Forest Insect and Disease Conditions

Kamloops Forest Region 1985

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Government of Canada
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SUMMARY

This report outlines the status of forest pest conditions in the Kamloops Forest Region in 1985. Emphasis is placed on pests which are capable of sudden damaging outbreaks and some population trends are forecast.

Mountain pine beetle killed 4 533 000 mature pine over 46 760 ha, mainly in the Lillooet, Okanagan and Merritt TSAs. This represents a slight decrease from 5 006 000 trees killed over 58 000 ha in 1984. **Elytroderma needle disease** severely discolored ponderosa pine throughout the host range in the Region for the fifth consecutive year. **Pine sawfly** defoliated lodgepole pine over 100 ha near Vavenby, the first time since 1978. There was severe discoloration of lodgepole pine caused by **Lophodermella needle cast** in the Tranquille River Valley for the third consecutive year. **Lodgepole pine terminal weevil** killed more lodgepole pine leaders in more areas than in 1984.

The outbreak of **Western spruce budworm** in Douglas-fir expanded fourfold to 180 400 ha of light to severe defoliation from Lillooet to Adams Lake. **Douglas-fir tussock moth** populations persisted in pockets, causing 70 ha of severe defoliation only at Cherry Creek. **Rhabdocline needle casts** discolored regeneration Douglas-fir at scattered locations throughout the Region, slightly more than in 1984.

There was an increase to 1 020 ha of recently killed Engelmann spruce by **spruce beetle**, mainly in the Lillooet TSA, up from 695 ha in 1984. **Spruce gall aphid** severely affected spruce cone crops at Skimikan Seed Orchard.

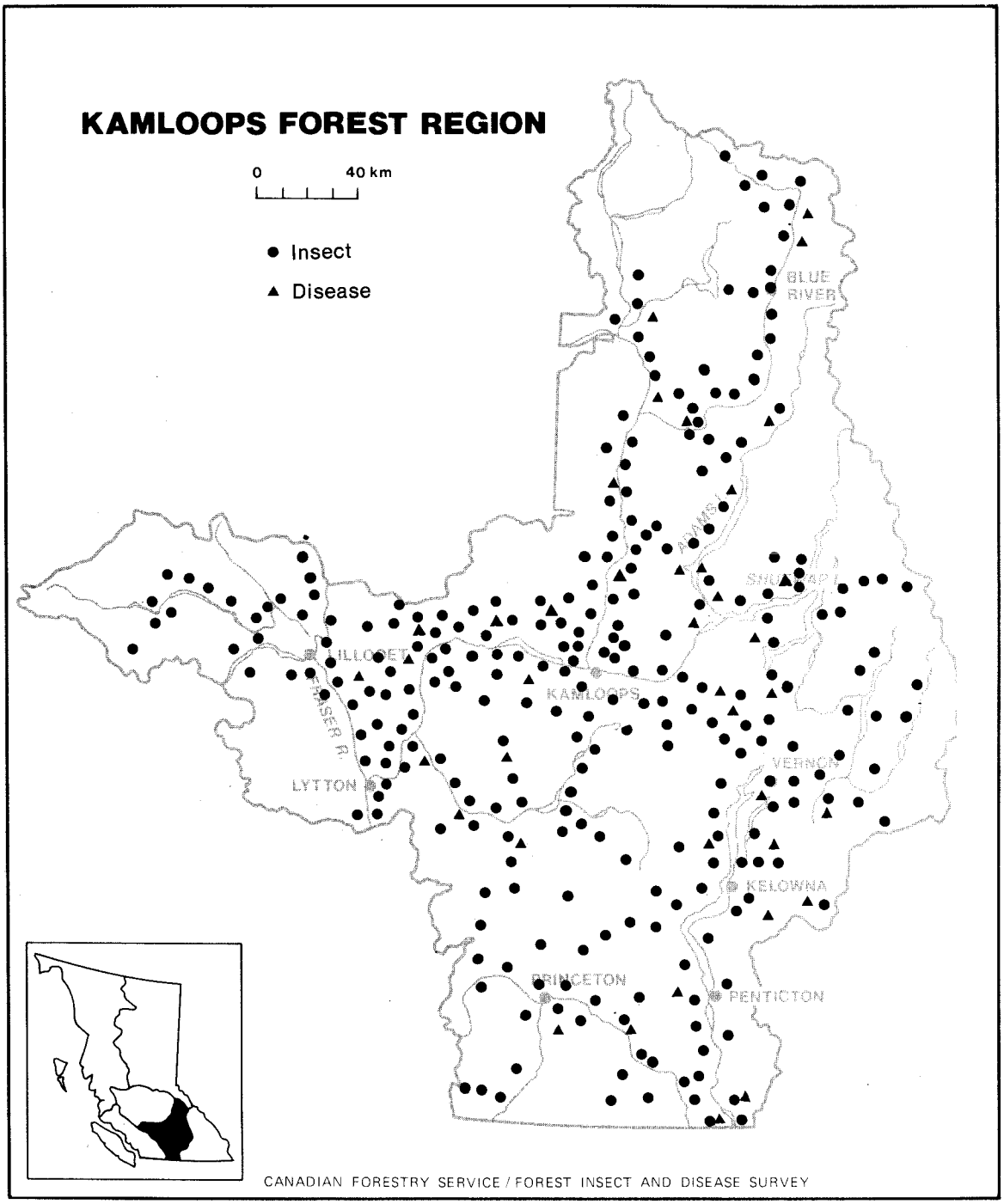
Alpine fir, killed by the western balsam bark beetle-disease complex, was mapped over 600 ha in scattered patches in Kamloops and Okanagan TSAs, down from 2 550 ha in 1984.

Western hemlock was lightly defoliated over 3 100 ha by **western blackheaded budworm**, the first time since 1976, in Wells Gray Park and east of Vernon. **Western hemlock looper** infestations collapsed in the Interior wet belt from east of Vernon to Shuswap Lake. **Hemlock sawfly** numbers increased in beating collections, often in conjunction with western blackheaded budworm.

Larch budmoth, up significantly from 1984, lightly to severely defoliated western larch over 8 900 ha from Vernon to Anarchist Mtn. on the east side of Okanagan Lake. No western larch defoliation by **larch casebearer** was recorded this year.

There were 480 insect and disease collections submitted by FIDS personnel to PFC from field assignments at Kamloops and Summerland from May 20 to September 30 (Map 1).

Potentially damaging defoliating larvae were found in 78% of beating collections, up slightly from 76% in 1984.



Map 1. Locations where one or more forest insect and disease samples were collected in 1985.

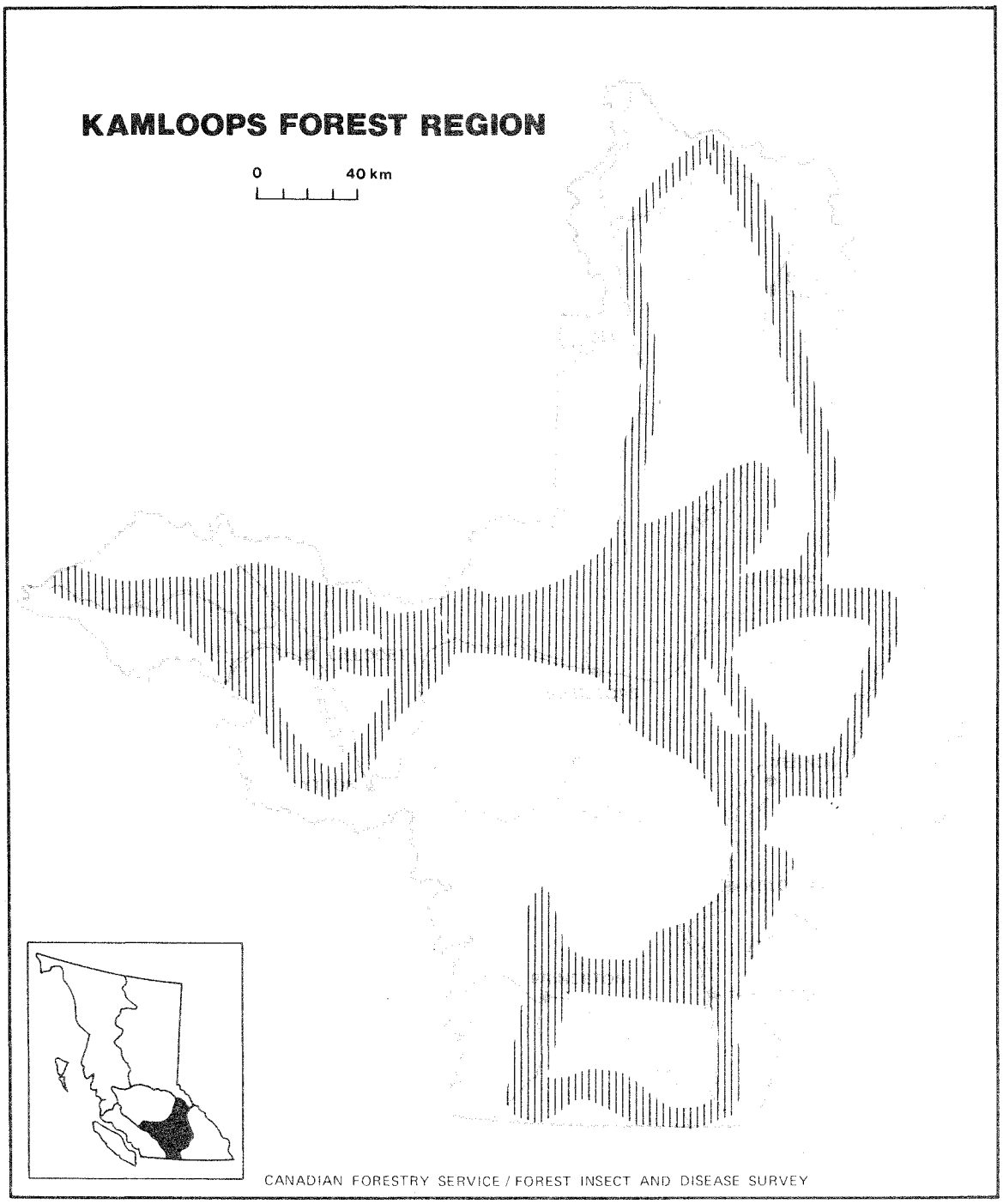
Special surveys were carried out for **pinewood nematode, European larch canker and European pine shoot moth**. A permanent plot was established near Twin Lakes to detect and monitor early signs of acid rain. Pheromone trapping programs continued for **Douglas-fir tussock moth, larch casebearer, Gypsy moth, pine budmoth and pitch nodule moth**.

