misc. hosts	14	4
			No hosts	250	0
			GRAND TOTALS	974	141

Table 2. Currently important insect and disease[1] problems by drainage divisions, Kamloops Forest District, 1969

Insect and disease problems	Principal hosts[2]	Importance by drainage divisions[3]																				
		140	141	142	143	144	145	146	160	161	162	163	164	165	180	181	182	183	184	185	186
Bark Beetles																						
Mountain pine beetle	lP, pP	3	0	0	1	4	1	4	3	1	1	2	1	3	4	4	3	3	1	1	3
Douglas-fir beetle	D	1	0	0	4	5	1	4	1	1	2	3	1	2	3	3	2	2	3	3	3
Spruce beetle	eS	0	0	0	0	4	0	0	0	0	0	3	2	0	1	3	1	0	0	0	0
Dryocoetes-Ceratocystis complex	alF	0	0	0	0	0	0	2	1	1	1	5	5	5	4	4	4	1	1	1	1
Defoliators																						
One-year-cycle spruce budworm	D	5	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest tent caterpillar	tA	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0
Foliage Diseases																						
Pine needle cast, Elytroderma deformans	lP, pP	0	0	0	0	3	4	0	3	1	3	1	0	0	4	4	2	2	3	0	0
Non-infectious Diseases																						
Climatic injury	lP, pP, wwP, D, C	1	1	1	1	1	1	1	1	2	1	2	1	1	2	2	4	2	1	1	1

[1] Includes only weather-induced and foliage diseases which fluctuate annually.
[2] See host code in Appendix I.
[3] High population and/or widespread outbreak in progress - 5.
Scattered high populations and/or significant damage in restricted areas - 4.
Rising populations and/or moderate numbers and/or potential problems - 3.
Static or falling population and/or moderate numbers and/or no problem at present - 2.
Endemic population and/or no significant damage - 1.
Not sampled and/or no host and/or not found - 0.



KAMLOOPS FOREST DISTRICT

20 MILES

Map 1

Location of points where one or more collections were made and field records taken in 1969.

Forest Insect ●

Forest Disease ▲

FOREST INSECT CONDITIONS

Currently Important Insects

Mountain pine beetle, Dendroctonus ponderosae

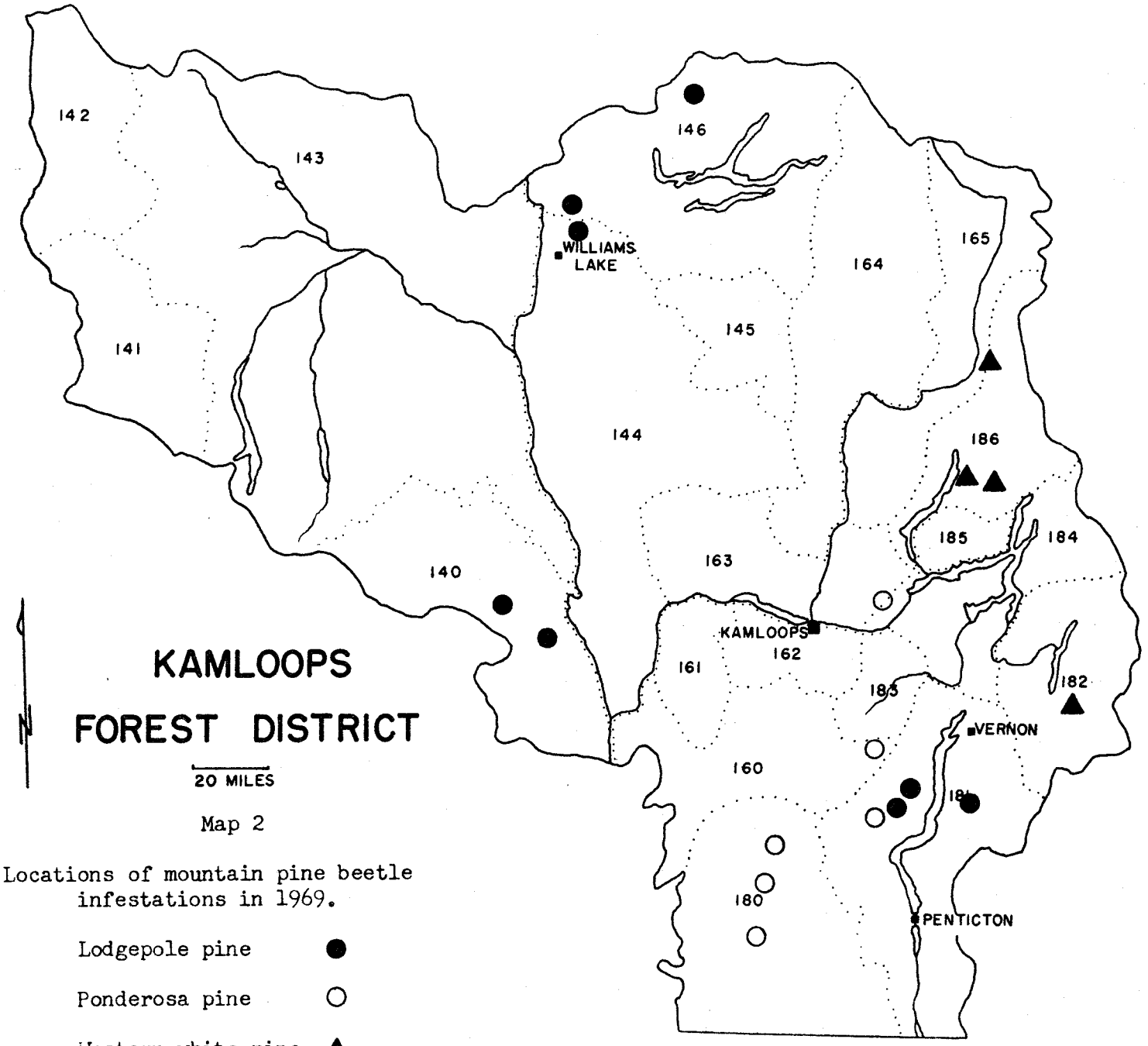
Infestations of mountain pine beetle in all species of pine increased in some areas and decreased in others. Overwintering mortality studies conducted in April in lodgepole pine stands near Williams Lake airport showed that 100% of the adults and 78% of the larval population had succumbed to extremely low temperatures during the winter of 1968-69. The highest numbers of lodgepole pine trees killed in 1968 and becoming red-topped in 1969 were near Tyee Lake (3,000), east of Williams Lake airport (7,500), along Cayoosh Creek (6,100), Cariboo Lake (2,000), Mission-Joe Rich Creeks (1,000) and Lambly and Terrace Creeks (600). The infestation at Bull Mountain collapsed and only 200 red-tops were noted.

