

Forest Insect & Disease Conditions 1979

CARIBOO FOREST REGION / S. J. ALLEN

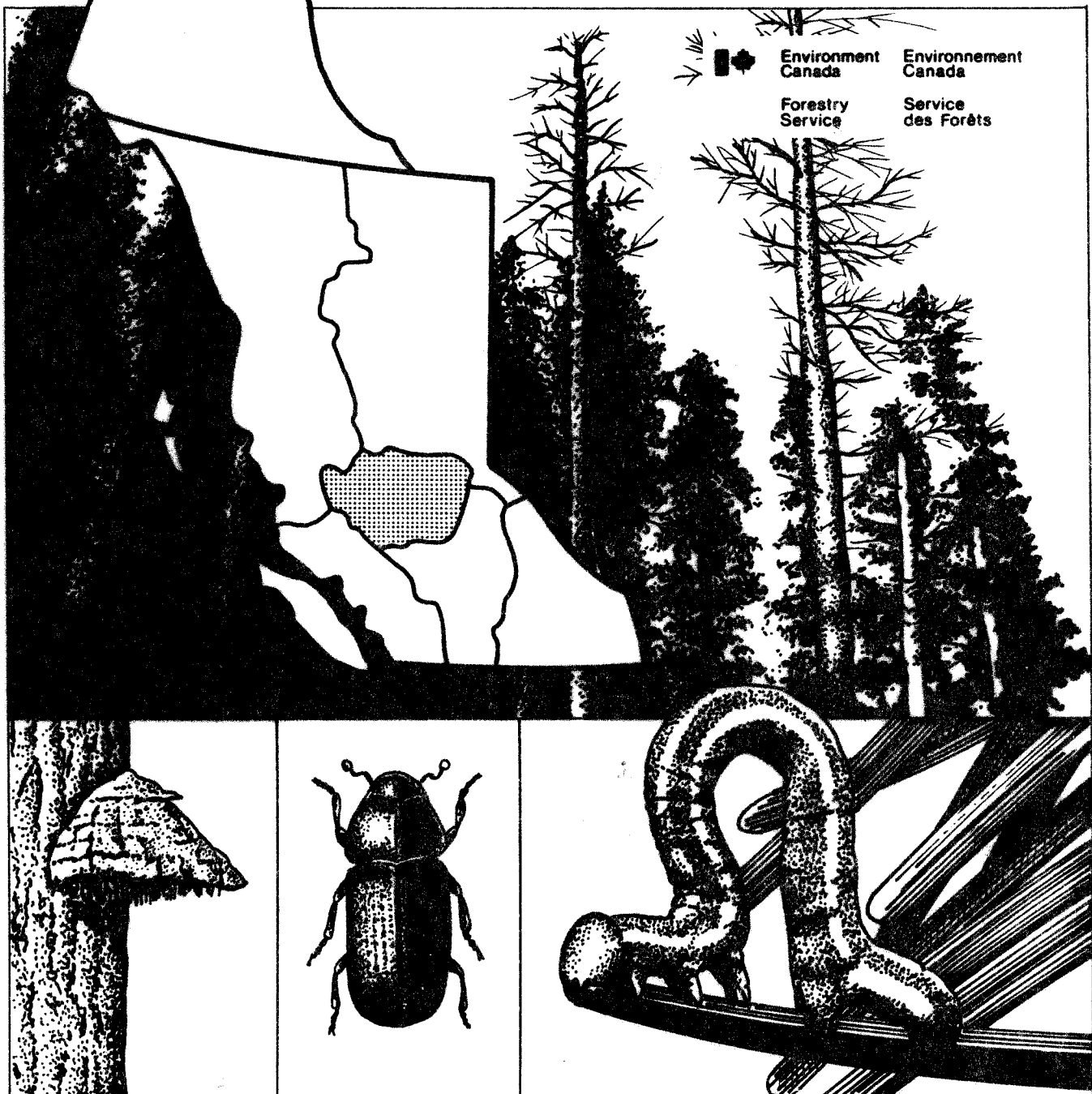


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SUMMARY

Forest pest conditions were highlighted by the mountain pine beetle, two-year-cycle spruce budworm and western spruce budworm infestations.

The extent of recently killed lodgepole pine trees increased in all areas except the 4 000 ha area around One Eye Lake where most of the mature lodgepole pine has been killed. Most of the lodgepole pine on 13 000 ha in the Klinaklini River Valley was killed prior to 1977 and is not included in the total infestation area of 31 000 ha.

Douglas-fir beetle activity increased. The numbers of red trees counted from the air increased from 160 in 1978 to 500 in 1979.

Western spruce budworm infestations in the Clinton area increased in intensity in 1979 causing up to 60 percent defoliation and top-stripping of some Douglas-fir on 3 100 ha.

Two-year-cycle spruce budworm, first year phase (1979) larvae, caused noticeable defoliation throughout 24 200 ha in the eastern part of the Cariboo Forest Region causing some 50 percent defoliation of the 1979 foliage.

The lodgepole terminal weevil killed up to 33% of the leaders in pure lodgepole pine stands near the Alex Graham mountain lookout.

Stands of immature lodgepole pine were again affected by diseases which caused partial discoloration of the previous years foliage.

Cronartium gall rust, Stalactiform and Comandra blister rusts caused moderate infections of branches and stems of lodgepole pine reproduction in the Quesnel River Valley.

Red belt disease caused reddening of foliage in the Klinaklini River Valley, Homathko River Valley, Jesmond, Loon Lake, Canim Lake, Horsefly Lake, Cariboo River and Lanezi Lake areas.

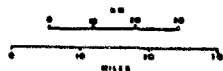
Venturia leaf blight caused minor damage to trembling aspen this year.

