ANNUAL DISTRICT REPORT

FOREST INSECT AND DISEASE SURVEY

BRITISH COLUMBIA, 1976

PART VI, CARIBOO FOREST DISTRICT

by

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PACIFIC FOREST RESEARCH CENTRE

CANADIAN FORESTRY SERVICE

VICTORIA, BRITISH COLUMBIA

- FILE REPORT -

DEPARTMENT OF FISHERIES & ENVIRONMENT

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INTRODUCTION

This report outlines, in detail, the status of forest insect and disease conditions in the Cariboo Forest District in 1976 and forecasts pest population trends.

Regular field work in the District extended from June 15 to August 6. Due to rotations of rangers to new districts, familiarization of roads involved extra time over and above the normal amount of time required to conduct the survey. Special surveys were as follows: Pheromone-baited trap program for 2-year-cycle spruce budworm and Douglas-fir tussock moth; Douglas-fir needle sampling for incidence of *Contarinia* sp. and *Adelges cooleyi*; aerial surveys for beetles throughout the western half of the District (Map 2).

Totals of 347 insect and 25 disease collections were submitted in 1976. Map 1 shows locations of collections.

The numbers of larval defoliators found in field collections increased by 12%; once again, the west Chilkotin forests supported few defoliating larvae.

Numbers of larvae collected				
1972	1973	1974	1975	1976
205	282	717	810	1,030

In the District, 67% of the collections contained larvae, compared with 50% in 1975, 57% in 1974, 60% in 1973 and 71% in 1972. Each positive collection contained an average of 7 larvae.

B. C. Forest Service Protection Division of the District Office at Williams Lake provided invaluable assistance in the form of 12 hours of Cessna 180 flying time and 12 man days assistance from two B.C.F.S. employees on the mountain pine beetle aerial and ground surveys, also personnel of the ranger districts' offices. These are hereby acknowledged.

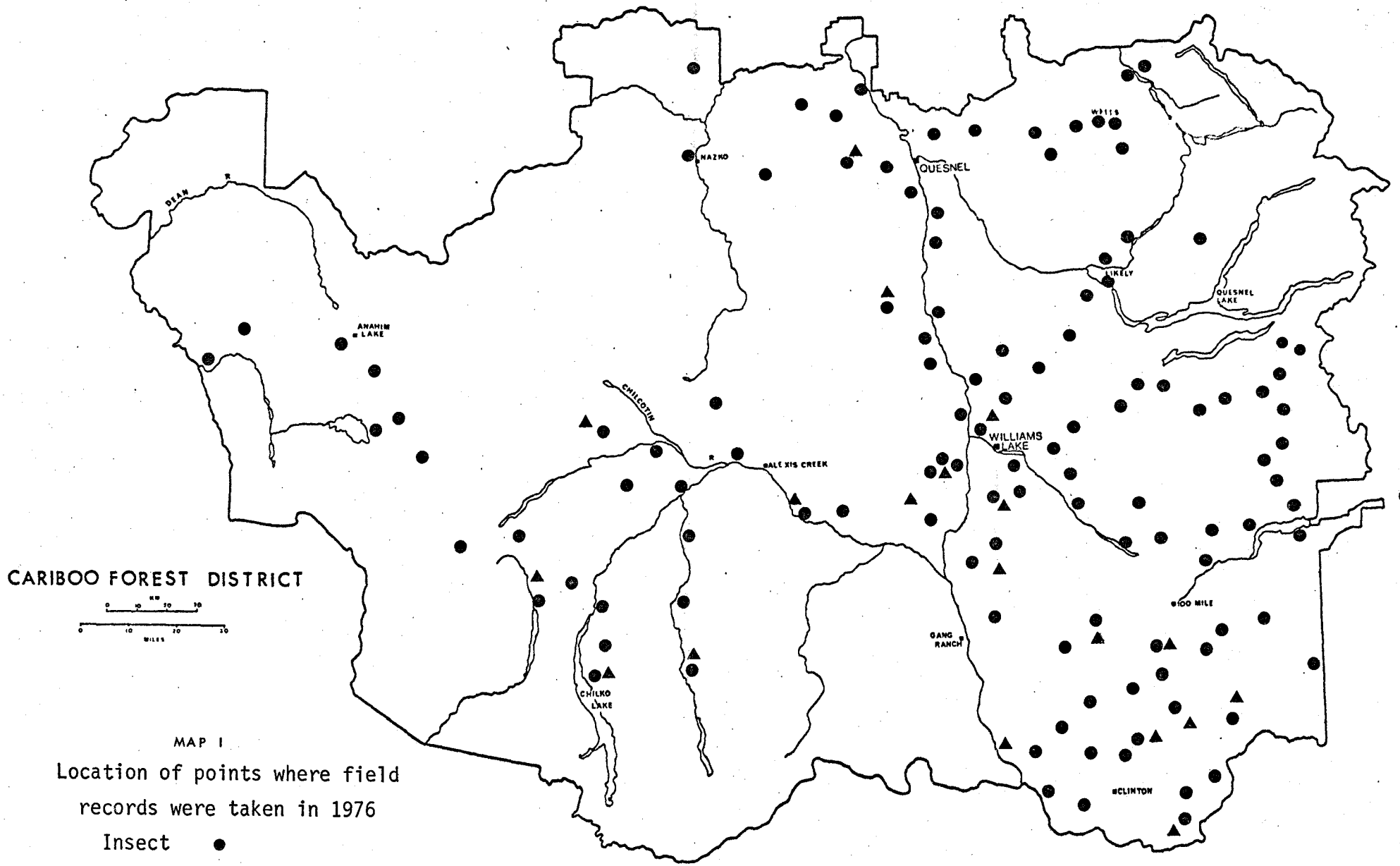
One special collection of 1,000 spruce budworm larvae was submitted to Dr. Harvey at Sault Ste. Marie, Ontario.

