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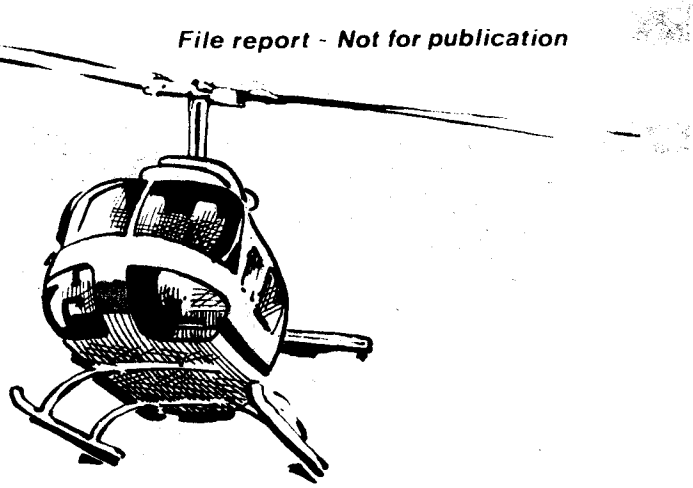
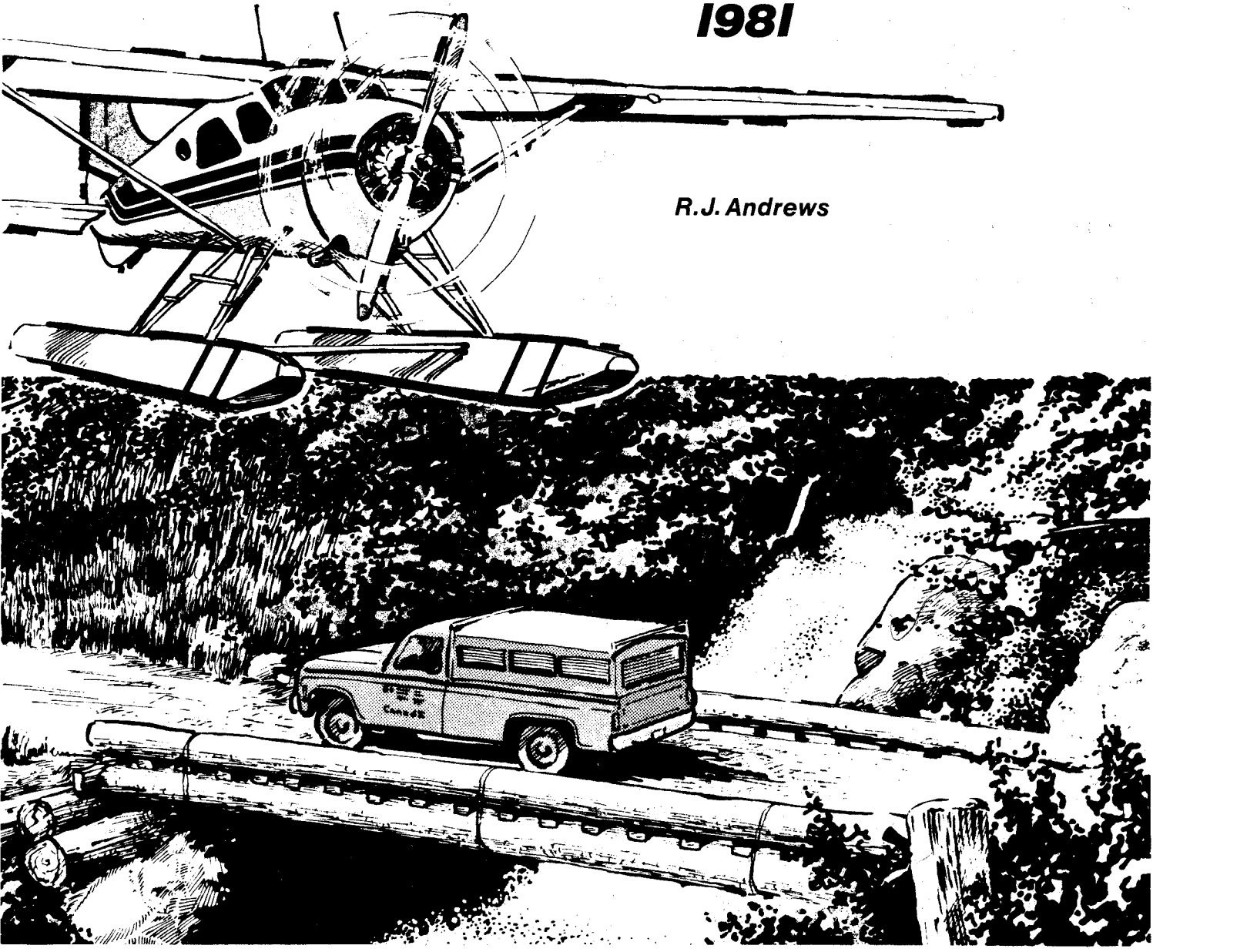


Forest Insect and Disease Conditions

Cariboo Forest Region
1981

R.J. Andrews



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SUMMARY

This report is a presentation of observations and data on an overview basis in an attempt to bring about an awareness of pest problems in the Cariboo Forest Region in 1981. Data may differ from specific surveys conducted by other forestry agencies for use in stand management. Attempts are made to forecast population trends and are listed by importance according to hosts.

