

# **Forest Insect and Disease Conditions**

**Cariboo Forest Region  
1987**

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Government  
of Canada

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Forestry  
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Service  
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forêts

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## INTRODUCTION

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This report outlines the status of about 18 forest pests, monitored by the Forest Insect and Disease Survey (FIDS) in the Cariboo Forest Region in 1987 and attempts to forecast some of their trends. Pests are discussed by host, generally in order of importance.

The Forest Insect and Disease Survey is a nation-wide network within the Canadian Forestry Service (CFS) with the responsibility of producing an overview of forest pest conditions and their implications; maintaining records and surveys to support quarantines and facilitate predictions; supporting forestry research with records, herbaria and insect collections; providing advice on forest insect and disease conditions and developing and testing survey techniques and conducting related biological studies.

The 1987 field season extended from early May to late September. More than 210 insect and disease samples were collected (Map 1) for identification and verification by specialists at the Pacific Forestry Centre (PFC), Victoria. Additional special collections were made for cooperative research programs at PFC. More than 60 contacts and on-site examinations of active pest problems were made, mostly with personnel from the British Columbia Forest Service (BCFS) and industry.

Major forest pests were mapped (Map 1) mainly at 1:100 000 scale during 10 hours of fixed-wing and 7 hours of helicopter aerial surveys provided by BCFS; an additional 5 hours were funded by CFS-FIDS. Additional maps were provided by BCFS regional pest management staff.

The cooperation and assistance provided by personnel of the BCFS, B.C. Ministry of Environment and Parks and industry is gratefully acknowledged.

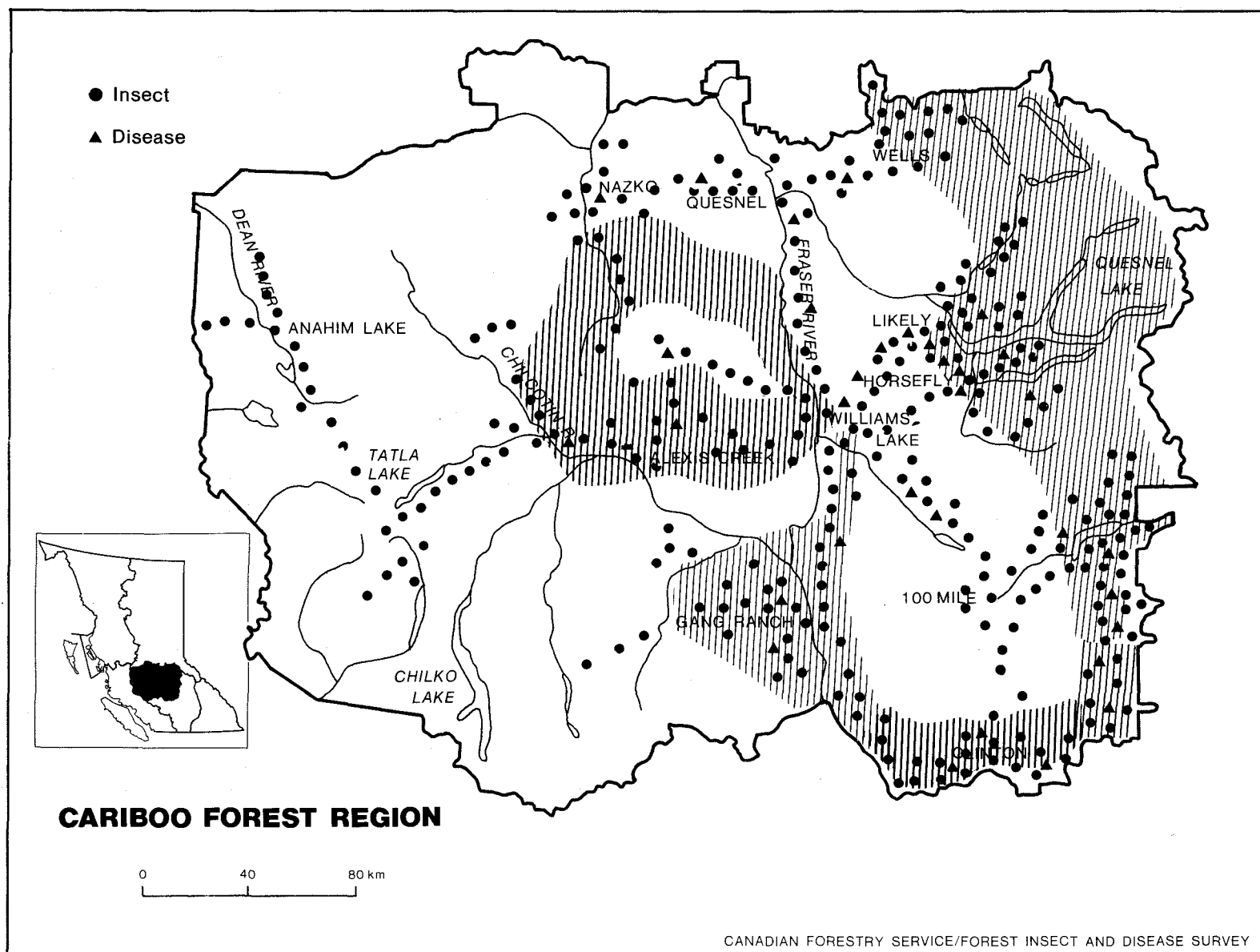
The Forest Insect and Disease Survey of the Canadian Forestry Service has conducted an annual survey of forest pest conditions in the Cariboo Forest Region since 1972 when the region was established. A field station at Williams Lake is the FIDS base during the field season (between May and October) and where correspondence or telephone messages may be directed. The address is:

Canadian Forestry Service  
Forest Insect and Disease Survey  
Box 4354, Williams Lake, B.C. V2G 2V4      Ph. 392-6067

From October to April the field station is closed and the FIDS ranger is located at Headquarters for the Pacific and Yukon Region at:

Canadian Forestry Service  
Forest Insect and Disease Survey  
Pacific Forestry Centre, 506 West Burnside Rd.  
Victoria, B.C. V8Z 1M5      Ph. 388-0600

Additional copies of this report, larger scale maps of infestations and other publications including national and provincial pest survey overviews, forest pest leaflets and regional pest histories can be obtained from the above address.



Map 1. Areas covered by aerial surveys to map bark beetle and defoliator infestations, and locations where one or more disease samples were collected in 1987

## SUMMARY

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New attacks by mountain pine beetle occurred over 500 ha near Chilko Lake but elsewhere in the region most of the recently dead mature lodgepole pine in 7250 pockets totalling 3400 ha were killed by increased engraver beetle populations. Increased conifer weevils lightly to severely defoliated young pine in three areas. The incidence of leader mortality caused by lodgepole pine terminal weevil declined. Surveys for pinewood nematode continued for the fifth consecutive year but none was found. Mortality and serious defects of young lodgepole pine by Atropellis canker was common west of Williams Lake.

Defoliation of Douglas-fir by western spruce budworm increased for the second consecutive year to over 9 000 ha mostly in the eastern part of the region. Increased populations of a Douglas-fir coneworm lightly defoliated new shoots and infested cones over 625 ha near Williams Lake. The number of mature Douglas-fir killed by Douglas-fir beetle declined for the third consecutive year. Dieback in young Douglas-fir plantations contained several dieback fungi.

Spruce beetle declined for the second consecutive year to the lowest level since 1977. Immature two-year-cycle budworm lightly defoliated spruce and alpine fir over 11 200 ha in widespread areas in the eastern part of the region.

Mortality of mature and overmature alpine fir by western balsam bark beetle increased in the eastern part of the region in numerous pockets totalling 16 000 ha.

Black army cutworm at low levels for the second consecutive year defoliated fireweed but not conifer seedlings east of Quesnel. An outbreak of variegated cutworms near Mitchell Lake collapsed.

There was no evidence of male adult gypsy moth in pheromone-baited sticky traps in forest recreation sites throughout the region. A hardwood trunk rot was prevalent in trembling aspen stands throughout the region. Poplar leaf blight, poplar-and-willow borer and western winter moth all increased from 1986 and caused widespread damage to poplar, birch, and alder, respectively.

