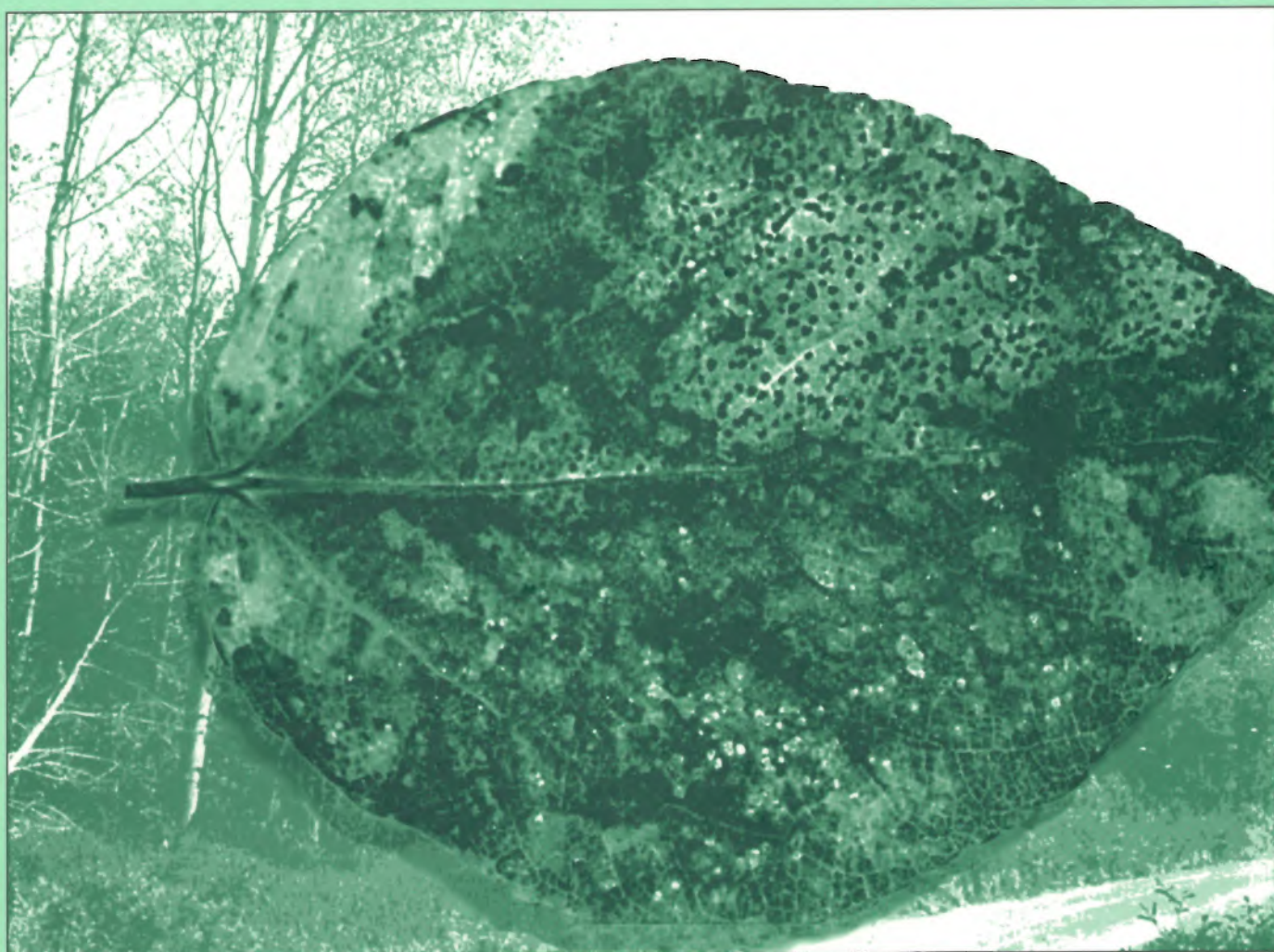


Forest pest conditions in the Maritimes in 1993

by
Laszlo P. Magasi
and
J. Edward Hurley

Canadian Forest Service - Maritimes Region
Information Report M-X-188E



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FOREST PEST CONDITIONS IN THE MARITIMES IN 1993

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ABSTRACT

This report reviews the status of forest insects and diseases in the Maritimes region in 1993 and forecasts conditions for 1994, when appropriate. Pests and problems of conifers, hardwoods, and high-value areas, such as nurseries, seed orchards, plantations, and Christmas tree areas, are described. Information on pests under quarantine regulations and control operations against spruce budworm and hemlock looper are summarized. A list of reports and publications relating to forest pest conditions is included. More detailed information is available from the Canadian Forest Service - Maritimes Region.

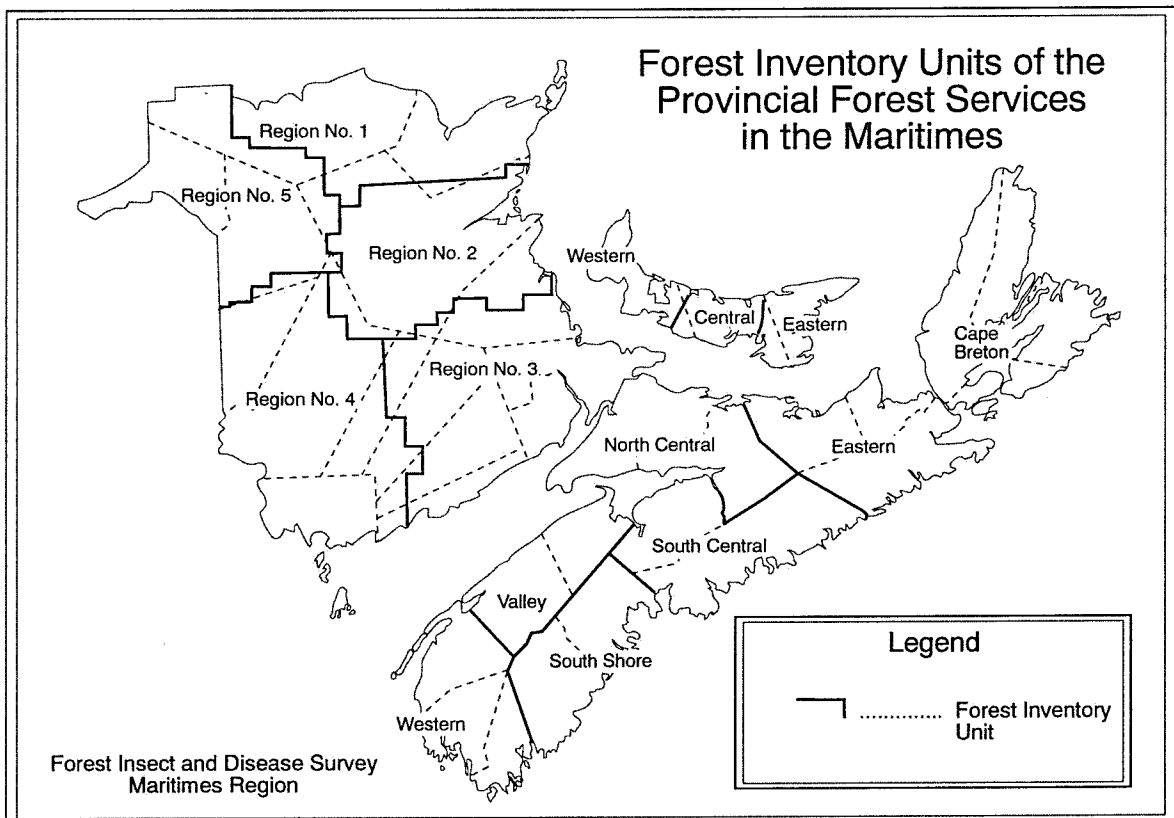
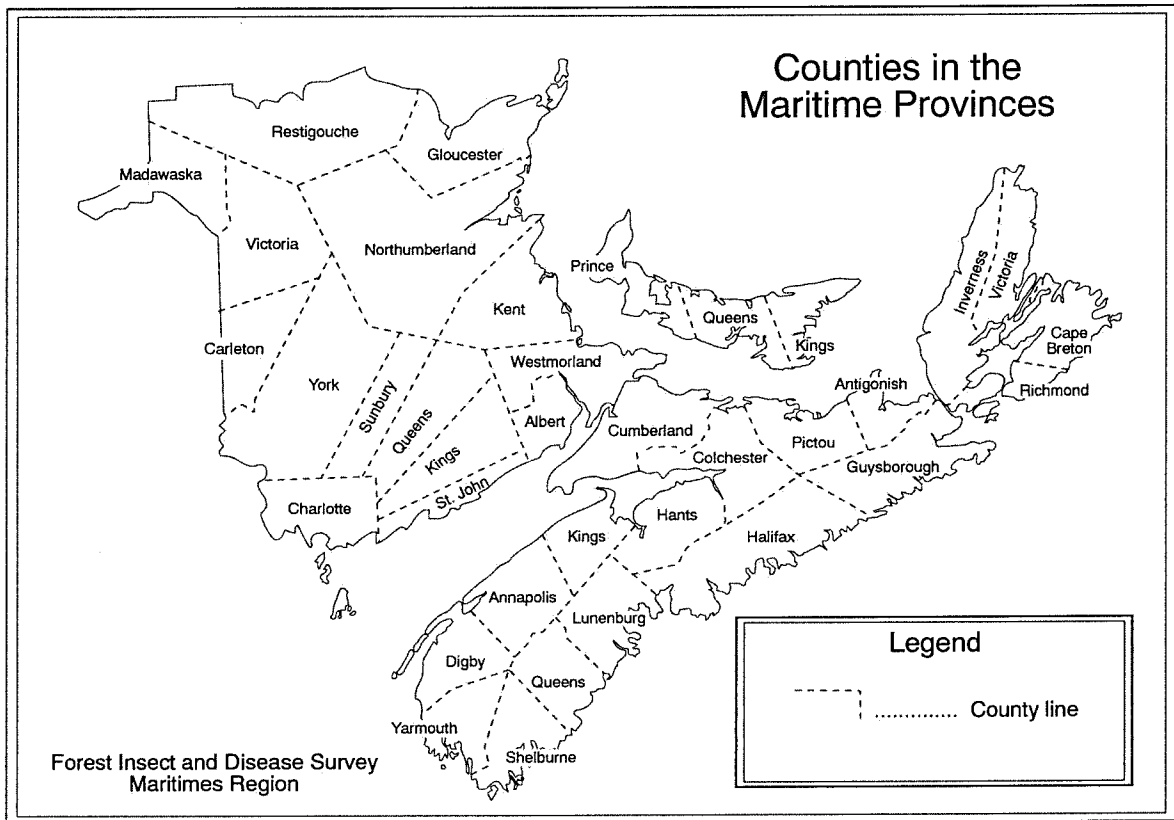
RÉSUMÉ

Ce rapport fait le bilan des insectes et maladies des arbres de la région des Maritimes en 1993, et donne un aperçu des conditions prévues pour 1994. 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. Des renseignements sur les ravageurs en quarantaine et sur les opérations de lutte contre la tordeuse des bourgeons de l'épinette et l'arpenteuse de la pruche sont résumées. Une liste de rapports et de publications portant sur les ravageurs forestiers est incluse. De plus amples renseignements sont disponibles auprès du Service canadien des forêts - région des Maritimes.

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INTRODUCTION

The Canadian Forest Service - Maritimes Region's "Strategic Plan 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 (FIDS) 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 through periodic reports, such as Seasonal Highlights, Technical Notes, Information Reports, and the Annual Report of the Forest Insect and Disease Survey.

In this annual report, pests and problems of conifers, hardwoods, and high-value areas, such as nurseries, seed orchards, plantations, and Christmas tree stands are described as they were observed in 1993. Included are survey information for forest pests under quarantine and control operations against spruce budworm and hemlock looper. A list of reports and publications relating to forest pest conditions is included.

This report aims to provide forest managers with information on pest conditions in the Maritime Provinces early enough that they can be taken into consideration in management decisions before the start of the 1994 field season. Insects and diseases that were widespread and caused considerable concern in 1993 are discussed in detail, others are presented in tabular form. More information on these and on other specific conditions will be provided by Canadian Forest Service - Maritimes Region upon request.

This year marks several changes in reporting arrangements, style, and content, all of these for several very important reasons. Because of changing environmental concerns, increasing emphasis on the overall health of the forest and the growing importance of predictive tools, reporting on these aspects of FIDS work will be elevated to the status of separate reports. The 1993 reports relating to these topics will be published as CFS-M information reports. The reader will also note authored chapters, intended to freshen style and recognize effort for work that encompasses several steps, from the collection of a pest to the written word, and to engender a greater sense of commitment to FIDS' strategic goals. FIDS is keenly aware of the dynamics of our forest ecosystem and is well-positioned to address several aspects of biodiversity. This report presents a chapter on new species records and host-pest combinations.

Two maps are included on the opposite page 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.

Efforts have been made to collect and report information in quantitative terms but, for a variety of reasons, it will never be possible to quantify all observations. 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 content of this report.

The cover of this report depicts *Linospora tetraspora*, a leaf fungus of balsam poplar, a new addition to the known mycoflora of the Maritime forests.

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 (NBDNRE), Forest Protection Limited, J.D. Irving, Limited, Nova Scotia Department of Natural Resources (NSDNR), and the Forest Insect and Disease Survey (FIDS). 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 over the last few years. Although the insect remains one of the major defoliators in the fir-spruce forest in the Maritimes, spruce budworm defoliation was observed only in Prince Edward Island during aerial surveys in 1993.

New Brunswick

Defoliation — For the first time in 45 years, no defoliation of balsam fir or spruce was observed in New Brunswick during the annual spruce budworm aerial survey conducted by NBDNRE. Pockets of defoliation were observed during ground surveys in the north-central part of the province. The level of defoliation ranged from trace to moderate, the worst pockets occurring in Northumberland and Restigouche counties.

Control operations — Foliage protection against spruce budworm in New Brunswick was conducted over 134,720 ha in 1993: 100,000 ha by Forest Protection Ltd. and 34,720 ha by Forest Patrol Ltd., a subsidiary company of J.D Irving, Ltd.

Forest Protection Ltd. treated 36% of their area with fenitrothion and 57% with *Bacillus thuringiensis* (*B.t.*). Most of this area was treated twice. The remaining 7% received an application of fenitrothion followed by an application of *B.t.*

Forest Patrol Ltd. treated 87% of their area with fenitrothion and 13% with *B.t.*; 85% of the total 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. *B.t.* products in 1993 were Futura XLV-HP®, Foray 76B®, and Dipel 264®.

Forecast— Surveys of overwintering larvae (L2 surveys) conducted by NBDNRE identified only six “pockets” of moderate infestation in the province, five of these in the central part of northern New Brunswick.

Nova Scotia

Defoliation — For the seventh consecutive year, no defoliation of balsam fir or spruce was observed during the annual spruce budworm aerial survey in Nova Scotia in 1993. Larvae were difficult to find during ground sampling and their presence was recorded only at seven locations in the central and eastern parts of the province. Light trap catches were very low. Catches in nine pheromone traps were reduced by 75% from the already low levels observed in 1992. The highest pheromone catch (50 moths) was in an area in Inverness County.

Control — No control measures on an operational scale were carried out against the spruce budworm in 1993.

Forecast— Surveys of overwintering larvae (L2 survey) conducted by NSDNR indicate that spruce budworm populations will remain low in 1994. Overwintering populations were negligible or low at 97% of the locations sampled and moderate at only 3%. The moderate populations were found in an area in northern Antigonish County.

