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ANNUAL DISTRICT REPORT
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA, 1978
PART IV, KAMLOOPS FOREST REGION

by

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PACIFIC FOREST RESEARCH CENTRE
CANADIAN FORESTRY SERVICE
VICTORIA, BRITISH COLUMBIA

- FILE REPORT -

DEPARTMENT OF ENVIRONMENT

December, 1978

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INTRODUCTION

This report outlines forest insect and disease conditions in the Kamloops Forest Region for 1977, and attempts to forecast pest population trends.

Regular field work in the District began on May 1 and ended on September 27. Special surveys for spruce beetle and mountain pine beetle were carried out in September. Aerial surveys consisted of 8 hours of fixed wing for mapping and sampling with a float plane and 2 hours with helicopter for survey of Okanagan Mountain Park. B.C. Forest Service supplied an additional 49 hours fixed wing flying for aerial surveys and one hour of helicopter for spruce beetle reconnaissance (Map 2).

Extension and liaison services continued in 1978, and cooperation between Canadian and Provincial Forestry Services was increased. Workshops were held again in May in most Ranger Districts with slides and films of insect and disease damage and discussion of problems on a Regional and local level. A special survey of all Okanagan cities and Kamloops for European pine shoot moth damage was initiated and began, with a workshop for seven crew members in which recognition of the insect and survey methods were presented by Canadian Forestry Service and Provincial Department of Agriculture personnel. Summer students, funded by B.C. Forest Service and instructed by Canadian Forestry personnel, were used by Insect Rangers, research personnel and District Rangers in general collecting, bark beetle, and other surveys. Workshops for instruction of spruce beetle life cycle and habits were held in Barriere, Sicamous and Kelowna for a group of seven students assigned to inspect spruce beetle populations in windthrown spruce.

A total of 446 beating collections were submitted to the Pacific Forest Research Centre in 1978. Map 1 shows collection localities and drainage divisions. Number of larval defoliators in field collections decreased, although 85 and 75% of the beating collections contained larvae in the south and north districts respectively.

Bark beetles continued to account for most of the tree mortality in the Kamloops Region in 1978. Mountain pine beetle damage increased dramatically near Trout Creek, Goldbridge, Mission-Belgo Creek, Stein and Ashnola rivers. Spruce beetle populations remained high in the upper Lambly Creek drainage and in the Barton Hills. A large trap tree program was initiated in this area and large numbers of beetles were absorbed into the trap trees. New infestations of spruce beetle were limited to three small areas in the Princeton Ranger District but increasing populations in windthrown material was more widespread in 1978 than in 1977.

Western spruce budworm defoliation of Douglas-fir was dramatically reduced in all previous areas of infestation although light to moderate defoliation was encountered near Walhachin. The European pine shoot moth was again found in Kelowna and Kamloops. Pine sawfly defoliation in the Vavenby area was much reduced. Larch case-bearer damage was prevalent at Anarchist Mountain, Shuttleworth Creek and near Cherryville. This insect appears to be firmly established in the latter area after only three years. Scale insects continued to cause significant damage to ponderosa pines from Okanagan Falls to Oliver.

Foliar diseases were less conspicuous in 1978 although Douglas-fir needle cast, larch needle cast and Scirrhia pini were common. A leaf blight of aspen was epidemic in three areas of the Region. Black stain root disease was found in a second area within the Region near Barriere.

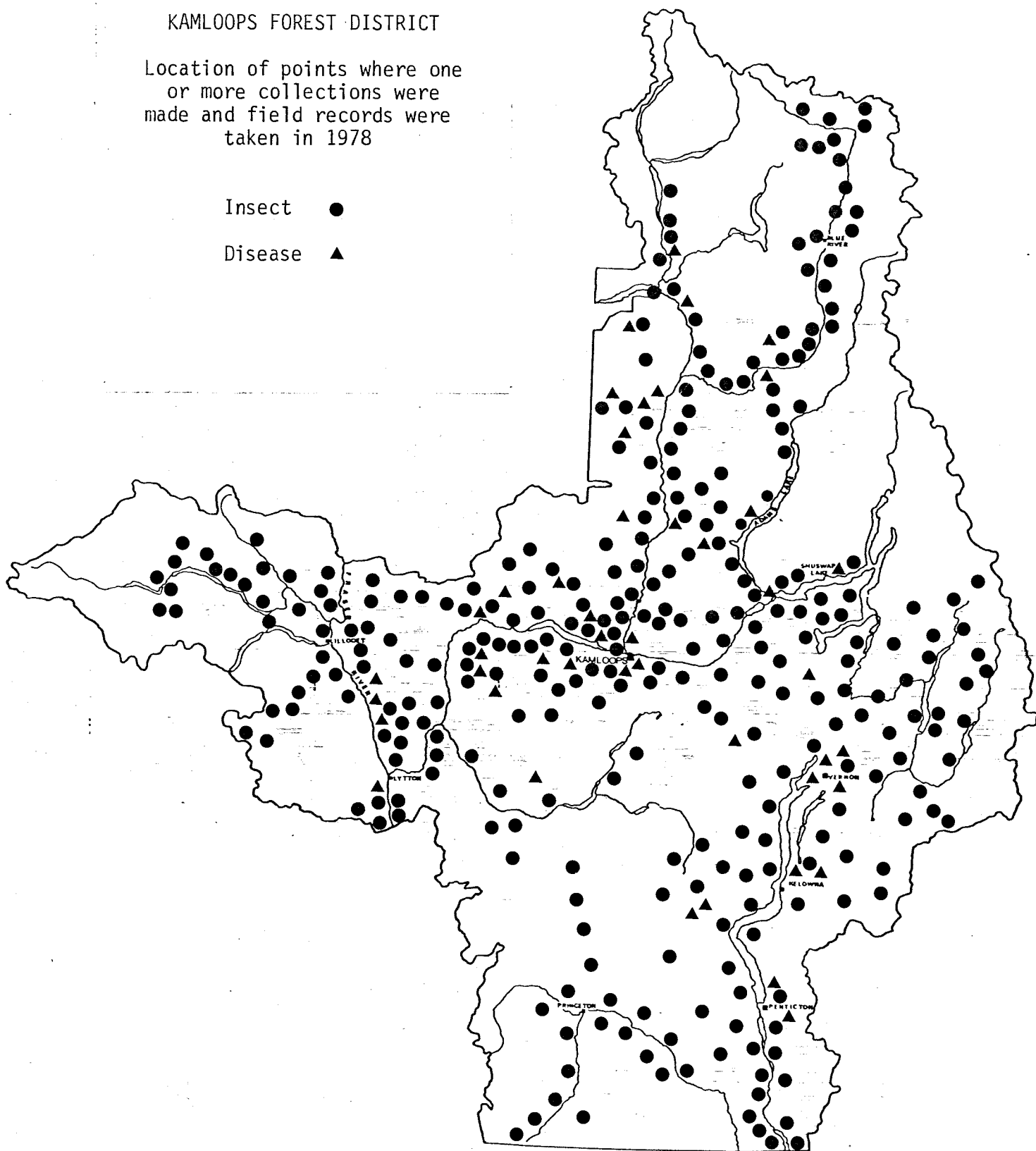
MAP 1

KAMLOOPS FOREST DISTRICT

Location of points where one
or more collections were
made and field records were
taken in 1978

