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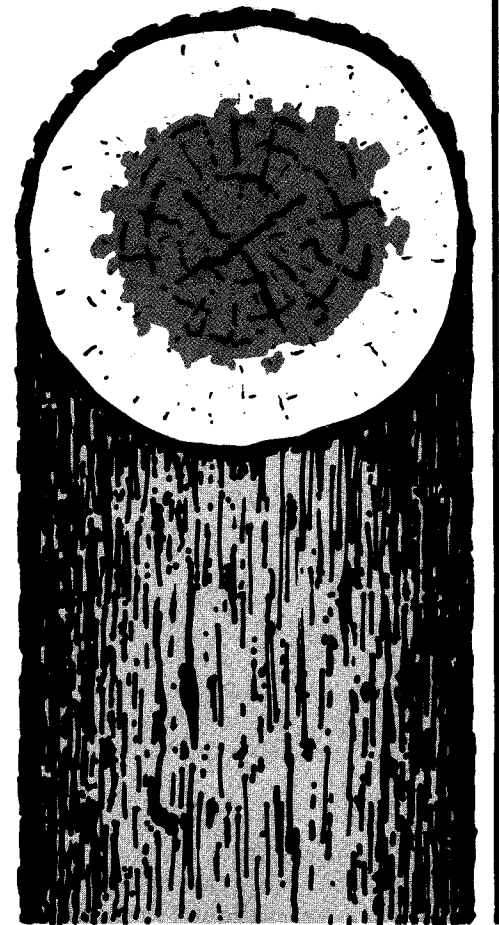
Service
des Forêts

Forest Insect & Disease Conditions

BRITISH COLUMBIA & YUKON / 1979

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CANADIAN FORESTRY SERVICE
PACIFIC FOREST RESEARCH CENTRE



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The Forest Insect and Disease Survey in the Pacific Region annually conducts a general survey of important forest pest conditions in British Columbia and the Yukon to monitor the occurrence, incidence and fluctuation of important forest insects and diseases and their subsequent damage. From late May through September, pest survey technicians assess pest populations during extensive ground surveys, conduct aerial surveys recording observations by sketch mapping and aerial photography, and evaluate specific occurrences of damage, frequently with other forestry agencies. This report is a summary of field records and reports submitted by field technicians who, in 1979, were assigned to the following districts. (More detailed information is contained in file reports.)

E.V. (Ernie) Morris	Vancouver Mainland
C.B. (Cliff) Cottrell	Vancouver Island (to mid-June)
R.G. (George) Brown	Vancouver Island (after mid-June)
D.F. (Don) Doidge	East Prince Rupert
H.P. (Peter) Koot	West Prince Rupert
J.S. (Jack) Monts	Prince George & Yukon
S.J. (Stan) Allen	Cariboo
R.J. (Dick) Andrews	North Kamloops
L.S. (Leo) Unger	South Kamloops
R.D. (Bob) Erickson	West Nelson
C.S. (Colin) Wood	East Nelson

Winter mortality of mountain pine beetle populations resulted in a reduction in the number of trees attacked during 1979 in some areas. All infestations are continuing, and in East Kootenay, beetle populations were sufficiently high in the lower Flathead Valley on both sides of the International Boundary that substantial numbers of trees were attacked in 1979.

While spruce beetle populations appeared to remain static in the Prince Rupert Region, infestations increased in the Prince George Region north of Fort St. James and east of Hixon in the Stoney Lake area.

Douglas-fir beetle attacks were not restricted to, nor particularly significant in, spruce budworm defoliated stands in the Fraser Canyon.

Spruce budworm populations declined in the Pemberton - Lillooet River area but continued in the Fraser Canyon and western portion of the Kamloops Region. The 2-year-cycle budworm increased

significantly in the Prince George and Cariboo regions and persisted in several locations in Kamloops and Nelson regions.

Larch needle cast and casebearer defoliation of western larch was prominent in many stands in the Kootenays, and larch sawfly infestations increased in the Sparwood - Fernie area.

Pines infested by European pine shoot moth were found at several locations in the Okanagan.

Conifer sawflies severely defoliated amabilis fir and western hemlock in at least two areas on Vancouver Island and several locations in the Prince Rupert Region.

The winter moth continued as a problem of shade and fruit trees in the Greater Victoria area.

Several other insects caused noticeable damage, such as weevil-killed leaders of pines and spruces, aphid damage to foliage or branch terminals, and discoloration and defoliation of deciduous trees.

Seed and cone pests were a problem in a better than average cone crop in northern British Columbia.

Weather damage on coniferous trees was prevalent and conspicuous throughout the Province.

Dwarf mistletoes continued to present problems in many areas designated for intensive forest management.

Needle casts of pines, while not as severe as last year, affected trees at a number of locations.

Blister rust, gall rusts and *Atropellis* canker of pines caused damage in young and mature stands.

To determine the incidence and distribution of some damaging native and introduced insects, 1200 pheromone-baited traps were placed at various locations in the province in 1979 to attract and trap adult males of the 1 and 2-year-cycle spruce budworms, blackheaded budworm, Douglas-fir tussock moth, European pine shoot moth, European elm bark beetle and the gypsy moth. The gypsy moth trapping program began in southern B.C. in 1975 and to date no adults have been trapped outside the Kitsilano area in Vancouver, where a very localized infestation occurred in 1978.



MOUNTAIN PINE BEETLE

Dendroctonus ponderosae

Aerial surveys, completed in August, revealed significant lodgepole pine mortality on more than 82 000 ha in the Interior of the Province, resulting from the 1978 beetle attack. Infestations occurred on some 23 000 ha in the Nelson Forest Region, of which more than 20 000 ha were in East Kootenay, where 4.5 million trees were killed compared to 425,000 in 1978. The expansion and intensification of the epidemic was particularly noticeable in the Flathead River Valley and the tributary valleys from Sage Creek south into the Kishinena - Akamina valleys, where the outbreak has increased from a number of small localized areas in the spring of 1978 to encompass all of the pine stands in the valley, and extends east into Waterton Park. The number of trees attacked in 1979 is equal to, or greater than in 1978, reflecting a northward migration of beetles from the devastated stands in Montana, thus nullifying an anticipated levelling off or reduction indicated by overwintering mortality of beetle broods.

West of Kooacanusa Lake, small groups of beetle-killed pine were recorded in 1978 in Ward and Gilnockie creeks. In 1979, the infestation increased significantly northward into Caven and Plumbob creeks. East of Kooacanusa Lake, pockets of 5 to 25 beetle-killed pine occurred near Kikomun Creek and the potential for a serious outbreak exists. Winter falling and burning of infested trees is being considered to reduce the beetle population and slow the progress of the infestation.

Pine stands in the White River, Kootenay River and Elk Creek valleys have been largely destroyed by the beetle since 1971, with increases in the extent and intensity of infestations from Lussier River - Coyote Creek area north through Whiteswan Lake, east into the Junction of the North, East and Mid White rivers; in the main White River Valley including Elk Creek; in the Kootenay River Valley north into Kootenay National Park and in adjacent Cross, Palliser and Albert River valleys. The 1979 attack is somewhat reduced from the 1978 level owing to overwintering beetle mortality and the reduction in available suitable host material.

West of the Columbia River, the number of lodgepole pine killed increased from the north end of Columbia Lake to Toby Creek and on the west slope of Steamboat Mountain between Invermere

and Spillimacheen. Significant increases in numbers of lodgepole and western white pine were recorded near Donald and adjacent to the highway to Beaver-mouth, around Waitabit Creek and east along the north shore of Bush Arm to Bush River, Lyell Creek and Valenciennes River. Pockets of attacked trees were evident south of Golden to Parson on the west side of the river, adjacent to Beaverfoot River in Glacier National Park, west of Field in Yoho National Park, and in the Blaeberry River Valley.

