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ANNUAL DISTRICT REPORT
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA, 1977
PART VI, CARIBOO FOREST DISTRICT

by
S. J. Allen^{1/}

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- FILE REPORT -

DEPARTMENT OF ENVIRONMENT
January, 1978

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INTRODUCTION

This report outlines in detail the status of forest insect and disease conditions in the Cariboo Forest District in 1977 and forecasts pest population trends.

Regular field work in the District extended from June 6 to August 1. Special surveys were as follows: Pheromone-baited trap program for 2-year-cycle spruce budworm and Douglas-fir tussock moth; egg and defoliation survey for western spruce budworm; Douglas-fir needle sampling for incidence of *Contarinia* sp. and *Adelges cooleyi*; aerial surveys for beetles throughout the western and southern portions of the District; ground appraisal surveys for mountain pine beetle and Douglas-fir beetle damage.

Totals of 354 insect and 37 disease collections were submitted in 1977. Map 1 shows locations of collections.

The numbers of larval defoliators found in field collections increased by 210%; once again, the west Chilcotin forests supported few defoliating larvae

Numbers of larvae collected				
1973	1974	1975	1976	1977
282	717	810	1,030	2,199

In the District, 76% of the collections contained larvae compared with 67% in 1976 and 50% in 1975, 57% in 1974 and 60% in 1973. Each positive collection contained an average of 13 larvae compared to 7 in 1976.

B.C. Forest Service Protection Division of the District Office at Williams Lake provided invaluable assistance in the form of 13 hours of fixed wing flying time and 11 hours of helicopter flying time (Map 2), plus several man days assistance from two members of the pest co-ordinator crew. These are hereby acknowledged. A further 5½ hours of flying time was used, supplied by Canadian Forestry Service, to fly the Klinaklini and Dean River mountain pine beetle infestations.

Two special collections of western spruce budworm larvae were submitted to the Insect Pathology Research Institute, Sault Ste. Marie, Ontario.

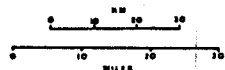
There was a decline to 36,280 red-top lodgepole pines counted in 1977 compared to 83,000 in 1976 and 140,000 in 1975. There was a fourfold increase in the number of trees attacked in 1977 which will result in an increase in the number of new red-tops counted in 1978.

Douglas-fir beetle remained at a low population level in the Dog Creek - Williams Lake area. Spruce beetles continued to lightly populate wind-thrown white spruce trees at Bowron Lake.

A moderate to heavy population of spruce budworm occurred at Maiden Creek near Clinton, Hart Ridge and at Big Bar Creek.

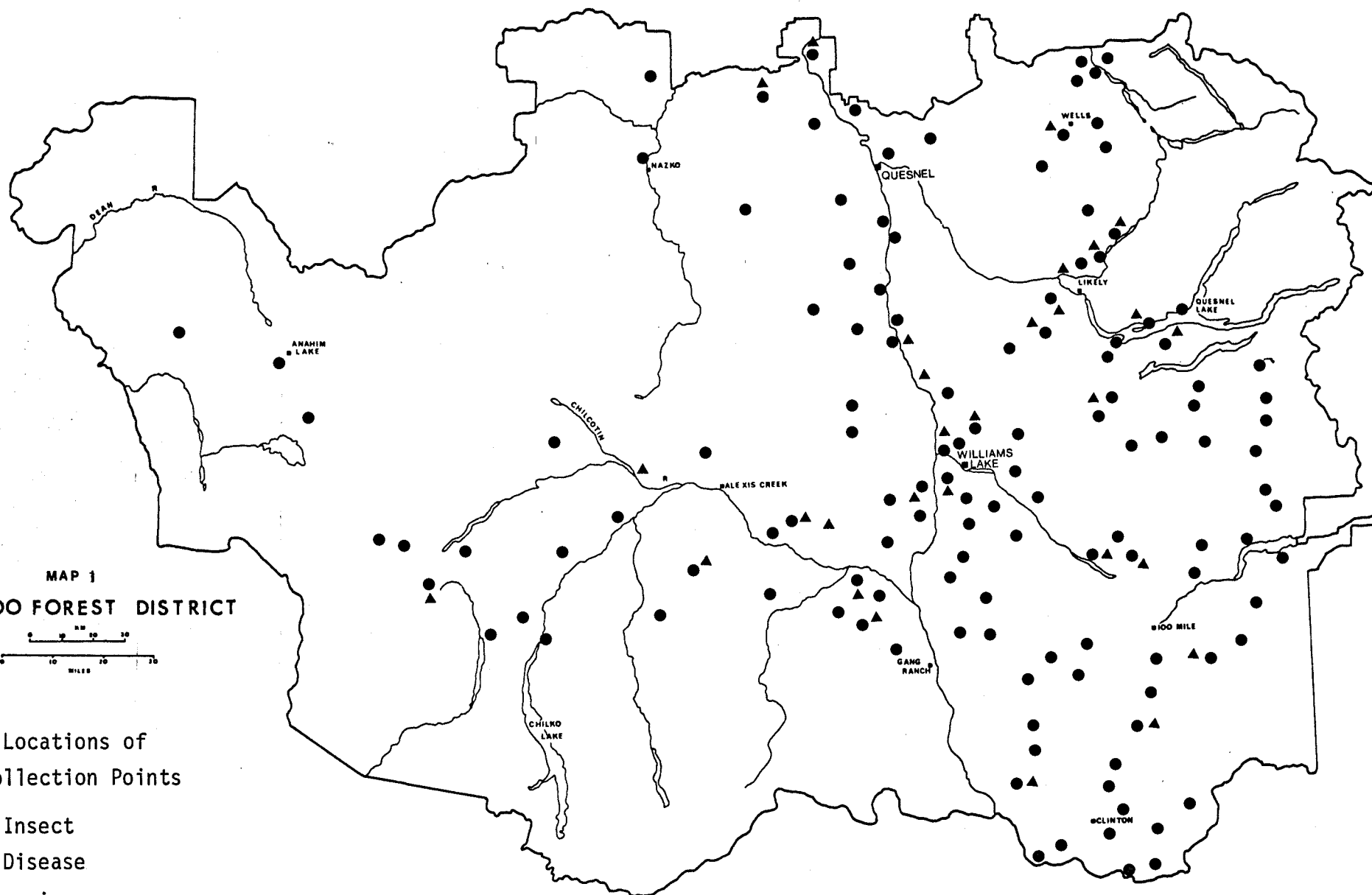
Disease problems included severe reddening of lodgepole pine caused by *Scirrhia pini* at Dean River, Spanish Lake and near Hendrix Lake. Leaf blight diseases occurred on black cottonwood and trembling aspen, and lodgepole pine stands were examined in several areas for *Verticicladiella wagnerii* at the base of recently dead or "sick" trees.