There was a decline in the number of red-top lodgepole pine in 1976 compared with 1975, indicating a decline in attacks by mountain pine beetle. There were 83,000 red-top lodgepole pine trees counted in 1976, compared to 140,000 in 1975. Douglas-fir beetle declined with only 250 red-top Douglas-fir trees found throughout the District. Western balsam bark beetles remained at low population level. Spruce beetle began to populate the Bowron Lake windfall white spruce.

A moderate population of 2-year-cycle spruce budworm occurred between Hendrix Lake and Bowron lakes and caused light to moderate defoliation.

One-year-cycle spruce budworm occurred throughout the southern areas in the District and caused light defoliation in the area south of Kelly Lake.

Disease problems included heavy wind damage at Bowron Lake and less serious damage throughout other areas in the District. Dwarf mistletoe incidence checks were made on several young stands of lodgepole pine in the western portion of the District.

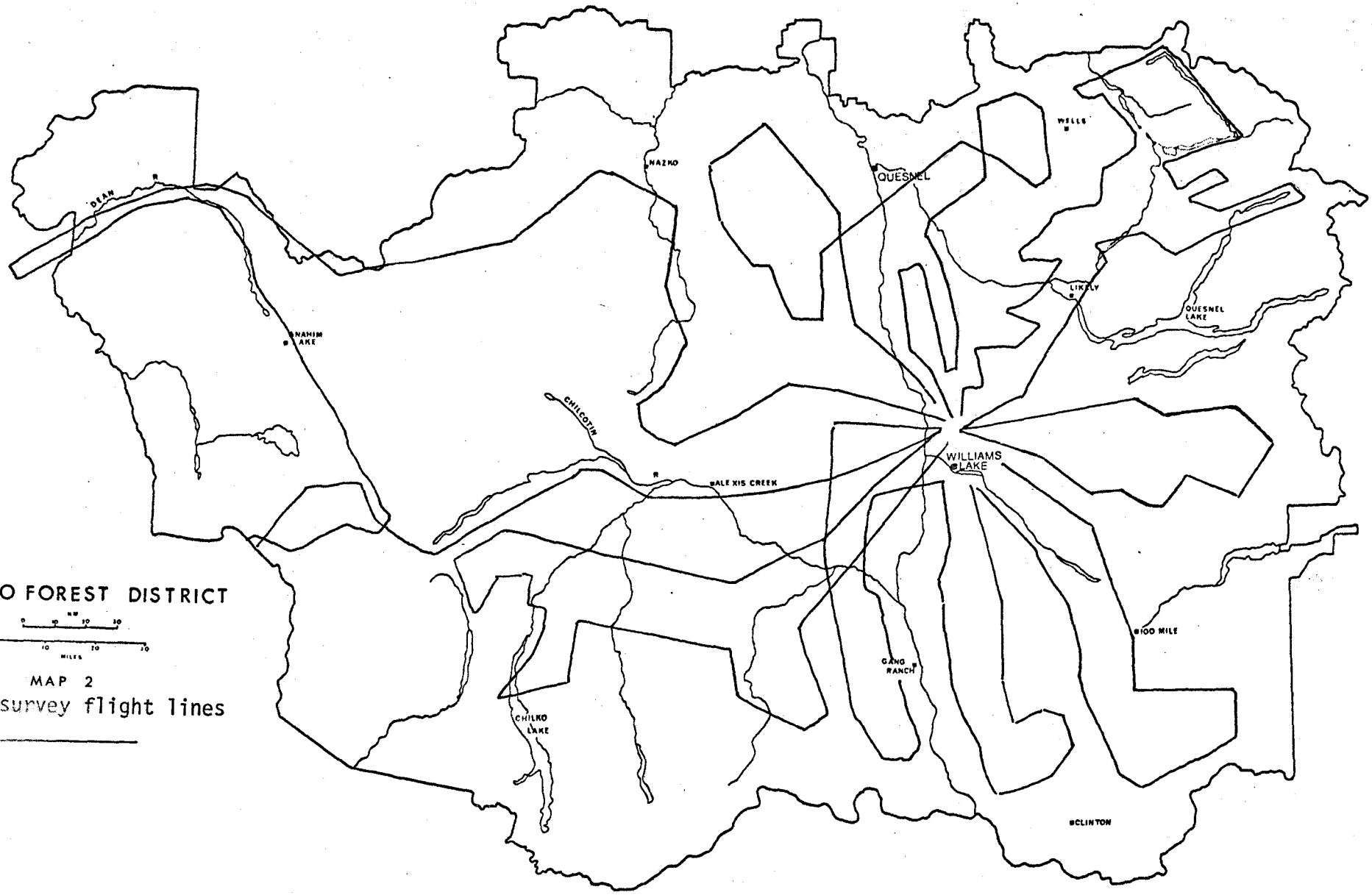


MAP 1

Location of points where field records were taken in 1976

Insect ●

Disease ▲



CARIBOO FOREST DISTRICT

KM 0 10 20 30

0 10 20 30 MILES

MAP 2

Aerial survey flight lines

1976 ——————

Mountain pine beetle, *Dendroctonus ponderosae*

Mountain pine beetle continued killing lodgepole pine trees throughout the Cariboo Forest District. The majority of attacks occurred within, or adjacent to the 1975 areas.

