Forest Insect and Disease Conditions

Vancouver Forest Region
1982

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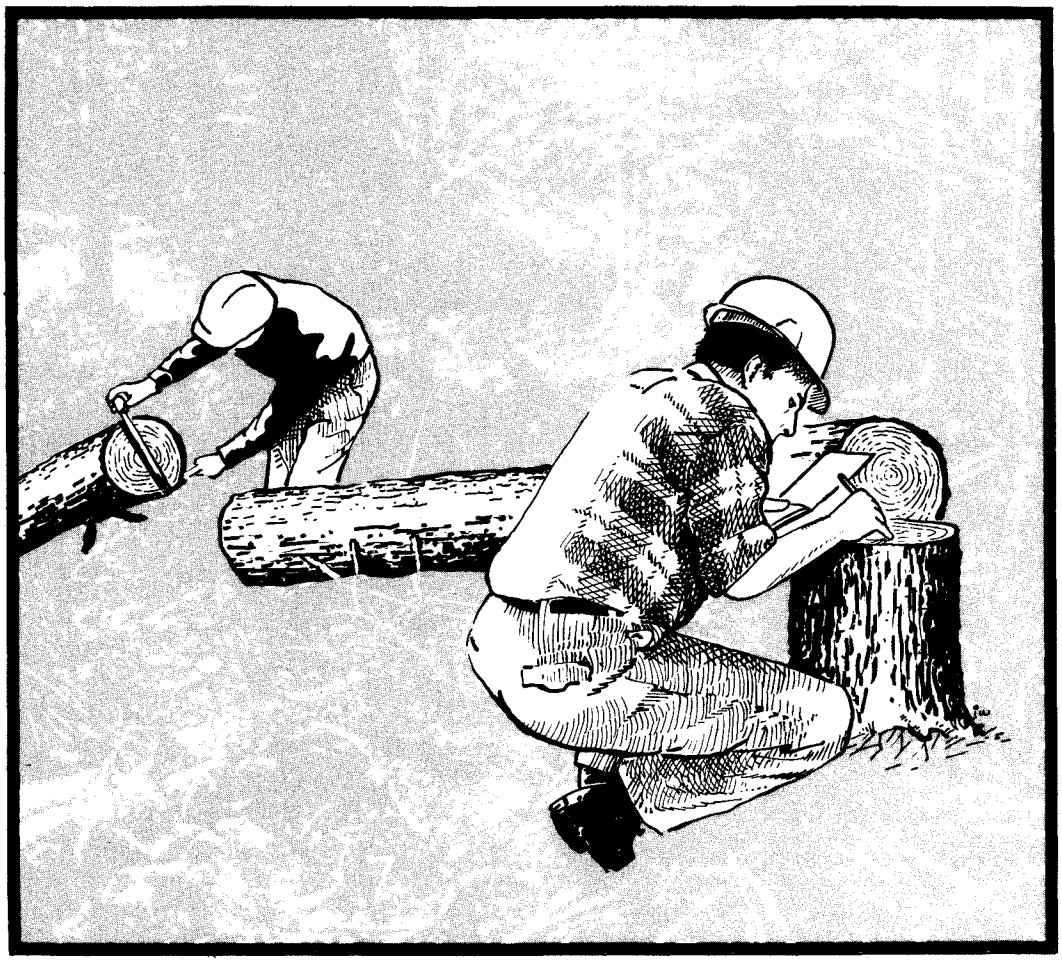

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*Appendix available from Pacific Forest Research Centre, Victoria, B.C.

SUMMARY OF PEST CONDITIONS

This report outlines forest insect and disease conditions in the Vancouver Forest Region in 1982 and forecasts population trends of some potentially damaging forest pests.

