



Forest pest conditions in the Maritimes in 1992

Laszlo P. Magasi

Maritimes Region • Information Report M-X-183E



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Canada

Forêts
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Canada

The cover photograph shows damage caused by the balsam twig aphid.

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- Monitors disease and insect pests in Canada's forests.
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- il encourage les Canadiens à prendre conscience de tous les aspects du secteur forestier.

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FOREST PEST CONDITIONS IN THE MARITIMES IN 1992

Laszlo P. Magasi
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ABSTRACT

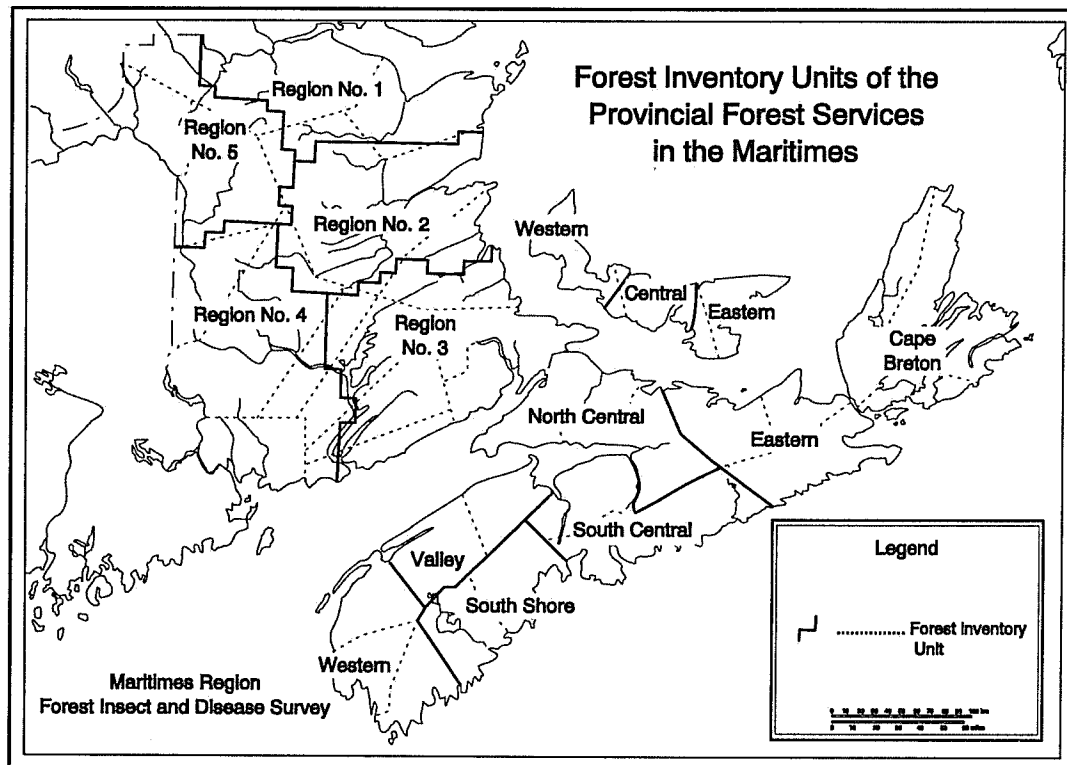
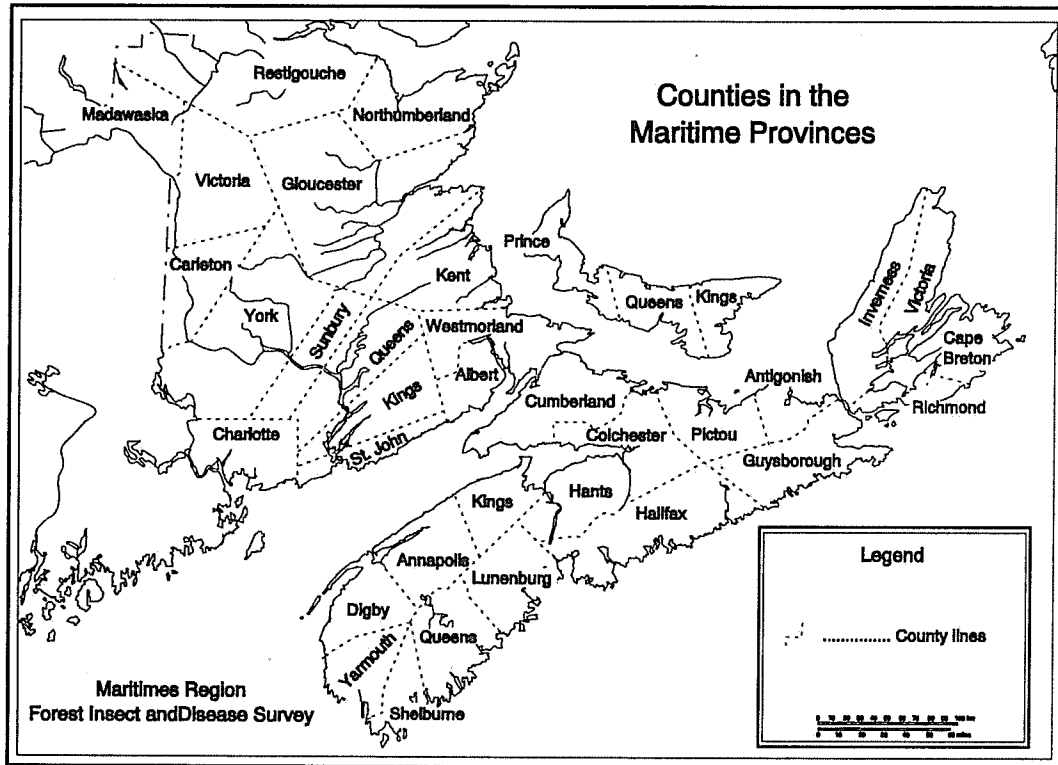
This report reviews the status of forest insects and diseases in the Maritimes region in 1992 and forecasts conditions for 1993, when appropriate. Pests and problems of conifers, hardwoods, and high value areas (*e.g.*, nurseries, seed orchards, plantations, and Christmas tree areas) are described as observed in 1992. Control operations against spruce budworm and *Sirococcus* shoot blight are summarized. A chapter on forest health monitoring brings together the various aspects of work dealing with changes in forest conditions, some of which are still unexplained. Forest insect monitoring systems, such as pheromones and light traps, both important tools in predicting population changes, are briefly described. A list of reports and publications relating to forest pest conditions is included. More detailed information is available from Forestry Canada - Maritimes Region.

RÉSUMÉ

Le présent rapport fait le bilan des insectes et des maladies des arbres de la région des Maritimes en 1992, et donne, au besoin, un aperçu des conditions prévues pour 1993. Les ravageurs et les problèmes des conifères, des feuillus et des zones importantes comme les pépinières, les vergers à graines, les plantations et les peuplements d'arbres de Noël sont décrits tels qu'ils ont été observés en 1992. Les opérations de lutte contre la tordeuse des bourgeons de l'épinette et la brûlure des pousses attribuable au *Sirococcus* sont résumées. Un chapitre portant sur la surveillance de la santé des forêts examine les divers aspects des travaux se rapportant aux changements dans les conditions forestières, dont quelques-uns sont encore inexpliqués. Les systèmes de surveillance des insectes forestiers ainsi que les pièges à phéromones et lumineux, deux importants moyens de prédire les changements dans les populations, sont brièvement décrits. Une liste de rapports et de publications portant sur les ravageurs forestiers est incluse. De plus amples renseignements sont disponibles auprès de Forêts Canada - région des Maritimes.

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INTRODUCTION

Forestry Canada - Maritimes Region's Strategic Plan for 1990-1995 states that:

"Forestry Canada - Maritimes will, through its Forest Insect and Disease Survey, capture the condition, health, and changes in the forest conditions and report these to our clients both at the regional and national levels."

This statement is an affirmation of the mandate on which the operation of the Forest Insect and Disease Survey has been based since the establishment of the unit in 1936. In the Maritimes, information on forest pest conditions and the effect of these on the forest is disseminated by means of periodic reports, such as the Seasonal Highlights, Technical Notes, Information Reports, and the Annual Report of the Forest Insect and Disease Survey.

In this report, pests and problems of conifers, hardwoods, and high value areas (e.g., nurseries, seed orchards, plantations, and Christmas tree stands) are described as they were observed in 1992. Control operations against spruce budworm and Sirococcus shoot blight are summarized. A chapter on forest health monitoring brings together the various aspects of work dealing with changes in forest conditions, some of which are still unexplained. Forest insect monitoring systems (e.g., pheromones and light traps, both important tools in predicting population changes) are briefly described. A list of reports and publications relating to forest pest conditions is included.

This report aims to provide forest managers with information about pest conditions in the Maritime provinces early enough that these can be considered in management decisions before the start of the 1993 field season. Insects and diseases that were widespread and caused considerable concern in 1992 are discussed in detail, others are presented in tabular form. More information on these and on other specific conditions will be provided by Forestry Canada - Maritimes Region upon request.

Two maps are included on the page facing the introduction to help the reader locate areas mentioned. One shows the counties of the three provinces and the other indicates the provincial forest services' forest inventory subdivisions.

An effort has been made to collect and report information in quantitative terms 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 should be interpreted as follows:

Trace	up to 5%
Light	6 - 29%
Moderate	30 - 69%
Severe	70 - 100%

Much of the information contained in this report has been collected by personnel of the Forest Insect and Disease Survey. However, the level of cooperation with clients has increased significantly in recent years and more and more of the work is now being done on a cooperative basis. While the contribution of our clients is acknowledged, the Forest Insect and Disease Survey remains responsible for the contents of this report.

The cover of this report depicts damage by the balsam twig aphid, an insect that caused considerable damage in balsam fir Christmas tree plantations, especially in Nova Scotia, in 1992.

PESTS OF CONIFERS

Spruce Budworm

Information about spruce budworm, *Choristoneura fumiferana* (Clem.), is summarized from various sources: New Brunswick Department of Natural Resources and Energy, Forest Protection Limited, J.D. Irving, Limited, Nova Scotia Department of Natural Resources, and Forestry Canada - Maritimes Region. Both published and unpublished data were used with permission and the cooperation of all organizations is acknowledged. More detailed information is available from the various agencies.

Spruce budworm populations have shown a marked downward trend in eastern North America during the last few years and, although the insect is still one of the major defoliators in the fir-spruce forest, the area of defoliation is generally declining. However, there was a drastic increase in defoliation in Prince Edward Island in 1992.

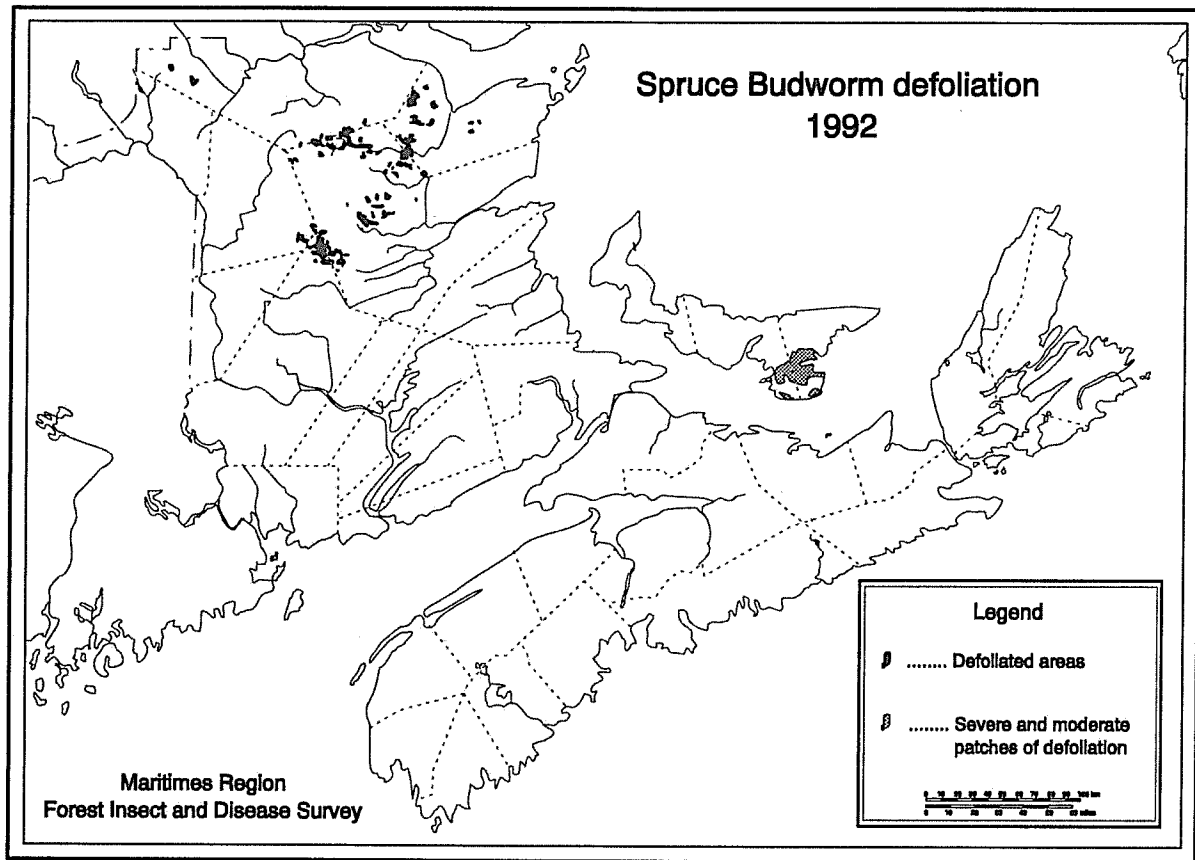


Figure 1 Source: Aerial Surveys by NBDNRE, NSDNR, and FC-MR (FIDS)

New Brunswick

Defoliation of balsam fir and spruce was recorded for 84,300 ha in the province in 1992 (Fig. 1). Because adverse, rainy, and windy, weather conditions removed much of the discolored foliage, aerial surveys were augmented by ground observations. It was impossible to distinguish the various levels of defoliation but it is assumed that most, if not all, of the area mapped was in the severe or moderate categories. Defoliation was recorded mainly in Gloucester, Northumberland, Restigouche, and northern York counties. Even though observations were difficult, it can be stated that spruce budworm defoliation was significantly reduced from 1991 when 266,000 ha of severe and moderate defoliation was mapped.

Control operations - Foliage protection against spruce budworm in New Brunswick was conducted over 269,775 ha in 1992: 236,675 ha by Forest Protection Ltd. and 33,100 ha by Forest Patrol Ltd., a subsidiary company of J.D. Irving, Ltd.

Forest Protection Ltd. treated 62% of their area with fenitrothion, and 34% with *Bacillus thuringiensis* (*B.t.*). Most of these areas were treated twice. The remaining 4% received an application of fenitrothion followed by an application of *B.t.*

Forest Patrol Ltd. treated 94% of their area with fenitrothion and 6% *B.t.*; 89% of the area was treated twice.

The rate of application for fenitrothion (Sumithion®) was either 210 g/ha or 140 g/ha per application. *B.t.* was applied either at 15 BIU/ha or at 30 BIU/ha per application. *B.t.* products used in 1992 were Futura XLV-HP®, Foray 76B®, and Foray 48B®.

Forecast - Based on overwintering larval (L2) surveys conducted by the New Brunswick Department of Natural Resources and Energy (NBDNRE), the prediction for 1993 is a total of 175,000 ha of variable, low-to-moderate, and

moderate infestation, a significant (72%) reduction from the previous year. In spite of lower populations, 75% of the infestation is still in the "need to protect" category.

Nova Scotia

Defoliation - For the sixth consecutive year, no defoliation of balsam fir or spruce was observed during the annual spruce budworm aerial survey in Nova Scotia in 1992. Larvae were hard to find during ground sampling and their presence was recorded only at ten locations across the province; only a few moths were captured in either the FIDS light traps or the nine FIDS pheromone traps. Catches were highest at the two pheromone trap locations in Inverness County on Cape Breton Island.

Control - No control measures on an operational scale were carried out against the spruce budworm in Nova Scotia in 1992.

Forecast - The overwintering larval (L₂) survey, conducted by the Nova Scotia Department of Natural Resources (NSDNR), indicate that spruce budworm populations will remain low in 1993. Overwintering population levels were negligible or low at 95% of the locations sampled and moderate at 5%. The moderate populations were found in two areas of Inverness County and in an area along the Northumberland Strait in Cumberland County. No high or extreme populations were found anywhere in the province.

Prince Edward Island

Defoliation - mostly of white spruce and to a lesser extent balsam fir, occurred over 35,000 ha in 1992. Of this, about 32,000 ha were in the severe or moderate categories, a considerable increase from the 130 ha reported in 1991. Defoliation was very patchy and ranged from trace to severe with the majority in the moderate defoliation category. This is a reversal of the situation found in 1991 when most of the defoliation was light. As in 1990 and 1991, defoliation occurred mainly in southern Kings and southeastern Queens counties. Elsewhere, defoliation was usually only trace or light but was more common and widespread than in 1991. A combination of aerial and ground surveys were used to determine the areas and levels of defoliation.

Light trap catches, which have been steadily increasing in the eastern part of the province during the last few years, decreased for the first time since 1988. At Kilmuir, Kings Co., 23,100 spruce budworm moths were caught in 1992 compared with 34,400 moths captured in 1991.

Control - No control measures on an operational scale were carried out against the spruce budworm in Prince Edward Island in 1992.

Forecast - The survey of overwintering larvae (L₂) was conducted by Forestry Canada - Maritimes Region (FC-MR) at 43 locations. Populations were extreme at 2%, high at 7%, moderate at 7%, low at 52%, and nil at 32% of the locations sampled. All the extreme, high, and moderate locations were in Kings and southern Queens counties. In 1993, significant defoliation is likely to occur in the southeastern part of the province and patchy defoliation can be expected in the rest of Prince Edward Island.

Hemlock Looper

Hemlock looper, *Lambdina fiscellaria fiscellaria* (Gn.), caused severe defoliation for the fourth and second consecutive years in New Brunswick and Nova Scotia, respectively.

