Forest Insect and Disease Conditions

Kamloops Forest Region 1982

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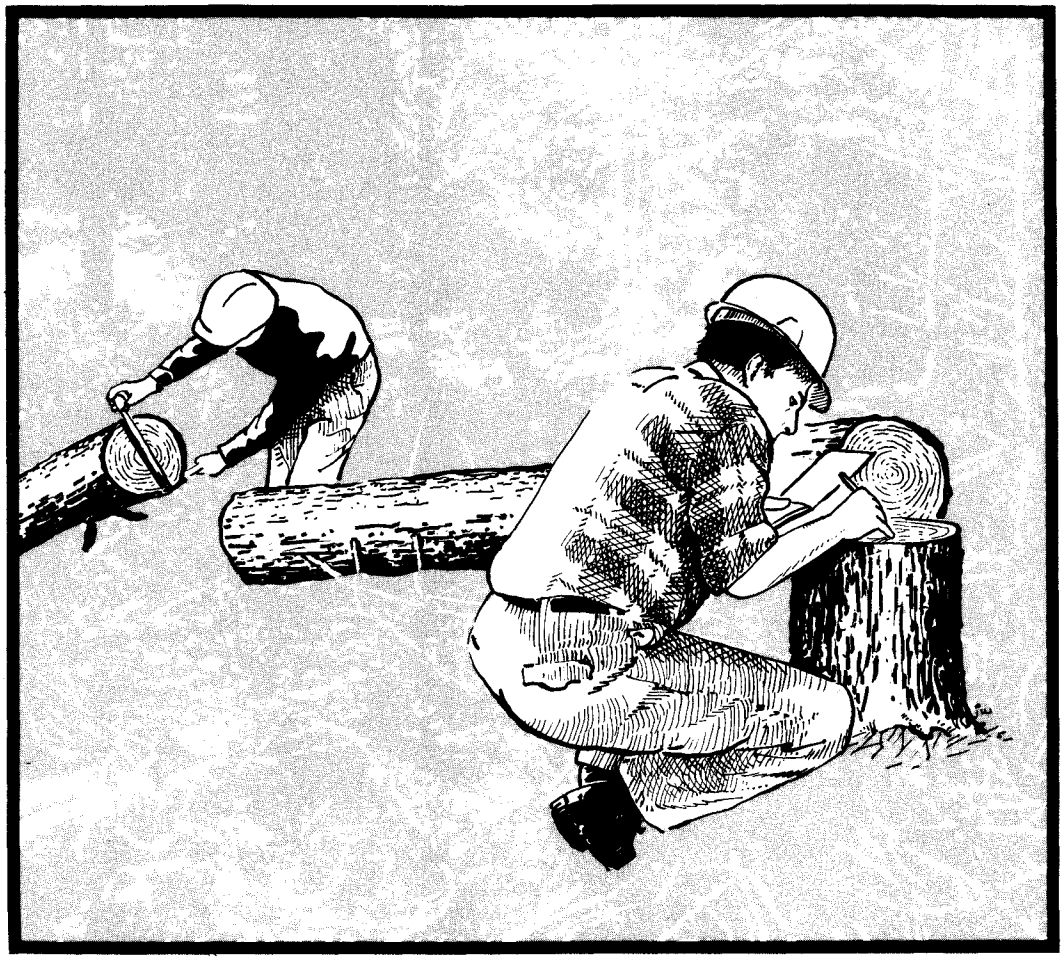

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SUMMARY

This report outlines THE STATUS OF FOREST PEST CONDITIONS IN THE KAMLOOPS FOREST REGION in 1982. Emphasis is given to pests which are capable of sudden damaging outbreaks, and some population trends are forecast.

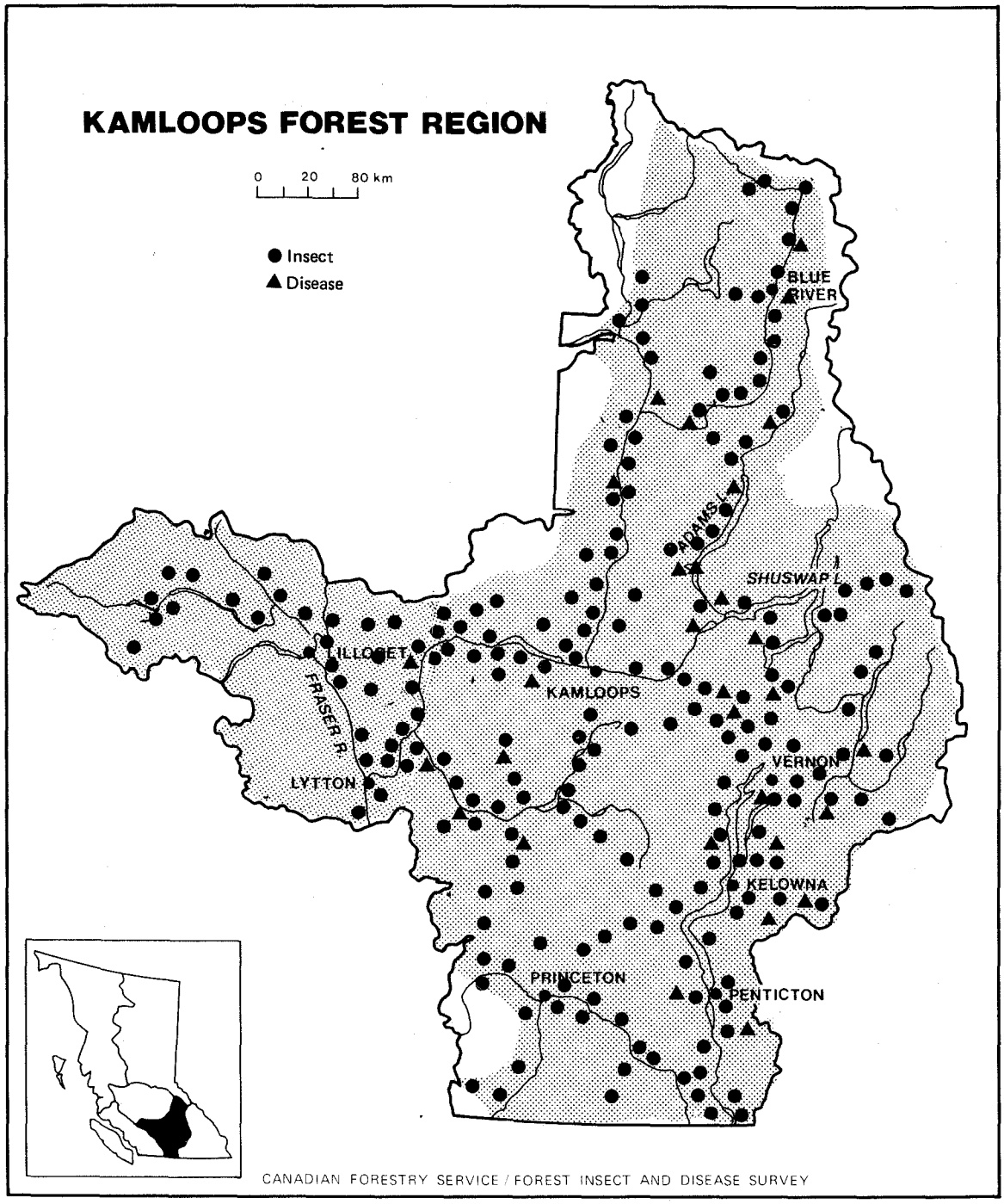
The most significant insect problem of mature forests was the mountain pine beetle which killed an estimated 920,000 pine trees (464 000 m^3) over 22 000 ha in 350 infestation areas. An estimated 20,000 newly planted lodgepole pine seedlings were destroyed by black army cutworm in a recently burned site near Bobo Creek in the North Thompson River valley. Populations of the pine needle sheath miner remained low in lodgepole pine stands in the Clearwater area where 5 400 ha were severely infected in 1980. Ponderosa pine were severely infected by Elytroderma needle disease throughout most of its range.

Douglas-fir tussock moth outbreaks expanded ninefold in the second outbreak year to 12 000 ha. It is the most extensive outbreak recorded, with numerous infestations in the Similkameen, Okanagan, and Thompson valleys. Experimental application of a naturally occurring virus successfully suppressed tussock moth populations in the Cache Creek area. For the fifteenth successive year Douglas-fir stands in the Ashcroft-Cache Creek-Spences Bridge area were defoliated by the western budworm, an area of 14 000 ha down slightly from 16 380 in 1981. Western false hemlock looper outbreaks expanded, the second year of the outbreak, to 1 150 ha of light to severe defoliation of Douglas-fir stands in the Salmon Arm-Shuswap area. Armillaria and Phellinus root rots infected up to 50% of the mature Douglas-fir in at least 20 ha near White Lake in the Shuswap Lake area, and to a lesser degree in the Adams River drainage. The current year's needles of most Douglas-fir in lower elevation stands throughout much of the Okanagan Valley were severely infected by Rhabdocline needle disease.

The number of mature Engelmann spruce recently killed by the spruce beetle remained few in localized monitored stands in the Thompson-Fraser-Okanagan regions, but may be on the increase near Princeton. The two-year-cycle spruce budworm, which defoliated Engelmann spruce-alpine fir in the North Thompson River drainage every second year since 1974, collapsed in 1982.

Mature alpine-fir killed by western balsam bark beetle totalled 2,975 in higher elevation stands throughout the Region.

Large areas of mature and overmature western hemlock forests in the Thompson River drainage were severely infested by the Indian paint fungus trunk rot. The potentially damaging western hemlock looper remained at low levels in cedar-hemlock stands but moderately defoliated adjacent stands in the Nelson Region.



Map 1

Areas covered by aerial surveys and locations where one or more forest insect and disease samples were collected, 1982

The 1982 Kamloops Region FIDS pest survey field season extended from mid-May to late September, during which 287 insect and disease samples were collected and submitted by FIDS rangers, B.C. Ministry of Forests and Industrial personnel. MAP 1 shows the locations where one or more samples were collected.

