


Canada
PERC
25th 1981
BC-X-
225

Environment
Canada

Environnement
Canada

Canadian
Forestry
Service

Service
canadien des
forêts

LIBRARY
OF FOREST RESEARCH CENTRE
FEB - 4 1982
606 W. BURNSIDE RD.
VICTORIA, B.C. V8Z 1M5
CANADA

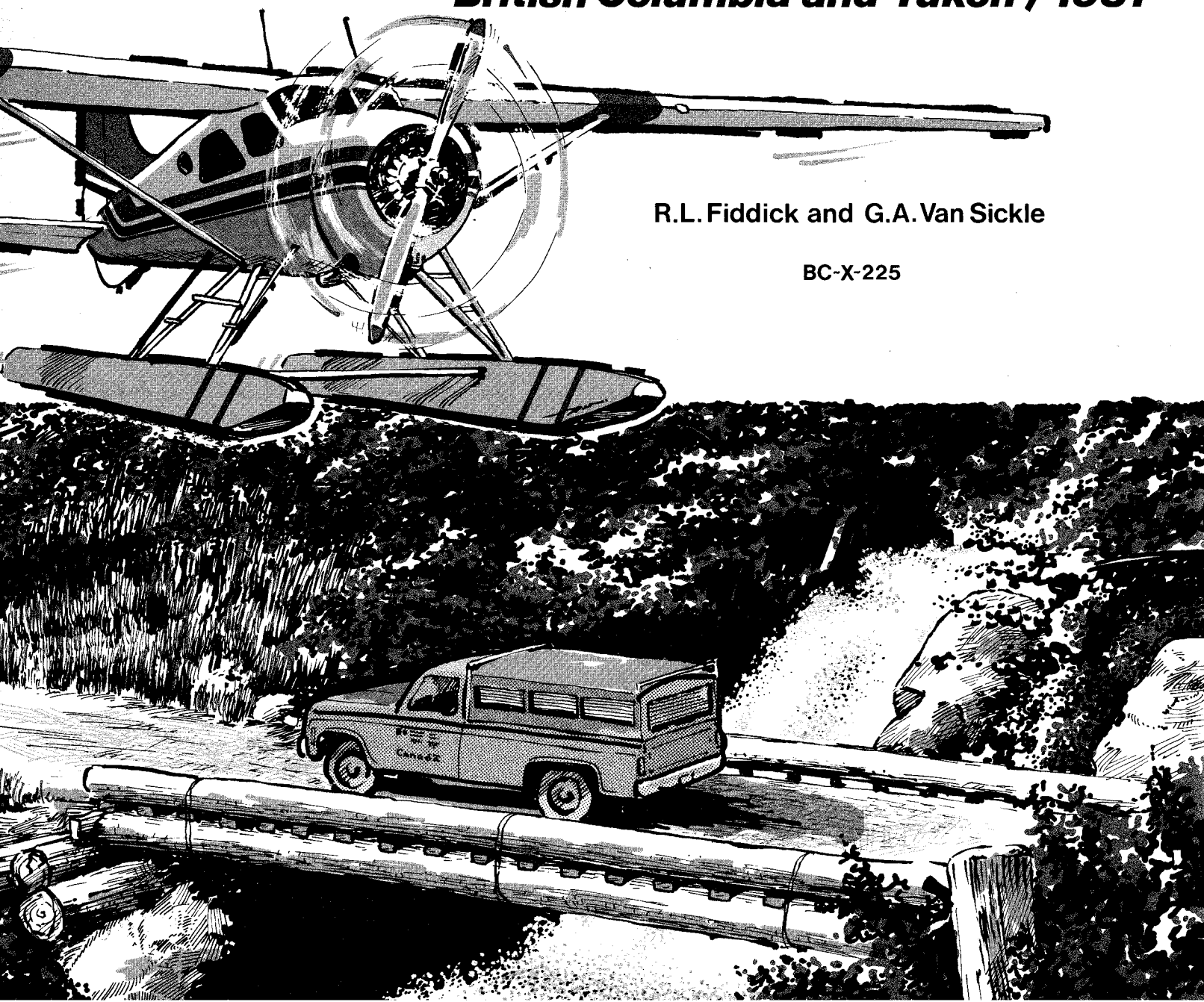


Forest Insect and Disease Conditions

British Columbia and Yukon / 1981

R.L. Fiddick and G.A. Van Sickle

BC-X-225



ABSTRACT

This summary of forest pest conditions in British Columbia and the Yukon in 1981 was compiled from records and field reports of 11 Forest Insect and Disease Survey technicians. Emphasis is on damaging pests that are, or may become, major management problems.

RESUME

Ce sommaire relatif à l'état des ravageurs forestiers en Colombie-Britannique et au Yukon en 1981 fut catalogué à partir des archives et des rapports sur les travaux effectués dans le champ par 11 techniciens des insectes et maladies des arbres. L'accent est mis sur les ravageurs qui sont ou pourraient devenir de sérieux problèmes de gestion.

TABLE OF CONTENTS

Summary	3
Pine Pests	4
Spruce Pests	8
Douglas-fir Pests	11
True Fir Pests	16
Hemlock Pests	18
Larch Pests	18
Multiple Host Pests	19
Deciduous Tree Pests	23
Other Noteworthy Insects and Diseases	24

Environment Canada
Canadian Forestry Service
Pacific Forest Research Centre
506 West Burnside Road
Victoria, B.C. V8Z 1M5
Canada

BC-X-225

1982

Summary

This report, which provides an overview of forest pest conditions in British Columbia and the Yukon in 1981, is compiled from field records and observations made by pest survey technicians supported by laboratory staff. More detailed information by provincial forest region is available in file reports based on the following district assignments in 1981.

R.O. (Roly) Wood	Vancouver Mainland
R.D. (Bob) Erickson	Vancouver Island
L.S. (Leo) Unger	East Prince Rupert
N. (Nick) Humphreys	West Prince Rupert
E.V. (Ernie) Morris	South Prince George and Yukon
J.F. (Jim) Loranger	North Prince George
R.J. (Dick) Andrews	Cariboo
C.S. (Colin) Wood	North Kamloops
H.A. (Henry) Woensdregt	South Kamloops
H.P. (Peter) Koot	East Nelson
R.W. (Rod) Garbutt	West Nelson

The mountain pine beetle continued as the most serious insect problem in the province, with some expansion and intensification in the Nelson and Cariboo Regions. An estimated 19.5 million trees were killed by the 1980 beetle attack on 158,000 ha.

Spruce beetle infestations were recorded over more than 86,000 ha, of which 59,000 ha were in the Prince George Region where severe attacks in 1980 resulted in more intensification, rather than expansion, of the infestation.

Western spruce budworm populations declined and light defoliation occurred in only two localized

spots in the Vancouver Region. In the Kamloops and Cariboo Regions, the population reduction was not as great and light defoliation was evident on 21,000 ha.

Douglas-fir tussock moth larvae were present in localized stands near Hedley, Armstrong, Pritchard, and Cache Creek in the Kamloops Region and severe defoliation occurred on 1,060 ha, mainly in the Pritchard Area. Associated with the tussock moth were increased numbers of the western false hemlock looper, particularly in the Armstrong-Salmon Arm Area.

Defoliation of western larch trees by the larch case-bearer was much lighter in the Nelson and Kamloops Regions, and larch sawfly defoliation occurred in only one small area. However, larch needle blights caused discoloration of western larch over widespread areas.

Several foliage diseases were prominent in 1981, probably favored by the cool, moist spring and early summer weather. Needle casts caused severe discoloration of ponderosa and lodgepole pine foliage in the Kamloops and Nelson Regions. A special survey for the native Swiss needle disease on Douglas-fir confirmed its presence in many stands, particularly in the Coastal Region and "wet belt" in the Interior. Fir fireweed rust was again severe on alpine fir in the Prince George Region.

Dwarf mistletoes and root rots, which are widespread in coniferous stands, are significant problems, particularly in intensively managed young stands, as are blister rust, gall rust, and *Atropellis* canker.

Pine Pests

MOUNTAIN PINE BEETLE

Dendroctonus ponderosae

Mortality of lodgepole pine, caused by the 1980 beetle attack, was sketchmapped during aerial surveys over more than 158,000 ha in the province, from the Flathead River drainage in the southeast corner through the Kamloops and Cariboo Regions to the Nass River in the Prince Rupert Region (see map). More than 19.5 million trees were killed, most of them in the Nelson and Cariboo Regions (Table 1). Scattered mortality also continued in the Nelson and Cariboo Regions on an additional 59,000 ha on which most of the pine had been previously killed. Exclusion of this area containing more than 8 million metres³ of pine and salvage logging in some infested stands has slightly reduced the current area of infestation reported, despite the continued expansion and intensification of infestations since the early 1970s.

Generally, there was a considerable increase in the number of trees attacked in 1981 compared with 1980, particularly in the Cariboo Region where, in the Chilcotin Area, an average of 55% of the trees were currently attacked. In the Prince Rupert Region, current attacks more than doubled. Based on limited prism cruises in representative stands, it is estimated that more than 32 million trees were attacked in 1981, of which the largest percentage was in the Cariboo Region. This, combined with large healthy beetle populations in attacked trees, points to continued increase and expansion of infestations in mature lodgepole pine stands.