A total of 19 hours of flying time was used for the annual aerial survey (Map 2). The Canadian Forestry Service supplied 13 hours, B.C. Ministry of Forests supplied six hours and regular B.C. Ministry of Forests fire patrols were used where possible.

Approximately 105 contacts and extension services were made with the general public, government agencies and forest industry in Kamloops Forest Region.

Important forest pests were recorded in eight of the 38 provincial parks surveyed in cooperation with B.C. Ministry of Lands, Parks and Housing.

Large scale copies of maps in this report are available at PFC.



Map 2. Areas covered by aerial surveys to map bark beetle and defoliator infestations, 1985

PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

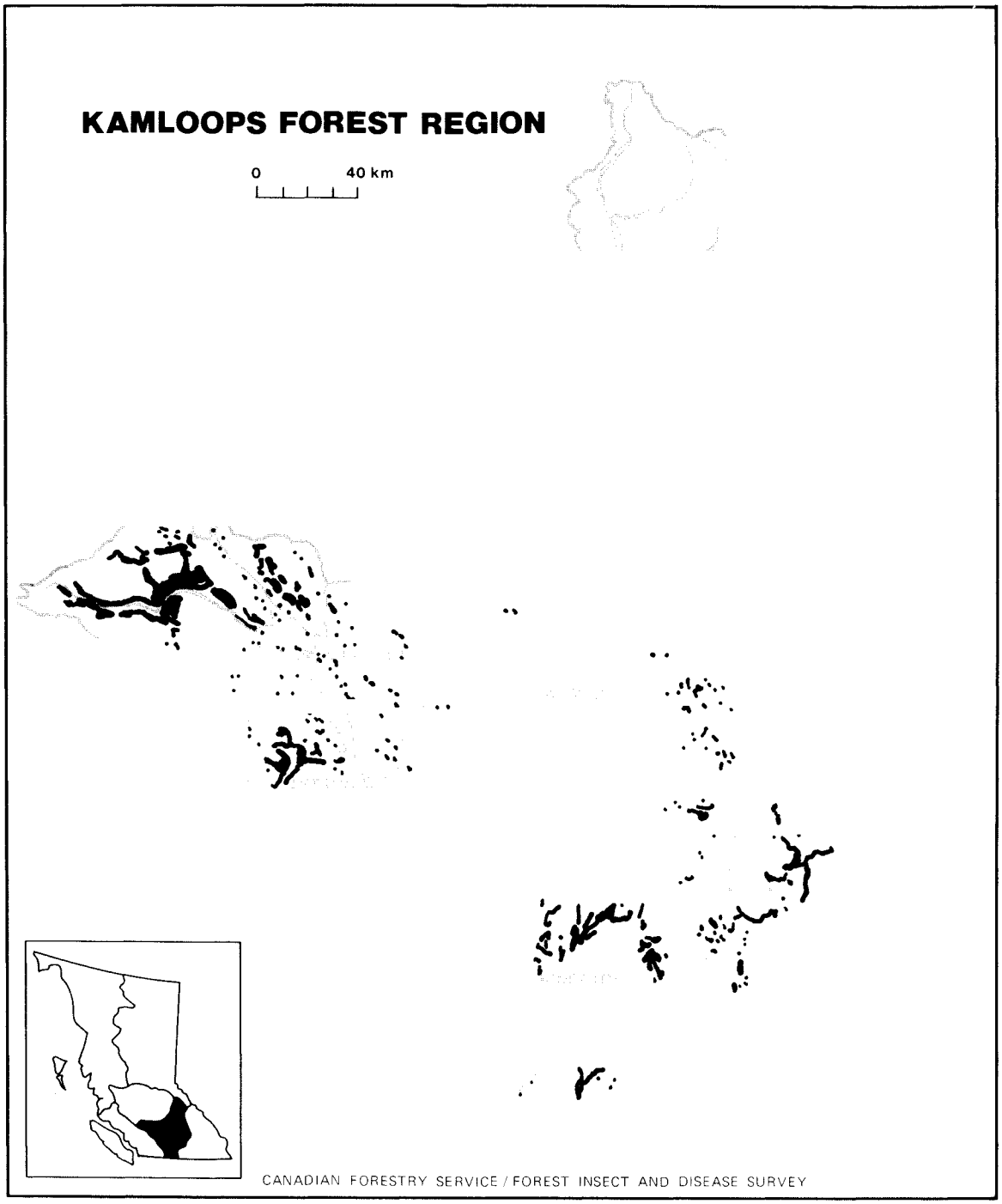
Mountain pine beetle recently killed 4 533 000 lodgepole, ponderosa and white pine trees over 46 760 ha in Kamloops Forest Region, a slight decrease from 5 006 000 trees over 58 000 ha in 1984 (Table 1, Map 3). The estimated volume of pine recently killed also decreased slightly to 2 183 200 m^3 from 2 734 220 m^3 in 1984. However, an additional 2 496 000 trees (1 243 600 m^3), which were killed prior to 1984 (grey), were mapped over 25 100 ha in old infestations (Table 2). Infestations estimated to contain 80%+ grey trees were called "grey", all others are called "recently dead or red". Approximately 80% of the grey areas were in the Gold Bridge-Carpenter Lake area west of Lillooet and the remainder east of Kelowna at Mission-Belgo creeks and Trout-Hayes creeks west of Summerland.

Table 1. Location, area, number and volume of pine trees recently killed by mountain pine beetle, determined from aerial and ground surveys, Kamloops Forest Region, 1985.

Timber Supply Area	Area (ha)	No. of trees killed	Vol. of trees killed (m^3)
Kamloops	240	12 000	4 800
Lillooet	37 000	3 700 000	1 850 000
Merritt	2 620	131 000	52 400
Okanagan	6 900	690 000	276 000
Total	46 760	4 533 000	2 183 200

Table 2. Location, area, number and volume of pine trees killed before 1984 (grey) by mountain pine beetle, determined from aerial and ground surveys, Kamloops Forest Region, 1985.

Timber Supply Area	Area (ha)	No. of trees killed	Vol. of trees killed (m^3)
Kamloops	0	0	0
Lillooet	24 520	2 452 000	1 226 000
Merritt	280	14 000	5 600
Okanagan	300	30 000	12 000
Total	25 100	2 496 000	1 243 600



Map 3. Areas of pine recently killed by mountain pine beetle, determined by aerial and ground surveys, 1985.

In the Lillooet TSA the area of recently killed pine declined 21% to 37 000 ha. The decline, due mainly to the deletion of the "grey" areas (24 500 ha) occurred in the Gun-Downton-Carpenter lakes area, where infestations began in 1972. Since then, most of the susceptible ponderosa and lodgepole pine has been killed in the valley bottoms and lower parts of drainages leading into the lakes.

North of Lillooet along the Fraser River near French Bar, South French Bar, Watson Bar and Leon creeks, infestations more than doubled to 4 600 ha from 1 775 ha in 1984. Along Tyaughton and Marshall creeks, there were 4 000 ha of recently killed pine mapped along with 7 240 ha grey. Additionally, 4 320 ha of red and 8 200 ha grey occurred from the east side of Tyaughton Creek to Gun Lake including the lower part of Gun Creek, up from 1984. Along Downton Lake and Bridge River the infestation expanded to 7 650 ha of red and 3 350 ha grey, up from 8 145 ha of red and grey in 1984. West of Lytton along the Stein River, 2 500 ha of recently killed pine and 1 600 ha of grey were mapped. The recently killed pine were high on the valley sides near the top end of the drainage, above where the first trees were killed in 1976. Infestations decreased 150 ha to 3 500 ha in the tributary drainages, Scudamore and Cottonwood creeks, mainly due to host depletion. In the Okanagan and Merritt TSAs, there was a slight decrease to 3 050 ha from 3 900 ha along Hayes and Trout creeks. The reduction is due to increased logging and in part to a less intensive aerial survey. Nearby in Summers Creek in the Merritt TSA, the infestation decreased slightly to 470 ha from 520 ha in 1984. Most of the mature pine is depleted in the drainage so further decreases can be expected. Elsewhere in the TSA, small spot infestations from the eastern boundary of Manning Park to Princeton decreased by half to 100 ha.