The most heavily affected PSYU's within the District were Chilko, Big Bar, Stum and Williams Lake. The largest infestation area was in the Klinaklini River Valley, with some 46,500 red-tops in the Cariboo District plus 18,000 in the Vancouver Forest District.

An assessment of beetle populations during the early summer showed brood reduction, especially in the dry belt infestations west of the Fraser River. Some broods were reduced to fewer than 10 larvae. This seemed to be the result of overcrowding (Table 1).

Table 1. Numbers of attacks, larvae and pupae found in 6-inch, breast height bark samples from mountain pine beetle green attacked lodgepole pine trees, Cariboo Forest District, 1976

Location	No. of attacks	No. of larvae and/or pupae	Avg no. larvae or pupae
Bull Mtn	102	82	0.8
Bald Mtn	145	369	2.5
Tyee L	266	1,047	3.9
Cariboo L	149	416	2.8

The areas and approximate numbers of trees affected by the 1975 attacks ('76 red-tops) were delineated during aerial surveys in August. Ground surveys during September using prism and fixed radius plots determined the intensity of 1976 attacks. There were 85,000 red-tops in 1976 compared to 140,000 in 1975; in both years infestations covered about 15 600 ha (39,000 acres) (Maps 3, 4, 5 and 6).

Table 2 lists red tree counts in their respective locations by PSYU areas. Fewer trees were attacked in 1975 than in 1974 (Table 3), indicating a considerable decline in beetle populations.

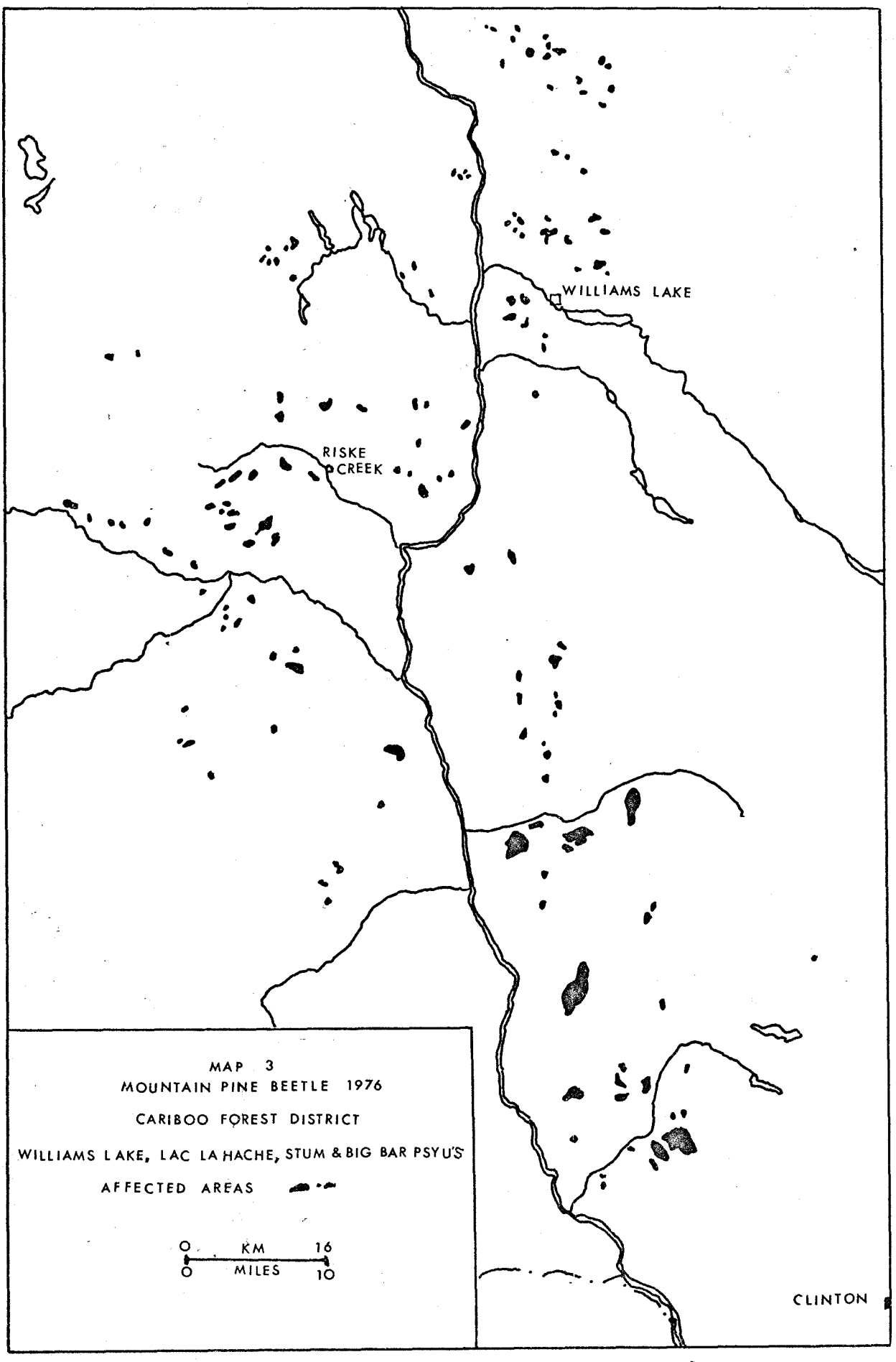
Table 2. Lodgepole pine trees killed by mountain pine beetle in P.S.Y.U.'s in the Cariboo Forest District, as indicated by red-tops in 1976.