Field work in the Region extended from June 1 to October 3. Special surveys were as follows: pheromone-baited trap program for western spruce budworm, two-year-cycle spruce budworm and Douglas-fir tussock moth; egg and defoliation surveys for western spruce budworm; aerial surveys for beetle, budworm and red belt damage; ground appraisal surveys for mountain pine beetle, Douglas-fir beetle damage; cone crop surveys for crop assessments and insect and disease incidence.

Totals of 224 insect and 43 disease collections were submitted in 1979. Map 1 shows locations of collections, map 2 shows aerial coverage flight lines.

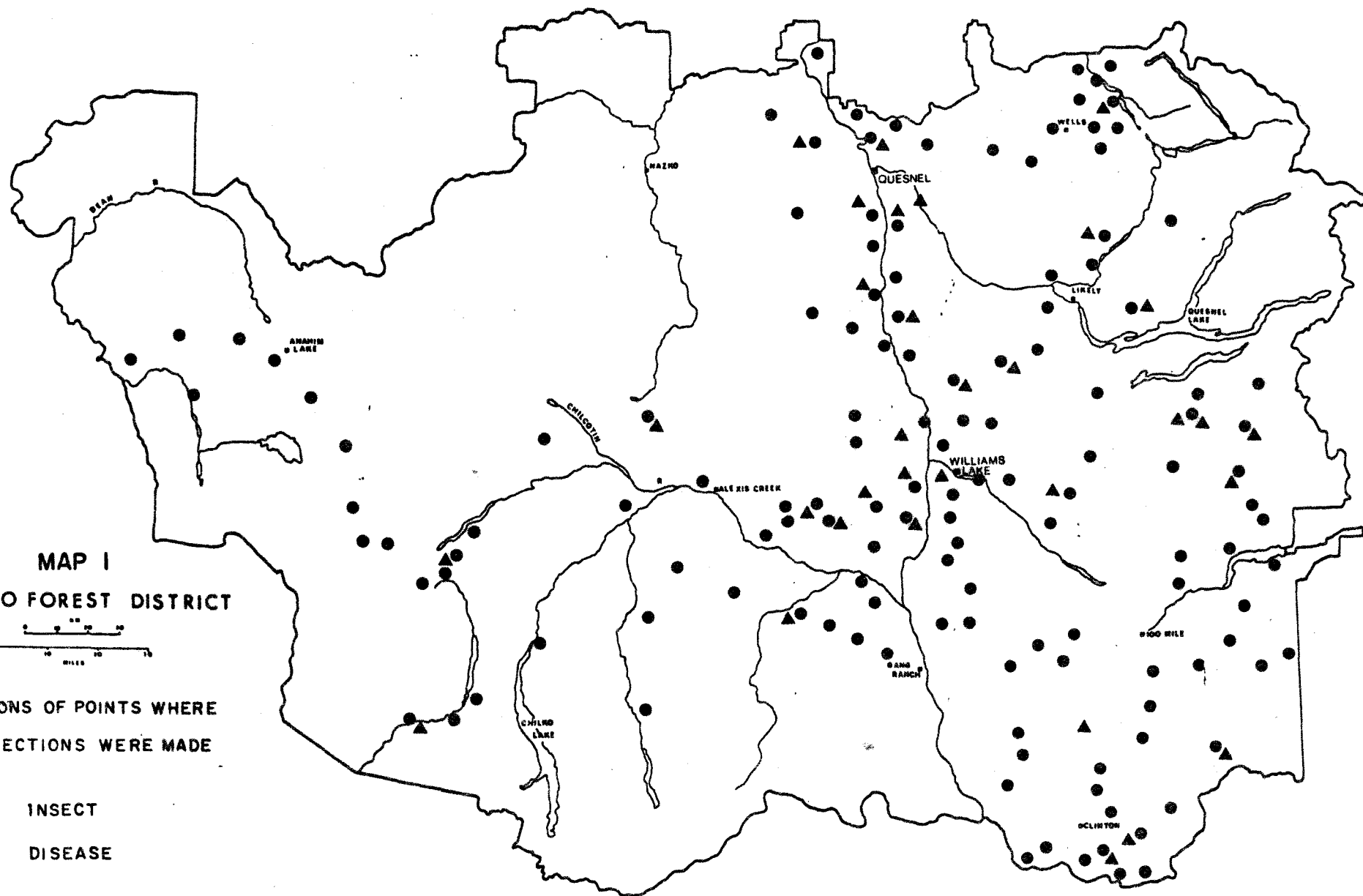
B.C. Ministry of Forests Protection, Research and Reforestation branches provided valuable assistance in the form of field observations and reports. The Protection Branch provided 20 hours of fixed wing flying time (map 2) which is hereby acknowledged. A further five hours of flying time was used for observations at Dean River and aerial photography at One Eye Lake.

