1972

QUEBEC REGION

R. MARTINEAU AND A. LAVALLEE

Laurentian Forest Research Centre, Sainte-Foy, Quebec

INTRODUCTION

Weather conditions during the growing season of 1971 were characterized by extremes in precipitation, very low in June and very high in August, unusually cool weather in July and August and unusually high temperatures in September and October.

The survey program has always been directed toward problems of economic importance in Quebec. To cope with the current attacks, reorientation of personnel and sampling programs was necessary. The survey unit was responsible for monitoring the biological aspects of a spruce budworm control operation, and for performing special sampling in cooperation with the Department of Lands and Forests, Quebec, to evaluate the conditions in balsam fir forests. As a result of these changes, the general sampling program for insects was reduced, but sampling required for forecasting trends in population levels of major forest insects was continued. Valuable information on several insects dealt with in this report was obtained from the provincial Department of Lands and Forests; the contribution is gratefully acknowledgd. In contrast to insect sampling, disease collections increased in number and quality. Rating samples was made easier by using better appraisal standards for foliar diseases, cankers, and climatic damage. The terms high, moderate, light and trace used in this report were defined according to the levels of infection and incidence used in Ontario (Annual Report 1968), with some modification to the category class limits.

Despite spraying 2 million acres of forest with insecticide during the summer, spruce budworm infestations worsened in western Quebec in 1971. The outbreak now covers 14 million acres. Increased infestations of this insect were also noted in central Quebec and to a lesser extent in eastern areas of the Province. A major hemlock looper infestation, covering 0.5 million acres, was discovered on Anticosti Island, and numerous maple groves in the Eastern Townships were damaged by the Bruce spanworm. Infestations of the large aspen tortrix and birch casebearer continued over wide areas of the Province, and the gypsy moth was found in 10 new counties at the latitude of Montreal. Conversely, populations of the jack pine budworm, the red-headed pine sawfly, and the cedar leaf miners continued to regress.

Adverse weather conditions, including heavy snow falls, contributed to broken trunks and branches, particularly in red pine plantations south and east of Quebec City. Low incidence infections by scleroderris canker in pine plantations located south and east of the natural range of jack pine was confirmed. *Nectria* sp. was found on beech trees at seven localities previously affected by the beech scale. New plots were established and old ones retallied to evaluate the impact of jack pine stem rusts and cytospora canker of black spruce, and to locate elm trees that escaped the Dutch elm disease. Eradication trials were performed on a reduced scale, against two destructive pathogens, *Scleroderris*

lagerbergii, and *Nectria* sp. Increased emphasis was placed on providing identification services for other organizations, particularly the Quebec Department of Lands and Forests and Laval University.

IMPORTANT FOREST INSECTS

Spruce Budworm, *Choristoneura fumiferana* (Clem.)—Extensive ground and aerial surveys to evaluate the status of the spruce budworm, were carried out by the Laurentian Forest Research Centre and/or in cooperation with the Department of Lands and Forests, Quebec. Increases were recorded in both populations of the insect and in the number of infestations. Known moderate to severe infestations were considerably greater in size and new infestation centers were discovered. A notable increase in the insect population was found where low numbers had previously been recorded. The insect has now reached outbreak proportions over the greater portion of the Province (see page 7). The budworm situation is here reported separately for western, central, and eastern Quebec.

Western Quebec – This region extends from the Saint-Maurice and l'Assomption watersheds in the east, to the Ontario boundary in the west, and from the Ottawa River to the height of land. The northern half is predominantly mixed forest, consisting of an association of balsam fir, spruce, white birch and aspen. Characteristic tree species in the south are mostly hardwoods, but white spruce and balsam fir occur throughout the area. Although the density of balsam fir is not high in western Quebec, the major infestation center, the Dumoine–Gatineau, is located in that area. In 1971 this infestation increased to 12.9 million acres from 5 million acres recorded in 1970, encompassing the Dumoine, Noire, Coulonge, Gatineau, Lièvre, and Rouge watersheds and extending north beyond the Transcontinental Railway. In June 1971, 2 million acres of this area were sprayed with the insecticide Fenitrothion to preserve the foliage and prevent mortality of balsam fir stands. Results were not as good as expected. Unusually dry weather during the spraying operation favored the extremely high insect population, enabling it to complete its development in a short time. Foliage was moderately to severely damaged over 2.5 million acres, including most of the sprayed area. Good results were obtained in part of the 24,000 acres around Low in the Gatineau watershed, first sprayed in 1970 and again in 1971. Destruction of old foliage and subsequent tree mortality of balsam fir was prevented in most areas.

Aerial surveys of western Quebec in July, helped to delimit new centers of infestation and/or infestation areas not fully investigated during previous surveys. Two centers were found northwest of the main Dumoine-Gatineau area of infestation; the first southwest of Rouyn–Noranda, between Opasatica Lake and the Ontario boundary, an area of 40,000 to 50,000 acres, where up to 2 years of defoliation was recorded, and the second, although made up of several small infestation patches, in the vicinity of Simard Lake, north of Belleterre, Temiscamingue County, was also considered an important infestation area. In the north, other small patches of light defoliation were recorded near Val d'Or. Numerous areas of small and medium size outbreaks were also found along Highway 58 from Louvicourt Township north to the 59th parallel. Southeast, small to large patches of light to moderate infestations were found in the vicinity of Mont-Tremblant near Saint-Jovite, Terrebonne County.

In August, egg-mass counts were made at 414 localities of western Quebec, and 84.5% were rated as severe, forecasting a severe defoliation in the area for 1972. The following table is a summary of the results obtained in the main infestation center.

Areas	Localities Sampled	Egg masses/100 ft² of foliage		1972 Damage Forecast
		Average	Ratio 1971/70	
Sprayed	101	847	0.53	S*
Unsprayed	313	807	1.09	S
Pomponne-Joncas	26	1894	1.64	S
Nilgaut Lake	2	807	0.73	S
Lower Dumoine	6	719	0.83	S
Ottawa-Lower Noire	19	779	0.78	S
Lower Coulonge	14	686	0.77	S
Ottawa-Lower Gatineau	16	349	0.39	S
Central Gatineau	31	1145	1.04	S
Baskatong-Cabonga	33	1276	1.98	S
Lièvre	79	585	6.3	S
Others	87	502	—	L to S

*The average number of egg masses per 100 ft² of foliage in relation to the degree of defoliation caused the following year is: 1–99 light (L), 100–199 moderate (M), 200 plus, severe (S).

Egg-mass count reductions were recorded in both sprayed and nearby unsprayed areas, probably due to the insecticide action. A decline in the number of eggs has also been noticed in unsprayed areas adjacent to the Ottawa River, but the cause is not known. In new centers, away from the main infestation area, egg sampling was less intense, and populations between localities varied. On the basis of ground and aerial defoliation surveys made in July and August approximately 3.7 million acres were considered high hazard areas, that is having suffered 2 years and more of severe defoliation; severe defoliation is forecast for 1972. In meetings held with provincial forest authorities it was decided that spraying operations in 1972 should be undertaken only in high hazard areas. Fortunately all areas concerned can be sprayed from existing airfields.

Central Quebec – This region extends from the Saint-Maurice watershed in the west to the mouth of the Saguenay River and Kamouraska County in the east. Forests of central Quebec have a much higher balsam fir content than those in western Quebec. The previously known Saint-Maurice River infestation, where some 21,000 acres of light to severe defoliation was observed in 1971, is located in this region. Elsewhere in the region budworm populations are not a cause of concern at present. Surveys show the occurrence of several new infestations in the Saint-Maurice watershed as follows: in the west, a light to moderate infestation, affecting 57,000 acres south of Matawin Reservoir near Saint-Michel-des-Saints, Berthier County; a 1.2 million acre year old infestation in the north, along both sides of the transcontinental railway from La Tuque to Sanmaur. To the east, small patches of light to moderate infestations were recorded in the lower section of Gouffre, Malbaie, and Noire watersheds in Charlevoix County.

In the central Quebec region, egg sampling was carried out in 185 localities. The distribution of these localities in each infestation category was: nil 70, light 73, moderate 4, and severe 38. West of the Saint-Maurice River eggs were generally present with high egg counts in three localities; the infestation center south of Matawin Reservoir, near Sanmaur, and in the Grand'Mère infestation area. Eggs were occasionally found between the Saint-Maurice River and the Laurentides Park, in the southern half of the park, and south of these two areas. In the northern half of Laurentides Park, and in the Saguenay area, eggs were usually present but in small numbers. In Charlevoix County the egg counts varied from none to high; high counts were only recorded in and around those patches of infestation in Gouffre, Malbaie, and Noire watersheds.

