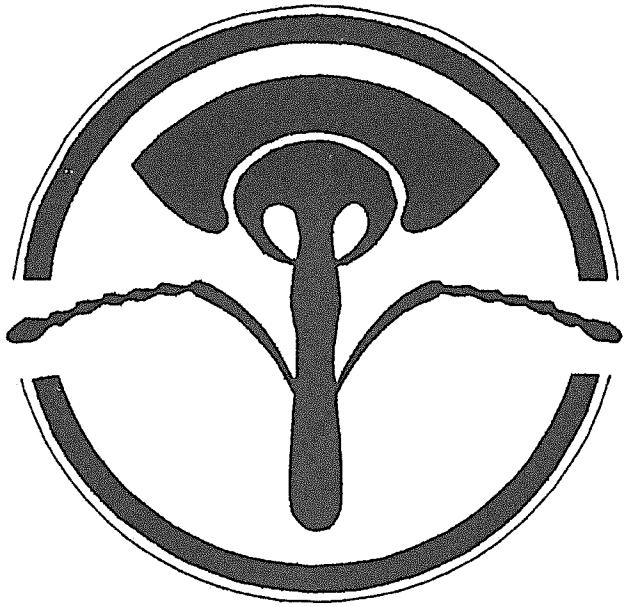
Forest Pest Conditions in the Maritimes in 1995

J. Edward Hurley
and
Laszlo P. Magasi

Canadian Forest Service - Atlantic Forestry Centre
Information Report M-X-199E



Forest Insect and Disease Survey

Natural Resources Canada
Canadian Forest Service

Ressources naturelles Canada
Service canadien des forêts

Canada

FOREST PEST CONDITIONS IN THE MARITIMES IN 1995

by

J. Edward Hurley and Laszlo P. Magasi
Editors

with reports by

A.S. Doane
K.J. Harrison
J.E. Hurley
A.W. MacKay
B.A. Pendrel
G.A. Smith
T.J. Walsh

M - X - 199E

Canadian Forest Service - Atlantic Forestry Centre
Natural Resources Canada
P. O. Box 4000, Fredericton, N.B. E3B 5P7

1996

ISSN: 1192-0033
ISBN: 0-662-24843-0
Catalogue No.: Fo46-19/199E

Additional copies of this publication are available in limited quantities at no charge from:

Canadian Forest Service - Atlantic Centre
P.O. Box 4000
Fredericton, New Brunswick
Canada E3B 5P7
(506) 452-3500
Fax (506) 452-3525

Photocopies or microfiches of this publication may also be purchased from:

Micromedia Ltd.
Place-du-Portage
165, rue Hôtel-de-Ville
Hull (Québec)
J8X 3X2

Une copie française de ce rapport est disponible sur demande.

The National Library of Canada has catalogued this publication as follows :

Main entry under title :

Forest pest conditions in the Maritimes in ...

[Information report ; M-X-199E] [ISBN 0-662-24843-0
Annual.]
Other language edition: 1991- : Les Ravageurs forestiers dans les Maritimes en ...
Includes an abstract in French.
Description based on: 1973.
Imprint varies: Mar. 1985-1987, Canadian Forestry Service. Maritimes; 1988-1993, Forestry Canada. Maritimes Region; 1994- Canadian Forest Service. Maritimes Region.
Information report / Maritimes Forest Research Centre.
Information report / Canadian Forestry Service. Maritimes Region.
Information report / Forestry Canada. Maritimes Region.
Information report / Canadian Forestry Service. Maritimes Region.
ISSN 0714-5063 = Forest pest conditions in the Maritimes.

1. Trees -- Diseases and pests -- Maritimes Provinces.
2. Forest insects -- Maritime Provinces.
I. Maritimes Forest Research Centre.
II. Canadian Forestry Service. Maritimes.
III. Canada. Forestry Canada. Maritimes Region.
IV. Canadian Forest Service. Maritimes Region.
V. Series: Information report (Maritimes Forest Research Centre).
VI. Series: Information report (Canadian Forestry Service. Maritimes)
VII. Series: Information report (Canada. Forestry Canada. Maritimes Region)
VIII. Series: Information report (Canada. Forestry Canada. Maritimes Region)
IX. Series: Information report (Canadian Forestry Service. Maritimes Region).

SB605.C3M33 634.9'6'09715 C83-071221 rev.

Abstract

This report reviews the status of forest insects and diseases in the Maritimes region in 1995. 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, a new insect-host combination, and control operations against spruce budworm 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 - Atlantic Forestry Centre.

Résumé

Le présent rapport fait le point sur les insectes et les maladies des arbres dans la région des Maritimes en 1995. Les ravageurs et les problèmes des conifères, des feuillus et des secteurs à valeur élevée (comme les pépinières, les vergers à graines, les plantations et les secteurs plantés d'arbres de Noël) y sont décrits. L'information relative aux ravageurs soumis à des règlements phytosanitaires, une nouvelle combinaison hôtes-ravageurs, ainsi que les activités de lutte contre la tordeuse des bourgeons de l'épinette sont résumés. On y trouve en outre une liste des rapports et des publications consacrés aux insectes et aux maladies des arbres. On peut obtenir de plus amples renseignements auprès du Service canadien des forêts - Centre de foresterie de l'Atlantique.

Table of Contents

Page

ABSTRACT iii

INTRODUCTION 1

PESTS OF CONIFERS 1
- Spruce Budworm 1
- Hemlock Looper 3
- Spruce Beetle 3
- Eastern Larch Beetle 4
- Armillaria Root Rot 4
- Spruce Budmoths 5
- Eastern Blackheaded Budworm 5
- Balsam Fir Sawfly 5
- Yellowheaded Spruce Sawfly 5

PESTS OF HARDWOODS 5
- Forest Tent Caterpillar 5
- Variable Oak Leaf Caterpillar 6
- Oak Leafroller and Oak Leaf Shredder 7

PLANT QUARANTINE SURVEYS FOR INTRODUCED FOREST PESTS 7
- Gypsy Moth 7
- European Larch Canker 10
- Dutch Elm Disease 10
- Scleroderris Canker 10
- Pine Shoot Beetle 11
- Butternut Canker 11
- Pinewood Nematode 12
- Forest Pests in Adjacent Jurisdictions 12

NURSERY AND GREENHOUSE PROBLEMS 12

SEED ORCHARD PESTS 13

CHRISTMAS TREE PESTS 13

NEW INSECT AND FUNGUS RECORDS IN THE MARITIMES 14

ACKNOWLEDGEMENTS 14

LIST OF PUBLICATIONS 15

INTRODUCTION

Forest pest conditions in the Maritime provinces have been assessed annually since the establishment of the Forest Insect and Disease Survey (FIDS) in 1936. Information on pests and their effect on the forest has been disseminated through periodic reports, such as Seasonal Highlights, Technical Notes, Information Reports, scientific publications, and various annual reports of the Forest Insect and Disease Survey.