Mission Creek was the only area where new (1969) beetle attack on lodgepole pine was found. Current attacks may have occurred in other areas, but were presumably light, due to the high overwintering beetle mortality.

Infestations in ponderosa pine near Clinton, Lower Hat Creek and Chapperon Lake apparently collapsed. Small groups of red-tops were observed near Gunn Lake, along the Nicola River from Merritt to Spences Bridge, on the west side of Okanagan Lake between Terrace and Shorts Creeks, and from Princeton north to Missezula Lake.

Numbers of red-topped western white pine decreased at Mud Lake, East Barriere Lake and in the Momich-Humamilt Lakes area, but increased along Ireland Creek.

Table 3 shows the number of trees killed and the estimated volume loss since 1966 for all pine species. Map 2 shows locations where beetle-killed pine trees were observed in 1969.



Map 2

Locations of mountain pine beetle infestations in 1969.

Lodgepole pine ●

Ponderosa pine ○

Western white pine ▲

Table 3. Pine trees killed by mountain pine beetle as determined from aerial surveys, Kamloops Forest District

Pine species	Period	Year of survey	No. trees killed	Est. total volume (cu ft)
Lodgepole	1964-65	1966	17,000	363,000
	1965-66	1967	25,500	553,000
	1966-67	1968	47,500	1,033,500
	1967-68	1969	20,500	455,500
Ponderosa	1964-65	1966	13,000	455,000
	1965-66	1967	21,000	711,000
	1966-67	1968	8,000	272,000
	1967-68	1969	2,700	89,000
Western white	1964-65	1966	1,200	48,000
	1965-66	1967	1,000	39,000
	1966-67	1968	2,700	108,500
	1967-68	1969	900	36,000

Douglas-fir beetle, Dendroctonus pseudotsugae

Numbers of red-topped Douglas-fir trees counted in the eastern and central parts of the District in 1969 were lower than in 1968. Groups of red-tops were noted in the Adams Lake area, from Princeton to Missezula Lake, on the west side of Okanagan Valley from Kelowna to Falkland, at Cultus Lake, along Battle and Tranquille Creeks and Deadman River, at Mamit Lake and along Nicola River.

In the west, numbers of red-tops increased; an estimated 10,000 were on the plateau from Williams Lake airport south to Dog Creek between the San Jose and Fraser Rivers. Red-tops were also noted east of the Williams Lake airport and along Knife Creek.

Bark samples in one area near 100 Mile House disclosed ovipositing adults and up to 78 small larvae per square foot. However, most samples from other widely separated points indicated a high beetle mortality during the winter of 1968-69. In a total of 418 chains cruised near Williams Lake in October, only one tree was found with 1969 beetle attack.

The following table gives the number of beetle-killed Douglas-fir trees counted and the estimated volume loss for the years 1967 to 1969.