Eastern Quebec – Aerial surveys in this region covered 11,000 square miles, 1,000 along the north shore of the Saint Lawrence River from Tadoussac to Forestville and 10,000 from Kamouraska County East to Matane, and in the southern part of Gaspé Peninsula. All three areas have a very high balsam fir content, but only Témiscouata forests (east of Kamouraska County) showed defoliation of any importance. The total area of infestation increased more than 10 times, from 42,500 acres in 1970 to 470,000 in 1971. In an attempt to stop the infestation from spreading further, the area was sprayed in June 1971. The operation was not too successful but the population was reduced. The whole of Témiscouata Lake watershed, the area east of that watershed to the New Brunswick boundary, the major part of Saint-François watershed and the upper portion of Trois-Pistoles watershed are now encompassed by the budworm outbreak. As yet only light damage has been observed over most of the outbreak area, but ground observations show sparsely distributed small areas of up to 2 years of severe defoliation. There are five major patches: north of Pohénégamook Lake; southwest of Cabano; along the road from Dégelis to Sinclair; east of Squatec Lake; and in areas adjacent to the New Brunswick boundary on the eastern side of Madawaska River.

Egg sampling was done in 180 localities; no eggs were found in 84. No eggs were found on the north shore of the Saint Lawrence River, or in the interior or on the northern side of the Gaspé Peninsula. Most of the localities where eggs were found had a light population, but it was moderate or severe in 28. Localities in the moderate to severe group were all in the Témiscouata Valley, concentrated in the vicinity of Saint-Cyprien and Sainte-Rita, in areas adjacent to and north of Témiscouata Lake, south of Saint-Louis-du-Ha!Ha!, and east of Madawaska River on the Quebec side. Because the trees are still in good condition, no control operation is contemplated in 1972.

Eastern Hemlock Looper, *Lambdina fiscellaria fiscellaria* (Gn.)—Insect samples from balsam fir received by the Department of Lands and Forests in 1971 totalled 2,699. Of these 108 contained specimens of the eastern hemlock looper, a decrease from 1970. The average number of larvae in each collection increased from 2 to 11. These facts do not however, reflect the true status of the insect in Quebec as an important outbreak, which started in 1970, is now seriously affecting 545,000 acres of balsam fir stands on Anticosti Island (see map). An aerial survey of the Island by the Department of Lands and Forests in mid-July, revealed that mortality of balsam fir had occurred over 200,000 acres; of the remaining area, 232,000 acres is moderately to severely defoliated. Based on the number of adults seen during ground observations, it was assumed that larval populations would be high in spring 1972, resulting in further severe defoliation and mortality. Apart from the expected loss of immense tracts of balsam fir forests, other resources, such as deer and salmon will be endangered as a result of fir mortality. Aerial spraying with insecticide is planned for 1972 by the Provincial Department of Lands and Forests.

Small extensions of the outbreak were found on the North Shore of the Saint Lawrence River, particularly in the lower sections of the Romaine, Aquanus, and Natashquan rivers. Early observations, by the Laurentian Forest Research Centre during the spring of 1971, of the infestation in Whitworth Township, Rivière-du-Loup County, revealed that insect numbers had declined abruptly. The identity of the causal organism was not determined but *Entomophthora* species had been present in 1970 in the hemlock looper population. Damage in the Whitworth infestation was negligible; insecticide treatment was not required.

Balsam Fir Sawfly, *Neodiprion abietis* complex—A moderate to severe outbreak of this insect has persisted on balsam fir since 1967 in the lower Gatineau

watershed and in the lower Ottawa Valley between Ile-aux-Allumettes and Buckingham. In some localities damage appraisal is difficult because of a concurrent attack by the spruce budworm. The presence of dead balsam fir has been recorded, mortality being tentatively attributed to the balsam fir sawfly; additional trees are in poor condition, because of repeated defoliation by the insect. The sawfly was also reported in unusual numbers near Saint-Louis-de-Bonsecours, Verchères County and Ham-Nord, Wolfe County. Low populations were recorded at scattered localities throughout most of the range of balsam fir in Quebec. Mass rearing of larvae during the last 3 years showed the presence of a polyhedral virus disease for the first time in 1971. The diseased larvae originated from Ham-Nord, 250 miles east of the main infestation center on the Gatineau and Ottawa watersheds.

Maple Loopers, Bruce Spanworm, *Operophtera bruceata* Hulst., ***Linden looper,*** *Erannis tiliaria* Harr. and ***Fall Cankerworm,*** *Alsophila pometaria* (Harr.)—One hundred and forty-six maple stands were sampled for looper larvae in the maple groves of south-central and southeastern Quebec and the Bruce spanworm was recorded in 113. Larval populations varied from low to high but were usually much higher than in 1970. High populations, resulting in moderate to severe defoliation were found in Beauce, Frontenac, Mégantic, and Rimouski counties (see map). As predicted in 1970, several maple groves in Beauce County were completely stripped of foliage in early June. By the end of July most of the trees had refoliated and only an experienced observer could detect that damage had occurred. Secondary effects of severe defoliation on sugar maple cannot, as yet, be appraised. The larval virus disease caused by *Borrelinavirus bruceata,* which stopped the 1962-64 infestation, was observed in some heavily infested stands.

The forecast for 1972 is not optimistic for the Chaudière watershed area and east of the Chaudière River, where extremely high larval populations are expected; west of that watershed no serious defoliation is expected. Data presented in the following table shows the number of females captured on banded maples in the fall, and reveals trends in population levels and conditions expected in 1972 in and around the sampled localities.

Locality	County	Average Number of Females Captured per Tree			Defoliation Expected*
		1970	1971	Ratio 1971/70	
Duchesnay	Portneuf	18.5	60.3	3.2	M
Saint-Sylvestre	Lotbinière	32.9	49.0	1.2	M
Lambton	Frontenac	12.4	3.7	0.3	T
Saint-Achille	Montmorency	2.9	2.7	0.9	T
Saint-Henri	Lévis	0.7	5.4	7.7	T
Saint-Benoit West	Beauce	306.4	976.2	3.2	S
Saint-Benoit South	Beauce	167.0	608.9	3.6	S
Saint-Raphaël	Bellechasse	0.7	2.2	3.0	T
Saint-Rose	Dorchester	5.5	21.2	3.8	L
Saint-Aubert	L'Islet	20.9	21.7	1.1	L
Saint-Hélène	Kamouraska	3.6	20.3	5.6	L
Sainte-Rita	Rimouski	32.3	18.4	0.6	L
Saint-Fabien	Rimouski	—	20.9	—	L
Saint-Alexis	Matapédia	6.6	15.6	2.4	L

*Defoliation expected from progeny of captured females is trace (T), 1–10%; light (L), 11–32%; moderate (M), 33–74% severe (S), 75% plus.

Briefly, moderate to severe defoliation by the Bruce spanworm is expected in 1972 in four of the counties listed. Data showing the ratio of the number of females captured in 1971 indicate that the insect population is increasing in almost half the areas sampled, and in some areas will reach outbreak proportions. Previous experience with infestations of this species in Quebec maple groves has been that when larval populations reach outbreak levels the insect is usually destroyed by the *B. bruceata* virus disease.

Larvae of the linden looper were found in 48 localities, mainly west of the Chaudière watershed, and populations were low. Adults captured on banded trees in the fall indicate that linden looper populations are generally decreasing and will be low in 1972.

The fall cankerworm was reported in seven localities. In the 3-year-old infestations at Venice, Missisquoi County, the larval population was estimated as moderate in 1971, a decrease from 1970. This is also the only locality where significant numbers of adults were captured in the fall of 1971.

Birch Casebearer, *Coleophora fuscedinella* (Zell.)—Populations of this insect increased markedly in many areas of eastern Quebec. Damage was severe in Saguenay, Kamouraska, Témiscouata, Rimouski, Matane, and Gaspé-Nord counties. Defoliation was moderate in Matapédia and light in Bonaventure and Gaspé-Sud counties. This increase was predicted on the basis of casebearer counts at permanent sampling points in the fall of 1970 except for Kamouraska County where sampling might have been biased. Casebearer sampling was carried out at all sampling points in 1971; but only counts for 25 branches out of 100 for each locality could be completed. Despite incomplete counts the results are considered indicative of overwintering population levels and are given in the following table with records of the previous year.