Prince Edward Island

Defoliation — mostly of white spruce and to a lesser extent balsam fir, occurred over 42,800 ha in 1993; 33,800 ha were in the severe and moderate categories (Fig. 1). This is an increase of 1,800 ha from last year (32,000 ha), and a considerable increase from the 130 ha reported in 1991.

Defoliation was again patchy and ranged from trace to severe, with the majority in the moderate category, as was the case in 1992. Similar to the last 3 years, defoliation occurred mainly in southern Kings and southeastern Queens counties. However, the area of defoliation appears to have expanded towards the north and to the west since last year. Elsewhere in the province, defoliation was only trace or light and there were fewer affected stands than in 1992.

Control — No control measures on an operational scale were carried out against the spruce budworm in 1993.

Forecast — Surveys of overwintering larvae (L2) conducted by FIDS indicate that significant defoliation will occur again in the southeastern part of the province. Spruce budworm populations appear to be very low in the remainder of the province.

— L.P. Magasi and A.W. MacKay

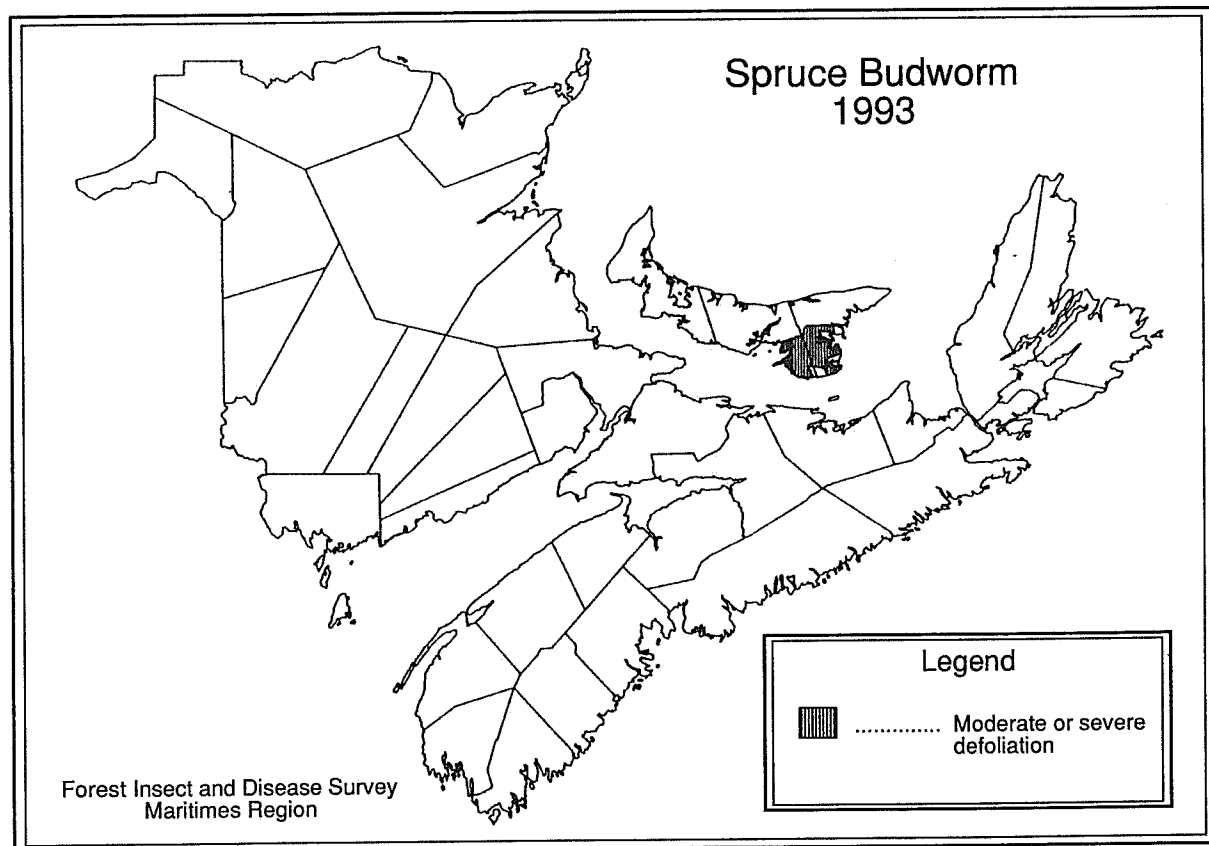


Figure 1 Source: Aerial surveys by NBDNRE, NSDNR, and CFS-M (FIDS)

Hemlock Looper

For the first time since 1989 defoliation by hemlock looper, *Lambdina fiscellaria fiscellaria* (Gn.), was not detected during aerial surveys in the Maritimes.

Populations declined rapidly in previously known outbreak areas and populations increased in new areas. Population declines were evident in central and southwest New Brunswick, especially in the 1991-92 outbreak areas in southern Charlotte County. Though insect numbers were comparatively small, larvae were found at locations in the southeast where they were rarely found during the 1989-93 period. Monitoring surveys showed similar population levels or marked reductions in insect numbers, compared to last year, in the province's central and northwest outbreak areas.

Foliage protection and population suppression against the hemlock looper in New Brunswick was conducted over 15,475 ha by Forest Protection Ltd.; 6950 ha with two applications of fenitrothion at 210 g/ha/application and 8525 ha with two applications of *B.t.* (Foray 76B) at 30 BIU/ha/application.

Egg sampling, conducted in the fall by NBDNRE at 353 plots in the northwest, northcentral, and southwest regions of New Brunswick, found low populations at a few locations in the extreme southwest of Charlotte County and at a few locations in the northcentral part of the province. Egg counts were negative elsewhere.

In Nova Scotia, only a few larvae were found at any of the locations sampled across the province. Defoliation, where it was found, never exceeded trace levels. However, pheromone trap catches indicate an upward trend in population with a total trap catch approximately three times the number of adults caught in 1992. Traps located on Cape Breton Island and central Nova Scotia showed the most significant increases. A light trap at Kejimikujik National Park had an increase in the number of moths caught to 476 in 1993 from 15 last year.

NSDNR conducted an egg survey at 19 locations in Halifax, Kings, Inverness, and Victoria counties. Twelve locations had negative results while seven others were determined to have low populations of hemlock looper for 1994.

Permanent plot assessments to determine tree mortality as a result of hemlock looper defoliation, near Clam Harbour, Halifax Co. showed that approximately 14,000 m³ of balsam fir have been killed in a 100-ha area that was severely defoliated in 1991.

An aerial survey in 1993 found that all of the balsam fir had died in the 1684-ha area that was severely defoliated in 1992. Using the permanent plot volume loss estimates, this translates to approximately 325,000m³ of dead balsam fir, after 1 year of severe defoliation by hemlock looper.

No defoliation was observed in Prince Edward Island and larval populations were very low for the third consecutive year. However, the average number of moths caught per pheromone trap increased to 247 in 1993 from 30 in 1992.

— J.E. Hurley

Spruce Beetle

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

In New Brunswick, infested trees were found along the Serpentine River, Victoria Co., where 20% mortality of white spruce occurred. Dead or dying trees were also found in Northumberland and Charlotte counties.

In Nova Scotia, spruce beetle infestations continued to intensify and expand in many parts of the province. In infested white spruce stands, most trees were dead or dying. Affected areas ranged in size from a few trees to 10 or more hectares in all counties except Richmond and Shelburne. Damage was especially noticeable along the north coast of the Bay of Fundy, from Digby to Hants County and in northeastern Pictou and northern Antigonish counties. Aerial surveys, conducted by NSDNR and FIDS, showed a marked increase in the number of pockets of recently killed white spruce from Brier Island, Digby Co. to Minasville, Hants Co. In Pictou and Antigonish counties, numerous patches of old and recently killed trees were observed over thousands of hectares.

Approximately 2000 ha of dead and dying white spruce were mapped by aerial surveys in Kings, Annapolis, Digby, Halifax, Hants, Pictou, and Antigonish counties. Table 1 lists the total areas by damage category for these seven counties.

Volume loss factors (m^3/ha) were determined at plots established in spruce beetle-infested white spruce stands representative of each of the three damage categories (Table 1; Low, Moderate, High). A total of nearly 109,000 m^3 of white spruce is estimated to have been killed by spruce beetle during the last 2 or 3 years, 60% of which was killed in 1993 alone.

Table 1 Area and volume loss of spruce beetle-infested white spruce in Nova Scotia

	Bark Beetle Damage			Total
	Low	Moderate	High	
Area (ha)	271	1045	710	2026
Volume Loss (m^3)	3496	38341	66854	108690

Area Source: NSDNR-Entomological Services

In Prince Edward Island, mortality continued in small scattered patches of mature and over-mature white spruce throughout the province, but newly infested, dying trees were less common than in the last 3 years. The highest mortality was recorded at Cabot Provincial Park, Prince Co., where 41% of the white spruce trees were attacked this year.

— J. R. Cormier and A.S. Doane

Eastern Larch Beetle

Eastern larch beetle, *Dendroctonus simplex* LeC., continued to attack and kill semi-mature and mature larch trees in all three provinces. Infested areas were small, generally less than 5 ha.

In New Brunswick, the insect remained active but was most common in the central and southern parts of the province. Tree mortality ranged from 4 to 20%; the highest occurring at Mates Corner, Westmorland Co., where 20% of the trees were killed.

Activity was low in Nova Scotia, as in 1992. A few trees were attacked at three locations in the north-central part of the province.

In Prince Edward Island, larch mortality again occurred mostly in Prince County, but was also observed at two locations in Queens County. The most severe attack was recorded at Camp Tamawaby Demonstration Woodlot, Prince Co., where 32% of the mature trees were killed, an increase from 8% in 1992. A few trees were heavily infested in a young European larch plantation at Kildare South, Prince Co.

— O.A. Meikle



European Larch Canker

European larch canker, caused by the fungus *Lachnellula willkommii* (Htg.) Dennis, was not found at the more than 100 locations examined in New Brunswick and Nova Scotia outside the known distribution area in the Maritime provinces in 1993 (Fig. 2). The disease is widespread and common within the infected areas. In New Brunswick, infections of more than 75% of trees were common within the infected area. In Nova Scotia, cankers were present on 88, 75, and 66% of trees at Yankeetown and Dean, Halifax Co., and Manganese Mines, Colchester Co., respectively.

In Prince Edward Island, where larch canker was found for the first time in 1992, no larch canker-infected trees were found at the 31 areas examined in 1993. Since 1981, more than 300 stands have been examined throughout the province and larch canker has only been found as single cankers in two of these stands, within 10 k of each other, in Prince County. Both cankers found in 1992 were removed and destroyed.

— K.J. Harrison

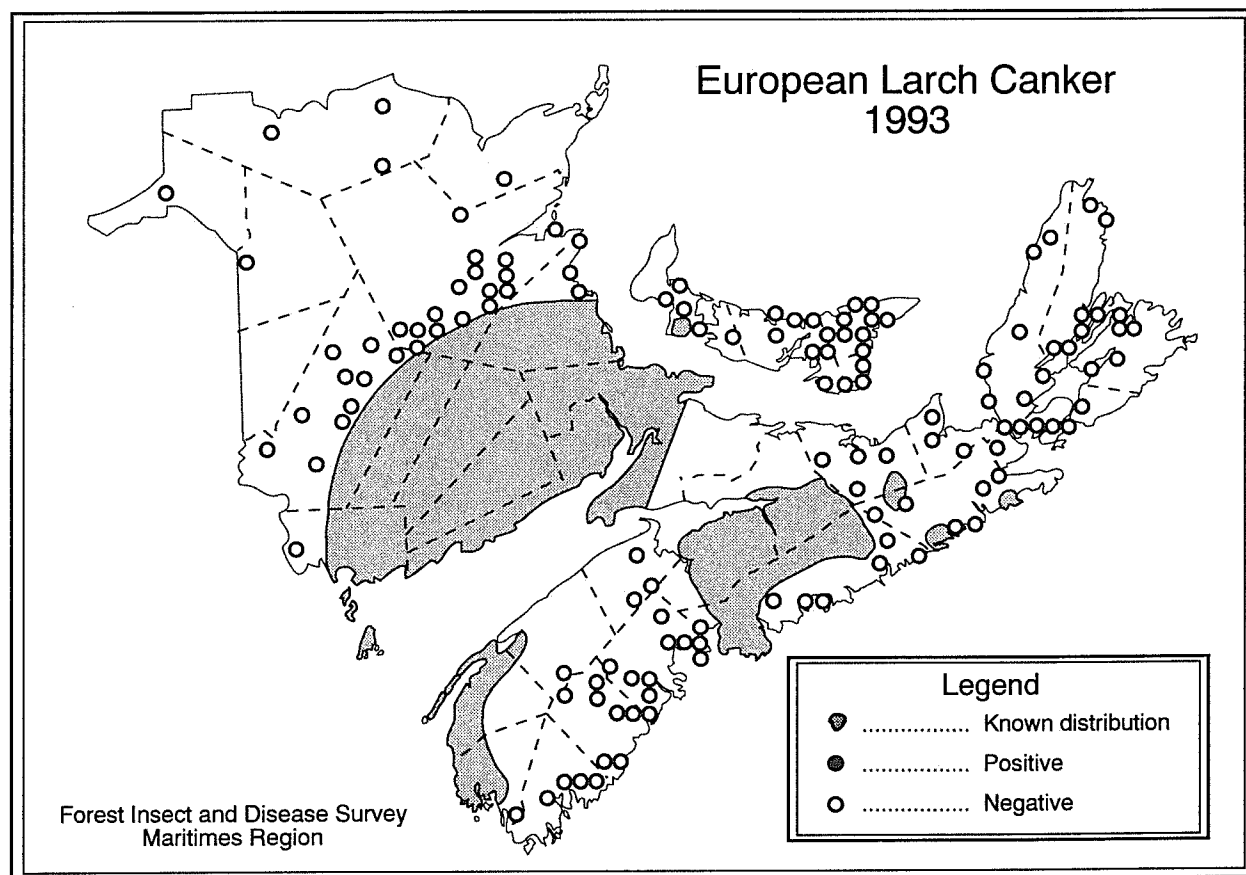


Figure 2

Sirococcus Shoot Blight

Sirococcus shoot blight, caused by the fungus *Sirococcus conigenus* (DC)P. Cannon & Minter, is present in all three Maritime provinces. Until this year it has been most widely distributed and most damaging in Nova Scotia, west of the Colchester-Pictou and Halifax-Guysborough county lines.

In 1993, the disease became more widespread and damaging, especially in Nova Scotia and Prince Edward Island. In many areas 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 Co., especially near the Park headquarters on Route 114, where 12% of the trees were dead and 57% had 51-99% shoot and branch mortality. At MacDougall Lake, Charlotte Co., light damage was observed in a previously infected young natural red pine stand.

In Nova Scotia, the disease continues to ravage red pine in the southwestern part of the province and also increased dramatically in eastern mainland Nova Scotia in 1993. Areas in eastern Nova Scotia that had trace and light infection in 1992 are now in the moderate and severe infection categories. The increase in infection was caused by cool, wet weather conditions this spring and early summer which are ideal for spore release and infection. The most serious damage was observed at Perch Lake Road, Pictou Co.; Garden of Eden Barrens, Guysborough Co.; East Folly Mountain, Colchester Co.; and Fairmont, Antigonish Co. The average shoot infection at FIDS plots increased from 17% in 1992 to 51% in 1993 at Perch Lake Road, and from 6 to 57% at East Folly Mountain. At Fairmont, a 3-ha pole-sized red pine plantation had moderate to severe infection on 60% of the trees. Severe damage was observed at Fougere Lake, which is the most easterly infected site reported to date.

