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ANNUAL DISTRICT REPORT  
FOREST INSECT AND DISEASE SURVEY  
BRITISH COLUMBIA, 1974  
PART V, NELSON FOREST DISTRICT

by

E. V. Morris and J. S. Monts<sup>1/</sup>

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VICTORIA, BRITISH COLUMBIA  
FILE REPORT

DEPARTMENT OF THE ENVIRONMENT  
March 1975

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## INTRODUCTION

This report outlines the status of forest insect and disease conditions in the Nelson Forest District for 1974, and forecasts pest population trends. Emphasis is placed on pests capable of sudden, damaging outbreaks.

Forest pest infestations reported to the Forest Insect and Disease Survey by public or private cooperators assist in the interpretation of the general pest situation and in gauging population trends.

Regular field work in the District commenced April 27 and ended November 1. Special surveys were as follows: larch casebearer, April 27 to May 2; black army cutworm, May 22 to June 14; aerial, August 12 to 16; mountain pine beetle, September 16 to October 2 and overwintering larch casebearer, October 28 to November 1.

A total of 376 insect and 15 disease collections were submitted in 1974. Map 1 shows the collection localities and drainage divisions.

Numbers of larval defoliators found in field collections decreased in the District this year; 82% of beating collections in the western part of the District and 74% in the eastern part contained larvae.

The major insect problems were the mountain pine beetle and black army cutworm. The mountain pine beetle caused extensive lodgepole pine tree mortality in the Elk Creek - White River area, along Blackwater Ridge near Donald, and at Goathide Creek in the West Kettle River drainage. Over 29,000 red-topped trees were counted in these areas. Black army cutworms defoliated Engelmann spruce and Douglas-fir seedlings on 5,500 acres (2,200 ha) at Blackwater Creek near Donald.

Hemlock looper and filament bearer infestations collapsed, with little defoliation evident in the Shelter Bay and Columbia River areas north of Revelstoke. Larch budmoth populations collapsed; some defoliation was evident along the Monashee Highway near Inonaklin Crossing. Larch casebearer lightly defoliated western larch in the southern part of the District.

Sulphur dioxide fumes from the Sullivan Mountain mine damaged the foliage of all tree species near Kimberley.

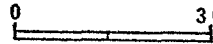
Details on individual insects and disease problems appear in subsequent sections.

Map 1  
NELSON FOREST DISTRICT

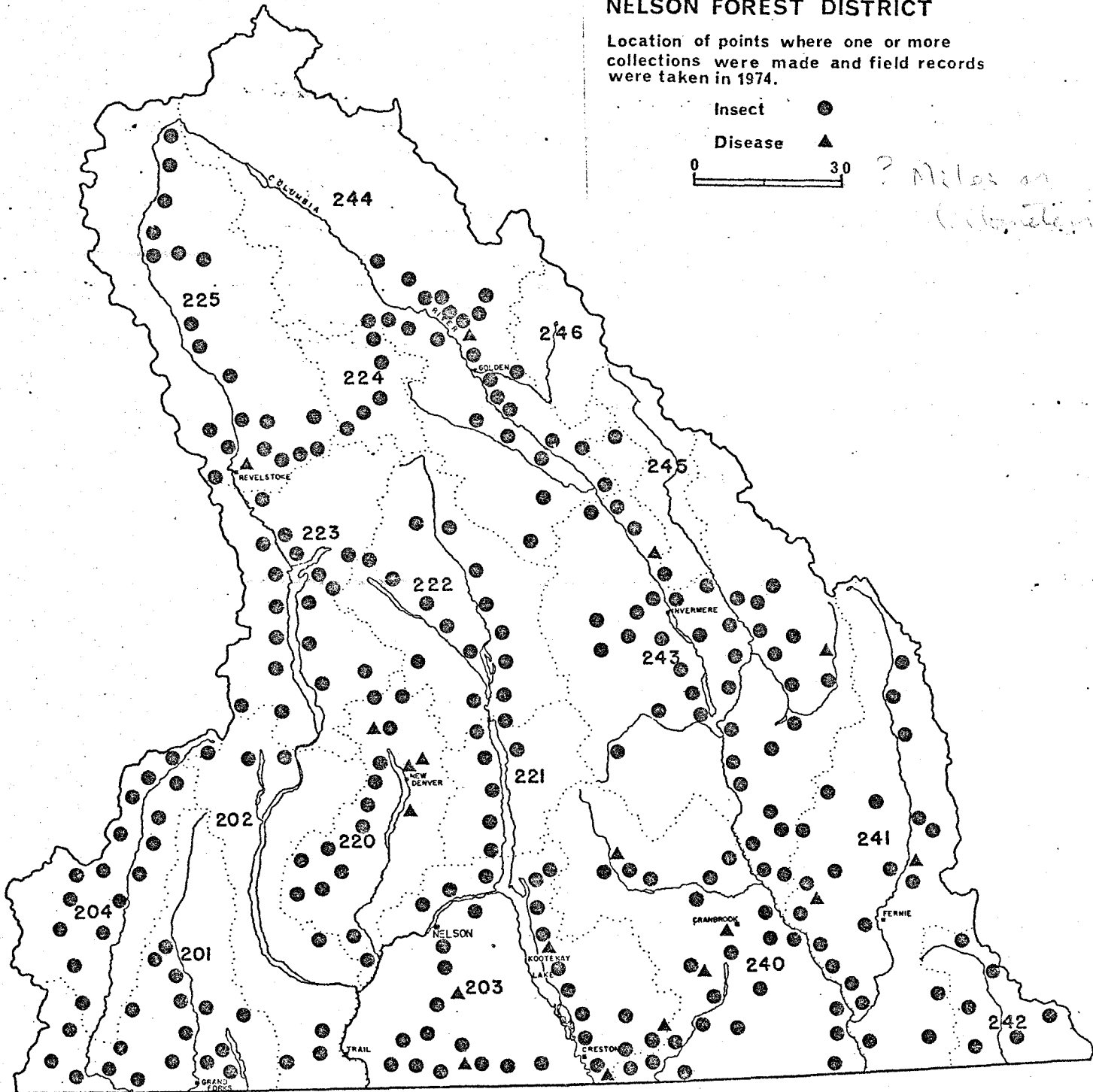
Location of points where one or more collections were made and field records were taken in 1974.

