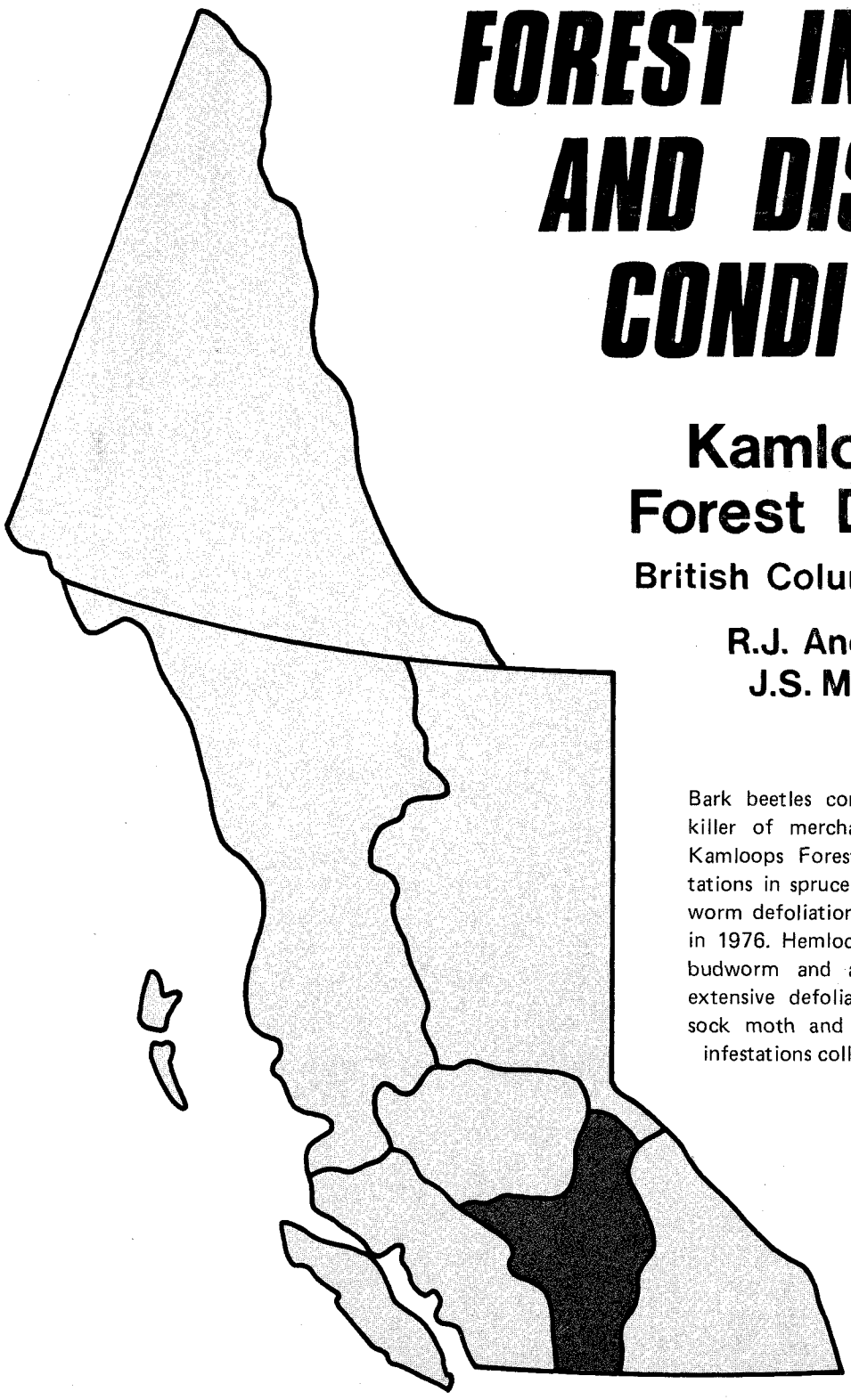


FOREST INSECT AND DISEASE CONDITIONS

Kamloops Forest District

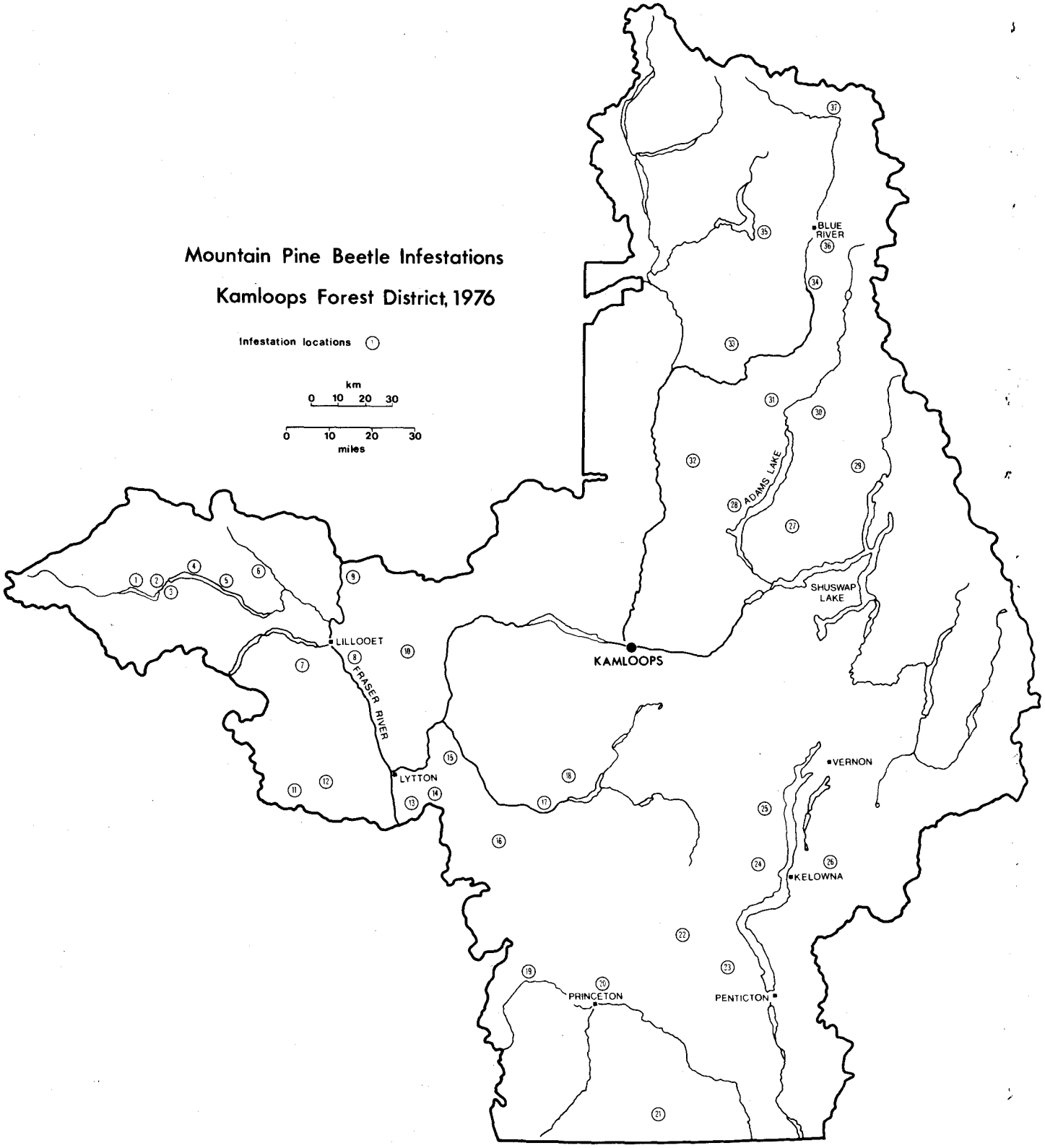
British Columbia, 1976

R.J. Andrews
J.S. Monts

Bark beetles continued as the biggest killer of merchantable timber in the Kamloops Forest District, with infestations in spruce and pine. Spruce budworm defoliation was more widespread in 1976. Hemlock looper, blackheaded budworm and a pine sawfly caused extensive defoliation of conifers. Tussock moth and false hemlock looper infestations collapsed.

Fisheries and Environment Canada Pêches et Environnement Canada

Canadian Forestry Service


Mountain Pine Beetle Infestations
Kamloops Forest District, 1976
Infestation locations (1)
km
0 10 20 30
0 10 20 30
miles
BLUE RIVER
ADAMS LAKE
SHUSWAP LAKE
KAMLOOPS
LILLOOET
FRASER RIVER
LYTTON
VERNON
KELOWNA
PRINCETON
PENTICTON

ha (39,000 acres), more than doubling the areas of damage in 1975 (Map 1 and Table 1).

white pine was affected in 1976. Numerous small infestations were along tributaries of the Fraser River

Table 1. Locations and acreage of trees killed by mountain pine beetle, Kamloops Forest District, 1976

Infestation no.	Tree species	Locality	Estimated acreage
1	lodgepole pine	Downton L	220 (89 ha)
2		Gun L	3,280 (1 328 ha)
3		Cadwallader Cr	880 (356 ha)
4		Tyaughton L	190 (77 ha)
6		Yalakom R	840 (340 ha)