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. A detailed survey of all red pine plantations was conducted by NSDNR to determine the status of the disease in the province and the results will be published.

In response to the high infection rates experienced in eastern mainland Nova Scotia this year, salvage/control operations are being initiated at some locations where red pine plantations are numerous. The objective is to control the spread of the disease in these locations and to salvage as much merchantable material as possible.

In Prince Edward Island, the disease continues to intensify in the known infected red pine plantations and is becoming more widespread each year. The status of the disease in previously reported areas is as follows: an average of 40% of the shoots dead, range 30-80%, at Valley, Queens Co.; average 40%, range 10-80% at Selkirk Road, Queens Co.; average 5%, range 0-40%, at Camp Tamawaby demonstration woodlot, Prince Co.; and moderate damage was recorded at Goose River, Kings Co. New areas reported in 1993 are: Cardigan, Kings Co., light damage in a small red pine plantation; Point Pleasant, Kings Co., trace and light with some moderate damage on natural red pine; Selkirk Road, Queens Co., 8% of red pine trees infected with one to two shoots dead per tree in a young plantation (adjacent to the older infected plantation mentioned above); and at Rustico Island, Queens Co., 4% of shoots on white spruce on 20% of trees were affected.

— A. W. MacKay

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 1993.

Armillaria root rot killed trees in 7% of the 164 spruce and pine plantations surveyed in New Brunswick and 6% of the 54 spruce and pine plantations assessed in Nova Scotia. Infection rates were generally low, mostly in the 2-6% range. The highest level of mortality was recorded in a black spruce plantation at Mountain Brook, Kent Co., N.B., where 10% of the trees were dead. Until 1991, spruce plantations appeared to be more vulnerable to the disease than pine plantations. However, infection was more common in pine plantations in New Brunswick both in 1992 and 1993, and also in Nova Scotia this year. (Table 2).

Armillaria root rot also caused sporadic tree mortality in other forest situations. Suppressed or stressed mature and semi-mature trees were killed in New Brunswick and Nova Scotia.

— A.M. Jones and G.R. Lemieux

Table 2 Frequency of Armillaria root rot-infected pine and spruce plantations in New Brunswick and Nova Scotia, 1986-1993

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
1993	60	12	104	5	14	21	40	0
All years	381	10	961	17	136	5	349	9

Spruce Budmoths

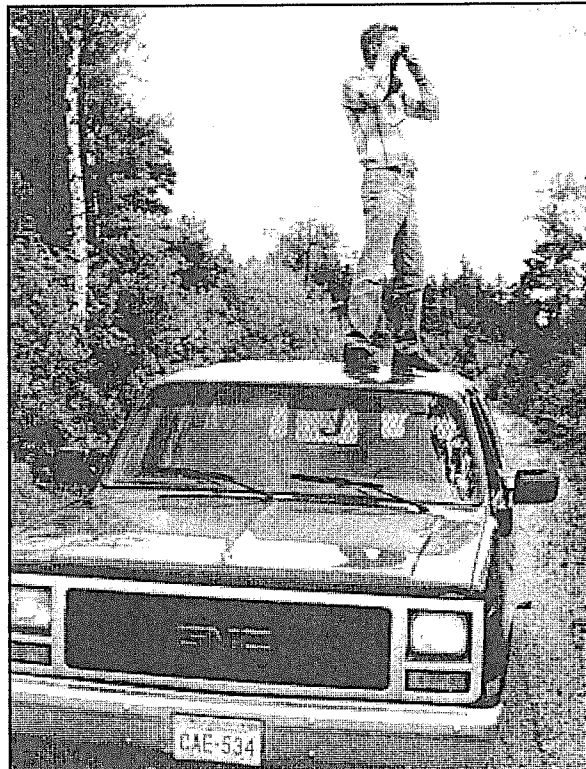
Shoot damage by spruce budmoths, *Zeiraphera* spp., on white spruce was slightly lower in New Brunswick and Nova Scotia and slightly higher in Prince Edward Island in 1993 than reported in 1992. Spruce budmoths comprise a group of closely related species: the spruce budmoth, *Zeiraphera canadensis* Mut. & Free., the purplestriped shootworm, *Zeiraphera unfortunana* Powell, and the yellow spruce budworm, *Zeiraphera fortunana* (Kft.). *Z. canadensis* is the most common and the 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 15% of the shoots were affected at the 36 locations examined (compared to 18% reported in 1992). The most serious injury was recorded at Nigadoo Lake, Gloucester Co., where 57% of shoots affected had moderate damage on all trees examined.

In Nova Scotia, damage was generally trace, with pockets of light or moderate infestations. Shoot injury averaged 12% at the 49 locations examined (compared to the 14% reported in 1992). Moderate damage was recorded at two locations in Inverness County, over a 1-ha area at Presqu'île and at Cap Rouge where 64% of the shoots were affected.

In Prince Edward Island, an average of 21% of the shoots were injured at the 17 locations examined (compared to 18% reported in 1992). Damage was trace or light at all locations except Rustico Island, Prince Edward Island National Park, Queens Co., where 63% of the shoots affected had moderate damage on all trees examined.

— T. J. Walsh



Larch Casebearer

Larch casebearer, *Coleophora laricella* Hbn., populations have declined throughout the Maritimes in 1993, resulting in less overall injury. Although feeding was observed on patches of trees up to 10 ha, most of the browning occurred on a few scattered individuals.

In New Brunswick, foliage discoloration occurred across most of the province, but was more common in southern areas, especially in Charlotte County. Foliage browning varied from trace to severe at the 31 locations assessed. The most appreciable browning was observed at Baillie, Mohannes, Rolling Dam, Sorrel Ridge, and St. Stephen, Charlotte Co., where moderate or severe defoliation on 1-10 ha of larch occurred.

In Nova Scotia, larch casebearer populations have decreased for the first time since 1989. Discoloration, affecting trees of all age classes, occurred in patches at various intensity levels in all western counties, except Shelburne, and was observed only in Inverness County in the eastern part of the province. This represents a significant reduction in distribution and intensity from 1992 levels. Patchy, severe browning occurred in areas of generally less than 5 ha. In the Tusket area of Yarmouth County, a 3- to 4-ha larch stand sustained severe foliage browning as did up to 2 k of roadside larch at Middle Beaver Lake, Halifax Co.

After 4 years of population decline, there were no reports of larch casebearer damage in Prince Edward Island in 1993.

— A.S. Doane



PESTS OF HARDWOODS

Dutch Elm Disease

Dutch elm disease, caused by the fungus *Ceratocystis ulmi* (Buism.) C. Moreau was active in all three Maritime provinces in 1993 (Fig. 3).

In New Brunswick, the disease is present wherever elm trees are found.

In Nova Scotia, Dutch elm disease continued to intensify and dead and dying trees were common throughout the province. On mainland Nova Scotia, the disease was found at the edge of the infected area at Monastery Dam, Antigonish Co. On Cape Breton Island, the disease expanded southward to three new locations in Inverness County, at Judique Intervale Brook, Princeville and west of Kingsville. In addition, the disease expanded northward to Scotch Hill, Inverness Co., and eastward to two locations: north of Glen Tosh, Victoria Co. and Big Pond, Cape Breton Co. The Big Pond location represents a significant extension of its distribution.

In Prince Edward Island, diseased trees were more common in western Prince County where the disease was first identified in 1979. No infected trees were found in either Queens or Kings counties in 1993.

— K.J. Harrison

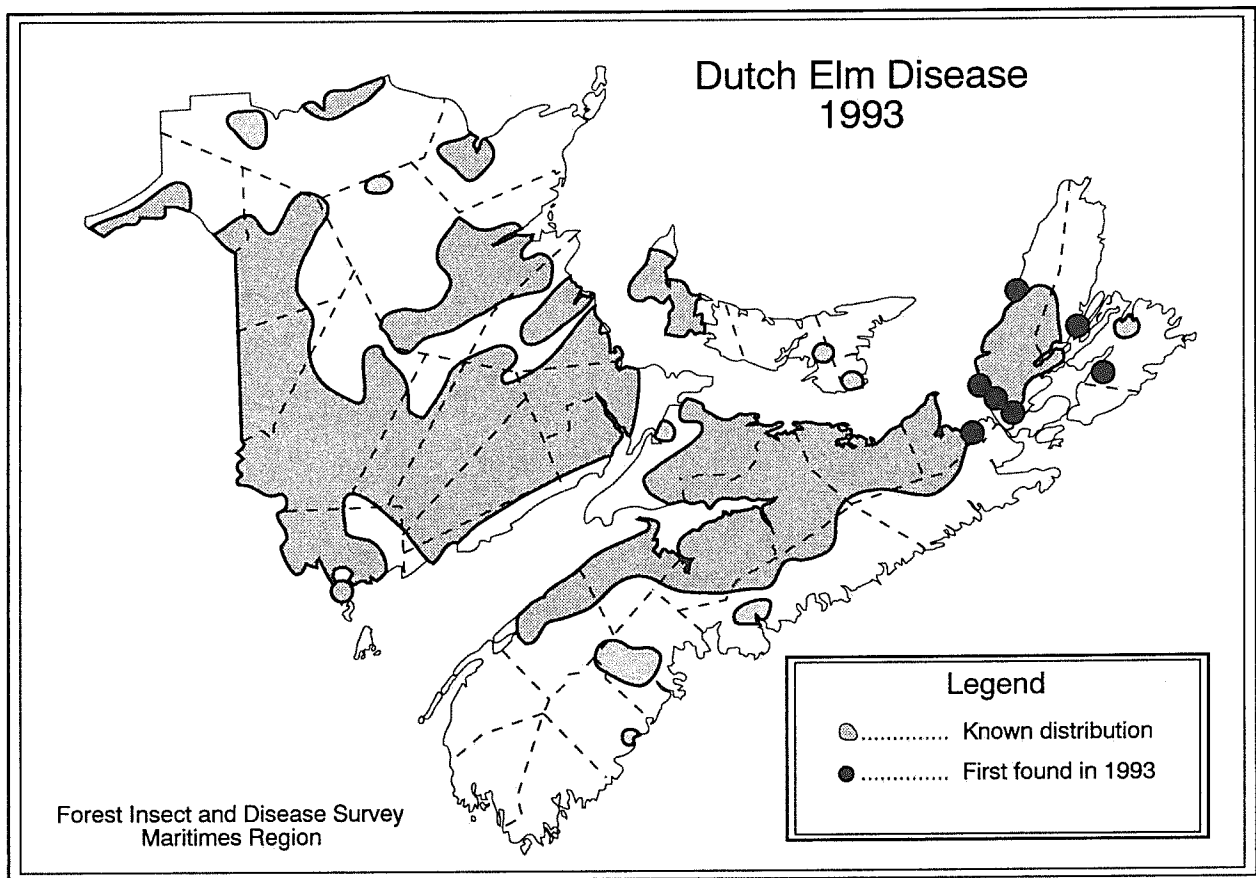


Figure 3

Gypsy Moth

Gypsy moth, *Lymantria dispar* (L.), has been present in parts of New Brunswick and Nova Scotia since 1981. The known distribution increased significantly in 1993 with the discovery of the insect in southcentral New Brunswick. Additional infested areas were found in western Nova Scotia. Gypsy moth is not known to occur in Prince Edward Island.

Activities relating to gypsy moth surveys were again organized by the Gypsy Moth Coordinating Committee, a multi-agency, multi-governmental group, and assisted by hundreds of volunteers.

The presence of various life stages other than male moths (larvae, pupae, female moths, egg masses) is used to determine the distribution of gypsy moth in the Maritimes. In 1993, gypsy moth was present both at new and previously infested locations in New Brunswick and Nova Scotia (Fig. 4).

In New Brunswick, gypsy moth was found for the first time east of Fredericton, York Co.; at locations along three major northeastern tributaries of the Saint John River: on both sides of Grand Lake; on both sides of Washademoak Lake, and along the Belleisle Bay, in Queens and Kings counties. The insect was also found for the first time in the Sussex area in Kings County and in the Oromocto-French Lake area in Sunbury County (Table 3). The 18 positive locations in southcentral New Brunswick represent 7% of the 252 locations where egg mass surveys were conducted by NBDNRE. The common feature of all new locations in this area is that they are "people places", i.e., provincial parks, campgrounds, picnic sites, and cottage areas, some with out-of-province owners. Both new and old egg masses were present in many of these areas, indicating that

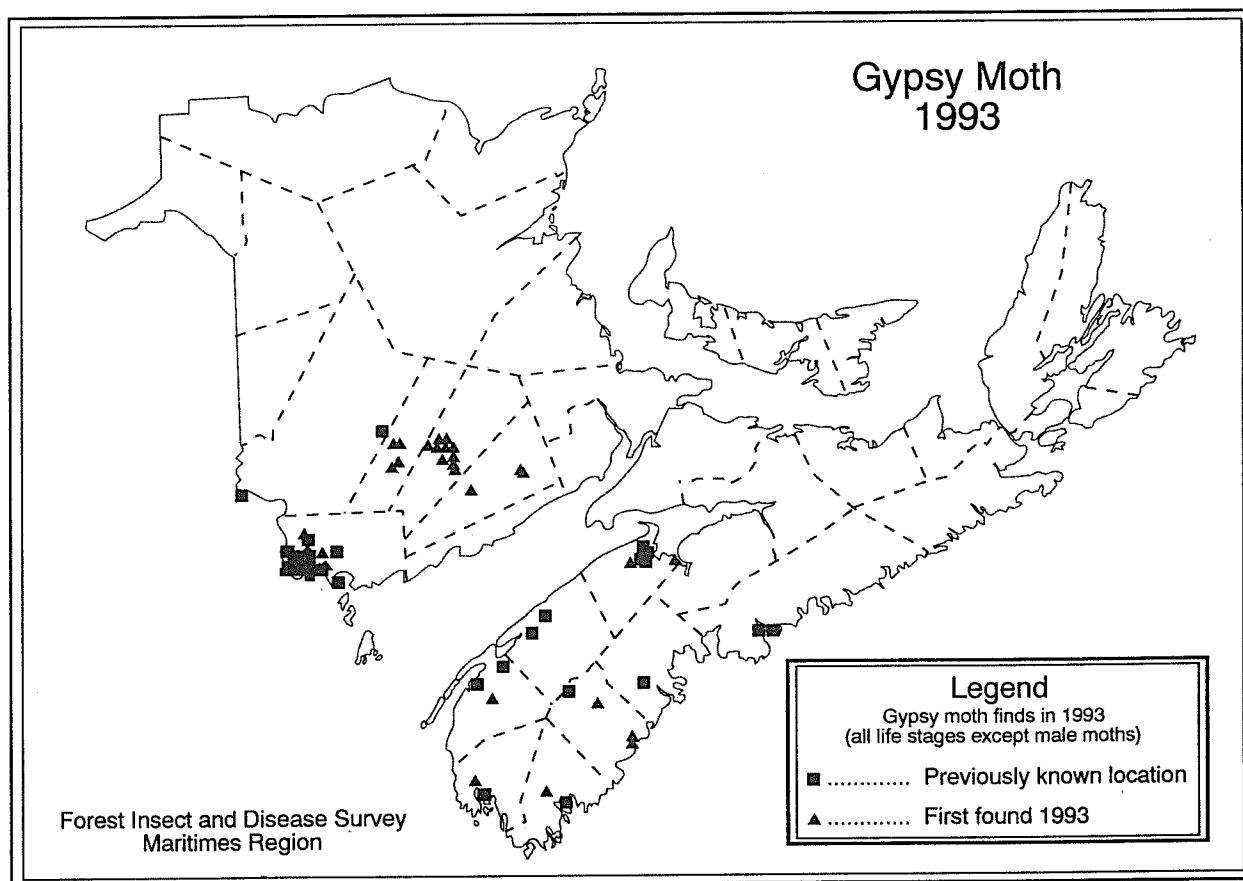


Figure 4 Information based on data provided by members of the Gypsy Moth Coordinating Committee

Table 3 Gypsy moth found for the first time in 1993 in New Brunswick, in areas outside the previously known distribution range.

