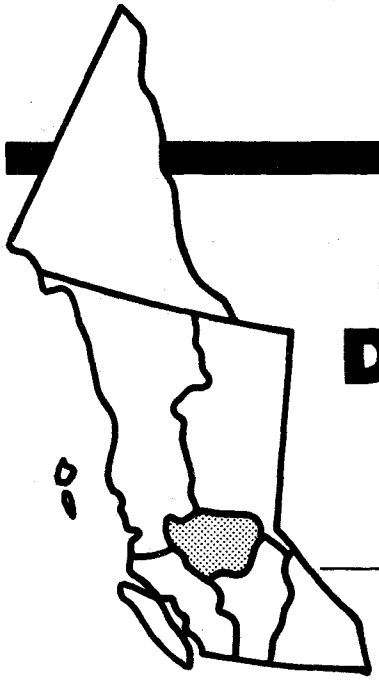

Forest Insect and Disease Conditions

Cariboo Forest Region 1985

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Government of Canada
Canadian Forestry Service

Gouvernement du Canada
Service canadien des forêts

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SUMMARY

This report outlines forest insect and disease conditions in the Cariboo Forest Region in 1985, and attempts to forecast pest populations with emphasis on pests capable of sudden damaging outbreaks. Pests are listed by host in order of importance.

The area of lodgepole pine killed by **mountain pine beetle** covered 189 500 ha, down dramatically from 381 000 ha recorded in 1984. This was due in part to deletion from inventory and aerial surveys of an additional 388 000 ha in the southwest which contained 30% or more gray pine, killed prior to 1983. **Dwarf mistletoe** infection intensities on regeneration lodgepole pine were rated in stands infested by or susceptible to **mountain pine beetle** attack. An average of 76% of the overstory pine trees and 17% of the regeneration in 18 areas examined were infected. Up to 4% of the unsuccessful **mountain pine beetle** attacked trees throughout the Chilcotin were infested by **pine engraver**. **Pine needle diseases** continued to decrease in intensity and incidence in the Region. The incidence of **lodgepole pine terminal weevil** attack increased in the Riske-Big creeks area and along Taseko Lake road.

Mature Douglas-fir killed by **Douglas-fir beetle** were observed on 1 470 ha in 20 supply blocks, a slight increase from 1 300 ha recorded in 1984. **Western spruce budworm** defoliation of Douglas-fir forests expanded significantly in the Clinton area to 29 500 ha from 18 800 ha recorded in 1984. Moderate to severe needle loss caused by **Douglas-fir needle cast** was prevalent throughout the host range in the southern portion of the Region.

The area of recent **spruce beetle** attack in the Bowron Lake Provincial Park and in Big Valley supply block was similar to 2 200 ha in 1984. Light to moderate defoliation by **two-year cycle-spruce budworm** was evident in spruce-balsam stands over 5 940 ha in the upper Willow River-Big Valley Creek area, a significant increase from 200 ha in 1984. Increased populations caused light to moderate defoliation along Matthew River, Wasko Lakes, Horsefly Mtn. and in the Bosk Lake area.

Alpine fir tree mortality caused by the **balsam bark beetle** increased slightly to 455 ha in 15 supply blocks, similar to previous years.

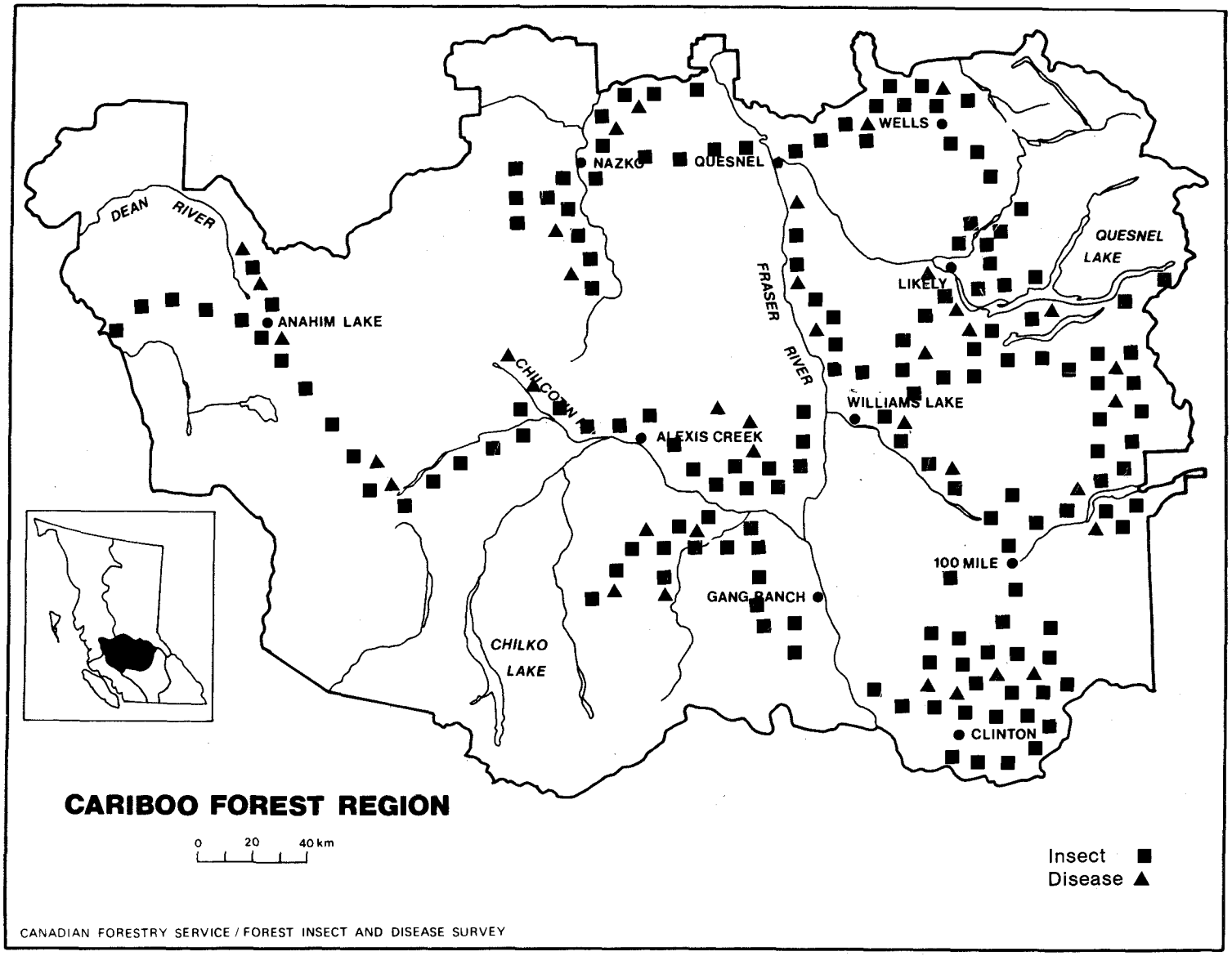
Populations of **western hemlock looper** prevalent in western hemlock and western red cedar stands near Quesnel Lake for the past two years collapsed in 1985. Severe infection by **rust-red stringy rot** caused extensive heart rot throughout mature western hemlock stands near Quesnel Lake. Light to moderate defoliation of western hemlock caused by the **blackheaded budworm** was evident over 4 480 ha near Quesnel Lake for the first time since 1973.

Increased populations of **black army cutworm** caused seedling mortality and severe defoliation to five Douglas-fir plantations in the Likely-Horsefly area.

