FIDS REPORT

FIDS Report 94-10

HISTORY OF POPULATION FLUCTUATIONS *AND* INFESTATIONS OF IHPORTANT FOREST INSECTS IN THE *QUEEN* CHARLOTTE ISLANDS FOREST DISTRICT

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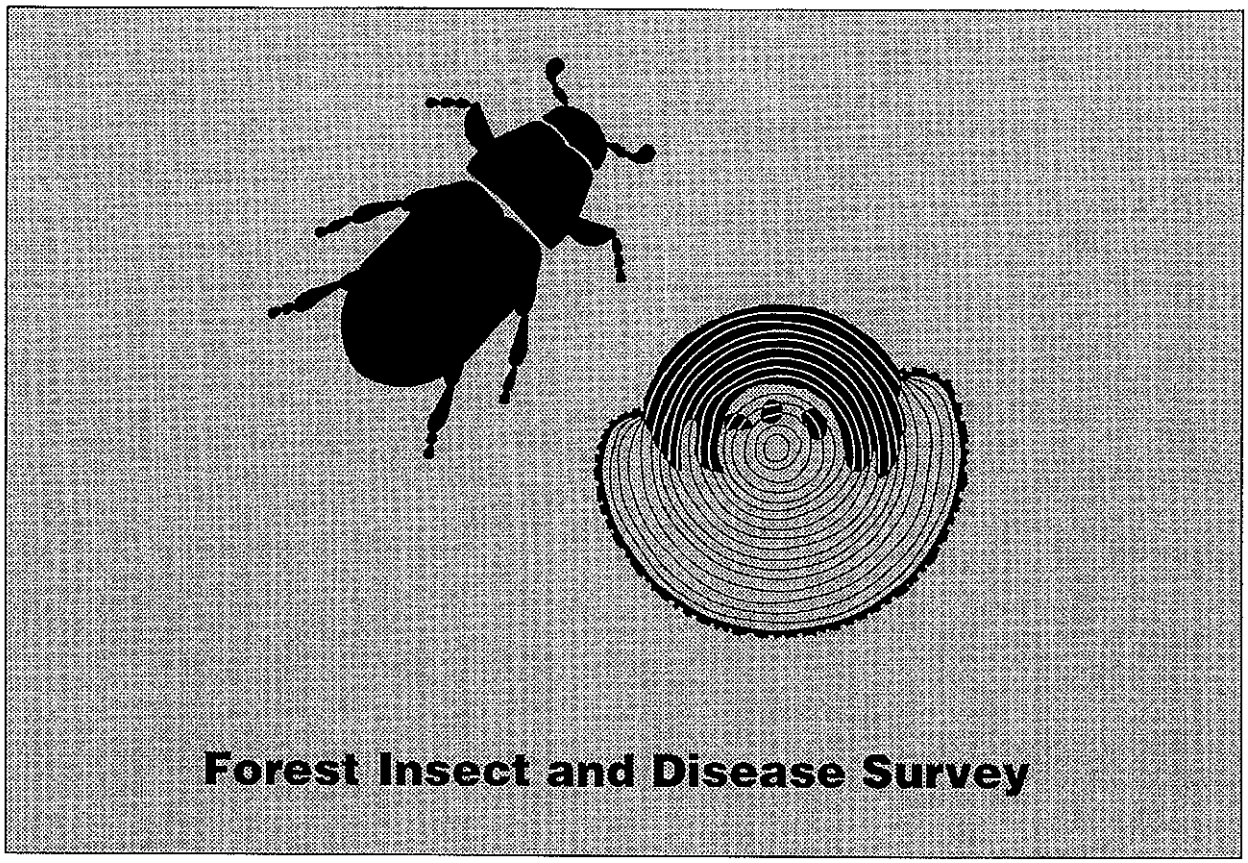

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INTRODUCTION

This report constitutes a history of some important forest insects in the Queen Charlotte Islands District of the Vancouver Forest Region. It serves to:

1. Designate the species of insects which have caused damage in the past and are presumably capable of causing damage in the future.

2. Record the pattern of population fluctuations.

3. Designate areas that appear to have chronic problems.

4. Point out the possibility of damage in different areas by insects, including species not known to have caused damage in the Queen Charlotte Islands.

Information in this report was compiled from Forest Insect and Disease Survey annual region reports, unpublished reports, a computer database and a variety of published histories of insects in British Columbia.

Widespread sampling of insect populations began in the southern portion of the Province in *1946* and in the Queen Charlotte Islands in *1949,* with the expansion of the Forest Insect and Disease Survey. Before *1949,* surveillance was mainly confined to industrialized areas; therefore, reports of infestations in remote areas were sporadic. Observations have gradually improved due to expanded road systems and through the use of aircraft for surveillance of forest problems.

The Queen Charlotte Island Forest District, as noted in a *1992,* Ministry of Forest, Inventory Branch, provincial summary report, encompasses *359 990* ha of productive forest land of which *342 222* ha are crown lands. The volume of mature timber on crown land has been broken down into five species groups as shown in the following table.