Location	UTM Grid	Egg masses
Grand Lake - west side		
Queens Back Lake	19-71(9)-508(4)	new and old
Queens Scotchtown	19-72(1)-508(6)	new and old
Grand Lake - east side		
Queens Robertson Pt. (South)	19-72(5)-508(3)	new and old
Queens Robertson Pt. (East)	19-72(5)-508(3)	new
Queens Robertson Pt.	19-72(5)-508(3)	new
Queens Whites Cove (West)	19-72(7)-508(3)	new and old
Queens Lakeside Prov. Park	19-73(1)-508(6)	old
Washademoak Lake - west side		
Queens Washademoak	19-73(7)-507(4)	new and old
Queens Washademoak Lk. Campground	19-73(9)-507(8)	new and old
Washademoak Lake - east side		
Queens Crafts Cove	19-73(3)-506(9)	new
Saint John River valley		
Queens Dykemans Brook	19-72(7)-506(7)	pupal case
Belleisle Bay		
Kings Belleisle Bay	20-27(7)-505(6)	new and old
Webster Beach Campground		
Oromocto area		
Sunbury Oromocto	19-69(5)-508(0)	new and old
Sunbury Oromocto	19-69(6)-508(0)	
Sunbury French Lake Prov Park.	19-69(2)-507(4)	undetermined
Sunbury French Lake	19-69(3)-507(2)	new and old
Sussex area		
Kings Sussex	20-30(4)-506(7)	new and undetermined
Kings Sussex Corner	20-30(6)-506(5)	new and undetermined

Note: Male gypsy moths are not considered a "gypsy moth find".

Table 4 Gypsy moth found for the first time in 1993 Charlotte County, New Brunswick

Location	UTM Grid	Egg masses
Mosher Road	19-62(9)-500(2)	new and old
Ghost Hill	19-63(1)-502(4)	new and old
Four Corners	19-63(3)-500(6)	new and old
Dewolfe	19-63(4)-502(0)	old
Blackland	19-63(6)-501(1)	new
Upper Mills	19-63(9)-500(0)	new
Oak Haven	19-64(1)-500(7)	new and old
Lily Hill	19-64(1)-501(2)	new

Notes

1 - Male gypsy moths are not considered a "gypsy moth find"

2 - A 'new' location is defined as a point at least 1 km distant from a previously infested location, i.e., one tenth UTM grid difference.

gypsy moth has been there for at least 2 years. In southcentral New Brunswick the ratio of new:old egg masses was 14:1, while in the old infested area in southwestern Charlotte County, the ratio was close to 1:1.

In southwestern Charlotte and adjacent York counties, egg masses were found at 27 of the 282 locations searched by NBDNRE in the southwestern part of the province (9.6%). Nineteen of these positive finds were at or close to previously infested points, while egg masses were found for the first time at eight other locations (Table 4). There were few egg masses in most places, although 50 new masses were counted on a single tree in St. Stephen, Charlotte Co. In Fredericton, gypsy moth was found in the two areas infested in 1992. Only one egg mass was found at the north-side location and less than 40 at the Agriculture Research Station.

In Nova Scotia, gypsy moth was found at 14 old and 8 new locations in the western half of the province (Table 5). Egg mass surveys at some of the previously infested locations and in some areas of high male-moth catches will not be completed before the spring of 1994; consequently, the 22 infested locations may not reflect the total situation. Gypsy moth was found for the first time in 1993 at new locations in seven of the nine counties in which the insect has been known to occur: Hants, Kings, Digby, Yarmouth, Shelburne, Queens, and Halifax counties.

Both new and old egg masses were found at some of the new locations, suggesting that the insect has been present there for at least 2 years. Populations were low in most of the infested areas (very few egg masses found) but visible defoliation was observed at New Minas, Kings Co., and thousands of larvae were present at Brooklyn, Queens Co.

The gypsy moth pheromone trapping program consisted of 4273 traps returned to FIDS in the Maritimes in 1993: 1616 in New Brunswick, 2344 in Nova Scotia, and 313 in Prince Edward Island. Of these, 4051 were

Table 5 Gypsy moth found in Nova Scotia in 1993 [* indicates new location in 1993]

County	Location	UTM Grid	Remarks
Hants	* Hantsport	20-40-499	Egg mass found in early 1993
Kings	Port Williams	20-38-499	
	New Minas	20-38-499	
	Kentville	20-38-499	
	Canning	20-38-500	
	* South Alton	20-37-499	new egg masses present
Annapolis	Bridgetown	20-31-496	
	Annapolis Royal	20-30-495	
Digby	Bear River	20-28-493	
	Weymouth	20-26-492	
	* Big Deadwater Lake	20-27-491	one pupa found
Yarmouth	Tusket	20-26-485	
	* South Ohio	20-25-486	pupae found
Shelburne	Shelburne	20-31-484	
	* Welshtown	20-30-485	old egg mass present
Queens	* Liverpool	20-36-487	new and old egg masses
	* Brooklyn	20-36-487	new and old egg masses
	* Pleasantfield	20-34-490	new and old egg masses
	Kejimikujik Nat. Park	20-32-491	
Lunenburg	Bridgewater	20-37-491	
Halifax	Halifax	20-45-494	
	Dartmouth	20-45-494	

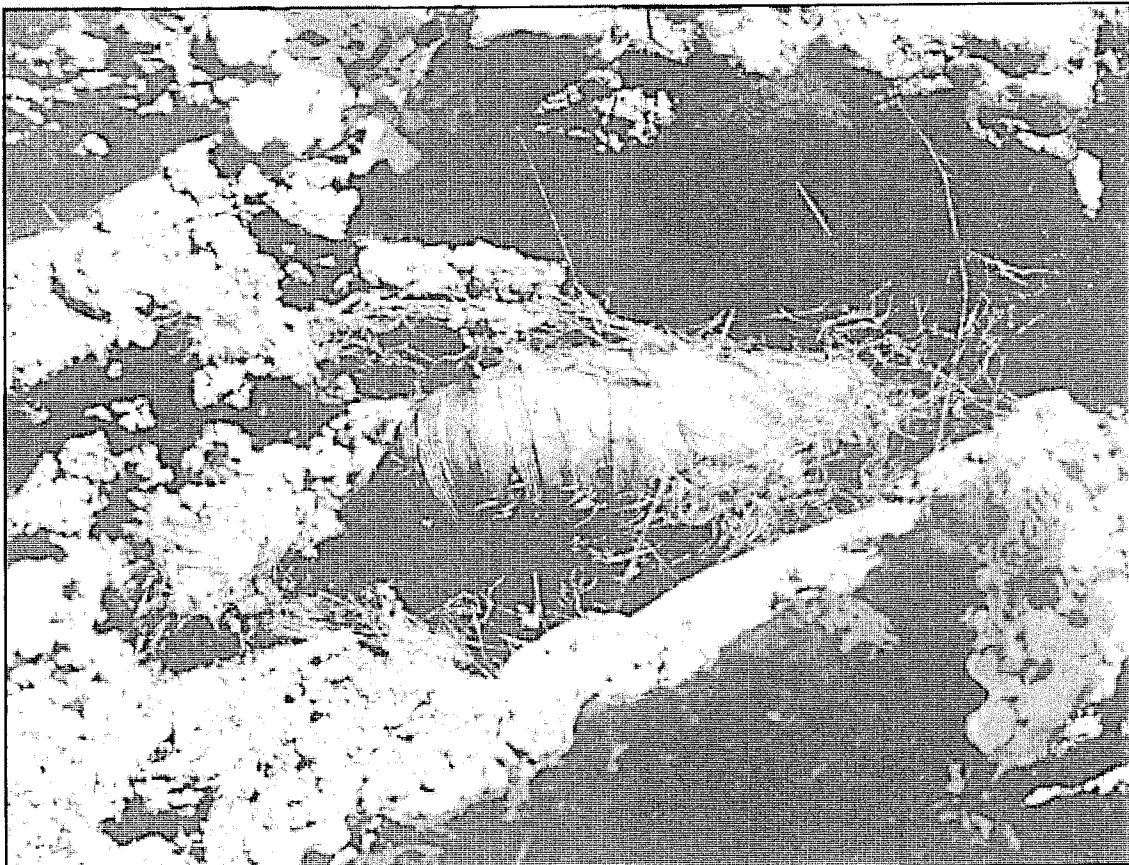
Note: Male gypsy moths are not considered a "gypsy moth find".

operational traps, placed at the end of July and collected after mid-September. The other 222 were 'daily observation traps', *i.e.*, trap catches were checked on a regular basis to determine the time when moths were caught. These traps were placed prior to mid-July and were collected after mid-September.

The numbers of blown-in gypsy moth males, captured in daily observation traps distributed across the region, were significantly lower, and these moths were captured in more concentrated areas than during the last 9 years. Blow-ins were recorded as two separate events in July, well in advance of local emergence dates. In Nova Scotia, 29 of 142 traps caught a total of 99 blown-in males (range 1-10), almost all during the July 6-10 period. The majority of the 29 positive traps were at or near coastal areas of Digby and Yarmouth counties. Four of 78 traps caught a total of five moths in southwestern New Brunswick during the July 13-21 period. No gypsy moth males were caught during either episode in Prince Edward Island.

With no major weather fronts blowing 'foreign' gypsy moth males into the Maritimes, the gypsy moth trapping program met its intended primary objective for the first time since 1983, *i.e.*, to aid in planning egg mass surveys.

— L.P. Magasi and J.E. Hurley



Forest Tent Caterpillar

For the third consecutive year in New Brunswick, forest tent caterpillar, *Malacosoma disstria* Hbn., was the major hardwood defoliator in 1993. The perimeters of the outbreak areas expanded in the central and southern parts of the province. In Prince Edward Island and Nova Scotia, populations remained low.

In New Brunswick, trembling aspen and other hardwoods were defoliated over 196,000 ha, compared to 77,500 ha in 1992. Of this, 172,700 ha was severe and 23,300 ha moderate defoliation (Fig. 5). Defoliation occurred in southeastern York, the northeastern part of Charlotte, Sunbury, Queens, and Kings counties and in a large area in central Kent and northern Westmorland counties. Although larvae were present in Northumberland and Madawaska counties, little or no defoliation was observed.

In Nova Scotia, forest tent caterpillar populations remained low and defoliation was limited to trace levels at a few locations.

In Prince Edward Island, the only report was from Malpeque, Prince Co. where severe defoliation occurred on Manitoba maple and wild apple trees in a 0.5-ha area.

— J. R. Cormier

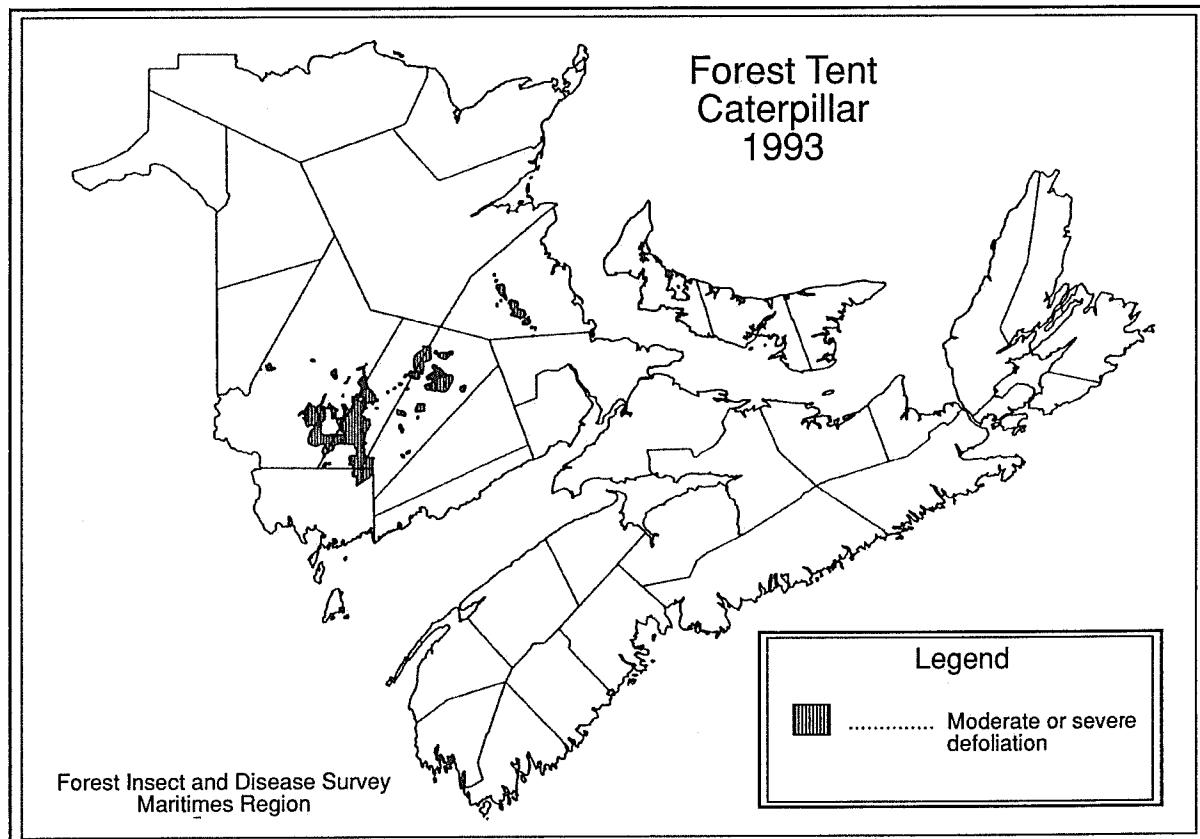


Figure 5

Oak Leafroller And Oak Leaf Shredder

The oak leafroller, *Pseudexentera spoliata* (Clem.), and the oak leaf shredder, *Croesia semipurpurana* (Kft.), either alone or in combination are the most serious pests of red oak in the Maritimes. Historically, the oak leafroller has caused the majority of the damage in western Nova Scotia, whereas in New Brunswick and Prince Edward Island the oak leaf shredder is usually the culprit. As a result of repeated defoliation, red oak stands in many areas are suffering various degrees of twig, branch, and crown dieback and tree mortality.

In Nova Scotia, the majority of the damage is in the western part of the province where most of the red oak stands are located. The peak damage occurred in 1988 when 22,800 ha were damaged with an average defoliation of 69 percent. In 1991, a severe spring frost caused a collapse of the insect population with a resultant drop in the average defoliation to 5 percent. Since 1991, the average defoliation had gradually increased and in 1993 was 15 percent. Overall defoliation this year was in the trace and light categories with only one report of severe defoliation on a few scattered trees at Hemlock Hill, Queens Co.

A summary of tree condition surveys in randomly selected oak stands in western Nova Scotia since 1988 is presented in Table 6. Condition of red oak has improved as populations decreased since 1988.

In New Brunswick, damage has been relatively low for the past 10 years and this trend continued in 1993. Defoliation was reported as moderate at Douglas, York Co., and light at Cranberry Lake, Queens Co.

In Prince Edward Island, defoliation levels remained the same as in 1992 with defoliation reported as moderate at Brudenell Point, Kings Co. and light at North Milton, Queens Co.