MAP 1
CARIBOO FOREST DISTRICT

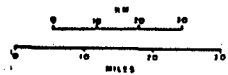


Locations of
Collection Points

Insect
Disease

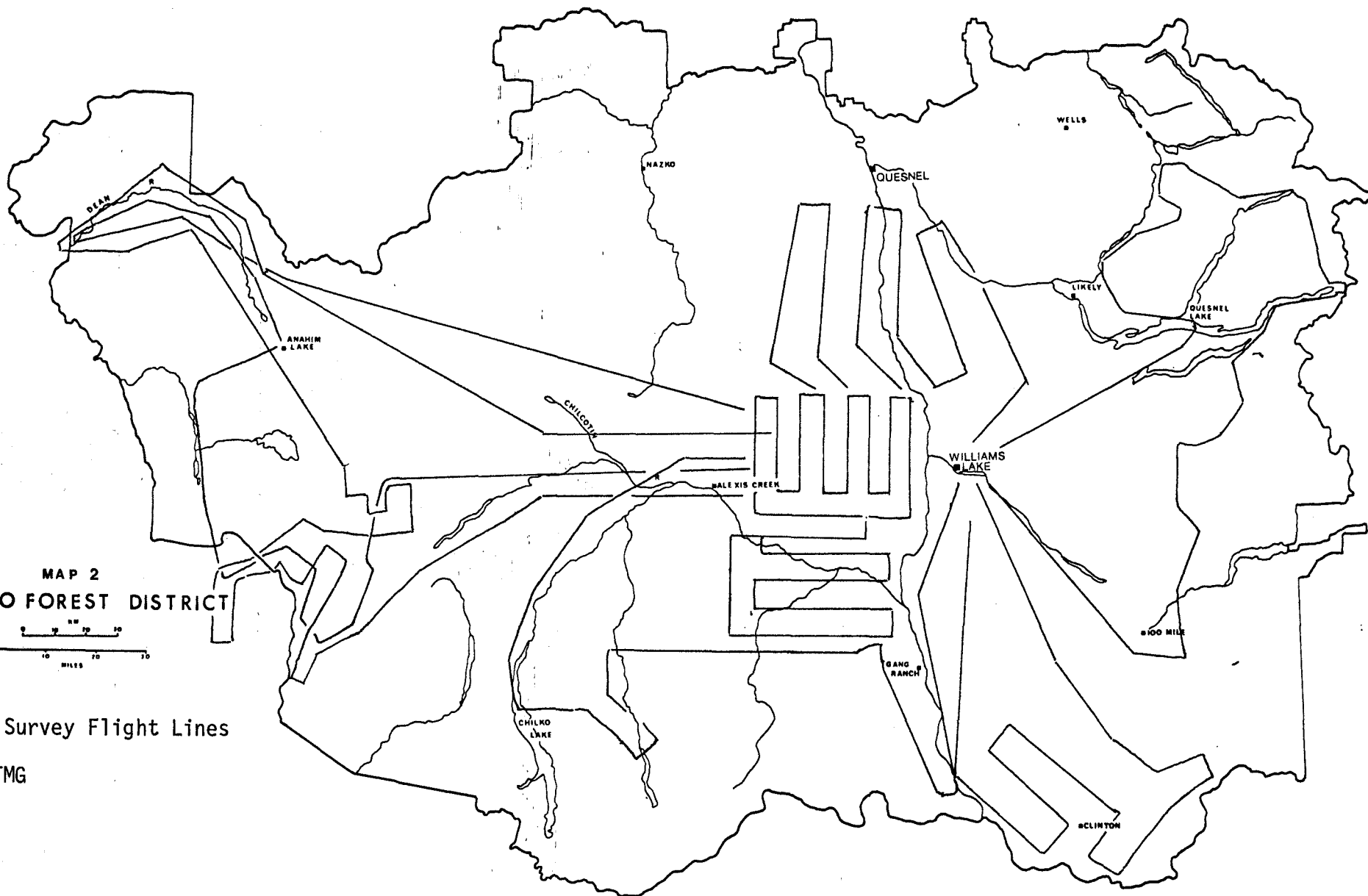


MAP 2
CARIBOO FOREST DISTRICT



Aerial Survey Flight Lines

TMG



INSECT CONDITIONS

Bark Beetles

Mountain pine beetle, *Dendroctonus ponderosae*

Mountain pine beetle continued to cause mortality of lodgepole pine throughout 18 746 ha (46,900 acres) generally within the same confines as 1976 but with expansions of several former minor infestations. The number of trees attacked in 1977 increased fourfold over 1976 and some local increases were as high as sixfold (Tyee Lake, Table 2).