Volume of Mature Timber
Queen Charlotte Islands

Species type	Volume (m^3)
Cedar	*63 629 000*
Hemlock	57 158 000
Spruce	*22 907 000*
Lodgepole pine	*582 000*
Deciduous	*54 000*

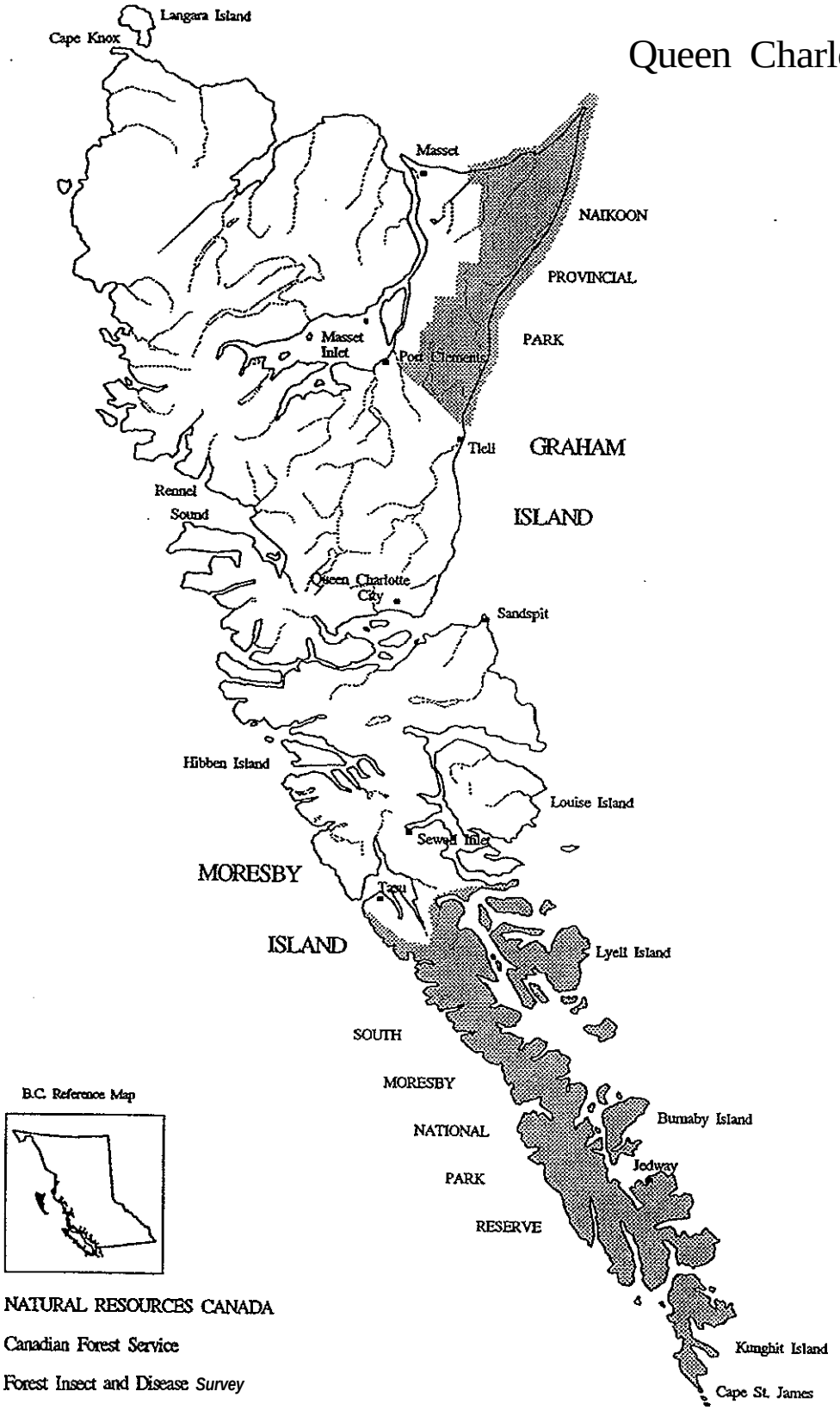
SUMMARY

Spruce beetle is a major cause of mortality in spruce in the province and has been reported as being "possibly" responsible for "extensive" injury prior to 1914. The only other report of serious activity was in several small infestations in 1984. Several outbreaks of spruce aphid have been recorded since 1961 through many parts of the District, causing severe defoliation and up to 22% mortality after several years of defoliation. Infestations often collapsed as a result of cold winter temperatures. The seedling weevil, Steremnius carinatus, girdled and killed up to 75% of Sitka spruce seedlings near Juskatla in 1962, with damage and lower levels of mortality noted in a number of plantations in several areas over the years. The Cooley spruce gall adelgid was first officially confirmed on Douglas-fir near Queen Charlotte City in 1990, and in galls on Sitka spruce, causing minor damage at Sandspit, in 1991. Spruce budmoths are common throughout the Islands, generally causing up to 5-10% damage to buds, however, up to 80% of buds were destroyed over a 20 ha area at Tow Hill in 1983. Larvae of two species of spruce sawflies have been collected intermittently from various locations throughout the district, and while severe defoliation can occur, especially on open growing spruce, no damage has been noted to date.

Western blackheaded budworm outbreaks have been reported since 1931 throughout the district with 4000 ha of defoliation recorded in 1973 and 44 300 ha in 1986 in which much of the damage was caused in conjunction with the hemlock sawfly. The greenstriped forest looper caused defoliation over 16 *400* ha mainly on Graham Island in 1963, since then, only a maximum of 97 larvae have been collected (at Geikie Creek in 1982) and no defoliation reported. Western hemlock looper was first recorded at low levels in 1949 in the Cumshewa Inlet, and although capable of causing massive defoliation and mortality, has never been reported as a serious defoliator in the District.

Conifer sawflies have been recorded since about 1945 with 10-15% defoliation reported on lodgepole pine between Port Clements and Tlell. In 1984 defoliation on pine extended over 200 ha at Nadu Creek. The sawfly on hemlock caused 14 110 ha damage mainly on Graham and the north end of Moresby Island in 1987. Defoliation was in conjunction with western blackheaded budworm, a common partner in outbreak situations. The saddleback looper has been recorded since 1949, with 95 larvae in a single sample found near Eden Lake in 1970, but no defoliation has been recorded. The yellowlined forest looper, rated a potential forest pest, occurs commonly at low levels and was noted to be present in 40% of collections in 1972. No defoliation has been reported to date.

