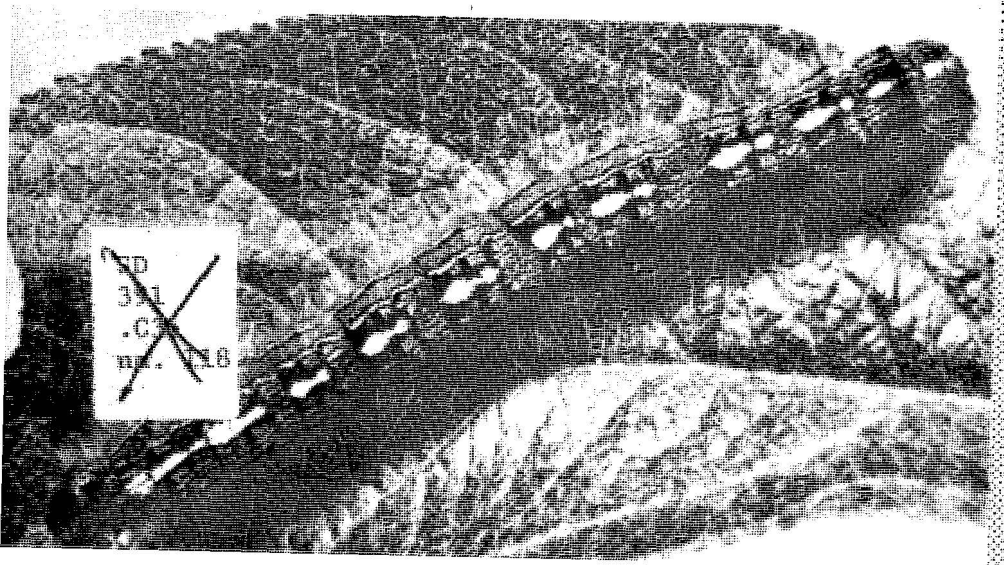
M - X - 118
ISSN 0704-769X

FOREST PEST CONDITIONS IN THE MARITIMES IN 1980

by
L. P. MAGASI



MARITIMES

CANADIAN FORESTRY SERVICE

MARITIMES FOREST RESEARCH CENTRE

The Maritimes Forest Research Centre (MFRC) is one of six regional establishments of the Canadian Forestry Service, within Environment Canada. The Centre conducts a program of work directed toward the solution of major forestry problems and the development of more effective forest management techniques for use in the Maritime Provinces.

The program consists of two major elements - research and development, and technical and information services. Most research and development work is undertaken in direct response to the needs of forest management agencies, with the aim of improving the protection, growth, and value of the region's forest resource for a variety of consumptive and non-consumptive uses; studies are often carried out jointly with provincial governments and industry. The Centre's technical and information services are designed to bring research results to the attention of potential users, to demonstrate new and improved forest managment techniques, to assist management agencies in solving day-to-day problems, and to keep the public fully informed on the work of the Maritimes Forest Research Centre.

FOREST PEST CONDITIONS IN THE MARITIMES

IN 1980

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Laszlo P. Magasi

Maritimes Forest Research Centre

Fredericton, New Brunswick

Information Report M-X-118

Canadian Forestry Service

Environment Canada

1981

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ABSTRACT

This report reviews the status of forest insects and tree diseases in the Maritimes Region in 1980, including damage related to forest base data, and forecasts conditions for 1981, when appropriate. Fourteen economically important insects and diseases are discussed in detail; information on other organisms is listed in tabular form. A summary of control activities and forest-pest related reports and publications are included. More detailed information is available on request from the Maritimes Forest Research Centre.

RESUME

Ce rapport fait le bilan des insects forestiers et des maladies des arbres dans la région des Maritimes en 1980, y compris les dégâts de nature économique, et donne un aperçu des conditions prévues pour 1981. L'auteur traite en détail de 14 insectes et maladies d'importance et énumère les autres organismes sous forme tabulaire. Il y inclut également un sommaire des travaux de répression et une compilation de rapports et de publications traitant de ravageurs forestiers. De plus amples renseignements sont disponibles sur demande au Centre de recherches forestières des Maritimes.

ACKNOWLEDGEMENTS

This report is the result of a combined effort of all members of the Forest Insect and Disease Survey: C.L. Burlock, L.J. Coady, C.M. Dobson, D.E. Elgee, K.J. Harrison, A.M. Jones, C.D. MacCall, A.W. MacKay, L.P. Magasi, O.A. Meikle, W.R. Newell, D.P. Ostaff, S.E. Pond and F.A. Titus. We wish to thank our students and the numerous staff members who contributed in many ways, especially E.G. Kettela, I. Millar and D.B. Marks.

Much of the information on the status and control of the spruce budworm in New Brunswick is based on data from Forest Protection Ltd., Fredericton, N.B.; part of the information on mortality is from the Department of Natural Resources. The Nova Scotia budworm control information is based on Department of Lands and Forest data.

Information contributed by the Pest Detection Officers of the New Brunswick Department of Natural Resources, the Nova Scotia Department of Lands and Forests and the Prince Edward Island Department of Agriculture and Forestry is acknowledged and appreciated. Special thanks go to those who participated in the gypsy moth adult trapping program.

Parks Canada, the Department of Natural Resources of New Brunswick, the Department of Lands and Forests of Nova Scotia, and private individuals operated light traps during the summer months.

INTRODUCTION

Some of the objectives of the Forest Insect and Disease Survey are to monitor insect and disease conditions, determine their effect on the forest, and report on the status of the important and most common pests. In the Maritimes, this information is disseminated to interested agencies and individuals through periodical reports such as: Seasonal Highlights; Technical notes; Information Reports; and the Annual Report of the Forest Insect and Disease Survey.

This information report differs both in format and content, from those published yearly since 1974 at the Maritimes Forest Research Centre. The Task Force on the Forest Insect and Disease Survey recommended that pest situations be related, where appropriate, to provincial forest inventory data, that results of operational control programs be summarized, and a list of reports and publications relating to forest-pest conditions be included.

Although general statements are made on pest conditions that may be expected in 1981, the title of the report no longer reflects that objective. Instead, a Technical Note is to be published before field season to predict conditions for 1981.

In recent years, efforts towards collecting and reporting information in quantitative terms have been emphasized, but for a variety of reasons, it will never be possible to express all observations quantitatively. Throughout this report, the terms "severe, moderate, light, and trace" are used to describe the level of defoliation and, in some cases, other injury, or insect population levels. Unless otherwise stated, the terms have the following percentage ranges:

Trace	up to 5%
Light	6 - 24%
Moderate	25 - 64%
Severe	65 - 100%

Two maps are included to help the reader locate areas mentioned in the report. One map (Fig. 9) shows the counties of the three provinces, the other (Fig. 10) indicates the provincial forest services' forest inventory subdivisions.

This report outlines forest pest conditions in the Maritime Provinces in 1980. It aims to provide forest managers with the information early enough to be considered in management decisions before the start of the 1981 field season. Insects and diseases that were widespread and caused considerable concern in 1980 are discussed in detail, others are presented in tabular form. More information on these and on other specific conditions will be provided upon request from the Maritimes Forest Research Centre.

IMPORTANT AND CONSPICUOUS FOREST PESTS

SPRUCE BUDWORM

This summary is based on information provided by Forest Protection Limited, the Department of Natural Resources in New Brunswick, the Department of Lands and Forests in Nova Scotia, the Department of Agriculture and Forestry in Prince Edward Island, E.G. Kettela, Maritimes Forest Research Centre, and data collected by the Forest Insect and Disease Survey.

In New Brunswick, defoliation of balsam fir and spruce stands caused by the spruce budworm, *Choristoneura fumiferana* (Clem.) occurred over 849 00 ha. Defoliation was severe on 447 000 ha, moderate on 226 000 ha, and light on 176 000 ha. Moderate and severe defoliation occurred mostly in the western half of the Province and in east-central New Brunswick (Fig. 1) and all but 93 000 ha of the 673 000 ha in these categories were outside the 1.6 million ha protection area. The total area

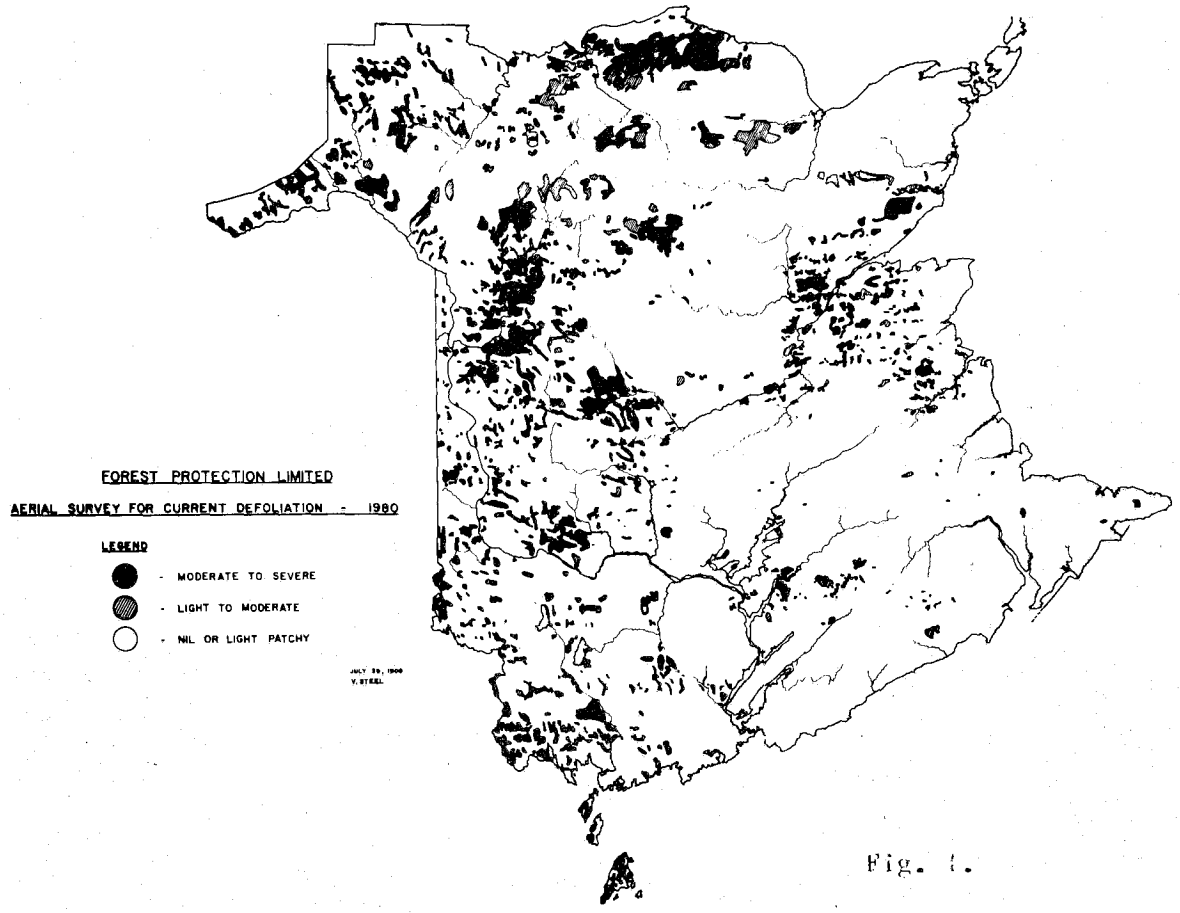
FOREST PROTECTION LIMITED
AERIAL SURVEY FOR CURRENT DEFOLIATION - 1980
LEGEND
- MODERATE TO SEVERE
- LIGHT TO MODERATE
- NIL OR LIGHT PATCHY

Fig. 1.