The percentage of insect collections which contained potentially damaging forest defoliators such as western hemlock looper and filament bearer and blackheaded budworm was 93% compared with 76% in 1981, 83% in 1980; 77% in 1979. Special collections were made of a variety of forest pests for research personnel in Canadian Forestry Service and agriculture research centres in Victoria, Sault Ste. Marie, and Ottawa.

A total of 54.5 hours of fixed wing and helicopter flying time was provided by B.C. Ministry of Forests, Protection Branch, Kamloops Region, to map and photograph major pest problems throughout the Region (MAP 1).

More than 45 contacts and extension services with Provincial, Federal and Industrial agencies and the general public were made during the report period.

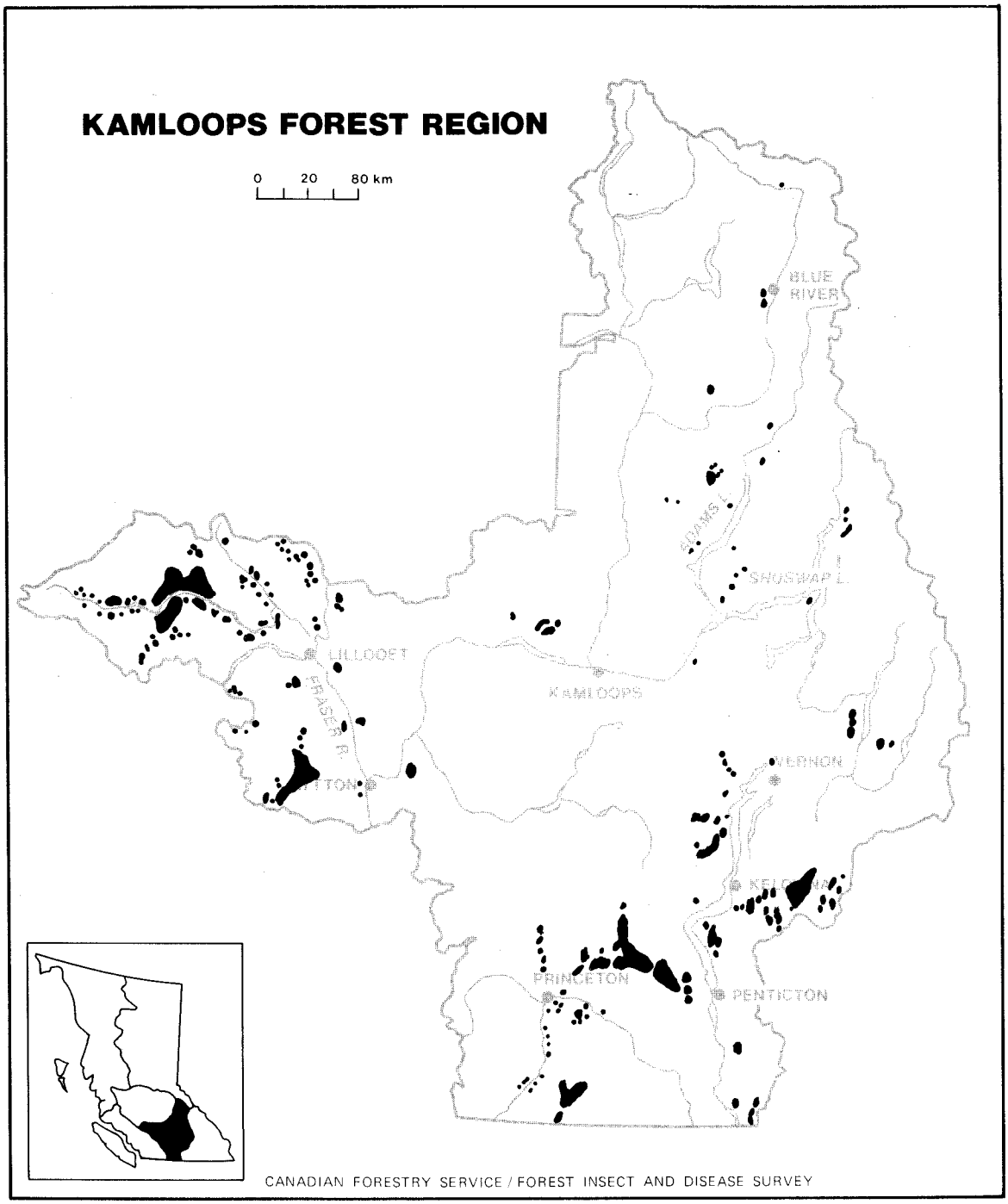
The annual survey of Provincial parks on behalf of the B.C. Ministry of Parks and Housing identified three major insect pests and one major disease in 8 of the 24 parks visited in six Park districts.

PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

More than 920,000 recently killed lodgepole, ponderosa and western white pine trees (464 000 m^3) were sketch mapped by aerial survey (MAP 2) in 350 infestation areas over 22 000 ha from south of Hedley to west of Gold Bridge (TABLE 1). This compared with 2.7 million trees (1.36 million m^3) over 19 500 ha in 1981.

Infestations ranged in number and intensity from two areas of old dead grey (totalling 2 000 ha) in the Gold Bridge area to more than 30 infestations on 10 000 ha, where more than 30% of the mature pine were killed by the 1981 beetle attack (severe). Between 5 and 30% of the pine were killed (moderate mortality) over 8 675 ha in 186 infestations, and less than 5% were killed (light) over 3 270 ha in 130 infestations (TABLE 2).



Map 2

Mountain Pine Beetle

Areas of recently killed pine, as determined by aerial surveys, 1982

TABLE 1. Area, number and volume of lodgepole, ponderosa and western white pine trees recently killed by mountain pine beetle, determined from aerial and ground surveys, Kamloops Forest Region, 1982.

Timber Sale Area	Host	Area (ha)	Number of trees killed	Volume of host killed (m^3)
KAMLOOPS	lP	200	900	800
	pP	0	0	0
	wwP	350	1,000	1 500
		550	1,900	2 300
LILLOOET	lP	11 500	827,000	413 500
	pP	150	1,500	750
	wwP	400	2,200	4 400
		12 050	830,700	418 650
MERRITT	lP	2 000	14,500	5 800
	pP	-	-	-
	wwP	-	-	
		2 000	14,500	5 800
OKANAGAN	lP	7 000	72,000	36 000
	pP	300	600	800
	wwP	100	300	450
		7 400	72,900	37 250
TOTALS	lP	20 700	914,400	456 100
	pP	450	2,100	1 550
	wwP	850	3,500	6 350
TOTAL		22 000	920,000	464 000

TABLE 2. Number of pine killed, area and number of mountain pine bark beetle infestation by severity, Kamloops Forest Region, 1982.

Timber Sale Area	Tree sp.[1/]	Number[2/] trees killed	Infestations								
			Area (ha)				Number				
			Light	Moderate	Severe	Grey	Light	Moderate	Severe	Grey[3/]	Total
KAMLOOPS TSA	lP	900	150	50			30	5			35
	wwP	1,000	250	100			14	1			15
		1,900	400	150			44	6			50
LILLOOET TSA	lP	827,000	1 000	2 000	8 500	2 000	10	83	20	2	115
	pP	1,500	100	50			10	5			15
	wwP	2,200	300	100				15	5		20
		830,700	1 400	2 150	8 500	2 000	20	103	25	2	150
MERRITT TSA	lP	14,500	195	1 800	55		16	17	2		35
OKANAGAN TSA	lP	72,000	1 000	4 500	1 500		35	50	5		90
	pP	600	200	100			5	5			10
	wwP	300	75	25			10	5			15
		72,900	1 275	4 625	1 500		50	60	5		115
SUMMARY	lP	914,400	2 345	8 300	10 105	2 000	91	155	27	2	275
	pP	2,100	300	100			15	10	0		25
	wwP	3,500	625	225			24	21	5		50
		920,000	3 270	8 625	10 105	2 000	130	186	32	2	350

[1/] lP - lodgepole pine; pP - ponderosa pine; wwP - western white pine.

[2/] Related to last year's attack.

[3/] Light: 1-5% of the host species red; Moderate: 6-30%; Severe: 31% or more; Grey: old dead trees.

The major outbreaks in lodgepole pine stands continued in the Lillooet TSA in the Carpenter-Gun-Downton lakes area, where more than 760,000 pine were killed over 5 550 ha, down from 2.5 million over 14 000 ha in 1981 and in the Stein River Valley, 34,425 pine killed over 550 ha, a small change from 40,695 trees over 880 ha in 1981. In the Merritt TSA in Hayes Creek 10,750 pine were killed over 1 350 ha, an increase from 6,220 pine over 320 ha; in the Okanagan TSA, in Mission and Belgo creeks, infestations increased to 24,250 pine over 1 500 ha from 10,475 over 630 ha. The Ashnola River Valley infestation increased slightly to 9,350 trees over 425 ha; Lambly Creek was little changed with 5,800 trees over 515 ha from 3,800 on 430 ha in 1981; in the Hayes Lake area, 4,900 over 500 ha, and in Trout Creek, 4,150 pine over 650 ha from 4,770 on 175 ha in 1981.

The increase in the area of 1982 outbreaks of about 11% was because infestations in lodgepole pine stands in the West Kettle River Valley drainage were included in the Kamloops Region for the first time as a result of recent TSA boundary adjustments. Small increases in infestation areas occurred north of Lillooet in the French Bar Creek area west of the Fraser River.

The decline in the number of recently killed trees from 2.7 million in 1981 to 920,000 resulted largely from the depletion of susceptible lodgepole pine in the Gold Bridge area where up to 59% (average 37%) of the pine has been killed over an estimated 14 000 ha, since the outbreak first developed in 1976 (TABLE 3).