Period	Year of survey	No. trees killed	Est. total volume (cu ft)
1965-1966	1967	4,500	360,000
1966-1967	1968	14,000	1,085,000
1967-1968	1969	14,500	1,090,000

A study of Douglas-fir beetle attacks on western larch, a minor host, was made near Cherryville in 1969. The site for the project was located more than five miles from the nearest beetle-killed Douglas-fir tree. Nine trees were felled in April and by June 6, six had been attacked by Douglas-fir beetles. Attacks were confined to the basal 14 feet of the trees and ranged up to six per square foot. On September 25, half-square-foot bark samples taken from the butt, mid- and upper-tree sections indicated only moderate success of the population (Table 4). Results show that thick-barked butt logs of western larch could produce a hazardous Douglas-fir beetle population if sufficient quantities of logs were present.

Table 4. Populations of Douglas-fir beetles in half-square-foot bark samples from western larch logs, Kamloops Forest District, September 25, 1969

Tree no.	No. adults found		
	Butt	Mid	Upper
1	28	0	0
2	26	0	0
3	12	4	0
4	5	0	0
5	19	0	0
6	11	0	0
Average	16.8	0.6	0

Spruce beetle, Dendroctonus obesus

Most Engelmann spruce trees attacked and killed in 1968 by spruce beetle changed color in 1969 and were mapped over extensive areas during aerial surveys. The most severe infestations occurred in the Quesnel Lake area on some 31,500 acres. Prism plot cruises at Weaver Creek showed that only 16% of the stand was healthy; 81% had been killed in 1968 or earlier, and 3% had been attacked in 1969. On Spanish Mountain, 48% of the trees examined were healthy, 40% had been killed in 1968 and 12% were attacked in 1969.

About 5,500 acres were infested in the Dunsapie Lake area west of Barriere, where 14% of the trees in prism plots had been killed in 1968 or earlier, and 1% had been attacked in 1969. About 2% of the trees suffered current light attacks which will probably cause them to die.

There was a light infestation on about 2,500 acres in the southern part of the District at Lambly (Bear) Lake. Two per cent of the trees examined had been killed in 1968 and, before that, 2%.

No overwintering adults were found in 1968 attacked trees at any location. Beetle broods in 1969 attacked trees were in the large larval, pupal or teneral adult stage in October. Spruce beetle attacks in 1970 are expected to be light in most parts of the District.

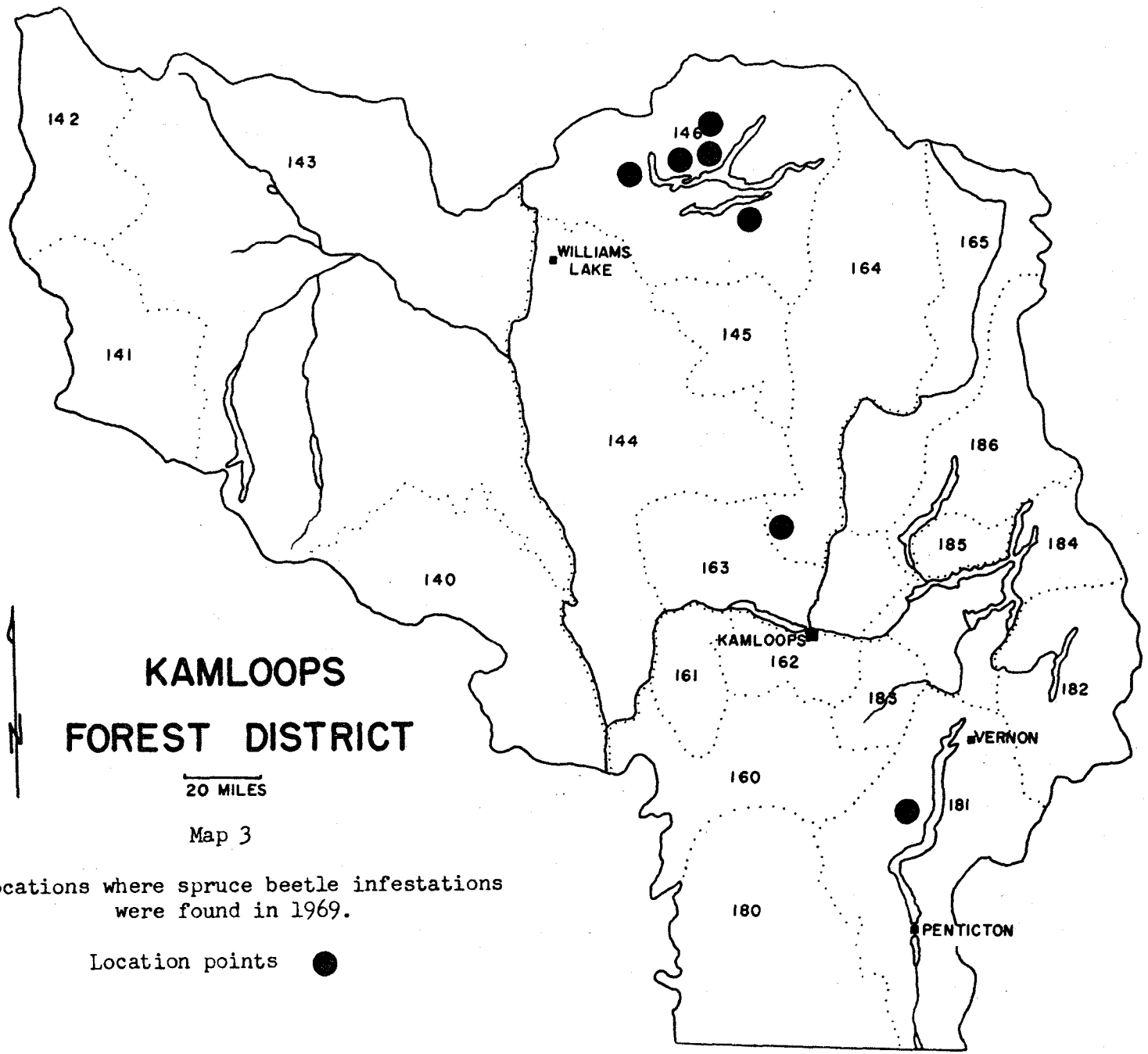
Map 3 shows locations where spruce beetle infestations were found in 1969.

