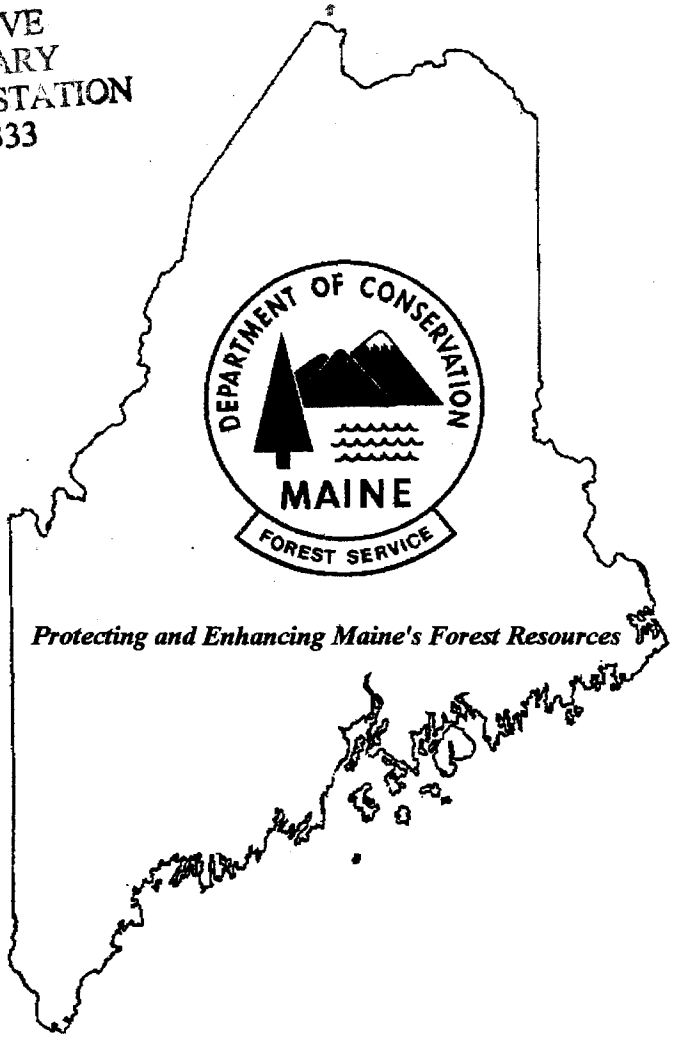
Forest & Shade Tree Insect & Disease Conditions for Maine

A Summary of the 2000 Situation



Forest Health & Monitoring Division
Summary Report No. 15
March 2001

Maine Forest Service
MAINE DEPARTMENT OF CONSERVATION
Augusta, Maine

MAINE

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Reflects staffing for the 2000 season

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Acknowledgements

This summary has been compiled and edited by Richard Dearborn and Clark Granger from input received from the staff of the Forest Health and Monitoring Division (**FH&M**). The editors would like to especially thank Charlene Donahue who not only submitted items for inclusion, but who was an invaluable resource for much of the electronic preparation set up. Dick Bradbury, Don Ouellette and Henry Trial, Jr. also submitted information on a variety of projects and pests. State Entomologist, Dave Struble, wrote administrative and quarantine entries and proofread the final draft. Wayne Searles continued his work on the White Pine Blister Rust Program and assisted in Hemlock Woolly Adelgid field activities. Entomology Technicians Skip Cram, Mike Skinner and Grayln Smith assisted on a number of field projects throughout the season as well. During the year Darlene Stebbins completed her work on computerizing insect collection data and she and Charlene Donahue were able to bring this information on line with the help of InforME. Government interns Kimberly Foss and Christopher Werle assisted on a variety of field and lab based projects.

Over the years our secretary/receptionist, Betty Barry has stretched her eyesight, patience and imagination to try and make sense of volumes of written and cut up manuscripts in a variety of styles of handwriting so that a readable/understandable product was available for our clients. This chore has not always been easy so we would like to extend our gratitude and thanks to her for being there for all of us.

As always our thanks go to many other administrative and field staff in the Maine Department of Conservation who facilitate much of our work and to cooperators associated with the USDA-Forest Health Protection, USDA-APHIS, Maine Department of Agriculture, University of Maine at Orono, and cooperators in other New England States and Maritime Provinces of Canada. Our thanks go too to our clients; arborists, Christmas tree growers, foresters, landscapers, nurserymen, etc. for your support in keeping us apprised of what you see in the course of your work.

Suggestions for Quick Access to Particular Items

This season's report is set up in roughly the same format as we have used for the past several years. The Table of Contents along with the "Highlights" section and the Index should again provide most of the help you need in narrowing down your search for items of particular interest. Cross referencing within the text is used in the case of complex problems. We have again provided our very brief narrative highlights (p. 8) and accompanying **one-point assessment table** (Table 1, p. 9) for damage level trends for quick review for many of our common problems. You should still scan the entire report to pick up new items of interest as well. **New** with this issue we have included a **color photo gallery** on diseases and injuries (follows p. 57) We hope that you like it.