The number of recently killed western white pine declined to 3,500 in 50 infestations from 6,000 trees in 65 areas in 1981. However, the area of stands in which trees were recently killed increased to 850 ha from 320 in 1981, but tree mortality was less than 5% of the pine in the infestation areas. The incre se resulted from trees being scattered over larger areas mainly in Cayoosh Creek (1,050 over 225 ha) in the Lillooet TSA, and in the Adams-Saskum lakes and Raft River areas (565 trees over 210 ha) in the Kamloops TSA. Elsewhere 1,600 trees were scattered over 400 ha from Duffy Lake and the Stein River Valley to Shuswap Lake and the Seymour River, to the upper North Thompson River Valley. Previously persistant infestation in the Blue River area declined, because of harvesting and host depletion, to a single pocket of 50 trees near Albreda and small groups of 2 - 20 trees elsewhere.

The 2,100 recently killed ponderosa pine was a decline from 4,100 recorded in 1981. The decline resulted largely from the reduced incidence of mortality in the Lillooet TSA where 1,500 trees were recorded in 1982 in the Stein River Valley and Gold Bridge areas, compared with 675 and 2,890 in each area, respectively, in 1981. The remaining 600 recently killed pine were contained in 5 infestation areas in the Okanagan TSA from Shorts Creek to Inkaneep, compared with 535 trees in sixteen areas in 1981. The decline in area was most evident near Anarchist Mountain and near Pass Lake near Kamloops.

TABLE 3. History of mountain pine beetle outbreaks, Kamloops Forest Region, 1964-1982.

YEAR	Lodgepole pine		Ponderosa pine		Western white pine		Total trees	Total
	#trees killed	Area (ha)	#trees killed	Area (ha)	#trees killed	Area(ha)	killed	Area (ha)
1982	914,400	20 700	2,100	450	3,500	850	920,000	22 000
1981	2,694,900	29 000	4,100	180	6,000	320	2,705,000	29 500
1980	-	36 000	-	400	-	600	-	37 000
1979	-	18 000	-	750	-	1 065	-	19 815
1978	-	12 850	-	2 185	-	980	-	16 015
1977	-	10 560	-	3 230	-	1 500	-	15 290
1976	-	12 360	-	1 260	-	2 400	-	16 020
1975	-	4 350	-	120	-	2 900	-	7 370
1974	22,300	2,025	150	20	15,600	2 025	38,050	4 070
1973	9,800	770	300	12	9,300	1 250	19,400	2 032
1972	4,050	-	360	-	13,650	-	18,060	-
1971	3,950	-	460	-	9,000	-	13,410	-
1970	4,000	-	1,000	-	1,700	-	6,700	-
1969	20,500	-	2,700	-	900	-	24,100	-
1968	47,500	-	7,350	-	2,250	-	57,100	-
1967	25,500	-	20,000	-	680	-	46,180	-
1966	17,000	-	14,000	-	1,150	-	32,150	-
1965	14,000	-	14,000	-	7,000	-	35,000	-
1964	19,000	-	6,100	-	5,550	-	30,650	-

Beetle infested stands were examined in the Lillooet and Okanagan TSA's on a random probe basis, no cruise lines or plots were completed. However, based on the probe, little change is expected in the intensities or extent of outbreaks in much of the Region in 1983. A possible exception is the area west of the Fraser River and north of the Bridge River Valley in the French Bar Creek area in the Lillooet TSA, where the number of stems and volume killed could increase, in large areas of susceptible lodgepole pine.

Lodgepole pine dwarf mistletoe, Arceuthobium americanum

As previously reported, mistletoe infections in lodgepole pine stands contribute greatly to accumulated volume loss in the Kamloops Region, where infections commonly exceed 50% or more in mature stands over 250 ha or greater. Severely infected (>15%) understory regeneration was common in the Pavilion area where infected overstory trees remain, in selectively logged areas.

There is little infection of resistant alpine fir and Engelmann spruce regeneration in mistletoe infected lodgepole pine overstory, common in many high elevation stands, such as the Upper Tranquille and Cow creeks.

Black stain root disease, Verticicladiella wagenerii

A limited survey of lodgepole pine stands in the Vavenby-Avola area, identified the pathogen as a causal agent of lodgepole pine mortality in the area.

Up to 14 000 ha of pine stands were severely defoliated by pine sawflies, Neodiprion spp. between 1976 and 1978, which contributed to the decline of the stands and which prompted harvesting of affected stands. The disease was also evident at undetermined intensities in Naswhito Creek west of the north arm of Okanagan Lake, where research studies by CFS pathologists are in progress.

Armillaria root rot, Armillaria mellea

The records of extent and incidence of infection of mature pine were little changed from observations made in 1980 and 1981 in the Vavenby-Clearwater and Mud river drainages. Up to 65 pine per ha were killed over 400 ha in the area, with an infection incidence of up to 23% in the mature stands, determined by ground cruises.

Atropellis canker, Atropellis piniphilla

The stem disease is common in many mature stands throughout the Region, causing undetermined levels of volume loss. Up to 96% of the

stems in a 2 000 ha stand near Penticton Creek were severely infected. Elsewhere, in the Highland Valley, Cross Creek and the Wells Gray Park area, infection commonly exceeds 50% of the trees in localized 10 ha and greater areas.

Pine needle sheath miner, Zelleria haimbachi

Larvae were present at low levels in lodgepole pine stands in the North Thompson valley near Clearwater, where 5 400 ha were defoliated in 1980 after which the population collapsed. The significance of the larvae at low levels, does not preclude the potential to build up rapidly by 1984.

Elytroderma needle disease, Elytroderma deformans

Severe infection of the previous year's needles occurred for the second consecutive year throughout much of the ponderosa pine range. Infection intensities ranged from 1 to 80% of the 1981 needles of up to 85% of the mixed age class trees. The infected areas ranged in size from 1 to 100 ha in the Chase, Pritchard and Savona areas. Infection is greatly influenced by moist air conditions during the fall spore release period.

Pine engraver beetle, Ips pini

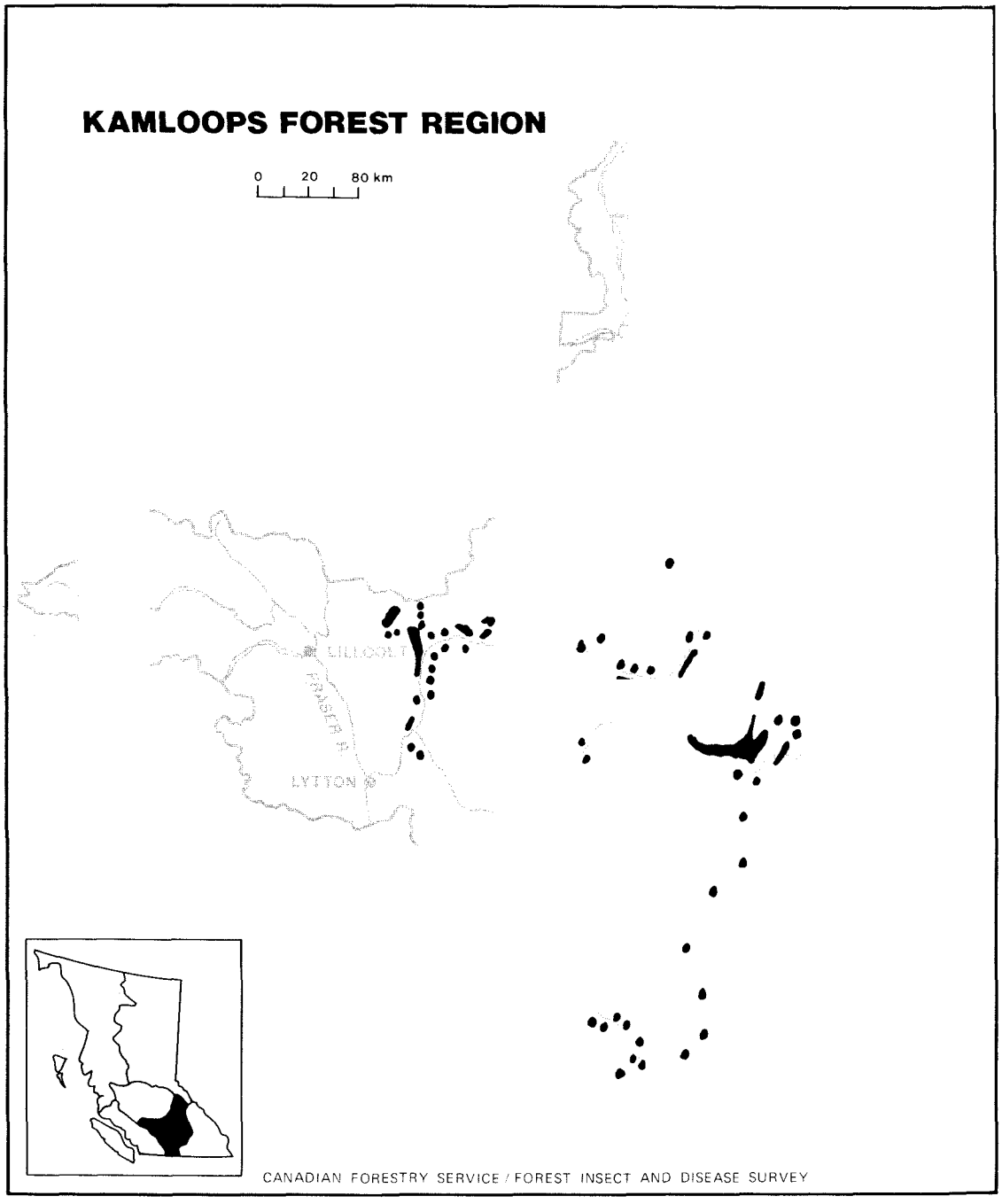
The incidence of current attack was common in mature lodgepole pine stands in the Warbron-McMurphy creeks area north of Vavenby and west of Highway 5. The attacks were restricted to trees predisposed by infection by black stain root disease, Verticicladiella wagenerii and/or Armillaria mellea. Mortality of the infected trees was accelerated by the beetle attacks.