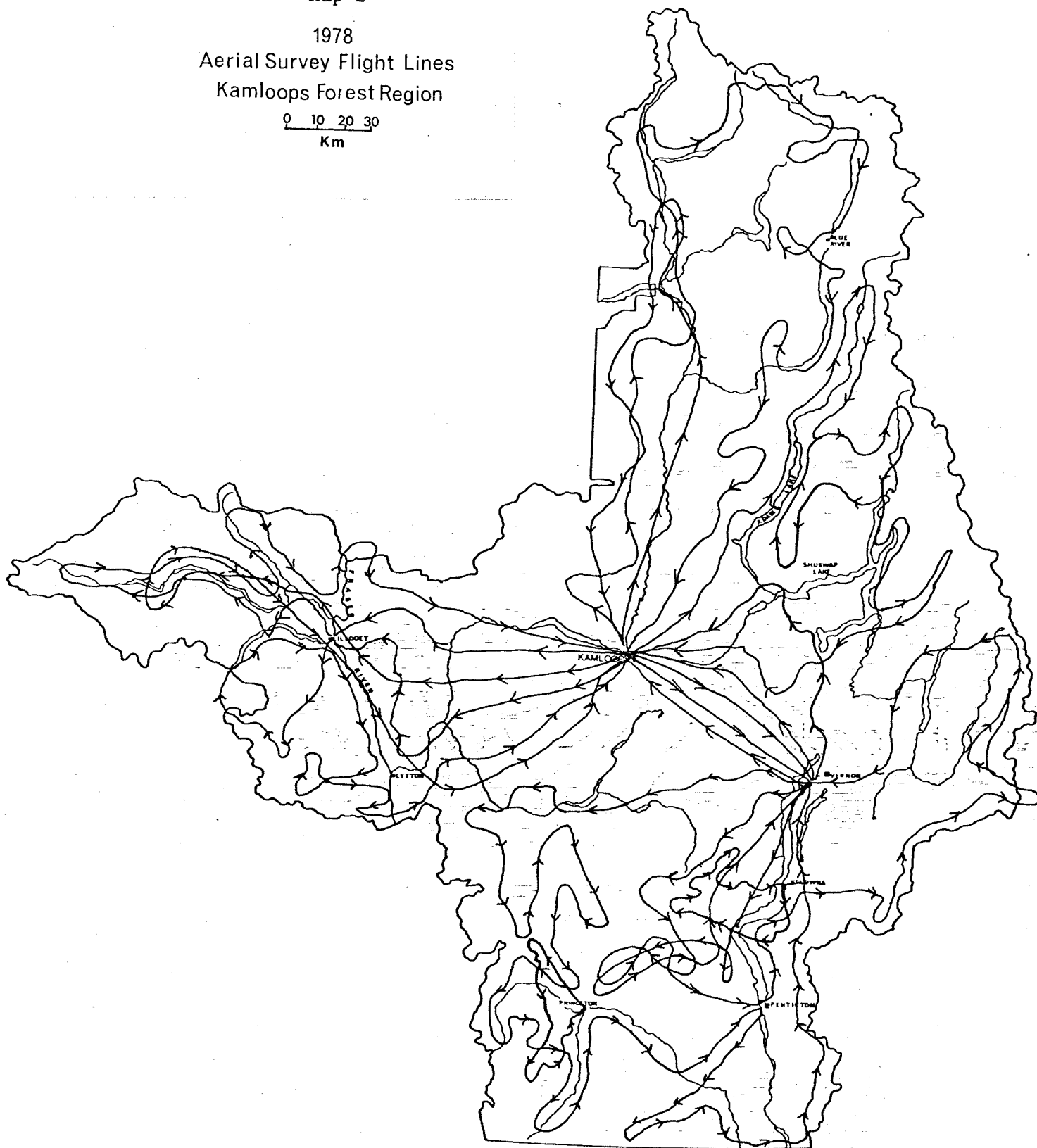
Insect ●

Disease ▲



Map 2
1978
Aerial Survey Flight Lines
Kamloops Forest Region

0 10 20 30
Km



Mountain pine beetle, Dendroctonus ponderosae

Area of damage caused by mountain pine beetle increased dramatically in 1978. Weather conditions through the winter favoured brood survival and large broods, examined in the spring showed virtually no overwintering mortality. Locations of major damage were: Trout Creek, 4 800 ha; Goldbridge 4 400 ha; Mission-Belgo creeks 1 672 ha; Blue River 464 ha; Stein River 1 672 ha; Ashnola River 477 ha. Near Mission-Belgo creeks and Blue River, mountain pine beetle damage has been continuous for 16 and 27 years respectively. At Trout Creek, Goldbridge, Stein and Ashnola rivers, where infestations have been continuous since 1973, 1972, 1975 and 1976 respectively, there were significant increases in the number of pine trees killed in 1978.

Areas where red topped trees occurred were mapped and photographed from aircraft in July, August and September. Where large infestations were encountered at Carpenter Lake, Trout Creek, Blue River and Mission-Belgo creeks oblique and vertical colour photographs were used to aid delineating infestation boundaries. The infestation areas are listed according to Provincial Forest Service Ranger Districts in Table 1.

Table 1. Location and areas of pine mortality caused by mountain pine beetle in the Kamloops Forest Region, 1978

Ranger District	Location	Pine Species	Hectares
Lumby	Shuswap River	wwP	6
	Sitkum Creek	wwP	240
	Outlet Creek	wwP	52
	Cherry Creek	wwP	5
	Total		303
Clearwater	Adams River	lP	30
	Total		30
Barriere	Rexford Lake	pP	4
	Sprague Creek	wwP	6
	Saskam Lake	wwP	20
	Adams Lake	wwP	13
	Total		43
Kamloops	Dufferin Hill	pP	2
	Total		2
Chase	Onyx Creek	wwP	2
	Scotch Creek	wwP	76
	Total		78
Salmon Arm	Bastion Creek	wwP	2
	Total		2
Sicamous	Malakwa	wwP	4
	Three Valley Gap	wwP	4
	Seymour River	wwP	4
	Total		12
Lillooet	Downton Lake	lP	17
	Gun Lake	lP, pP	1 248
	Goldbridge	lP, pP	812
	Plateau Pond	lP, pP	728
	Pearson Pond	lP, pP	448
	Tyughton Lake	lP, pP	92
	Marshall Ridge	lP, pP	344
	Carpenter lake	lP, pP	240
	Yalakom River	lP	314
	Bridge River	lP	110
	Yalakom River	pP	22
	Leon Creek	lP	164
	Gillion Creek	pP	25
	Bridge River	pP	1
	Rough Creek	pP	3
	Lillooet	pP	56

Ranger District	Location	Pine Species	Hectares
Lillooet	Three Lake Valley	1P	7
	Cayoosh Creek	1P	10
	Cayoosh Creek	pP	4
	Total		<u>4 645</u>
Vernon	Salmon River	1P	78
	McGregor Creek	1P	27
	Bradley Creek	1P	21
	BX Creek	1P	3
	Coldstream Creek	1P	7
	Whiteman Creek	1P	9
	Kalamalka Lake	1P	6
	Vernon Creek	1P	69
	Total		<u>220</u>
Penticton	Chapman Creek	1P	10
	Glen Lake	1P	7
	Osprey Lake	1P	512
	Thirsk Lake	1P, pP	1 162
	Darke Creek	1P, pP	363
	Lost Chain Creek	1P, pP	1 541
	Isintok Creek	1P	477
	Agur Lake	1P	518
	East Okanagan Lake	1P	17
	Kerr Creek	1P	3
	Ellis Creek	1P	5
	Matheson Creek	1P	4
	Shingle Creek	1P	12
	Farleigh Creek	1P	128
	Shuttleworth Creek	1P	9
	Anarchist Mountain	1P	176
	Mika Creek	1P	14
	Ashnola River	1P	234
	Young Creek	1P	243
	Total		<u>5 436</u>
Princeton	Hayes Creek	1P, pP	218
	Otter Creek	1P	8
	Christian Creek	1P	30
	Tulameen River	1P	124
	August Lake	1P, pP	98
	Allenby	1P	12
	Wolfe Creek	1P	3
	Whipsaw Creek	1P	25
	Total		<u>518</u>
Kelowna	Bald Range Creek	1P	59
	North Lambly Creek	1P	181
	Lower Lambly Creek	1P, pP	158
	Scotty Creek	1P	33
	Belgo Creek	1P	142

Ranger District	Location	Pine Species	Hectares
Kelowna	Mission, Belgo creeks	1P	685
	Trout Creek	1P	3
	Glen Lake	1P	54
	Trepanier Creek	1P	7
	Law Creek	1P	28
	Lorna Creek	1P	43
	Hydraulic Creek	1P	112
	Mission Creek	1P	327
	Clarke Creek	1P	138
	Kallis Creek	1P	4
	Clark Creek	1P	203
Total			2 177
T.F.L. #9	Terrace Creek	1P	774
	Shorts Creek	1P	255
	Whiteman Creek	1P	616
	Bouleau Ridge	1P	63
	Browns Creek	1P	47
Total			1 755
Ashcroft	Stein River	1P	1 341
	Stein River	wwP	37
	Stein River	pP	294
	Thompson River	pP	64
	Nicoamen Creek	pP	36
	Saskum Creek	pP	14
	Soap Lake	pP	6
	Hat Creek	pP	124
	Cache Creek	pP	6
	Tsotin Creek	pP	32
Total			1 954
Merritt	Powers Creek	1P	2
	Jack Swartz Creek	pP	4
	Merritt	pP	2
	Chapperon Lake	pP	6
Total			14
Blue River	Finn Creek	wwP	8
	Messiter	wwP	14
	Mud Lake	wwP	48
	Blue River	wwP	384
	Redsand	wwP	32
	North Thompson River	wwP	5
	Moonbeam Creek	wwP	48
	Gosnell	wwP	6
Total			545

