

ANNUAL DISTRICT REPORT
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA, 1971
PART V, NELSON FOREST DISTRICT

by
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INTRODUCTION

This report outlines the status of forest insect and disease conditions in the Nelson Forest District for 1971, and attempts to forecast pest population trends. It stresses 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 help in the interpretation of the general pest situation and assist in gauging population trends.

Regular field work in the District this season began May 10 and ended October 31. Special surveys were as follows: larch casebearer larval and pupal, May 22 to 28; aerial, August 2 to 6; spruce beetle and mountain pine beetle, September 13 to 24, and larch casebearer overwintering larval, October 28 to 31.

A total of 483 insect and 56 disease collections were submitted in 1971. Map 1 shows collection localities and drainage divisions.

Numbers of larval defoliators found in field collections remained unchanged from last year: in the western and eastern parts of the District, 80 and 76% of beating collections, respectively, contained larvae.

The mountain pine beetle and larch casebearer were the major insect problems in the District during 1971. Western white pine trees killed by the mountain pine beetle increased in the wet belt, notably in the Upper Arrow Lake area. The number of beetle-killed lodgepole pine trees increased at Elk Creek in the East Kootenays and at Kallis Creek in the West Kootenays. Surveys of Engelmann spruce stands indicated a general collapse of the spruce beetle outbreaks that occurred in 1967 and 1968. A few small infestations continued to harbor beetle populations. Douglas-fir beetle activity was at a low level; only a few red-topped trees were counted in 1971. The larch casebearer defoliated western larch trees at a number of localities in the southern part of the District. A localized outbreak of filament-bearer larvae infested western hemlock trees near Nakusp. Tent caterpillars defoliated trembling aspen in the Trail-Warfield area and along the Rogers Pass Highway near Revelstoke.

Needle blight disease caused discoloration and defoliation of western larch in higher elevation stands in the southern part of the District. Poplar leaf and shoot blight was evident in a number of trembling aspen stands. Drought-damaged coniferous trees, in 1970, were common at a number of locations.