The striped alder sawfly completely defoliated alder from Queen Charlotte City to Port Clements in 1945 and continued throughout the Queen Charlotte Islands causing severe defoliation for several years. Up to 95% defoliation occurred in 1957 with activity continuing till 1962. Damage was again recorded in the late 1970's and mid 1980's.


Queen Charlotte Island;
Langara Island
Cape Knox
Masset
NAIKOON
PROVINCIAL
PARK
Masset Inlet
Port Clements
Tlell
GRAHAM
ISLAND
Rennel Sound
Queen Charlotte City
Sandspit
Hibben Island
Louise Island
Sewell Inlet
MORESBY
ISLAND
Tasu
Lyell Island
SOUTH
MORESBY
NATIONAL
PARK
RESERVE
Burnaby Island
Jedway
Kunghit Island
Cape St. James
B.C. Reference Map
NATURAL RESOURCES CANADA
Canadian Forest Service
Forest Insect and Disease Survey
Scale 1: 1200000

SPRUCE PESTS

Spruce beetle, Dendroctonus rufipennis

The spruce beetle is one of British Columbia's most damaging pests. Major outbreaks have occurred over extensive areas of mature and overmature white spruce stands in interior districts in the Prince Rupert Forest Region since the 1940's. The life cycle of the beetle is usually two years but may last one or three, depending on climatic conditions. Most infestations have historically begun in blowdown and more recently from logging slash, road building or block-fringe blowdown. Control of the spruce beetle can be achieved by practicing sanitary logging methods, quick removal of decked logs and logging of blowdown or infested stands.

Year	Remarks
1914	"Reports of extensive (spruce) bark beetle injury to spruce farther up the coast and on Queen Charlotte Islands. It is possible that this beetle is the primary cause of damage but investigation was not possible". J.M. Swaine.
1915-1983	Adults were collected from two trees near Honna River in 1965, but there were no reports of damage during this period.
1984	Several small infestations were reported near Rennell Sound, Ian Lake and Gray Bay.
1985	At Phantom and Riley creeks, occasional stressed overmature trees had small beetle populations, but no mortality was expected.
1986-	Not reported.

The spruce aphid, Elatobium abietinum

The spruce aphid feeds on spruce. Mortality has been attributed to this aphid on the Queen Charlotte Islands and in the Prince Rupert and Port Edward areas. The aphid can also be a serious pest of ornamental spruce. There are several generations annually, but populations are at their highest during late winter and early spring and practically disappear in summer. The spruce aphid feeds mainly on old foliage, sucking nutrients from the needles. Epidemics in the forest are short term, usually no more then two years. Chemical control, to be effective, must be applied in March and April.

Year	Remarks
1959	A positive sample collected, but nothing was mentioned in reports.
1960	Aphid populations were incidental in the district.
1961	A severe and extensive outbreak of this aphid occurred on the Queen Charlotte Islands and along the coastal portion in the Prince Rupert area. Many of the mature spruce in Sandspit and Queen Charlotte City areas had lost all their old foliage. Equally severe attacks were found as far south as Tanu Island and as far north as Masset. Although the aphid feeds mainly on old foliage, a considerable percentage of 1961 growth was also lost as a result of these attacks. Attacks occurred on all size trees in all types of stands.
1962	Infestations decreased in intensity. Defoliation was light to moderate. The infestation extended as far south as Jedway on Moresby Island.
1963	The spruce aphid infestation was prevalent throughout most of the District. Mature trees were severely defoliated and many around Sandspit and Queen Charlotte City had only short new twigs containing any needles.
1964-66	Attack was very light.
1967	Light damage by this insect occurred on scattered trees in the Sandspit-Alliford Bay and Skidegate to Tlell areas.
1968	Infestations persisted in several localized areas. Aphids were active on fringe trees in the Skidegate-Tlell area and at Queen Charlotte City and Sandspit.
1969	Infestations collapsed, probably due to the severe winter of 1968-69.
1970-73	Aphid damage was not reported in the district.

Year	Remarks
1974	Spruce aphid defoliated shoreline Sitka spruce from Sandspit to Alliford Bay on Moresby Island, along Skidegate Inlet between Queen Charlotte City and Skidegate Mission, Tlell to Port Clements and near Juskatla. Single and scattered groups of trees were 50-80% defoliated.
1975-76	Not reported.
1977	Spruce aphid caused severe discoloration and needle drop of shoreline Sitka spruce mostly on the east coast but also along Rennell Sound and adjacent areas. Some needle drop also occurred farther inland.
1978	Populations collapsed
1979	Spruce aphid caused moderate discoloration and needle drop of shoreline Sitka spruce. Foliage browning was particularly evident between Sandspit and Alliford Bay and on Graham Islands at Queen Charlotte City.
1980	Defoliation of shoreline Sitka spruce occurred intermittently from Tlell south to Queen Charlotte City and between Alliford Bay and Sandspit. Cumulative defoliation since 1976 has resulted in some minor tree mortality, a few dead tops, and some trees with thinned foliage.
1981	Feeding was most evident on open growing mature spruce along much of the east, north and to a lesser extent the west coastline. There was 5-10% mortality on 320 ha between Queen Charlotte City and Tlell and at Gray Bay.
1982	Spruce aphid populations declined significantly. North of Skidegate, in a stand near Miller Creek, five years of accumulated feeding resulted in 22% tree mortality. On trees less than 30 cm dbh, mortality was *48%*.
1983	Populations increases resulted in light to moderate defoliation of shoreline spruce along the east coast. In further studies in these areas, 20% mortality in mature trees averaging 60 cm in diameter was noted.
1984	Increased populations caused widespread light-severe defoliation on the east and some west coast areas. New leader growth on severely infested trees averaged about *50%* less than on trees lightly defoliated.

