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ANNUAL DISTRICT REPORT
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA, 1975
PART VI, CARIBOO FOREST DISTRICT

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PACIFIC FOREST RESEARCH CENTRE
CANADIAN FORESTRY SERVICE
VICTORIA, BRITISH COLUMBIA

- FILE REPORT -

DEPARTMENT OF THE ENVIRONMENT

January, 1976

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INTRODUCTION

This report outlines, in detail, the status of forest insect and disease conditions in the Cariboo District for 1975, and forecasts pest population trends.

Regular field work in the District extended from June 3 - August 10, one of the shortest field seasons on record, due primarily to monetary restrictions. No survey was conducted west of Tatla Lake. Special surveys were as follows: continuing the Soolure trap program for two-year-cycle spruce budworm, plus this year traps were set out near 20-Mile House for Douglas-fir tussock moth; sampling Douglas-fir for incidence of *Contarinia* sp. and *Adelges cooleyi*; aerial surveys 20½ hours (Map 2) for beetles in late August as well as a special flight (4½ hours) to check the Dean River and Chilko Lake area for mountain pine beetle.

A total of 300 insect and 67 disease collections were submitted in 1975. Map 1 shows collection localities and drainage divisions.

The numbers of larval defoliators found in field collections increased slightly (13%); once again the west Chilcotin forests supported few defoliating larvae.

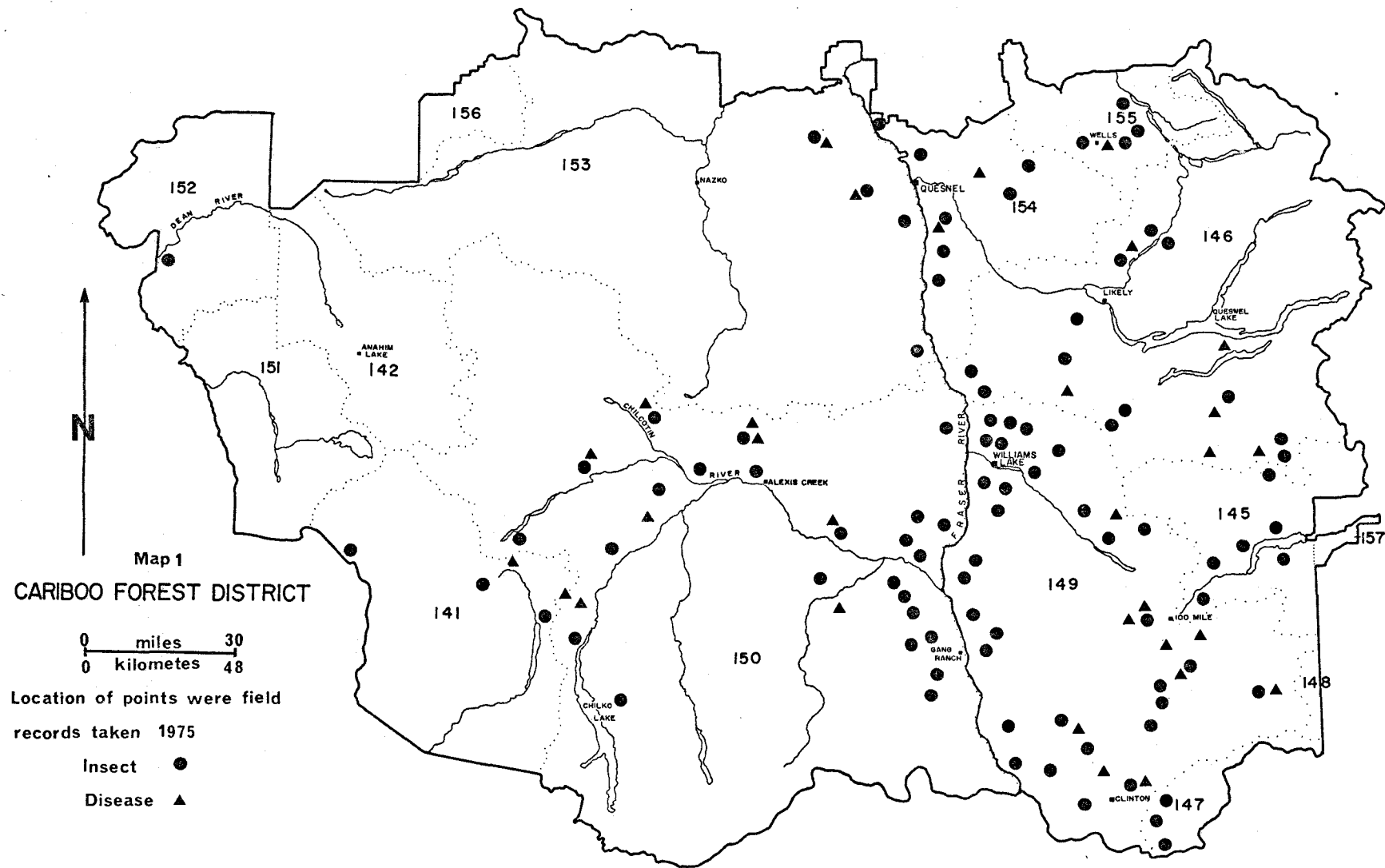
Numbers of larvae collected			
1972	1973	1974	1975
205	282	717	810

In the District, 50% of the collections contained larvae, compared with 57% in 1974, 60% in 1973 and 71% in 1972. Each positive collection contained an average of 10 larvae.

Mountain pine beetle went on the rampage, killing an estimated 140,000 lodgepole pine; Douglas-fir beetle declined, killing an estimated 4,700 trees. Spruce and western balsam bark beetles remained at low population levels.

This was the "odd" year for two-year-cycle spruce budworm, and only light defoliation occurred. One-year-cycle spruce budworm lightly defoliated Douglas-fir on Beecher's Prairie. Populations of other defoliating insects remained at low levels.

Disease problems were mainly stem and gall rusts of lodgepole pine in the District. A special survey was conducted to determine the extent and intensity of globose gall rust; at the same time the incidence of dwarf mistletoe, Stalactiform rust, and *Atropellis* cankers were noted.



Mountain pine beetle, *Dendroctonus ponderosae*

Lodgepole pine mortality from mountain pine beetle attack is a major problem in the District because the majority of the lodgepole pine is in the climatically moderate or high beetle hazard area, and a large portion of the pine exceeds the susceptible age of 80 years and size of 8 inches diameter.

Significant increases in populations became apparent in 1970. In 1972, infestations developed along the Klinaklini River, and in 1973 around the north end of Cariboo Lake. In 1974, infestations occurred at Bull and Bald mountains, at the south end of Cariboo Lake, around Tyee Lake and the mouth of Little River, and in scattered patches east of Williams Lake. During 1975, most of the susceptible stands were flown and infestations sketch mapped (see Maps 2-10). Vertical aerial photographs were taken and ground cruises were conducted at Bull-Bald mountains, Beecher's Prairie, and Tyee Lake. In 1975 infestations expanded and there was a six-fold increase in the numbers of lodgepole pine killed by beetles, from 21,000 dead (red-tops) in 1974 to 140,000 on an estimated 37,000 acres (14 900 ha) in 1975 (Table 1 and Map 11).

Additional areas with from 100-600 red-topped lodgepole pine were scattered throughout the District.

In 1975, 16 to 24% of the lodgepole pine stems on the four areas cruised were attacked (Table 2). Combined with the 1974 attack, the stands have lost 29 to 52% of their pine. Overwintering populations were high and there is potential for further tree mortality as the residual trees are of susceptible age and size.

The extremely large outbreak along the Klinaklini River, inaccessible except by helicopter, was not ground checked in the fall. Photos taken in August, however, show that the infestation is moving up the valley and into the tributary valleys. An abundance of host material exists in these valleys as well as on the plateau in the One Eye Lake area, hence the outbreak is expected to continue.