The main infestations were: Klinaklini River Valley from Klinaklini Lake to One Eye Lake, and Calwell Creek; Tatla Lake to Mosley Creek; junction of Dean River and Takia River; Hanceville - Riske Creek - Meldrum Lake - Gaspard Creek area; Dog Creek - Jesmond; Hawks Lake - Granite Mountain; Cariboo Lake and River, and near Tzenzaicut Lake.

Details of locations and area of infestations are contained in Table 1 and Map 3.

The areas and approximate numbers of trees killed by 1976 attacks (1977 red-tops) were delineated during aerial surveys in August. Ground surveys during September, using prism and fixed radius plots, determined the intensity of 1977 attack.

At One Eye Lake, 85% of the lodgepole pine trees have been attacked over some 1 200 ha (3,000 acres). Of these, 64% were red-tops and grey trees killed prior to 1977 and 11% were currently attacked. The One Eye Lake infestation is similar to the Klinaklini River infestation where some 60% of the lodgepole pine trees have been killed and 1976 attacks extended into the remaining pockets of susceptible stands.

The Cariboo Lake and River infestations increased slightly in 1977, but remained on the slopes rather than spreading to the bench areas.

In the Williams Lake Ranger District, substantial increases occurred in the number of attacks in 1977 at Tyee Lake and Skelton Valley. Sanitary logging in several of the infested areas containing 1976 broods reduced the beetle hazard.

Infestations in the Riske Creek Ranger District consisted of widely scattered small groups of trees and a few expanded larger infestations such as occurred at Mackin Creek and Thaddeus Lake. The number of trees attacked increased in 1977 on four cruise strips at Mackin Creek, Gaspard Creek, Thaddeus Lake and Strouse Lake (Table 2).

In the Clinton Ranger District the infestation in the Dog Creek - Jesmond area increased in 1977 in spite of sanitation logging. The number of ponderosa pine red-tops increased despite cutting and burning of infected trees during the winter of 1976-77.

With the fourfold increase in 1977 attacks, tree mortality will increase drastically.

Table 1. Description, area, and numbers of trees killed by mountain pine beetle infestations, Cariboo Forest District, 1977.

Location	Details	Area	No./76- attacked trees	Remarks
Klinaklini R - One Eye L (Cariboo F.D.)	Klinaklini L NE to Clearwater L, includes Calwell Cr & Miner L N to Caribou Flats	7 552 ha (18,880 ac)	18,000	groups, very large and compact, (19 x 45 km) (12 x 28 miles)
Klinaklini R (Vancouver F.D.)	Klinaklini L W & S to 13 km S of Knot Cr Jct.	2 560 ha (6,400 acres)	4,000	groups, large and compact, (6 x 24 km) (4 x 16 miles)
Tatla L - Mosley Cr	Middle L to Tatla L, Eagle L, Horn L & Bluff L	1 600 ha (4,000 acres)	1,600	groups, small and scattered (20 x 7 km) (13 x 4 miles)
Konni L	Konni L - Nemaia Cr	512 ha (1,280 acres)	860	groups, mixed sizes scattered (3 x 16 km) (2 x 10 miles)
Tweedsmuir Park Jct.	Dean R - Takia R	384 ha (960 acres)	500	groups compact and large (3 x 9 km) (2 x 6 miles)
Riske Cr R.D.	Mt. Alex Graham to Military Training area & Meldrum L - Minton Cr to Gangranch	2 100 ha (5,250 acres)	4,100	widely scattered multi-sized groups (55 x 60 km) (35 x 38 miles)
Williams Lake R.D.	Skelton L - Tyee L - Big L	102 ha (256 acres)	900	groups scattered and irregular over 50 km
Clinton R.D.	Dog Creek - Canoe Cr Canoe L	2 240 ha (5,600 acres)	4,350	groups scattered and large (40 x 12 km) (25 x 8 miles)
	Jesmond - Kosterling Cr	320 ha (800 acres)	750	groups scattered and large (15 x 5 km) (10 x 3 miles)
	Clinton - Kelly L Bonaparte R, Loon L Rd.	-	150 pP	groups scattered & very small nos. (15 x 5 km) (10 x 3 miles)

Cont'd...

Table 1 - cont'd.