## PINE PESTS

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Mountain pine beetle  
Dendroctonus ponderosae  
and  
Pine engraver beetle  
Ips pini

New attacks by mountain pine beetle in mature lodgepole and whitebark pine were confirmed by the British Columbia Forest Service (BCFS) over about 500 ha near Franklin Arm on Chilko Lake (Map 2). This is the first major increase since most populations were killed by below-normal temperatures in 1984-85. Elsewhere in the region there were more than 7 250 separate pockets of recently dead mature pine, most of which were killed by engraver beetle, mapped over a total of 3400 ha.

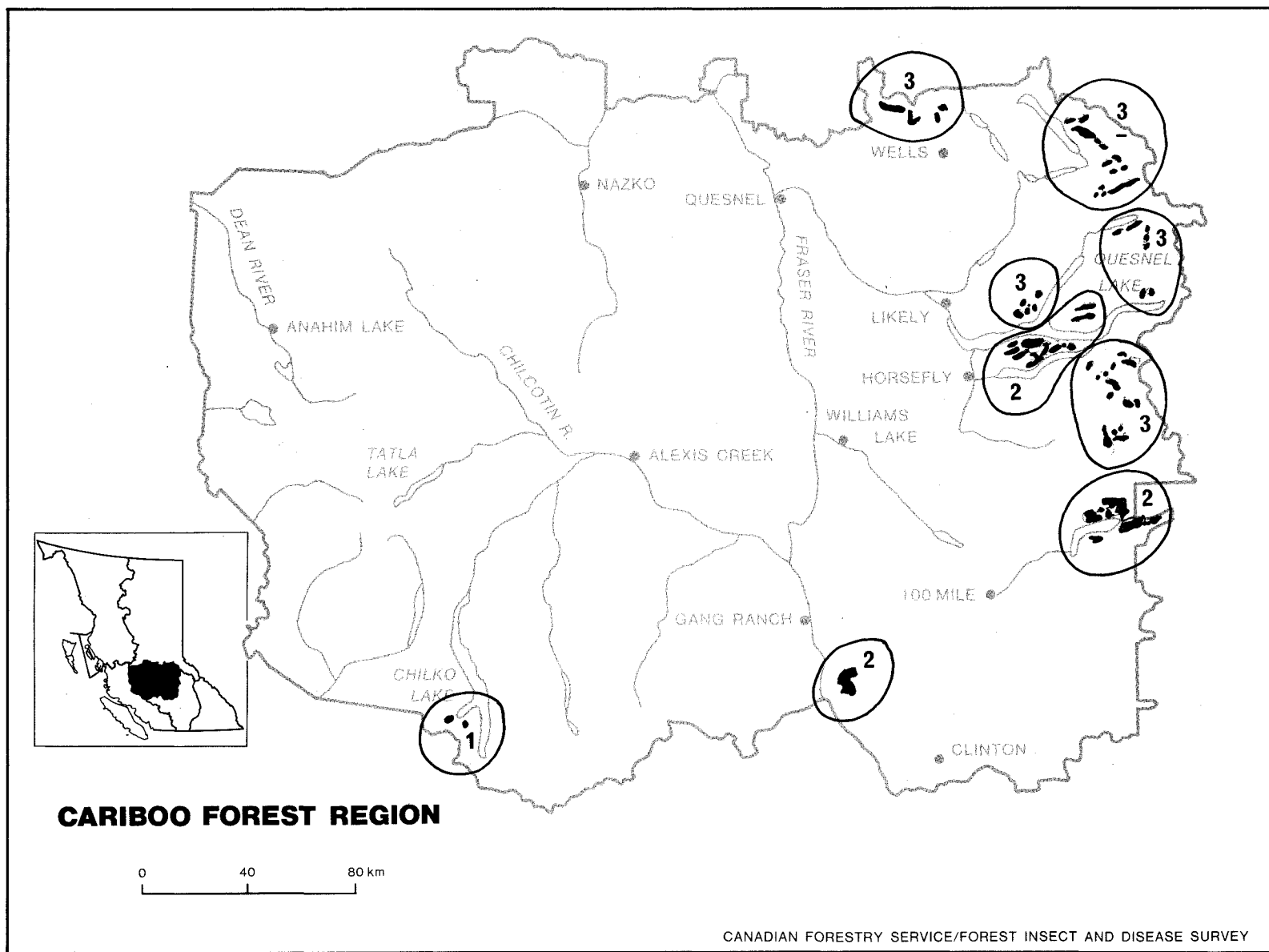
Very small numbers of mountain pine beetle larvae occasionally were found with pine engraver beetle broods in the Gaspard, Big Creek, Palmer Lake and Nazko areas. It is expected that mountain pine beetle populations will increase in 1988.