In West Kootenay, the beetle continued to kill lodgepole pine, with a doubling in the number killed to 10,000 on 1 376 ha compared to 5,200 in 1978. Most of the increase occurred along the West Kettle River, but a few small new infestations were recorded at Chapleau Creek near Slocan, with 750 recently killed trees, and near Taurus Lake along the West Kettle River, with 160 killed trees. There was also an increase in the number of western white pine killed, to 4,825 on 470 ha from 2,750 in 1978. The largest increase, from 350 trees to 1,500, occurred on 80 ha at Downie Creek. New localized infestations were recorded along Goldstream River, Carnes and La Forme Creek and on the west side of Slocan Lake.

In the Prince Rupert Region, infestations were mapped on approximately 4 800 ha with an estimated 29,000 lodgepole pine killed by the 1978 beetle attack. General areas of infestation were Skeena - Hazelton West 1 340 ha; Kispiox River Valley 550 ha; Suskwa River Valley 2 160 ha; Bulkley River Valley 170 ha; Babine Lake East 205 ha, and north of Kitwanga 380 ha. The most severe infestations continued in the largely inaccessible Harold Price Creek on 1 600 ha, with 12,000 dead trees, and along Suskwa River on 520 ha and 3,200 dead trees. The infestations are continuing to expand, with significant current attack occurring at most locations.

Lodgepole pine trees killed by 1978 beetle attack were numerous in the Cariboo Region in the Charlotte Lake - Tatla Lake - Puntzi Lake area, Alexis Creek - Riske Creek area, Dog Creek - Jesmond - Clinton area, Springhouse - Williams Lake and Cariboo Lake and River. These infestations now cover 31 225 ha, with new infestations at Matthew River - Cariboo River junction, Meadow Lake and in the Dean River Valley north of Anahim Lake. The largest infestation, which had spread from the Klinaklini River, where most of the pine has been killed, now encompasses some 20 000 ha, up from 13 000 ha in 1978. On cruise strips in the Cariboo Region, the number

of trees attacked in 1979 was significantly higher than in 1978.

In the Kamloops Region, infestations occurred over more than 23 000 ha. Increased numbers of trees, killed by beetle attack in 1978, were evident in all infestation areas, particularly near Goldbridge and the Stein River area, where infestations occurred over more than 5 000 ha, Hayes - Trout creeks 5 600 ha, Lambly - Terrace creeks 1 500 ha, Shorts - Whiteman creeks 1 600 ha, Belgo - Mission creeks 2 700 ha and Ashnola River 1 000 ha. Salvage logging is in progress in most of the infestations.

The following table shows the status of trees on cruise strips. On 20 of 37 strips, less than 50% of the pines remain healthy and on 8 of the strips, significantly less than 50% of the pines are healthy.

EUROPEAN PINE SHOOT MOTH

Rhyacionia buoliana

A continuing federal-provincial cooperative survey of the Okanagan for shoot moth located infested pines at 17 locations in Summerland, 41 in Kelowna and 2 in Kamloops. Of 86 infested pines, 43 were Scots pines, 33 mugho, 8 ponderosa and 2 Austrian. Infested pines were removed or treated by clipping and burning infested shoots and spraying.

The insect has been present in the area for a number of years and although eight native ponderosa pines were infested, it alone has not apparently been particularly attractive for establishment and reproduction of the shoot moth.

PINE NEEDLE SHEATHMINER

Zelleria haimbachi

This insect occurs commonly in the Kamloops Region and, in 1979, severely defoliated the current year's growth of lodgepole pine at four locations, totalling 1 190 ha near the North Thompson River Valley: 630 ha near Vavenby, 250 ha along Reg Christie Creek, 190 ha near Trout Creek and 120 ha along Clearwater River. Previous infestations have not caused any tree mortality.

Small, isolated patches of lodgepole pine were defoliated in the Fraser Canyon in Vancouver Region.

STEM AND BRANCH DISEASES OF PINES

Blister rust cankers and gall rust swellings were prevalent in two young pine stands in the Quesnel River Valley near Sardine Creek in the Cariboo Region. The western gall rust, *Endocronartium harknessii*, frequently affected many branches; Stalactiform rust, *Cronartium coleosporioides*, and Comandra rust, *Cronartium comandrae*, caused branch and stem infections. Spacing of these stands was not recommended as the rust will gradually kill many of the suppressed trees, thus causing a natural thinning of the stand.

Western gall rust was prevalent on lodgepole pine plantations in the Genevieve Lake area, southwest of Hixon in Prince George Region. Numerous branch galls occurred on over 60% of the trees and approximately 20% of the trees had galls on the main stem.

In the Prince Rupert Region, Stalactiform rust infections, most frequently of the bole, occurred in 36% of the 15- to 30-year-old lodgepole pine checked at Byman Creek, 20% of 10- to 20-year-old pine in a thinned stand on the Perow burn, and 40% in a similar stand at Co-op Lake near Burns Lake.

Up to five cankers per tree, caused by *Atropellis piniphila*, occurred on 90% of the lodgepole pine in a mixed stand on Blackwater Ridge northwest of Donald in East Kootenay.

East of Penticton in Penticton Creek Valley, severe infections of *A. piniphila* occurred on young 15- to 20-cm diameter lodgepole pine. Approximately 800 ha were affected, with 96% of the trees examined averaging 3.8 cankers per tree. Stem deformity resulting from the cankers will considerably reduce the commercial value of the trees.

All whitebark pine trees in a 1 000 ha mixed pine-alpine fir stand along McLatchie Creek in East Kootenay were infected with white pine blister rust, *Cronartium ribicola*.

NEEDLE DISEASES OF LODGEPOLE PINE

A needle cast, *Lophodermella concolor*, caused moderate discoloration and needle drop of open growing pine trees for 4 km along Three Forks road and was severe between km 48 and 51 on the

Status of Lodgepole Pines on Cruise Strips
in Areas Affected by Mountain Pine Beetles
1979

Region	Location	Percentage of stems			
		Healthy	Current attack	Red 1978 attack	Gray
Nelson	Goathide Cr	82	6	1	11
	Arlington L	43	19	18	20
	Procter L	33	54	11	2
	Lemon Cr	0	50	30	20
	Blackwater Ridge	45	21	8	26
Prince Rupert	Harold Price Cr	86	12	1	1
	Shegunia Cr	48	15	34	3
	Skunsnat Cr	35	49	13	3
	Upper Kispiox R	40	20	10	30
	Woodcock	13	0	26	61
Cariboo	Joes Lake Rd.	85	4	5	6
	Tatla L	76	12	8	4
	McClinchy Cr	77	7	4	12
	Tatlayoko Rd.	47	22	9	22
	China L Rd.	77	12	2	9
	Vert L	38	18	1	40
	Beaumont L	68	14	4	14
	Big Cr Rd.	84	5	7	4
	Big Cr X Rd.	57	30	8	5
	Thaddeus L	44	13	12	31
Drummond L	29	34	18	19	
Kamloops	Gwyneth L	25	59	14	2
	Gun Cr	32	41	24	3
	Pearson Ridge	29	42	23	6
	Mowson Pond	57	19	17	7
	McDonald Cr	58	35	1	6
	McDonald L	36	52	12	0
	Truax Cr	14	79	0	7
	Pearson Cr	92	8	0	0
	Agur L	63	23	12	2
	Isintok Cr	46	33	6	15
	Link L	90	3	5	2
	Thirsk L	44	44	4	8
	Trout Cr	48	4	22	26
	Ashnola R	45	26	27	2
	Summers Cr	62	22	12	4
Summers Cr	38	4	28	30	

Ashnola River road in Kamloops Region. *Scirrhia pini* was also present in the stands.