Keep in mind the following when scanning for particular problems:

- **Quarantine related issues** are discussed in Comments from the State Entomologist (p. 1) and under appropriate pests within the text. An overview of all state **quarantines** can be found on p. 59.
- **Insect problems** associated with both trees and shrubs in forest, plantation, shade tree and ornamental situations are broken down into only two categories. All **softwood (conifer) insect pests** are grouped in Section A (p.13). All **hardwood insect pests** are in Section B (p. 25).
- **Miscellaneous insects and other arthropods of medical, nuisance or curiosity significance** have their own section (p.39) which also includes an expanded series of tables showing the variety of **public assistance** requests received by FH&M (pp. 43).
- **Tree diseases and injuries** are listed alphabetically in a separate section beginning on page 47. This is accompanied by a **color photo gallery** pertaining to this section following page 57. The "PG" number found in the text of this section refers to the corresponding photo in the photo gallery.

For additional information you might wish to visit our website as well at:

<http://www.state.me.us/doc/mfs/idmhome.htm>

FOREST & SHADE TREE INSECT & DISEASE CONDITIONS FOR MAINE - A SUMMARY OF THE 2000 SITUATION

Comments from the State Entomologist

Last year in this opening section of the annual pest conditions summary I listed some of the success stories of the previous year, successes that were largely dependent on cooperative support from our various client/cooperators. This was again the case in 2000. Although an unprecedented threat from hemlock woolly adelgid (HWA) generated a work load and media coverage that overshadowed many of our other activities in the field, we were able to provide the monitoring and management activities to address a full range of forest health situations.

But before embarking on a discussion of Division accomplishments I would like to take a few moments to recognize the contributions of a former coworker who passed away on August 13th.

Jim Holmes started as an insect ranger with the MFS on May 15, 1950. In this capacity he received the princely sum of 49.20/week to monitor insect and disease conditions across Aroostook County from the Canadian border to the Allagash drainage (this amount including the requirement that he provide his own transportation). He worked on most of the pest problems of his tenure, but was most closely associated with spruce budworm survey and assessment.

He was a keen observer, and despite his claims of "I don't know much, but someone told me once", many entomologists across the northeast have treasured Holmes' stories and insights. When I was hired as Northern Region Entomologist in 1973, Jim took it upon himself to assure that I did not embarrass either the outfit or him. Even after he retired on October 21, 1977 he remained a ready source of advice, as close as the phone or a card. He will be missed.

Now regarding our accomplishments, we have:

- Successfully completed the second year of Forest Inventory data collection. Integration of this activity into the division workload is proceeding well. We were able to reduce the commitment of veteran field staff necessary to conduct this project, and refocus attention on more traditional pest monitoring and management activities.
- In cooperation with the Forest Policy & Management division, generated the "first in the nation" forest inventory report on the results of the new national annualized forest inventory. Having the ability to assess the state of our forests is becoming increasingly important.
- Provided through our web page an interactive database that allows researchers and the public access to records from the MFS insect collection.
- Conducted successful browntail moth management projects in 3 municipalities. More than 2380 acres were aerially treated without incident.

However, the big story for 2000 was hemlock woolly adelgid. For the past several years we have been warning about the threat that exotic pest species pose to Maine's forest resources and to the forest based communities and industries that depend on those resources. The recurrent theme has been that folks need to be sensitive to the possibility of accidentally introducing such pests, and. to contact us immediately if they suspected that they had encountered any of these species. The admonition back in 1996 was that, "Only by quick response do we have any hope of preventing or delaying establishment locally". While I regret the extent to which that threat has been borne out, I am grateful that the admonition did not fall on deaf ears.

It was through the vigilance of the public and the industry that we were alerted in late 1999 to the incipient establishment of HWA. Then, when we asked in the spring of 2000 for assistance in checking recently outplanted nursery stock and reporting suspicious symptoms, the response was immediate and positive. In addition to green industry response, we received more than 450 calls from the general public that netted 5 new infestations that we would have never otherwise have detected so quickly. Through cooperative efforts of the US Forest Service and the Maine Department of Agriculture we have been able to treat and remove known infested trees and reimburse the impacted landowners. It appears that with the assistance of the media, the public, industry and other agencies we

have been successful in denying HWA a local foothold from which to disperse and become established in Maine's landscape. However, all parties will need to remain fully engaged in monitoring in areas where infested stock was outplanted as well as be watchful for any other, as yet undetected, infestations.

As a result of last year's HWA experience, the USFS has established a task force to coordinate HWA research and development work (Maine is well represented in this process). In addition, we have been approached by states in the upper midwest regarding what they should consider in establishing parallel HWA quarantines.

Along a similar vein, we are working with counterparts in VT, NH, PQ, and with federal regulators in Canada and the USDA APHIS to develop a regional strategy for managing pine shoot beetle. Although this quarantined pest does not appear to pose a threat to the region's pine forests, with the long range movement of logs and bark products, it is critical that we have procedures in place to assure that Maine products can be handled in such a way so that we can safely and competitively market to potential customers.