Location	Details	Area	No./76- attacked trees	Remarks
Likely R.D.	Cariboo R - Cariboo L	1 344 ha (3,360 acres)	1,000	groups large over compact area (4 x 30 km) (3 x 19 miles)
W Quesnel R.D.	NE Tzenzaicut L	32 ha (80 acres)	75	groups small in compact areas (being logged)

Table 2
Strip Cruise Results on Mountain Pine Beetle Areas
Cariboo Forest District, 1977

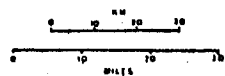
Location	Percentage lodgepole pine affected						Total trees Examined
	Healthy	Previous Attacks	Partial Attacks	1977 Attacks	Red	Grey	
Mackin Cr.	54	1.0	2.4	22	9	10	404
Gaspard Cr.	83	2	1	9	2	3	461
Thaddeus L.	54	1	1	10	7	26	225
Strouse L.	72	0	2	5	5	16	127
Alkali L.	93	0	0	3	0	4	102
Springhouse	84	1	0	5	6	4	319
One Eye Lake #1	6	1	5	18	42	28	148
One Eye Lake #2	8	3	5	25	19	49	164
Jesmond	43	5	1	18	14	18	243
Cariboo L.	59	3	2	13	3	20	242
* Tyee L.	63	-	-	30	5	2	6000+
* Skelton Valley	71	-	-	23	6	-	1000+

* Within C.F.S. Research area.

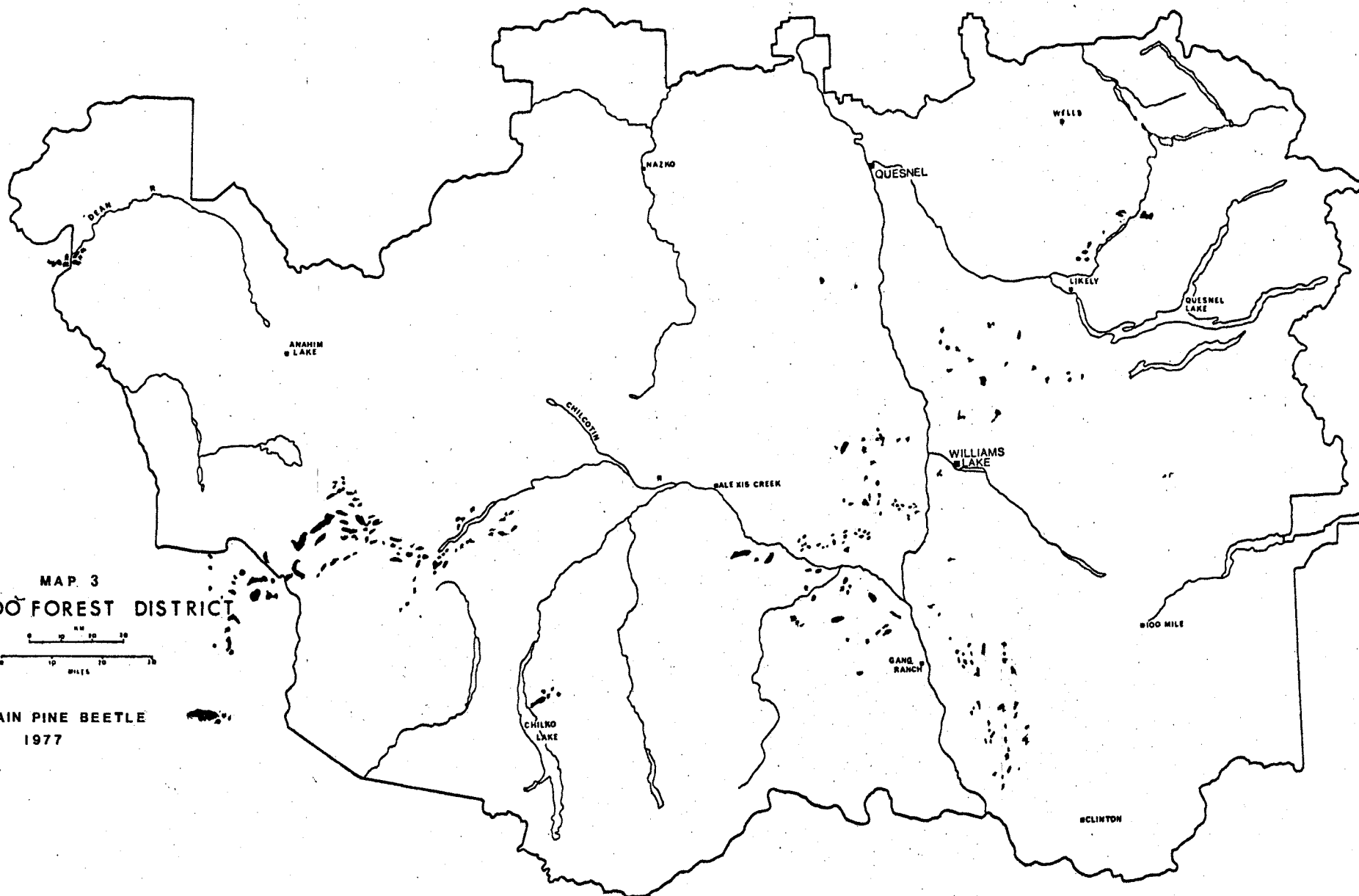
* B.C.F.S. beetle probe cruises.

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MAP 3
CARIBOO FOREST DISTRICT



MOUNTAIN PINE BEETLE
1977



Douglas-fir beetle, *Dendroctonus pseudotsugae*

Discolored Douglas-fir trees killed by beetle attack in 1976 were scarce in 1977, with only 600 observed from vantage points and during aerial surveys in August, compared with 400 red-tops in 1976 and 4,700 in 1975.

Mortality of some 350 Douglas-fir trees over about 40 ha was recorded on the north side of Williams Lake adjacent to the P. and T. lumber mill log storage area. The infestation was probably caused by infested logs in storage being allowed to release beetles which infested the standing trees. Mortality occurred over the past 5 years; approximately 200 trees were killed by 1975 attacks, 130 by 1974 and prior, while few were killed by 1976 attacks. Only two 1977 attacks were found and these appeared to have been unsuccessful.