— A.W. MacKay

Table 6 Conditon of red oak after repeated defoliation in western Nova Scotia, 1988-1993

Tree Condition	Percent of Trees					
	1988	1989	1990	1991	1992	1993
Healthy	9.1	1.0	0.2	0.1	0.1	0.0
Twig dieback only	2.6	18.2	8.6	32.4	39.8	22.4
Branch dieback 1-25%	42.9	52.2	77.1	56.8	53.8	68.8
26-50%	14.3	18.9	7.9	8.6	3.8	6.4
51+% dying	5.0	4.9	2.0	0.8	1.8	1.2
	0.6	0.9	1.0	0.7	0.5	0.0
Dead	5.5	3.9	3.2	0.8	0.3	1.2
Number of trees assessed	931	1004	975	1050	1025	250
Number of Stands	35	40	39	42	41	10

Poplar Serpentine Leafminer

Even though population levels of the poplar serpentine leafminer, *Phyllocnistis populiella* Cham., decreased considerably in New Brunswick in 1993, the insect continued to cause twig and branch dieback of trembling aspen in the northern half of the province. Population levels remained low in both Nova Scotia and Prince Edward Island.

In New Brunswick, foliage discoloration was still evident in the north, especially in the New Brunswick Uplands Forest Section. At 32 random sampling points located in Madawaska, Victoria, Restigouche, Northumberland, and Gloucester counties, an average of 22% of trembling aspen leaves were mined on most trees (87%). This represents a significant population reduction there, compared to 1992 when 44% of the leaves were mined on 89% of the trees. The highest infestation occurred along the Nepisiquit River east of Popple Depot, Northumberland Co., where severe leafmining caused the crowns of trembling aspen to take on a noticeable silvery appearance. As in previous years, both incidence and intensity decreased from the northern half of the province towards the Fundy coast. In the ten southern counties, infestation levels remained low with 10% of foliage affected on 58% of the trees. Trace leafmining damage was also found on largetooth aspen at Nine Mile Brook, Northumberland Co., where 11% of leaves were affected on most trees (80%).

In Nova Scotia, population levels remained low where the insect was found in the northeastern part of the province. At seven random sampling points located in Kings, Colchester, Cumberland, Pictou, and Cape Breton counties, an average of 7% of trembling aspen leaves were mined on 39% of the trees. The highest infestation occurred at Aylesford, Kings Co., where 27% of foliage was affected on all trees.

In Prince Edward Island, population levels also remained low with an average of 2% of foliage affected on 23% of trembling aspen trees. The highest infestation occurred at Cavendish, Queens Co., where only 4% of the leaves were mined on 30% of the trees.

— G. R. Lemieux

Aspen Leafrollers

Of the many defoliators of aspen, there are six species most commonly found rolling the leaves from mid-May to mid-July in the Maritimes region: an aspen leafroller, *Pseudexentera oregonana* (Wlshm.); spotted aspen leafroller, *Pseudosciaphila duplex* (Wlshm.); birch-aspen leafroller, *Epinotia solandriana* (L.); aspen leafroller, *Epinotia criddleana* (Kft.); darkheaded aspen leafroller, *Anacampsis innocuella* (Zell.); and lightheaded aspen leafroller, *Anacampsis niveopulvella* (Clem.). These species are usually considered as a complex, as their damage is similar and simultaneous. Occasionally, damage can be attributed to a specific member of the complex.

In New Brunswick, population levels of these insects have been increasing since 1991. In 1993, most of the species were present at more locations than in 1991 and 1992. The most commonly found species was *P. oregonana*, and, to a lesser extent, *P. duplex* and *E. solandriana*.

P. oregonana, one of the earliest insects to roll leaves on aspen, was responsible for various levels of defoliation in western New Brunswick, mostly along the Saint John River Valley from Connors, Madawaska Co. to Fredericton, York Co. In the northwest, young stands of trembling aspen were often severely defoliated, especially at St. Leonard and at Morneault Brook, Madawaska Co., where all leaves were attacked. At random sampling points where this species was observed, an average of 12% of the leaves were rolled in 1993 compared to 18%, 26%, and 7% in 1992, 1991, and 1990, respectively. Although leaf damage decreased from last year, the number of trees affected increased to 83% from 57% in 1992.

P. duplex, more commonly found in the northcentral, central, and eastern parts of the province, caused the most damage at McCormack Brook, Restigouche Co. and at Pokemouche Landing, Gloucester Co., where 23% of the leaves were rolled on all trembling aspen trees. Although this species was present at more locations in 1993 than 1992, the percentage of rolled leaves (11% in 1993, 10% in 1992) was virtually unchanged, and the percentage of affected trees remained the same (80%).

E. solandriana, has also gained some importance in 1993 and was present mainly along the Saint John River valley, in Victoria, Carleton, and York counties. In 1993, it was found on trembling aspen at 16 locations with an average of 11% of leaves rolled on 70% of the trees, compared to only one location in 1992. The worst damage occurred at Upper Knoxford, Carleton Co., where 36% of the leaves were rolled on all trembling aspen trees. Larvae were occasionally feeding in association with *P. oregonana*, usually in higher proportions southward. On white birch, trace levels of leafrolling were reported at a few locations in Madawaska, Northumberland, and York counties.

E. criddleana, *A. innocuella*, and *A. niveopulvella* were observed at trace levels at a few locations throughout the province; however, in most cases, damage levels and the number of locations increased since 1991. *E. criddleana* and *A. innocuella* larvae were occasionally feeding in association with *P. oregonana* (Wlshm.) and *P. duplex*.

In Nova Scotia, population levels also increased but distribution was more confined and damage levels generally lower than in New Brunswick. The most common and severe damage, observed in the northcentral and northeastern parts of the province, was due mainly to *P. oregonana*. At random sampling points where this species was found, an average of 13% of the leaves were rolled in 1993 compared to 12% in 1992 and 1991. The worst cases were reported from Heatherton, Antigonish Co., Grand Anse River, Inverness Co., and the Thorburn area, Pictou Co., where moderate and severe leafrolling occurred on all trembling aspen trees. Trace damage by other aspen leafroller species was present at a few locations in the province.

In Prince Edward Island, population levels in 1993, as in previous years, remained low. *P. oregonana*, the most common species, and *P. duplex* and *E. solandriana*, observed at a few locations, caused only trace damage.

— G. R. Lemieux and G.A. Smith

WEATHER-RELATED PROBLEMS

Two major weather-related problems were observed in 1993, one on conifers (red spruce), the other on hardwoods. They are discussed in this chapter.

Winter drying of red spruce

Winter drying of red spruce caused widespread foliage reddening at all damage levels in southern and especially southeastern New Brunswick and at three widely separated locations on mainland Nova Scotia. This highly visible damage was first noticed in April, 1993 and was apparent on affected trees until reddened foliage dropped off in early summer.

In New Brunswick, it was most severe and common in the southeastern part of the province, especially in Fundy National Park and throughout Albert, Queens, Kings, and Saint John counties. Reddening was also observed at locations in Charlotte, York, Carleton, and southern Westmorland counties with damage ranging from trace to severe (4-75% of foliage red).

Red foliage was most noticeable in Fundy National Park, Albert Co., where most observations and assessments were made in an attempt to establish a damage pattern. Winter drying affected the 1992 needle complement but, in the worst cases, caused damage to foliage as old as that produced in 1990. Those trees with more than 1 year's needle complement affected often had bud and shoot mortality as high as 70%. Reddened foliage was observed on entire crowns, but was more common and severe on the top third. Trees affected ranged from 1 m to mature trees, growing within stands, at edges or open areas. Often, there were many unaffected red spruce interspersed with damaged trees. Red spruce was found to be the only tree species affected.

Red spruce in plantations and thinnings was affected as well, with the most severe damage at Saddleback Mountain, Kings Co. and at Henderson Settlement, Queens Co., where 75% of trees had moderate reddening at both locations.

In Nova Scotia, this problem was not as common as in New Brunswick, but moderate and severe reddening occurred at three locations, East Branch, Yarmouth Co., Marshy Hope, Antigonish Co., and Economy Lake, Colchester Co.

Damage to red spruce was not observed in Prince Edward Island.

— O.A. Meikle and J.E. Hurley

Wind damage in Nova Scotia

Wind damage, mainly in the form of foliage injury, occurred on hardwoods in northern Colchester and northwestern Inverness counties. Damage was most serious on Folly, Cobequid, and Lynn Mountains in Colchester County, and on the South Cape Highlands, near MacKinnons Brook and at Sight Point, in Inverness County. Stands affected were confined to mountain tops and other elevated points. Light and moderate leaf browning, mainly of sugar maple, covered hundreds of hectares. Most of the affected leaves showed signs of physical injury, being torn or shredded to various degrees. The extensive damage was probably the result of strong, southeastern winds recorded in early July.

— T.J. Walsh

NURSERY AND GREENHOUSE PROBLEMS

Although a wide variety of pest-related problems were encountered in Maritime forest nurseries in 1993, the most important were overwintering injury and frost damage. The insects and diseases mentioned may appear insignificant; however, they did occur in spite of intensive monitoring and control measures. Good nursery practices limited their damage potential.

Table 7 gives an overview of nursery and greenhouse problems encountered in 1993.

— K.J. Harrison and G.A. Smith

Table 7 Problems observed in nurseries and greenhouses in the Maritimes - 1993.

Problem	Host(s)	Locality	Remarks
Craneflies Tipulidae	Black spruce	N.B.	Infested 16-week-old seedlings.
Frost damage	Conifers	N.B. & N.S.	Serious injury to seedlings in nurseries and plantations. In two N.B. nurseries, severe bud damage occurred when crops were removed from greenhouse before they were hardened off. In N.S., frost-injured stock was outplanted and some plantations had high mortality.
Gray mold <i>Botrytis cinerea</i> Pers. ex Fr.	White spruce	P.E.I.	On suppressed lower branches of 12-week-old seedlings.
Needle rust of spruce <i>Chrysomyxa ledicola</i> Lagh.	Red spruce	N.S.	On a few 2-year-old seedlings in holding area.
Overwintering injury	Conifers	Region	Present; not as severe as in 1992.
Ragged sprucegall adelgid <i>Pineus similis</i> (Gill.)	Red spruce	N.B.	Found on 2-year-old seedlings.
Sirococcus shoot blight <i>Sirococcus conigenus</i> (DC.) P. Cannon & Minter	White spruce	N.S.	On 6-week-old container seedlings, significant damage by this seedborne disease prevented by control measures.
Spruce harlequin <i>Palthis angulalis</i> (Hbn.)	White spruce	P.E.I.	Found on seedlings.

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.

Only a few seed and cone insects and diseases were observed in 1993 as cone production was low or nil in most spruce and larch seed orchards in the Maritime provinces.

Table 8 gives an overview of problems encountered in seed orchards in 1993.

— K.J. Harrison and G.A. Smith

Table 8 Problems observed in seed orchards in the Maritimes - 1993.

Problem	Host(s)	Remarks
Jack pine flower sawfly <i>Xyela</i> sp.	Jack pine	Infested male flowers on 50% of trees at Parkindale.
Spruce cone maggot <i>Strobilomyia appalachensis</i> Michelsen	Black spruce	Infested 30 to 75% of cones at Bettsburg, Debert, and 48 Road.
Conifer swift moth <i>Korscheltellus gracilis</i>	Black spruce	Young root-feeding larva at Bettsburg.
Frost damage	White spruce	Trace and light damage to shoots at Ste. Anne.
Needle rust on spruce <i>Chrysomyxa ledi</i> dBy.	White spruce	Trace and light foliage infection at Ste. Anne.
Red spruce gall adelgid <i>Pineus floccus</i> (Patch)	Spruce	On about 33% of trees at Parkindale.
Spider mites Tetranychidae	Black spruce	Infested 10% of trees at Parkindale.
Spruce budmoth <i>Zeiraphera</i> sp.	White spruce	Present at Parkindale.
White pine sawfly <i>Neodiprion pinetum</i> (Norton)	White pine	Infested 3% of trees at Dover.
Winter kill of buds	Red spruce	On scattered grafted trees at Waterville.

Location of seed orchards: Bettsburg, Northumberland Co., N.B.; Debert, Colchester Co., N.B.; Dover, Kings Co., P.E.I. Parkindale, Albert Co., N.B.; Ste. Anne, Madawaska Co., N.B.; Waterville, Kings Co., P.E.I.; 48 Road, Kings Co., P.E.I.

PEST ASSESSMENT SURVEYS IN THE NEW FOREST

Pest assessment surveys in the new forest by cooperating agencies determined conditions on close to 12,750 trees in 241 plantations and 14 thinned stands in 1993.

Assessment procedure 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 caused by each pest, on the different parts of each tree, was recorded. Field assessments were carried out primarily by staff of cooperating organizations while sample identification and data summary were done by the Forest Insect and Disease Survey.

Cooperating agencies in 1993, in addition to the Forest Insect and Disease Survey, were: New Brunswick Department of Natural Resources and Energy, J.D. Irving, Ltd., Nova Scotia Department of Natural Resources, and the Maritime Forest Ranger School.

There were 179 plantations and 14 thinned stands assessed in N.B., 60 plantations assessed in N.S., and 2 plantations assessed in P.E.I. Most of the plantations were single species of pine or spruce.

Most plantation trees (almost 93%) in the Maritimes are healthy (Table 9). There were at least some trees severely affected in 26% of the plantations assessed. Whether this poses a serious problem depends on the cause of damage and the percentage of affected trees in a given plantation. Table 10 lists the various plantation problems encountered at severe or moderate levels in the three provinces on pine and spruce.

Trees with moderate or severe damage were found in seven of the New Brunswick thinned areas. The damaging agents were: animals, balsam twig aphid, forest tent caterpillar, frost, mechanical injury, sawyer beetle, shoestring root rot, and white pine weevil.

— A.M. Jones and L.P. Magasi

Table 9 Tree condition in pine and spruce plantations and in thinned areas in the Maritime Provinces in 1993.

Province	Species	Tree Condition Class (% trees)			
		Healthy	Fair	Poor	Dead
New Brunswick	Pine	95	3	1	1
	Spruce	91	3	1	5
	Thinned	96	3	0	1
Nova Scotia	Pine	86	11	1	2
	Spruce	95	3	1	1
Prince Edward Island	Pine	94	4	2	0
	Spruce	100	0	0	0
Regional Average		94	4	1	1

Table 10 Number of pine and spruce plantations containing trees with moderate or severe problems in New Brunswick, Nova Scotia, and Prince Edward Island in 1993.

Problem	Pine			Spruce		
	N.B.	N.S.	P.E.I.	N.B.	N.S.	P.E.I.
Animal damage	19	3	0	4	10	0
Ants	0	2	1	0	0	0
Aphids	3	2	0	1	0	0
Bark beetles	2	0	0	1	1	0
Chlorosis	1	0	0	1	0	0
Competition - Unspecified	0	0	0	1	0	0
Competition - Hardwood	3	0	0	0	2	0
Competition - Softwood	1	0	0	1	0	0
Coneworm	4	0	1	2	0	0
Conifer sawflies	1	1	0	0	0	0
Discoloration	2	0	0	4	1	0
Eastern sprucegall adelgid*	-	-	-	2	1	0
Frost	1	0	0	15	6	0
Globose gall rust*	1	0	0	-	-	-
Ice damage	0	0	0	1	0	0
Insect damage (unknown)	1	0	0	4	0	0
J-root	0	0	0	0	8	0
Mechanical damage	1	0	0	3	1	0
Mites	1	0	0	0	0	0
Needle flecking	1	3	0	0	3	0
Needle rust	3	0	0	8	1	0
Northern pitch twig moth*	5	0	0	-	-	-
Planting problems	7	2	0	8	12	0
Ragged sprucegall adelgid*	-	-	-	2	2	0
Sawflies	0	0	0	4	0	0
Shoestring root rot*	0	1	0	2	1	0
Sirococcus shoot blight*	0	1	0	0	0	0
Shoot moth*	0	1	0	-	-	-
Snow damage	8	1	0	1	0	0
Spider mites*	0	1	0	0	0	0
Spruce bud midge*	-	-	-	17	0	0
Spruce budmoth*	-	-	-	10	0	0
Spruce gall midge*	-	-	-	3	0	0
Stunted growth	1	0	0	4	0	0
Weather damage	0	1	0	0	0	0
Weevil damage	2	0	0	7	1	0
White pine weevil*	4	2	0	8	3	0
Wind damage	3	1	0	0	0	0
Winter drying	1	3	0	8	7	0
Yellowing	0	0	0	2	0	0

*The scientific name is listed either in the "Other Insects and Diseases" section or elsewhere in the text.