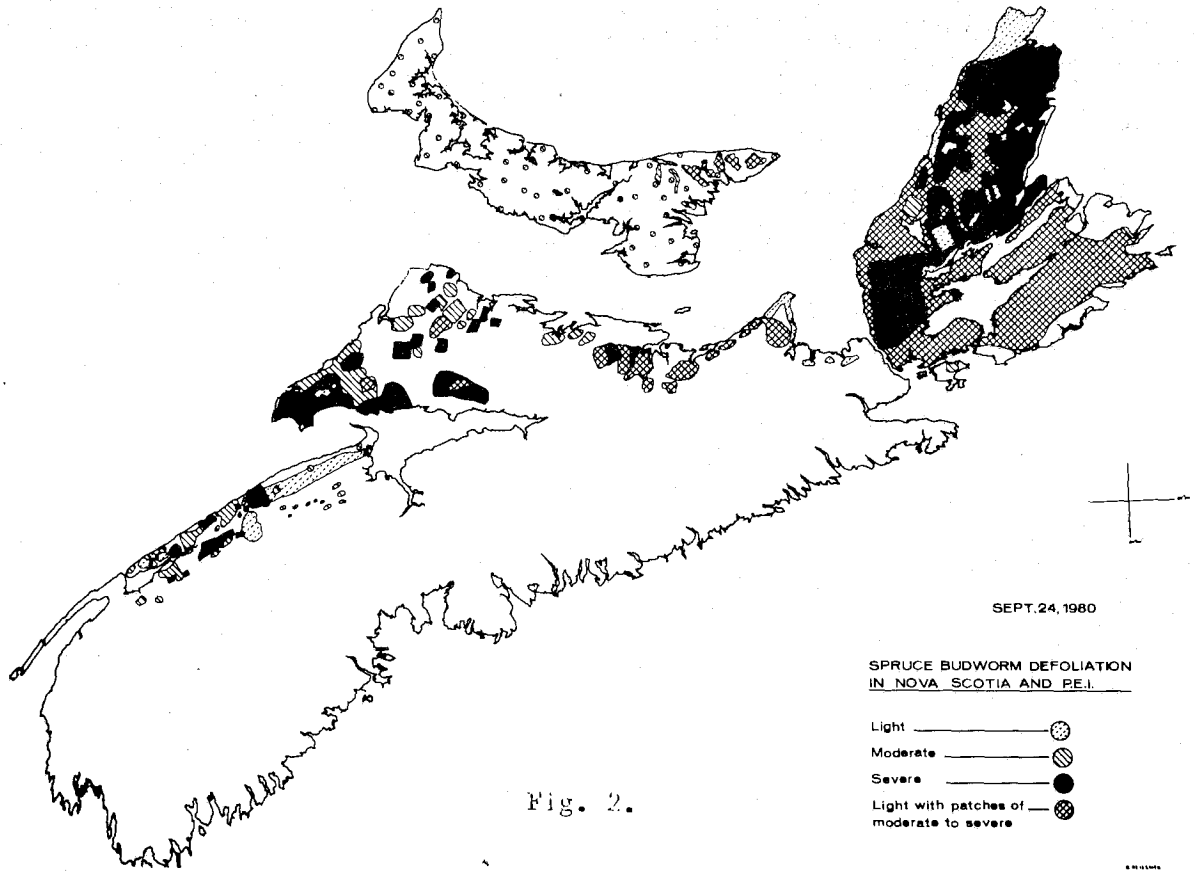
SEPT. 24, 1980
SPRUCE BUDWORM DEFOLIATION
IN NOVA SCOTIA AND P.E.I.
Light
Moderate
Severe
Light with patches of moderate to severe

Fig. 2.

of moderate to severe defoliation decreased by about 647 000 ha from the 1.3 million ha so defoliated in 1979.

Aerial damage appraisal surveys indicate that about 697 000 ha of forest have a measurable amount of tree mortality attributable to spruce budworm infestation. Most of this area is in the southern half of the Province and is usually associated with the 1-mile "set-back" zone. The highest proportion of "moribund" trees is also found in these areas.

Egg-mass surveys indicate an increase in budworm populations for 1981 in the western and northern areas of New Brunswick. The area of susceptible forests in the moderate to high hazard category is 1.5 million ha in the protection zone. An additional 1.1 million ha are low hazard areas but with moderate to high budworm populations expected there is 1981. These figures compare with the 3.0 million ha of moderate or high hazard so rated for 1980.

On mainland Nova Scotia, there was a dramatic increase in the area of defoliation from 1979 (Fig. 2). Defoliation was severe on 130 900 ha, moderate on 103 200 ha, light on 57 000 ha, and 102 000 ha were "variable" (a mixture of severe-moderate-light defoliation). The total area of defoliation, 393 300 ha in 1980, compares with 196 400 ha in 1979. The budworm outbreak on the mainland is confined to three main areas, Colchester — Cumberland counties, the Northumberland Strait coast of Pictou-Antigonish counties, and the Annapolis Valley. Most of the moderate and severe defoliation, 168 100 ha (with an additional 45 800 ha variable), is in the Colchester-Cumberland counties outbreak which has continued since the early 1970's. Considerable tree mortality has been occurring here for at least 4 years.

Egg mass surveys indicate a continuation of all three outbreaks in 1981. In Colchester-Cumberland counties, egg-mass densities were lower than in 1979 but high counts were recorded in a large area of the Cumberland Peninsula. There was a decrease in Pictou County but a considerable increase in Antigonish County, which will result in noticeable but patchy defoliation. Egg-mass infestations have increased for the fourth consecutive year, in both intensity and area in the Annapolis Valley.

On Cape Breton Island, 986500 ha of forest were defoliated to some extent in 1980, compared to the 890 000 ha in 1979. Defoliation was severe on 361 300 ha, moderate on 121 000 ha, light on 47 400 ha and variable on 456 800 ha. The area of moderate, severe, and variable defoliation, 939 200 ha, increased considerably from 725 800 ha so classified in 1979.

A further 10.9% of the merchantable balsam fir died in 1980 on the Cape Breton Highlands. Total tree mortality has reached 46.6% on permanent research plots. In contrast to previous years when most of the trees that died were nearly devoid of foliage, in 1980 many trees in the 76-90% total-defoliation class also succumbed to repeated budworm attacks. In the Lowlands, the 1980 tree mortality was 24.5% and total mortality reached 40.8%. Many of the trees on the Lowlands were attacked and killed by a weevil, *Pissodes* sp., which usually attacks only weakened suppressed trees. More than 10% of the remaining live trees are expected to die in 1981 on the Highlands, and 11.3% on the Lowlands. These predictions may prove conservative if weevil activity continues as suspected.

In Prince Edward Island, aerial and ground surveys showed that although spruce budworm populations were very high in the early stages of development in most areas, the

Forest Base data

	Area of moderate to severe defoliation[1] by spruce budworm ha	Total area of spruce-fir forest ha	Proportion of susceptible forest affected %
New Brunswick	673 000	3 386 000	19.9
Nova Scotia	1 275 000	2 449 000	52.1
Prince Edward Island	22 000	69 300	31.7

[1]Includes 'variable' defoliation in Nova Scotia

Mortality of balsam fir and spruce in New Brunswick and balsam fir on Cape Breton Island caused by the spruce budworm

	New Brunswick		Cape Breton Island
	Balsam fir	Spruce	Balsam fir
Merchantable volume[a]	117.20	159.49	173.5
Budworm susceptible species,[b]%	41.4	55.9	65.9
Mortality,%	28	13	43
Volume of dead timber	32.82	20.60	14.90
Susceptible species dead,%	11.6	7.3	28.3
Area[c] of susceptible species	3455.2		613.0
Area of mortality	400.8	175.9	173.5

[a]All volumes in millions cubic metres.

[b]Susceptible species includes balsam fir, spruce, hemlock and larch.

[c]All areas in thousands hectares.

expected severe defoliation did not materialize. Inclement weather interferred with the development of the insects and rapid shoot growth helped to off-set the effects of feeding. Aerial surveys detected about 22 000 ha of moderate to severe defoliation in Kings County, and ground surveys identified moderate to severe defoliation in patches elsewhere in the Province. This compares with 28 800 ha of defoliation in 1979.

Egg-mass surveys indicate a decrease in infestation levels in Prince Edward Island in 1981. There will still be areas where defoliation will occur but it is predicted that, in general, there will be less feeding by the spruce budworm in 1981.

SECONDARY STEM INSECTS

Sawyer beetles, *Monochamus* spp., and bark weevils, *Pissodes* spp., are important agents in the primary stages of the deterioration of dead and dying timber. However, tree mortality can occur when populations increase and insects repeatedly attack living trees. Sawyer beetles and bark weevils caused mortality in balsam fir, spruce, and jack pine stands in the Maritime Provinces. In one location on Cape Breton Island, 7 of 8 balsam fir trees that died between the fall of 1979 and the fall of 1980 had extensive weevil activity.

In New Brunswick, attacks by sawyer beetles and weevils resulted in mortality of balsam fir in patches and individual trees from Plaster Rock to Sadler Brook, Victoria County, including a 2000-ha area at Sadler Brook on the Plaster Rock - Renous Highway. A few scattered dead trees were observed from Plaster Rock to Nictau Lake, and from Kedgwick through Rapid Depot to Union Brook, Restigouche County. Dead and dying trees were common in a 25-ha area near Blacks Harbour, Charlotte County. Jack pine along the pine Glen-Dawson Settlement Road, Albert County were heavily infested with sawyer beetles. Numerous sawyer beetle egg slits observed on living balsam fir trees in the Sadler Brook and on jack pine in the Pine Glen areas indicate that the attacks are continuing and further mortality will occur.

DENDROCTONUS BARK BEETLES

Bark beetles of the genus *Dendroctonus* continued to cause widespread tree mortality in spruce and tamarack in the Maritime Provinces.

The spruce beetle, *Dendroctonus rufipennis* (Kby.), continued its heavy attacks on white spruce in Nova Scotia. A survey in 1979 showed that 48% of the white spruce stands examined were either infested with or suffered mortality from the beetle. Examination of 24 infested white spruce stands during the fall of 1979 and spring of 1980 showed that tree attacks represented 27% of the white spruce volume of these plots; 18.4% of the volume was dead. It is estimated that 779 200 m^3 of white spruce were infested with beetles but still living and an additional 1 584 900 m^3 were dead from beetle attack. This represents about 11% of the merchantable white spruce volume in Nova Scotia. Sixty-eight percent of the infested wood was on Cape Breton Island which has more than one-third of Nova Scotia's white spruce volume. Here, more than 20% of the merchantable volume of white spruce was infested or killed by beetles. Of trees attacked, 85% were greater than 22 cm in diameter, making up 82% of the merchantable volume.

In Prince Edward Island, an estimated 328 000 m^3 (20% of the total spruce volume) were infested with or killed by the spruce beetle. Of this, 53% is newly infested. Most of

Forest base data

	Volume of spruce[1] infested or killed by bark beetles m^3	Total volume of spruce[1] m^3	Proportion of susceptible host affected %
Nova Scotia	2 834 000	22 470 000	11.0
Prince Edward Island	328 000	1 608 000	20.0

[1]Spruce in Nova Scotia implies white spruce only while in Prince Edward Island all species of spruce are included.

the beetle activity was found in Queens County where 61% of the white spruce trees examined have been affected.

In New Brunswick, a small stand was affected on Grand Manan Island near Castalia. Some of the white spruce trees were dead, others were infested by beetles. This is the first time the beetle was found in the Province in the last 50 years.

Eastern Larch Beetle, *Dendroctonus simplex* Lec., was common throughout the range of its host and many mature and overmature larch trees were either infested or killed by the insect. No special surveys were conducted in 1980 but it was estimated in 1978 that nearly half a million cubic metres of larch were dead and the infestations have been expanding and intensifying since e.g., 75% of the larch on a study plot in central New Brunswick was in various stages of attack in 1980.

BALSAM WOOLLY APHID

Balsam woolly aphid, *Adelges piceae* (Ratz.), ranked in importance with the spruce budworm during the 1950's and early 1960's as the cause of balsam fir mortality. The insect attacks both twigs and stems. Continued infestation weakens, then kills, the tree. A succession of winters with below normal temperatures and light snow cover reduced insect populations in 1961-62 and again in 1970-71. Although some infestation, mostly in coastal areas of Nova Scotia, persisted through the years, "gouty" twigs were the most common manifestation of the insect's presence and stem attacks were reported only in isolated cases.

Recent observations on an apparent resurgence of the insect prompted a preliminary evaluation in 1979. Nearly one-third of the 64 randomly distributed stands examined, had signs of current balsam woolly aphid attack.

In 1980, a detailed survey found balsam woolly aphid (or signs of its activity) in 33 of the 60 balsam fir stands examined; 26% of the stands in

Table 1. Condition of balsam fir trees in balsam woolly aphid infested stands in the Maritimes in 1980

	Stands		No. of trees assessed	Tree condition[1] in infested stands					
				Dead[2]		Twig attack		Stem attack	
	Examined	Infested		Stands Affected	%Trees Affected	Stands Affected	%Trees Affected	Stands Affected	%Trees Affected
New Brunswick	23	6	74	2	14.9	2	9.5	4	29.7
Nova Scotia	30	20	294	4	2.7	12	16.7	16	33.0
Prince Edward Island	7	7	98	0	0	7	31.6	4	9.2
Region	60	33	466	6	4.1	21	18.7	24	27.5

[1] The tree conditions are not mutually exclusive, in any given stand all three conditions assessed may be present.

[2] Tree mortality attributed to balsam woolly aphid attack only. Trees that died from other causes are not included.

New Brunswick, 67% in Nova Scotia, and 100% in Prince Edward Island were infested. Infested stands were evenly distributed in Nova Scotia and Prince Edward Island but in New Brunswick 5 of the 6 infested stands were in the eastern part of the Province, 4 of these in coastal areas. A summary of the tree conditions in the infested stands is presented in Table 1. Tree mortality attributed to repeated attacks by the insect occurred in 6 stands. Mortality ranged from 4 to 100%, the highest near Barrington, Shelburne County, Nova Scotia.

FOREST TENT CATERPILLAR

The forest tent caterpillar, *Malacosoma disstria* Hbn., again was the most "visible" hardwood defoliator in New Brunswick in 1980, especially in the western part of the Province along the St. John River Valley (Fig. 3). This outbreak, which in 1978 was reported as "a few small patches of trembling aspen defoliated" increased in size to 17 500 ha in 1979, and in 1980 caused severe defoliation of hardwoods over 135 000 ha. The principal host was trembling aspen but other hardwoods such as cherry, birch, apple, and ground cover bushes such as raspberry were also affected. Insect populations were extremely high and thousands of larvae invaded residential districts, especially in Woodstock and surrounding areas. Larvae caused near panic in some communities and the invasion became a real "media event". The annoyance of residents was indicated during the annual parade in Woodstock when a service organization depicted the forest tent caterpillar on their "Year of the Worm" float.

