ANNUAL DISTRICT REPORT

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA, 1974

PART IV, KAMLOOPS FOREST DISTRICT

by

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PACIFIC FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

VICTORIA, BRITISH COLUMBIA

FILE REPORT

DEPARTMENT OF THE ENVIRONMENT

January, 1975

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

INTRODUCTION

This report outlines the status of forest insect and disease conditions in the Kamloops Forest District for 1974, and attempts to forecast pest population trends.

Regular field work in the District began May 15 and ended October 2. Special surveys were as follows: European pine shoot moth, May 20 to 23; aerial surveys, totalling 20 hours of flying time, from August 19 to 23, and western false hemlock looper egg surveys from September 23 to October 2. H. P. Koot assisted in an experimental spray project for Douglas-fir tussock moth during June and July.

A total of 654 insect and disease collections were submitted to the Pacific Forest Research Centre in 1974. Map 1 shows collection localities and drainage divisions.

Numbers of larval defoliators in field collections remained at a high level; 86% of the beating collections contained larvae, the same as in 1973.

Bark beetles continued to account for most of the tree mortality in the Kamloops Forest District. Although spruce beetle populations appear to have collapsed, the mountain pine beetle killed an increased number of lodgepole pine trees in the Okanagan Valley, and caused moderate to heavy losses of western white pine in the Shuswap and North Thompson valleys. Attacks on ponderosa pine remained low throughout the District.

Defoliating insects caused more damage in 1974 than in 1973. Western false hemlock looper infestations became the largest ever known. Douglas-fir stands in the North and South Thompson, Shuswap and Okanagan valleys were heavily defoliated. Western spruce budworm outbreaks expanded for the seventh consecutive year in the Bridge River area. Douglas-fir tussock moth infestations greatly increased in size in the North Thompson Valley and Kamloops Lake area, but declined in the Okanagan Valley. Western hemlock loopers caused light defoliation damage in the North Thompson Valley but declined in other wetbelt areas of the District.

Most of the current disease problems were caused by climatic factors, such as winter drying of lodgepole pine in the northern part of the District and Douglas-fir and ponderosa pine in the western portion.

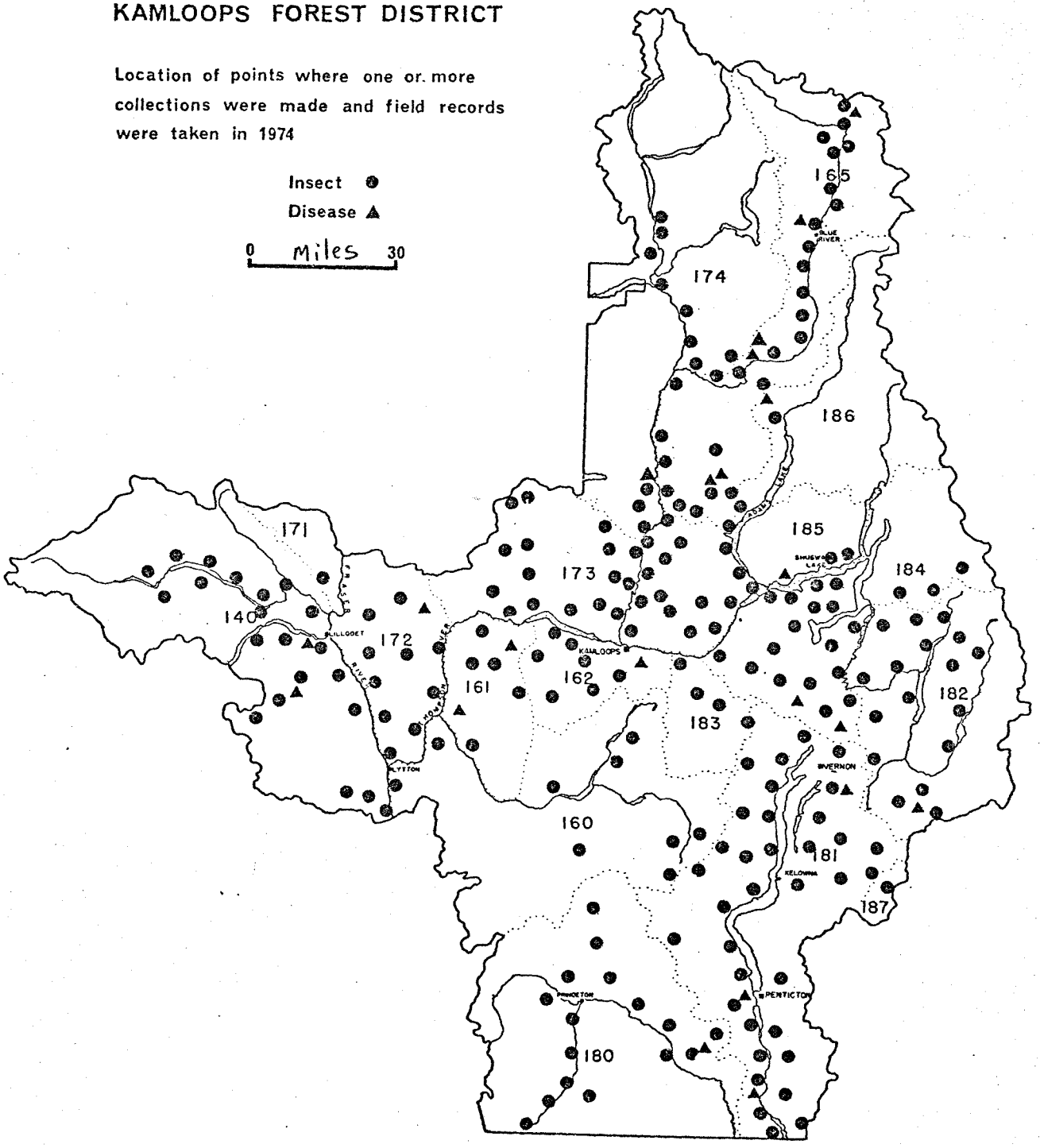
MAP I

KAMLOOPS FOREST DISTRICT

Location of points where one or more collections were made and field records were taken in 1974