7		Cayoosh Cr	1,840 (745 ha)
8		Cinquefoil Cr	160 (65 ha)
12		Stein R	400 (162 ha)
14		Nicoamen Cr	680 (275 ha)
15		Skeikut Cr	15 (6 ha)
18		Clapperton Cr	5 (2 ha)
21		Ashnola R	600 (243 ha)
22		Osprey L	25 (10 ha)
23		Trout Cr	9,500 (3 847 ha)
24		Lambly Cr	2,440 (988 ha)
25		TFL No. 9 & CP's 2-9	4,700 (1 903 ha)
26		Mission Cr	4,782 (1 936 ha)
Total			30,557 (12 375 ha)
2	ponderosa pine	Gun L	950 (384 ha)
4		Tyaughton L	840 (340 ha)
5		Marshall Cr	520 (210 ha)
9		Pavilion Mtn	120 (48 ha)
10		Upper Hat Cr	520 (210 ha)
17		Merritt	30 (12 ha)
19		Tulameen	60 (24 ha)
20		Princeton	10 (4 ha)
16		Spius Cr	50 (20 ha)
15		Skeikut Cr	15 (6 ha)
Total			3,115 (1 261 ha)

Table 1 - cont'd

Infestation no.	Tree species	Locality	Estimated acreage
7	western white pine	Cayoosh Cr	30 (12 ha)
11		Upper Stein R	100 (40 ha)
13		Siska	360 (145 ha)
14		Nicoamen Cr	80 (32 ha)
16		Spius Cr	10 (4 ha)
27		Scotch Cr	250 (101 ha)
28		Adams L	1,190 (482 ha)
29		Humamilt L.	120 (48 ha)
30		Gannet L	625 (253 ha)
31		Burton Cr	460 (186 ha)
32		N. Barriere L	440 (178 ha)
33		Raft R	280 (113 ha)
34		Cottonwood Flats	160 (64 ha)
35		Murtle L	15 (6 ha)
36		Blue R	1,240 (502 ha)
37		Upper Thompson R	560 (226 ha)
Total			5,920 (2 397 ha)
Grand total	All species		39,592 (16 034 ha)

near Lytton and Lillooet. Infestations persisted in the chronic areas of the North Thompson River, Adams and Shuswap lakes.