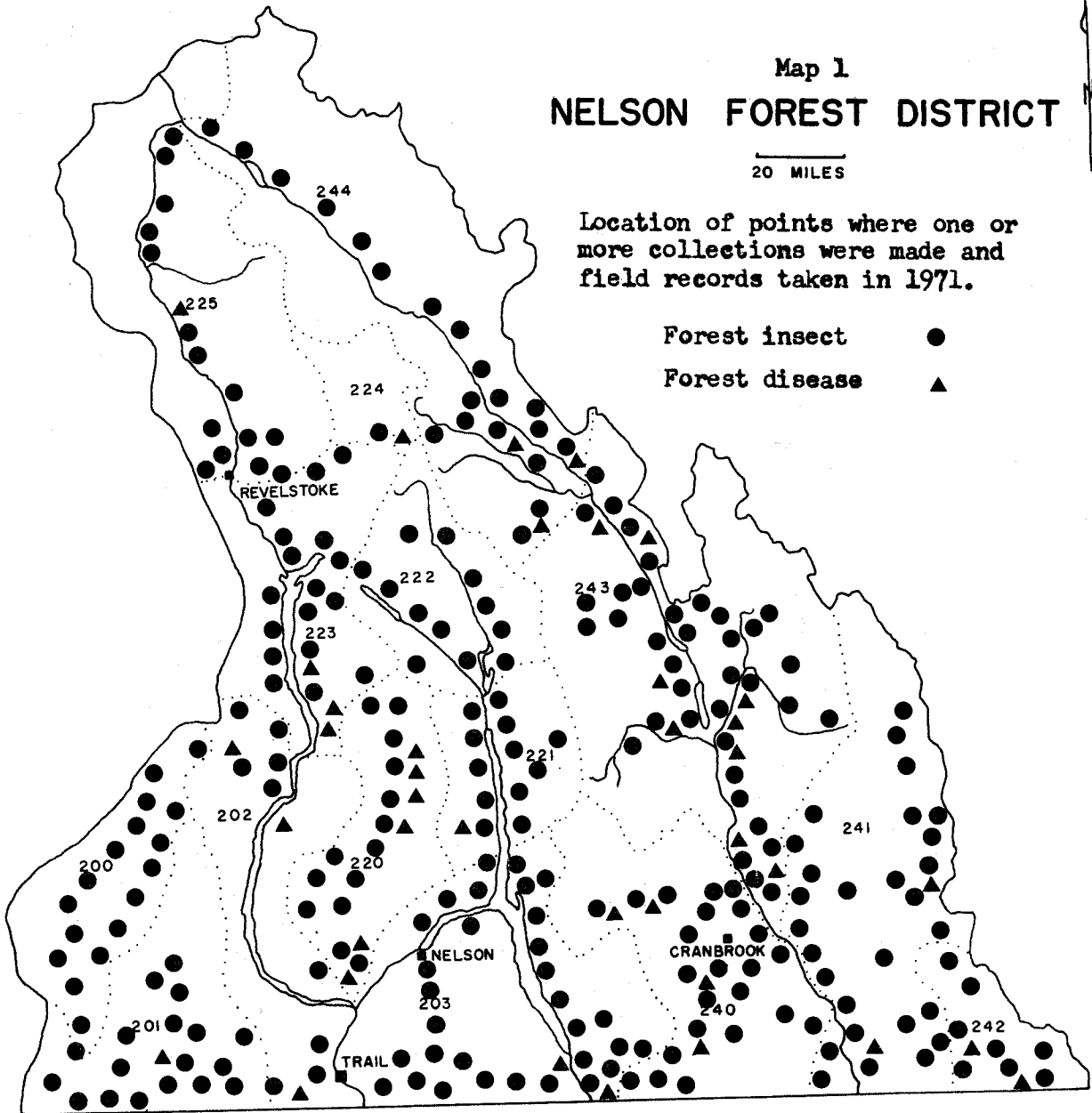
Details on individual insect and disease problems appear in subsequent sections.

Map 1
NELSON FOREST DISTRICT

20 MILES

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

Bark Beetles

Mountain pine beetle, Dendroctonus ponderosae

There was a marked increase in the number of western white pine and lodgepole pine red-tops counted in 1971. Over 26,000 western white pine red-tops were counted in wet belt areas of the District, the highest concentrations being along the Upper Arrow Lake, Armstrong-Trout lakes and Erie Creek in the Salmo District. Lodgepole pine counts totalled over 10,000 trees; the highest numbers were counted at Elk Creek and Redgrave in the East Kootenays and at Kallis Creek in the West Kootenays (Table 1).

Table 1. Red-top pine counts as determined from aerial and ground surveys,
Nelson Forest District, 1971

Pine species	Locality	No. trees counted
Western white	West Kootenays	
	West side Upper Arrow L	11,415
	East side Upper Arrow L	3,750
	Galena Pass	400
	Northeast Arm Arrow L	1,025
	Shelter Bay to Revelstoke	480
	Rogers Pass	250
	Big Bend Highway (west side)	500
	Armstrong - Trout l(s)	3,425
	Incomappleux R	200
	Lardeau R	700
	Duncan L and R	425
	North end Kootenay L	350
	Slocan L	600
	Erie Cr (Salmo)	2,300
	Nelson	100
	Christina L	75
	East Kootenays	
	Finley Cr	100
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	Total	26,095
Lodgepole	West Kootenays	
	Kallis Cr	2,500
	Granby R	100
	Slocan L	70
	East Kootenays	
	Elk Cr	6,275
	Bull R	230
	Redgrave	850
	Bush L(s)	200
		<hr/>
	Total	10,225

Moderate 1971 attacks on western white pine trees occurred in infestation areas examined along the Upper Arrow Lake in August. Larval populations were heavy in 1971-attacked trees. Stands where beetle infestations occurred were immature, with white pine comprising up to 20% of the stems in the stand. Tree measurements were made on beetle-killed trees at four localities (Table 2).