Insect ●
Disease ▲

0 Miles 30



FOREST INSECT CONDITIONS

Currently Important Insects

Bark Beetles

Mountain pine beetle, *Dendroctonus ponderosae*

Mountain pine beetle attacks in lodgepole pine stands increased in five major areas in the Okanagan Valley and along Bridge River. The number of red-topped trees more than doubled from 1973 to 1974, but are expected to increase at a slower rate in 1975. The 1974 counts of beetle-killed trees would be much higher except for logging of beetle-killed stands in Mission, Terrace, Lambly and Trout creeks. Table 1 shows a three-year comparison of beetle-killed trees, while Table 2 gives more specific locations of trees counted in 1974.

Table 1. Number of beetle-killed lodgepole pine trees as determined from aerial surveys, Kamloops Forest District

Location	Year of survey			No. acres
	No. of trees			1974
	1972	1973	1974	
S. fork Whiteman Cr	1,000	2,800	5,000	700
E. of Ellison	100	500	1,800	750
Mission Cr	250	500	2,800	650
Terrace - Lambly Cr(s)	1,600	2,000	6,500	1,500
Trout Cr	0	4,000	5,300	500
Bridge R	0	20	850	800
Cayoosh Cr	1,200	700	50	75
Fountain Va	0	0	75	25
Totals	4,150	10,520	22,375	5,000

Table 2. Number and location of beetle-killed lodgepole pine trees as determined from aerial surveys in 1974, Kamloops Forest District

Location	No. of trees
Gold Bridge	750
Carpenter L	100
Cayoosh Cr	50
Fountain Va	75
S. fork Whiteman Cr	5,000
Terrace Cr	3,400
Lambly Cr	500
Lambly L	1,250
Bald Range Cr	1,350
Scotty Cr	200
Rockface Cr	750
Vernon Cr	750
Emery Cr	100
Bellevue Cr	50
Mission Cr	1,050
Joe Rich Cr	1,350
Belgo Cr	330
Hereron L	20
Trout Cr	5,000
Darke Cr	20
Bull Cr	20
Bearpaw Cr	150
Isintòk Cr	110
Total	22,375

Mountain pine beetles continued to take an annual toll of western white pine throughout the District (Table 3). The count of red-topped trees in the 1974 aerial survey was 15,615, compared with 9,300 in 1973. However, several major white pine areas were not flown in 1973, so that year's count was probably close to the 1974 count.

Table 3. Number and location of beetle-killed western white pine trees as determined from aerial surveys in 1974, Kamloops Forest District

Location	No. of trees
Carpenter L	300
Yalakom R	500
Cayoosh Cr	2,600
Avola to Lempriere	4,700
Raft R	500
Burton Cr	200
N. Barriere L	1,600
Gannett L	1,200
Mt. Ida	300
Hupel	50
Tsuius Cr	70
Sawtooth Range	150
Upper Shuswap R	370
Park Mtn	1,080
Ireland Cr Va	970
Trinity Va	125
Vance Cr	100
Skagit R	800
Total	15,615

The number of ponderosa pine killed by the mountain pine beetle remained very low. Near Gun Lake, 150 trees were killed, as were 60 at Peachland and 20 in Lambly Creek Valley.

Spruce beetle, *Dendroctonus rufipennis*

Spruce beetle populations in the Okanagan region appear to have collapsed. No standing attacked trees, and only a few currently-infested windfalls, were found in or around large infested areas such as on Whiterocks Mountain. A large beetle population was known to exist in this area in 1973. But since few suitable host trees remain in or near this area, the 1974 beetle population may have attempted to establish itself some distance away in one of the few remaining large southern stands of mature Engelmann spruce near Mt. Chapperon.

Douglas-fir beetle, *Dendroctonus pseudotsugae*

The number of beetle-attacked Douglas-fir trees increased slightly. Groups of from 5 to 50 infested trees were noted at the following locations: Bridge River Valley; the Fraser River Valley south of Lillooet; Fountain; Pavilion Lake; Izman, Cornwall, Criss and Durand creeks; Paul Lake; Paxton Valley and at Okanagan Landing.

The Douglas-fir beetle has not been a serious problem in the Kamloops Forest District since 1965.

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, but at a somewhat slower rate than in previous years. Approximately 4,250 red-topped trees were noted during aerial surveys, the largest concentrations follow: Naswhito Creek and Bouleau Lake, 1,000 each, and Trepanier Creek, 900 (Table 4).