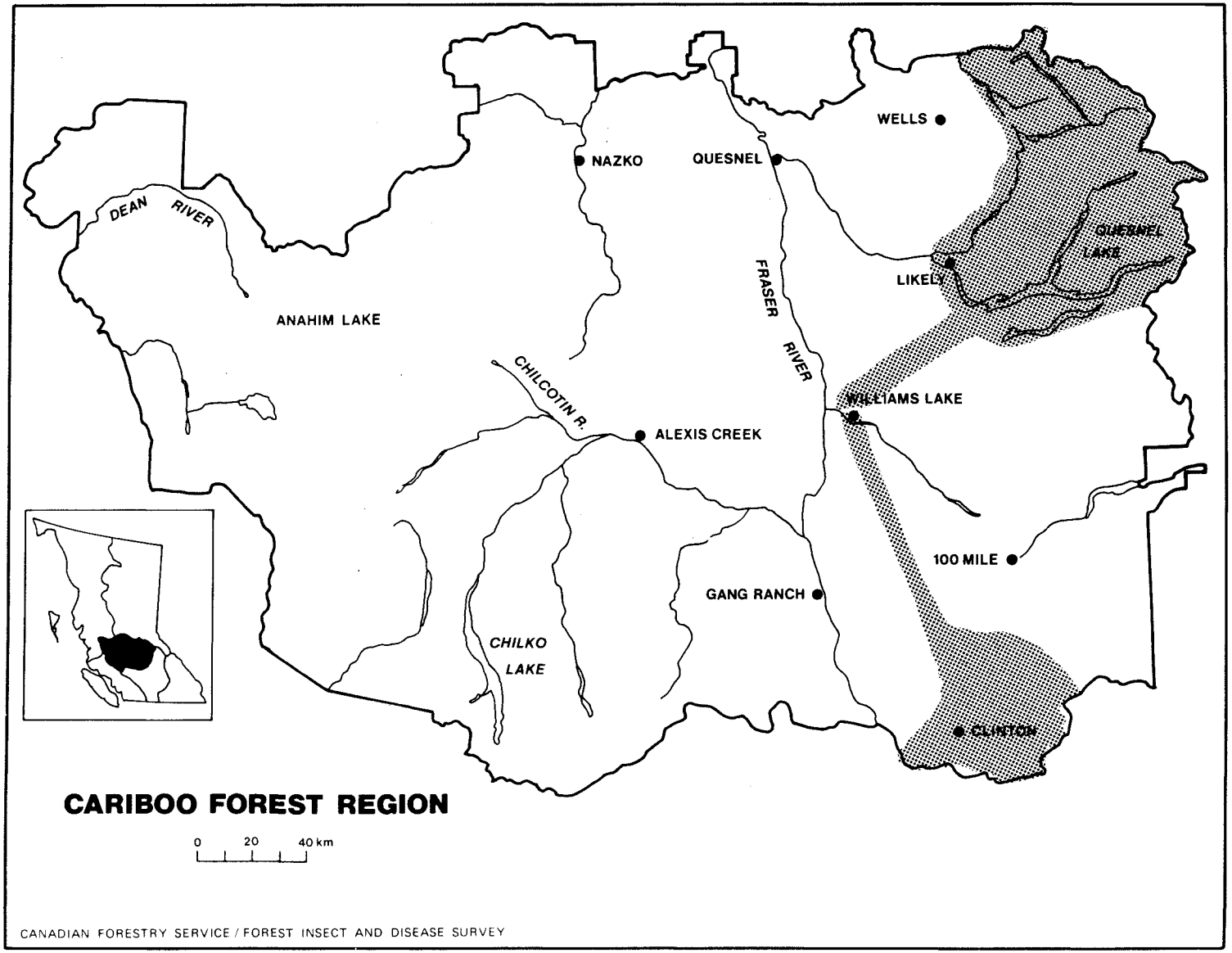
Pheromone-baited sticky traps were set out to monitor **Douglas-fir tussock moth, spruce budworms and pine budworms** at 26 locations throughout the Region, in support of ongoing research to determine geographic distributions and effective levels of attractants. Five pheromone-baited **gypsy moth** traps were set out at each of four locations in the Region in 1985, but no adults were trapped.

The Forest Insect and Disease Survey field season extended from May 24 to August 4. Special surveys to appraise bark beetle and defoliator infestations and lodgepole pine dwarf mistletoe infections were conducted from September 7 to 25. A total of 200 insect and disease collections were submitted to the Pacific Forestry Centre by the Regional Survey Technician and personnel from the Ministry of Forests. Locations where one or more insect and disease samples were collected are shown on Map 1.

Nine and one-half hours of flying time were funded by B.C. Ministry of Forests (Map 2) for aerial mapping in the southern and eastern portions of the Region. Information supplied by the B.C. Ministry of Forests pertaining to bark beetle distribution and intensities obtained from aerial surveys is gratefully acknowledged.



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



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

PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

Aerial surveys conducted by the B.C. Ministry of Forests determined a decrease in area of recent (1984 attack) beetle-caused lodgepole pine mortality throughout the Region from 381 000 ha in 1984 to 189 000 ha in 1985 (Table 2). The apparent reduction is due, in part, to the removal of an additional 388 000 ha, attacked prior to 1984, mapped in five supply blocks in the southwestern section of the Williams Lake TSA. Infestations in this area have been ongoing for the past 13 years causing 30+% tree mortality and the area has been deleted from inventory (Map 3). Eleven of the twelve supply blocks in the Chilcotin portion of the Region showed decreased areas of attack. In the Quesnel TSA, the northward advancement of the infestation resulted in increased areas of attack in the East and West Narcosli and South Kluskus blocks. In the 100 Mile TSA, Meadow, Holden and Loon supply blocks contained the greatest area of recently killed trees, with increased incidence of scattered small groups of killed trees in the Bonaparte, Sheridan, Rail, Ruth and Canim blocks.

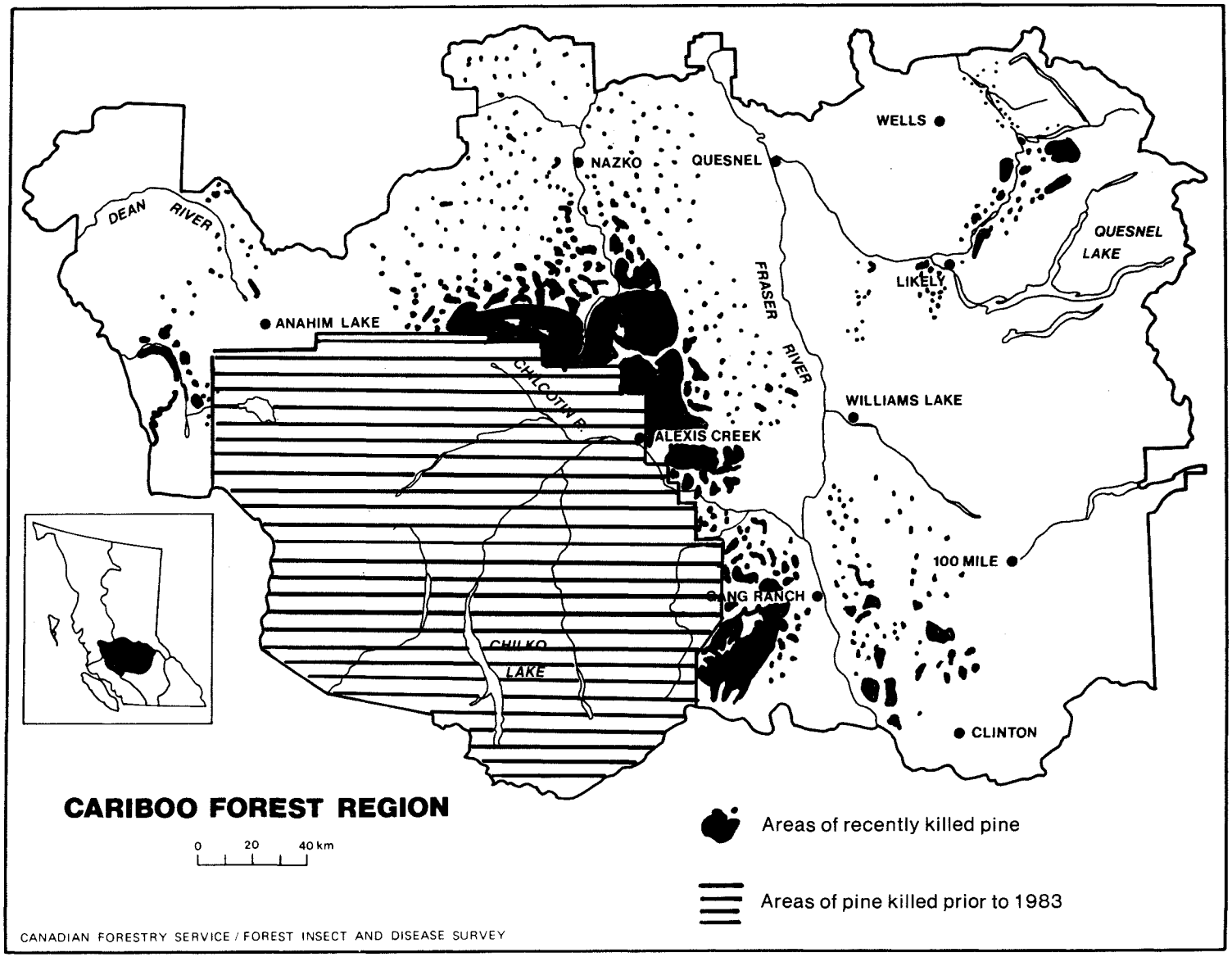
Spring brood assessments in 1984 attacked trees indicated a high incidence of overwintering mortality and a drastic decrease of populations. A 15 x 15 cm bark sample was removed at breast height from the north and south sides of each of 20 trees at 11 locations. The numbers of larvae, pupae and teneral adults and entrance holes were counted and 'R' values computed for each area (Table 1).

Table 1. 'R' values and 1985 population predictions, Cariboo Forest Region, June 1985.