Table 1. Numbers of red-topped lodgepole pine killed by mountain pine beetle, as estimated during aerial surveys, 1975, Cariboo Forest District

Location	No. red-tops	Location	No. red-tops	Location	No. red-tops
Klinaklini R	64,000	Vert L	400	Duckworth L	200
Bull Mtn	5,400	Doc English Gulch	400	Webster L	200
Bald Mtn	3,800	Martin L	400	Hanceville	200
Cariboo L	3,700	Gulatch L	350	Lyne Cr	200
Konni L	3,500	Westwick L	350	Hart L	200
Clearwater L	3,200	Springhouse	350	Keithley Cr	200
Jesmond	2,600	Pigeon Cr	300	Cuisson L	150
Dean R	2,500	Chimney L	300	Seller Cr	150

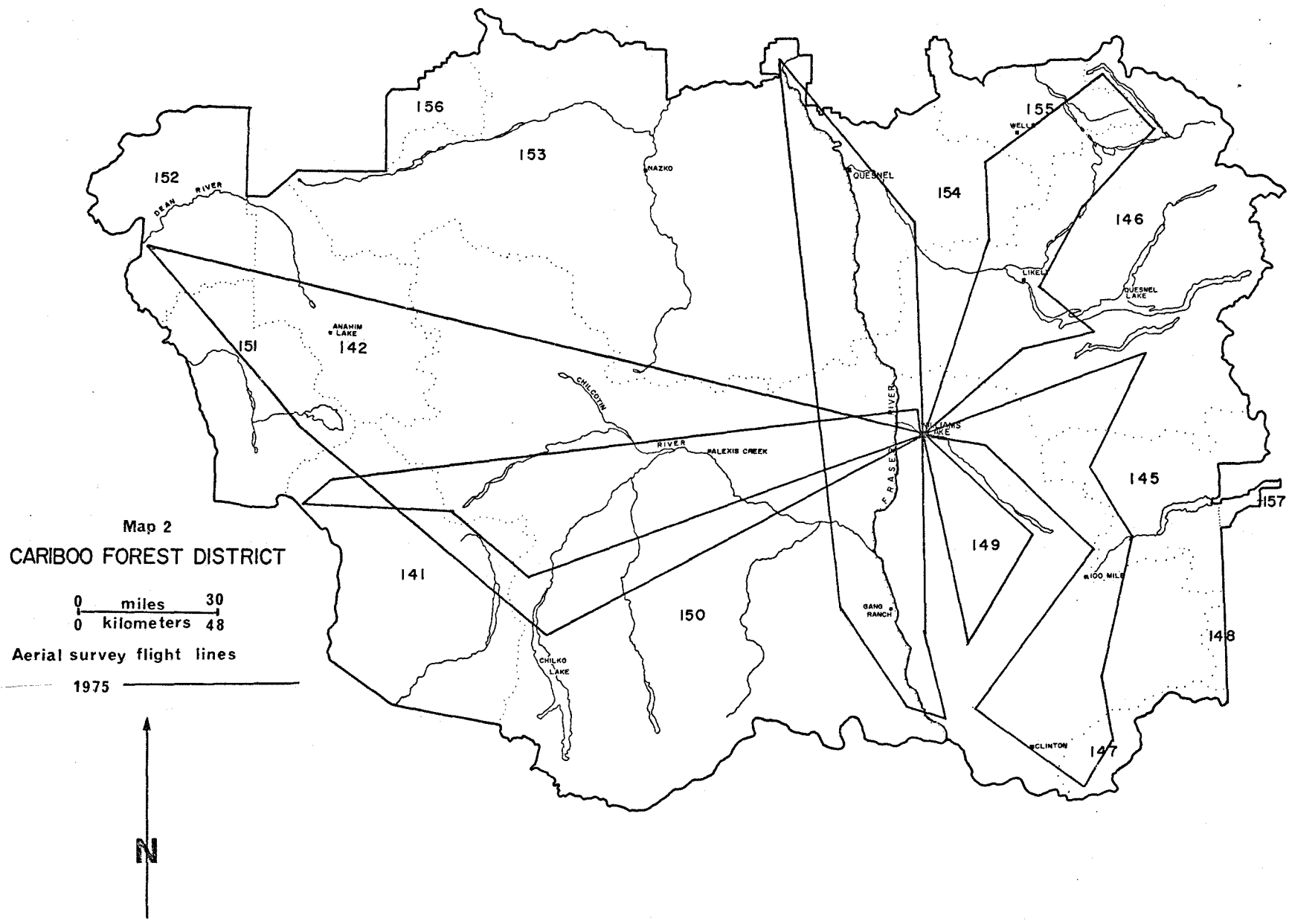
Table 1, Cont'd.

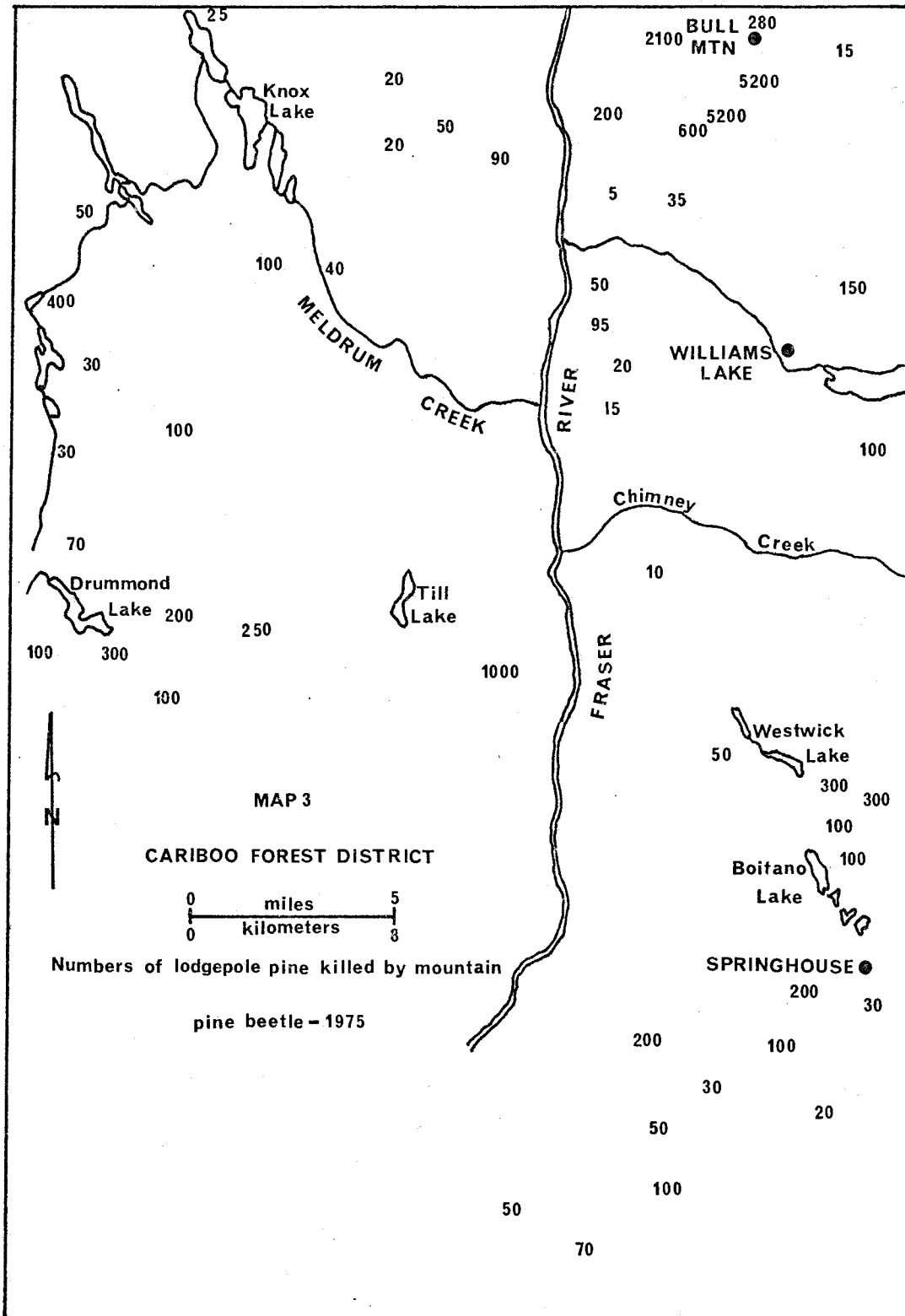
Location	No. red-tops	Location	No. red-tops	Location	No. red-tops
Tyee L	1,850	Big Bar Cr	300	Meadows L	150
Canoe Cr	1,750	McIntyre L	300	Churn Cr	150
One Eye Lake	1,300	Anahim Reserve	300	Vedan Cr	150
Grinder Cr	1,250	Granite Mtn	300	Buxton Cr	150
Little R	1,500	Little L	300	Narcosli Cr	125
Kostering Cr	1,300	Alkali L	300	McLeese L	100
Hawks Cr	1,200	Boitano L	250	Miner L	100
Dog Cr	1,150	Brigham L	250	Brunson L	100
Ditch Cr	1,050	China L	250	Marguerite	100
Till L	1,000	Eveline L	250	Nyland Cr	100
Drummond L	950	McCauley L	250	Jones Cr	100
Farwell Cr	900	Mayfield L	250	Poison L	100
McTaggart L	600	Beaumont L	250	Koster Cr	100
Sword Cr	600	Riske Cr	225	Alixton Cr	100
Skelton L	600	Borland Cr	200		
Williams L	550	Solomon L	200		
Onion L	400	Camille L	200		
Macalister L	400	Calwell L	200		