Insect ●

Disease ▲



? Miles on  
Collection



FOREST INSECT CONDITIONS

Currently Important Insects

Bark Beetles

Mountain pine beetle, *Dendroctonus ponderosae*

There was an increase in the number of lodgepole pine red-tops recorded in 1974. More than 29,000 were recorded during aerial and ground surveys. The highest concentrations of red-tops were in the Elk Creek - White River area, along Blackwater Ridge near Donald, and at Goathide Creek in the West Kettle River area. The number of western white pine red-tops was lower than in 1973. A total of 3,000 trees were counted, with the highest concentrations along Trout Lake, Upper Arrow Lake and along the Rogers Pass Highway (Table 1).

Table 1. Number of red-topped pine trees determined by aerial and ground surveys, Nelson Forest District, August 1974

Pine species	Locality	No. trees
Lodgepole	Upper Elk Cr	2,064
	Elk Creek Canyon	8,633
	Lower Elk Cr	9,521
	Jack Cr	1,360
	Rock Cr	445
	White R	1,711
	Dry Cr	125
	Palliser R	475
	Lussier R	30
	Parsons	125
	Blackwater Ridge	4,200
	Goathide Cr	1,000
	<hr/>	
	Total	29,689
Western white	Healy Cr	200
	Trout L	500
	Arrowhead	50
	Pingston Ridge	500
	Galena Pass	150
	Pingston Cr	500
	Saddle Mtn	550
	Shelter Bay	25
	Illecillewaet R	300
	Rogers Pass	75
	Beaver R	150
	<hr/>	
	Total	3,000

At the request of the British Columbia Forest Service an aerial and ground survey was done during August and September to assess the mountain pine beetle infestation at Elk Creek and White River in the Upper Kootenay Public Sustained Yield Unit.

#### Methods

Areas where red-top lodgepole pine trees occurred were photographed from a helicopter in August. The oblique color photographs were used for red-top tree counts and to outline infestation boundaries on a 40-chain forest cover map. For convenience, the area was divided into zones as follows: Zone A - Upper Elk Creek; B - Elk Creek Canyon; C - Lower Elk Creek; D - Jack Creek; E - Rock Creek, and F - White River (Maps 2,3,4). Three classifications were used to express the status of lodgepole pine stands in each zone: Class 1, areas within which 1973 red-tops occurred; Class 2, currently threatened lodgepole pine stands, and Class 3, susceptible lodgepole pine stands.

In September, a total of 24 cruise strips, with prism plots every two chains, were run in the six zones to determine the percentage of lodgepole pine trees killed by the mountain pine beetle and to assess the potential of the beetle population.

The cruise strips were run through 1973 red-top areas and beyond, to ascertain how far the 1974 attack had spread into the currently threatened stands. Trees on the prism plots were classified as follows:

- (1) healthy - trees not attacked or that had repelled attack;
- (2) green attack - trees successfully attacked during 1974;
- (3) red - trees successfully attacked during 1973;
- (4) grey - trees successfully attacked prior to 1973.\*

Overwintering beetle populations were assessed by counting the number of overwintering larvae and adults in a one-half square foot of bark taken at breast height from a number of green attacked trees on each strip.

#### Results

A total of 23,734 red-tops were counted on the oblique aerial photographs in the Class 1 category, with the highest counts in Zone C, Lower Elk Creek, and Zone B, Elk Creek Canyon (Table 2).

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\* Not all grey trees were found to have been beetle-killed. Natural mortality by suppression was evident in some cases.

Table 2. Estimated loss of lodgepole pine attacked by mountain pine beetle in Upper Kootenay P.S.Y.U. in 1973

Zones	Area	No. of red trees	Mean volume per red tree (cu. ft.)	Total (cu. ft.)
A	Upper Elk Creek	2,064	28.3	58,000
B	Elk Creek Canyon	8,633	21.0	181,000
C	Lower Elk Creek	9,521	16.7	159,000
D	Jack Creek	1,360	19.3	26,000
E	Rock Creek	445	12.7	6,000
F	White River	1,711	24.1	41,000
Total		23,734		471,000

There was a total of 1,890 acres within which 1973 red-top trees occurred. The largest areas were in Zone C, Lower Elk Creek, 802 acres (320 ha) and Zone B, Elk Creek Canyon, 366 acres (150 ha). Cruise strips run in the six zones had a total of 648 prism plots which showed that most of the trees attacked in 1974 were within the 1973 red-top areas and the bordering currently threatened stands (Table 3).

Table 3. Lodgepole pine in Upper Kootenay P.S.Y.U. (Class 1) classified relative to mountain pine beetle attack by percent stems and percent volume as determined from cruise strips

Zones	Healthy		Current attacked 1974		Red attacked 1973		Grey attacked prior to 1973	
	stems	vol.	stems	vol.	stems	vol.	stems	vol.
A	67.9	67.6	7.3	8.1	18.7	22.1	6.1	2.2
B	35.8	25.5	25.2	27.5	30.0	36.8	9.0	10.1
C	54.4	52.9	5.4	6.6	29.8	37.4	10.4	3.1
D	44.8	41.6	3.8	5.2	19.8	39.3	31.6	13.9
E	40.0	44.6	12.0	25.0	30.5	18.3	17.5	12.1
F	44.8	51.4	8.0	7.2	45.7	40.1	1.5	1.3

An estimate of total volume loss for lodgepole pine attacked in the Class 2 category cannot be provided. The best that can be presented is an estimate of the per cent volume of 1974 attack within the confines of designated distances from Class 1 (Table 4).

Table 4. Expected loss from 1974 mountain pine beetle attacks in Class 2 (currently threatened lodgepole), Upper Kootenay P.S.Y.U.

Zone	Average distance from Class 1 areas	Per cent volume 1974 attack
A	11 chains	2.9
B	4 "	39.3
C	12 "	7.9
D	12 "	11.8
E	8 "	2.9
F	8 "	4.4

The mountain pine beetle moved out from the previously infested areas and attacked trees for distances ranging from 4 to 12 chains. The heaviest attacks occurred in zones B, C and D where the infestations are of longer duration and hence where the highest populations of beetles existed.