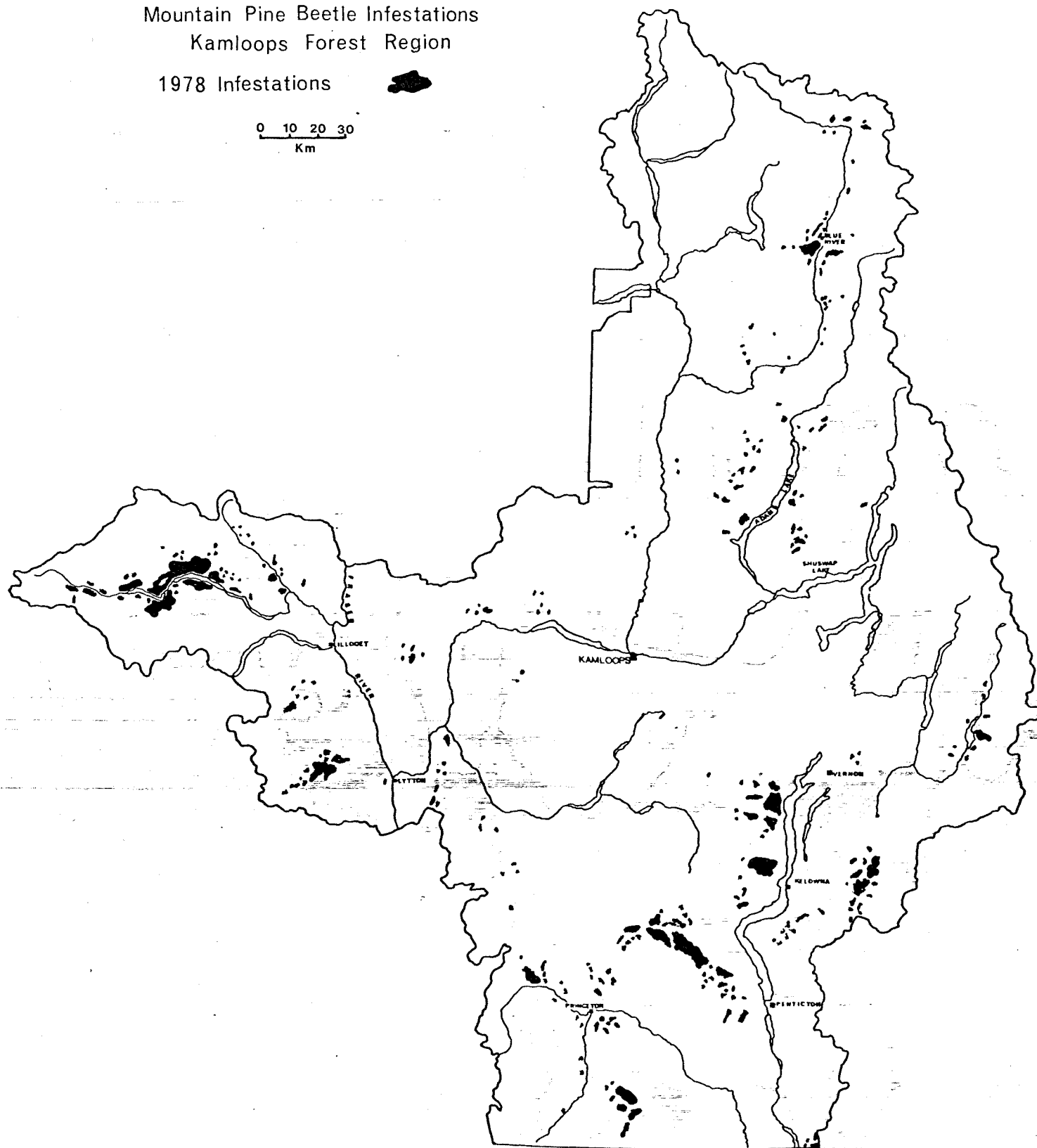
Ranger District	Location	Pine Species	Hectares
Enderby	Harland	wwP	9
	Wap Lake	wwP	2
	Glanzier Creek	wwP	25
	Total		36
Totals by species:		Lodgepole pine	8 042
		Ponderosa pine	682
		Lodgepole, Ponderosa pine mixture	7 964
		Western White pine	1 082
		GRAND TOTAL	17 770 ha

Cruising was conducted in September at Trout Creek, Goldbridge and Ashnola River to determine the percentage of trees attacked by mountain pine beetle (Table 2). A total of 249 prism plots were established at 50 meter intervals on a total of 16 cruise strips at the above locations.

Table 2. Status of lodgepole pine trees on cruise strips, Kamloops Forest Region, 1978

Strip	Location	Percentage of Stems				
		Healthy	Current 1978 attack	Red (1977)	Partial (1978)	Gray prior to 1977
1	Isintok Creek	40	23	11	5	19
2	Bull Creek	37	11	39	3	10
3	Trout Creek	38	20	26	6	8
4	Trout Creek	63	23	1	3	9
5	Thirsk Lake	52	35	3	8	-
6	Osprey Lake	68	22	6	2	-
7	Ashnola River	45	39	9	4	2
8	Ashnola River	33	17	8	6	2
9	Gun Lake	4	9	38	9	39
10	LaJoie Dam	20	10	18	11	39
11	Brexton	23	21	37	12	7
12	Mowson Pond	50	32	10	4	3
13	Pearson Ridge	28	42	10	7	12
14	Mile 2, LaJoie Dam	16	81	-	1	1
15	Mile 3, LaJoie Dam	78	15	-	7	-
16	McDonald Creek	39	25	20	9	7

Mountain Pine Beetle Infestations
Kamloops Forest Region



Spruce beetle, Dendroctonus rufipennis

A moderate to high spruce beetle hazard persisted in scattered locations throughout the Kamloops Region in 1978. Existing infestations near Dome Mountain and Van Horlick Creek continued, although damage in the Van Horlick Creek drainage was light due to the use of trap trees for the past two years. An extensive trap tree program in the Dome Mountain area in 1978 appears to have successfully reduced live tree attack. During aerial surveys three new areas of spruce beetle infestations were detected in standing timber near Princeton. At Olivine Creek, as in 1977, beetles killed trees in leave blocks. At Lawless Creek, cruising indicated an increasing population in standing timber and in a 20 ha area of blowdown. Near Placer Creek, damage was light.

The spruce beetle life cycle and recognition characteristics were explained for forest managers and industrial staff during sixteen informal seminars presented at ranger stations throughout the Region in 1977 and 1978. This aid to prompt detection and removal of infested material contributed significantly to reducing beetle attacks in numerous stands.

Dome Mountain Trap Tree Program

A moderate infestation of spruce beetle was observed during aerial surveys in 1977 in the Tadpole Lake area in and near T.F.L. 9. Subsequent cruising indicated a moderate to heavy beetle population in standing timber from west of Tadpole Lake to east of Dome Mountain. Since infested areas were too extensive to log before beetle flight in 1978, Canadian Forestry Service personnel recommended a trap tree program be initiated to reduce attacks on the residual stand and adjacent uninfested stands.

Roads were constructed by April 1978, approximately 300 m apart, and the timber between the roads was allocated into cut and leave blocks. In each of the seven cut blocks, Engelmann spruce trees on four to six strips, 16 m wide by 300 m long, were felled between roads (Map 5). More than 5,800 spruce trap trees were felled into the standing timber on the side of the strips.

To monitor beetle attack, and assess the effectiveness of the trap trees, four 10 m wide cruise strips were laid out in blocks 1, 3, 5 and 7 totalling 290 ch or 5.8 km. Each strip had one half its length in a designated cut block and one half in a reserve block. The strips were cruised in early May before beetle flight and in August after beetle flight, and trees on prism plots at 2 ch intervals along the strips were classified by year of attack. The following table shows the results.

Strip No.	No. of trees examined		
	Healthy	Attacked	Attacked
		1977/1976	1978
1	385	12	4
3	155	14	1
5	367	6	0
7	248	35	5

In July, two previously uninfested trap trees on each strip were examined by removing 468 cm² (1/2 ft²) bark samples from the butt, mid and upper bole and recording the number of beetle attacks as shown below.