There also was a decrease to 200 ha of recently dead pine from 425 ha in 1984, along the Ashnola River and in Cathedral Provincial Park where mountain pine beetle infestations began nine years ago on 160 ha.

There was also a 100 ha decrease this year to 700 ha along Dale Creek northwest of Beaverdell, along the West Kettle River and in the Hydraulic Lake area. East of Kelowna at Mission, Belgo, Pearson and Daves creeks, infestations expanded to 3 200 ha from 2 950 ha in 1984. Nearly 75% of the mature pine complement in this area has been killed since 1972 when the infestation began.

Examinations of infested stands to determine losses and infestation trends in September at eight locations in three TSAs indicated an average 12% current attack (range 2-27%), down from 15% (range 1-50%) in 1984 (Table 3). Previously killed red trees in the variable plot prism cruises averaged 18% (range 8-45%) with 10% grey (range 1-30%). The average total mortality caused by mountain pine beetle in the eight stands cruised was 40%, a moderate increase from 32% in 1984.

Table 3. Mountain pine beetle cruise data, Kamloops Forest Region, 1985.

TSA and Location	Healthy	Green attack	Partial attack	Red	Grey	Dead other causes	Total
LILLOOET TSA							
Brexton (Gold Bridge)							
stems/ha	110	12	22	269	190	0	603
volume/ha (m^3)	19	2	8	48	80	0	157
% of stems	18	2	4	45	31	0	100
% of volume	12	1	6	30	51	0	100
Watson Bar Creek							
stems/ha	527	166	58	126	135	84	1 096
volume/ha (m^3)	65	31	11	40	13	1	161
% of stems	48	15	5	12	12	8	100
% of volume	40	19	7	25	8	1	100
Marshall Creek							
stems/ha	855	51	172	126	194	30	1 428
volume/ha (m^3)	81	10	19	29	35	3	177
% of stems	60	3	12	9	14	2	100
% of volume	45	6	11	16	20	2	100
Leon Creek							
stems/ha	292	99	7	84	10	0	492
volume/ha (m^3)	98	66	3	49	3	0	219
% of stems	59	20	2	17	2	0	100
% of volume	45	31	1	22	1	0	100
MERRITT TSA							
Jellicoe Creek							
stems/ha	751	453	84	135	4	234	1 661
volume/ha (m^3)	81	168	26	56	2	12	345
% of stems	45	27	6	8	1	13	100
% of volume	23	49	7	16	1	4	100
OKANAGAN TSA							
Belgo Creek							
stems/ha	324	52	93	154	27	54	704
volume/ha (m^3)	96	20	22	92	10	8	248
% of stems	46	7	13	22	4	8	100
% of volume	39	8	9	37	4	3	100
Mission Creek 1							
stems/ha	1 885	247	162	428	103	550	3 375
volume/ha (m^3)	147	36	28	57	11	25	304
% of stems	56	8	5	13	3	15	100
% of volume	48	12	9	19	4	8	100
Mission Creek 2							
stems/ha	208	104	123	128	94	174	831
volume/ha (m^3)	78	65	35	84	61	10	333
% of stems	25	12	15	15	12	21	100
% of volume	23	20	11	25	18	3	100

Current attack at Brexton, Watson Bar, Leon and Marshall creeks in the Lillooet TSA averaged 10% in stands with an average dbh of 18, 17, 30 and 18 cm, respectively. In a mature stand at Jellicoe near Chain Lake in Merritt TSA, 27% were currently attacked in the second year of the infestation, down from 50% in 1984. The average rate of current attack was down to 9% from 25% in 1984 at Mission Belgo creeks, in Okanagan TSA. The average dbh of currently attacked trees was 23 cm at Belgo Creek, 15 cm at Mission Creek #1 and 29 cm at Mission Creek #2.

In older existing infestations in pure pine stands, large grey areas are easily visible. Recently killed and currently attacked trees are crowded high on the valley sides and the top ends of drainages, especially at areas such as Gold Bridge, Carpenter Lake, Tyaughton and Marshall creeks, Stein River, Hayes-Trout creeks and Mission-Belgo creeks. Based on cruise data which showed healthy progeny present in attacked trees, infestations will continue in 1986. However, cold weather in November 1985 may have had an effect on the number of surviving brood in parts of Kamloops Region since high rates (97%) of mortality were recorded by BCMF in neighbouring Cariboo Forest Region.

Elytroderma needle disease, Elytroderma deformans

For the fifth consecutive year, mature and immature ponderosa pine were moderately and severely infected throughout the host range in Kamloops Forest Region. The most severe discoloration occurred in 10-200 ha patches from Lytton to Kamloops, north of Kamloops to Little Fort and east of Kamloops to Chase.

Pine were 30-60% discolored in 50-80 ha patches from Heffley Creek to Barriere; 20-40% discolored in 10 ha patches along the South Thompson River Valley from Pritchard to Kamloops; 40-60% discolored over 20 ha at Stinking Lake northwest of Savona; 50% discolored over the entire drainage at Phinetta Creek and 5-30% discolored over 50 ha and 200 ha, respectively, at Blue Lake and Okanagan Falls. Two large areas, visible from aircraft, were mapped over 100 ha at Little Shuswap Lake and 275 ha, five km southwest of Summerland.

Elytroderma needle disease is the most serious, damaging needle disease of ponderosa pine in British Columbia. In chronically infected areas, it causes occasional mortality of regeneration sized trees, growth loss, branch and top dieback and predisposition to bark beetles such as western pine beetle, Dendroctonus brevicomis and red turpentine beetle, D. valens. Based on infection history, the infection will probably continue in 1986.

Pine sawfly, Neodiprion sp.

Lodgepole pine 20 m high were moderately to severely defoliated over 100 ha between Wire Cache and McMurphy, south of Avola along the North Thompson River. The last infestation occurred over a maximum of 14 175 ha from 1976-1978, resulting in trees weakened and predisposed to secondary beetle attack.

Examinations of overwintering cocoons in the duff in September indicated a continuing population and more defoliation there in 1986. However, pine sawfly infestations characteristically last only for up to two years then collapse due to parasites and/or diseases.

Lophodermella needle casts, Lophodermella concolor L. montivaga

Approximately 85% of the 1984 needles on regeneration lodgepole pine were 50% discolored over 50 ha at Fly Hill west of Salmon Arm and in mature pine at 80 km, Tranquille River Road. This is the third consecutive year of light to moderate infection in the Tranquille River area, leaving some trees with only current foliage. One-year-old foliage was 10-50% discolored in 50-100 ha patches near Scotch Creek on Shuswap Lake, Otter Creek near Vavenby, Roche Lake, Chuwhels Lake and Upper Criss Creek. The widespread infections of 1984 in the southern part of the Region declined to 5-10% of needles infected in 5-100 ha areas from Eastgate in Manning Park to Mission Creek east of Kelowna. Occurrence of warm, damp weather in early spring greatly influences the severity of infection. If this type of weather occurs next year, so will the disease.

Lodgepole pine terminal weevil, Pissodes terminalis

There were more lodgepole pine leaders killed in plantations by lodgepole pine terminal weevil in 1984 and showing as red tops in 1985 than last year. Two areas of 2 m high lodgepole pine had an average of 12% of the terminals attacked near Greenstone Creek northeast of Logan Lake and Chuwhels Lake near Kamloops. However, a reduced attack occurred in 1985 because the average mortality of overwintering larvae and pupae was 40% at Greenstone Creek and Chuwhels Lake. Below normal temperatures in October, 1984, killed the larvae resulting in endemic levels of attack of 1-5% in pure stands and less than 1% in mixed regeneration 2-5 m high.

The effects of recurrent annual attack are multiple leaders, reduced height growth and poor form.

Atropellis canker of pine, Atropellis spp.

This canker occurs commonly at low levels in many mature and immature pine stands throughout the Region but only relatively few areas are severely infected. In one of the most severely infected areas near Tunkwa Lake, 80% of all age class pine had 1 to 40 dead tips per tree over approximately 200 ha. The infected area was also coincident with severe lodgepole pine dwarf mistletoe, Arceuthobium americanum, infection in parts of the same area. Approximately 4 km northeast of Dominic Lake, 80% of the 100-year-old lodgepole pine over 400 ha were infected with 1 to 8 stem cankers per tree.

All mature pine were infected with 2-6 stem cankers per tree in many 1-3 ha pockets from Greenstone Creek to Morrison Creek near Logan Lake. Approximately 95% of the 5 m high lodgepole pine had 1-3 cankers per stem over 10 ha at Gorge Creek northwest of Savona. Rodents had fed upon 5% of the stem cankers resulting in partial girdling and very scattered mortality.

Severe infection by this perennial disease frequently results in degrade and breakage of wood products.