DOUGLAS-FIR PESTS

Douglas-fir tussock moth, Orgyia pseudotsugata

Light to severe defoliation extending over 12 000 ha of mainly privately owned forests in lower elevation Douglas-fir-Ponderosa pine type was defined by aerial and ground surveys (MAP 3); it was an elevenfold increase from 1 050 ha in 1981. The expanded area of defoliation followed population increases in 1980 and 1981 and the patterns of at least seven major previous outbreaks between 1930 and 1976. The 1982 outbreak area extended over 23 separate infestations, near Hedley and Olalla into the Okanagan Valley, the North Okanagan, and from Chase west to Monte Creek, Kamloops, Deadman River to Cache Creek and Carquille, south to Spence's Bridge.

Of the total area defoliated, the intensities of the damage ranged



Map 3

Douglas-fir Tussock Moth

Areas of defoliated Douglas-fir, as determined by aerial surveys, 1982

from 10 localized areas of 1 to 150 ha of light defoliation (less than 25% of the foliage) totalling 500 ha (4% of the total) to 18 areas of moderate defoliation (26-65% of the foliage) between 15 to 500 ha, totalling 2 500 ha (21% of the total); and 13 areas of severe defoliation (66% or more of the foliage) between 15 and 3 300 ha, a total of 9 000 ha (75%) (TABLE 4). Light to moderate defoliation of single and small groups of Douglas-fir and small exotic spruce occurred in residential areas of Kamloops, Penticton, Summerland and Kelowna.

TABLE 4. Location and area of Douglas-fir stands defoliated by Douglas-fir tussock moth, Kamloops Forest Region, 1982.

Location (TSA and geographic)	Area of defoliation (ha)				
	Light	Moderate	Severe	Grey	Total
KAMLOOPS TSA					
Monte Cr.-Pritchard	-	60	3 300	-	3 360
Cache Creek	50		2 900	-	2 950
Louis Creek	40		-	-	40
Stump Lake	60	-	20	-	80
Deadman River	-	535		-	535
Heffley Creek	-	65		-	65
Westsyde	-	40	-	-	40
Juniper Heights	80	150	690	-	920
Campbell Creek	20	150	65	-	235
	250	1 000	6 975	-	8 225
LILLOOET TSA					
Moran	-	175	-	-	175
MERRITT TSA					
Stemwinder Prov. Park	80	145	-	-	225
Hedley	20	-	-	-	20
Drynoch	50	30	-	-	80
	150	175	-	-	325

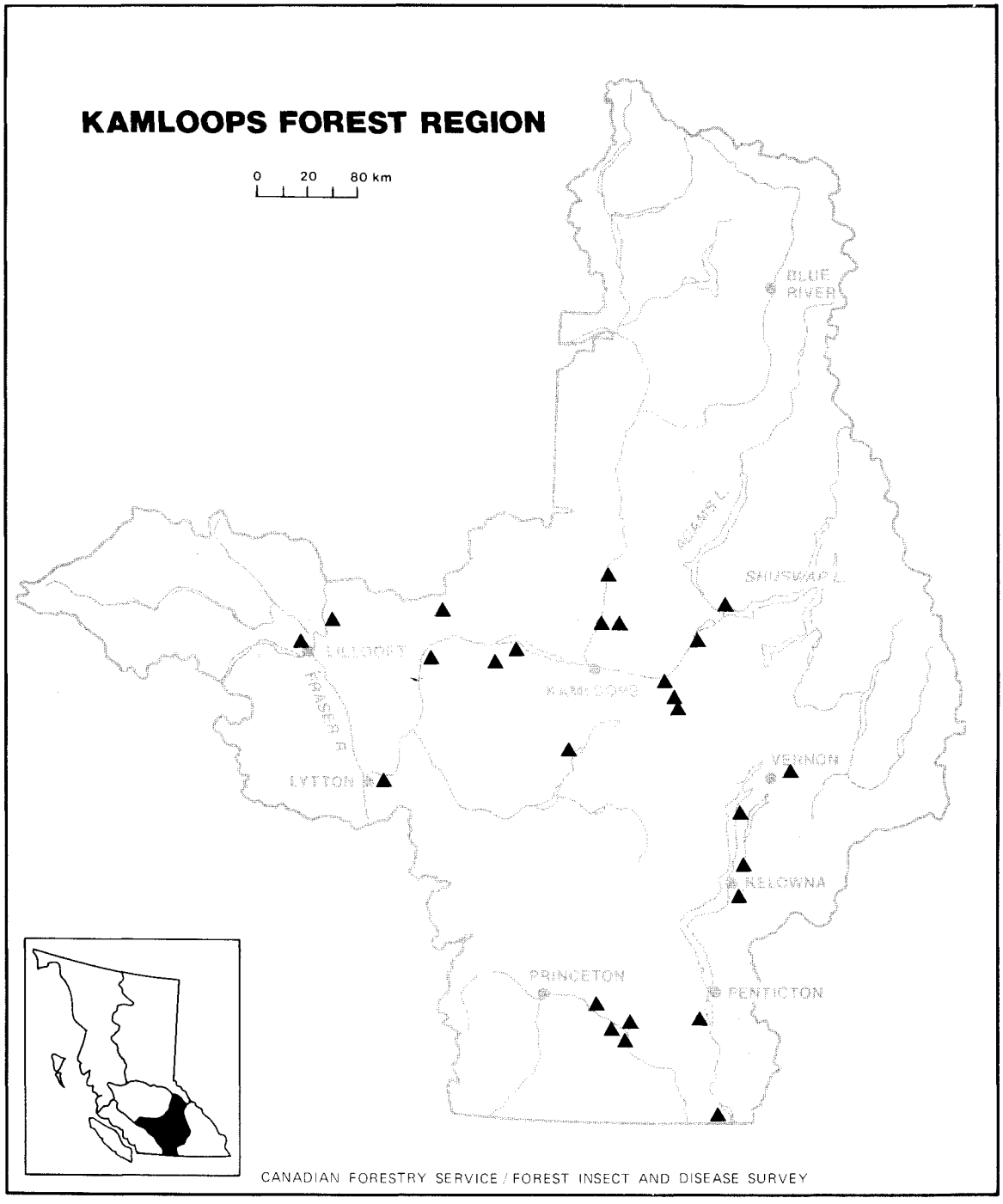
.../continued

Location (TSA and geographic)	Area of defoliation (ha)				
	Light	Moderate	Severe	Grey	Total
OKANAGAN TSA					
Chase	170	40	80	-	290
Yankee Flats	50	240	125	-	415
Canoe	-	-	65	-	65
Spallumcheen		135		-	135
Summerland		40		-	40
Westbank	-	70		-	70
Blue Lk.	50	-	-	-	50
Okanagan Falls	-	100	40	-	140
Falkland	30	-	400	-	430
Armstrong	-	480	1 040	-	1 520
Vernon	40	80		-	120
	340	1 185	1 750	-	3 275
SUMMARY					
KAMLOOPS TSA	260	995	6 975	-	8 225
LILLOOET TSA	-	175	-	-	175
MERRITT TSA	150	176	-	-	325
OKANAGAN TSA	340	1 180	1 750	-	3 275
	750	2 525	8 725	-	12 000

An experimental aerial spray program applied a naturally occurring nuclear polyhedrosis virus (NPV) over seven plots in the Veasy Lake valley, northwest of Cache Creek. The program, a co-operation of CFS/PFRC research staff and the B.C. Ministry of Forests reduced population by 60% with the lowest dosage, to 93% with the highest dosage. In treated plots successful pupal emergence ranged from 2 to 13%, compared with 25 to 43% in check plots. Long term effects are to be studied in 1983.

A 120 ha stand of Douglas-fir on the Niskonlith Indian Reserve near Chase was aerially sprayed with SEVIN-4 OIL during the larval dispersal period, and successfully controlled a potentially damaging population. The population had moderately to severely defoliated about 45 ha of the area in 1981 and overwintering egg populations had been high. However no post-spray defoliation occurred.

Male adult populations were monitored by traps baited with (z)-6-heneicosen-11-one pheromone of 0.1%, 0.01% and 0.001% conc. by weight. Five traps of each strength were located in eight areas from Blue Lake near Osoyoos to Lillooet and Cache Creek (MAP 4). The average numbers of males collected in the traps ranged from 20 to 63 in 0.1% to 21 to 64 in 0.01% and 2 to 52 in 0.001% (TABLE 5).



Map 4

Douglas-fir Tussock Moth

Locations of pheremone attractant traps to monitor adult male population

TABLE 5. Location and number of adult male Douglas-fir tussock moths in pheromone traps, and average number of egg masses per tree, per trap area, Kamloops Forest Region, 1982.

Location	Avg. no. moths per trap[1/]			Avg. no. egg masses per tree per plot[2/]
	0.1	0.01	0.001	
Barnes Lake	54	64	52	2
Sixteen Mile Creek	63	57	13	0
Indian Gardens	31	37	38	0
Stump Lake	22	24	2	0
Winfield	40	42	5	0
Chase	20	27	15	0.4
Monte Lake	48	41	14	0
McLure-Westside	22	21	22	0

[1/] 25 or more male adults in traps baited with 0.1% strength pheromone, (z)-6-heneicosen-11-one by weight indicate rising population levels.

[2/] See footnote 3/ Table 7.

Single and groups of five traps baited with 0.1% pheromone were located in 29 areas and attracted an average of 28 to 63 adults/trap (TABLE 6).

TABLE 6. Location and number of adult male Douglas-fir tussock moths trapped in 0.1% strength pheromone, Kamloops Forest Region, 1982.

