

ANNUAL DISTRICT REPORT
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA, 1971
PART IV, KAMLOOPS FOREST DISTRICT

by

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VICTORIA, BRITISH COLUMBIA
INFORMATION REPORT BC-X-64

DEPARTMENT OF THE ENVIRONMENT

MARCH, 1972

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INTRODUCTION

This report outlines the status of forest insect and disease conditions in the Kamloops Forest District for 1971, and attempts to forecast pest population trends. 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 gauging population trends.

Regular field work in the District this season began June 1 and ended September 9. Special surveys were as follows: European pine shoot moth, May 25 to 28; aerial surveys, totalling 32 hours of flying time, were done intermittently during August and early September, as fire season restrictions permitted.

A total of 541 insect and 40 disease collections were submitted in 1971. Map 1 shows collection localities and drainage divisions.

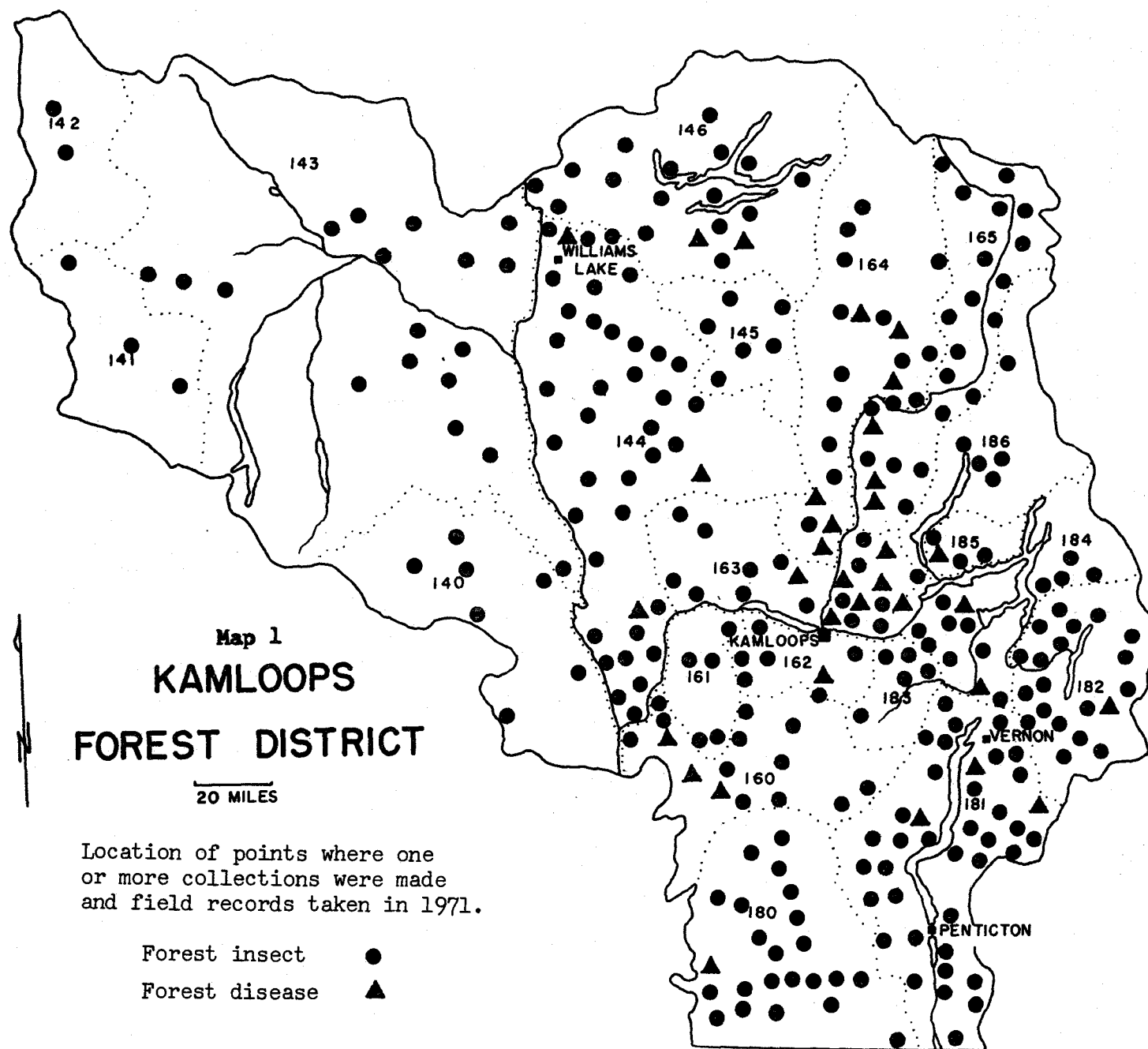
Larval defoliators found in field collections increased in the southern portion of the District but changed little in the northern part. In the south, 81% of the collections contained larvae compared with 69% in 1971. In the northern section, only 48% of the collections were positive.