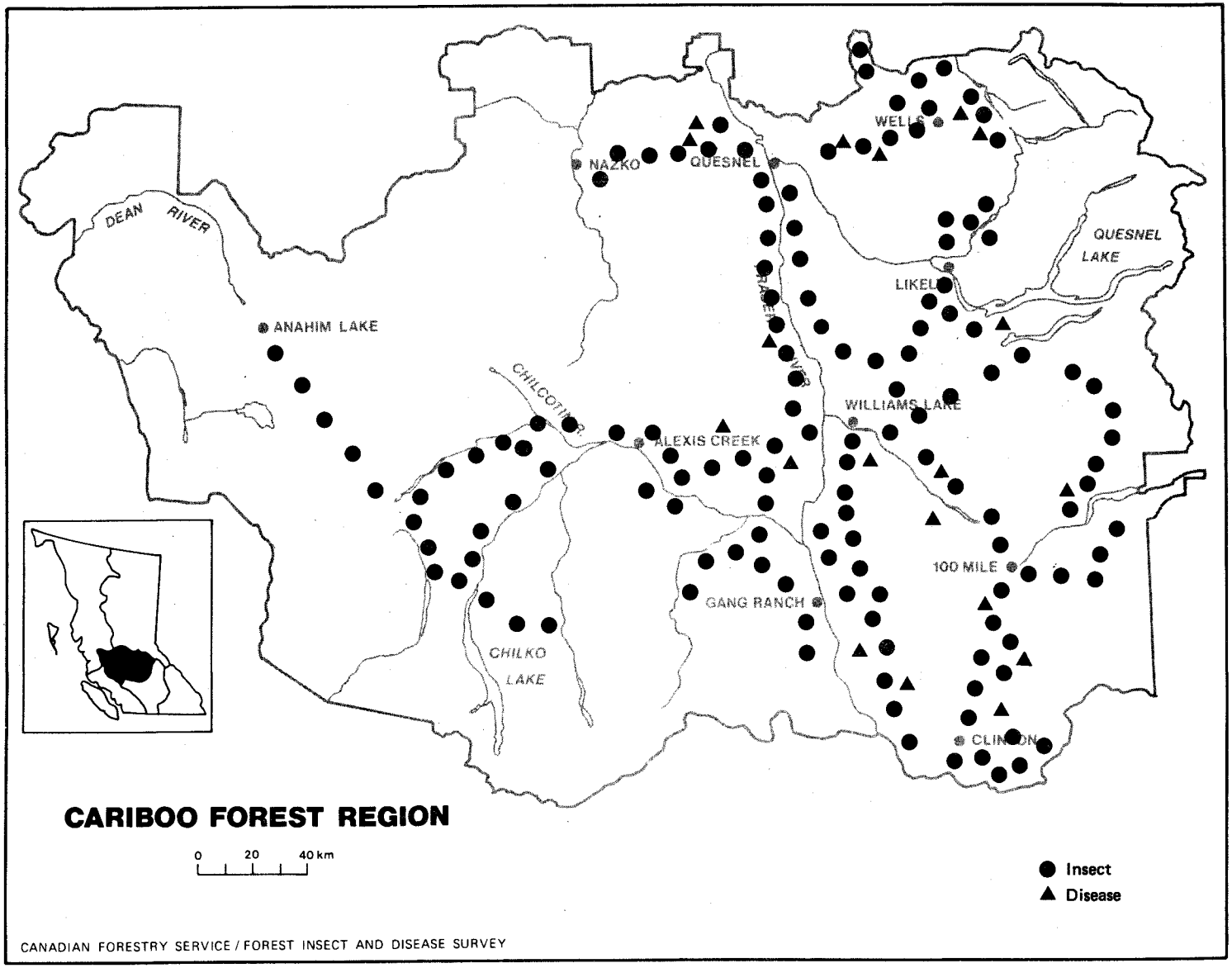
Mountain pine beetle accounted for most of the tree mortality in 1981. Areas of recently killed trees, determined by aerial surveys, increased to more than 72 000 hectares in 1981 from 63 000 hectares in 1980. Spruce beetle killed stands increased dramatically in area over an estimated 13 000 hectares in 1981 from 500 hectares in 1980. Over fourteen hundred Douglas-fir trees were killed by Douglas-fir beetles over a large area of host range and was often mixed with mountain pine beetle killed lodgepole pine. Western spruce budworm defoliation decreased to 5 040 hectares in 1981 from 10 600 hectares in 1980. Douglas-fir tussock moth larval populations increased dramatically in 1981 near Hart Ridge and Scottie Creek but by September a nuclear polyhedral virus had infected up to 80% of the larvae in collections and the number of egg masses were less than expected.

The Forest Insect and Disease Survey program extended from May 20 to August 19. A total of 125 forest insect and disease collections were submitted to Pacific Forest Research Centre in Victoria by Forest Insect and Disease survey technicians and personnel from industry and other forestry agencies. Locations where one or more insect or disease collections were made are shown on Map 1.

Thirty-five flying hours provided by Protection Division of B.C. Ministry of Forests were used to map bark beetles and defoliation infestation areas in August. Aerial flight lines are shown on Map 2.

Special surveys, funded by B.C. Ministry of Forests, were conducted to appraise mountain pine beetle, spruce beetle and Douglas-fir beetle infestations from September 4-16 and November 2-14.