There was a moderate overwintering beetle population in 1974-attacked trees (Table 5). Most of the 1974 progeny was in the small larval and egg stages. However, weather conditions remained favourable in October and most progeny would have reached the larval stage before freeze-up.

Table 5. Overwintering mountain pine beetle population September 1974

Zone	Average number per 1/2 square foot		
	adults	larvae	eggs present
A	8	-	✓
B	9	17	✓
C	11	46	✓
D	4	-	✓
E	9	60	-
F	5	9	-

The current mountain pine beetle infestation is expected to continue in 1975 and since it is a threat to the remaining mature lodgepole pine stands in the Elk Creek - White River area, priority should be given to logging these stands.

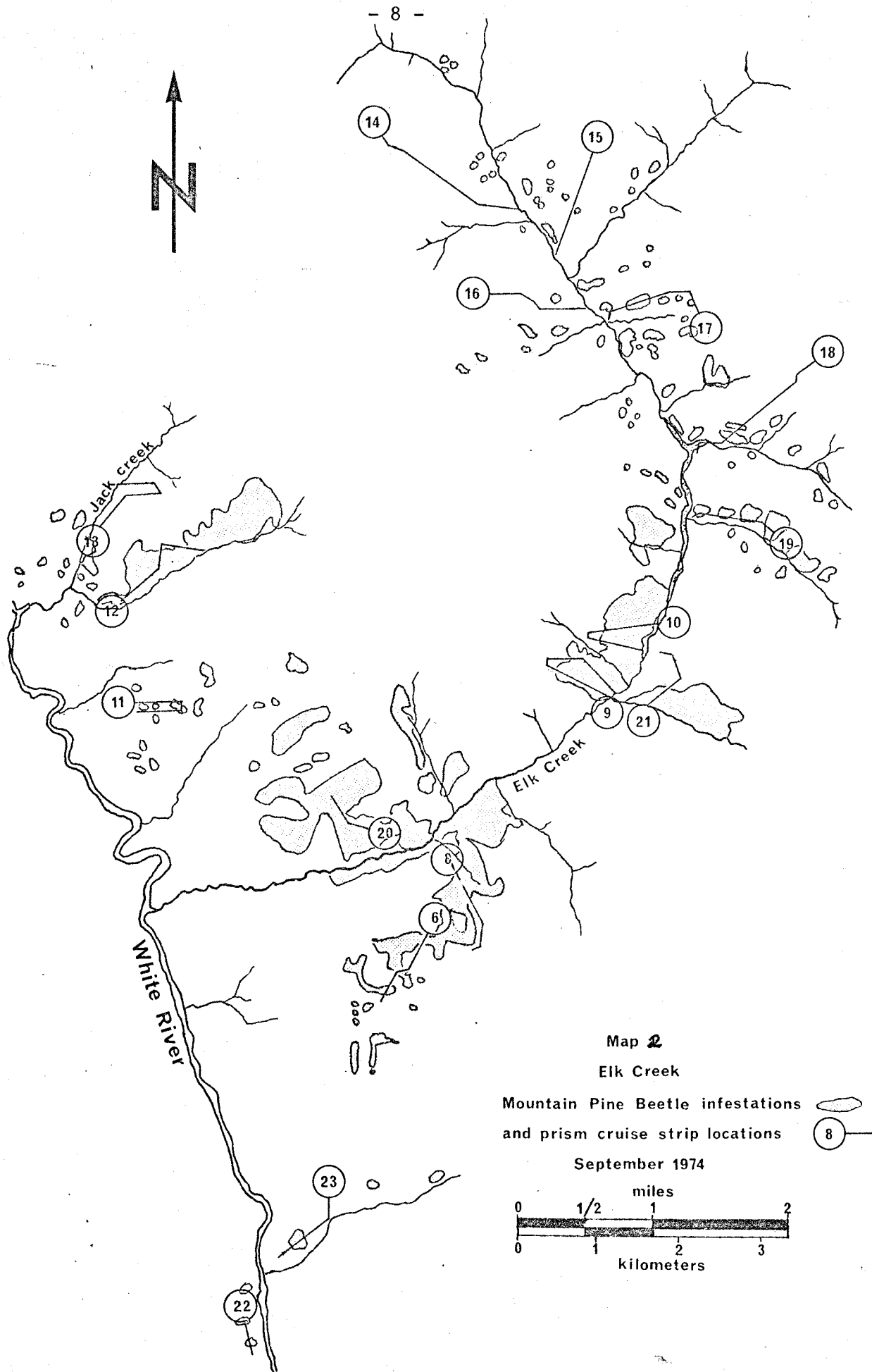
Cruise strips were also run at the Blackwater Ridge and Goathide Creek beetle infestations. A total of 35 prism plots were assessed at these two locations (Table 6).

Table 6. Lodgepole pine at Blackwater Ridge and Goathide Creek classified relative to mountain pine beetle attack by per cent stems as determined from cruise strips

Locality	Healthy	Current attacked 1974	Red attacked 1973	Grey attacked prior to 1973
Blackwater Ridge	58	13	9	20
Goathide Creek	56	22	13	9

There was a moderate overwintering beetle population in 1974-attacked trees at these two localities. Most of the 1974 progeny were in the larval stage. These infestations are expected to continue in 1975.