Bark beetles were the most destructive insects in the Kamloops Forest District in 1971. Although spruce beetle attacks declined north of Quesnel Lake, increases occurred in the Central Okanagan. Mountain pine beetle attacks were more numerous in western white and lodgepole pine in the North Thompson, Shuswap and Okanagan valleys. Western balsam bark beetles, in association with a lesion-causing disease, continued to kill alpine fir in high elevation stands. Douglas-fir beetle-killed trees were scarce throughout the District.

Douglas-fir tussock moth populations increased at scattered points in the Okanagan and caused severe defoliation at eight locations. The spruce budworm infestation near Seton and Anderson lakes more than doubled in size. Populations of the western hemlock looper and filament bearer in wet-belt areas and a looper on Douglas-fir, Nepytia sp., increased but caused little noticeable damage. Other defoliating insects remained at low levels.

Most of the new disease problems were caused by climatic stresses, such as drought damage to Douglas-fir near Lillooet and snow damage to several species of coniferous trees in the Cariboo and Okanagan Valley. Fume damage to a variety of plant life occurred in the vicinity of Kamloops.

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



FOREST INSECT CONDITIONS

Currently Important Insects

Bark Beetles

Spruce beetle, Dendroctonus rufipennis

An estimated 2,150 acres of severely infested mature Engelmann spruce in the Okanagan and Barton Hill forests were mapped during aerial surveys in August, 1971. At that time discolored foliage, appearing only on trees attacked in 1969, was used to delineate the infestation. Infested areas were estimated as follows: Dome Rock Mtn., 600 acres; Whiterocks Mtn., 1,000; Cameo Lake - Mt. Gottfriedsen, 500 and Brenda Lake, 50.

In September, prism plot cruises in three of the areas indicated a small attack had occurred in 1970, but numerous trees were attacked in 1971. In the largest infestation, south of Whiterocks Mtn., the combined attacks of 1969, 1970 and 1971 accounted for 77% of the spruce by stems, mostly the largest trees. The percentage of trees attacked each year is shown in the following table.

Area	No. prism plots	No. trees	% trees			Total
			attacked in			
			1969	1970	1971	
Whiterocks Mtn (N) ^{1/}	5	22	59	9	23	91
Whiterocks Mtn (S)	26	140	32	4	41	77
Brenda L	30	173	6	4	7	17

^{1/} In an area partially logged 10 to 12 years ago.

During November and December, foresters of the tree farm licence and British Columbia Forest Service were slated to carry out surveys to define the extent of 1971 attack outside the perimeters of the infestations as mapped from the air.

In all areas examined, a large population of overwintering adults were gathered at the base of 1970- and 1971-attacked trees. Larvae and adults that remained in the upper boles may be greatly reduced, during the winter of 1971-72, by woodpecker predation and cold temperatures, but the large numbers around root collars, protected from cold temperatures by snow, indicate that a substantial attack may occur in 1972.

Aerial surveys in 1971, in the Quesnel Lake area, indicated a continued decline in spruce beetle attacks. Approximately 1,000 acres of light to moderate attack were noted as follows: Blackbear Creek, 200; Spanish Lake, 100; Abbott Creek, 600 and Tasse Lake, 100 acres.