After severe infection of most lodgepole pine stands in East Kootenay in 1978, the infections persisted only in localized immature, dense stands. More than 50% needle loss occurred along lower Quinn Creek and the upper Bull River Valley. Often only current foliage remains on the trees.

SPRUCE BEETLE

Dendroctonus rufipennis

The only significant spruce beetle activity occurred in the northern portion of the Province in the Prince George and Prince Rupert regions. Severe^{1/} infestations occurred on 9 900 ha east of Hixon, near Stoney Lake, and there were light and moderate infestations on 43 000 ha north of Fort St. James at Trembleur and Kazchek lakes and in scattered areas along the Bowron, McGregor and Parsnip River drainages and near Takla, Tarnezell and Tchentlo lakes. New Infestations may arise following adult beetle attacks on fresh windfall and slash material accumulated over the winter in the Naver, Bowron and Willow River drainages south of Prince George, along the Parsnip River and Weedon Lake to the north, and at Tezzeron and Takla lakes north of Fort St. James. Bark samples from 10 recently downed trees at each of five locations in the above areas averaged 2.8 adults per 450 cm², indicating an increasing population.

To the west, in the Prince Rupert Region, the total area of spruce beetle infestations declined to 11 170 ha from 16 800 in 1978. A 2-year trap tree program and salvage logging of dead and infested trees near Smithers Landing contributed to the reduction. The largest infestations were on the east side of Babine Lake 2 360 ha, Chapman and Fulton lakes 2 900 ha, Morice River drainage 1 300 ha, Telkwa area 3 050 ha. Other outbreaks ranged from 160 to 550 ha.

Extensive areas of white spruce were wind-thrown in the fall of 1978 in the Chapman - Guess lakes and Walcott areas. The windthrown trees were generally lightly attacked in most areas, but even so, the vast amount would absorb large numbers of

^{1/} light - 1-5% of spruce attacked
 moderate - 6-30% of spruce attacked
 severe - 31% + spruce attacked

beetles. Many of the windthrown trees have root contact with the soil and will probably remain susceptible to beetle attack for 1 or 2 more years; i.e., continue to absorb most of the beetles produced, thereby minimizing attacks on standing green trees.

To determine tree condition and the status of infestations, results from cruise strips, with 211 prism plots, are tabulated below.

Currently, the spruce beetle populations appear to be declining in the Prince Rupert Region. However, the large amount of windfall could trigger a population increase which would pose a threat to other stands in the next 2 or 3 years.

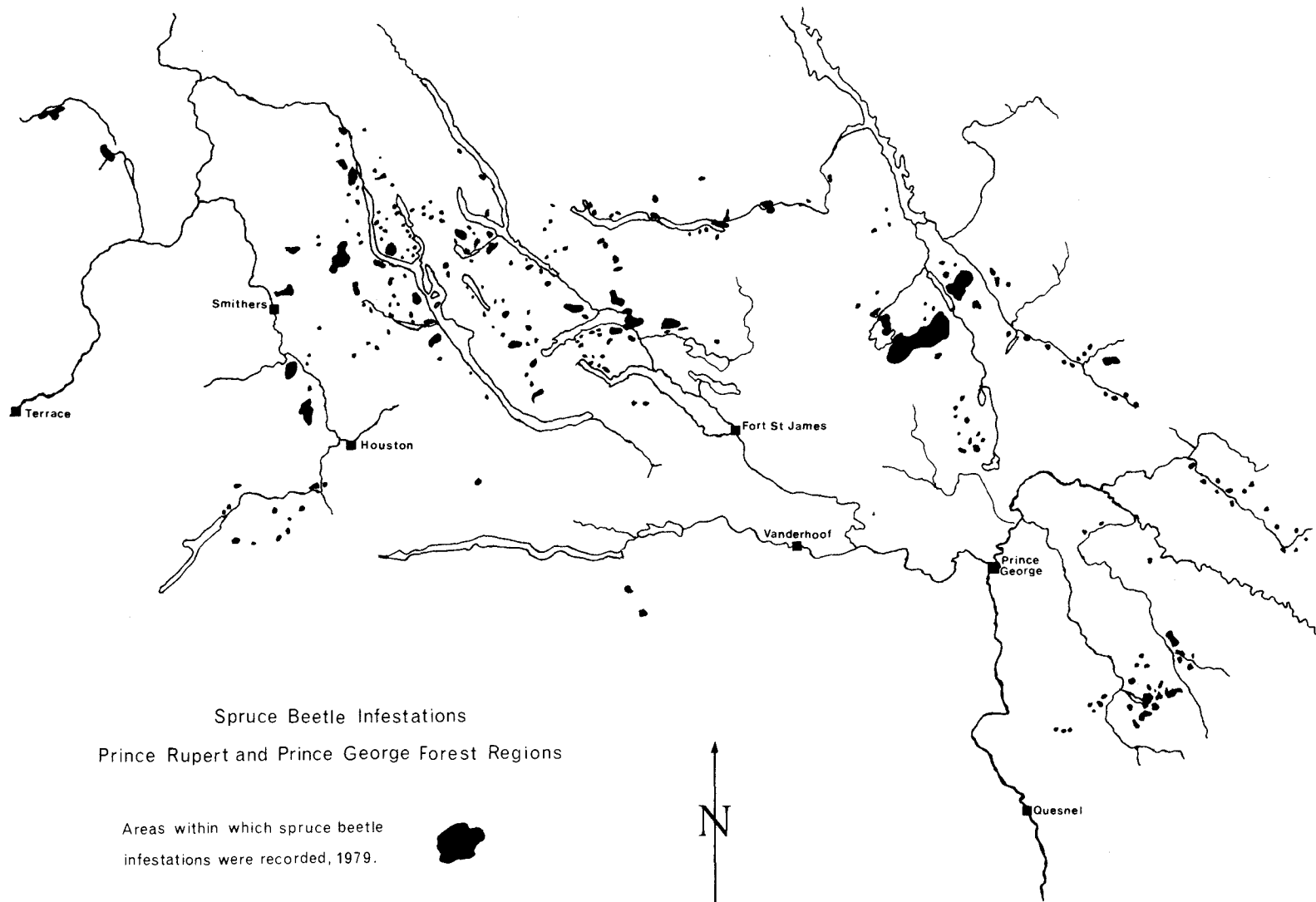


Spruce Beetle Galleries. Note larvae at ends of galleries.

DOUGLAS-FIR BEETLE

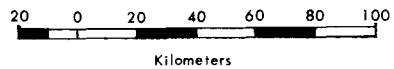
Dendroctonus pseudotsugae

There was a slight increase in the number of Douglas-fir trees killed by beetles within stands severely defoliated by spruce budworm in the Fraser Canyon from Yale to Boston Bar, although the overall number of beetle-killed trees throughout the defol-



Spruce Beetle Infestations
Prince Rupert and Prince George Forest Regions

Areas within which spruce beetle
infestations were recorded, 1979.



Status of White Spruce on Cruise Strips
In Stands Affected By Spruce Beetles,
Prince George and Prince Rupert Forest Regions,
September, 1979.