Pinewood nematode, Bursaphelenchus xylophilus

For the third consecutive year, surveys for the pinewood nematode in the Region were negative. Branch and stem samples from lodgepole and western white pine and spruce trees showing symptoms were collected at nine locations and analyzed for presence of nematodes.

These collections are done since many countries have placed quarantine restrictions on lumber exports from countries with nematode infestations. It was collected in the U.S.A. in 1979, but not to date in British Columbia.

Salt damage

Salt spray from winter road maintenance discolored roadside lodgepole pine and Douglas-fir at several locations in the Region including Manning Park-Princeton, Summerland-Kelowna and near Pavilion. Damage ranged from 30% discoloration on 70 lodgepole pine along Highway #3 east of Manning Park and 30 ponderosa pine between Kelowna and Summerland to 50 dead Douglas-fir near Pavilion Lake along Highway #12.

Tree and branch mortality could result in areas only discolored.

European pine shoot moth, Rhyacionia buoliana

Five pheromone-baited sticky traps were placed at each of 10 locations in the Okanagan Valley from Vernon to Penticton to monitor adult populations.

There was an average of 7 moths per trap (range 0 to 30) caught at five locations in Kelowna. Traps set out at three locations in Vernon and two in Penticton were all negative.

Pine shoot moth is an introduced pest of exotic ornamentals, and was first found in 1961 at Kelowna. An annual survey was done between 1961 and 1981; however, it has been discontinued. The danger of pine shoot moth spreading into native pines has not been realized.

Pine budmoth, Choristoneura lambertiana

As part of a continuing monitoring program to determine the distribution and taxonomy of conifer budworms, groups of five sticky traps were baited with Choristoneura pheromone and placed in five different pine stands from Lillooet to Osoyoos. The average number of moths caught was as follows: Lillooet, less than one per trap; Barnes Lake,, 11; Clearwater, 31; Blue River, 27 and Anarchist Mountain, 108.

Approximately 19 moths were trapped last year at Big White Mountain. Larval sampling and trapping will continue in 1986, the fourth consecutive year of the program.

DOUGLAS-FIR PESTS

Western spruce budworm, Choristoneura occidentalis

The area of immature and mature Douglas-fir infested by western spruce budworm increased fourfold in 1985 to 180 400 ha from 43 000 ha last year (Map 4). The defoliation (139 900 ha light[1], 36 250 ha moderate, 4 600 ha severe) occurred mainly in the Kamloops and Lillooet TSAs. Defoliation was mapped in large areas from Kamloops to Little Fort, east to Adams Lake and west of Kamloops to Lillooet including Highland Valley and Scottie Creek (Table 4).

More specifically, in the Lillooet TSA light to moderate defoliation occurred over approximately 2 700 ha along the Fraser River compared to 2 158 ha in 1984. The largest increase in defoliation in Lillooet TSA occurred along the north side of Anderson-Seton lakes including Mission Pass and along Carpenter Lake to Yalakom River, where 6 810 ha of mainly light defoliation was mapped. This follows the previous 11-year infestation which ended in 1978.

In the Cache Creek area, the multi-age stands of Douglas-fir were lightly to severely defoliated over 21 680 ha from Cache Creek north to Scottie Creek and west to Hat Creek including Veasy Lake. This represents a fourfold increase from 1984 levels. The area of Douglas-fir defoliation more than doubled to 4 800 ha of moderate defoliation from Ashcroft to Savona on the south side of the Thompson River Valley. There were 2 975 ha lightly to severely defoliated south of Ashcroft to Spatsum Creek near Highland Valley, up from 2 150 ha in 1984. Approximately 1 600 ha were lightly and moderately defoliated in Highland Valley, following a one-year respite.

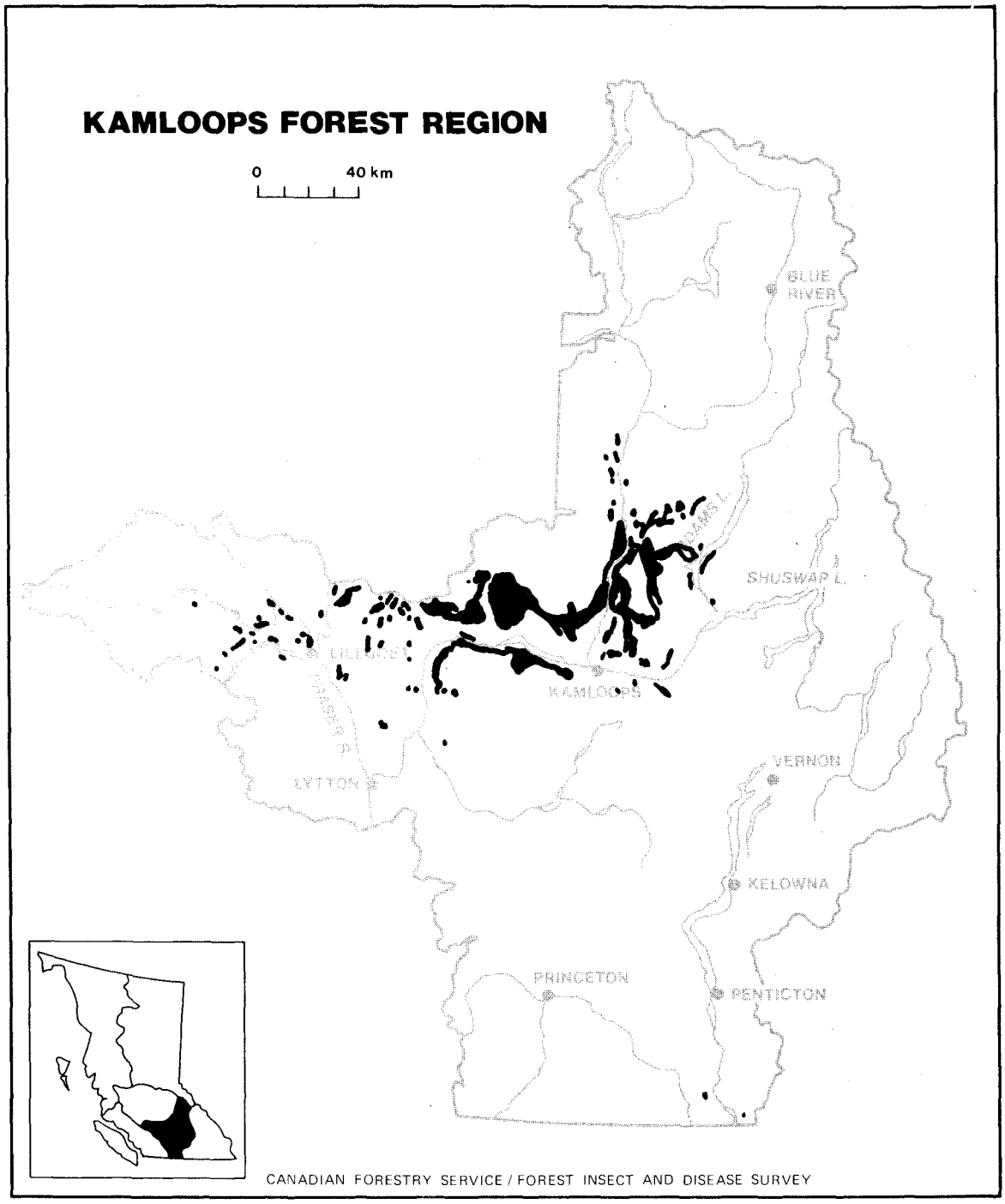
There was new light and moderate defoliation over 3 860 ha in the Pavilion Lake area.

North of Savona, 3 760 ha of light defoliation occurred along Deadman River where only 1 950 ha of Douglas-fir was defoliated in 1984.

The most severe defoliation occurred over approximately 34 000 ha from Deadman River east to the North Thompson River Valley, including Sabiston, Carabine and Criss creeks, Red Lake and Tranquille River. This represents a twofold increase in area and an increase in intensity of defoliation to 26 720 ha light, 5 360 ha moderate and 1 890 ha severe from 17 590 light and only 110 ha moderate in 1984.

Increases in intensity and area also occurred from Tranquille River along the west side of the North Thompson River to Jamieson Creek. There were 8 500 ha light, 5 280 ha moderate and 360 ha severe this year compared to 4 160 ha light in 1984.

[1]Light: 0-25% defoliated; moderate: 26-65% defoliated; severe: 65%+ defoliated.



Map 4. Areas of Douglas-fir defoliated by western spruce budworm, determined by aerial surveys, 1985.

Table 4. Location and area of Douglas-fir defoliated by western spruce budworm, as determined from aerial and ground surveys, Kamloops Forest Region, 1985.

