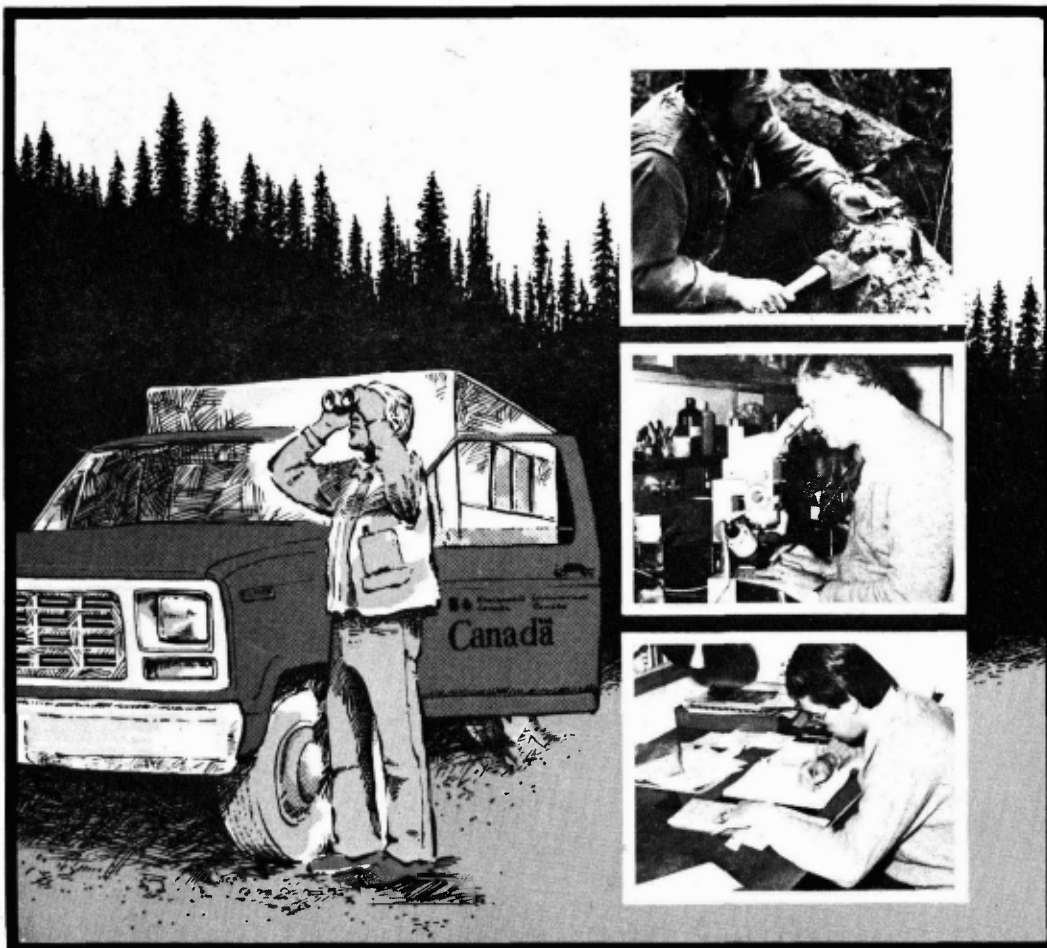


Forest Insect and Disease Conditions

Cariboo Forest Region
1983

R.J. Andrews



Environnement
Canada

Canadian
Forestry
Service

Environnement
Canada

Service
canadien des
forêts

TABLE OF CONTENTS

	Page
SUMMARY	1
PINE PESTS	4
Mountain pine beetle	4
Pine needle casts	13
SPRUCE PESTS	14
Spruce beetle	14
Two-year cycle spruce budworm	14
ALPINE FIR PESTS	15
Balsam bark beetle	15
DOUGLAS-FIR PESTS	15
Douglas-fir beetle	15
Western spruce budworm	16
Douglas-fir tussock moth	18
Needle casts of Douglas-fir	18
HEMLOCK PESTS	19
Western hemlock looper	19
DECIDUOUS PESTS	19
Forest tent caterpillar	19

SUMMARY

This report outlines forest insect and disease conditions in the Cariboo Forest Region in 1983, and attempts to forecast pest populations with emphasis on pests capable of sudden damaging outbreaks. Pests are listed by hosts in order of importance.

Mortality of lodgepole pine caused by mountain pine beetle increased to 382 000 ha from 222 000 ha in 1983. Pine needle casts severely infected pole-sized lodgepole pine throughout the Region.

Spruce beetle killed trees over 4 100 ha in 1983, down from 10 800 ha in 1982 with estimated volume loss of 419 120 m³. Light defoliation of white spruce by two-year-cycle spruce budworm was recorded over 130 ha along Polly Mtn. west of Quesnel Lake. Populations remained low elsewhere in the Region.

Alpine fir tree mortality caused by balsam bark beetle was recorded over 700 ha in the south Chilcotin, Rail, Upper Horsefly, and Junction supply blocks and along the south and east slopes of Bowron Lake Provincial Park, a decrease from 1982.