Year	Remarks
1985	Populations were greatly reduced following severe winter cold. Patchy light-moderate defoliation persisted on the eastern coastline. At a permanent sample plot established at Miller Creek, 67% of the mature spruce had died since 1982.
1986	No damage recorded.
1987	Populations increased with scattered severe defoliation common on eastern, southern and northern coastal areas of Graham Island and on north and east coastal areas of Moresby Island.
1988	Defoliation decreased throughout the District.
1989-90	Populations were at low levels.
1991	Small populations common in many areas. Moderate defoliation in a young plantation at Heather Lake. Young Sitka spruce was moderately defoliated over 2 ha at Peel Inlet.
1992	Populations increased dramatically in coastal areas with a total of *3450* ha of defoliation noted during ground and aerial surveys. Defoliation occurred along the coast from west of Queen Charlotte City to Tlell and both south and east of Masset. On Moresby Island, defoliation was noted from Alliford Bay to Sandspit including Ski Jump Creek and south to Gray Bay. Areas of severe defoliation were noted in patches further south to Lyell Island. Other areas of defoliation included Tow Hill, the Rennell Sound area, and Heather Lake.
1993	Populations declined dramatically due to cold winter temperatures. Defoliation was generally limited to pockets of attack on older foliage scattered along east coastal areas of both Graham Island and the north part of Moresby Island.

A seedling weevil, Steremnius carinatus

The larvae of this pest develop in the phloem of slash and in the roots of recently dead conifers. The adults cause damage by girdling 1-and 2-year old seedlings at the ground line, Douglas-fir and Sitka spruce are preferred species, but most conifer species are utilized to varying degrees.

Year	Remarks
1961	The weevil recognized as a pest on the Islands.
1962	Weevils attacked and girdled up to 75% of planted seedlings over 80 ha south of Juskatla Inlet.
1963	This weevil remains prevalent throughout, although attacks were not as severe as in 1962. At Deena River, west of Alliford Bay, 25 seedlings were girdled on one quarter hectare. A company forester at Juskatla examined seedlings and found up to 23% attacked and 12% dead with weevil injury in one area.
1964,68,70	Incidental weevil collections were made, but nothing was mentioned in reports.
1971	Inspection of 250 container-planted trees near Juskatla that were planted in 1969, showed *40%* of the seedlings had been attacked by this weevil and 25% mortality had occurred.
1972-80	Not reported.
1981	This seedling weevil killed up to 50% of the Sitka spruce seedlings, planted during the late winter of 1981, near Alliford Bay and South Bay on Moresby Island. In three of four plantations examined, 20, 30 and 50% of the seedlings were killed respectively, with the highest incidence adjacent to landings and spruce stumps in which the weevils had been feeding.
1982	Partial girdling of 4% of Sitka spruce seedlings in a 1981 plantation on Moresby Island was recorded.
1983-89	No damage recorded.
1990	The conifer seedling weevil killed 20% of Sitka spruce seedlings over a 5 ha area near Collinson Lake on Graham Island. Partial girdling was noted on 80% of the remaining seedlings.
1991	In a 5 ha plantation near Collinson Lake, one seedling was killed and 8% **of** seedlings were partially girdled, a reduction from 20% mortality in 1990. At Deena Creek in a new plantation, 3% of Sitka spruce were partially girdled and one natural hemlock was killed by the weevil.
1992-	Not recorded.

Cooley spruce gall adelgid, Adelges cooleyi

The Cooley spruce gall adelgid is the most prevalent of the adelgids that cause cone-shaped galls in the west. These galls are only of importance on seedlings and saplings because they kill the tips of branches and tend to stunt and deform trees. The hosts of the gall adelgid include all spruce species and the alternate host Douglas-fir, where it occurs only as a woolly adelgid. Adelges cooleyi can live on either host independently but galls are not formed without the presence of both hosts.

Year	Remarks
1957	An adelgid was collected in the Mamin River area and initially identified as A. cooleyi, however, samples were not retained and i.d. can not be confirmed.
1959	The adelgid was collected in Juskatla Inlet at "Sunny Point" but samples identified as A. cooleyi have not been retained and i.d. can not be confirmed.
1960	Spruce seedlings were reported infested at Marie Lake and Juskatla but identification was not confirmed.
1990	The adelgid was collected, and positively confirmed, for the first time on the Islands. More then 80% of needles on six ornamental Douglas-fir were infested near Queen Charlotte City. Sitka spruce in the area was not infested with galls.
1991	Six young ornamental Douglas-fir near Queen Charlotte City were again moderately-severely infested. Nine Douglas-fir in Sandspit were infested (trace-severe). New galls were found in seven young Sitka spruce at the Sandspit location. This is the first time galls on spruce caused by this adelgid have been found.
1992	At Sandspit, six young Sitka spruce were infested with galls and 10 Douglas-fir were lightly to moderately infested with the woolly adelgids. Near Queen Charlotte City three Douglas-fir continue to be infested but no galls were found on spruce in the vicinity. No infestations of adelgids were noted on either host in Port Clements.
1993	New galls were found on only two young Sitka spruce at Sandspit, where Douglas-fir, the alternafe host has been removed. The infestation continues at the Queen Charlotte City site and no adelgids were found at Port Clements.

Spruce budmoths, Zeiraphera spp., Epinotia sp.

Seven species of budmoth feed on western conifers, these are closely related, similarly appearing native species. Z. canadensis and two other species feed on Sitka spruce and the habits of-these three budmoths is believed very similar. Young larvae enter the swelling buds in spring and feed on the developing new needles. As the twigs elongate, the partially eaten needles die and cause the trees to appear reddish brown early in the season.