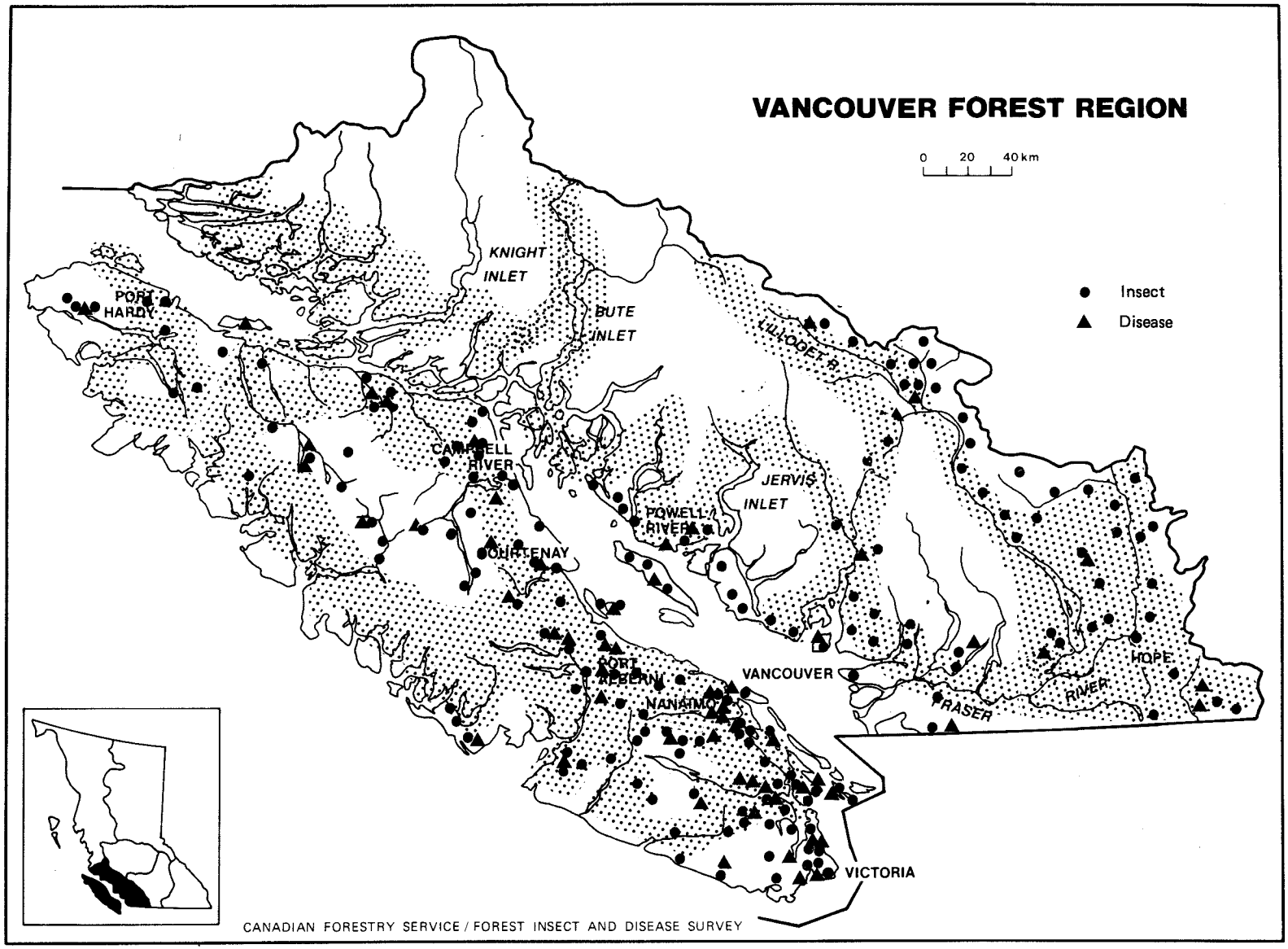
Phantom hemlock looper moderately to severely defoliated western hemlock on 100 ha at Coquitlam Lake. Douglas-fir tussock moth severely defoliated Douglas-fir trees near Chilliwack, in Clearbrook and Abbotsford, at Cassidy and at two locations in the Greater Victoria area. Western oak loopers moderately to severely defoliated Garry oak and Douglas-fir in the Mount Maxwell Ecological Reserve on Saltspring Island. Root weevils killed or damaged western hemlock and balsam seedlings in the Holberg area on Vancouver Island. Numerous regeneration Sitka spruce stands were attacked by spruce weevil near Port Alberni and in the northern part of the Island. Localized infestations of mountain pine beetle continued at reduced levels in the Pemberton and Fraser Canyon areas. Winter moth defoliation of deciduous trees in the Greater Victoria areas were little changed from 1981 but larval parasites were more numerous. Dwarf mistletoe, Armillaria root disease and Phellinus root rot were common in mature and second growth stands throughout the Region. For the first time in recent years, no defoliation by western spruce budworm was recorded in 1982.

The field survey extended from May 19 to October 14 during which special surveys were completed to monitor Provincial parks and campsites for adult gypsy moth, examination of natural and managed second growth stands for pest problems and examination of a western hemlock plantation on Vancouver Island for terminal crook disease.

A total of 476 insect and disease samples were submitted to the Pacific Forest Research Centre by CFS FIDS personnel and 76 by other agencies or individuals. Locations where one or more samples were collected and the areas of the Region covered during about 25 hours of fixedwing aircraft aerial surveys, for defoliator and bark beetle infestations, are shown on Map 1.

There was a 17% increase in the number of collections containing larvae in mainland forests from 61% in 1981 to 78% and on Vancouver Island a 1% increase from 66% in 1981 to 67% in 1982.

Details on individual pest problems follow under host tree species and by importance.



Map 1

Area covered by aerial surveys and locations where one or more forest insect or disease samples were collected, 1982

DOUGLAS-FIR PESTS

Douglas-fir tussock moth, *Orgyia pseudotsugata*

A new outbreak in the Fraser Valley caused moderate to severe defoliation of mature and immature Douglas-fir over approximately 60 ha in localized pockets along Highway 401 from east of Abbotsford to west of Clearbrook and in nearby residential areas. A previous outbreak occurred in the same general area in 1971-72, however the current infestation expanded to include the Chilliwack Golf and Country Club west of Chilliwack where the most severe defoliation occurred. Damage to scattered individual mature Douglas-fir ranged from a few defoliated branches to 85% of the crown defoliated. Defoliation of individual Douglas-fir was light to severe near Cassidy airport on Vancouver Island, in the city of Victoria and at a seed orchard on the Saanich Peninsula.

An aerial spray operation using SEVIN at the Chilliwack Gulf and Country Club was only partially successful and a second spray was applied, the results of which are not known.