As a consequence of changes precipitated by a federal government-wide program review and the February 1995 federal budget, the operation of the Canadian Forest Service (CFS) research activities in the future will be based on a set of national networks, with mandates and priorities towards meeting federal responsibilities to the forestry sector of Canada. The Forest Insect and Disease Survey, in its current form, will cease as of April 1, 1996. Staff will become part of the new national Forest Health Network, led from the CFS office in Fredericton.

This is the last of the "Forest Pest Conditions in the Maritimes" information reports. Its format is similar to reports of past years, although some of the summaries are more of an overview with less detail than in previous years. The report provides information on the major forest pest conditions in the Maritime provinces in 1995; there is a section on plant quarantine pests and a section on new species records and new host-pest combinations. As a departure from past practice, there is no extensive tabular listing of all the insects and diseases encountered during the year.

Much of the information contained in this report is information shared with us by the forest protection groups of the three provincial governments, the New Brunswick Department of Natural Resources and Energy (NBDNRE), the Nova Scotia Department of Natural Resources (NSDNR), and the Prince Edward Island Department of Agriculture, Fisheries and Forestry (PEIDAFF). Information sharing has been a long-standing tradition in the Maritimes and producing a single Maritimes report was of mutual benefit. We would like to take this opportunity to gratefully acknowledge past contributions of the provinces, as well as the contribution of all of our other government, industrial, municipal, and private clients and cooperators throughout the "FIDS years". We would also like to express our hope that we, with different mandates, can count on the same spirit of cooperation, camaraderie, and contribution from our partners in the future, that we have experienced over the past 60 years as we, together, have attempted to look after the health of the Maritime forests.

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%

On the cover of this report we wish to honor the FIDS symbol, to remind us of just how privileged we were to work with so many clients and partners during the past 60 years as members of the Forest Insect and Disease Survey.

PESTS OF CONIFERS

Spruce Budworm

Information about spruce budworm, *Choristoneura fumiferana* (Clem.) is summarized from various sources: NBDNRE, Forest Protection Limited, J.D. Irving, Limited, NSDNR, and the FIDS. 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 remain at relatively low levels with defoliation, detected by aerial surveys in 1995, only in New Brunswick.

New Brunswick

The annual spruce budworm aerial survey, conducted by NBDNRE, found defoliation of balsam fir for the first time since 1992. Ground surveys indicated generally low spruce budworm populations. Moderate defoliation, over an area totalling 4312 ha, was detected in two areas. The larger area, 4135 ha, was located in the northwest, 30 km west of States Lake, Restigouche County, and the smaller area, 177 ha, was located near Popple Depot, Northumberland County.

Protection against spruce budworm on Crown land was limited to small trials, conducted by NBDNRE, to test the efficacy of two registered *Bacillus thuringiensis* (*B.t.*) products and a new chemical product, tebufenozide (MIMIC®) in the process of being registered. Forest Protection Limited applied the treatments as follows: Foray 76B® at 2x10 BIU/0.5L/ha to 2462 ha; Dipel 64AF® at 2x15 BIU/1.2L/ha to 2060 ha; and MIMIC at 2x35g/0.5L/ha to 1210 ha.

Foliage protection against spruce budworm on private land in New Brunswick was conducted over 3518 ha in 1995 by Forest Patrol Ltd., a subsidiary company of J.D. Irving, Limited. All treated areas received one or two applications of *B.t.* insecticide product at an application rate of 20 BIU/ha. *B.t.* products used in 1995 were Foray 76B, Foray 48B®, Dipel 48AF® and Futura XLV-HP®.

Pheromone trapping surveys conducted jointly by NBDNRE and CFS were able to map areas of the province where endemic populations persist in the northwest (Fig. 1). Despite the low numbers of the pest, which are not readily detected by other survey methods, the areas described provide a previously unseen view of non-outbreak populations and it is anticipated that an effective early warning system now exists.

Surveys of overwintering larvae (L2 surveys) conducted by NBDNRE found no high or moderate counts around the province. New Brunswick is forecast to be virtually free of severe and moderate defoliation in 1996.

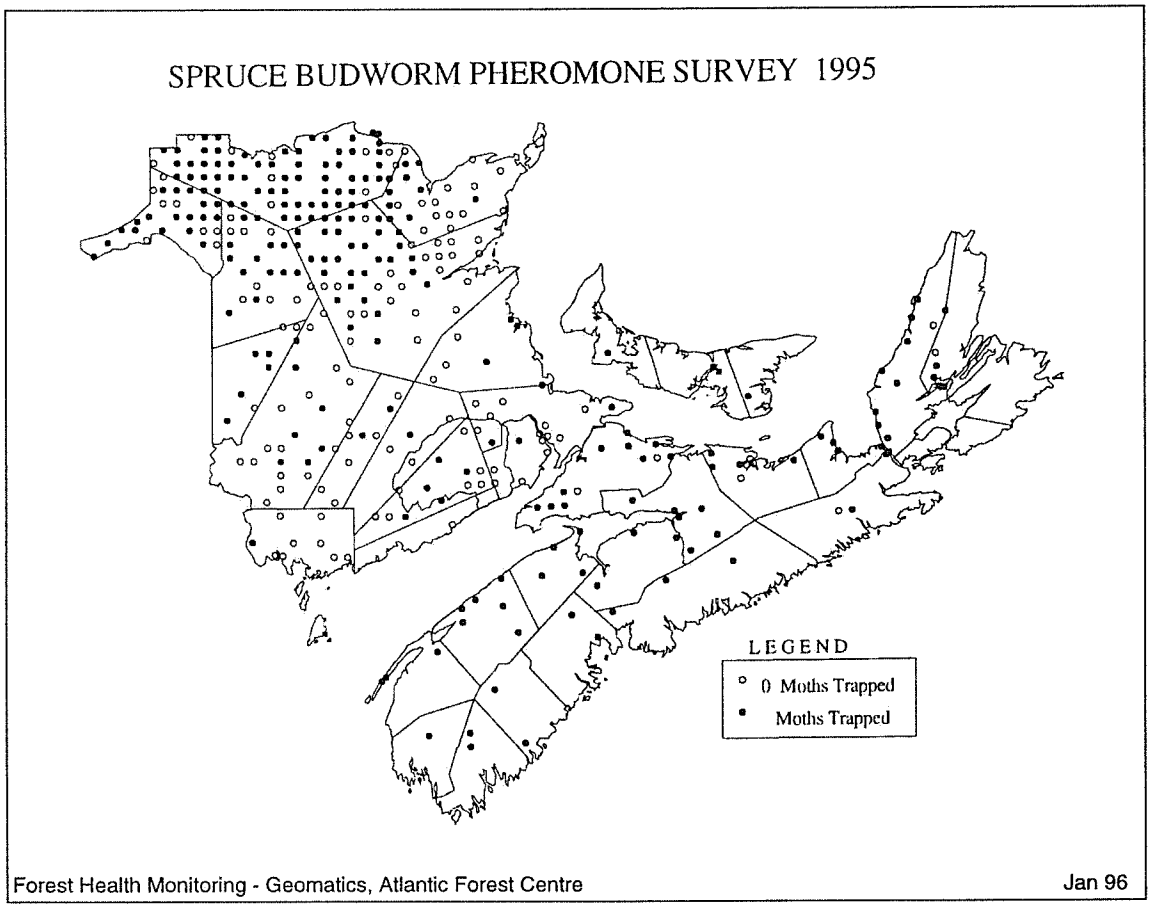


Figure 1.