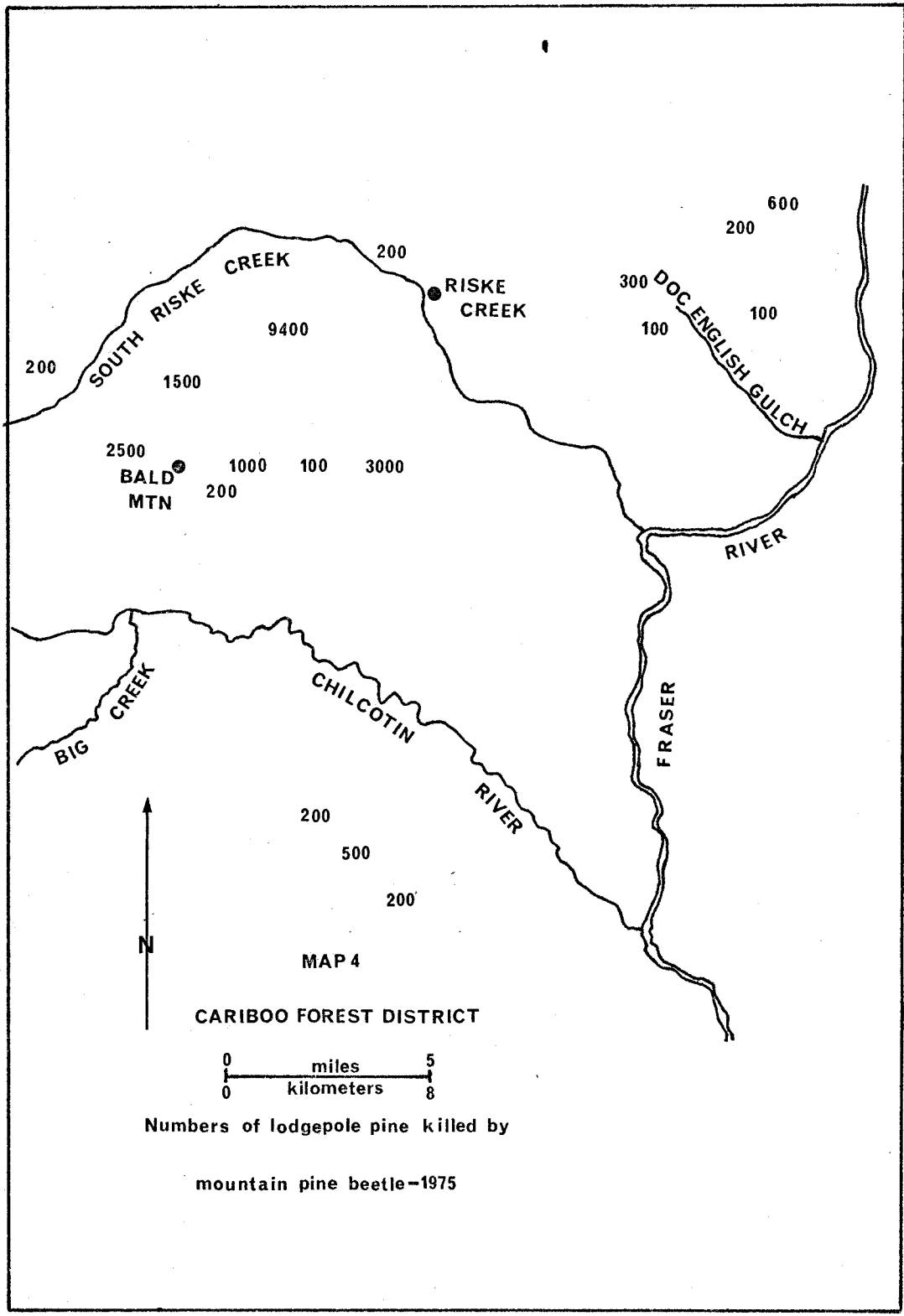
Table 2. Status of lodgepole pine trees on cruise strips, Cariboo Forest District, 1975

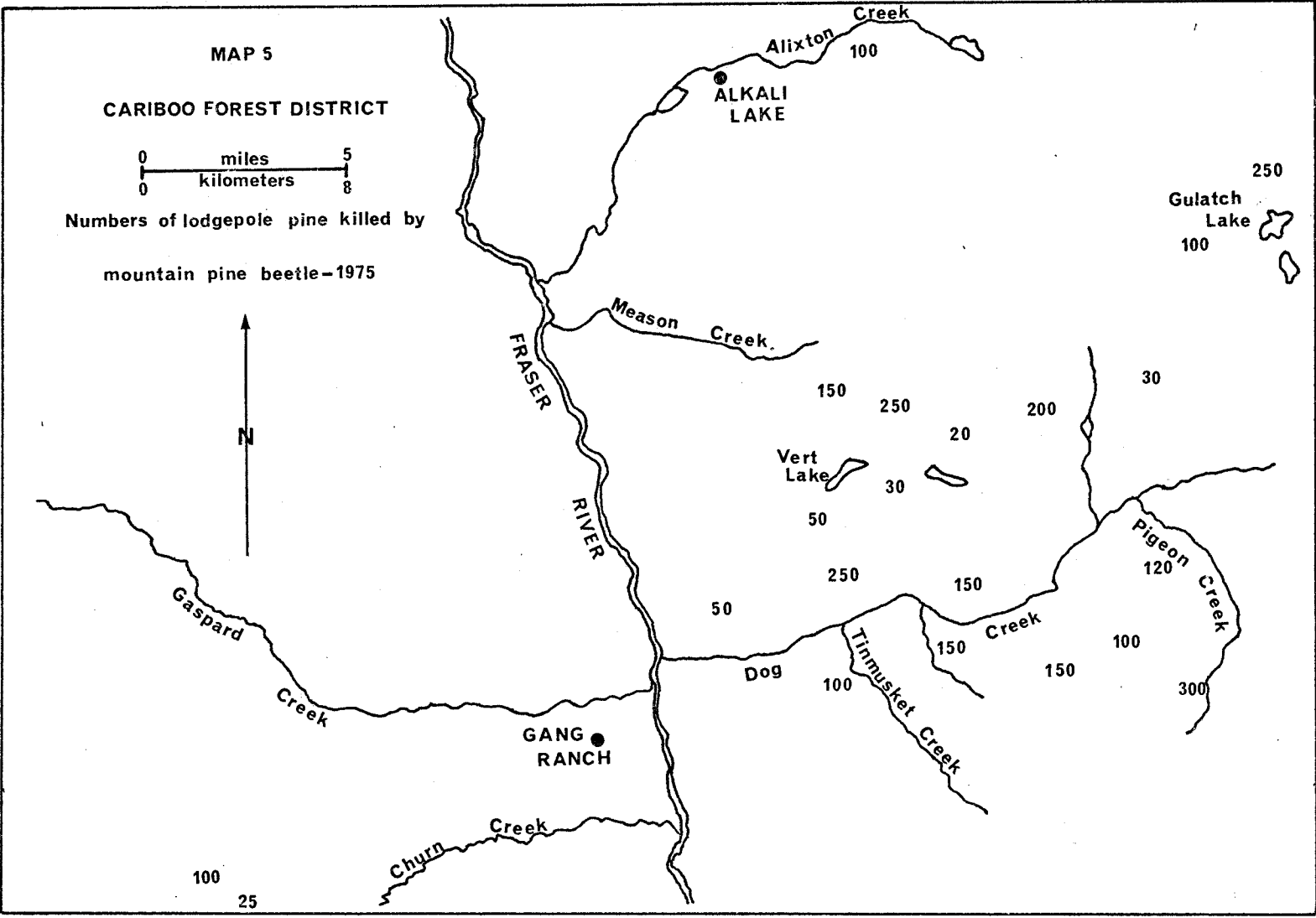
Location	Healthy	% trees		
		Green, attacked 1975	Red, attacked 1974	Grey, attacked prior to 1974
Bald Mountain	55	22	16	7
Bull Mountain	70	24	5	1
Tyee Lake	48	23	22	7
Beecher's Prairie	67	16	16	1

