

# PROVINCE OF BRITISH COLUMBIA

## FOREST INSECT SURVEY

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### INTRODUCTION

Forest Insect Survey activities in British Columbia in 1956 were continued to emphasize current infestations. The black-headed budworm infestation on northern Vancouver Island increased in extent and intensity. The 1-year-cycle spruce budworm outbreak in the Vancouver District decreased in intensity although the area infested increased in size. The 2-year-cycle spruce budworm caused heavy defoliation in the Babine Lake area. The Douglas-fir beetle was active in the Interior but the number of trees attacked in 1956 was considerably less than in 1955 and special surveys were conducted to determine the tree mortality.

The Victoria Laboratory received 2,158 insect collections, and the Vernon Sub-laboratory 2,208 for a total of 4,366. Of the total number, 245 collections were submitted by British Columbia Forest Service personnel, and 24 by other co-operators.

Collections received during 1956 were distributed among the principal tree species as follows:

Coniferous trees	Collections	Broad-leaved trees	Collections
Hemlock—		Poplar—	
Western hemlock.....	1,164	Trembling aspen.....	113
Mountain hemlock.....	8	Black cottonwood.....	35
	1,172	Miscellaneous poplars.....	13
			161
Douglas fir.....	819		
Spruce—		Alder—	
White spruce.....	242	Red alder.....	82
Engelmann spruce.....	201	Mountain alder.....	15
Sitka spruce.....	130	Green alder.....	4
Black spruce.....	43	Miscellaneous alders.....	17
Red spruce.....	4		118
Miscellaneous spruces.....	4		
	624	Willow.....	98
		Birch.....	33
Pine—		Cherry.....	23
Lodgepole pine.....	245	Garry oak.....	17
Ponderosa pine.....	139	Maple.....	15
Western white pine.....	75	Arbutus.....	3
Miscellaneous pines.....	10	Miscellaneous broad-leaved trees	37
	469		
		Total.....	505
Fir—			
Alpine fir.....	239		
Amabilis fir.....	56		
Grand fir.....	51		
Miscellaneous fir.....	1		
	347		
Cedar—			
Western red cedar.....	158		
Miscellaneous cedars.....	6		
	164		



Coniferous trees	Collections
Larch—	
Western larch.....	86
Miscellaneous larch.....	6
	92
Juniper—	
Rocky mountain juniper....	31
Common juniper.....	2
	33
Total.....	3,720
Miscellaneous hosts or no host specified...	141
Grand Total.....	4,366

#### IMPORTANT INSECTS

**Spruce Budworm**, *Choristoneura fumiferana* (Clem.).—The 1-year-cycle spruce budworm infestation in the Lillooet River and Lake area spread southward from Pemberton as far as Tisdall, and northeast from D'Arcy along the Anderson and Seton lakes to Bridge River north of Lillooet. In the Fraser River Valley the outbreak in the Nahatlatch River Valley subsided, but heavy defoliation occurred in the upper Anderson River Valley. For aerial and ground surveys the infestation was classified as light, heavy, and very heavy. Areas where trees had been attacked for three or four years and which contained a large number of bare tops and twigs were classed as very heavy. Stands in which the characteristic red or light-red color caused by current defoliation predominated were classed as heavy and light respectively. The total infested area was 452 square miles, of which 30 were in the Anderson River Valley. (The final figure for 1955 was 379 square miles of which 82 were in the Fraser River area, rather than the 171 and 30 square miles respectively given in the 1955 Report.) Forty-one square miles were classified as very heavy and 96 square miles suffered heavy defoliation.

The most outstanding feature of the infestation this year was the recovery of the trees. Scattered top-killing was noticeable throughout the older outbreak areas, but was less than expected. Trees with up to five feet of bare terminal were commonly topped with a tuft of new foliage. In some areas practically all growth was from adventitious buds put out in 1954. In 1956 bud kill was negligible, and 68 per cent of the twigs suffered only light damage, a marked improvement over last year. In the hardest hit areas, only about one half of the trees previously thought to have no chance of survival are now expected to die.