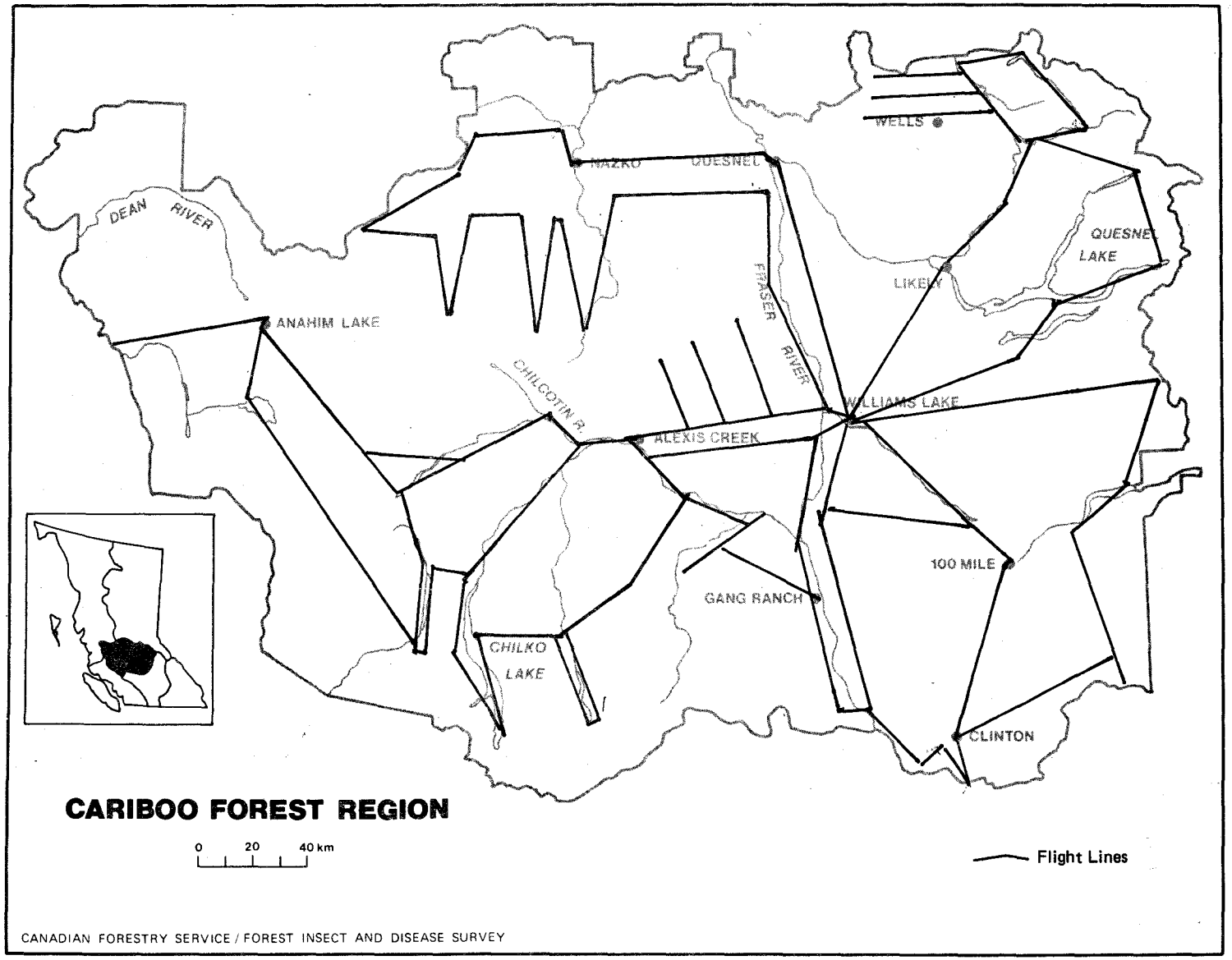
Three Canadian Forestry Service mountain pine beetle research programs were conducted in the Region in 1981. Dr. L.H. McMullen on "Water sprinkling as an effective technique for reducing emergence of mountain pine beetle in lodgepole pine," in which water sprinkling with soaker hoses on the surface of log decks containing lodgepole pine infested by mountain pine beetle reduced survival of the beetle to 5% compared with 83% in unsprinkled decks (Appendix 1). Dr. S. Whitney studied the biological control factors which affect mountain pine beetle, specifically the inoculation of beetle populations with the fungus Beauvaria sp. Dr. H. Moeck studied the host selection behavior; tree baiting, pheromone attractants and predisposition of trees to attack. The latter two studies are incomplete and data will be available when results are finalized.



Map 1

Collection Locations
1981

Locations Where One or More Insect or Disease Samples Were Collected



Map 2

Aerial Surveys
1981

PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

Mountain pine beetle killed an estimated 6 million trees over 72 000 hectares in the Cariboo Region in 1981 (Map 3). The infestations were first reported in 1974 near Klini Kleene, Riske Creek, Jesmond and along Cariboo Lake.

Area of tree mortality has expanded from Klini Kleene River north to Charlotte and Nimpo lakes and eastward to Puntzi Lake. Expansion of infestations southward was slow but since 1979 accellerated tree mortality has been monitored, probably as a result of mild winters. Near Riske Creek tree mortality has expanded to include pine stands from the Fraser River to west of Hanceville and south to Mons Lake. Near Jesmond infestation areas expanded along both sides of the Fraser River to Gaspard Creek and Springhouse and east to Meadow and Big Bar lakes. Infestations intensified along Cariboo Lake but spread has been restricted to the high pine component stands.

The area of tree mortality by T.S.A. as determined by aerial surveys are shown in Table 1.

Table 1. Location and area (ha) of lodgepole pine stands recently killed by mountain pine beetle as determined from aerial surveys, Cariboo Forest Region 1981.