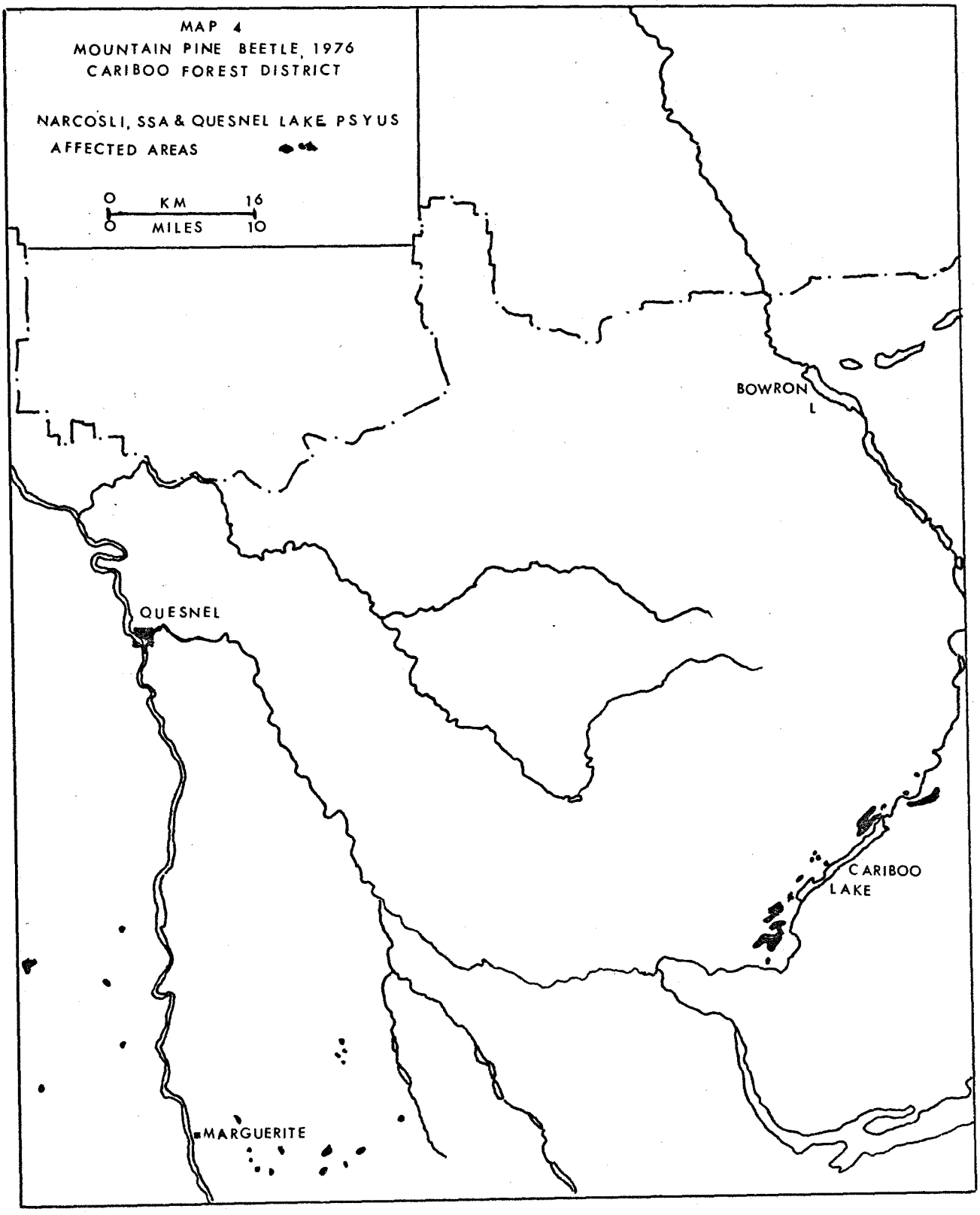
P.S.Y.U. & Location	Hectares	Acres	No./red-tops
Chilko			
Klinaklini R	5632	14,080	46,500
Calwell Cr	192	480	470
Tatla L	128	320	825
Clearwater L	832	2,080	4,425
Konni L	192	480	700
	6976	17,440	52,920
Stum			
Big Cr - Gaspard Cr	640	1,600	2,790
Fletcher L	64	160	430
Riske Cr	960	2,400	4,200
Meldrum Cr	192	480	930
	1856	4,640	8,350
Narcosli			
Castle Rock	64	160	350
SSA			
Cuisson Cr & L	60	150	225
W./Diamond I	4	10	25
Quesnel Lake			
Cariboo L	1024	2,560	300
Cariboo R	448	1,120	1,425
Little R	256	640	750
	1728	4,320	2,475
Williams Lake			
Springhouse	320	800	720
Williams Lake	320	800	1,125
Hawks Cr	320	800	1,220
Tyee L - Big L	576	1,440	5,560
	1536	3,840	8,625
Big Bar			
Clinton	64	160	55
Jesmond - Canoe Cr	2112	5,280	8,460
Dog Cr	1088	2,720	1,560
Lone Cabin Cr	128	320	240
	3392	8,480	10,315
Tweedsmuir Park			
Dean River	256	640	1,500