Table 2. Average tree measurement of beetle-killed western white pine, Nelson Forest District, 1971

Location	Dbh (inches)	Height (ft)	Vol(ft ³)
Upper Arrow Lake			
Shelter Bay	12.2	73	23.4
Galena Bay	11.9	77	26.8
Payne Creek	9.4	85	20.2
Slocan Lake			
Wilson Creek	12.6	70	23.4

Cruise strips totalling 160 and 150 chains were run in beetle-attacked lodgepole pine stands at Elk Creek and Kallis Creek, respectively, in September. Prism plots were established every two chains and the trees were examined and classified for beetle attack (Table 3). Range of tree size by cruise strip averaged 10-12 inches dbh and 70 to 90 feet in height.

Table 3. Status of lodgepole pine on mountain pine beetle strips, Elk and Kallis creeks, Nelson Forest District, 1971

Location	No. trees examined	Avg vol (ft ³)	% trees attacked				
			1971	1971 partial	1970	Prior to 1970	Total
Elk Creek							
Strip No. 1	124	19.8	13	0	28	19	60
Strip No. 2	347	27.8	37	0	12	8	57
Strip No. 3	102	31.6	45	6	11	20	82
Kallis Creek	535	17.2	37	0	13	11	61

The number of trees attacked in 1971 was more than double that in 1970, at both Elk and Kallis creeks. Beetle populations were heavy in 1971-attacked trees; the majority of beetles were in the larval stage, although some parent adults and eggs were present in most of the trees examined.

In summary, mountain pine beetle infestations on western white pine and lodgepole pine increased in a number of areas during 1970 and 1971. High overwintering beetle populations indicate that infestations will continue in 1972 and additional tree mortality will occur.

Spruce beetle, Dendroctonus rufipennis

Severe infestations of spruce beetle began in 1967 and continued in 1968, causing heavy losses of Engelmann spruce in the East Kootenay Region of the District. Smaller outbreaks followed in 1969, in the West Kootenays. Infestations declined in 1969 and, the following year, surveys indicated a general collapse of major infestations, although a few minor infestations persisted in several localities.

During August 1971, mature spruce stands were surveyed from aircraft to detect new or previously unrecorded beetle infestations. In September, prism cruises were run in selected areas to determine the proportion of merchantable trees attacked, and to assess beetle populations. In addition, a number of obviously infested and apparently uninfested mature spruce stands were examined for current beetle attacks, and an assessment was made of recent windfall. Trap trees were felled at several localities in the spring, and were examined in August to assess beetle populations and development.

In the East Kootenays, the 1971 aerial surveys indicated that the spruce beetle outbreaks had collapsed. Scattered patches of spruce trees killed by the beetle in 1969-70 were noted in the old infestation areas in the West Kootenays, at Pork Creek, Howser Ridge, Placer Creek and Bruer Creek. Several previously unrecorded patches of 100-200 trees, attacked in 1969-70, were observed during aerial surveys at Hall Creek (Nelson), Cayuse Creek (Castlegar), Perry Ridge (Slocan Valley), Kokanee Creek (Kootenay Lake), Hanna, Murphy and Neptune creeks (Trail), and in the Big White Mountain area of the Upper West Kettle River.

The only 1971-attacked spruce trees observed on the prism cruise strips were at Slewiskin Creek in the West Kootenays. Partial 1971-attacked trees were found in all areas where cruise strips were run, always on trees that had been partially attacked the previous year (Table 4).

Table 4. Status of spruce trees on spruce beetle cruise strips, Nelson Forest District, 1971

Location	No. trees	% trees attacked				Total
		1971	1971 ^{1/} partial	1970	Pre-1970	
East Kootenays						
Kilmarnock Creek	297	0	4	0	17	21
Burnham Creek	159	0	1	0	27	28
Bighorn Creek	209	0	1	1	62	64
Line Creek	213	0	3	0	27	30
West Kootenays						
Slewiskin Creek	82	1	6	2	21	30

^{1/} Partial 1971 attacks, partially attacked in 1970.