Parasites ranged from 10 per cent in early larval collections to 59 per cent in late-instar collections. This latter figure represents an increase over 1955 but is based on a smaller number of larvae. Pupal parasitism, based on field-collected pupal cases, was 48 per cent, a small decrease from the 55 per cent of last year. The number of egg masses containing one or more parasites was 13 per cent, a drop of 14 per cent. No diseased larvae were found.

The number of eggs decreased considerably in localities where counts were high last year, while there was a general increase in areas which had had low counts. The result was a more evenly distributed egg population. The highest egg counts were from sample points along Seton Lake, where 1956 was the first year of heavy defoliation. Egg counts in 1956 averaged 64 masses per 100 square feet of foliage compared with 112 in 1955, and 221 in 1954.

A 2-year-cycle spruce budworm infestation in the Prince Rupert Forest District was surveyed and mapped. The outbreak extended from Fulton Lake, Topley Landing on Babine Lake, and Tochcha Lake along both sides of Babine

Lake and the Nilkitkwa Lakes, up the Babine River as far as Kisegegas, and up the east side of the Nilkitkwa River to a point abreast of Centre Peak. Feeding was mostly restricted to spruce-alpine fir stands up to 3,000 feet elevation. The area was calculated to be 1,000 square miles. Defoliation was heavy, up to 100 per cent of the new foliage. Some of the 1955 and 1954 needles were lost in certain localities. Parasitism was very light. The egg population is high enough to result in medium to heavy bud damage in 1957.

The infestation on the lower end of Babine Lake in the area around Pinkut and Augier lakes persisted in 1956. At Pinkut Lake about 25 per cent of the buds were infested. The egg population was light.

The outbreaks at Star Lake and McKendrick Creek died out in 1956; no larvae were found and no defoliation was observed.

During 1956, the 2-year-cycle budworm population level in the Prince George Forest District decreased further. Defoliation was classed as a trace to light in most localities; obvious foliage discoloration was observed only at Lynx Creek north of Fort St. James, where defoliation was moderate. Budworms were slightly less numerous along the Hart Highway between Davie Lake and Pine Pass. The infestation in these areas covered some 35,000 acres of moderately defoliated alpine fir trees. Parasitism of larvae and pupae was very low. Egg counts indicate that the budworm population will be low in most parts of the Prince George Forest District in 1957.

In the Kamloops Forest District a light population of 2-year-cycle spruce budworm persisted in the subalpine forests of the Boleen Lake plateau and the Monashee Pass. Collections: Coast 133, Interior 86.

**Douglas-fir Beetle**, *Dendroctonus pseudotsugae* Hopk.—There was a decline in the Douglas-fir beetle population by the spring of 1956. At least some of the reduction was attributed to increased mortality of over-wintering stages. In the region about Lac La Hache, the number of beetles was reduced to one-third of the 1955 population level.

An intensive tree damage appraisal for the years 1953-55 was made in the summer and fall of 1956; the accompanying map shows the distribution of tree mortality caused by the Douglas-fir beetle in the province.

In the Nimpkish River Valley on Vancouver Island the number of green-attacked trees was small compared with the last three years. Felled and bucked logs were heavily attacked this year and undoubtedly absorbed many of the beetles. Company foresters in the area concerned estimate the total kill from 1952 to 1956 at 66,000,000 f.b.m., of which 19,000,000 f.b.m. have been salvaged. New attacks in the Lillooet River Valley, Vancouver Forest District, were also lighter than in 1955.

**Mountain Pine Beetle**, *Dendroctonus monticolae* Hopk.—In the Prince Rupert Forest District mountain pine beetle attacks extended from Morrison Lake along the east shore of Babine Lake to a point opposite Pierre Creek. Lodgepole stands on the west side of Babine Lake opposite Bear Island were also infested. There was a decrease in new attacks, but the outbreak is still active. In the majority of the trees examined the beetle attacks were pitched out. The volume of lodgepole pine killed in 1956 was calculated at 750,000 f.b.m.

The Takla Lake infestation in the Prince George Forest District also remained active in 1956. In southern British Columbia the population level was low.