Egg mass surveys on Douglas-fir trees at Chilliwack, Cassidy and Victoria showed an average of 1, 1.1 and 1.5 egg masses per branch, respectively. No eggs were found at the seed orchard. Based on data which indicates defoliation will occur when the number of egg masses exceeds 0.7 per branch, infestations are likely to continue in 1983, except in the seed orchard.

The numbers of male adults of *O. pseudotsugata* and *O. antiqua badia* caught in pheromone-baited traps at Pacific Forest Research Centre were lower than in 1981 (Table 1). The numbers of adults indicate endemic populations with little potential of causing serious defoliation.

TABLE 1. Number of male adult Douglas-fir tussock moths and rusty tussock moths in pheromone-baited traps in shade houses at Pacific Forest Research Centre, Victoria, 1981-82.

Year	Number of Adults in Traps					
	Douglas-fir tussock moth, *O. pseudotsugata*			Rusty tussock moth *O. antiqua badia*		
	No. traps	Total no. adults	Av/trap	No. traps	Total no. adults	Av/trap
1981	8	109	14	8	126	16
1982	9	38	4	9	28	3

Douglas-fir beetle, Dendroctonus pseudotsugae

An estimated 75 recently killed Douglas-fir trees were recorded in small groups in the Fraser River drainage, in Siwash Creek - 20 trees in a stand previously defoliated by spruce budworm; 30 trees northwest of North Bend and 25 trees between Mowhokam and Ainslee creeks.

Moderate populations were detected in 1982 attacked right-of-way Douglas-fir logs in three decks at Ainslee Creek and in one deck at Log Creek. These logs were to be removed before beetles emerge in 1983. There was an unconfirmed report of infested felled and bucked Douglas-fir in a 30 ha area on the east side of Harrison Lake, but no standing recently-killed trees were observed there during aerial surveys.

On Vancouver Island, at least 4 of 20 mature Douglas-fir trees were attacked by the beetles in an Ecological Reserve on Mount Maxwell on Saltspring Island. The trees over 16 ha of the 64 ha Reserve had been weakened and predisposed to bark beetle attack by at least two successive years of defoliation by the western oak looper, Lambdina f. somniaria. The status of the overwintering broods in recently attacked trees will be examined prior to emergence in 1983 to determine the beetle's potential to attack other susceptible trees in the area.

Western spruce budworm, Choristoneura occidentalis

Larval populations failed to develop in Douglas-fir stands in the Fraser Canyon and Pemberton areas for the second consecutive year and for the first time in 13 years there was no defoliation recorded in the Vancouver Region.

Few larvae were collected in beating samples on the mainland and none on Vancouver Island. The decline in numbers of larvae has been occurring since 1977 and is attributed mainly to climatic factors. Although studies in the past have shown that there are parasites commonly present in budworm populations, their effect on the populations has not been determined.

The incidence of Douglas-fir buds infested by early instar budworm larvae at seven locations in the Fraser Canyon and Pemberton areas ranged from 1 to 15% but averaged only 3% (Table 2). This indicated that light to moderate defoliation would occur in 1982 at Gilt Creek but the population failed to develop.

TABLE 2. Percentage of Douglas-fir buds infested with spruce budworm larvae, Vancouver Forest Region, 1982.

LOCATION	Percentage of buds infested
Fraser Canyon	
Kookipi Creek	1
Gilt Creek	15
Urquhart Creek	1
Skagit River	2
Pemberton	
Haylemore Creek	1
Owl Creek	1
Roger Creek	1
AVERAGE	3%

The average number of adult males collected in pheromone-baited traps at 8 locations in the Fraser Canyon-Pemberton areas and at 3 locations on Vancouver Island ranged from 0 to 67 (Table 3). This indicates that an endemic population remains a potential threat to Douglas-fir stands in the Region.

TABLE 3. Adult male western spruce budworm in pheromone-baited traps, Vancouver Forest Region, 1982.

Location	Average number and range of adults per trap by pheromone concentration								
	.001%			.01%			0.1%		
	No. of traps	No. of adults range	average	No. of traps	No. of adults range	average	No. of traps	No. of adults range	average
Fraser Canyon									
Kookipi Cr.	3	3-20	9	5	11-50	28	5	20-54	38
Gilt Cr.	4	0-5	1	5	6-15	10	5	10-54	31
Rhododendron Flats	5	0-1	1	5	2-10	5	5	20-30	24
Skagit R.	5	0-0	0	5	1-2	1	5	1-11	5
Pemberton									
Haylemore Cr.	5	0-4	2	1	15	15	5	47-80	67
Twin-One Cr.	5	0-1	1	5	5-21	13	4	21-60	48
Railroad Cr.	5	0-5	2	4	2-36	17	5	24-45	33
Owl Cr.	2	2-5	4	4	4-25	11	5	19-55	33
Vancouver Island									
Highlands Rd.	5	0-0	0	5	0-2	1	5	3-5	4
Fuller Lake	5	0-1	1	5	1-3	2	5	2-9	5
Green Mountain	5	0-1	1	5	2-6	4	5	3-42	23

Two Douglas-fir branches from each of three trees were sampled for egg masses at eight stands in the Fraser Canyon and Pemberton areas. Only one egg mass was found at Gilt Creek and none elsewhere. This indicated that a trace of defoliation may occur only at Gilt Creek in 1983.

Pine butterfly, Neophasia menapia

Large moth flights have been reported on Vancouver Island at various times since 1896 but defoliation of Douglas-fir has never exceeded the 25% which occurred at MacMillan Park in 1960 and near Woss Lake in 1963.