Nova Scotia

For the ninth consecutive year, no defoliation of balsam fir or spruce was observed during the annual spruce budworm aerial survey in Nova Scotia in 1995. Larvae were difficult to find during ground sampling and their presence was recorded at only five locations, all in the northeastern part of the province.

Pheromone trapping conducted by NSDNR and CFS indicated a dispersed and patchy endemic population (Fig. 1). The highest catches were less than in northern New Brunswick, but somewhat higher than in many parts of southern New Brunswick.

Surveys of overwintering larvae (L2 surveys) conducted by NSDNR at 127 locations found zero over-wintering budworm populations.

Prince Edward Island

Spruce budworm defoliation was significantly reduced in 1995. Defoliation levels were mainly in the trace category with a few patches of light damage observed. Defoliation, mainly of white spruce and to a lesser extent balsam fir, occurred throughout the province but was again more common in southern Kings and southwestern Queens counties.

No aerial survey was conducted because of the low defoliation levels and the difficulty of detection due to the reddish appearance of foliage caused by a heavy flower crop.

Hemlock Looper

Hemlock looper, *Lambdina fiscellaria fiscellaria* (Gn.), population levels were low in New Brunswick and Prince Edward Island but increased in Nova Scotia in 1995.

For the third consecutive year, no defoliation was detected in New Brunswick during the aerial survey conducted by NBDNRE.

The defoliation forecast for Nova Scotia by last year's egg survey occurred as predicted in Victoria County. A NSDNR aerial survey detected 55 ha of light defoliation and 12 ha of moderate defoliation of balsam fir in the MacRae Brook area of Crowdis Mountain.

Pheromone traps indicate a significant increase in population levels on Cape Breton Island, as well as in Antigonish and Guysborough counties. The 1995 province-wide hemlock looper egg survey also indicates a population increase. Samples were collected from 191 locations, with 55 sites being in the high or extreme category. All but three of the sites with high to extreme ratings are in Inverness and Victoria counties, with one each in Antigonish, Guysborough, and Kings counties.

In Prince Edward Island, hemlock looper populations appear to be similar to 1994 with defoliation levels no more than trace.

Spruce Beetle

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

In New Brunswick, mortality can be found but only small pockets of trees, widely scattered, are affected, principally across northern areas of the province. Although surveys for this pest have not been extensive in recent years, the incidence of tree mortality caused by this insect appears to have decreased.

In Nova Scotia, the spruce beetle infestation continued to intensify and appeared in new areas of the province. Aerial surveys conducted by NSDNR showed 273 locations throughout the mainland with varying amounts of mortality, representing 4470 ha of damage. Affected areas ranged in size from a few trees to over 300 ha, in all counties on mainland Nova Scotia. Mortality was particularly noticeable along the coast of the Bay of Fundy, from Digby to Hants County and in northeastern Pictou and northern Antigonish counties. Most of the affected locations contain pure stands of mature and/or overmature white spruce; however, severe mortality was observed in a 150-year-old red spruce stand covering 339 ha at West Advocate, Cumberland County.

In Prince Edward Island, no new areas of mortality were observed.

Eastern Larch Beetle

Tree mortality, caused by the eastern larch beetle, *Dendroctonus simplex* LeConte, was at similar levels in 1995 to 1994, with freshly killed larch trees found throughout the region. In New Brunswick, eastern larch beetle was more active in southern and eastern parts of the province. Dead trees ranged from 8-30%, with the most severe attack at Hammondvale, Kings County, where 30% of semi-mature larch trees were killed.

In Nova Scotia, dead trees were found at several locations in Digby and Hants counties, with the highest percentage near Stanley, Hants County, where new mortality was observed over a few hectares.

Newly dead trees were observed throughout Prince Edward Island, with the highest occurrence in Prince County.

Armillaria Root Rot

Plantation pest assessment surveys have been a major source of data for reporting the annual status of Armillaria root rot, *Armillaria mellea* (Vahl ex Fr.) Kummer. These region-wide surveys were not conducted in 1995 and the few records of disease that were found, though not unusual, do not provide for ample status reporting.

Study plots were established to monitor the spread of Armillaria root rot on two plantation species established on clearcuts of three different former covertypes. The objective was to determine if there are any differences in mortality as a function of the former covertype. Eight plots (Table 1) were established between 1983 and 1985; five with black spruce (one later destroyed) and three with jack pine. Although the number of sites limited statistical analysis, trends and differences over a 13-year monitoring period are apparent.

Black spruce would seem to have significantly greater total mortality than jack pine, at least on former softwood/hardwood sites. Black spruce planted on a former hardwood/softwood site appear more susceptible to Armillaria root rot than on softwood/hardwood sites. At this one site, a total of 32% of black spruce trees have been killed by the disease in the 15 years since planting.

Table 1. Cumulative percent mortality caused by Armillaria root rot in plantation plots for the period 1983 to 1995

					% Total Mortality by Year							
Plot #	Species	Year Planted	Year Plot Estab.	Prev. Cover-type	1983	1984	1985	1986	1987	1988	1991	1995
1	bS	1976	1983	s	8	10	10	10	na	na	12	12
2	bS	1973	1983	s/h	4	4	4	4	na	na	8	10
3	bS	1978	1983	s/h	8	12	20	20	na	na	20	20
4	bS	1980	1983	h/s	8	16	24	24	24	26	28	32
5	jP	1978	1984	s/h	-	2	2	2	na	na	2	2
6	jP	1981	1984	s/h	-	2	4	4	6	8	8	8
7	jP	1978	1984	s/h	-	2	2	2	na	na	2	2
8	bS	1981	1985	s/h	-	-	2	2	4	4	*	*

s - softwood
h - hardwood
na - not assessed
* - no longer monitored

Spruce Budmoths

Spruce budmoths comprise a group of closely related species: the spruce budmoth, *Zeiraphera canadensis* Mut. & Free., the purplestriped shootworm, *Zeiraphera unfortunana* Powell, and the yellow spruce budworm, *Zeiraphera fortunana* (Kft.). *Z. canadensis* is the most common and most important of the three, but occasionally the species-mix changes in favor of one of the other two.