Table 4. Location and numbers of alpine fir trees killed by *Dryocoetes - Ceratocystis* complex, Kamloops Forest District, 1974 aerial survey

Location	No. of trees
N. of Bouleau L	1,000
Fly Hill	200
Bolean L	300
Ashton Cr	50
Darley Cr	200
Peachland Cr	200
Trepanier Cr	900
Whiteman Cr	200
Naswhito Cr	1,000
Ideal L	200
Total	4,250

Defoliators

Western false hemlock looper, *Nepytia freemani*

Defoliation of Douglas-fir by the western false hemlock looper increased greatly in 1974 in the Kamloops Forest District. Infestations were the largest ever recorded for this insect in British Columbia. The area affected in 1974 was estimated at 14,175 acres (Table 5, Map 2), compared with 4,900 in 1973 and 3,200 in 1972. Most of the expansion occurred in the North Thompson Valley, in the vicinity of Chase, and near Lavington. Infestations declined somewhat in the Salmon Arm and Enderby areas, where defoliation first occurred in 1972. To date approximately 300 acres of semi-mature Douglas-fir have been killed near Sunnybrae and Gleneden.

The largest outbreaks occurred in the North Thompson Valley from Jamieson Creek to Barriere and from Rayleigh to McLure. On the west side of the valley, medium to heavy infestations were estimated on 6,750 acres, and on the east side, 1,350. In these areas, however, a large portion of the defoliation was caused by a combination of the western false hemlock looper and the Douglas-fir tussock moth.

There was moderate to heavy defoliation of Douglas-fir on approximately 4,200 acres on both sides of the South Thompson Valley near Chase, and on 1,135 acres east of Vernon and near Lavington in the Coldstream Valley.

To predict 1975 larval populations, egg samples were taken in September at 81 locations in and around infested areas (Table 6). Samples consisted of two 18-inch branches from the mid-crown of each of three trees at each location. The criterion adopted was that the larvae from 20 to 39 eggs per 18-inch branch can cause moderate defoliation, and larvae from 40 or more eggs can cause heavy defoliation. Results of the survey showed that large numbers of eggs existed in most infestations, especially in the North Thompson, Chase and Lavington areas, plus several previously uninfested areas near Monte Lake and Armstrong.

In general, most infestations are expected to increase in size and intensity in 1975. However, some localized outbreaks immediately adjacent to watercourses may collapse in 1975. A trichogrammid wasp, usually a parasite of aquatic insect eggs such as those of alderflies, attacked a high proportion of looper eggs on trees near marshy areas. Since the wasp emerges before the looper eggs hatch, the adult wasp is capable of parasitizing additional looper eggs. Egg parasites appear to have effectively reduced looper populations near Salmon Arm in 1973.

A significant amount of tree mortality and top-killing may occur in areas where Douglas-fir trees were severely defoliated for one or more years. Tree mortality occurred where trees were defoliated 90% or more in 1973 and sustained further defoliation in 1974, whereas trees defoliated less than 90% in 1973 and not re-attacked made a dramatic recovery. Table 7 shows the average defoliation and number of Douglas-fir trees killed by loopers in six 50-tree plots.

Assistance provided by the British Columbia Forest Service to appraise this outbreak is gratefully acknowledged.

Table 5. Defoliation of Douglas-fir by the western false hemlock looper in 1974, Kamloops Forest District

Location	Defoliation (acres)			
	Light	Medium	Heavy	Total
North Thompson Va (west)				
Louis Cr	-	600	-	600
Skull Hill	400	-	-	400
*Whitewood Cr	400	100	200	700
*Jamieson Range	200	-	3,800	4,000
*Jamieson Cr	-	-	600	600
*Westsyde-Jamieson Cr	130	20	300	450
				6,750
North Thompson Va (east)				
*Heffley Cr	75	-	1,000	1,075
*Vinsulla	75	200	-	275
				1,350
South Thompson Va (north)				
Whiskers Hill	600	-	200	800
Niskonlith L	400	-	-	400
Little Shuswap L		-	1,800	1,800
				3,000
South Thompson Va (south)				
Adams R	50		-	50
Cruickshank Point	-		50	50
S. of Chase	-	-	300	300
5 mi. S.W. of Chase	-	600		600
7 mi. S.W. of Chase	-	200	-	200
				1,200

cont'd..

Table 5 - cont'd.

Location	Defoliation (acres)			
	Light	Medium	Heavy	Total
Salmon Arm area				
Sunnybrae	50	-	-	50
Tappen	-	40	-	40
2.5 mi. N. of Gleneden	-	25	-	25
2 mi. N. of Gleneden	-	-	150	150
1 mi. S. of Gleneden	-	25	-	25
North Broadview	-	25	-	25
				315
Enderby-Armstrong area				
1 mi. W. of Grindrod	-	-	75	75
1 mi. N. of Enderby	-	100	-	100
Mt. Rose (N.E.)	100	-	-	100
Mt. Rose (S.E.)	100	-	-	100
Larkin	-	50	-	50
				425
Vernon-Coldstream area				
Bate Cr	-	50	-	50
N. of Lavington	-	-	600	600
S.E. of Lavington	-	25	50	75
S.W. of Lavington	200	-	10	210
*Deer Cr	-	-	100	100
Harris Cr	100	-	-	100
				1,135
Grand totals	2,880	2,060	9,235	14,175

*Douglas-fir tussock moth larvae contributed heavily to this defoliation.