Block No.	Total logs examined	Avg no. attacks per 468 cm ² (1/2 ft ²)		
		Butt	Mid	Upper
1	8	1.62	1.50	1.62
5	8	1.25	2.87	2.50
6	4	1.25	1.25	1.25
7	12	1.50	2.75	1.75

In addition, ten randomly chosen trap logs were examined in each strip to determine per cent infested. Bark was removed from the butt section 3 or 4 m from the cut and occurrence of attack recorded. Percentage of trap logs infested ranged from 53 to 85.

Projecting the number of attacks and beetles trapped, it is estimated that an average of 3.7 attacks per 0.093 m² (1 ft²) occurred; an average surface area of bark per tree was 21.76 m² (234 ft²); and the proportion of infested spruce was 0.7145. Therefore, an estimated 3,588,000 attacks occurred in the felled trees and with two beetles per attack, a total of 7,176,000 beetles were absorbed by the trap logs.

In addition, Crown Zellerbach felled 225 trap trees in 28 loctions near Tadpole Lake, south of Dome Mountain, where infested trees were first sighted in 1977; and 120 trap trees near Sandberg Creek, northeast of Dome Mountain, where light attacks occurred in standing timber along the road access. In August these trees had sustained a similar attack density to those in the Dome Mountain Project.

In September, cruise strips (Map 4) were run through spruce stands in four areas and tree condition was as follows:

Location	% of Engelmann spruce trees infested				
	Healthy	Current (1978)	Red (1976)	Partial (1978)	Grey (prior to 1976)
S of Tadpole L	44	12.0	6	11	26
W of Tadpole L	87	1.0	9	-	3
Dome Mtn*	92	0.5	1	0.2	6
Dome Mtn	87	2.0	4	0.3	6

* Immediately adjacent to Trap Tree Project

Logging commenced in August 1978 in the Project area and the trap trees with beetles and broods should be removed before beetle flight in May 1979.

Elsewhere in the Region spruce beetle attack in standing timber occurred at three locations in the Princeton Ranger District:

1) Lawless Creek

A 0.2 ha area of beetle-attacked Engelmann spruce was observed during aerial surveys in August in the upper Lawless Creek drainage. On a cruise strip, 31% of the stems on 11 prism plots were attacked in 1978, indicating an increasing beetle population. In addition, about 20 ha of blowdown occurred along an adjacent leave block. Of 50 stems, randomly selected and examined, all were heavily infested, mostly with large larvae and pupae. The pupae will probably develop into adults in one year rather than the customary two years.

2) Olivine Creek

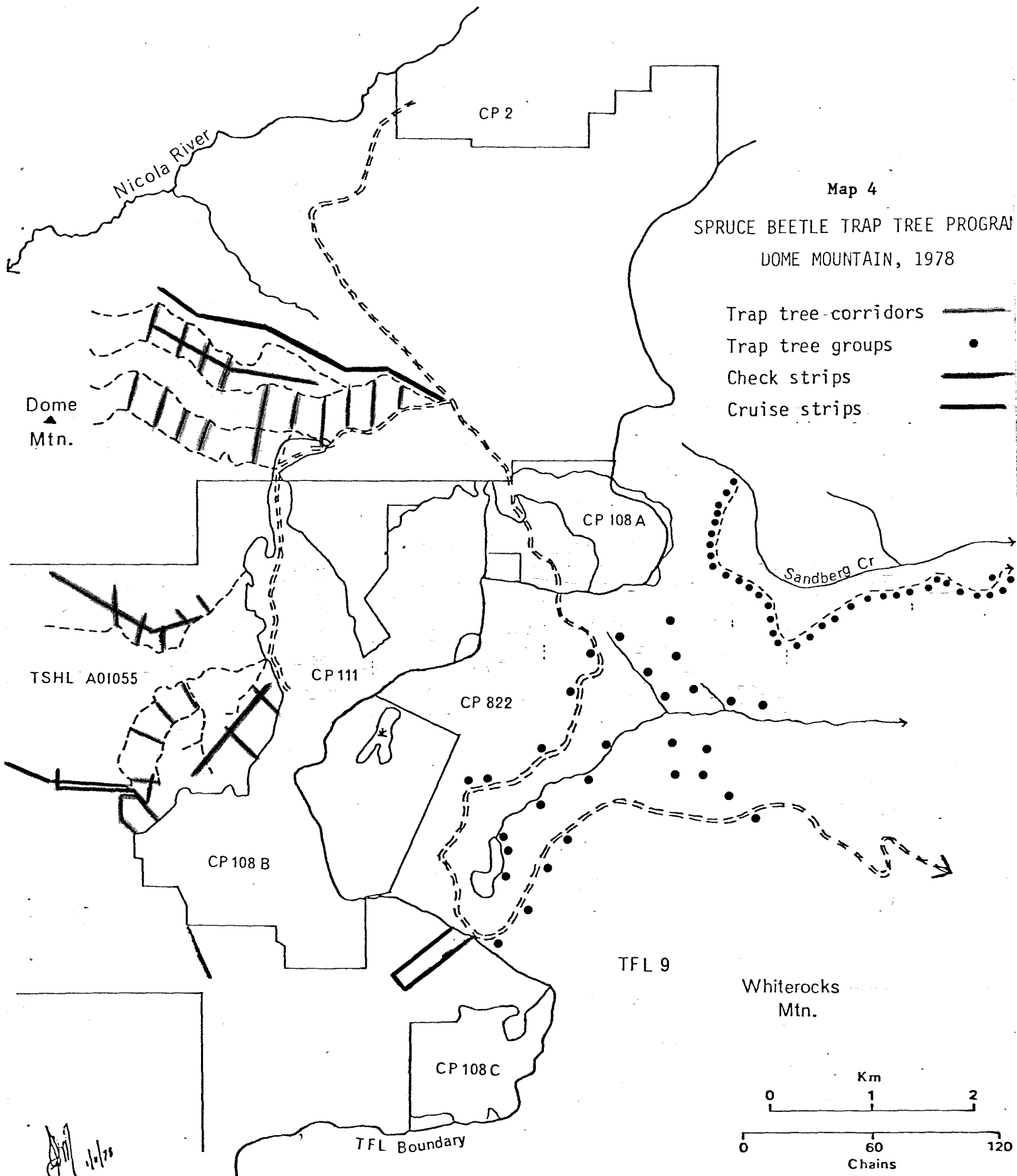
This infestation, first observed in 1977, was confined to one leave block near the top of the drainage. The beetle population had built up in 2- to 3-year-old blowdown along the perimeter of the block. Cruising disclosed that only 60% of the spruce were healthy, as shown below.

Healthy	% of Engelmann spruce infested			
	Current (1978)	Red (1976)	Partial (1978)	Grey (prior to 1976)
60	15	6	8	10

Logging of the infested block was recommended.

3) Placer Creek

Aerial surveys disclosed spruce beetle-attacked trees in a leave block near Placer Creek. Only 15 trees had been attacked in 1977 and three in 1978. Populations appear to be decreasing and little threat to the stand is expected. Further surveillance of the area will be made in 1979.



4) Chu Chua Creek

A helicopter survey of mature stands near the headwaters of the creek revealed active spruce beetle infestations on 80 ha in the spring of 1978. Summer assessments indicated that more than half of the spruce were infested by spruce beetle. Logging commenced during the summer and should be completed before the 1979 beetle flight.

Spruce beetle populations in windthrown spruce

A student crew of five persons, assigned by B.C. Forest Service to examine all reported areas of blowdown in the Kamloops Region, was instructed on bark beetle recognition, life cycle and habits by Canadian Forestry Service personnel.

A total of 14 damaged stands were subsequently examined by the crew during the summer. Ten blowdown areas were infested while four had no beetle activity.

<u>Infested areas</u>	<u>Beetle free areas</u>
Chu Chua Cr	Sicamous Cr
Van Horlick Cr	Harper Cr
Casper Cr	Monticola L
Smythe Cr	Lost Horse Cr
Thynne Mtn	
Chase Cr	
Yard Cr	
Curwin Cr	
Cahilty L	
McGillvray L	

Douglas-fir beetle, Dendroctonus pseudotsugae

Douglas-fir red tops were more numerous in the areas damaged by tussock moth north of Kamloops near Jamieson, Heffley and Darcy creeks. Infestations have expanded in the Tranquille and Durand creek drainages. Significant increases in bark beetle activity were also noted in areas severely defoliated by spruce budworm near Mission Pass, Fountain Valley, Koiek Creek and along Carpenter and Anderson lakes. In the southern portion of the District numbers of red topped Douglas-fir was less than in 1977.