**Spruce Bark Beetles**, *Dendroctonus* spp.—During 1956 no standing spruce trees were attacked in the infestation at Murphy Lake, Kamloops Forest District. The Engelmann spruce beetle continued its depredations in Nun, Monk, and Summit Creek valleys, Nelson Forest District. The large broods of larvae, pupae, and teneral adults in standing trees and freshly cut logs in Nun Creek Valley in September 1956, indicate that spruce bark beetles may be quite destructive in 1957. A tree damage appraisal showed that a total of 5,000,000 f.b.m. of spruce was killed by bark beetles in Nun, Monk, and Summit Creek valleys during 1953-55; 1956 damage was not determined.

**Black-headed Budworm**, *Acleris variana* (Fern.).—The black-headed budworm infestation on northern Vancouver Island increased in area and intensity in 1956. The known infestation, outlined by aerial and ground surveys, covered an area of about 3,000 square miles, an increase of nearly 1,400 square miles over last year. Some of this apparent increase is due to the extension of surveys into new localities. The entire northern end of the Island was infested as far south as Tahsish Inlet, Woss Lake, and Salmon River. Heavy defoliation extended over about 990 square miles in the following areas: Port Hardy to Holberg Inlet, Victoria Lake, Alice Lake, between Port McNeill and Englewood, and the Tsitika River Valley. In many cases the pole hemlock stands suffered heavy damage, and some mature stands lost up to 85 per cent of their foliage. The upper third of the crown was often the most heavily defoliated.

Larval parasitism averaged about 25 per cent, and pupal parasitism about 30 per cent. This was a considerable increase over 1955 when neither larval nor pupal parasitism exceeded 15 per cent in any area. Field sampling at the time of larval emergence indicated that egg parasitism was very low. No disease of any importance was found in the field.

An egg survey was conducted in the autumn of 1956 through the co-operation of various industries and the British Columbia Forest Service, who shared the expense and provided men to work with forest biology rangers. The results of this survey were not available at the time of writing but the highest egg counts were from areas where heavy defoliation occurred in 1956.

The same companies and the Forest Service also provided funds to conduct chemical control experiments in the Port McNeill-Port Hardy area during 1956. Ten per cent DDT in fuel oil applied at the rate of 1 gallon per acre gave good control. All larval stages from the second to the last instar were susceptible to the spray indicating that a control operation could extend over practically the entire period of larval development.

The infestation on the Queen Charlotte Islands has subsided. Hemlock stands at Cumshewa Inlet, Juskatla Inlet, Maude Island, Long Inlet, and Leonide Point in Skidegate Inlet sustained up to 90 per cent defoliation during the outbreak. Mortality plots have been established in several localities to study the effect of defoliation on tree survival.

Light to medium infestations were found along the coast from the Johnstone Strait Islands northward to Butehead. Light to medium defoliation was observed on hemlocks stands at Rivers Inlet, North and South Bentinck Arm, Labouchere Channel, and Elcho Harbour.

A light population of black-headed budworm persisted throughout much of the Interior but larvae were not numerous enough to cause noteworthy defoliation. The light infestation that has occurred on the Haines Road during recent years, subsided as did the severe outbreak along the Big Bend Highway. Collections: Coast 512, Interior 265.

**Western Hemlock Looper**, *Lambdina fiscellaria lugubrosa* (Hulst).—Hemlock looper numbers continued to decrease throughout the Province in 1956. No infestations were observed in the Interior.

In the coastal area occasional larvae were found in the Caycuse River, Nitinat River, Sarita River, and Harris Creek areas of southern Vancouver Island. Only a few larvae were collected in the other coastal districts. Collections: Coast 80, Interior 89.

**Forest Tent Caterpillar**, *Malacosoma disstria* Hbn.—Late in the summer of 1956, an infestation, in at least its second year, was discovered by P. Bodman of the British Columbia Forest Service at the north end of Adams Lake. Some 400 acres of trembling aspen trees had been severely defoliated by forest tent caterpillars. Egg counts averaging 37 masses per tree indicate that defoliation could be heavy again next year. Elsewhere in the Interior, the forest tent caterpillar was extremely scarce.

The forest tent caterpillar was found in association with the western tent caterpillar on the Saanich Peninsula, Vancouver Island. Although not in outbreak proportions, observations indicate that the population level is increasing. Collections: Coast 4, Interior 13.