MAP I
RIBOO FOREST DISTRICT



LOCATIONS OF POINTS WHERE
COLLECTIONS WERE MADE

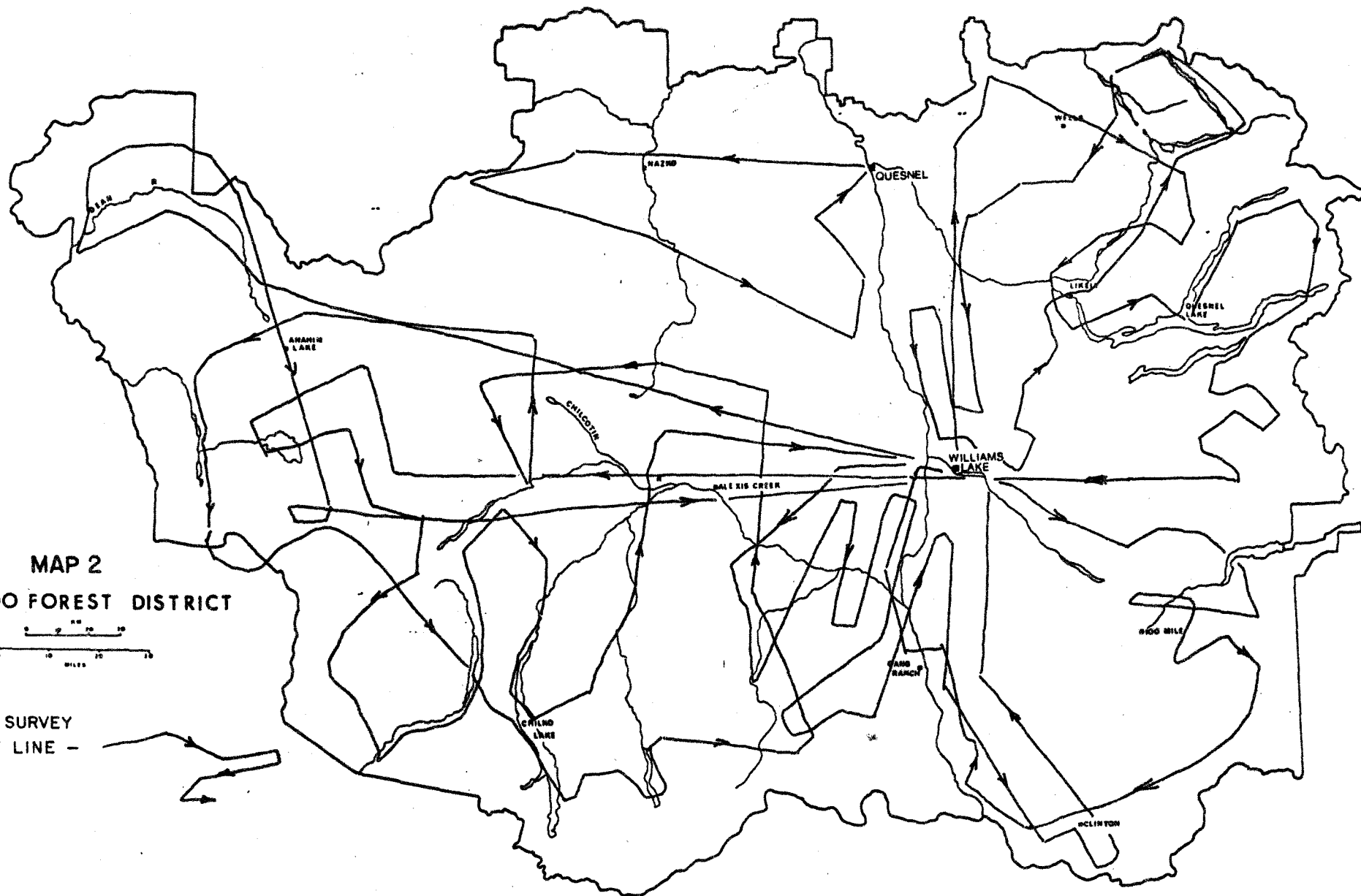
- INSECT
- ▲ DISEASE



MAP 2
RIBOO FOREST DISTRICT



TRIAL SURVEY
LIGHT LINE -



LODGEPOLE PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

Mountain pine beetle populations increased in spite of a very cold winter and some subsequent brood mortality. The number of lodgepole pine trees which were infested in 1978 and turned red in 1979 reflected the increase in attack recorded in the 1978 fall survey (Map 3).

New locations of mountain pine beetle attacks, mapped during aerial surveys extended the boundaries of the infestation northeast to Nimpo Lake with a few attacks as far north as Anahim Lake and the south side of the Ilgachuz Mountains.

As a result of beetle activity since 1972, most of the susceptible lodgepole pine in the Clearwater Lake - One Eye Lake area and upper Klinaklini River Valley has been killed (map 4), the majority of it prior to 1978. This has caused a "decline" in the number of recently killed trees recorded in 1979.

Overwintering larval mortality was checked by B.C. Ministry of Forests Research personnel and by FIDS during March and June respectively. Samples taken by B.C. Ministry of Forests in March showed from 40 to 100 percent winter mortality of beetles in the areas from Puntzi Lake to Lehman's Ranch, Likely, Tyee Lake and Jesmond. The heaviest mortality was at Puntzi Mountain (100%), Eagle Lake (100%) and Chilanko (91%). Samples taken by the FIDS during June at McIntyre Lake, Drummond Lake and Big Creek indicated from 95 to 98 percent mortality, Tatla Lake - Eagle Lake 100 percent mortality and Cariboo Lake 96 percent mortality. Nonetheless the surviving beetles, which probably overwintered successfully below snow level, emerged during July and caused an increase in the number of currently attacked trees compared to 1978 (Table 1).

Weather conditions during late 1978 and early 1979 consisted of minimum temperatures of from -40° to -60° C over a four day period, probably extreme enough but not long enough a period to result in complete mortality.

Aerial observations showed a movement of the infestation north and east from the Klinaklini River - One Eye Lake area toward the upper Chilanko River Valley, a spread in Charlotte and Tatla Lakes areas, concentrations in the Horn Lake-Bluff Lake area and down the Mosley Creek Valley to Twist Lake and Homathko River Valley beyond Tatlayoko Lake. Continuing small infestations occurred in separated groups of recently attacked trees in the vicinity of Puntzi Lake, Alexis Creek, Hanceville-Riske Creek, Farwell Canyon, Dog Creek-Jesmond, Springhouse, Williams Lake and Cariboo Lake. Areas of mountain pine beetle kill expanded at Miocene, Gavin Lake, Little Lake and Skelton Lake areas while new outbreaks occurred at Matthew River mouth and at Vase Creek near the Quesnel River.