TSA and location	Area of defoliation			
	Light	Moderate	Severe	Total
KAMLOOPS TSA				
Separating Lake	1 330	2 925	540	4 795
Deadman R.	1 710			1 710
Barnes L.-Spatsum Cr.	2 000	500	475	2 975
Highland Valley	1 220	390		1 610
Pass Valley	10 820	1 770	200	12 790
Deadman R.	1 970			1 970
East of Bonaparte I.R.		2 100	170	2 270
Scottie Cr.	1 400	2 690	290	4 380
Veasy L.-Hat Cr.	12 700			12 700
Loon Cr.	1 050			1 050
Sabiston-Carabine Cr.	8 700	1 420	1 470	11 590
Criss Cr.	6 320	660	250	7 230
Red L.	5 200		170	5 370
Tranquille R.	6 500	3 280		9 780
Durand Cr.-Lac Le Jeune Rd.	10 600	250		10 850
Campbell Cr.	320			320
Ducks Meadow	1 000			1 000
Pemberton Hill	1 000			1 000
Lac du Bois-Jamieson Cr.	8 500	5 280	360	14 140
Paul L.	2 900	4 050	480	7 430
Heffley L.-Heffley Cr.	3 940	3 150	50	7 140
Louis Cr.	9 850	2 520		12 370
Barriere	620	3 170		3 790
Adams R.	230			230
Adams L.	40			40
E. Barriere L.	5 500			5 500
Simmax Cr.	6 800	700		7 500
Little Fort	1 350			1 350
Barriere R.	1 000			1 000
Barriere	3 300			3 300
Fishtrap Mtn.	6 150		130	6 280
Lemieux L.	400			400
Subtotal	124 420	34 855	4 585	163 860
OKANAGAN TSA				
Mt. Kobau	150			150
Anarchist Mtn.	100			100
Subtotal	250			250
MERRITT TSA				
Pimainus	100			100
Subtotal	100			100

TSA and location	Area of defoliation			
	Light	Moderate	Severe	Total
LILLOOET TSA				
Pavilion	2 910	950		3 860
Lillooet	2 100	590		2 690
Cache Cr.	2 280		90	2 370
Oregon Jack Cr.	170			170
Venables Valley	90			90
Carpenter L.	2 500	90		2 590
Yalakom R.	1 900			1 900
Whitecap Cr.	400			400
Anderson L.-Seton L.	1 800			1 800
Botanie L.	320			320
Subtotal	14 470	1 630	90	16 190
SUMMARY				
KAMLOOPS TSA	124 420	34 855	4 585	163 860
LILLOOET TSA	14 470	1 630	90	16 190
OKANAGAN TSA	250			250
MERRITT TSA	100			100
Grand Total	139 240	36 485	4 675	180 400

East of the North Thompson, defoliation intensified in 1984 areas and spread into new areas resulting in 26 280 ha of light, moderate and severe from Paul Lake to Barriere including Heffley Lake, Louis Creek and East Barriere Lake. This represents nearly an eightfold increase from 2 640 ha of light defoliation in 1984.

Southwest of Kamloops, there were 10 850 ha light and moderate defoliation, up from 6 300 ha light last year, from Durand Creek to Lac Le Jeune Road.

In the Adams Lake area, defoliation occurred again for the first time since 1977. There were 7 500 ha of light and moderate defoliation east of Louis Creek along Sinmax Creek to Skwaam Bay on Adams Lake and in isolated spots down to the lower end of the lake.

The outbreak also spread north of Barriere, for the first time in recent history, as far as Little Fort, resulting in 2 750 ha of light defoliation in 15 separate infestations.

During 1981-85 the total area of Douglas-fir defoliated by western spruce budworm mapped from aerial and ground surveys was 184 342 ha. Of this total, 58% or 107 300 ha were defoliated for one year; 23% or 41 960 ha were defoliated for two years; 12% or 21 320 ha for three years; 6% or 12 156 ha for four years and less than 1% or 1 600 ha for five years. These were successive years of defoliation in most areas, with a few exceptions near Cache Creek where defoliation dropped off in some areas last year.

In May, approximately 100 buds were assessed from each of 20 locations throughout the infestation to predict 1985 defoliation. Results indicated severe at eight locations, moderate at three and light at nine (Table 5). The predicted defoliation was correct at 13 locations; however, at seven locations the defoliation was less severe than predicted and at one, defoliation was more severe.

Table 5. Location, percent buds infested, predicted budworm defoliation and actual defoliation, Kamloops Forest Region, 1985.

TSA and Location	Percent of buds infested	Defoliation[1] Predicted	Actual
KAMLOOPS TSA			
Tranquille R. (lower)	50	S	S
Tranquille R. (upper)	27	M	M
Duffy L. Rd.	46	S	M
Knouff L. Rd.	93	S	M
Paul L. Rd.	72	S	S
Mt. Harper	90	S	S
Pritchard (north side)	55	S	M
Barnard Cr.	4	L	L
Barnes L.	9	L	L
Separating L.	3	L	M
Nesbitt L.	7	L	L
Indian Gardens	7	L	L
Durand Cr.	35	S	L
Ironmask Hill	14	L	L
Oregon Jack Cr.	13	L	L
Scottie Cr.	20	M	M
LILLOOET TSA			
Pavilion L.	5	L	L
Fountain Valley	55	S	L
Marshall Cr.	20	M	L
Botanie Cr.	5	L	L

[1] 0% buds infested – no defoliation
1-15% " " – light defoliation
16-30% " " – moderate defoliation
31+% " " – severe defoliation

The moth flight which occurred July 3-13 was extremely large, particularly in the Barriere area and in the Pass Valley area near Cache Creek. The unusually warm evenings extended the flight period which could result in a large spread of the infestation in 1986. Pheromone-baited sticky traps, used at eight locations for the previous 15 consecutive years, were discontinued. The data obtained were inconclusive and could be used only to determine presence or absence, not to make predictions.

Egg mass collections at 21 locations in September averaged 319 per 10 m^2 foliage (range 72-977), significantly up from 58 in 1984 (Table 6). The number of eggs per sample was very high, indicating severe defoliation at most areas in 1986.

Egg samples at each location consisted of two 45-cm branch tips clipped from the mid-crown of each of 10 trees. The number of egg masses on each branch was counted and extrapolated to the number of eggs per 10 m^2 of foliage. They were then compared to established criterion to determine predicted defoliation for 1986.

Table 6. Location and average number of western spruce budworm egg masses collected and predicted defoliation for 1986, Kamloops Forest Region, 1985.

Location	Average number of egg masses/10m² of foliage/plot		Predicted[1] defoliation
	1985	1984[2]	
Marshall Cr.	72	33	Moderate
Fountain Valley	186	-	Severe
Mission Summit	392	-	Severe
Scottie Cr.	890	12	Severe
Oregon Jack Cr.	262	68	Severe
Watson Bar Cr.	127	46	Moderate
E. of Bonaparte I.R.	536		Severe
Pimainus Ridge	96		Moderate
Separating L.	359	-	Severe
Indian Gardens	890	48	Severe
Sabiston Cr.	970		Severe
Carabine Cr.	288		Severe
Red L.	406		Severe
Heffley L.	149		Moderate
Orchard L.	263		Severe
Adams L.	86	-	Moderate
Paul L.	186	98	Severe
W. of Barriere	120	-	Moderate
Lemieux L.	78		Moderate
Mt. Kobau	155	-	Severe
Anarchist Mtn.	182	-	Severe

[1] 1-50 egg masses/10 m² - light defoliation
51-150 " " - moderate defoliation
151+ " " - severe defoliation

[2] 15 locations sampled in 1985 were not sampled in 1984.

Weather, parasitism and disease can reduce populations. Approximately 100-200 early and late instar larvae were collected at 12 locations from June 11-28 and reared to determine parasitism. Larval parasitism by hymenopterous and dipterous insects averaged 14% at 12 locations (Table 7), down from an average of 20% at 13 locations in 1984.

There was 17% mortality of all crown classes of Douglas-fir in 1985 at a mortality plot established in 1983 at Separating Lake east of Ashcroft. There has been severe defoliation every year since the plot was established. South of Savona in the Indian Gardens area, there was 2% mortality of mainly intermediate crown class Douglas-fir. The amount of mortality varies throughout the infestation; however, it occurs most often in advanced regeneration in a mixed-age class stand.

Table 7. Location and average percent parasitism in early and late[1] instar western spruce budworm larvae, Kamloops Forest Region, 1985.

Location	Instar	Avg. percent parasitism		
		Hymenoptera[2]	Diptera	Total
Indian Gardens	Early	2	9	2
	Late	7	4	11
Beaton L.	Early	2	0	2
	Late	22	0	22
Scottie Cr.	Early	6	1	7
	Late	5	0	5
E. Bonaparte I.R.	Early	unavailable		
	Late	17	1	18
Sabiston Cr.	Early	1	0	1
	Late	11	3	14
Tranquille Rd.	Early	5	1	6
	Late	10	3	13
Knouff L. Rd.	Early	7	0	7
	Late	8	2	10
Paul L.	Early	15	0	15
	Late	10	3	13
Campbell Range Rd.	Early	3	3	6
Durand Cr.	Late	16	4	20
Lac du Bois	Late	13	0	13
Barriere R.	Early	8	16	24

[1]Early collections were mostly II, collected June 11-18 and late instar were V collected June 21-28.

[2]These parasites were Glypta sp. and Apanteles sp.

Of approximately 1 700 larvae from 12 locations submitted to Forest Pest Management Institute at Sault Ste. Marie, Ontario for disease determination, an average of 5% (range 0-24%) were infected by a nuclear polyhedrosis virus. The most severely diseased larvae were from Indian Gardens near Savona where 24% of the larvae were infected, exactly the same as in 1984. Based on low average parasitism and low disease infections throughout the infested area and very high egg counts, populations will probably increase.