Location	Percentage of stems					Trend
	Healthy	Current ^{1/}	Red ^{1/}	Partial ^{1/}	Gray ^{1/}	
PRINCE GEORGE REGION						
Fort St. James District						
Trembleur L	40	19	10	25	6	Increasing
Kloch L	50	12	5	23	9	Increasing
Kazchek L	35	15	12	19	19	Increasing
Hixon District						
Roadhouse L	78	6	4	8	4	Static
Stephanie Cr	57	40	3	0	0	Increasing
N.E. Stoney L	31	50	8	11	0	Increasing
Summit Lake District						
South War L	72	0	4	7	17	Decreasing
War L	81	0	6	6	7	Decreasing
Hodda Cr	72	5	1	20	2	Static
Parsnip R	82	2	0	14	2	Static
PRINCE RUPERT REGION						
Granisle	93	0	3	2	2	Decreasing
Telkwa	46	12	8	8	26	Static
Cranberry Jct.	92	0	0	0	8	Decreasing

^{1/} Current - attacked in 1979
Red - attacked and killed in 1978
Partial - 1979 attack on only one side of tree
Gray - killed prior to 1978

iated stands remained relatively low in the Vancouver Region. At Shovelnose Creek, near Squamish, a trap tree program successfully reduced the beetle population and no new standing tree attacks occurred.

In the Kamloops Region, a general reduction in the number of killed trees occurred, although recently killed trees occurred along Tranquille Creek and around the perimeter of the previous tussock moth infestation at Jamieson Creek and from Westsyde to McLure. Small groups also occurred in the Bridge River, Ashcroft, Kwikoit Creek and Lytton areas. A trap tree program in the Jamieson Creek area over the last 2 years contributed to a significant reduction in the beetle populations and no doubt resulted in fewer healthy trees being attacked.

In the Cariboo Region, recently killed Douglas-fir trees were more abundant in several areas. Small groups of 50 to 100 trees were reported in the Atnarko River Valley near the junction of the Hotnarko River, on the north side of the Canoe Creek Valley, west of Jesmond, Big Bar Creek Valley and north and west of Meldrum Creek.

In 75 budworm affected stands current bark beetle attacks were present in only four (5%) and usually only a few trees were attacked in each stand; 20% of the stands had been previously attacked. Spruce budworm defoliated trees appear unable to support and produce healthy beetle broods.

WESTERN SPRUCE BUDWORM

Choristoneura occidentalis

Defoliation of Douglas-fir by spruce budworm occurred on 48 800 ha compared to 32 900 in 1978 (see map). The area of defoliation in Vancouver Forest Region decreased from 25 200 ha in 1978 to 19 800, of which 5 200 were severe, along the Coquihalla and Skagit rivers and tributary valleys, Siwash Creek and near Keefers in the Fraser Canyon. There was very little budworm defoliation west of the Fraser River and the infestation in the Pemberton - Lillooet River area collapsed.

In the Kamloops Forest Region, the infestation continued in Jimmies Creek and the Indian Gardens Creek area and noticeable defoliation occurred near Walhachin, Ashcroft and Cache Creek, east of Spences Bridge along Pimainus Creek, Soap Lake and south of Lytton on the west side of the Fraser River to Kwoiek Creek. Moderate larval popu-

lations were found throughout these areas.

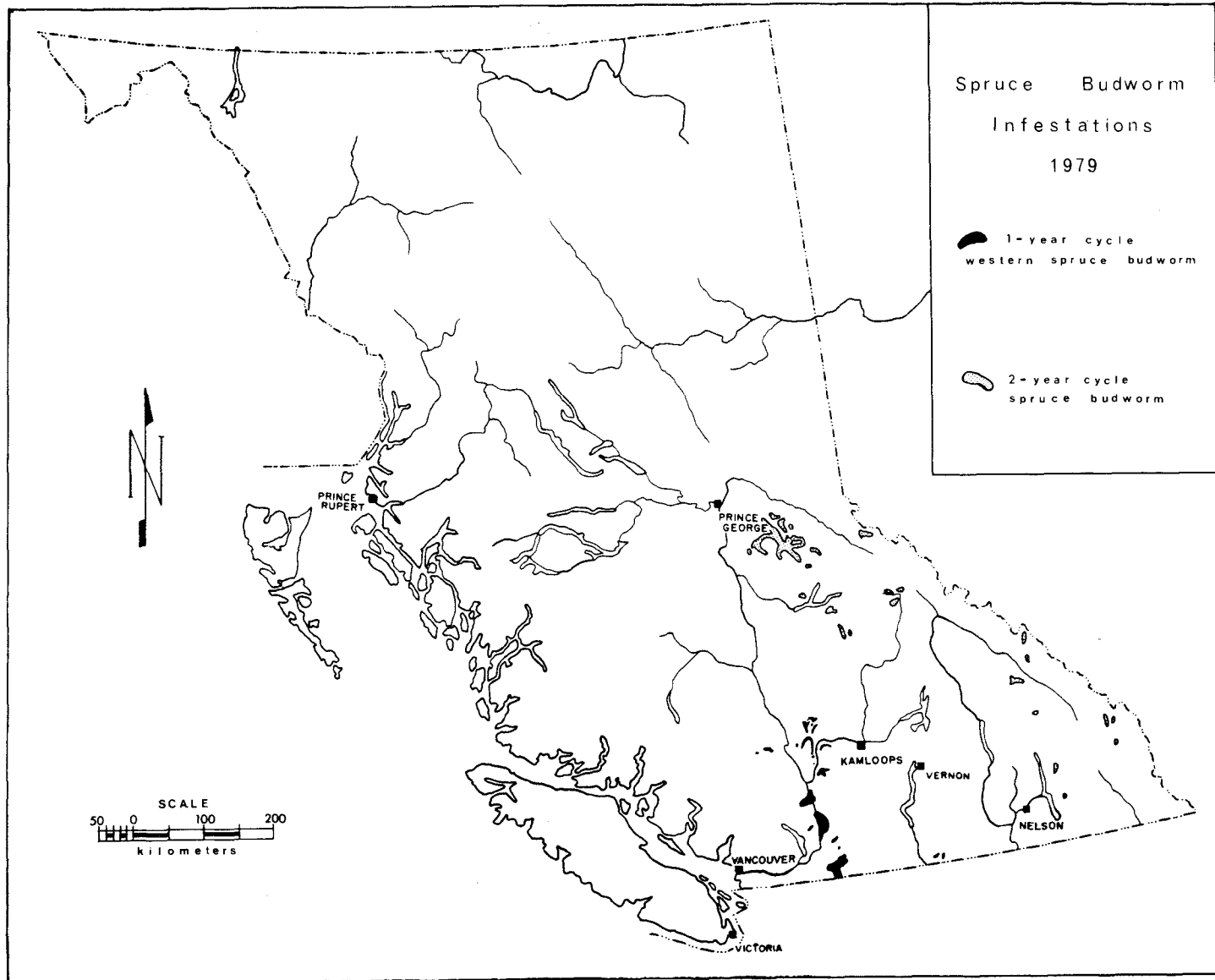
To the north of Cache Creek in the Cariboo Region, defoliation occurred on 3 100 ha in the Hart Ridge, Maiden Creek and Loon Lake areas. Scattered patches of severe defoliation occurred throughout the stands, where larvae had consumed all the new foliage and stripped the top metre on trees (See map).

Little evidence of disease was found in larvae submitted to the Forest Pest Management Institute from various locations within the infestation. About 25% of the larvae and pupae were parasitized in collections reared at the insectary.