In 1995, white spruce shoot damage by spruce budmoths, *Zeiraphera* spp., was down slightly throughout the region compared to 1994. While feeding usually does little injury to mature spruce, serious damage has been found in plantation white spruce in the past and remains a problem in a few plantations in northwest New Brunswick.

In New Brunswick, damage was trace or light with an average of 15% of the shoots affected at 15 locations, compared to 16% reported in 1994. The most serious injury was recorded at St. Arthur, Restigouche County, where 33% of the current shoots were lightly defoliated on 80% of the trees examined.

In Nova Scotia, damage was trace or light at 26 locations across the province. Shoot damage averaged 11%, compared to 10% in 1994. The most significant damage was light shoot injury on 23% of shoots on 100% of the trees at Arcadia, Yarmouth County.

In Prince Edward Island, an average of 24% of shoots were injured at 11 locations, down slightly from 26% in 1994. Damage was trace or light at all locations, with the highest percentage of shoots (40%) with light damage on all white spruce at Indian River, Prince County.

Eastern Blackheaded Budworm

During spruce budworm aerial surveys, NBDNRE discovered light (on 948 ha) and moderate (on 991 ha) defoliation by the eastern blackheaded budworm, *Acleris variana* (Fern), in two small areas east of Wild Goose Lake, Restigouche County, N.B. This is the first known outbreak in the Maritimes since blackheaded budworm defoliated balsam fir across northern New Brunswick and Cape Breton, Nova Scotia in the late 1940s. Larvae were found at seven other locations in the Maritimes but mainly at very low numbers. However, 12-15% of shoots were defoliated at trace and light levels at Teagues Lake, Gloucester County, South Tomogonops River, Northumberland County, and near Point Lepreau, Saint John County, N.B.

Balsam Fir Sawfly

Defoliation by the balsam fir sawfly, *Neodiprion abietis* (Harr.), has been found at a level not observed since 1975 and 1976. A total of approximately 250 ha of severe defoliation was delineated by a NSDNR aerial survey, mostly in young precommercially thinned balsam fir near New Harbour, Guysborough County, N.S. The potential for severe defoliation in 1996 is anticipated because of an abundance of cocoons at these sites. Trace and light defolition was observed at other locations in Antigonish, Digby, and Kings counties. In New Brunswick, light damage was found near Lepreau, Saint John County and at trace levels at three locations across the central portion of the province. Balsam fir sawfly was not found in Prince Edward Island.

Yellowheaded Spruce Sawfly

Defoliation by the yellowheaded spruce sawfly, *Pikonema alaskensis* (Roh.), appears as widespread in southern New Brunswick as last year, defoliating ornamental, wild, and plantation spruce species. However, damage has intensified in plantations of black spruce, as well as red spruce and Norway spruce at locations near Martin Head and the Shepody Road area in Saint John County, and Fundy National Park, Albert County. Defoliation is reduced from previous years but is still present at moderate and severe levels at several locations in Prince County, Prince Edward Island. Only one report of damage was found, at a trace level, in Nova Scotia.

PESTS OF HARDWOODS

Forest Tent Caterpillar

In 1995, for the fifth consecutive year, forest tent caterpillar, *Malacosoma disstria* Hbn., was the major hardwood defoliator in the Maritimes. Defoliation was found in the same areas as last year, in the central and southern parts of New Brunswick, but also new areas of defoliation were found in Westmorland County, not observed since the last outbreak in the early 1980s. In Nova Scotia, the

expected outbreak occurred in Digby and Annapolis counties, with light to severe defoliation. No defoliation was observed on Prince Edward Island.

In New Brunswick, an aerial survey estimated defoliation on trembling aspen and other hardwoods over an area of 435,000 ha, compared to 392,000 ha in 1994, and 196,000 ha in 1993. Of this, 285,000 ha were severe and 150,000 ha were moderately defoliated (Fig. 2). Defoliation occurred over a large area of central and southeastern York County, the northeastern parts of Charlotte, Sunbury, Queens, and Kings counties, in a large area in central Kent County and just across the county line into Westmorland. Defoliation, though in relatively small patches was found throughout western Westmorland County and probably represents the greatest increase in the extent of significant defoliation in New Brunswick. Other hardwoods, such as red oak and white birch, were defoliated in the outbreak areas as well.

In Nova Scotia, defoliation was observed for the first time since 1987. An aerial survey found defoliation of trembling aspen and other hardwoods over an area of about 9,670 ha in northern Digby and Annapolis counties. Of this, 5,730 ha had severe, 3,830 ha moderate, and 112 ha light damage. In spite of this defoliation, pheromone trap catches were down 78% province-wide with Cumberland County the only area with significant catches.

Variable Oak Leaf Caterpillar

In New Brunswick, beech mortality occurred at Prince William and Davidson Lake, York County, where beech had been defoliated by the variable oak leaf caterpillar, *Lochmaeus manteo* Dbldy., for 3 consecutive years. Trace defoliation of beech was found at Pocowogamis, York County, and Stewarton, Kings County. In Nova Scotia, in 1994, there was moderate and severe defoliation at several locations in eastern and western areas of the province. However, in 1995, populations appeared to have crashed. Trace damage on beech and red oak was found at Cape North, Victoria County, and north of Milton, Queens County. There are no reports of damage from Prince Edward Island.