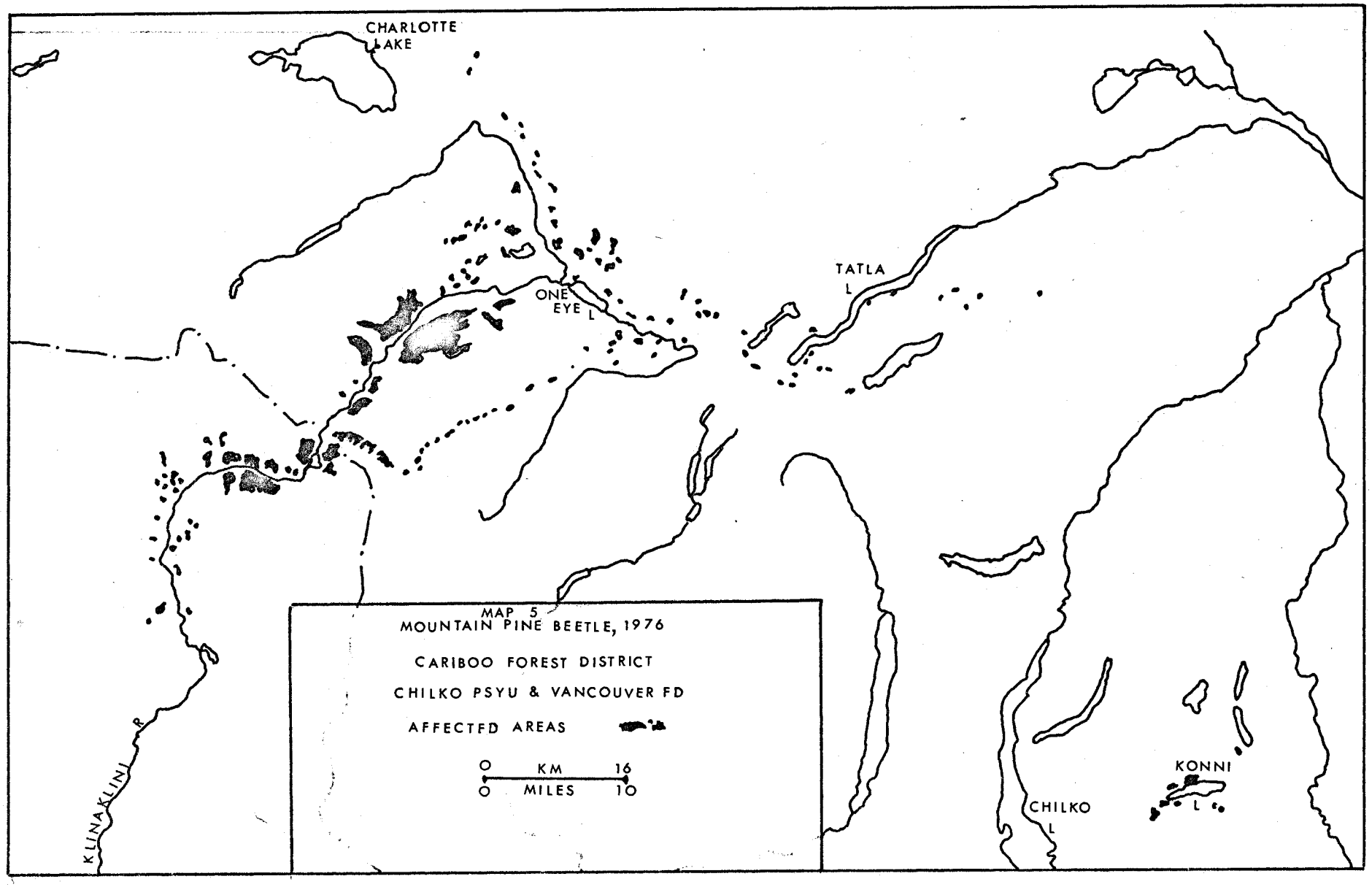
Table 3. Status of lodgepole pine trees on cruise strips, Cariboo Forest District, 1976.