In New Brunswick, 1,478 ha of severe defoliation of balsam fir occurred in three distinct areas in the western half of the province (Fig. 2) as determined during aerial surveys conducted by NBDNRE. This is a reduction from the 3,600 ha severe defoliation observed in 1991. Defoliation was often patchy with small groups of trees affected. Severely defoliated areas were (1991 figures in brackets):

Northwest (Restigouche Co.)		
Miller Lake	296 ha	(150 ha)
Central-North (Northumberland Co.)		
Christmas Mountain area	-	(1900 ha)
Mt. Carleton	32 ha	(200 ha)
Big South area	968 ha	(830 ha)
Cow Mountain	5 ha	(-)
South (Charlotte Co.)		
Mainland	-	(160 ha)
Deer Island	53 ha	(340 ha)
Other islands	124 ha	(25 ha)

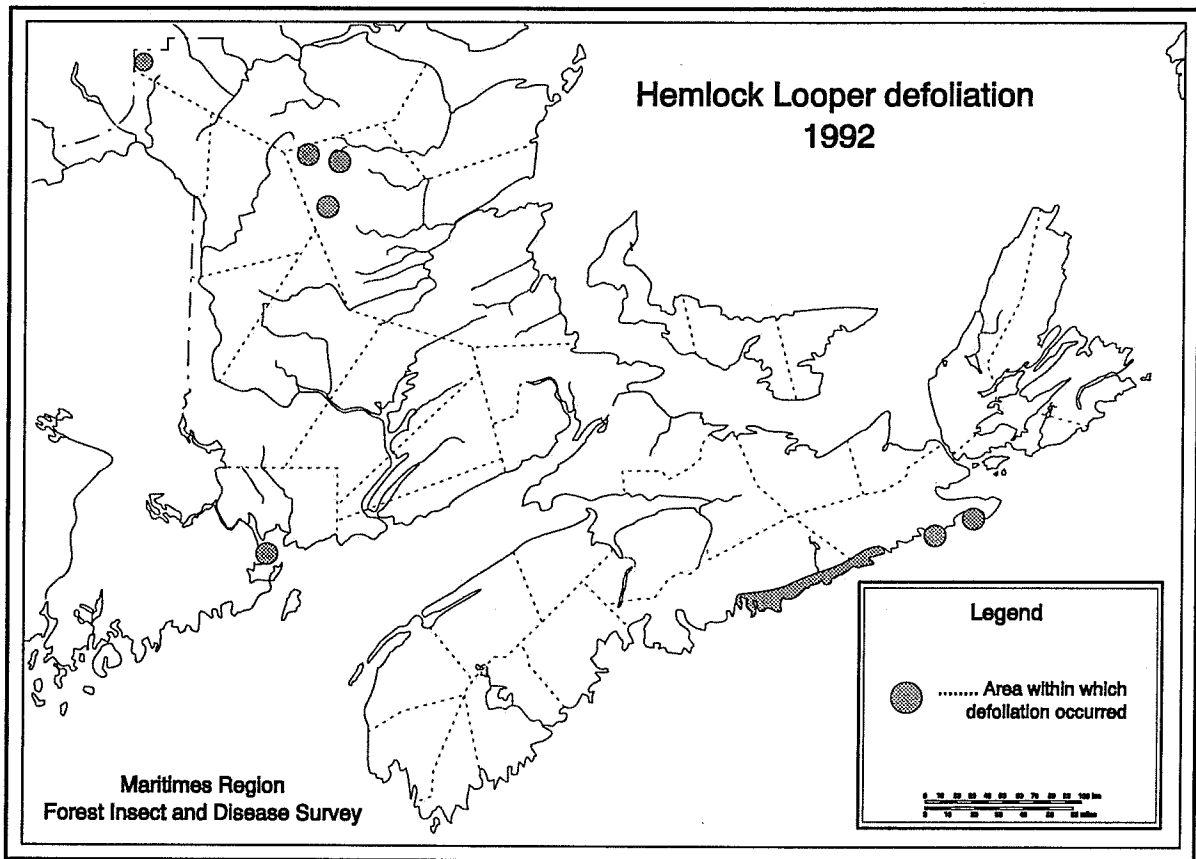


Figure 2 Source: Aerial surveys by NBDNRE, NSDNR, and FC-MR (FIDS)

In Charlotte County, where there was a reduction in both the area of defoliation and the intensity of the outbreak, both balsam fir and hardwood trees were defoliated. Disease (virus, fungus, bacterium) was present in the population. In a light trap at Mayfield, there was a more than tenfold reduction in the number of adults captured and, even though it was still the highest catch in the region, only 524 moths were caught.

Control operations were not conducted against the hemlock looper in 1992 in New Brunswick.

Based on egg sampling conducted in the late fall by NBDNRE at 421 locations, moderate or severe defoliation can be expected in 1993 in the areas "near Miller Lake in the north-west, south of Popple Depot in north-central New Brunswick, and in Mt. Carleton Provincial Park." The total area of expected defoliation forecast by NBDNRE for 1993 is in excess of 11,000 ha.

In Nova Scotia, defoliation, mainly of balsam fir, occurred for the second consecutive year along

the south-central coast of the province including many small islands and peninsulas from Terminal Beach, Halifax Co. to north of Sheep Island, Guysborough Co. (Fig. 2). There was also some defoliation in two small areas as far as 70 km east of the main infestation.

An aerial survey, conducted jointly with the NSDNR, showed defoliation over 3,618 ha. Although the total area of defoliation did not increase appreciably from the 3,500 ha affected in 1991, there was a significant change in the intensity of the outbreak. In 1992, defoliation was severe on 1,684 ha, moderate on 1,612 ha, and light or trace on 322 ha. Over 47% of the total defoliation was classified as severe, compared with less than 3% in this category during the previous year.

Assessments in the early summer of 1992, on permanent plots in Halifax County, to determine tree mortality as a result of hemlock looper defoliation, showed that approximately 10,000m³ of balsam fir was killed in the 100-ha area that was severely defoliated in 1991. While there was no

recent tree mortality in areas of moderate defoliation, almost half of the standing balsam fir (49% by volume) was dead - before the 1992 defoliation occurred.

Elsewhere in the province, larvae were found on a wide variety of coniferous and deciduous hosts, but usually only a few larvae were present outside the outbreak area. Fall egg surveys, conducted by NSDNR, indicate very low hemlock looper populations, even in the outbreak areas, for 1993. This should result in reduced defoliation.

In Prince Edward Island, no defoliation was observed and larval populations were very low, similar to the situation reported in 1991. The highest larval count was seven in a beating sample at Rustico Island, Queens County.

Spruce Beetle

Spruce beetle, *Dendroctonus rufipennis* Kby., activity increased in Nova Scotia, decreased in Prince Edward Island, and remained low in New Brunswick in 1992.

In New Brunswick, infestations have subsided. Newly attacked white spruce trees were observed at only one location, in Northumberland County, where 4% of the trees were dead. This is in sharp contrast to the situation in earlier years, when, especially in 1989, many trees were dying as a result of new beetle attacks over widespread areas in northern New Brunswick.

In Nova Scotia, white spruce and red spruce trees are dead and dying in many small pockets, ranging from a few trees to several hectares in size, in all counties, except Richmond and Cape Breton. Infestations are more widespread than in 1991 and the numbers of both newly attacked and recently killed trees have increased. Infestations, similar to that reported in 1991, were especially noticeable in northeastern Pictou and northern Antigonish counties. Aerial surveys, conducted by NSDNR with FIDS participation, in the Cape George area identified numerous sizeable patches with over 60% tree mortality, mostly along the Northumberland Strait coastline from Eigg Mountain, Pictou Co. to Cape George Point, Antigonish Co.

In Prince Edward Island, mortality continued in small scattered patches of mature and overmature white spruce throughout the province but newly infested, dying trees were less common than in the

last 2 years. At Rustico Island, Queens Co., 8% of the white spruce trees were successfully attacked this year compared to 4% in 1991 and 12% in 1990. Spruce beetle appears to be most active, and populations may increase further, in southern Kings and southeastern Queens counties where trees are under stress from spruce budworm defoliation.

Eastern Larch Beetle

Although eastern larch beetle, *Dendroctonus simplex* LeC., populations have been declining since the mid-1980s, the insect continued to attack and kill mature and semi-mature larch trees in all three provinces.

In New Brunswick, the insect remained active and was most common in the southern and central part of the province. Tree mortality in Madawaska, Northumberland, Kent, Westmorland, Kings, Queens, Sunbury, and Charlotte counties ranged from 4% to 32%, the highest at Bonny River, Charlotte Co.

In Nova Scotia, newly killed trees were found only at Wallace Bridge, Cumberland Co., in 1992.

In Prince Edward Island, eastern larch beetle killed a few trees. As in 1991, all new larch mortality associated with beetle attack was found in Prince County. Mortality ranged from a few trees to patches less than 1 ha in size. The largest area of tree mortality was observed at Portage. The highest level of incidence (8%) was recorded at Foxley River and in the Camp Tamawaby Demonstration Woodlot. Semi-mature trees were recently killed at both of these locations.

European Larch Canker

European larch canker, caused by the fungus *Lachnellula willkommii* (Htg.) Dennis, was found for the first time in Prince Edward Island in 1992. A 4-year-old canker was found in a young European larch plantation east of Wellington, Prince Co., and a 2-year-old canker was found in a natural stand of eastern larch, west of Miscouche, Prince Co. The two locations are within 10 km of one another. A survey of 12 additional areas in the vicinity, involving thousands of larch trees, failed to detect further infection. A total of 41 areas were examined for larch canker in the province in 1992.

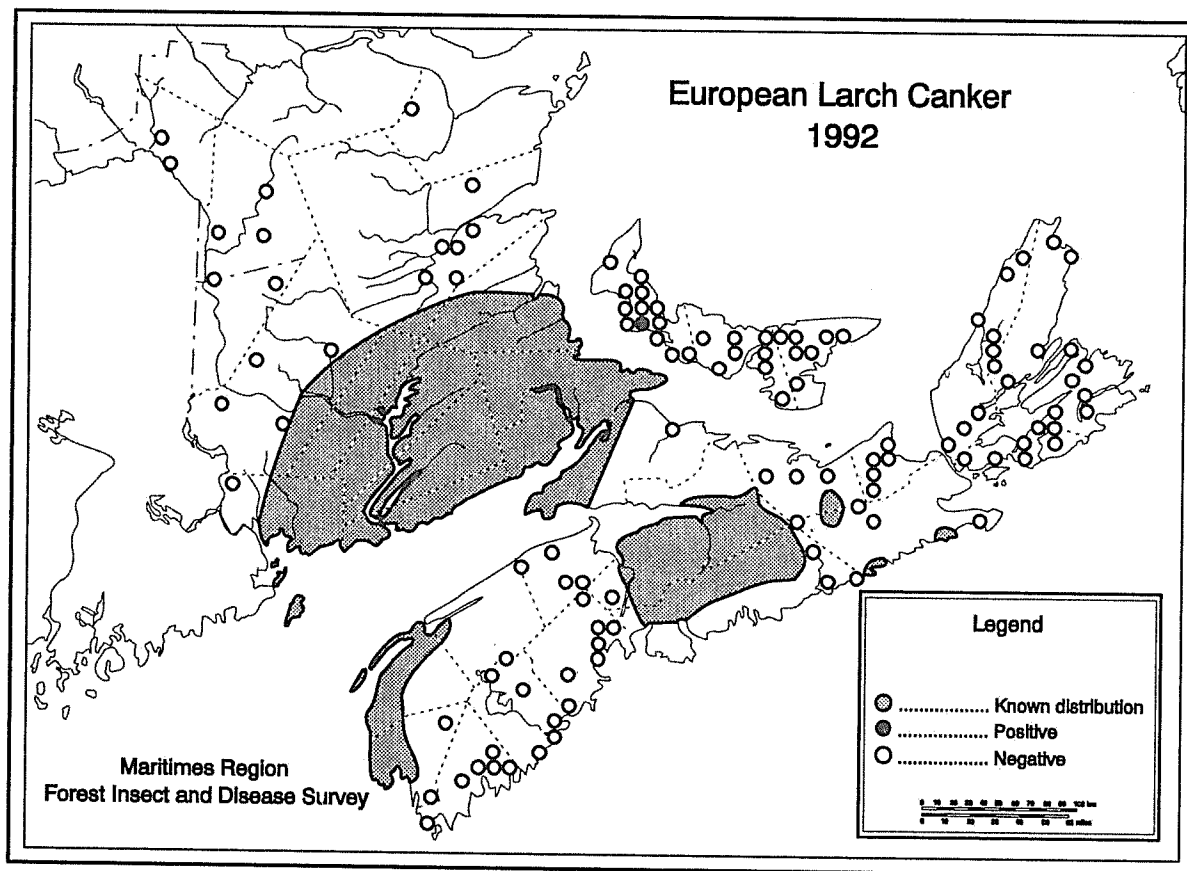


Figure 3

In spite of the discovery of the disease, plant quarantine regulations, restricting the movement of larch into Prince Edward Island from mainland Nova Scotia, from southeastern New Brunswick or from northeastern Maine, will remain in effect. This is due to the fact that the disease is restricted in distribution (only two areas affected of 278 areas inspected between 1981 and 1992) and that all cankers found in 1992 have been removed.

No infected trees were found at any of the approximately 100 locations examined in New Brunswick and Nova Scotia outside the known distribution (Fig. 3). The disease is widespread and common inside the infected areas. Branch cankers are present on 77% of the trees at Manganese Mines, Colchester Co., N.S., on 50% of the trees at Dean, Halifax, Co., N.S., and there are several other areas in both provinces where the infection rate is over 50%.

Scleroderris Canker

Damage by Scleroderris canker, caused by the fungus *Gremmeniella abietina* (Lagerb.) Morelet, has been increasing in New Brunswick pine plantations following several years of minimal activity.

The disease is widespread, especially in the northern half of the province, and affects jack pine, red pine, and Scots pine. Lower branch discoloration and mortality were observed in Restigouche, Madawaska, Victoria, and Northumberland counties, mostly in plantations already known to be infected. Almost 90% of jack pine trees were affected to various degrees in a 200-ha plantation at Parker Lake, Victoria Co., and moderate and severe damage was observed in a 10-ha jack pine plantation at Mount Elizabeth, Northumberland Co.

The European race of the disease is capable of killing trees of any size (the North American race kills only small trees). This and several other "in-

Table 1. Scleroderris canker - Non-North American race in New Brunswick, 1978 - 1992

No.	Location	UTM Grid	Host	Non-N.A. race identified	
				first	last
4	Upper Blackville, Northumberland Co.	20-28-516	Scots pine	1979	1979
6	Sandy Point Eel River Northumberland Co.	20-34-521	red pine	1979	1981
9	Limekiln, York Co.	19-67-512	red pine	1979	1979 (erad.)
10	Juniper, York Co.	19-63-515	red pine	1978	1978 (erad.)
11	Butte D'Or Paquetville Gloucester Co.	20-33-526	red pine	1979	1979 (erad.)
12	Bourgoin, Madawaska Co.	19-56-524	Scots pine	1988	1988

Table 2. Scleroderris canker - non-North American race in New Brunswick, 1978-1992. Results of observations, isolations, and race determinations from the six locations where *Gremmeniella abietina* has been identified

Year	Location number					
	4	6	9	10	11	12
1978				E	E	
1979	Int	E	E	*	*	
1980	x	x	*	*	*	
1981	x	Int?	*	*	*	
1982	NA	NA	*	*	*	
1983	neg	neg	*	*	*	
1984	NA	neg	*	*	*	
1985	NA	neg	*	*	*	
1986	neg	neg	*	*	*	
1987	neg	c	*	*	*	
1988	x	c	*	*	*	E
1989	x	c	*	*	*	NA
1990	NA	c	*	*	*	NA
1991	NA	c	*	*	*	NA
1992	x	pos.	*	*	*	?

(Location numbers refer to information in Table 1).

Legend: NA - North-American race
 E, Int - non-North American races
 Neg - negative, either no field symptoms or culture negative
 x - not checked
 c - controlled (pruning)
 * - eradicated
 ? - race identification pending (as of Jan. 31, 1993)
 Pos - fruiting bodies found, no culture available

Table 3. Summary of results of the *Sirococcus* shoot blight control experiment in Nova Scotia

Plot location	Tree height 1988 (m)	1988		1989		1990		1991		1992
		Trees inf. %	Treat- ment	Trees inf. %	Treat- ment	Trees inf. %	Treat- ment	Trees inf. %	Treat- ment	
Debert, Colchester Co.	2.5	19	P	5	P	0	P	2	P	0
Pleasant River Lake, Lunenburg Co.	2.8	66	P	25	P	8	P	4	P	3
Shulie Lake Rd., Cumberland Co.	3.5	37	P	18	N	37	N	50	N	74
Kedge River Mgmt. Area, Queens Co.	3.5	63	N	67	N	68	N	69	N	71

P = pruned; N = no treatment

intermediate" races, have been found in New Brunswick since 1978. Eradication attempts at a forest nursery, in a Christmas tree plantation and in a commercial plantation appear to have been successful in eliminating the disease. There were an additional six locations where jack pine was said to be infected by non-North American races of the fungus, however recent research indicates that past identifications of the European race on jack pine may have been in error.

The results of surveys by the Forest Insect and Disease Survey for the non-North American races of *Scleroderris* canker in New Brunswick are summarized in Tables 1 and 2. The disease had been eradicated at three of these locations even before the final race identifications were available (locations 9, 10, 11). At another location "controlled" status has been achieved by the pruning of branches to 2 m above the ground (location 6). The remaining two locations are "under surveillance", i.e., an annual inspection is conducted for symptoms and/or changes in symptom expression. Where present, branches with symptoms are cultured and tested to determine the race of the fungus.

In 1992, the disease was observed in two of the areas where the European race of *Scleroderris* canker was identified in the past. Laboratory testing for 1992 is not yet complete. However, this race has only been found once since 1981 in any of these areas. At Bourgoin, Madawaska Co., where the disease was first found in 1988 in a Scots pine plantation, most of the trees are severely damaged.

Scleroderris canker has not been observed in Nova Scotia since 1978 and has never been found in Prince Edward Island.

***Sirococcus* Shoot Blight**

Sirococcus shoot blight, caused by the fungus *Sirococcus conigenus* (DC.) P. Cannon & Minter, is present in all three provinces but is most widely distributed and most damaging in red pine plantations in Nova Scotia, west of the Colchester-Pictou and Halifax-Guysborough county lines, and in natural regeneration in the southern half of New Brunswick.

In 1992, the disease was again observed in all three provinces. In many areas, the repeated infection has resulted in serious deterioration of red pine stands and plantations.

In New Brunswick, the disease was confined to previously infected areas in the southern part of the province. Red pine deterioration continued in Fundy National Park, Albert County, as did disease intensification on young natural regeneration at MacDougall Lake, Charlotte Co.

In Nova Scotia, the disease continues to ravage red pine in the low-lying areas of the southwestern part of the province. Entire plantations are dead or dying. In many other plantations, both the incidence of infected trees and the intensity of infection (shoot mortality) are in the moderate range. The disease is becoming more widespread on the eastern mainland and appears to be spreading from the original infection centers into surrounding plantations. (A detailed survey of all red pine plantations by NSDNR, to determine the status of the

Table 4. Frequency of *Armillaria* root rot-infected pine and spruce plantations in New Brunswick and Nova Scotia, 1986-1992

Year	New Brunswick				Nova Scotia			
	Pine		Spruce		Pine		Spruce	
	Plant. Assessed	% Inf.	Plant. Assessed	% Inf.	Plant. Assessed	% Inf.	Plant. Assessed	% Inf.
1986	44	9	95	27	--	--	--	--
1987	34	6	113	23	--	--	--	--
1988	50	12	131	18	22	5	37	11
1989	68	7	187	22	14	7	42	21
1990	52	10	117	15	38	5	104	14
1991	36	14	109	17	24	0	81	11
1992	37	11	105	6	24	0	45	18
All years	321	10	857	18	122	3	309	15

disease in the province, has been completed and the results will be published shortly.) The intensity and incidence of the damage on white spruce was reduced for the second consecutive year at the Debert Tree Breeding Centre, Colchester Co., from the high levels reported in 1990. This was probably due to the dry spring weather conditions experienced which are unfavorable for infection and spread. Trace or light level infection also occurred on white spruce in Halifax and Yarmouth counties.

The deterioration of red pine stands in western Nova Scotia and the spread of the disease to plantations in the eastern half of the province makes Sirococcus shoot blight the major plantation problem in Nova Scotia.

In Prince Edward Island, the disease was present in all previously infected areas and continued to intensify at Goose River, Kings Co. and at Selkirk and Iona, Queens Co. The first red pine tree killed by the disease in the province was observed at Iona in 1992. Shoot damage was trace and light in a hedge-row and in a nearby older, understocked red pine plantation at St. Mary's Road, Kings Co. A young red pine plantation at Valleyfield, Kings Co., had trace infection on 28% of the trees and the disease was found at the Camp Tamawaby Demonstration Woodlot, Prince Co.