The infestation in Tweedsmuir Provincial Park near the junction

of the Dean and Takia Rivers decreased in size and only 50 recently-killed trees were visible compared to 130 in 1978 and 380 in 1977. The number of trees killed are shown in Table 2.

The pine beetle has spread over much of the Cariboo Region and has killed most of the lodgepole pine on nearly 17 000 ha from Klinaklini Lake to One Eye Lake. The present lack of host material in this vast area has resulted in a large "drop" in the numbers of recently-killed lodgepole pines.

Table 1. Status of lodgepole pine trees on cruise strips, Cariboo Forest Region, 1979.

Location	Total no. trees examined	% Healthy	% Attacked by mountain pine beetles		
			Green (1979)	Red (1978)	Grey (Prior to 1978)
Williams L PSYU					
Joes L Rd.	159	85	4	5	6
Chilco PSYU					
Tatla L	168	76	12	8	4
McClinchy Cr	166	77	7	4	12
Tatlayoko L Rd.	128	47	22	9	22
Big Bar PSYU					
China L Rd.	147	77	12	2	9
Vert L	85	39	19	2	40
Stum PSYU					
Beaumont L	119	68	14	4	14
Big Cr Rd.	115	84	5	7	4
Big Cr X. Rd.	99	57	30	8	5
Thaddeus L	195	44	13	12	31
Drummond L	119	29	34	18	19
Total or/Avg	1500	64	14	7	15

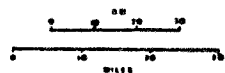
Table 2. Numbers of lodgepole pine trees killed by mountain pine beetles (1978 attack), Cariboo Forest Region, 1979.

Location	No. trees killed	
Tatla Lake - Clearwater Lake	30,000	W.C.
Anahim L - Abuntlet L	170	W.C.
Charlotte L - Atnarko R	2,180	W.C.
Nimpo L - Aktaklin L	2,600	W.C.
Long L - Sucker L	3,100	
Cariboo Flats	1,900	
Mosley Creek	1,150	
Tatla L	3,550	
Puntzi Lake	1,635	
Chilko L - Tatlayoko L's	885	
Alexis Cr	975	
Hanceville	1,625	
Big Creek	900	
McIntyre L - Beaumont L	4,450	
Drummond L (M.T. area)	1,025	
Meldrum Creek	450	
Gang Ranch	285	100 m.
Jesmond - China L	2,150	100 m.
Indian Meadows	1,475	100 m. 4680
Dog Creek	770	100 m.
Springhouse - Alkali Lake	530	W.C.
Williams Lake	1,950	
Tyee L - Hawks Cr	450	
Sheridan Cr	200	
Skelton Valley	450	10460
Miocene Gavin L	250	
Hydraulic	55	
Cariboo L	5,750	
Little R	825	
Matthew R (mouth)	350	Quersel
Total	72,085	

Lodgepole terminal weevil, Pissodes terminalis

This weevil continued to mine and kill lodgepole pine terminals in immature stands throughout the Region but at higher incidence than in 1978. Several one hundred-tree examinations were made in pure pine stands (Table 3).

