

IMPORTANT INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.).—The known extent of the 1-year-cycle spruce budworm outbreak in the Lillooet and Fraser-Nahatlatch river valleys increased to approximately 171 square miles, with 30 square miles of this area in the Fraser-Nahatlatch region. This is an increase of 58 square miles compared with 1954, but some of these infested stands had been attacked the previous year. Douglas fir was the principal host. As in 1954, feeding extended from the valley floors to an altitude of about 3,000 feet. Defoliation, although heavy, was slightly less than last year and was restricted mostly to new growth. Many of the trees put out numerous adventitious buds. Some top killing appears imminent, but tree mortality is expected only in a few unmerchantable stands on dry hilltops, where approximately 30 per cent of the trees did not produce adventitious buds.

Insect mortality due to natural factors increased in 1955. Estimated larval mortality at the time of spring establishment was a minimum of 22 per cent. The average larval parasitism was 22 per cent, an increase from the 8 per cent recorded in 1954. The most abundant larval parasite was *Glypta fumiferanae* (Vier.). Pupal parasitism amounted to 55 per cent. The percentage of egg masses containing one or more parasites averaged 27. No diseased larvae were found.

Egg counts averaged 112 masses per 100 square feet of foliage compared with an average of 221 in 1954. The infestation has probably passed its peak since the population is decreasing and parasitism is increasing.

During 1955, the 2-year-cycle budworm outbreak in the spruce and alpine fir stands of central British Columbia continued to diminish within the areas that sustained heavy tree defoliation prior to 1953. The most noteworthy decreases occurred in the Wells-Barkerville region; in Pine Pass, where there was severe defoliation in 1954; and in the overmature stands of the Nation River area where the budworm population has almost disappeared.

In 1955, spruce budworm larvae were fairly numerous along the Hart Highway between the Parsnip and Misinchinka rivers; from Tudyah Lake south to Summit Lake; in the mountains northeast of Sinclair Mills; in the vicinity of Bowron Lake; and in several localities north of Fort St. James.

Since 1955 was a "non-flight year" feeding was inconspicuous from the air and therefore the status of this insect in inaccessible regions could not be ascertained.

The 2-year-cycle budworm outbreaks at Babine Lake, Star Lake, and McKendrick Creek, all in the Prince Rupert Forest District, continued to subside although light to medium infestations persisted. Collections: Coast 128, Interior 150.

Douglas-fir Beetle, *Dendroctonus pseudotsugae* Hopk.—The Douglas-fir beetle continued to kill numerous groups of trees in the Kamloops and Prince George forest districts. Little current attack was observed in the Nelson Forest District.

Current infestations are restricted chiefly to a broad strip of country extending from the Fraser River south of Prince George southeastward into the dry belt as far as Okanagan Lake (see accompanying map). The severest attack occurred near Kamloops, especially in the Tranquille Forest Reserve, and near Bestwick. Along the west side of the Fraser River, south of Quesnel, the infestation appeared to decrease in 1955, but infested trees were still abundant over an area of about 50 square miles. Innumerable small infestations were scattered through the northern Cariboo, from Lac la Hache to Marguerite.

PROVINCE OF BRITISH COLUMBIA

FOREST INSECT SURVEY

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INTRODUCTION

As in previous years, the British Columbia Forest Service and private companies gave valuable assistance, not only in making collections and reporting on insect outbreaks, but also in providing aircraft for aerial reconnaissance and mapping infestations. Three forest insects caused considerable injury in British Columbia in 1955. The black-headed budworm defoliated hemlock stands in both the coastal and interior parts of the Province, the spruce budworm outbreak in the Vancouver District persisted, and the Douglas-fir beetle continued to attack Douglas fir stands particularly in the Kamloops Forest District.