Year	Remarks
1961	Severe damage occurred on terminals and laterals in young reproduction Sitka spruce near Sandspit and Skidegate Lake.
1962	Damage continued, and was determined as being caused by a combination of Zeiraphera sp., Epinotia sp. and Rhabdophaga sp.
1963	Damage increased considerably at Sandspit and showed some increase in most other areas from **the** previous year.
1964	Up to 32% of tips were infested in the District
1965	Populations declined.
1966-74	Low populations.
1975-76	Spruce budmoth was common and caused light to moderate damage. At Deena Creek, on Moresby Island, Sitka spruce had terminal and lateral bud damage.
1977	Infestations continued along Deena Creek on Moresby Island. Elsewhere, populations were low.
1978-79	Budmoths continued to cause deformed tops and laterals on *54* ha of pre-commercially thinned Sitka spruce at Spur *90* - Deena Creek on Moresby Island.
1980	Tip damage to laterals and leaders of Sitka spruce regeneration was greatly reduced at Deena Creek on Moresby Island. Based on historical data which indicates a five year damage period, spruce tip moth populations should continue to subside in 1981.
1981-82	Not reported.
1983	Lateral and terminal bud damage on Sitka spruce was widespread and common. At Tow Hill, an average of 80% of the buds were destroyed on semi-mature spruce over *20* ha.
1984	Populations increased, causing damage to 5-10% of Sitka spruce buds throughout the sampling area.

Year	Remarks
1985	Populations increased, with the greatest incidence at Lawnhill Point, where **50% of** the buds were damaged on fringe and open-growing trees.
1986	Increased in the district.
1987	Not mentioned in reports.
1988-90	Light defoliation in scattered patches.
1991	Light defoliation in scattered patches. At Tow Hill, 5-10% of new flush was damaged.
1992-93	Scattered trace to light defoliation throughout.

Spruce sawflies, Pikonema spp.

Two species of spruce sawflies commonly occur on Sitka spruce. The greenheaded spruce sawfly, Pikonema dimmockii, commonly occurs with the yellowheaded spruce sawfly, P. alaskensis, but is considerably less damaging. The yellowheaded spruce sawfly damages and sometimes kills open-growing spruce. The larvae feed first on the new needles and later on the older foliage.

Year	Remarks
1945	Occasional larvae were recorded but no damage was reported.
19*49*-*90	Spruce sawflies were variable throughout the district throughout this period. Usually 1-3 larvae were collected and generally both species identified. No damage reported.
1991-	Sawflies were common but at low endemic levels.

HEMLOCK PESTS

Western blackheaded budworm, Acleris gloverana

Western blackheaded budworm infestations have historically been characterized by periodic outbreaks lasting from one to four years. When conditions favor a high population of the budworm, the larvae cause extensive defoliation of hemlock, spruce, and several species of fir. Trees of all ages may be killed, top-killed, or severely weakened. The first recorded outbreak occurred in 1931, from Masset to Lyell Island. Since this outbreak, infestations have occurred several times.

Year	Remarks
1931	Severe infestation was found on hemlock from Masset Inlet to Lyell Island.
1943	Severe defoliation occurred on hemlock at Masset Inlet. Large moth flight was observed at Darwin Sound on Moresby Island.
1944	Severe infestation on pole and reproduction hemlock occurred near Masset Inlet.
1945	Occasional larvae, no damage reported.
1949-50	Endemic levels, occasional larvae found.
1952	Severe hemlock defoliation at Copper Bay on Moresby Island.
1953	Severe defoliation on Queen Charlotte Islands. Infestations occurred in the Masset area, from Port Clements east to Tlell and south along the coast to west of Queen Charlotte City. On Moresby Island defoliation was noted from about South Bay to Sandspit and south to Cumshewa Inlet with light feeding also recorded on the north side of Louise Island.
1954	Infestations continued and populations remained high near Masset, from Alliford Bay to Skidegate Lake and at Tasu Harbour.
1955	Infestation continued although populations declined.
1956	Populations subsided.
1957	Slight increase in population was noted on Moresby Island. Light defoliation occurred near Tow Hill, Masset, Port Clements, Tlell, and Sandspit. At South Bay, 16 out of 25 trees had dead tops. Scattered top kill was also observed elsewhere in the regeneration and intermediate trees over the entire affected area.

Year	Remarks
1958	Low populations at Naden Harbour, Masset Sound and Moresby Island.
1959	Populations increased to high from Skidegate Inlet to Jedway on Moresby Island.
1960	Populations decreased significantly.
1961	Populations at low levels.
1962-71	Populations at low endemic levels and not mentioned in reports.
1972	Ground surveys in July revealed low to high larval populations at Peel Inlet and Burnaby Island. Defoliation was light.
1973	Western blackheaded budworm reached epidemic proportions in localized stands, causing a total of 4000 ha of defoliation. Areas affected included Lyell Island, Burnaby Island, Tasu Sound, Jedway and Deena River.
1974	There was light defoliation in the southern parts of the Queen Charlotte Islands, severe defoliation at Deena Creek and light defoliation north of Queen Charlotte City and Port Clements. Moderate defoliation occurred near Eden Lake and severe defoliation on Kwaikans Island in Masset Inlet.
1975	Populations declined except near Port Clements where samples yielded up to 400 larvae per collection and light defoliation was evident.
1976-81	Not reported.
1982-83	Few larvae found.
1984	Budworm was not mentioned in reports and not recorded.
1985	Budworm defoliation of western hemlock covered 28 600 ha, and was concentrated in coastal areas of central and southern Moresby Island, Skidegate Channel and Masset Inlet.
1986	Defoliation of western hemlock covered 44 300 ha and occurred in association with hemlock sawfly, Neodiprion spp.. Severe defoliation (6150 ha) occurred in the mid-Moresby Island area, Skidegate Channel and Wathus Island. Moderate defoliation (22 800 ha) and light (15 350 ha) defoliation occurred in most hemlock stands on Moresby Island, southern Graham Island and the western Masset Inlet area.