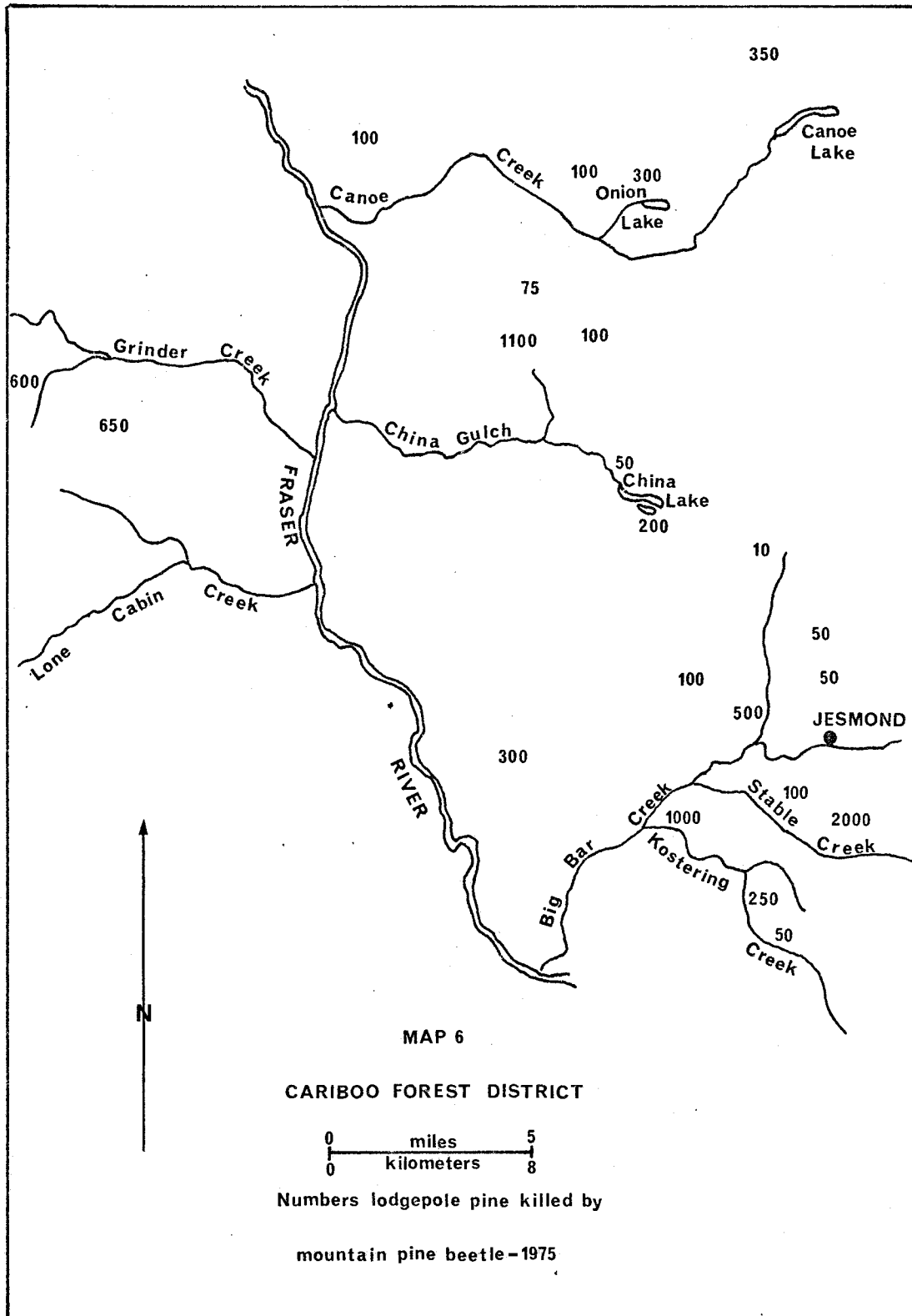
Mountain pine beetle also killed 175 ponderosa pine near Clinton.