Control- Prompted by concern over the fate of red pine plantations, a silvicultural control (pruning) experiment in young plantations was carried out in Nova Scotia during the fall of 1988 under the aegis of Forestry Canada. The experiment has been continued by FIDS since then. Since preliminary results (Table 3) indicated pruning to be an effective

control measure, further experiments were initiated in 1991, involving both young and pole-sized red pine plantations. These plots have been assessed in 1992 but analysis of the data is not yet available.

Armillaria Root Rot

Armillaria root rot, *Armillaria mellea* (Vahl ex Fr.) Kummer, is widely distributed in the region and mortality of young and old trees was common again in 1992.

In 1992, *Armillaria* root rot killed trees in 7% of the 142 spruce and pine plantations surveyed in New Brunswick and close to 12% of the 69 spruce and pine plantations assessed in Nova Scotia (Table 4). Infection rates were generally low, mostly in the 2%-8% range. The highest level of mortality was recorded in a jack pine plantation at Mt. Elizabeth, Northumberland Co., N.B., where 12% of the trees were dead. In general, spruce plantations appear to be more vulnerable to the disease than pine plantations. This difference has been consistent since the start of plantation surveys, although the 1992 New Brunswick results do not support this statement.

Armillaria root rot also caused sporadic tree mortality in other forest situations. Mature, semi-mature, suppressed or stressed trees were killed in all three provinces.

Spruce Budmoths

Shoot damage by spruce budmoths, *Zeiraphera* spp., on white spruce was generally light, with pockets of severe or moderate infestations occur-

ring. Damage occurred at slightly higher levels than in 1991 and was observed throughout much of the region. Spruce budmoths comprise a group of closely related species: the spruce budmoth, *Zeiraphera canadensis* Mut. & Free., the purplestriped shootworm, *Zeiraphera unfortunana* Powell, and the yellow spruce budworm, *Zeiraphera fortunana* (Kft.). *Z. canadensis* is the most common and most important of the three, but occasionally the species-mix changes in favor of one of the other two.

In New Brunswick, damage was generally light, an average of 18% of the shoots were damaged at the 33 locations examined (an increase from 11% reported in 1991). The most serious damage was recorded at the Roosevelt International Park on Campobello Island, Charlotte Co. where 75% of shoots were affected.

In Nova Scotia, average shoot damage was 14% at the 68 locations examined (an increase from 11% reported in 1991). Severe damage was recorded at Pillar Rock, Inverness Co., where 81% of the new shoots were damaged over a 2- to 3-ha area. Red spruce were affected in two areas of the province.

In Prince Edward Island, an average of 18% of the shoots were damaged at the 25 locations examined (an increase from 15% reported in 1991). Damage was trace or light in all but two of these areas: at Carleton, Prince Co. (79% shoot damage) and in the Prince Edward Island National Park at the Cavendish Campground, Queens Co. (45%).

Larch Casebearer

Larch casebearer, *Coleophora laricella* Hbn., populations increased for the third consecutive year in southern New Brunswick and the fourth year in most of Nova Scotia. Although feeding was mainly confined to trees in patches of up to 2-3 hectares, these patches were numerous and the insect was one of the most frequently observed forest pests in the early part of the 1992 summer season. The level of foliage discoloration as a result of feeding was variable, but moderate and severe patches were very common.

In New Brunswick, foliage discoloration occurred in most areas of the province with the exception of the northern counties of Restigouche, Madawaska, and Gloucester. Although the insect

was as widespread as in 1991, the intensity of feeding was much reduced in most of the affected area, except in Charlotte County. Foliage discoloration varied from trace to severe. The most obvious discoloration was observed in two 10-ha areas, at Rolling Dam and Digdeguash, Charlotte Co., where all trees suffered severe or moderate defoliation. Foliage discoloration was severe at single locations in York and Victoria counties but was generally light at most of the 34 other locations assessed.

In Nova Scotia, the distribution and severity of foliage discoloration increased throughout most of the province. Discoloration, which affected trees of all age classes, occurred in patches as a consequence of host distribution, but was severe in some areas. Severe foliage discoloration of patches, 2-3 ha in size, was observed at Judique, Harbourview, Margaree Forks, east of Mabou, and Cheticamp in Inverness Co., and at Meaghers Grant, Halifax Co. Often, several hundred meters of roadside larch trees were observed with severe or moderate browning. Some feeding by larch casebearer occurred on 75-80% of the larch in the province.

In Prince Edward Island, the decline in larch casebearer populations continued for the fourth year. Discolored larch trees were scarce, usually affected only to trace or light levels, and observed at only six locations in the province. A few trees had moderate foliage discoloration at Orwell, Queens Co.

PESTS OF HARDWOODS

Dutch Elm Disease

Dutch elm disease, caused by the fungus *Ceratocystis ulmi* (Buism.) C. Moreau, was of concern in all three Maritime provinces in 1992 (Fig. 4).

In New Brunswick, the disease is present wherever elm trees are found. Numerous infected and dying trees, both residual old trees and young saplings, were observed throughout the province in 1992. The "new" location, at Shediac, Westmorland Co., at the edge of the infected area, only signifies the fact that a sample was taken, the disease has been known to be present there for some time.

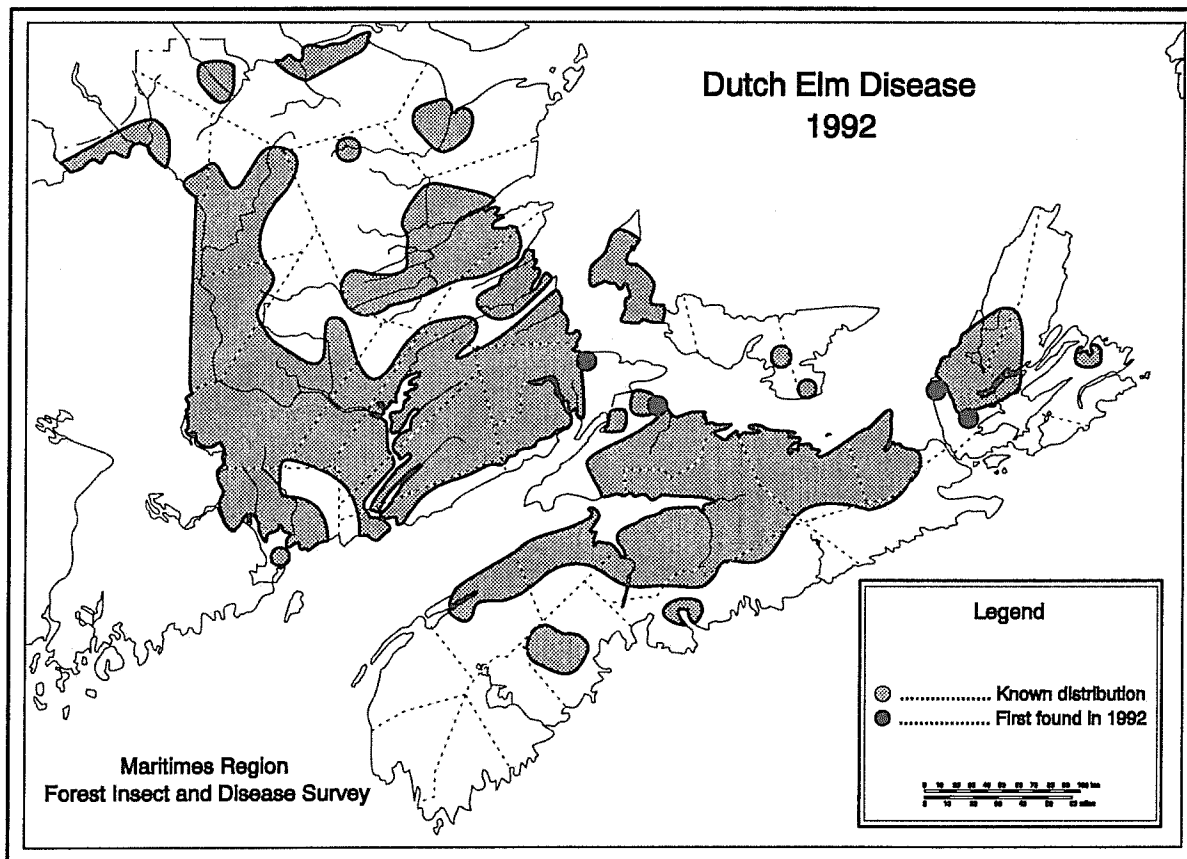


Figure 4

In Nova Scotia, the disease continued to intensify, evidenced by great numbers of dead and dying trees. Infected trees were found for the first time in 1992 at three locations, each representing either a minor extension in distribution or a "closing of the gap" between infected areas. These areas were Northport Beach, Cumberland Co., River Denys Center, Inverness Co., and at an unnamed location also in Inverness County, south of both Port Hood and Southwest Mabou.

In Prince Edward Island, diseased trees are becoming more common in the western part of Prince county in the areas with the longest history of Dutch elm disease. No infected trees were found in either Queens or Kings counties in 1992, where the disease was found on one tree in 1988 and 1991, respectively. These two trees were promptly removed and destroyed shortly after they were identified as diseased.

Gypsy Moth

The gypsy moth, *Lymantria dispar* (L.), situation remained unchanged in 1992 both in New Brunswick and Nova Scotia. Since its reappearance in the Maritimes in 1981, the gypsy moth has been present in southwestern New Brunswick and in western Nova Scotia but has caused visible defoliation only at Moores Mills, N.B., in 1987 and at New Minas, N.S., in 1991.

In 1992, early season egg mass surveys, larval surveys, adult trapping programs, and late fall egg mass surveys were conducted to determine the current status of gypsy moth in the region. The Gypsy Moth Coordinating Committee again coordinated all surveys, the work being carried out by federal, provincial, municipal, and industrial agencies.

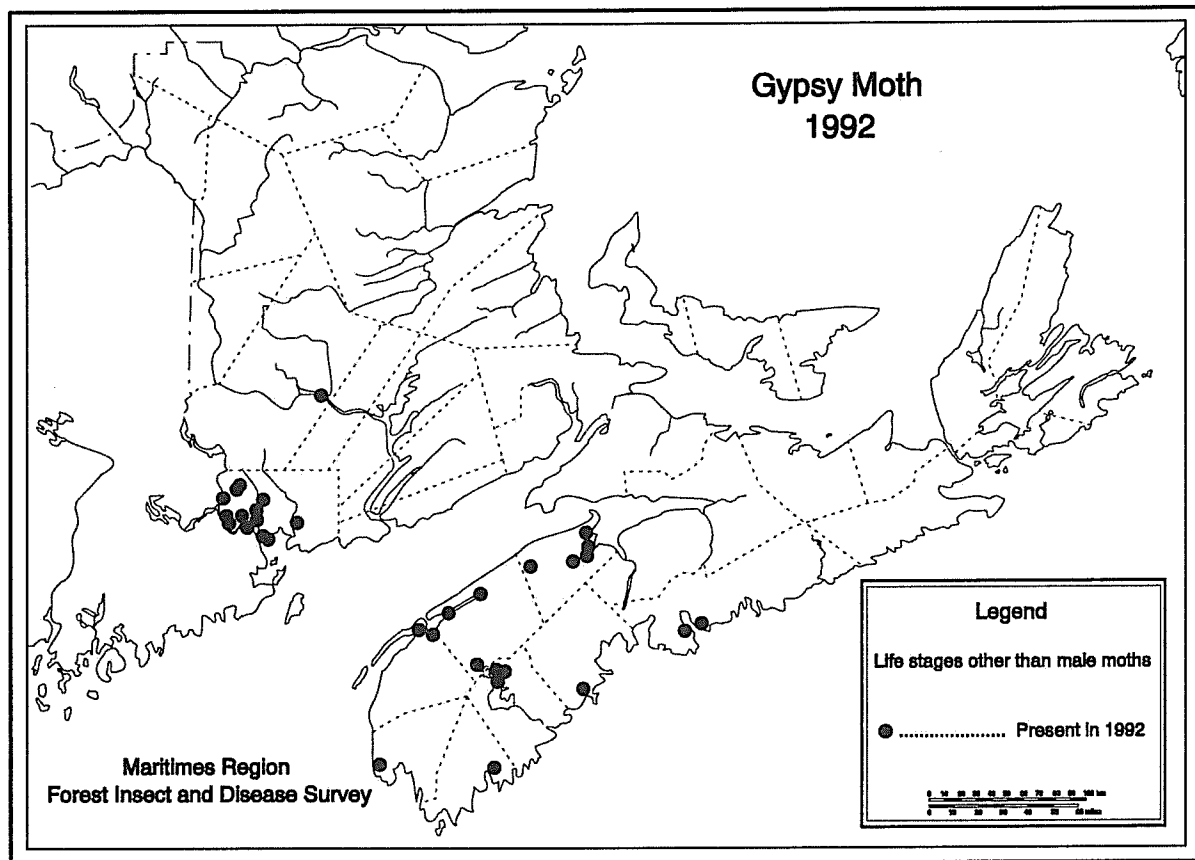


Figure 5 Information based on data provided by members of the Gypsy Moth Coordinating Committee

The status of the gypsy moth in the Maritimes in 1992, based on surveys for larvae, pupae, and egg masses is summarized in Figure 5. (Not all egg mass surveys are completed in the fall, consequently the information is accurate only up to the end of the year.)

In New Brunswick, gypsy moth was found at some of the locations where its presence has previously been recorded but populations remained generally low and no visible defoliation occurred anywhere in the province in 1992. Surveys conducted by NBDNRE in the fall of 1992, in southwestern New Brunswick at 171 locations, found egg masses in 13 areas, all either at or near points where the insect has been found before. The number of egg masses was very low at most locations, except at Mohannes, Charlotte Co., where 448 new egg masses were found at 12 points. Information collected over the past 12 years indicates that a generally low level but widespread gypsy moth population exists in the extreme southwestern part of the province. Outside of this area, gypsy moth is known to exist only in

Fredericton where a few (6) egg masses were found at the Agriculture Canada Research Station this fall.

In Nova Scotia, gypsy moth was found only in areas previously known to harbor the insect. Populations were low and no visible defoliation occurred in 1992. An egg mass was found at Yarmouth on a trailer imported from the United States, but was removed before the eggs hatched.

In Prince Edward Island, gypsy moth is not known to occur to date, although occasionally a few male moths, probably blown in by storms from the mainland, are captured in pheromone traps.

Adult-male pheromone trapping programs were conducted in all three provinces for the purpose of detection, delimitation or certification. Information was obtained from 4,921 traps in the region, 2,306 in New Brunswick, 2,312 in Nova Scotia, and 303 in Prince Edward Island. Traps are placed at higher densities in infested areas with the dual objectives of better defining infestations and re-

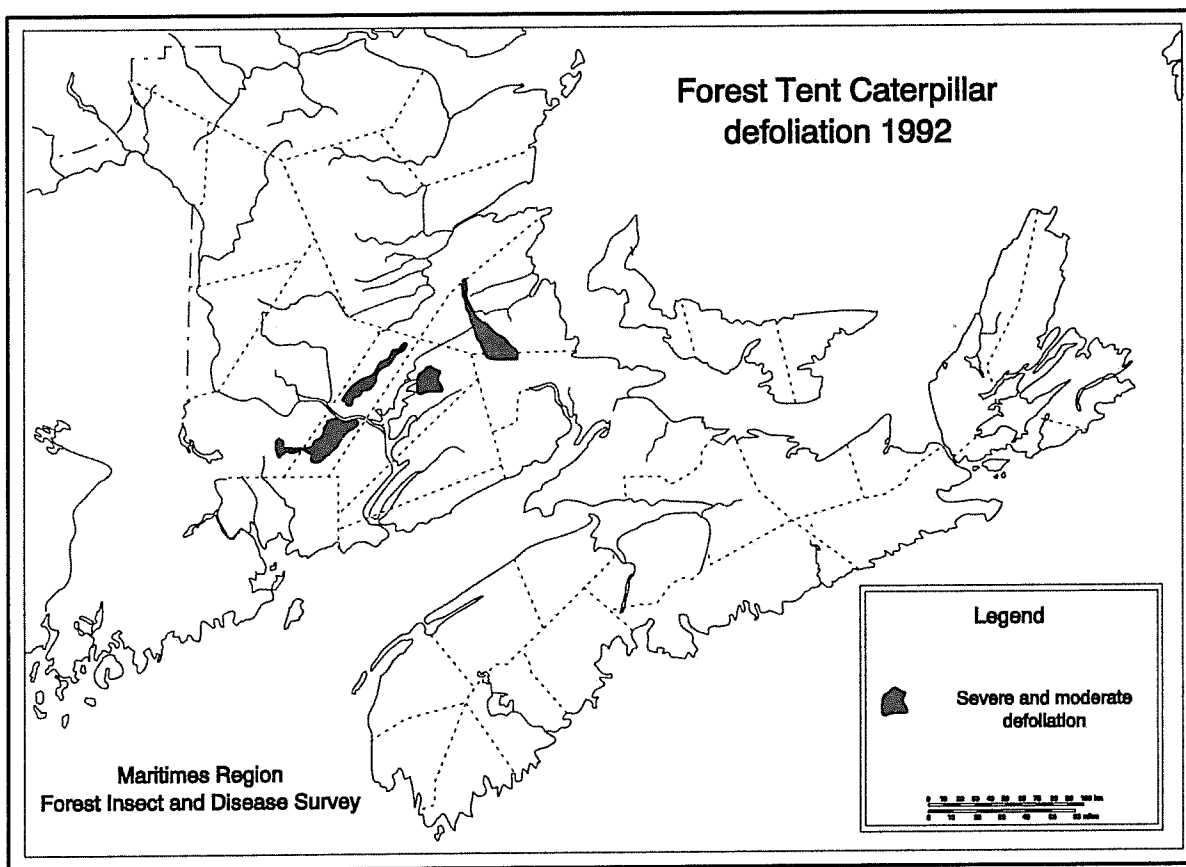


Figure 6

ducing the number of fertile egg masses through the capture of males, thereby reducing the mating frequency. Information from 284 "daily monitoring" traps indicates that much of the 1992 pheromone trap information will be impossible to interpret because of a major, storm-related blow-in of adult males at the time when local populations were still in the larval stages. Large numbers of moths, originating from outside the Maritimes, were brought in by the front of a late July storm and were captured in traps already placed. Since in-blown and local moths cannot be distinguished in operational traps without a capture date, it is impossible to determine local population levels.

Forest Tent Caterpillar

After years of virtual absence, forest tent caterpillar, *Malacosoma disstria* Hbn., was back on the scene in 1991 and in 1992, once again became a major hardwood defoliator.

In New Brunswick, trembling aspen was defoliated over 77,500 ha (Fig. 6). Of this, 45,000 ha was

severe and 32,500 ha moderate defoliation. Most of the defoliation occurred in Sunbury, Queens, and southeastern York counties and in a large area in Kent and northern Westmorland counties. The most serious defoliation was noted around Tracy, Sunbury Co.; Youngs Cove, Queens Co.; and Canaan, Westmorland Co. Small patches of light or trace defoliation occurred on the periphery of the main infestation areas. Larvae were found elsewhere and pheromone traps also captured moths, mostly in the central and northeastern parts of the province. The population was generally healthy except at the Acadia Forest Experiment Station and Tracy, Sunbury Co., where a significant number of larvae died of disease.

The increase in the size of the defoliated area in 1992 from the 2,900 ha of severe and moderate defoliation in 1991 is of a magnitude similar to that which occurred at the start of the last major forest tent caterpillar outbreak. At that time, moderate and severe defoliation increased from a few small patches in 1978 to 37,000 ha in 1979. This, and the fact that light trap catches doubled and tripled

in all but one of the seven light traps (the exception being at the Acadia Forest Experiment Station where disease caused a significant population reduction) indicates an expansion of the outbreak in 1993.