In the Nelson Region, an estimated 10.5 million lodgepole pine trees, totalling 3.3 million metres³, were killed in 2,424 separate infestations on 58,700 ha (Table 1). In addition, western white pine trees were killed on 9,000 ha in 78 separate locations. Major expansions occurred in the Caven-Bloom-Ward Creeks drainages in the Cranbrook District; in the Invermere District from Findlay Creek north along the west side of the Columbia and Windermere Lakes and the Columbia Valley to Golden; and in the White River drainage system. In the Kootenay National Park, infestations of 5 to 300 trees were recorded at 54 locations from Cross River to Kootenay Crossing, and in a partial survey of Yoho Park, 33 infestations were mapped on 360 ha. In Glacier Park, 16 small

localized infestations, totalling 240 ha, continued in western white pine, and in Revelstoke Park, several pockets of 2 to 5 white pines were killed along the Illecillewaet River, similar to 1980. In four stands cruised north of the Flathead drainage, current attacks occurred on an average of 14% of the trees (13% in 1980), although the range was 3% to 22%. However, in the Flathead Valley, where mainly immature trees remain, the beetle populations have declined as a result of reduced brood production and poor survival in the smaller trees, and the current attack dropped to less than 2% from 35% in 1980. In West Kootenay, where infestations are not nearly as concentrated, mortality continued and increased slightly in the Kettle River drainage at Trapping Creek between Grand Forks and Mt. Morrissey near Christina Lake and in scattered small pockets north of the international boundary from Gilpin to Bitter Creek. At the south end of Slocan Lake, infestations are active in the Springer, Chapleau, and Lemon Creeks. Western white pine mortality occurs in groups on both sides of the Upper Arrow Lake north of Nakusp.

The widespread infestations in the Cariboo Region showed no signs of abating, except where most mature pine had been killed, such as 36,000 ha in the Klinaklini River-Clearwater Lake Area. More than 6 million recently killed trees, totalling 2.1 million metres³, were mapped at 1,716 locations over 73,200 ha (Table 1). The most widespread and severe infestations occurred west of Williams Lake in the Chilcotin Area as far west as the Charlotte-Kappan Lakes. In 15 stands, the number of trees currently attacked averaged 33% (range 2% to 72%). The highest current attack occurred in the Alexis Creek District, where an average of 55% of the lodgepole pine were infested. At the Vert, McClinckey, and Tatlayoko Lakes, current attacks had declined due to shortage of host material; less than 30% of the lodgepole pine were healthy. In the Williams Lake Timber Supply Area (TSA), all of the logging of lodgepole pine is being done in beetle-killed stands. In the 100 Mile TSA, infested lodgepole pine comprises one-quarter of the harvest. West of Williams Lake, recreational sites in severely infested areas are closed to the public because of the dead trees.

In the Kamloops Region, more than 2.7 million pine trees were killed by 1980 beetle attack on 19,500 ha,

TABLE 1

Number and Area of Mountain Pine Beetle Infestations By Provincial Region
Based On Recently Killed Trees Observed During Aerial Surveys and Limited Ground Observations
British Columbia, 1981

Region	No. of Infestations	Area (ha)	Trees Attacked In 1980		No. of Stands Cruised	Average % of Trees ^b				
			number ^a	volume (m ³)		H	C	R	G	P
Nelson	2,424	58,700	10,500,000	3,360,000	4	61	14	13	7	5
Cariboo	1,716	73,230	6,116,000	2,140,600	15	38	32	14	12	4
Kamloops	352	19,515	2,792,000	977,000	15	33	21	23	23	--
Prince Rupert	332	5,740	190,000	173,000	6	36	36	16	8	4
Prince George	84	900	6,300	2,100	0	----	----	----	----	--
Vancouver	8	760	4,000	1,400	3	43	19	17	19	2
Total	4,916	158,845	19,608,300	6,654,100	----	42	24	16	14	--

^a Trees attacked in 1980, discolored in 1981

^b H - healthy
C - current, attacked in 1981
R - red, attacked in 1980
G - grey, attacked prior to 1980
P - partial attack (strip)

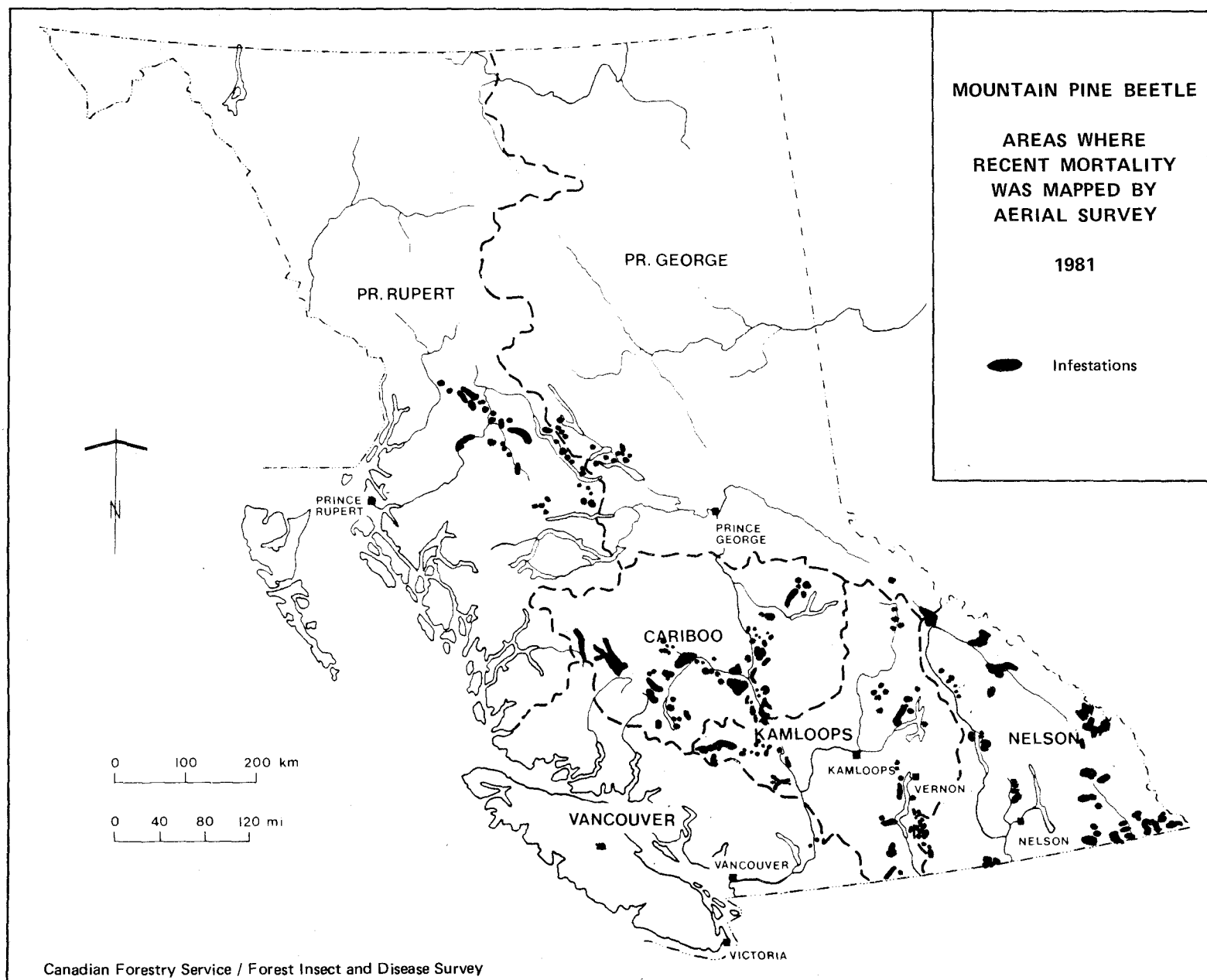
mostly in the Goldbridge and Downton-Carpenter Lakes Area near Lillooet (Table 1). In addition, there are 2.7 million "grey" previously killed trees in the Gun and Carpenter Lakes Area. Based on 2,675 trees examined on 15 quarter-hectare plots in the Goldbridge-Downton Lake Areas, 21% were currently attacked (range 4% to 50%), 23% were red, and 23% grey. In the Okanagan Valley, 46,000 recently killed trees were recorded on 2,000 ha, primarily in the Trout-Hayes, Mission-Belgo, and Lambly Creeks, and the Okanagan Mountain Park. The widespread tree mortality has resulted in increased harvesting of pine stands by operators in the Lillooet Area.

In the Prince Rupert Region, 190,000 recently killed lodgepole pine occurred in 332 infestations on 5,740 ha (Table 1). The largest, and most serious, outbreak continued in the Harold Price Creek drainage, where it has been active since 1972, with new small outbreaks continuing toward the headwaters. Significant outbreaks occurred in the Kispiox, Nass,

and Bulkley River Valleys, and in Tweedsmuir Park. In six stands cruised, the current attack averaged 36% (range 2% to 58%), the most severe being 58% in the Kispiox River Valley and 48% at Van Dyke on the Nass River. At Woodcock, on one permanent study strip, 95% of the pines had been killed over a 3-year period, while at three other locations, 67% of the pines were killed over 4 years.

Small infestations, totalling 6,300 trees, occurred at 84 locations on 900 ha in the Prince George Region in the McNaughton, Takla, and Stuart-Trembleur Lakes Areas. The large infestation near Valemount declined because of logging and lack of host material.

Lodgepole pine stands in the Vancouver Region are not extensive; however, infestations occurred on 500 ha at Haylmore Creek, 130 ha at Specht Creek near Pemberton, and 130 ha at Eastgate near the eastern entrance to Manning Park. Stand examinations indicate continuing tree mortality will occur in these



areas in 1982. At Haylmore and Specht Creeks, the potential for spread is not as great as at Eastgate, where extensive stands of mature pine adjoin the active infestations. Examination of this stand showed the current attack in the area cruised increased from 4% of the stems in 1980 to 30% in 1981.