Mountain pine beetle, Dendroctonus ponderosae

Considerably more red-topped western white pine were observed in 1971 than in 1970. The largest numbers of beetle-killed trees occurred at: Blue River, 1,700; Squaw Valley - Sugar Lake, 1,700; 1,000 trees along tributaries of the Shuswap River north of Sugar Lake; Allison Pass, 1,200; North Barriere Lake, 950; Humamilt - Momich lakes, 800 and Larch Hills, 700. Many of the infested trees had been weakened by white pine blister rust infections. High populations of beetles existed in most areas and further tree mortality is expected in 1972.

Counts of red-topped lodgepole pine were similar to those made in 1970. The largest outbreaks were: Cayoosh Creek, 1,500 trees; Mission - Joe Rich creeks, 1,200 and Terrace Creek, 550. At Terrace Creek, where ground surveys were carried out, a large proportion of the trees were attacked in 1971, as shown below, indicating increased attacks in 1972:

Location	No. prism plots	No. trees	% trees		Total
			attacked in		
			1970	1971	
Terrace Cr	40	174	19	31 ^{1/}	50

^{1/} Retained green foliage and not included in aerial counts.

Few red-topped ponderosa pine trees were noted in 1971. About 200 trees were attacked at Terrace Creek. Table 1 shows a 3-year comparison of beetle-killed pine.

Table 1. Pine trees killed by mountain pine beetle as determined from aerial surveys, Kamloops Forest District

Pine species	Year of attack	Year of survey	No. trees killed	Est. total vol (ft ³)
Western white	1967-68	1969	900	36,000
	1968-69	1970	1,700	78,400
	1969-70	1971	9,000	639,000
Lodgepole	1967-68	1969	20,500	455,500
	1968-69	1970	4,000	102,000
	1969-70	1971	3,950	98,750
Ponderosa	1967-68	1969	2,700	89,000
	1968-69	1970	1,000	29,000
	1969-70	1971	460	13,350

Dryocoetes-Ceratocystis complex

The western balsam bark beetle in association with the fungus Ceratocystis dryocoetidis, continued to take an annual toll of high-elevation alpine fir trees. The number of red-tops in 1971 was estimated at 17,100. The largest groups of dead trees were at: Bob Creek, 2,100; Jamieson Creek, 700; Queest Mountain, 950; Hunters Range, 6,000; Bouleau Lake, 1,200; Terrace Creek, 900 and Copper Creek, 550. The following table shows a comparison of counts made from 1969 to 1971.

Year of attack	Year of survey	No. trees killed	Est. total vol (ft ³)
1967-68	1969	15,600	405,600
1968-69	1970	31,600	821,600
1969-70	1971	17,100	427,500

Douglas-fir beetle, Dendroctonus pseudotsugae

There was a further decrease from 1970 in the number of red-topped Douglas-fir in the Kamloops Forest District, as shown in the following table.

Year of attack	Year of survey	No. trees killed	Est. total vol (ft ³)
1967-68	1969	14,500	1,090,000
1968-69	1970	1,700	146,000
1969-70	1971	195 ^{1/}	16,575

^{1/} The lowest count in approximately 20 years.

A moderate increase in damage may occur in 1972 since the summer of 1971 was favorable for brood development.

Defoliators

Douglas-fir tussock moth, Orgyia pseudotsugata

Tussock moth larvae caused over 90% defoliation of semi-mature and understory Douglas-fir and ponderosa pine at widely scattered sites in the Okanagan Valley. Eight infestations from 1 to 10 acres were located at: Oyama, one; Winfield, three; Glenmore district, two and one infestation each at Westbank and Kaleden. Also, a few larvae were found in Douglas-fir stands west of Oliver and Osoyoos. No parasites or virus diseases were noted in larvae or pupae collected in 1971 and, since egg masses were numerous in the fall, the infestation is expected to continue and expand in 1972. Tree mortality may occur when trees are attacked consecutively for two or more years.