In Nova Scotia, forest tent caterpillar populations remained low and defoliation was limited to one severely defoliated red oak tree in Truro, Colchester Co. and to a few dozen roadside trembling aspen trees north of Heatherton, Antigonish Co. where defoliation was trace or light. Although there was a small increase over 1991 in the number of adults caught at the FIDS light trap locations, numbers remained low. The majority of pheromone traps were negative, others captured very few moths. Consequently, no major changes in forest tent caterpillar populations are expected in 1993 and it is unlikely that much, if any, defoliation will occur.

In Prince Edward Island, only a single colony of forest tent caterpillar larvae was found at Haliburton, Prince Co. and all but two of the larvae were dead as a result of disease. Pheromone trap catches were negligible. There was a significant increase in adults captured in the light trap at Kilmuir, Kings Co. (from 68 in 1991 to 154 in 1992). The significance of this increase is uncertain but larvae may be more common in that area in 1993.

Oak Leafroller and Oak Leaf Shredder

The oak leafroller, *Pseudexentera spoliata* (Clem.), and the oak leaf shredder, *Croesia semi-purpurana* (Kft.), have been defoliating red oak since the early 1970s and are the most serious pests of this species in the Maritimes. As a result of repeated defoliation, trees in many areas are suffering from various degrees of twig, branch, and crown dieback.

In New Brunswick, oak leafroller caused moderate defoliation in a small area in Douglas, York Co. while light defoliation, by the two species feeding together, was observed on numerous trees at Cranberry Lake, Queens Co. Both of these infestations are expected to continue in 1993.

In Nova Scotia, both the intensity and the area of defoliation, predominantly by the oak leafroller, were similar to the low levels observed in 1991 and were significantly reduced from that reported in 1990. Defoliation occurred in scattered red oak stands in most areas in the western half of the province. The average level of defoliation was 8% (range 1-29%) compared to the 40% average (range 1-85%) in 1990. This is the second year of significant reduction in defoliation from 1990 and especially from 1988, at the peak of the outbreak, when the average defoliation was 69%. The most

Table 5. Condition of red oak after repeated defoliation in western Nova Scotia, 1988-1992

Tree Condition Class	Percent of Trees in Class				
	1988 ^a	1989 ^b	1990 ^c	1991 ^d	1992 ^e
Healthy	9.1	1.0	0.2	0.1	0.1
Twig dieback only	22.6	18.2	8.6	32.4	39.8
Branch dieback					
1-25%	42.9	52.2	77.1	56.8	53.8
26-50%	14.3	18.9	7.9	8.6	3.8
51+%	5.0	4.9	2.0	0.8	1.8
dying	0.6	0.9	1.0	0.7	0.5
Dead	5.5	3.9	3.2	0.8	0.3

^a based on assessment of 931 trees in 35 stands

^b based on assessment of 1,004 trees in 40 stands

^c based on assessment of 975 trees in 39 stands

^d based on assessment of 1,050 trees in 42 stands

^e based on assessment of 1,025 trees in 41 stands

severely defoliated oak stand affected by oak leafroller, was seen at Colpton, Lunenburg Co., where nearly a third (29%) of the leaves on all trees were damaged. Oak leaf shredder caused defoliation at Jeremy's Bay, Annapolis Co., where 32% of the leaves were affected on all trees. The average defoliation also decreased at the permanent red oak observation plots in Queens and Lunenburg counties. Defoliation was 17.8% in 1992 compared to 18.1% in 1991, 25.5% in 1990, 26% in 1989, and 54% in 1988. Pheromone trapping results do not indicate significant population changes in 1993 although the catches increased slightly from the previous year.

As a result of repeated serious defoliation, red oak stands in western Nova Scotia are generally in poor condition. The summary of tree condition surveys in randomly selected oak stands since 1988, is presented in Table 5. Results show that although few trees are healthy, trees are responding to the reduced defoliation of the past 3 years.

In Prince Edward Island, light defoliation occurred at North Milton, Queens Co. and Brudenell Point, Kings Co. At both these locations, 98% of the red oak trees have in excess of 25% branch dieback as a result of repeated defoliation by the two insects. Defoliation by the oak leaf shredder was moderate at Pleasant Grove, Queens Co., while the oak leafroller caused trace defoliation.

Birch Skeletonizer

Birch skeletonizer, *Bucculatrix canadensisella* Cham., populations decreased in Nova Scotia and in Prince Edward Island and increased slightly in New Brunswick in 1992.

In New Brunswick, the insect caused severe or moderate foliage discoloration of white birch and wire birch in several patches in Kent and Northumberland counties, mostly in the Rexton and Buctouche area. Severe or moderate discoloration also occurred at Canoose Stream, Charlotte Co., where most young white birch trees were affected.

In Nova Scotia, both the distribution and the intensity of skeletonizing of white birch leaves was drastically reduced from 1991 and, especially, 1990. Discoloration was found at only eight locations in five counties, compared to 26 locations in 11 counties reported in 1991. The most severe skeletonizing was recorded at South Lochaber,

Guysborough Co., where about 100 m of roadside white birch trees were affected. Only light or moderate leaf browning occurred at other locations, most of these in Antigonish County. Trees in Cape Breton Island and in the western part of the province, where skeletonizing was severe in 1991, either remained green or showed only trace discoloration.

In Prince Edward Island, foliage browning was only trace or light at scattered locations, mostly in Kings and Queens counties, where skeletonizing was severe or moderate in 1991. The highest infestation was recorded north of Harrington, Queens Co., where browning was light on 43% of the leaves on all the trees in the area. The majority of the damage was on white birch, but some wire birch was also skeletonized.

Poplar Serpentine Leafminer

Population levels of the poplar serpentine leafminer, *Phyllocnistis populiella* Cham., remained high in New Brunswick, causing twig and branch dieback of trembling aspen in the northern half of the province, but remained low in both Nova Scotia and Prince Edward Island.

In New Brunswick, foliage discoloration of trembling aspen was still in evidence in the north and also to some extent in the south. Both incidence and intensity decreased from the northern part of the province towards the Fundy coast. This outbreak has persisted since 1981. Twig and branch dieback as well as thin-topped, unhealthy trees are common. Population levels are still high in Restigouche, Gloucester, Madawaska, Victoria, and Northumberland counties, averaging 44% of the foliage affected on most (89%) of the trees. Although virtually unchanged from 1991 (46% of foliage) this still represents a population reduction for the fourth consecutive year (50% in 1990, 61% in 1989). In the ten southern counties, the average infestation level was 7% of foliage affected on 37% of trees. These figures, compared to those of the previous 4 years, indicate decreasing populations in this part of the province. One of 67 observations was on largetooth aspen.

In Nova Scotia, population levels remained low, the insect was found at only six locations. The highest infestation was 16% of foliage affected on all largetooth aspen trees at Raynardton, Yarmouth Co. Only trace leafmining occurred at

the other locations where trembling aspen or largetooth aspen trees were affected.

In Prince Edward Island, an average of 2% of the leaves were affected. The highest infestation, at Rustico Island, Queens Co. was only 4%. Trace leafmining, probably by this insect, also occurred on silver poplar at Brackley Beach, Queens Co.

NURSERY AND GREENHOUSE PROBLEMS

Although a wide variety of pest-related problems were encountered in Maritime forest nurseries in 1992, the most serious problems observed relate to overwintering injury and the deterioration of 2-year-old stock.

Severe overwintering injury to container crops occurred in a nursery in New Brunswick and in another in Nova Scotia. Seedlings raised in greenhouses were placed outside for overwintering without being properly "hardened off." The fact that the New Brunswick nursery had an extremely cold winter, with soil frozen to a depth of over 1.5 m and that the Nova Scotia nursery had no significant snow cover until late in the winter, contributed to the problem. Interestingly, in the Nova Scotia nursery, while heavy damage occurred in multipot-raised seedlings, damage was minimal in jiffy pots. Losses were reduced in both situations by holding the seedlings and allowing them to recover rather than out-planting them in the spring.

In Prince Edward Island, vigorously growing 2-year-old container seedlings had root-bound plugs, early bud set, and other problems, probably due to water management schedules.

Tarnished plant bug, *Lygus lineolaris* (Palisot), was found for the first time in the FC-MR greenhouse on experimental cloned seedlings of white spruce. White spruce seedlings were also infested with fungus gnats, *Mycetophilidae*. Twig aphids, *Mindarus* sp., infested black spruce seedlings in New Brunswick. All of the reported problems with fungi occurred in Nova Scotia: gray mold, *Botrytis cinerea* Pers. ex Fr., was present in holding areas on tall, overcrowded black spruce seedlings; smothering fungus, *Thelephora terrestris* Ehrh. ex Fr. grew among black spruce seedlings also in holding areas; and a cup fungus, *Lamprospora* sp. was present on Norway spruce container 'plugs' in a greenhouse.

SEED ORCHARD PESTS

Seed orchard pests fall into three distinct categories: those that damage the seeds or cones directly; those that affect the trees and thus have an indirect effect on cone and seed production; and those that are primarily defoliators but may feed on young, green immature cones and cause direct damage.

Spruce cone maggots, *Strobilomyia neanthracina* Michelsen and *S. appalachensis* Michelsen damage was variable in 1992, much higher in some orchards and much lower in others than in 1991. For example, the percentage of *S. neanthracina*-infested white spruce cones increased to 40% from 4% in 1991 in a New Brunswick orchard while infestation decreased to 3% from 20% in 1991 in another. The latter orchard had a very large cone crop in 1992.

Larch cone maggots, *Strobilomyia laricis* Michelsen and *S. viaria* (Huckett), together infested about 80% of the cones in a larch orchard near Queensbury, York Co., N.B., and another near Charlottetown, Queens Co., P.E.I.

Spruce seed moth, *Cydia strobilella* (L.) adults were caught in pheromone traps at all six locations in Nova Scotia and at four of seven locations in New Brunswick. The mean catch was higher than last year in both provinces. No moths were caught at the two locations in Prince Edward Island.

Coneworms - Fir coneworm, *Dioryctria abietivorella* (Grt.) was more evident than in 1991 in several white spruce and black spruce orchards in New Brunswick. Spruce coneworm, *D. reniculelloides* Mut. and Munn was not caught in pheromone-baited traps in any of the 18 spruce orchards sampled.

Sawflies - Webspinning sawfly, *Cephalcia* sp., infested a few white spruce and black spruce grafts at an orchard near Parkindale, Albert Co., N.B. Threelined larch sawfly, *Anoplonyx luteipes* Cresson, infested larch in an orchard near Queensbury. Greenheaded spruce sawfly, *Pikonema dimmockii* Cresson, fed on black spruce grafts at Parkindale.

Aphids, *Mindarus* sp., caused needle deformation and discoloration in a white spruce orchard near Debert, Colchester Co., N.S.

Mites - Spruce spider mite, *Oligonychus ununguis* (Jacobi), caused noticeable yellowing of 15-20% of black spruce trees and a Phytoid mite, infested less than 5% of white spruce trees in the same orchard at Parkindale.

PEST ASSESSMENT SURVEYS IN THE NEW FOREST

Multi-agency pest assessment surveys in the young forest determined pest conditions on close to 12,300 trees in 235 plantations and 11 thinned stands in the region in 1992.

Assessments required detailed examination of 50 trees in each plantation or thinned stand. Ten subplots, of five trees each, were selected along a pre-determined line of travel. The distance between subplots varied according to the size of the area to provide uniform coverage. The level of damage by each pest found on the different parts of each tree was recorded. Field assessments were carried out primarily by staff of cooperating organizations while identification of samples and data summary were done by the Forest Insect and Disease Survey.

Cooperating agencies, in addition to the Forest Insect and Disease Survey, in 1992 were: New Brunswick Department of Natural Resources and Energy, Fraser Inc., J.D. Irving, Ltd., Nova Scotia Department of Natural Resources, and the Maritime Forest Ranger School.

In 1992, 235 plantations were assessed by the cooperating agencies: 157 in New Brunswick, 75 in Nova Scotia, and 3 in Prince Edward Island. In addition, 11 thinned areas were assessed in New Brunswick. Most of the plantations assessed were various species of pine or spruce. Other species assessed included balsam fir, larch, and mixed stands. Detailed information will be published elsewhere, the following summarizes the results.

Most plantation trees are healthy in the Maritimes with almost 94% of the nearly 12,300 trees in this category (Table 6). There were at least some trees severely affected in 21% of the 235 plantations assessed. This may or may not be a serious problem, depending on the cause of damage and the percentage of affected trees in a given plantation. Those plantations need further investigation. Table 7 lists the various plantation problems encountered at severe or moderate levels in the three provinces on pine and spruce. Problems identified at these levels on "other" tree species assessed, included: animal damage, balsam twig aphid, balsam woolly adelgid, frost damage, mechanical damage, poor planting, sawyer beetle, shoestring root rot, snow damage, white pine blister rust, white pine weevil, and winter drying.

Trees with moderate or severe damage were found in six of the New Brunswick thinned areas. The damaging agents were: animal, balsam twig aphid, beech bark disease, frost, mechanical injury, snow, spruce budworm, and white pine weevil.

Table 6. Tree condition in plantations in the Maritime provinces in 1992.

Province	Species	Tree Condition (%)			
		Healthy	Fair	Poor	Dead
New Brunswick	Pine	96.9	1.3	1.0	0.8
	Spruce	94.2	3.7	1.3	0.8
	Thinned	96.7	2.0	1.1	0.2
	Other	94.0	3.2	0.8	2.0
Nova Scotia	Pine	95.5	3.3	1.0	0.2
	Spruce	90.0	5.2	2.0	2.8
	Other	86.0	9.3	4.7	0.0
Prince Edward Island	Pine	94.0	6.0	0.0	0.0
	Spruce	100.0	0.0	0.0	0.0
	Other	100.0	0.0	0.0	0.0

Table 7. Number of pine and spruce plantations containing trees with moderate or severe problems in New Brunswick, Nova Scotia, and Prince Edward Island in 1992.

Problem	Pine			Spruce		
	N.B.	N.S.	P.E.I.	N.B.	N.S.	P.E.I.
Adelgid	0	0	0	4	4	0
Animal damage	4	3	0	6	6	0
Aphids	0	3	0	2	3	0
Bark beetles	3	1	0	0	1	0
Chlorosis	0	0	0	1	0	0
Competition	0	0	0	1	2	0
Competition - Grass	0	0	0	0	1	0
Discoloration	1	1	0	8	2	0
Drought	0	0	0	0	1	0
East. sprucegall adelgid*	-	-	-	1	1	0
European pine shoot moth*	0	7	0	-	-	-
Frost	0	0	0	21	9	0
Gall midge	-	-	-	1	0	0
Globose gall rust*	1	0	0	-	-	-
Insect damage (unknown)	0	0	0	9	2	0
Mechanical damage	0	0	0	4	3	0
Needle flecking	0	3	0	0	0	0
Needle rust	1	1	0	3	2	0
Northern pitch twig moth*	1	0	0	-	-	-
Planting problems	4	1	0	8	16	0
Ragged sprucegall adelgid*	-	-	-	1	1	0
Sawflies	1	0	0	4	2	0
Shoestring root rot*	4	0	0	3	4	0
Snow damage	5	2	1	5	3	0
Sooty mold	0	4	0	0	0	0
Spider mite*	1	2	0	0	0	0
Spittlebug*	0	0	0	2	0	0
Spruce bud midge*	-	-	-	14	1	0
Spruce budmoth*	-	-	-	4	0	0
Weather damage	1	1	0	0	1	0
Weevil damage	0	1	0	0	5	0
White pine weevil*	2	0	0	3	1	0
Wind damage	0	0	0	0	1	0
Winter damage	0	0	0	5	2	0
Yellowheaded spruce sawfly*	-	-	-	1	0	0

*The scientific name is listed either in the table "Other insects and diseases" or elsewhere in the text.

Pine plantations assessed: 37 in N.B., 24 in N.S., 1 in P.E.I.

Spruce plantations assessed: 105 in N.B., 45 in N.S., 1 in P.E.I.

CHRISTMAS TREE PESTS

Many pests of balsam fir Christmas trees are mentioned elsewhere in this report. The balsam twig aphid and the balsam gall midge are discussed here because of their widespread occurrence both in Christmas tree areas and in natural stands, and because they affect the quality and, consequently, the value of Christmas trees. Pine needle scale is mentioned because its presence caused export problems both in 1991 and 1992.

Balsam twig aphid, *Mindarus abietinus* Koch, infestations caused widespread damage to Christmas trees in the Maritimes. Populations were high in Christmas tree production areas in New Brunswick, but had a significantly greater impact in Nova Scotia, severely affecting tree marketability.

Successful control appears to have been largely a function of timing of pesticide application. Many growers in Nova Scotia faced with extremely high aphid populations, were forced to resort to two, and in some cases even three, applications to achieve adequate control. Other growers, less vigilant with their control strategy, suffered severe or moderate damage. Many growers in Nova Scotia reduced their annual Christmas tree harvest by as much as 20 to 40% because of twig aphid damage.

The Experimental Christmas Tree Farm at Seffernsville, Lunenburg Co., N.S. may be considered the guide post for balsam twig aphid damage in 1992. No controls were implemented and all of the trees suffered severe damage - a few trees even suffered current shoot mortality. Many growers who had a look at this lot, considered it as "the worst damage in many years."

Balsam twig aphid populations also increased in the natural forest: in New Brunswick, severe shoot damage occurred in much of the central and eastern parts, with moderate damage noted throughout the rest of the province. Shoot damage increased to an average of 60% from 27% in 1991, at 44 areas assessed. There has been a gradual increase in the distribution of the aphid, as indicated by the surveys conducted by NBDNRE. Twig aphid was present at 79% of the 651 locations assessed in 1992, compared to 66% in 1991, 42% in 1990, 50% in 1989, 39% in 1988, and 16% in 1987.

In Nova Scotia, infestation levels increased for the third consecutive year. In many areas, severe or moderate damage was the norm rather than the exception. The average of damaged shoots increased to 55% from 24% in 1991, with 91% of the trees were affected in 1992, up from 36% in 1991 (63 locations assessed).

In Prince Edward Island, infestation levels increased for the fourth consecutive year. An average of 55% of balsam fir shoots were affected on 93% of the trees at the ten locations assessed, compared to last year, when the average was 30% on 88% of the trees. The worst damage occurred at Valleyfield, Kings Co., and at Kilmuir, Kings Co. where all the shoots of young balsam fir trees were affected.

Balsam gall midge, *Paradiplosis tumifex* Gagné, was widespread throughout the Maritimes but population levels were low and little needle damage resulted.

In New Brunswick, the balsam gall midge was of little concern to growers in Christmas tree areas in 1992. In natural forests the insect was recorded in seven of the counties. Little more than half (58%) of the trees were affected at ten locations assessed, but only an average of 3% of the balsam fir needles had galls. Infestation levels by the balsam gall midge were also determined at 651 locations by NBDNRE. Of these, 94% were negative, and 1-10% of the needles were affected at 6% of the locations, the highest infestation level recorded in the province. These figures are even lower than those of the last three years and indicate continuing low populations.

In Nova Scotia, a surprising number of trees with damaged needles were found at inspections during the fall harvest period. Infested trees were usually in pockets within Christmas tree stands, which is typical of this insect. In natural forests, balsam gall midge was found throughout the province. An average of 7% of the needles were affected at the 41 locations assessed. This represents only a slight (1%) increase from last year but is the second consecutive increase. The most serious infestation in natural stands was recorded at Beaver Harbour, Halifax Co., where all trees were affected and 80% of the needles had galls on them.

In Prince Edward Island, the highest infestation level found was 10% at Harrington, Queens Co.