In 1982 a large flight was reported at Port Alberni, and lesser numbers in MacMillan Park and at Kye Bay near Comox but no defoliation was recorded.

Cone and Seed Pests

Douglas-fir cone crops were generally light to moderate on Vancouver Island in 1982. A cone moth, Barbara colfaxiana, and a seed midge Contarinia spp. infested from 5 to 25% and averaged 18% of Douglas-fir cones at three locations (Table 4).

TABLE 4. Incidence of cone and seed pests on Vancouver Island, 1982.

Location	Host	Pest	% cones infested
Maple Mtn. Park	Douglas-fir	Contarinia oregonensis	15
		Contarinia washingtonensis	5
		Barbara colfaxiana	5
Brannon L.	Douglas-fir	Megastigmus spermatrophus	5
Schoen L.	Douglas-fir	Barbara colfaxiana	25
		AVERAGE	18

Phellinus root rot, Phellinus weirii

Mortality of infected mature Douglas-fir is common and widespread throughout the Region. An estimated 28% of mature and immature trees over 2 ha on the Okeover Arm Road in the Powell River area were killed and 1% of the trees in a 20-year-old plantation at Slollicum Creek on Harrison Lake were infected. Infection centers and recently killed trees were common in localized areas on Vancouver Island including Wild Deer, Chef and Rosewall creeks, at Roberts Lake, along Nanaimo Lakes Road and near North Cove on Thetis Island.

Armillaria root disease, Armillaria mellea

This disease infected and killed numerous immature trees in many young stands throughout the Region. More than 15 young, recently infected Douglas-fir trees were scattered over 400 ha along the north side of Spuzzum Creek between the Fraser River and Urquhart Creek, indicating that infection was widespread in that area. Between 1 and 5% of the young trees were infected and killed in 2 ha sample sites along the Silver-Skagit Road south of Hope; at Owl Creek north of Mount Currie, at Roger Creek south of Lillooet Lake and in a 40 ha Douglas-fir plantation along the Cheakamus Lake Road south of Whistler.

Armillaria mellea will remain a potential threat to young coniferous stands in the Region until they are 25-30 years old, after which the more vigorous trees become more resistant to infection.

Rhizina root rot, Rhizina undulata

This relatively uncommon disease killed 41 of 100 recently planted Douglas-fir seedlings examined in a 40 ha plantation near Tony Lake in the Powell River area. Seedling mortality was found only in the hottest part of the 1980 burn. Sporophores were commonly found near dead seedlings.

Sporophores are subsurface and are found only in slash burned sites one or two years after the area is burned and infest newly planted seedlings. Sporophores are usually more numerous in severely burned areas as occurred in the Tony Lake area.

Swiss needle cast, Phaeocryptopus gaeumanii

This disease, which severely infects all but the current year's foliage of Douglas-fir trees and results in premature needle loss was widely distributed on Vancouver Island.

An intensive 1981 survey showed that it was more widespread and damaging than previously recorded. In 1982, surveys at six locations on Vancouver Island showed the percentage of trees infected ranged from 4% to 70% in the following areas: Stamp Falls Provincial Park - 70%; Crown Zellerbach Seed Orchard, west of Saanichton - 55%; B.C. Forest Service Seed Orchard, Campbell River - 30%; Chef's Creek near Bowser - 14%; Dewdney Seed Orchard, south of Sidney - 13%; Thames Creek near Bowser - 4%.

Swiss needle cast is generally considered to be a minor pest of Douglas-fir in British Columbia and the most severe damage recorded was in 1979 when planted Douglas-fir on 1 000 ha in the Upper Klanawa River on Vancouver Island were severely infected, which resulted in premature needle drop.

Nutrient Deficiencies

Terminal dieback, needle loss and needle chlorosis, symptomatic of a deficiency of nitrogen, magnesium, calcium or boron was evident at one young western hemlock stand and 10 young Douglas-fir stands on Vancouver Island and at two Douglas-fir plantations on the Mainland.

A magnesium deficiency affected from 1 - 97% (an average of 42%) of the trees at five of six sites examined; a nitrogen deficiency occurred at one hemlock and one Douglas-fir stand, affecting up to 90% of the trees

and 50% of the foliage; suspected boron deficiency was evident on up to 3% of the Douglas-fir trees at four locations and calcium deficiency affected 30% of the trees at one site (Table 5).

TABLE 5. Nutrient deficiencies in coniferous stands, Vancouver Forest Region, 1982.

LOCATION	HOST	Percent of host trees affected by nutrients deficient					
		Nitrogen	% foliage affected	Magnesium	% foliage affected	Boron	Calcium
VANCOUVER ISLAND							
Rooney L.-Eve R.	western hemlock	9	20		-	-	-
Cougar Smith Cr.	Douglas-fir	90	40		-	-	-
Mt. Hall - Copper Canyon	"	-	-	-	-	2	-
Mt. Maxwell Pk.	"	-	-	1	-	-	-
Prior Centennial Pk.	"	-		10	40	-	-
Koksilah Seed Orchard	"	-	-	80	15	-	-
Goldstream Pk.	"	-	-	20	50	-	-
Dickson L. - Ash R.	"	-	-	97	-	-	-
Malcolm Island	"	-	-	-	-	trace	-
Adrian Cr.	"	-	-	-	-	-	30
MAINLAND							
Harrison L.	"	-	-	-	-	1	-
Cheakamus L.	"	-	-	-	-	3	-

Nutrient deficiency may become more significant in the future, particularly in fertilized stands. Nitrogen in most forest fertilizer applications usually enhances growth rates, and may result in nutrients, formerly at barely adequate levels, then becoming deficient.