Locality	County	Average Number of Casebearers/Bud*		
		1970	1971	Ratio 1971/70
Saint-Germain	Kamouraska	0.8	8.7	10.9
Estcourt	Témiscouata	6.6	4.6	0.7
Saint-Jean-de-la-Lande	Témiscouata	3.6	5.0	1.4
Cabano	Témiscouata	6.1	5.9	1.0
Saint-Mathieu	Rimouski	1.6	1.8	1.1
Bic	Rimouski	8.5	7.9	0.9
Saint-Anaclet	Rimouski	4.4	4.3	1.0
Metis Beach	Matane	3.1	7.9	2.5
Routhierville	Matapédia	2.5	4.7	1.9
Oak Bay	Bonaventure	0.6	1.0	1.7
New Richmond	Bonaventure	1.4	3.7	2.6
Saint-Siméon	Charlevoix		5.2	—

*It is estimated that five casebearers per bud will cause severe defoliation on white birch in the year following the count.

These data indicate that population levels are sufficiently high in most localities to cause severe defoliation in 1972 provided normal winter weather conditions occur. There was an increase in populations in Kamouraska, Matane, Matapédia, and Bonaventure counties. In other counties the population remained static.

Birch Skeletonizer, *Bucculatrix canadensisella* Cham.—A moderate to severe infestation of this insect was recorded in a triangular area joining Montreal, Buckingham, and Mont-Laurier. Similar infestations were found in the Saint-Maurice watershed, along Highway 19 from Rivière-aux-Rats to Kiskissing Lake, along the adjoining bush road from La Tuque to Lac Blanc, in the vicinity of Lièvre Depot, and along the road from Roberval to the Trenche River in Roberval County. Low populations were found in the vicinity of several widely separated localities, Saint-Jean-de-Matha, Joliette County; Saint-Urbain, Charlevoix County; Chicoutimi Park in the Sainte-Marguerite watershed; Saint-Jean-de-la Lande, Témiscouata County; and near Rimouski Lake, Rimouski County.

Aspen Defoliators, Large Aspen Tortrix, *Choristoneura conflictana* (Wlk.) and a ***Noctuid,*** *Enargia decolor* Wlk.—Populations of the large aspen tortrix, increased in 1971 and were more widely distributed. For the third consecutive year moderate to severe infestations persisted in a 3,000-square-mile area around Lake St. John and along the Saguenay River. Several patches of moderate to severe infestation, varying from one to several square miles, were found in Charlevoix, Montmorency, and Rivière-du-Loup counties. In these areas completely defoliated stands of trembling aspen were common in June. Severely defoliated trees had partly refoliated by the end of July but leaves were smaller and less abundant. These observations were confirmed in part during spruce budworm aerial surveys made by the Department of Lands and Forests. These surveys also revealed 11 patches of moderate to severe defoliation, varying from 1 to 4 square miles, within a 20 mile by 80 mile area adjacent to the Ontario boundary, and extending north from Temiscamingue Lake to Dasserat Lake in Abitibi-Ouest County. A small infestation was also found in the vicinity of Mont-Laurier, Labelle County. Small numbers of the insect were also collected from other localities throughout the Province.

Another defoliator, *Enargia decolor*, was often associated with the large aspen tortrix but was always greatly outnumbered. Three other species. *Pseudexentera oregonana* Wlshm., *Epinotia solandriana* L., and *Sciaphila duplex* Wlshm. were occasionally collected while sampling for the large aspen tortrix, but populations were extremely low.

Red-headed Pine Sawfly, *Neodiprion lecontei* (Fitch)—Surveys of this insect in 1971 were largely restricted to observations relating to the control experiments with a virus disease carried out in 1970 in the Shawville and Saint-Jovite areas. Populations of the sawfly were relatively low as revealed by counts of both egg and larval colonies. Out of 10 plantations visited in June in the Shawville area, eggs were found only at Thorne Lake. All colonies in the Thorne Lake plantation were collected either as young or old larvae for laboratory experiments by the Chemical Control Research Institute. Another plantation was found in the fall at North Clarendon where 50% of the 5-year-old red pine were severely defoliated.

Of the seven plantations treated around Saint-Jovite, larvae were found in small numbers at Rockway Valley and Chénéville. Two larval colonies at Rockway Valley were observed periodically to follow their development. The larvae were caged at the 6th instar, and it was found a few weeks later that more than 50% had spun cocoons. At Chénéville, 20 of the 50 colonies found were examined periodically in the field, and about 50% of the larvae spun cocoons; the others died from virus disease, confirmed by specimens submitted to the Insect Pathology Research Institute at Sault Ste. Marie, Ont. In the fall seriously defoliated red and jack pine trees were found near Brookdale, 2 miles from the closest sprayed plantation. Ninety per cent of the red pine foliage was chewed, compared with 20% on jack pine. Light defoliation was also observed in the fall on

a few scattered trees in nine other plantations in the same area. The virus appeared to have survived the winter but spread was limited. Conditions in and around the virus sprayed plantations of western Quebec will be re-evaluated in 1972. In the Eastern Townships a very low population was found in the Drummondville area.

Pitch Nodule Makers, *Petrova albicapitana* (Busck) and *Petrova* spp.—These nodule makers, long considered of little concern in Quebec jack pine forests, are now known to cause appreciable damage, such as growth reduction, branch mortality, and foliage necrosis. Jack pine stands are seriously affected by nodule makers over a 200-square-mile area along the Vermillion River. Nodule counts made in late fall revealed that in some localities up to 100% of the jack pine trees were affected with an average of over one nodule per branch. For years *Petrova* spp. have been established over a 3,000-square-mile area on the north side of Lake St. John and the Saguenay River and extending from Notre-Dame-de-la-Doré, Roberval County in the west, to Bagotville, Chicoutimi County in the east. In the eastern half of the latter area, nodule counts in 1971 showed that the infestation is severe, and comparable to that recorded in the Saint-Maurice watershed. In the remainder of the area the infestation varied from light to moderate. Moderate to severe infestations were also observed a few miles north of La Tuque, on Highway 19, in the same general area. Presence of the pitch nodule maker, *P. albicapitana*, has also been recorded in plantations south of the natural range of jack pine, in Beauce, Papineau, and Pontiac counties.

Jack-pine Sawfly, *Neodiprion swainei* Midd.—Sampling of jack pine in 1971 was reduced because of heavy work loads. Observations showed that populations of this sawfly were generally at a low level. Sampling was limited to 54 localities in Roberval, Lac-Saint-Jean, Chicoutimi, and Charlevoix counties. The population was low except at Rivière-à-Mars, where it was moderate and in Saint-Léon-de-Chicoutimi and Notre-Dame-du-Rosaire, where it was high. Information concerning the Saint-Maurice watershed, partly sprayed with Phosphamidon in 1965, was furnished by the Swaine Sawfly Project group. Larval sampling proved that the insect is still generally rare in this area. Forecasts based on tentative sequential sampling carried out in the fall at 14 localities in the Saint-Maurice area, indicate that jack-pine sawfly populations will be low in 1972, except in three unsprayed areas; Lac Flamand and Lac-aux-Rats where defoliation could be moderate, and Lac du Chevalier where defoliation could be severe.

Jack-pine Budworm, *Choristoneura pinus pinus* Free.—The population of this insect dropped to a low level in 1971 after aerial spraying with insecticide of the Mercier Dam infestation in 1970. This is the only area in Quebec where the jack-pine budworm caused major defoliation. Outside the Mercier Dam area a few insects were found in two new localities, Labelle, Labelle County, and Mont-Tremblant, Terrebonne County. The insect was also collected for the second time at Arundel, Argenteuil County.

Gypsy Moth, *Porthetria dispar* (L.)—Control operations against this insect in 1971 by the Plant Protection Division, Canada Department of Agriculture, were limited to three camping sites in the main infestation area of Huntingdon County. Adult male trapping is done each year by the Plant Protection Division. In 1971 it was carried out in a band, 8 miles wide by 50 miles long, extending from Saint-Jean and Chambly on the Richelieu River in the east to Lachute in the west. Out of 395 widely distributed traps males were captured in 105. An average of 2.4 individuals per trap was obtained; 10 traps caught more than 10 individuals and the maximum was 13. These catches are well above normal and are attributed to the use of a new attractant. Egg masses, normally found in the

vicinity of traps which had caught one male in previous years, could not be located in 1971, even after a 6-day search around those traps that had captured up to 10 males.