Dryocoetes-Ceratocystis complex

Aerial surveys in 1969 in the Kamloops Forest District disclosed an increase in the mortality of alpine fir. Locations and numbers of red-tops were as follows: Quesnel Lake (400), Whitewood Creek (1,025), Martin Meadows Lake (1,000), Heffley Lake (1,000), Sullivan Lake (1,000), Louis Creek (1,000), Thuya Lake (1,000), Moira Lake (500), Beauregard Lake (500), Bartlett Creek (500), Fadear Creek (500), Latremouille Creek (475), Bonaparte Lake (400), Terrace Mountain (1,000) and the headwaters of Harris and McAuley Creeks (1,700), for a total of 15,600 trees in 1969; in 1968, there were an estimated 8,095 red-tops.

One-year-cycle spruce budworm, Choristoneura occidentalis

An infestation in Douglas-fir on Mission Mountain between Carpenter and Seton Lakes increased in size and severity in 1969. The total area affected was about 400 acres. Defoliation in June extended from 2,300 feet elevation to the summit of the mountain at 3,900 feet. Approximately 50% of the current year's growth throughout the infestation was destroyed. Mass collections of larvae and pupae were taken in mid-June.



Map 3

Locations where spruce beetle infestations were found in 1969.

Location points ●

Of the 130 larvae and 239 pupae collected, 11 (8.4%) and 25 (10.4%), respectively, were parasitized. Egg sampling indicated that the infestation will probably persist in 1970.

Only occasional larvae were found in random beating collections at other points in the District in 1969.

Forest tent caterpillar, Malacosoma disstria

Defoliation of trembling aspen along the Wells Gray Park Road continued over an estimated 16,000 acres, approximately the same as in 1968. About 80% of the trees were totally defoliated. Egg sampling was done in October on three randomly selected co-dominant trees at three locations within the infestation (Table 5). Numbers of M. disstria egg masses diminished in 1969; however, since a count of 10 egg masses per 6-inch dbh tree generally indicates heavy defoliation, severe damage will again occur in 1970.

Table 5. Forest tent caterpillar egg mass counts on trembling aspen, Kamloops Forest District, 1969

Location	Tree no.	No. egg masses
Mile 18.3 Wells Gray Park Rd.	1	22
	2	44
	3	13
Mile 18.8 Wells Gray Park Rd.	1	9
	2	10
	3	14
Mile 20.5 Wells Gray Park Rd.	1	13
	2	13
	3	16

Other Noteworthy Insects

Blue horntail, Sirex cyaneus

This wood wasp damaged Engelmann spruce and alpine fir saw and peeler logs near Ross Creek, an area burned in 1967 at Shuswap Lake.

Wood wasps oviposit below the surface of the wood, leaving almost no external evidence of attack and making it impractical to assess the status of the population in standing trees.

On June 10, 25 Engelmann spruce and 17 alpine fir log bolts were cut within the burn at about 5,000 feet elevation and placed in outdoor cages at Vernon. The spruce logs ranged from 6 to 24 inches in diameter and from 30 to 60 inches long; alpine fir logs were about 16 inches in diameter and 30 inches long. By year's end, a total of 101 S. cyaneus adults emerged from spruce and 37 from alpine fir, indicating that a moderate to high infestation of wood wasps exists at Shuswap Lake.

A number of hymenopterous parasites emerged from the log bolts, among them several specimens of Ibalia ensiger Norton, one of the most important parasites of S. cyaneus.