Overwintering parent and teneral adults were present at the base of 1971 partially-attacked trees on three of the strips. At Line Creek, there were 1-10 adults per square foot of bark at the base of trees, 11-50 adults at Kilmarnock Creek and 51+ adults at Slewiskin Creek.

There were no 1971 attacks found on healthy trees, except for occasional partial attacks on trees partially attacked in 1970, as at Couldrey and Bighorn creeks in the East Kootenays and Pork Creek and Cooper and Howser ridges in the West Kootenays.

Recent windfall was scarce in all areas examined, except at Burrell Creek, north of Grand Forks, where spruce trees, from 10 to 24 inches in diameter, were blown down over several hundred acres in August, 1971. This windfall was found to be uninfested in October. At Line Creek, six 1971 windfalls, 16 to 20 inches in diameter, were uninfested; one 1970 windfall, 20 inches in diameter, was infested with 51+ larvae and adults per square foot of bark.

All trap trees felled in the spring of 1971 were attacked by the spruce beetle. The trap trees, at Wildhorse and Kilmarnock creeks, in the East Kootenays, had light larval populations. Those at Lodgepole Creek bore moderate numbers of larvae, while at Line Creek they had heavy populations of larvae and adults. There were light larval populations in the trap trees at Rossland Cutoff and Slewiskin Creek and a moderate larval population at Creston Skyway, in the West Kootenays.

In summary, 1971 attacked spruce trees were found at only one locality; a few 1971 partially-attacked trees were found at all localities where prism plots were run in old spruce beetle infestations. Presumably these trees will die through ensuing attacks by spruce beetles or secondary insects and disease.

Douglas-fir beetle, Dendroctonus pseudotsugae

Few Douglas-fir trees were killed by bark beetles in 1971. In the East Kootenays, 35 red-top trees were counted at Mary Anne Creek near Canal Flats and 50 at the Cranbrook Golf Course. In the West Kootenays, 50 trees were counted along Duncan Lake, 35 at Hamill Creek and 50 at Christina Lake.

Dryocoetes - Ceratocystis complex

Aerial surveys during August showed light alpine fir mortality in spruce-balsam stands in the East Kootenays. Counts of red-top trees were as follows: Couldrey - Cabin creeks drainage, 400; Alexander Creek, 50; Wildhorse River, 200, and Bull River, 200.

Defoliators

Larch casebearer, Coleophora laricella

Larch casebearer again caused moderate to heavy defoliation of western larch at a number of localities in the southern portion of the District. The heaviest defoliation occurred along the International Boundary from Patterson east to Roosville, north along the Columbia and Kootenay rivers to Nelson, along the west arm of Kootenay Lake to Balfour and north of Creston to Boswell. Heavy defoliation was confined to stands below 3,000 feet elevation. Distribution remained about the same as 1970, except north of Cranbrook, where casebearer larvae were found at St. Eugene Mission.