Timber Supply Area	Supply Block	Location	Area infested (ha)	Total area (ha)
Alexis Cr.	Anahim	Kappan Lake	1 228	
		Charlotte Lake	7 498	
		McClinchy Lake	969	
		Nimpo-Aktachlin Lake	2 165	
				11 860
	Tatla	Long L-Sucker Lake	2 943	
		Chantslar Lake	2 133	
		Puntzi Mountain	3 281	
		Pyper L-Tatla Lake	1 616	
		N.of Tatla Lake	7 878	
		Lunch & Cochin Lake	905	
		Eagle Lake	388	
		Splinter Hill	129	
		McGhee Lake	129	
		Little Meadow Mountain	141	
		Rosie L.-Chilko River	1 228	
		N. of Choelquoit Lake	505	
				21 276

(Cont'd)

Table 1. (Cont'd)

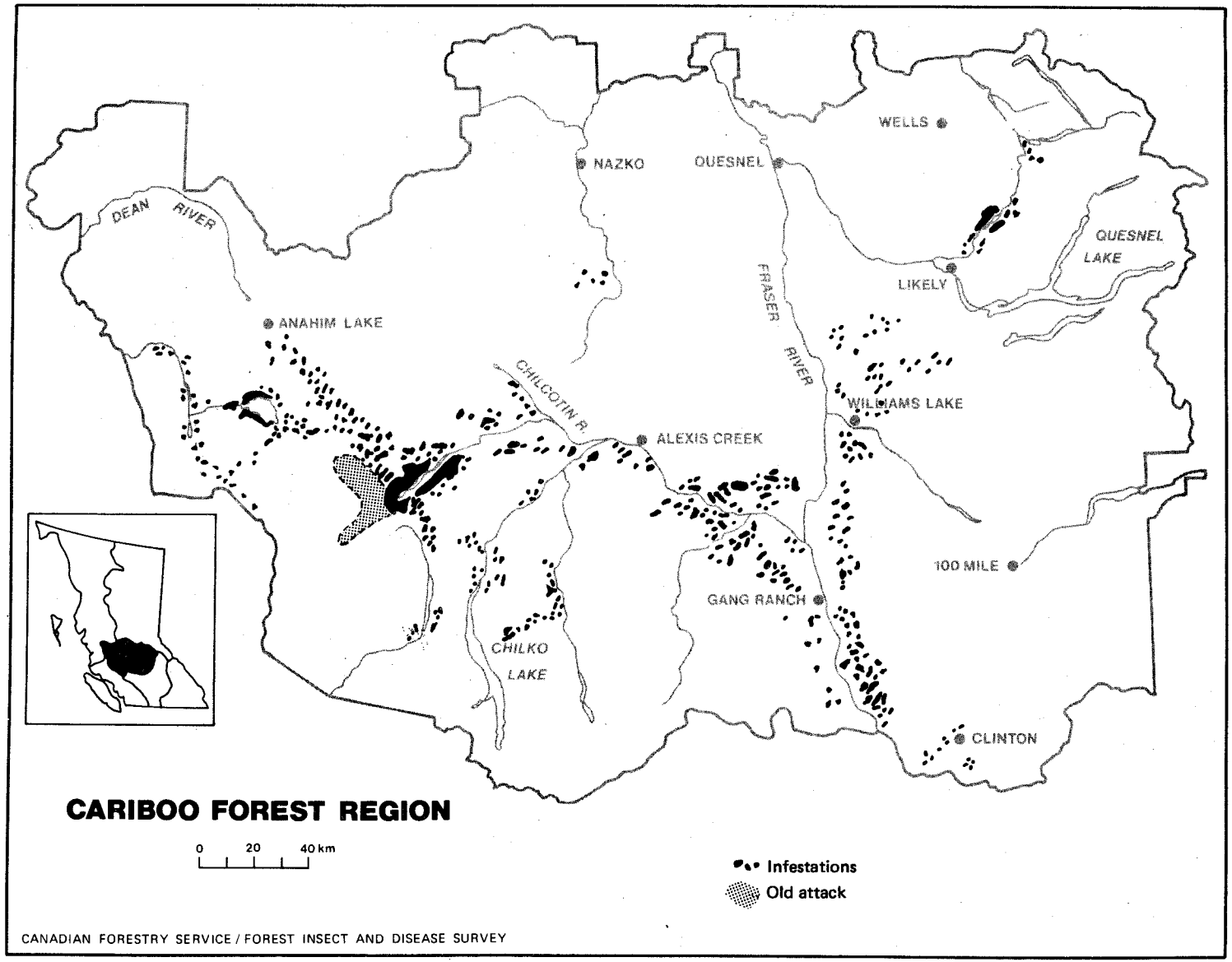
Timber Supply Area	Supply Block	Location	Area infested (ha)	Total area (ha)
Alexis Creek (Cont'd)	Chilcotin	N. of Chilko Lake	292	
		Tullin Mountain	129	
		Tsuniah Lake	61	
		Nemiah Valley	323	
		Tatlayoko Lake	723	
		Konni-Elkin Lakes	1 426	
				3 454
Alexis Creek	Kloakut	Cone Hill-Taseko River	214	
		Haines Lake	452	
		Minto Creek-Kilyut	1 680	
		Chilanko	320	
				2 660
	Chezacut	Mt. Alexis	1 440	
		Salt Lake	100	
		Upper Chilcotin	1 200	
				2 740
Williams Lake	Springhouse	Skulow-Seven Mile Lake	85	
		St. Josephs Mission	129	
		Dugan Lake	258	
		Williams Lake	1 440	
		Sword Creek	1 180	
		Hawks Creek	70	
		Edge Hills	711	
		Canoe Creek	929	
		Dog Creek	129	
		Alkali L.-Springhouse	234	
		Riske Cr-Fraser River	517	
		Chimney Valley	85	
				5 767
	Gaspard	Big Cr-Mons Lake	3 235	
		Hanceville-Fletcher Lake	703	
		Hanceville-Riske Creek	5 494	
		McEwan Creek	287	
		Gaspard Creek	690	
				10 409