Black-headed budworm, Acleris variana

Infestations of black-headed budworm in western hemlock stands in the District completely collapsed. Populations did not increase as expected in Engelmann spruce - alpine fir stands along the Tulameen River and very few larvae were found in 1969. Generally, a very low population of budworm was present, as indicated in the following summary of collections taken from May 28 to July 10:

Host	Number of samples taken during larval period	% samples containing larvae	Average number of larvae per positive sample
Western hemlock	16	13	5.0
Engelmann spruce	40	10	5.8
Douglas-fir	181	8	1.9

Slight feeding damage was found on Douglas-fir branch tips in Fountain Valley.

A wood borer, Semanotus sp.

Western red cedar poles in a pole yard at Lumby were examined for woodborer damage in November. The poles had been cut in the spring of 1968 in the Adams River area and had remained, unpeeled, in the woods until late October.

There were up to 32 larvae per block in cedar blocks one-foot in length by 10 inches in diameter; maximum penetration was 5/8 of an inch. This woodborer spends most of its life cycle under the bark and is believed to enter the wood only to construct a pupal gallery; consequently, penetration is normally quite shallow.

A sawfly on Douglas-fir, Neodiprion sp.

Douglas-fir trees on 75 to 100 acres along the Head of the Lake Road at the north end of Okanagan Lake were moderately to heavily defoliated. Most severe damage occurred on trees up to 15 feet in height, but the upper crowns of trees up to 100 feet tall were also defoliated.

Egg sampling in October was done by examining needles on four 12-inch branch terminals on each of 10 trees. There was an average of 110 eggs per square foot on 13.5 square feet of foliage. Ninety-two of 100 eggs examined appeared to be healthy.

Defoliation could be severe in this area in 1970.

Larch sawfly, Pristiphora erichsonii

Populations of larch sawfly declined in the District in 1969; 17% of the collections were positive with an average of 5.5 larvae, compared with 31% positive and 27.3 larvae per collection in 1968.

Square-foot duff samples taken in October at Aberdeen and Becker Lakes yielded very few sound cocoons.

Populations are expected to be light in 1970.

Douglas-fir needle midges, Contarinia spp.

Needle midge populations on Douglas-fir increased at permanent plots in the central parts of the District but decreased at most plots in the east. Table 6 gives results of examinations made in 1968 and 1969. Samples consisted of five branch terminals from each of five trees at each plot.

Table 6. Percentage of Douglas-fir needles infested by needle midges, Kamloops Forest District, 1968 and 1969

Location	No. needles examined		% needles infested	
	1968	1969	1968	1969
Cherry Cr.	796	1,383	5	15
Heffley Cr.	912	1,958	11	18
Barriere	1,560	2,411	13	41
Coalmont	1,186	1,125	25	2
Keremeos	1,516	1,435	2	22
Falkland	2,179	1,473	13	2
Monte Cr.	1,849	1,612	2	1
Lumby	1,495	1,996	7	7

Mature Douglas-fir in the Vernon area suffered heavy loss of needles, due to midge damage. Populations in 1970 will probably be moderate to high in this area and at other points where an increase was noted in 1969.

A spruce weevil, Pissodes strobi

Examinations of up to 50 Engelmann spruce trees were made at widely separated points in the District in 1969 to determine distribution of spruce terminal weevil. Currently infested terminals were found on trees at Terrace Mountain, Peachland Creek, Apex Mountain, Whipsaw Creek, Fly Hills, Bear Creek, McGillivray Lake, Clearwater and Horsefly Lake. Areas of heaviest attack were Apex Mountain and Whipsaw Creek, where 20% of the trees were infested. No attack was found on spruce in areas where the overstory was lodgepole pine.

Aspen leaf miner, Phyllocnistis populiella

Aspen leaf miner populations decreased at permanent plot sites in 1969. In the western parts of the District, less than 1% of the leaf surfaces were mined at Oregon Jack Creek, Clinton, Soda Creek and Williams Lake. In the central and eastern parts, percentage of leaf surfaces mined ranged from 0 to 39% at the nine plots sampled. Plots at Phillips Lake, McCulloch Road, Paul Creek and Campbell Range were the only ones with sufficient cocoons for parasitism studies. The number of adults produced per 100 leaf surfaces ranged from 0.2 at Campbell Range to 7.6 at Phillips Lake.

European pine shoot moth, Rhyacionia buoliana

A survey for European pine shoot moth on exotic pines was conducted from April 10 to 23. A total of 37,788 seedlings of various pine species were examined in 22 nurseries and garden shops between Osoyoos and Kamloops. Most of the seedlings were Interior-grown. No specimens of the insect or damage attributable to it were found.

