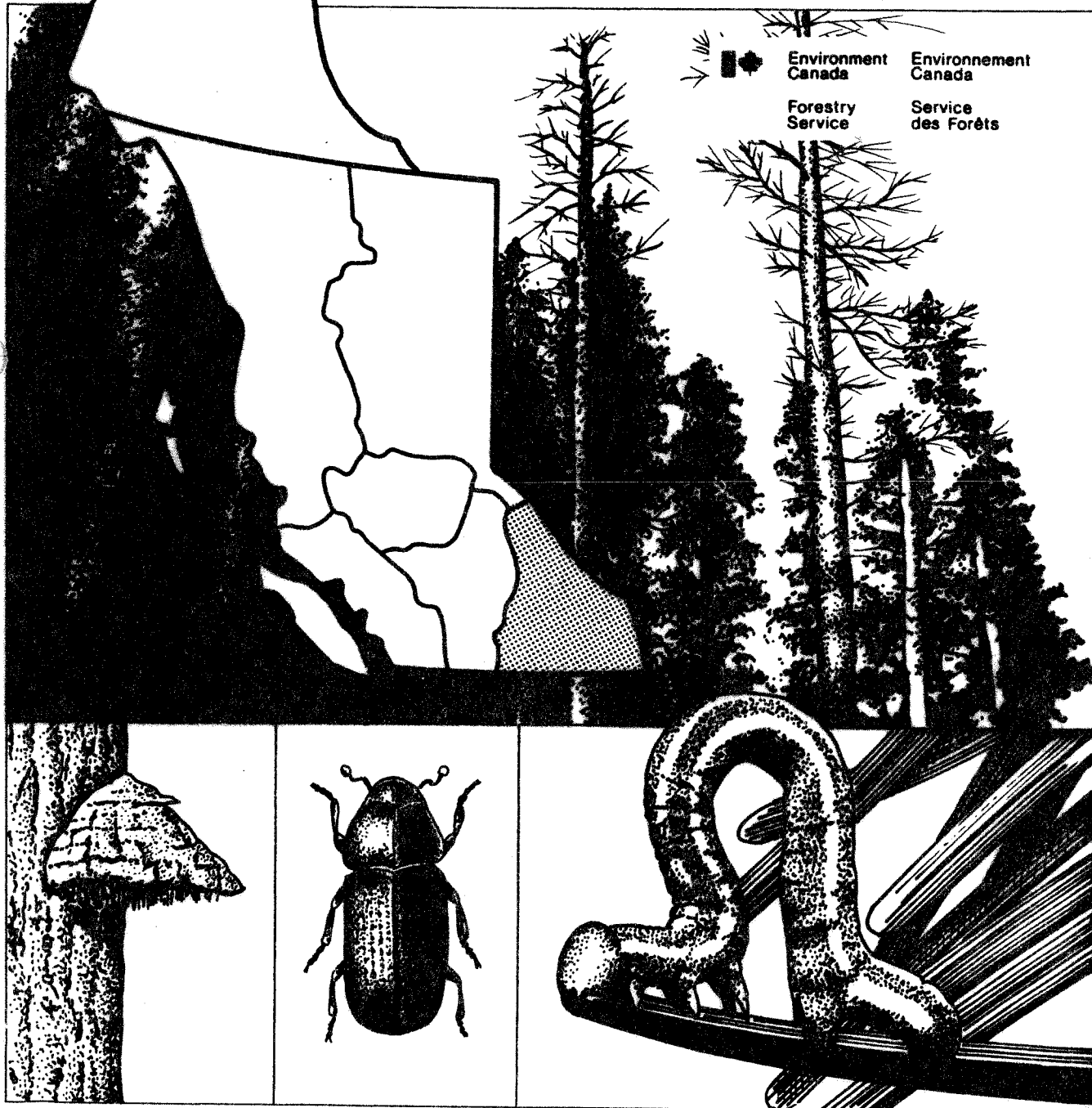


Forest Insect & Disease Conditions 1979

NELSON FOREST REGION / R. D. ERICKSON, C. S. WOOD



Environment Canada / Environnement Canada
Forestry Service / Service des Forêts

Table of Contents

	Page
Summary of Pest Conditions	1
PINE PESTS	5
Mountain pine beetle	5
Pine engraver beetle	16
Engraver beetles	16
Red turpentine beetle	16
European pine shoot moth	16
Pitch nodule moth	16
Sequoia pitch moth	16
Gouty pitch midge	17
Lodgepole terminal weevil	17
Lodgepole pine needle cast	17
Red band disease of pine	17
Pine needle blight	17
Atropellis canker of pine	18
White pine blister rust	18
Red root and butt rot	18
Root rot	18
DOUGLAS-FIR PESTS	18
Douglas-fir beetle	18
Spruce budworm	18
Leaf beetles	19
Douglas-fir needle midge	19
A bud blight	19
Rhabdocline needle cast	19
Conifer-cottonwood rust	20
Armillaria root rot	20
Climatic injury	20
WESTERN LARCH PESTS	20
Larch casebearer	20
Larch sawfly	23
Larch looper	24
Larch budmoth	24
Larch needle cast	24
Animal damage	25
Top-kill of western larch	26
Red ring rot fungus	26
A canker	26
Brown cubical rot	27

Table of Contents (Cont'd.)

	Page
WESTERN HEMLOCK AND WESTERN RED CEDAR PESTS	27
Winter damage	27
Western false hemlock looper	27
Western hemlock looper	28
Weevil damage	28
Red ring rot	28
ENGELMANN SPRUCE PESTS	28
Spruce budworm	28
Spruce beetle	30
Spruce weevil	30
Yellowheaded spruce sawfly	30
Spruce cone rust	30
ALPINE FIR PESTS	30
Western balsam bark beetle	30
Indian paint fungus	31
DECIDUOUS TREE PESTS	31
Western tent caterpillar	31
Fall webworm	32
Satin moth	32
Birch skeletonizer	32
Woolly aphids	32
Aspen leaf miner	32
Apple and thorn skeletonizer	32
Leaf and twig blight of poplar	33
DWARF MISTLETOES ON CONIFERS	33
BAITED STICKY TRAPS	34

SUMMARY

This report outlines the status of forest insect and disease conditions in the Nelson Forest Region for 1979, and attempts to forecast pest population trends.

Regular field work in the Region began May 15 and ended August 24. Special surveys were as follows: mountain pine beetle cruising and population and damage assessment, larch casebearer overwintering population sampling and larch sawfly cocoon sampling, September 24 - October 3. Talks on forest pests in the Nelson Region were done for B.C. Ministry of Forests and industry personnel at 10 locations in May. On September 26, an introduction to current pest problems in the Nelson Region was given to second year students in Forestry at Selkirk College. Meetings of the Kettle Forest Insect and Disease Control Committee and the East Kootenay Forest Insect and Disease Control Committee were held and attended twice in the west and three times in the east.

A total of 580 insect and disease collections were submitted to the Pacific Forest Research Centre from the Nelson Forest Region by Pest Survey Technicians. Map A shows collection locations and Map B shows flight lines of aerial surveys in August which consisted of 42 flying hours 28 of which were supplied by the B.C. Ministry of Forests. These flights were used to sketch map and photograph pest problems. Oblique, 70 mm aerial photographs of mountain pine beetle infestations were taken at Arlington Lakes, Goathide Creek, lower Flathead River Valley, Akamina - Kishinena creeks, Elk Creek and along part of the White River Valley.

This report is organized under a new format, designed to emphasize the trees rather than the forest pests; therefore the pests will be discussed under the general headings of species of trees affected.

Mountain pine beetle, the major pest of lodgepole, white and ponderosa pines, killed 4.5 million trees over 23 845 ha in 1979 compared to 407,000 trees over 17 660 ha in 1978. The largest and fastest expanding infestation was in the lower Flathead River Valley and adjoining drainages where the beetle flight in July occurred as a "beetle blitz" that is, vast numbers of beetles in flight. Lodgepole pine needle cast discolored trees over large areas in the Nelson Region. White pine blister rust continued causing flagging and top-killing throughout the host range. Pine needle blight was less evident than 1978 in the East Kootenay but caused discoloration in patches in the West Kootenay. In parts of the East Kootenay, pine engraver beetles were causing more damage than in the previous 2 years.

Douglas-fir is withstanding a small infestation of one-year-cycle spruce budworm near Rock Creek in the West Kootenay. The conifer-cottonwood rust has declined after 2 years of widespread infection. A bud-blight of Douglas-fir has continued to cause bud necrosis and poor tree form in several parts of the Nelson Region. Douglas-fir mistletoe was collected for the first time near Grand Forks.

A needle cast was widespread throughout the range of Douglas-fir in the East Kootenay.

Larch casebearer defoliated more western larch throughout the southern Nelson Region in 1979. An introduced parasite demonstrated effective control of casebearers at one plot. The defoliation of western larch by larch sawfly occurred for the fourth consecutive year. Squirrels, porcupines and bears damaged western larch in different ways throughout the Nelson Region. Larch needle cast discolored more trees than in 1978 in the East Kootenay and the same number in the West Kootenay, with some bud, tip or branchlet mortality. There was no defoliation of western larch by larch budmoth because the population collapsed.

Winter drying of mainly hemlock and cedar resulted in large areas of discolored foliage, and mortality of buds, branches and tree tops, throughout the Nelson Region. Hemlock looper and false hemlock looper increased in population, but caused no defoliation.

The two-year-cycle spruce budworm defoliated spruce and alpine fir again in several areas of the East and West Kootenay. In the western part of the Region, spruce beetle infestations are being controlled with logging and the use of trap trees.

Western balsam bark beetle continued to kill alpine fir throughout the Nelson Region.

Discoloration of white birch caused by the birch skeletonizer was widespread in the Nelson Region again.

Dwarf mistletoe infection occurred on lodgepole pine, western larch and Douglas-fir throughout the Nelson Region.