Severe defoliation of trembling aspen also occurred elsewhere in New Brunswick, notably in the Minto-Chipman-Youngs Cove area of Queens and Sunbury counties, in the Rogersville area in Kent and Northumberland counties, and in many scattered areas from Moncton to Newcastle. These outbreaks have a history similar to the St. John River Valley outbreak and occurred over 42 600 ha compared to 19 500 ha defoliated in 1979. The current outbreaks are by far the most extensive recorded by the Forest Insect and Disease Survey in New Brunswick since 1943. Egg-mass surveys conducted in the fall indicate that the outbreak is likely to cover an even larger area in 1981 and larval populations may exceed the 1980 levels. Parasitism and disease, which usually play a significant role in the decline of outbreaks, were very low in 1980 except in a few of the older outbreaks and are not likely to be important control agents in 1981. A certain combination of weather conditions, several unseasonably warm days, followed by frost before bud break offer the best hope for the natural collapse of the infestation. Artificial introduction of a disease organism (a polyhedrosis virus) into populations has shown some promise in hastening the end of outbreaks in experimental work but the method has not been operationally attempted in the Maritimes and certainly could not be expected to produce instant control for 1981.

In Prince Edward Island, the area of defoliation by the forest tent caterpillar was reduced by about two-thirds from that reported in Prince County in 1979. The outbreak began in 1973 and by 1975 covered 28 200 ha. In 1980, defoliation of trembling aspen was severe over 3100 ha and occurred to a lesser degree, mostly light or trace, over 2000 ha from Portage in the north to St. Gilbert and Grand River in the south. A few ornamental willow trees were completely defoliated in Summerside. Both disease and parasitism have been high in the population since 1976 when the collapse of the outbreak was

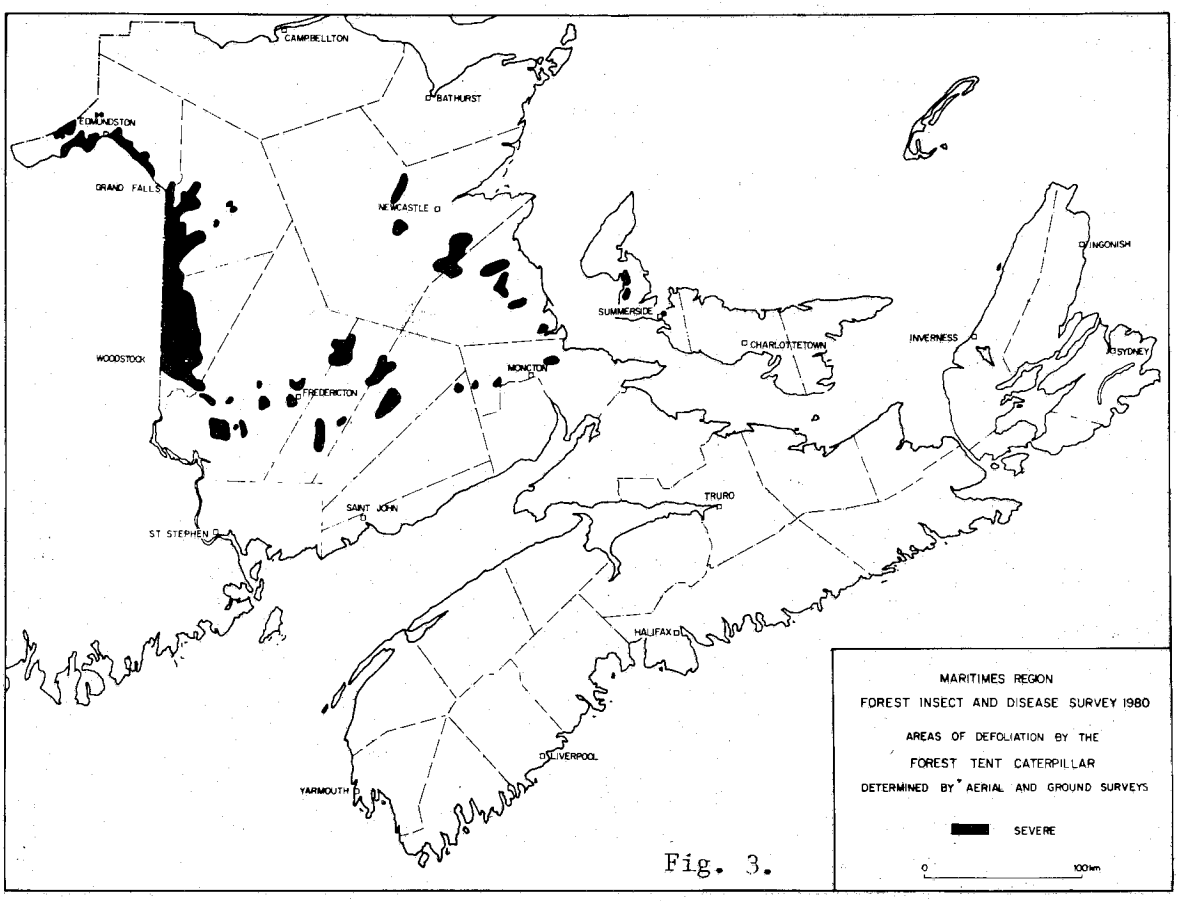

Fig. 3.

first predicted. In 1980, total pupal mortality averaged over 60% and egg-mass sampling indicates that, although the outbreak may persist, the area affected and the level of defoliation will be further reduced in 1981. Defoliation is expected to be light with moderate defoliation in some patches. However, the number of adults captured in light traps in both Queens and Kings counties increased considerably. The increase at Breadalbane, Queens County was more than 5-fold and quadrupled at Montague, Kings County over 1979 figures. This may be an indication of population buildup in these areas.

In Nova Scotia, light to moderate defoliation occurred on only a few apple and sugar maple trees at Truro and at New Glasgow. However, light trap catches doubled or tripled over 1979 catches at 4 of the 5 locations and increased to 515 from 123 at Londonderry, Colchester County. Egg-mass surveys will be conducted before the 1981 field season to determine where in Nova Scotia the imminent outbreak is most likely to occur.

Trees in the newer outbreaks in New Brunswick are not yet visibly affected by the repeated defoliation. In Prince Edward Island, however, the incidence of branch dieback of trembling aspen increased form 3.5 to 20.1% between 1975 and 1978. No assessment has been made since, but further stand deterioration was observed in the affected stands. Information from earlier outbreaks indicates that as much as 13% of trembling aspen over 2.5 cm dbh were

dead and another 45% had dead branches in areas of 2 or 3 consecutive years of complete defoliation. Most of the dead trees were in the 2.5 to 10 cm dbh class - the trees of the future merchantable volume.

Forest base data

In New Brunswick the area of severe defoliation by the forest tent caterpillar was 177 600 ha in 1980. This represents 44% of the 403 000 ha total susceptible forest in the Province.

In Prince Edward Island, severe defoliation occurred over 3100 ha of mixed forest interspersed with large, non-forested areas with groups of aspen trees of various sizes. Thus, the calculation of a figure for the proportion of susceptible forest affected is impractical.

POPLAR LEAF ROLLERS AND MINERS

Tree species that a few years ago were called weeds by the forestry community are no longer considered as such. Because hardwoods provide much needed renewable thermal energy in these years of global energy shortage, fast growing hardwoods, such as aspen and poplar, are gaining importance as a source of wood fibre and hybrid poplar plantations for fibre production are well beyond the experimental stages in many parts of North America. Anything interfering with optimum growth of these species is interfering with the future wood supply for both energy and fibre. Hence, a general statement is included on a group of insects, normally considered incidental and of little economic consequence.

Populations of several species of leaf rollers and leaf miners have been increasing in many areas of the Maritimes and have reached such proportions that now they are considered one of the major problems affecting the foliage of aspen and poplar. The insects, found alone or in combinations of several species, affect trees from small patches to stands up to 20 ha and are being found in areas where their presence has not previously been noted. The exact nature of their action is difficult to determine, however, by conjecture we believe that through interference with and reduction of the photosynthetic activities of the host, the vigor of the tree is lessened, predisposition to the invasion of secondary organisms is increased, and the amount of wood produced is decreased.

Aspen leaf rollers included the European leafroller, *Archips rosanus* (L.), fruit-tree leafroller *Archips argyrospilus* (Wlk.), large aspen tortrix, *Choristoneura conflictana* (Wlk.), obliquebanded leafroller *Choristoneura rosaceana* Harr.) and several others (*Acleris* sp., *Anacampsis innocuella* Zell., *Compsolechia niveopulvella* Chamb., and *Epinotia* sp.). *Sciaphila duplex* Wlshm. was by far the most common of all leafrollers encountered in 1980.

In New Brunswick, leaf rolling was widespread but more common in the eastern half of the Province. It was severe in areas of Sunbury, Queens, (at Codys, 54% of the leaves were rolled), Kings, and Westmorland counties; moderate in Albert, Gloucester and other areas of Westmorland counties; light or only trace elsewhere.

In Nova Scotia, the infestation along the Trans-Canada Highway Cumberland County, first reported in 1978 and expanded in 1979, persisted in 1980 and affected trees in various sized patches. The intensity of the leaf rolling was variable. Similar conditions existed over much of the range of trembling aspen in central and southwest Colchester County and this infestation extended in a westernly direction into the Annapolis Valley to Bridgetown. Moderate leaf rolling occurred again in the same areas of Pictou County where the insects were common in 1979 and

light leaf rolling was noted for the first time in Antigonish, Cape Breton, and Inverness counties.

In Prince Edward Island, leaf rollers were found throughout the Province but moderate rolling occurred only in a 5-km^2 area between Springhill and Mt. Pleasant, Prince County.

Poplar leafminers included the poplar serpentine leafminer, *Phyllocnistis populiella* (Chamb.) which caused severe or moderate mining of trembling aspen throughout most of northern New Brunswick. Forty-seven percent of the leaves were mined at Glazier Lake, Madawaska County, 60% at McGraw Brook, Northumberland County, and over 71% along the Upsalquitch Road in Restigouche County. A blotch miner *Messa populifoliella* (Town.) of importance mostly on ornamentals caused severe browning of scattered Carolina poplars in the Oromocto-Fredericton area in New Brunswick and moderate browning was common on Lombardy and Carolina poplars. Near Oromocto, up to 40% of the leaves were mined on small balsam poplar trees but only up to 25% of the foliage of the large trees was affected. Light infestations were scattered elsewhere through the Province on these hosts and on trembling aspen.

DUTCH ELM DISEASE

No major changes occurred in the distribution of Dutch elm disease, *Ceratocystis ulmi* (Buism.) C. Moreau, in the Maritime provinces in 1980 (Fig. 4): the more noteworthy extensions were found in Nova Scotia. The discovery of the disease at Willowdale, Pictou County, extends the distribution on the mainland eastward close to the Antigonish-Guysborough county line. Trees with typical symptoms of the disease were also found in a 10 km^2 inaccessible area near the junction of the North and the LaHave rivers in Lunenburg County, close to the location, near Pinehurst, where the disease was first found in 1978. Intensification of the disease continued in Nova Scotia and New Brunswick within the boundaries of the known distribution. In Prince Edward Island, where the disease was first found in Prince County in 1979, the Provincial Government removed all elm trees that were identified as harboring the fungus and many others in the immediate vicinity. In 1980, in spite of intensive scouting, both on the ground and from the air, no trees were identified as infected by the fungus. Groups of suspect trees were located in several areas but to date efforts to isolate *C. ulmi* from these have failed. It would be overly optimistic to presume that the disease has been eradicated in Prince Edward Island. The areas of suspect trees will be investigated again in 1981 and further attempts to isolate the fungus will be made.

In Fredericton, New Brunswick, infection rates within the Dutch elm disease control zone were 7 and 9%, respectively, on the south and north sides of the St. John River. Populations of the native elm bark beetle, *Hylurgopinus rufipes* (Eichh.), were lower in the City and immediate vicinity than in 1979, and much lower than in close-by wild areas where the population increased somewhat. Beetle populations declined drastically for the third consecutive year near the area where all elm trees were cut in the winter of 1977-1978.

In Nova Scotia seven areas were trapped but the native elm bark beetles were caught only near New Glasgow, Pictou County, and the beetle index (beetles/10 cm^2 trap) was less than one. Beetles were also found but in very low numbers in Prince Edward Island in the area where Dutch elm disease was found in 1979.