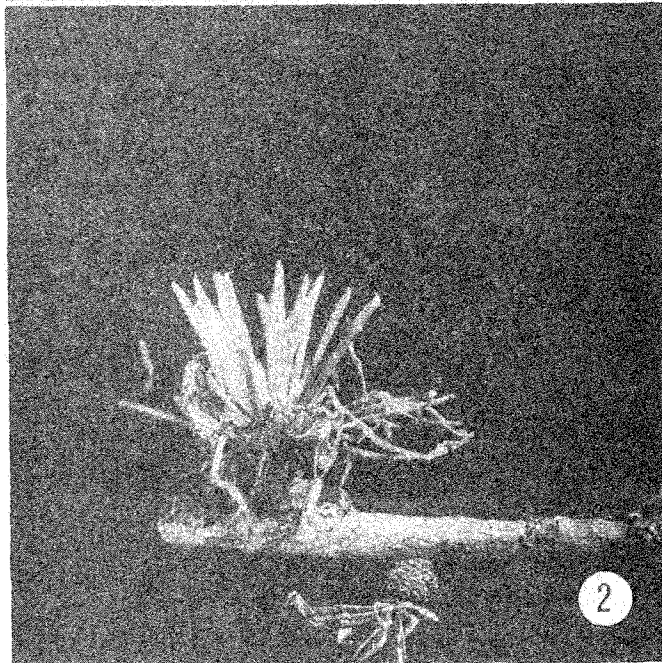
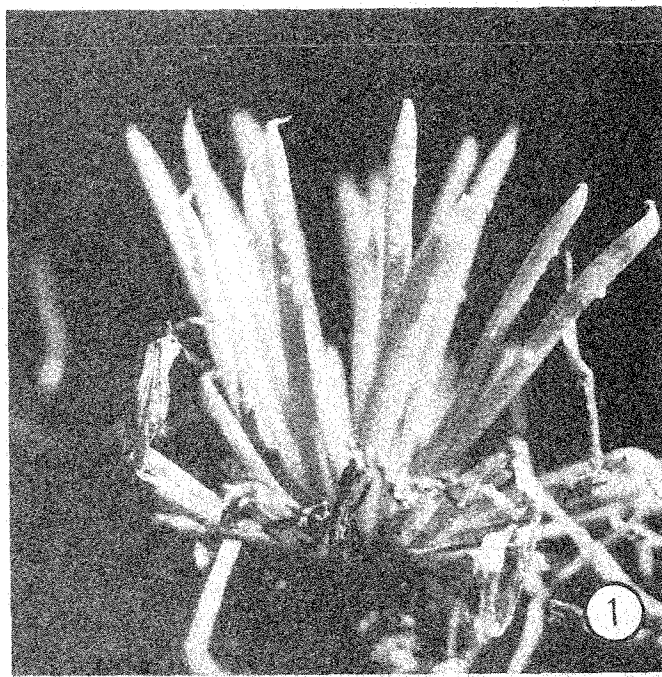
Casebearer larvae and pupae were collected in parasite re-lease plots at Fruitvale and East Arrow Creek, to determine if the parasite Agathis pumila, released in 1969, had become established. Only one specimen of A. pumila was found, at the Fruitvale plot.

Overwintering casebearers were counted in October on four 18-inch branch samples from the mid-crown of each of four trees at six locations (Table 5).

Table 5. Larch casebearer larval populations at six plots, Nelson Forest District, October 1971

Location	Average no. casebearer larvae per 18-inch branch		
	1969	1970	1971
Fruitvale	34	92	143
Salmo	67	275	273
Creston	14	52	58
Rykerts	24	312	69
East Arrow Creek	37	177	75
Yahk	13	120	64

Counts of overwintering larvae indicate that heavy defoliation of western larch trees will occur at Fruitvale and Salmo, and moderate defoliation at Creston, Rykerts, East Arrow Creek and Yahk, in 1972.



Figs. 1 and 2. Larch casebearer eggs on second crop of western larch needles and casebearer damaged first crop of needles. Fig. 1 (X4), Fig. 2 (X2). Fruitvale, Nelson Forest District, July 20, 1971. E.J. Chatelle.

Other Noteworthy Insects

Filament bearer, Nematocampa filamentaria

A localized infestation of filament bearer was found near Nakusp along Kuskanax Creek Road from mile 10 to 12. Light defoliation was evident on western hemlock in a mature hemlock-cedar stand. Up to 300 larvae were collected from hemlock and 77 from western red cedar in three-tree beating samples.