Tussock moths have been scarce in the Kamloops Forest District since 1965; however, severe defoliation resulting in extensive tree mortality has occurred in the past in the Thompson, Okanagan and Similkameen valleys.

Spruce budworm, Choristoneura occidentalis

The infestation on Douglas-fir in the Seton - Anderson lakes area increased from 4,250 acres in 1970 to 11,300 acres in 1971. Moderate to heavy defoliation recurred on Mission Mountain and along Whitecap Creek. New areas of defoliation were noted along McGillivray Creek and the south end of Anderson Lake. Approximately 75% of the current year's foliage was destroyed. Egg counts indicate that further defoliation will occur in 1972. No trees died at Mission Mountain, although trees have been attacked for four consecutive years.

Western hemlock looper, Lambdina fiscellaria lugubrosa

Populations of the western hemlock looper increased in the eastern portion of the Kamloops Forest District, as shown in the following table.

Drainage divisions	Number of samples taken during larval period			% samples containing larvae			Average number of larvae per positive sample		
	1969	1970	1971	1969	1970	1971	1969	1970	1971
181-184	55	78	70	1	11	24	0.7	2.2	11.5

The largest collections, from western red cedar and western hemlock, contained 61 larvae near Hidden Lake; 43 at Mile 22, Kingfisher Creek Road, and 27 at Noisy Creek. Defoliation was negligible. Larvae have been scarce in the District since 1964, when 100 acres of western hemlock trees were severely defoliated at Hidden Lake.

A looper on Douglas-fir, Nepytia freemani

Larval populations increased noticeably in the Okanagan - Shuswap - Sicamous areas. Largest collections were 52 larvae at Brash Creek; 40 near Chase, and 24 in Harris Creek Valley. No visible defoliation occurred. Elsewhere in the District there were only slight increases in numbers. Following is a comparison of Douglas-fir collections containing Nepytia larvae.

Drainage divisions	Number of samples taken during larval period			% samples containing larvae			Average number of larvae per positive sample		
	1969	1970	1971	1969	1970	1971	1969	1970	1971
181-184	46	48	43	28	23	47	2.9	4.0	10.9

Filament bearer, Nematocampa filamentaria

Although the filament bearer is not known to cause serious damage, the numbers of larvae per collection increased in cedar - hemlock stands in the Mabel Lake and Eagle River drainages. The largest collection, at Noisy Creek, contained 118 larvae. Light defoliation of western red cedar and western hemlock occurred in this area in association with the western hemlock looper. A summary of collections from drainage divisions 182 and 184 follows.

Number of samples taken during larval period			% samples containing larvae			Average number of larvae per positive sample		
1969	1970	1971	1969	1970	1971	1969	1970	1971
24	22	23	13	23	61	1.7	5.0	17.4

Scale Insects

Pine needle scale, Phenacaspis pinifoliae

Approximately 500 acres of ponderosa pine were severely infested by pine needle scale near the south end of Nicola Lake. All sizes of pine were affected in a belt at between 2,500 and 3,000 feet elevation, suggesting that the trees had been weakened by climatic conditions during the winter. All foliage produced prior to 1971 had been killed on most trees, and a few trees had died. The majority of 1971 foliage was heavily infested with crawlers during the summer. The poor condition of the trees, coupled with continuing attacks by the pine needle scale, may cause further tree mortality.

Other Noteworthy Insects

Larch casebearer, Coleophora laricella

Larval populations increased on western larch southeast of Oliver but did not cause extensive defoliation. Samples consisting of four 18-inch branch tips, taken at Mile 10, Camp McKinney Road, averaged 11.4 larvae per branch compared with 0.5 in 1970. This area borders on a large infestation in the Nelson Forest District.

European pine shoot moth, Rhyacionia buoliana

During the last week in May, 1,076 Scots pine, planted in forest sites, were examined for shoot moth damage. Two nurseries containing 1,495 Scots, mugho and Austrian pines were also checked. No larvae or signs of their damage were observed.