The Victoria laboratory received 1,801 insect collections, and the Vernon sub-laboratory 2,470 for a total of 4,271. Collections received during 1955 were distributed among the principal tree species as follows:

Coniferous trees	Collections	Broad-leaved trees	Collections
Douglas fir.....	1,099	Poplar—	
Hemlock—		Trembling aspen.....	167
Western hemlock.....	688	Black cottonwood.....	20
Mountain hemlock.....	28	Miscellaneous poplars.....	9
	716		196
Spruce—		Alder—	
White spruce.....	426	Red alder.....	97
Engelmann spruce.....	190	Green alder.....	2
Black spruce.....	41	Mountain alder.....	2
Sitka spruce.....	24	Miscellaneous alders.....	16
	681		117
Pine—		Willow.....	85
Lodgepole pine.....	272	Birch.....	32
Ponderosa pine.....	166	Garry oak.....	14
Western white pine.....	74	Maple.....	10
	512	Cherry.....	9
Fir—		Arbutus.....	3
Alpine fir.....	268	Miscellaneous broad-leaved trees.....	9
Amabilis fir.....	51	Total.....	475
Grand fir.....	20		
	339		
Cedar—			
Western red cedar.....	128		
Miscellaneous cedars.....	2		
	130		
Larch—			
Western large.....	110		
Tamarack.....	13		
Alpine larch.....	3		
	126		
Juniper—			
Rocky Mountain juniper....	36		
Common juniper.....	2		
	38		
Other coniferous trees.....	3		
Total.....	3,644		
Miscellaneous hosts or no hosts specified.....	152		
Grand Total.....	4,271		

On Vancouver Island new attacks occurred in the Nimpkish Valley infestation although the situation was no worse than in 1954. Logging is now in operation to salvage some of the timber killed in the past two years. Spot infestations were numerous at both ends of Woss Lake, just north of the Nimpkish infestation. New attacks and recently killed trees were observed in the Lillooet River Valley and in the Anderson River Valley near Boston Bar, Vancouver Forest District, where a large number of beetles were found in felled timber associated with logging operations.

Mountain Pine Beetle, *Dendroctonus monticolae* Hopk.—Excepting the infestations in lodgepole pine in central British Columbia, there was a general decrease in population levels of the mountain pine beetle in 1955. Small infestations were observed in a few areas.

An extensive, long-established infestation on lodgepole pine appears to be gaining in intensity along the Stuart-Trembleur-Takla Lake drainage system in central British Columbia. Heaviest tree mortality is centered along the lower end of Takla Lake in a decadent lodgepole pine stand; 300 attacked trees were counted near the mouth of Bivouac Creek, 800 on the slopes above Leos Creek, and about the same number near the mouth of Sakeniche River south of Takla Narrows. Scattered groups extend to the southeast as far as Tarnezell Lake. A light but widespread outbreak was discovered in the Narcosli Creek area in mature, undisturbed stands of lodgepole pine. Apparently the population level is increasing. A large outbreak on the east side of Babine Lake extended from a point opposite Pierre Creek north to and including Morrison Lake. A 2- by 5-chain plot south of Big Loon Lake contained 80 red-top or dead trees, 9 green-infested trees, and 64 uninfested trees. The most active infestation in southern British Columbia was on Steamboat Mountain. It contained 5 groups, each of 20 to 40 infested trees. Small patches of infested lodgepole pine were particularly common in the Kootenay River basin, northeast of Canal Flats.

Small active infestations in western white pine were observed north of Beach Bay on Shuswap Lake, along Asher Creek at Trout Lake, and along Beaton Creek; scattered infested trees occurred along the Big Bend Highway.

In 1955, the populations of *Dendroctonus monticolae*, *D. valens* Lec., and *D. brevicomis* Lec. on ponderosa pine decreased further at Alleyne Lake in the Aspen Grove country; a few groups of currently attacked trees were observed.

Spruce Bark Beetles, *Dendroctonus* spp.—The small infestations of these bark beetles on Engelmann spruce in the Nelson Forest District appear to have been greatly reduced during the past two or three years. However, fairly large numbers were observed at several localities in felled logs and in slash.

Western Hemlock Looper, *Lambdina fiscellaria lugubrosa* (Hlst.)—There was a general decrease in the hemlock looper populations in the Province in 1955.