Table 6. Defoliation prediction for 1975 based on 1974 (September) egg counts of western false hemlock looper, Kamloops Forest District

Location	Avg no. eggs per 18-inch branch		% eggs parasitized		1975 defoliation prediction
	1973	1974	1973	1974	
Darfield	-	0		-	
Chinook Cove	-	6	-	0	light
Louis Cr	-	33	-	8	medium
Fishtrap Mtn	-	3		0	light
Poison Cr	-	1	-	0	light
Oliver Cr	-	14	-	2	light
Skull Cr (S.W.)	-	93		17	heavy
McLure Ferry (N.)	-	37	-	45	medium
McLure Ferry	-	11	-	0	light
McLure (S.)	-	8		2	light
Black Pines (N.)	-	16	-	0	light
Black Pines	-	6	-	36	light
Black Pines (S.)	-	5		0	light
Sullivan Range	-	6	-	6	light
Jamieson Range	-	7	-	9	light
Knouff L Rd.	-	0		-	
Vinsulla	-	1	-	0	light
Vinsulla (S.)	-	26	-	3	medium
Lyons L	-	7		0	light
Heffley Cr	-	10		2	light
Jamieson Cr (N.)	-	8	-	26	light
Jamieson Cr (mi. 2.5)	2	66	0	2	heavy
Jamieson Cr (mi. 6.5)	-	1	-	14	light
Jamieson Cr (W.)	-	36		1	medium
Jamieson Cr (S.)	-	55		2	heavy
O'Connor L	-	66	-	1	heavy
Lower Dairy Cr	9	21	4	3	medium
Upper Dairy Cr	-	57	-	7	heavy
Rayleigh (N.E.)	-	5	-	0	light
Rayleigh	-	27	-	1	medium
Paul L	0	1		0	light
Lower Campbell Range Rd.	-	5	-	0	light
Pinantan Rd., (mi. 5)	-	1	-	0	light
Whiskers Hill	-	80		30	heavy
Whiskers Hill (E.)	-	40	-	1	medium
McGillivray L Rd.,(mi. 3)	42	44	8	17	medium
Niskonlith L (W.)	17	79	4	4	heavy
Niskonlith L - Loakin Cr	-	105	-	2	heavy
Loakin Cr, (mi. 7)	-	0		-	
Little Shuswap L, 1 mi. N.	-	197		6	heavy
Little Shuswap L (N.)	41	61	9	11	heavy

...cont'd.

Table 6 - cont'd.

Location	Avg no. eggs per 18-inch branch		% eggs parasitized		1975 defoliation prediction
	1973	1974	1973	1974	
Chase, 1 mi. S.W.	80	118	2	9	heavy
Chase, 1 mi. W.	74	110	2	5	heavy
Adams R Bridge	-	56	-	0	heavy
Sorrento, 2.5 mi. W.	-	22	-	0	medium
Squilax, 1 mi. S.	-	1	-	0	light
Chum L	-	0	-	-	
Phillips L	-	1	-	-	light
Skimikin L	-	0	-	-	
Sunnybrae, mi. 2	-	2	-	7	light
Sunnybrae, mi. 4	12	5	17	0	light
Sunnybrae, mi. 6	7	1	12	0	light
Gleneden, 1 mi. N.	37	51	12	5	medium
Gleneden, 2 mi. S.	-	26		0	medium
Gleneden, 3 mi. S.	-	4	-	0	light
North Broadview	4	11	30	6	light
Canoe, 1 mi. S.	19	6	27	6	light
Grindrod, 1 mi. S.	54	25	10	14	medium
Brash Cr, mi. 1	5	1	3	0	light
Glenmary	44	28	18	1	medium
Enderby, 1 mi. N.	24	13	14	5	light
Stepney	-	1	-	0	light
Glenemma	1	1	0	0	light
Mt. Rose	-	39	-	0	medium
Armstrong, 2 mi. S.	-	0			
Duck Meadow	-	0		-	
Monte L (N.)	-	4		4	light
Monte L (S.)	-	24	-	1	medium
Pinaus L Rd.	-	4		0	light
Falkland	-	1		0	light
Silver Cr	-	0	-	-	
Yankee Flats	-	2	-	50	light
Deer Cr	70	272	7	5	heavy
Lavington, 2.7 mi. W.	-	197	-	6	heavy
Lavington, 1.6 mi. E.	-	251		8	heavy
Lavington, 2 mi. S.E.	-	207	-	14	heavy
Coldstream Cr	-	11	-	5	light
Irish Cr	1	0	0	-	light
Beau Park	10	5	11	0	light
Whiteman Cr	1	1	0	14	light

Table 7. Douglas-fir tree mortality in plots of 50 trees each defoliated by western false hemlock looper, 1973 and 1974

Location	Avg defoliation (%)		Dead trees (%)	
	1973	1974	1973	1974
Enderby	23	11	0	0
Gleneden	65	74	0	4
Lavington	29	74	0	0
Sunnybrae, mi. 4[1/]	75	75	20	40
Sunnybrae, mi. 6	96	97	64	68
Canoe[1/]	71	53	6	6

[1/] Trees sprayed with an insect bacterium, *Bacillus thuringiensis* (*B.t.*) in June 1973.

Table 8. Three-year summary of western false hemlock looper collections by drainage division

Drainage division*	No. samples taken during larval period			% samples containing larvae			Avg no. larvae per positive sample		
	72	73	74	72	73	74	72	73	74
181 - 184	41	61	49	42	74	61	23	63	68
173	61	59	23	16	17	50	40	41	44
174	6	5	8	17	0	38	1	-	143

*See map.

Douglas-fir tussock moth, *Orgyia pseudotsugata*

Tussock moth larvae severely defoliated immature Douglas-fir and some ponderosa pine trees on approximately 800 acres south of Kamloops Lake, and in combination with the western false hemlock looper, heavily defoliated another 7,300 acres along the North Thompson River from Westsyde to McLure (Map 2). In the Okanagan Valley, 575 acres of Douglas-fir were lightly to moderately defoliated in eight small areas at Broadview, Bate Creek near Vernon, Wood Lake, Ellison, Kelowna, Okanagan Mission, and Campbell Mountain near Penticton (Table 9).