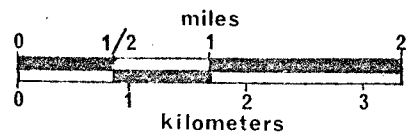


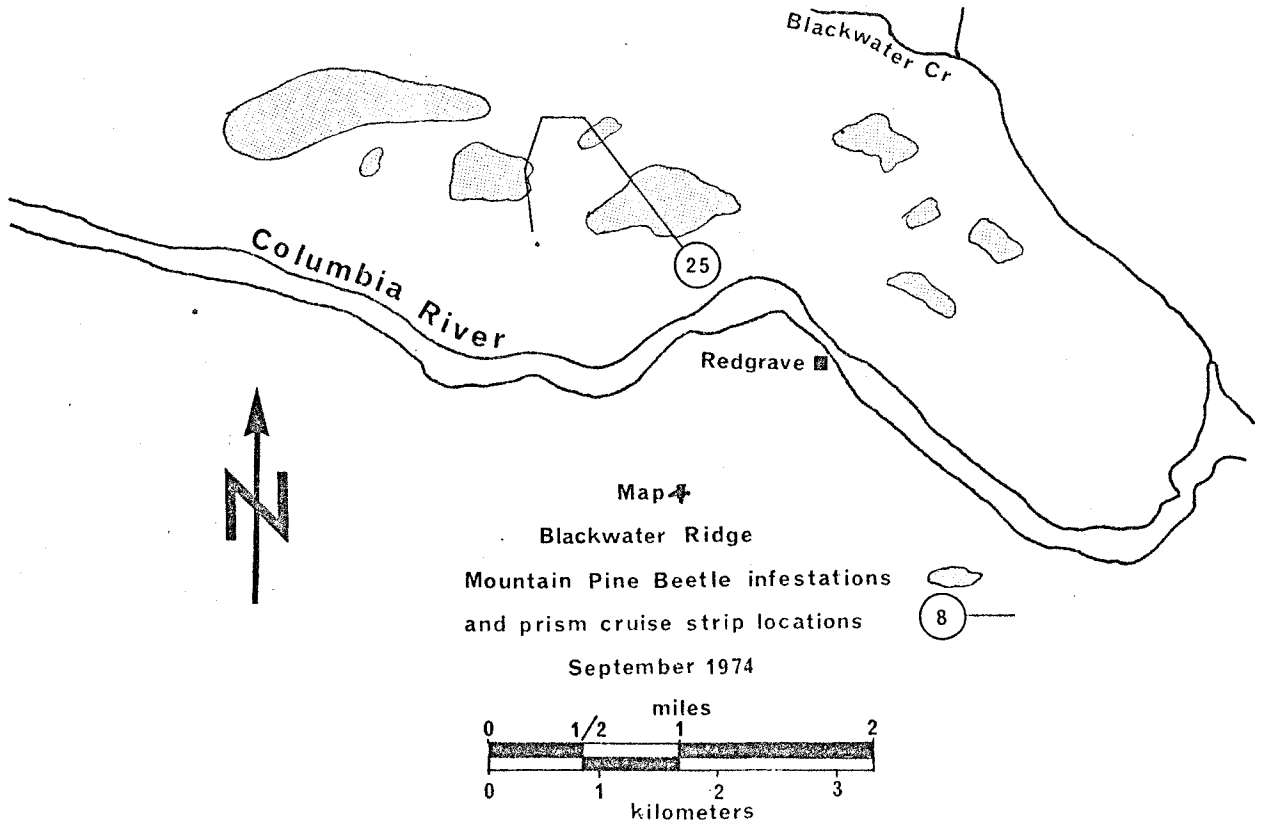
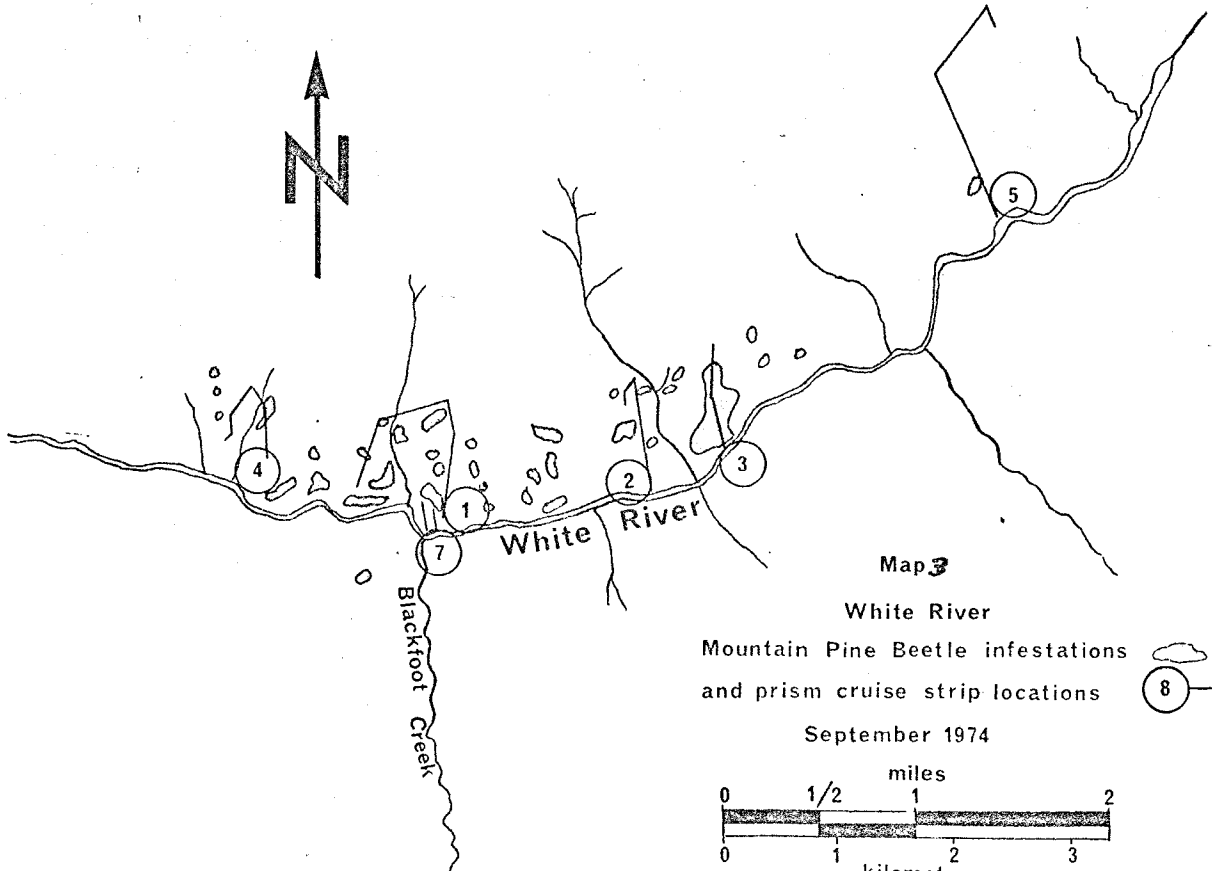
Map 2

Elk Creek

Mountain Pine Beetle infestations and prism cruise strip locations

September 1974





*Dryocoetes* - *Ceratocystis* complex

Aerial surveys during August were carried out with a helicopter to map in areas of alpine fir mortality on the Ottawa Hill above Slocan. It was found that alpine fir in mixed spruce-alpine fir stands had been killed over the past several years. The mortality occurred in small patches approximately one acre in size, scattered through stands several thousand acres in extent. Up to 10% of the alpine fir had been killed in these patches.