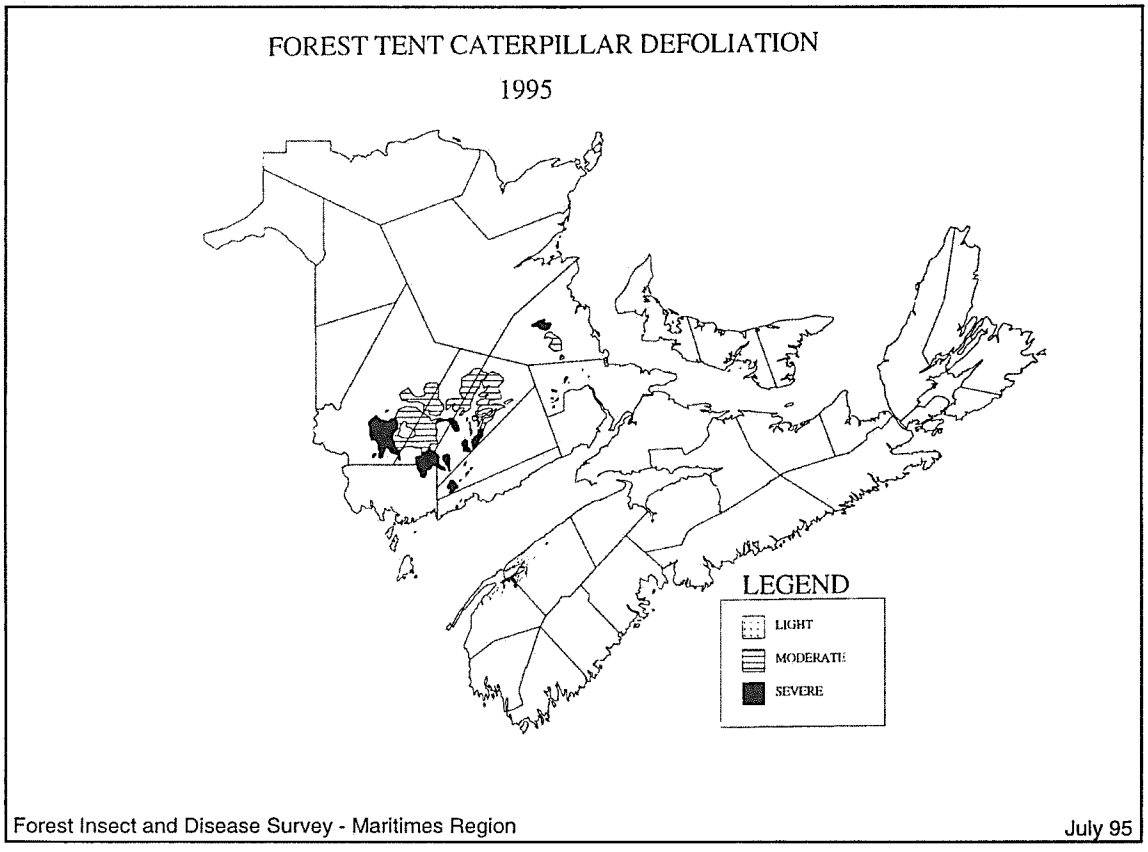


Figure 2.

Oak Leafroller and Oak Leaf Shredder

The oak leafroller, *Pseudexentera spoliana* (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 most of the damage in Nova Scotia, whereas, in New Brunswick and Prince Edward Island, the oak leaf shredder is usually the culprit.

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. Peak damage in 1988 saw an average defoliation of 69% over 22,800 ha. In 1991, a severe spring frost caused a collapse of the insect population with a resultant drop in the average defoliation to 5%. Since 1991, average defoliation has gradually increased, with 8% in 1992, 15% in 1993, and 34% in 1994. In 1993, there was only one report of severe defoliation whereas in 1994 several areas of patchy severe defoliation were observed in Annapolis and Queens counties, as well as one report each from Hants and Pictou counties. Damage was more widespread in 1995, with patches of moderate and severe defoliation in the Grafton Lake area in Annapolis and Queens counties. Various levels of defoliation were found at locations in Halifax, Kings, Lunenburg, Shelburne, and Yarmouth counties.

There are no reports of damage in 1995 for New Brunswick and Prince Edward Island.

PLANT QUARANTINE SURVEYS FOR INTRODUCED FOREST PESTS

A Memorandum of Understanding signed between the Department of Forestry and the Department of Agriculture (Food Production and Inspection Branch) in December 1993 formalized cooperative arrangements of mutual benefit. FIDS has been formally mandated to participate in detection surveys for introduced pests that may be of consequence to our forests. This chapter provides a list of forest pests currently under regulation that are being surveyed and monitored by FIDS. For more details, please contact the editors at the address on the title page of this report.

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 central New Brunswick. In 1995, additional infested areas were found both in New Brunswick and in western Nova Scotia, though in the same general area as previous finds. Gypsy moth is not known to occur in Prince Edward Island.

Members of the Gypsy Moth Coordinating Committee (a multi-agency, multi-governmental group, assisted by hundreds of volunteers) organized and coordinated gypsy moth pheromone trapping in the Maritimes.

The distribution of gypsy moth in the Maritimes is depicted in Figure 3 as the presence of various life stages other than male moths (larvae, pupae, female moths, egg masses) within 10-km UTM-grid cells. Pre-1995 positive grid cells, finds for the period 1981 to 1994, may have had one to several positive locations and may represent current-year finds in addition to older finds.

In spite of its presence in the region for at least 15 years, gypsy moth populations have only rarely been high enough to cause more than trace levels of defoliation, with the notable exception of one 4-ha patch near Moores Mills, Charlotte County, N.B. in 1987 and over a few hectares of forest in Kejimkujik National Park, near Grafton Lake, Queens County, N.S. in 1995. Moderate and severe defoliation to mature red oak and white birch, as well as on understorey red maple, witch hazel, and eastern white pine is the first record of forest defoliation by this insect in Nova Scotia. Populations are slowly increasing in some of the infested areas, indicated by the increasing ease in finding egg masses and larvae.

In New Brunswick, gypsy moth is mostly concentrated in two geographic areas: the southwestern part of the province where it was rediscovered in 1981 after a 40-year absence; and southcentral New Brunswick, where it was first found in 1993. A common feature of most infested locations in the southcentral area is that they are "people" places, *i.e.*, cottage areas, provincial parks, campgrounds, and picnic sites. The spread of gypsy moth is closely tied with movement of people.

In 1995, gypsy moth was found at 138 locations in New Brunswick, 17 of these in 12 previously uninfested grids (Table 2). All of the new locations are in UTM grid cells adjacent to grid cells with previous finds in the southcentral part of the province.

In Nova Scotia, gypsy moth is found at several locations in the western half of the province. Many of the infested locations are close to the coast, in areas of habitation (towns, villages) along major tourist routes. However, more locations with gypsy moth life stages, other than adults, are being found inland.

In 1995, gypsy moth was found at 20 locations in Nova Scotia, 12 of these in eight previously uninfested grids (Table 3). The number of egg masses per location varied from one to over 150, the latter near Grafton Lake, Queens County, in Kejimkujik National Park. This represents a significant increase in population from previous years when egg masses were difficult to find.

The gypsy moth pheromone trapping survey program for detection and delineation consisted of 2623 traps returned in the Maritimes in 1995: 1762 in New Brunswick, 510 in Nova Scotia, and 351 in Prince Edward Island.