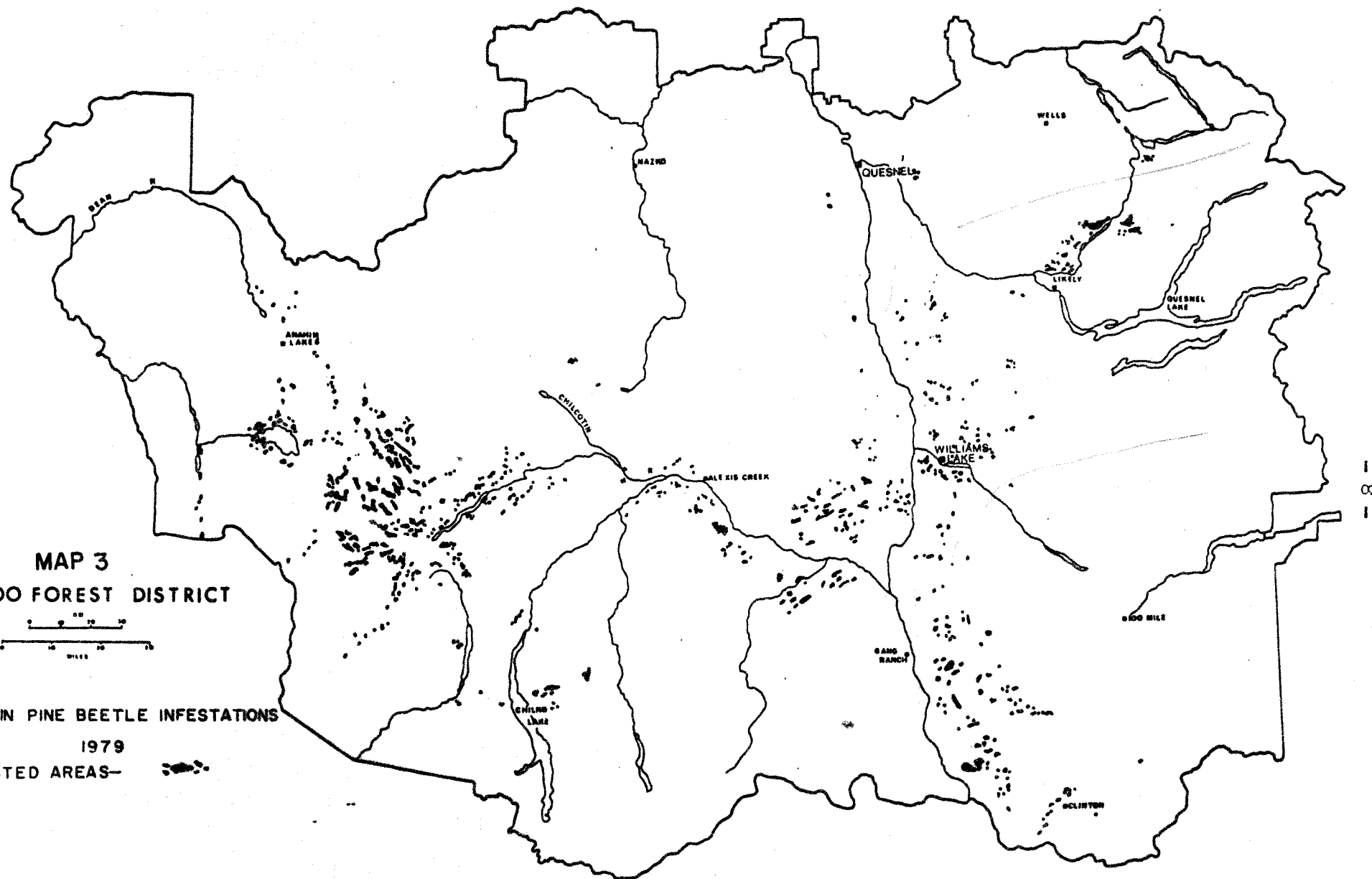
MAP 3
ARIBOO FOREST DISTRICT



MOUNTAIN PINE BEETLE INFESTATIONS

1979

INFESTED AREAS—



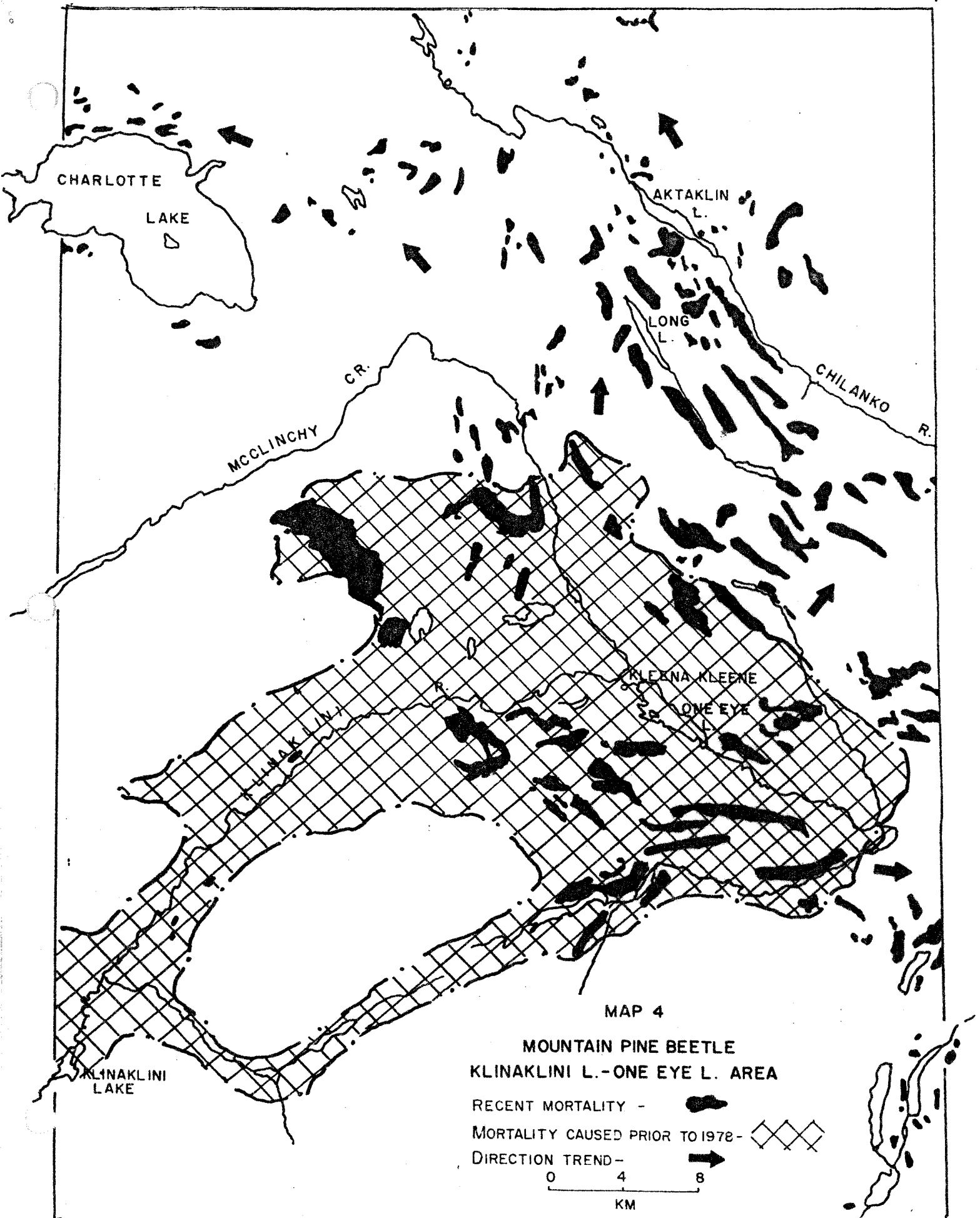


Table 3. Numbers of lodgepole pine infested by lodgepole terminal weevil, Cariboo Forest Region, 1979

Location	% Terminals infested
Alex Graham L/O Rd. m 5	36
Alex Graham L/O Rd. m 7	30
Tatlayoko Lake Rd.	26
Eagle Lake Rd.	10
Bosk Lake	2
Slough Creek #1 (near Wells)	12
Slough Creek #2 (" ")	10
Swift River FDR	6

Adult weevils lay eggs around July to hatch one week later and the larvae feed till late fall, killing the terminal. The large larvae overwinter, make pupal chambers in late May, pupate in June and emerge as adults about one month later. The majority of attacks are found in stands which range from one to 7.5 meters in height.