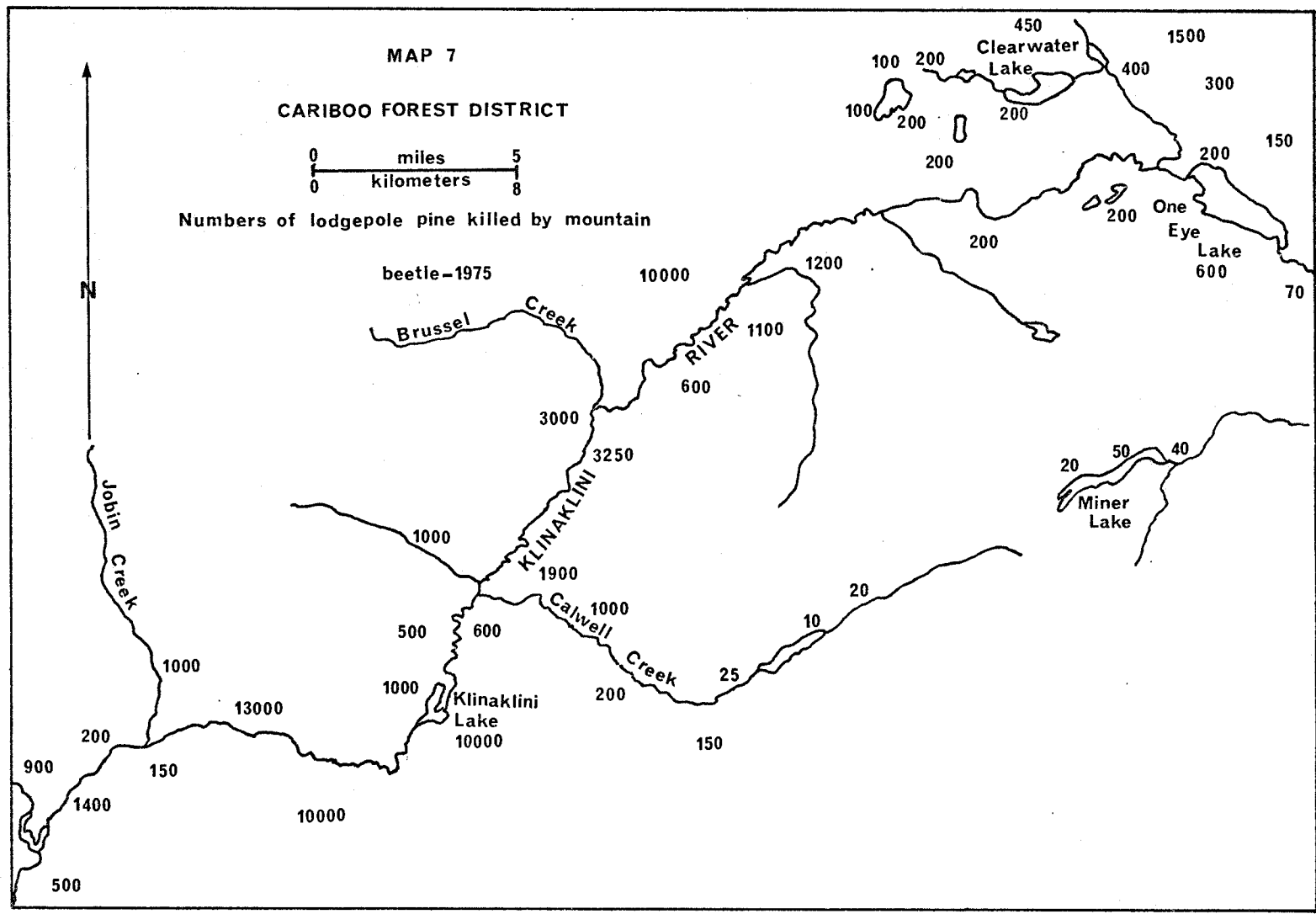


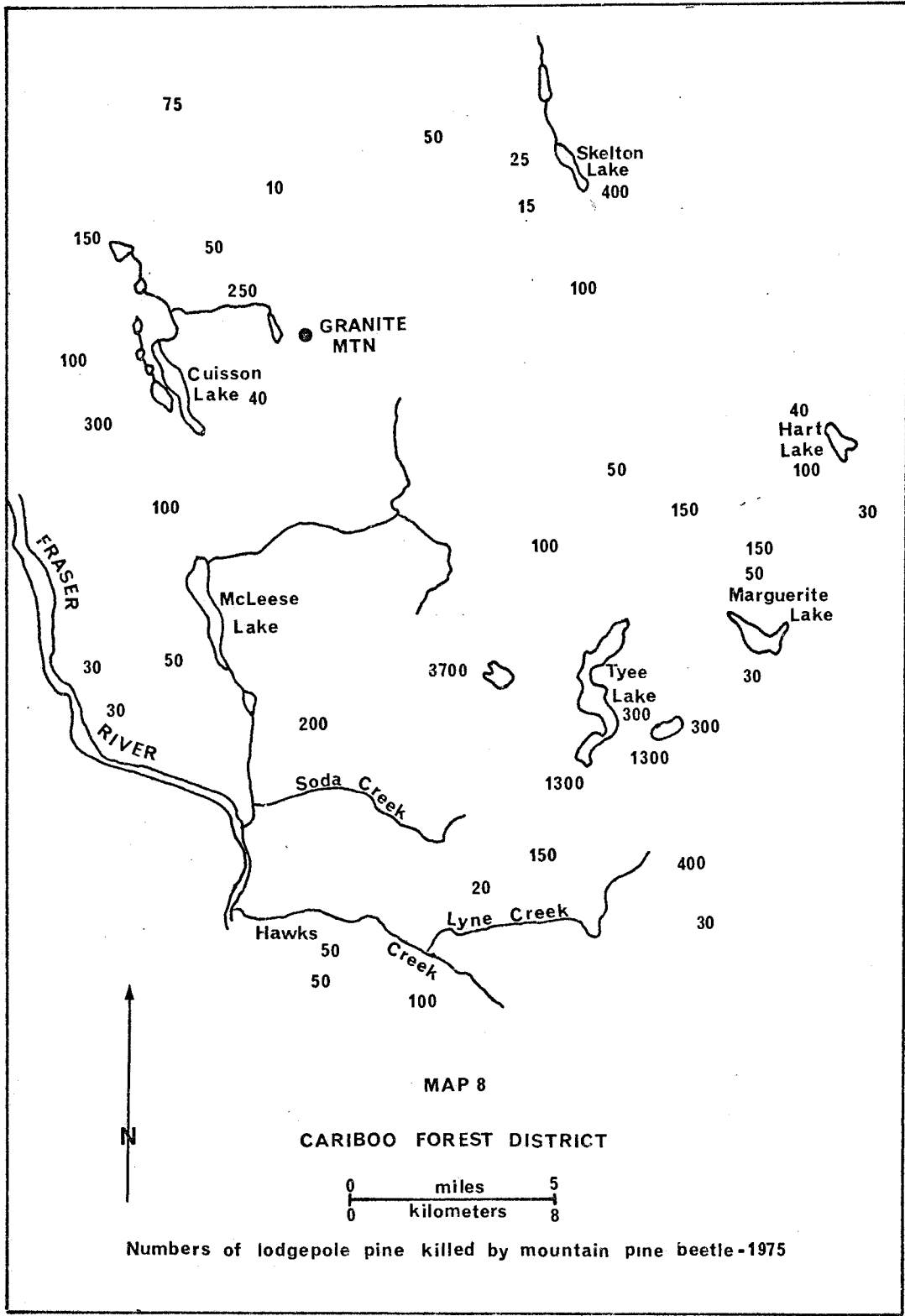


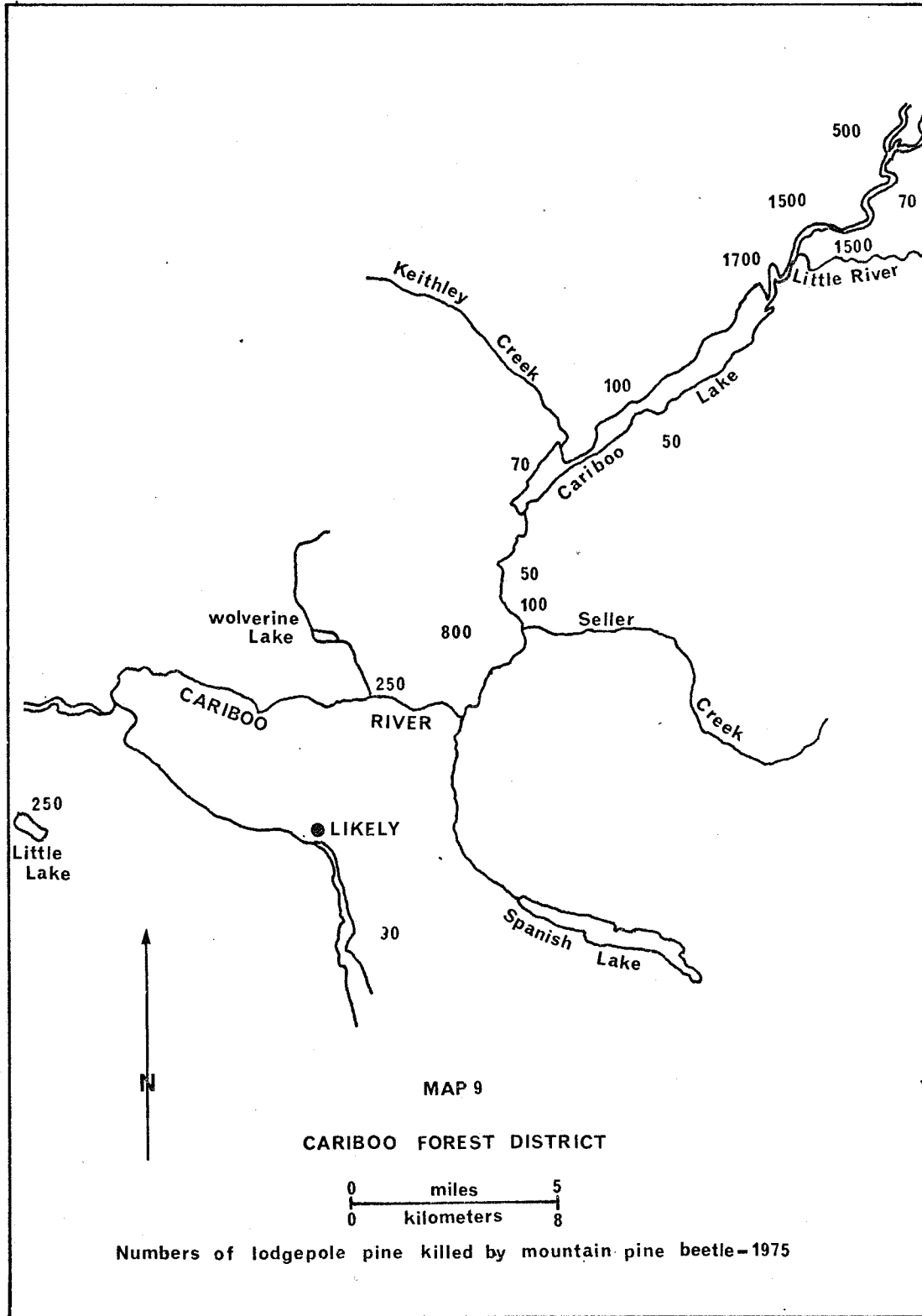


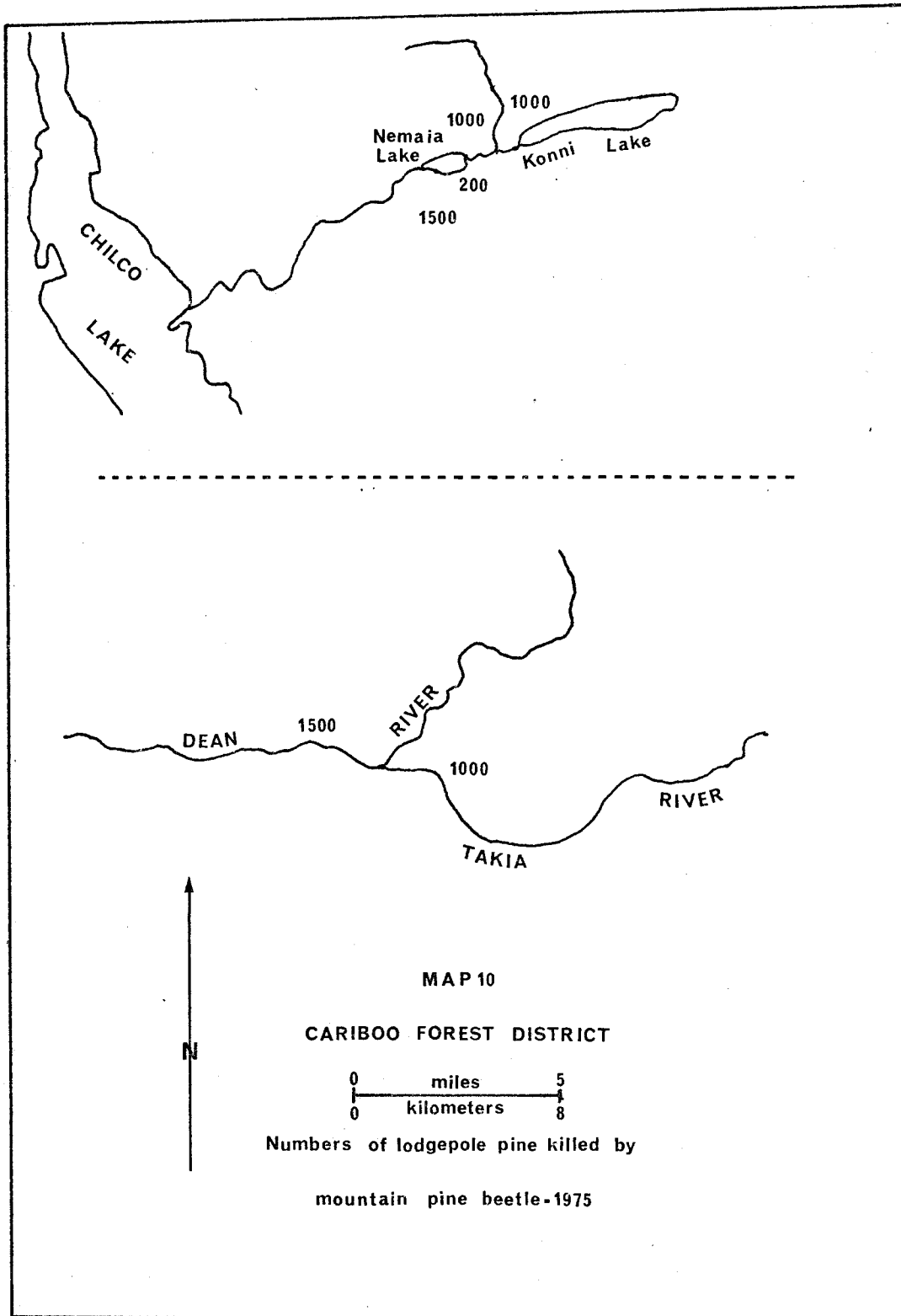


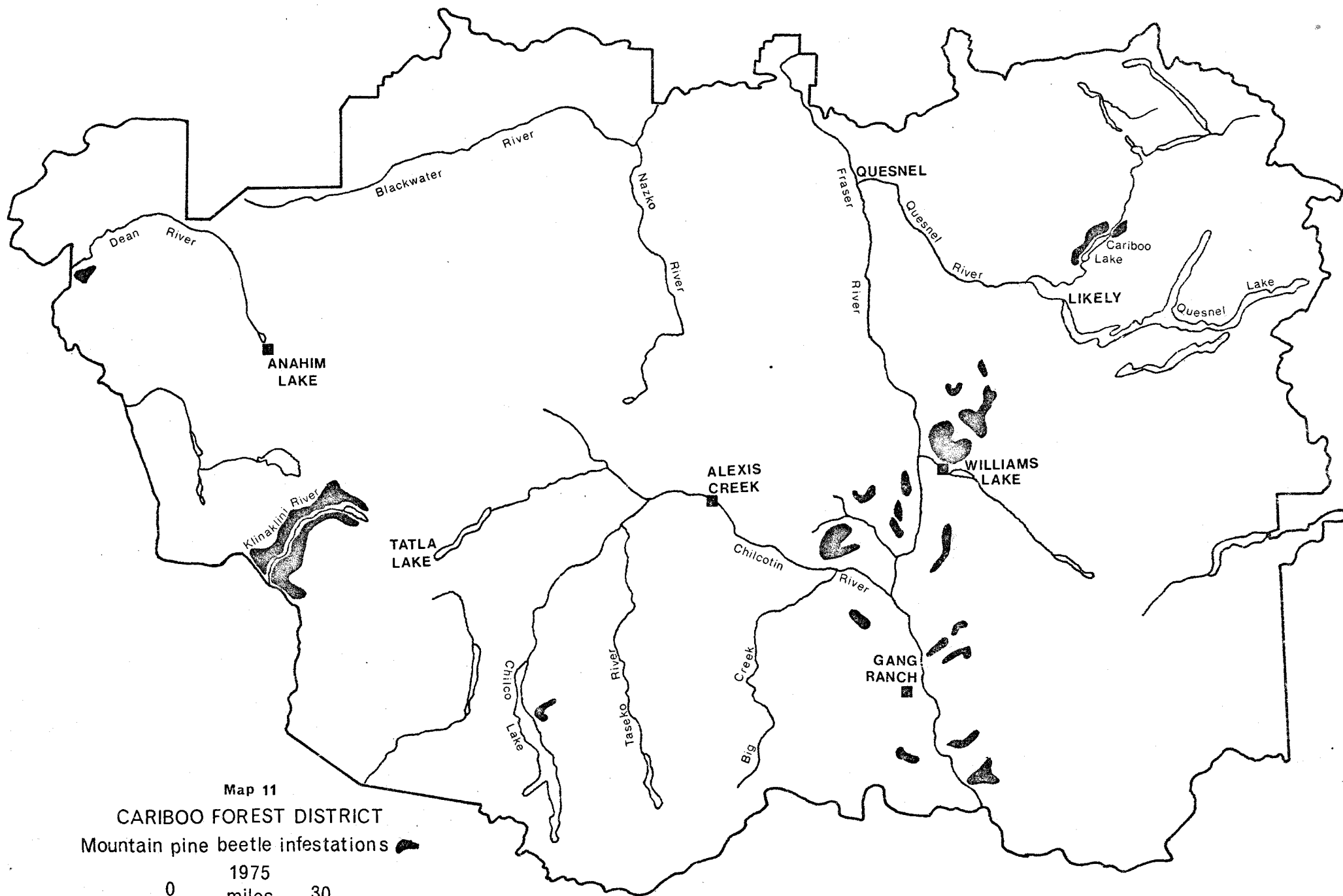












Map 11
 CARIBOO FOREST DISTRICT
 Mountain pine beetle infestations

1975
 0 miles 30
 0 kilometers 48

Douglas-fir beetle, *Dendroctonus pseudotsugae*

The numbers of red-topped Douglas-fir trees declined for the first time in five years. During 1973, subnormal summer temperatures and below normal precipitation may have slowed beetle development and prevented a large percentage of the brood from reaching the adult stage by the fall of 1973. This resulted in a less concentrated attack in 1974 and a reduction of red-tops in 1975.