Other known exotic pest threats are more removed. Asian longhorned beetle is apparently still confined to an area around New York City and Long Island and in Chicago. The situation in Chicago at least appears to be responding to the agressive survey and removal/destruction regimen that has been instituted; local officials see eradication as a very realistic objective. The lesson I draw from this is that pest beachheads can be isolated and destroyed IF they are detected sufficiently early and IF there is sufficient public and governmental commitment and resources to address the problem.

With increasing global trade and general movement of goods and people, these sorts of problems will continue to increase and will require an increasing portion of our resources to address them. At the same time we must continue to monitor native insects such as spruce budworm and hemlock looper. These problems will recur, and we need to be prepared to address them.

I am gratified that the public concern regarding forest sustainability has generated increasing support and demand for timely, relevant and unbiased forest monitoring. However, this support does not necessarily extend to public support for the use of traditional management tools:

- Many of the public doubt the wisdom of using pesticides, and forest lands are often held to a higher standard than people apply to their own property. Concerns over contamination, environmental harm, and chemical trespass are fueling support for a moratorium on use of most forest pesticides. Such a moritorium would seriously weaken Maine's ability to manage the impacts of the pest species mentioned above.
- Although there is strong support for quarantines to keep exotic pests out of Maine, use of similar regulations to manage those that have become established are coming under fire. There is presently a bill before the Legislature to exempt certain Ribes varieties from regulation under our white pine blister rust quarantine. I find it particularly ironic that the section of statute targeted for amendment is the section that allowed the MFS to stop all movement of HWA, and to get the situation under control last year.

Success in dealing with future forest health problems will depend on availability of forest and pest management tools. Key to this will be having management options and strategies that take into account the public's concerns and expectations. Otherwise, even if we maintain use of tools such as pesticides, we will not have the necessary support to successfully conduct a control project. There is no way that we will successfully meet these challenges except as a unified cooperative effort engaging the general public.

I can not overemphasize how important your contribution is to successful execution of our mission. And although we try to acknowledge you, our client/cooperators, the few words written here do not begin to convey the extent of our reliance or express our appreciation for your contribution. Without you we would not be able to effectively gather information regarding pest and forest conditions; nor could we as effectively disperse it to the larger public.

These Forest & Shade Tree Insect & Disease Condition Reports, although not an exhaustive summary of Division activities and accomplishments, serve as one of the primary vehicles for relaying general information from us to you; it is critical that they be useful. We sincerely hope that you will read them, use them, and keep in touch with us regarding information or suggested improvements so that they continue to meet your needs.

Cooperative MFS/USFS Projects

Forest Inventory & Analysis (FIA) - Panel #2 Synopsis of the 2000 Measurement and Analysis Effort

The 118th Maine Legislature authorized the Maine Forest Service to participate with the USDA/FS to implement an annual forest inventory (PL 1997C.720). To do this Maine has implemented a design of five panels, where the number of sample panels corresponds to the number of years in the inventory cycle. Each year's panel is evenly distributed across the entire state and no member of a particular year's panel has an immediate neighbor that is visited in the same year. Therefore, Panel #1 represents the first measurement year of the five year inventory cycle. Field work began in April 1999 on Panel #1 plots and the four remaining panels will be completed over a five year period.

Training and Field Measurement - Measurement during 2000 of the second year's panel of plots was accomplished by four MFS crews and three USFS crews. Starting in late March, initial weekly production was low, due in part to recalibration training for the veteran staff and a reduced number of crews. The complete complement of crews was hired before the full training May 15-19, after which weekly production increased. Despite several breaks to certify crew members in special measurements associated with the national FHM program and to train on use of the new personal data recorders, by early June production per crew was averaging more than three plots/week. Overall production per crew across the year was 3.22 plots/week.

Although we did not experience the same start-up problems that we had in 1999, the total number of plots to be measured did increase to 754 (an additional 54 plots) because of readjustments to the national base grid to allow meshing FIA and FHM plot cycles. Crew dedication and favorable weather enabled us to successfully accomplish the added work load, although it did extend the season. The field season finished up on Dec 12th, when that last FIA plot for Panel #2 was completed.

Approximately 60% of the plot data was collected by state crews. More importantly, the results of audits to assess Quality Assurance gave a 96.1% rating to MFS crews. Where the USFS considers a score of 85% as satisfactory, we can take these results as indicative of state capability to conduct this important project.

Data Analysis and Reporting - Despite our plans to have a report on the first years' panel available by late spring, this did not materialize until somewhat later. Where Maine was the first state to attempt generating a report from the annualized data, we became the test ground for the new data manipulation and analytical functions. The iterative debugging process extended well into the fall before all apparent problems were addressed and resolved. Although the "Report of the 1999 Annual Inventory of Maine's Forests" was a joint product of the FH&M Division and the FP&M Division, the FIA unit of the USFS's Northeast Research Station also deserves recognition for their contribution to both the field work and to the analytical process. Where we believe that we have fixed the glitches that delayed last year's report, we anticipate this year's report by late spring/early summer.