(Cont'd)

Table 1. (Cont'd)

Timber Supply Area	Supply Block	Location	Area infested (ha)	Total area (ha)
Williams Lake (Cont'd)	Churn	Churn Cr-Koster Lake	2 860	
		Lone Cabin Creek	719	
		Schroeder Creek	65	
		French Bar	323	
		Hogback Mountain	129	
				4 096
	Palmer Lake	N. of Hanceville	323	323
100 Mile	Loon L.	Hart Ridge	129	
		Clinton-Kelly Lake	48	
				177
	Meadow	Kostering-Big Bar Creeks	1 781	
		Little Big Bar-Long Lake	1 280	
		Meadow Cr. Augustine Lake	1 878	
				4 939
	Holden	Dog Creek	89	89
Horsefly	Cariboo	N. Cariboo River	840	
		Cariboo Lake	2 885	
		S. Cariboo River	937	
				4 662
		Total		72 452
		*Gray Area		
Alexis Creek	Tatla Anahim			35 900

* Gray area = Scattered red trees observed but more than 50% of trees were gray denoting attack prior to 1979.



Map 3

Mountain Pine Beetle
1981

Areas of Recently Killed Lodgepole Pine, As Determined From Aerial Surveys

Seven locations of beetle infested lodgepole pine were examined in May to monitor overwintering brood mortality. Two .045 m^2 bark samples were removed from each of ten trees per location and the number of living and dead progeny and the number of entrance holes were recorded. All locations sampled revealed high populations with virtually no overwintering brood mortality.

In September cruise strips were examined at 16 locations throughout the Region in areas of mountain pine beetle outbreak, (Table 2).

Table 2. Number and status of pine trees examined in plots established on cruise lines in mountain pine beetle infested areas, Cariboo Forest Region, 1981.

Location	No. of plots	No. of trees examined	Percent of trees				
			Healthy	1981 attack	1980 attack	1981 partial	Prior to 1980
Wild Goose Lake	16	124	37	57	5	0	2
*Vert Lake	6	115	29	5	11	1	54
Joes Lake	12	90	83	7	3	0	5
4 Mi. W. of Palmer Lake Road	15	87	26	37	31	2	2
Chilcotin Meadows	11	78	17	38	28	0	17
Mons Lake	8	44	77	23	0	0	0
Jamison Meadows	19	128	66	22	9	0	4
Puntzi Mountain	12	92	24	60	13	1	1
*Tatla Gravel Pit	10	154	31	38	11	0	19
Tatla Lake	10	68	6	72	13	3	6
McClinchy Lake	7	161	45	12	19	2	21
*4 Mi. Tatlayoko Lake Road	10	140	32	2	26	0	41
W. of Chilko River	8	38	42	55	0	2	0
Chilko River	10	77	58	40	0	1	0
E. of Chilko River	13	90	26	53	16	1	3
Caribou Lake	13	51	37	10	41	0	12

* Strips established and trees marked in 1979 and plots established on fixed radius; remainder established in 1981 using 5 BAF prism.

The cruise data indicated a high incidence of 1981 attack in all the areas. Precluding adverse winter climatic conditions, an increase in tree mortality and an expansion of infestation area may be expected in the Cariboo Region in 1982.

A pine needle cast, Lophodermella concolor

Moderate to severe browning of 1980 foliage of regeneration lodgepole pine was prevalent over a widespread area east of the Fraser River from Clinton to Quesnel. Up to 70% of the foliage on 90% of the stems was recorded on most plantation areas.
A pine needle cast, Elytroderma deformans infection discolored 20-50% of the 1980 foliage of scattered lodgepole pine in the Clinton-70 Mile House area.

A lodgepole pine needle miner Coleotechnites spp.

Current foliage on 10% of the pole-sized lodgepole pine were defoliated on two hectares near Porcupine Lake west of Quesnel.

Pine stem rusts, Cronartium sp.

Stem rust infections were recorded on 30% and 42% of the regeneration lodgepole pine in a plantation and a natural growing roadside site near Porcupine Lake.