		<u>Number of red-tops</u>			
1970	1971	1972	1973	1974	1975
60	80	470	1,700	7,500	4,700

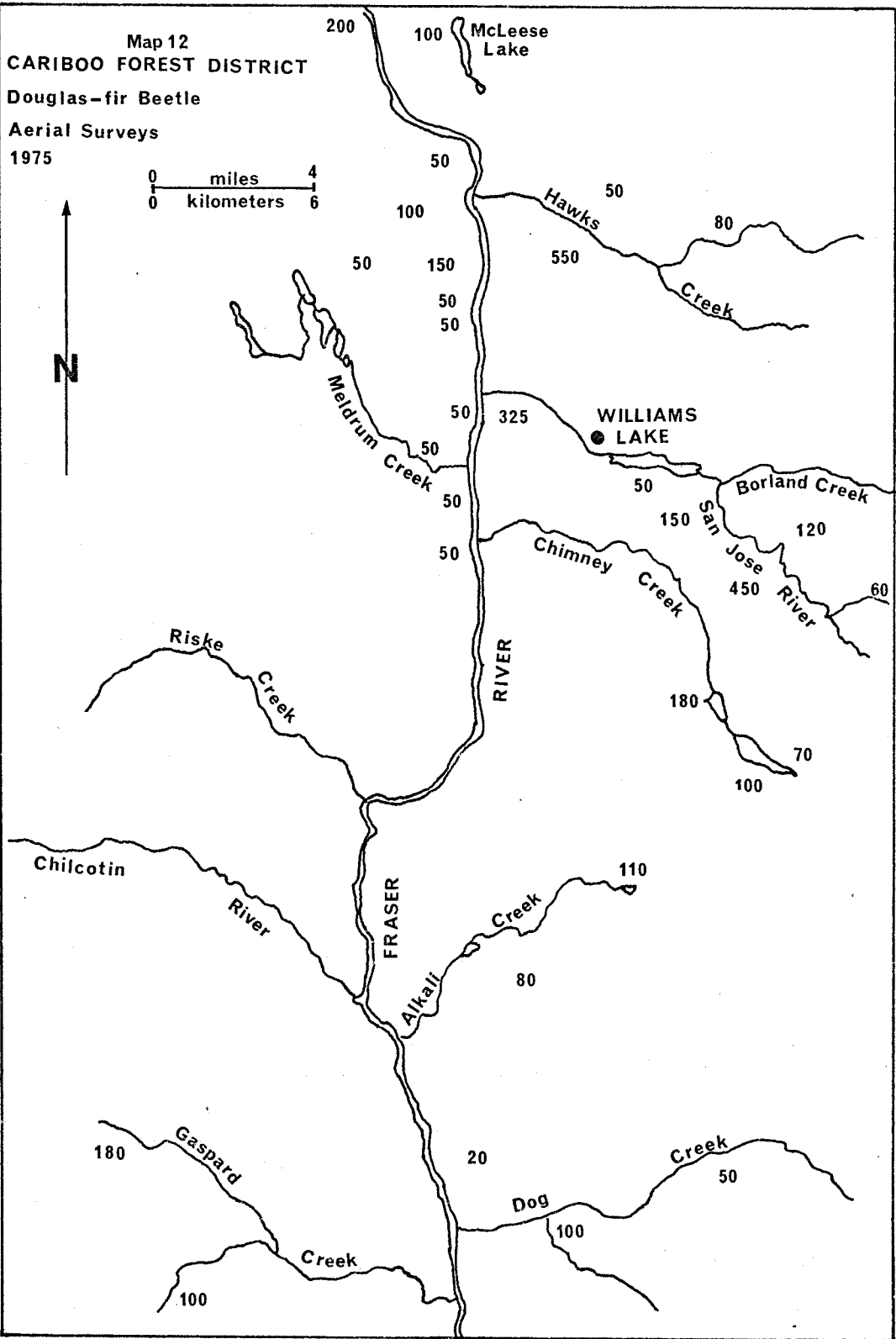
There were 4,700 dead Douglas-fir in 1975 compared with 7,500 in 1974 (Map 12). The main concentrations of dead trees were: Hawks Creek Valley (800), San Jose River-Jones Creek area southeast of Williams Lake (600), Meldrum Creek-Buckskin Lake (600), Chimney-Felker lakes (500), Williams Lake River (400), across the Fraser River from Macalister (400), Lee's Corner-Anahim Reserve (300), Dog Creek-China Gulch (300), Gaspard Creek-Churn Lake (300), north end of Chilko Lake (200), and McLeese Lake (100). Additional patches of from 10-50 red-tops were scattered throughout the District.