National Forest Health Monitoring Program (NFHM)

Measurement of the National Forest Monitoring detection grid continued in 2000 as part of the annualized Forest Inventory & Analysis (FIA) assessment of Maine. Maine is one of two states in the northeast with an annualized forest inventory, the other being Pennsylvania. As an annualized FIA state, FHM and FIA plots in Maine are divided into five subsets or "panels" that are measured on a five year rotation. FHM and FIA plots share the same sample footprint. FHM plots, now called phase 3 FIA plots, are considered a subset of the larger set of FIA plots (phase 2 plots). Approximately 10 new FHM plots will be added annually to each of the original four FHM panels (about 35 annually) to expand the former four year FHM rotation to the new five year FIA rotation. The fifth FHM panel will be composed of all new plots. This will keep annual FHM panel size at approximately 45.

The decision to annualize and combine FIA/FHM was made in 1999. In Maine this combined survey has been conducted by state survey and federal crews with support, oversight, and analytical assistance from a combined federal FIA/FHM organization. As part of the ongoing merger process an effort was made in 2000 to continue cooperation between FHM and FIA survey crews. During the 2000 assessment period, FIA crews did all

mensuration, damage, and crown measurements formerly done by FHM crews. An FHM specialist made soils, lichen, and ozone evaluations on designated phase 3 plots. In most cases, the FHM crew person visited the plots with the FIA crew. In addition to the 45 regularly assigned plots in 2000, an FHM crew person did soils and lichen evaluations on ten new ground phase 3 plots that had been omitted from the 1999 panel.

New variables added in 1998 to assess soils and lichens were continued in 2000. Both soils and lichen sampling went extremely well in 2000 and continued monitoring as part of the sampling core is expected. Some changes in soils protocols are expected in 2001. Another new set of variables designed to assess downed woody debris, and fire loading is expected to be added in annualized states in 2001. A method for measurement of vegetation diversity will be implemented in some cooperating states in 2001 but implementation in Maine is not expected until at least 2002.

NFHM methods and procedures continue to be widely employed in several other aspects of Forest Health & Monitoring evaluations.

North American Maple Project (NAMP)

The NAMP program was established in 1987 as a joint Canadian/US effort. The project was formed to evaluate the long term health of sugar maple in North America. Data was collected annually on 223 plots in ten states and four Canadian provinces from 1987 through 1997. Plots throughout the project area were established in pairs consisting of a commercial sugar bush and a natural, untapped maple stand. Nine plot pairs (18 plots) were established in west central Maine.

The NAMP program's expected 10 year project term was completed in 1997 and summaries were prepared. A summary of program objectives and results appear in the 1997 I&DM conditions summary (Summary Report No. 12, p. 5).

Plans to terminate the project were, however, altered as a result of the severe 1998 ice storm which significantly damaged many plots in the jurisdictions of several NAMP state cooperators. Funding became available from the USDA/FS/Forest Health Protection ice storm grant to study the impact of this ice "event" on this long standing plot network. To evaluate the ice storm impact, NAMP measurements were taken in the spring of 1998 and again in the summer of 1998 during the normal measurement period. In addition to the 1998 measurements, New Hampshire, New York, Vermont, and four Canadian provinces remeasured plots in 1999 to further assess the ice storm impact. Due to other commitments and a desire to allow more time to pass before a second ice evaluation was made, Maine delayed remeasurement until 2000. A summary of ice storm impacts was prepared by project coordinators.

In 2000, Maine FH&M crews remeasured 10 of the 18 established NAMP plots. Time constraints and altered plot status prevented measurement of the additional 8 plots. Currently Maine data is being prepared for submission to project coordinators for analysis. Plots in other New England and Canadian jurisdictions have also been remeasured.

At a recent NAMP meeting it was reported that plans to remeasure plots beyond the 2000 assessment are very much in doubt except in the New England area. It is likely that New England NAMP plots will either be measured on some other periodic schedule or that FHM style plots will be established on former NAMP sites. There was great interest at this meeting to produce a comprehensive project summary document that will fully describe and report the results of this extremely successful program.

Maine Outdoor Heritage Fund Grant - Computerization of Insect Collections

Information regarding Maine's insect reference collections is now available on the web culminating a three year project. Data from the Maine Forest Service's (MFS) insect reference collection of over 43,000 insect specimens is now easily available to the public. The information on labels from pinned specimens was painstakingly entered into the computer over the past three years. The MFS then worked with the computer group InforME to design a search engine that would retrieve information to answer a variety of questions.

Insect records are traditionally organized by scientific name, making it difficult to ask questions about what insects were found in a particular location or during a particular period.

The MFS database and associated search engine overcomes this problem, allowing researchers to easily investigate spatial and temporal relationships. Computerizing insect information also allows rapid access to the list of 4,700+ different species cataloged by the MFS. This was a time consuming process in the past, as this type of information was often scattered among various publications or has never been made available at all.

The collection records can be viewed at:
http://www.state.me.us/doc/mfs/idmcoll/collcover.htm

This is a joint project with the University of Maine and the Maine Department of Environmental Protection.