Douglas-fir trap trees, felled along the Joes Lake FDR were lightly attacked in 1977. These logs should be removed and processed during fall or winter to prevent the beetles from flying and infesting the standing timber in the spring.

Spruce beetle, *Dendroctonus rufipennis*

In 1977, spruce beetle attacks in the white spruce windthrown in 1975 between Bowron and Kibbee lakes was light, similar to 1976, and was found only on the shaded undersides of the windfalls. This species usually takes 2 years to develop from egg to adult. The 1976 broods developed to the young adult stage in 1977 and, unless exceptionally cold weather kills the beetles, they will probably attack infested or uninfested white spruce windfalls in 1978, since some of the 1975 windthrown trees may remain attractive.

Further checks and observations will be carried out in 1978.

Western balsam bark beetle, *Dryocoetes confusus*,
in association with the fungus, *Ceratocystis dryocoetidis*

Mature alpine fir stands in the Cariboo Forest District are subject to attack by the western balsam bark beetle. There were 750 red-tops in 1977 compared to 150 in 1976 and 1,200 in 1975. Generally red-tops occurred at Big Timothy Mountain, Matthew River, Ghost Lake, Cariboo River, Swift River and Dean River in the Iltasyuko River and Bottleneck Creek areas.

Defoliators

Western spruce budworm, *Choristoneura occidentalis*

Spruce budworm larvae defoliated Douglas-fir trees in the southeastern corner of the Cariboo District in the Clinton area at Maiden Creek, Hart Ridge, Scottie Creek, Loon Lake, Bonaparte River, north side of Clinton, and on the west side of the Fraser River opposite Big Bar Creek (Tables 3 and 4, Map 4). Defoliation was confined to the 1977 foliage, except at Maiden Creek where 20% of the understory Douglas-fir trees had top-stripping of from 2 to 4 feet. The most severe damage occurred on lower story trees, up to 30 feet tall, where as high as 30% total defoliation was recorded. One isolated group of trees in Maiden Creek area had been defoliated during 1976 but was only lightly damaged in 1977.

Egg sampling at five of the areas indicated heavier defoliation for 1978, as shown below.

Location	Host	No. egg masses per 100 ft ² /foliage	per/10 m ²	Predicted 1978 defoliation
Maiden Cr, mile 4½	D	216.7	231	heavy
Maiden Cr, mile 2	"	244.8	264	"
Hart Ridge	"	280.3	302	"
Big Bar Cr	"	140.0	151	"
Scottie Cr	"	50.0	54	moderate

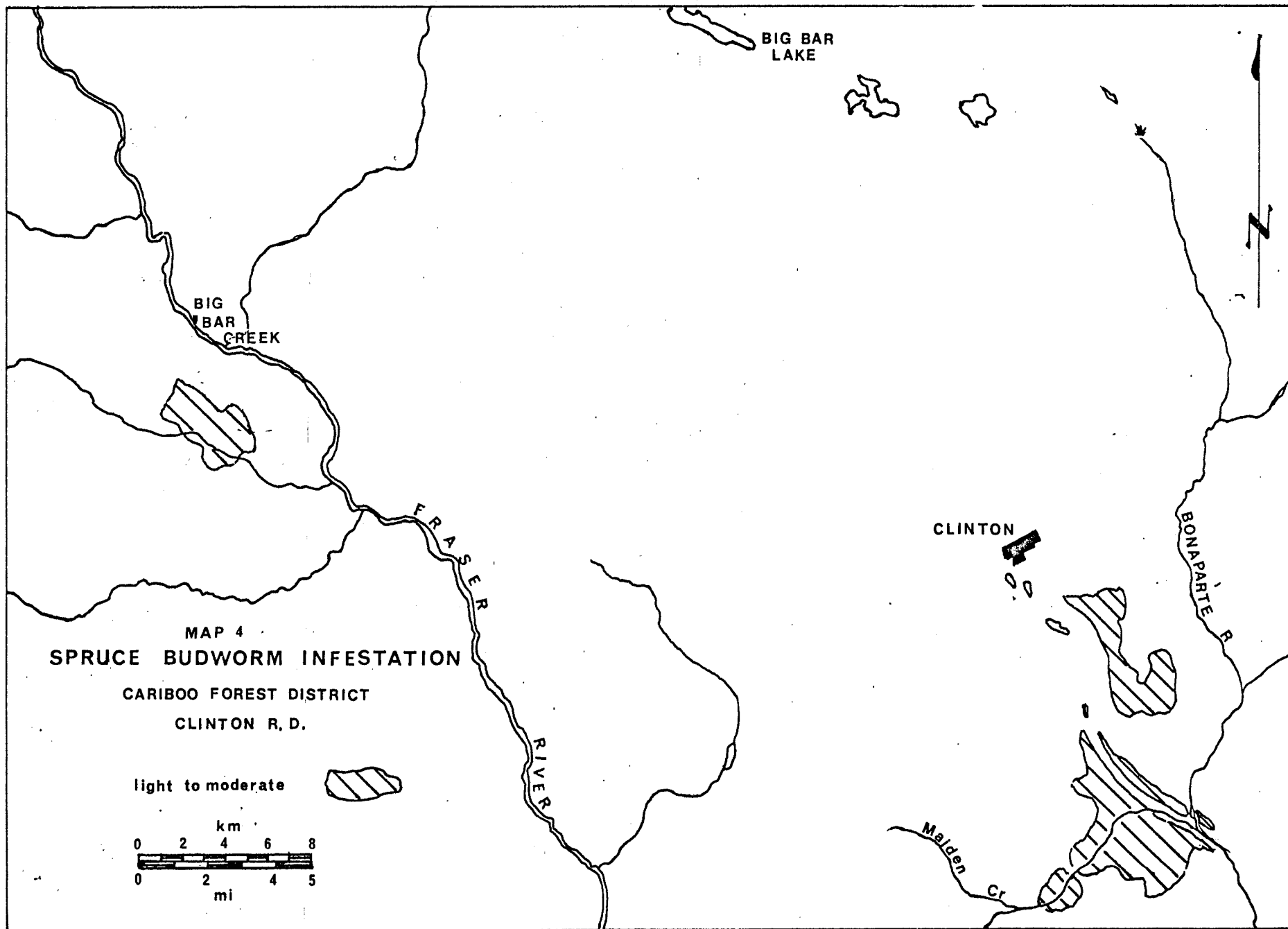
Table 3. Number of western spruce budworm larvae taken from 3-tree beating samples, Cariboo Forest District, 1975-1977.