**Western Tent Caterpillar**, *Malacosoma pluviale* (Dyar).—The western tent caterpillar infestation in the Fraser River Valley has subsided. On the Saanich Peninsula, Vancouver Island, apple, alder, willow, and wild rose were heavily defoliated. Larval parasitism was 7 per cent, and pupal parasitism 49 per cent. Disease was present in late-instar larvae and caused considerable mortality in some localities. The population level is expected to decline in 1957. Collections: Coast 90, Interior 8.

**Douglas-fir Needle Miner**, *Contarinia* sp.—During 1956 Douglas-fir needle miner population levels decreased throughout the Province.

Some 30 to 50 per cent of the current year's needles were destroyed at Oyama, Westbank and Peachland. In the Nelson Forest District the miner was present in most of the southern portion of the District east to Kootenay Lake and north to McCulloch. In the vicinity of Cascade, Douglas-fir trees on approximately 100 square miles were severely attacked with up to 90 per cent of the current year's needles damaged. Trees with up to 50 per cent of the current year's needles infested occurred on the east side of Granby River about 11 miles north of Grand Forks.

On Vancouver Island, at Falls Park, about 15 per cent of the current needles of Douglas-fir trees were infested. Collections: Coast 4, Interior 200.

**Silver-spotted Tiger Moth**, *Halisidota argentata* Pack.—The silver-spotted tiger moth apparently disappeared from the southern portion of Vancouver Island in 1956. The cause of this disappearance is unknown as overwintering colonies were found late in 1955. In the northern part of the Island, there was a light to medium infestation from Lantzville north to Campbell River, and on the Strait Islands between these two points. Parasites killed 32 per cent of the larvae reared. Collections: Coast 13.

**Fall Webworm**, *Hyphantria cunea* (Drury).—The unsightly tents of this webworm were numerous in the Okanagan Valley and the lowlands about Kamloops and Shuswap lakes. Collections: Interior 8.



**A Hemlock Sawfly, *Neodiprion* sp.**—The sawfly on hemlock remained prevalent in the Nelson and the eastern part of Kamloops Forest districts. It was less numerous along the Big Bend Highway than it was in 1955; defoliation ranged from a trace to light. Hemlock stands around Holberg Inlet, northern Vancouver Island, sustained light to medium defoliation in 1956. Collections: Coast 239, Interior 120.

**A Douglas-fir Sawfly, *Neodiprion* sp.**—Light to medium defoliation of the new growth of Douglas-fir trees was observed over 4 acres near Larkin, and 3 acres near Squilax. The most severe defoliation was at Larkin where 60 to 100 per cent of the new needles in the upper third of the trees were eaten. No sawfly eggs were found indicating that the outbreak may have collapsed. Larvae were collected in small numbers on northern Vancouver Island. Collections: Coast 59, Interior 163.

**Satin Moth, *Stilpnotia salicis* (L.).**—There was a decline in the abundance of the satin moth in the Bestwick and Lac du Bois areas in 1956. Tree mortality occurred in at least one of the trembling aspen groves that had been repeatedly defoliated.

A DDT spray applied in June 1956, apparently controlled the small infestation of satin moths at Kinsmen Beach, near Okanagan Landing.

Silver poplar trees at Victoria, Comox, Courtenay, and Genoa Bay, all on Vancouver Island, were again heavily defoliated. Parasites killed about 19 per cent of the larvae reared. Collections Coast 15, Interior 8.

**Douglas-fir Tussock Moth, *Hemerocampa pseudotsugata* McD.**—No larvae were observed near Cascade where an infestation occurred in 1955. A medium infestation persisted at Olalla during the spring of 1956, but disease caused an almost complete collapse by the end of the larval stage. Tussock moth larvae were collected in small numbers on Long Mountain near Oyama, at Yellow Lake, Bridge River, Lillooet and Lytton. Collections: Interior 18.

**Phantom Hemlock Looper, *Nepytia phantasmaria* (Stkr.).**—Two localized outbreaks of the phantom hemlock looper occurred in the Vancouver Forest District in 1956. About 200 acres of wooded area in Central Park, Burnaby, were heavily attacked. The top 20 feet of the crowns of some hemlock trees were completely stripped, and all crowns were heavily defoliated. The area was sprayed on August 3 with a 10 per cent solution of DDT in No. 1 fuel oil with good results. About 80 per cent of the mature hemlock trees and three small red cedar trees in the northwest corner of Queen's Park, New Westminster, were completely defoliated. There was a high incidence of a polyhedral virus in the specimens collected from the latter area. Collections: Coast 42.