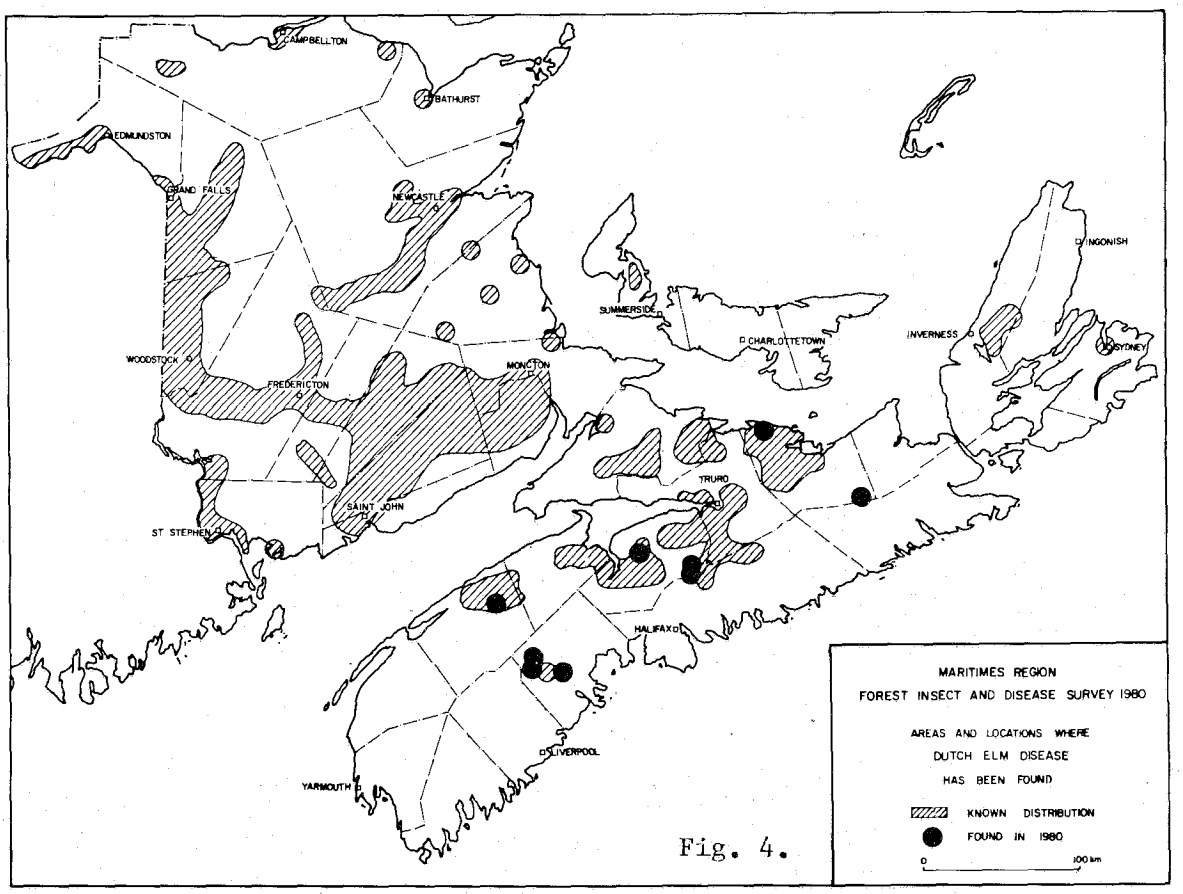

Fig. 4.

There has been no change in the status of trees in the Dutch elm disease resistance study since 1978. Of 33 apparently healthy elm trees selected in 1967 in areas of high tree mortality, 6 remain healthy, 2 are infected but living, 21 were killed by the disease and 4 died from other causes. Only one of the trees still alive is both healthy and exhibits good shade tree form.

MAPLE LEAFROLLER

Rolling of maple leaves by the maple leafroller, *Cenopis acerivorana* MacK., was widespread throughout the Maritimes in 1980. The insect is a relatively new arrival to the Region. It was first found in New Brunswick in 1956, in Prince Edward Island in 1961 and in Nova Scotia in 1962. Originally the insect was considered only a minor shade tree problem. However, it spread through the Maritimes and, apart from the normal population fluctuations, it persisted in high enough numbers that we now consider maple leafroller as one of the significant factors in the general decline of maple.

In 1980, leaf rolling was much more common than in previous years in eastern Nova Scotia and western Prince Edward Island and somewhat reduced in New Brunswick (Fig. 5). Red maple leaves were rolled more frequently than sugar maple and trees of all ages were affected. Over 40% of red maple leaves were rolled in areas of Restigouche County, St. Paul, Kent County and Cherryvale, Queens County in New Brunswick, and at McNeills Mills, Prince County, Prince Edward Island.

DECLINE OF MAPLE

Maple constitutes about 47% of the hardwood forest, by volume, in the Maritime Provinces and the condition of this resource has been deteriorating in recent years. The decline, expressed as earlier-than-normal leaf coloration and leaf fall in the autumn, branch dieback, dead tops, and apparent low vigor of the trees, is general throughout the Region. Forest stands as well as trees in urban areas are affected. Red maple suffers more than sugar maple.

There is no single cause to which the decline of maple is directly attributable. Along roads and in urban areas, salt and automobile emmission doubtless contribute but the deteriorating condition of stands is so general that other factors or a combination of factors such as drought, large-scale cutting practices, past insect outbreaks (greenstriped mapleworm, saddled prominent, lesser maple spanworm), prolonged epidemic or subepidemic populations of the maple leafroller, anthracnose, leaf spots and other disorders are likely at work.

Estimates of losses or of reduction in productivity by the trees are not available, other than those caused by specific organisms on specific locations (e.g. greenstriped mapleworm). However, we feel that the condition is serious enough to warrant recording here.

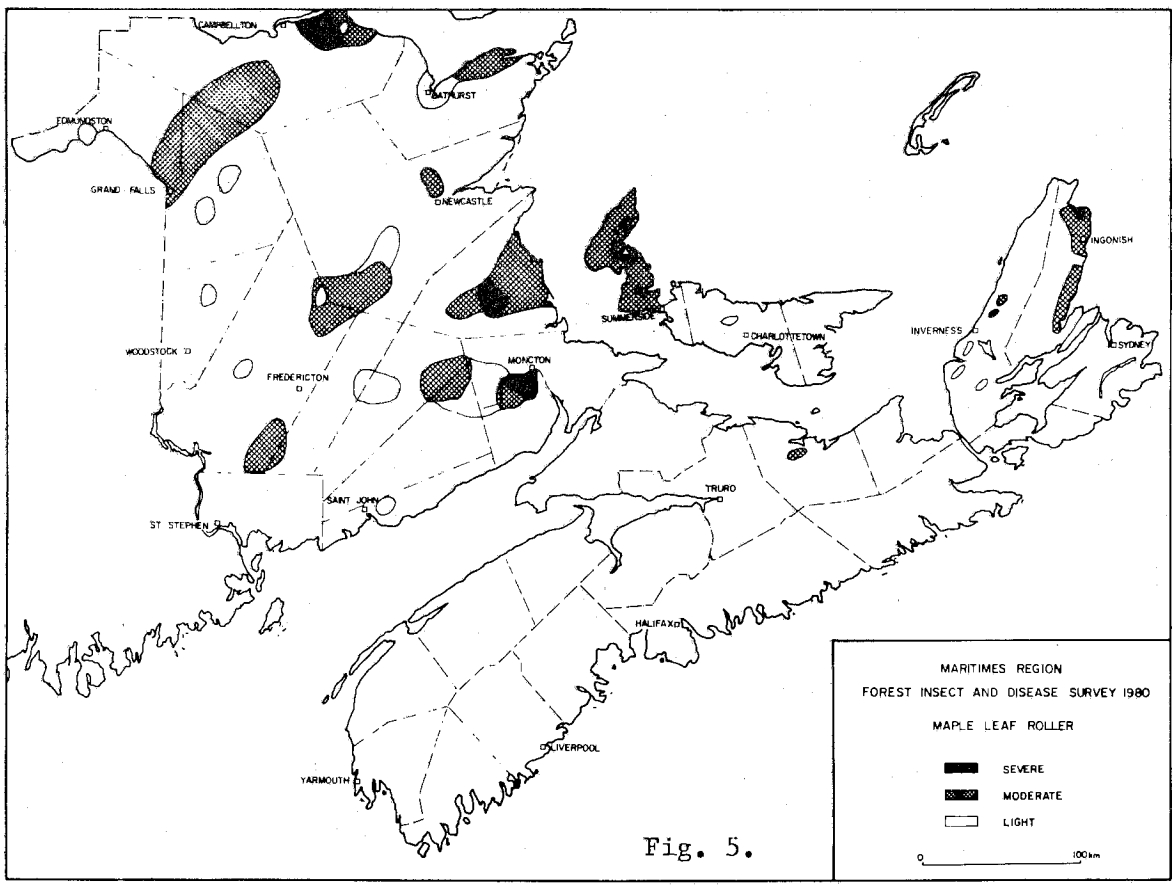

Fig. 5.

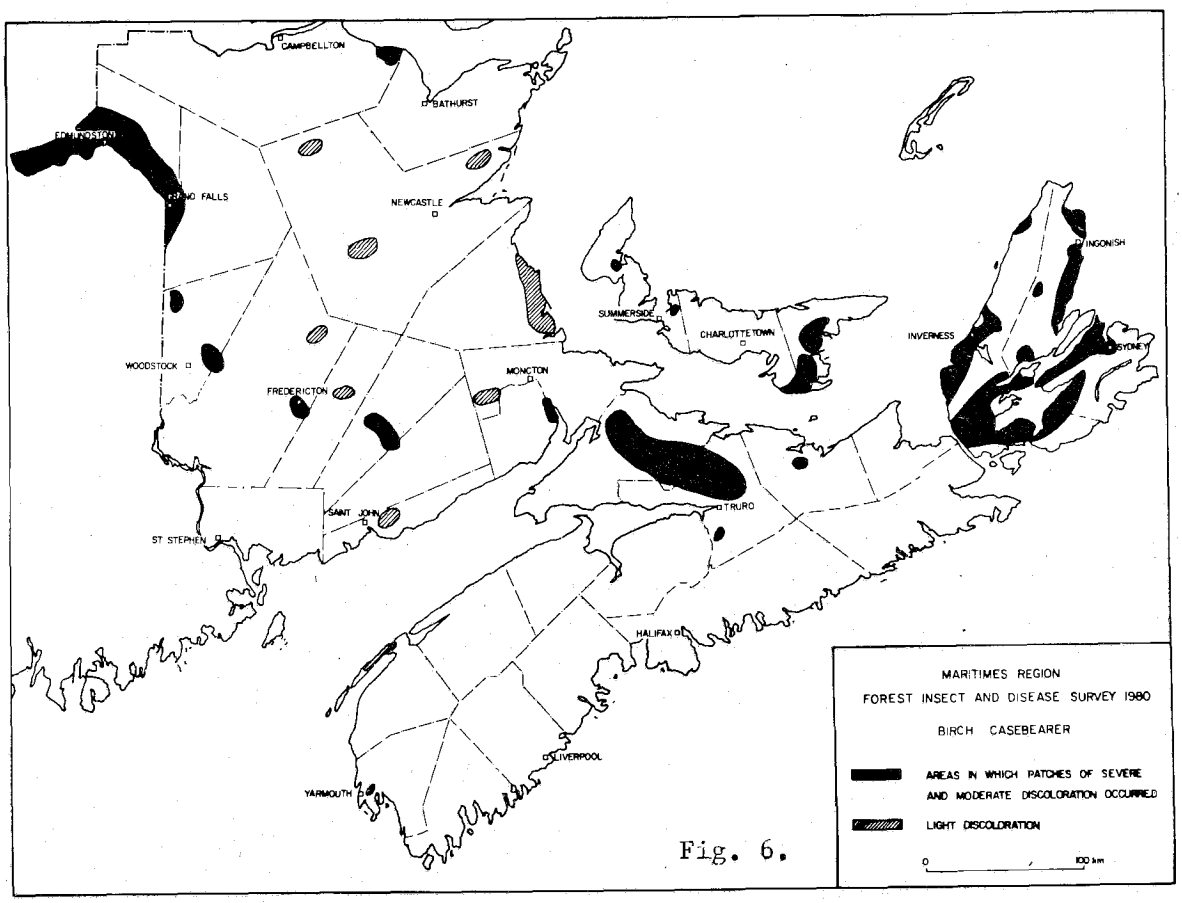

Fig. 6.

BIRCH CASEBEARER

Birch casebearer, *Coleophora fuscedinella* (Zell.), at low populations causes leaf spotting and foliage discoloration and is merely an aesthetic inconvenience. However, when populations are high, the discoloration becomes serious and repeated attacks by the insect cause decline in vigor, loss of growth, and death of young trees. This happened in 1962 on Cape Breton Island where 90% mortality of white birch reproduction occurred as a result of feeding by a combination of birch casebearer, birch leafminer, and birch skeletonizer. In 1969, after two years of very high populations in northern New Brunswick, birch tree mortality was common and many other trees had less than a full complement of foliage.

Birch casebearer populations are on the increase in many areas of the Maritimes. Browning on white birch was severe or moderate in New Brunswick over widespread areas of the northwest and in other scattered areas of the Province (Fig. 6); in Nova Scotia, in much of the lowlands of Cape Breton Island on young trees and in parts of Colchester and Cumberland counties; and in Prince Edward Island, at scattered but sizable areas throughout the Province. Alder was also severely discolored throughout Prince Edward Island, and in New Brunswick over 800 ha at Carron Point, Gloucester County, at St. Martins, St. John County, and in a 15-ha area in Fundy National Park.

DETERIORATION OF BIRCH

In 1979, widespread browning and loss of foliage of white birch occurred in a coastal strip in southern New Brunswick, including the islands of Campobello, Deer, and Grand Manan, and in an area west of Parrsboro, Cumberland County, Nova Scotia.