The area of defoliation is also expected to expand to new areas, such as in the Adams Lake drainage and Lillooet TSA, and intensify in areas lightly defoliated in 1985, including lower Adams Lake, Louis Creek and Heffley Lake area. Defoliation will probably continue and intensify in Fountain Valley, the Lillooet area and Anderson-Seton lakes where there have been western budworm infestations for 28 of the last 43 years.

Douglas-fir tussock moth, Orgyia pseudotsugata

Four small patches totalling 70 ha of severe defoliation at Six Mile Lookout west of Kamloops was the only tussock moth infestation recorded in Kamloops Region in 1985. Last year there were 160 ha of light and severe mapped nearby at Cherry Creek as well as 5 490 ha of grey or previously killed Douglas-fir. In the grey areas, the dead standing Douglas-fir was still visible, although reduced in parts by logging and firewood cutting. Red trees, adjacent to defoliated areas, killed by Douglas-fir beetle in 1984 were still visible but contained no evidence of beetles.

Larval beating collections yielded an average of four larvae in only three positive samples at Twaal Creek near Spences Bridge, Cherry Creek and near Kamloops. This represents a significant decline from the low (average 20) numbers at those locations in 1984.

Egg mass searches near Six Mile Lookout in September yielded only two egg masses, indicating a collapse of the small population with no defoliation expected to occur in 1986.

Pheromone sampling for male adult tussock moths continued using sticky traps baited with (z)-6-heneicosen-11-one. Only two moths were caught in traps with .01% concentration pheromone by weight, placed at 14 locations throughout the stands susceptible to tussock moth. Another two moths were caught in five traps placed at five locations baited with 1.0% pheromone concentration for one-time detection purposes for distribution (Table 8).

Table 8. Location and total number of moths caught at 1.0% pheromone concentration, Kamloops Forest Region, 1985.

Location	No. of Moths
Lillooet	2
Vavenby	0
Gold Bridge	0
Clearwater	0
Blue River	0
Teepee L. Rd.	0
Douglas Lake	0
Sicamous	0
Malakwa	0
Westbridge	0

Tree mortality at two plots established to assess impact of tussock moth defoliation at Heffley and Oregon Jack creeks was 51% and 13%, respectively. The plots were established in 1983 and were severely defoliated for two years successively. The average dbh at Heffley Creek was 26.3 cm, range 14-41 cm. The trees were slightly smaller at Oregon Jack Creek with an average of 19.7 cm, range 10-54 cm. Douglas-fir beetle was present in some of the larger diameter trees, but the main cause (99%) of mortality was severe defoliation.

Rhabdocline needle casts, Rhabdocline weirii
R. pseudotsugae

These needle diseases which cause discoloration and premature needle loss of the previous year's foliage, were collected at three areas. All of the understory regeneration 1-3 m high were 15-60% discolored by R. weirii over 20 ha west of Roche Lake. R. pseudotsugae discolored 90% of the foliage on all of the 3 m high Douglas-fir over approximately 120 ha at Criss Creek. The same needle cast infected 30-80% of the foliage on all trees in 1-5 ha patches along the Mile High Lakes road near Logan Lake. The trees most affected were 2-4 m high in dense clumps. Rhabdocline needle cast causes some growth loss but usually no serious damage except to trees that are growing offsite.

Root diseases, brown crumbly rot, Fomes pinicola
Laminated root rot, Phellinus weirii

Light infections of both pathogens were found in three mature Douglas-fir stands in Okanagan TSA. Surveys using the line intersect method showed brown crumbly rot infection in 2% of the stems west of Summerland near Osprey Lake and 5% in a stand at Fairview Road near Oliver.

West of Okanagan Lake, 12% of the stand was infected with laminated root rot near Fintry. These root rots occur widespread throughout the Region, resulting in significant annual volume loss.

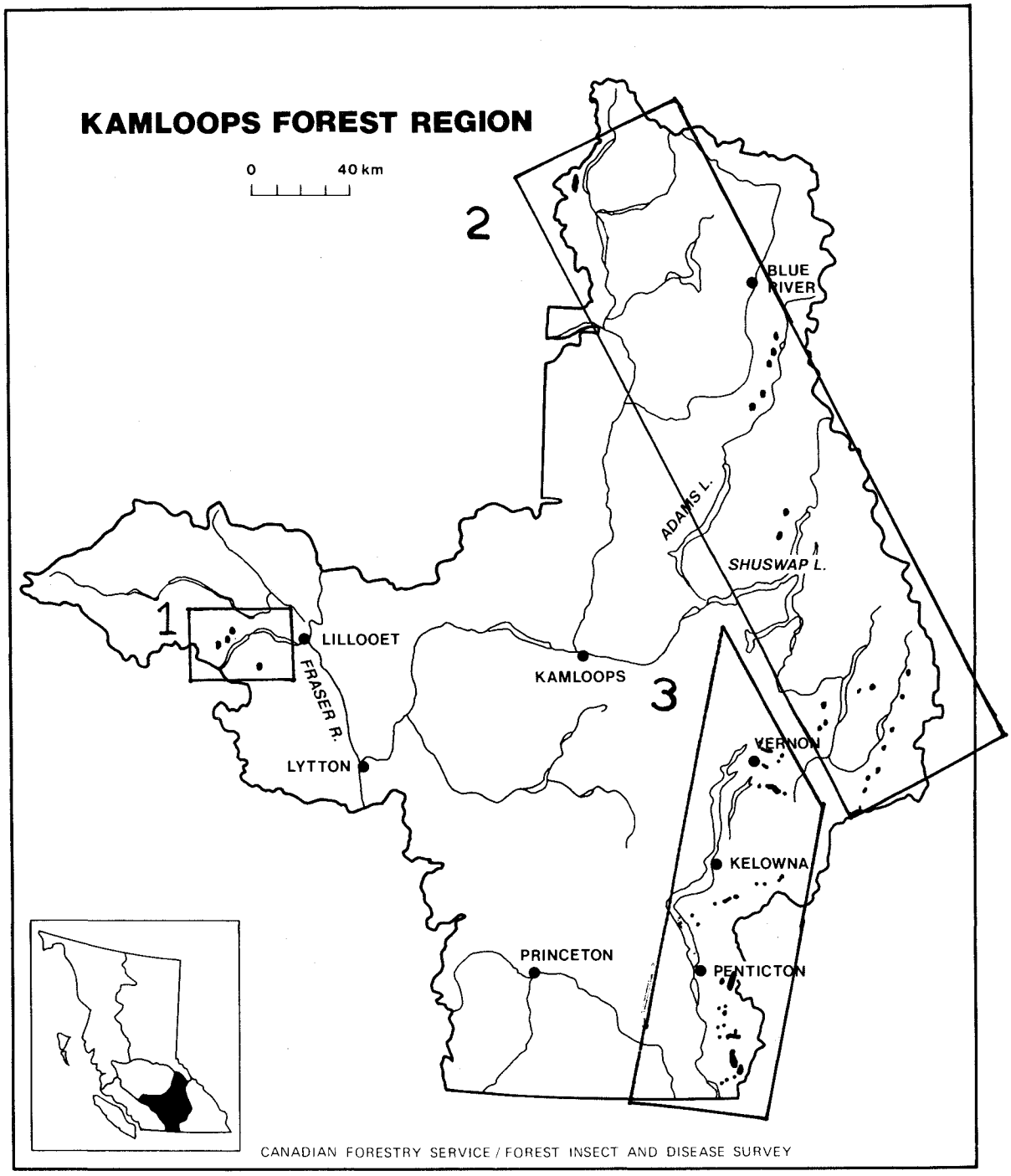
SPRUCE PESTS

Spruce beetle, Dendroctonus rufipennis

The area of mature Engelmann spruce recently killed by spruce beetle increased slightly in five areas to 1 020 ha (Map 5) from 695 ha in 9 areas in 1984.

These mainly high elevation, widely scattered infestations in two TSAs and visible from the air, were attacked and killed by spruce beetle which built up in adjacent slash or windfall.

The largest infestations were in the Lillooet TSA along Anderson Lake where approximately 1 000 ha of the total area infested were mapped. These areas included Whitecap Creek, 50 ha; Cayoosh Creek, 70 ha; Connel Creek, 500 ha and McGillivray Creek, 350 ha. The two largest infestations, Connel and McGillivray creeks, are inaccessible for logging. Most



Map 5. Areas of defoliation, determined by ground and aerial surveys, 1985

1. Spruce beetle
2. Western blackheaded budworm
3. Larch budmoth

of the nearby susceptible mature spruce is depleted in these drainages so the infestations have probably peaked. An old, endemic infested area covered 50 ha at the head of Harper Creek in Clearwater TSA, up from only 10 ha in 1984.

Ground surveys were not completed due to inaccessibility. However, based on historical trends and aerial observation of stands in and adjacent to infested areas, there is a potential for outbreaks in most currently infested areas where suitable host material exists. At Gold Creek near Adams Lake, potential for a new outbreak exists because of high stumps and slash in a winter logged area, newly infested by spruce beetle this year.