Table 3 shows a summary of counts of red topped Douglas-fir trees observed during aerial survey in July and August.

Appendix 1 shows results of information gathered on Douglas-fir beetle in Kamloops Forest Region by L. McMullen, 1978.

Table 3. Tree counts and distribution of Douglas-fir red tops by location and map references.

Map reference	Location	red top tree count
Kamloops Lake 92 I/NE	Tranquille Cr	216
	Durand Cr	265
	Mount Anne	15
	Heffley Cr	88
	Jamieson Cr	375
	McCauley-Williams Cr	152
	Dairy Cr	12
		<u>1123</u>
Ashcroft 92 I/NW	Barnes L	2
	Blue Earth Cr	10
	Oregon Jack Cr	12
	Hat Cr	25
	Pavilion L	164
	Sallus Cr	40
	Fountain V	50
	Bridge R	100
	Town Cr	30
	Fraser R	95
		<u>528</u>
Lytton 92 I/SW	Fraser R	482
	Kwoiek Cr	60
	Thompson R	33
	Nicola R	85
	Spius Cr	45
		<u>705</u>
Bridge River 92 J/NE	Carpenter L	55
	Yalakom R	53
	Anderson L	45
	Seton L	89
	Cayoosh Cr	30
		<u>272</u>
Bonaparte Lake 92 P/SE	Louis Cr	100
Clinton 92 P/SW	Fraser R	21

Merritt	N. of Merritt	18
92 I/SE	Jacks L	10
	N. of Chapperon L	10
	Moir Reservoir	3
		<u>41</u>
Vernon	Salmon R	55
82 L/SW	Bouleau Cr	10
		<u>65</u>
Penticton	Statford Cr	8
82 E/SW	Horn Cr	10
		<u>18</u>
Tulameen	Gillis L	50
92 H/NE		

GRAND TOTAL 2 293 trees

Balsam bark beetle, Drycoetes-Certocystis complex

The occurrence of red-topped balsam remained similar to that encountered in 1977. Balsam trees attacked by this insect-disease complex retain discoloured foliage for up to five years. Two added areas of balsam damage observed during aerial survey were Upper Trout Creek 130 ha and near Kingvale 49 ha.

Spruce budworm, Choristoneura occidentalis

Defoliation of Douglas-fir stands by spruce budworm was greatly reduced in the Kamloops Region in 1978. Mainly light defoliation occurred on over 5 200 ha in the Ashcroft-Lytton-Lillooet areas although moderate defoliation was encountered on 420 ha south of Walhachin. A trace of defoliation was encountered at Spius Creek, August Lake and along Anarchist Mountain in the south-eastern portion of the District.

Counts of small larvae in unopened buds in May was less in the western portion of the Region than in the east. Incidence of mined buds at Botanie, Izman and Cinquefoil creeks was 9, 7 and 4 percent infested respectively while at Spius, Prospect and Scotch creeks infested buds were 75, 12 and 23 percent respectively.

Three-tree beating samples in June and July showed similar results. Locations where more than 50 larvae per sample were found were: Anarchist Mountain, 300; Spius Creek, 150; Blue Lake, 150; Jimmies Creek, 125; August Lake, 70 and Ashcroft, 60. Feeding was mostly confined to current years growth except near Jimmies Creek and Ashcroft where up to one meter of top strip was evident. Nine collections of from 20 to 200 larvae were submitted to the Forest Insect Pathology Laboratory at Sault Ste. Marie, Ontario for possible disease determination; no disease was evident.

Damage was mapped from a fixed wing aircraft during the latter part of July and early August. A total of 5 295 ha of defoliation was mapped (Map 5). Table 4 shows the distribution of budworm damage in 1978.

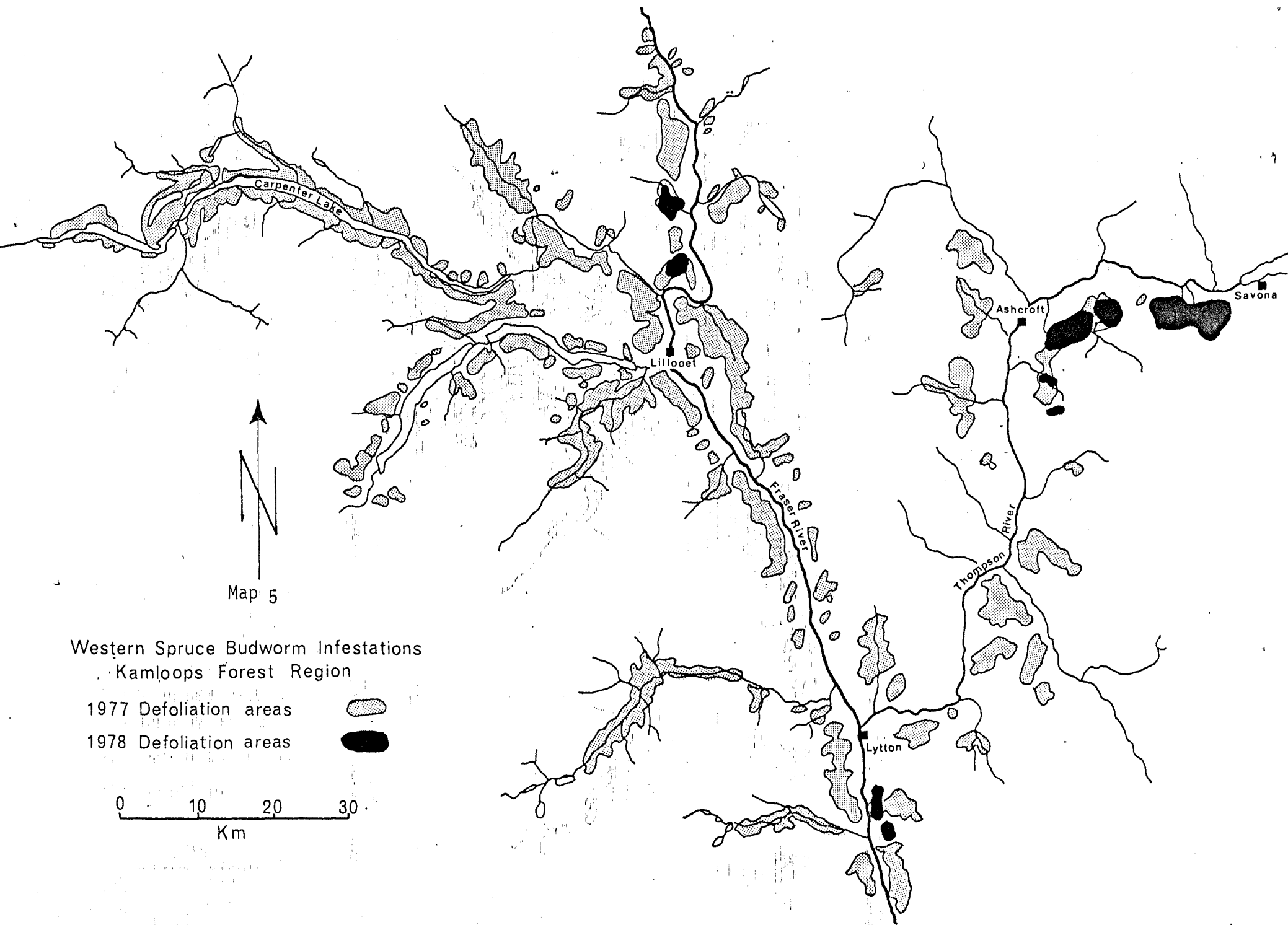


Figure 1 shows the percentage of samples containing spruce budworm larvae and the average number of larvae per sample in collections taken in the Kamloops Forest Region from 1949 to 1978.