In 1980, leaf browning was again common on birch and to a lesser degree on other hardwoods such as alders, mountain ash, and mountain maple. The affected area was about 15 km wide and extended from St. Andrews at Saint John and St. Martins. Trees on Deer Island and on Grand Manan Island were also affected but not to the same degree. The intensity of the browning varied on trees in the same location. Severe browning occurred along the Martinon Bypass, St. John County and at Blacks Harbour, Charlotte County. Moderate and light browning was common at many points within the affected area. Both old and young trees were affected, the foliage having a characteristic almost scorch-like border, and patches of discolored areas. On a few younger trees the old leaves were discolored but leaves on presumably new shoots were green.

Much of the white birch in the affected area appears to be in a weakened condition; the cause of which is not known. The only organism consistently identified was *Septoria* sp., a leaf spot fungus, which, however, does not account for either most of the symptoms or the intensity of the discoloration. It appears that the weakening of birch may be caused by some chronic condition and several theories have been advanced, including that of acid rain or a delayed effect of the 1976 Groundhog Day storm which deposited ocean salt in essentially the same areas.

In the affected areas, attacks by the bronze birch borer *Agrilus anxius* Gory were common with considerable tree mortality throughout. At Black River, St. John County, 20 of 54 trees were attacked by the insect, at Ben Lomond, St. John County, 21 of 52 trees were dead.

OAK LEAF SHREDDER AND ROLLER

The oak leaf shredder, *Croesia semipurpurana* (Kft.) and the oak leaf-roller, *Pseudexentera cressoniana* Clem. together caused considerable defoliation of oak in both New Brunswick and Nova Scotia in 1980.

In New Brunswick, most of the defoliation was caused by the oak leaf shredder alone. It was severe or moderate in essentially the same areas as in 1979: the St. John River Valley from Woodstock to Cambridge and scattered other locations where oak occurs in Albert, Westmorland, Kings, Queens, and Northumberland counties. Repeated defoliation affected trees at Cranberry Lake, Queens County, where in 1980 about one-third of the trees in a mature, 50-ha red oak stand had up to 90% of the leaves damaged to some extent, and some of the trees had twig and branch dieback; at Woodman's Point, Kings County, upper crown mortality was common and at least half of the crown was dead on 37% of the trees.

In Nova Scotia, the two insects occurred together in 1980, the leaf-roller being the predominant species. The level of leaf rolling and to a lesser degree leaf shredding was variable from severe to light in patches throughout much of Lunenburg, most of the eastern half of Queens, and in parts of central and eastern Annapolis counties. Smaller areas of affected trees also occurred in Hants, Kings, and Shelburne counties. Twig and branch dieback was common in many areas but has not changed significantly since 1979.

Only light to moderate defoliation, caused by the leaf shredder, occurred in Prince Edward Island in a small group of red oak trees near Milton, Queens County.

BEECH BARK DISEASE

A scale insect, *Cryptococcus fagisuga* Linding., and a fungus, *Nectria coccinea* var. *faginata* Lohm., Wats. & Ayers, in combination cause stem cankers on beech. Cankers deform the stem or coalesce as they grow and kill the tree. Beech bark disease spread through the Maritimes in the first half of the century after it was introduced into the Halifax area. Tree mortality has been considerable. Beech now constitutes less than 4% of the total gross merchantable volume. The disease killed as much as 40% of the beech volume near Fredericton between 1939 and 1952 during its advance through the area. In 1969, a survey was conducted to determine the status of the disease in the Region. In 1980, 50 of the original 103 areas were re-evaluated to determine the changes during the past decade. A comparison of the 1969 and 1980 surveys are shown in Table 2. Detailed results will be presented elsewhere. Regionally, the size distribution of beech has not changed significantly although there was a slight shift towards larger trees. There has been no change in tree mortality (6.5% vs 6.3%) and infection rate increased only minimally (15% vs 10% healthy trees). The number of trees with

Table 2. Comparison of data from the 1969 and 1980 beech bark disease surveys in the Maritimes

	N. B.		N. S.		P.E.I.		Maritimes	
	1969	1980	1969	1980	1969	1980	1969	1980
No. of plots examined	62	26	38	21	3	3	103	50
No. of trees examined	3114	1312	1934	1040	250	153	5298	2505
Living trees with varying degrees of basal cankering (% of lower 3 m of stem affected)								
0	19.7	19.5	9.1	0.5	1.2	1.3	14.9	10.5
1-20	10.9	34.3	8.7	17.2	0.8	31.4	9.6	27.0
21-50	7.2	19.4	9.9	31.1	2.8	29.4	8.0	24.9
51-	58.1	22.3	61.0	42.1	88.0	28.1	60.6	30.9
Dead trees (%)								
From beech bark disease	3.7	3.7	10.9	9.1	7.2	9.8	6.5	6.3
From other causes	0.4	0.8	0.3	0.0	0.0	0.0	0.4	0.4

cankers covering more than half of the lower 3 m of the stem dropped significantly (31% vs 61%) and the decrease was reversely proportional with diameter class in that smaller trees contributed more to the decrease (e.g. 2.5-7.5 cm dbh class showed 41% "improvement" while >25 cm dbh class "improved" by only 10%).

The most significant increase in the intensification of the disease occurred in the "living but infected to less than 50% of the lower bole" class. The percentage of all trees thus affected more than doubled (52% vs 19%) and most of the increase (from 15% to 52%) occurred on trees less than 25 cm in diameter.

The incidence of crown dieback increased between 1969 and 1980. More than 75% of the trees had varying degrees of dieback in 1980 compared to 20% in 1969. Trees with more than 50% of the basal 3 m cankered suffered dieback more frequently and had the highest degree of dieback.

The distribution of the severity of infection (Fig. 7) has not changed since 1969 and the healthiest beech in stands are still found in northwestern New Brunswick with the shortest history of beech bark disease.

The scale insect was active at all locations in Nova Scotia (97% of living trees infested) and in Prince Edward Island (90% of living trees infested) and at 21 of 26 locations in New Brunswick (51% of living trees infested). The incidence of wool was the same on small and larger diameter trees. The intensity of wool was assessed as medium (6-35% of bark covered by wool) at one location in Nova Scotia and at 3 locations in New Brunswick and light (1-5% of bark covered by wool) at 14 locations in Nova Scotia and 4 locations in New Brunswick.

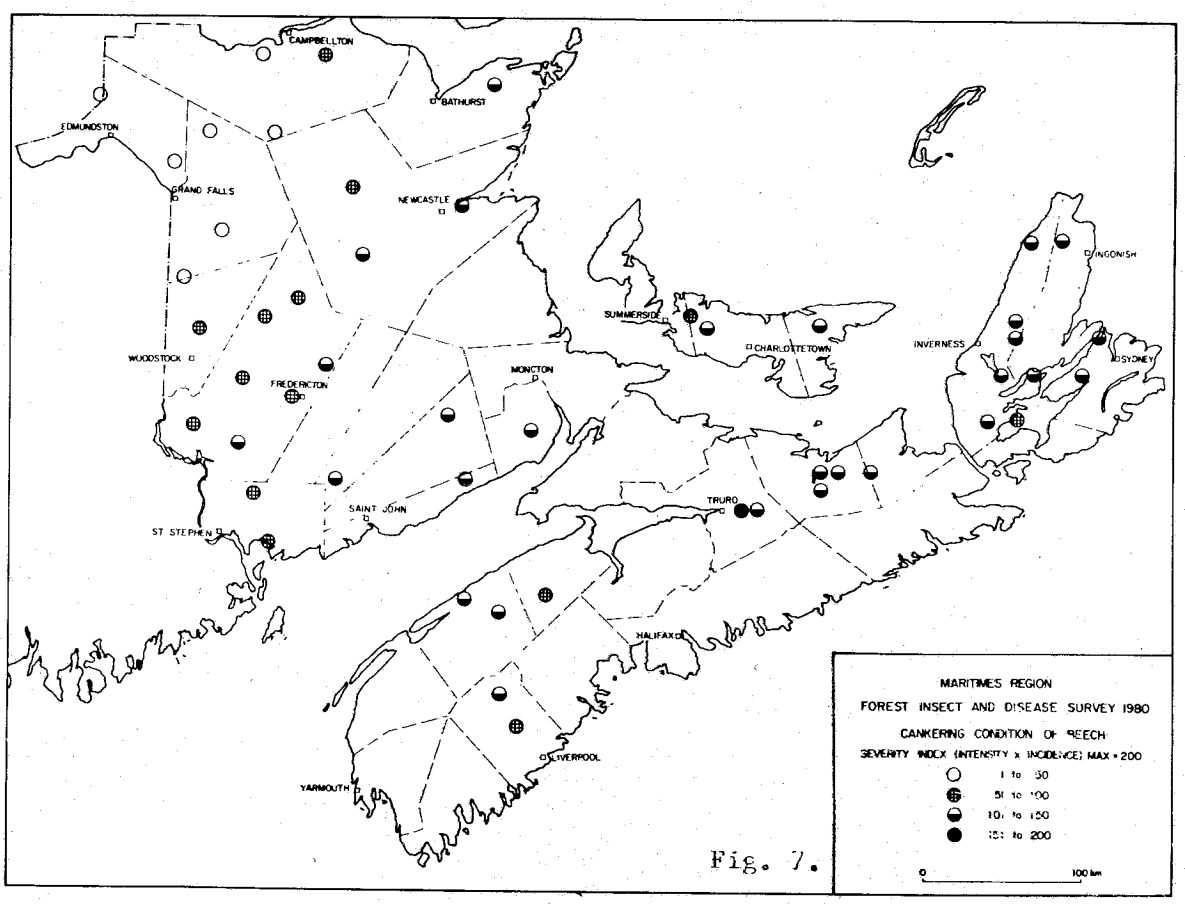

Fig. 7.

GYPSY MOTH

The gypsy moth, *Lymantria dispar* (L.), is a major pest in the northeastern United States, parts of Ontario, and Quebec. A voracious feeder of hardwoods and to a lesser degree of conifers, the insect has not been found feeding in the Maritimes since 1936 when a few egg masses and some larvae and pupae were located in the St. Stephen area in New Brunswick. Infestations in recent years have been spreading in Maine and in 1980 the northern edge of the outbreak reached within 25 km of the New Brunswick border.

In the spring of 1980, 200 sticky traps were set out in New Brunswick and Nova Scotia in an effort to capture early instar larvae that may be carried by prevailing winds and could conceivably establish a population in the Maritimes. For the second consecutive year, no windblown larvae were found in the traps.

A program of trapping male adults in pheromone-baited sticky traps has been conducted annually by the Forest Insect and Disease Survey since 1971. The program has been a cooperative project of the Canadian Forestry Service and the Plant Products and quarantive Division of Agriculture Canada, but in 1980 it was expanded with the cooperation of the provincial forestry services of New Brunswick, Nova Scotia and Prince Edward Island, Parks Canada, and private individuals.

Results of the adult trapping program since its inception are summarized in Table 3. After years of low or incidental catches, the

Table 3. Summary of results of the gypsy moth male adult pheromone trapping program in the Maritime Provinces

	Maritimes			New Brunswick			Nova Scotia			Prince Edward Island		
	No. of traps	Positive No.	%	No. of traps	Positive No.	%	No. of traps	Positive No.	%	No. of traps	Positive No.	%
1971	190	11	5.8	?	2	?	?	9	?			
1972	400	3	0.7	?	3	?	?	0	?			
1973	180	7	3.9	110	4*	3.6	56	3	5.4	0	0	-
1974	200	2	1.0	60	1	1.7	57	1	1.7	15	0	-
1975	135	1	0.7	58	1	1.7	57	0	0	16	0	-
1976	135	14	10.4	66	10	15.1	56	4	7.1	15	0	-
1977	132	32	24.2	60	17	28.3	43	15**	34.9	16	0	-
1978	246	84	34.1	64	17	26.6	167	67	40.1	15	0	-
1979	135	65	48.1	61	43	70.5	59	15	25.4	15	7	46.6
1980	401	240	59.9	199	128	64.3	181	108	59.7	21	4	19.0

* First time that two adults were caught in the same trap.

** First time a multiple catch was obtained. 7 of 15 traps were multiple catches, the highest number of males in a single trap was 10.

numbers of male moths increased significantly in 1976 and has continued to increase each year. Table 4 shows this increase in the average annual catch for eight areas of southern New Brunswick during the past five years. In the Region in 1980, 60% of the 401 traps placed contained adults. As in previous years, traps with the most adults were along the shores of the Bay of Fundy (Fig. 8). Catches of 30-40 adults were the rule rather than the exception, and a trap at Darling Lake, Digby County, N.S. contained 56 adults.

Egg-mass searches were conducted in the vicinity of traps with high catches and in forest stands most suitable to harbor gypsy moth populations but no egg masses or signs of defoliation were found.

In 1980, to test the idea that male moths originate elsewhere and are brought into the Maritimes by storm fronts, traps at 55 locations were observed daily and moth catches were recorded to indicate the moth invasion pattern. Some of the other traps were also observed periodically. Adults were trapped from July 16 (when traps were set out) until September 12 (when traps were removed) but in Nova Scotia, 81% of the catch was taken between July 17-28, in New Brunswick, 84% between July 30 and August 5, and in Prince Edward Island, 73% between August 1-4.

It is not yet known what all this information means. It is clear however, that serious outbreaks are close enough to the Maritimes to cause concern and that close surveillence of the situation is necessary if the Forest Insect and Disease Survey is to fulfill its obligation towards early detection of introduced forest pests. The fact that egg-carrying females of the gypsy moth are very poor fliers may give us a grace period but foresters in the Maritimes should be aware that what now appears only a threat, may soon become a reality.