Egg surveys in September to predict the budworm population for 1980 produced eggs at 16 of 23 locations in the Vancouver Region, at all 13 locations sampled in the Kamloops Region and 2 in the Cariboo. Based on the number of egg masses, predicted defoliation for 1980 is moderate to severe in the Coquihalla and Skagit River areas and light to moderate along the east side of the Fraser River from Yale to north of Boston Bar. In Kamloops Region, severe defoliation should occur at all areas defoliated in 1978, except moderate at Soap Lake, Squianny Creek and Penny Lake, and light at Pimainus Creek. Severe defoliation is indicated at Hart Ridge and Loon Lake in Cariboo Region.

At 65 randomly chosen locations within the infestation, 37 in Vancouver Region and 28 in Kamloops, 100 trees were examined to determine the frequency and length of top kill after varying numbers of years of defoliation. Increment cores from five live trees at each location are currently being analyzed. Of 55 stands (see table) within the infested area, top kill on from 1 to 63% of the trees occurred in 44; tree mortality ranging from 1 to 14% occurred in 16. Ten additional stands in areas of severe damage, totalling 5 700 ha, mapped during aerial surveys, were assessed by helicopter. Areas of highest mortality were Tsileuh Creek, Spuzzum Mountain and Anderson Ridge.

Top killing generally occurred where budworm feeding was moderate to heavy for more than 2 years and increased in severity with each additional year of defoliation.



Region	No. of plots	No. of trees	Percentage of trees by length of top kill in metres				Tree mortality
			<1	1-2.9	3-4.9	>5	
Vancouver	27	2,738	12	3	0	0	2
Vancouver	10	1,004	17	21	16	3	24
Kamloops	28	2,851	17.4	0.4	0	0	0.8

TWO-YEAR-CYCLE SPRUCE BUDWORM
Choristoneura biennis

Budworm populations have been increasing in the Cariboo Region since 1972 and in the Prince George Region since 1976. In 1979, the area of infestation increased throughout much of the Interior of the Province, with the largest increase in the Prince George Region. Light defoliation of alpine fir and white spruce occurred on more than 76 000 ha in the Holmes River and Stoney Lake - Willow - Bowron River area (see map).

In the Prince Rupert Region, light defoliation of alpine fir occurred on approximately 100 ha at Skunsnat Creek on the Kispiox River.

In the 1950s, some 3 200 000 ha were infested and defoliated in the Prince George and Prince Rupert Forest regions.

In the eastern portion of the Cariboo Region light to moderate defoliation occurred over 24 000 ha from Hendrix Lake - Horsefly River north to, and including the Bowron Lake Provincial Park where 17 000 ha were defoliated.

In the Kamloops Region, at Lempriere Creek in the North Thompson Valley, there was severe defoliation of alpine fir and Engelmann spruce in 1979, the off-year of larval development when feeding is generally light. The stand has been heavily defoliated for the past 3 even years and the trees appear to be severely damaged. Elsewhere in the North Thompson Valley small patches of light defoliation occurred west of Gosnell and along Chappell, Clemina and Allan creeks.

In West Kootenay, light feeding occurred on new shoots of alpine fir and Engelmann spruce on a small area at the head of Koch Creek and was

light to moderate on 200 ha at the head of Plant Creek. In East Kootenay, defoliation of the new growth was light on 250 ha at the junction of the east and north forks of Sanca Creek; and moderate on 1 000 ha along McMurdo Creek, on 750 ha in St. Mary Valley and on 500 ha of mature timber on Lapointe Creek.

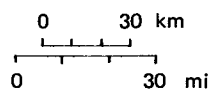
Severe defoliation of current year's growth occurred over 2 500 ha in north fork of White River extending east to the headwaters, and on 1 000 ha along the east fork from Stork Creek to Monroe Lake. Defoliation was very light in the south fork of Bugaboo Creek and moderate on understory alpine fir and Engelmann spruce in an area of large open cutblocks between Collie and Wildcat creeks.


LARCH CASEBEARER
Coleophora laricella

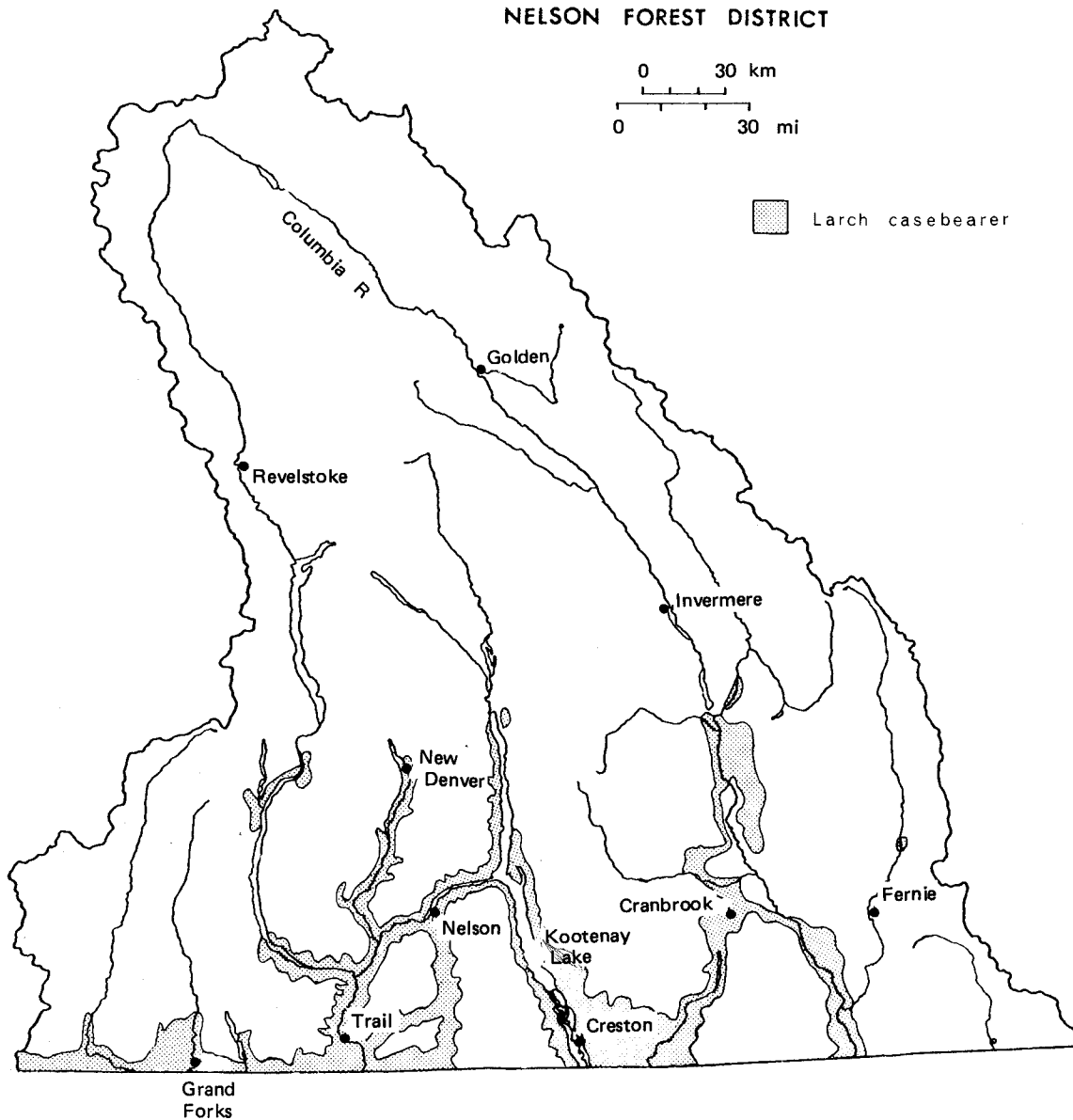
The spring defoliation of western larch occurred in the southern portion of the Nelson Forest Region (see map) at the same intensity as in 1978. Along the fringes of the infestation there were new pockets of 1-20 ha of severely defoliated trees and a spread of moderate defoliation into some valleys. 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 defoliation. On the fringe of the infestation from Christina Lake to Grand Forks, in the Fauquier,

Larch Casebearer Infestation 1979

NELSON FOREST DISTRICT



 Larch casebearer



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 has increased slightly.