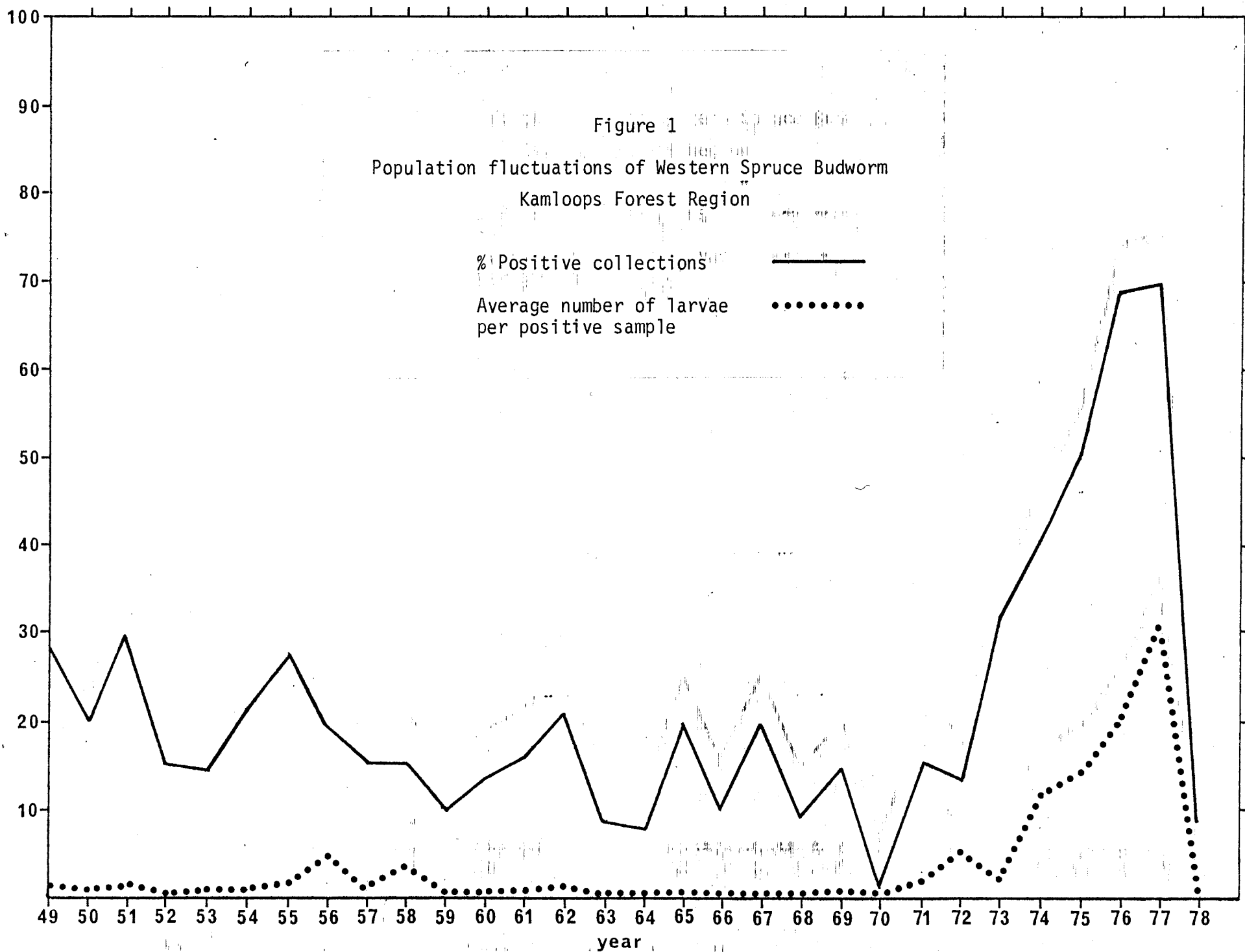


Table 4. Distribution of infestations of spruce budworm by intensity classification, Kamloops Forest Region, 1978.

Map	Location	Defoliation in hectares		
		light	moderate	heavy
Lytton	Siwash Cr	158		
	Falls Cr	227		
	Kwoiek Cr	146		
Kamloops L	Jimmies Cr	97	454	
	Indian Gardens Cr	2 009		
Ashcroft	Oregon Jack Cr	49		
	Slok Cr	259		
	Fraser R	300		
	Barnes L	818	146	
	Pennie L	<u>632</u>	<u> </u>	
TOTAL		4 695	600	
Grand Total 5 295 ha				

Egg populations were assessed in August to determine the potential populations for 1979. Table 5 shows the results of samples obtained from 41 locations throughout infested areas of the Kamloops region.

Table 5. Defoliation Prediction for 1979 from egg mass counts, 1978

Plot No.	Location	Egg mass density per 10m ² foliage	Expected level of defoliation in 1979
119	Kwoiek Cr	0	Nil
157	Texas Cr	0	Nil
158	Lillooet	0	Nil
167	Gun L	15.4	Light
169	Marshall Cr	0.65	Light
171	Slok Cr	0	Nil
172	Leon Cr	0	Nil
173	Yalakom R	31.2	Light
179A	Cayoosh Cr	40.2	Light
210	Oregon Jack	111.9	Moderate
213	Fountain V	0	Nil
215	Mission Pass	7.6	Light
301	Botanie Cr	80.7	Moderate
302	Izman Cr	20.8	Light
303	Cinquefoil Cr	70.2	Moderate
304	Fountain V	8.8	Light
305	Marble Canyon	229.2	Heavy
308	McLean L	16.5	Light
309	Cornwall Cr	13.5	Light
310	Oregon Jack	0	Nil
311	Murray Cr	0	Nil
312	Soap L	102.1	Moderate
313	Nicoamen	0	Nil
314	Prospect Cr	38.8	Light
323	W. Scotch Cr	0	Nil
338	Barnard Cr	73.2	Moderate
339	Barnes L	197.0	Heavy
340	Jimmie Cr	289.0	Heavy
341	Durand Cr	0	Nil
343	Burton Cr	0	Nil
349	Sicamous	0	Nil
352	Mara Ridge	0	Nil
357	Queest Mtn	0	Nil
372	August L	8.3	Light
380	Blue Lake	0	Nil
381	Anarchist Mtn	8.9	Light
384	Mi 7, Spius Cr	37.7	Light
385	Goldbridge	0	Nil
386	Pass Valley	25.6	Light
387	W. of Savona	136.0	Moderate
388	Pavillion Stn	0	Nil

Pheromone-baited flight traps at 17 locations shows a small increase in the number of male moths caught at two locations while in 13 loctions a decrease was indicated.

Table 6. Location and number of male spruce budworm moths caught in pheromone-baited traps, Kamloops

Location	Avg no. of male moths per trap
Burton Cr	28.4
Mission Pass	27.0
Gun L	36.4
Botanie Cr	34.6
Soap L	30.8
Cinquefoil Cr	23.4
Jimmie Cr	29.0
Pavillion L	30.6
Oregon Jack	24.8
Barnard Cr	39.4
Scotch Cr	24.4
Sicamous	31.6
Mara Ridge	25.2
Spius Cr	24.2
Merritt	22.4
Turnbull Rd (Kelowna)	28.0
August L	22.8

Pine sawfly, Neodiprion sp.

During June a reduced population of pine sawfly continued to cause defoliation of lodgepole pine along the North Thompson River from Vavenby to Avola (Map 6). Numbers of larvae per collection decreased from 700 in 1977 to 250 in 1978. During July, population decreased further and by the end of the larval feeding period light to moderate defoliation was evident on 2 216 ha, a decrease of more than 4 000 ha from 1977. Two mass collections of sawfly larvae were sent to Forest Pest Management Institute for disease determination but no disease was isolated. In August, no pupae were found in duff and soil samples beneath infested trees and in September branch samples taken for egg samples disclosed a complete collapse of population.

An infestation of sawfly causing light to moderate defoliation of pine near Clearwater River during 1977 suffered a complete collapse in 1978.

Larch casebearer, Coleophora laricella

The infestation of larch casebearer along Anarchist Mountain continued in 1978. Populations increased greatly near Shuttleworth Creek and Cherryville.

Distribution of larch casebearer has expanded rapidly in the Cherryville area. A trace of population found near Heckman Creek in 1976 increased in 1978 to the extent that moderate to heavy browning of western larch was evident over several hundred hectares. Traces of population were found at Lavington in 1977 and at Cedar Valley west of Vernon in 1978.

In November, branch samples from the three infested areas were collected and the number of overwintering larvae counted. Table 7 shows the results.