Location	'R' values[1]	Population prediction	% brood mortality
Gaspard Creek	3.6	Static	80
Mons Lake	2.7	Static	80
Km. 45 Palmer Lake Road	0	Decreasing	100
Spain Lake	0	Decreasing	100
Alexis Lake	0	Decreasing	100
Km 15 Taseko Lake Road	0	Decreasing	100
Km 45 Taseko Lake Road	0	Decreasing	100
Km 12 Honolulu Road	0	Decreasing	100
Km 45 Honolulu Road	4.5	Increasing	50
Baezaeko Lake Road	0	Decreasing	100
Little River	2.7	Static	80

[1] 2.5 and less - Decreasing
2.6 - 4 - Static
4.1 + - Increasing

In all plots examined, from 2 to 5 large larvae per 100 cm^2 sample were found at the root crown. However, at breast height 90 to 95% of the broods did not develop beyond the egg stage or early instar. Up



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

to 5% of the attacked trees had fading foliage by mid to late June. This was brought about by the greater than usual number of parent beetle galleries and their introduction of a blue stain fungus. The growth of this fungus effectively cuts off the sap flow. In one area near Km 45 of the Honolulu Road south of Nazko, increasing populations were indicated. Tree diameters here were larger than in other areas (19-32 cm at dbh) and the thicker bark offered greater protection for the broods.

Infestations are described by Timber Supply Area (TSA) and Supply Block (S.B.) (Map 4). Areas of killed timber are as determined from B.C. Ministry of Forests aerial surveys.

WILLIAMS LAKE TSA

1. Anahim S.B.

Small scattered groups of recently attacked trees over 6 000 ha were observed from a line between Kappan and Punkutlaenkut lakes northward to the Regional boundary. South of this line, attack prior to 1983 was observed over 72 000 ha; 52 000 ha where 31+% tree mortality was evident and 20 000 ha where tree mortality ranged from 6 to 30%.

2. Tatla S.B.

Lodgepole pine represents 68% of the mature volume in this supply block and over the past 12 years has been devastated by the beetle. The entire block has been written off as attacked prior to 1983, even though scattered individual trees continue to be attacked. Older mountain pine beetle-killed timber was delineated over 144 000 ha; 110 000 ha with 31+% tree mortality and 34 000 ha where 6-30% of the stems were killed.

3. Chilcotin S.B.

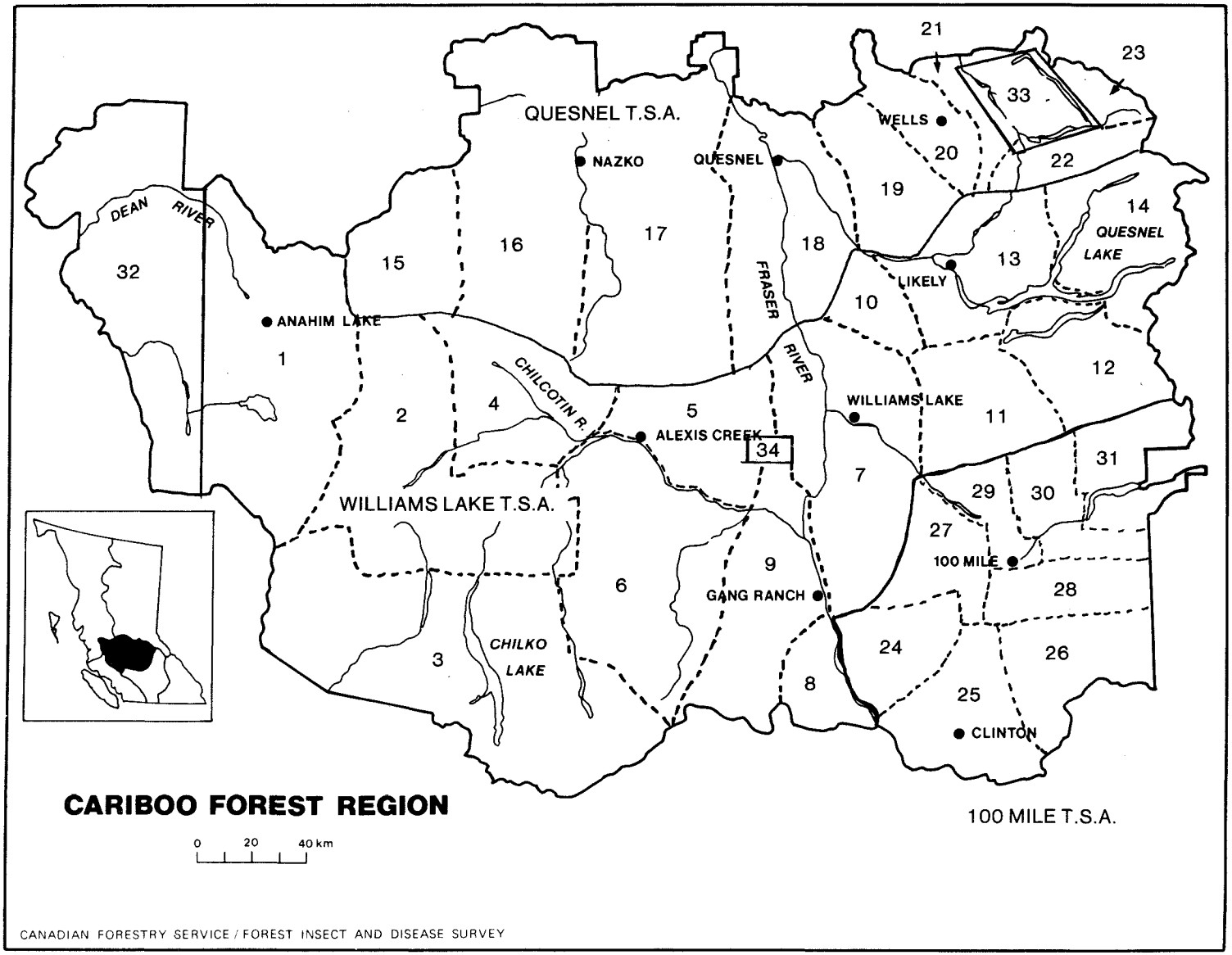
All areas of tree mortality were determined as attack prior to 1983. Total area observed was 31 000 ha; 17 000 ha, mostly in the western portion of the block with 31+% trees killed and 14 000 ha of more scattered attack ranging from 6-30% stems killed in the south and eastern portions of the block.

4. Chezacut S.B.

Recent tree mortality was observed over 18 500 ha, primarily over the northern portion of the Region. The largest concentrations of attack were centered around Thunder Mtn. and Whitetop Mtn. with scattered attack elsewhere. Area of tree mortality prior to 1983 was observed south of the Chilcotin River over 66 000 ha; 4 900 ha with 31+% trees killed and 17 000 ha with from 6-30% stems killed.

5. Palmer Lake S.B.

The area of recently killed trees in this supply block over the past two years has increased from 3 000 ha in 1982 to 63 000 ha observed



Map. 4. Timber Supply Areas and Supply Blocks.

in 1985. While numbers of trees killed are expected to decrease drastically in 1986, stands containing larger trees will probably harbour continuing populations.

6. Kloakut S.B.

Stands in the Pyper Lake area and along the Taseko River have been devastated with up to 80% tree mortality over the past five years. Eastward in the Towydkin and Mons lakes areas, infestations of 50 to 200 ha extended across the supply block, becoming smaller and scattered southward to the Chilcotin Range of the Coast Mountains. Recent attack was observed over 46 000 ha while attack prior to 1983 was mapped over 75 000 ha; 68 000 ha with 31+% stems killed and 7 000 ha where mortality ranged from 6 to 30%.

7. Springhouse S.B.

While recently killed trees were observed over 4 130 ha in 1985, a trend of decreasing populations established over the past two years is expected to continue in 1986.

8. Churn S.B.

This area has sustained five years of attacks along the upper reaches of Churn and Cabin creeks. Recent attack was observed over 2 550 ha in 1985. The largest infestations were noted between Stobart and Churn creeks, south of Cabin Creek and along the upper Little Churn Creek.

9. Gaspard S.B.

In the Gaspard drainage, 15 690 ha of recent mortality was mapped in the Mt. Alex area and south along the east facing slopes to near Churn Creek. Cruising in these stands in September 1985 indicated, however, that less than 1% of the remaining stems were currently attacked and populations are expected to decrease dramatically in 1986.

10. Skelton S.B.

Small scattered groups accounted for most of the mortality in this block. Total area of damage was observed over 747 ha, a decrease from 1 570 ha in 1984.

11. Moffat S.B.

About 570 ha of mature pine in scattered pockets were killed by mountain pine beetle in 1985, down from 1 540 ha recorded in 1984.

12. & 14. Upper Horsefly and Junction S.B.

Lodgepole pine represents less than 10% of the mature volume in these blocks and beetle-caused tree mortality was low.