Location	1975	1976	1977
Maiden Cr	-	-	176
Kay Cr	-	-	50
Buckskin Cr	8	2	0
Jesmond	10	12	0
Knife Cr Rd.	0	1	2
80 mi., Hwy. #97	1	2	0
Exeter Rd.	4	2	1
Chasm	3	2	3
Big Bar Rd., near Hwy.	0	0	25
Big Bar L	12	4	1
Porcupine Cr	0	9	4
Kelly L	66	-	1
Loon L Rd. 11 mi.	3	3	62
" " " 19 "	0	0	14
Alkali L Rd.	0	1	0
Scottie Cr	0	0	47
Meldrum Cr	2	1	1
Dog Cr	0	0	2
Sheep Cr Hill	0	0	6
Buffalo L	0	0	4
Bonaparte R	0	0	55
Gavin L	0	1	1
Hydraulic	0	0	1
Jim Cr	1	1	0
	110	41	456

Table 4. Summary of western spruce budworm collections
by drainage divisions, Cariboo Forest District.

Drainage divisions	No. of samples taken during larval period		% samples containing larvae		Avg no. larvae per positive sample	
	1976	1977	1976	1977	1976	1977
547	44	41	43	54	26	31.0
548	24	12	8	17	1.0	3.5
549	4	3	0	0	-	-
554	0	0	-	-	-	-
555	6	6	0	17	-	1.0
556	20	18	20	17	1.0	1.0
557	5	6	20	17	1.0	4.0
559	0	0	-	-	-	-
	103	86	25	34	1.8	20.8

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

The first year larvae of 1977-78 2-year budworm lightly defoliated alpine fir, Engelmann spruce and white spruce on the MacKay River-Hendrix Lake area. During June the resultant reddening was more apparent on alpine fir, but by mid-July had faded so that it was hardly noticeable.

Egg sampling in 1976 indicated a moderate to heavy population for 1977-78 from Hendrix Lake to Bowron Lake Park.

Traps, baited with a sex attractant, and set out near Umiti Creek, Wells, Barkerville and Hendrix Lake, caught a number of male spruce budworm moths (Table 5). This would indicate the presence of off-phase 2-year-cycle budworm or 1-year-cycle western spruce budworm in the area.

Table 5. Numbers of 2-year-cycle spruce budworm larvae taken in beating samples and numbers of moths caught in Soolure traps, Cariboo Forest District.

Location	No. of larvae in beating collections				Total no. of male moths trapped			
	1974	1975	1976	1977	1974	1975	1976	1977
Umiti Cr	1	0	1	1	37	36	119	26
Wells	0	0	0	0	140	70	419	31
Barkerville	3	0	0	0	39	24	299	42
Hendrix Cr	49	78	121	1	360	112	327	34

Sawflies, *Neodiprion* spp.

These sawflies occurred throughout most of the District on most of the coniferous hosts at double the 1976 population level (Table 6). Larvae were most numerous on white spruce and western hemlock. The most outstanding numbers were found in three-tree-beating collections in the following areas: Buffalo Lake, Engelmann spruce, 400+ larvae; Hawkins Lake, Engelmann spruce, 50 larvae; Shoal Bay, western hemlock, 200+ larvae.

Heavier populations of *Neodiprion* sp. from 1975 to 1977 may be associated with deterioration and some mortality of the widely scattered overmature western hemlock trees on the north side of Quesnel Lake near the entrance to the North Arm. This is mentioned under "Mortality of western hemlock at Quesnel Lake".

Table 6. *Neodiprion* spp.

Drainage divisions	No. of samples taken during larval period		% samples containing larvae		Avg no. larvae per sample	
	1976	1977	1976	1977	1976	1977
547	64	81	37	35	3.7	3.1
548	31	20	16	20	2.4	1.2
549	4	7	0	14	-	1.0
554	8	8	0	0	-	-
555	9	19	11	21	3.0	3.5
556	52	64	42	50	7.0	10.6
557	17	14	53	71	24.3	57.7
559	10	14	0	14	-	6.5
Totals	195	227	31	35	7.8	13.0

Douglas-fir tussock moth, *Orgyia pseudotsugata*

Ten traps containing sex attractant were set out near Chasm during August as in previous years, but only one male adult was caught compared to 23 in 1976.