The heaviest infestation in the Interior occurred in a stand of mature and overmature hemlock and cedar some 3 miles south of McBride in the Prince George Forest District. Noticeable defoliation ranging from 30 to 100 per cent, was observed over an area 2 miles long by $\frac{1}{2}$ mile wide. The infestation 3 miles south of Penny in an overmature stand was again severe, but larval numbers had decreased. Both a polyhedral virus and a pathogenic fungus, *Empusa* sp., were found in larvae collected in the McBride-Penny region. The Eaglet Lake-Fraser River infestation collapsed. Alpine fir in this area have suffered severe damage; a few trees up to 12 inches D.B.H. died after the recent attack. As a result of the severe defoliation, "stag-heads" will probably appear on some of the overmature hemlock stands. Understory hemlock trees that

were almost completely denuded during the recent infestation appear to be recovering. A light infestation persisted near Ptarmigan Creek in the Prince George Forest District.

The hemlock looper population along the Big Bend Highway, bordering the Columbia River, decreased somewhat although there were light infestations in some sections.

Hemlock looper population levels remained relatively low throughout the coastal areas. A reduction was noted in the light infestation at Scully Creek in the Prince Rupert Forest District. Larvae were also found commonly in the Lakelse Lake-Terrace areas. In the Lillooet River Valley, the looper was found in association with the spruce budworm, but numbers were not high enough to cause concern. Up to five larvae per 3-tree beating sample were found in the Nitinat River area, South Vancouver Island District, the scene of an old hemlock looper infestation. Collections: Coast 100, Interior 159.

Black-headed Budworm, *Acleris variana* (Fern.)—During 1955 there was a general increase in black-headed budworm population levels.

Scattered top killing was observed along the Portland Canal, Prince Rupert District. A small amount of tree mortality, restricted mainly to overmature hemlock, was also recorded. At least part of this damage was attributed to heavy defoliation suffered in the black-headed budworm outbreak which subsided in this area in 1954. Although larvae were still present, their numbers decreased in the Ecstall River Valley, Skeena River Valley, Kitsumgallum Lake, Lava Lake, and the Nass River area. On the Queen Charlotte Islands, heavy defoliation persisted along the inlets on the east coast of Moresby Island, particularly at Cumshewa Inlet, and in the Honna River Valley west of Queen Charlotte City on Graham Island. Feeding was lighter on the remainder of Graham Island. Larval parasitism averaged 19 per cent, with a high of 33 per cent at Moresby Camp. A capsule virus was found in some larvae, but the disease was not epidemic. There appeared to be a scarcity of pupae, and the initial egg survey failed to reveal a single egg. Further surveys are being made to verify these results.

A medium to heavy infestation was reported in the Ocean Falls and Bella Coola areas in the South Prince Rupert District. The heaviest defoliation occurred in a few immature hemlock stands at South Bentinck Arm and Labouchere Channel where at least 60 per cent of the current year's foliage was destroyed. Parasites killed 22 per cent of the larvae collected in this area.

The black-headed budworm on North Vancouver Island increased greatly in 1955, both in numbers and in extent. The known infestation, mapped by aerial and ground surveys, extended over at least 1,600 square miles of hemlock and fir stands. The heaviest defoliation occurred in the following regions: north and east of Holberg Inlet, the west and east sides of Neroutsos Arm, the Kashutl and Kaouk River valleys on the west coast, the Nimpkish and Bonanza Lake areas, and along the east coast of the Island from Port McNeil south to Adam River. Feeding was restricted to altitudes below 4,000 feet. The top third of the crowns suffered the heaviest damage, and in some cases tops were completely defoliated for 5 to 20 feet. No tree mortality has been observed but some top killing appears imminent. Larval parasitism did not exceed 15 per cent in any area, and pupal parasitism was with one exception also light. Pupae collected at Sayward outside the main infestation, were 90 per cent parasitized. Egg counts indicated that light to heavy defoliation can be expected in 1956, barring an unforeseen collapse of the population due to natural control factors.

Light infestations were observed in the Interior at a number of places including the area between Miles 40 and 60 on the Haines Road. A medium infestation of black-headed budworm, together with *Neodiprion* sp., occurred in mature and overmature hemlocks from Miles 15 to 22, and 40 to 45 on the Big Bend

Highway north of Revelstoke, the area affected totalling about 10 square miles. The major portion of this infestation occurred on the west side of the Columbia River between altitudes of 2,500 and 3,200 feet. Collections: Coast 202, Interior 197.