Several hundred infested Scots pine from the Vancouver area were planted in May near Armstrong, but few trees survived. These trees had been fumigated and only dead larvae were found. No attacks were noted during the summer in a nearby natural ponderosa pine stand.

Douglas-fir needle midges, Contarinia spp.

The percentage of Douglas-fir needles infested by needle midges remained low, except for a moderate infestation in the vicinity of Heffley Creek (Table 2). Needles were examined on five branch tips from each of five trees of Christmas-tree-size at each plot.

Table 2. Percentage of Douglas-fir needles infested by needle midges, Kamloops Forest District

Location	No. needles examined		% needles infested	
	1970	1971	1970	1971
Heffley Cr	1,911	1,253	22	34
Barriere	2,020	1,705	24	15
Cherry Cr	1,160	1,119	19	6
Coalmont	1,192	1,597	5	2
Keremeos	1,203	1,440	6	15
Falkland	1,634	1,494	7	4
Monte Cr	1,694	1,437	11	16
Lumby	1,764	1,800	12	3

Cooley spruce gall aphid, Adelges cooleyi

Infestations on Douglas-fir trees were generally light throughout the District. Near Coalmont and Winfield, up to 80% of needles on the current year's growth were damaged on small groups of immature trees. Damage levels in annually examined plots at Heffley Creek, Barriere, Cherry Creek, Keremeos, Falkland, Monte Creek and Lumby varied from 2 to 14% of the needles infested.

Cone insects

Up to 95% of the seeds were destroyed in Engelmann spruce cones collected from Silver Star Mountain, Boleyn, McGillivray and Knouff lakes and near Clearwater. The most common pests were a cone moth, Laspeyresia youngana, and a cone maggot, Hylemya anthracina. Cone crops were generally light throughout the District.

Table 3. Other insects of current minor significance

Insect	Host	Locality	Remarks
<u>Acleris</u> <u>gloverana</u> Black-headed budworm	Douglas-fir, western hemlock, Engelmann spruce	General	Defoliator. Larvae extremely scarce.
<u>Altica</u> spp. Leaf beetles	Alder	Lavington, Lumby	Leaf skeletonizer. Moderate to severe damage along Coldstream and Duteau Cr(s).
<u>Archips</u> <u>cerasivoranus</u> Ugly-nest caterpillar	Choke cherry	Head of Okanagan L	Defoliator. Defoliation common in this area only.
<u>Cryptorhynchus</u> <u>lapathi</u> Poplar-and- willow borer	Willow	North Thompson Va	Borer. Numerous trees infested on Mt. Tod.
<u>Hyphantria</u> <u>cunea</u> Fall webworm	Choke cherry, miscellaneous trees and shrubs	Okanagan Va	Defoliator. Common, but less damage than in 1970.
<u>Malacosoma</u> <u>disstria</u> Forest tent caterpillar	Trembling aspen, black cottonwood	Raft R, Mad R, Winfield	Defoliator. Scattered patches of heavy defoliation.
<u>Melanolophia</u> <u>imitata</u> Green-striped forest looper	Douglas-fir	General	Defoliator. Low populations, 6% of collections contained an average of 1.0 larvae.
<u>Neodiprion</u> spp. Conifer sawflies	Western hemlock, Douglas-fir, lodgepole and ponderosa pine, Engelmann spruce, alpine fir	General	Defoliator. Head-of- Okanagan Lake infestation collapsed. Scarce on all hosts except for moderate numbers on hemlock and Douglas-fir.

Table 3. (Concluded)

Insect	Host	Locality	Remarks
<u>Pissodes</u> <u>terminalis</u> Pine terminal weevil	Lodgepole pine	Cariboo, Chilcotin	Terminal borer. Common on reproduction along roads and creeks.
<u>Pristiphora</u> <u>erichsonii</u> Larch sawfly	Western larch	Eastern Okanagan Va	Defoliator. Scattered pockets of defoliation.