Lillooet Airport	28	Hedley (east of town)	48
Skihist Prov. Park	29	south of Similkameen R.	
Pavilion	32	Plots 16-21	44
Durand Creek (Tunkwa Rd.)	63		38
Kamloops Lake	50		41
Heffley Creek	43		41
Heffley Creek (Balco office)	59		43
Monte Lake Prov. Park	40	Hygrothermograph site	47
Monte Lake Prov. Park	46		
Roderick Haig Brown Prov. Pk.	36	Hedley (east of town)	43
Ellison Prov. Park	36	north of river	40
Bromley Prov. Park	31	Plots 1-	51
			37
			38
			39
			48
		Hedley (west)	
		BCMF Rec. site	41
		Stirling Creek Road	41

To determine the status of the population and their potential for 1983, an egg mass survey was completed in 50 locations in the Region by CFS/FIDS and research staff (TABLE 7) and nearly 200 locations by the B.C. Ministry of Forests personnel. The sample method consisted of examination of three lower crown branches on a minimum of 20 trees to a maximum of 70 trees per location. The average number of egg masses on the total number of trees determined the status and potential: less than 0.7, insignificant defoliation; between 0.7 and 2.0 defoliation, variable from none to severe; more than 2.0, severe defoliation of more than 60% (communication, R. Shepherd, CFS February 1983).

Projections of areas and severity of defoliation in 1983 based on egg mass surveys indicate defoliation will occur at 33 locations with intensities varying from light to severe.

The absence of egg masses from lower crown branches in non-defoliated stands should not preclude the possibility of egg masses being present in the mid and upper crown, and a potentially damaging population.

The examination of stands in the Region during the egg mass survey identified a naturally occurring nuclear polyhedrosis virus (NPV) in stands near Armstrong, Enderby, Falkland and Chase and in the Hedley and in the Similkameen River Valley where an experimental virus spray program was successfully completed in 1981. The applied virus affected late instar larvae and prevented pupal and adult development, which resulted in very low numbers of female cocoons with egg masses. The incidence of virus infection and the absence of egg masses in the lower crown of trees may not preclude the possibility of defoliation in 1983, though at reduced levels.

As pheromone trap data is accurate mainly when populations are increasing to infestation levels, and less so at the current outbreak status, projections based on that data can be misleading and have not therefore been attempted.

Estimates of Douglas-fir mortality in tussock moth defoliated stands can be accurately completed only after the outbreak has subsided. However, of 565 trees examined in 10 severely defoliated stands in the Pritchard-Monte Creek area, 31% were dead (range 6 to 71%); defoliation averaged 85% (range 40 to 100%) and top stripping was common. In the previous outbreak period in the Region, tree mortality in selected stands averaged 27% (range 3 to 82%) of trees severely defoliated particularly in the first two years.

A contributing element to mortality of tussock moth defoliated Douglas-fir stands is Douglas-fir beetle Dendroctonus pseudotsugae. Although there was no evidence of current attack in 1982, the incidence of attack of 9% and 19% in two areas defoliated in the 1972-76 outbreak period and 6% to 24% current attack in six areas in 1976, indicates that the beetle could contribute to the incidence of tree mortality in some mature stands in the current outbreak.

TABLE 7. Location and average number of Douglas-fir tussock moth egg masses on three lower crown branches per tree, per plot, and predicted defoliation in 1983, Kamloops Forest Region, 1982.

Location	Avg. No. egg masses/tree/plot	Predicted 1983 defoliation[3/]
NORTH THOMPSON RIVER AREA		
[1/]Little Fort	0	None
[1/]Barriere	0.1	Possible
[1/]Huff Lake	0	None
[1/]Kanata	11.0	Probable
North Dog Creek	0.2	Possible
Mt. View Ranch	0.3	Possible
Mt. View High	0.1	Possible
[1/]McLure-Westside	4.0	Probable
[1/]Vinsulla	1.0	Probable
[1/]Robbins Creek	0.2	Possible
McLure-Westside Km 2	0.2	Possible
McLure-Westside Km 6.7	0	None
Heffley Creek Km 8	0.1	Possible
Heffley Creek Dump	10.0	Probable
SOUTH THOMPSON-FRASER RIVERS AREA		
Juniper Heights	6.0	Probable
Kamloops Lake Viewpoint	0.5	Possible
Durand Creek	0.1	Possible
Indian Gardens	0.1	Possible
Barnes Lake (Ashcroft)	3.0	Probable
Indian Gardens	7.0	Probable
Sixteen Mile Creek (Carquile)	0.7	Possible
Pavilion I.R.	0.4	Possible
Lillooet Airport	0	None
Skihist Prov. Park	0	None
[2/]Stump Lake	0	None

..../Continued

Location	Avg. No. egg masses/tree/plot	Predicted 1983[3/] defoliation
CHASE-SALMON ARM		
Chase Dump	0.5	Possible
Monte Lake Westside	0	None
Monte Lake Prov. Park	3.0	Probable
Roderick Haig Brown Prov. Park	0	None
Salmon Arm 40th Ave.	0.1	Possible (combined with WFHL)
OKANAGAN VALLEY		
Falkland-Westside	7.0	Probable
Falkland-East Km 23	2.0	Probable
Armstrong Hwy. 97A East	0.1	Possible
Winfield	2.0	Probable
Westbank Elem. School	0.5	Possible
Westbank Bouchiere	40.0	Probable
Westbank Bouchiere	0.3	Possible
Westbank Glenway	0	None
Green Lake (O.K. Falls)	0	None
Olalla	3	Probable
SIMILKAMEEN RIVER VALLEY		
[1/] Hedley-East south of Similkameen River; Plots 16-21	0	None
[1/] Hygrothermograph site	0	None
Hedley-East, north of river; Plots 1-6	0	None
[1/] Stemwinder Prov. Park	0.1	Possible
[1/] Stemwinder	0.5	Possible
[1/] BCMF Recreation Site	0	None
[1/] Stirling Creek Road	0	None
Hendricks Campground	0	None
Bromley Prov. Park	0	None
Ashnola River Km 8	0.2	Possible

1/ Data provided by R.F. Shepherd, T. Gray, CFS/PFRC

2/ $\pm$ 3 Km north of localized severe defoliation

3/ 0 egg masses per tree (avg) - no defoliation. 0.1 - 0.7 egg masses per tree (avg) - possible defoliation. 0.7+ egg masses per tree (avg) - probable defoliation. From: Preliminary sequential survey system for Douglas-fir tussock moth egg masses, R.F. Shepherd, I.S. Otvos, CFS Victoria, R. Chorney, BCMF, Kamloops, B.C. Unpublished.

Western spruce budworm, Choristoneura occidentalis

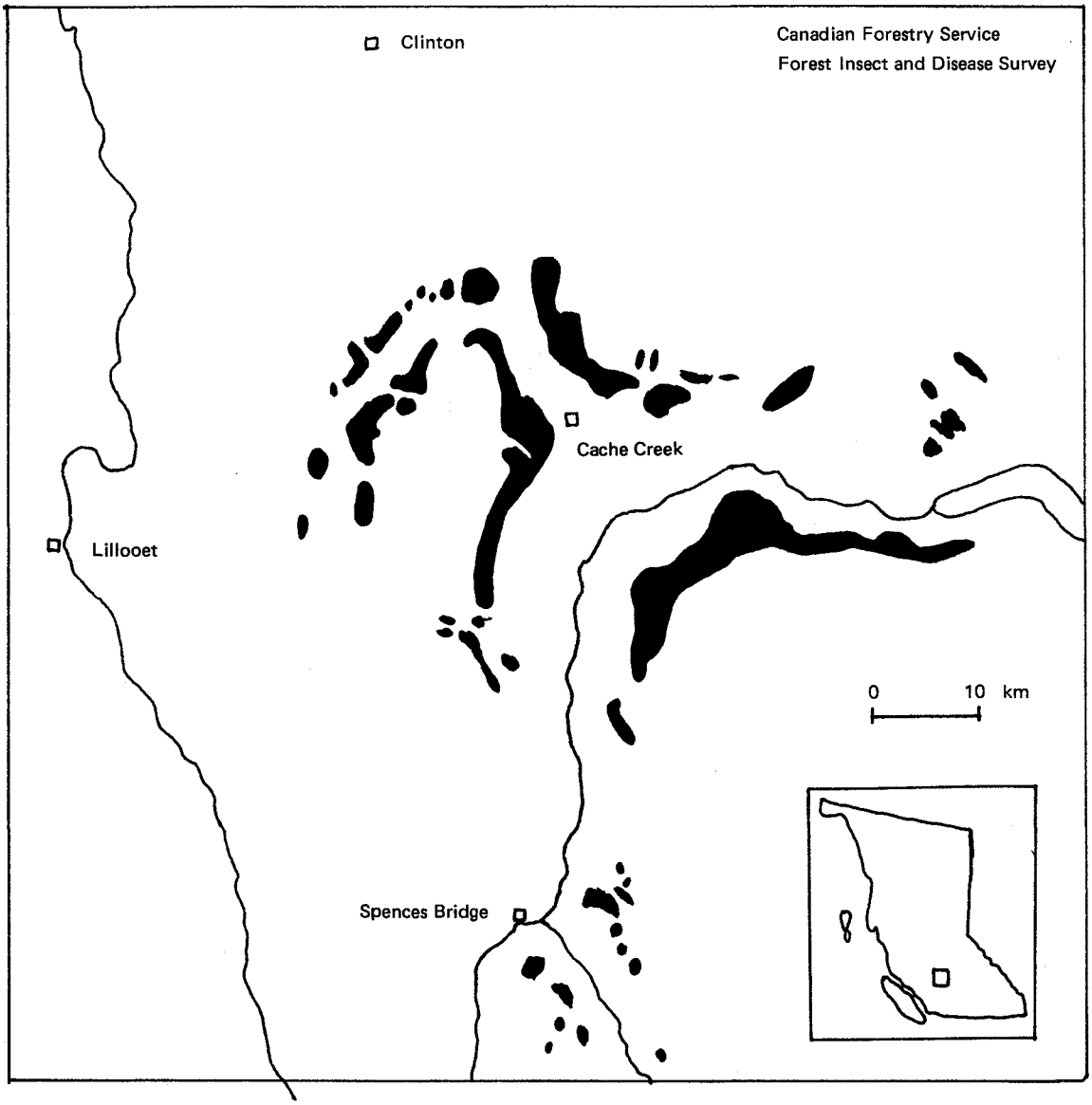
About 13 000 ha of multi-age class Douglas-fir stands in the 750 to 1500 m elevation range in the Spences Bridge-Ashcroft-Cache Creek-Savona areas were lightly to severely defoliated (TABLE 8); the fifteenth successive year of defoliation by western budworm in the Thompson and Fraser river drainages, west of Savona (MAP 5).