There was a general increase in the number of samples containing filament bearer larvae along Upper Arrow Lake and Koch Creek in the Slocan Valley. Fifty-three and 41% of samples from hemlock and cedar, respectively, contained larvae, with an average of three larvae from hemlock and one from cedar per positive sample. These average larval counts exclude samples taken within the infestation at Kuskanax Creek.

No overwintering eggs were present on samples of hemlock and cedar bark, moss and foliage taken from the lower crowns of trees at Kuskanax Creek in September.

Western hemlock looper, Lambdina fiscellaria lugubrosa

Hemlock looper larvae were common in beating collections from western hemlock and western red cedar along the Upper Arrow Lake and Koch Creek in the Slocan Valley. Seventy percent of the collections from cedar and 64% from hemlock contained larvae. Positive samples had an average of 15 and 8 larvae from cedar and hemlock, respectively.

Egg sampling, in September, showed light overwintering egg populations at Kuskanax Creek and Shelter Bay.

Douglas-fir needle midges, Contarinia spp.

Damage by needle midges to Douglas-fir Christmas trees was light in 1971. The only significant damage was in a localized area near Grand Forks, where 30% of new needles were infested. Plots examined at Canal Flats, Invermere, Edgewater and Brisco had an average of 3% of new needles infested.

Forest tent caterpillar, Malacosoma disstria

Tent caterpillars caused moderate to heavy defoliation of trembling aspen along the Rogers Pass Highway from Revelstoke to Mile 11, and in the Warfield - Rosslund area. A high percentage of the larvae at Warfield were diseased.

Larch sawfly, Pristiphora erichsonii

Larch sawfly caused light defoliation of pole-sized and mature western larch trees along Kootenay Lake, Kinnaird - Christina Lake Highway and along the Rossland Cutoff. The absence of overwintering larvae in duff samples taken along the Kinnaird - Christina Lake Highway in September, indicates that populations will remain at a low level in 1972.

Cone Insects

Cone crops were generally light to moderate in 1971. To determine the incidence of cone-insect damage, 20 cones from three trees from one or more tree species, were examined at 14 areas. Eighty-five percent of the Engelmann spruce cones were infested with a spruce cone maggot, Hylemya anthracina, and 76% with a spruce seed moth, Laspeyresia youngana. Alpine fir cones were 80% infested with a fir seed maggot, Earomyia spp. (Table 6). Cone samples from western hemlock and western red cedar were free of insect damage.

Table 6. Results of examination of cones from Engelmann spruce, alpine fir, Douglas-fir and western white pine, Nelson Forest District, 1971.

Tree species	Locality	% cones infested				
		<u>Laspeyresia</u> <u>youngana</u>	<u>Hylemya</u> <u>anthracina</u>	<u>Earomyia</u> spp.	<u>Barbara</u> <u>colfaxiana</u>	<u>Conophthorus</u> <u>monticolae</u>
Engelmann spruce	West Kootenays					
	Kinnaird Hwy. Summit	45	50			
	Slewiskin Creek	65	0			
	Shannon Creek	100	30			
	Lemon Creek	95	70			
	East Kootenays					
	Elk Creek	0	10			
	Flathead River	0	10			
	Cabin Creek	60	35			
	Alpine fir	West Kootenays				
Nancy Green Summit				25		
Shannon Creek				13		
Lemon Creek				100		
Creston Skyway Summit				35		
East Kootenays						
Flathead River			0			
Douglas-fir	West Kootenays					
	Winlaw				0	
	East Kootenays					
	Fort Steele Elk Creek				0 5	
Western white pine	West Kootenays					
	Summit Lake				0	
	Kaslo				75	
	Crawford Bay				0	

Table 7. Other insects of current minor significance

Insect	Host	Locality	Remarks
<u>Acleris gloverana</u> Black-headed budworm	Western hemlock	Nelson District	Defoliator. Populations at low level in 1971.
<u>Adelges cooleyi</u> Cooley spruce gall aphid	Douglas-fir	Nelson District	Sucking insect. Light damage to Douglas-fir Christmas trees.
<u>Hyphantria cunea</u> Fall webworm	Miscellaneous deciduous	Christina Lake, Trail - Warfield	Defoliator. Tents common in 1971.
<u>Neptia freemani</u> A looper	Douglas-fir	Nelson District	Defoliator. Of 83 Douglas-fir collections 24% were positive averaging two larvae per positive collection.
<u>Stilpnotia salicis</u> Satin moth	White poplar	Trail - Fruitvale	Defoliator. Heavy defoliation of individual trees in residential properties. New distribution record.