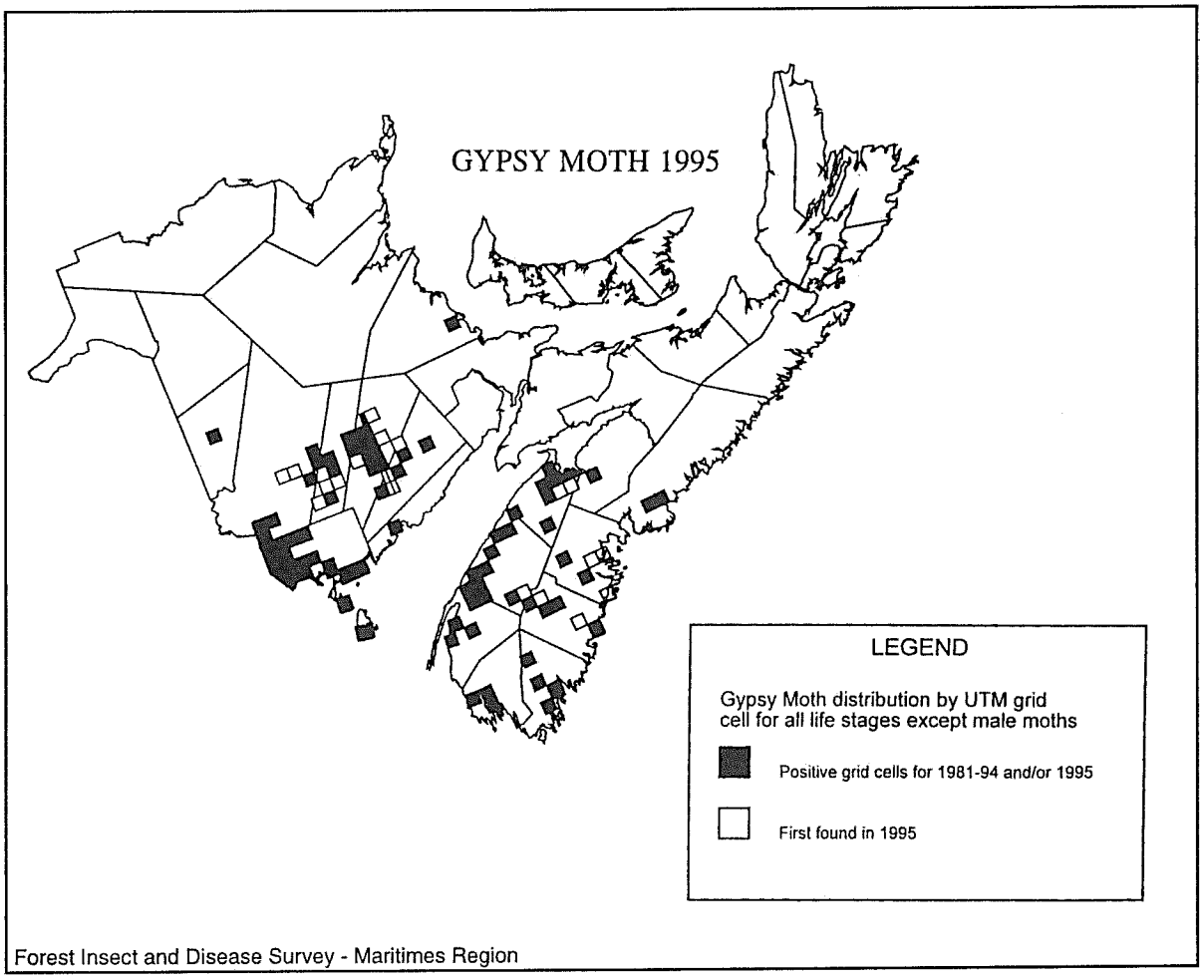


Figure 3.

Table 2. Gypsy moth found for the first time in 1995 in New Brunswick, in areas outside the previously known distribution range

County	Location	UTM Grid	Life Stage
Charlotte	North of Shorts Mountain	19-65-500	new egg mass
	South of Gilmans Corner	19-65-500	old and new egg masses
Kings	Southeast of Beulah	19-73-505	new egg masses
	East of Evandale Ferry	19-73-505	new egg mass
	East of Evandale	19-73-505	pupae cases/cast skins
	Lower Kars	19-73-504	new egg mass
Queens	East of Spoon Island	19-73-505	new egg mass
	South of Harts Lake	19-71-507	old and new egg masses
	Picketts Cove	20-27-508	new egg masses/ pupa/cast skins
	North of Thornetown	20-27-508	old and new egg masses
	Hawkes Point	20-27-510	old and new egg masses
Sunbury	Fredericton Junction	19-68-506	old and new egg masses
	South of Fredericton Junction	19-69-506	old and new egg masses
	Little Lake Road	19-67-505	old and new egg masses
York	Bear Island	19-65-508	new egg masses
	Lower Queensbury	19-66-508	new egg masses
	Washademoak	20-28-507	old and new egg masses

Table 3. Gypsy moth found for the first time in 1995 in Nova Scotia, in areas outside the previously known distribution range

County	Location	UTM Grid	Life Stage
Annapolis	near Taylors Lake	20-32-492	new egg mass
Kings	near Canaan	20-38-498	new egg mass
	Canaan/White Rock	20-38-498	new egg mass
	near Newtonville	20-39-498	new egg mass
Lunenburg	Rissers Beach	20-38-489	pupal case
	Blockhouse	20-38-492	pupal case
	Mahone Bay	20-39-492	new egg mass/ pupal case
Queens	Caledonia	20-33-491	new egg mass
	Harmony Mills	20-33-491	new egg mass
	Duck Pond	20-35-488	new egg mass/ pupal case
	Milton	20-35-488	new egg mass/ pupal case
	Meadow Pond	20-36-487	new egg mass

European Larch Canker

In 1995, European larch canker, caused by the fungus *Lachnellula willkommii* (Htg.) Dennis, was not found at any of the seven locations examined outside the known distribution area in New Brunswick. The disease is widespread and common within the infected (and quarantined) area in the province. For example, in the Acid Rain National Early Warning System plot at Lepreau Falls, Saint John County, 88% of the tamarack had cankers caused by the disease.

In Nova Scotia, the disease was not found at any of the 18 locations examined outside of the known distribution in 1995. The disease is widespread and common within the infected areas in the province.

In Prince Edward Island, where larch canker was found for the first time in 1992, two infected trees were found in one of the 22 areas examined in 1995. The two infected trees, each with two branch cankers, were found at the Camp Tamawaby Demonstration Woodlot, Prince County, the same location where an infected tree was found in 1994. All cankers found to date have been removed and destroyed. All known positive locations are within 5 km of each other, in Prince County. Three other areas in this same UTM grid were examined in 1995 and found to be negative. Since 1981, nearly 375 locations have been examined throughout the province but larch canker has only been found (as branch cankers) in three of these stands. The province currently remains outside of the quarantine zone. Additional surveys conducted early in 1996 revealed the disease is more prevalent in the Camp Tamawaby Demonstration Woodlot than previously found. PEIDAFF have undertaken a suppression effort in the demonstration woodlot by removing larch material over a 10-ha area.

The known distribution of the European larch canker remains unchanged from 1994. Readers will find the map published in last year's annual report.[1]

Dutch Elm Disease

This disease, caused by the fungus *Ceratocystis ulmi* (Buism.) C. Moreau, remained a concern in all three Maritime provinces in 1995.

In New Brunswick, the disease is present wherever elm trees are found. In Nova Scotia, the disease continued to intensify within its known distribution and dead and dying trees are common. In Prince Edward Island, the disease was active in western Prince County where it was first identified in 1979. No infected trees have been found in either Queens or Kings counties since individual infected trees were found and removed in 1988 and 1991, respectively.

A map of the current distribution of Dutch elm disease was published in last year's report[1]. No new locations were found in the Maritime provinces in 1995.