A portion of the University's information is on the Internet at:
http://www.umesci.maine.edu/biology/entomology/entmus.htm

The DEP has their aquatic collection ready for posting to their State web site.

The collection will be posted at:
http://janus.state.me.us/dep/blwq/biohompg.htm

This project was jointly funded by the Maine Outdoor Heritage Fund, The Maine Forest Service and the U S Forest Service.

Conifer Seed Orchard Insect Study - 2000

In 2000 the seed orchard insect study focused on cone maggots (*Strobilomyia* sp.) and all field work was carried out in the Plum Creek orchard in Unity. Cone maggots are often the most destructive insect in a seed orchard, sometimes destroying the entire crop. Each species has a slightly different life cycle or attacks different tree species. There are two species of maggot that feed on larch cones, *S. laricis* and *S. viaria.* White spruce cones are fed on by *S. neanthracina* and black spruce is attacked by *S. appalachensis.* Cone insects are difficult to control as they spend most of their life protected by the cone or resting as pupae in the soil.

A sequential sampling method has been developed in Canada to predict seed loss from cone maggots. Cones are sampled in May and June and dissected scale by scale looking for maggot eggs or larvae. Control recommendations are based on a predictive table and timely applications can effectively control the maggots. This procedure was used this past summer at the Plum Creek seed orchard in Unity. Cone maggots in the hybrid larch stand were found in moderate numbers and a single treatment of dimethoate provided 100% control of the maggot. White spruce and native tamarack stands were checked and left unsprayed. Late summer checks showed cone infestations within the range predicted by the spring cone dissections. Although cone dissections were time consuming, they did provide an accurate seed loss prediction in 2000. This method will be tested again in 2001.

Other insect pests were at very low levels in the orchard in 2000. The hybrid larch again had *Adelges lariciatus* on the foliage and in the cones but these caused little or no damage. Larch casebearer (*Coleophora laricella*) numbers were down significantly in 2000 and no action was necessary to control them in the tamarack this year. White spruce had low numbers of yellowheaded spruce sawfly (*Pikonema alaskensis*) and eastern spruce gall adelgid (*Adelges abietis*). *Sirococcus* shoot blight was again visible on a few white spruce trees although it was not as striking this year as last. Jack pine were infested with the pitch midge (*Cecidomyia resinicola*); especially at the site of male cones, and trace amounts of the pitch nodule maker (*Petrova albicapitana*) were also evident as in 1999.

Cooperative Forest Biodiversity Projects

Biodiversity issues, albeit under another name, Forest Insect Survey, have long been the foundation of much of the FH&M work in Maine. Several years ago in response to the rise in emphasis on forest biodiversity issues *per se* we began looking into how this might relate to forest change and sustainability. One new biodiversity study was conducted in 2000 utilizing an intern from the State Government Internship Program. Work on two others continued as well.

Sampling of Terrestrial Arthropod Populations in Three Forest Stands - Year Three

A forest biodiversity project was started on three plots (hardwood, softwood and partial cut) in T3R8 WELS in 1998 in cooperation with the Shifting Mosaic Program of the Manomet Center for Conservation Studies of Brunswick, Maine. The initial objective was to develop and evaluate a sampling protocol for soil surface invertebrates. Although no further sampling was conducted in this study in 2000, the species identification process continued and has been nearly completed.

Maine Carabid Beetle Project

In 1997 a cooperative project was undertaken to catalogue the species of carabid beetles (Coleoptera: Carabidae) of Maine with respect to Biophysical Region. Carabid beetles were selected for this project due to their importance as potential bioindicators in a wide variety of projects and due to the scarcity of information on the Maine fauna. Project cooperators are Dr. Ross T. Bell of the University of Vermont, Dr. Robert E. Nelson of Colby College and Richard G. Dearborn of the Maine Department of Conservation. Over the years records have been brought in from a number of sources and now number close to 5,000 records comprising nearly 400 species.

Variations in Ground Beetle (Coleoptera: Carabidae) Populations Across Specific Ecological Habitats for the Stetson Brook Watershed in Lewiston, Maine

In June of 2000, a study was conducted along Stetson Brook in Lewiston, Maine by government intern, Kimberly Foss to try and define the nature of the terrestrial insect fauna, in particular ground beetles (Coleoptera: Carabidae). This study was designed to provide additional insect records for the Maine Carabid Beetle Project while adding to a better understanding of terrestrial insects in relation to the riparian zone. During this study 630 individual ground beetles were collected from Stetson Brook by visual searches and pitfall traps, comprised of 62 species, many of which showed differences in relation to the distance from the water. A draft report is in the process of publication.

Publications

A file of publications is maintained at the Insect & Disease Laboratory in Augusta on a variety of forest resource related topics. This file contains publications of our own plus many from other sources as well. This file is upgraded and new fact sheets are prepared as needed on a wide variety of the more common tree pest problems. Our Technical Report series, now numbering 40, is listed on page 61 and copies of most are still available. Extended conditions summary reports, such as this one, have been issued annually since 1987 (for the 1986 season). A limited number of sets of these summaries is still available.