The area of tree mortality attributed to Douglas-fir beetle was 19 000 ha. The area of Douglas-fir defoliated by western spruce budworm increased to over 18 500 ha in the Clinton, Loon Lake and Hart Ridge areas, up from 2 800 ha in 1982. Severe defoliation of Douglas-fir by Douglas-fir tussock moth occurred over 170 ha south of Clinton for the second year. Needle cast diseases of Douglas-fir caused moderate to severe discoloration of year old foliage in patches along the Quesnel River and in the Clinton area.

High populations of western hemlock looper in the Quesnel Lake area resulted in only trace defoliation in localized areas near Grain and Abbot creeks.

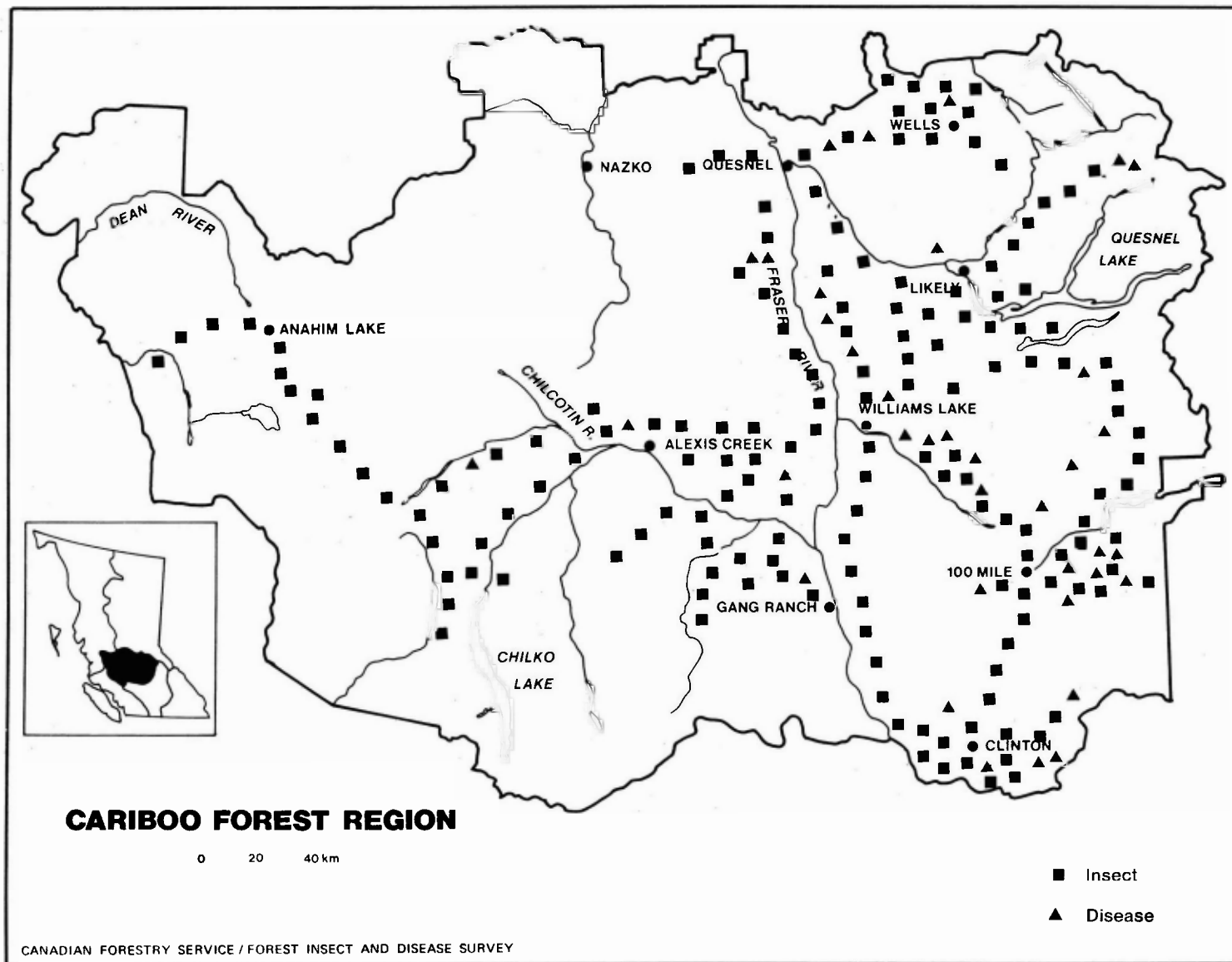
The Forest Insect and Disease Survey field season extended from May 16 to August 1 and from September 7 to 20 in 1983, three weeks less than in 1982 because of budget restraint. A total of 182 insect and disease collections were submitted to Pacific Forest Research Centre by the Regional Survey Technician and personnel from B.C. Ministry of Forests. Locations where one or more insect or disease samples were collected are shown on Map 1.

Eleven special collections of western spruce budworm and western hemlock looper larvae were examined at the Biological Control Unit of PFRCC, Victoria, for disease determination.

Special surveys to appraise bark beetle and defoliator infestations were conducted from September 7-20.

Two pheromone-baited gypsy moth traps were set out at each of three locations in the Region in 1983: no insects were trapped. Fifteen traps were set out at each of four locations in the "off year" for two-year cyle spruce budworm resulting in unexpectedly high numbers of moths. A single set of traps in the western spruce budworm infestation area showed decreased numbers of moths compared with those trapped in 1982.