Balsam fir trees infested by the pine needle scale, *Chionaspis pinifoliae* (Fitch), were found in 1991 by local plant health authorities in Bermuda in a Christmas tree shipment from Nova Scotia. Even though only a few of the minute white scales were found on any tree, their presence resulted in the destruction of a portion of the shipment. Pine needle scale is common on most species of pine (especially on ornamental Mugho pine) and spruce but has rarely been recorded on balsam fir in the past. The discovery of the scale on balsam fir Christmas trees added another insect to the growing list of pests of concern to growers. In 1992, growers and inspectors attended a number of technical and information sessions on the biology, recognition, control options, and export regulations regarding the insect. Also, in 1992, another shipment of infested trees arrived in Bermuda from Nova Scotia.

FOREST HEALTH MONITORING

Observing and reporting on changes in the condition of the forest has been an integral part of the work done by the Forest Insect and Disease Survey in its more than 50 years of existence. Monitoring changes, regardless of the cause, has been explicit in our mandate and predates currently fashionable terminology. FIDS personnel are always on the lookout for unusual or unexplained forest conditions and we have been reporting these under various titles. To focus attention on our forest health monitoring activities we have brought these aspects together in this chapter and those changes that are not attributable to actions of forest pests are briefly described.

Acid Rain National Early Warning System (ARNEWS)

The Acid Rain National Early Warning System (ARNEWS) was established by Forestry Canada in 1984 to monitor the condition and changes in the condition of the forest in order to detect early signs of acid rain damage.

The ARNEWS system consists of: (1) permanent plots, where detailed measurements and observations are made at regular intervals; (2) condition appraisal points where trees are checked for symptoms and specific measurements, such as needle retention, are made; and (3) continuous general surveillance for signs of changes in the health and condition of the forest.

In the Maritimes region, in 1992, the 17 ARNEWS plots were visited in July to determine forest insect and disease conditions; detect acid rain symptoms; observe seed crop and premature change in foliage coloration; and collect ground vegetation samples. In August, detailed assessments of all plots were carried out following the procedures developed by the Maritimes FIDS unit for the national system (DPC-X-25, Magasi, 1988).

Needle Retention by Conifers

Observations are made for signs of acid rain or other pollution damage at all locations where pest conditions are assessed in detail. Special attention is directed to the number of years that conifers retain their foliage. A summary of needle retention values obtained from the 309 locations assessed in 1992 is presented in Table 8. It is apparent that the percentage of needles retained decreases with the aging of foliage and the rate of the decrease varied among tree species and between provinces. It is important to realize that these figures represent provincial averages and, most importantly, that at least some of the loss is definitely attributable to feeding by defoliating insects. Similar information has been collected annually since 1985, in our effort to build a database which will enable us to analyse possible changes.

North American Sugar Maple Project (NAMP)

The North American Sugar Maple Decline Project (NAMP) collected a fifth year of data in 1992 from the 12 New Brunswick and two Nova Scotia plots. Analysis of results to date show that, on average, sugar maple condition changed little in the Maritimes since the plots were established, as expressed by measurements of dieback and leaf density. The results apply to both managed sugar bushes and unmanaged stands.

Trees also remained in good condition on the five maple plots in Prince Edward Island. Although technically not part of the network, the Prince Edward Island maple plots are assessed by NAMP methodology.

NAMP objectives are to determine the rate of change in tree condition, to relate this to sugar bush management, initial levels of stand condition, and atmospheric pollution, and to identify the geographical relationship between cause and damage. Tree condition during the period of the study

Table 8. Retention of needles produced in different years by various coniferous trees in the Maritimes region - 1992

Species	Province	No. of locations	Percent needles retained of needles produced in the year indicated							
			1992	1991	1990	1989	1988	1987	1986	1985
Balsam fir	New Brunswick	88	98	94	90	79	66	58	39	30
	Nova Scotia	60	98	94	89	81	72	58	38	21
	Prince Edward Is.	2	90	85	80	75	80	65	30	25
White spruce	New Brunswick	31	94	99	98	89	76	63	44	32
	Nova Scotia	46	98	95	89	81	68	48	25	13
	Prince Edward Is.	16	80	79	76	69	59	44	22	6
Black spruce	New Brunswick	21	100	100	100	94	80	74	55	45
	Nova Scotia	13	100	98	94	85	71	46	32	15
	Prince Edward Is.	2	100	100	100	95	85	80	80	35
Red spruce	New Brunswick	24	95	100	94	89	75	63	45	34
	Nova Scotia	24	100	98	93	83	74	59	37	26
Red pine	Nova Scotia	5	100	92	64	38	0	0	0	0
	Prince Edward Is.	1	100	100	80	70	0	0	0	0
Jack pine	New Brunswick	5	100	96	76	74	34	20	6	2
White pine	New Brunswick	3	100	100	60	0	0	0	0	0
	Nova Scotia	7	100	84	24	1	0	0	0	0
Hemlock	New Brunswick	1	100	90	90	80	70	40	20	0
	Nova Scotia	6	100	93	82	57	22	7	3	2

Table 9. Condition of white birch along the Bay of Fundy in New Brunswick on permanent plots, 1982-1992

Year	% of trees in class			
	No dieback	Twig dieback	Twig & Branch dieback	Dead
1982	92.9	1.5	4.7	0.9
1983	83.7	8.6	6.0	1.7
1984	64.0	24.9	7.8	3.3
1985	45.3	34.9	14.4	5.4
1986	14.5	47.3	31.3	6.9
1987	0.0	42.6	49.8	7.6
1988	0.0	38.0	54.0	8.0
1989	0.2	43.0	47.0	10.0
1990	0.2	47.0	42.0	11.0
1991	20.5	48.3	18.8	12.4
1992	6.5	58.5	19.9	15.1

Based on 540 trees in 11 plots.

has not deteriorated significantly, relative to observations before 1988.

There was a major review of the NAMP program in 1992. As a result, it is anticipated that the life span of the program, originally planned for 5 years, will be extended.

Maple Monitoring in Nova Scotia

Tree conditions at two sugar maple plots and one red maple plot remained largely unchanged, but deteriorated slightly on the third sugar maple plot. The measurement of dieback and leaf density, using NAMP methodology, was adopted in 1991. Dieback on the four plots is just below 10%, having increased by an average of 1.4% from last year. However, leaf density also increased marginally which may indicate an improvement in the health of the trees.

Deterioration of White Birch Along the Bay of Fundy

Recurring, early, and usually severe foliage browning and premature leaf fall along the Bay of Fundy has resulted in serious deterioration of white birch trees in this area. The cause of the condition, first reported in 1979, is not known, but insects and diseases have been ruled out and some type of pollution is suspected as the causal agent. Multi-disciplinary research was initiated in 1986 to in-

vestigate possible causes, including acid rain, acid fog, and ozone. There are now strong indications that coastal acid fog and ozone may be major contributing factors.

In 1992, there was no noticeable foliage browning of white birch along the Bay of Fundy in New Brunswick or along the Cumberland County shores of Nova Scotia. A few trees had a trace of browning from birch leafminer, birch skeletonizer or Septoria leaf spot, but most trees looked green and exhibited good shoot growth. This is in sharp contrast to the condition in the first half of the 1980s, when severe foliage browning was present in most years by early to mid-August.

Tree condition has been assessed annually since 1982 on permanent plots. Summarized results from the plots in New Brunswick are shown in Table 9. The results indicate that the improvement in the condition of surviving trees, first noted in 1989, continued in 1992.

Leaf browning of birch, similar to symptoms usually associated with the condition just described, was observed in areas of central, north-central and eastern Nova Scotia. Foliage browning was generally light and was mostly associated with Septoria leaf spot. An average of 48% of the leaves were affected in 1992, compared to an average of 83% last year.

White Spruce at Loch Katrine, Nova Scotia

Chlorotic foliage has been observed since 1985 on white spruce trees near Loch Katrine, Antigonish Co., Nova Scotia, in an uneven-aged stand of about 20 hectares. The current foliage is green, but all older needles on affected trees exhibit various levels of yellowish discoloration. Not all trees in the stand are affected, but trees from all age classes show similar symptoms. Yellowing is more prominent on the upper surface of needles than on the underside. Needle retention of older foliage is less than normal. Some of the trees have thin crowns and a few have died. Since 1988, there has been a slight but gradual increase in the size of the affected area. The cause of this condition is unknown but insects or diseases do not appear to be involved. Neither foliage nor soil samples, collected in 1987, showed major differences between affected and non-affected areas that might explain the chlorotic foliage. However, tree growth in the affected area was drastically reduced in 1984 and remained slow until 1987 when growth was last measured. The average annual radial increment during 1984-1987 was reduced by 35% compared to growth in the preceding 10-year period. The stands affected are on shallow soil in an area of former agricultural activity. The "old field" spruce succession scenario is being considered as a possible cause.

In 1992, chlorotic foliage was present again, at levels similar to those observed last year. There was no extension in the size of the affected area.

Two plots were established in 1990 to obtain more detailed information on the stands and to monitor changes. One plot is in a stand of mature and overmature trees, the other in a nearby immature stand. The first tree mortality occurred on the mature plot in 1992. Spruce beetle killed 8% of the plot trees, an additional 12% of the trees are under attack. The damage caused by spruce beetle is a clear indication that these trees are under stress. On the immature plot, 6% of the trees died in 1991 and an additional 4% died in 1992. However, all dead immature trees were in the suppressed category and mortality here is considered part of the natural stand development. There has been a slight improvement in tree condition classes in both the mature and the immature stands since 1990, which indicates an improvement in overall health of these trees. Needle retention was better on the young trees than on the older ones. Needle

discoloration appears to be decreasing in the mature stand while increasing on the immature stand.

INSECT POPULATION MONITORING SYSTEMS

Pheromone Trapping Program

In the Maritimes, pheromones have been used as survey tools since 1969, when traps were first used in detection surveys for the gypsy moth. In 1992, pheromones were used to monitor nine forest insects.

Pheromone traps are used to detect low levels of insect populations, to monitor the fluctuation of populations, to predict, with varying degrees of accuracy, population levels and the damage that may result. Pheromones, in some circumstances, are also used in control.

An important aspect of pheromone trapping programs is standardization, ensuring uniformity in all aspects of the trapping system. In the Maritimes, delta traps are used for most general monitoring in two-trap clusters, with traps separated by at least 20 m. In 1992, Multi-pher[®] traps were used for spruce budworm, in either two- or three-trap clusters, but for hemlock looper, traps were placed individually. In addition to "operational" testing reported here, research is also under way to develop more efficient systems.

European pine shoot moth - Both the number of positive traps and overall catches were generally lower than in 1991 in the Maritimes (Fig. 7). As in previous years, higher populations were predominant in Nova Scotia and Prince Edward Island. The highest populations were detected in eastern Nova Scotia and catches at both of those locations represent an increase from last year.

The criterion for selecting locations for European pine shoot moth traps is that they be in young red pine plantations. The purpose of this trapping system is primarily to give early warning of a possible outbreak in the plantation being monitored. Plantations with trees around 1 m in height are selected as new locations. The sites are changed when the trees are considered seriously infested or when they reach a height of 3 m. Because changes in locations are an annual feature of European pine shoot moth trapping, it is not appropriate to make detailed comparisons of mapped results between years except in the sense of overall trends.

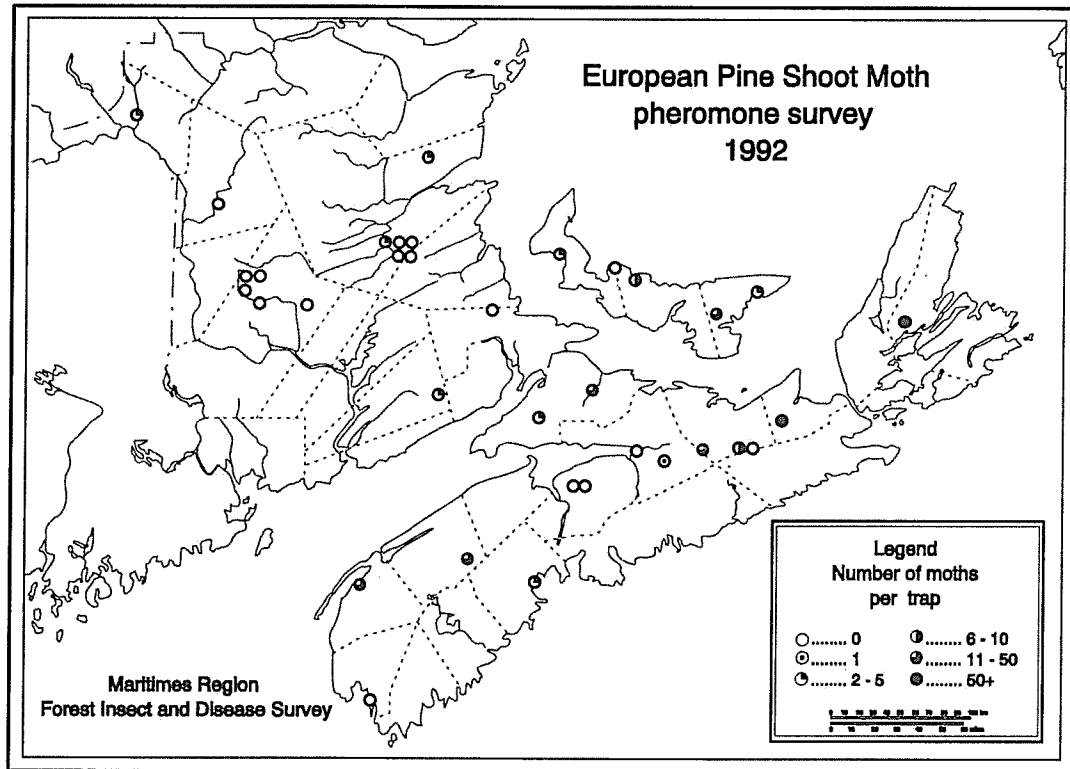


Figure 7

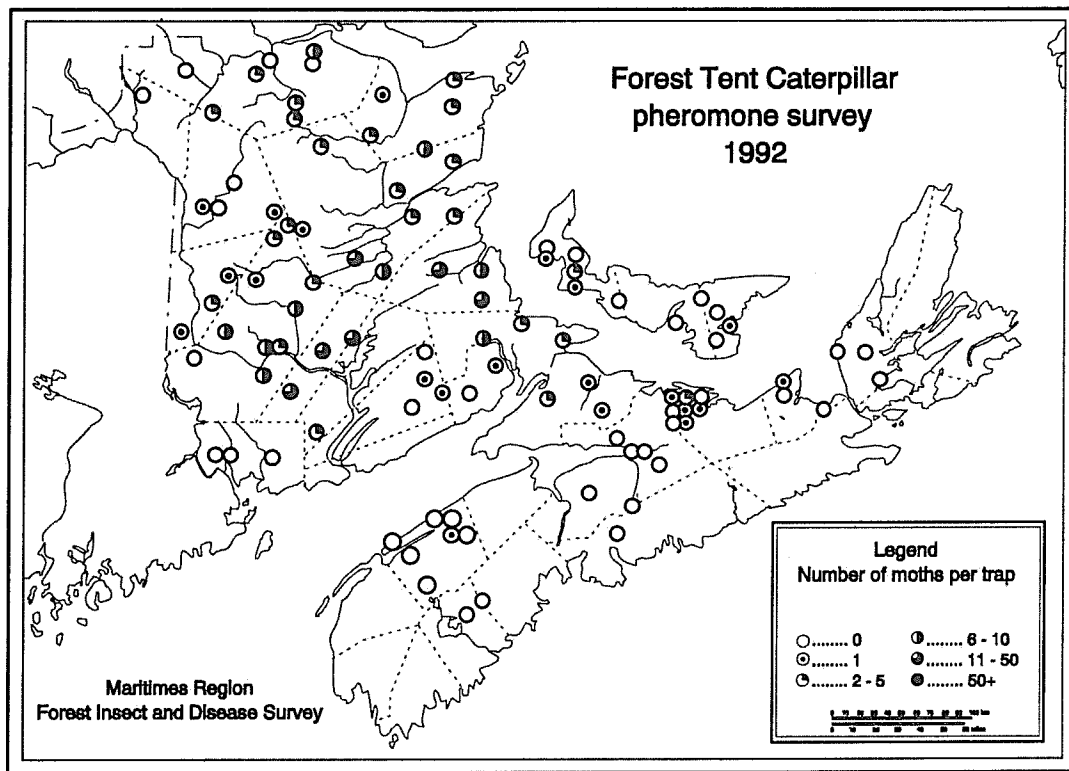


Figure 8

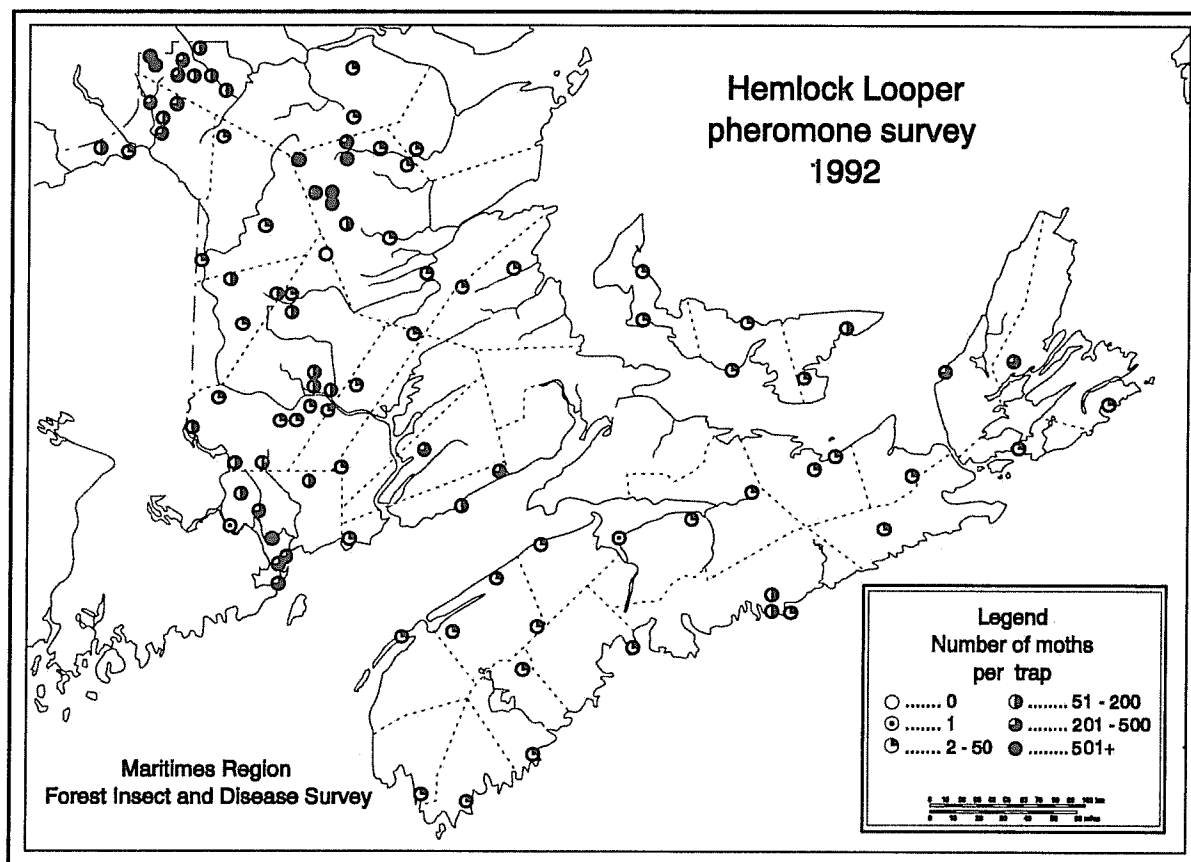


Figure 9

Forest tent caterpillar - There was another significant increase in numbers of forest tent caterpillar moths captured in traps in the Maritimes in 1992, especially in New Brunswick where there is an active and increasing outbreak (Fig. 8). An increase in pheromone trap captures in New Brunswick was noted in 1989. While little change occurred in 1990, captures increased significantly in 1991, corresponding with the onset of the current outbreak. It appears that pheromone trapping has given a 2-year advance warning of population increase to levels when visible defoliation occurs. The highest catches correspond well with the band of defoliation in south-central and eastern New Brunswick (see Fig. 8). The 1992 trapping results suggest a further expansion of the outbreak in New Brunswick and the possibility of patchy defoliation in some parts of the two other provinces.