In the Kamloops Forest Region, defoliation decreased. At Anarchist Mountain, defoliation was moderate in pockets of 1-5 ha; along part of Shuttleworth Creek Valley there were pockets of 1-5 ha of light defoliation, and near Cherryville there was no visible defoliation this year.

Counts of overwintering larvae at nine locations indicate a continuing population in 1980.

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. 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 and an assessment of overwintering cocoons indicates a similar pattern for the current infestation.

LARCH NEEDLE CAST

Hypodermella laricis

Sometimes confused with larch casebearer feeding, the similar foliage discoloration of western larch, caused by *H. laricis* infection, was prevalent in most larch stands in West Kootenay from Beaverdell to the Slocan Lake area and in localized pockets throughout the host range in East Kootenay. Loss of foliage occurred in stands where severe infection persisted for the past 2 years.

In the Kamloops Region, young larch over 200 ha on a north-facing slope at White Lake were moderately infected. Light to moderate browning occurred over 260 ha near the junction of Cherry, Currie and Monashee creeks, and a trace of discoloration occurred on larch throughout the Cherryville to Monashee Creek area.

CONIFER SAWFLIES

Neodiprion spp.

Defoliation of amabilis fir and western hemlock occurred over more than 4 400 ha southwest of Kelsey Bay. Collections of from 500 to 3,000 larvae were made on understory trees near Keta Lake, where defoliation was severe on 550 ha, moderate on 2 700 ha and light on 1 200 ha. The buds on the severely defoliated balsam were sound and should flush in 1980. Hemlock was not as severely defoliated and unless further heavy feeding occurs in 1980, should not be severely damaged.

Northwest of Campbell River, moderate to severe defoliation occurred on 200 ha in the Big Tree Creek drainage at 750 to 900 metres' elevation. The amabilis fir was most heavily defoliated, with almost all old foliage and some new foliage removed.

A prediction is difficult as some adults emerge from cocoons in the fall, while others may not emerge for 2 years. Eggs found on balsam and hemlock foliage indicate the infestation could continue in 1980.

In the Prince Rupert Region, two large patches of moderate to severe defoliation of overmature western hemlock and alpine fir occurred on 940 ha along the Skeena River south of Carrigan Creek and on 780 ha in the Kispiox River Valley near Ironside Creek. Limited mortality of alpine fir was observed. Light defoliation was also recorded along Burdick Creek.

On the Queen Charlotte Islands, light defoliation of western hemlock regeneration occurred at spur 90 near South Bay and at Pallant Creek on Moresby Island. On the south coast of Prince Rupert District, larvae were collected in moderate numbers at most locations, with a maximum of 300 larvae in Carlson Inlet.

In the Kamloops Region, light defoliation of understory and intermediate western hemlock trees occurred along Outlet Creek and between Noisy Creek and the Enderby - Mabel Lake road.

TREMBLING ASPEN PESTS

Larvae of the large aspen tortrix, *Choristoneura conflictana*, heavily defoliated large patches of mature

aspen in the Yukon. Immediately north of Carmacks, the area of defoliation exceeded 2 000 ha and extensive areas of defoliation occurred near Dawson, McQuesten and Mayo. Light and moderate defoliation of young aspen trees was visible along the Yukon River near Whitehorse and from km 1 525 to 1 545 along the Alaska Highway.

Leaf and shoot blight, *Venturia macularis*, affected aspen throughout much of its range in Prince George and Prince Rupert regions, with severe foliar browning and early leaf drop from Prince George to Summit Lake, in the McLeod - Mackenzie area, along Williston Lake and on the north side of Stuart Lake. To the west, severe damage occurred along the Kenny Dam road, Vanderhoof to Pinchi Lake, at Germansen Landing and from Fraser Lake to Endako. Most of the aspen in the Bulkley Valley from Burns Lake to Hazelton were infected for the third consecutive year. Areas of severe infection also occurred south of Francois Lake from Southbank to Ootsa Lake, and at Uncha Lake; at Aiyansh, about 100 ha of aspen were moderately infected.

Foliar browning and twig killing was severe from Revelstoke north to Mars Creek in the West Kootenay.

The Bruce spanworm, *Operophtera bruceata*, defoliated trembling aspen in the Smithers, Houston and Burns Lake areas of the Prince Rupert Region. Small patches of aspen, 5-20 ha, have been defoliated at Glacier Gulch, Round Lake, Quick, Decker Lake, and an area 3 km long between Perow and Knockholt has been completely defoliated. The Bruce spanworm was most often found on aspen also affected by leaf and twig blight.

Most of the affected trembling aspen trees should recover.

BIRCH LEAF MINERS

Discoloration of birch leaves, caused by *Bucculatrix* sp. mining, was widespread in the Columbia River Valley from Radium north to Bush Arm and east along the Kickinghorse Valley, where an infestation has persisted for 5 years. It also occurred along the east side of Kootenay Lake from Duck Lake north to Crawford Bay and at the east end of Spillimacheen River Valley, where all the foliage was infested. In the West Kootenay, leaf mining and

discoloration occurred from 12 km west of Kaslo along the Kaslo River to Kaslo, and north to Trout Lake. Individual trees were affected along the east side of Slocan Lake.

The blotch miner, *Lyonetia salicifoliella*, mined and severely discolored western white birch over 940 ha from Johnson Lake to North Barriere Lake and near Vavenby and Albrede in the North Thompson River Valley.

Birch casebearer, *Coleophora* sp., damaged and discolored white birch foliage along the Deas Island Freeway in the Delta and Richmond municipalities. Sporadic damage occurred on birch trees throughout the lower Mainland and Fraser Valley.

ALDER SAWFLY *Hemichroa crocea*

Young red alder trees were almost completely defoliated over 3 ha on Kwaians Island in Masset Inlet, Queen Charlotte Islands. This is the second year of defoliation and, as a result, the Sitka spruce regeneration has been released and increased growth was noticeable. Elsewhere, moderate to severe defoliation occurred on roadside alder between Skidegate Mission and Miller Creek.

WINTER MOTH *Operophtera brumata*

Defoliation of Garry oak, broadleaf maple, ornamental birch, hawthorn and a variety of fruit trees was general throughout Victoria and surrounding municipalities, north along the Saanich Peninsula to Sidney and west to Colwood. Defoliation was not recorded in Duncan or Nanaimo, although moths were trapped in both areas in October, 1978.

Parasites were released, under a cooperative federal-provincial contract, in a number of locations in Greater Victoria. A parasitic fly, *Cyzenis albicans*, was released at 14 locations and a second parasite, *Agrypon flaveolatum*, was released at the same locations plus 17 others. From 50 to 300 parasites were released at each location. Sampling in 1980 will determine if they become established.