Trapping in 1971 showed that the distribution of the insect had extended to 10 new counties, all at the latitude of Montreal Island: Shefford, Rouville, Chambly, Laval, Deux-Montagnes, Argenteuil, and four counties in the Montreal area. All counties located to the south, with the exception of Brome, were previously affected. The main center of infestation located south of Ormstown, Huntingdon County, now covers 2 square miles. Part of Saint-Antoine-Abbé, Botreaux, Cairnside, and l'Artifice are included in the infested area. Defoliation was severe on trembling aspen, red maple, wire birch, willow, and alder. Populations were so high in June that tree trunks were covered with larvae. Based on cadavers, it was estimated that 5% of the larval population died from a disease. Identity of the causal organism has not yet been determined. Transportation of living material outside the infested area is generally not permitted to the Survey staff. As an exception, in 1971 two massive collections of young and old larvae, were transported to the Research Institute at Belleville, Ontario, for rearing and recovery of the parasites. Results should reveal part of the parasite complex in Quebec. The 1972 control and survey program has not been established.

Beech Scale, *Cryptococcus fagi* (Baer.)—Areas throughout most of the range of beech were examined in 1971 for the presence of this scale and it was found that the insect continues to spread. Six new outbreaks were discovered at Saint-François, Richmond County; Saint-Hilaire, Frontenac County; Saint-Honoré, Beauce County; Saint-Michel, Bellechasse County; Lac-Trois-Saumons, l'Islet County; and at Matapédia, almost the eastern limit of beech distribution. In three areas: La Guadeloupe, Frontenac County; Cap Saint-Ignace and Lac-Trois-Saumons, l'Islet County, progress of the scale has been retarded by *Chilocorus stigma* Say – a well-known predator of this species. A population increase was recorded in the Saint-Augustin infestation, despite treatment in 1970 with Diazinon.

Birch Leaf Miners—Browning of birch foliage caused by *Fenusa pusilla* Lep. was less striking than in 1970. Counts of affected leaves from 39 localities served to establish the degree of damage. Damage in four of the 39 localities was classified severe (more than 70% of leaves affected), in 19 localities as moderate (30 – 60%) and in the remainder as light or nil. The proportion of leaves affected in all sampled areas was 32% both for wire and white birch. This is comparable to data obtained during 1969, the year of previous assessment.

Observations of the severe infestation by the amber-marked leaf miner, *Profenusa thomsoni* (Konow) reported for the last 2 years in an area north of La Tuque, Laviolette County, were also made. In 1971 the same area was severely affected by the birch skeletonizer and the amount of leaf mining by *P. thomsoni* could not be assessed.

European Spruce Sawfly, *Diprion hercyniae* Htg.—Collections of this sawfly showed that the insect is still present throughout the Province, but generally in small numbers. The highest counts were made in Saguenay County, particularly on white spruce at Raguenau, and black spruce at Baie-Trinité. Rearing of larvae from Raguenau, showed the presence of the virus disease caused by *Borrelinavirus hercyniae* known for years to be responsible for controlling the population of the insect in Quebec. Of the 3,562 spruce collections received by the Department of Lands and Forests, Quebec, 738 contained this insect, with an average of 4.8 larvae per collection. The largest ones (maximum 31) also originated from Saguenay County.

Yellow-headed Spruce Sawfly, *Pikonema alaskensis* Roh.—In 1971, this sawfly was collected in 33 localities, 20 from Saguenay County. The insect was generally present in low numbers but was sufficiently abundant to cause severe defoliation in some localities. Severe defoliation occurred for the second consecutive year near Nicabau, Lac-St-Jean County. High populations of this insect were also found in Namur, Papineau County; Chibougamau, Abitibi County; Saint-David, Chicoutimi County; East Angus, Compton County; and Forestville and Port-Cartier, Saguenay County.

Ugly-nest Caterpillar, *Archips cerasivoranus* Fitch—Populations of this caterpillar decreased in 1971, but the insect was still very common on cherry trees throughout cultivated lands in southern Quebec. The insect is well distributed southeast of the Laurentides Mountains, from Montreal in the west to the Etchemin watershed in the east. Sixty per cent of the 66 localities sampled were classified in the moderate and severe categories, or halfway between the percentages obtained for 1969 and 1970. The maximum count of 250 tents per 1,000 square feet of roadside bush was found at Mont-Tremblant, Terrebonne County. High counts were also recorded in other counties, including Saint-Maurice, Champlain, Portneuf, Lotbinière, Beauce, and Dorchester.

Tent Caterpillars—The status of the forest tent caterpillar, *Malacosoma disstria* Hbn. was comparable to that of 1970 and the insect remained rare. Tents of the eastern tent caterpillar, *M. americanum* (F.), were common throughout the agricultural areas of southern Quebec; in all cases the infestation was light. The western caterpillar, *M. californicum pluviale* Dyar, was only collected in seven localities of Quebec in 1971. The insect was found in small numbers on trembling aspen and pin cherry.

Fall Webworm, *Hyphantria cunea* (Drury)—Populations of the fall webworm in 1971 were comparable to those of 1970. It was common in south-central and part of southwestern Quebec. Collection points were concentrated on Highway 8 from Papineau to Lachute, in the vicinity of Highway 41 from Saint-Jerome to Berthierville, on Highway 2 from Louiseville to Cap-de-la-Madeleine, in Metropolitan Quebec, and in the vicinity of Drummondville and Richmond in the Eastern Townships. The insect was also found in a few localities of Témiscamingue, Huntingdon, Saint-Jean, and Lac-Saint-Jean-Ouest counties. Tent counts were made along roadsides in 26 localities; infestations at 10 locations were classified as moderate and severe. The maximum count, 297, was found near Berthierville, Berthier County.

Green-striped Mapleworm, *Anisota rubicunda* (F.)—Light to severe defoliation by this insect was found in three areas this year, along the bush road from Témiscamingue to the Rivière-des-Jardins watershed in Témiscamingue County, in the vicinity of Bouchette, Gatineau County, and in the southern section of Joliette and Montcalm counties. Elsewhere the insect was present in small numbers or absent. Infections by a *Bacillus* sp. were reported on larvae originating from Tee Lake, Témiscamingue County, and Saint-Liguori, Montcalm County.

Larch Casebearer, *Coleophora laricella* (Hbn.)—After several years at a relatively low level, the population of this insect appeared to have increased in 1971. Counts of casebearers in relation to number of buds were made in 41 localities. The insect was found in all localities; an average of 18 casebearers per 100 buds was recorded with a maximum of 70. The number of casebearers per 100 buds considered necessary to cause moderate to severe defoliation is estimated at 25; this number was present in 14 localities well distributed through southern Quebec.

OTHER NOTEWORTHY INSECTS

Insect	Host(s)	Locality	Remarks
Acleris variana (Fern.) Black-headed budworm	Fir, balsam Spruce, white	Fir and spruce range	Collected occasionally with spruce budworm and spruce sawfly.
Adelges piceae (Ratz.) Balsam woolly aphid	Fir, balsam	Gaspé Peninsula	Small population increase in most permanent plots; gout starting in Port Daniel Reserve.
Argyresthia aureoargentella Brower *A. freyella* Wlshm. *A. thuiella* Pack and *Pulicalvaria thujaella* Kft. Cedar leaf miners	Cedar, eastern white	Eastern Townships and southeastern Quebec	Infestation declining, tree appearance improving; some mortality.
Cecidomyidae A midge	Pine, Scots	East Angus and vicinity	Infestation static; chemical control tests show promise.
Cecidomyia reeksi Vock. A midge	Pine, jack	Distribution not determined	Common; severe infestation in area sprayed for jack pine budworm near Mercier Dam.
Croesia semipurpurana (Kft.) Oak leaf tier	Oak, red	2 localities in each of Gatineau, Papineau counties and in Metropolitan Quebec	Light to moderate.
Dasineura balsamicola Lint. Balsam gall midge	Fir, balsam	Sparse	Up to 70% of needles affected near East Angus, Compton County.
Deuteronomos magnarius (Guen.) Notched-wing geometer	Maple	Samot Township, Pontiac County	Associated with *A. rubicunda* and *H. gultivitta* in local infestations; defoliation 25%.
Dioryctria reniculella (Grt.) Spruce coneworm	Spruce, white	Wide distribution	Abundant with spruce budworm in Grand'Mère white spruce plantations.
Glycobius speciosus (Say) Sugar-maple borer	Maple, sugar	Sugar maple distribution area	Damage common and increasing. Report of up to 30% of stems affected in some areas.
Heterocampa guttivitta Wlk. Saddled prominent	Maple, red Birch, white	Six scattered localities	Light defoliation.
Nepticula turbidella H.-S. Aspen petiole borer	Aspen, trembling	19 localities widely distributed	Infestation lighter than 1970; up to 99% of leaves affected in some localities; over 50% in 13 localities.
Nepytia canosaria (Wlk.) False hemlock looper	Fir, balsam	Sainte-Sophie, Megantic County	Severe defoliation.
Phyllocolpa populella (Ross) A sawfly	Poplar	Metropolitan Quebec	Common for a number of years.
Phytagromyza populicola (Wlk.) A poplar leaf miner	Poplar	Four widely separated localities	Rare since 1962, more common in 1971.
Pikonema dimmockii Cress. Green-headed spruce sawfly	Spruce, black and white	30 localities mainly in eastern Quebec	Population low, increase in North Shore region.
Pissodes strobi (Peck) White pine weevil	Pine, white Spruce, white	Pine and spruce plantations	Sampling reduced in 1971.