SPRUCE PESTS

Spruce beetle Dendroctonus rufipennis

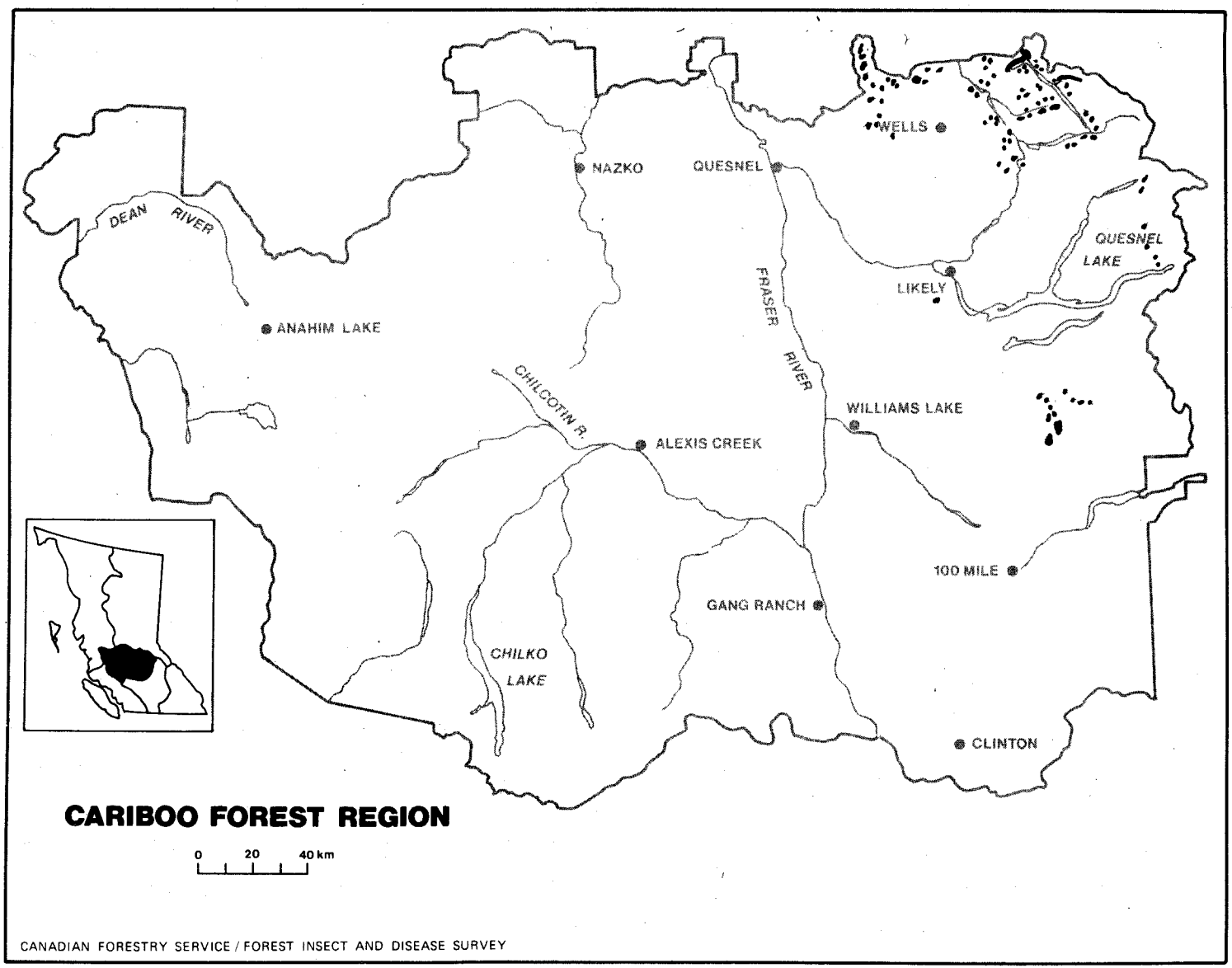
A dramatic increase in the number of mature white spruce recently killed by spruce beetle was recorded in stands in the eastern portion of the Cariboo Region in 1981. More than 13 000 hectares of damage was sketchmapped in the Willow-Big Valley and Bowron River drainages east of Quesnel, throughout Bowron Lake Provincial Park, and from Bosk to Hendrix Lake (Map 4). Additional surveys by B.C. Ministry of Forests, Williams Lake recorded over 2 200 hectares near the Horsefly River between McKusky Creek and McKay River. Smaller spot infestations of 10 to 50 trees were recorded along Swift, Sovereign and Lightning creeks in the Quesnel TSA and near Mitchell, Crooked, Gotchen and McNeil lakes, Niagara and Cariboo rivers and Dietrich Creek in the Horsefly District (Table 3).

Mature spruce stems windthrown in 1-5 hectare patches in the past 3-5 years along logging perimeters and in stands, was common throughout the infestation areas. It probably provided suitable beetle infestation material to produce the initial population buildup and subsequent attack in standing timber.

Table 3. Location area (ha) and volume (m^3) and volume (m^3) of spruce beetle infested mature white spruce as determined by ground and aerial surveys, Cariboo Forest Region, 1981

Location	Area infested Light	Moderate	Severe	Volume infested m^3 Light	Moderate	Severe
Bowron Lake Park						
Isaac Lake	990	924	1 320	16 830	46 200	180 840
McLeary Lake	396			6 732		
Lanezi Lake	330			5 610		
Babcock Lake	330			5 610		
Spectacle Lake	264			4 488	1 650	63 294
Bowron Lake		330	462			
Bowron R.	856			14 552		
TOTAL	2 310	1 254	1 782	58 822	47 850	244 134
Quesnel T.S.A.						
Towkuh Creek		389	132		19 450	18 084
Stephanie Creek	66		396	1 122		54 252
Ketchum Creek			924			126 588
Big Valley	594			10 098		
Crescent Lake	264			4 488		
Trigillus Creek	40			680		
Hyde Creek	132			2 244		
Lottie Lake		194				
Estridge Cr.	132			2 244		
Betty Wendell Cr.	735	194		12 495	9 700	
Umiti Creek	64			1 088		
Rustin & McKinna Crs.	259			4 403		
Kruger Lake			259			35 483
TOTAL	2 286	777	1 711	36 618	29 150	234 407
Horsefly T.S.A.						
Bosk Lake		518			25 900	
Cariboo River	64	198		1 088	9 900	
Mitchell Creek	8			136		
Niagara River	64			1 088		
TOTAL	136	716		2 312	35 800	
100 Mile T.S.A.						
Hendrix Lake			323			44 251
Boss Creek	64		647	1 088		88 639
Gotchen Lake	64			1 088		
McNeil Lake	64			1 088		
Dietrich Creek	64			1 088		
TOTAL	256		970	4 352		132 890
Grand Total			13 054			816 551 m^3