The South Thompson, Okanagan and Similkameen valleys have a history of recurring outbreaks, usually in semi-arid forest sites or in residential areas. This is the second year of defoliation near Kamloops and will probably result in some mortality of Douglas-fir trees, especially north of Jamieson Creek, where many trees grow on dry, rocky sites.

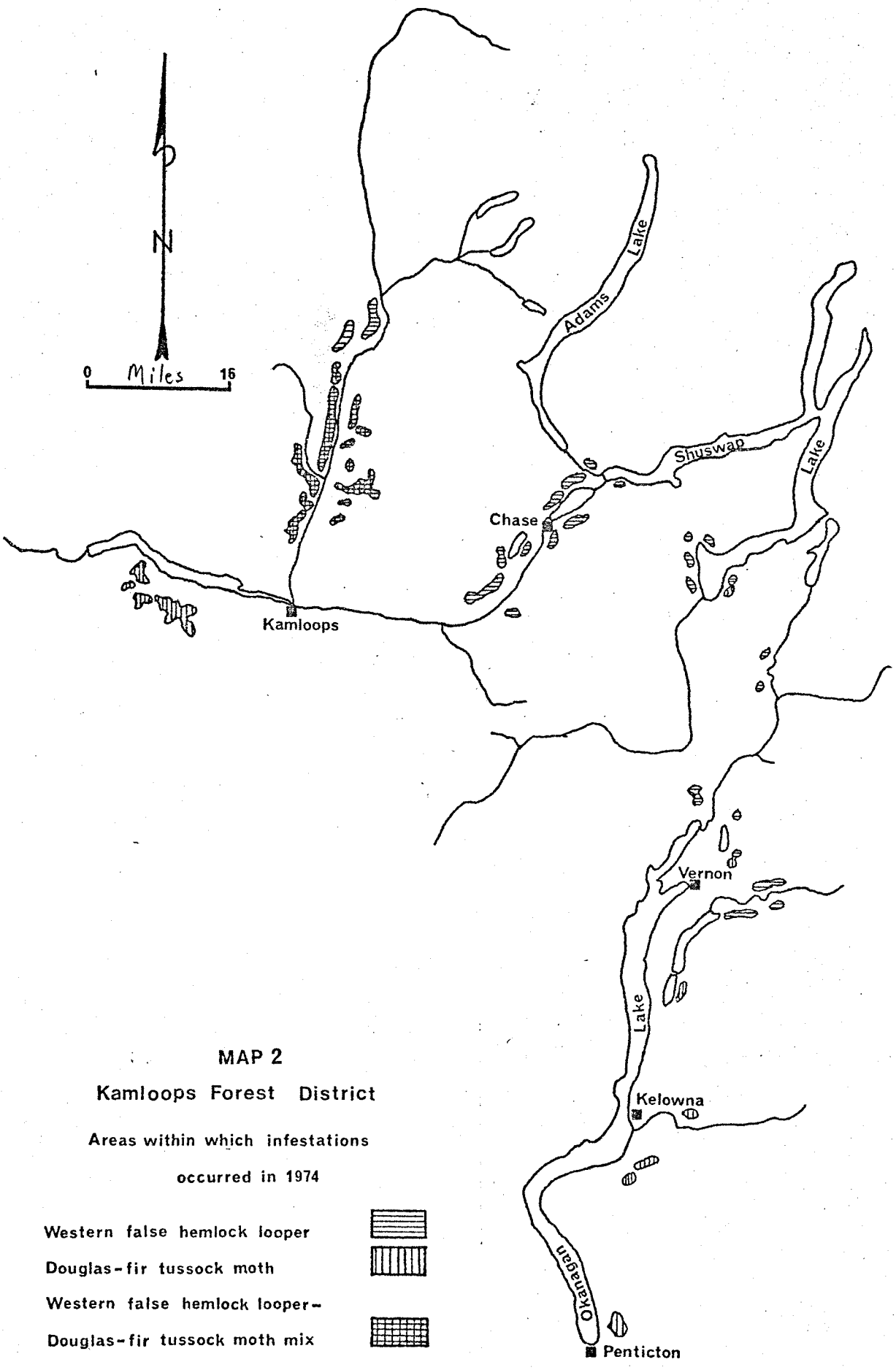
A nuclear polyhedral virus which greatly reduced tussock moth populations in the Okanagan Valley in 1973, was found in several areas south of Kamloops Lake and near Jamieson Creek in 1974, and is expected to spread in 1975. This virus was used experimentally in an aerial spray trial early in June on 25 acres along Kamloops Lake, and effectively reduced larval populations and prevented further defoliation.

It is expected that infestations in the Okanagan Valley will collapse in 1975, but will continue in areas west and north of Kamloops until 1976, when the virus disease should control the population.

Table 9. Douglas-fir tussock moth infestations, Kamloops Forest District, 1974

Location	No. acres defoliated
Kamloops L (south)	820
Westsyde - Whitewood Cr[1/]	6,000
Rayleigh - McLure[1/]	1,350
Broadview	5
Bate Cr	55
Wood L	25
Ellison	100
Kelowna	50
Bellevue Cr	100
Okanagan Mission	200
Campbell Mtn	50
Total	8,755

[1/] Defoliation in combination with the western false hemlock looper.