13. Cariboo S.B.

While lodgepole pine represents only 21% of the mature volume in this block, the stands contain the highest volume of pine in the Region. Mountain pine beetle has depleted these stands along both sides of Cariboo Lake since 1972 and has fostered populations that have spread into the Little, Matthew and Cariboo river drainages to Bowron Lake Provincial Park.

Scattered groups of recently killed trees were observed over 3 030 ha in 1985, from Cariboo River northward in all drainages entering Cariboo Lake. Populations have decreased over the past two years and are expected to decline further in 1986.

QUESNEL TSA

15. South Kluskus

A total of 1 394 ha of tree mortality, consisting of small groups of trees, was observed mostly along the Baezaeko and Coglistiko rivers. Westward, groups of killed trees were less numerous. While this marks an increase of 1 200 ha from that recorded in 1984, a decreased incidence of tree mortality is expected in 1986.

16. Narcosli West

Increasing area of beetle-caused tree mortality has been evident over the past two years along the lower Baezaeko and Nazko rivers in this block. In 1985, area of recently killed pine was observed over 5 860 ha, an increase from 1 730 ha recorded in 1984.

Host material is abundant in stands along drainages and, where above average in volume, will harbour continuing although greatly reduced populations in 1986.

17. Narcosli East

Scattered pockets of infestation were seen over 4 656 ha near Nazko River valley, becoming more sporadic eastward. The infested area more than doubled since 1984. Greatly reduced, but continuing, pockets of infestation may be expected along the Nazko River in 1986.

18, 19, 20, 21. SSA, Cottonwood, Big Valley and Bowron S.B.'s

Recently killed pine was observed in small scattered groups over 200, 150, 85 and 150 ha, respectively, in these blocks. Historically, they have sustained low mountain pine beetle populations because of the diverse timber types. A decreased incidence of damage may be expected in 1986.

22. Cunningham S.B.

The greatest area of mountain pine beetle-killed trees was

observed along Matthew River to Ghost Lake. Scattered small groups of killed trees were also noted near Black Stuart Mtn., along Cunningham Creek and westward along the upper Swift River. Total area of damage was observed over 1 038 ha, a decrease from 4 230 ha noted in 1984.

100 MILE TSA

27. Holden S.B.

Scattered small groups of mortality were widespread throughout the supply block with higher concentrations near Clink and Snag lakes. Tree mortality was observed over a total of 1 787 ha.

24. Meadow S.B.

The largest areas of recent beetle-killed pine were observed along Big Bar Mtn., north of Big Bar Lake and near Rivers Lake. Small groups of killed trees were numerous eastward to Meadow and Gustafsen Lake and were less frequently observed to the Cariboo Highway.

25. Loon S.B.

Groups of killed trees were observed along the Edge Hills, east of the Fraser River, with additional scattered small pockets north of Loon Lake to Bonaparte River. Area with beetle-killed trees totalled 1 205 ha.

26, 28, 29, 30, 31. Bonaparte, Sheridan, Rail, Ruth and Canim S.B.'s

Recently killed trees were observed in small scattered pockets over 88, 26, 85, 50 and 8 ha, respectively, in these blocks.

Table 2. Area and volume of recent mountain pine beetle-killed lodgepole pine as determined by B.C. Ministry of Forests aerial surveys, Cariboo Forest Region, 1985.

TSA and Supply Blocks	Infestation area (ha)	Volume (m^3)
WILLIAMS LAKE		
Anahim	6 060	82 508
Tatla		
Chilcotin		
Chezacut	18 560	253 543
Palmer Lake	63 600	1 019 700
Kloakut	46 000	765 690
Springhouse	4 130	41 930
Churn	2 550	79 720
Gaspard	15 690	344 080
Skelton	750	8 880
Moffat	570	3 530
Upper Horsefly	90	2 080
Junction	5	10
Cariboo	3 030	72 050
SUBTOTAL	161 035	2 673 730
QUESNEL		
South Kluskus	1 390	11 700
Narcosli West	5 860	103 870
Narcosli East	4 660	59 610
SSA	200	1 260
Cottonwood	150	1 740
Big Valley	90	890
Bowron	150	2 960
Cunningham	1 040	22 100
SUBTOTAL	13 540	204 130
100 MILE		
Holden	1 790	13 040
Meadow	4 570	48 540
Loon	1 200	5 650
Bonaparte	90	570
Sheridan	30	130
Rail	80	520
Ruth	50	460
Canim	10	50
SUBTOTAL	7 820	68 960
PROVINCIAL PARKS AND FEDERAL LANDS		
Tweedsmuir Park	5 289	105 780
Bowron Lake Park	870	11 310
Military Block	910	12 049
SUBTOTAL	7 070	129 140
TOTAL	189 465	3 075 960

Cruise strips representative of recently attacked stands were established at 22 locations to assess the number and status of beetle-killed lodgepole pine (Table 3). Current attacks decreased from an average of 24% in the 1984 selected stands to less than 2% in the 22 stands cruised in 1985. Minimum temperatures of -30°C in October and -45°C in December 1984 recorded at Williams Lake Airport, with lower temperature prevalent in the Chilcotin, are believed to be the primary cause of the population mortality. However, a contributing factor was the slower development cycle that was prevalent throughout 50+% of the population brought about by the cool wet summers of 1983 and 1984.

A parallel, in part, to these conditions occurred in 1977-78 and in 1978-79 when temperatures dropped to -28°C in November 1977, followed by -33°C in December. Overwintering brood mortality the following spring reached 95% in samples taken at 4 locations from Riske Creek to One Eye Lake. In 1978-79, temperatures dipped to as low as -60°C for four days. Spring brood sampling by B.C. Ministry of Forests personnel, in the area from Puntzi Lake to Lehman's Ranch, Likely, Tyee Lake and Jesmond revealed from 40 to 100% brood mortality. FIDS sampling at McIntyre Lake, Drummond Lake and Big Creek indicated from 95 to 98% brood mortality, 100% near Tatla-Eagle lakes, and 96% near Cariboo Lake. Nevertheless, surviving beetles emerged in July and caused an increase in the number of currently attacked trees compared to 1978. Following these years, areas of infestation expanded greatly until 1984.

Low temperatures of from -30°C to -45°C recorded in October and December, 1984 and reported lower temperatures in October and November 1985, exceeded the -30°C recorded from 1977 to 1979. The disruption of the normal brood development cycle from 1983 to 1985 was also more evident than reported from 1977 to 1979. Based on these factors and, additionally, the results of overwintering brood studies and fall cruising in 1985, a continuing decrease in infested area is expected in 1986.

Because of the tendency of beetle populations to rebound following severe setbacks such as have occurred in the past two years and the knowledge that there has been an enormous population base in the Region, continuing annual population assessments are imperative. In addition, if an overview aerial survey were conducted during June 1986, 1985 attack, because of its sorrel foliage colouring, could be isolated from previous years attack. With the locations mapped, cut and burn operations would ensure a greater limitation of 1986 attack.

Table 3. Location and status of lodgepole pine in mountain pine beetle-infested stands, Cariboo Forest Region, 1985.

Location	Percent of trees/ha					Average percent of volume/ha				
	Healthy	Current	Partial	Red	Gray	Healthy	Current	Partial	Red	Gray
Gustafsen L.	98	0	0	0	1	98	0	0	0	2
Snag L.	100	0	0	0	0	100	0	0	0	0
Skulow L.	94	1	0	0	5	91	1	0	0	8
Gaspard Cr.	77	1	1	6	15	77	1	1	6	15
Mons L.	84	2	1	1	12	74	3	1	1	21
Km 26 Palmer L.	82	5	1	1	11	75	5	1	2	11
Km 42 Palmer L.	90	2	0	1	6	81	4	0	2	13
Thunder Mtn.	72	0	0	4	24	55	0	0	7	38
Km 20 Taseko L. Rd.	78	4	1	1	16	63	5	1	2	29
Km 34 Taseko L. Rd.	93	0	0	0	7	85	0	0	0	15
Spain L.	91	0	0	5	4	75	0	0	13	12
Km 160 Clusko R. Rd.	90	5	0	3	2	73	11	0	8	8
Km 174 Clusko R. Rd.	84	2	0	10	4	74	3	0	15	8
Morrison Meadows	97	0	0	1	2	92	0	0	2	6
Dean R.	90	1	0	3	6	88	1	0	3	8
Km 18 Honolulu Rd.	85	0	2	0	13	80	0	1	0	19
Km 40 Honolulu Rd.	95	4	1	0	0	91	7	2	0	0
Km 44 Honolulu Rd.	100	0	0	0	0	100	0	0	0	0
Km 1.5 Clisbako Rd.	95	1	1	3	2	85	3	0	6	6
Km 7 Clisbako Rd.	95	1	0	4	0	87	1	1	9	0
Keithley Cr.	33	0	0	8	59	27	0	0	9	64
Average	86	1.6	0.3	2.4	9	76	2.1	0.4	4	13

Lodgepole pine dwarf mistletoe, Arceuthobium americanum

In 1982, surveys to determine the incidence and intensity of dwarf mistletoe infection on regeneration lodgepole pine were conducted beneath seven mountain pine beetle-killed overstory stands in the Tatla Lake area. In 1985, similar surveys were conducted at three sites along Gaspard Creek drainage and at five sites along Palmer Lake Road in the Nazko area and in the Anahim Lake area. In contrast to the 1982 survey where all the locations were or had been severely infested by mountain pine beetle, eight of the 18 locations surveyed in 1985 were free of beetle infestation. However, these stands were in areas that were susceptible to beetle attack given the rate of infestation expansion prevalent from 1979 to 1984.