* Light 0-5%; Moderate 6-30%; Severe 31+%



Map 4

Spruce Beetle

1981

Areas of Recently Killed Mature White Spruce
As Determined By Aerial Surveys

Table 4. Status of mature white spruce trees examined in or adjacent to spruce beetle outbreak areas. Cariboo Forest Region, 1981

Strip No.	Location	No. of plots established	Total no. of white spruce trees examined	Percentage of stems				
				Healthy	Current attack	Red	Partial attack	Gray
1.	Ketchum Creek CP40	71*1/	418	59	8	16	6	11
2.	Ketchum Creek CP40	40	297	87	7	2	1	3
3.	Ketchum Creek CP37	13	81	37	6	47	0	0
4.	E. of Crescent Lake (logged)	9	60	69	8	7	8	5
5.	N.E. of Crescent Lake (logged)	12	110	38	2	38	3	19
6.	Bowron R. (N of Towkuh Creek)	11	74	51	7	30	5	7
7.	Towkuh Creek CP.G	12	80	70	10	11	4	5
8.	Towkuh Lake CP.G	14	86	82	7	0	2	9
9.	Rebman Creek CP.H	20	140	52	11	3	1	32
10.	W. of Stoney Lake CP.9	30	106	81	1	13	3	2
11.	Kruger Lake CP 31	31	128	93	1	0	0	6
12.	Indianpoint Creek CP 27	18	53	81	0	8	2	9
13.	Indianpoint Creek CP 35	26	97	89	3	2	1	0
14.	Sovereign Creek CP WW	23	130	77	5	3	0	15
15.	McKenna Creek CP 45	19	95	73	1	2	2	18
16.	McKenna Creek CP 45	26	83	83	2	6	1	7
17.	Benson Lake	21	109	97	0	0	0	3
18.	Opp. 3600 Road CP DD	16	49	98	0	0	0	2
19.	Mary Creek CP CC	34	126	89	0	4	0	7

*1/ Percentage of stems infested were taken from 46 plots.

Nineteen beetle infested stands were cruised in September and November to determine the extent of beetle attack. Prism plots were established at 50 metre intervals along cruise lines through designated stands in infested areas. All tree species included by a 5 BAF prism, were measured for diameter and white spruce were categorized as healthy or beetle infested. The results are shown in Table 4.

Progeny counts in .045 m^2 bark samples from an average of five infested stems per strip showed more than 25 adults per sample, in stands along Ketchum Creek, Big Valley and Bowron and Willow rivers, which indicated a high potential for continuing attack in 1982. No cruises were done in Bowron Lake Provincial Park or near Bosk and Hendrix lakes, however the density of infested stems and area of infestation indicates a similar potential for attack in this area. South of Big Valley near McKenna, Sovereign creeks and Benson Lake and the locations cruised along Indianpoint Creek and Kruger Lake there were less than 10 overwintering adults per sample from infested trees which indicated low potential for increased attack in 1982. Similarly no significant damage is expected in 1982 in areas near Niagara, Cariboo rivers, Gotchen and McNeil lakes and along Dietrich Creek.

Mature trees windthrown during the previous 3-5 years probably contributed to the population buildup but no longer present a hazard, however incidence of more recent blowdown should be monitored and removed to prevent further population increases.

Two-year-cycle spruce budworm, Choristoneura biennis

The two-year-cycle budworm was in the "off" year in 1981 after causing widespread damage in 1980. Low numbers of larvae were found in mined buds along the Horsefly River near McKay Creek and near Bowron Lake and no current defoliation was observed.

DOUGLAS FIR PESTS

Douglas-fir beetle, Dendroctonus pseudotsugae

The number of Douglas-fir trees recently killed by beetles increased throughout the host range in the Cariboo Region in 1981 to 1400, from scattered small groups in 1980. Recently killed trees were recorded from aerial surveys in the following areas: Grinder-Higgenbottom crs., 185; Dog Creek, 400; Gaspard Creek, 60; and Word Creek, 70. Elsewhere 185 trees were counted in groups of 5 to 20 trees from Williams Lake north along the Fraser to McLeese Lake, 100 trees north of Riske Creek in the Military Block and 400 northeast of Clinton along the Bonaparte River.

In addition to the above mentioned areas B.C. Ministry of Forests aerial survey recorded concentrations of beetle killed Douglas-fir in the 150 Mile, Horsefly-Canim Lake and Keithley Creek areas.

Near Dog Creek two strips 10 metres wide by 250 metres long, examined to determine the status of attack, showed 72% of the trees were healthy, 9% were attacked in 1981, 13% attacked in 1980 and 5% attacked prior to 1980 in one strip. The second strip showed 84% healthy, 3% attacked in 1981, 11% attacked in 1980 and 2% attacked prior to 1980. Along Porcupine Creek in the Empire Valley area examination of approximately .2 hectares (1/2 acre) surrounding each of 3 groups of 7, 3 and 4 1980 infested trees showed no evidence of 1981 attacked trees around the first group of 7 trees, the second group of 3 trees showed 19, 1981 infested trees and the third group of 4 trees had 5, 1981 infested trees.