MAP 2

Kamloops Forest District

Areas within which infestations occurred in 1974

Western false hemlock looper

Douglas-fir tussock moth

Western false hemlock looper-Douglas-fir tussock moth mix

Western spruce budworm, *Choristoneura occidentalis*

Infestations of one-year-cycle spruce budworm in Douglas-fir stands continued in the Anderson, Seton, Carpenter, Gun and Downton lakes area, and south of Lytton along Kwoiek Creek. This is the seventh consecutive year of defoliation in the Bridge River Valley. New outbreaks were recorded between Pavilion and Fountain, along Fountain Valley (Three Lake Valley), Botanie Creek, Skaist Creek (Manning Park), and along the Adams River north of Adams Lake. Foliage damage in the western portion of the District nearly doubled from 45,000 acres in 1973 to 84,500 in 1974 (Map 3), although defoliation intensity was generally lighter in 1974. Defoliation was heavy on 3,000 acres, moderate on 17,000, and light on 64,500. Heaviest feeding damage occurred near Kwoiek Lake, Seton Portage and south of Seton Lake along Phair Creek. Along the Adams River there was 1,600 acres of light defoliation.

Foliage discoloration became apparent by the end of June, at which time almost 100% of the 1974 growth had been consumed in many areas. Larval populations were comparable to those found in 1973 in previously infested stands, but increased substantially north of Lillooet along the Fraser River, Fountain Valley, and along Botanie Creek.

Larval parasitism was measured in July at Mission Pass, Gun Lake and Kwoiek Creek, by dissecting 100 late-instar larvae at each location. Parasitism was 31, 9, and 8% respectively; there was little evidence of virus disease in larvae submitted to the Insect Pathology Research Institute.

Egg populations were assessed in August by counting the eggs on two sample 18-inch branches from the mid-crown of each of 10 trees at six locations in the District. Defoliation was estimated on 10 trees at each location (Table 10). Predictions of 1975 damage were based on the criterion that 50 to 149 egg masses per 100 ft^2 of foliage could result in moderate defoliation, and more than 150 in heavy defoliation.

The results of the egg survey indicate that infestations will continue in 1975.

Table 10. Spruce budworm egg masses and intensity of defoliation of Douglas-fir, Kamloops Forest District

Location	Avg no. egg masses per 100 ft^2 of foliage		Estimated loss of new foliage (%)		Estimated total defoliation %		Predicted defoliation for 1975*
	1973	1974	1973	1974	1973	1974	
Gun L	82	88	55	75	15	15	M
Marshall Cr	255	205	70	75	20	15	H
Mission Pass	35	220	75	80	25	25	H
Fountain Va	-	193	-	85	-	10	H
Cayoosh Cr	-	83	-	90	-	20	M
Kwoiek Cr	159	234	95	90	45	30	H

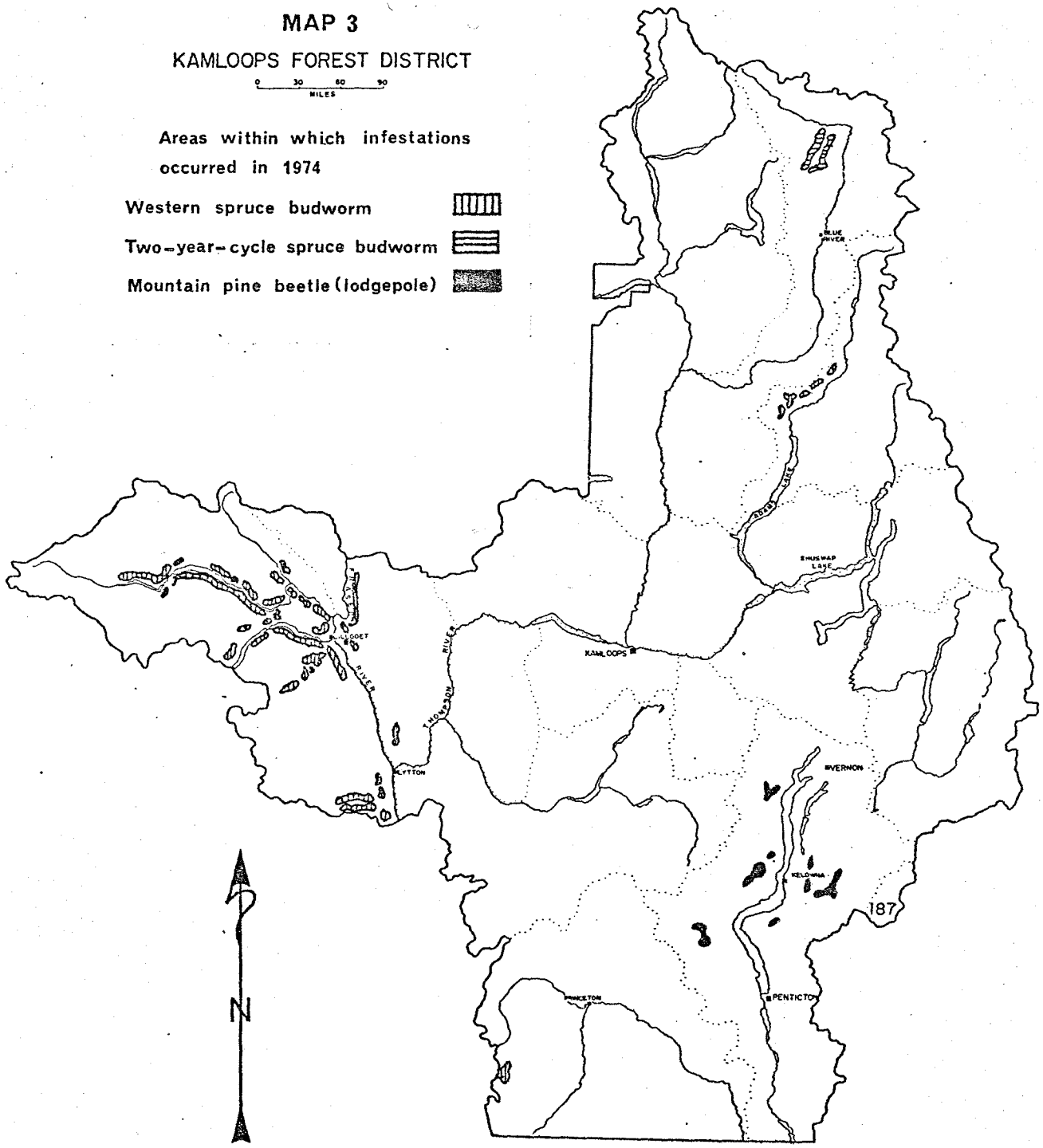
*L - light - up to 30% of total foliage lost;
M - moderate - from 35 to 70% of foliage lost;
H - heavy - more than 70% of foliage lost.