A series of cruise lines were spaced at ten kilometre intervals along the roads. Along each line, five 50 m^2 (4.0 m radius) circular plots spaced at 50 metre intervals were sampled. All regeneration trees falling within the plot radius were tallied as infected or uninfected (Table 4). Height of the regeneration tree closest to plot center for each quadrant was recorded and the age of the young tree was determined by counting branch whorls. Percentage stocking was determined on the basis that two or more seedlings per quadrant was adequate. A prism sweep from plot center was made to determine the number of overstory trees, their infection rating and mountain pine beetle attack status (Tables 4 and 5). Diameters and heights of 20 overstory trees were recorded for volume assessment.

An average of 76% of the overstory pine from Gaspard Creek to Anahim Lake were infected. On average, stocking was only 74% (range 5-90%) and of this 17% (range 0-60%) was already infected with dwarf mistletoe. There was no apparent correlation between intensity of infection on the overstory to incidence of infection on the regeneration nor the stand density to regeneration density. The most important inference obtained from the survey was that natural advanced understory regeneration in the Chilcotin will not form quality future stands. Management decisions for the use of sanitation procedures are indicated, particularly in severely mountain pine beetle-killed stands.

Samples from dwarf mistletoe-infected stands along Gaspard Creek and Palmer Lake roads, were infected (up to 60% seed production killed) with two hyperparasitic fungi, Wallrothiella arceuthobii and Colletotrichum gloeosporioides, which occasionally restrict dwarf mistletoe plant development. As these hyperparasitic fungi fluctuate in occurrence in wet and dry sites and according to wet and dry years, they may not be a major control agent.[1]

[1]Baranyay, J.A. 1970. Lodgepole pine dwarf mistletoe in Alberta, Dept. of Fish. and Forestry, Can. For. Serv. Publ. No. 1286, 1970.

Table 4. Incidence of mistletoe infection on regeneration and overstory lodgepole pine in 18 stands at four locations, Cariboo Forest Region, 1985.

Location	Regeneration pine			Overstory pine
	Percentage infected[1]	Average % stocking	Age	Percentage infected[2]
Km 10 Gaspard Cr. Rd.	0	55	6	11
Km 20 Gaspard Cr. Rd.	9	75	7	94
Km 26 Gaspard Cr. Rd.	2	90	14	48
Km 9 Palmer L. Rd.	4	75	9	67
Km 20 Palmer L. Rd.	15	85	11	97
Km 20 Palmer L. Rd.	1	85	14	100
Km 43 Palmer L. Rd.	57	85	14	71
Km 53 Palmer L. Rd.	0	5	3	19
Puntchesakut L.	3	25	12	100
10 Km W of Puntchesakut L.	2	85	12	77
Km 4 Honolulu Rd.	3	55	8	89
Km 12 Honolulu Rd.	44	85	17	100
Km 19 Honolulu Rd.	24	25	13	56
Km 13 Dean R. Rd.	26	30	14	62
Km 33 Dean R. Rd.	4	60	19	100
Km 38 Dean R. Rd.	60	75	22	100
2 Km W of Anahim	30	50	10	100
Morrison Meadows	26	65	13	90
Average	17	74	12	76
Pyper L.	2	60	8	
Tatla L.	0	50	16	
Tatla L. South	0	55	10	
Tatla L. West	55	45	25	
Horn L. Rd.	0	20	15	
Clearwater L.	35	60	24	
McClinchy R.	20	65	28	
Anahim	32	-	-	
Puntchesakut L.	47	-	-	
Average	21	50	18	

[1]Percent infection determined on a per plot basis.
[2]Percent infected determined on trees per ha based on prism sweep.

Table 5. Average dwarf mistletoe ratings[1] of lodgepole pine in mountain pine beetle-infested stands, Cariboo Forest Region, 1985.

Location	Non-infested trees	Mountain pine beetle categories: Attacked 1985	Attacked 1984	Attacked Prior to 1984	Average	Severity
Km 10 Gaspard Cr.	0.3	0	1		1	Light
Km 20 Gaspard Cr.	4.2	3.2	2.0		4	Moderate
Km 26 Gaspard Cr.	1.4	0	0.6	1.3	2	Light
Km 9 Palmer L. Rd.	2.5	0	1.1		2	Light
Km 20 Palmer L. Rd.	3.4	4.0	5.0	4.7	6	Severe
Km 29 Palmer L. Rd.	5.6	4.9	5.3		5	Severe
Km 43 Palmer L. Rd.	5.4	5.4	5.0	0.4	4	Moderate
Km 53 Palmer L. Rd.	0.2	0	0		3	Moderate
Puntchesakut L.	2.4	0	0		3	Moderate
10 Km W of Puntchesakut L.	2.3	0	0		3	Moderate
Km 4 Honolulu Rd.	2.8	0	0	3.0	3	Moderate
Km 12 Honolulu Rd.	4.1	0	0		5	Severe
Km 19 Honolulu Rd.	2.7	2.5	0	2.0	3	Moderate
Km 13 Dean R. Rd.	3.2	0	0		4	Moderate
Km 33 Dean R. Rd.	4.7	0	0		5	Severe
Km 38 Dean R. Rd.	5.8	0	0	6.0	6	Severe
2 Km W of Anahim	4.9	0	0		5	Severe
Morrison Meadows	2.8	0	0		3	Moderate

[1]The Six Class Rating System for Dwarf Mistletoe Infection Intensity Ratings:

no mistletoe signs or symptoms	= 0
1%–50% of crown third infested	= 1
51% or more of the crown third infested	= 2

The three ratings for each tree are totalled and averaged for all sampled trees of susceptible species. The average is rounded upward to the next whole number and interpreted as follows:

0	– healthy
1–2	– light
3–4	– moderate
5–6	– severe

Lodgepole pine terminal weevil, Pissodes terminalis

Random roadside counts of regeneration lodgepole pine at 8 sites between Farwell and Gaspard creeks, along the Big Creek access road and along Palmer Lake road from Km 5 to Km 30 showed a range of from 11 to 20% weevil infested. At four sites along Taseko Lake road between Tsuh and Tête Angela creeks, counts of infested leaders ranged from 20 to 27%. Similar random counts conducted along these access roads in 1984 ranged from 3 to 5% leaders infested.

Engraver beetle, Ips pini

High populations of the engraver beetle were found in up to 4% of the unsuccessful mountain pine beetle-attacked lodgepole pine throughout the Chilcotin. Pine trees attacked in 1984 that contained parent adult galleries only were most commonly infested by engraver beetles, but there were occurrences of Ips pini attacking single scattered trees not previously attacked by mountain pine beetle. Observations during September showed attack on scattered lodgepole pine only on the upper stem area which will result in partial canopy reddening of foliage in April to June 1986. Continuing high populations may be expected in 1986.

Pinewood nematode, Bursaphelenchus xylophilus

In the third year of quarantine-related special surveys, there was no evidence of the nematode in 17 lodgepole pine branch and stem samples from symptomatic trees throughout the Region. Similar surveys elsewhere in the Province produced no evidence of this nematode; however, native nematodes were isolated from pine and other coniferous hosts and from woodborer adults.

Pine needle cast, Lophodermella concolor

Needle cast infections of lodgepole pine decreased in area in 1985, following four years of severe widespread infection. However, moderate infection of two-year-old foliage persisted over 50+ ha near Alexis Lake, Big Creek and Puntchesakut Lake. While defoliation has been severe, little damage to the infected advanced regeneration and pole-sized trees is expected.

The northern pitch twig moth, Petrova albicapitana
P. metallica

Single pheromone-baited sticky traps were set out at five locations in the Region in cooperation with Dr. E.V. Underhill of the National Research Council as part of a program in development of sex attractant baits for Petrova spp. (Table 6).

Table 6. Numbers of northern pitch twig moth caught in pheromone traps at five locations, Cariboo Forest Region, 1985.

Location	Elevation (m)	No. of moths trapped	
		P. albicapitana	P. metallica
Cottonwood R.	975	14	0
Likely	975	4	30
Puntchesakut L.	1 067	0	34
Palmer L. Rd. (Raven L.)	1 128	0	8
Hanceville Flats	1 067	0	120
TOTAL		18	192

Distribution of baits in 1984 in Alberta and in 1985 in British Columbia showed a wider range of P. metallica than was previously recorded. In Alberta, P. metallica was trapped above 1 000 m and P. albicapitana below 1 000 m. A summary of results of trapping throughout British Columbia in 1985 was inconclusive in geographic or elevation distribution.