The increase in numbers of attacked trees from 1980 to 1981 and ground checks near Dog and Porcupine creeks indicated a continuing high population and a similar level of attack of mature Douglas-fir trees in 1982.

Western spruce budworm, Choristoneura occidentalis

Western spruce budworm larval populations defoliated an estimated 5 040 hectares of Douglas-fir stands in 1981 compared with 10 600 hectares in 1980.

In May, Douglas-fir buds were examined at 7 locations to determine the current budworm population. South of Clinton 40-70% of the buds were infested and west of Clinton in the Big Bar Creek area 26% were mined. Based on the criterion that over 20% infested would result in defoliation, damage was expected to continue at similar levels to 1980.

Aerial surveys in July recorded light defoliation near Loon Lake 2 070 ha, Bonaparte River 195 ha, Hart Ridge 710 ha, Scottie Creek 840 ha, and Maiden Creek 1 230 ha. However there was no defoliation observed along Big Bar Creek or northeast of Clinton along Bonaparte River where 3-tree beating samples yielded between 70 and 150 larvae. The criterion used to classify the three defoliation categories during aerial surveys were: Light - discolored foliage barely visible from the air, some branch tip and upper crown defoliation; Moderate - pronounced discoloration, noticeable, thin foliage, top third of many trees severely defoliated, some completely stripped; Severe - bare branch tips and completely defoliated tops, most trees more than 50% defoliated.

Egg masses on two branches from the mid crown of each of ten trees, to predict population trends and damage potential, were collected in September at four locations near Clinton. The number of egg masses per 10 m^2 of foliage indicated that severe defoliation may be expected in 1982 northeast of Clinton along the Bonaparte River and along Hart Ridge; moderate defoliation along Maiden Creek and light defoliation along Big Bar Creek (Table 5).

Table 5. Egg population and predicted defoliation by western spruce budworm in 1982, Cariboo Forest Region 1981.

Location	Number of egg masses per 10 m^2 of foliage	Predicted defoliation[1/] for 1982
Mound Rd.	372	Severe
Hart Ridge	181	Severe
Maiden Creek	135	Moderate
Big Bar Creek	22	Light

Categories

1/ Light = 1-50 egg masses per 10 m^2 of foliage.
Moderate = 51-150 egg " " " "
Severe = 151+ " " " "

Douglas-fir tussock moth, Orygia pseudotsugata

The number of larvae in 3 tree beating samples in Douglas-fir stands south of Clinton to Scottie Creek and along Loon Lake Road yielded from 60 to 150 larvae per sample. However, the only damage observed was 25-90% defoliation on less than 2 hectares near Scottie Creek.

Examination of stands near Scottie Creek, to assess the overwintering egg mass incidence, showed 80% of the larvae had spun cocoons but did not pupate because of infection by a nuclear polyhedral virus. However 18 apparently healthy egg masses were collected from the lower branches from 40 trees at this location which indicates a light population may be expected in 1982 but will likely decrease because of the virus.

Western false hemlock looper, Nepytia freemani

There was no defoliation of Douglas-fir by western false hemlock looper populations in 1981. However collections south of Clinton yielded less than 5 larvae per sample and collections west of Williams Lake from 10-26 larvae.

The occurrence of larvae in the Williams Lake area is a northern extension of known distribution of this insect and represents a potential threat to these stands.

Swiss needle cast, Phaeocryptopus gaumanii

Branch samples of Douglas-fir were collected from 3 trees at each of 4 locations in the Region to determine the distribution and intensity of infection by Swiss needle cast.

A range of from 2% to 47% and 7% to 25% of 1976 to 1978 needles were infected at Big Lake and McLeese Lake respectively. Samples were negative from near 100 Mile House and south of Clinton near Alkali Lake.

PESTS OF NATURAL AND MANAGED SECOND GROWTH STANDS AND PLANTATIONS

Fourteen plantation and thinned stands were examined to determine the incidence of pests which may occur naturally or be influenced by management practises (Appendix 2).

Douglas-fir needle cast, Rhabdocline pseudotsugae

Moderate to severe infection (50-75%) of 1980 Douglas-fir foliage on 50% or more of stems was recorded throughout thinned stands near Niquidet, Tad lakes and along Beggs Road, and on most regeneration Douglas-fir throughout the host range.

Pine needle cast Lophodermella concolor

Severe infection (75% or more) of 1980 foliage was recorded on 90% or more of planted lodgepole pine stems at Niquidet Lake and in a thinned lodgepole pine - Douglas fir stand nearby.

Fir fireweed rust, Pucciniastrum epilobii

The rust was common throughout the host range and caused moderate to severe defoliation in thinned and planted areas near Strathnaver, Polly and Benny lakes where it infected 20% to 75% of the needles on 75% or more of the stems.

Conifer-aspen rust, Melampsora medusae

Douglas fir and trembling aspen were lightly infected in managed and natural regeneration stands near Niquidet Lake.

Hemlock-willow rust, Melampsora epitea

Light infection was recorded on western hemlock in natural and managed portions of the stand near Benny Lake.

White stalactiforme blister rust, Cronartium coleosporides

Forty-two and 33% of regeneration lodgepole pine stems in natural and plantation stands were infected near Strathnaver and Porcupine Lake.

Douglas-fir dieback disease, Sclerophoma pithyophila

Less than 10% of open growing Douglas-fir in a thinned stand near Place Lake and 25% of natural open-growing trees over 10 to 20 hectares near Dog and Big Bar creeks were infected.

Canada

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1982