Since it is not known how far males will fly or are blown by wind, the presence of adults indicates only that the area should be checked the following year.

Sucking insects

Cooley spruce gall aphid, *Adelges cooleyi*

Cooley spruce gall aphid, a sucking insect, attacks Douglas-fir and spruce trees. Its presence on Douglas-fir trees is indicated by small white tufts of wool on the needles. It infests Christmas tree size Douglas-fir, causing needle discoloration and drop. On the five permanent plots, established to monitor the population, the average number of needles infested throughout decreased from 1975, although increases were evident at three of the plots (Table 7).

Table 7. Percentage of Douglas-fir needles infested by Cooley spruce gall aphid, Cariboo Forest District.

Location	% needles infested		
	1975	1976	1977
Clinton	23	3	0
108 Mile House	1	5	1
Williams Lake	3	7	1
McLeese Lake	26	11	0.5
Ten Mile Lake	8	22	0.5

Needle miners

A Douglas-fir needle midge, *Contarinia* sp.

This midge mines the needles of Douglas-fir causing them to become distorted and discolored. Even light infestations can degrade Christmas trees, and render them useless for export. Five permanent plots were established in 1973 to monitor this insect. To assess the intensity of infestation, all current year's growth needles were examined on five branch tips from each of five trees at each plot. The percentage of needles infested remained light (Table 8).

Table 8. Percentage of Douglas-fir needles infested by needle midges, Cariboo Forest District.

Location	% needles infested		
	1975	1976	1977
Clinton	0	0	0.2
108 Mile House	0	0.3	0.3
Williams Lake	1	0.3	0.25
Ten Mile Lake	6	4.0	4.1
McLeese Lake	1	0.2	0.2

Cone insects

Cone crops on most of the coniferous tree species in the Cariboo Forest District were non-existent in 1977, so no cone insects were available.

Mortality of western hemlock at Quesnel Lake

Mortality of overmature western hemlock trees from Shoal Bay to North Arm entrance on Quesnel Lake has occurred for the past few years. Along with the decadent condition of the older trees, defoliation by blackheaded budworm, *Acleris gloverana*, from 1971 to 1974, the hemlock looper, *Lambdina fiscellaria lugubrosa* in 1975-76 and *Neodiprion* spp. sawflies from 1974 to 1976, have all contributed to the deterioration of stands.

In 1977, no hemlock looper larvae were found, but *Neodiprion* spp. larvae had caused light defoliation of lower story western hemlock trees.

Table 9. Insects of current minor significance.

Insect	Host(s)	Locality	Remarks
<i>Acleris gloverana</i>	D, alF, wS, eS, wH	Quesnel L, Big L, Hendrix L, Quesnel	26 larvae in 10 collections, static.
<i>Ectropis crepuscularia</i>	D, wS, lP, wH	Quesnel L, Quesnel, Moffat L Rd., Williams Lake	12 larvae in 9 collections, static.
<i>Enypia griseata</i>	D, eS	Williams Lake - Clinton	15 larvae in 9 collections, static.
<i>Epirrita autumnata</i>	wS, alF, D, wH	Bowron L, Horsefly, Hendrix L	18 larvae in 15 collections, increase.
<i>Lambdina f. lugubrosa</i>	wH, wS, eS, alF, D, wC	Bowron L, Quesnel - Likely	31 larvae in 20 collections, increase.
<i>Nyctobia limitaria</i>	D, wS, eS, wH	Quesnel L, Fraser R Valley, Chilcotin R Valley	27 larvae in 16 collections, increase.
<i>Pikonema dimmockii</i>	wS, eS	Throughout District	46 larvae in 23 collections, increase.

DISEASE CONDITIONS

A needle cast on lodgepole pine, *Scirrhia pini*

Severe infections of a needle cast, *Scirrhia pini*, caused conspicuous reddening and premature loss of foliage on large groups of lodgepole pine trees in the Cariboo District in 1977. Most of the damage was seen from the air while mapping mountain pine beetle infestations. The principle areas included: Dean River Valley from Lessard Lake to Squiness Lake adjacent to Anahim Peak, 3 200 ha; north side of Spanish Lake, 1 200 ha; Moffat Lakes west of Big Timothy Mountain, 100 ha (Map 5).

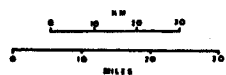
This needle cast infection is unusual on interior lodgepole pine and is believed to have developed because of the cool, wet summer for the past few years. The infection is found in younger pine stands and is considered serious, since it has been previously found to cause mortality to coastal lodgepole pine trees.

In the Spanish Lake area, trees were previously infected by globose gall rust, *Endocronartium harknessii*, on the lower branches and stems but they have been outgrowing some of the infection.