An infestation near the Spillimacheen River along Whisky Creek was found to contain approximately 225 red-topped alpine fir in two patches.

Douglas-fir beetle, *Dendroctonus pseudotsugae*

Douglas-fir beetle populations remained at a low level. No infestations were found during aerial and ground surveys.

Spruce beetle, *Dendroctonus rufipennis*

No current spruce beetle-attacked Engelmann spruce were found. There were occasional attacks on current windfall at several localities in the District.

Defoliators

Black army cutworm, *Actebia fennica*

An infestation of black army cutworms caused moderate to severe bud damage and defoliation of Engelmann spruce seedlings planted on the site of the 1971 "Sue" fire near Golden. The pest occurred on an estimated 7,000 acres (2,800 ha) of the burned area. Severe damage was limited to seedlings planted in low lying parts of the valley bottom. Moderate seedling damage occurred on the lower slopes of, and along, Blackwater Ridge (Map 5).

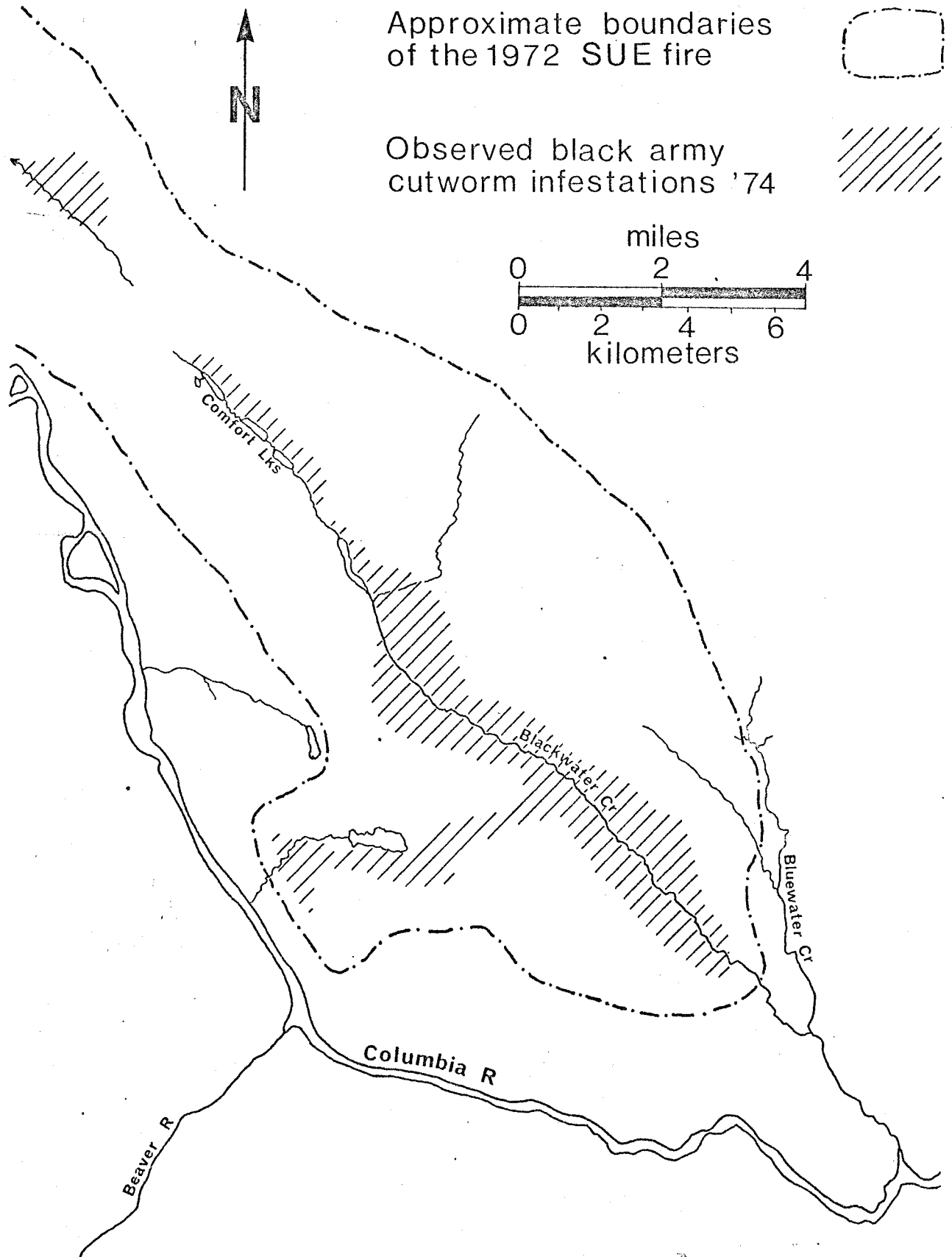
Cutworm larvae stripped most of the deciduous ground cover including fireweed, willow, rose and alder in the areas of heavy infestation. They fed on the buds and, to a lesser extent, the old foliage of seedlings established on the burn. More than one-third of the 1973 buds were damaged on 50% of the Engelmann spruce seedlings on 400 acres at mile 24, and over half of the buds were destroyed on more than 75% of the seedlings on 600 acres at mile 27. Douglas-fir seedlings at these locations had been lightly defoliated.