In late July high numbers of lodgepole pine faders, indicative of recent bark beetle attack, were observed from the air adjacent to recently logged stands in the Mt. Alex area in the Gaspard Creek drainage. Ground surveys of three cutblocks in the area, CP 900 (300 ha), CP 903 (98 ha) and a private sale A26980 (100 ha), revealed extensive slash accumulated in piles and windrows.

Significantly increased pine engraver beetle populations had emerged from the slash and attacked mature pine up to 50 meters into adjacent stands. The greatest intensity of attack, however, was within 15 meters of the cutblock boundaries. Seven stands totalling about 500 ha in the Churn and Big creek drainages, adjacent to areas logged between October 1986 and June 1987, were also heavily infested by pine engraver beetles.

To determine the incidence of recent engraver beetle attack and brood condition, nine cruise strips were run within 15 meters of cutblock boundaries at five of the sites (Table 1). The highest incidence of pine engraver beetle attack was in the Big Creek (37%) and Churn Creek (35%) areas.

Published information on engraver beetle biology in British Columbia is limited; however, observations in the Cariboo Region in 1987 raised several important factors.



Map 2. Areas of (1) pine recently killed by mountain pine beetle, (2) Douglas-fir defoliated by western spruce budworm and (3) alpine fir and spruce defoliated by two-year cycle budworm, detected during aerial and ground surveys.

Table 1. Status of engraver beetle attack at five locations in the Williams Lake TSA, Cariboo Forest Region, 1987.

Location	Date Logged	Average dbh (cm)	Percentage stems/ha			
			1987	attack	Prior to <sup>1</sup>	1987
Gaspard Cr. (CP 900)1	Oct. 1986	19	59	17	23	1
" " " " 2	" "	14	70	14	14	2
" " " " 3	" "	19	59	30	8	3
Mt. Alex (A26980)	June 1987	22	67	0	20	13
White Rd.-Mud Cr.	Oct. 1986	21	48	25	23	4
Big Cr. (CP 906 Blk.2)	Mar. 1987	18	56	5	37	2
Big Cr. (P906 Blk. 1)	Mar. 1987	19	56	22	7	15
Churn Cr.(CP 922 Blk.1)	Nov. 1986	22	53	7	30	10
Churn Cr.(CP 927 Blk.4)	Oct. 1986	19	65	0	35	0
Average		19	59	13	22	6

<sup>1</sup>Primarily old mountain pine beetle-killed trees with old engraver beetle-damaged tops.

There were two separate periods of attack by adult beetles. The first was during early May when overwintering adults emerged from the duff and attacked accumulated slash in logged areas. Some overflow adults from this flight attacked perimeter trees on cutblock edges and in some cases parent adults re-emerged from slash after egg laying and attacked perimeter trees, probably within two weeks of the first attack. There were fewer engraver beetle-attacked trees where cutting boundaries were established through small tree types.

The large broods produced by the first attack successfully developed to the adult stage and emerged in mid-July and attacked additional perimeter trees. The adults fed for 2 to 3 weeks under the bark without mating, then emerged and dropped to the forest floor to overwinter in the duff.

Foliage color change of engraver beetle-attacked trees differs greatly from the accepted norm of most bark beetle-attacked trees. Mountain pine beetle-killed trees change color in the spring following attack; however, trees attacked by engraver beetle in May and July begin to change color within two weeks. Optimum time for cruising and aerial surveys during years of high engraver beetle populations was early August when May-attacked trees are a bright red and July-attacked trees are yellowish, thus showing a clearer definition of attack period.