Rust diseases

Three rust diseases infected 9-year and 14-year old stands of reproduction lodgepole pine in the Quesnel River Valley near Sardine Creek. These were *Cronartium* gall rust, *Endocronartium harknessii*, Stalactiform blister rust, *Cronartium coleosporioides* and Comandra blister rust, *Cronartium comandrae*. From B.C. Ministry of Forest cruises 17% of the trees had gall rust infection, 6% blister rust and 5% damage from other causes. Some 70% of the stems were healthy.

Foliar discoloration of lodgepole pine

Several areas of immature lodgepole pine have been affected by fungi which discolored the previous year's foliage. The symptoms have occurred since 1977 and have been associated with three needle disease organisms: *Scirrhia pini*, *Lophodermella concolor*, *Elytroderma deformans* and at least one unknown disease organism.

The symptoms occurred throughout young lodgepole pine stands in the Springhouse-Alkali Lake area, and west of the Fraser River on the Chilcotin and Fraser plateaus including some 1 000 ha in the Dean River Valley north of Anahim Lake seen during the aerial survey has been affected. From the air, some of the trees appear to have heavy dieback.

Red belt of lodgepole pine

Red belt damage was seen during aerial surveys in scattered bands throughout the eastern slopes of the coast mountains south of Tweedsmuir Provincial Park and the Cariboo Mountains bordering Wells Gray Park. The reddening effect was seen at Knot Creek, Klinaklini River Valley, Calwell Creek, Homathko River, Taseko Lake, Loon Lake, Canim Lake, Mount Bowman (near Jesmond) Horsefly Lake, Bosk Lake, Sandy Lake and Lanezi Lake. Most of the damage lay between 1 350 and 1 800 meters elevation and was up to 100 meters in vertical spread.

Red belt is a foliage and sometimes twig and shoot injury caused by weather conditions which turns needles reddish-brown in well defined bands of forest along south or west slopes. It is believed to be foliage desiccation caused by warm winds while roots and stems are frozen, or by a rapid drop in temperature following above freezing temperatures. Although the damage is often fatal to lodgepole pine in Alberta, it seldom results in mortality in British Columbia.

DOUGLAS-FIR PESTS

Western spruce budworm, Choristoneura occidentalis

The spruce budworm remained in approximately the same areas as in 1978 but intensified causing moderate to heavy defoliation to Douglas-fir stands in patches on Hart Ridge. Lighter defoliation occurred near Loon Lake, Maiden Creek, Scottie Creek and Big Bar Creek. Much of the heavier defoliation at Hart Ridge was not visible from the air because it was on understory trees. Overstory trees were generally lightly defoliated although some top-stripping occurred on a 100 tree plot at Hart Ridge where defoliation averaged 28%. Most of the damage occurred on intermediate trees and up to 90% current defoliation was common.

Branch samples from 10 trees each at Hart Ridge and Loon Lake areas contained 255 and 191 egg masses per 10 m² of foliage respectively. These numbers of eggs indicate that a heavy population will be present in the Hart Ridge area and moderate to heavy populations in the Loon Lake area and depending on weather conditions, will probably compare with 1979.

Douglas-fir beetle, Dendroctonus pseudotsugae

The numbers of recently-killed Douglas-fir increased in 1979 according to numbers found in aerial and ground surveys. Counts of the reddened trees, along with reports of beetle infested Douglas-fir trees, indicated an upswing in standing tree attack.

A total of some 500 red trees were counted compared to 160 in 1978. These were at Meldrum Creek, 56; Deserters Creek, 20; Webster

Creek, 10; Narcosli Creek, 55; Alexandria I.R. 20; Cuisson Lake, 25; McLeese Lake, 20; Soda Creek, 10; Canoe Creek, 180; Big Bar Creek, 70; Stock Valley, 10 and Hotnarko River, 30^{1/}.

Continuing lack of fresh windthrow and slash and the increasing population trend suggest increased beetle attacks on standing Douglas-fir. However, trap tree programs in 1980 would help to reduce the attack on standing trees and destroy a portion of the beetle population.

Cone pests

During the 1979 season, Douglas-fir cone crops were moderate but cone insects caused the cones in 63% of the areas examined to be unsuitable for seed extraction (Map 5). Cone samples were examined for the presence of insects at 19 locations and the more damaging pests found were the Douglas-fir cone moth, Barbara colfaxiana, the coneworm, Dioryctria abietivorella, and a Douglas-fir cone scale midge, Contarinia washingtonensis.

The Douglas-fir cone moth was found in 50% of the collections submitted, causing sufficient damage to render most of these areas unsuitable for cone collecting. Three or more larvae in one cone may destroy 100% of the seed.

A Douglas-fir cone scale midge occurred in samples from Gavin Lake, Farwell Canyon, Australian, Marguerite and Umiti Creek and may have affected seed viability along with other cone invading insects. Cone scale midges do not cause direct damage since their feeding tunnels may extend below the seeds, but they may affect seed viability.

The coneworm was present in 13 out of 22 areas sampled, but the population numbers were too light to cause widespread damage and were only effective on very few cones. When numbers are heavier than normal, this pest causes complete destruction of cones by boring indiscriminately through scales and seeds.

A Douglas-fir seed chalcid, Megasitgmas spermatrophus was present in four of the 22 areas sampled. These minute insects each eat the contents of one seed and remain within the seed coat until they emerge as adults in late May or June. Losses are not usually severe.

Western spruce budworm, C. occidentalis, defoliated Douglas-fir in the areas south and west of Clinton and so caused a reduction in cone crop to nil or very light in the infestation areas. It is believed that cone buds were destroyed by the budworm prior to development.