Twenty-four hours of fixed wing flying were supplied to FIDS by the B.C. Ministry of Forests in July to map bark beetle infestations south and west of Alexis Creek to Tweedsmuir Provincial Park boundary and Bowron Lake Provincial Park in the northeast section of the Region. The remainder of the Region was aerially surveyed by Ministry of Forests personnel and the information mapped was made available to Canadian Forestry Service. Areas of infestation in this report were calculated from the maps supplied.



Map 1

Locations where one or more forest insect or disease samples were collected in 1983

PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

The largest concentration of mountain pine beetle-caused tree mortality continued in the western supply blocks of Williams Lake TSA. Increasing areas of tree mortality were becoming evident eastward in the Kloakut block and northward in the Chezacut and Palmer Lake blocks. Tree mortality along the Fraser River continued to increase but at a lesser rate. East of Highway 97 scattered groups of killed trees were becoming more evident. In the Cariboo Lake area tree mortality continued to expand northward in the Little River and north Cariboo River drainages extending along the west side of Bowron Lake Provincial Park to Wells.

WILLIAMS LAKE TSATatla Lake SB

Lodgepole pine represents 68% of the mature volume in this supply block, where area of attack increased to 105 000 ha from 72 840 ha in 1982. Major increases occurred in the southeast portion of the block with a marked increase of scattered groups of recently attacked trees north of Chilanko River to Satah and Luck mountains.

Chezacut SB

Lodgepole pine represents 91% of the mature volume in this block. Area of tree mortality increased almost fourfold to 77 700 ha from 20 175 ha in 1982. Mortality occurred along the southern boundary extending from Puntzi Mtn. west to Alexis Mtn. becoming patchy northward, but increased occurrence of patches were noted north to Quesnel TSA boundary.

Kloakut SB

Lodgepole pine represents 64% of the mature volume. Area of tree mortality increased to 36 410 ha from 28 950 ha in 1982. Light scattered mortality in 1982 became more intensive from Cardiff Mtn., east of Nemaia Valley to Big Creek and north to Chilcotin River.

Anahim SB

Lodgepole pine represents 72% of the mature volume. The area of tree mortality decreased to 34 000 ha from 45 630 ha in 1982. However, severe recent attack persists along Atnarko River west of Charlotte Lake into Tweedsmuir Provincial Park, with scattered groups of killed pine reported west to Hagensborg along the ridge tops in the Vancouver Region. An increase in the number of scattered attacked trees was observed north of Charlotte Lake to Dean River and eastward to Satah Mtn.

Chilcotin SB

Lodgepole pine represents 30% of the mature volume. The area of mortality increased to 30 900 ha from 19 760 ha in 1982. Severe 1982 attack has become apparent along Mosley Creek to Homathko River and north to Tatlayoko Lake, and patches of recently killed trees were reported extending south along Homathko River into the Vancouver Region. Scattered groups of recently attacked trees were observed along Cheshi Pass to Chilko Lake, Franklin Arm, Nemaia Valley, Vedan and Elkin lakes.

Palmer Lake SB

Lodgepole pine represents 72% of the mature volume in this block where the area of tree mortality increased to 25 240 ha from 3 650 ha in 1982. The concentration of attack along the southern boundary from Redstone to Alexis Creek was increasingly patchy northward, extending into the Nazko River drainage.

Gaspard SB

Lodgepole pine represents 48% of the mature volume. The area of attack increased to 16 000 ha from 10 400 ha in 1982 along the upper reaches of the Gaspard Creek drainage.

Cariboo SB

Lodgepole pine represents 21% of the mature volume. The area of mortality nearly doubled to 6 400 ha from 3 520 ha in 1982 along the north end of Cariboo Lake, Little River and Keithley Creek, and extended into Cunningham SB of Quesnel TSA.

Springhouse SB

Lodgepole pine represents 26% of the mature volume. The area of tree mortality increased to 6 000 ha from 5 000 ha in 1982 with scattered groups of attacked trees from Dog Creek north to Williams Lake.

Churn SB

Lodgepole pine represents 62% of the mature volume. Area of tree mortality decreased to 3 100 ha from 3 600 ha in 1982 along the upper reaches of Lone Cabin, Grinder and Koster creeks.

Military Block

The area of pine mortality increased to 2 050 ha from 1 150 ha in 1982. The largest concentration of killed trees was situated south of "The Dome" along Riske Creek. Scattered groups of trees were observed along Stock Valley and north to Madden Lake.

Skelton SB

Lodgepole pine represents 49% of the mature volume in this supply block. Increased attack from 70 to 1 800 ha was recorded consisting of mainly scattered pockets south of Big Lake Creek, along Peavine Valley and near Whitestone Lake.

Moffat SB

Lodgepole pine represents 63% of the mature volume. The area of mortality increased to 1 300 ha from 100 ha in 1982, mainly west of Horsefly along Beaver Creek.

Junction and Upper Horsefly SB

Lodgepole pine represents 1% and 9% of mature volume respectively in these blocks. Increased tree mortality was recorded over 320 ha in the Penfold Creek area and over 190 ha in the Dillabough Creek and Hen Ingram Lake areas.