Sectar traps were used for the second year as a means of assessing adult budworm populations. The traps, containing a sex attractant at the rate 10 mg of Soolure, were set out at seven locations in the District just prior to moth emergence in early July, and retrieved after the moth flight in August. There was a general increase in the number of male moths captured, but the significance of numbers caught is not yet known (Table 11).

Table 11. Numbers of spruce budworm larvae in beating samples and moths caught in sectar traps, Kamloops Forest District, 1974

Location	Avg no. larvae in beating samples		Avg no. male moths per trap	
	1973	1974	1973	1974
Mission Pass	20	163	18	19
Kwoiek Cr	-	225	-	58
Botanie Cr	-	205	-	65
Dominic L Rd.	0	1	12	27
Lac Le Jeune Rd.	0	0	5	45
Enderby	8	0	10	12
Vernon	0	3	8	20

Plots established in 1973 at Kwoiek Creek and Mission Pass, to study the effects of defoliation over a period of years, were re-examined in August. At Mission Pass, where trees have sustained foliage damage for seven consecutive years, 20% of the Douglas-fir trees examined had from 2 to 10 feet of top-stripping, and several had top-kill. Except for a few understory trees, no tree mortality was evident in either of the infested stands, but increment loss and tree deformity is presumed.


MAP 3
KAMLOOPS FOREST DISTRICT
0 30 60 90
MILES
Areas within which infestations occurred in 1974
Western spruce budworm
Two-year-cycle spruce budworm
Mountain pine beetle (lodgepole)
BLUE RIVER
SHUSWAP LAKE
ADAMS LAKE
KAMLOOPS
BLACKPOOL
FRASER RIVER
THOMPSON RIVER
LYTTON
VERNON
KELOWNA
PENTICTON
PRINCETON
N
187

Two-year-cycle spruce budworm, *Choristoneura biennis*

Alpine fir and Engelmann spruce trees suffered light to moderate defoliation over approximately 3,000 acres along Lempriere Creek and along the North Thompson River near its headwaters. This is the first record of damage by this pest in the specified area. Some top-stripping was evident on alpine fir understory, but no heavy defoliation was observed.

No obvious defoliation is expected in 1975, as it is a non-flight year when larvae only mine the buds and needles.

Larch budmoth, *Zeiraphera improbana*

Larch budmoth infestations east of Vernon increased in size and number in 1974. For the third consecutive year, high elevation western larch trees were heavily defoliated on 2,000 acres in the southern portion of Silver Star Provincial Park, and on 1,000 acres east of Silver Star Mountain. New infestations of approximately 500 acres each were noted at the headwaters of Heckman Creek, on Vernon Hill, and near Dutton Creek southeast of Okanagan Falls. Large moth flights were observed in the latter area. To date, no tree mortality has been noted.

Western hemlock looper, *Lambdina fiscellaria lugubrosa*

Hemlock looper populations in cedar-hemlock stands increased to near outbreak levels in the North Thompson Valley north of Blue River. However, populations declined in the Shuswap drainage, where light to moderate defoliation occurred in 1973 at Perry River, Owlhead, Kingfisher and Tsuius creeks.

Larvae were commonly found in low numbers on Douglas-fir trees throughout the District, except for one small infestation near Black Pines. A two-year comparison of beating samples follows:

Drainage division*	Host	No. samples taken during larval period		% samples containing larvae		Avg no. larvae per positive sample	
		1973	1974	1973	1974	1973	1974
165, 174	wH, wC	20	21	45	43	30	18
181 - 184	D	57	50	37	28	1	3
182, 184	wH, wC	26	25	92	80	23	5
181 - 184	all hosts	88	96	69	46	10	4

*See map.

Black army cutworm, *Actebia fennica*

Although Douglas-fir and Engelmann spruce mortality occurred in a plantation at Redsand in 1973, there was no sign of cutworm feeding in 1974. Early in June, clear cut, burned and planted areas were checked at Coldscaur and Moose lakes near Clearwater, along Lempriere Creek, and on Barriere Ridge. Cutworms were present in these areas, but there was sufficient ground cover for them to feed on and seedlings were not damaged.

A further decline in the population is expected in 1975.

Satin moth, *Stilpnotia salicis*

Several small isolated groves of trembling aspen and black cottonwood were heavily defoliated near Allison and Dry lakes, north of Princeton. Satin moth larvae have been scarce in the District in recent years.