Scleroderris canker

The European race of Scleroderris canker, *Gremmeniella abietina* (Lagerb.) Morelet is capable of killing trees of any size, unlike the North American race which kills only small trees. The European race and several other intermediate races have been identified at six locations in New Brunswick between 1978 and 1988.[2] At three of these locations, the disease was eradicated; at one location, control status was achieved by pruning the lower branches; and the remaining two locations have been under surveillance by FIDS, *i.e.*, an inspection is conducted for symptoms or changes in symptom expression. Where present, branches with symptoms are cultured and tested to determine the race of the fungus.

Scots pine at the two remaining sites, Upper Blackville, Northumberland County and Bourgoin, Madawaska County, have been monitored intermittently since 1979 and 1988, respectively. Samples, taken at Bourgoin in 1995, were identified as the European race of Scleroderris. This race was last detected at this site in 1988.

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

---

[1] Hurley, J.E., and Magasi, L.P. (*Editors*). 1995. Forest Pest Conditions in the Maritimes in 1994. CFS-M Info. Rept. M-X-194E.

[2] Magasi, L.P., and Hurley, J.E. (*Editors*). 1994. Forest Pest Conditions in the Maritimes in 1993. FC-MR Info. Rept. M-X-188E.

Pine shoot beetle

The presence of the pine shoot beetle, *Tomicus piniperda* (L.), has been of major concern to the Christmas tree industry in the Great Lakes area of Canada and the United States since 1992. Introduced from Europe, possibly via the Great Lakes shipping routes, this small beetle is a serious pest of pines. In North America, the pine shoot beetle has been found only on pines, principally Scots pine, in areas under cultivation for Christmas trees.

Considering the risk to the Christmas tree exports, a multi-agency survey was organized to determine the presence of the pine shoot beetle on pine species, principally in plantations and at potential entry points such as nurseries. In the Maritimes, surveys were conducted by NBDNRE Extension Branch, NSDNR, Agriculture and Agri-Food Canada (AAFC) and CFS, mostly in Christmas tree areas with species of pine and a few nurseries as well.

Mostly Scots pine, but also red pine, eastern white pine, Austrian pine, and some horticultural pine species, were surveyed at 63 sites in Christmas tree areas, plantations, and nurseries. Table 4 shows the species breakdown by province. Nearly all of the trees inspected were in Christmas tree areas. Neither pine shoot beetle nor any suspected damage were found at any of these locations.

Butternut canker

During 1995, a total of 21 butternut stands were examined for butternut canker in the Maritime provinces. Twenty stands were located in five counties of southern New Brunswick and one stand in Queens County, Prince Edward Island. The number of trees ranged from individuals to seven trees at each location, reflecting the low numbers of butternut in the region. Butternut canker, *Sirococcus clavigignenti-juglandacearum* Nair, Kostichka & Kuntz, has not been found in the Maritime provinces to date.

Table 4. Number of pine shoot beetle sampling areas by pine species and province

Province	Survey Areas	Number of Survey Sites	Number of Sites Surveyed by Pine Species				
			Scots	Red	White	Austrian	Other
NB	Christmas tree areas	9	9				
	Plantations						
	Nurseries	7	6		1	1	
NS	Christmas tree areas	20	20	3	3		
	Plantations						
	Nurseries	4	1			2	4
PEI	Christmas tree areas	6	6				
	Plantations	7		7			
	Nurseries	10				10	10
	Totals	63	42	10	4	13	14

Pinewood nematode

The pinewood nematode, *Bursaphelenchus xylophilus* (Steiner & Buhrer) Nickle, is a roundworm about 0.6 mm long that has become a worldwide concern to plant quarantine officials and our lumber exporters in the past decade.

Intensive forest surveys conducted in the Maritime provinces since 1985 have found pinewood nematode at about 30 widely scattered locations in New Brunswick and Nova Scotia, and it has never been found in Prince Edward Island. The nematode was found only in trees that had died from insect, disease or animal damage. Pinewood nematode is not a tree killer in the Maritimes.

Pinewood nematode has been found in wood chips and spruce, pine and fir lumber destined for export. FIDS has been involved in cooperative mill surveys with AAFC and the Maritime Lumber Bureau to exempt hemlock and cedar from the quarantine restrictions applied to other conifer species. During mill surveys, pinewood nematodes were found around grubholes (sawyer beetle galleries) in sawn lumber.

No specific pinewood nematode surveys were undertaken in 1995.

Forest Pests In Adjacent Jurisdictions

Although no specific surveys were carried out in 1995, FIDS is aware of a number of pests of quarantine significance that occur in neighboring jurisdictions. These include: ash yellows, European spruce bark beetle (*Ips typographus* L.), hemlock woolly adelgid (*Adelges tsugae* Annand), and sapstreak of sugar maple (*Ceratocystis virescens* (R.W. Davidson) C. Moreau) (also known as *C. coerulescens* (Münch) Bakshi).

NURSERY AND GREENHOUSE PROBLEMS

A variety of pest-related and abiotic problems were reported from Maritime provinces' forest nurseries in 1995 (Table 5). The most significant was overwintering injury. The insects and diseases mentioned may appear insignificant, but they did occur in spite of intensive monitoring and control measures by nursery staff. Good nursery practices limited their damage potential in most cases.

Table 5. Problems observed in forest nurseries and greenhouses in the Maritimes in 1995

Problem	Host(s)	Locality	Remarks
Aphids Aphididae	wS	NS	Old damage on 1-year-old container stock
Crane flies	nS	NS	Leather jacket larvae damaged roots, required culling, and caused 50% loss
Tipulidae	sW	nS	
Fungus gnats Mycetophilidae	wS	NS NB	Present in greenhouse
Lygus bug or tarnished plant bug *Lygus lineolaris* Beauv.	nS	NS	Present on young greenhouse container stock
Needleminer Gelechiidae	nS	NS	Present on young greenhouse container stock
Overwintering injury	S	NB	Loss of 500,000 container seedlings in one nursery

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 immature cones and cause direct damage. Table 6 gives an overview of insect problems encountered in seed orchards in 1995. There were no seed orchard diseases reported this year.

CHRISTMAS TREE PESTS

Several insects and diseases cause concern at the regional or local scale in the Maritimes Christmas tree production areas. Foliage pests such as the balsam twig aphid (*Mindarus abietinus* Koch), balsam gall midge (*Paradiplosis tumifex* Gagné), spruce spider mite (*Oligonychus ununguis* (Jacobi)), spruce budworm, hemlock looper, and occasionally any one of the four species of balsam fir needle rust, generally cause problems that are often brought to the attention of extension specialists. These pests are usually annoyances only at the local level and their effects are minimized by the implementation of recommended cultural or control strategies. However, some of these pests, such as the balsam twig aphid, are cyclical in nature and may affect Christmas trees over a wide geographic area.