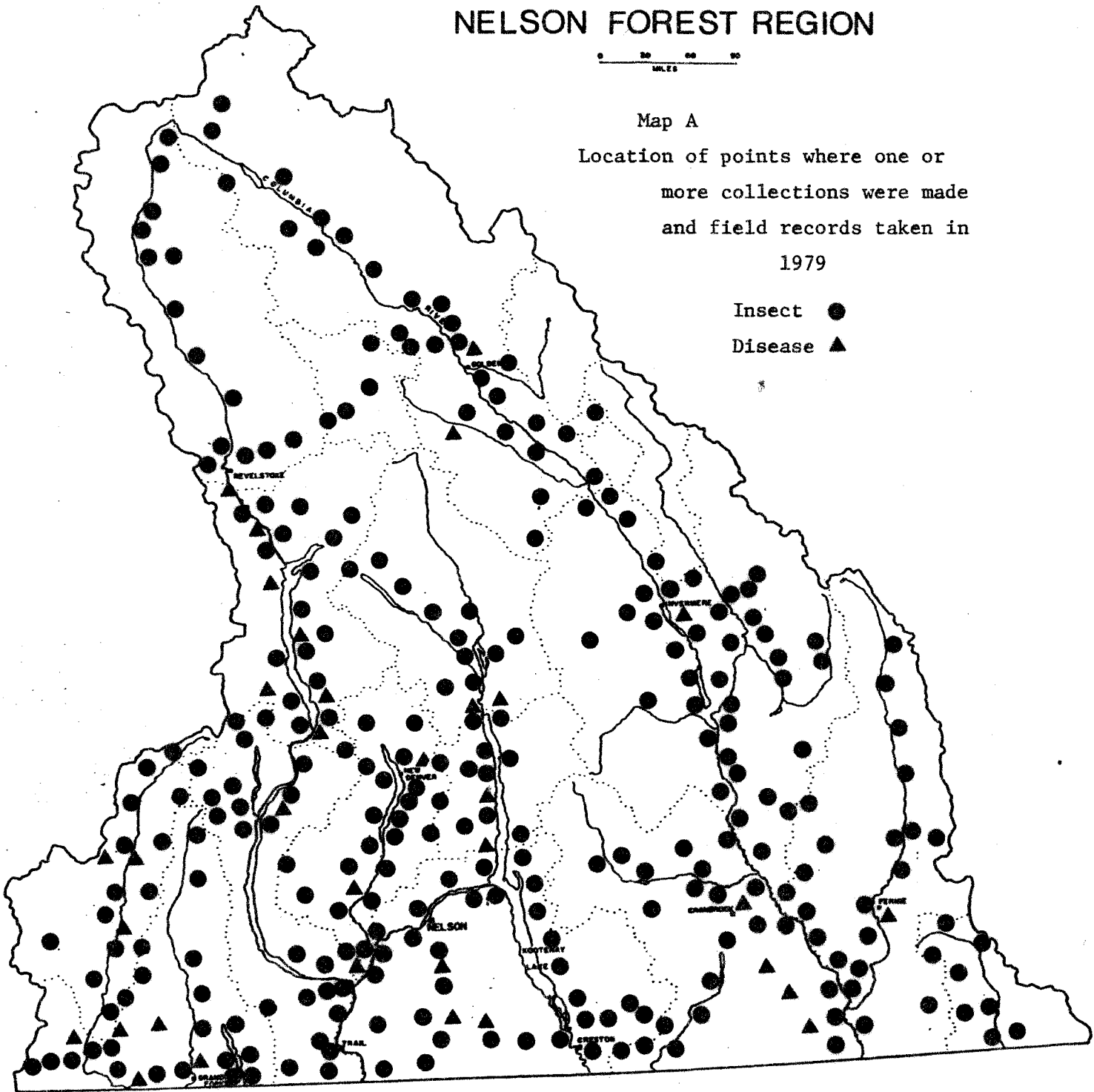
NELSON FOREST REGION



Map A

Location of points where one or more collections were made and field records taken in 1979

Insect ●
Disease ▲

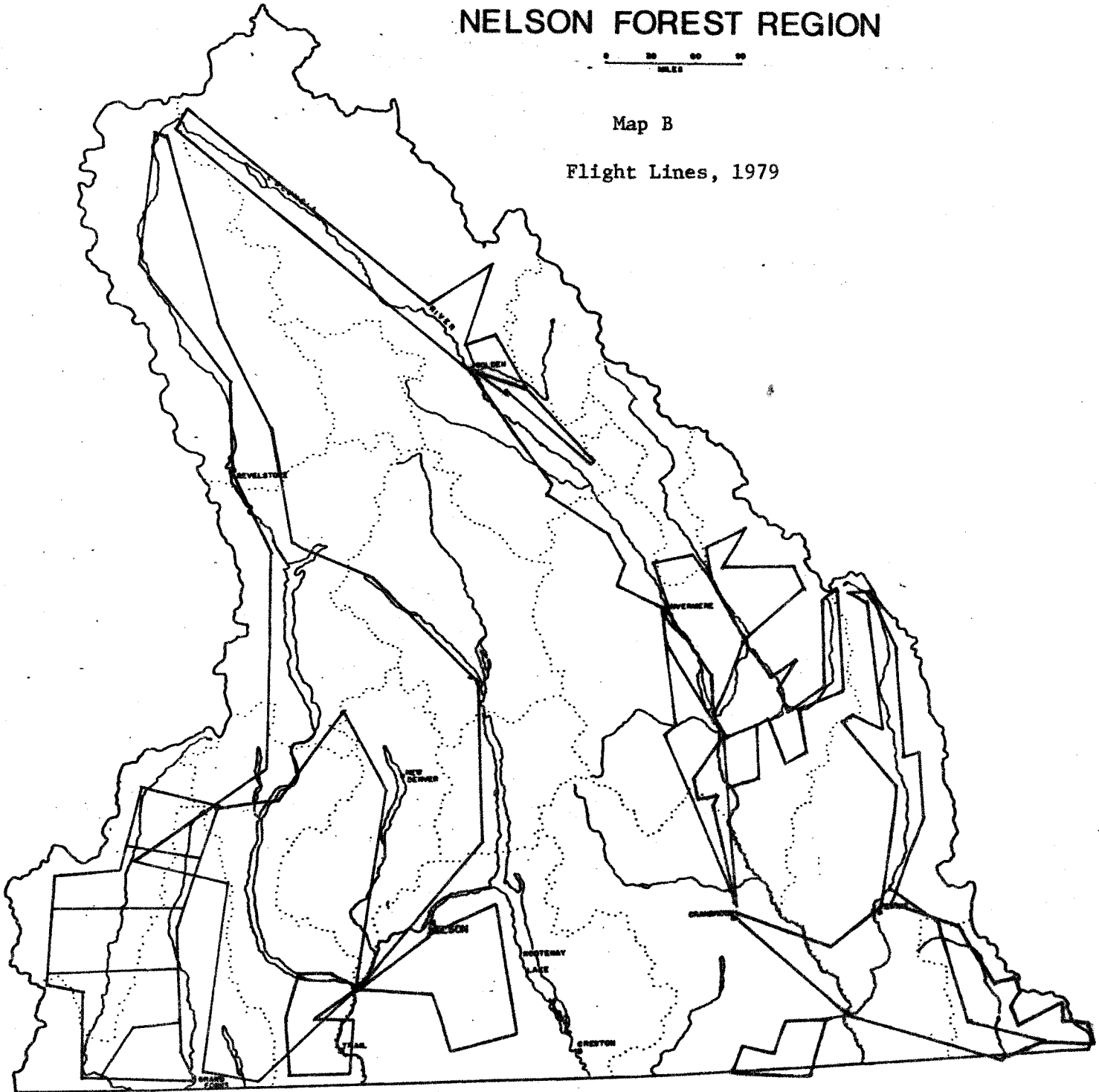


NELSON FOREST REGION



Map B

Flight Lines, 1979



PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

Mountain pine beetle killed more than 4.5 million trees over 24 000 ha in the Nelson Forest Region in 1979 (Table 1), compared to 407,000 trees over 17 660 ha in 1978.

In the West Kootenay approximately 10,000 lodgepole pine trees were killed on 1 375 ha compared to 5,200 on 1 160 ha in 1978, maps 1-4. The largest infestation continued in the Beaverdell area with major increases along the West Kettle River from Arlington Lakes to Goathide Creek, where the number of killed trees doubled. New infestations were recorded at Chapleau Creek near Slocan, 750 trees, and near Taurus Lake along the West Kettle River, 160 trees were killed where only a few were recorded in 1978.

The number of beetle-killed western white pine trees in the West Kootenay also increased; to 4,825 on 470 ha from 2,750 on 468 in 1978. The largest increase was recorded at Downie Creek where numbers of killed trees increased from 350 in 1978 to 1,500 over 80 ha in 1979. New infestations were recorded along the Goldstream River, Carnes and La Forme creeks and along the west side of Slocan Lake.

In the East Kootenay, the number of beetle-killed trees increased to an estimated 4.5 million compared to 425,000 in 1978, see appendix. The expansion and intensification of the epidemic was most prevalent in the Flathead River Valley where the outbreak increased from a small number of localized pockets of beetle-killed trees in the lower Kishinena Creek area in the spring of 1978 to encompass all the pine stands in the Valley from Frozen Lake in the west to the Alberta border in the east and north to Flathead Pass.

West of Koochanusa Lake localized areas of beetle-killed lodgepole pine trees expanded from the Ward-Gilnockie creeks area northward in the Caven-Plumbob creeks area. Small localized pockets occurred in the Kikomum-Elko area for the first time adjacent to the sawmill processing beetle-killed lodgepole pine. Mountain pine beetle and pine engraver attacks also occurred in stands adjacent to the sawmill in Cranbrook.

In the White-Kootenay rivers drainages, where large areas of lodgepole pine have been destroyed since 1971, the infestation continued to expand and intensify from 210,000 trees killed in 1978 to 1.75 million in 1979, including Lussier River - Coyote Creek area, north through Whiteswan Lake, east into the junction area of the North, East and Mid-White rivers; in the main White River Valley and Elk Creek; in the Kootenay River Valley and adjacent Cross, Palliser and Albert River valleys north into Kootenay National Park.