Increased incidence of scattered infested ponderosa pine was general throughout the host range in 1976, with heavy infestation of overmature pine near Carpenter Lake. Western pine beetle, Dendroctonus brevicomis, sometimes in association with mountain pine beetle, was denser in this area than for many years.

The intensity of attack and brood density in all tree species examined indicate a continuing population in 1977.

Near Lillooet, light to heavy infestations of **SPRUCE BEETLE,** Dendroctonus rufipennis, were found at Camoo, Van Horlick and Casper creeks, tributaries of Bridge River and Cayoosh Creek. Infestations occurred in "leave" blocks and along perimeters of logged areas. Windfall and slash were abundant in each area and likely contributed to the population buildup. Cruising and brood assessments in the infested stand revealed a heavy population of larvae and young adults which probably will result in a large attack in 1977. As logging before beetle flight was not feasible, a comprehensive trap tree program was instigated. The trap trees should absorb the predicted heavy beetle attack and subsequent disposal should do much to reduce attack on susceptible standing spruce.

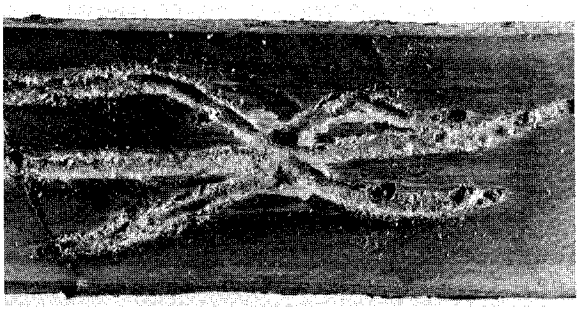
Near the headwaters of Chu Chua Creek, 101 ha (250 acres), which were infested in 1975 and since logged, still showed infested trees in 1976 along logging boundaries. Continuous logging is required to eradicate these infested stems.

Along Lempriere Creek drainage, where heavy

defoliation by 2-year-cycle spruce budworm occurred in 1974 and 1976, scattered dead and partially infested trees were examined. Beetle populations were light, but some tree mortality had occurred from repeated attacks over the past 4 years. Light attack was also found along Hydraulic Creek, east of Kelowna. The infestation was small and infested stems were scheduled for removal.

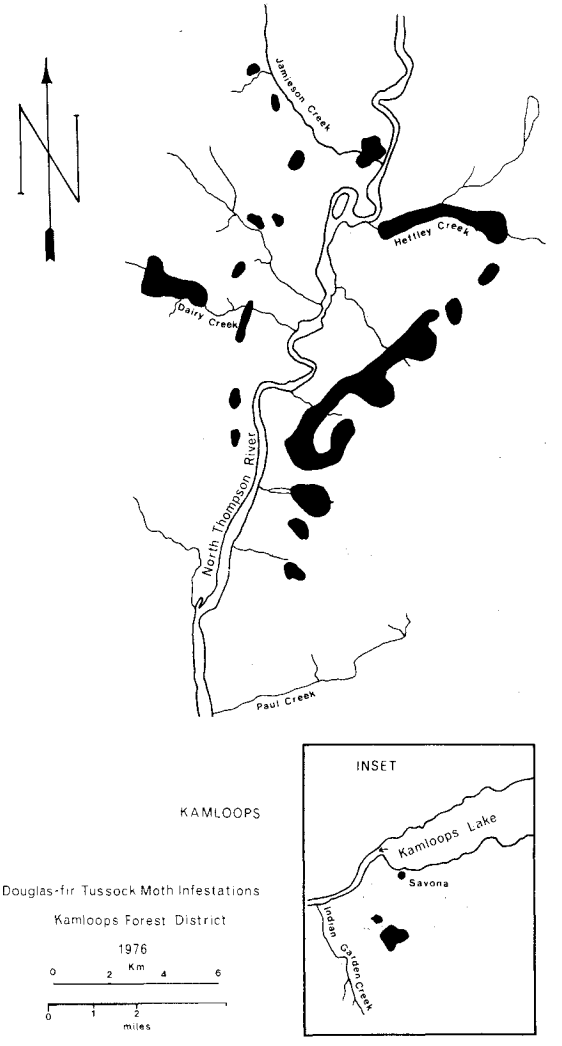
Douglas-fir tree mortality caused by **DOUGLAS-FIR BEETLE,** Dendroctonus pseudotsugae, was light throughout the type range in the District in 1976. However, indications of Douglas-fir beetle attack in stands defoliated by Douglas-fir tussock moth were investigated. Mortality attributed to defoliation by the tussock moth in 1974 and 1975 ranged from 3 to 34%, but 1975 attacks by Douglas-fir beetle on severely defoliated trees killed an additional 9 to 19% of the trees in two stands. Attack by bark beetles in 1976 was evident in seven of the eight areas, increasing expected mortality by 6 to 24%.