QUESNEL TSASouth Kluskus, Narcosli East and Narcosli West SB

Lodgepole pine represents 80, 77, and 74% of mature volume respectively in these blocks. Increased occurrence of scattered, small groups of beetle-attacked trees was noted throughout the southern portions of these supply blocks over about 6 700 ha.

Cunningham SB

Lodgepole pine represents 10% of the mature volume. The area of attack increased along north Cariboo River extending into Bowron Lake Provincial Park. Increasing attack was also found along Matthew River to Ghost Lake.

Bowron SB

Lodgepole pine represents 18% of the mature volume. The number of small groups of attacked trees increased to 760 ha along the west side of Bowron Lake Provincial Park to Wells.

100 MILE TSAMeadow SB

Lodgepole pine represents 54% of the mature volume. The most intensive attack was found over 17 820 ha north of Mt. Bowman to Kosterling Mtn., south of Long Lake to Little Big Bar Lake and north of Meadow Lake to Augustine Flats.

Holden SB

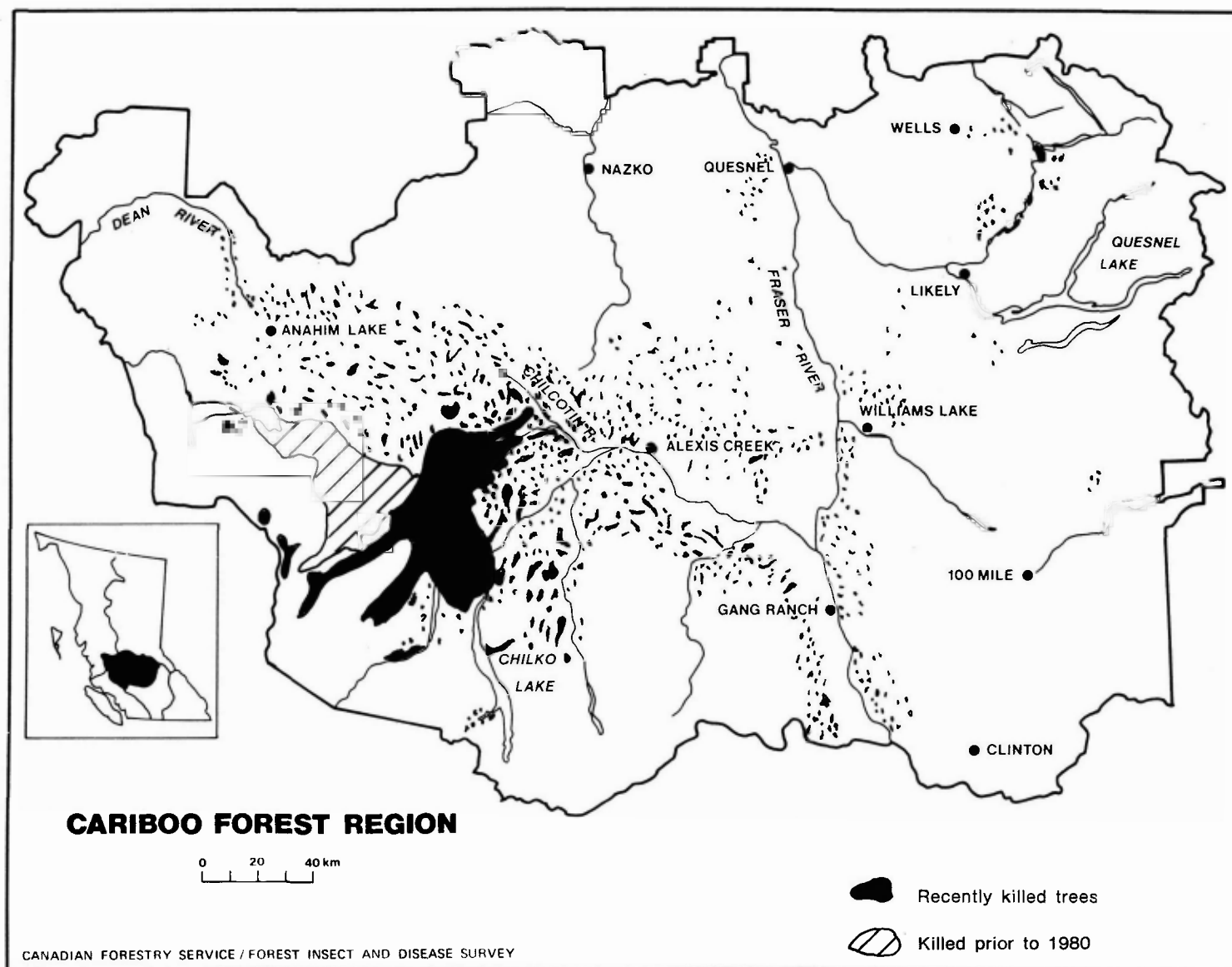
Lodgepole pine represents 46% of the mature volume. Scattered groups of attacked trees occurred over 2 370 ha along the western boundary of the block from Augustine Flats to Emerald Lake.

Loon SB

Lodgepole pine represents 46% of the mature volume. Scattered groups of attacked trees occurred over 1 410 ha along Edge Hills, north of Clinton to Koster and along Bonaparte River.