A pupal survey was done in these areas in mid-July. A total of 45 one-square-foot duff samples from mile 24 to mile 34 averaged .8 larvae per sample. Pupae were sent to the Victoria Laboratory; they were found to be heavily parasitized.

The British Columbia Forest Service conducted a seedling damage assessment survey at the plantations. Seedling survival is higher than was expected, and the seedlings were putting out adventitious growth.

Infestations are expected to persist in 1975 in portions of the "Sue" fire area.

Map 5



European pine shoot moth, *Rhyacionia buoliana*

Approximately 150 Mugho pines, planted in 1968 at the Hi-Arrow dam viewpoint, were found to be heavily infested with pine shoot moth larvae. Seventeen Austrian and one Scots pine were found to be lightly infested. The infestation appears to have been established for the past few years, as evidence of old damage is common. No doubt the trees were infested when moved from the Coast.

Examination of the surrounding native yellow pines revealed the occasional shoot infested with shoot moth larvae. The vigorous growth of the yellow pine shoots, and heavy sap flow, appeared to have drowned out the larvae.

The British Columbia Hydro Authority undertook a control program by clipping all the infested shoots from the Scots and Austrian pines and clipping all the shoots of the Mugho pines and burning them before moth emergence. They also sprayed all the exotic pines with an insecticide several times during the summer.

Traps baited with a sex attractant were set out in the surrounding yellow pine stands and in the exotic pines to attract adult male pine shoot moths. A total of 35 traps were set out in seven areas, to gain a measure of the moth population in these stands. Each trap had a bottom surface trapping area of 36 square inches and was baited with 0.5 cm (1/8 inch) of the pheromone impregnated polymer. The pheromone was supplied by Dr. G.N. Daterman, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. A total of three adults were found in the traps, two in the exotic pine stand and one in the bordering native yellow pine stand.

Larch casebearer, *Coleophora laricella*

Larch casebearer defoliation of western larch in the southern areas of the District was generally lighter in 1974 than it was in 1973. Casebearers were found for the first time in the Fauquier - Burton area and along the Monashee Highway in the lower elevation stands. This is a spread of approximately 55 miles north along the Arrow Lake from Syringa Creek, where casebearers were known to occur in 1973. The heaviest defoliation again occurred along the International Boundary from Cascade east to Roosville, north along the Columbia and Kootenay rivers to Nelson, along the west arm of Kootenay Lake to Kaslo and north of Creston to Boswell. Defoliation was confined to stands below 3,000 feet elevation. Table 7 shows larch casebearer populations at five locations in the Nelson Forest District.

Table 7. Larch casebearer larval populations at five plots, Nelson Forest District, 1969 - 1974

Location	Avg no. casebearer larvae per 18-inch branch					
	1969	1970	1971	1972	1973*	1974*
Fruitvale	34	92	143	79	8 (15)	10 (8)
Salmo	67	275	273	201	15 (16)	6 (6)
Rykerts	24	312	69	164	60 (66)	33 (28)
East Arrow Creek	37	177	75	94	22 (32)	37 (51)
Yahk	13	120	64	16	3 (4)	5 (5)

\*Number per 100 fascicles in brackets.

Assessment of data on overwintering larval populations indicated that light defoliation is likely to occur in the spring of 1975 at all sample plot localities. Larch casebearer populations can build up rapidly and if weather conditions are favorable in 1975, the larval population could be back to high levels by mid-summer.

Casebearer larvae and pupae were collected in parasite release plots at Fruitvale and East Arrow Creek to determine the population level of the parasite *Agathis pumila*, released in 1969. Eleven per cent of the casebearers were parasitized by *Agathis* at the Fruitvale plot and two per cent at East Arrow Creek.

A contract to study the native parasites of the larch casebearer was awarded to S.F. Condrashoff in 1974. A total of 15 plots were established by the contractor from Anarchist Mountain in the western part of the District to East Arrow Creek in the east. Some of these plots will be used to release imported parasites from Europe in 1975 and 1976. A small number of parasites imported from Europe and Japan were planted in five areas, mostly on caged western larch infested with larch casebearer, during 1974. The parasite *Diadegma* was caged at Thrums and South Slokan, *Dicladocerus* was caged at Thrums and Blewett, and *Agathis* was caged (a few were released) at Blewett, Sheep Creek and near Nelway, and *Chrysocharis* was caged at Thrums.

Five plots were established to study the effects of larch casebearer defoliation of western larch. Twenty trees were tagged at each locality and the defoliation estimated at three crown levels. These plots are located at Thrums, Salmo, Rykerts, East Arrow Creek and Yahk. These plots will eventually be used to study the increment and height loss.

Western hemlock looper, *Lambdina fiscellaria lugubrosa*

Western hemlock looper populations, which were epidemic during 1973, collapsed in 1974 in many of the mature to overmature hemlock-cedar forests along the Columbia River and its tributaries from Shelter Bay to north of Mica Creek, from Galena Bay south to Nakusp and at Flat and Quartz creeks along the Rogers Pass Highway.

Egg samples collected early in the season at Shelter Bay and Mulvehill Creek had up to 80 per cent of the eggs parasitized. The heaviest egg parasitism was by *Trichogramma* sp. and *Telenomus* sp. Unfavorable, cool, wet weather conditions during the early larval development and egg parasitism presumably were major factors in collapse of the infestations.

Larval samples taken along the Big Bend Highway north of Revelstoke averaged 28 larvae from hemlock and 23 from cedar. The highest numbers of larvae were at mile 10 Big Bend Highway, where beating samples contained 110 from hemlock and 75 from cedar. South of Revelstoke in the Shelter Bay area, samples averaged 40 larvae from hemlock and 15 from cedar. The highest number of larvae were collected 2 miles north of Shelter Bay: 110 from hemlock. A general decline in larval numbers was also evident along the Rogers Pass Highway where infestations occurred in 1973 (Table 8).

Only light tip defoliation was evident in all areas surveyed. Several larval collections sent to the Insect Pathology Research Institute showed no evidence of disease.

An egg survey in October showed few overwintering eggs at Shelter Bay, mile 10 Big Bend Highway, Downie Creek, Goldstream River and Bigmouth Creek.