In September when foliage color was red, July attacks were determined by the high number of recently vacated galleries and high densities of a predacious beetle (Staphylinidae: Aleocharinae). The impact of these predators on the engraver beetle population is not yet known.

To reduce the hazard and damage during years of high engraver beetle populations, accumulated pine slash should be minimized by dispersal or burning prior to beetle emergence in May. Piling pine slash creates optimum conditions



for brood survival because it takes longer to dry out than when left scattered on the ground where it dries faster and is less attractive to beetles. Beetle broods in dispersed slash are often unsuccessful or occur in small numbers. In situations where beetles have infested winter and spring slash, felling of trap trees prior to brood emergence or the use of pheromone baits on nearby trees can help contain attack. These methods, however, have not yet been field tested.

**A conifer weevil**  
**Magdalis gentilis**

Increased weevil populations lightly to severely defoliated the current year's growth of young pine in three areas in the region in 1987. Immature lodgepole pine in 1- to 2-ha patches near recently logged areas in the upper Gaspard Creek drainage were moderately to severely defoliated. Light feeding damage occurred in stands along the 2300 road south of Horsefly and in the Spring Brook area south of Williams Lake, both thinned in 1986. Young adult weevils cause defoliation during maturation feeding, which seldom results in long-term damage other than some increment loss. Adults breed in pine slash in thinned or logged areas. Recent research by the University of British Columbia has indicated that this weevil will attack and produce broods in young lodgepole pine terminals often in conjunction with lodgepole pine terminal weevil, Pissodes terminalis.

**Lodgepole pine terminal weevil**  
**Pissodes terminalis**

The incidence of leader mortality in lodgepole pine regeneration at four long-term study sites in the region declined to an average of 6% in 1987. In 1986, 7 to 28% (average 13%) of the terminals near Big Creek and Raven, Chezacut and Nimpo lakes were infested and killed. Populations are expected to continue but at low levels in 1988.

**Pinewood nematode**  
**Bursaphelenchus xylophilus**

There was no evidence of pinewood nematode in wood or woodborer samples collected by the Canadian Forestry Service, Forest Insect and Disease Survey, in the region in 1987, the fifth consecutive year of detection surveys. The nematode was positively identified, however, in 1986 by Agriculture Canada in wood chips at Quesnel, Williams Lake, 100 Mile House and Clinton.

The 20 wood samples were all lodgepole pine from widespread parts of the region. The 126 adult woodborers, suspected to be vectors of the nematode, were collected mostly from log decks. Most adults were Monochamus scutellatus, of which 21 contained different genera and species of native nematodes which are normal insect or bacterial associates but none were B. xylophilus. Other adults were cerambycids, buprestids and siricids.

**Atropellis canker**  
**Atropellis piniphila**

Severe infection levels by the canker were noted in dense, naturally growing pole-sized lodgepole pine for 1.5 km along the Mackin Creek road near Km 160. About 57% of the trees (average 6.5 cm dbh, range 2 to 15 cm) over a ten-meter square block were infected with from 2 to 5 cankers per stem; 13% of the trees (average 3.4 cm dbh) were killed.

This disease is commonly found in young, dense lodgepole pine stands, particularly in the western portion of the region where young stands are extensive. Tree mortality occurs most often in pole- and sapling-sized trees and, while the pathogen seldom kills large trees, it results in serious defects through malformation, stain and sometimes decay of the bole. Thinning of young stands offers a means of control by weeding-out infested trees.

**DOUGLAS-FIR PESTS**

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**Western spruce budworm**  
**Choristoneura occidentalis**

Western spruce budworm populations increased for the second consecutive year and defoliated mainly the current year's growth of Douglas-fir, Engelmann spruce and alpine fir in mixed stands over 9 000 ha (Map 2) mostly in the eastern part of the region, up from 180 ha in 1986. Mainly light<sup>1</sup> defoliation occurred between Quesnel and Horsefly lakes, near Canim Lake and some moderate<sup>2</sup> defoliation at Mahood Lake. Elsewhere in the eastern part of the region populations increased generally and trace defoliation of new tips was visible only from the ground, near Likely along the Cedar Creek road south of Canim Lake and near Bowers, Machete and Eagan lakes. For the first time since 1979 light defoliation occurred in predominantly Douglas-fir stands on Big Bar Mountain west of Clinton and populations increased and trace defoliation occurred near Km 2 on the Big Bar Lake road north of Clinton where stands were last defoliated in 1985.