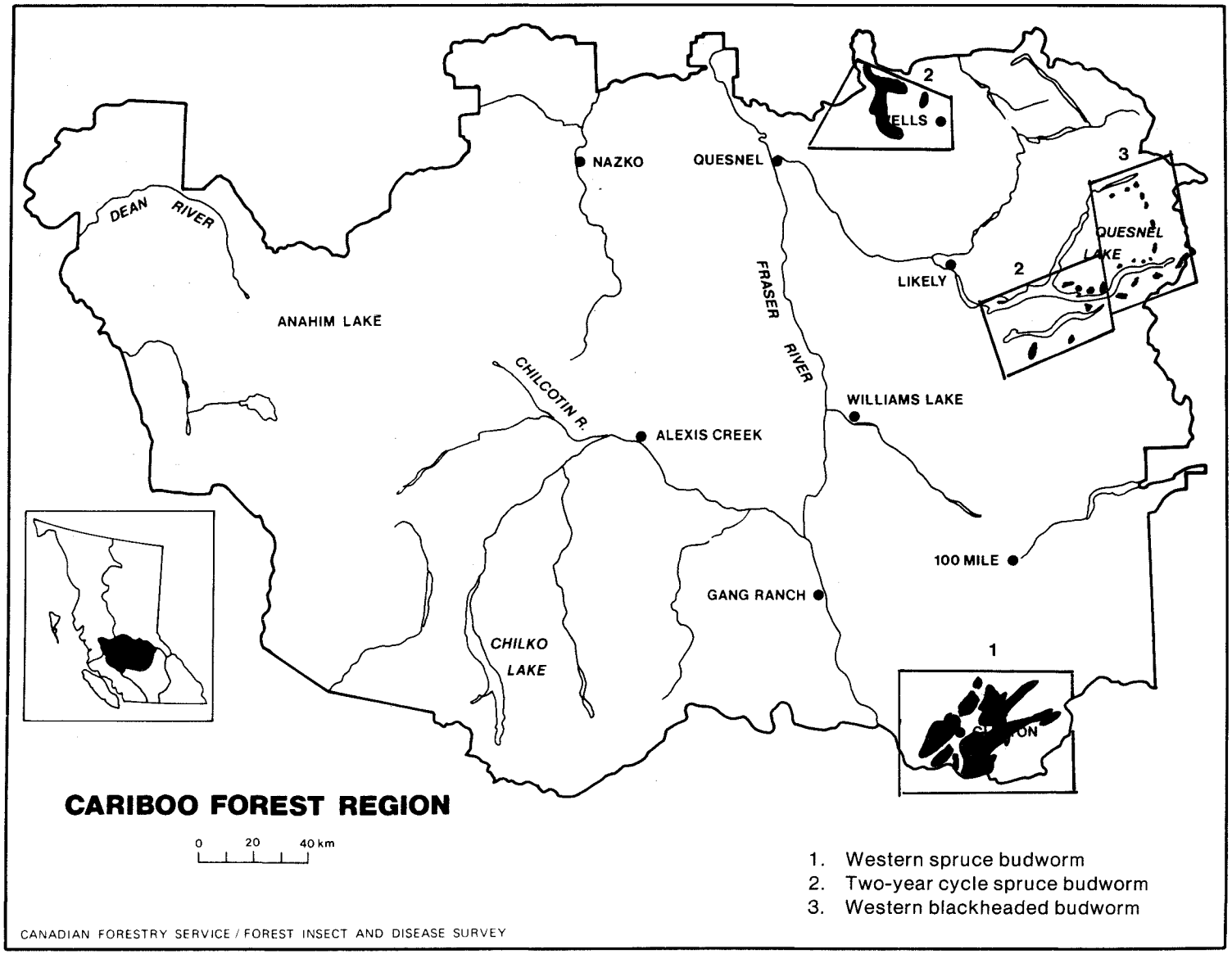
DOUGLAS-FIR PESTS

Western spruce budworm, Choristoneura occidentalis

The area of western spruce budworm-damaged Douglas-fir increased significantly in the Clinton area to 29 500 ha from 18 800 ha in 1984 (Map 5). The increase occurred west of Clinton along the Kelly Lake road, north of Clinton along Highway 97 to 61 Mile and northeast of Clinton along the Bonaparte River to Mt. Grant. A decrease of defoliation was noted in the Loon Lake area.

Early June examinations of 100 buds from each of five trees at four locations from Loon Lake to 70 Mile disclosed that from 24 to 59% were infected. Based on the criteria that more than 20% infested will result in moderate to severe defoliation of current year's growth, continuing defoliation is expected.

Three-tree beating samples throughout previously defoliated stands yielded up to 300 larvae per sample. Beyond the boundaries of previous infestation, increased larval counts were obtained in all collections. Of particular note were collections taken south of Green Lake, near North Bonaparte and along Big Bar Lake which yielded from 150 to 300 larvae per sample, a threefold or more increase from 1984 levels. Eight collections of from 100 to 150 early and late instar larvae from each of four locations were reared to determine parasitism which averaged 6% (Table 7).



Map 5. Areas of recent tree mortality and defoliation detected during aerial and ground surveys, 1985.

Table 7. Parasitism results of reared early and late instar western spruce budworm, Cariboo Forest Region, 1985.

Location and larval instar	No. of larvae reared	Percentage		Adults emerged
		Parasitized larvae	Dead from unknown causes[1]	
Early instar larvae				
Big Bar L. Rd.	75	9	56	35
N. Hart Ridge	75	2	50	48
Microwave Hill (Clinton)	123	13	50	37
Loon Lake	128	14	52	34
Late instar larvae				
Big Bar L. Rd.	150	6	20	74
N. Hart Ridge	92	2	62	36
Microwave Hill (Clinton)	125	2	65	33
Loon Lake	80	3	37	60

[1]Speculated causes of the high mortality rate include removal of larvae from natural environment, travel and rearing methods.

Parasitism by mainly Glypta fumiferanae and to a lesser extent, Apanteles fumiferanae, affected 2% to 14% of the reared larvae and 20 to 65% were killed from other causes. Percentage parasitism decreased from 1984 and will offer little means of population control.

Visual estimates of defoliation damage were conducted on 10 codominant sample trees at each of six locations in September (Table 8). In four previously defoliated stands budworm larvae consumed 94 to 100% of the current year's growth and over the past five or more years 22 to 47% of the older foliage. Along Tin Cup and Grant mountains budworm larvae consumed 39 and 77% of the terminal growth and 10 and 12% of the older foliage. No tree mortality was observed.

Table 8. Appraisal of current and total foliage loss caused by western spruce budworm, Cariboo Forest Region, 1985.

Location	Average percent defoliation	
	Current growth	Total foliage
Big Bar L. Rd.	100	47
Microwave Hill	94	22
Loon L.	97	45
N. Hart Ridge	96	37
Mt. Grant	77	12
Tin Cup Mtn.	39	10
Average	83	28

In 1985, in conjunction with the Damage Appraisal Unit, a two-stand survey was conducted on which to base further surveys to determine damage to advanced regeneration. The first stand examined was located off the main highway north of Clinton, 1.4 km north of Big Bar Lake access road. The stand was multi-aged with an average of 433 overstory trees/ha. Defoliation began in this stand in 1982 and still continues. Average defoliation on overstory trees was 100% and 40% of the current and total foliage, respectively. No regeneration tree mortality attributed to budworm was detected in this overstocked stand. However, many of the young trees appeared weak and dying with average percent defoliation of 100% and 56% for the current and total foliage, respectively. Height growth loss, calculated by comparing actual height to potential height derived from pre-infestation growth, was estimated at 0.17 m or 5.6%. This represented a loss of about 2.5 years of height growth.

The second stand surveyed was along the North Hart Ridge Access Road. This stand, also multi-aged, had an average 558 overstory trees/ha. Defoliation started in 1980. Average defoliation was 60% and 50%, for current and total foliage, respectively. Regeneration stocking was not as high as in Big Bar road area: 2 220 trees/ha. On average, 55% and 49% of the current and total foliage was consumed. Mortality was estimated at 180 trees/ha or 8.1% (Table 9). Height growth loss of the regeneration averaged 0.3 m or 12.5% of the estimated potential height the trees would have reached in the absence of budworm. This represented a loss of about four years of height growth.

A third stand in the South Hart Ridge area was inspected and a visual assessment of the regeneration condition made. It was estimated that most if not all regeneration in this stand was dead.

le 9. Characteristics, mortality and growth loss caused by western spruce budworm in advanced Douglas-fir regeneration in two stands, Cariboo Forest Region, 1985.