THE WESTERN BALSAM BARK BEETLE, in association with a disease complex, Dryocoetes-Ceratocystis, damaged alpine fir from Jamieson Creek north to Mann Creek, approximately 1 053 ha (2,600 acres). North of Sicamous, beetle-damaged alpine fir trees were seen on each side of the valley. South of Yard Creek there were 729 ha (1,800 acres) of attacked trees and on the western side near Legerwood Creek, 275 ha (680 acres). Other areas of scattered attack were between Klo Creek and McCulloch Lake, east of Kelowna, and near Bouleau Lake, west of Vernon.



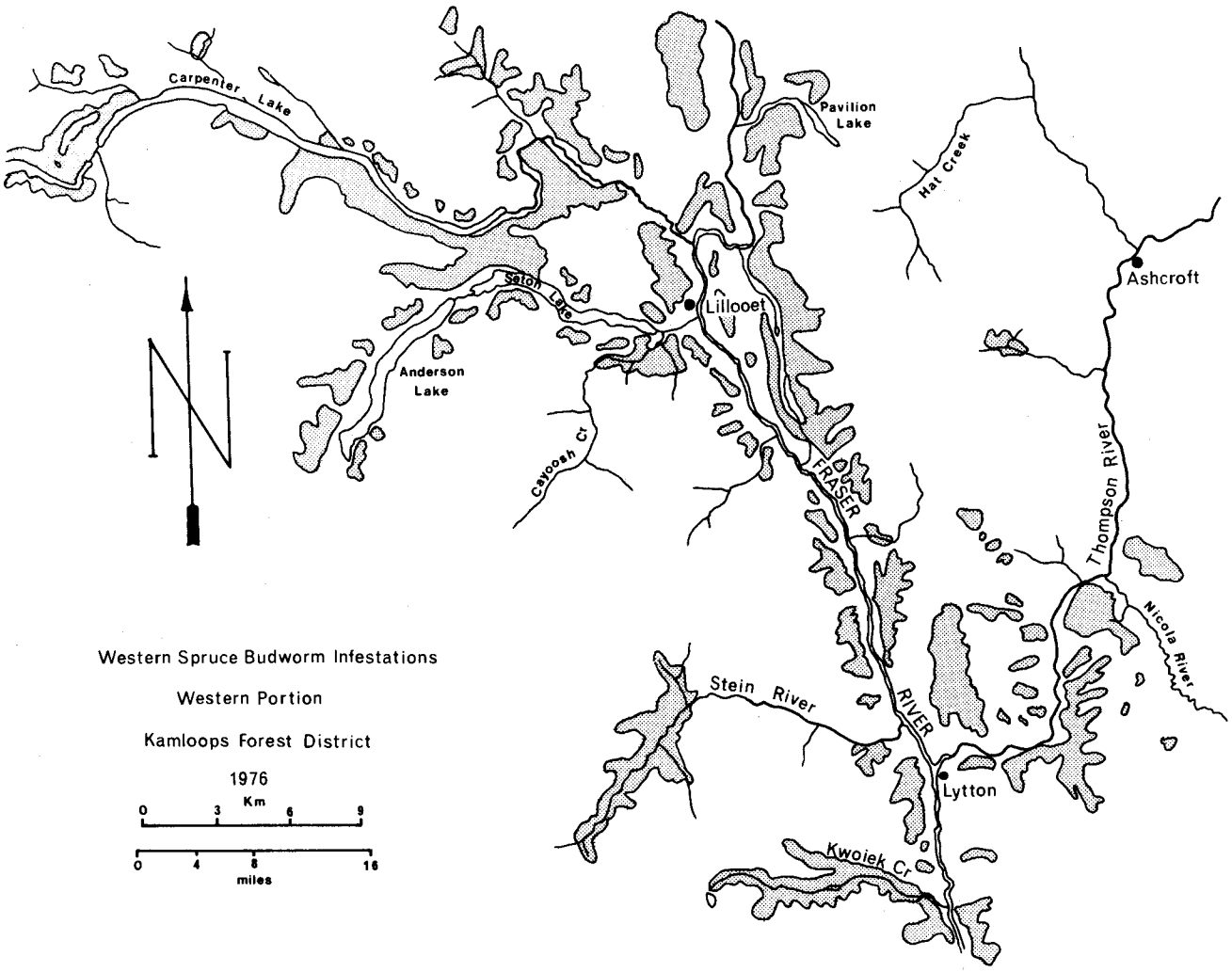
Balsam bark beetle galleries in bark of alpine fir

More than 12 150 ha (30,000 acres) of Douglas-fir were sprayed in 1976 for control of **DOUGLAS-FIR TUSSOCK MOTH,** Orgyia pseudotsugata. However, severe defoliation did occur on 1 782 ha (4,400 acres) beyond the sprayed boundaries or in "leave" blocks.



Defoliated areas in 1976 were along the North Thompson River from above Westside to Dairy Creek, on the Kamloops Indian Reserve, and north along the ridges to Strawberry Hill and Heffley Creek, and along Palmer Forsythe Road. Large patches of trees near Indian Garden Ranch south of Savona were also stripped.

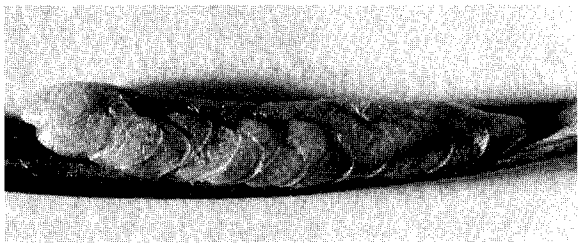
A virus disease in these populations during the latter stages of larval development reduced the number of adults significantly. The results of an egg survey in heavily defoliated areas disclosed a complete collapse of the infestation.