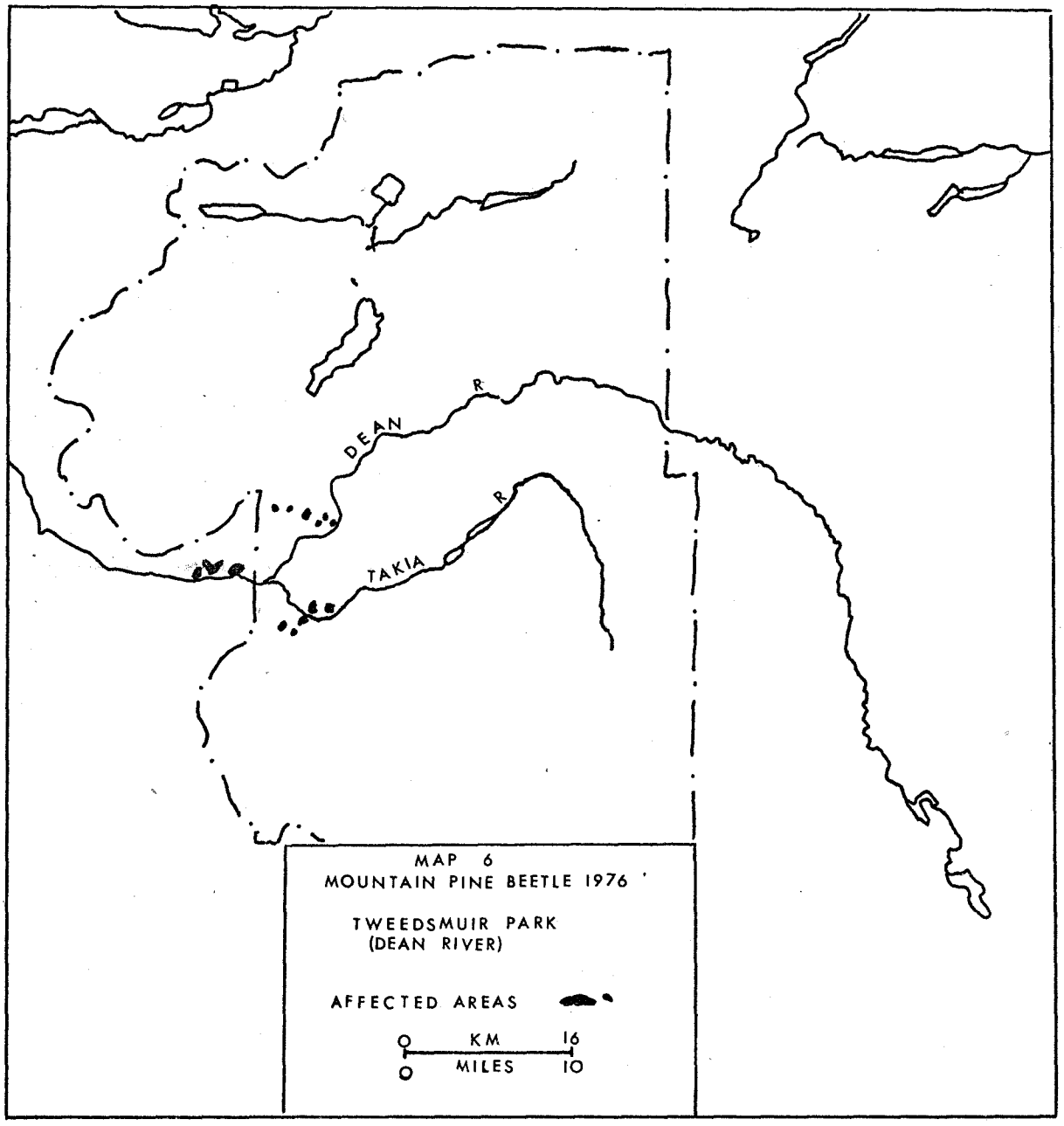
Location	Total no. lP trees	% healthy	% attacked by mountain pine beetle		
			Green (1976 attack)	Red (1975 attack)	Gray (attack prior to 1975)
Riske Cr	55	86	1	8	5
Drummond L	55	50	3	20	27
Thaddeas L	134	78	6	16	0
Becher's Prairie	114	57	8	11	24
Springhouse	251	83	0.7	8	8
Jesmond	348	40	4	44	12
Cariboo R	177	63	10	8	19
Tyee L	108	42	11	22	25
Bonaparte R	780	92	1	6	1
Totals	2,022	73	6	11	10

Sanitation salvage logging in some areas reduced beetle populations. The stepped up sanitation logging planned for 1976-1977 plus the logging which has already been done should further reduce beetle populations in 1977. However, any surviving beetles remain a threat to adjacent mature lodgepole pine stands.


WILLIAMS LAKE
RISKE CREEK
CLINTON
MAP 3
MOUNTAIN PINE BEETLE 1976
CARIBOO FOREST DISTRICT
WILLIAMS LAKE, LAC LA HACHE, STUM & BIG BAR PSYU'S
AFFECTED AREAS
0 KM 16
0 MILES 10


MAP 4
MOUNTAIN PINE BEETLE, 1976
CARIBOO FOREST DISTRICT
NARCOSLI, SSA & QUESNEL LAKE PSYUS
AFFECTED AREAS
0 KM 16
0 MILES 10
BOWRON L
QUESNEL
CARIBOO LAKE
MARGUERITE


CHARLOTTE LAKE
ONE EYE L
TATLA L
KLINAKLINI R
KONNI L
CHILKO L
MAP 5
MOUNTAIN PINE BEETLE, 1976
CARIBOO FOREST DISTRICT
CHILKO PSYU & VANCOUVER FD
AFFECTED AREAS
0 KM 16
0 MILES 10


DEAN R.
TAKIA R.
MAP 6
MOUNTAIN PINE BEETLE 1976
TWEEDSMUIR PARK
(DEAN RIVER)
AFFECTED AREAS
0 KM 16
0 MILES 10

Douglas-fir beetle, *Dendroctonus pseudotsugae*

Numbers of Douglas-fir trees discolored by Douglas-fir beetle attacks declined to a low level in 1976, with only 250 red-tops counted from aerial surveys and ground vantage points. This was an abrupt decline after the 1975 count of 4,700 dead Douglas-fir trees. The red-tops were seen in the McLeese Lake and Soda Creek areas while a few scattered individuals were evident in the Alkali Lake - Dog Creek area and near Redstone.

During 1974 and 1975 abnormally cool summer temperatures and above normal precipitation may have slowed beetle development and prevented a large percentage of the brood from reaching the adult stage by the fall of 1974. This resulted in a less concentrated attack in 1975 and subsequent lack of red-tops.

Populations of Douglas-fir beetle will probably remain at a similar level in 1977.

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 1,200 red-tops in 1975 and 450 in 1976, respectively. Activity was confined to the Swift River, Agatha Creek, Matthew River regions where much mortality of alpine fir has been evident in the past.

The cool, moist summer of 1976 may have slowed development of the infestations.

Spruce beetle, *Dendroctonus rufipennis*

Occurrence of spruce beetle in sheet windthrow at Bowron Lake Park became apparent in late August, 1976, almost 10 months after the windthrow occurred. Attacks were mainly light and while 53% of the spruce windthrow was attacked, 36% held established broods while the balance were unsuccessful.