SEED AND CONE PESTS

There was an exceptionally heavy Engelmann and white spruce cone crop in the Cariboo, Prince George and Prince Rupert regions in 1979. In the Cariboo Region, severe infestations of the spruce cone borer, *Hylemya anthracina*, and the spruce seedworm, *Laspeyresia youngana*, occurred at 14 of 23 locations, rendering them unsuitable for cone collecting. In addition, spruce cone rust, *Chrysomyxa pirolata*, infected 10% of the cones at 11 locations, reaching 25% at Black Creek east of Horsefly.

The Douglas-fir cone crop, while somewhat lighter, was also heavily infested with insects. Of 19 locations sampled, 12 were judged not suitable for collecting owing to infestations of the Douglas-fir cone moth, *Barbara colfaxiana*, the coneworm, *Dioryctria abietivorella*, and the cone midges, *Con-tarinia washingtonensis* and *C. oregonensis*.

In the Prince Rupert Region, white spruce cones at 16 of 19 locations were infested with *H. anthracina* and *L. youngana*. The cone rust, *C. pirolata*, occurred at 17 locations, varying from 2 to 77% of the cones. Rust infection causes premature opening of the cones and also causes abnormal germination of seeds. The combination of the disease and insect attack rendered 12 of the areas unsuitable for cone collecting.

No information is available on the intensity of disease infection or insect infestation in the Prince George Region.

WEEVIL DAMAGE

Leader damage to lodgepole pine by the lodgepole terminal weevil, *Pissodes terminalis*, has occurred since 1976 in a 6- to 10-metre-high young stand between km 48 and 49.6 on the West Morice Forest Development road in the Prince Rupert Region. In a 1.6 km roadside check, the numbers of attacked leaders were : 1976-11, 1977-9, 1978-38, 1979-18.

Along Osilinka River, north of Germansen Landing in the Prince George Region, 130 lodgepole pine terminals were attacked along 1 km in a 15-year-old burn site.

An increased number of lodgepole pine were infested in the Chilcotin area of the Cariboo Region,



Spruce cone rust, infection causes premature opening of the cones.

where 6 to 33% of the terminals in pure pine stands were affected at Alex Graham Lookout, Eagle Lake, Big Creek, Springhouse and Slough Creek.

Spruce weevil, *Pissodes strobi*, damage occurred in most immature Engelmann spruce stands in the southern portion of East Kootenay, notably in the Yahk River Valley, the Moyie River and Lamb Creek areas and in Forster Creek near Wilmer; however, less than 10% of the terminals were killed in any area.

COOLEY SPRUCE GALL APHID

Adelges cooleyi

A very high aphid population developed in a seed orchard in Central Saanich, where all foliage of young Douglas-fir, planted adjacent to Sitka spruce, was heavily attacked. By late May, the new foliage was shrivelled and brown, and cones were also heavily attacked. Early in June, winged adults were leaving the Douglas-fir trees and attacking the Sitka spruce. Galls will form, killing the branch terminals, and tree growth and seed production will be reduced. Aphid

damage was conspicuous throughout much of the Vancouver Forest Region.

In East Kootenay, the aphid was widespread throughout the host range and in many areas up to 90% of the tips of Engelmann spruce were infested.

SMALLER EUROPEAN ELM BARK BEETLE

Scolytus multistriatus

For the first time in British Columbia, pheromone traps were used to determine the presence of the elm bark beetle, which can vector Dutch elm disease. Numerous beetles were trapped in the southern Okanagan Valley from Osoyoos to Kelowna, and a few were trapped in the Kamloops area. Traps in the Nelson and Vancouver Forest regions were negative. To date there is no evidence of Dutch elm disease in British Columbia.

Tree Mortality Caused by DOUGLAS-FIR TUSSOCK MOTH Defoliation

The tussock moth, *Orgyia pseudotsugata*, has caused varying amounts of damage and tree mortality in the Okanagan Valley and Kamloops area since 1916. In 1971, an infestation began in the Okanagan and by 1975 had spread to encompass stands as far north as McLure on the North Thompson River. By the time the outbreak subsided as a result of natural factors and a control program, more than 10 000 ha were infested. Severe defoliation occurred on 5 700 ha along both sides of the North Thompson Valley from Westsyde to McLure and on 2 700 ha between Cherry Creek and Savona.

After allowing sufficient time for tree recovery, and to insure better delineation of affected stands, an aerial survey in 1979 determined that significant tree mortality had occurred on 1 530 ha in the North Thompson Valley. Seven cruise strips totalling 1,372 trees were established in stands representative of varying mortality intensity. At Jamieson Creek on two strips, 60% and 61% of trees were dead, Lanes Creek 8%, Dairy Creek 18%, Lyons Lake 20%, Palmer Forsythe 44%, and six miles north of Jamieson Creek 82% of the trees were dead.

WEATHER DAMAGE

Winter drying of coniferous trees was prevalent in many parts of the Province. On southern Vancouver Island, winter drying or parch blight caused reddening of Douglas-fir foliage in the Greater Victoria area, on the Saanich Peninsula and north to Duncan. In the Fraser Valley, the damage was particularly noticeable on the south side of the river from Abbotsford to Hope, in the Greater Vancouver area and along Howe Sound to Squamish.

The older foliage of lodgepole pine was reddened over large areas throughout the Cariboo, mostly on southern exposures. Main areas of damage were Klinaklini River Valley, Homathko River Valley, Jesmond, Horsefly and Quesnel lakes.

In the Kamloops Region, heavy discoloration of lodgepole pine occurred on 440 ha at 780 to 900 metres elevation along the north side of Clearwater River. Western red cedar foliage was discolored at East Barriere Lake on 500 ha, Kwikoit Creek 370 ha, Mad River 320 ha, Humamilt Lake 125 ha and near Murtle Lake 1 350 ha.

Young exposed western hemlock and western red cedar were reddened and tip and lower branch mortality of cedar occurred from Fernie to Revelstoke in East Kootenay. In some instances, terminal growth of western hemlock was killed. Damage was prevalent in many extensive areas in West Kootenay. The upper three-fourths of many young hemlock, cedar and white pine were completely defoliated, and some hemlock died.

DWARF MISTLETOES

Arceuthobium spp.

Under intensive forestry programs, increased attention is being directed toward minimizing the occurrence and effect of dwarf mistletoes through sanitation programs during juvenile spacing and stand regeneration. It is not necessary to survey this perennial disease annually, but the observations below are indicative of the widespread impact of this major pest problem in British Columbia.

Mountain hemlock along the Hollyburn Ridge trail in Cypress Bowl Provincial Park near West Vancouver were infected with *A. tsugense*. Moderate to heavy brooming occurs on trees along 1 km of the trail, indicating extensive infection.



Severe brooming of western larch caused by mistletoe infection at Blewett.

Infection of mountain hemlock is not common in British Columbia.

Along Khutzeymateen Inlet, north of Prince Rupert, hemlock dwarf mistletoe was found on one of three helicopter logging sites. Residual removal should prevent a problem in the regenerated stand.

Most lodgepole pine stands in East Kootenay were infected to some extent, including St. Mary River Valley, Estelle access road, Ram Creek north to Mica Pondage and in the Columbia and Kootenay Valley tributaries. North of Canal Flats, 300 ha of 15-year-old lodgepole pine on Mount De Smet is to be spaced with attention to removal of the infected regeneration trees. Residual felling of the bordering infected trees would reduce the spread. At Norbury Lake, between Bull and Wildhorse rivers, 10% of the understory ponderosa pine were infected with *A. americanum* beneath a heavily infected stand of lodgepole pine.