Bonaparte, Rail and Ruth SB

Scattered small groups of killed trees occurred over 130 ha in the Bonaparte block, over 190 ha in the Rail block and over 130 ha in the Ruth block near Murphy Lake.



Map 2

Mountain pine beetle

Areas of recently killed lodgepole pine determined from aerial surveys, 1983

TABLE 1. Area of mountain pine beetle-killed lodgepole pine from 1980 to 1982 as determined by aerial surveys and volume losses as determined by cruises in 1982 and 1983, Cariboo Forest Region, 1983.

Timber Supply area	Supply Block	Infested area (ha)	Volume (m ³)
Quesnel	South Kluskus	130	
	West Narcosli	4 610	
	East Narcosli	1 980	
	S.S.A.	320	
	Cottonwood	250	
	Big Valley	70	
	Bowron	770	
	Cunningham	3 840	
	Bowron Lake Prov. Park	760	
	SUBTOTAL	12 730	693 945
100 Mile	Holden	2 370	
	Meadow	17 820	
	Loon	1 410	
	Bonaparte	130	
	Rail	190	
	Ruth	130	
	Canin	510	
	SUBTOTAL	22 560	1 418 600
Williams Lake	Anahim	34 000	
	Tatla	105 000	
	Chezacut	77 750	
	Chilcotin	30 900	
	Kloakut	36 410	
	Palmer Lake	25 240	
	Gaspard	16 000	
	Churn	3 090	
	Springhouse	6 080	
	Skelton	1 870	
	Cariboo	6 400	
	Moffat	1 280	
	Junction	320	
	Upper Horsefly	190	
	Military Blk.	2 050	
	SUBTOTAL	346 580	19 406 162
	TOTAL	382 000	21 518 700

Compilation of information from aerial survey maps supplied by B. C. Ministry of forests indicated an increase of infested area to 382 000 ha in 1983, up from 222 000 ha reported by FIDS and 287 000 ha reported by the Ministry of Forests, in 1982.

It was estimated that 35,000,000 trees were killed in 1982 with a volume loss of 12 500 000 m³ based on cruise data from 17 strips run in 1982 and 14 strips run in 1983. The procedure used to derive numbers of trees killed in 1982 were as follows:

1. Based on cruise data from 14-1983 strips the average stems per ha was 937.3.
2. Based on cruise data from 17-1982 strips, the average current attack was 12.47%.
3. 1982 infestation area was 222 000 ha

Therefore, trees killed in 1982 in the this area =

$$12.47\% \times 937.3 \times 222\ 000 = \underline{25,947,651} \text{ trees}$$

4. Based on 1983 cruise data in new attack areas, red trees were 6% (assume all killed last year).
5. New area was 382 000 - 222 000 = 160 000 ha.
6. Trees killed in 1982 in this area = 6% x 937.3 x 160 000 = 8,998,080 trees.

Larval broods in 1982-attacked trees were examined in June to determine the 1982-83 overwintering mortality and brood viability. On 20 trees at each of 12 locations throughout the western portion of the Region, two 15 x 15 cm bark samples were removed at dbh from the north and south sides of the tree. From these samples, numbers of larvae, pupae, teneral adults and entrance holes were counted. Average numbers were calculated for the 25 trees and the "R" values¹ computed for each sample area (Table 2).

All areas examined showed an increasing population potential and increased attack was verified by fall cruising.

¹An R value is the average ratio for the 20 trees at a location between:

$$\frac{\text{number of eggs + larvae + pupae + adults}}{\text{number of galleries originating in sample area}}$$

TABLE 2. Results of brood examination for overwintering mortality in 1982 mountain pine beetle-killed trees, Cariboo Forest Region, 1983.

Location	"R" Values	1983 population prediction
Johnson Meadows	12.3	Increasing
Mons Lake	5.8	"
Little River	4.8	"
Williams Lake airport	4.5	"
Puntzi Mtn.	11.7	"
Pyper Lake	13.1	"
Tatla Lake	8.1	"
Nimpo Lake	12.6	"
Cochin Lake	15.3	"
East of Henry's Crossing	12.6	"
Alexis Lake	13.7	"
Chilko River	14.3	"

¹'R' Values = 0 to 2.5 - population decreasing
 2.6 to 4.0 - population static
 4.1+ - population increasing

Cruise strips were established at 14 locations in the fall, representative of more recently attacked stands to assess the number and status of beetle-killed lodgepole pine (Table 3).

Beetle attack intensity is classified as light if 1-5% of the trees in an area are killed, moderate if 6-30% are killed and severe if 31+% are killed. Two of three cruises along the "100 road" north of Redstone and two of three cruises near Puntzi Lake indicate severe attack. Similar intensity was also found along Chilko River, near Cochin Lake, and in the upper Big Creek area near Mons Lake. Moderate attack was noted due to rapidly increasing populations near Gaspard Creek, Alexis Lake, and in patches observed along Palmer Lake Road in the Thunder Mtn. area.

TABLE 3. Number, status and average % vol/ha of pine trees as determined from cruise lines in mountain pine beetle-infested stands, Cariboo Forest Region, 1983.