WESTERN HEMLOCK PESTS

Phantom hemlock looper, Nepytia phantasmaria

Populations suddenly erupted at Coquitlam Lake in the Greater Vancouver Water District in 1982, and severely defoliated about 50 ha of immature western hemlock in two areas south of the lake and 50 ha of mature hemlock along the west side of the lake. More than 1,000 larvae per sample were collected in 3-tree beating samples of which about 12% were western hemlock looper, Lambdina f. lugubrosa.

Both defoliators have been present at Coquitlam Lake since 1970-72 when a Lambdina outbreak killed western hemlock and western red cedar on more than 200 ha, but until the current outbreak, Nepytia, was less numerous and damaging.

About 80% of the mature Nepytia prepupal larvae and some pupae were infected and killed by one of two diseases, Entomophthora sp. and Paecilomyces sp.

Two branches from each of three hemlock trees at each of two locations in October showed an egg population of only 17 eggs per m^2 of foliage which, when coupled with the high incidence of disease, indicates that defoliation should not occur at Coquitlam Lake in 1983.

Elsewhere on the mainland, an average of 2.5 larvae was collected in 4% of the samples from western hemlock. On Douglas-fir an average of 1.7 larvae was collected in 22% of the collections and only one larva was collected on Vancouver Island, which indicates low endemic populations.

Conifer sawflies, Neodiprion spp.

Although larval populations in western hemlock stands at Keta Lake near Kelsey Bay on Vancouver Island declined, they remained moderate to high in other areas, but no defoliation was recorded. There were maximums of 300 larvae per sample at Haihte Lake, 70 at Rooney Lake near Eve River and 30 at Corrigan Creek in the Franklin River Division. An average of 37 larvae per sample was found in 21% of the western hemlock collections on Vancouver Island.

On the mainland, larvae were common in low numbers on all coniferous hosts. Except possibly for Haihte Lake, defoliation is not expected in the Region in 1983.

Western hemlock looper, Lambdina f. lugubrosa

At Coquitlam Lake, in the Greater Vancouver Water District, there were up to 50 larvae in early samples from western hemlock which indicated

possible defoliation. However, larvae were subsequently fewer than those of phantom hemlock looper, Nepytia phantasmaria.

Throughout the mainland area of the Region, there was a substantial increase in the number of Lambdina larvae in beating samples from western hemlock. There was an average of nine larvae in 30% of the samples compared to two larvae in 16% of the samples in 1981, which indicates a rising population. However, there was little change in samples from western red cedar and Douglas-fir which remained at an average of two and one larvae, respectively.

On Vancouver Island, populations remained low with an average of two larvae in 6% of the hemlock collections and a total of three larvae collected from Douglas-fir at two locations.

Root weevil, Steremnius carinatus

Damage by this weevil in the Holberg area on northern Vancouver Island was reported by forest industry personnel following survival surveys of western hemlock and amabilis fir plantations. Weevil attacks in 1981 damaged 75% of western hemlock seedlings in a 1980 plantation at Brink Lake. Other 1980 western hemlock plantations where feeding damage but no tree mortality was recorded included: along the Stranby River, at Denad and Pegattem creeks and near Nahwitti and Leeson lakes.

In a 1981 amabilis fir plantation in the San Josef River Valley, 40% of the seedlings were killed in 1982. Lower levels of mortality occurred in plantations near Erie Lake, Ronning, Kwatleo and Denad creeks and in the Macjac River Valley. Light damage, but no mortality, to natural regeneration western hemlock and western red cedar seedlings was also common in the latter five areas.

Western blackheaded budworm, Acleris gloverana

The most recent outbreak of this insect in the Region occurred on Vancouver Island between 1972 and 1974. Since then, populations remained low and in 1982 only 6% of the samples from western hemlock contained an average of two Acleris larvae. Little change is expected in 1983.

Rusty tussock moth, Orgyia antiqua badia

No defoliation was observed in the Region in 1982. However, low numbers of larvae of this potentially damaging defoliator were present in samples in western hemlock stands at Coquitlam Lake near Vancouver and at Weaver Creek near Harrison Lake. A few larvae were found on dogwood trees at Peace Arch Park near the British Columbia - Washington border and one was collected from Douglas-fir at Turnbull Lake on Vancouver Island. No defoliation is expected to occur in 1983.

Green-striped forest looper, Melanolophia imitata

Populations of this defoliator have been at low levels since the last outbreak on Vancouver Island in 1969 and this trend continued in 1982. The preferred host of the insect is western hemlock and throughout the Region, 11% of the collections from that host contained larvae with an average of less than three per sample. An average of only one larva was found in positive samples from Douglas-fir, western red cedar, true firs and Sitka spruce, which indicate low endemic populations for 1983.

Hemlock dwarf mistletoe, Arceuthobium tsugense

Hemlock dwarf mistletoe seriously affects growth in infected mature and immature western hemlock stands throughout the Region. Levels of intensity of infection ranged from 10% to 100% at 11 locations in 1982 (Table 6).