West of the Columbia River from Columbia Lake to Toby Creek and

along the west slope of Steamboat Mountain between Invermere and Spillimacheen there were more beetle-killed trees in 1979 than 1978.

Significant increases were also recorded in lodgepole and white pine stands near Donald; adjacent to the Trans Canada to Beavermouth; around Waitabit-Mar creeks area north to Bush Arm in the Chatter-Prattle, Lyall creeks and Valenciennes River areas. From Parson north to Golden small pockets persist on the west side of the Columbia River, also in the Blaeberry River Valley; and in the south end of the Beaverfoot River Valley, beetle-killed lodgepole pine were recorded for the first time between Wapta Falls and the west gate of Yoho National Park and west of Field. The number of white bark pine trees killed in the higher elevation stands surrounding the Lower Flathead River Valley was 1,500, from which the beetle was collected for the first time in B.C., at Storm Creek.

Prolonged sub-zero temperatures in January 1979 in the East Kootenay, resulted in mortality of adults and larvae in some areas. The mortality varied but was most severe in higher elevation, thin-barked trees where it was 100% in the bole above the snow. However sufficient mountain pine beetle progeny survived to overcome the effects of the overwintering mortality. This was demonstrated by the continued expansion of the infestations and the large numbers of trees attacked in 1979 in most regions particularly in the southern Flathead River Valley including Sage and Kishinena creek valleys. Ground surveys in this region indicated a major 1979 flight, probably originating in the devastated stands in Montana, attacked virtually all the remaining unattacked stands from Couldrey Creek east to the Akamina Creek junction with Kishinena Creek north to Sage Creek including the Proctor Lake area. This major flight was observed by B.C. Ministry of Forests personnel who recorded beetles being picked off their clothes and from hair and beards, near the Calder Creek Lookout.

The presence of the pine engraver beetle, Ips pini, in mountain pine beetle infestation areas was greater than in previous years. However the number of stems attacked were few by comparison to the number of mountain pine beetle attacked stems. The absence of pitch tubes in many 1979 attacked trees was also noted, indicating successful brood establishment.

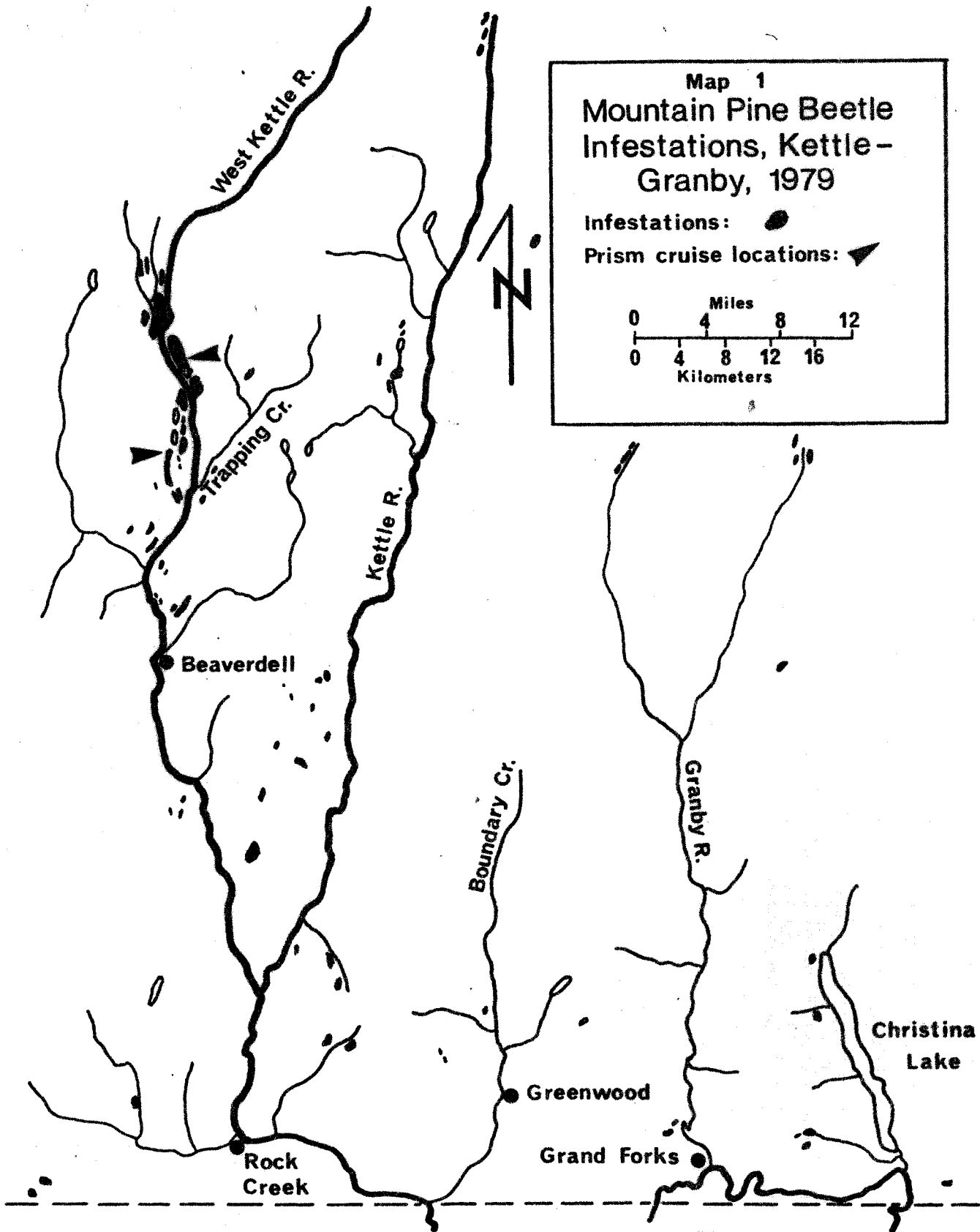
The numbers of lodgepole pine stems attacked in 1979 in the West Kootenay are comparable to 1978 levels, with a slight increase expected in the number of beetle-killed trees in 1980. Beetle progeny have good overwintering survival potential, being 90% larvae on September 11.

Ground surveys were done to assess the amount of current, 1979, attack by mountain pine beetle in the Nelson Forest Region. The results, Table 2, show the per cent of trees attacked in 1979 to be as high or higher than 1978. In the East Kootenay, at Lemon Creek along the Kootenay River and at Proctor Lake in the Flathead River Valley, approximately half of the lodgepole pine trees were attacked this year. Mountain pine beetle very seldom attacks stands with this intensity. This probably resulted

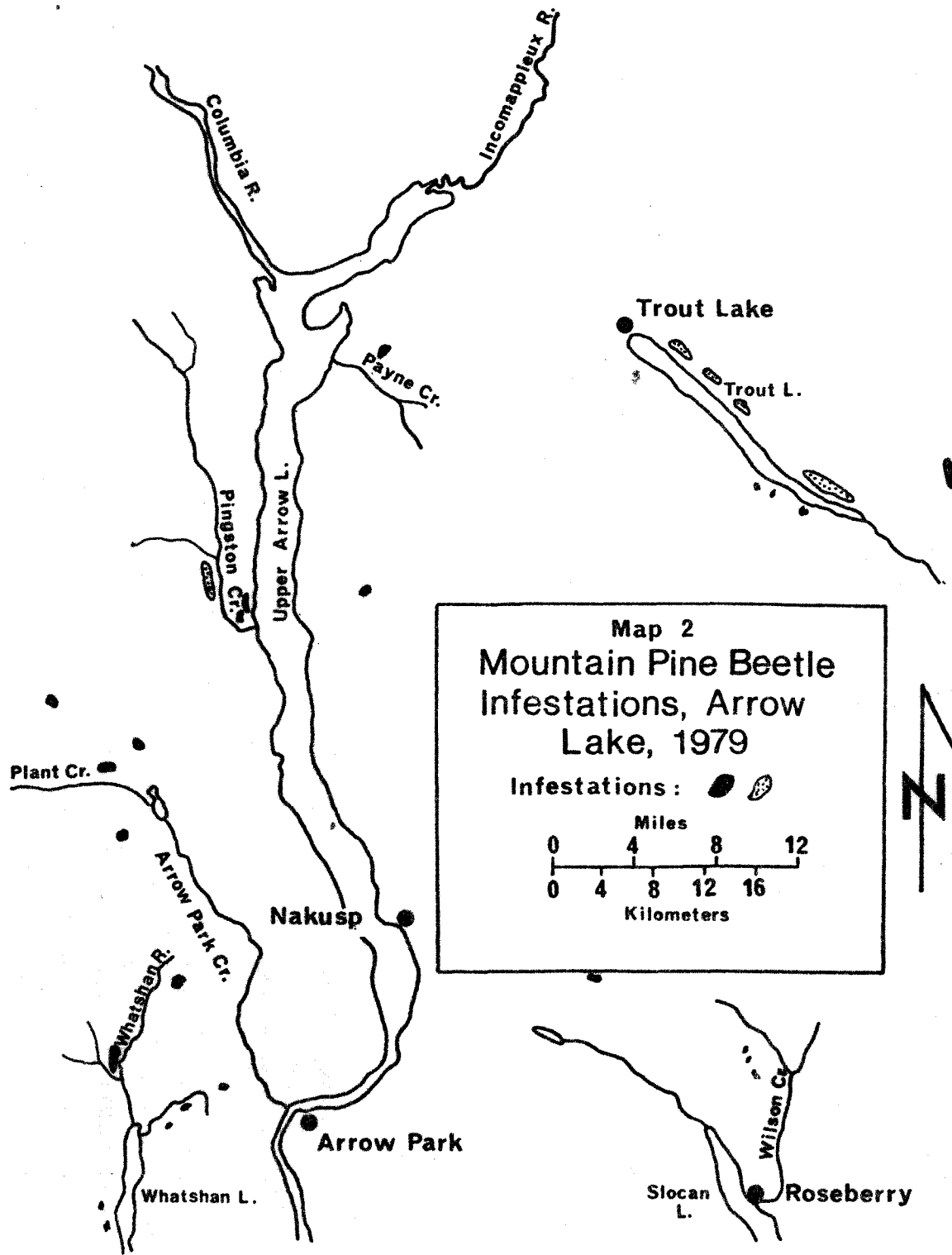
from the extremely large numbers of beetles in the 1979 flight.