Provincial extension specialists have reported a relatively quiet year during 1995, but a few exceptions are worth noting. In Nova Scotia, several Christmas tree growers in Antigonish, Colchester, Guysborough, and Pictou counties, have noted a marked increase in the occurrence of whitemarked tussock moth *(Orgyia leucostigma* J.E. Smith) egg masses. Growers with tree lots on the Annapolis valley floor area of Kings, and Annapolis counties had to control populations of the balsam twig aphid. Populations of the balsam twig aphid peaked in 1992 and suddenly crashed in 1993. No problems were experienced with this pest in 1994. Growers over a much larger area of southwestern Nova Scotia will likely closely monitor trees in 1996.

Despite the findings in some Christmas tree lots in Nova Scotia, balsam twig aphid, populations remained low throughout the region's natural forests. Trace and light damage was found at seven locations in New Brunswick, averaging 10% of shoots.

Table 6. Insect problems observed in seed orchards in the Maritimes in 1995

Problem	Host	Locality	Remarks
Lepidoptera complex: Spruce cone geometer *Eupithecia mutata Pears.* Coneworms *Dioryctria* spp.	wS	NB	Approx. 75% of cones infested at Queensbury, York County.
Spruce cone maggot *Strobilomyia neanthracina* Mich.	wS	NB NB PEI	In NB, >95% infestation at both Pokiok and Queensbury, York County, 75% at Parkindale, Albert County, and 63% at St. Anne, Madawaska County. In NS, 67% at Waterville, Kings County and 55% at Debert, Colchester County. In PEI, 16% at Dover, Kings County.
Weevil damage *Curculionidae*	bS	NB	Old girdling damage on 15% of seedlings in 1994 black spruce progeny test

Surveys conducted by NBDNRE showed that twig aphid occurrence declined further, present at almost 6% of the 549 locations assessed in 1995, compared to 13% in 1994, 63% in 1993, 79% in 1992, and 66% in 1991. In Nova Scotia and Prince Edward Island, damage was trace at the few locations where it was detected, with the exception of light and some moderate damage to Christmas trees at Toronto, Queens County, P.E.I.

Balsam gall midge monitoring results from the region's forests remained low in 1995. Only trace levels of galls were detected at the ten locations where this insect was found in the Maritimes. NBDNRE determined that, of 549 locations sampled, only 1% of locations had 1-10% of needles affected, compared to 1% in 1994 and 2% in 1993. Reports from locations in Nova Scotia and Prince Edward Island are rare and indicate very low population numbers.

NEW INSECT AND FUNGUS RECORDS IN THE MARITIMES

Each year, the biomonitoring activities of FIDS yield a wealth of information, including new species of pests, predators, and parasitoids, as well as pest-host records for the Maritime provinces. With the increased interest in forest health monitoring, biodiversity, climate change, and biological controls, it is important to highlight these records for our clients.

In 1995, a new insect-host record was found for the Maritimes.

Spruce cone geometer, *Eupithecia mutata* Pears. was collected for the first time in the Maritimes from cones of eastern hemlock near a Smithsonian Biodiversity Plot in Kejimkujik National Park, at Grafton Lake, Queens County, Nova Scotia. This insect was previously only known to occur in the Maritimes in the cones of spruce and balsam fir.

ACKNOWLEDGEMENTS

Members of the Forest Insect and Disease Survey of the Canadian Forest Service - Atlantic Centre who contributed to the content and production of this report in 1995 were: J. Régis Cormier, Art S. Doane, Dennis E. Doucette, Ken J. Harrison, J. Edward Hurley, Anita M. Jones, Gérard R. Lemieux, A. Wayne MacKay, Laszlo P. Magasi, Sandra M. McInnis, O.A. (Sandy) Meikle, Bruce A. Pendrel, Ralph A. Simpson, Georgette A. Smith, and Tom J. Walsh.

We wish to thank our summer students and the numerous staff members at Canadian Forest Service - Atlantic Centre who contributed in many ways.

As already mentioned in the introduction, this report would not have been possible without contributions from the provincial forestry services. Special thanks go to Nelson Carter, Dan Lavigne, and Wilf Patterson of NBDNRE, Eric Georgeson of NSDNR, and Wade MacKinnon of PEIDAFF, who, along with their staff, continued to support the idea of one unified regional pest report.

We acknowledge the contribution of scientists at the Centre for Land and Biological Resources Research (CLBRR) of Agriculture and Agri-Food Canada for identifications provided.

The contribution and cooperation of private citizens and of personnel at all levels of federal, provincial, municipal, and industrial organizations are noted with thanks.

This was a year of significant personnel change in our group as people were leaving – or are about to leave – the service. Some of them retired, the rest will pursue other opportunities. Gone will be the experience, dedication, and camaraderie of some 130 years combined service with the departure of colleagues Régis Cormier, Anita Jones, Gérard Lemieux, Sandra McInnis, Les Magasi, and Sandy Meikle. It is fair to say that life around here will never be the same without them. Our best wishes follow them on their departure.

LIST OF PUBLICATIONS

Reports and publications by the staff of the Forest Insect and Disease Survey produced in 1995 are listed below. One article, which was omitted from the 1994 report, is included here.

Cormier, J.R. 1995. Forest insects and diseases in Roosevelt Campobello International Park in 1994. CFS-M Tech. Note 311.

Doane, A.S. 1994. Forest insects and diseases in Cape Breton Highlands National Park in 1993. CFS-M Tech. Note 292.

Doane, A.S. 1995. Forest insects and diseases in Kejimkujik National Park in 1994. CFS-M Tech. Note 308.

Hall, J.P. (*Compiler*) 1995. Forest insect and disease conditions in Canada 1993. Forest Insect and Disease Survey, Natural Resources Canada, CFS, Ottawa.

Hall, J.P. (*Compiler*) 1996. Forest insect and disease conditions in Canada 1994. Forest Insect and Disease Survey, Natural Resources Canada, CFS, Ottawa.

Jones, A.M. 1995. Forest pest assessment surveys in New Brunswick in 1994. CFS-M Tech. Note 312.

Jones, A.M. 1995. Forest pest assessment surveys in Nova Scotia in 1994. CFS Tech. Note 313.

Lemieux, G.R. 1995. Forest insects and diseases in Kouchibouguac National Park in 1994. CFS-M Tech. Note 306.

MacKay, A.W. 1995. Forest insects and diseases in Prince Edward Island National Park in 1994. CFS-M Tech. Note 307.

Meikle, O.A. 1995. Forest insects and diseases in Fundy National Park in 1994. CFS-M Tech. Note 310.

Pendrel, B.A., Doucette, D.E., and Simpson, R.A. 1995. Pheromone trap monitoring of forest pests in the Maritimes - 1994. CFS-M Tech. Note 305.

Walsh, T.J. 1995. Forest insects and diseases in Cape Breton Highlands National Park in 1994. CFS-M Tech. Note 309.