TABLE 6. Intensity of dwarf mistletoe infection on western hemlock, Vancouver Forest Region, 1982.

Location	Percentage of trees infected		
	understory	intermediate	overstory
MAINLAND			
Saltery Bay Park	30	-	50
Porpoise Bay Park	60	-	40
Cypress Park*		25	-
Sowerby Creek		-	90
Texada Island (S. of Blubber Bay)		-	10
VANCOUVER ISLAND			
Keta Lake	100	-	
Muchalat Lake	100	-	-
Woss Lake	75	-	-
Myra Falls (Buttle Lake)	-	-	90
Drum Lakes	100	-	-
Rheinhart Lake	20	-	-

*mountain hemlock

The pathogen can be controlled through implementation of stand tending recommendations, however the problem is likely to persist for some time.

Phellinus root rot, Phellinus weirii

Extensive blowdown of infected western hemlock stems was reported near Hudson Creek on the Sechelt Peninsula, at Ring Creek near Squamish and at Pemberton Creek near Pemberton. Several one- or two-ha openings similar to those caused by Phellinus were observed during aerial surveys in western hemlock - Douglas-fir stands over an estimated 200 ha along the northwest side of Birkenhead Lake; ground examination of the area is scheduled for 1983.

Terminal crook disease, Colletotrichum acutatum

This pathogen, an important nursery pest on radiata pine in New Zealand and potentially damaging to North American conifers, was discovered for the first time in North America on western hemlock seedlings in an Aldergrove nursery.

Infection was identified on 38 of 33,000 western hemlock seedlings examined during a stratified, random sampling of every seedlot and bay containing western hemlock, Sitka spruce and western red cedar; about 177,000 cedar and 690,000 spruce seedlings were also examined and all were healthy.

About 70,000 western hemlock seedlings from the Aldergrove nursery had been outplanted in 1981, before the pathogen was identified, at several sites near Northwest Bay on Vancouver Island. Seedlings at four sites were surveyed in 1982. The pathogen was isolated from only one of 61 seedlings suspected of being infected. A second examination of natural regeneration and planted seedlings revealed no infected stock.

Although the surveys indicated that C. acutatum is probably not well adapted to climatic or site conditions in the Northwest Bay area, further examinations of both planted and natural hemlock seedlings will be conducted in 1983.

PINE PESTS

Mountain pine beetle, Dendroctonus ponderosae

A total of 3,000 recently killed pine trees on 500 ha was recorded from aerial surveys in the Region in 1982 (Table 7); a decrease of 40% from 5,000 trees on 1 500 ha in 1981. Most of the tree mortality (1,750 trees) occurred in areas where tree mortality had been recorded previously; however, mortality was observed for the first time north of Bute Inlet along the Homathko River and was probably an extension of mountain pine beetle infestations in the Cariboo Region.

TABLE 7. Location, area, number and species of pine trees killed by mountain pine beetles, Vancouver Forest Region, 1982.

Location	Pine Species	Area (ha)	Number of dead trees
FRASER CANYON			
Mowhokam Cr.	lodgepole	20	80
Ainslee Cr.	"	60	600
W. of Boston Bar	"	40	100
Uztlius Cr.	"	10	30
Anderson L.	"	10	20
PEMBERTON			
Specht Cr.	lodgepole	20	350
Gates L.	"	100	300
Spruce-Haylemore Crs	"	20	150
Blackwater Cr.	western white	10	100
S. of Birkenhead L.	lodgepole	10	20
BUTE INLET			
Homathko R.	lodgepole	200	1250
TOTALS		500	3000

A ground survey of a 65 ha infestation near the east gate of Manning Provincial Park in March 1982 was made to determine the number of recently killed trees in the area. More than 18,000 lodgepole pine trees were examined, 20% of which were currently infested. These infested trees were marked to be later removed before the beetle flight period.

An estimated 5,000 trees in the area were removed during the summer by Manning Provincial Park personnel. A post-cut survey of the infested area showed that of 8,000 trees examined, only 252 (3%) were currently attacked. These were flagged to facilitate removal prior to the 1983 beetle flight period and by November more than half were cut and burned on site. The remainder are to be removed before beetle flight in 1983.

Currently attacked lodgepole pine were also found at Mule Deer and Hampton campsites a few kilometers west of the east gate infestation. The status of the pest will continue to be monitored in 1983.

Lodgepole pine stands west of east gate have reached the size and age where they are more susceptible to mountain pine beetle attack. Completion of the east gate control project and removal of infested trees

in adjacent campsites should contribute to a continued reduction of mountain pine beetle populations in this area.

Red Band Needle Disease, Dothistroma pini

An estimated 35% of the one-year-old needles on all the lodgepole pine over 200 ha near the confluence of North Creek and Lillooet River northwest of Pemberton were infected by this disease which caused premature needle loss.

Although it is unusual for the disease to be so severe over such a large area, damage to trees will not likely be serious, unless infections occur annually over two or more years. The incidence and intensity of infection is governed principally by weather conditions, with wet years favoring spore development and intensifying damage.

SPRUCE PESTS

Spruce beetle, Dendroctonus rufipennis

Tree mortality occurred only in Mowhokum Creek in the Vancouver Region in 1982, where less than 20 recently killed Englemann spruce were recorded.