Larval populations are expected to be at a low level in 1975.

Filament bearer, *Nematocampa filamentaria*

Filament bearer larval populations declined in 1974. Beating samples from hemlock at Ferguson produced up to 200 larvae and 190 south of Trout Lake townsite. At Kuskanax Creek near Nakusp, 25 larvae were collected from hemlock (Table 9). All these areas had high larval populations in 1973. The larvae did not appear in good condition and were retarded in their development. Light tip defoliation occurred on western hemlock in all areas of 1973 infestations. No eggs were found in the infestation areas. Larval populations are expected to be light in 1975.



Table 8. Summary of western hemlock looper collections on western hemlock and western red cedar by drainage divisions, Nelson Forest District

Drainage divisions*	No. samples during larval period				% samples containing larvae				Avg no. larvae per positive sample				Avg no. larvae per sample			
	1971	1972	1973	1974	1971	1972	1973	1974	1971	1972	1973	1974	1971	1972	1973	1974
220	12	10	12	10	58	70	92	20	5.7	20.1	17.7	3.0	3.3	14.1	11.7	0.5
221	4	3	4	3	0	33	50	33	0	2.0	6.0	1.0	0	0.6	3.0	0.3
222	5	7	7	9	40	71	86	55	1.5	13.2	13.1	5.0	.6	9.4	11.2	3.3
223	26	13	23	26	88	91	100	65	10.3	22.6	55.5	11.0	9.1	20.9	55.5	7.5
224	3	1	3	2	75	0	100	50	2.0	0	41.7	2.0	1.5	0	41.7	1.0
225	13	13	17	20	28.7	100	100	85	1.5	31.8	173.1	24.0	.43	31.8	173.1	22.8
244	5	3	3	3	33.3	50	75	100	.5	57.5	133.7	40.0	.17	17.3	100.3	40.0

\* See Map 1.

Table 9. Summary of filament bearer looper collections on western hemlock by drainage divisions, Nelson Forest District

Drainage divisions*	No. samples during larval period				% samples containing larvae				Avg no. larvae per positive sample				Avg no. larvae per sample			
	1971	1972	1973	1974	1971	1972	1973	1974	1971	1972	1973	1974	1971	1972	1973	1974
220	7	5	9	6	57	40	22	0	4.7	13.5	1.5	0	2.7	5.4	.3	0
221	3	3	3	2	0	33	33	0	0	1.0	1.0	0	0	.3	.3	0
222	4	4	5	5	75	100	100	40	6.0	71.7	101.6	162.5	4.5	71.7	101.6	65.0
223	15	8	16	19	40	87	43	16	4.0	28.7	53.8	27.6	1.6	25.1	23.5	1.4
224	1	0	2	1	0	-	50	100	0	-	3.5	1.0	0	-	1.8	1.0
225	8	8	11	12	50	87	73	25	1.5	61.4	61.4	10.3	.8	6.8	44.6	2.5
244	3	2	2	1	0	100	100	0	0	11.0	11.0	0	0	3.5	11.0	0

\* See Map 1.

Larch budmoth, *Zeiraphera improbana*

Larch budmoth infestations declined along the Inonoaklin Valley and along the east side of the Arrow Lake from Applegrove to McDonald Creek. Numerous larvae were present early in the season near Inonoaklin Crossing, but there was very little defoliation of the western larch trees.

A search for pupae in the Inonoaklin Crossing area later in the season produced only a few pupae, indicating that the larval population will be light in 1975.

Forest tent caterpillar, *Malacosoma disstria*

There was moderate defoliation of trembling aspen stands on 1,200 acres (480 ha) along the west side of the Columbia River near Golden. Localized infestations and moderate defoliation of aspen occurred along the Columbia River near Parson and Spillimacheen. These infestations are expected to continue in 1975.

The infestations in the Trail - Warfield area collapsed in 1974. Very little defoliation had occurred in these areas.

Other Noteworthy Insects

Western false hemlock looper, *Nepytia freemani*

Light tip feeding occurred on the new foliage of Douglas-fir along the east side of Lake Windermere from Dutch Creek to Swansea Mountain. Collections in this area averaged 26 larvae, which is a small increase over 1973 counts. A localized infestation at Premier Lake caused light defoliation of Douglas-fir.

The infestation in the Nakusp area on western hemlock in 1973 collapsed in 1974.

Western blackheaded budworm, *Acleris gloverana*

Blackheaded budworm lightly defoliated the new growth of hemlock trees in the Galena Pass area, along the Ferguson - Trout Lake Road and along the Saddle Mountain Road opposite Nakusp. Up to 50 larvae per beating collection were taken along the Ferguson Road with 40 in the Galena Pass area.

There was a general increase in the number of larvae collected in the Rogers Pass area. Number of larvae per collection averaged less than 10 but in recent years no larvae were in evidence in these areas.

Western spruce budworm, *Choristoneura occidentalis*  
and two-year-cycle *C. biennis*

A localized infestation of one-year-cycle spruce budworm caused light defoliation of immature hemlock and Douglas-fir trees at mile 2 Ferguson - Trout Lake Road. Beating samples produced up to 200 larvae from hemlock.

Soolure traps for trapping male spruce budworm moths were set out at seven localities in the District. The results are shown in Table 10. The traps were baited with a sex attractant and coated on the inside with a sticky substance to trap the moths.

Table 10. Average number of *Choristoneura occidentalis* moths trapped in Soolure traps at seven localities, Nelson Forest District

Locality	Stand type	No. of larvae collected	Avg no. of moths trapped
Wilson Cr	western hemlock	0	3
Kuskanax Cr	" "	0	7
Galena Bay	" "	0	5
Whiteswan L	Douglas-fir	0	36
Premier L	" "	0	17
Dutch Cr	" "	1	20
North White R *	Engelmann spruce	1	32

\* *Choristoneura biennis*.

The two-year-cycle spruce budworm infestation that caused severe defoliation of Engelmann spruce and alpine fir along the North White River in 1972 collapsed in 1974. There was no noticeable damage this year, and only one larva was found in beating samples in the area.

Hemlock sawfly, *Neodiprion* sp.