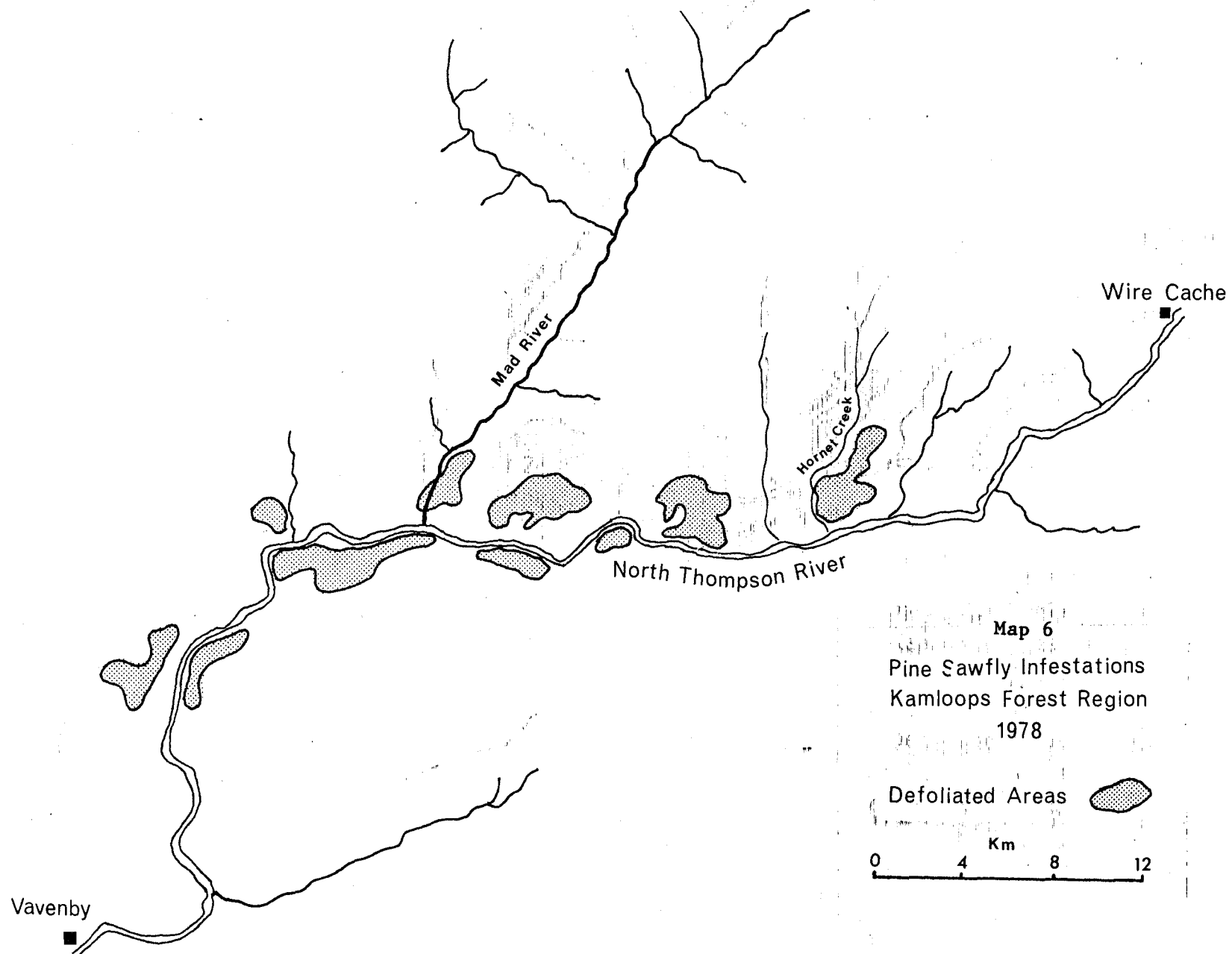


Table 7. Average number of casebearer per 18" branch sample and per 100 fascicles of western larch at 3 locations, Kamloops Forest Region, 1978

Location	Avg no. of casebearers per 18" branch sample	Avg no. of casebearers per 100 fascicles
Anarchist Mtn	300	87
Shuttleworth Cr	113	42
Cherryville	162	71

With the rapid build-up of the larch casebearer populations near Cherryville, extensive low elevation larch stands in the Sugar-Maple lakes area, Enderby and Salmon Arm District may become infested in the next few years.

Forty pair of Agathis pumila, a casebearer parasite were released near Cherryville during July, 1978.

Black pineleaf scale, Nuculaspis californica

The black pineleaf scale severely damaged ponderosa pine foliage on about 400 ha (1,000 acres) in the arid Okanagan Falls area south to Oliver. During the past 3 years infestations of scale insect have reduced the foliage on many trees to tufts of short needles. Damage was most evident along east-facing slopes and benches above the valley floor away from the influence of irrigation. Limited tree mortality was evident in smaller diameter trees, some attributable to attacks by the western pine beetle, Dendroctonus brevicomis.

Additional pests on the ponderosa pine in the area were white pine scale, Phenacaspes pinafoliae in relatively small patches, and a midge (Cecidomyidae) that had caused discoloration of the twigs on some trees.

European pine shoot moth, Rhyacionia buoliana

A survey of pine species for European pine shoot moth was made in all cities and towns of the Okanagan Valley and Kamloops. In May, B.C. Forest Service funded seven students and rented four vehicles to conduct a door-to-door survey for infested pines.

In 1976, infested pines were detected in Kelowna and Vernon; in 1977 and 1978 in Kelowna and Kamloops. Cooperative assistance for instruction, crew supervision and inspection of pines in nurseries was conducted by Canadian Forestry Service, Provincial Ministry of Agriculture and Federal Ministry of Agriculture, respectively.

The survey started May 2 in Vernon and lasted until June 10. European pine shoot moth was positively identified by Canadian Forestry Service, Victoria in samples submitted from 49 locations in Kelowna and Kamloops areas. Infested pine shoots were clipped and burned by the crew and a spray program utilizing dimethoate insecticide followed in June and July.

Table 8 shows the number of European pine shoot moth infestations by area and year.

Table 8. Location and number of European pine shoot moth infestations, 1976-78, Kamloops Forest Region

Locations	No. of locations infested		
	1978	1977	1976
Kamloops	15	21	-
Vernon	-	-	10
Kelowna	33	34	40
Westbank	3	-	-
Peachland	3	-	-

For individual locations see list of addresses in Appendix VI.

By May 29, traps baited with a sex pheromone (trans-9-dodicenyl acetate) were set out at 19 locations in Kelowna, one in Vernon and 16 in Kamloops: a total of 45 traps. No adults were collected in the traps.

Appendix III Minutes of Plant Protection Advisory Council European pine Shoot Moth Sub-Committee April 21, 1978.

IV Minutes of Plant Protection Advisory Council European pine Shoot Moth Sub-Committee June 15, 1978.

V Minutes of Plant Protection Advisory Council European pine Shoot Moth Sub-Committee August 30, 1978.

VI Addresses where infested pines were found, 1978.

Douglas-fir tussock moth, Orgyia pseudotsugata

An infestation was discovered on a single 8 inch diameter Douglas-fir in North Kamloops. Defoliation was moderate and a recommendation (malathion) was given for spraying. Examination of all Douglas-fir trees in the neighbourhood uncovered no further infestation. A mass larval collection was sent to Dr. G. Grant per his request.

While few tussock moth larvae have been found since the collapse of the infestation in 1976 pheromone baited traps have been set out to detect population fluctuations. A total of 225 traps baited with a sex pheromone (Trans 6 Heneicosen-11-ONE) were set out at 23 locations throughout the Douglas-fir belt. At 12 locations a group of 5 traps were baited with a single concentration (0.1%) of pheromone while at the remaining 11 locations, groups of 15 traps were set with three concentrations of pheromone. Tables 9 and 10 shows the results.

Figure 2 shows a summary of fluctuating Douglas-fir tussock moth populations in the Kamloops Region from 1949 to 1978.