Tree species composition by stem in the area was: spruce 17%; lodgepole pine 80%; alpine fir 2.5% and others 0.5%. The majority of the broods are expected to emerge in 1978, however it will be necessary to re-examine both in 1977 and 1978 since this population could pose a significant threat to standing white spruce, especially if its emergence coincided with attacks by progeny originating from 1977 attacks.

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

Spruce budworm caused defoliation of alpine fir and Engelmann spruce over an area of 27 200 ha (68,000 acres) from Hendrix Lake north to Bosk and Crooked lakes, along the MacKay and Horsefly rivers' headwaters and in the Matthew River - Cameron Creek valleys as well as around the Bowron Lakes circuit in 1976. The 1976 defoliation, which was from the second year of feeding by these larvae, was light to moderate on overstory trees and heavier on the mid and lower story layers which consisted of mainly alpine fir. Larval populations were much higher than the limited defoliation would indicate. This was probably due to the wet, cold weather in the summer of 1976, particularly in the wet belt areas. It is suspected that weather conditions prevented normal larval development and heavy feeding, and at the same time, increased lineal tree development, especially on codominant and dominant trees.

Traps, baited with Soolure sex attractant, were set near Umiti Creek, Wells, Barkerville and Hendrix Creek. These trapped significantly high numbers of male moths which were only proportionate to the number of larvae found at one sample point, Hendrix Creek (Table 4).

As in earlier years, Soolure attractant traps in 1976 attracted male moths in the areas of low populations, i.e. Umiti Creek, Wells and Barkerville. Similarly large numbers of adults were trapped during the non-flight year, 1975.

Use of the traps remains in the experimental stage and cannot be relied on for conclusions. As the sample areas are chronic budworm areas, close surveillance is to be maintained.

Two-year-cycle spruce budworms seldom kill other than a few suppressed understory trees, and cause some top-kill of intermediate and codominant trees.

Table 4. Numbers of two-year-cycle spruce budworm larvae taken in beating collections, and numbers of moths caught in Soolure traps, Cariboo Forest District, 1973-1976.

Location	No. of larvae in beating collections				Total no. of male moths trapped			
	1973	1974	1975	1976	1973	1974	1975	1976
Umiti Cr	0	1	0	1	0	37	36	119
Wells	0	0	0	0	0	140	70	419
Barkerville	0	3	0	0	0	39	24	299
Hendrix Cr	-	49	78	121	-	360	112	327

Western spruce budworm, *Choristoneura occidentalis*

Western spruce budworm caused light defoliation of Douglas-fir south of Kelly Lake and in some areas along the Cariboo - Kamloops forest districts boundary at French Bar Creek - Yalakom River headwaters.

Defoliation occurred in the Becher's Prairie area, near Riske Creek, in 1975 but did not persist in 1976. However, a light population was present on Douglas-fir throughout the central and southern portions of the District. One-year-cycle budworm occurred in 3-tree beating samples over the past 3 years, as shown in Table 5, which indicates a decline, but the persistence of the budworm could indicate a continuing population along with the adjacent Kamloops District infestations.

Table 5. Numbers of one-year-cycle spruce budworm larvae at 3-tree beating sample points, Cariboo Forest District, 1974-76

Location	1974	1975	1976
Exeter Rd.	6	4	2
Knife Cr	1	0	1
Buckskin Cr	0	8	2
Hudgson Rd.	1	1	0
Brunson L	1	1	0
Meldrum L	2	2	1
Westwick L	2	2	0
Jesmond	2	10	12
Kelly L	12	66	-
80 mile Hwy. 97	2	1	2
Big Bar L	2	12	4
Chasm	6	3	2
Meadow L	0	0	2
Jim Cr	0	1	1
Loon Lake Rd.	0	3	3
Alkali Lake Rd.	1	0	1
Tin Cup Lake Rd.	3	4	0
Gavin Lake Rd.	1	0	1
Porcupine Cr	0	0	9
Stuie	6	0	0
Sheridan Cr	0	2	0
Hartwig L	0	3	0
Fidlington Rd.	3	0	0
	51	123	43

Douglas-fir tussock moth, *Orgyia pseudotsugata*

Since 1948 no damage has been caused by this defoliator in the Cariboo Forest District. However, because of the extensive infestations in the Kamloops - Savona area, traps containing sex attractant were set out near 20 Mile House in August. This year, the sex attractant was prepared in laminated plastic strips, each of which was pinned into one of the 10 traps. The results are shown in Table 6.

Table 6. Numbers of adult male tussock moths captured at 20 Mile House, August, 1976, Cariboo Forest District.

Location	Trap no.	No. adults	No./adults per trap
20 Mile House	1	2	
	2	0	
	3	2	
	4	3	
	5	0	
	6	1	
	7	2	
	8	2	
	9	3	
	10	8	
Total		23	2.3

During the 1975 season, when both magicaps and plastic strips were used, it was found that the magicap method of dispersing the attractant was more effective. 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.

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. Five permanent plots were established to monitor the population. The average number of needles infested throughout the plots 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		
	1974	1975	1976
Clinton	61	23	3
108 Mile House	89	1	5
Williams Lake	91	3	7
McLeese Lake	88	26	11
Ten Mile Lake	68	8	22

A 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, 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 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		
	1974	1975	1976
Clinton	0	0	0
108 Mile House	2	0	0.3
Williams Lake	5	1	0.3
McLeese Lake	5	1	0.2
Ten Mile Lake	4	6	4

Cone insects

Damage was present on the abundant 1976 Douglas-fir cone crop. The insect species which were found in cones were collected in six areas. These are listed in order of abundance as follows:

Barbara colfaxiana

Douglas-fir cone moth, a serious pest, was found at Vert Lake, Gaspard Creek, and near Hanceville. Larvae bore through all parts of the cone, feed on scale tissues and seeds. One larva destroys 65% of seed in one cone; three will destroy 100%.