SUMMARY OF CONTROL PROGRAMS

Spruce budworm was the only insect in the Maritimes for which large - scale operational control programs were carried out in 1980. Spraying in several nurseries and greenhouses was conducted to control or, more frequently, to prevent insect and disease problems but no information was collected on these operations.

In New Brunswick, control operations for the spruce budworm were conducted by Forest Protection Ltd. The area treated in 1980 covered 1 614 000 ha. Of this, 1 361 000 ha were treated with fenitrothion, 250 000 ha with aminocarb and 3000 ha with both insecticides. All but 8000 ha of the area received two treatments. The operational cost, about $8,970,000, includes materials and application, assessments, experimental trials etc.

In Nova Scotia, 25 670 ha were treated with the biocide *B.t.* [*(Bacillus thuringiensis kustaki, B. t. k.)* Thuricide 16 B] in two major areas, on Cape Breton Island and in Cumberland County. The total cost of the operation ($1,176,000) includes the biocide ($383,000), equipment ($103,000) which is reusable, salaries ($181,000), aircraft rentals, lodging, travel, truck rentals etc. and assessments. The unit cost of the operation was $45.79/ha.

Table 4. Average annual catch of male gypsy moth in pheromone traps in southern Brunswick 1976-1980

Area	No. of traps	Average number of male adult per trap				
		1976	1977	1978	1979	1979
Grand Manan Island	10	0.1	0.2	1.0	4.4	34.6
Campobello Island	5-6	0.2	0.4	0.2	5.6	26.7
Deer Island	4-6	0.5	0.7	0.7	4.5	21.0
St. Andrews	5-10	0.4	0.6	0.6	17.4	33.0
St. Stephen	3-5	0.3	0.3	0.3	8.0	19.0
St. George	5-6	0.4	1.0	0.4	3.0	8.5
Saint John & area	10	0	0.2	0.2	1.4	2.5
Fundy National Park	16	0.1	0.1	0	1.0	1.1

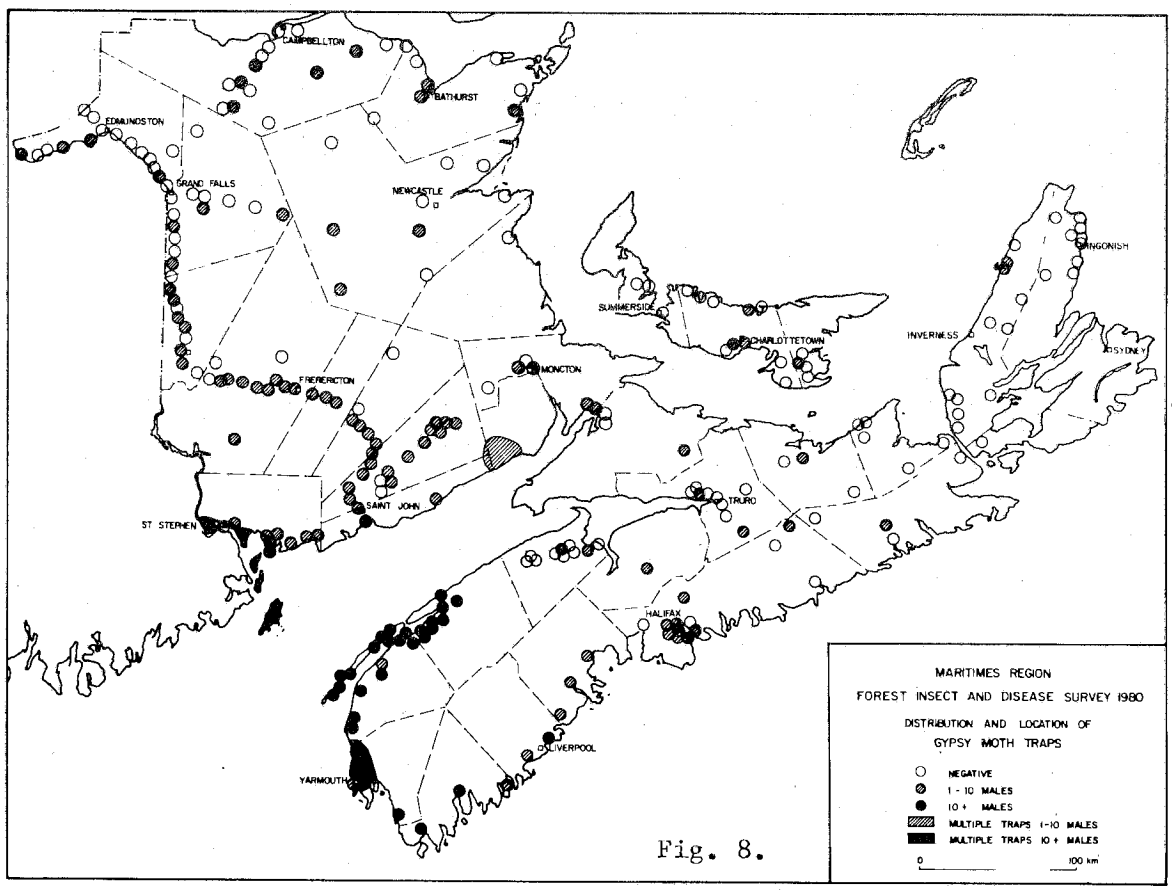

Fig. 8.

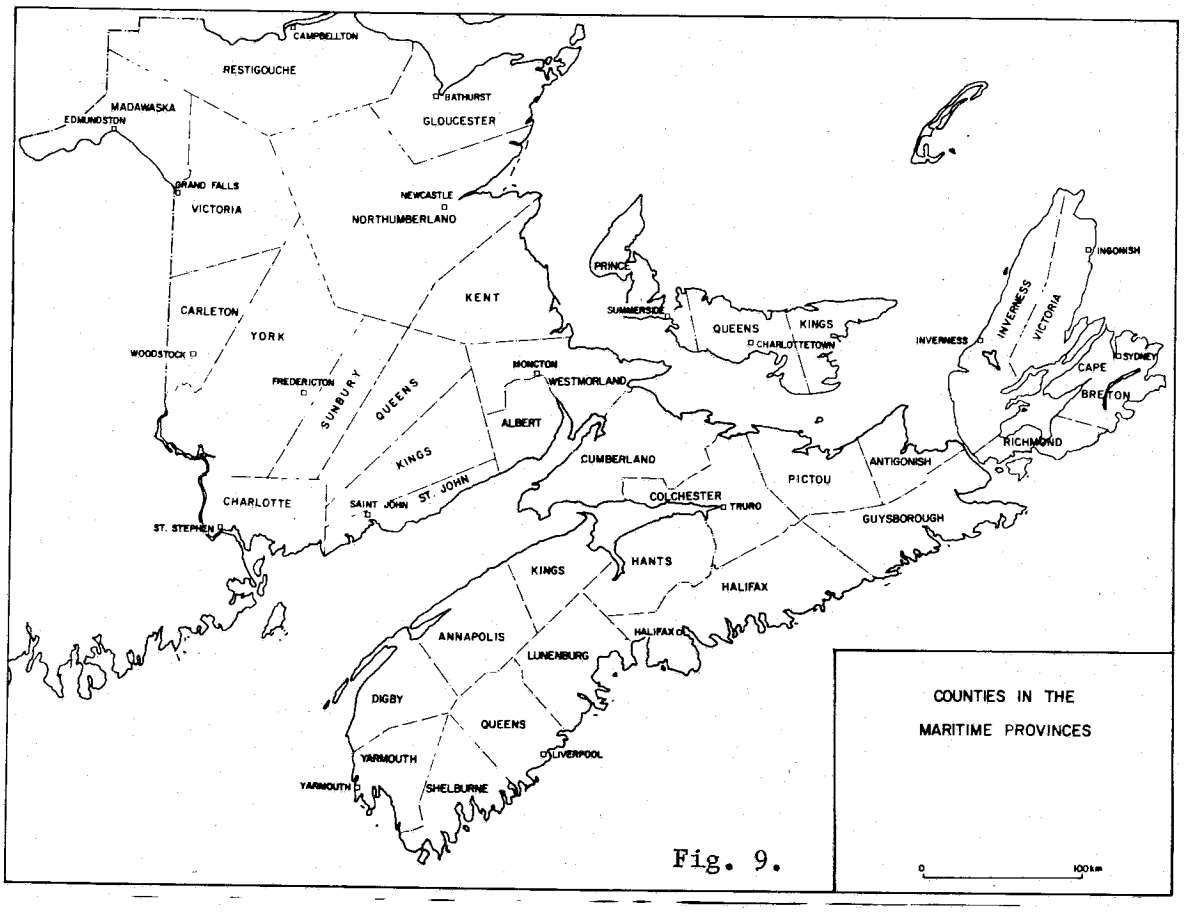
CAMPBELLTON
RESTIGOUCHE
BATHURST
MADAWASKA
EDMUNDSTON
GLOUCESTER
GRAND FALLS
VICTORIA
NEWCASTLE
NORTHUMBERLAND
PRINCE
INGONISH
INVERNESS
VICTORIA
KENT
CARLETON
YORK
SUMMERSIDE
QUEENS
KINGS
CHARLOTTETOWN
WOODSTOCK
MONCTON
SYDNEY
CAPE
BRETON
FREDERICTON
SUNBURY
QUEENS
WESTMORLAND
ALBERT
KINGS
CUMBERLAND
ANTIGONISH
RICHMOND
PICTOU
CHARLOTTE
SAINT JOHN
ST. JOHN
COLCHESTER
TRURO
GUYSBOROUGH
ST. STEPHEN
KINGS
HANTS
HALIFAX
ANNAPOLIS
HALIFAX
LUNENBURG
DIGBY
QUEENS
LIVERPOOL
YARMOUTH
YARMOUTH
SHELBURNE
COUNTIES IN THE
MARITIME PROVINCES
0
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Fig. 9.

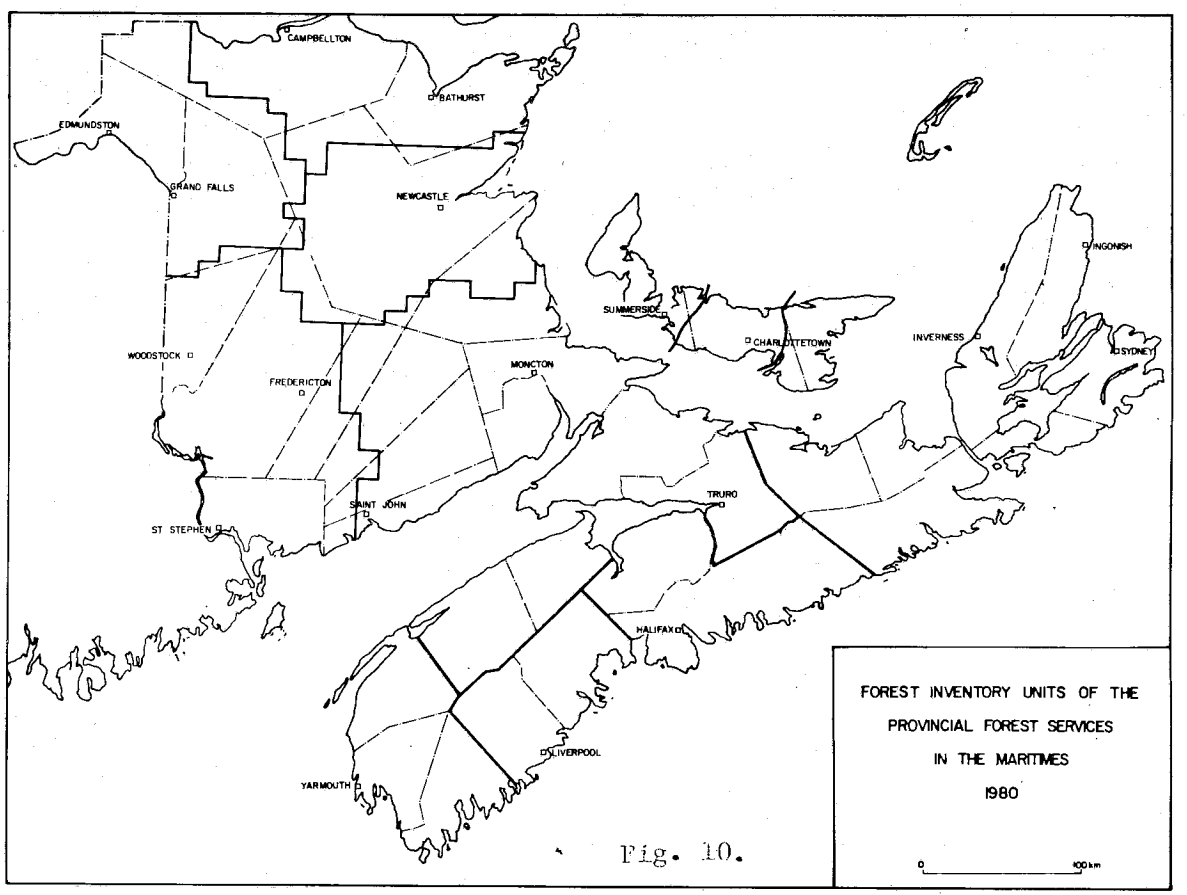
CAMPBELLTON
BATHURST
EDMUNDSTON
GRAND FALLS
NEWCASTLE
INGONISH
SUMMERSIDE
CHARLOTTETOWN
INVERNESS
SYDNEY
WOODSTOCK
MONCTON
FREDERICTON
SAINT JOHN
TRURO
ST STEPHEN
HALIFAX
LIVERPOOL
YARMOUTH
FOREST INVENTORY UNITS OF THE
PROVINCIAL FOREST SERVICES
IN THE MARITIMES
1980
0
100 km

Fig. 10.