Pine plantations assessed: 60 in N.B., 14 in N.S., 1 in P.E.I.

Spruce plantations assessed: 104 in N.B., 40 in N.S., 1 in P.E.I.

CHRISTMAS TREE PESTS

Balsam fir has a number of insect and disease pests mentioned elsewhere in this report. This chapter provides a status report for balsam twig aphid, *Mindarus abietinus* Koch, balsam gall midge, *Paradiplosis tumifex* Gagné, spruce spider mite, *Oligonychus ununguis* (Jacobi) and spruce budworm, *Choristoneura fumiferana* Clem., insects that have the potential to seriously affect Christmas tree marketability.

The balsam twig aphid caused widespread damage to Christmas trees in the Maritimes in 1992, particularly in Nova Scotia. With expectations for the worst in the spring of 1993, Christmas tree associations and provincial extension agencies, with input from FIDS, organized several field days and technical sessions. Growers were informed of predictions, the value and importance of insect monitoring and hazard assessment and other issues that included several aspects of control technology. For reasons unknown, the balsam twig aphid outbreak declined dramatically in 1993.

Although there are no official figures on control efforts by Christmas tree growers, provincial extension personnel report that very few growers in the Maritimes needed to control potentially damaging levels of twig aphids.

The balsam twig aphid population collapse was also reflected in the region's natural forests. Trace and light damage was found across New Brunswick, with shoot damage averaging 12% (60% in 1992 and 27% in 1991) at 61 areas assessed. Surveys conducted by NBDNRE showed that twig aphid occurrence has been declining, present at 63% of the 644 locations assessed in 1993 compared to 79% in 1992 and 66% in 1991. In Nova Scotia, trace and light damage was observed on an average of 4% of shoots (55% in 1992) at 34 areas. In Prince Edward Island, an average of 2% of shoots (55% in 1992) had trace damage at five locations.

Balsam gall midge, found in all three provinces but at lower levels of incidence and damage than last year, was of little concern to growers in 1993. The low population levels of this insect are reflected in the lack of damage in natural stands, averaging in the range of 2-3% of needles affected. Infestation levels, determined by NBDNRE at 644 locations, found needles at 98% of the locations free of galls while only 2% of locations had 1-10% of needles affected. Last year, 94% of the locations were free of galls while only 6% of locations had 1-10% of needles affected. The most serious infestation recorded in natural stands in the Maritimes was at Middle Musquodoboit, Halifax Co., N. S., where 12% of needles had galls on 40% of the trees.

Spruce spider mite populations were very high in some areas of the Maritimes, causing more concern than any other pest. Provincial extension staff in New Brunswick and Nova Scotia report that damage was severe on a few trees scattered within Christmas tree lots in Victoria, Carleton, York, Kings, and Kent counties in New Brunswick and several mainland counties in Nova Scotia.

Spruce budworm caused noticeable damage to balsam fir Christmas trees in southern Queens and Kings counties, Prince Edward Island where mature softwood stands, consisting predominately of white spruce, were defoliated.

— J.E. Hurley

NEW PEST RECORDS IN THE MARITIMES

Each year the biomonitoring activities of the Forest Insect and Disease Survey yield a wealth of pest information, including a number of new species and pest-host records for the Maritime Provinces. With the increased interest in forest health monitoring, biodiversity, and climatic change, it is important to highlight these records and put them into perspective for our clients.

In 1993, the following new records and pest-host combinations were found in the Maritimes.

Diplodia tip blight, caused by the fungus *Sphaeropsis sapinea* (Fr.) Dyko & Sutton (formerly known as *Diplodia pinea* (Desm.) Kickx), was collected in Prince Edward Island for the first time, at Southport, Queens Co. on a dying, mature, ornamental Austrian pine. This disease is known to occur in Nova Scotia, primarily on ornamental Austrian and Scots pine, however, it also caused trace shoot damage on young red pine in a plantation in Queens Co., N.S. in 1989. *Diplodia* tip blight has not been found in New Brunswick.

Early birch leaf edgeminer, *Messa nana* (Klug), was collected for the first time in the Maritimes. This species has been the predominant leafmining sawfly on birches in the neighboring state of Maine for almost a decade. In New Brunswick, the brownish blister mines were observed on white birch, wire birch, and yellow birch in five counties in southern New Brunswick: Charlotte, Saint John, Kings, Westmorland, and Albert. Trace and light leafmining was reported at nine locations, the highest at Mount Hebron, Kings Co. with 20% of leaves mined on all white birch trees.

Groundhog tick, *Ixodes cookei* Packard, was recorded for the first time in the Maritimes at Fredericton, York Co., N.B. Adults were collected from a dog and a cat, two of several known hosts, including humans. Although not a pest of trees, all life stages of this organism inhabit wooded areas and are components of the forest ecosystem.

Linospora leaf blight of balsam poplar, caused by the fungus *Linospora tetraspora* G. Thompson, was collected for the first time in the Maritime Provinces at Canterbury, York Co., N.B. This leaf blight, illustrated on the cover of this report, was present on leaves of balsam poplar attacked by a leaf rust, *Melampsora medusae* Thuem. This fungus produces irregular leaf blotches which may affect entire leaves. After infection in late spring, the leaves develop dark brown patches which become ash-colored with fine black spots (about 0.5 mm in size) developing in late summer. The disease has been reported from Quebec and New England and as far west as the Pacific Coast.

Pales weevil, *Hylobius pales* (Herbst), was collected for the first time in the Maritimes from pine logs at Brooklyn, Queens Co., N.S. Damage by adults, which includes boring and girdling of stems and branches, was not assessed before trees were cut. This species is considered a serious pest in pine cut-over land and young pine plantations in Ontario, Quebec, and in the eastern United States.

Variable oak leaf caterpillar, *Lochmaeus manteo* Doubleday, was found on linden (basswood) for the first time in the Maritimes. Usually a defoliator of beech and oak, it caused moderate damage in a linden hedgerow at Fredericton, York Co., N.B.

Woolly apple aphid, *Eriosoma lanigerum* (Hausmann), was found for the first time on mountain ash in New Brunswick. Usually a gall-former on leaves of apple and elm, the flocculent colonies were found on branches of an ornamental mountain ash at Fredericton, York Co., N.B.

— K.J. Harrison and G.A. Smith

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Thaddée Renault retired at the end of the 1993 field season. His departure, after more than 20 years in FIDS, and many more in the organization, will leave a big gap, especially in the area of client services. While we will miss him, we wish Thaddée all the best in retirement.

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OTHER INSECTS AND DISEASES

This table lists alphabetically, by common name, most insects and diseases encountered in the Maritimes in 1993 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 1993 to warrant detailed discussion. It may be that, although severe, an organism, *e.g.*, seedling debarking weevil, was only of localized importance in 1993.

— A.W. MacKay, A.S. Doane, and T.J. Walsh

INSECT OR DISEASE)	HOST(S)	REMARKS
Alder flea beetle <i>Altica ambiens alni</i> Harr.	Alder	Overall, intensity similar to 1992 levels in the region. Various levels of leaf browning, mostly in southern New Brunswick; throughout Nova Scotia and in eastern Prince Edward Island.
Ambermarked birch leafminer <i>Profenusa thomsoni</i> (Konow)	Beech White birch Wire birch Yellow birch	Found at various levels in New Brunswick; highest, severe at Kellys Beach, Kent Co. Trace damage at six locations in Nova Scotia and two in Prince Edward Island.
Anthrachnose of hardwoods <i>Discula quercina</i> (West.) Arx	Basswood White ash	In Nova Scotia, leaf browning on ornamentals at two locations. No observations from New Brunswick or Prince Edward Island.
Anthrachnose of maple <i>Kabatella apocrypta</i> (Ell. & Ev.) Arx	Red maple Sugar maple	No observations in 1993.
Apple-and-thorn skeletonizer <i>Choreutis pariana</i> (Cl.)	Apple	Damage of varying intensity at ten locations, mainly in eastern Nova Scotia. No observations from New Brunswick or Prince Edward Island.
Ash rust <i>Puccinia sparganioides</i> Ell. & Barth.	White ash	No observations in 1993.
Aspen webworm <i>Tetralopha applastella</i> (Hlst.)	Trembling aspen	No observations in 1993.
Bagworm <i>Thyridopteryx ephemeraeformis</i> (Haw.)	Balsam fir Red spruce	In Nova Scotia, a few larvae found at four locations with no associated damage. No observations from New Brunswick or Prince Edward Island.
Balsam bark weevil <i>Pissodes dubius</i> Rand.	Balsam fir Red spruce	Found at five locations in three counties in New Brunswick; highest, 20% of balsam fir infested at Vandine Brook, Northumberland Co. No observations from Nova Scotia or Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Balsam fir bark beetle <i>Pityokteines sparsus</i> (LeC.)	Balsam fir	Trace damage at one New Brunswick location. No observations from Nova Scotia or Prince Edward Island.
Balsam fir sawfly <i>Neodiprion abietis</i> (Harr.)	Balsam fir Black spruce Red spruce White spruce	Population levels low in northern New Brunswick; low at 13 locations throughout Nova Scotia and trace defoliation at two sites in Prince Edward Island.
Balsam fir tip blight <i>Delphinella balsameae</i> (Waterm.) E.Muell	Balsam fir	No observations in 1993.
Balsam shootboring sawfly <i>Pleroneura brunneicornis</i> Roh.	Balsam fir	Trace damage at a few locations in New Brunswick and Nova Scotia. No observations from Prince Edward Island.
Balsam woolly adelgid <i>Adelges piceae</i> (Ratz.)	Balsam fir	In New Brunswick, incidence and infestation levels similar to 1992; highest (76%) stems attacked at Rocks, Grand Manan, and 65% twig damage on 80% of trees at Otter Cove, Charlotte Co. An average of light twig damage at 16 locations in Nova Scotia; highest, moderate twig damage at Round Bay, Shelburne Co., and west of Big Tracadie, Antigonish Co. Present at low levels in Prince Edward Island.
Beech bark disease <i>Nectria coccinea</i> var. <i>faginata</i> Lohm., Wats. & Ayers and Beech scale <i>Cryptococcus fagisuga</i> Lindling.	Beech	Cankered trees common throughout the region. Infection ranged from 12 to 100% of trees in numerous stands examined.
Birch casebearer <i>Coleophora serratella</i> (L.)	Alder Beech White birch Wire birch Yellow birch	In New Brunswick, found at more than 100 locations at 1992 levels of mainly trace or light. Severe damage at Palfrey Brook, York Co., and Serpentine Lake, Northumberland Co. Damage in Nova Scotia at 1992 levels of mainly trace or light at 66 locations, highest (35%) of white birch leaves at Grand Etang, Inverness Co. In Prince Edward Island, damage down from 1992, at mainly trace levels, averaging 26% of white birch leaves. Highest, moderate on all white birch trees at Stanhope, Queens Co.
Birch leafminer <i>Fenusa pusilla</i> (Lep.)	White birch Wire birch Yellow birch	Infestation increased from 1992 with patches of trace to severe throughout New Brunswick. Most common in central Kings and western Albert counties with moderate and severe damage. In Nova Scotia found at 20 locations, mainly in western part of province, at trace or light levels. Levels down in Prince Edward Island, only trace or light damage in Prince Co.

INSECT OR DISEASE	HOST(S)	REMARKS
Birch leafspot <i>Septoria betulina</i> Pass.	White birch	Varying intensity levels mainly in central and eastern Nova Scotia; highest, several kilometers of roadside trees with light, moderate, or severe browning, in Pictou, Guysborough and Inverness counties. Trace or light spotting at scattered locations in New Brunswick and Prince Edward Island.
Birch sawfly <i>Arge pectoralis</i> (Leach)	Alder White birch Wire birch	Defoliation levels up in New Brunswick from 1992, with patchy light or moderate damage at a few locations, mainly in Restigouche Co. In Nova Scotia, trace or light damage at six locations. Single report on a few trees in Prince Edward Island.
Birch skeletonizer <i>Bucculatrix canadensisella</i> Cham.	White birch Yellow birch	More widespread in New Brunswick than in 1992; most common and severe in Charlotte and Kent counties. Levels down for second consecutive year in Nova Scotia, only trace damage at a few sites. In Prince Edward Island, skeletonizing increased to light and moderate with severe patches throughout; highest at Rustico Island, Queens Co.
Bruce spanworm <i>Operophtera bruceata</i> (Hlst.)	Apple Sugar maple Trembling aspen White birch	In New Brunswick, mostly low numbers; highest (moderate) damage on white birch at Rivière à la Truite, Madawaska Co. Trace damage at one location in Nova Scotia. No observations from Prince Edward Island.
Canker of larch <i>Potebniomyces coniferarum</i> (Hahn) Smerlis	Tamarack	Trace damage at each of two locations in New Brunswick and Prince Edward Island. No observations from Nova Scotia.
Canker on spruce <i>Botryosphaeria piceae</i> Funk	White spruce	No observations in 1993.
Cedar leafminers <i>Argyresthia aureoargentella</i> Brower <i>Argyresthia freyella</i> (Wlsh.) <i>Argyresthia thuella</i> (Pack.) <i>Coleotechnites thujaella</i> (Kft.)	Cedar	In New Brunswick, incidence remained at 1992 levels, intensity decreased from trace to severe foliage damage to trace and light with a few moderate patches. Two reports from Nova Scotia; highest, moderate on ornamentals at Cherryfield, Lunenburg Co. No observations from Prince Edward Island.
Cherry blight	Choke cherry Pin cherry	In New Brunswick, intensity decreased from light and severe in a few counties in 1992 to light and moderate in 1993. In Nova Scotia, damage decreased in incidence and intensity for the second year, mainly trace, light or moderate at scattered locations. In Prince Edward Island, damage increased from light and moderate in 1992 to moderate and severe in 1993.
Cherry casebearer <i>Coleophora pruniella</i> Clem.	Trembling aspen	Trace damage at four locations in eastern Nova Scotia. In Prince Edward Island, damage decreased for the second year, mainly trace with a few small moderate patches in Queens Co. No observations from New Brunswick.