ELYTRODERMA DISEASE OF PINE

Elytroderma deformans

Infection of ponderosa pine was common throughout the Kamloops Forest Region, with up to 95% of 1980 needles infected on trees in all age classes at Sabiston Creek, Savona, and in the Venables Valley west of Ashcroft. Along the Green Mountain Road west of Penticton, about 200 ha of pine had approximately 100% of the needles infected, while much lower, though still significant, intensities occurred over a further 4,000 ha. Around Merritt, approximately 75% of the last year's foliage was infected. Infection levels and foliage discoloration were more severe than at any time during the past decade, probably because of the wet summers of 1980-1981.

In the Nelson Region, ponderosa pine throughout the Kettle River Valley were discolored as a result of moderate to severe infection. The most severe infections occurred around Rock Creek, where 20% of the foliage was discolored with heavy brooming on most trees. Between Grand Forks and Christina Lake, most trees had 40% of the foliage infected.

LODGEPOLE NEEDLE CAST

Lophodermella concolor

Discoloration of older foliage of lodgepole pine caused by *L. concolor* was prevalent throughout the Prince George Forest Region. Severe infection occurred along Beaver Creek Road, with 70% of the foliage infected on 80% of the trees; from Summit Lake to Bear Lake, 90% of the 1980 foliage was infected, and along the south Willow River access road, infection was light and spotty.

In the Yukon, areas of moderate to severe infection and foliar browning occurred at intervals along Highways 1, 9, and 10, and in and around the Takhini Forest Nursery.

WEATHER DAMAGE

Cold, drying winds during the 1980-1981 winter caused desiccation and severe discoloration of the foliage of lodgepole pine trees and, to a lesser extent, white spruce trees in various areas in the Prince George Region. Significant damage in the form of killed buds and branch tips and top dieback occurred in the Pine Pass Area and east to Chetwynd, north of Fort St. John, Trutch Mountain, Minnaham River Valley, and Summit and Muncho Lakes. Similar damage occurred in the Yukon along Kluane Lake to Beaver Creek to the Alaska border and along Little Atlin Lake.

In the Nelson Region, lodgepole pines were damaged, with accompanying branch and top kill, along the north slope of Mt. Broadwood above Elk Creek and near Fernie. Snow damage in the form of uprooted and bent and broken trees affected 5% of the lodgepole pine along roadsides for 5 to 6 km along the Bull River and along the Moyie River Road near Munroe Lake.

Spruce Pests

SPRUCE BEETLE

Dendroctonus rufipennis

Mortality of white and Engelmann spruce trees, resulting from 1980 beetle attack, increased substantially in the province in 1981, with infestations mapped on more than 86,000 ha (Table 2) (see map). In addition, some 1981 attacked trees began to fade earlier than usual, perhaps because of the warm autumn, and are not included in the aerial survey totals completed early in September.

Indications are that beetle populations increased in individual, or patches of, trees windthrown in the mid to late 1970s, then emerged to attack nearby green standing trees. Generally, the spruce beetle has a 2-year life cycle, needing 2 years to develop through the life stages before emerging to attack green trees. In all areas, healthy beetle broods will overwinter in 1980 attacked trees and emerge to attack in the spring of 1982. Small numbers of beetles matured and flew in 1981 and fewer trees were attacked, except in the Prince Rupert Region.

The largest and most serious infestations occurred within the Prince George Forest Region, mainly in the Bowron, Willow, and McGregor River drainages, with smaller infestations in the Parsnip River, the Weedon, Stuart, Trembleur, Takla, and Williston Lakes Areas, and west of McBride. Almost 3 million metres³ of white spruce were killed in 1979: 80 in 1,488 separate infestations totalling more than 59,000 ha (Table 2), of which 9,500 were classed as severe¹; 25,600 as moderate; and 24,000 as light. Logging of infested stands and groups of 20 to 25 trap trees at 300 locations during the past year contributed to a reduction of population and damage in the Bowron-Willow River Area. Also, 720 lethal trap trees treated with MSMA were used in a number of areas accessible only by air along Herrick Creek (McGregor River). Based on cruises in 18 stands (Table 2), trees were heavily attacked in 1980 in

the upper Bowron, Willow, and McGregor River Areas, with from 4% to 73% of the spruce attacked on individual strips. Particularly severe attacks occurred at the Indianpoint and Harvis Creeks, where only 18% and 16% of the spruce, respectively, remained healthy after 2 years of infestation. A decrease occurred in the Stuart-Trembleur Lakes Area and at Weedon Lake. Salvage logging of infested and beetle-killed white spruce comprises 95% of the harvest in the spruce-alpine fir stand in the East Prince George Forest District and 80% in the Fort St. James District.

In the Cariboo Region, directly south of infestations in the Bowron-Willow Rivers, more than 800,000 m³ have been killed in 160 infestations covering some 13,050 ha. Of this, 4,460 ha were of severe, 2,750 ha were of moderate, and 5,840 ha were of light intensity. More than one-third of the infestation was in the Bowron Provincial Park. Based on 19 cruise strips in the area, the number of trees attacked in 1980 increased over that of 1979 (Table 2). In the Ketchum Creek, Crescent Lake, and Bowron River Area, the 1980 attack ranged from 30% to 47% of the stems. The 1981 attack was much lighter because of the 2-year life cycle, enabling only a small portion of the beetles to emerge and attack. East of Quesnel, salvage logging of beetle-killed and susceptible white spruce comprises most of the harvest.

In the Nelson Region, 122 infestations were recorded over 8,000 ha, killing an estimated 450,000 m³. The largest infestations occurred in Pingston Creek in the Revelstoke District, 2,500 ha; north and south of Summit Creek in the Kootenay Lake District, 2,200 ha; and along Cabin Creek in the Cranbrook District, 2,200 ha.

Infestations in the Prince Rupert Region continued in scattered locations, particularly in the Morice River-Parrot Lakes, the McDonnell, Ootsa, and Natowite Lakes, and the Kispiox and Nass-Bell Irving River

¹ Severity classification made from the air, based on discoloration:

Severe:	More than 31% of trees killed by 1979 and 1980 attack.
Moderate:	6% to 30% killed.
Light:	1% to 5% killed.

Areas. Recently killed trees (1980 attack) were mapped on 6,200 ha at 229 locations. Infestations were light on 3,100 ha, moderate on 3,010 ha, and severe on only 90 ha. More than 1,000 ha of spruce in Tweedsmuir Park were infested. Six cruise strips, at various locations in and adjoining infestations, indicated little change occurred from 1979 to 1980. Surveys in 1980 indicated the infestations should decline in most areas. However, about half the beetles in 1980 attacked trees completed their life cycle in 1 year, causing an increase in the number of trees attacked in 1981, ranging from 2% to 45% (average 23%) (Table 2). The remaining beetles in the 1980 attacked trees are healthy, indicating further attacks will occur in 1982. Trap trees felled at White Eye Lake (Ootsa Lake) and McDonnell Lake were heavily attacked, but at Morice River, the trap trees were concentrated in a 4 ha area several kilometers from the main infestation and were lightly attacked.

Scattered mortality over 1 to 3 ha occurred in the Kamloops Region at the Hurley, Van Horlick, Miledge, Lambly, and Shorts Creeks, and in Okanagan Mountain Park (an estimated total of 70 trees were killed).

SPRUCE WEEVIL *Pissodes strobi*

The weevil continues to be a problem in young planted and natural spruce stands in the province. Repeated attack prevents normal terminal growth and trees become stunted and bushy.

One hundred tree examinations were made at various locations to record distribution and percentage of trees attacked.