Fall webworm, Hyphantria cunea

Unsightly webs of this insect were numerous in many parts of the District. The highest populations occurred near Okanagan Lake but webs were also present along the South and North Thompson Rivers, near Little Shuswap and Kamloops Lakes, along the Nicola River, between Lillooet and Lytton and near Spences Bridge.

Spruce gall aphid, Adelges cooleyi

Gall aphids were common on Douglas-fir and Engelmann spruce throughout the District. In both the 100 Mile House Ranger Districts, an estimated 20% of the Douglas-fir needles were infested. From 13 to 77% of the needles on Douglas-fir in permanent plots at Barriere, Heffley Creek and Cherry Creek and from 5 to 17% at Coalmont, Keremeos, Monte Creek, Falkland and Lumby were infested.

Ambrosia beetle, Trypodendron lineatum

There was a high population of ambrosia beetle at Mile 15, Fly Hills Road, with up to 62 holes per half-square-foot of bark in alpine fir killed by the Dryocoetes spp. beetles. A moderate population was present in Engelmann spruce killed by spruce bark beetle at Spanish Mountain and Weaver Creek, and in Douglas-fir trees killed by Douglas-fir beetle near Quesnel Forks.

Pine needle-sheath miner, Zelleria haimbachi

The infestation in ponderosa pine at Gallagher Lake collapsed in 1969. Larvae were present in some beating collections but populations were low. Examinations of 25 branch tips on each of four trees at Venables Valley, Murray Creek, Lytton, Lillooet and Lower Hat Creek showed that a maximum of 6% of the tips were infested.

Poplar-and-willow borer, Cryptorhynchus (Sternochetus) lapathi

Severe damage by this weevil to willow was observed near Heffley Lake during aerial surveys in 1969. An estimated 75 to 100 acres were affected and all the willows within the confines of the infestation appeared to be dead.

Populations of C. lapathi decreased at Coquihalla and along Wells Gray Park and Oregon Jack Creek roads.

Table 7. Other insects of current minor significance

Insect	Hosts[1/]	Locality	Remarks
Altica sp. A chrysomelid beetle	Al, bCo	Shuswap Lake Okanagan Lake	Defoliator. Severe damage to shade trees.
Archips cerasivoranus Ugly nest caterpillar	Choke-cherry	Little Shuswap Lake	Defoliator. Moderate infestation.
Choristoneura biennis Two-year-cycle spruce budworm	eS	General	Defoliator. Very low population.
Coleophora laricella Larch casebearer	wL	Anarchist Mountain	Defoliator. No specimens found in branch samples.
Dendroctonus valens Red turpentine beetle	pP	Pritchard	Bark beetle. Infestation over 3 acres of burned trees.
Lambdina fiscellaria lugubrosa Western hemlock looper	wH, D, C, eS	General	Defoliator. Very low population; 22% of wH collections were positive with an average of 1.5 larvae.
Lepidosaphes ulmi Oyster shell scale	W, bCo, tA	Okanagan Lake Campsite	Sucking insect. Very high numbers of eggs on shade trees in park; egg mortality of 95% presumably from low temperatures.
Malacosoma pluviale Western tent caterpillar	B, Al, W	Okanagan Lake	Defoliator. Tents common but not numerous.

Table 7. (Continued)

Insect	Hosts[1/]	Locality	Remarks
Melanolophia imitata Green-striped forest looper	most conifers	General	Defoliator. On D, 23% of collections were positive with 2.5 larvae each.
Orgyia pseudotsugata Douglas-fir tussock moth	D	General	Defoliator. Only one larva collected in 1969.
Pikonema alaskensis Yellow-headed spruce sawfly	eS	General	Defoliator. 40% of collections positive with average of 2.3 larvae.
P. dimmockii Green-headed spruce sawfly	eS	General	Defoliator. 30% of collections positive with average of 1.9 larvae.
Pissodes terminalis Pine terminal weevil	lP	Tunkwa Lake	Terminal borer. Infestation collapsed, probably due to extreme winter cold.
Stilpnotia salicis Satin moth.	tA	Campbell Range, Agate Bay	Defoliator. Small infestation at Agate Bay on Adams Lake.

[1/] Host tree abbreviations appear in Appendix I

FOREST DISEASE CONDITIONS

The organisms currently causing much of the tree mortality, growth loss and quality reduction attributed to diseases are 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 which makes annual summaries of their status repetitious; for this reason the following report may omit the mention of 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 or 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 and Branch Diseases

Dwarf mistletoes, Arceuthobium spp.

A survey was conducted in 1969 to determine the distribution and intensity of these parasitic plants on various coniferous hosts in the District. At each location, 50 trees were examined and the number of infected trees recorded. Results of the survey are summarized in the following sections. Map 4 shows the distribution of dwarf mistletoes on three hosts in the Kamloops Forest District.