Information on a variety of topics of current importance is also available electronically on our website at **<http://www.state.me.us/doc/mfs/idmhome.htm>**.

In addition to published reports, our staff continues to give talks to a variety of groups including schools and provides items of interest to the news media and various association newsletters as well.

- The following items were published during 2000 by our staff:

  Forest Health & Monitoring Division. 2000 (March). Forest & Shade Tree-Insect & Disease Conditions for Maine - A Summary of the 1999 Situation. MFS, FH&M Div. Summary Report No. 14. 66 pp. Compiled and edited by R.G. Dearborn and C.A. Granger.

  ____ 2000. Forest & Shade Tree-Insect & Disease Conditions for Maine. 6 regular seasonal issues from April19 through September 25 plus 3 special mailings. Regular issues compiled and edited by R.G. Dearborn and C.A. Granger; special mailings by other FH&M staff.

  ____ 2000 (October). Report of the 1999 Annual Inventory of Maine's Forests. With FPM Div. 11 pp. plus 27 Tables and 2 Figures.

- Other selected publications from 2000 of possible interest to our readers:

  Decker, K. 2000 (September). A Guide to Life in Storm Damaged Trees. Plastic laminated trifold. Vermont FP&R. With USDA/FS.

  Hanson, T. and J. Rykken. 2000. Forest Insect Discovery Program. An Educational Program in a box. This kit contains: a manual, educational card games, pheromone traps and a variety of collecting materials including a collecting net and beating sheet/frame. Vermont FP&R.

- Websites of interest:

  Forest Health & Monitoring Division - Insect Collection Database - Has links to other sites such as the Maine Carabid Beetle Project: **http://www.state.me.us/doc/mfs/idmcoll/collcover.htm**

  UMO - Folger Library - Maine Nature News -Has seasonal black fly reports for Maine and other items of interest: **www.mainenature.org**. Prepared by Frank Wihbey.

  University of Maine at Orono - Insect Collection Database: **http://www.umesci.maine.edu/biology** - then click on "facilities," then "insect collection".

Forest and Shade Tree Insect and Disease Conditions for Maine 2000 at a Glance

Conditions in 2000 had a few more surprises than in 1999 but even at that it was a fairly calm season. The milder than normal winter was without major destructive storms but the cool, wet conditions that followed in May and June held back gardens and other warm weather plant growth and resulted in scattered late frost injury, especially to balsam fir, and increased incidence of anthracnose. By July, near drought-like conditions prevailed in southern areas of the state while things were rather soggy to the north. Biting fly numbers ranged from severe in the east to low in the west and south (except along the coast) and ticks seemed to be everywhere.

Forested areas remained green and lush overall from June through August with some exceptions. White pine and beech remained unthrifty in many areas as a result of drought induced decline and insects. Browntail moth, fall webworm, larch sawfly, spruce beetle, and white pine weevil populations remained high while spruce budworm populations continued low. Gypsy moth, hemlock looper (fall-flying), satin moth and striped alder sawfly numbers rose sharply while the prominents held a low profile. Christmas tree problems were variable and destructive to some degree everywhere but, except possibly for balsam gall midge, not as striking as in 1999. And lastly, black locust and viburnum browned by leaf beetle feeding was a common sight by August along highways across southern Maine.

Asian longhorned beetle, **Asian gypsy moth**, **brown spruce longhorn beetle**, **and Japanese (cedar) longhorned beetle** have still not become established in Maine. The **pine shoot beetle** was found (1 specimen) in a trap in Adamstown near the NH border for the first time in 2000. The **hemlock woolly adelgid**, which was brought in on infested nursery stock during or before 1999, continues to draw concern as well. We urge our readers to be especially alert and watch for these pests in Maine. Report any suspected infestations to the Insect & Disease Lab. Quarantine related issues also continue to be an increasing subject for discussion.

Table 1 provides a one-point assessment source for trend levels for most of the common problems encountered in Maine in 2000.

Table 1. Damage level (*) trends for 2000 (compared to 1999 levels)