Location	Root collar diameter (cm)	Ht. (m)	No. stems/ha Alive	No. stems/ha Dead	% Dead	Defoliation % Current	Defoliation % Total	Ht. growth loss* m	Ht. growth loss* %
1.4 km N of Big Bar L. Rd.	3.5	2.9	10500	0	0	100	70	0.17	5.6
North Hart Ridge	3.0	2.1	2040	180	8.1	93	53	0.30	12.5

*Top-kill + reduced increment

This survey should be expanded in 1986 to include a sample of 2-5% of the defoliated, susceptible stands of the Kamloops and Cariboo Regions. Surveys should consist of (a) quick stocking loss survey and (b) detailed measurement of some 20-30 trees/stand for growth loss determination.

Study plots were established near Loon Lake and along South Hart Ridge in 1979 by the Damage Appraisal Unit to monitor cumulative Douglas-fir tree mortality caused by western spruce budworm. In 1985, along Hart Ridge, 7% of the volume or 29% of the stems/ha have been killed while near Loon Lake 0.5% of the volume or 1.3% of the stems/ha

have been killed. The higher mortality along Hart Ridge in comparison to Loon Lake was attributed in part to the harsher growing conditions and increased defoliation in 1984 caused by high populations of Douglas-fir tussock moth.

Two branches from each of ten trees at six locations were collected and examined to determine the number of egg masses to predict population trends and damage potential in 1986 (Table 10).

Table 10. Number of western spruce budworm egg masses per 10 m^2 of foliage and predicted defoliation of Douglas-fir in 1986, Cariboo Forest Region, 1985.

Location	Number of egg masses per 100 m^2 of foliage	Predicted defoliation 1986
North Hart Ridge	311	Severe
Big Bar L. Rd.	158	Severe
Mt. Grant (Bonaparte R.)	448	Severe
Microwave Hill	149	Moderate
Tin Cup Mtn.	85	Moderate
Loon Lake	27	Light

Based on the criteria that 1-50 egg masses per 10 m^2 of foliage will cause light defoliation; 51-150 will cause moderate and 151+ will cause severe defoliation, light to severe defoliation is expected to occur in 1986.

Douglas-fir beetle, Dendroctonus pseudotsugae

The area of mature Douglas-fir killed by the bark beetle in the Region in 1985 increased slightly to over 1 470 ha from 1 320 ha in 1984. Scattered groups of from 10 to 50 trees were recorded over 240 ha in Churn S.B.; over 380 ha in Gaspard S.B. and over 600 ha in Springhouse S.B., the three largest areas of attack.

Scattered groups of trees will continue to be attacked as long as mature stands exist; however, the persistant use of trap trees will greatly contain populations.

Douglas-fir tussock moth, Orgyia pseudotsugata

Populations which defoliated up to 500 ha between 1981 and 1983, collapsed in 1984 due to a high incidence of a nuclear polyhedrosis virus (NPV). A severely defoliated stand opposite McKay Creek south of Clinton was monitored, beginning in 1984, to determine tree recovery and/or tree mortality and the possible incidence of Douglas-fir beetle attack. A total of 64 trees in eight plots were examined along a compass line. Tree diameters ranged from 7 to 75 cm; most (65%) were less than 20 cm. In 1984, 94% of the trees examined were classified as severely defoliated (67+% defoliation) and the remainder (6%) as moderately defoliated

(33-66%). No tree mortality was recorded but four tree showed no new foliage flush by September 1984. Despite new growth in 1985, 44% of the trees were still classed as severely defoliated, 37% as moderately, 8% as light and 11% were dead. There was no evidence of Douglas-fir beetle attack on the recovering trees. Light defoliation of current year's growth by western spruce budworm was noted in 1984 and in 1985.

To determine pest infestation distribution of Douglas-fir tussock moth populations, five sticky traps, baited with a tussock moth pheromone (z-6-heneicosen-11-one) were set out at each of ten locations throughout the Region (Table 11). No Douglas-fir tussock moth adults were lured to the traps; however, a closely related pine tussock moth, Dasychira grisefacta, was. While numbers of pine tussock moths per trap (11 to 41) indicate relative abundance throughout the Region, FIDS larval beating sample records over the past 30 years revealed few concentrations of larval populations and no records of infestation.

Table 11. Locations and results of pheromone-baited traps set out to determine distribution of Douglas-fir tussock moth populations, Cariboo Forest Region, 1985.

Location	Host Stand type	Dasychira grisefacta Moths trapped	Avg. no./trap
Big Bar L. Rd.	D, lP	153	30
Lac La Hache	D, lP	123	24
Canim Lake	D, lP	166	33
Military Block	D, lP	153	30
Miocene (Bunting L.)	lP	206	41
Hydraulic	D, lP	148	29
McLeese Lake	D, lP	152	30
Alexis Creek	D, lP	91	16
Kleena Kleene	D, lP	133	26
Yuzkli Cr. (Willow R.)	wS, lP	59	11

D = Douglas-fir; lP = lodgepole pine; wS = white spruce

Douglas-fir needle cast, Rhabdocline spp.

The severity and extent of needle infection decreased north of Williams Lake following two years of increasing incidence. Samples and observations from Km 5 Taseko Lake Road, Rayfield Creek, Hutchison Lake and near Jesmond, however, continued to reveal from 1 to 100 ha patches of moderate to severe infection of year-old needles.

SPRUCE PESTS

Spruce beetle, Dendroctonus rufipennis

Spruce beetle-caused tree mortality was observed on 2 160 ha in 1985, similar in location and total to the 2 200 ha reported in 1984. Areas of recent tree mortality were in the Canim Supply Block, 35 ha; Cottonwood, Big Valley, Bowron and Cunningham blocks, 1 090 ha; Cariboo, Upper Horsefly and Junction blocks, 20 ha and Bowron Lake Provincial Park, 1 020 ha. Static or increasing populations are expected in the eastern portion of the Quesnel TSA based on increased blowdown observed in the Bowron Lake Park.

Two-year-cycle spruce budworm, Choristoneura biennis

Increased populations of two-year-cycle budworm were evident in spruce-balsam stands along the eastern portion of the Region from Bonaparte Lake east of Clinton, to the Willow River-Big Valley Creek areas east of Quesnel (Map 5).

In May up to 70% of the buds were infested with early instar larvae along the upper Willow River and in the Big Valley Creek area. This resulted in 80 to 100% defoliation of current year's growth by July. High larval counts (50-150 larvae per sample) in beating samples were collected near Hendrix Lake and near Bonaparte Lake in June. During a limited aerial survey in July, upper crown defoliation was observed over 3 710 ha in the Willow River drainage and over 2 230 ha along the southeast arm of Quesnel Lake and along Horsefly Mountain.

As 1985 is the "off year" when limited feeding by 1st to 3rd instar larvae occurs, heavier feeding by 4th to 6th instar larvae will result in more conspicuous damage over a greater area in 1986.

Cooley spruce gall aphid, Adelges cooleyi

This pest of regeneration Engelmann and white spruce was common on young trees throughout spruce-balsam stands from Hendrix Lake north to Bowron Lakes and Willow River. In the Crooked Lake-Horsefly River areas estimates of infested tips ranged from 20% to 65%.

ALPINE FIR PESTS

Balsam bark beetle, Dryocoetes confusus

Low numbers of alpine fir recently killed by bark beetles persisted in 14 of 30 supply blocks in the Region in 1985, little changed from 1984. Areas of tree mortality occurred in small scattered groups of from 2 to 140 trees over 170 ha in four supply blocks in 100 Mile TSA; over 80 ha in six supply blocks in Williams Lake TSA and over 200 ha in four supply blocks in Quesnel TSA.

WESTERN HEMLOCK PESTS

Western hemlock looper, Lambdina fiscellaria lugubrosa

Epidemic population levels of western hemlock looper, evident for the past two years in overmature western hemlock and western red cedar stands in the Quesnel Lake area, decreased dramatically in 1985. In 1983 and 1984, three-tree beating sample yields ranged from 50 to 450 larvae per sample; in 1985, from 5 to 40 larvae.

During the height of the infestation in 1984, western hemlock looper defoliated an estimated 5 000 ha of western hemlock along the north shore of Quesnel Lake. In 1985, in this area, four patches of overmature trees totalling 640 ha failed to refoliate because of two cumulative years of moderate to severe feeding by the looper. In September a study plot was established in a portion of the affected stand to determine tree damage and possible tree mortality over the next five years following the outbreak (Table 12). The stand was typical of overmature western hemlock, western red cedar stands in this area of the Region. Rust red stringy rot, Echinodontium tinctorium, caused extensive heart rot in 75% of the western hemlock and severe infection by yellow root rot, Poria subacida, and/or crumbly brown rot, Fomes pinicola, were prevalent in similar percentages of western red cedar stems.

Table 12. Crown class and defoliation categories of western hemlock trees defoliated by western hemlock looper near Winkley Creek during 1983 and 1984, Cariboo Forest Region, 1985.