OTHER NOTEWORTHY INSECTS (concluded)

Insect	Host(s)	Locality	Remarks
Plagiodera versicolora (Laich.) Imported willow leaf beetle	Willow	Metropolitan Quebec and Metropolitan Hull	Moderate to severe infestations.
Pristiphora erichsonii (Htg.) Larch sawfly	Tamarack	Province-wide	Population generally low; moderate at Saint-Cyprien, Rivière-du-Loup County.
Pristiphora geniculata (Htg.) Mountain-ash sawfly	Mountain-ash	Province-wide	Local infestations; larval mortality due to virus disease at Sault-au-Mouton, Saguenay County.
Stilpnotia salicis L. Satin moth	Poplar	Charlevoix, Compton and Drummond counties	Local infestations.
Trichiocampus viminalis (Fall.) Poplar sawfly	Poplar	5 localities in five different counties	Local infestations; virus disease in larval population at Saint-Hyacinthe.

IMPORTANT FOREST DISEASES

Gall Rust, *Endocronartium harknessii* (J. P. Moore) Y. Hiratsuka—Between 1968 and 1971 jack pine ranked third among the coniferous species cut for pulpwood or sawlogs in Quebec. The volume of jack pine used ranged from 8 to 12% of the total volume of wood harvested. Gall rust, a disease of jack pine, is likely present on jack pine throughout most of its natural range, but Survey records show that a high incidence of the disease occurs in some regions and other regions are practically free from infection. Reports of the rust galls come mainly from the northern section of the host's range. In an area northeast of the Saguenay River infections were rated as severe (see accompanying map). Numerous collections were also made in the Lac-Saint-Jean area, and along the upper Saint-Maurice River, where the severity of infection was rated light to moderate. North of the Saint Lawrence River, in a 50-mile-wide strip between Saint-Siméon, Charlevoix County and Montreal, negative reports in jack pine plantations were recorded; plantations south of the Saint Lawrence River were also frequently free from the disease. Damage from gall rust is usually less severe in areas outside the natural range of jack pine. For example, in 1971 a small Scots pine plantation was found affected with the gall in Parke Reserve, Kamouraska County, but infections were recent and limited. These new infection centers should be considered for eradication. Additional information is presented in the table under the following section.

Stem and Branch Rusts of Pine—*Cronartium comptoniae* Arth. was again the predominant rust on branches and stems of semi-mature jack pine in the Lac-Saint-Jean region during 1971. No change was observed in the distribution of *Peridermium stalactiforme* Arth. and Kern (= *Cronartium gloeosporioides* Arth.) and *Cronartium comandrae* Pk. The results given in the following table were obtained from three sample plots established in Saguenay County in 1968 to study stem-and-branch-canker-forming rusts on jack pine. Among other observations, the data show that the incidence of rusts has increased over the 3-year

period and that once the rusts are established they can spread rapidly. Data on *P. stalactiforme* and *C. comandrae* were grouped as agents responsible for fusiform cankers. In these areas *Endocronartium harknessii* was also present.

Locality*	*P. stalactiforme* and *C. comandrae*			*E. harknessii*		
	Diseased trees		Increased incidence (%)	Diseased trees		Increased incidence (%)
	1968	1971		1968	1971	
Ilets Caribou	36	60	66	11	16	45
Forestville	13	14	40	25	35	40
Labrieville	16	21	30	48	198	400

*500 trees examined (d.b.h. 2.5—4.0 inches) in each locality.

White Pine Blister Rust, *Cronartium ribicola* J. C. Fischer—White pine blister rust was rated as severe in three localities along the Saint-Maurice River between Shawinigan and La Tuque during 1971. Other severe infections were reported at Saint-Georges and Linière, Beauce County; Sutton, Brome County; and Farnham Corners, Missisquoi County. In these localities more than 50% of white pine in plantations or in natural forests were severely affected by the disease. Ten additional records of moderate infections were made along the Gatineau, Lièvre, and Rouge rivers and in the Eastern Townships. As there is no practical control for this disease, the rate of mortality is increasing, especially in regions of high susceptibility.

Scleroderris Canker of Pine, *Scleroderris lagerbergii* Gremmen—Severe damage was observed on branches of red pine in a recently infected 10-acre plantation at Saint-Thérèse-de-Colombier, Saguenay County, and on Scots pine in a 20-acre plantation at Saint-Agathe-des-Monts, Terrebonne County.

Two small infection centers were also detected in Scots and jack pine plantations in Rang Saint-Mathieu, near Grand'Mère, Champlain County. As the disease was rare in surrounding areas, infected trees were eradicated in cooperation with Consolidated Bathurst Company. Results of this trial will be evaluated.

Some 60 other pine plantations were examined, mostly south of jack pine's natural range. Many plantations in Labelle, Gatineau, Beauce, Dorchester, Compton, and Frontenac counties are still free of scleroderris canker. Observations in these areas will continue.

Cytospora Cankers on Conifers—The incidence of cytospora cankers on white and black spruce was rated light in five localities in Champlain County, at Leeds, Mégantic County, and Drummondville, Drummond County. On black spruce, severe trunk deformations were found at Duchesnay, Portneuf County, which is 90 miles southwest of Holliday, Kamouraska County; the latter is the only known area where abnormalities were previously noted. At Holliday, two sample plots (200 trees each) were established in 1971 to evaluate the impact of the disease. In one plot, 55% of the 35-year-old black spruce had at least one young canker; in the other plots, 28% of the 70-year-old black spruce had cankers up to 20 years of age. At Grand'Mère, Champlain County, cytospora cankers still produce abundant resinosis in plantations of white and Norway spruce; from 1968 to 1971 more than 30% of the stems in a white spruce plantation and 26% of the stems in a nearby Norway spruce plantation were removed because they were killed either by cytospora canker or by root rot.

Leucostoma kunzei (Fr.) Munk ex Kern and *Valsa freizii* (Duby) Fckl., the perfect stages of *Cytospora* spp., were also recorded on balsam fir, jack and red pine in 20 young plantations in Saguenay, Portneuf, Bellechasse, Gatineau, Labelle, and Argenteuil counties; the level of infection was low.

Nectria Canker of Balsam Fir—In cooperation with the Department of Lands and Forests, Quebec, eradication of trees affected by nectria canker was performed for the first time near Port-Cartier, Saguenay County. Over 350 balsam fir trees were felled and burned to eliminate an infection center in the North Shore region. Results of the operation will be appraised later. Infected trees in small areas surrounding Port-Cartier and along Manicouagan River are to be eradicated also. The general distribution of this disease did not change, but two additional small infection centers were found within 3 miles of the area eradicated near Port-Cartier.

Needle Rusts of Conifers—Most of the 49 collections of *Coleosporium asterum* (Diet.) Syd. were made on red and jack pine in Portneuf, Beauce, Dorchester, Montmagny, Frontenac, Charlevoix, and Papineau counties; the infection level was low in 1971.

Needle rusts of black and white spruce, *Chrysomyxa ledi* d By. and *C. ledicola* Lagh., were common in the Saguenay and Lac-Saint-Jean region and in other localities, but infection levels were generally lower than in 1970.

Root Rots—Sugar maple was killed in small infection centers of *Armillaria mellea* (Vahl ex Fr.) Kummer near Victoriaville, Arthabaska County; Saint-Ambroise-de-Kildare, Joliette County; and Neuville, Portneuf County. At Leeds, Mégantic County, damage to balsam fir and white spruce by *A. mellea* was moderate. Root rot also affected balsam fir in Lotbinière and Portneuf counties. At Nicabau, Lac-Saint-Jean County, *A. mellea* could be a factor contributing to the rapid mortality of jack pine saplings infected by *Scleroderris lagerbergii*; *A. mellea* was found in the root system of several saplings killed in 1971. In an observation area examined in 1967 at Grand'Mère, Champlain County, 20% of the stumps of a thinned white spruce plantation showed fruit bodies of *A. mellea* compared with 52% of the Norway spruce stumps. In 1971 fruiting structures were present on only 3% of the stumps.