Location	Percent of Trees/Ha					Average % of Volume/Ha				
	Healthy	Current	Partial	Red	Grey	Healthy	Current	Partial	Red	Grey
Km 111 Redstone	33	39	6	11	11	17	48	8	18	9
Km 131 Redstone	80	7	0	13	0	71	12	0	17	0
Km 135 Redstone	61	34	1	0	4	39	58	2	0	1
Chilko R.	51	25	14	2	8	27	45	12	3	13
Puntzi L. West	58	40	1	1	0	48	49	1	2	0
Puntzi Mtn.	32	40	8	18	2	20	37	11	29	3
Puntzi L. North	54	31	9	5	1	44	35	8	9	4
Cochin L.	36	60	4	0	0	23	75	2	0	0
Lingfield Cr.	23	44	9	21	3	14	43	9	33	1
Chilko R.	73	23	4	0	0	66	32	2	0	0
Km 37 Palmer L.	78	15	2	3	2	71	20	3	3	3
Alexis L.	65	29	5	0	1	50	43	5	0	2
Gaspard Cr.	76	21	0	1	2	63	31	0	3	3
Mons L. Rd.	38	42	2	14	4	25	50	3	29	3
AVERAGE	54	32	5	6	3	41	41	5	10	3

Three cruise lines established along the Little River drainage, northeast of Cariboo Lake revealed no 1983 attack. Examination of 1982 attacked trees (i.e. red trees) in September showed ultimate instar larvae, pupae and teneral adults under the bark, indicating a two-year life cycle.

Typically, the peak flight and attack of the mountain pine beetle is in the period from late July to mid-August, corresponding to a 1-year life cycle. However, as brood development, emergence and flight activity are all temperature dependent, the length of the life cycle, the timing of emergence and the attack period can vary considerably from year to year, especially in cooler areas.

Beetle development was delayed in the Little River area probably as a result of cool weather. As well as resulting in a marked decrease of 1983 attack, broods will be exposed to predation by other insects and woodpeckers for a longer period which may reduce the population further. Close monitoring of the population status in 1984 will determine the impact of this development slowdown.

Pine needle casts, Lophodermella concolor, Dothistroma pini,
Phaeoseptoria contortae

For the third consecutive year severe discoloration of two-year old pine foliage by Lophodermella concolor was most notable over widespread areas east of the Fraser River in the conversion zone and moderate intensities west of the Fraser River to Tatla Lake with severe patches near Big Creek, Alexis and Puntzi lakes. While Lophodermella concolor was the main pathogen of the discolored foliage, Dothistroma pini was also present at varying intensities.

Infection of one-year old needles by Phaeoseptoria contortae was prevalent in one pine plantation near Boss Creek. This was the first identified incidence of the disease on lodgepole pine in British Columbia. It was identified on lodgepole pine in southwestern Alberta in 1965.

Infection by these needle casts are greatly favoured by moist conditions. New host needles are infected by windborne and rain-splashed spores in early summer. Symptoms of the disease appear the following year when needles turn brown and the trees take on a scorched appearance. Continued severe infection may be expected in 1984.

SPRUCE PESTS

Spruce beetle, Dendroctonus rufipennis

The area of mature white spruce mortality killed by spruce beetle decreased to 4 000 ha from 10 000 ha in 1982. The largest infestations were in Bowron Lake Provincial Park over 830 ha, Bowron SB over 1 280 ha, and in the Cottonwood SB over 960 ha. Smaller infestations also occurred in the Quesnel TSA including Bowron Unregulated (128 ha); Cunningham SB (192 ha) and Cottonwood SB (192 ha). In the 100 Mile TSA, 384 ha of recent mortality was recorded in the Canim SB and over 128 ha in Upper Horsefly SB in the Williams Lake TSA.

Moderate to severe attack in 1984 may be expected in the Upper Ketchum and Big Creek drainages based on the following: brood counts from 15 x 15 cm bark samples revealed high populations at sample areas along "2400s" and "24k" roads near the Regional boundary. From 10 trees sampled at each location there was an average of three attacks and an average of 30 pupae per sample (range of 24-36 pupae). Seventy-five percent of the samples contained pupae, the remainder, ultimate instar larvae. Current attack was observed mostly in previously attacked stems and occasionally in unattacked stems.

Decreasing numbers of attacked stems have been noted in the Bowron Lake Provincial Park, and the Hendrix Lake area for the past two years; a continuing decrease is expected in 1984.

Two-year cycle spruce budworm, Choristoneura biennis

Bud counts on alpine fir in May in the upper Willow River drainage revealed from 3 to 12% infested buds along Big Valley Creek and from 15 to 37% along Willow River from the confluence of Big Valley Creek and Willow River to Nitaga Creek. Further south near Wells, Little River, Grain Creek near Quesnel Lake and Hendrix Lake, less than 5% were infested.

Three-tree beating samples at the latter three locations in June yielded low numbers of larvae (average 3.5 per sample) but near Willow River-Crescent Lake, 20 and 30 larvae per sample were collected with trace defoliation in localized areas, the only defoliation observed in the Region.

Four sets of 15 traps, baited with 96% trans-11-tetradecenal and 4% cis-11-tetradecenal pheromone in three concentrations by weight (0.1%, 0.01%, 0.001%) were located near Willow River, Little River, Grain Creek and Hendrix Lake to determine adult population status. Low numbers were expected because 1983 is a "non-flight" year, when young larvae hibernate overwinter and complete their development cycle to adults in 1984.