Cooley spruce gall aphid, Adelges cooleyi

The spruce gall aphid is common on immature Engelmann spruce throughout the host range in the Region. The damage is most important in seed orchards although plantations can be severely affected as well.

The most severely infested area was at the BCMF seed orchard at Skimikin, where 40% of the current growth was galled on all of the white spruce 1-3 m high from the Bulkley Valley and Central Plateau. Engelmann spruce trees 1-3 m high from the West Kootenay had only 10% of the branch tips galled on 80% of the trees. This difference could be caused by different wind patterns or proximity to the alternate host, Douglas-fir.

ALPINE FIR PESTS

Western balsam bark beetle, Dryocoetes confusus

There were 600 ha of alpine fir killed by the beetle disease complex in high elevation alpine fir stands in the Region in 1985. The large reduction from 2 550 ha mapped in 1984 is due mainly to reduced aerial survey coverage in Kamloops and Lillooet TSAs.

In Okanagan TSA there were 85 ha mapped at Holstein Lake east of Vernon. In the Kamloops TSA, dead alpine fir were mapped at E. Barriere L., 95 ha; Mt. Tod, 25 ha; Mt. Lolo, 40 ha; Wentworth Cr., 235 ha and Devick Lake, 120 ha in two spots.

Alpine fir mortality has been recorded throughout the host range in the Region for decades, most frequently in the Bouleau Lake area near Terrace Mtn. and on the Cariboo Plateau west of the North Thompson River.

The mortality is expected to continue, based on the long history of chronically infested stands in the Region.

LARCH PESTS

Larch budmoth, Zeiraphera improbana

Larch budmoth lightly to severely defoliated 8 900 ha of western larch in the southern part of the Region (Table 9), the first time since 1976 when about 3 900 ha were severely defoliated at Silver Star Mountain and east of Okanagan Falls (Map 5).

Moderate and severe defoliation occurred in 24 infestations from Osoyoos to Vernon in stands with 20% or greater western larch component and at elevations greater than 1 200 m.

Table 9. Location and area of western larch stands defoliated by larch budmoth as determined from aerial and ground surveys, Kamloops Forest Region, 1985.

	Area of defoliation (ha)			
Location	Light	Moderate	Severe	Total
Saunier Cr.	–	1 500		1 500
Shuttleworth Cr.	–	250		250
Vaseux Cr.	–	750		750
Inkaneep Cr.	–	3 400		3 400
B.X. Cr.	–	500		500
Coldstream Cr.	–	175		175
Vernon Hill	–	175		175
Lavington	–	1 150	–	1 150
S.E. of Kelowna	–	–	250	250
Priest Cr.	–	–	625	625
Naramata L.			75	75
Baker L.	–	–	50	50
Totals	–	7 900	1 000	8 900

Larch budmoth defoliated 1 100 ha in the second year of a continuing infestation, adjacent to defoliation in Kamloops Region in the western part of the Nelson Forest Region.

Larch budmoth biology is not well known so patterns of infestations are of major interest. Infestations have lasted only two years in the past in the Kamloops Region, so more damage could occur in early summer, 1986. Impact on western larch is probably not large, although increment would be reduced. No control measures have ever been attempted.

Larch casebearer, Coleophora laricella

There was no apparent defoliation of western larch caused by larch casebearer in the Kamloops Region in 1985, down from 1 100 ha of light defoliation in King Edward Main area near Vernon in 1984. However, 1985 defoliation could have been partly obliterated by defoliation caused

by larch budmoth in the same area. The most recent infestation in the Region prior to 1984 was in 1981 at Cherryville, Shuttleworth Creek and Anarchist Summit when localized stands were lightly defoliated.

Five pheromone-baited sticky traps caught an average of 235 adults (range 96-1176) in a previously infested stand near Vernon. However, no moths were caught in five similar traps placed in an uninfested stand at Mara Lake. These traps were set out to detect the spread of larch casebearer through its host range.

In 1984, traps placed in infested stands at Lumby, Anarchist Summit, Shuttleworth Creek and west of Fintry near Okanagan Lake, averaged 61 moths per trap (range 2-300).

Collections of 200 late instar larvae and pupae in late May at Cherryville, Anarchist Summit and Shuttleworth Creek for parasite determination, averaged 7% parasitism by hymenopterous insects. This is a slight increase from an average of 2% by Bracon sp., also a hymenoptera, at Cherryville, Shuttleworth Creek, Anarchist Summit and Begbie Creek last year.

Overwintering larval counts at Anarchist Summit and Shuttleworth Creek in October averaged 4.6 and 8.5 casebearer larvae per 100 fascicles, respectively, much reduced from 88 and 41 larvae per 100 fascicles in 1984. The cause of this reduction is not well documented. Based on prediction criterion[1] using the number of overwintering larvae per 100 fascicles, there will be only negligible defoliation next year at the locations sampled.

Red ring rot, Fomes pini

Mature western larch in two mixed stands near Vernon were severely infected by this common stem decay fungus. Ground surveys, using the line intersection method, found 50% of the larch component infected in a 50% larch-Douglas-fir stand at Six Mile Forest Road near Mara Lake.

A similar stand along King Edward Main southeast of Vernon had 30% of the larch infected. Both stands were approximately 20 m high and 30 cm average dbh at 700 m elevation.

The infected trees will yield virtually no merchantable wood for harvest; however, the trees are not dead.

Larch needle cast, Hypodermella laricis

The extent and severity of needle cast on western larch needles decreased to approximately 100 ha from 2 500 ha from Anarchist Summit to Vernon in 1984. In the only infestation recorded, 30% of the foliage was discolored on 90% of the larch over 95 ha along King Edward Main. There also was 30% of the foliage discolored on 95% of the larch over 5 ha at Shuttleworth Creek east of Okanagan Falls.

[1]Criterion developed by Bousfield et al. in the U.S.A.

Discoloration of the needles by this disease causes little immediate damage, but repeated years of severe infection could result in reduced growth. With warm, damp, spring weather, infections could continue and intensify in 1985.

Larch needle blight, Meria laricis

There was no evidence of needle blight infected western larch stands in the Region in 1985, down from 90 ha of severe infection near Hidden Lake, Cottonwood Creek and Mabel Lake in 1984. The decline, one year after the first infection in the Region, probably was due to drier weather conditions during the spore dispersal period during April and May. Although still common in larch stands in the adjacent Nelson Region, infection has been less severe and widespread. However, the disease could intensify if weather conditions are favourable next spring.

European larch canker, Lachnellula willkommii

A survey of four western larch stands in the Region was negative in 1985, the fourth consecutive year of surveys. This canker disease causes severe branch and seedling mortality of eastern larch in the Maritimes. Similar diseases, native to British Columbia, have been found as saprophytes on the bark but never associated with a canker. Surveillance of larch stands will continue in 1986 to detect the possible spread of this pathogen into British Columbia.

WESTERN HEMLOCK PESTS

Western blackheaded budworm, Acleris gloverana

A new outbreak of western blackheaded budworm lightly defoliated 3 100 ha of overmature western hemlock in the interior wet belt portion of the Region in 1985 (Map 5). The defoliation was scattered in 20-450 ha infestations (Table 10) from the west side of Hobson Lake in Wells Gray Provincial Park to Monashee Creek near Cherryville.

The largest and most numerous infestations were in the Okanagan TSA: 350 ha light at Trinity Valley near Vernon, and 450 ha light at Scotch Creek near Shuswap Lake. In the Kamloops TSA there were 450 ha lightly defoliated at Wallace Creek; 450 ha of light at Tumtum Lake; 400 ha of light at Myrtle Lake and 300 ha of light at each of Ray and Hobson lakes.

There was an average of 43 larvae (range 3-300) collected in three-tree beating samples in 1985 compared to 12 (range 6-90) in 1984.

Table 10. Location and area of western hemlock stands defoliated by the western blackheaded budworm, Kamloops Forest Region, 1985.

TSA and Location	Area of defoliation (ha)			
	Light	Moderate	Severe	Total
OKANAGAN TSA				
McIntyre	20			20
Monashee	30			30
Currie Cr.		50		50
Cherryville	50			50
Trinity Valley	350			350
Scotch Creek	450			450
Hidden Lake	50			50
Whip Creek	50			50
Vigue Creek	50			50
	1 050	50		1 100
KAMLOOPS TSA				
Wallace Creek	450			450
Tumtum Lake	450			450
Myrtle Lake	400			400
Pyramid	100			100
Hobson Lake	300			300
Ray Lake	300			300
	2 000			2 000
SUMMARY				
Okanagan TSA	1 050	50		1 100
Kamloops TSA	2 000			2 000
Total	3 050	50		3 100

Collections of overwintering eggs in September in the infestations near Blue River showed an average of 10 eggs per branch sample, indicating light defoliation at that location in 1986.*

Samples were comprised of two 45-cm branch tips from each of 10 trees. From these the average number of eggs per branch was determined.

* 1-26 eggs/45-cm branch - light defoliation
27-59 " " " - moderate defoliation
60+ " " - - severe defoliation

Previous infestations in 1967 lightly to severely defoliated 19 000 ha in the Shuswap River-Mabel Lake area and moderately defoliated 6 400 ha of western hemlock near Blue River. This was the third year of infestation which collapsed in 1968.