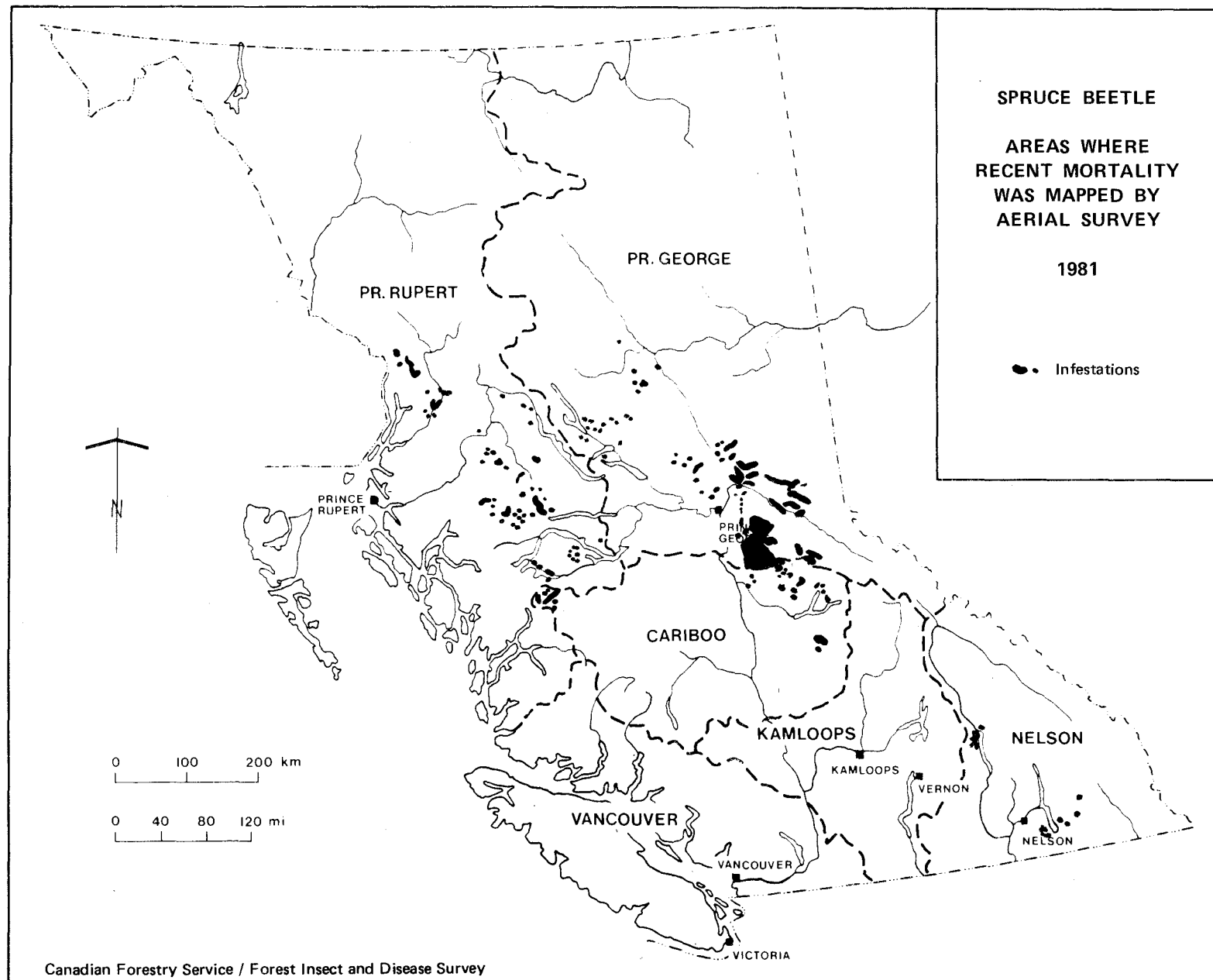
On Vancouver Island, the intensity of current attack on young Sitka spruce in the Gold River-Tahsis Area was: Head Bay, 44%; Malaspina Lake, 7%; Leagh Creek, 5%; and Sucwoa River, 0%. Further north in the Port Alice-Port Hardy Area, three areas along Waukwass Creek were 3%, 12%, and 7%; Alice Lake, 2%; and Truite Lake, 1%. Near Ucluelet, 5% of the spruce were attacked. Continuing attacks of this intensity could seriously affect the growth of trees in this important spruce-growing area. Clipping and burning of the infested leaders is being done by the B.C. Ministry of Forests and by industry to reduce

TABLE 2

Number and Area of Spruce Beetle Infestations By Provincial Forest Region
Based On 1979 and 1980 Killed Trees Observed During Aerial Surveys and Limited Ground Observations
British Columbia, 1981

Region	No. of Infestations	Area (ha)	Volume Killed ('000 m ³)	No. of Stands Cruised	Average % of Trees ^a				
					H	C	R	G	P
Prince George	1,488	59,000	2,995	18	61	2	20	14	3
Cariboo	160	13,050	816	19	74	4	11	9	2
Nelson	122	8,000	450	2	66	3	22	5	4
Prince Rupert	229	6,240	184	6	49	23	12	12	4
Total	1,999	86,290	4,445	45	63	8	16	10	3

^a H - healthy
C - current, attacked in 1981
R - red, attacked in 1980
G - grey, attacked prior to 1980
P - partial attack (strip)



the weevil population in certain areas. No attacks were noted between the Sarita River and Bamfield.

In the Nelson Region, the 1981 leaders were killed on 10% of the young roadside Engelmann spruce at McLeod Meadows and Dolly Varden Creek in Kootenay National Park.

Attacks were not observed in spruce stands at Raft River, kilometer 23 McGillivray Lake Road, and Johnson Lake Road in the Kamloops Region, or at four locations along the McGregor River at Pine Pass and Silver Sands in the Prince George Region.

From 7% to 12% of the Sitka spruce were attacked in three untreated stands near Terrace in the Prince Rupert Region.

SPRUCE APHID *Elatobium abietinum*

Open-growing, roadside, and shoreline Sitka spruce have been heavily infested by this aphid at various locations on Vancouver Island. From Sooke to Point-No-Point, many trees have lost 30% to 80% of 2-year and older foliage, as did trees bordering Highways 1 and 19 between Victoria and Campbell River. Near Spit Road at Campbell River, spruce on a 20 ha area were heavily infested. In the Greater Victoria area, many ornamental and native spruce are at least partially defoliated and some are completely discolored.

On the Queen Charlotte Islands, from 5% to 10% of the mature Sitka spruce along the west coast of Graham Island and the north coast of Moresby Island had been killed, following several years of defoliation. In some areas, defoliation of younger trees extended up to 2 km inland. In the Prince Rupert Area, moderate to severe defoliation of Sitka spruce occurred from the mouth of the Skeena River north to Somerville Island in Portland Inlet and east as far as Work Inlet.

Douglas ~ fir Pests

WESTERN SPRUCE BUDWORM *Choristoneura occidentalis*

The area of defoliation of Douglas-fir by the western spruce budworm decreased significantly in 1981, with mostly light defoliation recorded on 21,000 ha, down from 81,000 ha in 1980. In the Vancouver Region, defoliation occurred in only two isolated patches—in the Kamloops Region on 16,300 ha and in the Cariboo Region on 5,000 ha. Pheromone-baited traps caught significant numbers of moths, indicating that, though reduced in numbers, the budworm is still widespread and that the egg populations are high enough to insure continuation of the population at low levels and cause mostly light defoliation in 1982.

In the Vancouver Region, egg counts in the summer of 1980, supplemented by counts of infested buds

in the spring of 1981, suggested that moderate to severe defoliation would occur at several locations in the Fraser Canyon and light to moderate in the Hope-Manning Park Area. This did not occur and beating samples taken during the larval period indicated the larvae had all but disappeared, possibly discouraged from feeding by the cool, wet weather at a critical period. No current defoliation was visible from the air in early August, but two isolated patches were observed from the ground in September.

In the Vancouver Region, substantial numbers of male moths were caught in pheromone-baited traps at seven widely separated locations, indicating the presence of a significant budworm population, possibly in isolated pockets. In addition, enough egg masses were found at five widely separated locations (Table 3) to indicate populations may continue at low levels.

TABLE 3

Pheromone Trap Catches of Western Spruce Budworm,
Number of Egg Masses Per 10 m² of Foliage, and
Predicted Defoliation For 1982

Location (By Forest Region)	No. of Stands Sampled	Adults Per Trap At % Concentration			Egg Masses Per 10 m ²	Predicted Defoliation ^a 1982
		0.1	0.01	0.001		
VANCOUVER						
Hope Area	3	16	3	0.3	9	L
Fraser Canyon	2	46	13	0.5	7	L
Pemberton Area	3	44	9	1	16	L
KAMLOOPS						
Lillooet Area	3	52	36	6	95	M
Ashcroft	3	---	---	---	164	M
Raft River (Barriere)	1	36	12	1	---	---
Greenstone Mountain	1	45	46	6	---	---
Scotch Creek	1	54	11	0	---	---
August Lake	1	69	24	4	---	---
Spius Creek	1	55	11	1	---	---
CARIBOO						
Clinton Area	4	60	48	30	180	S

^a Egg masses per 10 m² and potential defoliation:

up to 50 = (L) light
51-150 = (M) moderate
151+ = (S) severe

In the Kamloops Region, current defoliation was mapped on 16,300 ha in the Cache Creek, Ashcroft, and Lillooet Areas and in the Pimainus Creek and Nicola Valley, a reduction from 43,000 ha in 1980 (see map). Generally, defoliation was light to moderate, with pockets of severe defoliation from Indian Gardens to Barnard Creek. Larval populations, based on three tree-beating samples, were significantly lower than the past 3 years, with a corresponding reduction in feeding. Pheromone-baited traps at four locations outside defoliated areas caught significant numbers of budworm moths (Table 3) and egg counts indicate that moderate and severe defoliation could occur in some scattered patches.

Near Clinton in the Cariboo Region, the area of defoliation was reduced and the intensity was lighter than in 1980. Light defoliation occurred on 5,000 ha along Hart Ridge, Bonaparte River, Loon Lake, and Big Bar Creek. The number of moths caught in pheromone traps and egg counts in the same locations indicate moderate to severe defoliation could occur in much of the area in 1982 (Table 3).

In the Nelson Region, the light infestation, which has persisted for 4 years at Johnson Creek between Rock Creek and Bridesville, expanded to 1,000 ha.

DOUGLAS-FIR TUSSOCK MOTH *Orygia pseudotsugata*

In the Kamloops Forest Region, tussock moth larvae defoliated Douglas-fir trees in patches over an estimated 1,060 ha in four separate locations: Monte Creek-Pritchard-Niskonlith, 800 ha; Armstrong-Glenemma, 180 ha; Carquille, 50 ha; and Similkameen Valley, 30 ha (see map). Defoliation was severe over 550 ha, with top stripping and some trees completely defoliated, mainly in the Monte Creek-Pritchard Area where some tree mortality could occur.

A previous infestation in the Kamloops Region subsided in 1976, after causing severe defoliation and considerable tree mortality on 5,700 ha in the North Thompson Valley and on 2,500 ha south of Kamloops Lake.

The current infestation could be the initial stages of a widespread outbreak, encompassing many of the stands previously infested. Larvae and egg masses found in many samples beyond defoliated areas and adults in pheromone traps indicate the

presence of tussock moth from Hedley in the south to Cache Creek in the north.