Alder Flea Beetle/Leaf Beetle	→	locally high
Annosus Root Rot	→	moderate
Apple Scab	↗	
Arborvitae Leafminer	↗	locally high
Ash Anthracnose	↗	high
Ash Leaf and Twig Rust	→	low endemic
Balsam Fir Sawfly	→	low endemic
Balsam Gall Midge	→	moderate to high
Balsam Shootboring Sawfly	↗	spotty
Balsam Twig Aphid	↘	light to moderate
Balsam Woolly Adelgid	↗	locally high
Beech Bark Disease	→	high
Birch Casebearer	↘	spotty
Birch Leafminer	↗	statewide
Bronze Birch Borer	↗	spotty
Brown Ash Decline	↘	trees improving
Browntail Moth	↘	<2,500 A.
Bruce Spanworm	→	low endemic
Bud Abortion (balsam fir)	→	low
Butternut Canker	→	15 counties
Cone Buds (balsam fir)	↗	moderate
Coral Spot Nectria Canker	↗	moderate
Cristulariella Leaf Spot	→	very low or absent
Dogwood Sawflies	↑	high but spotty
Dutch Elm Disease	→	high
Eastern Larch Beetle	↗	heaviest Wash. & Hanc. Cty.
Eastern Tent Caterpillar	↗	spotty
European Larch Canker	→	static
Fall Cankerworm	→	low endemic
Fall Webworm	→	high SW >10,000 A.
Forest Tent Caterpillar	→	low endemic
Gypsy Moth	↑	heavy defoliation, >2,500 A.
Hardwood Decline	→	little change from 1998
Hemlock Borer	→	spotty
Hemlock Looper	↑	high moths, spotty defoliation
Hemlock Woolly Adelgid	↑	10 sites in 6 southern counties
Horse Chestnut Leaf Blotch	↘	moderate
Ice/Snow Damage	→	damage still evident
Introduced Pine Sawfly	→	spotty
Jack Pine Sawfly	↘	light E coastal
Larch Casebearer	↗	heavy E-spotty elsewhere
Larch Sawfly	→	locally high
Large Aspen Tortrix	→	spotty
Late Spring Frost	↗	moderate
Locust Leafminer	↗	moderate to severe
Maple Leafcutter	→	light defoliation, <500 A.
Mountain Ash Sawfly	→	high, local
Oak Leaf Blister	↗	
Oak Leaftier/Skeletonizer	↘	spotty light to moderate
Oystershell Scale	↗	spotty, Central
Pear Thrips	→	low and spotty
Pine Leaf Adelgid	↗	galls on black spruce
Pine Needle Rust	→	low
Pine Shoot Beetle	↗	one report (beetle)
Pine Spittlebug	↗	spotty
Pine Tip Moths (various)	↑	high spotty southern
Porcupine Damage	→	locally high
Red-topped Fir	→	common S Central
Rhabdocline Needle Cast	→	moderate to high
Road Salt Spray	↘	low
Saddled Prominent	→	low/endemic
Saratoga Spittlebug	→	low
Satin Moth	↗	central, high 5,337 A.
Scleroderris Canker	→	low
Spider Mites	→	high, local
Spring Frost Damage	→	moderate
Spruce Beetle	↗	high Central coast, 3,275 A.
Spruce Budmoth	→	low and local
Spruce Budworm	→	low/endemic
Spruce Galls (various)	↗	high local
Striped Alder Sawfly	↑	moderate to heavy >150 A.
Taxus Mealybug	↗	spotty
Ticks (two species)	↑	spreading inland
Variable Oakleaf Caterpillar	→	low/endemic
Viburnum Leaf Beetle	↑	heavy southern third of ME
Walking Stick	↑	light on 10 A. coastal
White Pine Blister Rust	→	low
White Pine Decline	→	high-S-1995 drought related
White Pine Weevil	→	high locally severe
Willow Flea Weevil	→	moderate statewide
Winter Browning	→	low
Yellowheaded Spruce Sawfly	↘	scattered pockets

* damage levels: ↗- up slightly; ↘- down slightly; ↑- up sharply; ↓- down sharply; →- stable at level indicated

■ - Especially notable in 2000

3/01

Light Trap Survey

Maine has used a system of light traps for detecting and monitoring lepidopterous forest pests since 1943. Twenty three (23) Rothamstead (incandescent) and Green River (black light) type light traps were operated at established sites throughout the state during the 2000 season (Table 2). All were operated by contracted operators except the one at Ste. Pamphile, a trap which is cooperatively operated by Seven Islands Land Company. The traps in Acadia Nat'l Park (Bar Harbor), Arundel, Elliotsville, and Dennistown were not operated in 2000 due to difficulties in finding new operators. A new trapping site in Biddeford was chosen to replace the trap in Arundel, formerly run by Monica Russo, a cooperator. The Biddeford trap was operated by John Kibbin, a new contractor and a former teacher and is situated west of I95 at the edge of a lightly wooded lot in the vicinity of the Saco River. The trap site in Chesuncook (Frost Pond Camps) was sold early in the year, and trap operation was taken over by the new owner, Maureen Raynes. The period of trapping was extended 45 additional nights in Mt.. Vernon, Greenbush, Chesuncook, Millinocket, Topsfield, Calais, and Steuben to detect **fall-flying hemlock looper**, *Lambdina fiscellaria*. Below is a summary of types of traps and operating periods for each of the trap sites. Light trap locations are depicted in Figure 1.