Lodgepole pine dwarf mistletoe, Arceuthobium americanum

This parasite infected lodgepole pine throughout the sampled range of the host except in the more moist areas northeast of 100 Mile House. Of the 60 plots established, 22 had more than 75% of the trees infected. Heaviest infection occurred near Williams Lake, 100 Mile House, Clinton, Mamit Lake, Le Jeune Lake Road, Dominic Lake, Pasayten River, Whipsaw Creek and Peachland Creek. A. americanum was also found on ponderosa pine 11 miles southwest of Princeton.

A hyperparasite of A. americanum, Glomerella cingulata, was found at Mile 27 Coldwater River Road. A fungus, Walrothiella arceuthobia, which prevents seed maturation by attacking the female flowers of dwarf mistletoe, was present at Mile 9 Pasayten River Road, Mile 1 Adams Lake Road and at 112 Mile House. However, these organisms appear to have little effect in controlling the spread of dwarf mistletoe.

Douglas-fir dwarf mistletoe, Arceuthobium douglasii

A. douglasii was not found in the western or central parts of the District or in the moist section of the eastern part. It was very common in Douglas-fir stands from Anarchist Mountain north to Vernon and from a few miles west of Hedley to about 10 miles east of Rutland. Plots at Twin Lakes and near Summerland and Westbank had more than 70% of the trees infected.

Western larch dwarf mistletoe, Arceuthobium campylopodum f. laricis

Forty per cent of western larch trees in plots on Anarchist Mountain were infected by dwarf mistletoe. Near Baldy Creek east of Oliver, 42% of the trees examined were infected. At the latter location, mature trees had been logged and the stand consisted of trees in the 4- to 10-inch diameter class.

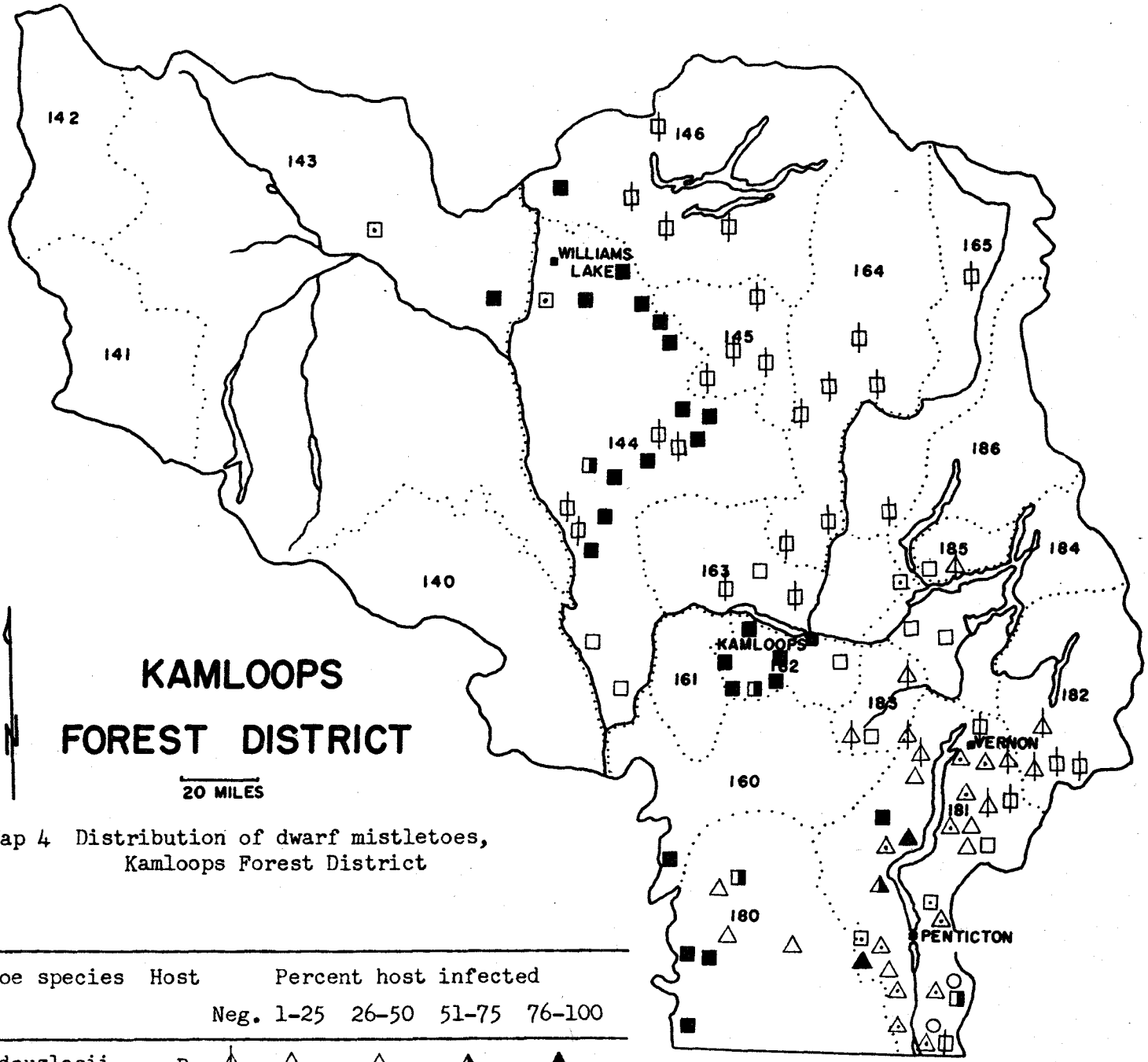
Dwarf mistletoe on western larch has been collected as far north as Lavington.