**Larch Sawfly, *Pristiphora erichsonii* (Htg.).**—The larch sawfly remained scarce. A few individuals were collected near Phoenix, in the western part of Nelson Forest District. Only one colony was observed in the Prince George Forest District.

**Pine Needle Scale, *Phenacaspis pinifoliae* (Fitch).**—Heavy tree mortality has been caused by this scale insect among ponderosa pines bordering fruit orchards in the following areas of the Okanagan Valley: Campbell Mountain south of Skaha Lake, east of Oliver, and on the east side of the Valley from Duck Lake north to Oyama. The scale *Nuculaspis californica* Coleman replaces *Phenacaspis* in the southern parts of the Okanagan Valley.

**Engelmann Spruce Weevil, *Pissodes engelmanni* Hopk.**—Young Engelmann spruce trees were lightly infested by *Pissodes* at various places in the Nelson Forest District, including localities along the Monashee Highway and near Salmo. At a sample point along the Upper Kettle River, 27 per cent of the trees were infested in 1956, and 40 per cent had been infested in previous years.

Damage by this weevil was apparent on open-grown white spruce reproduction in the Prince Rupert Forest District. In an old field near Sheraton Station, 19 of 72 white spruce trees were infested this year.

**A Pine Root Weevil, *Hylobius* sp.**—Weevils were common throughout the white pine stands of the central portion of Nelson Forest District. Weevils were taken south of Kaslo, near Revelstoke, and along Kushanax Creek. At Kushanax Creek some small dead or dying white pine trees showed evidence of *Hylobius* feeding.

**Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.).**—This defoliator was numerous in some parts of the Prince George Forest District; the most severe defoliation, averaging 50 per cent, extended for 15 miles along the Hart Highway north of Salmon River. Collections: Interior 6.

**Aspen Leaf Miner, *Phyllocnistis populiella* Cham.**—The aspen leaf miner was again abundant over much of the range of trembling aspen in the Interior, north into Yukon Territory.

In the Prince Rupert Forest District heavy infestations occurred north and east of Cedarvale, along the Skeena River Valley above and below Hazelton, and between Hazelton and Smithers. Up to 100 per cent of the foliage was infested. Collections: Coast 8, Interior 21.

**Willow Leaf-miner, *Lyonetia saliciella* Busck.**—This miner was again abundant on willow in the western and central portions of the Nelson Forest District.

**Striped Alder Sawfly, *Hemichroa crocea* (Fourc.).**—An infestation extended over a 105-square-mile area in the Vancouver Forest District. Areas affected were Port Moody, Port Coquitlam, Ives Lake, Buntzen Lake, and Mt. Seymour. Feeding by the first-generation larvae was heavy around Port Moody, but all areas were attacked by larvae of the second generation. Much of the red alder was completely defoliated.

In the Interior, most of the mountain alders along the west arm of Kootenay Lake were defoliated. Collections: Coast 20, Interior 3.

**Spruce Gall Aphid, *Adelges cooleyi* Gill.**—Spruce regeneration from the east end of Francois Lake to Endako, Prince Rupert Forest District, was heavily attacked by spruce gall aphids. In some areas up to 60 per cent of the new twigs had galls.

**Spruce Seed Moth, *Laspeyresia youngana* Kearf.**—In the Yukon Territory the spruce seed moth and a dipteran caused severe damage to white spruce seed. Samples taken in some 300 square miles of forest indicated that 45 to 95 per cent of the spruce cones were infested.

**White Pine Cone Beetle, *Conophthorus monticolae* Hopk.**—An estimated 60 per cent of the western white pine cones along Crawford Creek, on the east side of Kootenay Lake were infested by this beetle.

**A Poplar Flea Beetle, *Altica* sp.**—The foliage of cottonwoods bordering the Kootenay River between Wasa and Newgate appeared scorched from flea beetle feeding.