TABLE 8. Location and area of Douglas-fir stands defoliated by western spruce budworm, Kamloops Forest Region, 1982.

Location (TSA and geographic)	Area of defoliation (ha)				
	Light	Moderate	Severe	Grey	Total
KAMLOOPS TSA					
Gallagher lakes	1 800	1 250	-	-	3 050
Cache Creek	2 100	1 750	-	-	4 850
Ashcroft	500	2 000	25	-	2 525
Mt. Savona	-	2 200	-	-	2 200
Sabiston	725	-	-	-	725
	5 125	7 200	25	-	12 350
MERRITT TSA					
Soap Lake	-	275	-	-	275
Pimainus Creek	375		-	-	375
	375	275	-	-	650
SUMMARY					
KAMLOOPS TSA	5 125	200	25	-	12 350
MERRITT TSA	375	275	0	-	650
	5 500	7 475	25	-	13 000

The defoliated stands, determined from ground and aerial surveys, declined in area by 15% from 16 380 ha in 1981. The largest decline, of about 2 500 ha, to 12 600 ha, was in the Ashcroft-Cache Creek-Savona area. In the Soap Lake - Pinainus Hills near Spences Bridge the area of defoliated stands declined by 300 ha to 700 ha. Defoliation was not evident in the Marshall and Murray creeks areas in the Lillooet area, a decline from 105 ha in 1981. However, a 700 ha area of light defoliation was observed in the Sabiston Creek drainage, north of Kamloops Lake. This was the first year of recorded defoliation in this area, and indicative of an eastward expansion.

Defoliation intensities also declined with light over 5 400 ha (38% of the defoliated area) and moderate over 8 850 ha (61%). The



Map 5

Western Spruce Budworm

Areas of defoliated Douglas-fir, as determined by aerial surveys, 1982

severely defoliated stands visible from the air, totalled about 50 ha in localized patches in the Barnes Lake-Brassy Creek; Cache Creek-Campbell Hill and Cornwall-Oregon Jack creeks, where similar defoliation intensities were visible in 1981, over 600 ha.

Experimental aerial spray trials with nuclear polyhedrosis and granulosis viruses were conducted in two previously defoliated 176 ha blocks of Douglas-fir forest in the Ashcroft area. The purpose was to compare the potential of the viruses to initiate a continuing virus population. The trials, a cooperation between Pacific Forest Research Centre and Forest Pest Management Institute personnel, showed that the NPV had a greater initial impact which reduced the population by 52% compared with 35% with GV. Carryover effects will be studied in the NPV and GV treated plots and three check plots in subsequent years.

The impact of successive years of defoliation has not been quantitatively assessed. However, qualitative examination showed top-kill of usually less than one metre on up to at least 10% of trees severely defoliated in successive years. The affected areas include the Six Mile Creek access, in the Bonaparte River Valley, north of Cache Creek, and the three severely defoliated areas.

Adult male populations were monitored in nine non-defoliated stands at distances from major outbreak areas from August Lake near Princeton to Mission Pass near Shalath. Results from each location where five traps were baited with each of 0.1%, 0.01% and 0.001% strength 96% trans-11-tetrodecenal 4% cis-11-tetrodecenal pheromone showed variable population levels (TABLE 9). The average number of adults attracted into the weakest (0.001%) concentration ranged from 21 to 68 (average 41) in the Barnes Lake area near Ashcroft, in Botanie and Fountain valleys near Lytton and Marshall Creek and Mission Pass west of Lillooet. Elsewhere in the Region from Adam Lake to Salmon Arm, Merritt, and near Princeton the range of attracted adults was zero to less than one.

TABLE 9. Number of Western spruce budworm male adults trapped in pheromone sex attractant traps, Kamloops Forest Region, 1982.

Location	Average number male adults per trap					
	0.1%		0.01%		0.001%	
	1982	1981	1982	1981	1982	1981
Barnes Lake	117	-	115	-	53	-
Botanie Valley Rd. Km 7.2	61	51	79	32	21	5
Fountain Valley	32	-	56	-	68	-
Marshall Creek	55	-	55	-	26	-
Mission Pass (Carpenter Lk.)	59	-	45	-	39	-
Burton Creek (Adams Lk.)	16	-	5	-	1	-
August Lake (Princeton)	59	69	13	24	1	4
Spius Creek (Merritt)	19	55	2	10	1	1
Scotch Ck. Rd. Km 1	30	54	8	11	0	0

Predicted population trends based solely on this data is currently under study but results suggest rising populations in five areas, with an average of 41 adults per trap per location and low non-defoliating populations in other previously non-defoliated Douglas-fir forests.

Egg mass sampling was limited to a moderately defoliated stand in the Indian Gardens area. Results from 10 m^2 of foliage from two 50 cm branches from the mid-crown of each of ten intermediate trees averaged 150 egg masses per sample.

Defoliation is expected to continue in the area, precluding adverse climatic factors, based on the following data: 1-50 egg masses per sample - light defoliation, 51-150 moderate defoliation and severe defoliation with more than 150 egg masses per sample.

The Indian Garden infestation area is expected to expand eastwards into Durand Creek in 1983, and infestations could develop in the Gun Lake area. The predictions are based on the increased numbers of late instar larvae, 10 and 15 respectively, collected in beating samples of three trees, and evidence of extremely light but increased feeding of the current foliage.

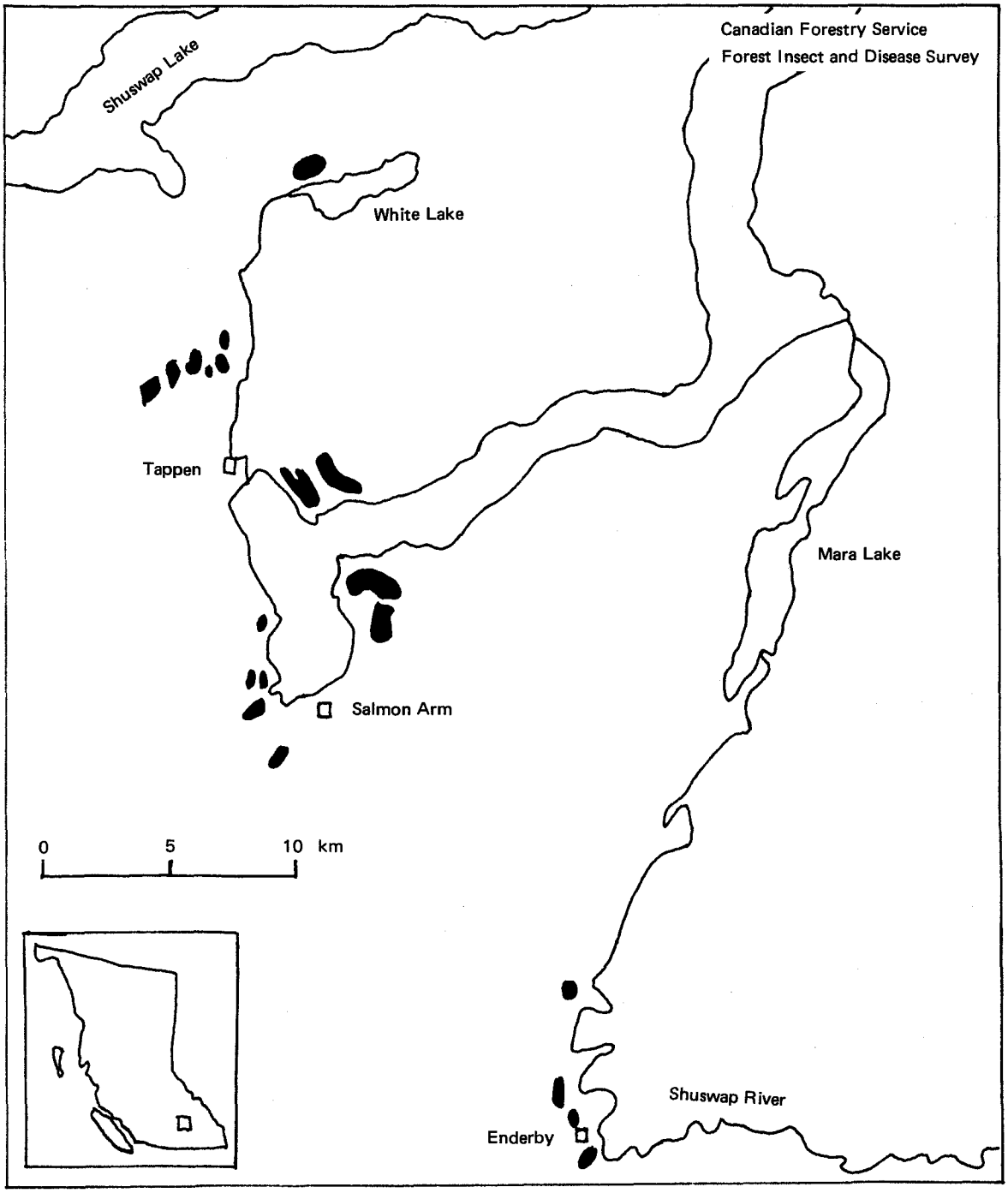
Western false hemlock looper, Nepytia freemani

The area of Douglas-fir stands defoliated in the Salmon Arm-Shuswap Lake area in the second year of the outbreak increased threefold to 1 150 ha of mainly privately owned forest, from 350 ha in 1981 (MAP 6).

The defoliation intensities varied in the eight infestation areas from severe (more than 65% defoliation) over 385 ha (33% of the area) to moderate (26-65%) over 645 ha (56% of the area) to light (less than 25%), over 120 ha (11% of the area) (TABLE 10). This compared with 350 ha of light defoliation in 1981.