Year	Remarks
1987	Defoliation totalled 14 110 ha (light-2890 ha, moderate-8430 ha, severe-2590 ha), of which 9660 ha were on Graham Island generally in the Skidegate Channel and Masset Inlet areas. The remaining 4450 ha of defoliation were towards the north end of Moresby Island. During larval sampling, sawfly larvae outnumbered budworm larvae by an average ration of 1.4:1 through the Moresby Archipelago and 2.7:1 on Graham Island.
1988	Area of defoliation declined to 7360 ha, including Masset Inlet, southern Graham Island and northern Moresby Island. Defoliation was 4960 ha light, 2210 ha moderate and 190 ha severe. Most defoliation was attributed to the sawfly, as the budworm populations had generally declined sharply.
1989	Infestations collapsed, no larvae or defoliation was found.
1990	No larvae collected.
1991	Only one larva was found in a standard three-tree sampling.
1992-93	No larvae were found in 14 standard three-tree samples.

Greenstriped forest looper, Melanolophia imitata

Greenstriped forest loopers are general feeders on conifers, but prefer hemlock, cedar, Douglas-fir and occasionally broad-leaved trees and shrubs. This looper is an economic feeder; fairly high populations can occur before defoliation is noticeable. The greenstriped forest looper had no history of severe defoliation and it was not considered a destructive forest pest until 1960. The Queen Charlotte Islands is the only area that has experienced tree mortality due to this defoliator.

Year	Remarks
1949-61	Occasional larvae have been found throughout District in most years.
1962	The occurrence and abundance of greenstriped forest looper increased slightly in all areas.
1963	This looper reached outbreak proportions on Graham Island, with 180 larvae collected just west of Tlell. The outbreak area extended over 16 400 ha of hemlock-cedar-lodgepole pine-spruce stands. Defoliation of hemlock and cedar was severe on 14 170 ha.
1964	The infestation declined throughout most of Graham Island. The infestation spread to the west side of Masset Sound, causing light to moderate defoliation over 2430 ha.
1965	Populations declined to very low levels.
1966	Populations at low levels.
1967	Populations increased averaging 5.5 larvae per sample
1969	An increase in abundance and distribution of larvae was noted.
1970-78	Low populations.
1979	Larval incidence was common but no defoliation was reported.
1980	Incidence increasing, with 43 larvae collected at Geikie Creek, but no defoliation reported.
1981	Larval populations decreased.
1982	There were increased larval populations with up to 97 larvae collected in standard three-tree beatings (Geikie Creek).
1983-92	Low populations.
1993-	Low numbers were found at Yakoun River, Riley Creek and Marie Lake.

Western hemlock looper, Lambdina fiscellaria lugubrosa

The western hemlock looper is periodically destructive in coastal forests of British Columbia.

Outbreaks develop in forests in which the preferred host, western hemlock, predominates. Associated Sitka spruce, fir, and Douglas-fir are also readily fed upon and understory shrubs may be defoliated. Heaviest losses of timber have occurred in extensive old-growth hemlock stands. The first feeding on the needles takes place in May, June and the early part of July. From July to October the feeding of larvae causes a heavily infested forest to turn yellowish-red then brown.

Year	Remarks
1949	One larva collected from a sample at Cumshewa Inlet.
1952	Single larva recorded at Tow Hill, but not noted in reports.
1959	For the first time the survey recorded two occurrences of the hemlock looper. One collection at Crescent Point, Logan Inlet , contained two larvae and another collection on the Peel Inlet road contained one larvae. Both collections were made from hemlock in mid-July.
1961	Populations of the looper continued at low levels in the mainland and no larvae were found in the Queen Charlotte Islands.
1962-81	Populations generally at low levels and only occasional single larvae were found.
1982-	Hemlock looper was not reported in the District.

MULTIPLE EOST PESTS

Conifer sawflies, Neodiprion spp.

Of all the sawflies, the Neodiprion spp. are of greatest concern to western foresters. These sawflies attack several species of trees at all ages. They feed gregariously on old foliage which weakens the trees, teamed with insects that feed on new foliage, most notably the western blackheaded budworm, they become a real threat. Sawfly populations fluctuate greatly.

Year	Remarks
1945	Large populations were noted in many areas including Skidegate Lake, Masset Inlet, Alliford Bay, and Cumshewa Inlet.
1949	Occasional scattered larvae were common.
1961	Sawfly larvae were common in collections. A small localized outbreak was discovered on lodgepole pine between Port Clements and Tlell causing loss of from 10-15% of current growth on some young pine.
1962	Larvae were common throughout.
1963	Larvae were common throughout. Approximately 600 larvae were collected just west of Tlell.
1964-82	No defoliation or larval numbers are mentioned for this period.
1983	Pine sawfly caused 80% defoliation of young shore pine over 5 ha near Nadu Creek on Graham Island. Hemlock sawfly populations continued to increase with light defoliation at Yakoun Lake and Alliford Bay.
1984	The infestation of pine sawfly at Nadu Creek increased and defoliated shore pine over 200 ha. No hemlock sawfly damage was recorded.
1985	Increased populations of hemlock sawfly feeding in conjunction with the western blackheaded budworm caused severe defoliation of hemlock on Talunkwan and Lyell islands. No pine sawfly damage wa reported.
1986	Increased populations of hemlock sawfly and western blackheaded budworm caused 1300 ha of severe defoliation in the Honna River and South Bay areas. Thirty-five percent of three-tree beating samples contained over 500 larvae each.