Egg counts at nine sites to relate egg masses to the adult population and at 18 other locations indicate defoliation will occur well beyond the current infestation in 1982. Based on the criterion that 0.75 egg masses per tree predicts potential defoliation of 20%, Douglas-fir in 21 of 27 locations will be defoliated, reaching moderate to severe levels in at least ten of the areas examined (Table 4).

Adults were trapped at an additional 26 locations, using five traps baited with 0.1% pheromone concentration at each, but the numbers were such that no visible defoliation is expected in 1982.

In an area near Hedley, a naturally occurring host specific virus was applied to an infested area in a cooperative Canadian Forestry Service-B.C. Ministry of Forests project. Moderate and low populations had been detected in 1980 and defoliation was minimal, so the effectiveness of a treatment early in an infestation could be evaluated. Preliminary results indicate that an insect viral epizootic was initiated by both ground and aerial applications. Foliage protection was less than expected, perhaps due to the cool weather which slowed development of the virus, but tussock moth populations were significantly reduced and little defoliation should occur in the treated stands next year.

In the Cariboo Region, larval populations were high enough to cause noticeable but light defoliation of Douglas-fir in the Scottie Creek-Loon Lake Area. In September, many larvae had not reached the adult stage but had died as large larvae or as larvae in the cocoon, mainly due to a naturally occurring nuclear polyhedral virus.

A localized outbreak occurred on a few Douglas-fir trees on the golf course at Christina Lake east of Grand Forks in the Nelson Region.

DOUGLAS-FIR BEETLE *Dendroctonus pseudotsugae*

Since the early 1960s, when a program of sanitary logging and close utilization of Douglas-fir stands was initiated in the Interior of the province, relatively few trees at scattered locations have been killed annually, usually after predisposition by drought,

root rot, mechanical damage, or defoliation. Because of the nature of Douglas-fir beetle attacks, which occur in widely spread individuals or small patches, the 1981 attacks were difficult to detect and few were recorded.

In 1981, in the Cariboo Region, increased tree mortality was observed in the area from French Bar Creek north along the Fraser River to McLeese Lake. Douglas-fir trees attacked in 1980 and turning red in 1981 were noted in association with mountain pine beetle-killed trees over large areas near Loon Lake, Empire Valley, Dog Creek, Gaspard Creek, and along Lac La Hache.

In the Kamloops Region, about 700 trees were killed in groups of 2 to 25 at scattered locations. Generally, the attacked trees were overmature, on poor sites, or were infected by root rot *Armillaria mellea*.

Some 200 recently killed Douglas-fir were recorded in patches in the McLeod-Stuart Lakes and McGregor River-McBride Areas in the Prince George Region.

Small pockets of overmature, root rot-infected trees were killed in the Bella Coola Valley in the Prince

Rupert Region. In the localized stand, the 1981 attack doubled that of 1980.

In the Vancouver Region, where beetles had been attacking spruce budworm-defoliated trees, only 15 1980-attacked trees in two groups were recorded between East Anderson River and Uztlius Creek.

WESTERN FALSE HEMLOCK LOOPER *Nepytia freemani*

Populations increased in 1981 in the Armstrong-Salmon Arm Area in the Kamloops Region and intermediate and mature Douglas-fir trees were defoliated in six areas: Carlin, Herald, Paradise, and Grindrod, 100 ha each; and White Lake and Sunnybrae, 25 ha each. Localized infestations occurred in this general area from 1972-1974.

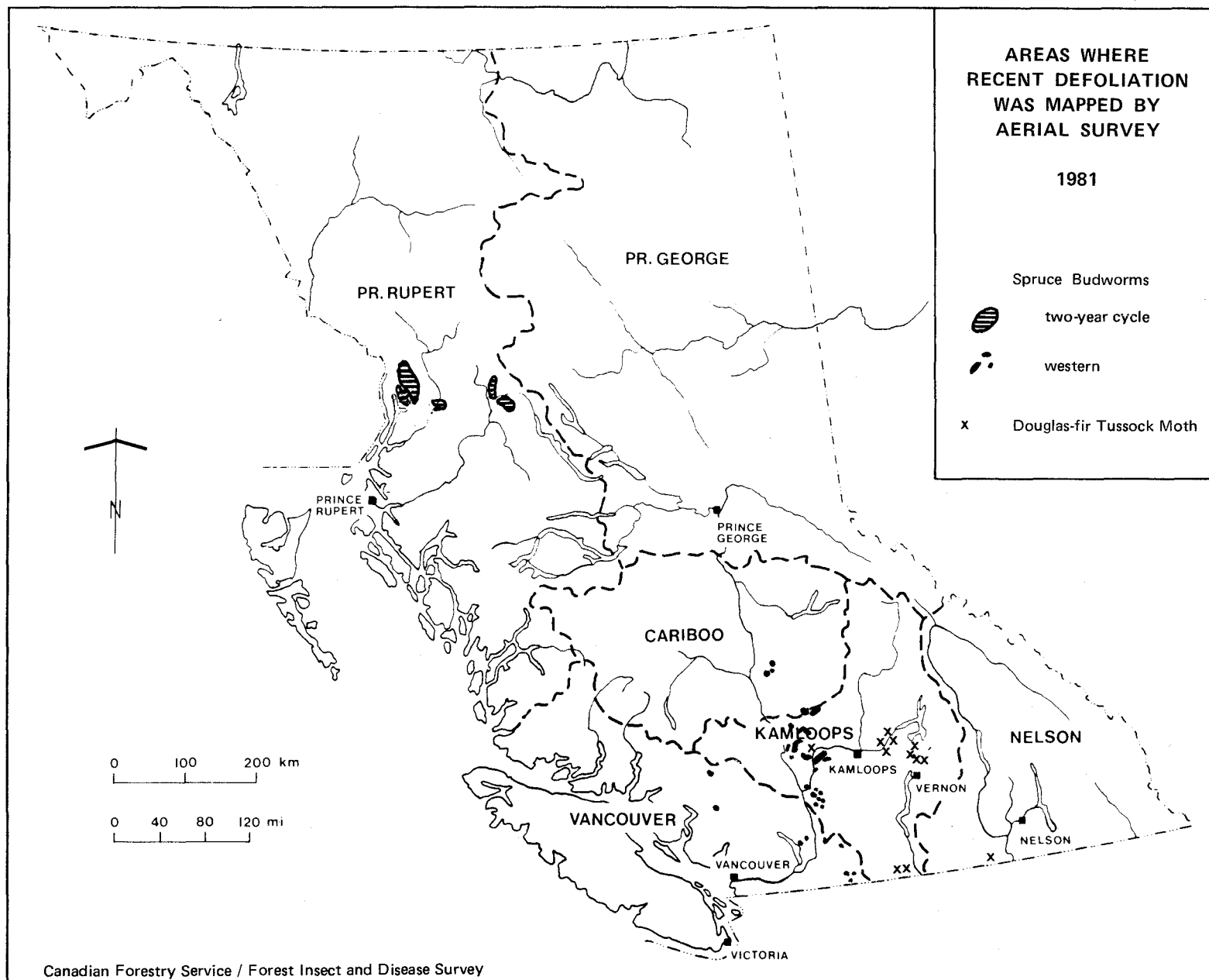
A few diseased larvae were found in a collection from Mt. Rose northwest of Armstrong, but it was not prevalent in the area.

At Bastion Mountain and Tappen near Sunnybrae, on two plots, the tops of all the trees were severely defoliated, with complete top stripping on 60%

TABLE 4

Douglas-fir Tussock Moth Pheromone Catch and Egg Surveys
Kamloops Region
1981

Location	No. of Stands Sampled	Average No. of Adults Per Trap At % Concentration			Egg Masses Per Tree	Predicted Defoliation 1982
		0.1	0.01	0.001		
Monte Creek	1	70	58	39	1.8	Yes
Ashcroft	1	50	31	9	3.3	"
Savona	3	53	53	24	3.1	"
Kamloops	5	20	22	6	3.0	"
Cache Creek	4	---	---	---	3.2	"
Falkland	3	35	---	---	6.1	
Armstrong	5	42	---	---	2.3	
Hedley	5	---	---	---	3.7	



and 40%, respectively. Egg counts at these locations indicated population increases in 1982.

BORON DEFICIENCY

Planted Douglas-fir and naturally regenerated western hemlock at Brittain River in the Vancouver Region exhibited symptoms of boron deficiency, such as bushy tops, large numbers of branches at each whorl, dieback of buds and current shoots, necrosis or browning in the cambial zone, and a brittle condition of many stems and branches.

An extremely hot fire at Brittain River (approximately 30 years ago) and high rainfall may have lowered boron levels further by leaching, thus inducing the above symptoms. Similar conditions may exist elsewhere in south coastal British Columbia.

SWISS NEEDLE DISEASE *Phaeocryptopus gaumannii*

A special survey was conducted to determine the incidence and distribution of this native Douglas-fir

needle cast. Severe infection causes discoloration of foliage and premature needle loss, possibly resulting in reduced increment growth.

Infection occurred throughout the range of Douglas-fir on Vancouver Island and the Lower Mainland from the Fraser Canyon to Lund and was highest in the wet belt transition zones in the Kamloops, Cariboo, and Nelson Regions.

DOUGLAS-FIR NEEDLE RUST *Melampsora medusae*

Infection of Douglas-fir was common throughout the host range in the Kamloops Region but was particularly severe, with most of the 1981 shoots infected in patches between Spences Bridge and Ashcroft, along the Vavenby-Adams Lake Road, Bonaparte Lake-Barriere Road, and the North Thompson River Valley.