Gypsy moth - the pheromone trapping detection survey has been used in the Maritimes since 1969. The survey program and the data interpretation problems encountered in 1992, because of adults

blown in by storms, are discussed in detail elsewhere in this report.

Hemlock looper - Testing of the pheromone continued in 1992. Multi-Pher[®] traps were placed singly at 96 locations (Fig. 9). All but one of the traps captured moths, some of them by the thousands (highest catch was 3,054) and some of the "unsaturating" traps were filled to overflow. Trap catches correspond well with other population level indicators (defoliation, larval counts, light trap catches), especially in New Brunswick. The lower than expected catches in areas of defoliation in Nova Scotia may be related to the low egg counts found there during fall surveys.

Jack pine budworm - The proportion of positive traps remained unchanged (60%) and trap catches declined marginally from 1991 (Fig. 10). The results are consistent with a lack of larval populations and defoliation during the year.

Oak leafroller - Although there was some fluctuation in individual trap catches when compared to

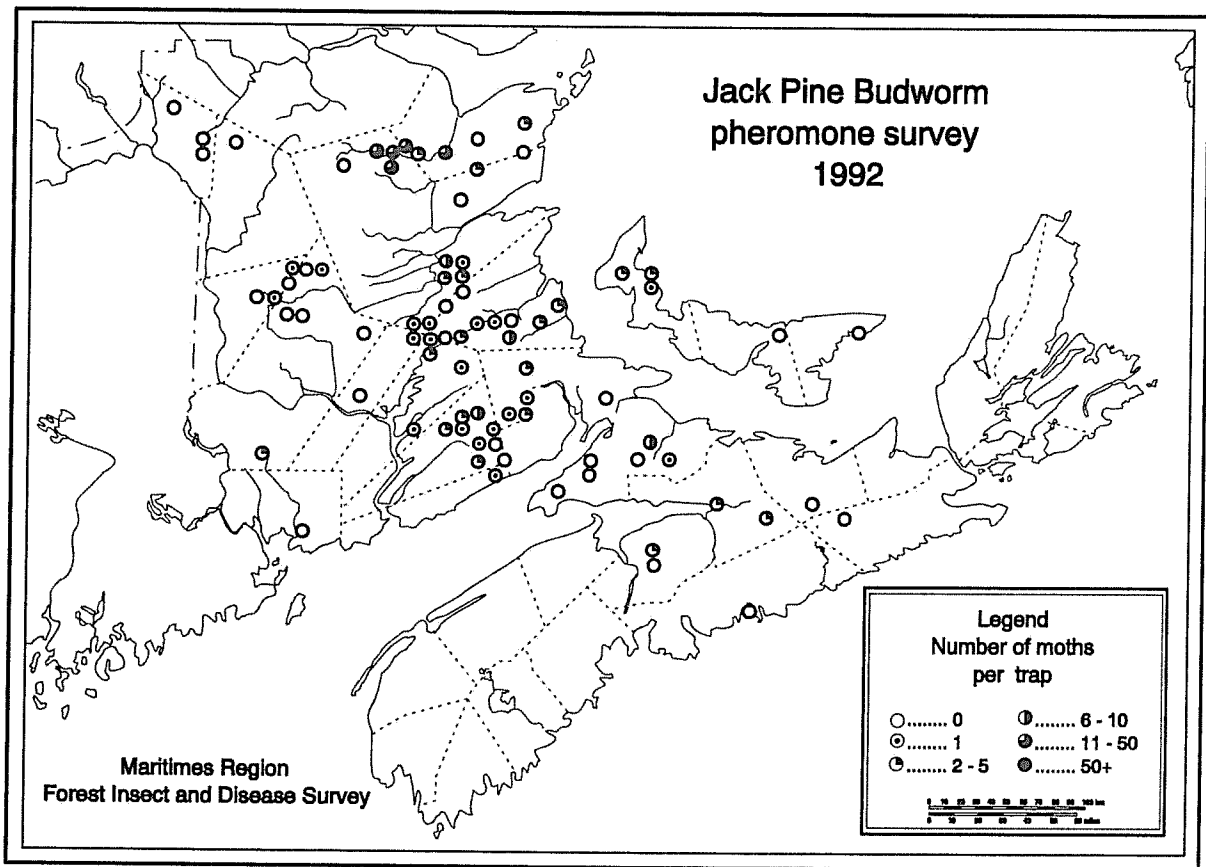


Figure 10

adults captured at the same specific locations last year, there was no real change in overall captures in 1992 (Fig. 11). The 1992 observations will aid in the calibration of the trapping system and our ability to make predictions in the future.

Oak leaf shredder - The number of moths captured in 1992 in western Nova Scotia increased from 1991 in the majority of the traps but still remains lower than in New Brunswick. (Fig. 12).

Spruce budmoths - Testing continued for two species of budmoth, *Zeiraphera canadensis* and *Zeiraphera unfortunana*. While regional trapping programs determine the distribution of these insects, difficulties remain in finding an effective trap placement design. Therefore, it is not appropriate to present results until these problems are resolved.

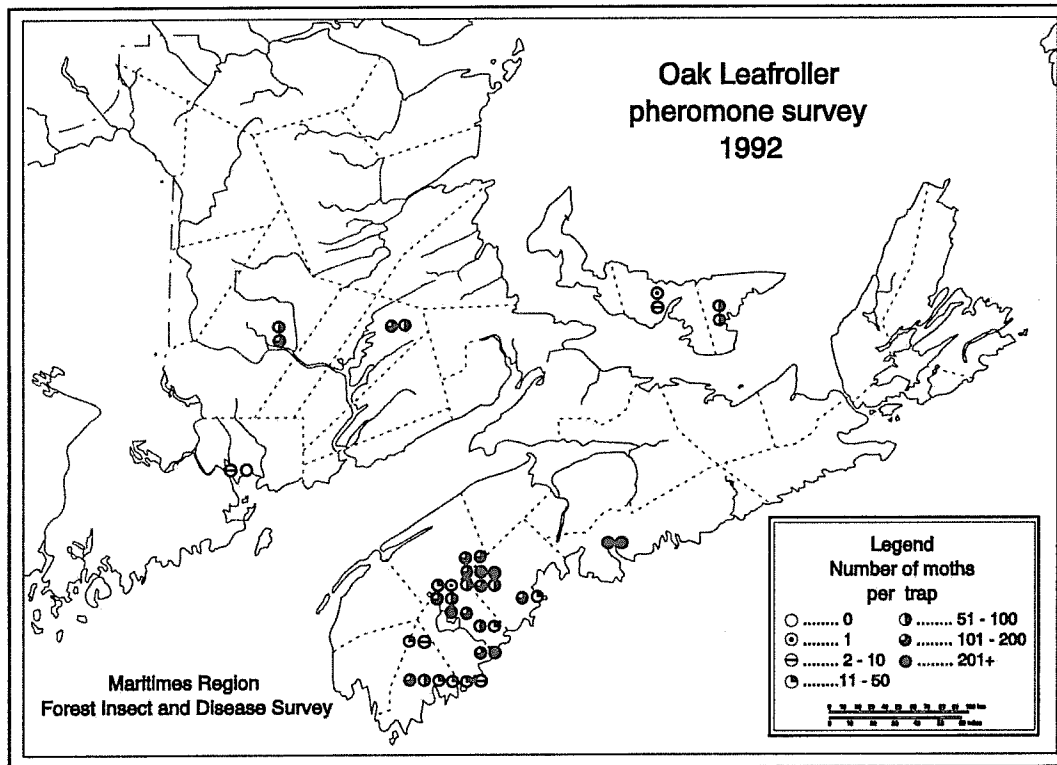


Figure 11

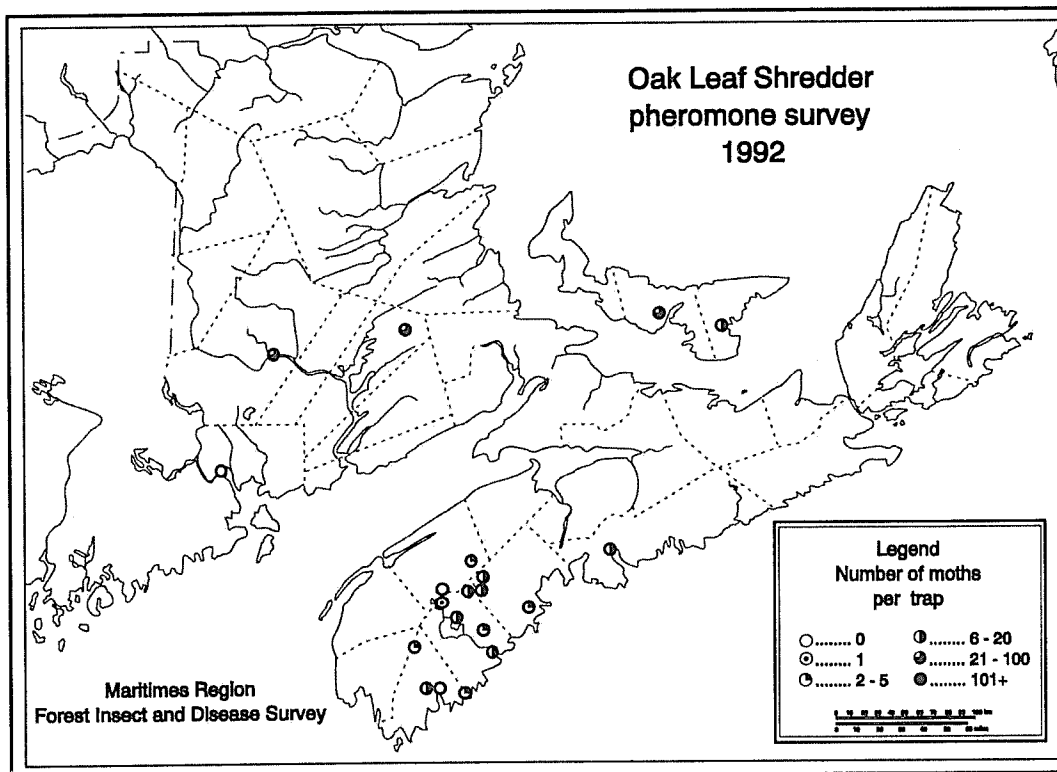


Figure 12

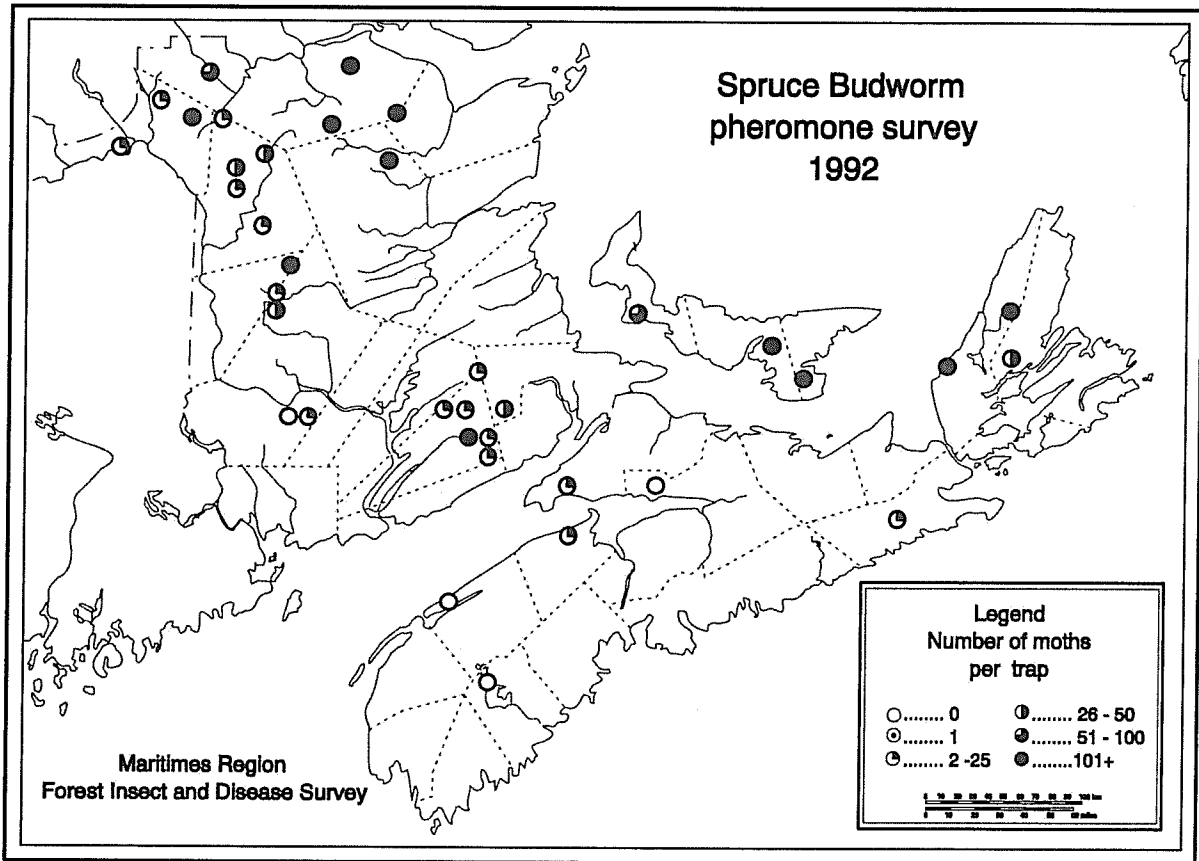


Figure 13

Spruce budworm - The number of spruce budworm pheromone trapping locations was increased to 35 in 1991 from 24 in 1990, in an effort to better describe the population distribution. In 1992, two or three traps were employed at each of 37 trapping locations. Pheromone trapping results for 1992 (Fig. 13) correspond well with spruce budworm defoliation, especially the high catches

in northern New Brunswick and in eastern Prince Edward Island. A feature of this trapping system is that the traps are sensitive enough to detect populations where no visible defoliation occurs. Data from additional years will be required before the system can be used to make predictions regarding defoliation.

The Light Trap Monitoring System

Light traps have been used in the Maritimes to monitor forest insect populations since shortly after the Second World War. The traps use a built-in light source to attract insects, which are killed in the trap. The insects are then sent in to the Forest Insect and Disease Survey to be identified and counted. The information is used in the design of surveys, prediction of populations, and research.

The 14 light traps in the Maritimes region are maintained by Forestry Canada personnel, provincial government cooperators, National Parks personnel, industrial concerns or private individuals on behalf of the Forest Insect and Disease Survey. They operate from mid-April until late fall. Catches are collected daily and are submitted weekly for identification. Trap design and light source were standardized in 1976 and trap locations remain the same whenever possible.

Light trap locations in the Maritimes region in 1992 were:

New Brunswick

Acadia Forest Exp. Sta., Ripples,
Sunbury County
Ashton Hill, Northumberland County
Canterbury, York County
Fundy National Park, Albert County
Mayfield, Charlotte County
Nash Creek, Restigouche County
Plaster Rock, Victoria County

Nova Scotia

Big Intervale, Victoria County
Georgeville, Antigonish County
Kejimikujik National Park, Annapolis County
Londonderry, Colchester County

Prince Edward Island

Breadalbane, Queens County
Howlan, Prince County
Kilmuir, Kings County

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We wish to thank our summer students, casuals, and the numerous staff members at Forestry Canada - Maritimes Region who contributed in many ways.

Special thanks go to Tracy Burns, Ron Hallett, Ed Kettela, Scott McConaghy, Richard Morin, Harvey Munn and his staff, Caroline Simpson, and Jon Sweeney.

Much of the information on the status and control of the spruce budworm and hemlock looper is based on data provided by other organizations as listed in the appropriate chapters.

Information contributed by the Pest Detection Officers and other staff members of the New Brunswick Department of Natural Resources and Energy, the Nova Scotia Department of Natural Resources, and the Prince Edward Island Department of Energy and Forestry is acknowledged and appreciated. Special thanks go to those who participated in the various pheromone surveys.

The Canadian Parks Service of Environment Canada, the New Brunswick Department of Natural

Resources and Energy, the Nova Scotia Department of Natural Resources, and private individuals operated light traps during the season, as did the staff at the Forestry Canada Acadia Forest Experiment Station. Their cooperation is appreciated.

Thanks go to the companies whose participation in the expanded plantation pest assessment surveys made this project a truly federal-provincial-industrial undertaking. Some of them also participated in other projects, especially the pheromone program.

The contribution and cooperation of private citizens and of personnel at all levels of industrial organizations, various municipalities, and educational institutions are noted with thanks. Their efforts on our behalf in so many ways not only make our work easier but also make us a more effective unit. Special thanks to Don Murray of the City of Fredericton.

We acknowledge the contribution of scientists of the Centre for Land and Biological Resources Branch (CLBRB) of Agriculture Canada for identifications provided.

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 Forestry Canada - Maritimes Region produced in 1992.

Bowers, W.W., Hudak, J., and Raske, A.G. (*Editors*) with Magasi, L.P., Lachance, D., Myren, D.T., Cerezke, H.F., and Van Sickle, G.A. 1992. Host and vector surveys for the pinewood nematode, *Bursaphelenchus xylophilus* (Steiner and Buhrer) Nickle (Nematoda: Aphelenchoidae) in Canada. FC-Nfld & Labrador Region Information Report N-X-285.

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Hurley, J.E., and Magasi, L.P. 1992. Highlights of forest pest conditions in the Maritimes in mid-June 1992. FC-MR Tech. Note 268.

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Simpson, R.A. 1992. Nova Scotia plantation pest assessment survey report for 1991. FC-MR Tech. Note 263.

Walsh, T.J. 1992. Forest insects and diseases in Kejimikujik National Park in 1991. FC-MR Tech. Note 261.

OTHER INSECTS AND DISEASES

This table lists alphabetically, by common name, most insects and diseases encountered in the Maritimes in 1992 but not discussed in detail elsewhere in the report. 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., larch sawfly, is at an ebb of biological activity and did not cause enough concern in 1992 to warrant detailed discussion. It may be that, although severe, an organism, e.g., seedling debarking weevil, was only of localized importance in 1992.