TABLE 4. Average number of male moths caught in traps baited with one of three concentrations of pheromone, Cariboo Forest Region, 1983.

Location	Pheromone concentration		
	.001	.01	.1
Willow River	2	5	37
Little River	0	3	45
Grain Creek	4	7	66
Hendrix Lake	0	4	15

Although there has been insufficient data accumulated to determine the significance of numbers of two-year cycle budworm moths caught in traps, they do indicate continuing populations. Based on the percentage of infested buds counted on alpine fir it is expected that light to moderate defoliation will occur in the upper Willow River area in 1984.

ALPINE FIR PESTS

Balsam bark beetle, Dryocoetes confusus

The number of bark beetle-killed trees in the Chilcotin SB declined to 1125 trees from 5600 in 1982. These were scattered along Franklin Arm, Farrow, Cheshi, Edmond, Ottarasko and Notituko creeks and Lord River near the south ends of Tatlayoko, Chilko and Taseko lakes. Near the southeast corner of Bowron Lake Provincial Park, 160 trees were counted along the upper Cariboo River, 75 along Lanezi Lake and 220 along Betty Wendall Creek.

Alpine fir tree mortality was noted by BCMF staff during aerial surveys south of Tisdall Lake, near Timothy Mtn., along the north slopes of Viewland Mtn. and along Watt Creek in the Upper Horsefly, Rail, and Junction supply blocks, however, numbers are not available.

DOUGLAS-FIR PESTS

Douglas-fir beetle, Dendroctonus pseudotsugae

Areas within which Douglas-fir beetle caused tree mortality remained near static, with 18 800 ha recorded in 1982 and 19 000 ha in 1983, based on BCMF data.

TABLE 5. Distribution and area of Douglas-fir bark-beetle killed trees by Timber Supply Area (TSA) and Supply Block, Cariboo Forest Region, 1983.

TSA	Supply Block	Area (ha)
Williams Lake	Palmer Lake	65
	Gaspard	3 585
	Churn	1 985
	Springhouse	6 550
	Skelton	130
	Cariboo	65
	Moffat	130
	Military Blk.	1 530
	SUBTOTAL	14 040
100 Mile	Meadow	4 670
	Rail	130
	SUBTOTAL	4 800
Quesnel	SSA	190
TOTAL		19 030

Western spruce budworm, Choristoneura occidentalis

Western spruce budworm defoliated an estimated 18 500 ha of Douglas-fir forest in 1983; 7 900 ha severely, and 10 600 ha lightly. Severe defoliation occurred along Hart Ridge, north of Loon Lake to Bonaparte River and south of Loon Creek along the north-facing ridge to Hwy. 97 (Map 3). Light defoliation was evident on the west slopes of Tsilsalt Ridge to Clinton, along the Microwave Hill north of Clinton to Mile 57 on Hwy 97, and along Bonaparte River to the oil pipeline crossing southwest of Fly Creek.

Douglas-fir buds were examined in May at four locations which were lightly defoliated in 1982. Near Big Bar Lake Road and Hwy 97 north of Clinton, 27% of the buds were infested; 60% along Bonaparte River at the north end of Hart Ridge; 70% at south Hart Ridge and 56% at Loon Lake. Based on the criteria that 20% of the buds infested would result in defoliation of the current year's growth, defoliation was expected to increase in all areas sampled.

The average number of larvae per standard three-tree beating sample in June in infested Douglas-fir stands were 150 larvae per sample and ranged to 450. Six samples of 100 larvae were collected from Hart Ridge, Big Bar Lake and Loon Lake during early instar and prepupal stages to determine parasitism and disease incidence.

TABLE 6. Percentage parasitism of early and late instar western spruce budworm populations at three locations, Cariboo Forest Region, 1983.

Location	<u>Glypta</u> <u>fumiferanae</u>	<u>Apanteles</u> <u>fumiferanae</u>	Unidentified diptera	% Total
<u>Bonaparte R.</u>				
early instar larvae	26	10	0	36
late instar larvae	17	3	0	20
<u>Big Bar L. Rd.</u>				
early instar larvae	6	0	0	6
late instar larvae	11	0	7	18
<u>Loon Lake</u>				
early instar larvae	46	7	0	53
late instar larvae	47	0	1	48

While percentage parasitism was relatively high at Bonaparte River and Loon Lake, a much higher level would be required for parasitism to have a significant impact in reducing populations.

Fifteen traps (5 per concentration) baited with pheromones at three concentrations by weight (0.1%, 0.01%, 0.001%) were located along north Hart Ridge to determine adult male budworm flight densities. A total of 914 moths, down from 1,146 moths in 1982, was caught with averages of 104 at 0.1%, 66 at 0.01%, and 26 at 0.001% which indicated continuing populations in 1984.

Two branches from mid-crown of each of 10 trees were collected in September at four locations near Clinton to determine the number of egg masses present and to predict population trends and damage potential in 1984 (Table 7). The number of egg masses per 10 m² of foliage indicated that severe defoliation may be expected along north and south Hart Ridge and near the junction of Hwy. 97 and Big Bar Lake road and moderate defoliation near Loon Lake.