Megastigmus spermatrophus

A Douglas-fir seed chalcid; was found at Alkali Lake. The larva feeds inside one seed throughout its feeding period; the damage is general but not usually severe.

Contarinia washingtonensis

Douglas-fir cone scale midge; was found at Alkali Lake. Larvae feed in tunnels under seeds, so affecting some seed viability indirectly. Light to moderate damage may not affect seeds, while heavy damage often kills cones prematurely.

Dioryctria abietivorella

Douglas-fir cone worm; was found at Vert Lake. Larvae feed voraciously, tunneling indiscriminately through scales and seeds causing destruction of cones; very destructive when in epidemic numbers.

Table 9. Insects of current minor significance

Insect	Host(s)	Locality	Remarks
Acleris gloverana	Douglas-fir Fir, alpine Spruce, white, Engelmann	Throughout District	Total of 14 positive collections. Small numbers throughout, avg 1.4.
Lambdina f. lugubrosa	Douglas-fir Hemlock, western Fir, alpine Spruce, Engelmann	Crooked L, Keithley, Alkali L, Riske Cr, Stuie	Total of 19 larvae in 7 positive samples.
Malacosoma pluviale	Huckleberry, blue	Horsefly R falls	Single collection.
Neodiprion spp.	Douglas-fir Spruce, Engelmann, white Fir, alpine Hemlock, western	Throughout District	Total of 60 positive collections, avg 8.0.

Dwarf mistletoe, *Arceuthobium americanum*

Young lodgepole pine reproduction stands were examined for dwarf mistletoe infection in seven areas. Varied intensities of infection were found where residual trees had survived or had been present until recently, but in each case these infected residuals contained the bulk of mistletoe infection while the younger surrounding trees varied from "no infection" to "slight infection". The only heavily infected trees were runt residuals, which seem to exist in most stands. The stature of most residuals was short; usually less than 25 feet, either from the dwarfing effect of the mistletoe or from suppression, breakage, dieback, etc. The dwarf mistletoe spread from the residuals becomes incidental as the stand outgrows them.

Where residuals are much taller and at more frequent intervals in the stand, as in the case of logging cutovers, the impact on lower story reproduction trees is more serious over a longer period of time and can cause more growth loss.

The seven plots examined were in areas with residuals of 25 feet or less, and infection of regeneration stands ranged from 0 to 28% (Table 10).

Table 10. Areas examined and incidence of dwarf mistletoe infection of young lodgepole pine stands where residuals are less than 25 feet high, Cariboo Forest District, 1976.

Location	% infection
Green Lake Rd. mile 3.0	10
Chezacut Rd. mile 25	24
Tatlayoko and Choelquoit L Rds.	16
Taseko Lakes Rd. mile 37.6	10
Chilko Lake - Nemaih Cr	2
6 miles W/Big Bar L	28
Twan Cr	0

Conifer-aspen rust, *Melampsora medusae*

Infected Douglas-fir trees were found across the lower mid-belt of the Cariboo District from Hanceville to Young Lake. The infection was confined to newer foliage and was generally very light except near Hanceville, where 60% of the new foliage was infected on the odd tree. Two infections out of the five were found on Douglas-fir cones. These were from Alkali Lake and Young Lake, where approximately 5% of the cones were infected.

Wind damage

A large sheet blowdown area was reported by the B. C. Forest Service over an area lying generally northwest of Bowron Lake Park in late November, 1975. This involved a total of some 1400 ha (3,500 acres) of merchantable timber between the Prince George and Cariboo forest districts. Of this total, one area of an estimated 200 ha (500 acres) is in the park itself, between Bowron and Kibbee lakes, and on the north side of Devil's Club Mountain. This is probably the most extensive un-salvaged area, since Parks Division policies prohibit logging. Most of the other locations were salvage-logged in 1976. Species composition in the windfall area was 23% white spruce and 76% lodgepole pine, by stems. Thirty-six percent of the spruce windfall was attacked by spruce beetle, *Dendroctonus rufipennis*, but the bulk of the broods will not be due to re-attack until 1978 since, under normal conditions, these beetles require 2 years to mature.

Red belt disease

During aerial surveys for mountain pine beetle, sunscald or winter drying areas of lightly discolored lodgepole pine were noted as follows: northeast of Ghost Lake at approximately 1500 meters (5,000 feet) elevation, 240 ha (600 acres); Far Mountain at 1500 meters (5,000 feet) elevation, 760 ha (1,900 acres); the west side of Bald Mountain at 1380 meters (4,600 feet), 40 ha (100 acres). The reddening discoloration appeared to consist of current foliage on the exposed side of each stand.

Table 11. Diseases of current minor significance.

Disease	Host	Locality	Remarks
Lirula macrospora A needle cast	Spruce, white	Bowron Lake	Affecting 5/10 trees in the area. Light intensity on '75 foliage.
Lophodermella concolor A needle cast	Pine, lodgepole	Twan Creek	Found on '75 foliage, affecting 10% of trees in area.
Hendersonia pinicola A hyperparasite	Pine, lodgepole	Twan Creek	Found in association with *L. concolor*.
Rhabdocline weirii Needle cast	Douglas-fir	Hudgson Rd.	Very light single tree attack.
Elytroderma deformans Pine needle cast	Pine, lodgepole	88 Mile (Hwy. 97)	Light incidence.