Infested buds were examined at 7 locations in May to forecast defoliation intensity for 1987. An average of 55% (range 15-75%) of the alpine fir buds were infested at four locations from Viewland Mountain to Hen Ingram Lake. At three locations near Canim and Mahood lakes, 20 to 75%, average 43%, of the Douglas-fir buds were infested.

Numbers of larvae in standard beating samples in June ranged from 150 to 400 near Quesnel and Canim lakes and ranged from 35 to 50 per sample near Big Bar Mountain. Between 5 to 30 larvae per sample were collected elsewhere, including near Hydraulic and along the Quesnel Forks road and near Likely, along Phinetta Creek east of Lac des Roches and along the Bosk and Canim lakes road near Hendrix Lake.

<sup>1</sup>Light - discolored foliage barely visible from the air, some branch tip and upper crown defoliation

<sup>2</sup>Moderate - pronounced discoloration, noticeably thin foliage, top third of many trees severely defoliated, some completely stripped.

Larval parasitism was 11% at Big Bar Mountain which was too low to significantly reduce populations.

The number of egg masses at each of six locations indicates mostly severe defoliation in the eastern part of the region and moderate defoliation on Big Bar Mountain in 1988 (Table 2).

A sampling method to improve detection of increasing budworm populations by relating larval numbers to moth catches in pheromone-baited traps was initiated in cooperation with the Forest Insect and Disease Survey by Dr. Roy Shepherd of the Pacific Forestry Centre in 1987. Two lightly defoliated stands were selected, one on the lower slopes of Viewland Mountain and the second near Roserim Lake. The number of larvae from each of three 45-cm branch tips on each of 25 trees per site averaged 4 and 11, respectively. The number of adults caught in five pheromone-baited traps at each site averaged 180 and 39 per site, respectively. Additional years of data are necessary, however, before numbers can be correlated with population changes and damage.

Table 2. Number of western spruce budworm egg masses per 10 m<sup>2</sup> of foliage and predicted defoliation of Douglas-fir, Cariboo Forest Region, 1988.

Location	Number of egg masses per 10 m <sup>2</sup> of foliage	Predicted <sup>1</sup> defoliation
Km 95 Big Bar Mt.	89	Moderate
Km 99 Big Bar Mt.	78	Moderate
Mahood Lake	316	Severe
Cedar Cr.	153	Severe
Viewland Mt.	219	Severe
Jacques Lake	278	Severe

<sup>1</sup> 1 to 50 egg masses = light defoliation  
 51 to 150 egg masses = moderate defoliation  
 151+ egg masses = severe defoliation

#### A Douglas-fir coneworm *Dioryctria pseudotsugella*

This coneworm which defoliates current year's growth of Douglas-fir during years of high populations, increased significantly in 1987. The current year's growth of Douglas-fir was moderately to severely defoliated over 430 ha along the south-facing slopes above Williams Lake and over 190 ha along Sheep Creek Hill. Small numbers of western spruce budworm, *Choristoneura occidentalis* were also present in the coneworm-infested areas. The fir coneworm, *Dioryctria abietivorella*, damaged up to 50% of the Douglas-fir cones in the Williams Lake area and 30% near Marguerite and along Moon Road along the west bank of the Fraser River.

**Douglas-fir beetle**  
**Dendroctonus pseudotsugae**

For the third consecutive year, the area of mature Douglas-fir killed by Douglas-fir beetle declined.

Based on aerial survey data provided by the BCFS, trees in pockets totalling 590 ha, down from 650 ha in 1986, were most common near Big Bar Mountain west of Clinton where 100 trees were scattered over about 295 ha. Elsewhere, 30 groups of recently killed trees were widely distributed from the Edge Hills north along the Fraser River to Soda Creek, east of Highway 97. From Lac la Hache south to the Bonaparte River, 46 groups of beetle-killed trees were recorded.

Populations generally are at endemic levels and little change is expected in 1988.