^{1/} Hotnarko River: report submitted through B.C. Ministry of Forests from Mr. Stanley Edwards of Bella Coola, B.C.

SPRUCE PESTS

Two-year-cycle spruce budworm, Choristoneura biennis

Two-year budworm in its first year phase caused heavier than normal damage throughout the eastern portion of the Cariboo Forest Region in 1979. Budworm caused an average of 50% defoliation of the 1979 growth of Engelmann and white spruce and alpine fir (Map 5). Bud mortality was negligible. By July most of the larvae had hibernated. The infestation was made up of five areas of defoliation: Hendrix Lake - Horsefly R, 2 500 ha; Cariboo R - Cariboo L, 1 100 ha; Bowron Lake Provincial Park, 17 000; Big Valley Creek 3 300 ha and Grain Creek Valley, 300 ha, a total of 24 200 ha.

Second year larvae should emerge in late May or early June, 1980 and cause moderate to heavy defoliation in most of these areas by June or early July.

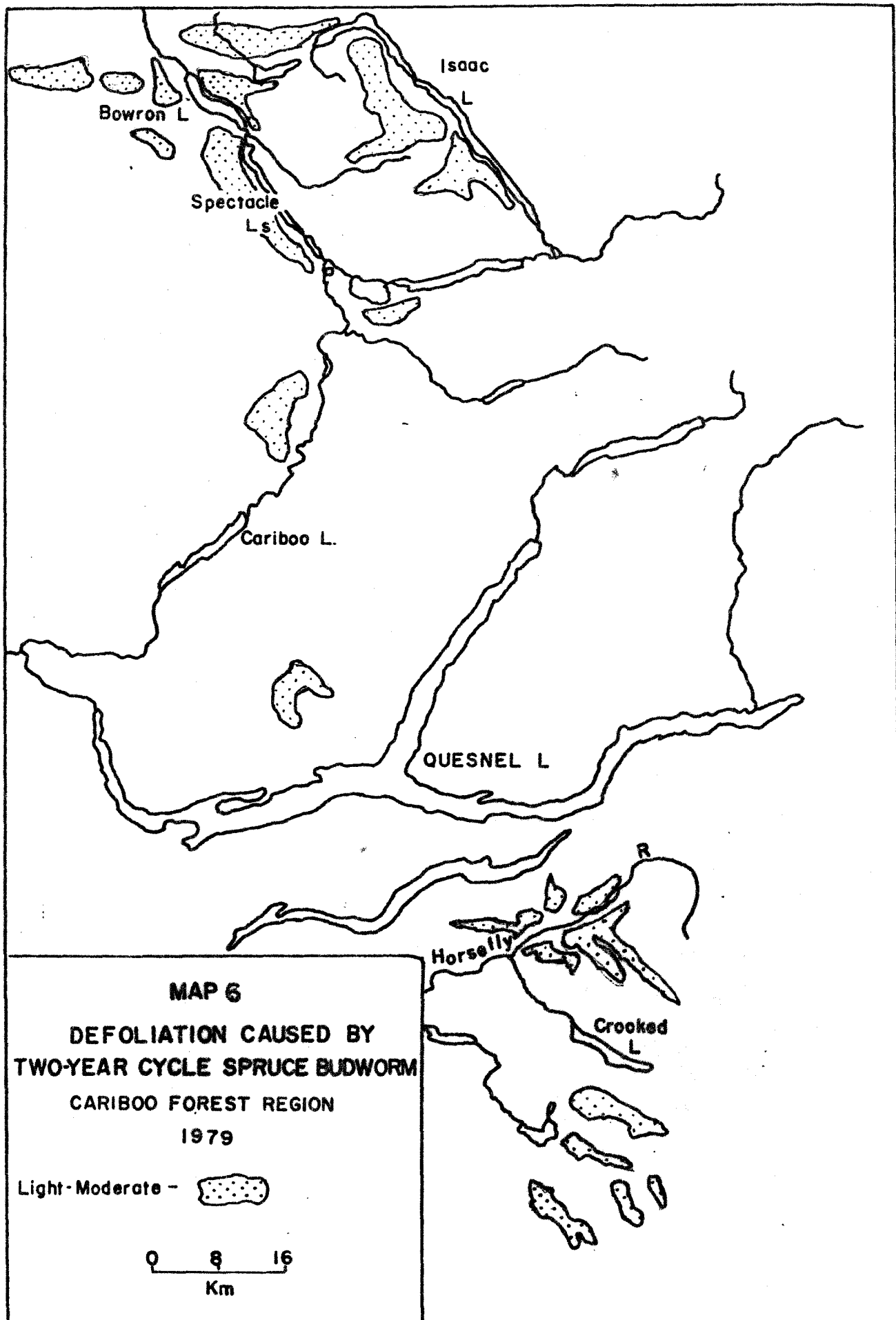
Since 1972, when the infestation began, sattered top kill and some mortality of a minority of suppressed alpine fir has occurred and this may increase with further heavy defoliation.

Fifteen pheromone traps each were set out to attract male moths at Hendrix Lake and Wells. Three strengths of pheromone were used: 5.0, 0.5 and 0.05 concentrations (Table 4).

Table 4. Numbers of 2-year-cycle spruce budworm male moths caught in varied concentration pheromone traps, Cariboo Forest Region, 1979

Location	Pheromone concentration	Total no. moths caught	Avg no. moths per trap
Hendrix Lake	5.0	216	43
	0.5	116	23
	0.05	85	17
Wells	5.0	297	59
	0.5	135	27
	0.05	46	9

The consistency and numbers of moths found is unusual since the normal adult stage of 2-year-cycle spruce budworm occurs on the even year, i.e. 1978, 1980, etc. The moths which were found in these traps were probably off-phase adults. The varied concentrations of pheromone attracted proportionally to the strength and indicated the presence of a moderately numerous spruce budworm population.