TABLE 10. Area and intensity of defoliation of Douglas-fir stands by western false hemlock looper, Kamloops Forest Region, 1982.

Location	Area (ha) and intensity of defoliation			
	Light	Moderate	Severe	Total
Carlin-Tappen	-	200	50	250
White Lake	25	-	-	25
Sunnybrae	-	150	100	250
Gleneden	15	100	-	115
Canoe	-	50	175	225
Salmon River	-	50		50
Grinrod-Mara	30	30	-	60
Enderby	50	65	60	175
TOTALS	120	645	385	1 150



Map 6

Western False Hemlock Looper

Areas of defoliated Douglas-fir, as determined by aerial surveys, 1982

The most recent outbreak in the area persisted from 1971 to 1976 and peaked when 5 675 ha were defoliated. The effects of successive years of defoliation based on limited surveys of previous outbreaks, indicate that increment loss is the major impact. Some overmature trees on poor sites, if repeatedly defoliated during the outbreak period, could be attacked and killed by Douglas-fir bark beetle, Dendroctonus pseudotsugae, as occurred on Bastion Mountain between 1971 and 1976. However, the incidence of attack is less than 5% of the severely defoliated stands.

The average number of overwintering eggs per square metre of foliage (from two 45 cm branches from the mid-crown of each of ten trees per location) was 46 at Tappen and 17 from Bastion Mountain near Sunnybrae (TABLE 11). Egg mortality caused by unknown agents (determined by color differentiation in the egg extraction process) was 22% and 33% per location, respectively. Less than 1% of the larvae were infected by the pathogen Beauvaria bassiana, no change from 1981 levels.

TABLE 11. Number of overwintering eggs and predicted defoliation of Douglas-fir stands by Western false hemlock looper, Kamloops Forest Region, 1982.

Location	Total No. eggs per branch	Avg. No. eggs per 1 m^2 foliage	Predicted Defoliation 1983 1/
Sunnybrae (Bastion Mtn.)	138	17	Light
Tappan (C.X.A.)	372	46	Moderate

1/ $\leq$ 30 indicates a light defoliation.

30-70 indicates a moderate defoliation.

70 and greater indicates a severe defoliation.

The sample data and the reported high numbers of moths in flight in the Tappen-Sunnybrae-Salmon Arm area indicate light to moderate defoliation of Douglas-fir stands in the area in 1983, precluding any adverse climatic factors.

Armillaria root rot, Armillaria mellea

Infected, recently killed mature and overmature Douglas-fir were common at mainly low levels in much of the host range in the Shuswap-Adams lakes-North Thompson River areas, particularly on poorer sites.

The highest incidence of infection was observed in a 20 ha site between White Lake and Eagle Bay in the Salmon Arm District, examined in cooperation with B.C. Ministry of Forests, Pest Management personnel. Up to 50% of the 100-year-old plus Douglas-fir had been recently killed over half the area, where root rot centres, foci, were estimated to be 20 metres in diameter, about 20 metres apart over a 0.5 ha area.

A laminated root rot, Phellinus weirii, which also killed Douglas-fir trees in the area, is described elsewhere in this report.

Elsewhere in the Region, the average incidence of infection by Armillaria root rot was estimated at one tree per hectare per annum. Recently killed trees were commonly visible from major access roads in the Louie Creek - Mt. Todd; Adams - Little Shuswap, and Niskonlith lakes areas.

Laminated root rot, Phellinus weirii

The disease recently killed at least 25% of the mature Douglas-fir over half a 20 ha mixed Douglas-fir-western red cedar stand near White Lake in the Eagle Bay-Shuswap Lake area.

The incidence of infection is the highest recorded in recent years and surveys to further delineate extent and intensity of infection will be implemented in 1983. Qualitative sampling has identified the pathogen, but not the incidence and extent, in numerous stands throughout the Region from near Barriere, Salmon Arm, Vernon, Kelowna, Summerland, Princeton and Merritt.

Douglas-fir beetle, Dendroctonus pseudotsugae

The decline trend in the numbers of recently killed trees from 2,915 in 1978 to 700 in 1981 continued in 1982, when tree mortality attributed solely to the beetle was not evident anywhere in the Region during aerial or ground surveys.

Since 1972 when an unspecified number of "widespread red tops" was reported, the areas in which tree mortality commonly occurred were in the Kamloops TSA: Tranquille, Deadman, Jamieson creeks, Westside, Vinsulla and McLure and Paul Lake and Tunkwa Lake road; in the Lytton, Pavilion, Seton and Oregon Jack Creek areas of the Lillooet TSA; in the Merritt TSA in the Nicola River Valley and Nicola-Logan and Douglas lakes area, and the Princeton-Tulameen; Whiteman Creek-Glenrose area in the Okanagan TSA.

Unconfirmed factors in the decline trend could include increased utilization of mature Douglas-fir, which accounts for 27% of the productive area on crown lands.

Douglas-fir needle blight, Rhabdocline pseudotsugae

Severe infection of 1982 Douglas-fir needles was common in mixed age stands between Penticton and Kelowna. The severity of infection, previously uncommon in the area, was induced by favorably moist conditions in the spring. This resulted in the chlorotic condition and premature needle loss which usually affects tree growth and vigor.

SPRUCE PESTS

Spruce beetle, Dendroctonus rufipennis

There was little change in the number of recently killed trees in the Region in 1982 (85), compared with 70 in 1981.

TABLE 12. Location and number of Engelmann spruce trees recently killed by spruce beetle, Kamloops Forest Region, 1982.

TSA and Location	Trees killed		Area (ha)		
	Number	Volume (m^3)	Light (1-5%)	Moderate(6-30%)	Severe(31%+)
LILLOOET TSA					
Hurley Creek	20	20	5		
Van Horlick Ck.	15	30	15		
	25	50	20		
OKANAGAN TSA					
Lambly Creek	10	20	20		
Shorts Creek	10	20	10		
	20	40	30		
KAMLOOPS TSA					
Miledge Creek	15	30	15		
Hunters Range	20	40	10		
	35	70	25		
TOTAL ALL TSA's	80	160	75		

Single and small groups of 2-20 trees commonly adjacent to previously logged areas and often near previously active infestations were counted during aerial surveys. In Miledge Creek in the Kamloops TSA, 15 trees; in Hurley (15) and Van Horlick creeks (15) in the Lillooet TSA; Lambly and Shorts creeks (20) and in the Hunters Range area in the Okanagan TSA (20). There were unconfirmed reports of recent tree mortality from BCMF ground surveys in the Princeton areas, but none were seen from the air.

Although ground surveys of susceptible stands were not completed by CFS-FIDS in late 1982, based on the current status little change is expected in the extent and intensity of the pest in the Region in 1983.

Improved management techniques by Industrial and Provincial Government forestry personnel, including trap tree programs, cruises and probe lines, have contributed to the relatively endemic status of the beetle in the Region. The techniques had been implemented when significant tree mortality over large areas, occurred throughout the Region between 1971 and 1973.

Two-year-cycle budworm, Choristoneura biennis

There was no defoliation of Engelmann spruce and alpine-fir in higher elevation stands in Lempriere Creek in the North Thompson River drainage or elsewhere in the Region.

Recent budworm outbreaks were reported in the above drainages in 1974 and defoliated stands in 1976 and 1978 and 13 700 ha in 1980. Egg mass samples from the area in 1980 indicated low to moderate populations in Lempriere Creek and high at Fishtrap Creek near McLure in 1982, however, none was visible. Cause of the collapse was not identified, but larval disease and climatic factors could have been contributing factors.

Recovery of previously defoliated trees was good with less than 1% topkill (average 0.5 m) of severely defoliated understory trees.

ALPINE FIR PESTS

Western balsam bark beetle, Dryocoetes confusus

The 2,975 recently killed mature higher elevation alpine fir (2100 m^3) observed during aerial surveys (TABLE 13) were about the same as recorded in 1981, 2,435. However, the trees were scattered over a larger area, 3 085 ha, compared to 1 870 ha in 1981.

Mortality was widespread in ten major infestation areas which ranged in size from 20 to 1 000 ha from North Barriere Lake (150 trees over 150 ha) in the Kamloops TSA to the Bridge River drainage and Duffy Lake (300 trees over 35 ha) in the Lillooet TSA, to Greyback Lake in the Okanagan TSA (1,000 over 1 450 ha).

Tree mortality has persisted at fluctuating levels throughout much of the mature host range in the Region for many years. Between 1971 and 1975 17 600 m^3 were killed (15,975 trees); in 1976, mortality occurred over 2 050 ha, which increased to 9 500 ha in 1977 and 1978, declined to non-specified levels in 1979, and none in 1980.

TABLE 13. Location, number and volume of alpine-fir trees recently killed by western balsam bark beetle, determined from aerial surveys, Kamloops Forest Region, 1982.

TSA AND LOCATION	Area (ha)	Number of trees killed	Volume of trees killed (m^3)
KAMLOOPS TSA			
North Barrier Lake	50	150	100
	900	1,000	700
	225	350	250
	1 175	1,500	1 050
LILLOOET TSA			
Bridge River	15	50	20
Duffy Lake	20	250	195
	35	300	215
OKANAGAN TSA			
Greyback Lake	1 450	1,000	710
Kelowna	25	25	20
Mt. Kathleen	400	150	95
	1 875	1,175	825
SUMMARY			
KAMLOOPS TSA	1 175	1,500	1 050
LILLOOET TSA	35	300	215
OKANAGAN TSA	1 875	1,175	825
	3 085	2,975	2 090

LARCH PESTS

Larch casebearer, Coleophora laricella

As predicted from pupal rearings in 1981, populations declined to almost zero in 1982. Defoliated stands were not recorded from ground or aerial surveys in any of the western larch stands on the western limits of the host range in the Region.