In the Nelson Region, generally less than 10% of the foliage was infected; however, 40% of the current growth of immature open-growing trees was infected on 10 ha at Moberly, north of Golden.

True Fir Pests

TWO-YEAR CYCLE SPRUCE BUDWORM *Choristoneura biennis*

Two-year cycle budworm normally mature in the even-numbered years, when they do their heaviest feeding. In some areas in the province, they are off-cycle and mature in the odd-numbered years.

In the Prince Rupert Region, infestations occurred in spruce-balsam stands over more than 38,000 ha. Light to moderate defoliation occurred on about 34,000 ha along the Nass River Valley from Vandyke Island north along the east side of Meziadin Lake to Bowser Lake. In addition, light defoliation occurred on 4,000 ha along the Babine River from Shedin Creek

to Thomlinson Creek. Larvae were present, but defoliation was too light to map along the Kispiox River from Miten Lake to Swan Lake. Larval development in the area indicated that at least a portion of the population was one-year cycle or was maturing on alternate years, thereby causing heavier defoliation in the "odd" year than normal. A small number of larvae in a collection from Meziadin Lake were infected with a *Beauveria* fungus. Egg counts in the Nass River were low, but in the Kispiox River Valley, the number of egg masses was sufficiently high to indicate moderate to severe defoliation in 1982.

Current defoliation was not visible in areas defoliated in the Cariboo and Prince George Regions last year.

In the Nelson Region, up to 15% defoliation of alpine fir and Engelmann spruce occurred in the Glenogle, McMurdo, and Bugaboo Creek Valleys. These larvae were "off phase" and completed their cycle in 1981.

In the Kamloops Region, alpine fir and Engelmann spruce stands have, since 1974, been defoliated biennially on about 13,700 ha in the Upper North Thompson River Valley, Lempriere Creek, and Miledge Creek. Defoliation did not occur in 1981; however, the previous defoliation has resulted in bud mortality and top kill of 0.25 to 2.5 meters on 10% of the understory and second-growth trees.

FIR-FIREWEED RUST

Pucciniastrum epilobii

In the Prince George Region, up to 75% of the current foliage on half the immature alpine fir trees was infected in the McGregor River drainage and along the Hart Highway from Summit Lake to Mackenzie junction. Somewhat lighter infection intensity occurred north of Mackenzie and east to Azouzetta Lake and the Hudson-Hope Area. Intensities were high in many of the same areas in 1980.

In the Byman Creek Area in the Prince Rupert Region, 50% of the 1981 foliage on fringe and open-growing trees was infected, whereas trees deep in the stand had only 5% of the foliage infected. Infected needles drop during summer and trees that have been infected for more than one year often have thin crowns.

WESTERN BALSAM BARK BEETLE

Dryocoetes confusus

Sporadic outbreaks of the balsam bark beetle with the associated fungus *Ceratocystis dryocoetidis* have,

over the years, killed alpine fir over extensive areas in the province. In recent years, infestations declined and tree mortality has been much reduced. Aerial surveys have, of necessity, not always included the high elevation balsam stands, but have concentrated on the more serious mountain pine beetle, spruce beetle, and defoliator problems.

Alpine fir mortality was common but spotty in higher elevation stands in the Kamloops Region in 1981. An estimated 2,500 recently killed trees were recorded, mainly in the Porcupine Ridge Area north to Bonaparte Lake and at Grayback Lake and the Upper Penticton and Trout Creeks.

In the Prince George Region, light mortality of alpine fir occurred on 320 ha at Takla Lake and Nation Lake and scattered mortality was recorded in high elevation white spruce-alpine fir stands in the McGregor, Parsnip, and Pine Pass Areas. Previously killed trees, some of which can retain red foliage for several years, are numerous in the Pine Pass Area.

At McKendrick Pass, east of Smithers in the Prince Rupert Region, light mortality continued where alpine firs have been killed for a number of years. Increment cores from 25 infected trees showed an average age of 266 years and an average diameter of 41 cm. Of the 25 trees, heart rots, *Fomes pini* and *Echinodontium tinctorium*, were present in 5. About 8% of the alpine firs were killed on 200 ha along the Skagway Highway near White Pass. Elsewhere in the Region, very light scattered mortality occurred in high elevation stands.

The most serious infestations in the Nelson Region were in the Revelstoke District where 5,000 recently killed trees were recorded on 1,750 ha at Nichols Creek, 1,000 on 600 ha along Bigmouth Creek, 10,000 on 3,000 ha in Jumping Creek, and 1,000 over 2,000 ha in Pingston and Thor Creeks. Elsewhere in the Region, 3,000 trees were killed on 1,000 ha along Blueberry River, 2,000 on 1,000 ha in Skelly Creek, and 300 over 10 ha in Chapleau Creek.

Hemlock Pests

HEMLOCK LOOPER

Lambdina f. lugubrosa

The population at Coquitlam Lake, east of Vancouver, which last year appeared to herald an outbreak, subsided and only a few larvae were found.

In western hemlock and cedar stands in the Golden-Revelstoke-Mica Creek Area, populations increased from endemic levels of 1 to 3 larvae per sample to 20 to 30 larvae, with the highest numbers at Silver Creek and Tangier River east of Revelstoke. Defoliation was not visible. An outbreak occurred in the same general areas in 1972-1973 and subsided after 2 years of moderate to severe defoliation, which caused scattered mortality of Douglas-fir and western hemlock on dry, rocky sites at Shelter Bay on Arrow Lake.

DWARF MISTLETOE

Arceuthobium tsugense

The status of mistletoe infection varies little from year to year, hence, annual surveys and reporting are limited. Western hemlock stands in coastal areas are infected to varying intensities. Observations in 1981 included a 40-year-old stand south of Nimpkish River being spaced, although all the trees were infected. In a 20-year-old hemlock stand north of Port McNeil, infected residuals had been left and all the trees were now infested; at Paleface Creek, on Chilliwack Lake, 90% of the understory trees were infected beneath a heavily infected overstory. South of Rupert Inlet, an 80-year-old stand was lightly infected.

Larch Pests

LARCH CASEBEARER

Coleophora laricella

Casebearer populations declined markedly in 1981. During the past several years, larvae defoliated western larch stands throughout the host tree range in the Nelson Region and the southeast portion of the Kamloops Region. Although severe defoliation occurred in a number of areas for several years, tree mortality has not been recorded.

In the Nelson Region, the area of defoliation was much reduced, with light to moderate defoliation (10% to 50%) of larch trees along Summit Creek to Creston Valley, at Rykerts, between Jaffray and Elko on the east side of Kooacanusa Lake, several miles into Tepee Creek on the west side of the lake, and along the Yahk River. Little damage occurred in the Grand Forks Area where defoliation recently had been severe.

In the Kamloops Region, defoliation was light (1% to 15%) in localized patches at Cherryville and

Shuttleworth Creek but was severe (greater than 75%) on open-growing larch trees on Anarchist Mountain.

Small numbers of parasites, *Agathis pumila* and *Chrysocharis laricinellae*, have been introduced into the infested areas periodically since 1969, and in 1980, parasitism of casebearers at nine locations increased to as high as 57% and was credited with a considerable reduction in the casebearer population.

In 1981, parasites were present in pupae collected in May at five locations: Anarchist Mountain (Osoyoos), 69% of pupae parasitized; Anarchist Mountain, 12%; Shuttleworth Creek, 42%; Johnstone Creek, 38%; and Rykerts, 15%. The majority of the parasites were identified as *Dicladocerus* spp., a native parasite. The introduced parasites were present in low numbers. The high percentage of parasitism is probably due to an increased number of parasites and the reduced casebearer population. The overall effect should be to keep the casebearer population at lower levels for a few years.

LARCH NEEDLE DISEASES

Meria laricis and *Hypodermella laricis*

A survey to determine the distribution of *M. laricis* was carried out in western larch stands in 1981. The high infection level found in stands at several widely separated locations in the southern part of the province strongly suggests the fungus has been present for some years. The cool, moist spring and summer of the past 2 years probably favored the spread of infection. It is suspected to be the major cause of larch discoloration in the Flathead Valley, where it caused mortality of larch seedlings planted where pine had been logged. Infections were also found in the Fernie Area, the Yahk Provincial Forest,

and around Creston. It was found in association with *Hypodermella laricis*, a needle cast, around Salmo, Nelson, and throughout the Slokan Valley.

Three larch trees planted out of the natural range at a residence near Harrison Lake in the Vancouver Region were infected, as were several trees planted as ornamentals in Victoria and Duncan.

Discoloration of western larch, caused by *H. laricis*, was common but sporadic throughout the host range in the Nelson Region. Virtually all the larch trees in the Trail, Castlegar, and Nelson Areas had up to 80% infection of the foliage. East of Nancy Greene Lake, larch over 30 km were red-orange. In East Kootenay, areas of noteworthy infection occurred in the Lower Flathead River drainage, Upper Kootenay, and Moyie River Area.

Multiple Host Pests

PESTS OF YOUNG STANDS

Examination of recently treated and young, natural stands for pest problems was continued. A total of 130 stands were examined, of which 96 were under intensive management, such as thinning, spacing, and fertilization. In 16 natural lodgepole pine stands, stem and gall rusts were minor, i.e., less than 10% of the trees infected. However, in 27 of 40 managed stands, it was considered a major problem, together with *Atropellis* canker and *Armillaria* root rot, indicating more care should be exercised in selecting trees for removal. Foliage rusts and needle casts were present in some areas, but none were causing significant damage.