INSECT OR DISEASE	HOST(S)	REMARKS
Deterioration of cedar	Cedar	In Saint John Co., N.B., condition of trees improved, current shoot mortality down significantly from 1992 levels. The initial cause of the deterioration remains uncertain. No observations from Nova Scotia or Prince Edward Island.
Diplodia tip blight <i>Sphaeropsis sapinea</i> (Fr.) Dyko & Sutton	Austrian pine Red pine Scots pine	Moderate damage on several Scots pine, Argyle Head, Yarmouth Co., and on one tree at Kingsburg, Lunenburg Co., N.S. Severe on Austrian pine, Southport, Queens Co., P.E.I. No observations from New Brunswick.
Eastern blackheaded budworm <i>Acleris variana</i> (Fern.)	Balsam fir Red spruce White spruce	More common than in 1992, trace to moderate damage, especially in northern New Brunswick. Trace damage at five locations in each of Nova Scotia and Prince Edward Island.
Eastern dwarf mistletoe <i>Arceuthobium pusillum</i> Peck	Spruce	Found at many locations across Nova Scotia. Highest incidence in northern Antigonish and western Inverness counties, where numerous brooms with associated mortality were common. Trace damage at one location in Prince Edward Island. No observations from New Brunswick.
Eastern spruce gall adelgid <i>Adelges abietis</i> (L.)	Black spruce Red spruce White spruce	Present throughout the region, damage to both 1992 and 1993 shoots generally trace and light. Highest (12% of 1993 shoots) at Riviere Du Portage, Northumberland Co., N. B., Southwest Margaree (25% of 1992 shoots) Inverness Co., N.S. and Rustico Island (11% of 1992 shoots) Queens Co., P.E.I. See Plantation Pest Assessment Survey chapter.
Eastern tent caterpillar <i>Malacosoma americanum</i> (F.)	Alder Apple Cherry	Found throughout New Brunswick except in Gloucester and Madawaska counties; population levels significantly higher than in 1992; very common in the southcentral part of the province. In Nova Scotia, similar to 1992, nests common throughout most of the province. Scattered nests throughout Prince Edward Island.
Elm leaf beetle <i>Pyrrhalta luteola</i> (Mill.)	Elm	Outbreak persists, damage similar to 1992, with moderate and severe foliage browning widespread throughout the city of Fredericton, York Co., N.B. No observations from Nova Scotia or Prince Edward Island.
Elm leafminer <i>Fenusa ulmi</i> Sund.	Elm	Damage similar to 1992, light and moderate leaf browning with some severe patches on exotic elms throughout Nova Scotia and Prince Edward Island. No observations from New Brunswick.
European pine sawfly <i>Neodiprion sertifer</i> (Geoffroy)	Red pine Scots pine	Trace, light or moderate damage at three locations in Nova Scotia. No observations from New Brunswick or Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
European pine shoot moth <i>Rhyacionia buoliana</i> (D. & S.)	Red pine Scots pine	Trace or light damage on young pine trees throughout Nova Scotia and Prince Edward Island. No observations from New Brunswick.
European spruce sawfly <i>Gilpinia hercyniae</i> (Htg.)	Balsam fir Spruce	Present at low numbers throughout the region, causing only trace defoliation; most common in Nova Scotia.
Fall cankerworm <i>Alsophila pometaria</i> (Harr.)	Hardwoods	Incidence and intensity levels increased throughout the region, mainly moderate and severe defoliation on ornamentals.
Fall webworm <i>Hyphantria cunea</i> (Dru.)	Hardwoods	Nests more common throughout southern New Brunswick than in 1992. Nest counts up for the third year, very common throughout Nova Scotia. One or two nests per site, common throughout Prince Edward Island as in 1992.
Flat leaf tiers <i>Psilocorsis reflexella</i> Clem.	Hardwoods	Trace or light damage at 22 locations throughout Nova Scotia, trace at three locations in New Brunswick and one location in Prince Edward Island.
<i>Psilocorsis</i> spp.	Hardwoods	In Nova Scotia, trace defoliation at four locations. No observations from New Brunswick or Prince Edward Island.
Foureyed spruce bark beetle <i>Polygraphus rufipennis</i> (Kby.)	Spruce	Found at one location in each of New Brunswick and Nova Scotia. No observations from Prince Edward Island.
Frost damage	Conifer Hardwoods	Severe damage at only two locations in New Brunswick, elsewhere trace or light. Trace at a few locations in Nova Scotia and Prince Edward Island. See Nursery and Greenhouse Problems, Seed Orchards Pests and Plantation Pest Assessment Survey chapters.
Gall mites <i>Eriophyidae</i>	Hardwoods	Mites affected an average of 28%, 22% and 29% of leaves in New Brunswick, Nova Scotia and Prince Edward Island respectively, ranging from 1 to 83%.
Globose gall rust <i>Endocronartium harknessii</i> (J.P.Moore) Y. Hiratsuka	Jack pine Scots pine	Found at four locations in New Brunswick, most damage on jack and Scots pine at Upper Blackville, Northumberland Co. and at a single location in Prince Edward Island. No observations from Nova Scotia. See Plantation Pest Assessment Survey chapters.
Greenheaded spruce sawfly <i>Pikonema dimmockii</i> (Cress.)	Spruce	Present at low numbers throughout region.
Greenstriped mapleworm <i>Dryocampa rubicunda rubicunda</i> (F.)	Maple	Damage levels up in New Brunswick with severe defoliation over 20 ha at Weldfield and 4 ha at Rosaireville, Northumberland Co. Trace or light feeding at six locations in Nova Scotia. No observations from Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Hail damage	Red maple Sugar maple Yellow birch	Trace or light damage at a location in each of New Brunswick and Nova Scotia. No observations from Prince Edward Island.
Hare damage	Conifers	No observations in 1993.
Hypoxylon canker <i>Hypoxylon mammatum</i> (Wahl.) Mill.	Trembling aspen	Damage increased throughout the region in 1993. In New Brunswick, found throughout, averaging 15% mortality; highest (90% of trees) dead or dying, Caribou Depot, Restigouche Co. An average of 16% trees infected at eight locations in Nova Scotia. In Prince Edward Island, an average of 19% trees at four locations were dead or dying.
Ink spot of aspen <i>Ciborinia whetzellii</i> (Seaver) Seaver	Trembling aspen	In New Brunswick, damage of varying intensity at five locations; highest, severe along 0.5 k of roadside trees, Wrights Brook, Northumberland Co. Trace damage at one location in Nova Scotia. No observations from Prince Edward Island.
Jack pine budworm <i>Choristoneura pinus pinus</i> Free.	Jack pine	No damage observed but slight increase in number of adult moths caught in pheromone and light traps.
Larch needleworm <i>Zeiraphera improbana</i> (Wlk.)	Tamarack	No damage observed, a few adult moths caught in light traps in the Maritimes.
Larch sawfly <i>Pristiphora erichsonii</i> (Htg.)	Tamarack	In New Brunswick, for the third consecutive year, severe defoliation on a 2-ha area at Rexton, Kent Co., also, severe on 2 ha at MacDonald Lake, Queens Co. In Nova Scotia, eight reports; highest, moderate and severe on 3 ha, Conquerall Mills, Lunenburg Co. No observations from Prince Edward Island.
Large aspen tortrix <i>Choristoneura conflictana</i> (Wlk.)	Trembling aspen	No observations in 1993.
Leaf and twig blight of aspen <i>Venturia macularis</i> (Fr.) E. Muell. & Arx	Largetooth aspen Trembling aspen	Damage down slightly from 1992 levels in the Maritimes. Average 9% of shoots on 64% of trees throughout New Brunswick; highest, severe on 67% of young trees, Chelmsford, Northumberland Co. In Nova Scotia, mostly trace or light damage; highest, light and moderate on 1 ha of young trees, Piedmont, Pictou Co. Trace or light damage at four locations in Prince Edward Island.
Leaf blister <i>Taphrina carnea</i> Johanson <i>Taphrina dearnessii</i> Jenkins <i>Taphrina flava</i> Farl.	Red maple Sugar maple White birch Wire birch Yellow birch	<i>T. carnea</i> caused trace or light injury to yellow birch leaves at a few locations throughout the region. <i>T. dearnessii</i> brought similar injury levels to red maple and/or sugar maple at eight locations in New Brunswick, 13 in Nova Scotia and one in Prince Edward Island. <i>T. flava</i> produced trace, light or moderate leaf injury at 12 locations in Nova Scotia; highest, (moderate) blistering on 72% of white birch leaves at Whycocomagh, Inverness Co. Light at five locations in New Brunswick. No observations from Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Leaf blotch of horse-chestnut <i>Guignardia aesculi</i> (Peck) V.B. Stew.	Horse-chestnut	Found wherever host occurs in the region. In New Brunswick, intensity down from 1992 to trace and light. In Nova Scotia, intensity up, mainly moderate or severe damage. Intensity up, light to severe leaf browning, across Prince Edward Island.
Leafcone caterpillars <i>Caloptilia</i> spp.	White birch Wire birch Yellow birch	Common throughout New Brunswick, trace to moderate damage; highest, moderate on all white birch southwest Miramichi River, York Co. Trace in Nova Scotia and Prince Edward Island.
Leaf fungus of largetooth aspen <i>Astrodochium coloradense</i> Ell. & Ev.	Largetooth aspen	Damage similar to 1992, moderate and severe foliage discoloration on scattered trees throughout western Nova Scotia; highest, moderate leaf browning on several dozen trees at Upper Vaughan, Hants Co. No observations from New Brunswick or Prince Edward Island.
Leafspot on poplar <i>Drepanopezia tremulae</i> Rimpau	Trembling aspen	Patches of light, moderate or severe damage found throughout Nova Scotia and Prince Edward Island. No observations from New Brunswick.
Lesser maple spanworm <i>Itame pustularia</i> (Gn.)	Red maple Sugar maple	Lower incidence throughout the region than in 1992. Trace to moderate damage at five locations in New Brunswick. Trace at 15 locations in Nova Scotia and three locations across Prince Edward Island.
Maple bladder gall mite <i>Vasates quadripes</i> (Shim.)	Red maple	Common and widespread throughout region. In New Brunswick an average of 28% of leaves affected on 72% of trees at 24 locations. In Nova Scotia, 40% of leaves on 76% of trees at 53 locations; 57% of leaves on 85% of trees across Prince Edward Island.
Maple leafroller <i>Sparganothis acerivorana</i> Mack.	Red maple	In New Brunswick, leafroller damage was similar to 1992, averaging 7% of leaves on 60% of trees at 22 locations. In Prince Edward Island, less intense this year, mostly trace damage; highest light and moderate at Brudenell, Kings Co. No observations from Nova Scotia.
Maple spindlegall mite <i>Vasates aceris-crumena</i> (Rly.)	Red maple Sugar maple	Common throughout the region. In New Brunswick, an average of 30% of leaves with galls at 29 locations; highest (64%) at Reddin Brook, Kings Co. In Nova Scotia, 24% of leaves affected at 11 locations; highest (71%) at South Cape Highlands, Inverness Co. In Prince Edward Island, 54% of leaves affected at six locations; highest (87%) at Stanchel, Queens Co.
Mites <i>Oligonychus milleri</i> (McGregor) <i>Oligonychus ununguis</i> (Jacobi)	Conifers	No observations in 1993.
Mountain ash sawfly <i>Pristiphora geniculata</i> (Htg.)	Mountain ash	In New Brunswick, light at three locations; severe on several ornamentals Fredericton, York Co. No observations from Nova Scotia or Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Needle casts <i>Lirula macrospora</i> (Hartig) Darker	Black spruce Red spruce White spruce	In New Brunswick, moderate damage to black spruce at Hunters Brook, Madawaska Co. In Nova Scotia, trace or light at nine locations; highest (30% of red spruce needles), Pomquet Forks, Antigonish Co. No observations from Prince Edward Island.
<i>Lirula mirabilis</i> (Darker) Darker	Balsam fir	Light damage in New Brunswick; trace in Nova Scotia; severe on a few trees in Prince Edward Island.
<i>Lirula nervata</i> (Darker) Darker	Balsam fir	Trace or light damage at one location in each of New Brunswick and Prince Edward Island. In Nova Scotia, damage averaged 3% at 14 locations; highest, severe on scattered Christmas trees at Northwest, Lunenburg Co.
<i>Phaeocryptopus gaeumannii</i> (Rohde) Petr.	Douglas fir	Light damage at one location in Prince Edward Island. No observations from New Brunswick or Nova Scotia.
<i>Rhabdocline weirii</i> Parker & Reid	Douglas fir	No observations in 1993.
<i>Rhabdocline</i> sp.	Douglas fir	Found at one location in Nova Scotia. No observations from New Brunswick or Prince Edward Island.
<i>Bifusella linearis</i> (Peck) Hoehn.	White pine	No observations in 1993.
<i>Hypodermella laricis</i> Tub.	Tamarack	Trace damage at one location in Prince Edward Island. No observations from New Brunswick or Nova Scotia.
Needle flecking	Conifers	Trace or light damage at 13 locations in Nova Scotia and at two locations in Prince Edward Island. No observations from New Brunswick.
Needle rusts on balsam fir <i>Melampsora abieti-capraearum</i> Tub. <i>Pucciniastrum epilobii</i> Oth. <i>Pucciniastrum goeppertianum</i> (Kuehn) Kleb. <i>Uredinopsis</i> spp.	Balsam fir	Trace or light infection at 74 locations throughout the region. The highest, light damage on 18% of needles by <i>Uredinopsis</i> sp. at Square Lake, Westmorland Co., New Brunswick.
Needle rust on eastern hemlock <i>Melampsora abietis-canadensis</i> C.A. Ludwig ex Arth. <i>Melampsora farlowii</i> (Arthur) Davis <i>Melampsora</i> spp. <i>Pucciniastrum vaccinii</i> (Wint.) Jorst.	Eastern hemlock Trembling aspen	One report of <i>M. abietis-canadensis</i> on trembling aspen from each province; moderate in New Brunswick; trace in Nova Scotia and light in Prince Edward Island. Two reports of <i>P. vaccinii</i> from Nova Scotia. <i>Melampsora</i> spp. caused severe damage at one location in Prince Edward Island. No observations of <i>M. farlowii</i> .
Needle rusts on pine <i>Coleosporium asterum</i> (Diet.) Syd. <i>Coleosporium</i> spp. <i>Coleosporium viburni</i> Arthur	Jack pine Red pine	<i>C. asterum</i> caused trace or light damage on pine at one location in New Brunswick and two locations in Prince Edward Island. <i>C. viburni</i> caused trace or light damage on jack pine at one location in each of Nova Scotia and Prince Edward Island. <i>Coleosporium</i> spp. caused trace damage on red pine at one location in Nova Scotia.