Detailed maps of mountain pine beetle infestations in the East Kootenay are included in the appendix.

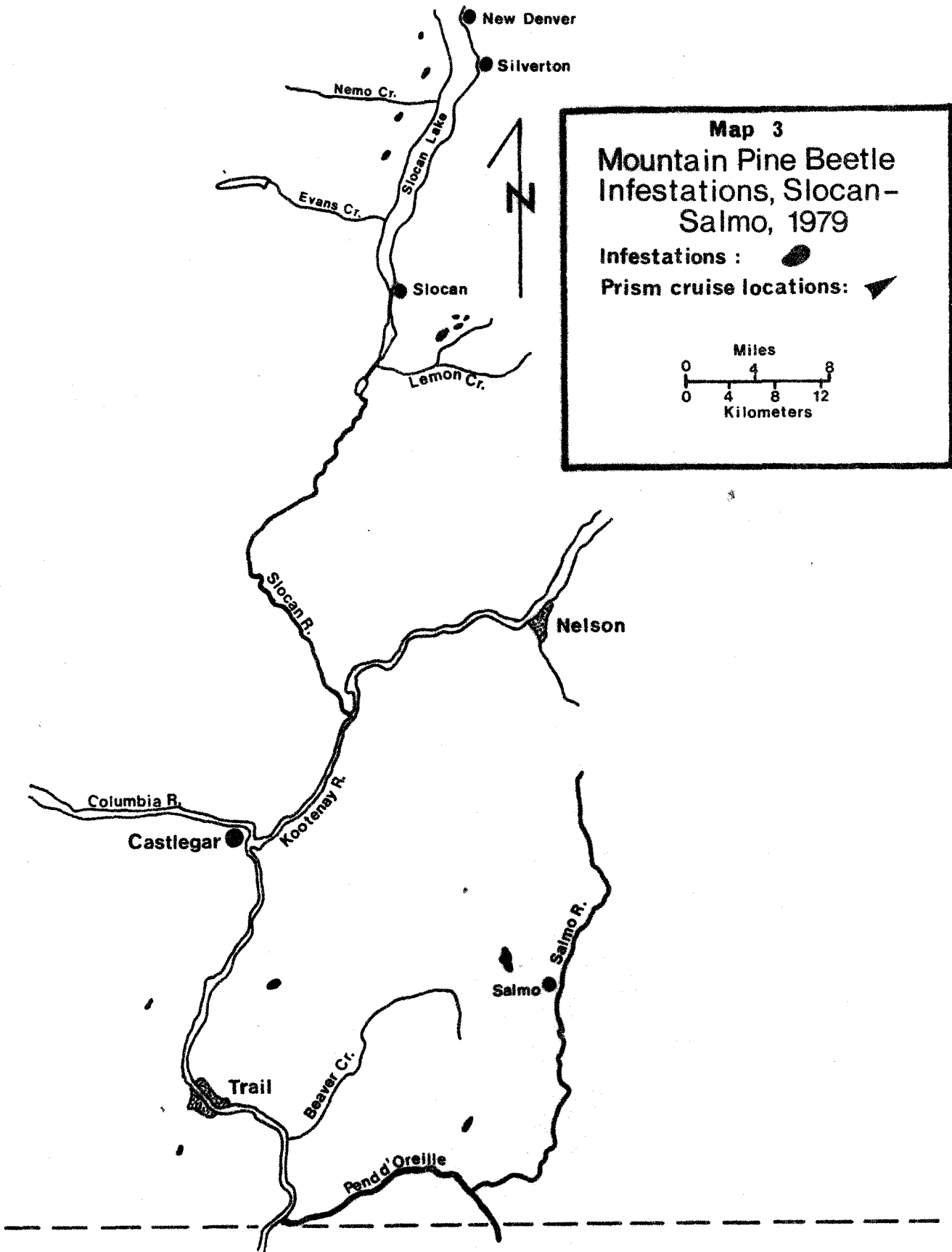
Mountain pine beetle infestation at Starvation Creek, a tributary
of the Flathead River, August, 1979.



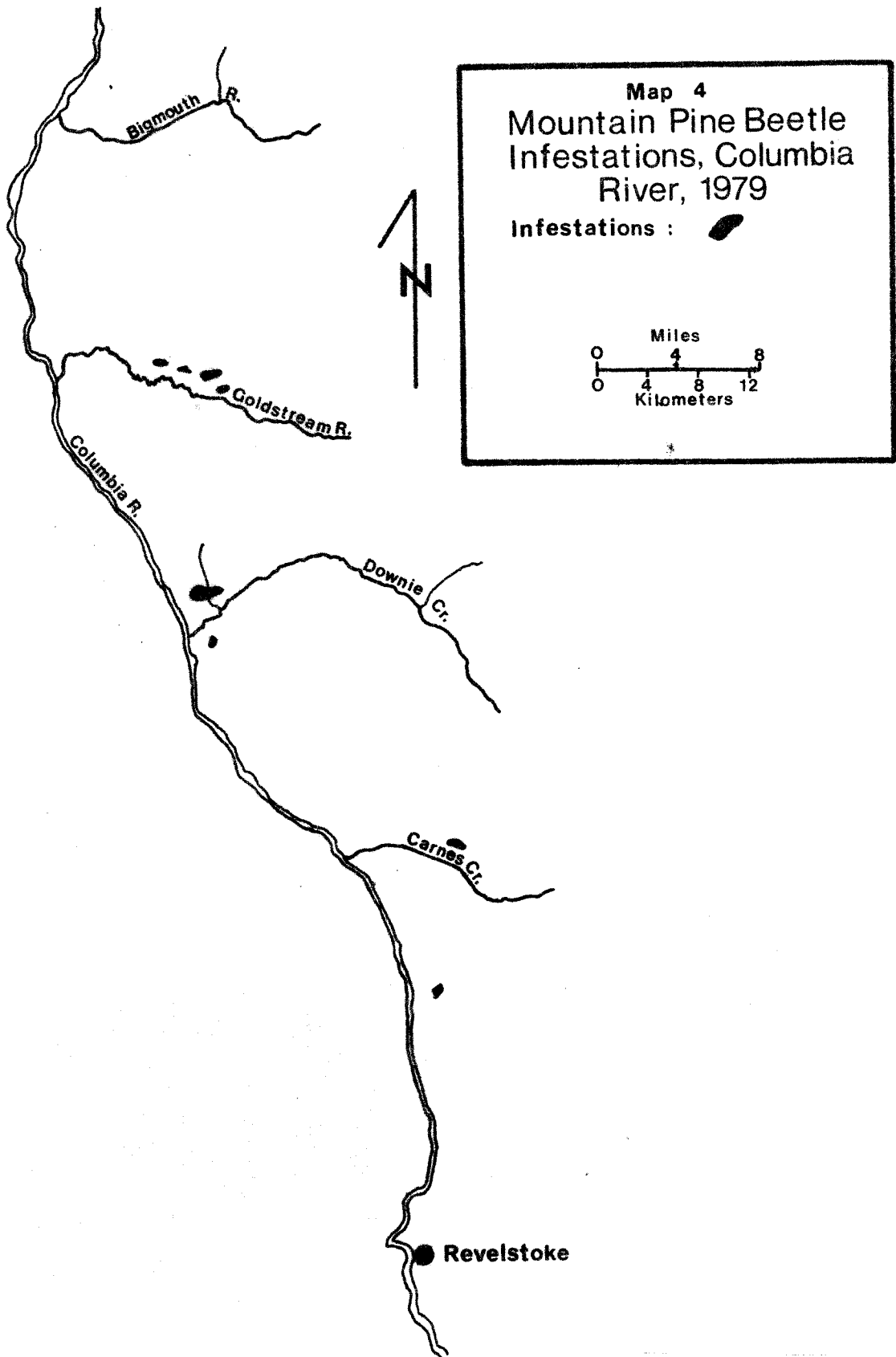
Larger scale maps available
at: Forest Insect & Disease
Survey, 506 West Burnside.



Larger scale maps available
at: Forest Insect & Disease
Survey, 506 West Burnside.



Larger scale maps available
at: Forest Insect & Disease
Survey, 506 West Burnside,
Victoria



Larger scale maps available
at: Forest Insect & Disease
Survey, 506 West Burnside,
Vancouver

Table 1. Number and area of pine trees killed by mountain pine beetle in 1978 and red in 1979, Nelson Forest Region, 1979

Pine species	Location	No. of trees	Area ha
lodgepole	<u>West Kootenay</u>		
	Big Sheep Cr	3	1 B
	Nicoll Cr	10	1 D
	Burrell Cr	75	12 B
	McFarlane Cr	5	1 A
	Eagle Cr	5	1 A
	Galloping Cr	2	1 A
	Sally Cr	5 *	1 A
	Winnifred Cr	45	14 B
	Lower Winnifred Cr	10	1 D
	Kettle R. below Winnifred Cr	195	20 B
	Rendell Cr	25	2 B
	Copper Kettle L	20	2 B
	Copper Kettle Cr	90	3 B
	Bitter Cr	25	2 B
	Moody Cr	120	12 B
	Prior Cr	3	1 B
	Hardy Cr	8	1 B
	Fourth of July Cr	25	2 B
	Canyon Cr	15	1 D
	Crouse Cr	50	5 B
	Waddell Cr	30	2 B
	N. Taurus L	5	1 B
	Taurus L	85	6 B
	Boomerang Cr	160	14 B
	Motherlode Cr	10	1 D
	Henderson Cr	2	1 B
	Windfall Cr	11	1 D
	Fiva Cr	231	20 B
	Beaverdell, north	20	2 B
	Kettle R, below Fiva Cr	15	2 B
	Nicholson Cr	35	3 B
	Rock Cr	10	1 B
	East Cr	5	1 B
	Little Goat Cr	90	6 B
	Chenier Cr	40	2 B
	King Solomon Mountain	450	56 B
	West Kettle R, near above	20	1 B
Dale Cr	20	2 B	
Ferroux Cr	10	1 A	
Mt. Ferroux	100	12 B	
China Cr.	10	1 B	