Forest Tent Caterpillar, *Malacosoma disstria* Hbn.—There were no forest tent caterpillar infestations in the Interior of British Columbia during 1955. Large numbers of eggs were laid in the fall of 1954 in the Prince George Forest District, and a few points in the Kamloops and Nelson Forest districts, but the majority failed to hatch. In some instances egg mortality apparently occurred early in the fall, for there was no embryonic development. At Summit Lake in the Nelson Forest District, where an apparently normal hatch of eggs occurred, a disease wiped out the population in the early larval instars.

Forest tent caterpillars were found in association with western tent caterpillars on South Vancouver Island. The infestation was light and confined mostly to the southern portion of the Saanich Peninsula. Collections: Coast 2, Interior 8.

Western Tent Caterpillar, *Malacosoma pluviale* (Dyar).—Heavy defoliation of red alder, apple, willow, wild rose, and cherry occurred again in the Fraser River Valley, the Strait Islands, and in the Saanich Peninsula, Vancouver Island. No damage was reported outside of the Vancouver Forest District. Disease was probably responsible for the heavy larval mortality in some sections of the Fraser Valley, and a polyhedral virus disease caused high mortality around Victoria. Field records indicated a medium to heavy egg population in the Saanich Peninsula. Collections: Coast 74, Interior 10.

Douglas-fir Needle Miner, *Contarinia* sp.—There was a general decrease in Douglas-fir needle miner numbers during 1954-55, although the larval population level remained fairly high in certain parts of the Province.

In the Kamloops Forest District, the infestation at Squilax diminished to a mere trace. The infestation at Peachland also decreased, although some 50 per cent of the current year's needles were mined. The percentage of needles mined ranged from 15 to 25 at points sampled at Shuswap Lake, and from 10 to 20 in the Barriere region along the North Thompson River. The degree of infestation in other sample localities in the Kamloops Forest District was as follows: Oyama, 15 to 30 per cent; Powers Creek in Westbank, and Hydraulic Creek in Kelowna up to 85 per cent; Chute and Trout creeks near Penticton, 30 per cent; and Lytton, 30 per cent.

In the Nelson Forest District, a heavy infestation was observed near Cascade and Grand Forks where some 50 to 90 per cent of the new needles were mined. Other infestations noted in this district and the degree of needle damage were as follows: Granby and Burrell rivers, 25 to 35 per cent; Beaverdell and Midway, up to 45 per cent; and Needles and North Castlegar, 15 to 30 per cent.

During 1955 no infestations were recorded in the Prince George Forest District.

On Vancouver Island two infestations were reported at Black Creek and Cassidy where 50 and 20 per cent respectively of the needles were mined. Collections: Coast 3, Interior 73.

Silver-spotted Halisidota, *Halisidota argentata* Pack.—There was a marked increase in the abundance of this species as compared with 1954. The insect was found on the southern half of Vancouver Island as far north as Campbell River, on the Gulf Islands, and throughout the southern mainland. The heaviest infestations were near tide-water and in the southern portion of the Vancouver Forest District. Although feeding was heavy in localized areas

there was no permanent damage and all trees re-foliated by July. The preferred host was Douglas fir, but lodgepole pine, hemlock, and grand fir were also attacked. Parasitism remained essentially the same as in 1954, and was still too light to effect much control. The predominant parasite was *Uromacquartia halisidotae* Tns. No disease was found. Collections: Coast 95.

Hemlock Sawfly, *Neodiprion tsugae* Midd.—The hemlock sawfly increased to epidemic proportions in a few localities in 1955. Larvae were numerous on the Big Bend Highway between Revelstoke and Downie Creek in association with the black-headed budworm, and from north of Kinbasket Lake to north of Donald in association with the hemlock looper. Light defoliation of hemlock trees bordering forest openings was observed in the Sinclair Mills and Eaglet Mountain areas, Prince George Forest District. On Eaglet Mountain, the population level was especially high on the northern slopes where defoliation by hemlock looper was severe in 1954.

The hemlock sawfly was widespread throughout the coastal areas in 1955. Numerous colonies were found at Stewart in the Prince Rupert Forest District but no serious damage was reported. Collections (*Neodiprion* spp.): Coast 130, Interior 425.