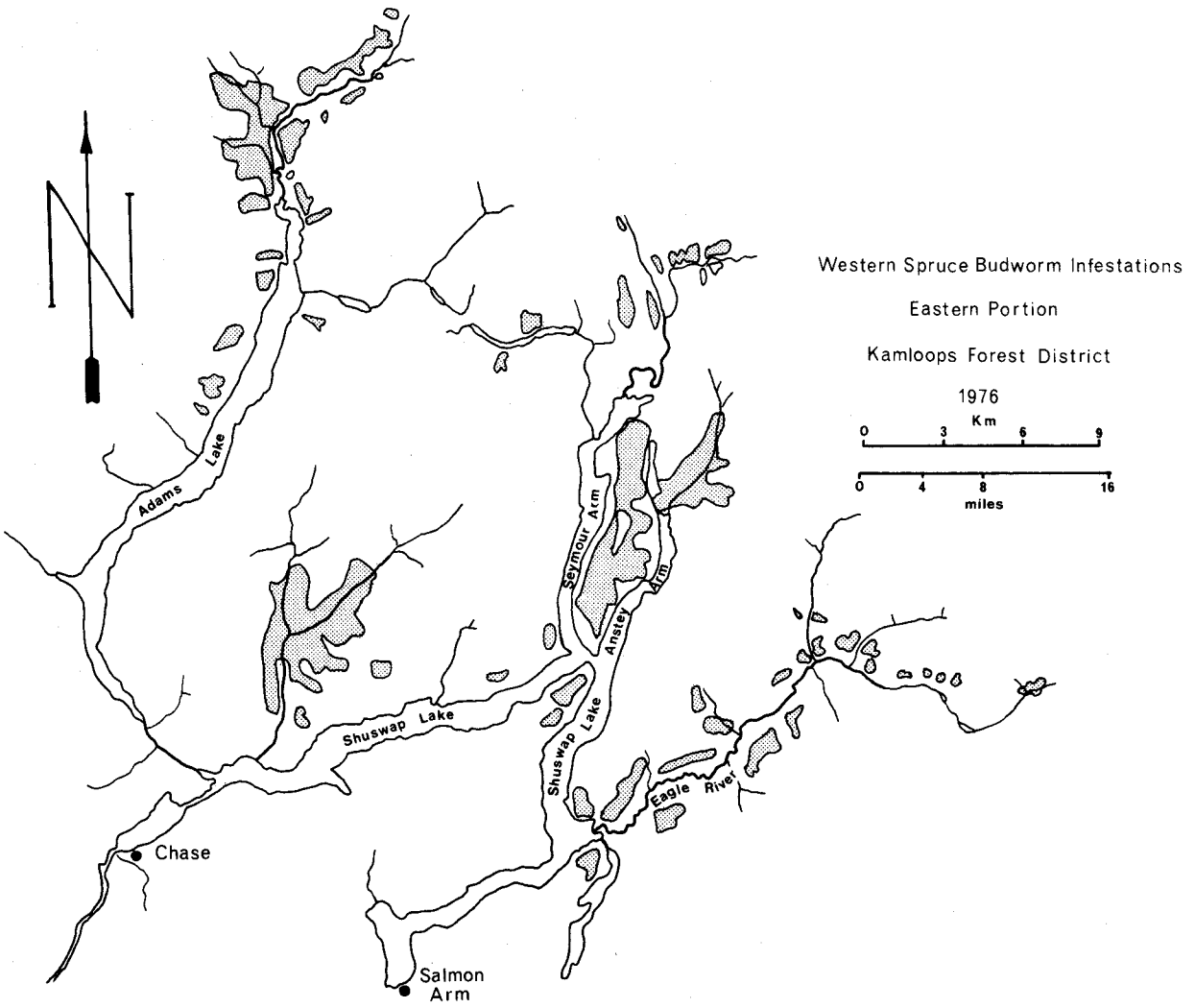
Infestations of **WESTERN SPRUCE BUDWORM,** Choristoneura occidentalis, continued in the western portion of the District and in the Adams Lake area. New infestations were located in the Upper Shuswap Lake, Scotch Creek, Sicamous - Seymour River areas in the north and in the Ashcroft and Nicola River areas of the southwest.

Aerial surveys in August revealed 42 930 ha (106,000 acres) of Douglas-fir defoliation in the southwestern portion of the District, 40 500 ha (100,000 acres) in the Clinton - Ashcroft- Big Bar area, 17 010 ha (42,000 acres) around Adams Lake and 20 655 ha (51,000 acres) in the Shuswap Lake - Sicamous area.

Severe defoliation, causing from 2 to 12 feet of top-stripping, occurred at Mission Pass, Whitecap and Kwoiek creeks in the Fraser River area and at Scotch Creek, along Anstey Arm and near Mara Lake in the Shuswap drainage. Moderate defoliation was prevalent in the Anderson, Seton, Carpenter, Gun and Downton lakes area, along Cayoosh Creek and tributaries of the Fraser River from Pavilion to Lytton, near Sicamous, along Seymour River, north of Shuswap Lake and along Adams Lake and



Spruce budworm egg mass



River.

Larval feeding, from 2,000 to 3,000 feet elevation, was completed by the end of July but at higher elevations continued into early August. No disease symptoms were detected in the larval populations.

Appraisal plots, established in 1973 at Kwoiek Creek and Mission Pass, to study the effects of defoliation, were examined in August. At Mission Pass, where trees have sustained foliage loss of varying degrees for 9 consecutive years, 44% of the Douglas-fir examined showed top-stripping, some with as much as 40 feet of bare top. Four of the plot trees had been blown down and were heavily infested by Douglas-fir beetle. Damage was more severe at Kwoiek Creek where, after 5 successive years of severe defoliation, 88% of the trees showed similar top-stripping. Three trees in this plot had been killed by Douglas-fir beetle.