Hemlock sawfly, Neodiprion sp.

Standard FIDS three-tree beating samples in western hemlock-western red cedar stands from Mud River north of Clearwater to Blue River and west to Myrtle Lake contained up to 300 larvae. This was a significant increase from up to 40 in 1984; however, defoliation was not evident except where the sawfly was found with western blackheaded budworm, such as west of Blue River. There, very light defoliation was recorded, caused by sawfly mixed half and half with budworm larvae.

The last sawfly infestation was in 1976 in three areas near Blue River and in Wells Gray Park, where 6 400 ha were moderately defoliated by both the sawfly and blackheaded budworm.

Western hemlock looper, Lambdina fiscellaria lugubrosa

Following two years of light to severe defoliation, 4 450 ha in 1983 and 7 960 ha in 1984, the hemlock looper infestation collapsed in the interior wet belt, western hemlock-western red cedar stands in the eastern portion of the Region.

There was an average of only three larvae per positive beating sample (range 1-6), down from an average of six (range 1-500) in 1984.

The collapse of the population was attributed mainly to a nuclear polyhedrosis virus and larval and pupal parasites. The virus infected 38% of the late instar larvae collected in 1984 at Scotch Creek. Dipterous and hymenopterous parasites were found in 45% of pupae collected from burlap traps at Scotch Creek in 1984.

WESTERN RED CEDAR PESTS

Laminated root rot, Phellinus weirii

Widespread mortality of cedar caused by laminated root rot occurs annually throughout the Region.

A mature, western red cedar in a Douglas-fir stand 25 m high near Whiteman Creek on the west side of Okanagan Lake had 10% of the stems infected. The small 20-ha creekside stand was cruised using the line intersection method.

A wide variety of stand types are infected throughout the Region, however, the most significant annual volume loss occurs in wet belt hemlock-cedar stands.

DECIDUOUS PESTS

Fall webworm, Hyphantria cunea

Chokecherry, willow, Saskatoon and poplar were webbed and defoliated again for the thirty-second year in Kamloops Forest Region. Roadside shrubs were severely defoliated in the Okanagan-Shuswap area and from Kamloops to Lillooet. Chronic damage by this insect is currently an urban forestry problem. Based on its long history in Kamloops Region, populations will continue at a high level.

Gypsy moth, Lymantria dispar

The Canadian Forestry Service, as part of a cooperative moth trapping program with Plant Health Branch, Agriculture Canada, has set out single sticky traps in provincial parks and campgrounds and roadside highway picnic sites for the past 10 consecutive years. There were no moths caught in 50 traps placed at 23 locations this year. However, one male adult was caught in a trap placed by Plant Health at Cache Creek Campgrounds, 4 km north of Cache Creek. This moth was probably just a "hitch-hiker" on a recreational vehicle from an infested area in Eastern Canada or the U.S.A. As last year, when a single moth was also trapped at Adams River, an extensive egg mass search and followup survey will be done in the area. It, as well, is not expected to develop into an infestation, however, all possibilities must be considered.

Birch leafminer, Lyonetia saliciella

Nearly 3 000 ha of discolored western white birch were visible in patches between Adams Lake and the North Thompson River, down slightly from 2 600 ha in 1984. The areas most affected were: south shore of North Barriere Lake; near Johnson Lake and along Johnson Creek; along Fadear Creek and along the west side of Adams Lake in 100-500 ha patches from Skwaam Bay to Brennan Creek.

This insect, in the past, has been confused with a birch skeletonizer, Bucculatrix sp. Last year the 2 600 ha of similar discoloration was attributed to the birch skeletonizer, however, the effects on the host are the same.

Satin moth, Leucoma salicis

This introduced pest of poplar severely defoliated 200 ha of black cottonwood and aspen in 0.25-5 ha patches in the grassland areas south of Merritt for the third consecutive year. For the first time, poplar was also severely defoliated at several locations including: 7 km east of Logan Lake (2 ha); 3 km north of Marble Canyon Park (1 ha) and southwest of Chase at the top end of Charcoal Creek (150 ha).

Immediately following the introduction of satin moth into British Columbia, it was considered a pest of economic importance because of

possible damage to fruit orchards. However, the introduction of imported parasites controlled the population levels reducing the chance of disastrous damage.

Small infestations have occurred periodically since 1945 and should continue in 1986.

PESTS OF YOUNG STANDS

Several important pests caused significant damage to natural and planted young stands at 17 locations examined in the Kamloops and Okanagan TSAs (Table 11). Fixed-radius plots were used to select and sample trees on a transect through the plantation area.

Pine needle diseases, Dothistroma pini and Coleosporium asterum, severely infected lodgepole pine in two plantations at Mt. Martin east of Monte Lake. Pine terminal weevil, Pissodes terminalis, killed pine leaders at Paska and Chuwhels lakes. Rodents, deer and cattle damaged trees at five locations. One of the most severe was at Greenstone Lake where cattle trampled young lodgepole pine, partially girdling them at the root collar. This could result in seedling deformation or mortality.

Western spruce budworm, Choristoneura occidentalis, severely defoliated advanced Douglas-fir regeneration at Sabiston Creek north of Savona. Spruce gall aphid, Adelges cooleyi damaged new branch tips on Engelmann spruce at a plot near White Lake. Other minor damage caused by Armillaria root rot and western gall rust was recorded on lodgepoloe pine.

Table 11. Location, stand description and pests of young stands examined, Kamloops Forest Region, 1985.

TSA and Location	Tree species	Avg. height (m)	Pest and damage
KAMLOOPS TSA			
Lac Le Jeune	lP	3	Rodents; 2% killed, 15% partially girdled.
Cahilty Cr.	alF, eS	1	2-yr. spruce budworm; 77% with 1-4 infested tips.
Gold Cr.	alF, eS	0.3	No pests.
Mt. Martin (1)	lP, Df	3	Dothistroma sp.; 85% of lP, 5-30% discolored. Coleosporium asterum: 22% of lP, 5-30% discolored.
Mt. Martin (2)	lP, Df	3	Dothistroma sp.; 80% of lP, 5-60% discolored.
Sabiston Cr.	Df	4.5	Choristoneura occidentalis; 94% of Df, 80-100% defoliated, 6% dead.
Greenstone Cr.	lP	0.5	Cattle damage; 14% of lP partially girdled.
Chuwhels L.	lP	2	Cattle damage; 5% of lP with 1-3 broken branches. Pissodes terminalis; 20% lP with dead tops.
Paska L.	lP	1	Pissodes terminalis ; 6% lP with dead tops.
Jamieson Cr.	lP	0.75	Endocronartium harknessii; 8% of lP with 1-4 galls/ tree. Armillaria sp.; 3% lP dead.
OKANAGAN TSA			
Fly Hill	lP	2.5	Unknown cause; 36% lP terminals bare.
White L. (1)	Df, wC wH	2.5	No pests.
White L. (2)	eS, wC, wH	3	Adelges cooleyi; 68% of eS had 5-30% of branch tips galled.
McNulty Main (1)	lP, Df	1.2	Animal damage; 5% of lP leaders browsed.

TSA and Location	Tree species	Avg. height (m)	Pest and damage
McNulty Main (2)	lP, Df	1	Animal damage; 7% of lP partially girdled
Shuttleworth Cr. (1)	lP, wL	0.3	Sunscald; 6% of lP and wL affected.
Shuttleworth Cr. (2)	lP, wL	0.3	Sunscald; 2% of lP and wL affected

FOREST PESTS IN PROVINCIAL PARKS

As part of a continuing program, the status of forest pests was determined in the provincial parks in the Region. Pests were recorded in eight of the 38 parks examined. The major pests were mountain pine beetle, Dendroctonus ponderosae, western spruce budworm, Choristoneura occidentalis, and western blackheaded budworm, Acleris gloverana. Mountain pine beetle continued to kill lodgepole pine in Okanagan Mountain Park, 350 ha and Cathedral Park, 200 ha. The infestation at Gun Lake Park has subsided due to lack of suitable host, with only pine snags left standing. Western spruce budworm moderately defoliated all age classes of Douglas-fir over 250 ha at Paul Lake Park. Western blackheaded budworm lightly defoliated western hemlock over a total of 960 ha at Hobson, Ray and McDougall lakes in Wells Gray Park.

There were 20 dead, mature, roadside Douglas-fir in Marble Canyon Park caused by roadside salt spray. There were a few red trees in the same area in 1984; however, more have died as a result of bark beetle attack. Lodgepole pine dwarf mistletoe infected 80% of lodgepole pine in 10-ha spots throughout Le Jeune Park with an average of 1-5 brooms per tree.

Pheromone-baited sticky moth traps were set out in selected parks to monitor the spread of gypsy moth, Lymantria dispar, into British Columbia and the population level of Douglas-fir tussock moth, Orgyia pseudotsugata. There were no gypsy moths caught in 50 traps placed at 23 different parks and campgrounds. Also, no Douglas-fir tussock moths were caught in seven traps set out at Monte Lake following the collapse of the infestation in the Region. Traps will again be used in 1986.

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