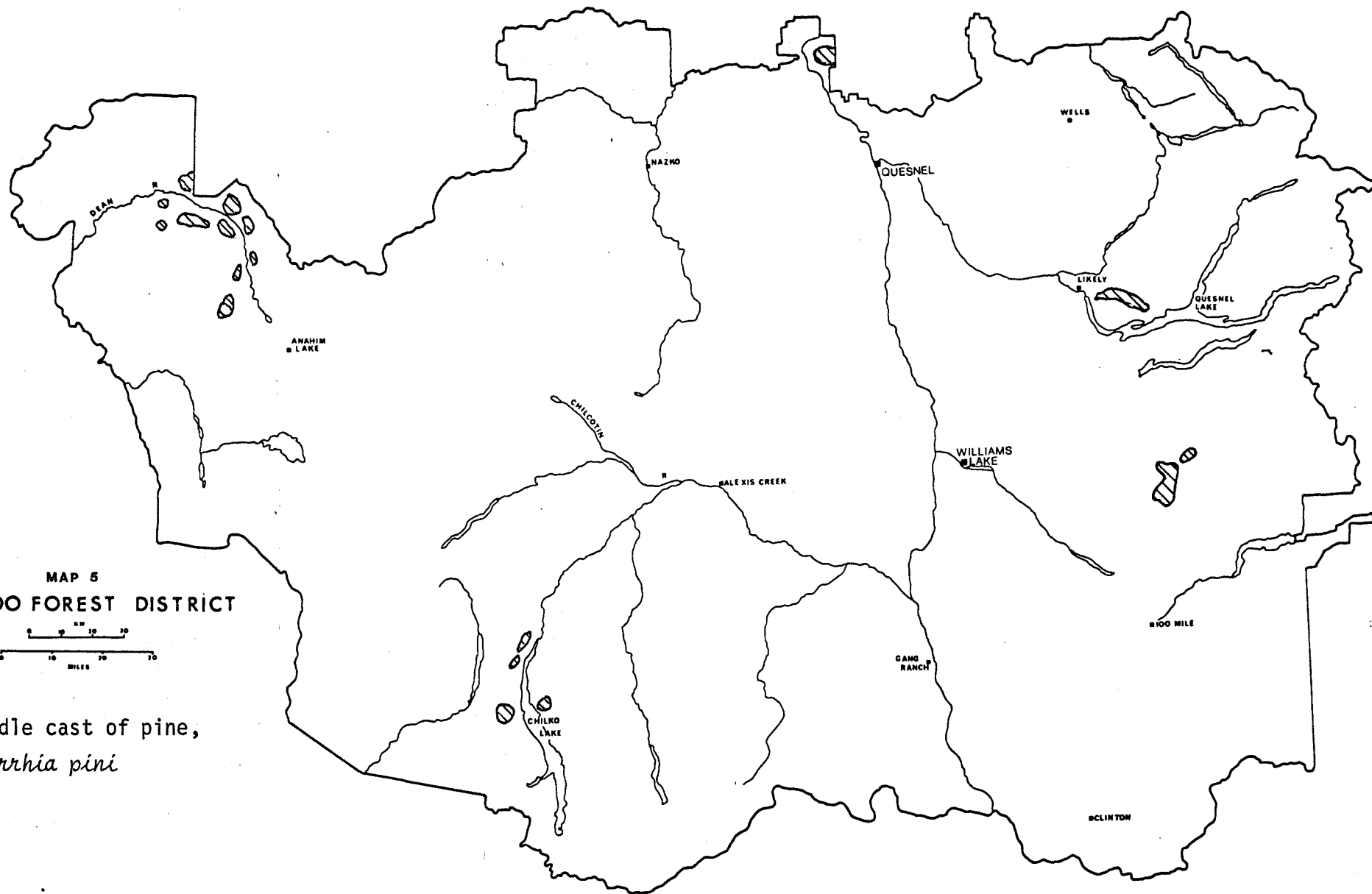
Venturia spp. on poplar

Venturia populina, a leaf spot-disease, caused severe discoloration of the leaves of approximately 40% of the black cottonwood trees throughout the Williams Lake and East and West Quesnel Ranger Districts in 1977, especially in valley bottoms. *Venturia macularis* caused severe leaf discoloration on trembling aspen trees on Highway 97 from Williams Lake to Quesnel, on the Horsefly and Likely roads, Beaver Valley Road, and in the areas northeast of Quesnel near the Cottonwood River. The most severe damage occurred in the Big Lake - Beaver Valley area, where 80% defoliation occurred on 30 to 40% of the trees.

MAP 5
CARIBOO FOREST DISTRICT



Needle cast of pine,
Scirrhia pini



Douglas-fir discoloration and needle drop

Mature Douglas-fir trees throughout the Fraser and Chilcotin plateaus lost up to 30% of their foliage during September, 1977. No living causal agents were found on foliage samples.

This defoliation may have resulted from the sudden change to hot, dry weather in July and August after three cool, wet summers from 1975 to 1977.

Table 10. Diseases of current minor significance.

Disease	Host	Locality	Remarks
<i>Ceratocystis</i> sp. "blue-stain fungus"	1P	throughout m.p.beetle infestation in Williams Lake and Riske Creek Ranger Districts	Collected from recently killed trees to check for presence of <i>Verticicladiella wagnerii</i> .
<i>Lophodermella concolor</i> needle cast	1P	Springhouse	Caused secondary infections on needles of <i>S. pini</i> infected trees along with <i>Hendersonia pinicola</i> .
<i>Melampsora medusae</i> rust	D	Redstone, Keno L, Pantage L, Springhouse	Light infections on Douglas-fir 1977 foliage. Secondary host, willow.
<i>Polyporus volvatus</i> sap-rot	1P	Drummond L	Infecting trees recently killed by mountain pine beetle. Active throughout infestation.
<i>Rhabdocline pseudotsugae</i> needle cast on Douglas-fir	D	Knife Cr Rd., Marguerite, Keithley	Light attacks on less than 10% of Douglas-fir trees.