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. Once established in a stand, they 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., frost, 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

Stem diseases

Dwarf mistletoe, Arceuthobium laricis

Dwarf mistletoe infections on western larch occur throughout much of the range of this host in the western and central portion of the District, and extends as far east as Kimberley. Distribution surveys to locate dwarf mistletoe infections beyond this range in the East Kootenays obtained negative results.

Collections of A. laricis were made from several other coniferous tree species where heavy infections occurred on mature overstory western larch in the Slocan Valley. At Wilson Creek, the parasite was found on alpine fir, western white pine, lodgepole pine and Engelmann spruce. A collection from grand fir at Playmore is a new host record for British Columbia.

Foliage diseases

Needle blight of larch, Sarcotrochila alpina

Discoloration of western larch foliage in stands over 3,500 feet elevation was evident during aerial and ground surveys along Kootenay Lake, Kinnaird - Christina Lake Highway, Rossland Cutoff and along the Slocan Valley. Ground examination of these stands showed that pole-sized and mature larch trees in pure and mixed stands had heavy needle blight damage. This is the first record of this needle blight disease on western larch in British Columbia.

Poplar leaf and shoot blight, Venturia populina

Foliage discoloration and light defoliation of trembling aspen occurred at a number of localities in the southern areas of the District and along the Columbia Valley from Moyie Lake to Golden. An estimated 30 to 40% of the trees in aspen stands at Kimberley, Wasa Lake, Invermere and Golden had 75 to 90% of their leaves infected.

Needle cast, Lophodermella concolor and a needle blight, Hendersonia pinicola

Moderate to heavy defoliation of lodgepole pine, by a combined infection of these two diseases, was common along the Monashee Highway from the junction of the Main Kettle River Access Road east to Inonoaklin Crossing. These diseases were also common in these areas in 1970.

Physiological diseases

Drought damage

Drought damage during 1970 caused some tree mortality and predisposition to secondary insect attack at widespread locations in the southern areas of the District. A stand consisting of 25 acres of mature Douglas-fir along the Estella Mine Road near Wasa Lake sustained 75% mortality. Examination of 25 pole-sized lodgepole and ponderosa pine at South Slocan and 70 mature ponderosa pine on the St. Marys Indian Reservation showed that these trees were predisposed by drought and had been subsequently attacked by the bark beetles, Ips sp. and Dendroctonus valens.

Snow damage

High elevation alpine fir and Engelmann spruce trees along the Slocan Valley, the valley east of New Denver and along the Upper Main Kettle River Valley suffered varying degrees of snow damage. In the Idaho Mountain Basin (Slocan Lake), there was a high incidence of top breakage and splitting of the remaining stem.

Other Noteworthy Diseases

Table 8. Other diseases of current minor significance

Organisms	Hosts	Locality	Remarks
<u>Chrysomyxa weirii</u>	Engelmann spruce	Whiteswan L., Delphine Cr.	A needle rust. Common on current foliage. Widespread.
<u>Elytroderma deformans</u>	Lodgepole pine, ponderosa pine	Kettle R., Kootenay R.	Pine needle cast. Common in these areas.
<u>Lirula abietis-concoloris</u>	Alpine fir	Bugaboo Cr.	Needle blight. Common on previous year's needles.
<u>Pucciniastrum epilobii</u>	Alpine fir	Spillimacheen R., White R., Bugaboo Cr.	Foliage rust. Affected up to 25% of the needles in these areas.