FOREST DISEASE CONDITIONS

The organisms currently causing most of the tree mortality, growth loss, and quality reduction attributed to diseases are dwarf mistletoes and stem and root rot fungi which, 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 annually varying foliage diseases and abnormal weather conditions, i.e., frosts, drought, snow damage, etc., which 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

Foliage Diseases

Elytroderma disease of pines, Elytroderma deformans

There were light to moderate infections on ponderosa pine throughout the host range. Six plots, established in 1961, were examined annually to determine the effect of the disease (Table 4). Root diseases, prevalent in some areas, and bark beetle attack may have contributed to the heavy mortality.

Table 4. Percentage of ponderosa pine foliage infected by Elytroderma disease and number of dead trees, Kamloops Forest District

Location	Est. % foliage infected		No. dead trees		Increase in no. of dead trees
	1970	1971	1970	1971	
Clinton	27	22	12	14	2
Lower Hat Cr	17	14	4	4	0
Le Jeune L Rd	50	42	30	32	2
Lower Nicola	43	35	5	5	0
Glenemma	21	24	8	8	0
Carrs' Ldg.	21	26	18	20	2

Physiological Diseases

Drought damage

The foliage of numerous Douglas-fir seedlings and immature trees turned red in the spring of 1971 as a result of drought conditions experienced in the summer of 1970. The most extensive damage occurred along Bridge River from Lillooet to Yalakom River, where an estimated 7,000 trees were killed. Scattered tree mortality occurred from Lillooet to Lytton, with occasional groups of 200 to 300 trees. A few trees were killed in the Nicola River Valley from Spences Bridge to Merritt.

Winter drying

Extensive areas of winter drying of lodgepole pine and western red cedar occurred in the eastern Cariboo. The foliage of pine was discolored in a sporadic quarter-mile-wide belt from Jack Knife Creek, east of Williams Lake, to the northern boundary of the Kamloops Forest District. In the Likely - Keithley Creek areas, approximately 4,000 acres of lodgepole pine and western red cedar were damaged. One year's damage does not cause appreciable tree mortality.

Snow damage

Snow and ice damage was extensive in the vicinity of Mt. Moore, east of Kelowna. The top 30 to 40 feet of numerous mature Engelmann spruce were broken off over several thousand acres. Very few alpine fir were affected.

Scattered upper-crown breakage of lodgepole pine, Engelmann spruce and Douglas-fir was common in the Cariboo. The most noticeable damage occurred near the Williams Lake Airport.

Fume damage

In July, sulphur dioxide fumes discolored the foliage of coniferous and deciduous growth in the North Thompson Valley from Vinsulla to Kamloops. The damage resulted from a train wreck at Vinsulla in which exploding propane gas ignited sulphur to produce the fumes. Ponderosa pine, Douglas-fir, black cottonwood, trembling aspen and minor species of trees and shrubs were affected in the valley bottom and to 300 feet up the adjacent slopes. Most native trees should recover from fume damage, although larger ponderosa pines and Douglas-firs may be predisposed to bark beetle attacks.

Porcupine damage

Porcupines were unusually active in the Nicola Valley during the winter of 1970-1971, stripping the bark from the upper boles of immature ponderosa pine and from large limbs of mature trees. As a result, dead tops and branch flagging were common on scattered trees from Spences Bridge to Merritt. The most noticeable damage occurred near Lower Nicola and Clapperton, where groups of 5 to 20 trees were affected. Occasional damage was noted south of Kamloops and near Osoyoos.

Table 5. Other diseases of current minor significance

Organism	Host	Locality	Remarks
<u>Chrysomyxa</u> <u>weirii</u>	Engelmann spruce	Wells Gray Park, Black Cr Rd(s)	Needle rust. Light infections.
<u>Coleosporium</u> <u>asterum</u>	Lodgepole pine	Clearwater	Needle rust. Light infections.
<u>Cronartium</u> <u>coleosporioides</u> f. <u>coleosporioides</u>	Lodgepole pine	Beaver Valley (Horsefly)	Blister rust. Light infections.
<u>Pucciniastrum</u> <u>epilobii</u>	Alpine fir	Vavenby	Needle rust. Heavy infections in localized areas.