(Cont'd)

Table 1 (Cont'd)

Pine species	Location	No. of trees	Area ha
	Wallace L	10	1 B
	China Butte	15	1 B
	Lower Trapping Cr	25	1 B
	Upper Trapping Cr	30	2 B
	Devil Cr	80	4 K.L.
	Hermon Cr	20	1 K.L.
	Hall Cr	1,295	168 K.L.
	Arlington Lakes-Ptarmigan Cr	2,250	325 B
	Goathide Cr-West Kettle R	3,040	600 B
	Sophia Cr	10	1 K.L.
	Tiger Cr	5	1 K.L.
	Neptune Cr	5	1 K.L.
	Landis Cr	50	4 K.L.
	Tillicum Cr	20	1 K.L.
	Erie Cr	50	4 K.L.
	Chapleau Cr	750	40 A
	Total	9,750	1 375
lodgepole	<u>East Kootenay</u>		
	Flathead R valley, including		
	Akamina-Kishinena Crs	2,000,000	8 000 Cran
	Elk Cr	400,000	1 150 Cran
	White-Kootenay river valleys	1,750,000	7 000 J
	Upper Kootenay-Palliser-Cross Rivers	20,000	800 J
	Findlay-Lavington-Dutch Creeks	3,000	350 J
	Toby Cr-Windermere L	7,000	350 J
	Horsethief Cr-Steamboat Mountain	12,000	600 J
	Parson-McMurdo-Golden	1,000	150 J/S
	Blackwater-Waitabit-Blaeberry	77,000	1 600 B
	Elko-Caven-Ward Crs	500	25 C
	St. Mary R-Alki Cr	200	10 C
	Blue Lake, n. of Elkford	300	15 C
	Total	4,271,000	20 050
	Total lodgepole, Nelson Region	4,280,750	21 425
Western white pine	<u>West Kootenay</u>		
	John Cr	25	2
	Cove Cr	25	2
	Nemo Cr	10	2
	Hoben Cr	10	2
	Sharp Cr	20	2
	Trout L	445	60 A

(Cont'd)

Table 1 (Cont'd)

Pine species	Location	No. of red-tops	Area ha
	Healy Cr	220	24 <i>KL</i>
	Skinner Cr	10	2 <i>R</i>
	Halfway R	25	2 <i>R</i>
	Goldstream R	1,170	100 <i>R</i>
	Downie Cr	1,500	80 <i>R</i>
	Keystone Cr	120	2 <i>R</i>
	Carnes Cr	60	7 <i>R</i>
	La Forme Cr	15	2 <i>A</i>
	Payne Cr	20	2 <i>A</i>
	Whatshan L	10	6 <i>A</i>
	Stevens Cr	20	2 <i>A</i>
	Bergman Cr	25	2 <i>A</i>
	Whatshan R	250	65 <i>A</i>
	Upper Whatshan R	30	4 <i>A</i>
	Cusson Cr	30	2 <i>A</i>
	Plant Cr	30	2 <i>A</i>
	South Fosthall Cr	50	6 <i>A</i>
	Pingston Cr	510	67 <i>A</i>
	Davis Cr	20	2
	Cooper Cr	35	4
	Lardeau R	40	6
	Little Glacier Cr	10	1
	Ranch Cr	60	8
	Wilson L	30	2
	Total	4,825	470
western white pine	<u>East Kootenay</u>		
	McNaughton L-Bush R	230,000	2,000
	Kitchener-Irishman Cr		
	Salmo Creston Highway	300	15
	Total	230,300	2 015
	Total white pine Nelson Region	235,125	2 485
Whitebark and ponderosa pine	<u>West and East Kootenay</u>		
	Flathead R Valley	1,500	75
	Hwy 3, west of Rock Cr	280	15
	Total	1,780	90 ✓
Total, all pine Nelson Region		4,517,655	24 000

Table 2. Condition of lodgepole pine in cruised areas, Nelson Forest Region, September, 1979

Location		^{1/} Current	Red	Partial	Grey	Healthy
<u>West Kootenay</u>						
Ptarmigan -	stems/ha	59	20	33	163	1259
Goathide creeks,	% stems/ha	4	1	2	11	82
	Avg. dbh, cms	20	25	23	25	15
Arlington Lakes	stems/ha	55	62	9	68	143 ^{2/}
	% stems/ha	16	18	3	20	43
	Avg. dbh, cms	33	30	30	28	28
<u>East Kootenay</u>						
Proctor L	Total stems	59	12	0	3	36
(Flathead R)	% total stems	54	11	0	2	33
	Avg. dbh, cms	20	32	0	19	12
Lemon Cr ^{3/}	% total stems	50	30	0	20	-
(Kootenay R)						
Blackwater ^{3/}	% total stems	21	8	0	26	45
Ridge						

^{1/} Current - attacked in 1979
 Red - attacked and killed in 1978
 Partial - only a portion of the bole currently attacked
 Grey - killed prior to 1978, needles fallen.

^{2/} Cruise also recorded: Douglas-fir, 47 stems/ha
 Western larch, 117 stems/ha

^{3/} B.C. Ministry of Forests data

Pine engraver beetle, Ips pini

The incidence of attacks in standing and windthrown lodgepole pine in the East Kootenay has increased since 1977, most noticeably in the Beaverfoot and lower Flathead River valleys, near Toby Creek and near Rock Creek in the White River Valley.

In the West Kootenay, populations remained low, however drought conditions in 1979 and large areas of slash in the Rock Creek-Midway area may contribute to an increase in populations and damage in 1980.

Engraver beetles, Scolytus spp.

The lower branches of mature yellow pine trees in the Creston-Kootenay-Wyndel areas and the lower Kootenay River Valley were attacked by scolytids, resulting in premature foliage discoloration or "flagging".

Red turpentine beetle, Dendroctonus valens

This insect infested 10% of the ponderosa pine trees over a 50 ha area severely scorched by fire, near the old Kimberly Airport. There was no tree mortality by late 1979, however some is possible.

European pine shoot moth, Rhyacionia buoliana

No evidence of shoot moth was found in previously infested Mugho pine trees at either the Hugh Keenleyside Dam viewpoint or the I.C.B.C. Claim Centre at Trail. No adults were collected in pheromone-baited sticky traps located in surrounding pine, however the effectiveness of the pheromone used is now questionable.

Pitch nodule moth, Petrova albicapitana

About 16 ha of lodgepole pine, 3 to 8 metres high, near South Slokan were damaged by this insect. Pitch nodules and flagging occurred on 80% of the trees with up to 50 dead branch tips per tree.

Sequoia pitch moth, Vespa mima sequoiae

All of the young lodgepole pine trees, 3 to 5 metres high, over 20 ha near Edgewood have 1 to 5 pitch masses per tree. These trees have some deformity and possible growth loss.

Gouty pitch midge, Cecidomyia piniinopsis

An average of 10% of the current year's tips of 35% of the immature yellow pine trees in plantations at mile 2, Findlay Creek road, west of Canal Flats, were killed in 1979, a decline from 1978 when 50% of the tips were killed on 90% of the trees in the 12 ha area.

Lodgepole terminal weevil, Pissodes terminalis

This pest is uncommon in regeneration lodgepole pine stands in the East Nelson Region, causing damage at only two known locations: in Forster Creek west of Wilmer, where endemic populations have killed 10% of the terminal shoots in a localized 1 ha area; and approximately 2 km north of Moyie Lake where damage is similar to Forster Creek.

Lodgepole pine needle cast, Lophodermella concolor

Discoloration of pine foliage occurred at several locations in the Nelson Forest Region. In the West Kootenay, the largest area was along Blueberry Creek, 2 km east of Nancy Greene Lake, where 90% of the pine over approximately 500 ha were up to 100% infected. Less severely infected areas were: Boundary Creek, Monashee Highway (Cortiana Creek to Kettle River), and Beaverdell Creek. A hyperparasite, Hendersonia pinicola, which may reduce the discoloration in 1980, was present in all the areas, except Blueberry Creek.

In the East Kootenay, the majority of the lodgepole pine stands in the southern region were severely infected, resulting in premature needle loss of up to 100% of the 1978 needles, most noticeably in immature densely stocked stands. Many of the trees had only 1979 foliage on the lower two-thirds of the crowns.

Red band disease of pine, Scirrhia pini

Lodgepole, western white and ponderosa pines were infected in pockets of 5 to 10 ha from Slocan to Slocan Park, where up to 40% of the foliage was infected on 60% of the trees. This was a decline from the previous two years.

Pine needle blight, Leptomelanconium cinereum

At Zincton, east of New Denver, up to 40% of the foliage of 70% of the lodgepole pine trees in a 40 ha area were infected, resulting in discoloration and premature needle drop. The blight was less evident in the Elko-Grasmere-Newgate area where it was prevalent in previous years. However, discoloration and premature loss of older needles in ponderosa pine stands has been attributed to a combination of blight and drought.

Atropellis canker of pine, Atropellis piniphila

Mixed age lodgepole pine stands on Blackwater Ridge near Donald are up to 90% infected with up to 5 stem cankers on some overmature trees. The disease is also common in other lodgepole pine stands including the Cross River Valley and in Horsethief Creek.

White pine blister rust, Cronartium ribicola

White pine blister rust is epidemic throughout western white pine stands in the Region. In a higher elevation area of approximately 1 000 ha along the McLatchie Creek access road south of Fernie, 99% of the immature white bark pine trees are infected, but tree mortality to date is less than 1%.