**Douglas-fir dieback fungi**

Douglas-fir in plantations between Km 2 and 9 along the Gavin and Quesnel Lakes road were surveyed for Sclerophoma pithyophila but none was found. Fungi associated with branch mortality isolated from three samples included Gelatino-sporium uncinatum, Phacidium gaeumannii and Valsa abietis.

Top dieback occurred on 27%, 18% and 14% of the trees at Km 2, 4 and 9, respectively, and ranged from 0.3 to 2.0 meters in length. Most of the dieback occurred 2 to 3 years ago but some were 7 and 8 years old. Original stand type in the area was predominantly western red cedar and western hemlock or spruce-alpine fir in wet or dry extremes as secondary species; Douglas-fir was a minor stand component.

A high incidence of Cooley spruce gall adelgid, Adelges cooleyi, infested planted Douglas-fir and spruce at Km 9. Spruce tips were moderately to severely galled and new Douglas-fir needles were discolored.

## SPRUCE PESTS

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### **Spruce beetle** **Dendroctonus rufipennis**

For the second consecutive year, spruce beetle populations declined significantly in the northeastern part of the region and there was no evidence of recently killed mature spruce. Recent blowdown in the east Ketchum area and near Km 2445, however, was attacked this year and contained an average of 8 adults per 900 cm<sup>2</sup> bark sample. This indicates low but potentially damaging populations in 1989 when 2-year-cycle populations mature.

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

Immature 2-year-cycle budworm defoliated spruce and alpine fir stands over 11 200 ha in the eastern part of the region (Map 2), up from 3 700 ha defoliated by immature larvae in 1985, but less than the 21 000 ha defoliated in 1986 by mature larvae. Defoliation was mainly light but widespread in the Big Valley, Willow and Mackay river drainages, in Grain Creek and near Hendrix Lake. Increasing populations infested more than 50% of the alpine fir and spruce buds in those areas and up to 90% along Big Valley Creek.

In the Bosk-Hendrix lakes and Deception Creek areas, western spruce budworm and 2-year-cycle budworm were abundant and could be differentiated only by their size in late June. In many spruce and alpine fir stands near 1200 meters elevation, western spruce budworm larvae were more numerous than two-year-cycle. Based on the high numbers of budworm larvae present in 1987, defoliation by two-year-cycle budworm is forecast to increase in 1988 throughout most of the areas defoliated this year.

## ALPINE FIR PESTS

**Western balsam bark beetle**  
**Dryocoetes confusus**

The area of mature alpine fir recently killed by balsam bark beetle in 1987 increased to more than 16 000 ha from 970 ha in 1986 (Table 3).

Most areas of recent mortality, based mainly on BCFS aerial survey data compiled on Overlay at Pacific Forestry Centre, occurred in concentrated pockets near Hendrix Lake, between Hendrix and Deception creeks, west of Hendrix Lake south of Timothy Mountain and near Jim Creek and Windy Mountain, northeast of Bridge Lake (Table 3).

Table 3. Areas of mature alpine fir killed by western balsam bark beetle, Cariboo Forest Region, 1987.

Map sheet: Locations	No. of groups of recently killed trees	Estimated area (ha)
Quesnel Lake: Timothy Mountain, Hendrix and Deception creeks	168	440
Bonaparte: Jim Creek and Windy Mountain area	110	1155
McBride: Bowron Lake Provincial Park	18	5
Prince George: West of Pantage Lake near Twin Springs Creek	8	2
Barkerville: Bowron Lake Provincial Park	7	2
Anahim Lake: South of Trail Creek, north of Dean River, Upper Clusko River, north of Thunder and Baldstone Mountains and north-northwest of Thunder Mountain	5	5
Quesnel: Upper Udy Creek	1	1
Mt. Waddington: South Chilko Lake	1	5
Total	318	1615

## MULTIPLE HOST PESTS

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### **Black army cutworm** **Actebia fennica**

Black army cutworm populations in the region remained low for the second consecutive year. Low numbers of larvae were reported near Victoria Creek (in CP 425) east of Quesnel where abundant fireweed was very lightly defoliated; there was no damage to newly planted conifer seedlings. An average of 1.6 larvae were found in 45 1000-cm<sup>2</sup> soil samples at 900-1100 m elevation, indicating very low populations.