Year	Remarks
1987	Defoliation totalled 14 110 ha (light-2890 ha, moderate-8630 ha, severe-2590 ha) of which 9660 ha were on Graham Island generally in the Skidegate Channel and Masset Inlet areas. The remaining 4450 ha of defoliation were towards north end of Moresby Island. During larval sampling, sawfly larvae outnumbered western blackheaded budworm larvae by an average ratio of 1.4:1 through the Moresby Archipelago and 2.7:1 on Graham island.
1988	Area defoliated declined to 7360 ha, including Masset Inlet, southern Graham Island and northern Moresby Island. Defoliation was 4960 ha light, 2210 ha moderate and 190 ha severe. Most defoliation was attributed to the sawfly as the western blackheaded budworm populations had declined sharply.
1989	Trace defoliation occurred in the South Bay area, elsewhere populations collapsed with few larvae found.
1990	Populations were found in small pockets in Juskatla area, at Blackwater Creek, Ferguson Bay and Collinson Lake and caused occasional trace defoliation.
1991	Small pockets of residual sawfly populations continued. Trace, spot defoliation was noted at Marie Lake and Hangover Creek.
1992	A maximum of 21 larvae per three-tree beating sample was collected. No defoliation was found.
1993	A maximum of 25 larvae per three-tree beating sample was found and no defoliation was noted.

Saddleback looper, Ectropis crepuscularia

The saddleback looper commonly occurs with the hemlock looper and western blackheaded budworm. ,Westernhemlock is the preferred host. Douglas-fir, western red cedar, true firs, spruce, alder,,willow and poplar are other principal hosts. Deciduous and ground cover is defoliated before heavy feeding becomes apparent on overstory trees. Until 1960, when a severe outbreak occurred in the Kitimat area, saddleback looper was not regarded as a serious forest defoliator.

Year	Remarks
1949-68	Scattered, single to maximum eight larvae per sample were collected during this period. Some positive collections occurred almost every year but no damage was reported.
1969	Moderate numbers of larvae were collected near Eden Lake on Graham Island.
1970-71	Near Eden Lake, beating samples from western red cedar and western hemlock averaged 95 and 75 larvae, respectively, similar to 1969.
1972-78	No damage was reported; endemic level larvae were commonly found.
1979	Significant numbers of larvae were found in the Rennell Sound area.
1980	Populations of saddleback loopers on western hemlock, Sitka spruce and western red cedar increased significantly, but there was no defoliation. The average number of larvae per positive sample increased to 12. The highest populations occurred along Dolomite Narrows and at Rennell Sound.
1981-8	Not found in samples.
1988-	Populations remained endemic.

Yellowlined forest looper, Cladara limitaria (formerly Nyctobia limitaria)

This looper is common in British Columbia. It is usually a solitary feeder on foliage of many conifers, especially true firs, spruce, hemlock, Douglas-fir, and larch. It is rated a potential forest pest though no destructive outbreaks are recorded. Larvae are most often associated with other loopers and tortricid outbreaks. Several name changes have occurred with this insect.

Year	Remarks
1950-71	Occasional larvae throughout the District over most years.
1972	On Moresby Island, *40%* of collections contained an average of 2.7 larvae each.
1973-	Incidental larvae in three-tree beating samples occurred in most years.

DECIDUOUS TREE PEST

Striped alder sawfly, Hemichroa crocea

This sawfly is periodically abundant on red alder, Alnus rubra, stripping foliage from extensive stands. There are two generations per year. Feeding starts from the underside, giving the leaf a characteristic riddled appearance. Feeding continues on a leaf until only the coarser midrib remains. Severe infestations of this sawfly on alder occurred on the Queen Charlotte Islands for 20-odd years prior to 1962, although no tree mortality had been reported.

Year	Remarks
1945	Most alder trees were completely defoliated from Port Clements to Queen Charlotte City.
1946	Present throughout the District, causing severe defoliation of alder in all areas.
1948	Infestation continues.
1949	Infestation declining but occasional to 100% defoliation.
1950	Sampling continued but not mentioned in reports.
1951	Not reported or sampled.
1952	Up to 50% defoliation occurred at Skidegate Inlet, Masset Inlet, Skidegate Lake and Cumshewa Inlet.
1953	Distribution and intensity of the red alder sawfly declined. Tree mortality was more apparent than in previous years.
1954-55	No defoliation noted.
1956	Small populations were found in Masset Sound but no defoliation was noted.
1957	Up to 95% defoliation occurred in scattered patches at Skidegate, Queen Charlotte City, Lawn Point, Alliford Bay and Sandspit.
1958	Defoliation continued in areas noted in 1957 with additional heavy feeding noted on the southeast coast of Moresby Island.
1959	Estimates of defoliation up to 90% in many cutover areas in the southern areas of the Queen Charlotte Islands.
1960	Alder was infested in small patches on Moresby Island.

Year	Remarks
1961	Severe defoliation occurred on the north end of Louise Island between Mathers Creek and Carmichael Passage. Defoliation was also noted on the south shore of Cumshewa Inlet.
1962	There was light defoliation at Alliford Bay.
1963-77	There were no reports of infestations.
1978	Light damage was noted over several hectares on Kwaikans Island and for 1 km along the shore of Rennell Sound.
1979	Young red alder were almost completely defoliated over 3 ha on Kwaikans Island in Masset Inlet. Moderate to severe defoliation occurred on roadside alder between Skidegate Mission and Miller Creek.
1980	Roadside alders near Skidegate Mission were lightly defoliated for the third consecutive year, but damage was much reduced from previous years.
1981-83	Not reported.
1984	Red alder was severely defoliated along the north and east coast of Graham Island.
1988	The sawfly caused light to moderate defoliation of red alder throughout the eastern half of Graham Island and in central and north-western Moresby Island. The majority of defoliation occurred late in the season, possibly due to a second generation of larvae.
1989-	Not reported.