Red root and butt rot, Polyporus tomentosus

Infected mature and overmature lodgepole pine trees occurred over approximately 2 ha in the northeast part of Whiteswan Provincial Park resulting in windthrow of approximately 25% of the trees.

Root rot

An unidentified root rot killed trees in pockets in densely stocked lodgepole pine regeneration, approximately 2 metres high, 5 cm dbh, in 6-metre diameter foci in stands near Bingay Creek in the Upper Elk River Valley. Less than 100 trees have been killed. The fungus could not be collected from the old mortality.

DOUGLAS-FIR PESTS

Douglas-fir beetle, Dendroctonus pseudotsugae

Populations remained low in the Nelson Forest Region. Endemic populations persist in single predisposed overmature trees throughout the Region. At Deer Creek, near Castlegar, ten trees infected by Armillaria root rot, Armillaria mellea, were beetle-attacked.

Western spruce budworm, Choristoneura occidentalis

The infestation in Douglas-fir and western larch stands in the lower part of Johnstone Creek and in Johnstone Creek Provincial Park continued for the second year and expanded to 200 ha from 80 ha in 1978. The Douglas-fir was more severely defoliated with 60% of the current growth and 20% of the total foliage destroyed. Beating samples contained large numbers of larvae, 90 to 150 per beating.

Collections of 1 to 7 larvae were common in beating samples in the Beaverdell area, along the West Kettle River to Westbridge, along the Kettle River to Crouse Creek and from Rock Creek to Grand Forks but there was no noticeable defoliation.

There were no diseases or parasites present in larvae examined by the Forest Pest Management Institute in Ontario.

Leaf beetles, Dichelonyx sp.

Leaf feeding beetles declined drastically from 1978 levels in the Kikomun - Elko - Jaffray area, where up to 50% defoliation of single immature Douglas-fir trees occurred in 1978.

Douglas-fir needle midge, Contarinia sp.

Discoloration of Douglas-fir foliage caused by this Douglas-fir needle midge and a woolly aphid, Adelges sp., was common in most areas of the East Kootenay, particularly in the pure stands and Christmas-tree growing areas in the southern region where it has persisted for many years.

Damage varied from a few infested needles on single trees to localized 1 ha areas where up to 30% of the current year's needles were infested.

A bud blight, Dichomera gemmicola

Bud necrosis on Douglas-fir trees, caused by this disease, occurred in several parts of the Region. At Poplar Creek, Argenta, Davis Creek and in the Kaslo River Valley 60-100% of the trees were infected with 5 to 30% bud mortality. Affected trees up to 7 m high were shortened and bushy, due to the annual bud killing.

Multi-leader development of Douglas-fir trees in immature stands in the Wigwam River Valley was probably caused by this blight. It was more damaging in the East Kootenay in 1978, infecting up to 75% of the buds of single trees in several areas.

Rhabdocline needle cast, Rhabdocline pseudotsugae

This needle cast was widespread throughout the host range in the East Kootenay, infecting up to 75% of the needles in groups of trees up to 5 and resulting in premature needle loss. It was particularly severe in lower Quinn Creek in the Upper Bull River drainage, where premature needle loss was greater than 50% over 100 ha.

Conifer-cottonwood rust, Melampsora occidentalis

After the previous two years of widespread, severe infection, only two small 5 ha areas were infected in 1979. At Davis Creek, up to 80% of the current year's growth of 80% of the regeneration Douglas-fir was infected. At Miller Creek, 30% of the current growth was infected on 70% of the trees.

Armillaria root rot, Armillaria mellea

As reported in 1978, root rot causes annual mortality of Douglas-fir in the Nelson Forest Region.

At Little Foster Creek in the Mica Pondage region, this root rot has killed mature Douglas-fir trees, 80-100 years old, resulting in up to 16 snags/ha in foci up to 10 metres in diameter at 100 metre intervals in a stand where Douglas-fir comprises up to 54% of the stand.

Climatic Injury

Douglas-fir trees that exhibited drought damage along highways 3/95 and 93/95 from Yahk to Brisco and in the Windermere-Invermere area as reported in 1978, showed initial signs of recovery in early 1979. However the low levels of precipitation during 1979 will probably result in tree mortality by 1980.

Drought factors are considered to have contributed to the premature needle drop of yellow pine throughout its host range, of immature western larch on steep dry sites and to a lesser extent to Douglas-fir stands, in the East Kootenay.

WESTERN LARCH PESTS

Larch Casebearer, Coleophora laricella

The spring defoliation of western larch occurred again in the southern portion of the Nelson Forest Region at the same intensity as in 1978. Along the fringes of the infestation there were new pockets of 1-20 ha of severely defoliated trees and a spread of moderate defoliation into some valleys. Defoliation was moderate to severe from Kitchener to Creston, Creston to Rykerts and the International Boundary, along the east side of Kootenay Lake from Creston to Kootenay Bay, on the west side of the Kootenay River Valley from the International Boundary to Summit Creek, and along Summit Creek to Blazed Creek. Severe defoliation occurred from Nelway to the Seven Mile dam site in the Pend-d'Oreille River Valley. From Nelway to Salmo and west to Fruitvale the defoliation was light. Between Nelson and Castlegar along the Kootenay River Valley the defoliation was generally moderate with large patches, 50-200 ha, of

severe. On the fringe of the infestation from Christina Lake to Grand Forks, in the Fauquier, Lardeau and Kaslo areas, there were small patches, 5-20 ha, of light and moderate defoliation. Pockets of severe defoliation occurred from Cranbrook to Moyie, between Wardner and Jaffray and south of Cranbrook along Gold Creek. From Fernie to Sparwood, in the Flathead River Valley and from Cranbrook to Canal Flats, the defoliation increased slightly.

Table 3. Western larch defoliation by larch casebearer at five permanent plots, Nelson Forest Region, 1979.

Location	Elevation (m)	Defoliation
Fruitvale (Thrums)	690	moderate-heavy
Salmo	660	light
Rykerts	660	light
East Arrow Creek	720	none
Yahk	840	none

Light: 0-25% discolored
Moderate: 26-50% discolored
Heavy: 51-75% discolored
Severe: 76-100% discolored

Overwintering larval counts were completed at six locations in the Nelson Forest Region, including five permanent sample plots, and three areas in the adjacent Kamloops Forest Region (Table 4) and predicted defoliation in 1980 should be generally light.

Table 4. Overwintering larval populations and predicted defoliation in the Nelson and Kamloops Forest Regions, 1979.

Location	Avg no. larvae per		Predicted ^{1/} defoliation	
	45 cm branch	100 fascicles		
Fruitvale	(permanent)	27	13	light
Salmo	"	182	78	moderate
Rykerts	"	94	38	light
East Arrow Cr	"	6	4	light
Yahk	"	5	4	light
Thrums		29	10	light
Anarchist Mtn (Kamloops F.D.)		121	82	moderate
Shuttleworth Cr	" "	70	28	light
Cherryville	" "	38	24	light

^{1/} Forecasting Larch Casebearer Defoliation in the Northern Region. (W.M. Ciesla, W.E. Bousfield), Progress Report, U.S.D.A. Northern Region #71-33, 1971.

Larch casebearer pupae were collected at several locations in May to determine the presence of parasites (Table 5). The exotic parasites Agathis pumila and Chrysocharis laricinellae have both been released from time to time in the Nelson Forest Region. The following table illustrates the fact that they have not spread throughout the casebearer population.

Table 5. Number of parasites reared from larch casebearer pupae, Nelson Forest Region, 1979

Location and date collected	No. of pupae examined	No. of adults (percent)	
		Agathis pumila	Chrysocharis laricinellae
Fruitvale, May 16/79	200	14(7)	40(20)
Salmo, "	200	0	9(4.5)
East Arrow Creek, "	200	53(26.5)	0
Yahk, "	200	3(1.5)	0
Rykerts, "	200	3(1.5)	0
West Creston May 17/79	200	0	0
Thrums May 18/79	200	0	53(27)
Blewett May 18/79	200	0	0
Pass Creek May 18/79	200	0	38(19)

Larch sawfly, Pristiphora erichsonii

Defoliation of western larch continued for the fourth year in the Elk River Valley over 4 000 ha from Line Creek to Sparwood, Hosmer and Fernie, compared to 4 600 ha in 1978. Defoliation intensity varied but commonly exceeded 75% on trees between Sparwood and Fernie. The outbreaks in 1942-45 and 1964-67 began in the same general areas and moved westward. An assessment of overwintering cocoons (Table 6) indicates a similar pattern for the current infestation.

The parasite release program, initiated in 1978 with the release of Olesicampe benefactor from Manitoba sources, was discontinued in 1979 due to lack of material.

Table 6. Number of overwintering larvae in cocoons per 1 m² duff^{1/}, Elk River Valley, 1979.

Location	1976	1977	1978	1979
Sparwood, Old Hwy.	<2	561	675	452
Sparwood, Water tower ^{2/}	-	-	497	268
Hosmer, Trailer park	-	-	-	336
Elkford Road, Farm area	-	132	505	-
Elkford Road, A.N.G. pipeline	-	39	641	-
Total no. of cocoons	<1	732	2,318	1,056
Avg. no. of cocoons / 1000 cm ² duff ^{3/}	<1	27	58	35

^{1/} 1000 cm² duff sample from each of 10 trees at each of 3 locations; total 30 trees.

^{2/} Parasite release area in 1978.

^{3/} From Forest Insect and Disease Survey records, samples \geq 20 cocoons per 1000 cm² duff can result in some (light) defoliation.

Larch looper, Semiothisa sexmaculata

Since the collapse of the large 1977 infestation in the Arrow-Slocan-Kootenay lakes area in 1978, numbers of larvae have decreased and no defoliation has been recorded.

Larch budmoth, Zeiraphera improbana

Infestations of the budmoth, which covered 1 890 ha in 1978, collapsed in 1979. At Caribou and McDonald creeks, 50% of the larvae were parasitized in 1979.