Needle disease of ponderosa pine, Elytroderma deformans

Infection of ponderosa pine by this needle cast was generally lighter than in 1968 although pockets of heavy infection remained throughout much of the host range in the District. There was a reduction in the percentage of foliage infected at almost all permanent plots established to record annual fluctuations of the disease (Table 8).

Table 8. Percentage of ponderosa pine foliage infected by Elytroderma deformans at six locations, Kamloops Forest District

Location	Estimated % foliage infected	
	1968	1969
Clinton	38	33
Lower Hat Creek	21	13
Le Jeune Lake Road	34	35
Lower Nicola	37	36
Glenemma	30	20
Carr's Landing	34	22



Map 4 Distribution of dwarf mistletoes, Kamloops Forest District

Dwarf mistletoe species	Host	Percent host infected				
		Neg.	1-25	26-50	51-75	76-100
Arceuthobium douglasii	D	△	▲	▲	▲	▲
A. campylopodum f. laricis	wL	○	○	⊙	◑	●
A. americanum	lP	□	□	⊡	◨	■

There was an increase of from one to four dead trees at all plots. Most of them were very small and were probably killed by drought. A few larger ones were killed by bark beetles.

Severe infection by E. deformans occurred on 86% of lodgepole pines examined near Eagle Creek and along Upper Range Road south of Westwold.

Exotic Plantations

Examination of the plantations on Terrace Mountain and at Tamarack and McGillivray Lakes have been discontinued because few trees survive.

In the plantation of Scots pine along Knife Creek Road, 10% of 50 trees examined had branches infected by western gall rust, Endocronartium harknessii. The remaining trees were healthy and had up to 15 inches of the current year's growth.

Other Noteworthy Diseases

Climatic injury

Below-normal temperatures during the winter of 1968-69 resulted in moderate to severe damage to various tree species.

Ornamental spruce, fir, cypress, juniper and several deciduous species were damaged in home gardens between Kelowna and Kamloops.

Ponderosa pines an the vicinity of Clapperson, Spences Bridge, Deadman River and Le Jeune Lake Road suffered from frost damage. Many of the trees later recovered satisfactorily, indicating that bud damage was minimal.

Reddening of foliage of western white pine over several hundred acres near Curwen Creek was attributed to winter injury. A high percentage of the needles on many trees were still green and it is expected that most trees will recover.

Severe reddening of foliage was noted on western red cedar over most of the range of that species during aerial surveys in 1969.

Table 9. Other diseases of current minor significance

Organism	Hosts[1/]	Locality	Remarks
Armillaria mellea	C	Armstrong	Root rot. Numerous trees dying in farm yards.
Atropellis piniphila	pP, lP	McCulloch Road, Albreda	Stem canker. Average of 1 out of 25 trees infected.
Biatorella resinae	A. piniphila	Albreda	Parasitic on A. piniphila.
Chrysomyxa arctostaphyli	eS	Apex Mountain	Needle rust. Estimated 35% of foliage infected on examined trees
Chrysomyxa weirii	eS	Bear Creek	Needle rust. Light infection noted.
Lophodermella concolor	lP	Upper Range Road, Green Lake to 70 Mile House	Needle cast. Up to 100% of the year old needles infected on 60% of trees examined.
Rhabdocline sp.	D	Pasayten River Road	Needle cast. Moderate infection on 60% of the trees examined.

[1/] Host tree abbreviations appear in Appendix I

Appendix I. Host tree abbreviations

Abbr	Common name	Abbr	Common name
C	cedar - general	S	spruce - general
wC	western red cedar	eS	Engelmann spruce
D	Douglas-fir	Al	alder
F	fir - general	A or Po	aspen or poplar - general
alF	alpine fir		
H	hemlock - general	bCo	black cottonwood
wH	western hemlock	tA	trembling aspen
roJ	Rocky Mtn. juniper	B	birch - general
cJ	common juniper	wB	white birch
L	larch - general	M	maple - general
aL	alpine larch	bM	broadleaf maple
wL	western larch	mM	Manitoba maple
P	pine - general	W	willow
lP	lodgepole pine		
pP	ponderosae pine		
wwP	western white pine		
wbP	white bark pine		