Populations of Douglas-fir beetle will probably remain about the same for 1976.

Western balsam bark beetle, *Dryocoetes confusus*, in association with the fungus *Ceratocystis dryocoetidis* Kendr. and Molnar

Alpine fir in high elevation stands in the interior wetbelt of the Cariboo District are subject to continual attack by the western balsam bark beetle. At present the population seems to be static with only 1,250 red-topped alpine fir recorded in 1975 compared with 1,100 in 1974. This bark beetle kills trees in association with the lesion causing fungus, *Ceratocystis dryocoetidis*, which destroys the cambium. Therefore even a light attack can cause tree mortality. Counts of red trees and areas were: Moffat Lakes (400), Molybdenite Creek (300), Tisdall Lake (200), Hen Ingram Lake (200), Swift River (100), and Spanish Lake (50).

Light tree mortality will probably continue in 1976 in high elevation stands.



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

Defoliation of alpine fir and Engelmann spruce by *C. biennis* occurred along the upper Horsefly River and the MacKay River drainage, even though 1975 was an "odd" year when larvae feed only a short time before hibernating until next year. Normally, feeding in the "odd" year is light, but in 1975 the larval population was high enough to cause 20% to 80% defoliation of understory alpine fir, and light to moderate defoliation of overstory alpine fir and Envelmann spruce. Some open growing small trees (5'-10') were 100% defoliated.

Insect traps, baited with a sex attractant (trans-11-tetradecenal) were set near Umiti Creek, Wells, Barkerville and Hendrix Creek to determine if significant numbers of budworms were off cycle, i.e. flying on the "odd" year instead of the "even" year. Male adults were trapped in all areas (Table 3).

Table 3. Numbers of spruce budworm larvae taken in beating collections and numbers of male moths caught in Soolure traps, Cariboo Forest District, 1972-75

Location	No. larvae in beating collections				Total number male adults collected			
	1972	1973	1974	1975	1972	1973	1974	1975
Umiti Cr	1	0	1	0	0	0	37	36
Wells	0	0	0	0	-	0	140	70
Barkerville	0	0	3	0	-	0	39	24
Hendrix Cr	-	-	49	78	-	-	360	112

Once again Soolure traps were successful in attracting male moths even in areas of low populations, i.e., Umiti Creek, Wells and Barkerville. Use of traps is still in the testing stage, and no conclusions can be drawn from the results, however, as these are chronic budworm areas, close surveillance should be maintained.

Two-year-cycle spruce budworm seldom cause mortality of native trees. However, in 1976, some mortality of understory trees and some top-kill may be expected.

Areas where defoliation occurred in 1974 (100,000 acres) will likely be defoliated again in 1976, namely the Bosk-McNeil lakes area, MacKay and Horsefly rivers, Little River, Cunningham Creek and the Bowron Lake circle.

Western spruce budworm, *Choristoneura occidentalis*

Western spruce budworm lightly defoliated Douglas-fir in small patches on Beecher's Prairie near Riske Creek and at Kelly Lake near Clinton. These were the only areas where damage was noticeable although 44% of the beatings contained larvae. The Soolure trap program conducted at Stuie in 1973-74 on the western border of Tweedsmuir Park was discontinued in 1975 due to lack of funds.

A continuing low population is predicted in 1976, with maybe some defoliation expected near Riske Creek.

Douglas-fir tussock moth, *Orgyia pseudotsugata*

This defoliator of Douglas-fir killed trees over several thousand acres south of Clinton near 20-Mile House in 1948. No larvae have been collected in the District since. However, because of the extensive infestations in the Kamloops-Savona area, traps containing a sex attractant were set out at 20-Mile House in August. An average of 6 male moths per trap were caught (Table 4). Female tussock moths are wingless.

Table 4. Numbers of adult male tussock moths captured at 20-Mile House, August 1975, Cariboo Forest District

Location	Traps containing magicaps	No. adults per trap	Traps containing laminated strip	No. adults per trap
20-Mile House	1	12	1	2
	2	8	2	3
	3	11	3	1
	4	8	4	1
	5	14	5	1

Two different methods of dispersing the attractant were used. In one, the attractant was injected into magicaps, and in the other the attractant was impregnated into a plastic strip. The magicap method of dispersing was most successful in attracting moths.

Since it is not known how far males will fly or are blown by wind, the presence of the adults indicates only that the area should be checked closely in 1976.

Cooley spruce gall aphid, *Adelges cooleyi*

Cooley spruce gall aphid, a sucking insect, attacks Douglas-fir and spruce trees. Its presence on Douglas-fir is indicated by small, white tufts of wool on the needles. It infests Christmas-tree size Douglas-fir, causing needle discoloration and drop. Five permanent plots were established to monitor the population. The number of needles infested at the plots decreased on an average of 68% from 1974 (Table 5). Only a few galls were noted on spruce.

Table 5. Percentage of Douglas-fir needles infested by Cooley spruce gall aphid, Cariboo Forest District

Location	% needles infested		
	1973	1974	1975
Clinton	34	61	23
108 Mile House	50	89	1
Williams Lake	37	91	3
McLeese Lake	21	88	26
Ten Mile Lake	7	68	8

A needle midge, *Contarinia* sp.

This midge infests the needles of Douglas-fir causing them to become distorted and discolored. Even light infestations can degrade Christmas trees, thus rendering 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 percent of needles infested decreased slightly. However, this is of little significance since the incidence was already light (Table 6).

Table 6. Percentage of Douglas-fir needles infested by needle midges, Cariboo Forest District

Location	% needles infested		
	1973	1974	1975
Clinton	1	0	0
108 Mile House	2	2	0
Williams Lake	2	5	1
McLeese Lake	4	5	1
Ten Mile Lake	1	4	6

A conifer sawfly, *Neodiprion* spp.

This sawfly caused light tip defoliation of small groups of Engelmann spruce trees at Buffalo-Ruth lakes and Eagle Creek again this year, but no permanent damage is expected.

Poplar and willow borer, *Cryptorhynchus lapathi*

This weevil attacks small willow trees, boring into the stem at the base, causing the stems to break from wind and snow. One of the more notable areas infested was the road to the Williams Lake Airport just off Hwy. #97. Infested willows were along one mile of the road: 146 damaged willows were counted.

Table 7. Other insects of current minor significance

Insect	Host(s)	Locality	Remarks
<i>Dionychtria pseudotsugella</i>	Douglas-fir	Williams Lake	Appears to be a good population of this defoliator in the Douglas-fir in the town of Williams Lake; no visible damage but a good frass fall.
<i>Malacosoma pluviale</i> western tent caterpillar	willow	Williams Creek near Barker-ville	Moderate populations along the creek.