In the Vancouver Region, in three stands, up to 10% of the remaining trees had been scarred during spacing, predisposing them to stem and root decays. Root rots, *Armillaria* and *Phellinus*, were present in three of five spaced stands and in four natural stands. Of ten spaced western hemlock stands, four had mistletoe infections on more than 90% of the trees and three others ranged from 10% to 30%.

In the Prince Rupert Region, stem and branch rusts were the most serious problems in spaced and unspaced lodgepole pine stands, affecting from 2% to 20% of the trees in five of eight 10- to 15-year-old plantations and all of the eight natural and spaced stands examined. The root collar weevil, *Hylobius warreni*, and the lodgepole terminal weevil, *Pissodes terminalis*, had damaged 3% of the trees in four areas. *Atropellis* canker is common in most pine stands of 60 to 80 years of age, ranging in intensity from 5% to 22% of the stems. Near Ootsa Lake, of 100 trees examined in a spaced stand, 14% had *Atropellis* canker, compared with 12% in the adjacent unspaced stand. White spruce plantations were damaged by late frosts in the northcentral part of the region and *Pineus* sp. heavily infested all of the trees near Babine Lake. The 1981 leaders of from 7% to 12% of the Sitka spruce were attacked by the spruce weevil, *Pissodes strobi*, in three untreated stands near Terrace.

On the Queen Charlotte Islands, a weevil, *Steremnius carinatus*, caused 20% to 50% mortality of 1-year-old Sitka spruce in plantations at South Bay and the

TABLE 5

Pest Conditions In Young Forest Stands
British Columbia, 1981

Tree Species	Stand Type	Stands Examined	Pest Problems	
			Minor	Major
Douglas-fir	Natural	7	Swiss needle cast, needle blight, needle rust, shoot miner, frost damage	<i>Phellinus</i> , bark beetles
	Spaced	20	Swiss needle cast, needle rust, shoot miner, gall aphid	<i>Phellinus</i> , <i>Armillaria</i> , beetles in felled trees, <i>Phomopsis</i> canker
Lodgepole Pine	Natural	16	Stem and gall rust, terminal weevil, pitch twig moth	Dwarf mistletoe, <i>Atropellis</i> canker
	Spaced	40	Animal damage, browsing, terminal weevil, needle miner, needle cast, sheath miner, stem and cone rust, pitch twig moth	Rabbit and squirrel damage, stem and gall rust, <i>Armillaria</i> , <i>Atropellis</i> canker, root weevil, pitch moth
White Spruce	Natural	1	Nil	Leader weevil
	Spaced	8	Needle rust, spruce aphid, frost damage	Leader weevil
Sitka Spruce	Natural	1	Nil	Leader weevil
	Spaced	3	Nil	Spruce aphid, root collar weevil
Western Hemlock	Spaced	11	Canker, needle rust, annosus root rot	Dwarf mistletoe
Alpine Fir	Spaced	4	Needle rust	Nil
Black Spruce	Spaced	4	Nil	Nil
Coast Mixed (wH, aIF, wL, sS, IP)	Natural	9	Rodent damage (IP), gall rust (IP)	Pine leaf chermid (sS), balsam twig aphid (aIF), needle cast (sS), needle rust (wH), woolly aphid (IP)
	Spaced	4	Nil	Nil
Interior Mixed (D, IP, pP, eS, wL)	Spaced	2	Needle cast, windthrow (wL)	Dwarf mistletoe (IP and wL), gall rust (IP)

spruce aphid, *Elatobium abietinum*, caused up to 60% defoliation of young trees near the shoreline. *Fomes annosus* root rot was present in 1% of the trees in stands being spaced at Juskatla, where high stumps were left to minimize infection.

Of seven lodgepole pine stands examined, which were being spaced in the Prince George Region, four were free of pests, but up to 90% of the stems in three stands were infected by the globose gall rust, *Endocronartium harknessii*. Six mixed stands examined were free of pests.

In the Nelson Region, in three spaced stands, an average of 30% of the lodgepole pine were infected by *E. harknessii*, and while no mistletoe was present in the stands, nearby unspaced stands had extensive mistletoe infection. At Spillimacheen, in a spacing and fertilization trial, rabbit damage in recent years was the most prevalent problem, affecting 12% of the trees in unspaced stands and 62% and 81% of the trees in spaced stands. Additional problems were globose gall rust infections on stems and branches of 13% of the trees; lodgepole terminal weevil, 3%; browsing, 1%; and pitch nodule maker, more than 1%. The root collar weevil, *Hylobius warreni*, killed 5% of the pines in a provenance trial in White River.

In the Beaverfoot River Valley, 7% of the Engelmann spruce adjacent to the skid trails in a commercial thinning project had been scarred. In a 6-year-old plantation at Arrow Lake, 55% of the Douglas-fir trees had double leaders from browsing and attack by a terminal boring insect, *Diorcyctria* sp., as did 70% of the trees at Santa Rosa Summit east of Christina Lake.

In the Cariboo and Kamloops Regions, stem rusts and globose gall rusts were present on stems of 10% to 45% of the lodgepole pine in spaced stands at several locations. Scattered trees in three stands displayed symptoms of *Armillaria mellea*. Of 13 lodgepole pine stands examined in the Kamloops Region, the lodgepole terminal weevil was present only at Aberdeen Lake, where 11% of the 1981 leaders were attacked. In spaced stands at Lac Le Jeune and Upper Jamieson Creek, partial and complete girdling of stems and branches by squirrels occurred on 20% of the pines.

ROOT ROTS

Root rots are a widespread, perennial problem in coniferous forests in the province and have considerable impact on long-term forest management plans, particularly thinning, spacing, and reforestation.

Annosus root rot, caused by *Fomes annosus*, was common in a Sitka spruce-western hemlock stand in localized patches over 8 to 14 ha at kilometer 84 and kilometer 86 of the Nass River-Cranberry River Road in the Prince Rupert Region. Many infected trees had been windthrown. The heart rot, *Echinodontium tinctorium*, was present in about 40% of the trees. Scattered pockets of white spruce trees infected with the red root and butt rot fungus, *Polyporus tomentosus*, were found in 60% of the spruce stands examined in the interior of the region. In addition to growth loss, blowdown susceptibility, and tree mortality, infected trees and the resulting blowdown create ideal centers for spruce beetle populations to develop.

In the Kamloops Region, there is widespread infection of Armillaria root rot, *Armillaria mellea*, in Douglas-fir stands from Douglas Lake north to Louis Creek and Deadman River Valley. Mortality of nonvigorous trees on poor sites is common. Infection of lodgepole pine occurs in pockets in the North Thompson River Valley between Hornet Creek and Mad River, where an estimated 65 trees per hectare are being killed annually over 400 ha, where sawflies had severely defoliated the trees in 1976-1978.

In the Nelson Region, *Armillaria* is a major problem along the west side of Upper Arrow Lake, where juvenile spacing of stands was curtailed because of it.

In the Vancouver Region, areas of scattered Douglas-fir mortality, similar to that caused by the laminated root rot, *Phellinus weirii*, were recorded during aerial surveys along Nepopkum Creek off the Skagit River and Uztlius Creek off Anderson River. The disease is widespread in the Powell River Area and was present in a spaced stand at Slesse Creek and in second-growth stands near Lizzie Creek on the Lillooet River.

Using the stand survey method developed at PFRC, the B.C. Ministry of Forests and the forest industry assessed *P. weirii* damage at a number of locations on Vancouver Island and the Lower Mainland. The total area of stands involved was 840 ha, of which 9% (range 1% to 45%) were in root rot centers (Table 6).

TABLE 6

Intensity of Root Rot, *Phellinus weirii*, in Selected Young Stands
Vancouver Forest Region
1981

Location	Stand Area (ha)	% of Stand In Root Rot Centers
DUNCAN		
Mesachie Lake	61	11
McKay Lake	171	4
" "	105	8
Beaver Lake	95	10
" "	13	5
Shawnigan Lake	16	4
PORT ALBERNI		
Stamp Falls	220	6
CAMPBELL RIVER		
Quinsam Lake	13	3
" "	20	1
" "	12.5	2
" "	18	4
CHILLIWACK		
Klesilkwa River	15.4	45
" "	2.9	24
Skagit River	38.4	10
POWELL RIVER		
Powell River	6	5
Okeover Inlet	23.5	6
Scuttle Bay	49	9
Siammon Creek	40	1
Siammon Lake	44.5	11
" "	33	8
Lang Creek	14.8	16
" "	26.4	3
Total	840.4	9 (average)

ANIMAL DAMAGE

Partial and complete girdling of stems and branches by squirrel feeding occurred on 20% of the immature lodgepole pine in spaced stands at the Cahilty and Jamieson Creeks and on 50% of the stems (no branch damage) at Lac Le Jeune in the Kamloops Region. In a spacing and fertilization trial area near Spillimacheen in the Nelson Region, 12% of the lodgepole pine in an unspaced stand was damaged by rabbit feeding (10% old, 2% new); 62% in 1.8

meter spacing (52% old, 10% new); and 81% in 3.6 meter spacing (51% old, 30% new). The felled trees, no doubt, provide shelter, enabling the rabbits to feed freely on the leave trees.

In the Yukon, rabbit feeding stem-girdled 5% to 30% of the seedlings and sapling-size lodgepole pine, trembling aspen, and other deciduous trees at widespread locations. Damage was heavy throughout the Takhini nursery and surrounding stands near Whitehorse.

Deciduous Tree Pests

LEAF AND TWIG BLIGHT OF POPLAR *Venturia* spp.