The possibility of trees weakened by successive years of budworm defoliation, and thus more susceptible to Douglas-fir beetle attack, was investigated by running cruise strips through three damaged stands. At Kwoiek Creek, only one tree in the severely defoliated area cruised had current bark beetle attack and none were observed at Seton Portage or Mission Pass.

Assessment of egg populations and flight trap information indicate an expanded area of defoliation in 1977 and increased populations in areas defoliated in 1976. Assuming conditions are conducive to larval development, an even greater degree of defoliation may be expected in 1977.

A **2-YEAR-CYCLE SPRUCE BUDWORM,** Choristoneura biennis, infestation at Lempriere Creek caused heavy defoliation over 7 978 ha (19,700 acres) of Engelmann spruce and, to a lesser extent, alpine fir. Top-stripping occurred on both overmature and pole-sized trees.

Light to moderate defoliation was reported in this area during 1974, although most of the damage was on alpine fir.

Egg sampling in 1976 indicated a continuing heavy population; therefore, moderate to heavy defoliation may be expected in 1978, the year that most of the 2-year-cycle larvae mature and develop to the adult stage.

BLACKHEADED BUDWORM, Acleris gloverana, defoliated 6 400 ha (16,000 acres) of western hemlock in three areas near Blue River. Approximately 30% of the foliage in overmature stands had been consumed by August, when damage was noted during aerial surveys.

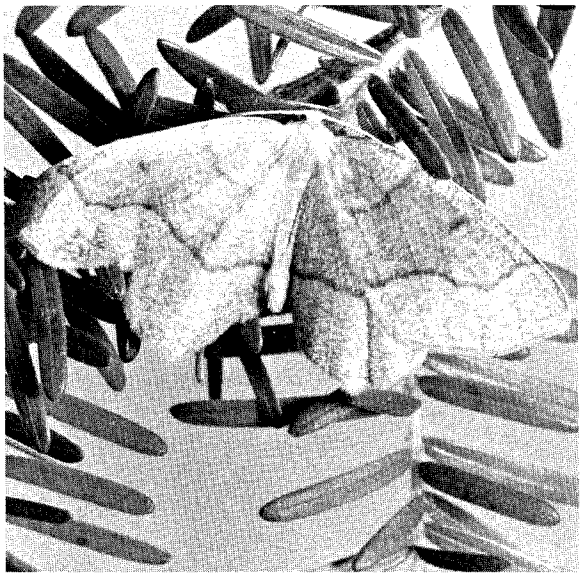
Egg samples collected in late September and examined at the Pacific Forest Research Centre predict heavy defoliation for these stands in 1977.

WESTERN HEMLOCK LOOPER, Lambdina f. lugubrosa, caused heavy defoliation in western hemlock stands near Clearwater River south of Donald Creek, and from the end of Clearwater Lake to Azure Lake. The extent of the infestation was about 10 500 ha (26,000 acres). Through cooperation with the B.C. Forest Service, the area was visited in early September by helicopter, and ground observations were made at three locations within the infestations. Numerous western hemlock looper moths were in flight. No eggs were seen, but pupae were numerous on the stems. Many standing western hemlock, Engelmann spruce and western red cedar trees were examined at the lower bole and 10 to 20 pupae per square foot were found in bark crevices. Two felled western hemlock stems at mid crown contained 25 to 40 pupae per square foot in bark crevices.

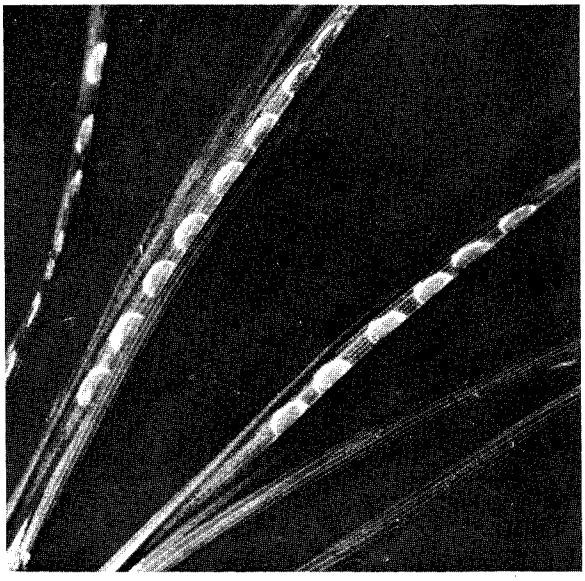
The infestations along Clearwater Lake were more active than the one south of Donald Creek. The area south of Donald Creek had been infested for 2 or perhaps 3 years and considerable tree mortality had resulted on 1 200 ha (3,000 acres). Defoliation ranged from 50 to 80% on most trees, but the number of pupae in bark crevices was much lighter in this area.

The high incidence of pupae indicated a continuing heavy looper population in 1977 along Clearwater Lake and further mortality of western hemlock in the area south of Donald Creek.

A **LODGEPOLE PINE SAWFLY,** Neodiprion sp., severely defoliated old-growth foliage of lodgepole pine stands along the North Thompson River from Vavenby to Cottonwood Flats. The infestation covered 14 175 ha (35,000 acres) from the valley



Hemlock looper adult



Pine sawfly egg niches

bottom to 3,000 feet elevation.