Larch needle cast, Hypodermella laricis

Discoloration of western larch by this needle blight was widespread throughout the host range in the Nelson Forest Region. Intensity and areas of infection in the West Kootenay were the same as in 1978, discoloring 40 to 70% of the foliage of young growth and mature trees in areas of 2 to 100 ha: along Granby River, Beaverdell Creek,

along the Kettle River from Crouse Creek to Damfino Creek, in the Lemon Creek Valley, Halfway River, Caribou Creek, Conkle Lake, Lardeau area, Koch, Snowball, Sand and Worthington creeks and at Motherlode Creek.

In the East Kootenay, intensity and areas of infection increased, and varied from a few groups of needles on single small trees to 50% of the needles infected over 150 ha areas. Some areas infected were: Blazed Creek, Salmo-Creston Hwy.; up to 50% of the foliage infected in stands over 150 ha; Whiteswan-White-Kootenay rivers drainages; maximum 25% of 40 ha stand moderately infected; Ram-Roam-Sheep creeks; 100% infection of small understory trees in half hectare areas; Teepee-Gold creeks to Newgate; 50% infection of 10% of the stand in 1 ha areas. Where localized small pockets of moderately and severely infected trees have persisted for 3 or 4 years (such as Cabin Creek) bud, tip and occasionally small branch mortality is evident in the lower two-thirds of the trees. Damage was very pronounced in stands also damaged by larch casebearer, such as Toby Creek, Creston PSYU.

Animal Damage

Damage to branches and stems of immature and mature western larch, lodgepole pine and yellow pine trees attributed to squirrels, porcupines and bears has a long recorded history in the Nelson Forest Region and continued in 1979.

Top-kill of 2 to 5 metres of western larch, girdled by rodents, occurred at Syringa, Tulip, St. Annes and Josh Creek in the West Kootenay. Lodgepole pine trees were top-killed by porcupines over 270 ha at Yellow Creek near Edgewood.

Areas of damage to all three tree species were widespread throughout the southern half of the East Kootenay region, notably in the Gold-Teepee-Sunrise-Sundown creeks area; Moyie River Valley-Lamb Creek; Grasmere-Elko; Lizard-Bighorn-Cabin creeks-Flathead River Valley; Upper Kootenay PSYU.

Damage varies with host from minor foliage discoloration to tree mortality and includes:

1. small patches up to 13 cm² of stembark chewed off - lodgepole pine;
2. large patches up to 0.1 m² of stembark chewed off - lodgepole pine;
3. upper terminal growth girdled (dead crown) - western larch;
4. less than 25 mm diameter branches girdled - lodgepole pine; lengths up to 30 cm often adjacent to western gall rust

galls - ponderosa pine;

5. lower 2 m stripped or partially stripped clean of bark - western larch.

Numbers of damaged or killed trees per hectare varies from 1 in intermediate western larch to more than 20 in regeneration lodgepole pine and western larch.

A canker, Phomopsis pseudotsugae, is reported to cause top girdling and subsequent mortality of the upper crowns of sapling and pole-size western larch trees in northern Washington and Idaho, (Plant Disease Reporter Vol. 49 pp 102-105). In British Columbia, the upper crown mortality of western larch has been attributed to rodent feeding and no evidence of a disease has yet been found, however the Phomopsis canker occurs commonly on Douglas-fir in southern British Columbia.

Top-kill of western larch

Top-kill and subsequent multi-leader development of understory regeneration western larch trees was recorded in a 250 ha area in the lower Yahk River Valley, but no causal agent has been identified. Up to 5 trees per hectare in the infested area were affected.

Red ring rot fungus, Fomes pini

Up to 20% of the mature overstory western larch trees in a localized 10 ha area near Toby Creek on the Creston-Salmo highway were infected by, and exhibit conks of this heart rot, one of the most common wood-destroying fungi in B.C. The infected stand was also infected by larch needle blight, Hypodermella laricis, larch dwarf mistletoe, Arceuthobium laricis and larch casebearer, Coleophora laricella.

A canker, Potebniamyces coniferarum

Twenty percent of the small diameter western larch trees in a steep, localized 1 ha area along the Elk River "River road" east of Elko had "target" type cankers. However, most of the cankers had healed and the impact was primarily stem deformation. It is not considered economically important, but it was the first collection of this canker on western larch in British Columbia. The perfect stage of this disease, Phomopsis pseudotsugae, occurs commonly on immature Douglas-fir trees causing terminal die-back.

Brown cubical rot, Fomes officinalis

Sporophores of this fungus were evident on up to 50% of the overmature, overstory western larch trees scattered over a large area in the Lavington-Prairie-Findlay creeks area. A single sporophore on a living tree indicates a culled or unmerchantable tree.

WESTERN HEMLOCK AND WESTERN RED CEDAR PESTS

Winter damage

Winter drying of western hemlock, western red cedar, western white pine and Pacific yew was widespread throughout the Interior wet belt stands in the Nelson Forest Region.

The most severe damage occurred in the West Kootenay in the Arrow Park Lake area from Shelter Bay to Revelstoke and north to Mica Creek; in the Salmo area; along Highway 6 on the Monashee from the Kettle River to Galloping Creek; along the Halfway River; from Kaslo to Retallack along the Kaslo River; north of Terrace Creek on the west side of the Granby River Valley; Sandra Creek, and from Ymir to Nelson.

Western hemlock was the most severely damaged, especially the regeneration to 3 m in height. From Shelter Bay to Revelstoke up to 60% of the crowns of damaged trees were killed. However, only the upper third of cedar trees was discolored with very little branch or top dieback. Similarly, white pine trees showed only some discolored foliage in the middle crown. Only the trees infected with white pine blister rust stem cankers had any twig or branch mortality, and these were also infested with pine engraver beetles, Ips spp.

In the East Kootenay the foliage discoloration of immature exposed cedar, hemlock and yew was widespread from Creston to Yahk; Elko to Sparwood and Spillimacheen to Bush Arm on the Mica Pondage. The impact on the affected conifers was generally minimal, however some young hemlock trees in exposed sites suffered substantial needle loss and terminal dieback. Exposed immature cedar trees had some tip and lower branch mortality; intermediate and mature trees were rarely damaged. Some roadside regeneration lodgepole, western white and ponderosa pine were discolored, however there was no damage to Douglas-fir, Engelmann spruce, alpine fir or deciduous trees.

Western false hemlock looper, Nepytia freemani

In the West Kootenay in 1979, 25% of the beating samples from western hemlock and Douglas-fir contained an average 2.6 larvae, more than in 1978, which could indicate an increase in the numbers of larvae for 1980.

In the East Kootenay larval populations remain low, at less than one larvae per positive collection from Douglas-fir.

Western hemlock looper, Lambdina f. lugubrosa

In 1979 in the West Kootenay, 15% of the beating samples from hemlock and Douglas-fir contained hemlock looper larvae, averaging 1.7 larvae per beating, more than 1978. This looper has been a serious defoliator of western hemlock and Douglas-fir in wet belt stands in the Nelson Forest Region.

In the East Kootenay region numbers of larvae remained at low endemic levels.

Weevil damage

Flagging of western red cedar branches caused by a species of weevil feeding on the bark and inner wood of small branches occurred over approximately 150 ha of a pure cedar stand between 760 and 1000 m elevation near the top end of Plant Creek, west of Nakusp. This same type of damage occurred in 1976 near Bigmouth Creek along the Columbia River. An attempt will be made in 1980 to identify the species of weevil causing this damage.

Red ring rot, Fomes pini

Overmature western hemlock, alpine fir and Engelmann spruce trees in most higher elevation stands in the East Kootenay are commonly infected by red ring heart rot. Up to 50% infection is common in "leave" blocks along creeks and rivers, where usually more than one external sporophore is common on infected host trees.

ENGELMANN SPRUCE PESTS

Two-year-cycle spruce budworm, Choristoneura biennis

Damage to 1979 foliage of Engelmann spruce and alpine fir stands by the two-year-cycle spruce budworm occurred in eleven areas in the East Kootenay; seven previously recorded, two recorded for the first time in 1979, and two suspected but not confirmed, table 7. Defoliation intensity varies from less than 10% to more than 75% defoliation of the 1979 foliage of mature and immature trees, and has resulted in top-stripping and bud mortality of understory trees in the North White River Valley.

Table 7. Defoliation and area of stands defoliated by the two-year-cycle spruce budworm, Choristoneura biennis, Nelson Forest Region, 1979.

Location	Area (ha) (approx.)	Defoliation intensity	First reported	Remarks
Blaeberry R	500	<50%	1979	"On-year" ^{3/}
Glenogle Cr	400	<10%	1977	"Off year"
McMurdo Cr	1 000	<50%	1975	"Off year"
Bugaboo Cr	120	<10%	1978	"Off year"
St. Marys R	750	<50%	1978	"Off year"
Lapointe Cr	500	<50%	1978	"Off year"
Sanca Cr	250	<10%	1979	"Off year"
North Fork White R	2 500	>75%	1968 ^{1/}	"On year form"
East White R	1 000	<50%	1977	"On year form"
Mid Fork White R	-	-	1978]	suspected, not ^{2/}
Thunderbird Cr	-	-	1978]	confirmed

^{1/} The North Fork infestation was first reported in 1968 and persisted until its collapse in 1974, which was attributed to an Entomopox virus, isolated from the larval population in the area. The population reoccurred in 1977 and damage occurred in 1978 and 1979.

^{2/} The defoliation in the Mid-Fork White River and Thunderbird Creek was suspected but not confirmed in 1979 as neither area was accessible by ground and defoliation was not visible from the air. However defoliation was recorded by ground observation in both areas in 1978 and was suspected to have persisted in 1979.

^{3/} The larval population of the "On year" form of the two-year-cycle spruce budworm matures every second year in even or "on" year, i.e. 1976, 1978 and 1980.

The "off year" form appears to mature every second year in "off" or odd years i.e. 1977, 1979. However damage to buds and new shoots by early instar larvae of both forms has been evident in the years of early instars.

Spruce beetle, Dendroctonus rufipennis

Infestations at Campbell Creek, west of Beaverdell and at the junction of Trap Creek and the Upper Kettle River, first located in 1978, showed little evidence of beetle activity in 1979. At Campbell Creek no currently attacked standing trees were recorded and the 1978 attacked trees were severely woodpeckered with only small numbers of surviving beetle progeny.