Browning and dropping of foliage of poplars, caused by *V. populina*, was widespread in the Fraser Valley and Lower Mainland Area of the Vancouver Forest Region. The problem was most evident in late summer, when almost all trees along the Fraser River to Hope and in the Fraser Canyon showed signs of infection.

In the Prince Rupert Region, cottonwoods in the Bella Coola Valley were moderately to severely discolored from the village east to Atnarko, and light infection occurred along Babine Lake. Infection of trembling aspen by *V. macularis* was severe over several thousand hectares along the Stewart-Cassiar Highway and was moderate in patches throughout the Bulkley Valley, in the Kispiox River drainage, and along Francois Lake.

In the Prince George Region, light to moderate damage occurred in small patches at the Stuart and Williston Lakes and in the Vanderhoof Area.

OAK LOOPER *Lambdina somniaria*

Oak loopers severely defoliated Garry oak and

Douglas-fir trees in a localized area of 16 ha on Saltspring Island. This is the first reported defoliation since the last outbreak in the Greater Victoria Area in 1958-1961, when some Douglas-fir trees were killed. Egg counts indicate the infestation will continue in 1982.

LARGE ASPEN TORTRIX *Choristoneura conflictana*

In the Prince George Forest Region, trembling aspen stands were defoliated along the Alaska Highway from Trutch Mountain to Muncho Lake and Liard to Fireside. Light defoliation in small patches occurred in the Chetwynd, Dawson Creek, and Fort St. John Areas and near Vanderhoof.

Infestation in the Yukon continued to cause moderate and severe defoliation on more than 50,000 ha, in patches of 50 ha to over 1,000 ha, with severe defoliation at Teslin Lake, Aishihik River, Snag, Dawson City, Little Salmon Lake, and Little Atlin Lake.

At Aishihik River, severe defoliation for several years has killed an estimated 8% of the trees on 500 ha and 30% of the living trees have top and branch dieback.

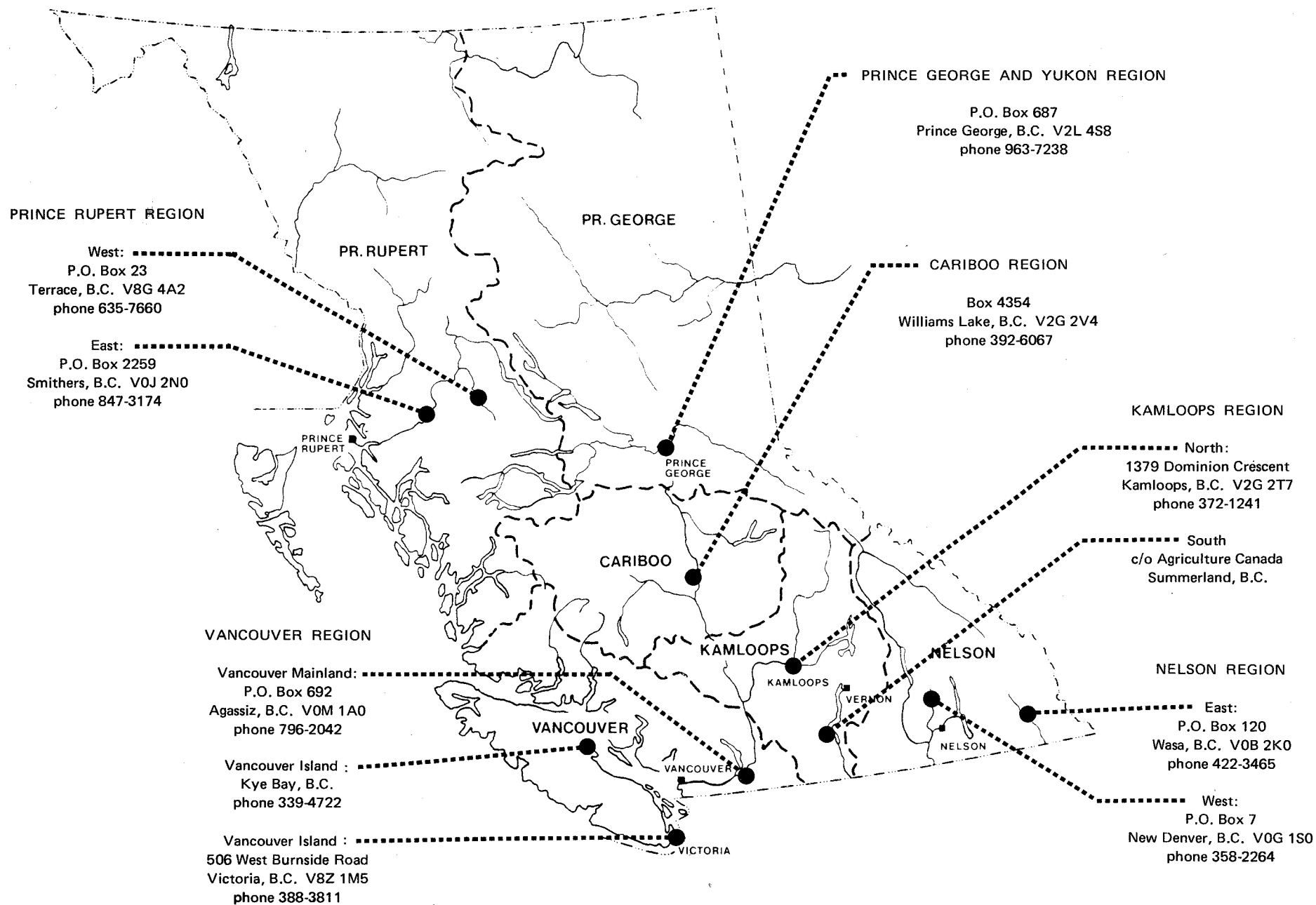
Other Noteworthy Insects and Diseases

PEST	REGION	LOCATION	HOST	REMARKS
Aspen leaf miner <i>Phyllocnistis populiella</i>	Kamloops	Knouff Lake Road south to Lyons Lake	Aspen, trembling	All foliage over 100 ha decreasing to 20% in scattered groves to the south.
Birch leaf skeletonizer <i>Bucculatrix</i> sp.	Nelson	Golden-Invermere Area	Birch, white	Up to 75% of leaves skeletonized.
	Kamloops	Adams Lake		From 10% to 100% of leaves skeletonized in patches of up to 50 ha.
	Prince George	Mt. Robson Valemount Canoe Arm		
Cypress tip moth <i>Argyresthia</i> sp.	Vancouver	Victoria Area	Juniper Cedrus	Many ornamentals in area up to 90% defoliated.
Dichomera bud fungus <i>Dichomera gemmicola</i>	Nelson	Blueberry River	Douglas-fir	Up to 100% bud mortality on individual trees near Split Creek.
Douglas-fir needle midge <i>Contarinia</i> sp.	Kamloops	Jamieson Creek	Douglas-fir	Up to 75% of 1981 needles dis- colored and shed in patches along access roads.
Fall webworm <i>Hyphantria cunea</i>	Vancouver Kamloops Nelson	Widespread	Deciduous trees	Many roadside trees completely shrouded in webbing.
Hemlock needle rust <i>Pucciniastrum vacinii</i>	Vancouver	Cous Creek near Alberni	Hemlock, western	Lightly infected 80% of regenera- tion and mature trees.
Larch sawfly <i>Pristiphora erichsonii</i>	Nelson	N.E. of Canal Flats	Larch, western	Populations near Fernie and Spar- wood collapsed. Parasites were released in localized outbreak at Canal Flats.

(continued)

Needle cast <i>Lophodermium</i> spp.	Vancouver	Quinsam Lake Comox Lake Hornby Island Qualicum	Pine, lodgepole	Infection of 80% of trees at scattered locations.
Pine needle sheathminer <i>Zellaria haimbachi</i>	Prince Rupert	Ootsa-Francois Lakes Bulkley Valley Telkwa River	Pine, lodgepole	Light defoliation in patches.
Purple mold <i>Tuberculina maxima</i>	All regions		Pine, lodgepole	Negative reports of the occurrence of this mold on globose gall rust were of interest considering its potential as a control.
Red band needle blight <i>Scirrhia pini</i>	Prince Rupert	Hicks Hill Morice River	Pine, lodgepole	Up to 90% of trees with 25% infection in localized areas.
Shoot and tip blight of Douglas-fir <i>Sirococcus</i> sp.	Nelson	Lockhart Beach Prov. Park Christina Lake-Salmo	Douglas-fir	From 20% to 50% of branch tips killed on immature trees.
Spruce bud moth <i>Zeiraphera</i> sp.	Vancouver	Tofino Bamfield Area	Spruce, Sitka	Light defoliation of branch tips.
Spruce sawflies <i>Pikonema</i> spp.	Nelson	Fernie Cranbrook		Severe defoliation of lower crowns of trees at localized spots.
Spruce tip moth <i>Griselda radicana</i>	Nelson	Toby Creek Horsethief Creek	Douglas-fir	Defoliated 60% of new growth.
White pine foliage weevil <i>Scythropus elegans</i>	Vancouver	Shawnigan-Renfrew Road Area	Pine, western white	From 30% to 80% of needles discolored and defoliated at two locations.
Willow leaf skeletonizer <i>Pyrrhalta carbo</i>	Vancouver	Campbell River Campbell Lake	Willow	All willows up to 100% discolored.
Winter moth <i>Operophtera brumata</i>	Vancouver	Greater Victoria	Deciduous trees	Infestation persisted for 8th year with severe defoliation. The first parasites were recovered from releases in 1979-1981.

SEASONAL ADDRESSES OF FOREST INSECT AND DISEASE SURVEY RANGERS



Canada

35441