In September, sampling disclosed a heavy egg population and that a large sawfly population will prevail into 1977. However, in past infestations of this pest, defoliation occurred for 2 years and then collapsed, in part from infection by virus and parasitism. It is expected that moderate to heavy defoliation may occur in 1977; but, by the year's end, a marked decrease in population should occur. Host damage should be restricted to a growth loss.

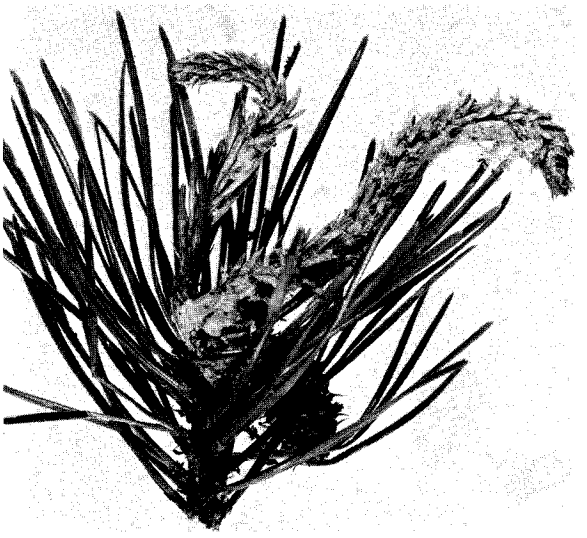
THE RUSTY TUSSOCK MOTH, Orgyia antiqua badia, defoliated lodgepole pine in 1975, but by September of 1976, populations had completely collapsed. The infestations were in the Monte Hills - Douglas Plateau area near Dardanelles and Todd lakes. Area of damage in 1975 was estimated to cover 2 400 to 3 200 ha (6,000 to 8,000 acres), of which 400 ha (1,000 acres) sustained light to moderate defoliation. Egg mass samples collected in May, 1976 and sent to Insect Pathology Research Institute indicated a high incidence of virus infection. During 1976, larval populations caused only light damage. The complete absence of egg masses in September indicated a collapse of the population.

EUROPEAN PINE SHOOT MOTH, Rhyacionia buoliana, infested pines were found in Kelowna at the Okanagan Regional College in May, and later in Vernon. A comprehensive survey, involving the Provincial and Federal Departments of Agriculture and the Canadian Forestry Service to determine the incidence in planted pines encompassed Kamloops and all cities of the Okanagan Valley, as well as commercial nurseries outside of town limits.

Forty-nine locations contained infested pines, 41 in Kelowna and 8 in Vernon. During the survey, all infested shoots were clipped and burned. In one instance, several heavily infested trees were cut and burned.

A spray program was organized by the Departments of Agriculture to control known infestations. All institutions, such as Okanagan Regional College and municipal governments, were given responsibility for spraying their own planted stock, while pine on private lots and some plantings on commercial properties were sprayed by B.C. Agricultural personnel. Infested pines were sprayed three times at 2-week intervals.

Traps baited with a sex attractant were set out to further monitor moth populations in Kelowna, Vernon, Westbank, Westwold and Penticton. Eighty traps captured 12 male moths, 11 from Kelowna residential properties and one from Vernon Justice Park.



European pine shoot moth infested pine

Results of the trapping program indicated a need for an extensive survey in 1977. Tentative plans have been prepared by a committee comprised of representatives from the Provincial and Federal Departments of Agriculture, B. C. Forest Service and Canadian Forestry Service.

SCALE INSECTS continued to infest all ages of ponderosa pine trees in the Kelowna, Summerland, Penticton and Okanagan Falls areas. **BLACK PINELEAF SCALE,** Nuculaspis californica, was predominant near East Kelowna and Okanagan Falls, while at Penticton and Summerland, **PINE NEEDLE SCALE** (white), Phenacaspis pinifoliae, was predominant. Some mortality occurred to pole-sized trees near Kelowna and east of Penticton near the Carmi Road.

Light to moderate defoliation of trembling aspen and black cottonwood by the **SATIN MOTH,** Stilpnotia salacis, was observed from Knutsford south to Merritt and south along the Merritt-Princeton Highway for 12 miles. Other areas of spotty, light defoliation of trembling aspen and silver poplar were

observed near Tranquille and along the South Thompson River from Dallas to Monte Creek.

The satiny, white moths were numerous in the Kamloops - Monte Creek area in August. Increased defoliation is expected in 1977.

Moderate defoliation of trembling aspen by **FOREST TENT CATERPILLAR,** Malacosoma disstria, was observed northeast of Haylmore Lake during aerial surveys in August. Area of damage ranged from 120 to 200 ha (300-500 acres).

Low populations of **LARCH CASEBEARER,** Coleophora laricella, resulted in light browning of western larch trees east of Okanagan Falls along Shuttleworth Creek.

A new record of occurrence for the larch casebearer was collected east of Cherryville near Heckman Creek, where three pupae were taken from the lower crown of a 10-inch diameter tree. This extends the known range of the casebearer west of the Monashee Mountains and north of Penticton.

Low to moderate populations of **LARCH BUDMOTH,** Zeiraphera improbana, caused light defoliation of overmature western larch along Shuttleworth Creek, east of Okanagan Falls. Elsewhere populations were low.

Light to moderate browning of black cottonwood caused by an **ALDER FLEA BEETLE,** Altica ambiens, was prevalent in the Salmon Arm - Shuswap Lake area and along Mara Lake.

WESTERN FALSE HEMLOCK LOOPER, Nepytia freemani. The already low population near Kamloops and in the Okanagan Valley continued to decline in 1977.