LIST OF PUBLICATIONS

Reports and publications by the staff of the Forest Insect and Disease Survey and forest pest related articles by other members of the Maritimes Forest Research Centre produced in 1980:

Kettela, E.G. 1980. A synopsis of results of budworm spraying in New Brunswick in 1980 and a forecast of infestations and hazard for 1981. M.F.R.C. Technical Note No. 18

Kettela, E.G. 1980. Spruce budworm infestations in Nova Scotia in 1980 and a forecast for 1981. M.F.R.C. Technical Note No. 19

MacLean, D.A. 1980. Vulnerability of fir-spruce stands during uncontrolled spruce budworm outbreaks: a review and discussion. For. Chron. 56: 213-221

Magasi, L.P. 1980. Forest pest conditions in the Maritimes in 1979 with an outlook for 1980. M.F.R.C. Inf. Rep. M-X-106

Magasi, L.P. 1980. Highlights of forest pest conditions at the end of May 1980. M.F.R.C. Technical Note No. 10

Magasi, L.P. 1980. Highlights of forest pest conditions at the end of June 1980. M.F.R.C. Technical Note No. 12

Magasi, L.P. 1980. Highlights of forest pest conditions at the end of July 1980. M.F.R.C. Technical Note No. 15

Magasi, L.P. 1980. Highlights of pest conditions in mid-September 1980. M.F.R.C. Technical Note No. 16

Magasi, L.P. 1980. Control of Scleroderris canker in small plantations. M.F.R.C. Technical Note No. 11

Magasi, L.P. 1980. Monitoring fluctuations of insect populations by the Forest Insect and Disease Survey in the Maritimes. Abstract in Proc. Acadian Ent. Soc. Ann. Meeting, Kentville, N.S. Apr. 15-16, 1980

Magasi, L.P., F.A. Titus, and E.G. Kettela. 1980. Parasitism and biological control. In I.W. Varty (Chairman) 1980. Environmental surveillance in New Brunswick 1978-1979. Effects of spray operations for forest protection. Committee for Environmental Monitoring of Forest Insect Control Operations (EMOFICO). Univ. New Brunswick, Fredericton, N.B.

Miller, C.A., D.O. Greenbank, and E.G. Kettela. 1980. Utilization possible de lampes-pièges dans le couvert forestier pour prédire les populations d'oeufs de la Tordeuse des bourgeons de l'Epinette. Serv. Can. For. Rev. bim. rech. 36: 8-9

Ostaff, D.P. 1980. How to recognize impending tree deterioration in budworm-attacked forests. Paper presented at Seminar: Spruce Budworm Attacked Timber, Amherst, N.S. June 26, 1980. Forintek Canada Corp. and Maritime Lumber Bureau

Ostaff, D.P. 1980. Conditions of balsam fir on research plots on Cape Breton Island in the fall of 1980. M.F.R.C. Technical Note No. 17

Ostaff, D.P. and W.R. Newell. Spruce mortality in Nova Scotia caused by the spruce beetle, *Dendroctonus rufipennis* (Kby.) (in preparation)

Renault, T.R. and D.P. Ostaff. 1980. Spruce beetle infestations in the Maritimes M.F.R.C. Technical Note No. 21

OTHER INSECTS AND DISEASES

This table lists, alphabetically by common name, most insects and diseases encountered in the Maritimes in 1980 not discussed in detail. Inclusion in the table does not imply that the organism is necessarily of lesser economic importance than those discussed in the text. It may be that an organism, e.g., whitemarked tussock moth, is at an ebb of its cyclical activity and did not cause enough concern in 1980 to warrant detailed discussion. It may be that although "severe", an organism, e.g., balsam gall midge, was only of localized importance in 1980. The listing thus is a departure from past practice when only organisms of lesser importance were tabulated.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Alder flea beetle *Altica ambiens alni* Harr.	Alder	Maritime Province	In Nova Scotia, populations higher than in previous years. Areas of moderate and severe leaf browning common throughout much of the mainland and at one location in Cape Breton Co. In New Brunswick, browning severe on scattered roadside alders near Milltown and in a 2-ha area at Lower Little Ridge, Charlotte Co. In Prince Edward Island, severe browning confined to small patches in Kings and Queens counties.
Anthracnose of maple *Kabatiella apocrypta* (Ell. & Ev.) Arx	Maple, red sugar	New Brunswick Prince Edward Island	In New Brunswick, both incidence and intensity much lower than in 1979. In northwestern and central New Brunswick where leaf browning was moderate or severe in 1979 only a trace in 1980. In Prince Edward Island, light and moderate leaf browning of sugar maple at Bloomfield and of red maple near Summerside and Mill River, Prince Co.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Ash rust *Puccinia sparganioides* Ell. & Barth.	Ash, red, white	Nova Scotia, Prince Edward Island	Infection light on white ash in areas of Digby, Shelburne, Queens, Pictou, Antigonish, Guysborough (on about 70% of the trees between Boylston and Big Intervale) and Cape Breton counties, N.S., in Prince County P.E.I. and on red ash at Rollo Bay, Kings Co, P.E.I.
Aspen leaf beetle *Chrysomela crotchi* Brown	Aspen, trembling	Nova Scotia	The localized outbreak reported in 1979 at Dunn Lake, Annapolis Co., collapsed; no insects were found in 1980.
Balsam fir aphid *Cinara* sp.	Fir, balsam	New Brunswick	Damage common in a Christmas tree plantation at McGivney, and in an improved stand at Cross Creek, York Co., also present in several areas in Charlotte Co.
Balsam gall midge *Paradiplosis tumifex* Gagné	Fir, balsam	New Brunswick Nova Scotia	Localized severe infestations at Letete, Charlotte Co, and Spruce Lake, St. John Co., N.B., moderate in Kings, Queens, Sunbury, York, Kent, and Gloucester counties N.B. Light infestations also in these and in areas of Westmorland, Albert, and Charlotte counties, N.B., Colchester, Cumberland, Hants, Lunenburg, and Yarmouth counties, N.S. Populations expected to remain low in Nova Scotia and Prince Edward Island, may increase in New Brunswick
Balsam shootboring sawfly *Pleroneura brunniecornis* Roh.	Fir, balsam	New Brunswick	Injury negligible in New Brunswick including the Priceville, Northumberland Co. area where levels were moderate in 1979. In Nova Scotia, only light shoot damage occurred.
Balsam twig aphid *Mindarus abietinus* Koch	Fir, balsam	Maritime Provinces	Populations remained generally low throughout Region, except in two areas of western Restigouche Co. and near Minto, Sunbury Co. No increase expected in 1981.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Birch lace bug *Corythuca pallipes* Parsh.	Birch, white yellow	Nova Scotia	The localized outbreak at Rocky Mountain, Pictou Co., reported in 1979, collapsed and no injury occurred this year.
Birch leafminer *Fenusa pusilla* (Lep.)	Birch, white wire	Maritime Provinces	Foliage browning of wire birch and to a lesser extent white birch generally moderate throughout Nova Scotia and southern New Brunswick. Severe browning in areas of varying sizes in both provinces especially in the northcentral and western parts of Nova Scotia. Discoloration variable at scattered locations in Prince Edward Island. Very little leaf browning observed in northern New Brunswick. Repeated feeding by this insect can cause loss of tree vigor which may result in growth loss and predisposition to secondary organisms.
Birch sawfly *Arge pectoralis* (Leach)	Birch, white	Nova Scotia	The localized severe infestation at MacKenzie Mountain, Inverness Co. reported in 1979, collapsed, and no insect or injury was present in 1980.
Birch skeletonizer *Bucculatrix canadensisella* Chamb.	Birch	Maritime Provinces	Outbreaks of this insect occur periodically and sometimes cover extensive areas. The last outbreaks were reported in 1977. An extensive survey in 1980 indicates that populations of this insect are extremely low throughout.
Bronze birch borer *Agrilus anxius* Gory	Birch, white	Maritime Provinces	This insect attacked and killed weakened trees in many areas. In Prince Edward Island National Park, at Rustico Island, 36% of the trees dead, in Victoria Park, Charlottetown mortality, 16%, and at Dalhousie Junction, Restigouche Co., N.B., 28%. See also: Deterioration of Birch
Bruce spanworm *Operophtera bruceata* (Hulst)	Apple, Maple, sugar, Oak, red	New Brunswick	Moderate defoliation of maple along the Plaster Rock-Renous Highway near the York-Victoria-Northumberland county line. Insect numbers low and defoliation negligible elsewhere in the Province.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Cedar leafminers *Argyresthia aureoargentella* Brower *Argyresthia thuiella* (Pack.) *Pulicalvaria thujaella* (Kft.)	Cedar	Prince Edward Island	Severe leafmining again over about 2000 ha in the Muddy Creek-Sandy Park area and north of Highway No. 2 Prince Co., P.E.I. Tree deterioration continued as evidenced by many dead branches. Browning of ornamental cedars common at Truro, Brookfield, and Elmsvale, Colchester Co., N.S.
Cherry blight	Cherry, pin	Nova Scotia Prince Edward Island	Leaf browning at varying levels of intensity throughout the two provinces at scattered locations.
Cherry casebearer *Coleophora pruniella* Clem.	Aspen	New Brunswick Prince Edward Island	Moderate or severe leaf browning on small groups of trees in Fundy National Park, N.B., at Clermont, Prince Co., and at several locations in Queens County, P.E.I. Elsewhere in Prince Edward Island, the insect was observed throughout, but only at low populations.
Eastern spruce gall adelgid *Adelges abietis* (L.)	Spruce, white	New Brunswick	Numerous galls on 10% of trees in a 2-ha plantation at Little Ridge, Charlotte Co., common on scattered trees in areas of Charlotte, York, Kings, Westmorland, Albert, and Restigouche counties.
Eastern tent caterpillar *Malacosoma americanum* (F.)	Apple, Cherry, pin Miscellaneous hardwood bushes	Maritime Provinces	Defoliation widespread and often severe in southern New Brunswick and in parts of Kings, Hants, and Inverness counties, Nova Scotia. In New Brunswick this insect (which forms nests) occurred frequently with the forest tent caterpillar (which does not) thereby confusing many residents as to the species involved. High egg-mass counts in southwestern Charlotte Co. N.B. indicate further defoliation in 1981.
Elm leafminer *Fenusa ulmi* Sund.	Elm, English	Maritime Provinces	Foliage browning severe and widespread at Amherst, Earltown, Halifax, Liverpool, Parrsboro, Pictou, River John, Truro, and Windsor, N.S., Charlottetown,

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
			Montague, Murray River, Richmond, and Summerside, P.E.I. and at Dorchester, N.B.; moderate at Kentville, Wolfville (decreased from last year in these communities), Annapolis Royal, Bedford, Bridgetown, Eureka, Lower Economy and Stellarton, N.S., Baie Verte and Sackville, N.B. Trees at Dorchester are deteriorating from years of repeated attacks.
European pine sawfly *Neodiprion sertifer* (Geoff.)	Pine, Austrian, Scots, red	Nova Scotia	First confirmed record from Region, from ornamental trees at Little Harbour, Pictou Co., and Truro, Colchester Co.
European pine shoot moth *Rhyacionia buoliana* (Schiff.)	Pine, red Scots	Nova Scotia Prince Edward Island	Because of exceptionally good growth of new shoots, damage in plantations "appeared" reduced from previous levels. However, insect numbers remained high, infestations continued in 1980 and the insect remains a serious pest.
Fall cankerworm *Alsophila pometaria* (Harr.)	Apple, Elm, Oak	Nova Scotia New Brunswick	Light to moderate defoliation of apple at Northeast Margaree, Inverness Co., N.S., of elm and oak at Fredericton, N.B. and in association with winter moth and bruce spanworm of apple at West Paradise and at Middleton, Annapolis Co., N.S. Few trees involved in all cases.
Globose gall rust *Endocronartium harknessii* (J.P. Moore) Y. Hiratsuka	Pine, jack, Scots	New Brunswick	75% of the lower branches infected in a small Scots pine plantation at Rexton, Kent Co. Galls numerous on branches of a few jack pine at Berrytown, Albert Co. and Tracadie, Gloucester Co. A few small trees and numerous small branches on other jack pine killed at Kouchibouguac National Park.
Greenstriped mapleworm *Dryocampa rubicunda rubicunda* (Fabr.) and	Beech, Birch, white,	Maritime Provinces	The area of infestation by the two insects much reduced in New Brunswick from 1979 levels. Moderate or severe defoliation near Magaguadavic Lake,