Infections of *A. americanum* were found on almost 90% of the 40- to 50-year-old lodgepole pine on 4 ha near Woodcock on the Skeena River in Prince Rupert Region.

Larch mistletoe, *A. laricis*, was prevalent

throughout the host range west of the Kootenay River, with particularly severe infection of overstory trees persisting at the east end of St. Mary River Valley, along the south side of the valley and between Wycliffe and St. Mary Lake. In West Kootenay, 80% of the larch trees on Meadow Mountain above Lardeau were severely infected. Some tree mortality has occurred.

At Morrissey Creek, near Grand Forks, Douglas-fir trees on approximately 30 ha were severely infected with *A. Douglasii*, causing several large brooms on each tree. Nearest known infections are at Big Sheep Creek near Rossland, some 28 km away.

In the Kamloops Region, in several mixed stands on Anarchist Mountain, proposed for intensive management, scattered residual Douglas-fir, western larch and lodgepole pine are heavily mistletoed. Regeneration was also infected, with the lodgepole pine most severely affected. Logging or felling of residual trees and juvenile spacing, in which infected trees are removed, should be considered.

BUD NECROSIS

Bud necrosis of young Douglas-fir, caused by a fungus *Dichomera* sp., occurred at a number of locations in West Kootenay. From 5 to 30% of the buds were killed on 60 to 100% of the trees at Argenta, Poplar Creek, Davis Creek and Kaslo River. The result is distorted terminal growth of small trees and bushy form for the more mature trees. In East Kootenay, up to 75% of the buds of young Douglas-fir were infected on a localized area in the Kootenay River Valley and the Bighorn - Wigwam River area.

In the Prince Rupert Region, in a 7-year-old white spruce plantation along Ganokwa Creek, buds on 21% of 300 trees examined were infected with *Camarosporium strobilinum*. In some instances, leader buds were killed, preventing the tree from producing a 1979 leader. At Division Lake, 60% of the white spruce in a plantation had infected buds; terminal buds were infected on 9% of the trees.

TRUNK ROTS

Decay in mature and overmature trees, a major loss factor in the Province, is not usually covered in annual reports because it is a perennial problem with little annual fluctuation. It is usually accounted for by applying the published decay, waste and breakage factors. The following observations in East Kootenay should indicate that decays remain a significant problem of concern to forest management.

Infection of western hemlock, alpine fir and Engelmann spruce by the Indian paint fungus, *Echinodontium tinctorium*, and red ring rot, *Fomes*

pini, was prevalent, with up to 50% of the trees infected in most higher elevation stands from Fernie to Revelstoke. Fruiting bodies were common on infected trees. Some specific areas with *E. tinctorium* infection were Kamma Creek, a tributary of Goat River, Kid Creek, Spruce Tree Creek and Yahk River Valley, and up to 20% of the mature western larch trees in Summit and Toby creeks had fruiting bodies of *F. pini*.

About half of the overmature, residual western larch trees, in an area logged for mountain pine beetle salvage at Findlay Creek, were infected with brown trunk rot, *Fomes officinalis*.

SWISS NEEDLE CAST

Phaeocryptopus gaeumannii

A needle cast affected planted regeneration Douglas-fir trees, 3 to 10 metres high, on 1 000 ha in the Upper Klanawa River Valley. Severe needle drop occurred, with many trees retaining only 1979 foliage. The disease has apparently not been serious in naturally regenerated stands in the Pacific Northwest.

ANIMAL DAMAGE

Animal damage was prevalent but scattered in western larch, lodgepole pine and ponderosa pine stands in East Kootenay from Invermere south to the International Boundary. Often up to 15 trees per hectare were affected. Squirrels and porcupines had either chewed off small or large patches of bark or girdled the upper bole. Bear damage occurred closer to ground level and, in some instances, the lower 2 metres of the bole were stripped of bark.

Other Noteworthy Insects and Diseases

Insect/Disease	Host(s)	Forest Region	Locality	Remarks
<i>Acleris gloverana</i> Blackheaded budworm	Fir, alpine	Prince Rupert	Morice L	Light defoliation of new growth.
<i>Armillaria mellea</i> Shoestring root rot	Douglas-fir	Nelson	Little Foster Cr	16 trees/hectare killed at intervals in valley.
<i>Chrysomyxa ledicola</i> Spruce-labrador tea rust	Spruce, Sitka	Prince Rupert	Tlell, Port Clements	Third year of mod- erate to severe infection.
<i>Dichelonyx</i> sp. Leaf chewing beetle	Douglas-fir, Pine, yellow	Nelson	South portion of East Kootenay	No damage in 1979 after severe damage in 1978.
<i>Elatobium abietinum</i> Spruce aphid	Spruce, Sitka	Prince Rupert	Sandspit - Alliford Bay, Lyell Island, Louise Inlet	Discoloration and needle drop on shoreline trees.
<i>Galerucella</i> sp. Willow leaf beetle	Willow	Nelson	Columbia R Valley, Kaslo - Trout L	Widespread discol- oration of foliage.
<i>Hyphantria cunea</i> Fall webworm	Misc. trees and shrubs	General	East Kootenay, West Kootenay, Okanagan, Fraser Valley	Webbing and defoli- ation prominent.
<i>Leucoma salicis</i> Satin moth	Aspen, trembling	Nelson	Topping Cr, Hanna Cr	Severe defoliation in localized areas.
<i>Lophophacidium hyperboreum</i> Snow blight	Spruce, white	Prince Rupert	Chapman L, Perow burn	30% of foliage in- fected on 78% of trees in plantation. 24% of foliage in- fected on 65% of trees.
<i>Melampsora epitea</i> Foliage rust	Willow	Prince Rupert	Skins L Dam	Light infection
<i>Melampsora paradoxa</i> Foliage rust	Larch, western	Kamloops	Cedar Cr, Harris Cr, Heckman Cr	Light infection in many stands.

cont'd..

Insect/Disease	Host(s)	Forest Region	Locality	Remarks
<i>Melanolophia imitata</i> Green-striped forest looper	Hemlock, western	Prince Rupert	Ocean Falls - Bella Coola	Increasing populations, but no defoliation.
<i>Petrova</i> sp. Pitch moth	Pine, lodgepole	Nelson	South Slocan	Up to 50 flagged branches/tree on 80% of trees over 20 ha.
<i>Phellinus weirii</i> Phellinus root rot	Douglas-fir	Vancouver	Okeover Arm	20 ha of infected second growth treated by stump removal.
<i>Phyllocnistis populiella</i> Aspen leaf miner	Aspen, trembling Cottonwood	Nelson	Illecillewaet Valley	Moderate to severe leaf mining.
<i>Pikonema alaskensis</i> A spruce sawfly	Spruce, Engelmann	Nelson	Kuskanax Cr	30% of new shoots defoliated in 40 ha plantation.
<i>Polyporus tomentosus</i> Root and butt rot	Spruce, white	Prince Rupert	Morice R, km 17	Infection centres over 40 ha.
	Pine, lodgepole	Nelson	White R - Elk Cr area	Infected trees were subsequently wind-thrown on 2 ha in Whiteswan Park
<i>Pucciniastrum epilobii</i> Fir fireweed rust	Fir, alpine	Prince Rupert	Morice R	Localized area of light infection.
<i>Rhabdocline pseudotsugae</i> Douglas-fir needle cast	Douglas-fir	Nelson	East Kootenay Bull R to Cabin Cr	50% needle loss on many trees.