Scale Insects

Pine needle scales

The black pineleaf scale, *Nuculaspis californica*, severely infested ponderosa pine trees near Trout Creek, Summerland and Penticton. Some tree mortality occurred southeast of Penticton, where trees have been repeatedly attacked. The pine needle scale, *Phenacaspis pinifoliae*, was common near Kamloops and in the Okanagan Valley, especially around Winfield, Glenmore and Rutland. Ponderosa pine trees of all ages were weakened in 1973 by a severe drought.

Other Noteworthy Insects

Douglas-fir needle midges, *Contarinia* spp.

Midges extensively damaged Douglas-fir trees in Christmas-tree cutting areas throughout the Okanagan Valley. Near Shuttleworth Creek, even semi-mature Douglas-fir had lost almost all of their 1973 foliage by mid-1974.

Cooley spruce gall aphid, *Adelges cooleyi*

Populations on immature Douglas-fir trees were high in the Kamloops, Shuswap and Okanagan areas. Along Kamloops Lake this aphid caused a complete loss of 1974 foliage over an extensive area

European pine shoot moth, *Rhyacionia buoliana*

No shoot moths or signs of their damage were noted in Okanagan Valley pine plantations in 1974. Late in May, 844 Scots pines were examined in five plantations for the presence of the shoot moth (Table 12). Naturally-seeded lodgepole and ponderosa pines were also checked when they occurred in or around Scots pine plantations.

Trees in nurseries and department store garden shops were examined by personnel of the Plant Protection Division of Canada Department of Agriculture.

Table 12. Examination of pine plantations for the presence of European pine shoot moths, 1974

Location	No. and species of pine		
	Scots	lodgepole	ponderosa
Larkin	28	-	50
Glenmore (S.)	28	-	50
Glenmore (N.)	41	-	6
Joe Rich Cr	147	50	-
Westbank	600	25	-
Totals	844	75	106

Table 13. Other insects of current minor significance

Insect	Host(s)	Locality	Remarks
Acleris gloverana Western blackheaded budworm	alpine fir, Douglas-fir, Engelmann spruce, western hemlock	General	Defoliator. Common in low numbers.
Bucculatrix canadensisella Birch skeletonizer	western white birch	Clemina to Albreda	Skeletonizer. Severe skeletonization of birch leaves along Albreda R.
Coleophora laricella Larch casebearer	western larch	Southeastern Okanagan Va	Defoliator. Larval populations remained at a low level.
Hyphantria cunea Fall webworm	chokecherry, miscellaneous trees and shrubs	Okanagan and Thompson valleys	Defoliator. Unusually scarce in 1974.
Malacosoma disstria Forest tent caterpillar	trembling aspen, miscellaneous deciduous hosts	Mad R	Defoliator. Infestation collapsed.
Nematocampa filamentaria Filament bearer	western red cedar, western hemlock, Douglas-fir	Mabel L	Defoliator. Numerous in 1973; scarce in 1974.
Neodiprion spp. Conifer sawflies	Douglas-fir, western hemlock, ponderosa pine	General	Defoliator. Numerous on western hemlock at Perry R and N. Thompson Va; on ponderosa pine at Heffley Cr.
Phloeosinus sp. A bark beetle	western red cedar	Shuswap L	Bark beetle. Killed small number of flood-damaged trees.
Pineus sp. A bark aphid	Scots and Austrian pines	Okanagan and Similkameen valleys	Sucking insect. Heavy infestations in some Christmas-tree plantations.

FOREST DISEASE CONDITIONS

Currently Important Diseases

Stem Diseases

Elytroderma disease of pines, *Elytroderma deformans*

Infection intensity on ponderosa pine trees declined. Four plots, established in 1961, have been examined annually to determine the effect of the disease (Table 14). Root diseases and bark beetle attacks, which have killed trees in the past, did not contribute to any further tree mortality in 1974

Table 14. Percentage of ponderosa pine foliage infected by Elytroderma disease, and number of dead trees, Kamloops Forest District

Location	% foliage infected		No. dead trees		Increase in no. of dead trees
	1973	1974	1973	1974	
Lower Hat Cr	20	-	4	-	-
Le Jeune L Rd.	50	40	33	33	0
Lower Nicola	40	38	9	9	0
Glenemma	45	40	12	12	0
Carrs	50	37	25	25	0

A needle cast disease, *Rhabdocline* sp.

Heavy, localized infections of needle cast disease occurred on Douglas-fir trees at Upper Hat and Bear creeks, and in Botanie Valley.

Physiological Diseases

Winter drying

Winter drying of Douglas-fir, ponderosa and lodgepole pines, was prevalent in the northern and western portions of the District.

Conspicuous red flagging on young Douglas-fir trees was common between 2,500 and 3,000 feet in elevation along lower Campbell Range and Tranquille Creek.

On lodgepole pine, severe winter damage occurred along the Albreda River from Clemina to Albreda. Many trees were completely discolored in a band between 3,000 to 3,500 feet elevation. Light to moderate discoloration was observed along Otter Creek Valley and near the headwaters of the North Thompson River.

Severe foliage discoloration of ponderosa pine occurred in a band along the Fraser River near Fountain, and in several exposed areas between Rayleigh and Heffley Creek. Some ponderosa pines along Deadman River were lightly damaged.

Animal damage

Porcupines girdled the upper stems of immature western larch trees on two 100-acre areas southeast of Okanagan Falls, killing the upper 10 to 25 feet of each tree. Porcupines also damaged scattered ponderosa pine trees along Durand Creek, south of Savona.