INSECT OR DISEASE	HOST(S)	REMARKS
Alder flea beetle <i>Altica ambiens alni</i> Harr.	Alder	Overall, intensity similar to 1991 levels in the region. Various levels of leaf browning, mostly in southern New Brunswick; in Nova Scotia, light, moderate, and patches of severe browning common; in Prince Edward Island, scattered light, moderate and severe patches of browning in Queens and Kings counties with a few moderate patches in Prince Co.
Ambermarked birch leafminer <i>Profenusa thomsoni</i> (Konow)	White birch Wire birch	Found at light or moderate levels, mainly in southwestern New Brunswick; highest (28% of leaves) at Big Brook, Restigouche Co. Trace damage at a few locations in Nova Scotia and moderate on 60% of leaves at Mount Vernon, Queens Co., P.E.I.
Anthraxnose of hardwoods <i>Discula quercina</i> (West.) Arx	Beech Black ash English oak Red maple Sugar maple White ash	In New Brunswick, trace leaf browning at Buctouche, Kent Co. In Nova Scotia, leaves on all English oak trees were severely damaged at Wolfville, Kings Co. Trace injury at Indian River, Prince Co., P.E.I.
Anthraxnose of maple <i>Kabatiella apocrypta</i> (Ell. & Ev.) Arx	Red maple Sugar maple	Found at trace levels at one location in each of New Brunswick and Nova Scotia. No reports from Prince Edward Island.
Apple-and-thorn skeletonizer <i>Choreutis pariana</i> (Cl.)	Apple	Light to severe defoliation was reported at ten locations in Nova Scotia, and 22 locations throughout Prince Edward Island. No reports from New Brunswick.
Ash rust <i>Puccinia sparganioides</i> Ell. & Barth.	White ash	Second consecutive year of reduced infection levels, only a few trees affected at two locations in Yarmouth county, N.S. No reports from New Brunswick or Prince Edward Island.
Ash yellows	Ash	Not found in region to date. This disease is present in the United States and remains a concern to plant quarantine officials.

INSECT OR DISEASE	HOST(S)	REMARKS
Aspen leafrollers <i>Epinotia criddleana</i> (Kft.) <i>Pseudexentera oregonana</i> (Wlshm.)	Trembling aspen White birch	Leafrolling at many locations throughout the region, but most significant in northwestern New Brunswick where damage to trembling aspen, most noticeably in saplings and young stands, by <i>Pseudexentera oregonana</i> was found at all damage levels; most noticeable at St. Leonard, Madawaska Co., where a 12-ha trembling aspen stand was severely damaged; in Nova Scotia, 35% leafrolling at Brierly Brook, Antigonish Co.; and in Prince Edward Island, a mixed population averaging 6% damage in all counties. Light trap catches of spotted aspen leafroller down at most locations except at Kilmuir, Kings Co., P.E.I. (90 adults caught, up from 35 in 1991).
Birch-aspen leafroller <i>Epinotia solandriana</i> (L.)		
Darkheaded aspen leafroller <i>Anacampsis innocuella</i> (Zell.)		
Lighthheaded aspen leafroller <i>Anacampsis niveopulvella</i> (Clem.)		
Spotted aspen leafroller <i>Pseudosciaphila duplex</i> (Wlshm.)		
Aspen webworm <i>Tetralopha aplastella</i> (Hlst.)	Trembling aspen	Trace and light damage in northwestern New Brunswick; highest (16% of leaves) at St-Jean-Baptiste, Restigouche Co. No reports from Nova Scotia or Prince Edward Island.
Bagworm <i>Thyridopteryx ephemeraeformis</i> (Haw.)	Balsam fir Tamarack	In Nova Scotia, low populations at four locations with no associated damage. No reports from New Brunswick or Prince Edward Island.
Balsam bark weevil <i>Pissodes dubius</i> Rand.	Balsam fir	No reports in 1992.
Balsam fir bark beetle <i>Pityokteines sparsus</i> (LeC.)	Balsam fir	Affected a few weakened trees at one location each in New Brunswick and Nova Scotia. No reports from Prince Edward Island.
Balsam fir sawfly <i>Neodiprion abietis</i> (Harr.)	Balsam fir	Population levels remain low in region.
Balsam fir tip blight <i>Delphinella balsameae</i> (Waterm.) E. Muell.	Balsam fir	No reports in 1992.
Balsam shootboring sawfly <i>Pleroneura brunneicornis</i> Roh.	Balsam fir	In New Brunswick, damage was much reduced from 1991. Light damage on 80% of trees north of Harrington, Queens Co., P.E.I. No reports from Nova Scotia.
Balsam woolly adelgid <i>Adelges piceae</i> (Ratz.)	Balsam fir	Infestation continues at light levels in region. In New Brunswick, incidence and infestation levels similar to 1991; highest (32% twigs damaged on 65% of trees) on Campobello Island, Charlotte Co. In Nova Scotia, more widespread than 1991, averaging light twig and stem damage at 25 locations; highest twig damage 40% at Walker Lake, Cape Breton Co. and 32% at Round Bay and West Head, Shelburne Co. Present at low levels on Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Beech bark disease <i>Nectria coccinea</i> var. <i>faginata</i> Lohm., Wats. & Ayers	Beech	Cankered trees common throughout the region. Infection ranged from 8 to 100% of trees in numerous stands examined.
and		
Beech scale <i>Cryptococcus fagisuga</i> Linding.		
Birch casebearer <i>Coleophora serratella</i> (L.)	Alder White birch Wire birch Yellow birch	In New Brunswick, found at more than 70 locations, mainly trace and light damage; highest (moderate and severe damage on white birch and yellow birch) at Mount Carleton Provincial Park, Northumberland Co. Damage levels in Nova Scotia at 1991 levels of mainly trace and light. Found at 64 locations, highest (96%) at Cap Rouge on white birch leaves and moderate at Petit Etang, Inverness Co. In Prince Edward Island, mainly trace damage, averaging 34% white birch leaves on nearly all of the trees.
Birch leafminer <i>Fenusa pusilla</i> (Lep.)	White birch Wire birch Yellow birch	Widespread in New Brunswick at trace to moderate damage levels; highest was moderate browning on white birch at Pow Brook, Albert Co. Found at seven locations in Nova Scotia at trace or light levels. In Prince Edward Island, trace, light, and patchy severe damage in Prince and Queens counties.
Birch sawfly <i>Arge pectoralis</i> (Leach)	Alder White birch Wire birch	Single report from each province, with only a few larvae and no damage.
Bruce spanworm <i>Operophtera bruceata</i> (Hlst.)	Apple Sugar Maple Trembling aspen	A few larvae at scattered locations throughout New Brunswick. Light damage on sugar maple in Truro, Colchester Co., and at Collingwood Corner, Cumberland Co., Nova Scotia. No reports from Prince Edward Island. Light trap catches up at six of seven New Brunswick locations, highest was 308 adults at Plaster Rock, Victoria Co.
Canker of larch <i>Potenzia myces coniferarum</i> (Hahn) Smerlis	Tamarack	One tree affected at each of two locations in New Brunswick. In Nova Scotia, trace damage at four locations. Common in Prince Co., but found at only a few locations elsewhere in Prince Edward Island.
Canker on spruce <i>Botryosphaeria piceae</i> Funk	White spruce	Found for the first time in the Maritimes, light damage to white spruce shoots at White Point, Queens Co., N.S. No reports from New Brunswick or Prince Edward Island.
Cedar leafminers <i>Argyresthia aureoargentella</i> Brower <i>Argyresthia freyella</i> (Wlshm.) <i>Argyresthia thuella</i> (Pack.) <i>Coleotechnites thujaella</i> (Kft.)	Cedar	In New Brunswick, trace to severe foliage damage throughout, most noticeable near Saint John, St. John Co., with severe damage found on all trees. One report from Nova Scotia at Sheet Harbour, Halifax Co. In Prince Edward Island, scattered patches of light and moderate damage in Prince Co.

INSECT OR DISEASE	HOST(S)	REMARKS
Cherry blight	Choke cherry Pin cherry	In New Brunswick, damage increased in incidence and intensity from trace and light in 1991 to light and severe in 1992. In Nova Scotia, damage decreased in incidence and intensity with mainly trace or light damage, except for severe patches in northern Victoria Co. In Prince Edward Island, damage increased from trace and light in 1991, to light and moderate in 1992.
Cherry casebearer <i>Coleophora pruniella</i> Clem.	Trembling aspen	In New Brunswick, trace damage at Clark Lake, Kings Co. In Prince Edward Island, damage decreased in 1992 to scattered patches of light to severe leaf browning mainly in southern Kings and Queens counties. No reports from Nova Scotia.
Deterioration of cedar	Cedar	In Saint John Co., N.B., condition of the trees seemed to worsen. The initial cause of deterioration remains uncertain. In Prince Edward Island, trees in the Miscouche - Wellington area, Prince Co., show increasing dieback, possibly due to repeated cedar leafminer damage. No reports from Nova Scotia.
Diplodia tip blight <i>Sphaeropsis sapinea</i> (Fr.) Dyko & Sutton	Red pine Scots Pine	Severe damage on several red pine in Truro, Colchester Co., and moderate on several Scots pine, Argyle Head, Yarmouth Co., N.S. No reports from New Brunswick or Prince Edward Island.
Eastern blackheaded budworm <i>Acleris variana</i> (Fern.)	Balsam fir White spruce	A few larvae and moths were collected throughout the region — most commonly in New Brunswick.
Eastern dwarf mistletoe <i>Arceuthobium pusillum</i> Peck	Spruce	In Nova Scotia, found at 16 locations, highest incidence at Creignish, Inverness Co., where 2 to 3 km of roadside white spruce had patchy severe damage and some mortality occurred. No reports from New Brunswick or Prince Edward Island.
Eastern spruce gall adelgid <i>Adelges abietis</i> (L.)	Black spruce Red spruce White spruce	Present throughout the region, generally at trace and light infestation levels. Highest (39% of shoots) at Kouchibouguac National Park, Kent Co., N.B.; Grand Anse River (36%), Inverness Co., N.S. and at Rustico Island (27%), Queens Co., P.E.I.
Eastern tent caterpillar <i>Malacosoma americanum</i> (F.)	Alder Apple Cherry	Found throughout New Brunswick, except in Madawaska and Restigouche counties, at population levels similar to 1991; nests common in southern areas especially along Youngs Cove Road, Queens Co. In Nova Scotia, up slightly from 1991, nests found throughout most of the province. Scattered nests observed throughout Prince Edward Island.
Elm leaf beetle <i>Pyrrhalta luteola</i> (Mill.)	Elm	Moderate and severe foliage browning widespread throughout the city of Fredericton, York Co., N.B. No reports from Nova Scotia or Prince Edward Island.
Elm leafminer <i>Fenusa ulmi</i> Sund.	Elm	Light and moderate leaf browning with some severe patches on exotic elms throughout Nova Scotia and Prince Edward Island. No reports from New Brunswick.

INSECT OR DISEASE	HOST(S)	REMARKS
European pine sawfly <i>Neodiprion sertifer</i> (Geoffroy)	Red pine Scots pine	In Nova Scotia, a few insects at Canning, Kings Co. In Prince Edward Island, trace damage south of Valleyfield, Kings Co. No reports from New Brunswick.
European pine shoot moth <i>Rhyacionia buoliana</i> (D. & S.)	Austrian pine Red pine Scots pine	Trace or light damage was reported throughout Nova Scotia and Prince Edward Island. Light damage on 96% of trees at Beaver Cove, Cape Breton Co., N.S.; trace damage on 86% of trees south of Valleyfield, Kings Co., P.E.I. No reports from New Brunswick.
European spruce sawfly <i>Gilpinia hercyniae</i> (Htg.)	Spruce	Present at low numbers throughout the region, most common in Nova Scotia.
Fall cankerworm <i>Alsophila pometaria</i> (Harr.)	Hardwoods	In New Brunswick, only one report of moderate and severe defoliation on Manitoba maple from Petit Rocher to Bathurst, Gloucester Co. In Nova Scotia, moderate and severe defoliation recorded at eight locations, seven in central and eastern Nova Scotia. Mixed populations with winter moth caused light and moderate defoliation throughout Prince Edward Island.
Fall webworm <i>Hyphantria cunea</i> (Dru.)	Hardwoods	Nests were common throughout southern New Brunswick at numbers similar to 1991. Nests more common throughout Nova Scotia than in 1991 and less common throughout Prince Edward Island.
Flat leaf tiers <i>Psilocorsis reflexella</i> Clem.	Hardwoods	In New Brunswick, one report of severe damage on 35% of trembling aspen leaves at Canoose River, Charlotte Co. In Nova Scotia, an average of 6% of leaves at 16 locations, and Prince Edward Island, an average of 7% of leaves on 61% of trees at eight locations throughout province.
<i>Psilocorsis</i> spp.		In Nova Scotia, trace or light damage, at seven locations. No reports from New Brunswick or Prince Edward Island.
Foureyed spruce bark beetle <i>Polygraphus rufipennis</i> (Kby.)	Spruce	No reports in 1992.
Frost damage	Conifers Hardwoods	Severe damage common in New Brunswick, especially on hardwoods in southern areas, damage light on conifers. In Nova Scotia, trace or light damage reported at 40 locations. In Prince Edward Island, damage trace to moderate on conifers; highest (65%) on balsam fir shoots at Valleyfield, Kings Co.
Gall mites <i>Eriophyidae</i>	Hardwoods	Mites affected an average of 23%, 20% and 25% of leaves in New Brunswick, Nova Scotia and Prince Edward Island respectively, ranging from 1 to 95%.
Globose gall rust <i>Endocronartium harknessii</i> (J.P. Moore) Y. Hiratsuka	Jack pine Red pine Scots pine	Found at three locations in New Brunswick; most common (40% of trees) at Black River, Northumberland Co. No reports from Nova Scotia or Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Greenheaded spruce sawfly <i>Pikonema dimmockii</i> (Cress.)	Spruce	Populations remained low throughout the region.
Greenstriped mapleworm <i>Dryocampa rubicunda rubicunda</i> (F.)	Maple	In New Brunswick, reported at five of six light trap locations; highest (25 moths) at Ashton Hill, Northumberland Co., N.B. Trace damage at one location in Nova Scotia and at three locations in Prince Edward Island.
Hail damage	Conifers Hardwoods	In New Brunswick, severe damage to conifers and hardwoods on a 100-ha site near Black Brook, Victoria Co.; also, light damage at Popelogan Lake Branch, Restigouche Co. and at Coombes Brook, Madawaska Co. No reports from Nova Scotia or Prince Edward Island.
Hare damage	Conifers	No reports in 1992.
Hypoxylon canker <i>Hypoxylon mammatum</i> (Wahl.) Mill.	Trembling aspen	In New Brunswick, found throughout averaging 8% mortality; highest (24% of trees) at St. Philippe, Westmorland Co. An average of 8% infected at six locations in Nova Scotia. In Prince Edward Island, an average of 12% at eight locations; highest (52%) at Rustico Island, Queens Co.
Ink spot of aspen <i>Ciborinia whetzellii</i> (Seaver) Seaver	Trembling aspen	In New Brunswick, trace and light damage at a few locations in Charlotte, Queens, and Gloucester counties; highest (36% of leaves on all trees) at Bois Blanc, Gloucester Co. In Nova Scotia, one report of trace damage. No reports from Prince Edward Island.
Jack pine budworm <i>Choristoneura pinus pinus</i> Free.	Jack pine	No damage, but a few moths caught in the two northeastern light traps in New Brunswick. No reports from Nova Scotia or Prince Edward Island.
Larch needleworm <i>Zeiraphera improbana</i> (Wlk.)	Tamarack	In New Brunswick and Nova Scotia, only reports were of a few adults caught at light trap locations. In Prince Edward Island, trace damage at Derby, Prince Co.
Larch sawfly <i>Pristiphora erichsonii</i> (Htg.)	Tamarack	Repeated severe defoliation on 2-ha area at Rexton, Kent Co., N.B. In Nova Scotia, six reports; highest (moderate and severe defoliation) at Marinette, Halifax Co. No reports from Prince Edward Island.
Large aspen tortrix <i>Choristoneura conflictana</i> (Wlk.)	Trembling aspen	No reports in 1992.
Leaf and twig blight of aspen <i>Venturia macularis</i> (Fr.) E. Muell. & Arx	Largetooth aspen Trembling aspen	In New Brunswick, intensity and incidence same as 1991 levels, averaging 14% of shoots on 65% of the trees. Most severe in central areas with all saplings severely damaged at Newmarket, York Co. In Nova Scotia, at 11 locations averaging 14%, highest (96%) at Second Lake, Digby Co. Trace at two locations and moderate leaf spotting at one location in Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Leaf blister <i>Taphrina carnea</i> Johanson	White birch Yellow birch	Trace or light at ten locations in New Brunswick; highest (16% of leaves on all trees) at Brookville, Carleton Co. Two reports from Nova Scotia; highest (33% of leaves) at McAlese Lake, Cumberland Co. No reports from Prince Edward Island.
Leaf blotch of horse-chestnut <i>Guignardia aesculi</i> (Peck) V.B. Stew.	Horse-chestnut	Found wherever host occurs in the region. Moderate and severe browning on Deer and Campobello Islands, Charlotte Co., N.B. In Nova Scotia, intensity down from 1991 to mainly light and moderate damage. Found throughout Prince Edward Island at trace to moderate levels.
Leafcone caterpillars <i>Caloptilia</i> spp.	Trembling aspen White birch Wire birch Yellow birch Pin cherry Sugar maple	Common in New Brunswick at mainly trace levels; highest was light damage to 100% of white birch at North Nigadoo River, Gloucester Co. Trace or light in Nova Scotia at seven locations. Trace at two locations in Prince Edward Island.
Leaf fungus of largetooth aspen <i>Astrodochium coloradense</i> Ell. & Ev.	Largetooth aspen	A leaf fungus, first reported as "Early leaf browning" in 1986, has been identified. This fungus, a new record for the Maritimes, caused moderate and severe foliage discoloration on scattered trees throughout western Nova Scotia; highest was severe browning on several dozen trees at Upper Vaughan, Hants Co. No reports from New Brunswick or Prince Edward Island.
Lesser maple spanworm <i>Itame pustularia</i> (Gn.)	Red maple Sugar maple	In New Brunswick, trace or light damage, except for moderate damage in Restigouche and Gloucester counties; highest (81% of leaves on 100% of trees) at South Benjamin River, Restigouche Co. Increased at all light trap locations in New Brunswick; highest (574 moths) at Acadia Forest Experiment Station, Sunbury Co. Trace or light damage at 32 locations in ten counties in Nova Scotia. Moth catches up at two of six light trap locations; highest (516 moths) at Kejimikujik National Park, Annapolis Co. In Prince Edward Island, mainly light damage; (71% of leaves) at Pleasant Grove, Queens Co.; two of three light trap catches showed increases; highest (100 moths) at Howlan, Prince Co.
Maple bladder gall mite <i>Vasates quadripes</i> (Shim.)	Red maple Sugar maple	Common and widespread throughout region. In New Brunswick, an average of 32% of leaves affected on 72% of trees at 35 locations; highest (93% of leaves on all trees) at North Branch, Gloucester Co. In Nova Scotia, 32% of leaves on 75% of trees at 58 locations; highest (75% of leaves on all trees) north-west of Broad Cove, Victoria Co. In Prince Edward Island, 30% of leaves on 66% of trees at 13 locations, highest (88% of leaves on all trees) at Bear River, Kings Co.
Maple leafroller <i>Sparganothis acerivorana</i> Mack.	Red maple Sugar maple	In New Brunswick, leafroller damage was more common than in 1991, averaging 8% of leaves rolled on 58% of maples at 18 locations; highest (moderate and severe on 2 ha of sugar maple) near Lower Queensbury, York Co. In Nova Scotia, two locations with trace defoliation. Light to moderate leafrolling on 2- to 10-ha patches of red maple in eastern Kings Co., P.E.I., elsewhere, trace at five locations.