Polyporus tomentosus var. *circinatus* (Fr.) Sartory and Maire affected black spruce at Holliday and white spruce at La Pocatière, Kamouraska County; in the latter locality the infection was in a small stand, about 200 feet in diameter, surrounded by a 10-year-old red pine plantation.

At Drummondville, Drummond County; Saint-Zacharie, Dorchester County; Saint-Georges, Beauce County; and Pontmain, Labelle County, defective rootings of jack and red pine, due to poor planting techniques, could lead to root rot damage.

Tip Blight of Spruce, *Sirococcus strobilinus* (Desm.) Petr.—Light to moderate infections on Norway spruce were reported at Linière, Beauce County and Saint-Roch-de-Mékinac, Champlain County, on black spruce near Malbaie Lake, Montmorency County, and on white spruce at Saint-Malachie, Dorchester County in 1971. All new infections of the disease are within 15 miles of previously known infections, except Malbaie Lake, which is 30 miles from an infection of black spruce.

Yellow Witches' Broom, *Melampsorella caryophyllacearum* Schroet.—Balsam fir was commonly infected by yellow witches' broom near Port-Cartier, Rivière-Pentecôte, and Tadoussac, Saguenay County, and at Causapscal,

Matapédia County. Trees in various localities of Gaspé-Ouest and Bonaventure counties were also affected. Yellow witches' brooms are frequent in the northern section of the range of balsam fir. Reports in previous years were mostly from Anticosti Island and the north shore of the Saint Lawrence River.

Foliar Diseases of Hardwoods—The first symptoms of infections by the ink spot fungus, *Ciborinia whetzelii* (Seaver) Seaver, appeared 2 weeks later than in previous years. Damage to aspen foliage was low throughout the Province but was moderate to severe in four localities listed in the following synopsis.

Locality	County	Acres Affected	Level of Incidence*	Level of Infection**
Pointe Lebel	Saguenay	10	High	High
La Tuque	Champlain	200	High	High
Saint-Édouard	Maskinongé	50	High	Moderate
Lac de l'Est	Kamouraska	500	High	Moderate

*High = over 75% of trees affected.
**High = over 75% and moderate = 25–74% of the foliage affected on 100 trees examined.

Trembling aspen leaves were also infected by the rust, *Melampsora medusae* Thuem. in Labelle, Terrebonne, and Drummond counties where infections were rated as moderate. Light infections on *Salix* spp. by *Melampsora epitea* Thuem. were recorded in Drummond, Saguenay, and Champlain counties.

Beech Bark Disease, *Crytococcus fagi* (Baer.) and *Nectria coccinea* var. *faginata* Lohm., Wats. and Ayers—At least two species of *Nectria* were collected on beech bark at Lac-Trois-Saumons, Saint-Aubert, and L'Anse-à-Gilles in l'Islet County, Saint-Benoit and Les-Etroits in Témiscouata County, Saint-Augustin, Portneuf County, and Sainte-Lucie, Montmagny County. Beech in most of these areas had been infested by *C. fagi* within the last 3 years. More observations are needed to establish the identity of species additional to *N. coccinea* var. *faginata* and *N. galligena* Bres.

Dutch Elm Disease, *Ceratocystis ulmi* (Buism.) C. Moreau—Based on field observations and the number of requests from the public for diagnosis, the incidence and severity of Dutch elm disease was lower in 1971 than in 1970 and no change in its distribution was noted. As part of a study on the resistance to Dutch elm disease, four observation areas, established 25 years ago by Dr. R. Pomerleau (Forest. Chron. 37: 356-367), were re-examined. At the beginning of the study the number of elm trees tagged in each plot, covering about 1 square mile, varied from 194 and 513. During the intervening period, factors other than the disease may have contributed to the elimination of elm trees in the four areas. The percentages of healthy trees present in 1971 were 6% in Sainte-Théodésie, Verchères County, and Saint-Gérard, Yamaska County; 11% in La Présentation, Saint-Hyacinthe County; and 28% in Saint-Grégoire, Nicolet County. Although the proportion of healthy trees is low in some areas, they can be considered as having escaped the disease, as Dutch elm disease has been present long enough to cause infection.

External Defects in Sugar Maple—The canker caused by *Eutypella parasitica* Davidson and Lorenz is often the most frequent and visible defect in sugar maple stands. Surveys for this pathogen were carried out in the vicinity

and east of Quebec City. Moderate to severe infections by this ascomycete were recorded at Raudot, Rivière-du-Loup County, Saint-Fabien, Rimouski County, Saint-Laurent, Bonaventure County, Saint-Achille, Montmorency County, and west in Lost River, Argenteuil County. The following table shows the frequency of occurrence of *E. parasitica* in comparison to other external defects present in "relatively healthy" sugar maple stands located within a 50-mile radius of Quebec City. These defects should be taken into consideration when trees are being selected for removal during stand improvement cuttings because they are major entry points for trunk decays (Lavallée, 1968. Forest. Chron. 44 (4): 5-10).

	Locality			
	Victoriaville	Saint-Basile	Neuville	Saint-Augustin
Total number of trees	1,200	1,200	150	1,000
Number examined	400	350	100	200
Percent of trees with				
Eutypella cankers	28	20	2	22
Frost cracks	5	3	10	5
Mechanical injuries	5	3	3	4
Decay fungi	2	4	10	5

A crown decline has been noted in recent years in three sugar maple stands in the vicinity of an asbestos mine near Saint-Jules, Beauce County. Tree mortality now occurs at the rate of 5% annually. Decline was also noted at Duchesnay, Portneuf County, in a stand surrounding an area logged 2 years ago.

Fire Blight, Erwinia amylovora (Burr.) Winsl. *et al.*—Field observations and increased requests from the public for diagnosis, indicate that conditions favored the development of fire blight on ornamental mountain-ash in the vicinity of Quebec City for the second consecutive year. Also, the disease was reported in natural forests as far north as Sault-aux-Moutons and Pointe-aux-Anglais, Saguenay County.

Climatic Damage—Heavy snow falls caused the breakage of red and jack pine stems, up to 3.5 inches dbh, on areas of over 1 acre in six plantations of Kamouraska, Beauce, and Dorchester counties. Broken lower branches were also observed on more than 50% of the trees in 18 plantations of red, jack, and Scots pines along the Saint Lawrence River, particularly in Portneuf, Champlain, Saint-Maurice, Berthier, Joliette, Maskinongé, Lévis, Dorchester, and Kamouraska counties. Severe damage was also reported in Argenteuil, Papineau, Labelle, and Chicoutimi counties either on pines, white spruce, or balsam fir. In Argenteuil and Kamouraska counties, broken trunks and branches are recorded year after year and planted red pine has difficulty in recovering.

Late frosts at the end of May killed buds and new shoots of both conifers and hardwood trees in most regions south of the Saguenay River. The damage was widespread and more severe than in previous years. Reports of frost damage came from 38 different counties of the Province. Trembling aspen, sugar maple, white birch, white spruce, and balsam fir were the most susceptible species. Ornamental trees were also affected at nine localities.

Winter drying of conifers was not as severe as in 1969 and 1970, because mild temperatures and rain did not occur during the winter. However, more than 50% of the red pine trees were affected in some plantations in Portneuf and Gatineau

counties. Eastern white cedar, white and Scots pines, balsam fir, and Norway and white spruce were also affected at various localities throughout the Province.

Hail caused light to moderate damage to trembling aspen, white birch, balsam fir, and white spruce in a 2-square-mile area between Breakeyville and Saint-Etienne, Lévis County and light damage to the foliage of trembling aspen occurred at Cap-Chat, Gaspé County.

Animal Damage—A sudden defoliation of new shoots in a plantation of 40,000 Scots pine trees was noted at Sawyerville, Compton County. The only causal agent consistently associated with the disease on these Christmas trees was an eriophyid mite of the genus *Trisetacus*. *Naemacyclus niveus* (Pers. ex Fr.) Sacc. was often observed on 2-year-old needles.