A small trap tree project succeeded in attracting a moderate beetle population; the affected trees were subsequently removed.

The pest is less of a threat in the area than elsewhere because spruce is a minor species. However, trap tree programs and improved monitoring practices contribute to maintaining low populations.

Spruce weevil, Pissodes strobi

Surveys to determine the presence of spruce weevil and intensity of attacks were completed in Sitka spruce stands in nine areas in the Vancouver Region in 1982. The incidence of current attack ranged from 0 to 40% and averaged 12%. Four stands had no evidence of attack (Table 8).

TABLE 8. Incidence of current and old spruce weevil attacks in Sitka spruce plantations, Vancouver Forest Region, 1982.

Location	Percent of trees infested (100 tree sample) Current Attack (1982)	Old Attack (1981 and previous)
MAINLAND		
Salsbury Lake	0	0
Mowhokam Creek	0	0
VANCOUVER ISLAND		
Fair Harbour	40	0
Nimpkish	0	0
Head Bay	10	15
Sayward	30	37
Pacific Rim	0	0
Kennedy River	5	9
Kennedy Lake	20	23

Current attacks and leader mortality were also noted at Seymour River and Ashlu Creek on the mainland, on Malcolm Island and from Campbell River to Kelsey Bay where roadside infested trees were common.

B.C. Ministry of Forests conducted surveys of Sitka spruce regeneration over an estimated 2 000 ha in the region in 1982. Current spruce weevil attacks were not recorded in any of 38 stands (approximately 1 700 ha) examined in the Port McNeil District. However, 1981 attack averaged 6% ranging from 0-65%. At Borden, American, Log and Wray creeks in Chilliwack Forest District, Sitka spruce stands were free from current and previous attacks.

ALPINE FIR PESTS

Western balsam bark beetle complex, *Dryocetes confusus*-*Ceratocystis dryocoetidis*

This insect-disease complex is a major cause of alpine fir mortality in British Columbia and in 1982 killed an undetermined number of widely scattered mature alpine fir trees in 4 000 ha of high elevation Englemann spruce - alpine fir stands in the drainages of Mowhokam and Scuzzy creeks.

PESTS OF MANAGED AND NATURAL SECOND-GROWTH STANDS AND PLANTATIONS

The status of insect and disease pests was monitored in managed and natural second growth stands in 1982 at 29 locations in the region,

11 on the mainland and 18 on Vancouver Island (Table 9).

The major pest problem on the mainland was Armillaria mellea, common in 4 of 11 stands surveyed. On Vancouver Island no major pest problems were found in stands although of 17 Douglas-fir stands, 5 exhibited evidence of Phellinus weirii, 4 some nutrient deficiencies.

TABLE 9. Pests of managed and natural second growth stands and plantations, Vancouver Forest Region, 1982.

Location	Stand Type 1/	Stand Status	Number Examined	Pest(s) Found	Remarks
MAINLAND					
Weaver Cr.	D-fir	natural	1	none	
Texada I.	wH	natural	1	Arceuthobium tsugense	Infection on 10% of understory
Salsbury L.	sS	planted	1	none	
Okeover Arm Rd.	D-fir	natural	1	Phellinus weirii	28% of examined trees infected
Cheakamus L. Rd.	D-fir	planted	2	boron deficiency? Armillaria mellea	12% of trees infected 2% of trees infected
Bowen I.	wH	natural	1	Armillaria mellea	only 1 tree with symptoms
Slollicum Cr.	D-fir	planted	1	Phellinus weirii	1 tree infected
Spuzzum Cr.	D-fir	planted	1	Armillaria mellea	20% of examined trees with symptoms
Eureka Cr.	wH	managed	1	Armillaria mellea	1 tree infected
Sowerby Cr.	wH	managed	1	Arceuthobium tsugense Sclerophoma sp.	90% of remaining trees severely infected on most trees on edge of spaced stand
Lang Bay	wH	managed	1	none	
VANCOUVER ISLAND					
Campbell R.	D-fir	managed	1	none	
North Cove Thetis I.	D-fir	natural	1	Fomes pini Phellinus weirii	infection on 1 tree 1 infection centre

TABLE 9 - continued

Location	Stand Type 1/	Stand Status	Number Examined	Pest(s) Found	Remarks
Nanaimo Lakes Rd.	D-fir	managed	1	Phellinus weirii	4% of trees infected
Mt. Benson Rd.	D-fir	managed	1	Verticicladiella wagenerii	1 tree infected
				Cronartium ribicola	on 2 wwP trees left in stand
Cowichan Hwy BK229	D -fir	managed	1	Cronartium ribicola	on both wwP left in spaced area
Mt. Hall BK6	wH-D-fir	managed	1	none	
Rosewall Cr. BK164	D-fir	managed	1	Phellinus weirii	2 trees with symptoms
Roberts L.	D-fir	managed	1	Phellinus weirii	2% of trees infected
Manson Cr.	D-fir	managed	1	none	
Thames Cr. BK 199	D-fir	managed	1	Phaeocryptopus gaeumanii Cronartium ribicola	20% of foliage affected on 4% of the trees on 4 of 5 wwP left in spaced area
Chef Cr.	D-fir	managed	1	Phaeocryptopus gaeumanii	15% of foliage infected on 14% of the trees
				Phellinus weirii	1 tree infected
Dickson L.	D-fir	managed	1	Nutrient deficiency (suspected Mg)	97% of trees affected
Rooney L.-Eve R.	wH	managed	1	Sclerophoma sp.	20% of foliage on 97% of trees
WF30-Woss L.	D-fir	managed	1	Faciation suspected copper deficiency	on 3% of trees plus shepherd's crook on 33% of trees
Cowichan Hwy. BK 259	D -fir	managed	1	Cronartium ribicola	on 1 of 3 wwP left in spaced stand
Mt. Hall-Copper Canyon	D -fir	planted	1	Suspected boron deficiency	2% of trees affected
Iron R. Mainline	D-fir	managed	1	Nutrient deficiency (suspected Ca or boron)	30% of trees affected
Harewood L. Rd.	D-fir	managed	1	none	