Larval parasitism was less than 10%. Based on historical records, little change is expected in the status of the cutworm in two-year-old burns mainly in high hazard areas in the eastern part of the region in 1988.

Pheromone-baited traps are being developed in a joint CFS research and FRDA contract to provide more accurate forecasting of cutworm populations in recently burned sites where conifer seedling planting is proposed.

### **Variegated cutworm** **Peridroma saucia**

There was no further damage to conifer seedlings by the cutworm in the region in 1987, following an outbreak in a 93-ha plantation near Mitchell River in 1986 which severely defoliated pockets of newly planted conifers. About 64% of the pupae from the Mitchell River site, analyzed in May this year, had died during the 1986-87 winter; 11% had been killed by predators and 4% had been parasitized. Adults had emerged from the remainder in late 1986 but did not survive the winter.

Five sticky traps, each baited with pheromones developed in Edmonton, were deployed to monitor male adult cutworms at each of the Weld and Bosk fires, near Little River and Bosk Lake. An average of 1 and 5 males were caught per trap per location, respectively, indicating very low populations.

Data based on the numbers of trapped adults in 1987 and pupal data in 1986 and 1987 suggest that the cutworm at Mitchell River were probably introduced with planting stock.

## DECIDUOUS TREE PESTS

Gypsy moth  
Lymantria dispar

As part of a continuing monitoring program to monitor and prevent establishment of this potentially serious defoliator in British Columbia, single pheromone-baited sticky traps were placed by the Forest Insect and Disease Survey in 19 forest recreation and park sites throughout the region, between June and late September; no male adults were caught (Table 4).

Table 4. Locations where single pheromone-baited sticky traps were placed to monitor adult male gypsy moth in the Cariboo Forest Region, 1987.

Location	No. adult males caught
Loon Lake Provincial Park	None
Big Bar Lake Provincial Park	"
Green Lake Provincial Park	"
Lac la Hache Provincial Park	"
Canim Lake Provincial Park	"
Ruth Lake Provincial Park	"
Bridge Lake Provincial Park	"
Horsefly Lake Provincial Park	"
Bull Canyon Provincial Park	"
Tweedsmuir Park Provincial Park	"
Ten Mile Lake Provincial Park	"
Pinnacles Provincial Park	"
Puntchesakut Lake Provincial Park	"
Bowron Lake Provincial Park	"
Cottonwood Provincial Park	"
Barkerville Provincial Park	"
Cedar Pt. Likely Provincial Park	"
Wells Gray - Mahood L. Provincial Park	"
Military Block, Department of National Defence	"



Hardwood trunk rot  
Phellinus (Fomes) igniarius

In response to a request from an international cooperator, samples of living conks of the white trunk rot, the external sign of the disease, were collected at 10 locations from Narcosli Creek south to Green Lake. Extensive staining of the heartwood of young trembling aspen (2-7 cm diameter) and advanced decay and heartrot in older trees was prevalent throughout the region. White trunk rot is the principal factor responsible for the short merchantable life, often only 40 to 50 years, of most trembling aspen stands in the Cariboo.

Other noteworthy pests of deciduous trees which increased in the region in 1987 are listed in Table 5.

Table 5. Other noteworthy deciduous tree pests, Cariboo Region, 1987.

Pest	Host	Location	Incidence
Poplar leaf blight, <u>Venturia populina</u>	Black cottonwood	Region-wide	widespread severe infection and discoloration of groups of 1 - 5 trees
Poplar-and-willow borer, <u>Cryptorhynchus lapathi</u>	Willow	Region-wide	widespread increased populations killed stems along roadsides
Western winter moth, <u>Erannis tiliaria vancouverensis</u>	Birch, Alder	Mahood Lake	light to moderate defoliation particularly to shoreline and fringe trees

### Addendum/Postscript

After more than 33 years with the Forest Insect and Disease Survey the author, Dick Andrews, retired on December 31, 1987. His valuable knowledge and expertise developed from his experience in five forest regions will be missed.

In 1988, Bob Erickson will transfer to Williams Lake from the Kamloops Forest Region where he has represented FIDS since 1983.

Canada