INSECT OR DISEASE	HOST(S)	REMARKS
Needle rusts on spruce <i>Chrysomyxa ledi</i> dBy. <i>Chrysomyxa ledicola</i> Lagh. <i>Chrysomyxa</i> spp.	Black spruce Colorado blue spruce Red spruce White spruce	<i>C. ledi</i> and <i>C. ledicola</i> caused trace to severe damage throughout region. Highest, severe by mainly <i>C. ledi</i> on ornamental Colorado blue spruce throughout Westmorland, Kent, Northumberland and York counties, New Brunswick. <i>Chrysomyxa</i> spp. caused trace damage at 17 locations throughout Nova Scotia and two locations in Prince Edward Island. See Nurseries & Greenhouse Problems and Seed Orchard Pests chapters.
Needle rust on tamarack <i>Melampsora medusae</i> Theum.	Balsam poplar Tamarack	Trace or moderate damage at two locations in each of New Brunswick and Prince Edward Island. Highest, moderate on 72% of needles on all tamarack trees at Lawson Brook, Gloucester Co., N.B. No observations from Nova Scotia.
Northern pitch twig moth <i>Petrova albicapitana</i> (Busck)	Jack pine	Trace damage at 17 locations in New Brunswick, two in Nova Scotia and one in Prince Edward Island.
Oak leaf tier <i>Psilocorsis quercicella</i> Clem.	Beech Red oak White birch	Trace or light damage at one location in New Brunswick and two in Nova Scotia. No observations from Prince Edward Island.
Obliquebanded leafroller <i>Choristoneura rosaceana</i> (Harr.)	Hardwoods	In New Brunswick, trace or light defoliation at eight locations; highest, 28% white birch leaves on all trees at Alwood Brook, Westmorland Co.; all light trap catches showed slight population increase. In Prince Edward Island at endemic levels. No observations from Nova Scotia.
Ocean salt spray	Conifers Hardwoods	In Nova Scotia, light to severe damage at four locations. Late June storm caused light to severe foliage browning along north shore of Prince Edward Island. No observations from New Brunswick.
Ocellate gall midge <i>Cecidomyia ocellaris</i> O.S.	Red maple Sugar maple	Present across New Brunswick, average leaf damage 14% on 68% of trees; highest (39% on all sugar maple) at Gillis Gulch, Restigouche Co. Present throughout Nova Scotia, averaging 10% of leaves; highest (31%) at several locations in western Nova Scotia. Average of 7% on 61% of trees in Prince Edward Island.
Orange spruce needleminer <i>Coleotechnites piceaella</i> (Kft.)	Black spruce Red spruce White spruce	Trace damage across Nova Scotia and Prince Edward Island. No observations from New Brunswick.
Pear thrips <i>Taeniothrips inconsequens</i> (Uzel)	Sugar maple	Low numbers at three locations in New Brunswick, no visible defoliation. No observations from Nova Scotia or Prince Edward Island.
Pepper-and-salt moth <i>Biston betularia cognataria</i> (Gn.)	Trembling aspen	At endemic levels in Nova Scotia. No observations from New Brunswick or Prince Edward Island.
Pine bark adelgid <i>Pineus strobi</i> (Htg.)	White pine	Trace at three locations in Nova Scotia. No observations from New Brunswick or Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Pine engraver <i>Ips pini</i> (Say)	Red pine	No observations in 1993.
Pine leaf adelgid <i>Pineus pinifoliae</i> (Fitch)	Black spruce Red pine Red spruce White pine	Light damage at one location in New Brunswick. Trace or light infestation mainly on spruce across Nova Scotia. No observations from Prince Edward Island.
Pinewood nematode <i>Bursaphelenchus xylophilus</i> (Steiner & Buhrer) Nickle	Conifers	Lumber samples submitted by Maritime Lumber Bureau inspectors and the Association des Manufacturiers de Bois de Sciage du Québec were processed by the Forest Insect and Disease Survey in Maritimes Region. All samples from the Maritimes and Quebec were negative.
Pinkstriped oakworm <i>Anisota virginiensis virginiensis</i> (Drury)	Red oak White birch	Single moth caught in a light trap in Nova Scotia. No observations from New Brunswick or Prince Edward Island.
Poplar felt mite <i>Phyllocoptes didelphis</i> Keifer	Large-tooth aspen Trembling aspen	Found throughout New Brunswick at trace to moderate levels; highest (73%) trembling aspen leaves on all trees at Blackland Brook, Restigouche Co. In Nova Scotia, average 20% of foliage at 21 locations; highest (47%) north of Forest Glen, Colchester Co. Trace damage in Prince Edward Island.
Poplar leaf-folding sawfly <i>Phyllocolpa</i> spp.	Large-tooth aspen Trembling aspen	Common throughout region. In New Brunswick, found at 41 locations, average of 15% leaves folded on 67% of trees; highest (52% on all trees) at Pirate Brook, York Co. In Nova Scotia, average of 7% on 70% of trees at 24 locations; highest (25%) North of Homeville, Cape Breton Co. In Prince Edward Island, average 10% on 72% of trees.
Poplar leaf-mining sawfly <i>Messa populifoliella</i> (Town.)	Balsam poplar Carolina poplar Trembling aspen	No observations in 1993.
Poplar petiole gall moth <i>Ectoedemia populella</i> Busck	Trembling aspen	Found at a few locations in the region causing trace damage.
Porcupine damage	Conifers	Girdled trees common throughout New Brunswick and Nova Scotia. Highest (44%) of balsam fir trees damaged at Crombie Settlement, Victoria Co., New Brunswick. In Nova Scotia, several dozen hectares of plantation red pine with 25% of the stems girdled at Garden of Eden Barrens, Guysborough Co., and in the Trafalgar burn area, Pictou Co. Porcupines do not occur in Prince Edward Island.
Ragged spruce gall adelgid <i>Pineus similis</i> (Gill.)	Black spruce Red spruce White spruce	In Nova Scotia, population levels similar to those in 1992. Found at 14 locations; highest (37% of red spruce shoots) Hattie Lake, Guysborough Co. No observations from Prince Edward Island. See Nurseries and Greenhouse Problems chapter for New Brunswick observations and Plantation Pest Assessment Survey chapter.

INSECT OR DISEASE	HOST(S)	REMARKS
Red flag of balsam fir <i>Fusicoccum abietinum</i> (Hartig) Prill. & Delacr.	Balsam fir	In Nova Scotia, light damage at two locations. No observations from New Brunswick or Prince Edward Island.
Red pine cone beetle <i>Conophthorus resinosae</i> Hopk.	Red pine	A few larvae at one location in Nova Scotia. No observations from New Brunswick or Prince Edward Island.
Red spruce adelgid <i>Pineus flossus</i> (Patch)	Red spruce	Light damage at a few locations in New Brunswick and Nova Scotia. No observations from Prince Edward Island. See Seed Orchard Pests chapter.
Roadside salt damage	Conifers	Various intensity levels at numerous locations throughout the region. Most common on red pine and white pine.
Saddled prominent <i>Heterocampa guttivitta</i> (Wlk.)	Red maple Sugar maple	No damage observations in 1993. Slight increase in light trap catches in region.
Satin moth <i>Leucoma salicis</i> (L.)	Silver poplar	Damage up slightly in New Brunswick, moderate or severe at 11 locations. Incidence and intensity up in eastern Nova Scotia to moderate and severe; highest (severe) on several dozen trees at Red Islands and Hay Cove, Richmond Co., and Port Hastings, Inverness Co. Mainly moderate damage on ornamentals throughout Prince Edward Island. Numbers up slightly at all light trap locations throughout region.
Seedling debarking weevil <i>Hylobius congener</i> D.T., Sch. & Marsh.	Conifer seedlings	Found at three black spruce plantations in Charlotte Co., N.B. with 20%, 30% and 55% seedling mortality. No observations from Nova Scotia or Prince Edward Island.
Snow damage	Jack pine Red pine	Trace or light injury to a few trees in region. See Plantation Pest Assessment Survey chapter.
Spearmarked black moth <i>Rheumaptera hastata</i> (L.)	White birch	Trace or light defoliation at two locations in New Brunswick. Endemic levels in Nova Scotia. No observations from Prince Edward Island.
Spider mites <i>Tetranychidae</i>	Conifers	Present at four locations in New Brunswick; highest (severe) on red spruce at Rivère du Portage, Northumberland Co. Trace to severe at 25 locations throughout Nova Scotia; highest (severe) at Robert Brook, Inverness Co. In Prince Edward Island found at 10 locations; most damage (moderate or severe) on tamarack. See Christmas Tree Pests, Seed Orchard Pest and Plantation Pest Assessment Survey chapters.
Spittlebugs <i>Aphrophora</i> spp. <i>Cercopidae</i>	Conifers Hardwoods	Present at trace population levels throughout region.

INSECT OR DISEASE	HOST(S)	REMARKS
Spotted tussock moth <i>Lophocampa maculata</i> Harr.	White birch	Endemic levels in Nova Scotia. Low numbers in light traps in region.
Spruce bud midge <i>Rhabdophaga swainei</i> Felt	Black spruce Norway spruce Red spruce White spruce	Found at mostly trace damage levels throughout the region. See Plantation Pest Assessment Survey chapter.
Spruce bud scale <i>Physokermes piceae</i> (Schr.)	Black spruce Red spruce White spruce	Single report of trace damage in New Brunswick. Most common in Nova Scotia, trace or light damage throughout province. Trace shoot damage at a few locations in Prince Edward Island.
Spruce coneworm <i>Dioryctria reniculelloides</i> Mut. & Mun.	Spruce	See Plantation Pest Assessment Survey chapter.
Spruce gall adelgid <i>Adelges lariciatus</i> (Patch)	White spruce	No observations in 1993.
Spruce micro moth <i>Coleotechnites atrupictella</i> (Dietz)	Red spruce White spruce	No observations in 1993.
Spruce twig aphid <i>Mindarus obliquus</i> (Cholod)	Red spruce White spruce	Significant decline in Nova Scotia to trace damage at six locations. Single report of trace damage in Prince Edward Island. No observations from New Brunswick.
Stillwell's syndrome	Balsam fir	Incidence increased in central and northern New Brunswick and throughout western Nova Scotia. Highest (4-5 balsam fir per ha) at Archibald Brook, Restigouche Co., N.B. and scattered individuals throughout central and western N.S. Mortality throughout Prince Edward Island but not as common as in 1992.
Sugar maple borer <i>Glycobius speciosus</i> (Say)	Sugar maple	Single report of trace damage in both New Brunswick and Prince Edward Island. No observations from Nova Scotia.
Sunscorch	Balsam fir Manitoba maple	Varying intensity levels of wilting and subsequent browning mainly in western and northern New Brunswick; highest (severe) common in northern Madawaska Co. Trace damage at one location in each of Nova Scotia and Prince Edward Island.
Tarspot of maple <i>Rhytisma acerinum</i> (Pers. ex St. Amans) Fr.	Red maple	Found at 21 locations in Nova Scotia, average 22%; highest (81%) at South Range, Digby Co. Trace damage at one location in New Brunswick, and two locations in Prince Edward Island.
Uglynest caterpillar <i>Archips cerasivorana</i> (Fitch)	Hardwoods	Less common in New Brunswick than in 1992; highest number of nests were in Kent Co. Nest numbers similar to 1992 levels in Nova Scotia; highest at Ben Eoin, Cape Breton Co.; Great Village, Colchester Co.; and Brooklyn, Queens Co. No observations from Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Variable oak leaf caterpillar <i>Lochmaeus manteo</i> Dbly.	Beech Red oak Sugar maple	Both incidence and intensity increased greatly from 1992 levels. Damage of varying intensity throughout York County, N.B. and at several locations in western Nova Scotia. Highest, moderate over 50 ha of beech, Southhampton, York Co., N.B. and moderate or severe on understory beech, South Brookfield, Queens Co.; N.S. No observations from Prince Edward Island. See New Pest Records in the Maritimes chapter.
Wax filament scale <i>Xylococcus betulae</i> (Perg.)	White birch Yellow birch	Found in southern New Brunswick, averaging 88% of white birch at 11 locations. In Nova Scotia; highest (46%) of white birch, Eatonville, Cumberland Co. No observations from Prince Edward Island.
Weevil <i>Strophosoma melanogrammus</i> Forst.	Balsam fir Red maple White birch White spruce	A few weevils were found at four locations in Nova Scotia. No observations from New Brunswick or Prince Edward Island.
Whitemarked tussock moth <i>Orygia leucostigma</i> (J.E. Smith)	Balsam fir	In Nova Scotia, larvae found at four locations, with no significant injury. No observations from New Brunswick or Prince Edward Island.
White pine blister rust <i>Cronartium ribicola</i> J.C. Fisch.	White pine	In New Brunswick, found at 12 locations; highest (16% of trees killed) at Harris Brook, Northumberland Co. In Nova Scotia, two locations; highest, 12-ha plantation with 70-80% of trees with branch or stem cankers, northeast of Big Pond Centre, Cape Breton Co. Trace damage at Scotchfort, Queens Co., P.E.I.
White pine needle blight	White pine	Light or severe on a few trees at two locations in New Brunswick. Various levels of damage over 2-3 ha at Perch Lake, Pictou Co., N.S. Moderate discoloration at two locations on a few trees in Prince Edward Island.
White pine sawfly <i>Neodiprion pinetum</i> Nort.	White pine	A few larvae at one location in Nova Scotia. No observations from New Brunswick. See Seed Orchard Pests chapter for Prince Edward Island.
White pine weevil <i>Pissodes strobi</i> (Peck)	Black spruce Jack pine Norway spruce Red pine White pine White spruce	Common and widespread throughout region. In New Brunswick, found at 27 locations; highest (40% of white pine) at Bettsburg, Northumberland Co. Incidence increased in Nova Scotia; highest, moderate over several hectares of young white pine at Rossignol Lake, Queens Co. In Prince Edward Island six locations; highest (16%) at Foxley River, Prince Co. See Plantation Pest Assessment Survey chapter.
Whitespotted sawyer beetle <i>Monochamus scutellatus</i> (Say)	Conifers	In New Brunswick found at 13 locations; highest, moderate injury of balsam fir shoots at two locations. Trace or light damage at 21 locations in Nova Scotia and one in Prince Edward Island.

INSECT OR DISEASE	HOST(S)	REMARKS
Willow blight <i>Venturia saliciperda</i> Nuesch	Willow	Severe damage on one tree only, in each of Nova Scotia and Prince Edward Island. No observations from New Brunswick.
Willow flea weevil <i>Rhynchaenus rufipes</i> (LeC.)	Willow	Incidence increased from 1992 levels. Moderate and severe browning at five locations in New Brunswick; highest, severe at Bathurst, Gloucester Co.; and throughout Nova Scotia and Prince Edward Island.
Wind damage	Conifers Hardwoods	In New Brunswick, physical damage, in the form of brown and tattered leaves, was mostly light at several locations; highest (moderate) at Caledonia Mountain, Albert Co. Trace to moderate foliage damage throughout Nova Scotia; highest, light or moderate in Halifax, Lunenburg and Queens Counties. A suspected tornado uprooted and broke off a number of trees over a 2-ha site near Oxford Lake, Victoria Co., N.S. In Prince Edward Island, 26% of leaves with mostly light damage at 25 locations; highest, moderate on sugar maple at Richmond, Queens Co. See Weather-Related Problems chapter.
Winter drying	Conifers	Trace and light damage was found at a few locations in northern New Brunswick. In Nova Scotia, damage was moderate and severe throughout; largest area affected (moderate and severe) reddening of young balsam fir along 2 k of road near Big Barren, Victoria Co. In Prince Edward Island, trace or moderate damage at two locations. See Weather-Related Problems chapter.
Winter moth <i>Operophtera brumata</i> (L.)	Hardwoods	Less widespread throughout region than in 1992. Light and moderate damage at two locations in Nova Scotia. Moderate or severe defoliation throughout Prince Edward Island. No observations from New Brunswick.
Witches' broom of balsam fir <i>Melampsorella caryophyllacearum</i> Schroet.	Balsam fir	Common and widespread throughout the region.
Witches' broom of spruce <i>Chrysomyxa actostaphyli</i> Diet.	White spruce	No observations in 1993.
Woolly alder aphid <i>Paraprociophilus tessellatus</i> (Fitch)	Alder	Moderate and severe population levels in Kent and Northumberland counties, N.B. In Nova Scotia, trace, light or moderate levels throughout. In Prince Edward Island, trace levels at one location.
Yellowheaded spruce sawfly <i>Pikonema alaskensis</i> (Roh.)	Black spruce Colorado blue spruce Norway spruce White spruce	Damage levels similar to 1992. Found at nine locations in New Brunswick; highest, pockets of severe damage in black spruce plantation, at Hammondsdale, Kings Co. Found at six locations in Nova Scotia; highest (severe) on a white spruce hedge at Alton, Colchester Co. Moderate and severe throughout Prince Edward Island; highest, severe patches at St. Gilbert and North Enmore, Prince Co.