Western globose gall rust, *Endocronartium harknessii*

This rust is the most common, most conspicuous and most destructive rust of lodgepole pine in western Canada. It is a short cycle rust, i.e., it completes its life cycle on pine alone, without any secondary hosts. The most conspicuous sign of infection is irregularly round to pear-shaped galls on the stems of seedlings and on the branches of older trees. Galls are woody and perennial, growing larger each year and producing new crops of spore blisters until they have girdled and killed the branch or stem they're growing on. When the host dies, the rust dies.

In 1975 a survey was conducted in the Cariboo-Chilcotin areas to determine the extent and intensity of the rust in the pine stands. Since 24% of the lodgepole pine in the Province occurs in the Cariboo Forest District, it was decided to examine 100 randomly selected pines in each of 24 plots for either branch or stem galls. More than 90% of the trees were infected at two locations (Table 8).

Table 8. Areas in the Cariboo Forest District examined for the disease *Endocronartium harknessii*

Location	% infection
Mi. 15.5 Likely road	68
Keithley Creek	90
Rail Lake	43
North Bonaparte	71
Exeter "F" road	25
Exeter "W" road	5
Mt. Begbie	33
Mi. 19 Big Bar Lake road	0
Mi. 9.3 Meadow Lake road	4
Mi. 3.0 Green Lake road	6
Mi. 58 Cariboo Hwy.	9
Chasm	2
Wingdam	99
Wendle Park	14
Mi. 20.7 Blackwater road	71
Mi. 14 Nazko road	42
Mi. 52 Hwy. #20	46
Big Creek	0
Mi. 14 Alexis Lake road	21
Puntzi Lake	12
Chezacut	16

Table 8, Cont'd.

Location	% infection
Mi. 1.5 Tatlayoko Lake road	78
Mi. 21 Chilko Lake road	0
Mi. 12 Chilko Lake road	78

Globose gall rust was found at 21 of the plots with an average infection of 49% of the trees and a maximum of 99% at the Wingdam plot. In the 21 infected plots, 14% had stem galls with a maximum of 45% at North Bonaparte. Branch galls occurred on 25% of the trees with a maximum of 77% infected at the Wingdam plot. Stem galls can cause tree mortality because of the girdling effect of the rust.

Western globose gall rust could be an important pest of plantations, especially if trees are planted in the vicinity of infected overstory trees. In most thick overgrown pine stands the effect of the rust is probably beneficial, acting as a thinning agent, thus allowing some trees to release and gain increment.

Dwarf mistletoe, *Arceuthobium americanum*

Mistletoe is the most important parasite of lodgepole pine in the District. It exists only on living hosts, seriously retarding and distorting their growth. In 1975, 100 lodgepole pine trees were examined randomly at each of 24 locations. Infection ranged from nil to 88% of the trees (Table 9).

Table 9. Areas examined and intensity of dwarf mistletoe infection of lodgepole pine, Cariboo Forest District, 1975

Location	% infection
Mi. 15.5 Likely road	7
Keithley Creek	0
Rail Lake	0
North Bonaparte	0
Exeter "F" road	31
Exeter "W" road	0
Mt. Begbie	1
Mi. 19 Big Bar Lake road	34
Mi. 9.3 Meadow Lake road	25
Mi. 3 Green Lake	28
Mi. 58 Cariboo Hwy.	28
Chasm	62
Wingdam	0
Wendle Park	0
Mi. 20.7 Blackwater road	0
Mi. 14 Nazko road	88
Mi. 52 Hwy. #20	68
Big Creek	82
Mi. 14 Alexis Lake road	55
Puntzi Lake	2
Chezacut	48
Mi. 1.5 Tatlayoko Lake road	0
Mi. 21 Chilko Lake road	44
Mi. 12 Chilko Lake road	32

Mistletoe infections occurred at 16 locations with an average of 40% of the trees infected. At mile 14 Nazko road, 88% of the pine were infec-

ted. This is a continuing problem that requires more intensive management of pine stands. Recommendations for control of the pest have been set out and should be practised where feasible: Dwarf Mistletoes in British Columbia and Recommendations for their Control, by J. A. Baranyay and R. B. Smith, BC-X-72.

Stalactiform rust, *Cronartium coleosporioides*

This rust, normally prevalent in reproduction lodgepole pine stands, also infects larger stems. In 1975, 24 areas were examined for evidence of this rust and nine areas were found to be infected (Table 10).

Table 10. Areas examined in the Cariboo District for the lodgepole pine disease, *Cronartium coleosporioides*

Location	% infection
Mi. 15.5 Likely road	0
Keithley Creek	0
Rail Lake	0
North Bonaparte	0
Exeter "F" road	0
Exeter "W" road	22
Mt. Begbie	25
Mi. 19 Big Bar Lake road	3
Mi. 9.3 Meadow Lake road	0
Mi. 3 Green Lake road	0
Mi. 58 Cariboo Hwy.	5
Chasm	1
Wingdam	2
Wendle Park	0
Mi. 20.7 Blackwater road	0
Mi. 14 Nazko road	0
Mi. 52 Hwy. #20	0
Big Creek	0
Mi. 14 Alexis Lake road	0
Puntzi Lake	0
Chezacut	1
Mi. 1.5 Tatlayoko Lake road	2
Mi. 21 Chilko Lake road	5
Mi. 12 Chilko Lake road	0

At Mt. Begbie, 25% of the lodgepole pine examined were infected and on a logging road near Exeter, 22% were infected. Stalactiform rust causes branch and tree mortality by girdling, although on larger stems the principal result of the infection is growth loss and deformity.

The disease alternates between pines and its secondary host, Indian paintbrush. However, after a pine is infected the disease is perennial until the infected portion dies.

Blow Down

Blowdown of Engelmann spruce and alpine fir occurred in small patches at mile 12 Hendrix Lake road for about $\frac{1}{2}$ mile alongside the road and the power line. The B. C. Forest Service reported a large blow down area near Bowron Lake, 3,000 acres of Engelmann spruce in a solid patch and 6,000 acres of total damage. This area will have to be checked closely for spruce beetle build-up. No problem is anticipated as the area has no history of beetle problems.

Salt Damage

Material used to salt the highway north of Clinton has caused damage to Douglas-fir alongside the road. The damage to the foliage was probably caused by salt spray, while the actual run-off probably caused the damage to be more noticeable on the downhill side of the highway. Damage to the trees has been gradual, but now is very noticeable on the smaller trees; a few of the overstory Douglas-fir, predisposed by the salt, are now being attacked by Douglas-fir beetle.

Atropellis canker, *Atropellis piniphila*

This disease causes cankers which deform stems and render lodgepole pine useless for sawlogs. In addition, sapwood staining and bark adhesion in the canker area make them undesirable for pulping. In 1975, 24 areas were randomly selected and 100 trees in each area were examined for the disease. Infection occurred in 11 areas, with a high of 32% of the trees infected at Wendle Park (Table 11). Volume losses result from the need to cull cankered trees and from the non-productive occupation of good forest land by badly infected stands. Tree mortality, while not uncommon in infected trees, is of little consequence in the overstocked stands where it occurs.

Table 11. Areas examined in the Cariboo District for the disease of lodgepole pine, *Atropellis piniphila*

Location	% infection
Mi. 15.5 Likely road	9
Keithley Creek	0
Rail Lake	7
North Bonaparte	13
Exeter "F" road	3
Exeter "W" road	0
Mt. Begbie	10
Mi. 19 Big Bar Lake road	0
Mi. 9.3 Meadow Lake road	0
Mi. 3 Green Lake road	0
Mi. 58 Cariboo Hwy.	0
Chasm	1
Wingdam	25
Wendle Park	32
Mi. 20.7 Blackwater road	0
Mi. 14 Nazko road	1
Mi. 52 Hwy. #20	2
Big Creek	0
Mi. 14 Alexis Lake road	0
Puntzi Lake	0
Chezacut	0
Mi. 1.5 Tatlayoko Lake road	1
Mi. 21 Chilko Lake road	0
Mi. 12 Chilko Lake road	9

Table 12. Other diseases of current minor significance

Organism	Host(s)	Locality	Remarks
<i>Lophodermella concolor</i> needle cast	lodgepole pine	Kersley	This needle cast infected 5% of trees checked along the road near Kersley - south of Quesnel.
<i>Hendersonia pinicola</i> hyperparasite	lodgepole pine <i>Lophodermella concolor</i>	Kersley	Hyperparasite found in association with <i>Lophodermella concolor</i> .
<i>Rhabdocline</i> needle cast	lodgepole pine	Kersley	Severe infection completely defoliates trees. Light infection at Kersley - south of Quesnel.
<i>Sclerophoma pithyophila</i> (imperfect stage of <i>Sydowia polyspora</i>)	lodgepole pine, Scots pine	Williams Lake, Alexis Lake	Canker causing organism causes flagging of branches and stem cankers. Light infection.