LODGEPOLE PINE DWARF MISTLETOE, Arceuthobium americanum infection is common throughout the host range in Kamloops Forest District. Volume loss through decreased increment is high and tree mortality has occurred as a result of reduced host vigor. Infection is spread by seeds shot from the parasitic plants on infected trees. After logging, unless clean clear-cutting has been the practice, the regeneration is rapidly infected from the overstory residuals.

Near Big White Mountain, a 100+ acre area was logged in 1950 but was not slash burned. Residual lodgepole pine trees up to 70 feet high were left singly and in groups of from two to 10 per acre. Mistletoe infection on these ranged from one to two aerial plants per tree to 10. Four groups of 25 regeneration trees were examined in a radius of 20 feet from residual infected pines. Seventeen per cent of the regeneration was infected.

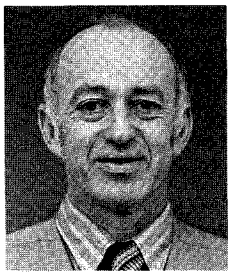
Unless all infected trees are cut or poisoned at the time of clear-cutting, the sanitation value of the operation is lost. Residual trees left in relatively clear-cut areas should be examined and, if infected, cut within 5 years following successful regeneration.

STATUS OF FOREST PESTS IN PACIFIC REGION 1976

PEST	DISTRICTS						
	PRINCE RUPERT	PRINCE GEORGE	VANCOUVER	CARIBOO	KAMLOOPS	NELSON	YUKON
MOUNTAIN PINE BEETLE	infestations, Cedarvale to Babine L	small infestations, Stuart L area	extensive infestation, Klinaklini R	infestations in central and western regions	widespread infestations on lodgepole and white pine	scattered infestations	not found
SPRUCE BEETLE	small infestations, Smithers Landing, Otter L	low populations	not found	low populations	infestations, Yalakom PSYU	small infestation, Kootenay L	low population, Haines Jct to Watson Lake
DOUGLAS-FIR BEETLE	not found	low populations	light attacks, Fraser Canyon - Pemberton - Vancouver Island	low populations	attacks on tussock moth-defoliated trees	low populations	no host
WESTERN SPRUCE BUDWORM (1-YEAR-CYCLE)	trace	low populations	extensive infestations, Fraser Canyon - Pemberton areas	low populations	extensive infestations, Lillooet - Adams and Shuswap lakes	moderate populations, Revelstoke	trace
SPRUCE BUDWORM (2-YEAR-CYCLE)	low populations, Bell-Irving R	defoliation, Holmes R	not found	infestations, Horsefly to Bowron L	infestation, Lempriere Cr	low populations	not found
WESTERN BLACKHEADED BUDWORM	light infestation, Bell-Irving R	low populations	low populations	low populations	infestation, Blue R	low populations	trace
FOREST TENT CATERPILLAR	low populations	severe defoliation, McBride area	not found	not found	infestation north of Barriere	infestations, Golden and Fort Steele	not found
CONIFER SAWFLIES *Neodiprion* spp.	infestations, islands south of Prince Rupert	infestations east of Prince George	low populations	low to moderate populations	infestations, Vavenby to Avola	moderate populations, Beaton	trace
CONE RUSTS	common on white and Sitka spruce	common on white spruce	not found	light infection	not found	not found	not found

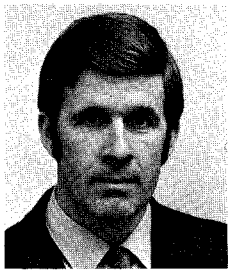
Forest District Ranger Assignments - 1977

CARIBOO

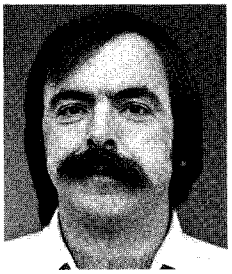


Stan Allen

VANCOUVER



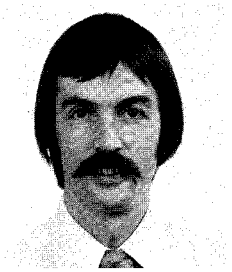
Ernie Morris



Colin Wood

KAMLOOPS

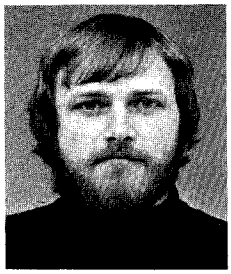
Dick Andrews



Jack Monts

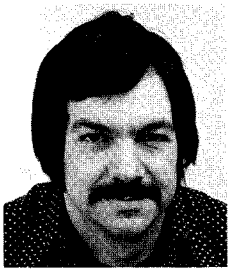
PRINCE GEORGE & YUKON TERRITORY

Roly Wood

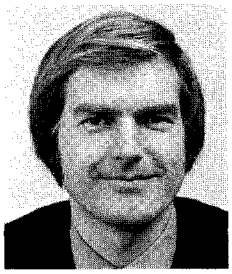


Leo Unger

PRINCE RUPERT



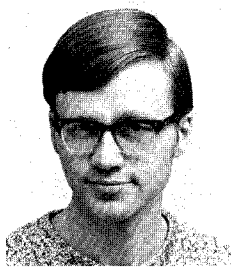
Don Doidge



Peter Koot

NELSON

Cliff Cottrell



Bob Erickson

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PACIFIC FOREST RESEARCH CENTRE, 506 W. BURNSIDE RD., VICTORIA, B.C., V8Z 1M5
BC-X-159 FEBRUARY, 1977