Hemlock sawfly larvae were numerous in mature to overmature hemlock-cedar forests along the Upper Arrow Lake from Nakusp to Galena Bay and along the Columbia River from Shelter Bay to Goldstream River. Over 600 larvae were taken in 3-tree beating samples from western hemlock at Shelter Bay, Revelstoke and Goldstream River. There was light defoliation on fringe trees at these localities. Most of the high larval populations were found in areas where hemlock looper infestations occurred in 1973.

Larvae were also common in collections along the Rogers Pass Highway and in Glacier and Mount Revelstoke National Park. Light defoliation occurred at Flat Creek, where more than 200 larvae were collected.

Douglas-fir needle midges, *Contarinia* spp.

Needle midge damage on Douglas-fir Christmas trees in the East Kootenay was light. Only about 2 per cent of the new needles were infested at the sample plots at Canal Flats, Invermere, Edgewater and Brisco. Damage was also light in the West Kootenay.

## FOREST DISEASE CONDITIONS

The organisms currently causing tree mortality, growth loss and quality reduction attributed to diseases are dwarf mistletoes and stem and root rot fungi. Once established in a stand, they persist for many years. They usually intensify at a slow rate, making annual summaries of their status repetitious; for this reason the following report may omit some of the more important diseases. Emphasis is placed on new outbreaks, the status of the annually varying foliage diseases and abnormal weather conditions, i.e. frost, drought, snow damage, etc., which immediately affect tree appearance and often cause dieback and growth loss, and factors influencing the occurrence of the more important diseases, are summarized elsewhere.

### Fume Damage

Escaping sulphur dioxide fumes caused severe damage to the foliage of trees on the south slopes of Sullivan Mountain near Kimberley. The fumes, created underground by oxidizing ore, escaped through mine ventilation shafts to the surface and were dispersed through the nearby forest stands.

Severe foliage damage resulted on all trees in stands adjacent to the surface vents, and on western larch, lodgepole pine and Douglas-fir on more than 200 acres between the fume source and Kimberley.

Foliage damage will decrease with reduced fume emission as the mining operations remove oxidizing material from the area.

### Winter Damage

The foliage of Douglas-fir trees along the highway from Creston to Crawford Bay suffered severe damage as a result of winter drying. Mortality was evident on more than 300 Douglas-fir and ponderosa pine trees in roadside stands along Kootenay Lake. Western white pine trees were discolored along the east side of the Columbia River above 2,500 feet elevation from Revelstoke to the Goldstream River. Weakened trees affected by winter injury may be subject to attack by other pests.

### Larch needle cast, *Hypodermella laricis*

Western larch trees on 500 acres along Tanglefoot Creek and 700 acres at Dewar Creek, and in the Crawford Bay area, suffered heavy foliage discoloration. The 1974 foliage was unaffected.

NELSON DISTRICT

Appendix I

Permanent Sample Stations

There are 142 permanent sample stations in the Nelson District which are sampled annually to monitor defoliator populations. More than one tree species is sampled in many of the locations and it is possible to obtain 343 three-tree beating samples from the 142 stations. Following is a list of the stations showing trees sampled and year of establishment.

Tree sampled	Year established											Totals
	1961	1962	1963	1964	1965	1968	1970	1971	1972	1973	1974	
wH	6	15	6	-	-	3	2	2	3	2	-	39
wC	6	11	4	1	-	3	16	2	2	2	-	47
D	26	21	8	1	2	4	4	4	-	1	-	71
wL	7	13	4	1	1	-	10	3	-	-	-	39
lP	14	12	5	-	1	2	1	5	2	-	-	42
pP	9	3	1	-	-	-	2	-	-	-	-	15
wwP	1	-	-	-	-	1	16	-	-	-	-	18
eS	6	6	5	-	1	-	16	8	3	1	-	46
aLF	7	2	2	-	1	-	1	5	2	1	-	21
gF	-	2	-	-	-	-	-	1	-	-	-	3
roJ	1	-	-	-	-	-	-	-	-	1	-	2
	83	85	35	3	6	13	68	30	12	8	-	343

The sampling station records including descriptions are stored in the Nelson Forest District file in room 6 of the Survey building, P.F.R.C.



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Appendix II

Tree Damage Appraisal Plots

Tree appraisal plots have been established in the Nelson Forest District to follow population trends of some defoliators and to record damage to individual trees.

Following is a list of appraisal plots showing pest, date established and purpose.

Pest	Location	Date established	Purpose
Western hemlock looper	Shelter Bay	1973	defoliation impact
	Goldstream River	1973	" "
Larch casebearer	Fruitvale	1969	larval and parasite studies
	Salmo	1966	and defoliation impact
	Rykerts	1966	
	East Arrow Creek	1969	
	Yahk	1966	
Needle miners <i>Contarinia</i> spp.	Canal Flats	1963	insect population trend
	Windermere Lake	1963	and damage appraisal
	Edgewater	1963	
	Brisco	1963	
Spruce budworm <i>Choristoneura</i> spp.	Kuskanax Creek	1972	monitor spruce budworm
Soolure traps	Wilson Creek	1972	moth populations
	Galena Bay	1972	
	Dutch Creek	1972	
	Whiteswan Lake	1972	
	Premier Lake	1972	
	North White River	1972	

Plot records are on file in the Nelson Forest District file, Room 6, Survey Building, P.F.R.C.

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Appendix III

PEST REPORTS AND SPECIAL REPORTS

1974

<u>Title</u>	<u>Author</u>	<u>Date published</u>
Black army cutworm infestation near Golden	J. S. Monts	June 6
Assessment of damage to lodgepole pine by mountain pine beetle in Elk Creek and White River areas of B.C.	H. A. Tripp, E. V. Morris, and J. S. Monts	December 31
The forest impact of sulphur dioxide fumes from underground combustion of sulphide ores near Kimberley, B.C.	Drake Hocking, N.F.R.C. File Rept. Project NOR-7-114	October
Forest insect and disease conditions, 1974, Nelson District	E. V. Morris and J. S. Monts	January
History of population fluctuations and infestations of important forest insects in the Nelson Forest District and adjoining National Parks	E. V. Morris and J. S. Monts	May