Table 9. Average number of male tussock moths caught in 3 pheromone concentrations, Kamloops Forest Region, 1978

Location	Avg. no. of male moths per concentration					
	0.1		0.01		0.001	
	DFTM*	PTM*	DFTM	PTM	DFTM	PTM
Indian Gardens	0.5	-	0	-	0	-
Dairy Creek	3.0	-	0.3	0.7	0	-
Monte Lake	0.8	-	1.0	-	0	-
Heffley Creek	3.6	-	1.0	-	0	-
Barnes Lake	0	-	0	-	0	-
Rose Swanson Mtn	7.6	0.4	3.8	-	0	-
Vernon BX	1.8	-	0.2	-	0	-
Kaleden	0.2	-	0	0.2	0	-
Winfield	0.6	-	0	-	0	-
Okanagan Mission	0.2	2.2	0	0.2	0	-
Osooyoos	0	-	0	0.2	0	-

D.F.T.M. - Douglas-fir tussock moth - Orgyia pseudotsugata

P.T.M. - Pine tussock moth - Dasychira pinicola

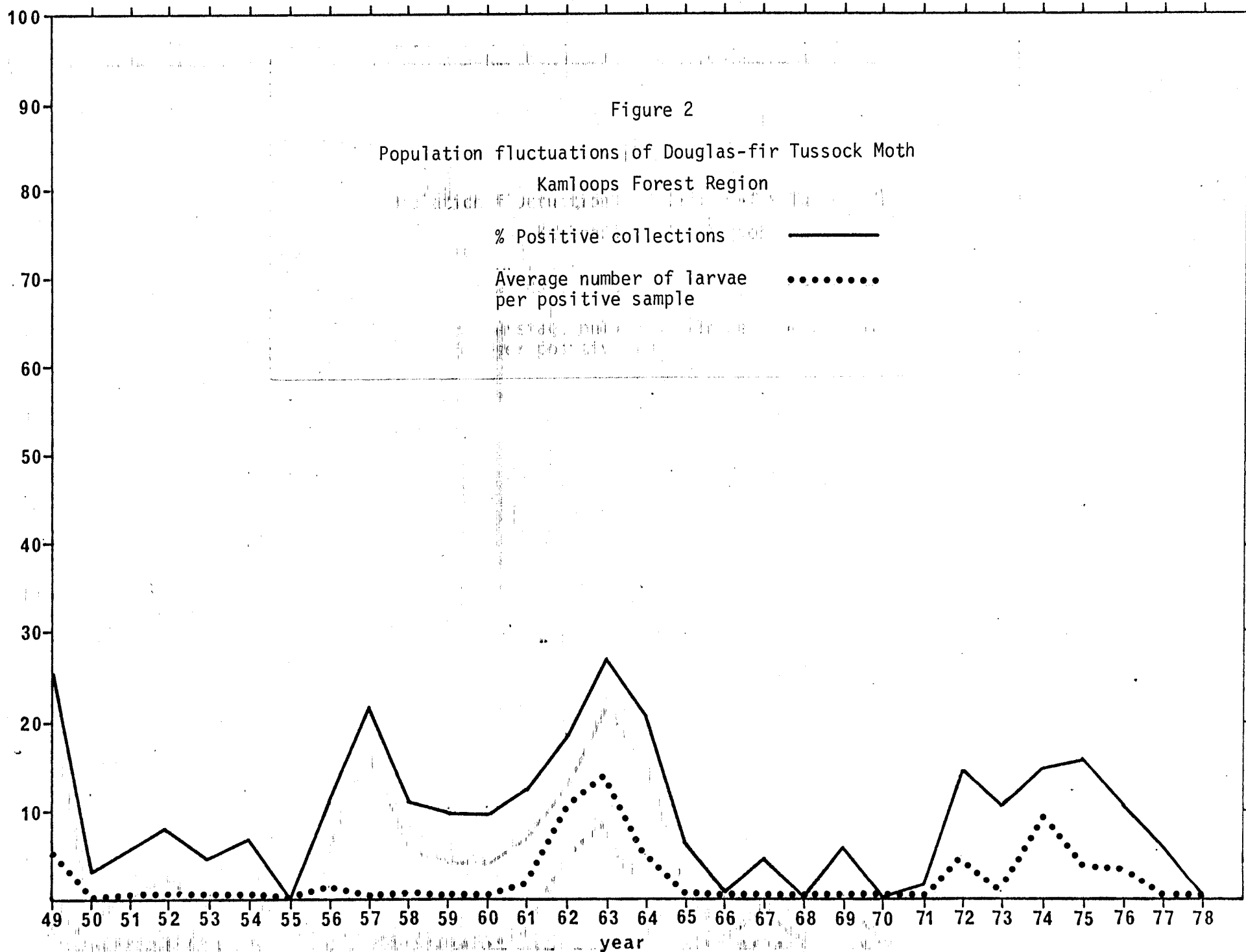


Table 10. Avg. no. of tussock moths per single pheromone concentration,
Kamloops Forest Region, 1978

Location	Avg no. tussock moth		
	DFTM*	ATM*	PTM*
Olalla	3.6		
Barriere	0.4		
Gun L	0.5	1.8	
Pass Valley	5.4		2.8
Marshall Cr	0		2.8
Renfrew St (Kamloops)	18.0		
Dardanelles L	0.8	0.4	13.6
Spences Bridge	6.8		1.8
Salmon R	13.0		
Tulameen	0.6	1.0	2.2
Osprey L	0	3.0	5.0
Copper Mtn	0	0.2	6.4

*D.F.T.M. - Douglas-fir tussock moth - Orgyia pseudotsugata

*A.T.M. - Antique tussock moth - Orgyia antiqua badia

*P.T.M. - Pine tussock moth - Dasychira pinicola

Conifer shoot gouting

Localized infestations of an undetermined pest, produced gouted shoots in 1978 on ponderosa and lodgepole pines and Douglas-fir near Princeton, along Ashnola River and Spius Creek in the southern portion of the Region. A few trees north of Sweets Bridge and between Peachland and Summerland were similarly damaged. In the northern part of the Region gouted shoots occurred in Kamloops and as far west as Lytton, Cache Creek, Pass Valley, Barnes Lake and north at McLure. Trees most commonly affected are 3 to 5 m high ponderosa pine with 90 to 100% of the candles gouted. Many of the swollen branch tips and leaders were dying or dead.

Bruce Spanworm, Operophtera bruceata

A large infestation of Bruce spanworm and a winter moth Operophtera brumata, in the southern portion of Vancouver Island area prompted a pheromone trap survey by Agriculture Canada in the Okanagan Valley to determine occurrence of either insect species. Traps were set up at Winfield (4), Kelowna (4), Westbank (3), Summerland (4), Penticton (4), Vernon (4), Oyama (4). A total of 12 Bruce spanworm were caught but no winter moth.

Nursery pests

Two visits to the B.C. Forest Service nursery at Skimikin uncovered no insect or disease problems. Further inspections by Walter Locke of P.F.R.C. and collections by nursery personnel revealed minor problems; results are shown in Appendix VII.

Pathology

Black stain root disease of conifers, Verticicladiella wagnerii

Two areas of confirmed damage caused by the black stain root disease have now been found in the Kamloops Region. Near Nashwito Creek, 607 hectares were confirmed in 1977 and 40 hectares near Thuya lake, northwest of Barriere in 1978. At both locations the stands are immature with tree diameters ranging from 10 to 15 centimetres.

Near Thuya Lake area, logging was underway immediately adjacent to the infected area and with confirmation of black stain root disease, the cutting permit was increased to clear cut infected stems.

Salt Damage to Roadside Conifers

The incidence of trees damaged or killed by salt usage along highways increased greatly in the Kamloops Region in 1978. Roadside trees, along hills or in areas where shade is prevalent, were the hardest hit.

Two means by which salt is transferred from roadways to trees are: (a) misting when vehicles travelling at high speeds spray the trees with salt laden mist causing dehydration and; (b) by runoff-melting of ice and snow by salt, resulting in salt in solution with water running off lower side of the roads and being absorbed by the roots.

Damage was mostly to Douglas-fir and ponderosa pine and was noted in the following areas:

Lytton-Lillooet Highway

Highland Valley Road

Upper Hat Creek

Lac Le Jeune Road

Dufferin Hill

Paul Lake Road

Monte Creek-Vernon Highway

Hope-Princeton Highway, south of Princeton.

Ink spot of Aspen, Ciborinia whetzellii

Severe browning of trembling aspen was evident in three areas of the Region.

Near Clearwater River, 1 984 hectares were observed while 113 hectares were noted at Avola and at Monashee Creek.

Winter Damage

Two areas of winter damaged Douglas-fir and lodgepole-pine were observed:

478 hectares near Marshall Creek and 97 hectares near Tyaughton Lake.

Appendix 1 shows information gathered from Douglas-fir beetle studies in
Kamloops Forest Region, 1978.

Appendix II - Status of Western Spruce Budworm on Douglas-fir in British Columbia,
October, 1978

- D.A. Ross, G.A. Van Sickle, R.L. Fiddick and C. Collis