Spruce beetle, Dendroctonus rufipennis

Spruce beetle activity remained at a low level in 1979 in the Bowron Lake Provincial Park windthrow area of 1976.

An examination of 50 old fallen trees showed loose bark and several new ambrosia beetle attacks, but these trees were no longer attractive to the spruce beetle. Three newly fallen white spruce trees, wind-thrown in 1978, had only one new attack by spruce beetle.

Of 200 standing white spruce examined on the south side of Kibbee Creek, through the south fringe of the wind-throw, 199 were unattacked. One 30 foot snag-top survivor (with a few green branches) had sustained four 1979 attacks near the butt.

Observations of outside undisturbed areas of white spruce showed no attacks by spruce beetle; these included the Bowron River east side road and the Indian Lake road.

The beetle population continues at an endemic level but the main attraction of this massive windfall area has gone and no build-up has occurred.

Several current infestations are present in Bowron and Willow River valleys at Stoney Lake and Haggan Creek thirty-kilometers to the north and west in neighboring Prince George Forest Region.

Cone pests

An overall bumper crop of cones developed on Engelmann and white spruce in the Cariboo Forest Region in 1979. Of a total of 26 areas in which samples were taken, only 7 were considered suitable for harvesting due to damage caused by cone insects. .

A spiral spruce cone-borer, Hylemya anthracina was found in 25 of the 26 cone samples from spruce. The coneborer, along with a seedworm, Laspeyresia youngana, was responsible for 19 of the areas being unsuitable for harvesting. This borer moves spirally about the cone-axis, damaging scales and destroying seeds. One larva per cone may destroy up to 50% of the seed. There is no visible external evidence of damage until the larva bores an exit tunnel to the surface of the cone in June after overwintering as a larva and pupating in May.

A spruce seedworm, Laspeyresia youngana, was found in 18 of the 26 cone samples from spruce. In most instances it was not as numerous or as damaging to the spruce cones as the spiral coneborer, but one larva is capable of destroying from 10 to 20 seeds, so a large population can cause heavy losses. There is no external evidence of damage.

A spruce cone axis midge, Dasineura rachiphaga, was found in eight of the spruce samples. The insect is one of the most common found

in spruce cones in B.C. but it is less destructive as it feeds on the scales during early summer, gradually moving into the cone axis. There is no external evidence of damage.

Two-year-cycle spruce budworm, Choristoneura biennis defoliated Engelmann and white spruce trees in the Hendrix Lake - Horsefly River and Bowron Lake - Quesnel Lake areas and in so doing, caused significant reductions in cone numbers. The absence of Engelmann and white spruce cones was particularly noticeable in areas which were infested by the two-year spruce budworm and it is believed that the cone buds failed to develop.

Out of the 26 areas examined, the cone rust, Chrysomyxa pirolata was present in 11 and an average of 10 percent of the cones were infected. The heaviest infection, 21 percent, was found at Black Creek.

One collection of the rust was found on the alternate host, Pyrola sp. at Keithley Creek.

ALPINE FIR PESTS

Two-year-cycle spruce budworm, Choristoneura biennis
See "Engelmann and white spruce."

Western balsam bark beetle, Dryocoetes-Ceratocystis complex

Western balsam bark beetle, Dryocoetes confusus in association with the lesion causing fungus, Ceratocystis dryocoetidis killed some 100 alpine fir trees on the west side of Tatlayoko Lake, a drop in mortality since 1978 when a total of 1150 dead trees were counted.

A fir cone maggot, Earomyia abietum

Light populations of this cone maggot were present in two out of three cone samples taken from alpine fir at Umiti Creek road and Heckman Pass. Basically a seed feeder, this larva moves from one seed to another on the growing cone.

Table 5. Pests of current minor significance

Host	Insect/disease	Locality	Remarks
Lodgepole pine	<u>Epirrita autumnata</u> Green velvet looper	Barkerville Wendle Park Canin L	6 larvae in 4 samples, static population
Douglas-fir	<u>Dioryctria pseudotsugella</u> A Douglas-fir cone moth	Gaspard Cr Macalister 10 Mile Lake	4 larvae in 3 samples, static population
Douglas-fir	<u>Enypia griseata</u> A red-headed looper	W side, Fraser River to Alex Graham L/out	7 larvae in 6 samples, static population
Douglas-fir	<u>Melanolophia imitata</u> Green-striped forest looper	Horsefly R, MacKay Cr, Bull Mtn	3 larvae in 3 samples, decreasing population
Douglas-fir	<u>Neodiprion</u> spp. Conifer sawfly	Throughout Region	61 larvae in 21 samples, decreasing population
Douglas-fir	<u>Melampsora medusae</u> A Douglas-fir aspen rust	Thaddeus L, Williams Lake, Beaumont L	Common throughout hosts' range
Engelmann spruce	<u>Pikonema dimmockii</u> Green-headed spruce sawfly	Throughout Region	35 larvae in 17 samples, decreasing population
White spruce	<u>Nyctobia limitaria</u> Yellow lined looper	Keithley Creek	2 larvae, static population
Alpine fir	<u>Accleris gloverana</u> Western blackheaded budworm	Spanish L, Bosk L, Wingdam, Swift R	5 larvae in 4 samples, decreasing population
Alpine fir	<u>Melampsora abietis-capraearum</u> A willow true fir rust	Black Creek W. side	Caused necrosis of needles of fir and yellow leaf spot on willow

Table 5. (Cont'd)

Host	Insect/disease	Locality	Remarks
Alpine fir	<u>Pucciniastrum</u> <u>epilobii</u> Fir-fireweed rust	Keithley Creek	Common through- out hosts' range
Western hemlock	<u>M. epitea</u> A hemlock-willow rust	Marguerite Williams Lake	Common through- out hemlock zone