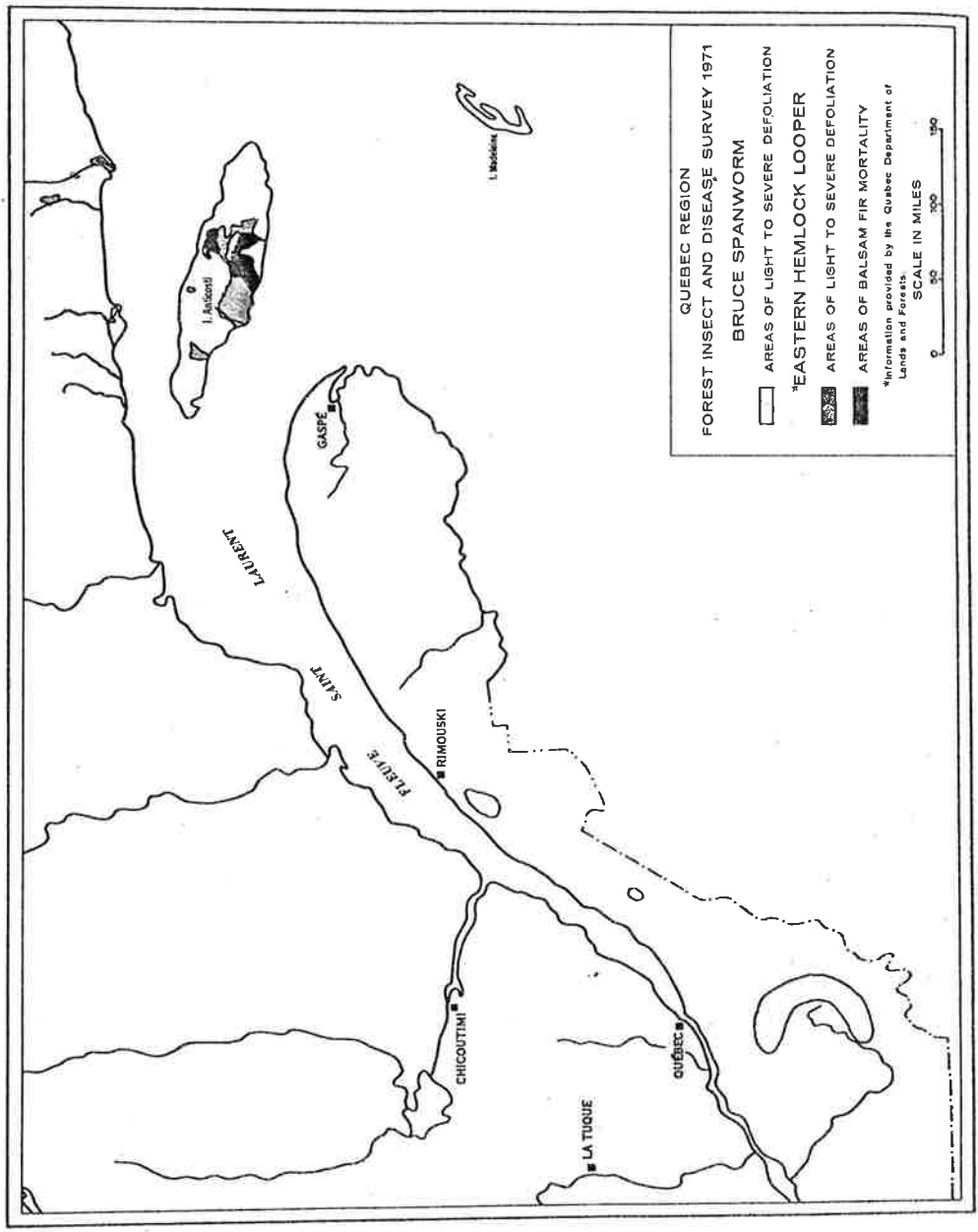
Leaders and lateral branches in a 3,000 white spruce plantation were severely damaged by rabbits at Saint-Zacharie, Dorchester County; other severe damage occurred in a Scots pine plantation at Saint-Apolinaire, Lotbinière County.