Based on annual pupal rearing data, except for 1982 the decline in intensity and extent of defoliation has been attributed to

introduced and native pupal parasites including Dicladocerus sp., Chrysocharis sp., and Mesopolobus sp., particularly in the Shuttleworth Creek near Okanagan Falls, and Anarchist Mountain areas.

Little change is expected in the status of the casebearer population in 1983, but population assessments will continue.

WESTERN HEMLOCK PESTS

Indian paint fungus, Echinodontium tinctorium

The brown stringy trunk rot is common in most mature western hemlock stands in the Region which contributes 3% of the timber supply. Single external fruiting bodies which indicate substantial decay were common on between 15 and 85% of the mature trees (which exceeds the immature in area by almost 3 to 1) over widespread areas in the Saskum Lake and Wells Gray Provincial Park area in the North Thompson River drainage.

Western hemlock looper, Lambdina f. lugubrosa

Larval populations remained at nondamaging levels in 'wet-belt' western hemlock-western red cedar stands in the North Thompson, Adams and Seymour river drainages. However, in similar forest types in the adjacent Columbia River drainage in the Nelson Region, defoliation extended over 6 500 ha in numerous separate infestation. During the previous outbreak in the Nelson Region, between 1972 and 1974, looper populations severely defoliated stands in the North Thompson and Perry river drainages in the Kamloops Region. Defoliation of wet-belt stands in the Region is not expected in 1983 based on larval sampling, but populations could increase to pre-outbreak levels, particularly in stands adjacent to the Nelson Region boundary.

Larvae were numerous in Douglas-fir stands in the Highland Valley area but too few to cause visible defoliation in 1983 (see DOUGLAS-FIR PESTS).

Overwintering egg populations, in 1982 defoliated stands, between Upper Arrow Lake and Mica Dam in the Nelson Region, indicate that population will continue and defoliation of western hemlock stands is expected to occur in the Columbia River valley area in 1983.

Black army cutworm, Actebia fennica

About 20,000, 1-0 lodgepole pine seedlings were killed by the cutworm when an outbreak developed with little warning in a 1982 plantation slashburned in 1980, near Bobo Creek in the North Thompson River valley northwest of Blue River.

A total of 27,000 seedlings were planted in early June on the mainly steep, south sloped, 17 ha site (CP 49).

About a week after larvae had first been seen feeding on deciduous ground cover including fireweed, and the newly planted seedlings, seedling mortality was classified with BCMF, Clearwater District personnel cooperation. BCMF tree survival study plots were established randomly across the planted area and the seedling condition assessed.

About 50% of the seedlings had been killed by complete defoliation which had killed the terminal bud; about 25% were severely defoliated but not expected to recover, although the terminal bud was in place. The surviving (25%) seedlings were in a moist flat area and had been only lightly or not damaged at all.

Six sticky traps baited with an attractant (not pheromone) to monitor male adult populationswere sited at 50-100 m intervals along an access road across the non-planted portion of the slash-burned site (CP 49) above the outbreak area. Four traps were located at similar distances in a recently burned and planted site near Adolph Creek east of Bobo Creek, where cutworm larvae had not been observed, but could have been attractive to adults.

The number of adults trapped in Bobo Creek was 28 (range 1-9, average/trap 5) and 18 (0-8, 6/trap) in Adolph Creek.

Assessment of population potential based on trap data is currently inconclusive and under study. However, the number of moths attracted to the baited traps are the highest in recent years (T. Gray, pers. comm.) and potentially damaging numbers of larvae could be encountered in 1983.

The pest is sporadic in outbreak patterns and economic impact, and although natural control factors including parasites, disease and predation affect population levels, silvicultural and/or registered control practices are the most effective in preventing economic losses or controlling populations respectively.

Prevention of damage in proposed planting sites in one or two-year-old slash-burned areas can be achieved by monitoring cutworm populations before planting. If larvae are evident, prevention and control options include use of registered pesticide or change of plantation site, or delay of planting.

Spruce weevil, Pissodes strobi

A summary of surveys for spruce weevil in regeneration Engelmann spruce stands (to 15 m) in the Region between 1967 and 1982 showed that weevil-killed terminals were observed in only 50% of the 56 stands examined. In those stands, current attack averaged 16% (range 1-85%) in 19 of the areas (68%) and 9 areas (32%) were also attacked the previous year.

Lodgepole pine terminal weevil, Pissodes terminalis

Surveys to determine the extent and intensity of weevil killed terminals in regeneration lodgepole pine showed that the pest was present in two of four second growth immature stands examined in the Region in 1982. The severest intensity was 11% in a recently spaced 35-year-old stand near Dee Lake in the Aberdeen Lake area. Elsewhere terminal mortality rarely exceeded 1% of the trees, as occurred in a 10-15-year-old stand in the Dardenelles Lake area east of Stump Lake. Two other young stands, one near Stump Lake and a second near Aberdeen Lake, did not show signs of current or previous year terminal mortality.

White stalactiform blister rust, Cronartium coleosporioides

Between 20 to 35% of the stems of the 30-year-old lodgepole pine over about 1 000 ha in the Dardenelles Lake area south of Kamloops were infected. The stem infection, up to a metre long, seriously affect growth and wood quality. The high incidence of infection in the area is significant in the allocation of stands for stand treatment programs.

Mature stem cankers infected at least 50% of the mature lodgepole pine over more than 10 km^2 in higher elevation plateau areas in Criss and Deadman creeks and between Little Fort and Bridge Lake.

Cone and Seed Pests

Cone crops were generally light to moderate for most species with moderate to heavy crops of Douglas-fir and Engelmann spruce in localized areas.

Cone and seed pests were assessed from 20 cone samples from four hosts in twelve areas of the Region (TABLE 14).

The Douglas-fir cone moth, Barbara colfaxiana, the coneworm Dioryctria abietivorella, a seed chalcid Megastigmus spermatrophus, a cone midge, Contarinia sp., infested up to 12% of the Douglas-fir cones at five locations, Stump Lake, Indian Gardens, Barnes Lake, Twaal and Hat creeks.

A spruce cone rust, Chrysomyxa sp., infected 10% of the Engelmann spruce cones at McGillivray Lake and in two other stands between 10 and 70% of the cones were infested by a cone seedworm, Cydia youngana and to a lesser degree by a spruce cone maggot, Hylemia anthracina, a seed maggot Earomyia abietinum.

Up to 55% of the ponderosa pine cones from stands near Stump Lake and Iron Mask Hill were infested by maggots, seedworms and a midge, Dasineura sp., as were alpine fir cones from immature trees in previously logged stands in Finn Creek south of Blue River.

TABLE 14. Location and percent cones infested by major cone and seed pests, Kamloops Forest Region, 1982.

Host	Location	Percent cones infested						
		Cone moth	Coneworm	Seed chalcid	Cone midges	Cone maggot	Cone seedworm	
DOUGLAS-FIR	Indian Gardens	30		10	10			
	Hat Creek	10	10	5				
	Barnes Lake		5					
	Twaal Creek	14L[1/]						
	Stump Lake	9L						
	Kamloops	8L	2L					
ENGELMANN SPRUCE	Finn Creek				35		70	
	O'Connor Lake					6L	10	
	McGillivray Lake							Spruce cone rust 10%
PONDEROSA PINE	Stump Lake			15	55			
	Iron Mask Hill							
ALPINE-FIR	Finn Creek			56		56		

[1/] L = Number of larvae in 20 cone sample.

FOREST PESTS IN PROVINCIAL PARKS

Three major insect pests and one major disease were identified in 8 of 24 Provincial Parks in six Regional Park Districts visited during the annual parks survey (APPENDIX I).

Mountain pine beetle, Dendroctonus ponderosae, outbreaks persisted in mature lodgepole pine stands in or adjacent to Gun Lake, Cathedral and Okanagan Mountain parks.

Douglas-fir tussock moth, Orgyia pseudotsugata larvae lightly defoliated Douglas-fir trees in Bromley Rock and Stemwinder parks but at reduced levels compared to 1981, when successful experimental viral applications were completed.

Armillaria root rot, Armillaria mellea, recently killed single mature lodgepole pine in scattered root rot centres in Wells Gray, North Thompson and Cathedral Parks and Douglas-fir trees in Shuswap Lake park. None of the infected trees were evident close to campsite areas.

Western false hemlock looper, Nepytia freemani, severely defoliated Douglas-fir stands near Sunnybrae Park. Defoliation is expected to continue in the area in 1983, possibly in the park area.

No adult Gypsy moths were attracted to single pheromone traps located in 18 parks in the Region in an annual program to monitor the potential introduction of the damaging pest into British Columbia.

DECIDUOUS PESTS

Fall webworm, Hyphantria cunea

A variety of deciduous trees and shrubs including western choke cherry, apple, poplar and Manitoba maple were defoliated at widespread locations in the Okanagan-Shuswap, Thompson and Fraser river drainages.

Defoliation ranged from 10 to 100% but little permanent damage to the hosts is expected.

Gypsy moth, Lymantria dispar

A pheromone baited trap program to detect the presence of male adult populations, continued for the seventh year in cooperation with Agriculture Canada, Plant Quarantine.

There were no male moths in any of the single traps located in 19 Provincial parks and campgrounds throughout the Region. However, ten adults were collected in seven traps in the Lower Mainland and potentially damaging populations occur in Washington State.

Trapping programs in the Region in 1983 will continue to monitor the pest, which is a destructive feeder on most hardwoods and to a lesser degree on conifers.

Birch leaf miner, Bucculatrix sp.

Foliage discoloration of birch stands in the Skwaam Bay-Louie Creek access road area west of Adams Lake declined significantly. Less than 10% of the foliage was affected in less than 10% of the stands in the area, compared with 100% of 95% of the trees in areas up to 50 ha in 1981. The discoloration is caused by larval feeding between the upper and lower leaf surfaces, and although highly visible, has no apparent affect on tree growth or form.

Aspen leaf miner, Phyllocnistis populiella

Populations declined to the level that discoloration was not visible on any stands in the Region. The effects of leaf mining in successive previous years resulted in dessication and early leaf-fall but no other visible effects.

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