Trap trees and selective logging will be used as control methods before the beetle flight period in spring 1980.

Localized endemic beetle populations persist in small areas of windthrow, usually less than 2 ha, in higher elevation spruce-alpine fir stands at McLatchie Creek, south of Fernie and along the Albert River. There is no evidence of attacks in standing trees, however as road construction increases annually into the higher elevation stands, windthrow and beetle hazard potential increase.

Spruce weevil, Pissodes strobi

Damage to Engelmann spruce terminals occurs in immature regeneration spruce stands in many parts of the Nelson Forest Region, including an area along the Salmo River from Hall to Ymir where 30% of the 3 to 9 m high Engelmann spruce trees were damaged. In the Yahk and Moyie river drainages damage is common but affects less than 10% of the terminals in any area.

Yellowheaded spruce sawfly, Pikonema alaskensis

For the second consecutive year, a 40 ha Engelmann spruce - Douglas-fir plantation at Kuskanax Creek near Nakusp Hot Springs was infested by spruce sawflies. The spruce trees 1.5 to 3 m high had 30% of the current growth defoliated down from 60% in 1978.

Spruce needle rust, Chrysomyxa weirii

This rust was again common in Engelmann spruce stands, usually infecting less than 25% of the 1978 needles on less than 20% of the trees in small localized areas probably with minimal impact on growth.

ALPINE FIR PESTS

Western balsam bark beetle, Dryocoetes-ceratocystis complex

Alpine fir trees killed by Dryocoetes confusus in association with Ceratocystis dryocoetidis occur annually throughout the host range in

the Nelson Forest Region; table 8 shows the location and number of trees killed.

Table 8. Alpine fir killed by western balsam bark beetle, Dryocoetes confusus, Nelson Forest Region, 1979.

Location	No. of trees
<u>West Kootenay</u>	
St. Anne Creek	500
Granby River, north of Cane Creek	100
Granby River, top end	700
Goatskin Creek	50
Big White Mountain	150
Pingston Creek	300
Bannock Burn Creek	200
Greasybill Creek	500
Sandy Creek	200
Lasca Creek	200
<u>East Kootenay</u>	
Spillimacheen River Valley	200

Indian paint fungus, Echinodontium tinctorium

Overmature alpine fir and western hemlock stands in the East Kootenay are commonly infected with this brown stringy heart rot. In Kamma Creek in the Goat River drainage at least 50% of the western hemlock in the higher elevation stands have conks. The heart rot is also prevalent in adjacent Kid Creek and Spruce Tree Creek in the Yahk River Valley.

DECIDUOUS TREE PESTS

Western tent caterpillar, Malacosoma c. pluviale

Tent caterpillar colonies which defoliated deciduous trees, rose and sage in the Elko-Kikomun-Grasmere region decreased from thousands during 1975 to 1978 to isolated groups of 4 to 5 larvae.

Fall webworm, Hyphantria cunea

A variety of shrubs and trees, including chokecherry and apple trees, were lightly defoliated by this webworm for the third consecutive year in the Nelson Forest Region in the following areas: from Nelson to Castlegar, in the Grand Forks area, and from Wynndel near Creston to Radium Hot Springs. Impact to hosts is minimal but highly visible.

Satin moth, Stilpnotia salicis

The infestation which occurred in 1978 on poplar stands at Red Mountain near Rossland declined in 1979. Defoliation was severe over 200 ha in Topping Creek and 100 ha in Hanna Creek, adjacent to the 1978 infested where it collapsed.

Birch skeletonizer, Bucculatrix canadensis

Discoloration of white birch was widespread in the Nelson Forest Region for the third consecutive year. However it was less severe than in 1978 in the West Kootenay where damage in 1979 occurred along the Kaslo River from 13 km west of Kaslo to Kaslo and north to 13 km north of Gerrard.

In the East Kootenay, birch trees were discolored throughout the host range north of Radium to Revelstoke including the Kickinghorse River Valley and the National Parks, for the fifth year in some areas.

Woolly aphids, Eriosoma spp.

All the elm trees examined in Nelson, Castlegar, Trail and Kaslo were infested by this aphid which resulted in curling of 30% to 60% of the foliage.

Aspen leaf miner, Phyllocnistis populiella

Trembling aspen and black cottonwood stands in the Illecillewaet River Valley, west of Albert Canyon to Revelstoke, were moderately to severely discolored by the leaf miner which caused similar damage in the area in 1978.

Apple and thorn skeletonizer, Anthophila pariana

Foliage on apple trees from South Slovan to Castlegar was rolled and discolored from 65 to 100% and in the Wynndel-Creston Valley area, trees were discolored up to 100% for the second year.

Leaf and twig blight of poplar, Venturia macularis

Trembling aspen stands along the east side of the Columbia River Valley from Revelstoke to Mars Creek were severely infected and discolored by this twig blight which causes branch dieback. The most severe defoliation occurred in a 200 ha area near Mars Creek.

Infection of aspen stands in the East Kootenay, where the disease was widespread in 1978, was limited to a 1 ha area near Cranbrook Airport.

DWARF MISTLETOES ON CONIFERS

Dwarf mistletoes, Arceuthobium spp.

Distribution of dwarf mistletoe infected stands in the Nelson Forest Region was widespread. Control sanitation programs have been implemented by the B.C. Ministry of Forests and forest industry, particularly in mountain pine beetle salvage operations and juvenile spacing program areas. In the Upper Kootenay PSYU approximately 700 ha of lodgepole pine dwarf mistletoe infected stands were treated in 1978 and approximately 1 450 ha were scheduled for treatment in 1979.

A 30 ha area of severely infected Douglas-fir was recorded for the first time near the top end of Morrissey Creek, near Grand Forks. This infected stand fills a gap in the distribution of the disease between Kootenay Lake and the Okanagan.

Mortality of western larch severely infected by larch dwarf mistletoe is not uncommon and was recorded in a severely infected stand between 760 and 1 100 m elevation on Meadow Mountain above Lardeau.

Noteworthy examples of dwarf mistletoe stands recorded in 1979 include:

<u>A. laricis</u>	western larch	Corn Creek, Creston Goat River South side St. Marys River, west of Wycliffe	50% infection of all age classes infected. Overstory residuals scattered. 75% infection of mature overstory trees.
-------------------	---------------	---	--

<u>A. douglasii</u>	Douglas-fir	Wynndel-Crawford Bay	High incidence of brooms.
---------------------	-------------	----------------------	---------------------------

<u>A. americanum</u>	lodgepole pine	Kootenay River Crossing Bingay Creek-Upper Elk River	50% infection all age classes. Less than 25% infection in dense, immature stands.
	ponderosa pine	Near Norbury Lake Park	10% infection of understory trees from infected overstory lodgepole pine in 2 ha area.

BAITED STICKY TRAPS

The trapping program continued in the Nelson Forest Region in 1979 to monitor the adult population of potentially damaging, commercial and urban forest pests which were:

Blackheaded budworm	-	<u>Acleris gloverana</u>
Spruce budworm	-	<u>Choristoneura</u> spp.
Douglas-fir tussock moth	-	<u>Orygia pseudotsugae</u>
Gypsy moth	-	<u>Porthetria dispar</u>
European pine shoot moth	-	<u>Rhyacionia buoliana</u>
Dutch elm disease vector	-	<u>Scolytus multistriatus</u>

This is the first year that attractants were used to monitor the Dutch Elm disease vector in the Nelson Forest Region however no beetles were caught.

Summary of pheromone trap program
Nelson Forest District - 1979

Target Insect	Location	Pheromone	No. of traps	Total Adults Trapped	
				Moths	Beetles
<u>Acleris gloverana</u>	St. Cyr Creek	100% trans-11-tetradecenal	10	26	
	Blaeberry River		5	0	
	Quartz Creek		5	0	
	Tangier River		5	0	
<u>Choristoneura</u> spp	Silverton Creek	Trans-cis-11 tetradecenal		(3 conc. by wt.)	
	"	0.05	5	280	
	"	0.5	5	451	
	"	5.0	5	479	
	Radium		5	98	
	Premier Lake		10	435	
	Dutch Creek		10	404	
	Whiteswan Lake		5	185	
	White R-E. Fork		5	240	
	McMurdo Creek	(See appendix)			
<u>Orygia</u> spp.	Cascade	Cis-6-heneicosen-11-one		(3 conc. by wt.)	
	"	^{1/} 0.001	5	13	
	"	0.01	5	48	
	"	0.10	5	75	
	Nelson		5	46	
	Duncan Lake		5	50	
	Castlegar		5	2	
	Galena Bay		5	55	
	Nakusp		5	24	
	New Denver		5	14	
	Kaslo		5	62	
	Cranbrook		5	0	
	Elko		5	128	
	Canal Flats		5	0	
	Brisco		5	0	
Golden		5	22		
^{2/} <u>Porthetria dispar</u>	Rossland	cis-7,8-epoxy	2	0	
	Trail	-2-methylocta	2	0	
	Balfour	decane	1	0	
	Kokanee Park		2	0	
	Nelson		2	0	

(Cont'd)

Target Insect	Location	Pheromone	No. of traps	Total Adults Trapped	
				Moths	Beetles
<u>Rhyacionia</u> <u>buoliana</u>	Hugh Keenlyside	Trans-9-dodicenyl			
	Dam		15	0	
	Creston	"	5	0	
	Cranbrook		2	0	
<u>Scolytus</u> <u>multistriatus</u>	Castlegar	Multilure	2		0
	Nelson	"	4		0
	Kaslo	"	2		0
	Trail	"	2 *		0

1/ The results of the tests of three different concentrations of pheromones will be supplied by Shepherd and Gray.

2/ Gypsy moth traps in East Kootenay region were set out by Plant Quarantine Branch, Penticton; all 40 were negative, as were 73 in the West Kootenay and 18 in the Boundary region of the Nelson Forest Region.