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Pinkstriped oakworm *Anisota virginiensis virginiensis* (Dru.)	Maple, red		McDougall Lake, Queens Lake and Caribou Lake in southwestern New Brunswick on a total of 1500 ha. At Caribou Lake, where defoliation occurred for the fourth consecutive year, tree mortality and crown dieback common on red maple. Greenstriped mapleworm alone caused moderate defoliation of red maple at Malakoff, Westmorland Co., N.B., and severe defoliation of individual trees in the Chignecto Game Sanctuary, Cumberland Co., N.S. The outbreak collapsed in Prince County, P.E.I.
Hemlock looper *Lambdina fiscellaria fiscellaria* (Guen.)	Conifers	Maritime Provinces	Populations remained very low throughout the Region.
Ink spot of aspen *Ciborinia whetzelii* (Seaver) Seaver	Aspen trembling	Prince Edward Island New Brunswick	Severe discoloration on a few trees in Prince Edward Island. The disease present throughout central and northern New Brunswick but few leaves affected.
June beetles *Phyllophaga* spp.	Fir, balsam	New Brunswick	White grubs caused damage to newly planted Christmas trees at Oromocto Lake, York Co., in the Woodstock area of Carelton Co., and several areas of Charlotte County.
Juniper webworm *Dichomeris marginella* (Fabr.)	Juniper	New Brunswick	Foliage browning of various intensity restricted to Grand Manan Island and coastal parts of Charlotte County.
Larch canker *Dasyscypha* sp.	Tamarack	Southeastern New Brunswick	Unidentified species of *Dasyscypha* caused branch cankers on a few trees at 10 locations in York, Sunbury, Queens, Kings, St. John, Westmorland, and Kent counties. Foliage above the swollen canker turned yellow prematurely but whether branch mortality will result is not yet known. However, a sample, similar in appearance, from western Nova

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
			Scotia on dead branches indicates that possibility. Cankers averaged about one per tree. This is the first time this condition has been found in the Region
Larch casebearer *Coleophora laricella* (Hbn.)	Larch	Maritime Provinces	Severe or moderate needle browning in parts of York, Sunbury, Queens, Westmorland, and Northumberland counties, New Brunswick, Yarmouth, Digby, Annapolis, Colchester, Halifax and Inverness counties, Nova Scotia. Populations increasing and light browning resulted from feeding in many stands in eastern and southern New Brunswick, western Nova Scotia and in all three counties in Prince Edward Island.
Larch sawfly *Pristiphora erichsonii* (Htg.)	Tamarack	Maritime Provinces	Populations declined to the lowest levels since 1955. Only a trace of defoliation in a few areas in southwestern Nova Scotia.
Late frost	Coniferous Deciduous	Maritime Provinces	Late frost killed new shoots in widely separated areas in the Region. The most significant damage occurred in a 5-ha balsam fir Christmas tree demonstration area at Ville St-Laurent, Gloucester Co, N.B. Both hardwood and softwood species affected in parts of Nova Scotia. Frost damage minimal on Prince Edward Island.
Leaf and twig blight of aspen *Venturia macularis* (Fr.) E. Muell. & Arx	Aspen, trembling	Maritime Provinces	The intensity of the disease much reduced from 1979 levels. Moderate foliage discoloration found only on a few trees in Mt. Carleton Provincial Park, Restigouche Co., and in a few places in Victoria County in New Brunswick.
Leaf blotch of horse-chestnut *Guignardia aesculi* (Peck.) V.B. Stew.	Horsechest-nut	Maritime Provinces	Severe foliage discoloration on Grand Manan Island, N.B., and leaf drop up to 50% in Digby and Yarmouth counties, N.S. Elsewhere the disease widespread but caused only light or moderate browning throughout much of the range of its host.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Leaf spot on maple *Phyllosticta minima* (Berk. & Curt.) Underw. & Earle	Maple, sugar	New Brunswick	Moderate and severe discoloration restricted to the vicinity of Lawrence Station, Charlotte Co. The severe infections in Queens, York, and Gloucester counties reported in 1979 did not reappear this year.
Mountain-ash sawfly *Pristiphora geniculata* (Htg.)	Mountain-ash	Maritime Provinces	Defoliation severe on scattered trees in parts of York, Kent, Albert, and Westmorland counties New Brunswick; variable in many areas of Nova Scotia and throughout Prince Edward Island.
Needle rust *Coleosporium asterum* (Diet.) Syd.	Pine, jack	New Brunswick	Infection ranged from very light to severe (37% moderate to severe) on 95% of trees in a 8 ha, 4-year-old plantation at Canaan, Queens Co. golden rod, the alternate host present in the area.
Needle rusts *Pucciniastrum epilobii* Otth or *P. goeppertianum* (Kuehn) Kleb.	Fir, balsam	Maritime Provinces	Infection light in many areas of the Region except in Cumberland and Guysborough counties, N.S. where a few Christmas tree plantations suffered moderate needle loss. In Fundy National Park, N.B. the rust was widespread, and, in places, moderate along hiking trails on young regeneration.
Oak leaftier *Psilocorsis quercicella* Clem.	Oak, red	New Brunswick	Present in a 50-ha stand at Hansen Cove and on numerous trees at Oak Bay in Charlotte County but defoliation not significant.
Orange spruce needleminer *Pulicalvaria picealla* (Kft.)	Spruce, red white	Nova Scotia Prince Edward Island	Needle mining common in isolated locations in Shelburne, Annapolis, and Cape Breton counties N.S.; about 5% of one-year-old needles mined at Fredericton and Oyster Bed Bridge, Queens Co. P.E.I.
Pine bark adelgid *Pineus strobi* (Htg.)	Pine, eastern white	Maritime Provinces	A survey of 40 locations in the Region revealed the presence of the insect in all but 3 areas which were in Madawaska, Victoria and Restigouche counties in New Berunswick. Insect populations low in all areas and trees showed no evidence of reduced vigor.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Pine tortoise scale *Toumeyella parvicornis* (Ckll.)	Pine, jack, red	New Brunswick	The infestation in the provenance plantations at Despres Lake, Northumberland Co. continued. In a jack pine plantation 5% of the trees are dead, 84% infested, 71% of these have at least 70% of the crown affected.
Poplar-and-Willow borer *Cryptorhynchus lapathi* (L.)	Willow	New Brunswick Prince Edward Island	Roadside willows in Charlotte Co., N.B. and both roadside and ornamental willows in Prince Co., P.E.I. suffered attack resulting in mortality.
Red pine sawfly *Neodiprion nanulus nanulus* Schedl	Pine, red, white	Nova Scotia Prince Edward Island	Defoliation severe on red and light on white pine understory over about 4 ha at Mt. William, Pictou Co., N.S. Few other localized outbreaks in both Nova Scotia and Prince Edward Island.
Roadside salt damage	Coniferous	Maritime Provinces	Reddening of needles of conifers in areas where susceptible hosts, mostly red pine and white pine trees, are close to roads where salting is carried out during winter months.
Root collar weevils *Hylobius* sp.	Pine, eastern white jack, red, Scots, Spruce, Colorado blue	Maritime Provinces	In New Brunswick damage, and in one case some mortality, occurred in some jack pine plantations in St. John, Albert, and Sunbury counties; in Nova Scotia a few Scots pine trees died in Inverness County, and a few white pine in Annapolis County. At Brookvale, Queens Co., P.E.I. more than half of the trees in a small (less than 1 ha) red pine plantation infested and many of the trees were in very poor condition. Colorado spruce infested at Port Hill, Prince Co., P.E.I.
Satin moth *Leucoma salicis* (L.)	Willow Poplar, silver	Maritime Provinces	Defoliation of mostly ornamental silver poplar trees to various degrees throughout much of the Region. The outbreak in Kent County, N.B., on trembling aspen in natural stands, reported in 1979, did not continue. Late summer leaf skeletonizing indicates further defoliation in numerous areas in 1981.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Scleroderris canker *Gremmeniella abietina* (Lagerb.) Morelet	Pine	Maritime Provinces	Symptom expression by the disease the poorest since 1971 when it was first found in the Region. Although the fungus was present in areas where it was known to occur before, new infections were rare. Weather conditions during the summer of 1979 were likely unfavorable for infection. A resurgence of the disease in New Brunswick in 1981 is a distinct possibility.
Shoestring root rot *Armillaria mellea* (Vahl ex Fr.) Kummer	Fir, balsam Pine, jack Tamarack	Maritime Provinces	The disease was associated with mortality in numerous situations where preconditioning factors weakened trees (spruce budworm defoliation of fir, faulty planting, etc). The most noteworthy observation in 1980 was the involvement of the fungus in spruce budworm weakened stands in central New Brunswick.
Shoot blight *Sirococcus strobilinus* Preuss	Pine, red	Nova Scotia	The incidence of the disease greatly reduced from previous years. It was observed at only two locations and caused shoot mortality only at Glenmore, Halifax Co.
Spring cankerworm *Paleacrita vernata* (Peck)	Elm	Nova Scotia	The outbreak in Hants County, reported in 1979, collapsed. Defoliation only on a few trees near Middleton, Annapolis Co.
Spruce bud midge *Rhabdophaga swainei* Felt	Spruce, black, white	Maritime Provinces	Populations generally low in the Region except in isolated areas of Victoria, Charlotte, Queens, and Gloucester counties. At Veneer Siding, Victoria Co., N.B., 691 buds/100m^2 killed in a black spruce plantation.
Spruce coneworm *Dioryctria reniculell-oides* Mut. & Mun.	Fir, balsam, Spruce, black, red.	Maritime Provinces	Population levels low throughout the region, although the insect present throughout.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Spruce gall midge *Mayetiola piceae* (Felt)	Spruce, white	New Brunswick	Isolated small infestations caused twig mortality in a few areas in southern New Brunswick.
Summer storm	Coniferous Deciduous	Prince Edward Island Nova Scotia	High winds on August 16 carrying ocean salt caused severe browning of all vegetation along the northern coast of the Province, most noticeable in the Stanhope Beach area of the Prince Edward Island National Park, St. Eleanor's and Belmont, Prince Co. The same storm affected, to a lesser degree, coastal areas of Pictou, Inverness, and Victoria counties in Nova Scotia. Birch foliage discolored on the Cape Breton Highlands, birch and poplar in Halifax county.
Swaine jack pine sawfly *Neodiprion swainei* Midd.	Pine, jack	Nova Scotia	The outbreak in the Chignecto Game Sanctuary, Cumberland Co. collapsed, probably as the result of spraying in 1979.
Whitemarked tussock moth *Orgyia leucostigma* (J.E. Smith)	Coniferous Deciduous	Maritime Provinces	The populations of this economically important forest insect remained extremely low throughout the Region.
White pine weevil *Pissodes strobi* (Peck)	Spruce, Norway, red white, Pine, eastern white, jack, red, Scots	Maritime Provinces	In Nova Scotia, 51.4% of 325 trees at 12 of 12 locations, New Brunswick, 41.0% of 325 trees at 11 of 12 locations and Prince Edward Island, 3.5% of 85 trees at 3 of 3 locations damaged by the insect. In New Brunswick up to 56% of white spruce, and up to 24% of red spruce also damaged. Other hosts were attacked in numerous locations.
Willow blight *Venturia saliciperda* Nuesch	Willow	Maritime Provinces	Severe or moderate foliage browning over much of mainland Nova Scotia, Prince County, P.E.I. and St. John, Kent, and Victoria counties in New Brunswick. Disease intensity somewhat reduced in New Brunswick from 1979 levels.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Willow flea weevil *Rhynchaenus rufipe* (Lec.)	Poplar, hybrid, silver, Willow	Maritime Provinces	Severe browning at many locations in Victoria, Carleton, York, Charlotte, Sunbury, St. John, and Westmorland counties in New Brunswick, Annapolis, Hants, Halifax, Colchester, Pictou, Antigonish, and Guysborough counties in Nova Scotia and throughout Prince Edward Island. Lesser browning common in these and other counties.
Winter drying	Coniferous	Maritime Provinces	At many locations throughout the Region with varying degrees of reddening.
Winter moth *Operophtera brumata* (L.) and Bruce spanworm *Operophtera bruceata* (Hulst)	Apple, Oak, red	Nova Scotia Prince Edward Island	In Nova Scotia, mixed populations caused moderate defoliation at Mochelle, Annapolis Co., and light to moderate defoliation in other parts of the county. The severe defoliation of 1979 at Abercrombie, Pictou Co., declined to light in 1980. Defoliation of apple in areas of Pictou and Antigonish counties was moderate, a reduction from severe in 1979. Limited infestations also in Hants, Yarmouth, and Lunenburg Co. Apple moderately defoliated in Queens County, P.E.I. See Fall Cankerworm.
Winter storm	Aspen, trembling, Fir, balsam, Spruce, black	Prince Edward Island	Freezing rain, snow, and wind on November 18, 1980 broke stems and, branches and pushed trees over to 30-45° angle in pockets in southeast Queens and Kings counties.

INSECT OR DISEASE	HOST(S)	LOCALITY	REMARKS
Yellowheaded spruce Sawfly *Pikonema alaskensis* (Roh.)	Spruce black, blue, red, white, Colorado blue	Maritime Provinces	Defoliation found in more areas in Nova Scotia in 1980 than in 1979. Severe or moderate defoliation on single or small groups of trees at about 16 locations in the eastern half of the mainland and the insect present elsewhere in other locations. More trees died at Wentworth Centre, Cumberland Co., N.S. In New Brunswick, the population lower at Upham, Kings Co., than in 1979 and defoliation light in the 110 ha area of black spruce. Defoliation in Charlotte County on white spruce, and the insect found in other areas. In Prince Edward Island, the insect observed in two areas of Prince County but defoliation negligible.