Satin Moth, *Stilpnotia salicis* (L.).—Heavy defoliation of several groves of trembling aspen trees at Currie Lake and near Lac du Bois recurred in 1955. Small infestations were observed near Stump Lake, Harper Ranch in the South Thompson River Valley, Spences Bridge, and at Kinsmen Beach near Vernon.

In 1955, several silver poplar trees in Victoria were again defoliated. About 30 shade trees of the same species were almost completely defoliated at Comox. Collections: Coast 10, Interior 33.

Douglas-fir Tussock Moth, *Hemerocampa pseudotsugata* McD.—A 4-acre stand of open-grown Douglas fir trees near Cascade was fairly heavily infested by the Douglas-fir tussock moth. The upper quarter of the crowns of the majority of trees were almost completely defoliated. A virus disease greatly reduced larval numbers during the late instars.

A light infestation occurred at Olalla Creek near Keremeos in the Kamloops Forest District, but defoliation was not noticeable. Egg counts indicate that the Olalla infestation may increase in 1956. Collections: Interior 12.

False Hemlock Looper, *Nepytia* sp.—There was a slight decrease in the population density of the false hemlock looper in the Interior. This looper was found in association with the spruce budworm in the Lillooet drainage area. The population level, although higher than in 1954, was still low. Collections: Coast 21, Interior 75.

Larch Sawfly, *Pristiphora erichsonii* (Htg.).—No larch sawflies were found on western larch in 1955. Very light infestations occurred on eastern larch near Cluculz and Pantaga lakes and in swamps along the northern section of the Hart Highway, Prince George Forest District. Collections: Interior 4.

Pine Needle Scale, *Phenacaspis pinifoliae* (Fitch).—This scale insect was again abundant on ponderosa pine trees between Oyama and Penticton. Pine stands near orchards were most heavily infested.

A Pine Root Weevil, *Hypomolyx piceus* (DeG.).—Larvae, pupae, and adults of this weevil were taken on the roots and root collar of western white pine trees at Mackinson Flats near Arrowpark. Although relatively few specimens were collected, a high percentage of trees 4- to 12-inches D.B.H. have

been attacked, presumably by this weevil, during recent years. A number of pine stems, 2-inches D.B.H. and less, have been killed.

Poplar and Willow Borer, *Sternochetus lapathi* (L.).—This weevil continued to attack willow in the Bull River and Cherry Creek areas, Nelson Forest District. Dead stems outnumbered live stems at these two localities.

Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.).—The large aspen tortrix caused about 50 per cent defoliation of the trembling aspen trees between Mileposts 20 and 30 of the Beaten River Road. The infestations between Mile 80 and Mile 140 on the Alaska Highway decreased in intensity. Heavy defoliation was general in aspen stands in the Salmon River area north of Prince George; defoliation ranged between 75 and 90 per cent. Collections: Interior 8.

Ugly-nest Caterpillar, *Archips cerasivorana* (Fitch).—Larvae of this species severely defoliated choke cherry bushes for a distance of 1 mile alongside highway No. 95 north of Invermere Junction. Collections: Interior 3.

Aspen Leaf Miner, *Phyllocnistis populiella* Chamb.—The aspen leaf miner was abundant over much of the range of trembling aspen. Infestations were heaviest in central and northern British Columbia where it was not unusual for 75 to 100 per cent of the leaves to be attacked.

A Willow Leaf-miner, *Lyonetia saliciella* Bsk.—This leaf miner was again abundant on willow in many parts of the Nelson Forest District.

Velvet Green Looper, *Epirrita autumnata* (Gn.).—A localized light to medium infestation occurred in a stand of overmature alpine fir and white spruce on the Nation River Mine road, Prince George Forest District. Defoliation of most of the infested alpine fir trees ranged between 40 to 50 per cent. These trees have also been severely defoliated by the 2-year-cycle spruce budworm. Collections: Coast 45, Interior 23.

Striped Alder Sawfly, *Hemichroa crocea* (Fourc.).—No damage was reported in the previously affected areas on Vancouver Island and the Queen Charlotte Islands. About 4 acres of alder near Yarrow, Vancouver Forest District, were 95 per cent defoliated. Collections: Coast 2.

LIST OF CO-OPERATORS

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