1/ D -fir - Douglas-fir wH - western hemlock sS - Sitka spruce
lP - lodgepole pine wwP - western white pine

DECIDUOUS TREE PESTS

Winter moth, Operophtera brumata

Defoliation of deciduous trees on southern Vancouver Island continued in 1982 for the twelfth consecutive year with only a slight reduction in extent or intensity in the Greater Victoria, Colwood and Saanich Peninsula areas. Defoliation occurred mainly on Garry oak, broadleaf maple and fruit trees and was generally light except for localized areas of severe defoliation in Victoria and the Saanich Peninsula.

Four larvae were hand collected from two Garry oak in the Mt. Maxwell Ecological Reserve on Saltspring Island in May, a follow-up survey in December produced no adults; no defoliation was attributed to winter moth at this site. Surveys in the Delta-Richmond areas were negative.

A parasite release program established in 1979 continued in 1982, with 350 adult Cyzenis albicans and 250 adult Agrypon flaveolatum released at the PFRC and High Rock Park in Victoria.

With recovery of 12 adult Agrypon flaveolatum at three locations in Victoria, indications are that larval parasites have become sufficiently established in the Greater Victoria area to influence winter moth populations; further releases will be made in 1983.

Western oak looper, Lambdina f. somniaria

Garry oak and Douglas-fir in 16 ha of the Mt. Maxwell Ecological Reserve on Saltspring Island were severely defoliated (50-100%) in 1982 for the third consecutive year.

Light to severe defoliation was recorded on up to 20 Douglas-fir trees, 4 of which were attacked in 1982 by Douglas-fir bark beetle, Dendroctonus pseudotsugae.

The large moth flights in December indicate that the oak looper infestation will continue in 1983.

Gypsy moth, Lymantria dispar

Personnel of the Forest Insect and Disease Survey again cooperated with personnel of the Canada Department of Agriculture in a survey for gypsy moth in the Vancouver Region in 1982. On the mainland one or two traps baited with sex attractant pheromone were placed in 8 provincial parks or campsites, however no adults were trapped. On Vancouver Island two traps were placed in each of five locations and results were negative (Table 10).

Seven adults were trapped in 10 traps set in the North Vancouver and Clearbrook areas by Agriculture Canada, Plant Quarantine personnel. Egg masses were not found in or near the trap locations. Surveys will continue in 1983.

TABLE 10. Gypsy moth, Lymantria dispar, trap locations, Vancouver Forest Region, 1982.

Location	No. of traps	No. of adults found
MAINLAND		
Skagit River	1	0
Silver Lake	1	0
Hicks Lake, Harrison	2	0
Coquihalla Campsite, Hope	2	0
Nicolum R., Hope	2	0
Emory Creek, Hope	2	0
Chilliwack Lake	2	0
Entrance Bay, Cultus L.	1	0
VANCOUVER ISLAND		
Little Qualicum Falls Park	2	0
Ivy Green Park	2	0
Petroglyph Park	2	0
Rathtrevor Beach Park	2	0
Englishman River	2	0
TOTAL	23	0

Fall webworm, Hyphantria cunea

Light to severe defoliation of a variety of deciduous trees and shrubs was conspicuous in the lower mainland and eastern Vancouver Island areas.

Defoliation occurred on Bowen Island, from Vancouver east to Nahatlatch Lake and north to Squamish and Pemberton with the highest concentration of webs occurring in the Agassiz area.

Defoliation of single and small groups of trees was intermittent from the Malahat north of Victoria to Campbell River.

The damage caused by this defoliator is considered to be of little economic importance.

Armillaria root disease, Armillaria mellea

On Newcastle Island Provincial Park near Nanaimo, Armillaria mellea affected 90% of an estimated 200 mature Garry oak in a 15-20 ha area. Symptoms included thinning crowns and yellowing of foliage.

Although the incidence of the root rot on Garry oak is not common, infected trees could be hazardous in park systems particularly in campsite areas.

STATUS OF PESTS IN PROVINCIAL PARKS

As part of an ongoing cooperative survey with the B.C. Ministry of Lands, Parks and Housing, the status of insect and disease pests were monitored in 59 Provincial Parks in the Vancouver Region (Appendix 1).

Major forest pests were recorded in 7 of the Parks and included Armillaria root rot and dwarf mistletoes. Minor pests included many potentially damaging forest pests including western hemlock looper, green-striped forest looper, and blackheaded budworm.

Gypsy moth pheromone traps were located in 13 Parks, but no moths were caught (see results under Gypsy Moth).

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