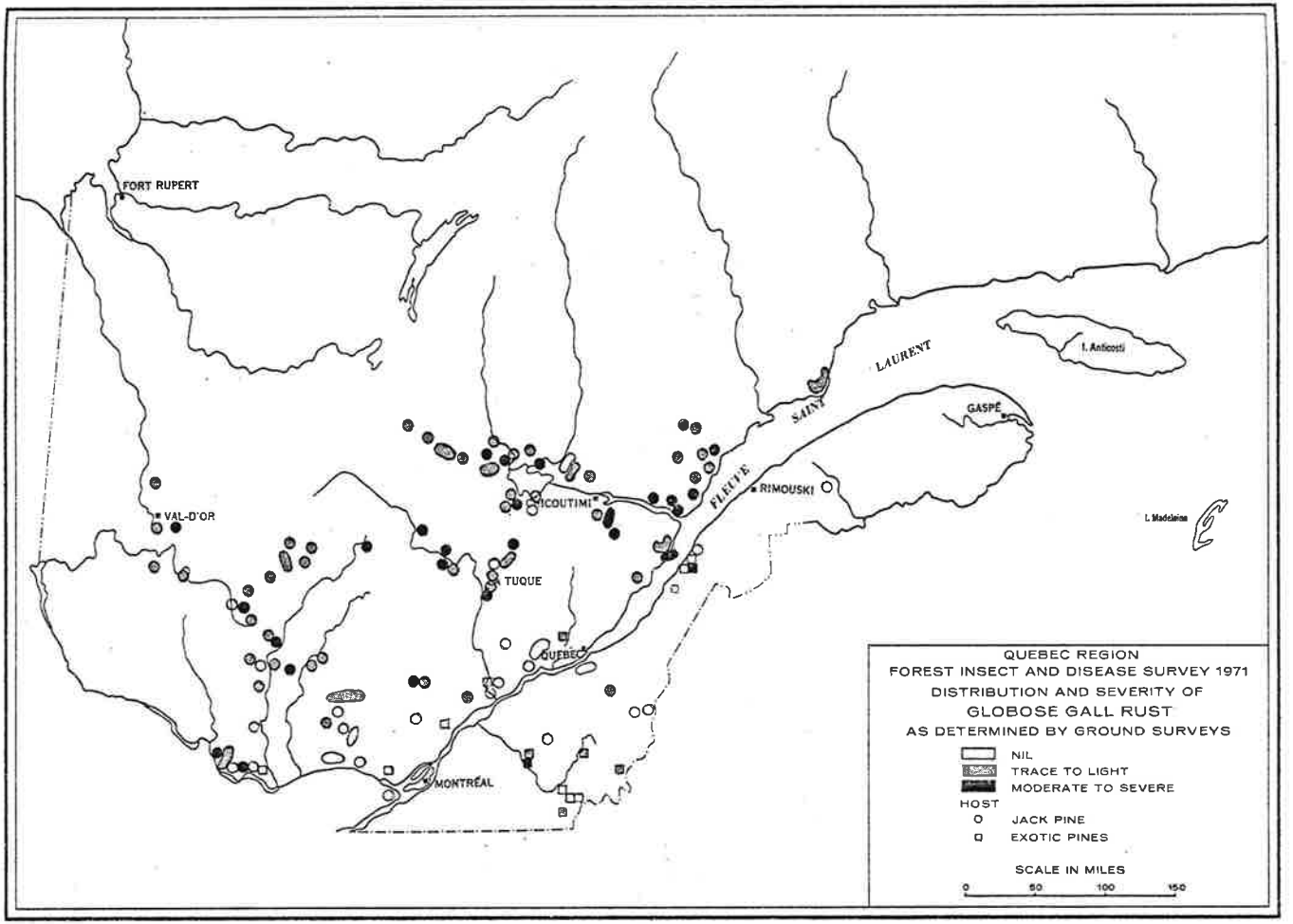
OTHER NOTEWORTHY DISEASES

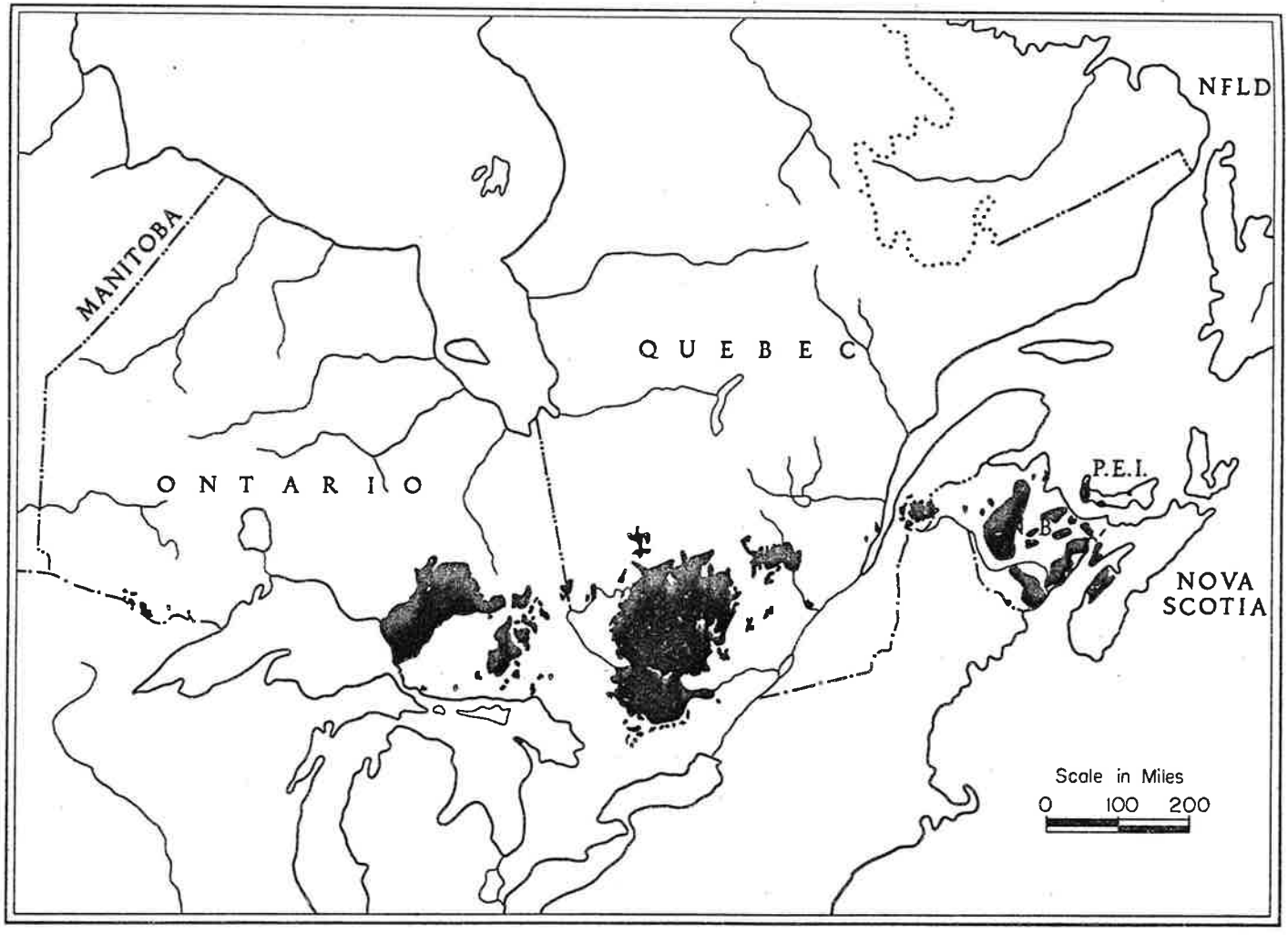
Organism and Disease	Host(s)	Locality	Remarks
Ceratocystis major (Van Beyma) C. Moreau	Pine, red	Harrington, Argenteuil County	Associated with mortality of seedlings in nursery; first record in the Province.
Diatrypella favacea (Fr.) Ces. and De Not.	Birch, yellow	Valcartier Village, Quebec County	On branches killed by dieback; first herbarium record.
Hercospora tiliae (Pers. ex Fr.) Tul.	Basswood	Lachute, Argenteuil County	On dead branches of living trees; first herbarium record.
Hypoxylon mammatum (Wahl.) Miller Hypoxylon canker	Aspen, trembling	30 localities throughout the Province	In 5 localities, up to 40% of the trees are affected.
Melampsoridium betulinum (Fr.) Kleb. Leaf rust	Birch, wire	Sainte-Sophie, Assomption County	Severe infections in 1971.
Melanconis stilbostoma (Fr.) Tub. Canker, dieback	Birch, white	Sainte-Foy, Quebec County	First host record in Quebec.
Peridermium balsameum (Pers.) Kleb. Needle rust	Fir, balsam	Arnaud Township, Duplessis County	Extension of known northern distribution.
Phialophora richardsiae (Nannf.) Conant Stain	Butternut	Côte-Sainte-Étienne, Aregnteuil County	Associated with mechanical wounds.
Polyporus abieticola Overh. Wood rot	Fir, balsam	Valcartier, Quebec County	First herbarium record.
Polyporus cuticularis Bull. ex Fr. White rot	Hickory, butternut	Pointe-aux-trembles, Montreal Island	Associated with mechanical wounds; first herbarium record.
	Beech	Sainte-Foy, Quebec County	
Polyporus spraguei Berk. and Curt. Brown rot	Oak, red	Outremont, Montreal Island	First collection in Quebec.

OTHER NOTEWORTHY DISEASES (concluded)

Organism and Disease	Host(s)	Locality	Remarks
Polyporus spumeus (Sow.) Fr. var. *malicola* Lloyd Heart rot	Ash, white	Laval-des-Rapides, Jesus Island	Associated with trunk injuries; first herbarium record.
	Willow, black Cottonwood, eastern	Quebec City, Quebec County	
Polyporus undosus Pk. Wood rot	Pine, red Fir, balsam	Vicinity of Quebec City, Quebec County	First herbarium record.
Polyporus volvatus Pk. Sap rot	Pine, jack	Mercier Dam, Gatineau County	On trees killed by the jack-pine sawfly; first herbarium record.
Poria cinerascens (Bres.) Sacc. and Syd. *P. mappa* Overh. and Lowe *P. oleracea* Davids. and Lombard *P. xantha* (Fr. and Lind.) Cke. Wood rots	Fir, balsam Fir, balsam Oak, red Oak, red	Vicinity of Quebec City, Quebec County	First herbarium records; graciously obtained from L. Sirard's private collection.
Retinocyclus olivaceus Fckl. Stain	Pine, jack	Sault-aux-Cochons, Saguenay County	Associated with squirrel damage; first herbarium record.
	Spruce, white	Cabano, Témiscouata County	Associated with mechanical wounds.
Rhodotus palmatus (Bull. ex Fr.) R. Maire	Maple, red	Saint-Donat, Montcalm County	First herbarium record.
Stegonosporium muricatum Bon.	Birch, white	Sainte-Foy, Quebec County	First herbarium record.
Taphrina caerulescens (Desm.) Tul. Leaf blister	Oak, red	Sainte-Foy, Quebec County	Increased incidence of this organism in the vicinity of Quebec City.
Taphrina carnea Johans. Leaf blister	Birch, yellow	Grosses-Roches, Matane County	Infections due to favorable weather conditions.
Taphrina populina Fr. Leaf blister	Poplar, Lombardy	Cacouna, Rivière-du-Loup County	Moderate infections.
Trichocladium canadense Hughes Stain	Butternut	Côte-Saint-Étienne, Argenteuil County	Isolated from discoloration near injuries.


QUEBEC REGION
FOREST INSECT AND DISEASE SURVEY 1971
BRUCE SPANWORM
AREAS OF LIGHT TO SEVERE DEFOLIATION
*EASTERN HEMLOCK LOOPER
AREAS OF LIGHT TO SEVERE DEFOLIATION
AREAS OF BALSAM FIR MORTALITY
*Information provided by the Quebec Department of Lands and Forests.
SCALE IN MILES
0 50 100 150
I. Anticosti
I. Madeleine
GASPE
LAURENT
SAINT
FLEUVE
RIMOUSKI
CHICOUTIMI
QUEBEC
LA TUQUE


FORT RUPERT
VAL-D'OR
TUQUE
CHICOUTIMI
RIMOUSKI
GASPÉ
I. Anticosti
I. Madeleine
SAINT LAURENT
FLEUVE
QUEBEC
MONTRÉAL
QUEBEC REGION
FOREST INSECT AND DISEASE SURVEY 1971
DISTRIBUTION AND SEVERITY OF
GLOBOSE GALL RUST
AS DETERMINED BY GROUND SURVEYS
NIL
TRACE TO LIGHT
MODERATE TO SEVERE
HOST
JACK PINE
EXOTIC PINES
SCALE IN MILES
0
50
100
150



Areas of moderate to severe defoliation by the spruce budworm in eastern Canada 1971.