INSECT OR DISEASE	HOST(S)	REMARKS
Maple spindlegall mite <i>Vasates aceris-crumena</i> (Rly.)	Red maple Sugar maple	Common throughout the region. In New Brunswick, an average of 20% of leaves had galls at nine locations; highest (61%) at McLean Brook, York Co. In Nova Scotia, 32% of leaves at nine locations; highest (48%) at Sutherlands Mountain, Pictou Co. In Prince Edward Island, 16% of leaves at four locations; highest (23%) at Freetown, Prince Co.
Mites <i>Oligonychus milleri</i> (McGregor) <i>Oligonychus ununguis</i> (Jacobi)	Conifers	See under Seed Orchard Pests.
Mountain ash sawfly <i>Pristiphora geniculata</i> (Htg.)	Mountain ash	Trace damage on a few trees in Nova Scotia and Prince Edward Island. No reports from New Brunswick.
Needle casts <i>Lirula macrospora</i> (Hartig) Darker	Black spruce Norway spruce Red spruce White spruce	In New Brunswick, found at two locations; highest (40% of red spruce needles) at Hornes Gulch, Restigouche Co. In Nova Scotia, found at ten locations usually at trace levels; highest (20% of white spruce needles), north of Ingonish Beach, Victoria Co. No reports from Prince Edward Island.
<i>Lirula mirabilis</i> (Darker) Darker	Balsam fir	No reports in 1992.
<i>Lirula nervata</i> (Darker) Darker	Balsam fir	Trace or light damage at two locations in each of New Brunswick and Prince Edward Island. In Nova Scotia, damage averaged 5% at 19 locations, highest (20%) at White Point, Queens Co.
<i>Phaeocryptopus gaeumannii</i> (Rohde) Petr.	Douglas fir	In Prince Edward Island, 60% needle damage at Brookvale, Queens Co. No reports from New Brunswick or Nova Scotia.
<i>Rhabdochline weirii</i> Parker & Reid	Douglas fir	No reports in 1992.
<i>Bifusella linearis</i> (Peck) Hoehn.	White pine	Found on a few needles at Peskawa Lake, Digby Co., N.S. No reports from New Brunswick or Prince Edward Island.
Needle flecking	Conifers	Trace and light damage at six locations in New Brunswick and at 15 locations in Nova Scotia. Trace to moderate damage at six locations throughout Prince Edward Island.
Needle rusts on balsam fir <i>Melampsora abietis-capraearum</i> Tub. <i>Pucciniastrum epilobii</i> Otth <i>Pucciniastrum goeppertianum</i> (Kuehn) Kleb. <i>Pucciniastrum</i> sp. <i>Uredinopsis</i> spp.	Balsam fir	Trace or light infection at 48 locations throughout the region. The highest, light damage on 11% of needles by <i>Uredinopsis</i> sp. at Miller Lake, Restigouche Co. and 11% of needles by <i>P. epilobii</i> at Cormier Cove, Westmorland Co., N.B.
Needle rust on eastern hemlock <i>Melampsora abietis-canadensis</i> C.A. Ludwig ex Arth. <i>Melampsora farlowii</i> (Arthur) Davis <i>Pucciniastrum vaccinii</i> (Wint.) Jorst.	Eastern hemlock Largetooth aspen	In Nova Scotia, <i>M. abietis-canadensis</i> caused trace damage to leaves and needles at three locations and moderate to severe damage on hemlock cones at two locations; trace damage by <i>P. vaccinii</i> at two locations; no reports of <i>M. farlowii</i> in 1992. No reports from New Brunswick or Prince Edward Island.
Needle rusts on pine <i>Coleosporium asterum</i> (Diet.) Syd. <i>Coleosporium viburni</i> Arthur	Jack pine Red pine	<i>C. asterum</i> , caused trace and light damage on red pine at six locations in the region. Light to severe infection on jack pine at three locations in New Brunswick. No reports of <i>C. viburni</i> .

INSECT OR DISEASE	HOST(S)	REMARKS
Needle rusts on spruce <i>Chrysomyxa ledi</i> dBy. <i>Chrysomyxa ledicola</i> Lagh.	Black spruce Colorado blue spruce Red spruce White spruce	<i>C. ledi</i> and <i>C. ledicola</i> caused trace to moderate damage throughout region. Highest by <i>C. ledi</i> moderate on 3-4 ha of black spruce at Marcelville, Northumberland Co., New Brunswick.
Needle rust on tamarack <i>Melampsora medusae</i> Theum.	Tamarack Trembling aspen	Trace damage on tamarack at two locations in New Brunswick and one location in Prince Edward Island. Light damage (21%) on trembling aspen at Caribou Marsh, Cape Breton Co., Nova Scotia.
Northern pitch twig moth <i>Petrova albicapitana</i> (Busck)	Jack pine	In New Brunswick, trace damage at eight locations. In Nova Scotia, trace damage at three locations. In Prince Edward Island, two locations; highest (36% of trees affected) at Foxley River, Prince Co.
Oak leaf tier <i>Psilocorsis quercicella</i> Clem.	Hardwoods	In Nova Scotia, an average of 7% of leaves damaged at six locations. In Prince Edward Island, trace defoliation on beech leaves at Bear River, Kings Co. No reports from New Brunswick.
Obliquebanded leafroller <i>Choristoneura rosaceana</i> (Harr.)	Hardwoods	In New Brunswick, trace leafrolling at 13 locations. In Nova Scotia, at endemic levels. In Prince Edward Island, trace defoliation at two locations.
Ocean salt spray	Red pine Scots pine White spruce	In Nova Scotia, light and moderate damage in a red pine plantation at Caribou, Pictou Co. In Prince Edward Island, moderate and severe damage to different tree species in Prince Edward Island National Park, Queens Co. No reports from New Brunswick.
Ocellate gall midge <i>Cecidomyia ocellaris</i> O.S.	Red maple Sugar maple	Trace and light at 28 locations throughout New Brunswick. Present at 63 locations across Nova Scotia, average leaf damage was 11%; highest (52% on 100% of red maple) at Dunn Lake, Queens Co. Average of 5% at 11 locations in Prince Edward Island.
Orange spruce needleminer <i>Coleotechnites piceaella</i> (Kft.)	Red spruce White spruce	In Nova Scotia, average of 14% of needles mined at 17 locations in 11 counties; highest (63%) at Beechmont, Cape Breton Co. In Prince Edward Island, average of 33% of needles affected at six locations; highest (52%) south of Bayfield, Kings Co. No reports from New Brunswick.
Pear thrips <i>Taeniothrips inconsequens</i> (Uzel)	Sugar maple	Found at five locations in New Brunswick, one in Nova Scotia and one in Prince Edward Island. No visible defoliation.
Pepper-and-salt moth <i>Biston betularia cognataria</i> (Gn.)	Red spruce White spruce	Trace at two locations in Nova Scotia. No reports from New Brunswick or Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Pine bark adelgid <i>Pineus strobi</i> (Htg.)	White pine	Less common in Nova Scotia than in 1991, averaging 10% at seven locations. Low numbers at one location in Prince Edward Island. No reports from New Brunswick.
Pine engraver <i>Ips pini</i> (Say)	Red pine	Found only on a single tree, south of Valleyfield, Kings Co., P.E.I. No reports from New Brunswick or Nova Scotia.
Pine leaf adelgid <i>Pineus pinifoliae</i> (Fitch)	Red spruce White pine	Single report from New Brunswick, of moderate damage on white pine at Castaway Stream, Kent Co. An average of 10% of white pine shoots affected in western half of Nova Scotia (3% in 1991). No reports from Prince Edward Island.
Pinewood nematode <i>Bursaphelenchus xylophilus</i> (Steiner & Buhner) Nickle	Conifers	No samples tested from the Maritimes in 1992.
Pinkstriped oakworm <i>Anisota virginensis virginensis</i> (Drury)	Red oak White birch	Single moth caught at light trap locations at Acadia Forest Experiment Station, Sunbury Co., N.B. and Kejimikujik National Park, Annapolis Co., N.S. No reports from Prince Edward Island.
Poplar felt mite <i>Phyllocoptes didelphis</i> Keifer	Largetooth aspen Trembling aspen	Trace damage in northern and western New Brunswick. In Nova Scotia, average infestation 10% of leaves at 26 locations; highest (53%) at Second Lake, Digby Co. Present at three locations in Prince Edward Island, with an average of 25% of leaves affected.
Poplar leaf-folding sawfly <i>Phyllocolpa</i> spp.	Balsam poplar Largetooth aspen Trembling aspen	Found throughout New Brunswick at 60 locations, average of 24% of leaves folded on 75% of trees; highest (89%) at Brockway, York Co. In Nova Scotia, average of 8% on 60% of trees at 19 locations; highest (41%) at Ingram River, Halifax Co. In Prince Edward Island, average 16% on 93% of trees at 14 locations; highest (39%) at Indian River, Prince Co.
Poplar leaf-mining sawfly <i>Messa populifoliella</i> (Town.)	Balsam poplar Carolina poplar Trembling aspen	No reports in 1992.
Poplar petiole gall moth <i>Ectoedemia populella</i> Busck	Trembling aspen	Light infestation at two locations in Nova Scotia. In Prince Edward Island, 18% of petioles affected on 86% of trees at five locations. No reports from New Brunswick.

INSECT	HOST(S)	REMARKS
Porcupine damage <i>Erethizon dorsatum</i> Linnaeus	Conifers	Girdled trees common throughout New Brunswick and Nova Scotia. Most serious, 40% of balsam fir at Mactaquac River, York Co., and 32% of balsam fir at Tracyville, Sunbury Co., N.B. In Nova Scotia, 25% of red pine affected in the Trafalgar burn area, Pictou Co., and similar feeding at Garden of Eden Barrens, Guysborough Co. Porcupines are not known in Prince Edward Island.
Ragged sprucegall adelgid <i>Pineus similis</i> (Gill.)	Black spruce Red spruce	In Nova Scotia, intensity increased but not as widespread as in 1991. Found at ten locations; highest (48% of red spruce shoots) north of Middle Beaver Lake, Halifax Co. No reports from New Brunswick or Prince Edward Island.
Red flag of balsam fir <i>Fusicoccum abietinum</i> (Hartig) Prill. & Delacr.	Balsam fir	Reported for the first time in many years in New Brunswick, light damage at Acton, York Co. In Nova Scotia, down from common occurrence in 1991, to a few locations, often mixed with damage from sawyer beetle and winter drying. No reports from Prince Edward Island.
Red pine cone beetle <i>Conophthorus resinosae</i> Hopk.	Red pine	Trace damage at one location in Nova Scotia. No reports from New Brunswick or Prince Edward Island.
Red spruce adelgid <i>Pineus floccus</i> (Patch)	Red spruce	Found mainly at trace or light levels in both New Brunswick and Nova Scotia; highest (43% shoots) at Rushy Lake, Yarmouth Co., N.S. No reports from Prince Edward Island.
Roadside salt damage	Conifers	Various intensity levels at scattered locations from all three provinces. Most common on red pine and white pine.
Saddled prominent <i>Heterocampa guttivitta</i> (Wlk.)	Red maple Sugar maple	Trace defoliation, Upper Burnside, Colchester Co., N.S. No reports from New Brunswick or Prince Edward Island.
Satin moth <i>Leucoma salicis</i> (L.)	Silver poplar	In New Brunswick, moderate or severe defoliation at eight locations. In Nova Scotia, trace to severe damage at five locations. In Prince Edward Island, moderate or severe defoliation throughout province.
Seedling debarking weevil <i>Hylobius congener</i> D.T., Sch. & Marsh.	Conifer seedlings	In Nova Scotia, weevils found at Mabou, Inverness Co. No reports from New Brunswick or Prince Edward Island.
Snow damage	Conifers	Trace and light damage at six locations in Nova Scotia and three locations in Prince Edward Island. No reports from New Brunswick.
Spearmarked black moth <i>Rheumaptera hastata</i> (L.)	White birch Yellow birch	Trace and light defoliation throughout northwestern New Brunswick. Trace damage at two locations in Nova Scotia. No reports from Prince Edward Island.
Spittlebugs <i>Aphrophora</i> spp. <i>Cercopidae</i>	Conifers Hardwoods	Present at low levels throughout the region.

INSECT	HOST(S)	REMARKS
Spotted tussock moth <i>Lophocampa maculata</i> Harr.	Hardwoods	Found in low numbers in light traps.
Spruce bud midge <i>Rhabdophaga swainei</i> Felt	Black spruce Red spruce White spruce	Trace and light damage throughout the region.
Spruce bud scale <i>Physokermes piceae</i> (Schr.)	Black spruce Red spruce White spruce	Trace shoot damage throughout most of the region.
Spruce coneworm <i>Dioryctria reniculelloides</i> Mut. & Mun.	Spruce	In Prince Edward Island, at endemic levels. No reports from New Brunswick or Nova Scotia.
Spruce gall adelgid <i>Adelges lariciatus</i> (Patch)	White spruce	In New Brunswick, trace damage at three locations. No reports from Nova Scotia or Prince Edward Island.
Spruce micro moth <i>Coleotechnites atripictella</i> (Dietz)	Red spruce White spruce	No reports in 1992.
Spruce twig aphid <i>Mindarus obliquus</i> (Cholod)	Black spruce Red spruce White spruce	In New Brunswick, trace shoot damage at four locations. In Nova Scotia, an average of 16% at 61 locations; highest (75%) north of Yarmouth, Yarmouth Co. Five locations in Prince Edward Island, average 36%, highest (59%) at Woodvale, Prince Co.
Stillwell's syndrome	Balsam fir	Incidence increased in northern New Brunswick; highest mortality (3-4 balsam fir per ha) at Robinsonville, Restigouche Co. In Nova Scotia, mortality remained low, but widespread. In Prince Edward Island, more common in Prince and Queens counties than in 1991 but less than high levels recorded in 1990.
Sugar maple borer <i>Glycobius speciosus</i> (Say)	Sugar maple	Trace or light damage at two locations each in New Brunswick and Prince Edward Island. No reports from Nova Scotia.
Tar spot of maple <i>Rhytisma acerinum</i> (Pers. ex St. Amans) Fr.	Red maple	Found at 16 locations in Nova Scotia, average 25%; highest (92%) at Mushpauk Lake, Yarmouth Co. In Prince Edward Island, 12% at five locations. No reports from New Brunswick.
Uglynest caterpillar <i>Archips cerasivorana</i> (Fitch)	Alder Cherry	Less common in region than in 1991. Areas with greatest number of nests included Redmondville, Northumberland Co. and Beaconsfield, Victoria Co., N.B.; Great Village and Glenholme, Colchester Co., N.S., and Rustico Island, Queens Co., P.E.I.
Variable oak leaf caterpillar <i>Lochmaeus manteo</i> Dbly.	Beech Red oak Sugar maple	Population levels were much reduced from the 1990 outbreak in New Brunswick and Nova Scotia. Single report of light damage in New Brunswick and only a few larvae were found in Nova Scotia. No reports from Prince Edward Island.

INSECT	HOST(S)	REMARKS
Wax filament scale <i>Xylococcus betulae</i> (Perg.)	Beech White birch	Found in southern New Brunswick, averaging 83% of white birch at 12 locations. In Nova Scotia, 23% of white birch at 11 locations; highest (84%) north of Petit Etang, Inverness Co. One report from Prince Edward Island, 12% of beech at Freetown, Prince Co.
Weevil <i>Strophosoma melanogrammus</i> Forst.	Balsam fir Red spruce White spruce	The two red spruce plantations assessed at Hunters Mountain, Victoria Co., N.S. in 1991 were re-examined in 1992. Although no weevils were found in 1992, mortality was 80% in one and 10% in the other plantation as a result of 1991 weevil attack. A few beetles were found at eight locations in Nova Scotia. No reports from New Brunswick or Prince Edward Island.
Whitemarked tussock moth <i>Orygia leucostigma</i> (J.E. Smith)	Balsam fir Red maple White birch White spruce	Low numbers of moths caught at five light trap locations in New Brunswick and Prince Edward Island. In Nova Scotia, larvae found at six locations, with no significant feeding.
White pine blister rust <i>Cronartium ribicola</i> J.C. Fisch.	White pine	More reports in New Brunswick than in 1991; at 19 locations in central region; highest (32% of white pine killed) at Nepisiquit Lake, Northumberland Co. No reports from Nova Scotia or Prince Edward Island.
White pine sawfly <i>Neodiprion pinetum</i> Nort.	White pine	No reports in 1992.
White pine weevil <i>Pissodes strobi</i> (Peck)	White pine Black spruce Norway spruce	Common and widespread throughout region. In New Brunswick, found at 49 locations; highest (64% of white pine) at Kouchibouguac National Park, Kent Co. In Nova Scotia, found at 33 locations; highest (16% of white pine) at three locations. In Prince Edward Island, six locations, highest (24%) at two locations.
Whitespotted sawyer beetle <i>Monochamus scutellatus</i> (Say)	Conifers	Incidence up significantly from 1991, with trace and light damage throughout region. In New Brunswick, 42 locations, highest (56%) of balsam fir at Tuadock River, Victoria Co. In Nova Scotia, 56 locations, highest (84%) of balsam fir at Lesterdale, Guysborough Co. In Prince Edward Island, three locations, highest (88%) of balsam fir at Camp Tamawaby, Prince Co.
Willow blight <i>Venturia saliciperda</i> Nuesch	Willow	Moderate damage at St. Rose, Gloucester Co., N.B. No reports from Nova Scotia or Prince Edward Island.
Willow flea weevil <i>Rhynchaenus rufipes</i> (LeC.)	Willow	Trace and light damage at one location in Charlotte Co., N.B. In Nova Scotia, moderate and severe browning similar to 1991, most widespread and intense in Antigonish Co. Common at moderate or severe levels throughout Prince Edward Island.

INSECT	HOST(S)	REMARKS
Wind damage	Hardwoods	Foliage browning by wind was down throughout the region from 1991. Trace browning and physical damage present at several New Brunswick locations; most significant at Penniac, York Co., where a small tornado uprooted and broke off a number of trees. In Nova Scotia, found at 27 locations across the province averaging 10% leaf damage (no browning on north and west facing slopes in Inverness and Victoria counties the year). Average leaf browning was 27% at 12 locations in Prince Edward Island; highest (64% of red maple leaves) at Pleasant Grove, Queens Co.
Winter drying	Conifers	Less severe than in 1991. In New Brunswick, trace or light damage in central part of province and moderate at a few other locations. In Nova Scotia, various damage intensity levels at 16 locations in 10 counties. Not common in Prince Edward Island but moderate and severe damage in a 2-ha white pine plantation at Albion Cross, Kings Co.
Winter moth <i>Operophtera brumata</i> (L.)	Hardwoods	Severe defoliation on apple at Riverside, Albert Co., N.B. Found in Nova Scotia at 12 locations, with moderate or severe defoliation common on apple in Antigonish area, Antigonish Co. More widespread than in 1991 in Prince Edward Island, light to severe throughout.
Witches' broom of balsam fir <i>Melampsorella caryophyllacearum</i> Schroet.	Balsam fir	Present at trace levels in eastern New Brunswick and in Prince Edward Island. In Nova Scotia, at 12 locations; highest (12% of trees) at Ellershouse, Hants Co.
Witches' broom of spruce <i>Chrysomyxa actostaphyli</i> Diet.	White spruce	Light damage on 32% of white spruce at Cape George, Antigonish Co., N.S. No reports from New Brunswick and Prince Edward Island.
Woolly alder aphid <i>Paraprociphilus tessellatus</i> (Fitch)	Alder	Light infestation in Restigouche and southern Charlotte Co., New Brunswick. In western Nova Scotia, light or moderate levels at many locations. No reports from Prince Edward Island.
Yellowheaded spruce sawfly <i>Pikonema alaskensis</i> (Roh.)	Black spruce Norway spruce White spruce	In southeastern New Brunswick, found at four locations; pockets of severe damage in black spruce plantation at Hammondvale, Kings Co. Found at 11 locations in Nova Scotia; highest, light to severe on a Norway spruce plantation, south of Glen Bard, Antigonish Co. In Prince Edward Island, decreased somewhat from 1991, but still light to severe at a few locations.