TABLE 7. Number of egg masses per 10 m² of foliage and predicted defoliation of Douglas-fir by western spruce budworm in 1984, Cariboo Forest Region, 1983.

Location	Number of Egg Masses, ¹ per 10 m ² of foliage	Predicted Defoliation for 1984
North Hart Ridge	254	Severe
South Hart Ridge	183	Severe
Big Bar Lake Rd.	320	Severe
Loon Lake	59	Moderate

¹Categories: Light 1-50 egg masses per 10 m² of foliage
 Moderate 50-150 egg masses per 10 m² of foliage
 Severe 151+ egg masses per 10 m² of foliage

Unless there is severe mortality of overwintering or early instar larvae, continued defoliation and expansion of existing infestations may be expected.

Douglas-fir tussock moth, Orgyia pseudotsugata

Severe defoliation of Douglas-fir was confined to three patches over 170 ha of valley-bottom trees along Hwy. 97 south of Three Mile Lake.

Three tree beating samples in June in these stands yielded 300-400 tussock moth larvae per sample. Light populations (1-50 larvae per sample) were collected with high numbers of western spruce budworm along east facing slopes of Tsilsalt Ridge to Clinton, along Hart Ridge and north of Loon Creek to Loon Lake.

Examination of 70 Douglas-fir trees at each of three stands between Clinton and Kay Creek yielded no egg masses in September. Reports of severe viral infection in tussock moth populations south of Kay Creek to Cache Creek in the Kamloops Region substantiate low egg counts and indicate population collapse in 1984.

Needle casts of Douglas-fir, Phaeocryptopus gaumanni
Rhabdocline pseudotsugae

Infection of all but current year's needles by Swiss needle cast, Phaeocryptopus gaumanni severely defoliated patches of immature Douglas-fir from Likely to Quesnel along the Quesnel River. Defoliation was confined to the lower crown of trees.

Needle infection of Douglas-fir caused by Douglas-fir needle cast, Rhabdocline pseudotsugae was more evident in 1983 than in 1982. Moderate to severe browning of patches of Douglas-fir was evident in the Clinton area at four widespread locations, Caspard Creek drainage and near Squawk, Sulphurous and Drewry lakes.

Spores of needle casts require considerable moisture to germinate; because of this, and since infected needles are not killed and cast until the following year, the disease is most visible following wet years. Only current season's needles are susceptible. There is considerable variation in the susceptibility of Douglas-fir to these diseases. In general, coastal Douglas-fir is less susceptible than interior variety and local seed sown stock is less susceptible than offsite stock.

Increased occurrence and density of infected trees may be expected in 1984 for both P. gaumanni and R. pseudotsugae.

HEMLOCK PESTS

Western hemlock looper, Lambdina fiscellaria lugubrosa

Populations of western hemlock looper increased in 1983. In the eastern portion of the Region from Hendrix Lake north to Little River, 98% of western hemlock collections under 975 metres elevation contained larvae with an average of 122 per sample. In the same area, 48% of alpine fir collections contained an average of 30 larvae per sample and 30% of Douglas-fir collections contained an average of 3 larvae.

Centres of high populations in June were in decadent hemlock-cedar stands under 975 metres elevation along Quesnel Lake, with a range of 150 to 480 larvae per three-tree beating sample; however, by mid-July numbers decreased to 50-100 larvae per sample. About 400 larvae were examined to determine parasitism and disease incidence in the population. One parasite was found but there was also a light incidence of a nuclear polyhedral virus and an Entomophthora fungal disease detected in the population. These diseases may have been responsible for the decline in numbers of larvae by the end of July which resulted in trace defoliation in these stands by September.

Egg sampling in infested stands near Abbot and Grain creeks was completed in September to determine egg population density and viability. A minimum of 100 grams of lichen were collected from each of five dominant western hemlock trees at each of 2 locations. The eggs were isolated from the lichen by the use of a hot water wash, and finally deposited on absorbent paper, and the number of eggs per 100 grams of lichen was calculated. Based on the criteria that 5-26 eggs per 100 grams of lichen results in light defoliation, 27-59 moderate and 60+ severe, light defoliation may be expected at Abbot Creek and a trace of defoliation near Grain Creek in 1984.

A Sawfly on Western Hemlock, Neodiprion sp.

Thirty-eight percent of western hemlock collections yielded an average of 18 sawfly larvae per sample. The maximum, 50 larvae, near Grain Creek north of Quesnel Lake caused only minor defoliation. However, an increased population in the area indicated light defoliation could occur in 1984.

DECIDUOUS PESTS

Forest tent caterpillar, Malacosoma disstria

The forest tent caterpillar severely defoliated trembling aspen over 400 ha along the south facing slopes of Black Mtn., east of Horsefly and 10 ha near Forest Grove. Areas of defoliation noted near Bonaparte and Bridge lakes in 1982 showed no damage in 1983. Defoliation in the Black Mtn. area will likely persist in 1984.

Canada

Environment Canada
Canadian Forestry Service
Pacific Forest Research Centre
506 West Burnside Road
Victoria, B.C., V8Z 1M5
(604) 388-3811

1984