PESTS OF MINOR SIGNIFICANCE AND COMMON, INCIDENTAL INSECTS

INSECT	HOST'	YEARS	REMARKS
Acantholyda spp.(4)[2]	sS,wH,rA	49-90	web spinning sawflies, common, little damage
Agriotes ferrugineipennis	sS,wH,lP	63-65	click beetle; low nos.
Ampedus spp.(5)	sS,wH	61-68,90	click beetles, under bark and in decayed wood
Anaspis rufa	sS	60,62,63	beetle, low nos. on decayed matter
Anoplodera spp.(4)	sS,wH,lP	50,59-66	deadwood feeding beetles, low nos.
Aphrophora permutata	sS,wH,lP	49-65	spittle bug, cause no sig. damage
Athous spp.(6)	sS,wH,rA	50-68	click beetles, low nos.
Caripeta divisata[3]	wH,sS	53-64	geometrid defoliator, can cause sev. def. and mortality
Cecidophyopsis psilaspis	Y	92,93	big bud mite, common, damaging on new buds
Cinara sp.	sS,wH,-P	61-62,69,83, 87,90,92	aphid, colonial feeder, branches, stems, some minor damage
Ctenicera spp.	wH,sS,rA	49-68	click beetles, low nos., most yrs
Cydia spp.(2)	sS	50,52,60-69	occas., cones, bark, branches, little econ. imp. except cones
Dioryctria spp.(2)	wwP	62,71,88,93	incidental, mine cones, buds, shoots, some minor damage
Dryocoetes affaber	sS	93	bark beetle, secondary
Dyslobus spp.(3)	wH,wrC,sS	49-50,60-90	weevils, role unknown, occassional
Enypia spp.(2)	wH,sS	50's,60's	geometrids, occas. larvae only
Epinotia radicana	sS,wH	52-85	feeds on opening buds, small nos.
Epirrita spp.(2)	wH,sS	50-87	loopers, large flight '87, occas. larvae found, potentially damaging
Eumacaria sp.	mult. spp.	49-79	geometrid, common in small nos.
Eupithecia spp.(16)	mult. spp.	49-89,91,93	common geoms., occas. larvae

INSECT	HOST'	YEARS	REMARKS
Gabriola dyari	wH,sS	49,52,59-66, 69-80,91	geometrid, mostly single larvae
Geoderces spp.(2)	sS,wH	49-74,79,87, 90	weevils, low nos., minor conifer feeder
Gnathotrichus sulcatus	sS,wH	49,61	ambrosia beetle, maj. econ. imp.
Hydriomena spp.(4)	wH,sS,rA	49-89	geometrids, low larval nos.
Hylemya spp.	sS	69,85-89	gen. agric. or nurs. seedling pests
Hylurgops rugipennis	wH,sS	49,56-82	bark beetle, common at base of dead and dying trees
Ipelates latus	wH,sS,rA	49-63	small beetle, low nos.
Leptura obliterata	wH,sS	50,56,61	woodborer, occas., mostly dead wood
Megapenthes spp.(2)	mult. spp.	49-63,68	click beetles, low nos.(15 in 1950)
Panscopus gemmatus	wH,sS,wrC	49-68	weevil, intermittent, role unknown
Phloeosinus spp.(2)	wrC	49,62,82,83	bark beetles, low nos., in stressed or dead trees
Pineus spp.	sS,-P	55-90	occas. large nos. galls or woolly adelgids, very minor damage
Pissodes spp.(2)	wH,sS	56,60-63,68	weevils, low nos., attacks boles
Pityophthorus spp(4)	wH,sS	62,64,70	bark beetles, low nos., dead and dying, mostly twigs and branches
Plectrura spinicauda	mult. spp.	49-69	mining beetle, occas. larvae/adult in dead branches
Podabrus piniphilus	sS,lP,wH	50-64,68	beetle, occas. larv./ad. some years
Prothalpia holmbergi	sS,wH	50,62-64	beetle, single adults
Pseudohylesinus spp.	wH,sS	49-64	bark beetles, in dead and dying
Sciopithes obscurus	wH,sS,wrC	49-88	weevil, low nos., not forest pest

INSECT	HOST[1]	YEARS	REMARKS
Semiothisa spp.(2)	wH,sS	50-77	geoms., low nos., larch species caused sev. def. in Nelson
Stenoporpia albescens	wH,sS,wrC	**52,59-74,80**	geometrid, incidental feeder
Sthereus quadrituberculatus	mult. spp.	50-72	weevil, low nos., minor feeder
Thallophaga hyperborea	**wH,sS**	49,52-79	geometrid, occas. single to three larvae
Trypodendron spp.(2)	wH,sS,wrC	**49,56,60,62, 83**	ambrosia beetles, low nos., attacks rec. dead trees, logs, econ. imp.
Venusia spp. (2)	rA	*49-68*	geometrid, low nos., intermittent during this period (30 in *1950)*

[1] sS-Sitka spruce; wH-western hemlock; rA-red alder; wrC-western red cedar; lP-lodgepole pine; Y-yellow cedar; -P-pine species; mult. spp.-minimum *4* hosts

[2] ( )-indicates number of species of the genus collected and identified

[3] bolding indicates species has caused significant or economic damage elsewhere or is considered capable of causing significant/economic damage