Crown class	No. of trees examined	Defoliation category[1]		
		Light	Moderate	Severe
Dominant	14	3	7	4
Codominant	11	3	2	6
Intermediate	15	0	6	9
Suppressed	12	4	6	2
Total	52	10	21	21

[1] Light - 1–33% defoliation
Moderate - 34–66% "
Severe - 67+% "

Five of the 21 trees comprising the severe category were 100% defoliated or dead. The remaining 16 trees in this class ranged from 67 to 99% defoliation and may die in the next two to four years, considering the low tree vigor of these severely diseased trees.

Blackheaded budworm, Acleris gloverana

Moderate defoliation of western hemlock over 4 480 ha was observed in patches along both sides of Quesnel Lake from Illahee Mtn. and Buckingham Lake to Summit Lake and Blue Lead Creek (Map 5). Light

defoliation was observed northward along Niagara Creek to Christian Lake. This is the first aerially visible defoliation caused by this pest in the Region since 1973.

Forty-seven percent of the alpine fir beating sample collections in the eastern portion of the Region contained an average of 4.7 blackheaded budworm larvae per sample. Visible feeding damage was restricted to the area along the east arm of Quesnel Lake but the consistant incidence of larvae in collections indicates a generally increasing population.

Egg surveys were conducted west of Bouldery Creek and near the mouth of Summit Creek in cooperation with the B.C. Ministry of Forests. Branch samples harboured few eggs, indicating trace populations in 1986.

WESTERN RED CEDAR PESTS

Heart rots, Poria subacida, Fomes pinicola

Heart rots caused by yellow root rot, Poria subacida, and brown crumbly rot, Fomes pinicola, have reduced most large diameter mature western red cedar trees in the Quesnel Lake area in the eastern portion of the Region to only 7 to 12 cm shells for the greater length of the bole. An estimated 60% of the heartwood was decayed in most trees 45-75 cm dbh and dead tops ranging from 10-15 m long are frequent in first growth stands throughout wet belt forests of the Region.

MULTIPLE HOST PESTS

Black army cutworm, Actebia fennica

Increased damage by black army cutworm was prevalent in the Likely-Horsefly area of the Region where 32 recently burned sites were planted in 1985. Seventeen plantations were examined and five of them, predominantly Douglas-fir plantations, were heavily infested. Near Rollie Creek west of Cariboo River, planting had to be curtailed because of severe damage. Three mass collections containing 1 200 late instar larvae were reared to determine incidence of disease and parasitism. There was less than 5% parasitism and no viral infection was determined, indicating a low natural biological control factor and likely a continuing increased population.

After the larval feeding stage, 100+ seedlings were examined along a line through plantations at each of five sites (Table 13) to assess defoliation and bud damage.

Table 13. Defoliation and bud damage of Douglas-fir seedlings in five plantations, Cariboo Forest Region, 1985.

Location	No. of seedlings examined	% seedlings by defoliation class					Percent bud kill		
		0–20	21–40	41–60	61–80	81–100	None	Partial	Complete
Cedar Cr.	145	6	1	1	6	84	9	14	77
Boswell L.	100	0	0	0	1	99	0	11	89
Sellar Cr.	100	4	25	11	16	44	67	16	17
Hen Ingram L.	100	52	2	11	5	30	86	10	4
Rollie Cr.	150	0	0	0	5	95	0	5	95

A cooperative trapping survey with B.C. Ministry of Forests was initiated to determine black army cutworm populations in areas to be planted in 1986. Twelve FIDS traps were located in 1985 planting sites near Gavin, Spanish and Tasse lakes and 30 B.C. Ministry of Forests traps were set out from July 29 to August 9 at 12 proposed 1986 planting sites. The strength of lures used by FIDS was a 1% z-7 dodecenyl and the strength of lure obtained for B.C. Ministry of Forests was an improved pheromone (mixture of z-7-12 acetate, z-11-14 acetate and z-5-14 acetate) used by Dr. D.L. Struble, Crop Entomology Section, Agriculture Canada. The number of moths caught with the improved lures was higher than those caught in the FIDS traps (Table 14).

Table 14. Average number of black army cutworm moths caught in attractant-baited traps at 16 proposed 1986 planting sites, Cariboo Forest Region, 1985.

Location	No. of traps	Avg. no. of moths per trap	Location history	
			logged	burned
BCMF (new lures)				
CPCC	2	20	1982	1983
Cariboo L.	2	12	1983	1985
Boswell L.	3	29	1982	1983
CP 302 Blk 3 & 4	3	20	1983	1984
CP 303 Blk 4 & 6	4	15	1982	1983
CP 317	1	12	1983	1983
CP 111 Shiko L.	3	24	1983	1983
CP 1E	4	30	1983	1984
CP 102 Edney L.	2	23	1982	1983
CP 126 Blk 4 & 8 Gavin L.	2	33	1982	1984
CPE Blk 2A, 2B, Shiko L.	2	46	1982	1982
Bosk L.	2	2	1982	1983
CFS-FIDS - 1% lures				
Km 1605 Gavin L.	3	14	-	-
Km 1606 Gavin L.	3	18	-	-
Spanish L.	3	2	-	-
Tasse L.	3	3	-	-

There is no established interpretation of the number of moths caught and the potential defoliation that may be expected. However, a hazard warning based on these relationships can be gained from trapping and monitoring resultant damage over several years. A sampling method for washing soil samples in early May to determine early populations will be tested in 1986. The results would substantiate the adult trapping program from the previous year and possibly ensure a timely hazard warning prior to planting. The sampling would be done in burned sites most vulnerable to attack based on proximity to previous year's infestation and trapping results. Southerly exposed Douglas-fir plantations below 1 100 metre elevations are believed to be most susceptible.

Epidemic populations of the black army cutworm for the past four years in the Prince Rupert Region has resulted in a hazard warning guideline gained from attractant-baited trapping. The guidelines being developed by Canadian Forestry Service (FIDS) are based on traps placed in uninfested areas that were to be planted the following spring. The average number of moths per trap was interpreted to provide potential damage that may be expected. The categories are suggested as temporary rough guidelines as ongoing research on attractant refinement and trap design improvement will result in revisions.

Table 15. Potential seedling damage guidelines based on moth and pupal counts in the Prince Rupert Forest Region.

Potential seedling damage	Average number of moths per trap	Average pupal counts per 1 000 cm^2[1]
Occasional light bud feeding	10	1–2
General light bud feeding patches of moderate feeding and scattered mortality	11–20	3–9
Major infestation	21+	10+

[1]The potential damage levels are not likely to occur in cutblocks where pupae were counted but in more recently burned areas within flight distance.

Cone and seed pests

A moderate to heavy spruce cone crop was evident in the Region in 1985. Inland spruce cone rust, Chrysomyxa pirolata, was prevalent along the eastern portion of the Region from Bonaparte River to Bowron Lake; up to 25% of the cones near Likely and along Willow River were infected. Significant damage was caused by a spruce cone moth, Cydia strobilella, and a spiral spruce-cone borer, Hylemya anthracina, infested an average of 15% and 18%, respectively, of cones at 9 of 11 locations. Other pests encountered in the examinations were a spruce cone axis midge, Dasineura rachiphaga; a spruce-cone gall midge, Dasineura canadensis, and a spruce seed midge, Mayetiola carpophaga. However, while they may occur in large numbers, they did not cause extensive seed damage.

The Douglas-fir cone crop was near a record low throughout the Region in 1985. One collection near Gavin Lake showed negative pest damage while the only other sample collected in the Tweedsmuir Provincial Park showed 20% of the cones infested with a Douglas-fir cone moth, Barbara colfaxiana.

Abiotic damage

Reddening and wilting of new growth of natural and planted regeneration Douglas-fir, alpine fir and Engelmann spruce were common from Bonaparte River north to Quesnel lake. Damage was typical of late frost. Unless this injury frequently reoccurs, the trees recover, although they make irregular growth.

Hail damage

Widespread scarring and deformation of branches and leaders of 12-14-year-old Douglas-fir trees and lodgepole pine in neighbouring plantations was prevalent in the Niquidet Lake area. The hail wounds were confined to the upper side of the branch and to the side of the main stem facing the storm.

DECIDUOUS TREE PESTS

A white trunk rot, Fomes igniarius

Extensive staining of the heart wood of regeneration trembling aspen (2-7 cm diameter) followed by advanced decay and heart rot in 10+ cm diameter trees was prevalent in trembling aspen stands throughout the Region. Samples taken in the Tatla Lake area, Alexandria, Sheridan and Green lakes areas indicate from scattered tree infection to stands where eight of ten stems examined were infected.

Aspen leaf blight, Venturia macularis

Scattered individuals and small groups of sapling-sized trembling aspens with leaf blotching caused by this disease were common in the Williams Lake and Lac La Hache areas.

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