Table 2. Location, trap type, and period of operation of light traps, 2000 light trap survey

Location	Trap Type	Operation Dates	Location	Trap Type	Operation Dates
Allagash	Rothamstead	Jul 1-Jul 30 (30 nights)	Haynesville	Rothamstead	Jun 17-Jul 31 (45 nights)
Ashland	Rothamstead	Jul 1-Jul 30 (30 nights)	Kingfield	Rothamstead	Jul 1-Jul 30 (30 nights)
Bar Harbor	black light	Not operated	Millinocket	Rothamstead	Jun 17-Jul 31/Aug 17-Sep 30 (90 nights)
Biddeford	Rothamstead	Jun 17-Jul 31 (45 nights)	Mt. Vernon	black light	May 18-Jul 31/Aug 17-Sep 30 (120 nights)
Blue Hill	Rothamstead	Jun 17-Jul 31 (45 nights)	No. Bridgton	Rothamstead	May 18-Jul 31 (75 nights)
Brunswick	Rothamstead	Jun 17-Jul 31 (45 nights)	Rangeley	Rothamstead	Jun 17-Jul 31 (45 nights)
Calais	black light	Jun 17-Jul 31/Aug 17-Sep 30 (90 nights)	Shin Pond	Rothamstead	Jul 1-Jul 30 (30 nights)
Chesuncook	black light	Jun 17-Jul 31/Aug 17-Sep 30 (90 nights)	So. Berwick	Rothamstead	May 18-Jul 31 (75 nights)
Dennistown	Rothamstead	Not operated	Ste. Aurelie	Rothamstead	Jul 1-Jul 30 (30 nights)
Elliotsville	Rothamstead	Not operated	Ste.Pamphile*	Rothamstead	Jul 3-Aug 31 (60 nights)
Exeter	Rothamstead	Jun 17-Jul 31 (45 nights)	Steuben	black light	Jun 17-Jul 31/Aug 17-Sep 30 (90 nights)
Greenbush	Rothamstead	Jun 17-Jul 31/Aug 17-Sep 30 (90 nights)	Topsfield	Rothamstead	Jun 17-Jul 31/Aug 17-Sep 30 (90 nights)
Guerette	Rothamstead	Jul 1-Jul 30 (30 nights)	Washington	Rothamstead	May 18-Jul 31 (75 nights)

* Intermittent operation

The trapping periods target potential forest pests for each specific site and forest type. Traps used to monitor spruce-fir insects were operated for thirty (30) days from July 1 to July 30; traps monitoring hardwood or hardwood-softwood insect pests were operated forty five (45) days from June 17 to July 31; traps monitoring the **spring-flying hemlock looper**, *Lambdina athasaria* and other early hardwood or hardwood-softwood insect pests were operated seventy five (75) days from May 18 to July 31; traps monitoring the fall-flying hemlock looper were operated 45 days from August 17 to September 30.

With the exception of Mt.Vernon & Steuben, all trap catches were processed at the I&DM laboratory during the season as they were received. The Steuben trap catches were processed at Steuben by Michael Roberts, the trap operator. The Mt.Vernon catches were processed by Richard Dearborn. Trap catches of most of the major pests being monitored are summarized in Table 3. Further results of the light trap survey are included in summaries of various pests discussed in the body of this report.

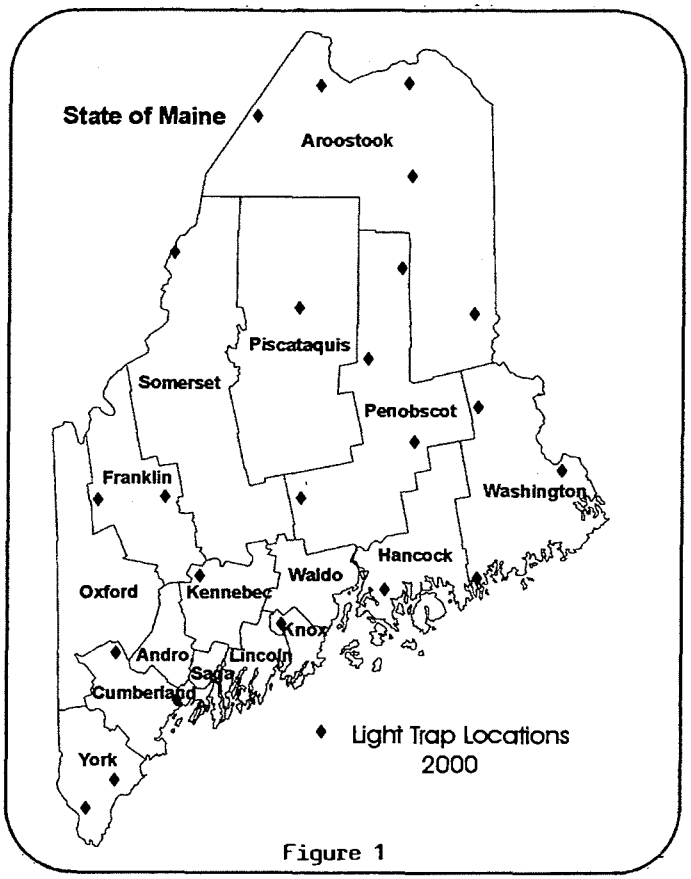


Figure 1

Table 3. Comparison summary of light trap survey collections of forest pest species, 2000

	Species								
Location	*Choristoneura conflictana*	*Choristoneura fumiferana*	*Dryocampa rubicunda*	*Heterocampa guttivata*	*Leucoma salicis*	*Lochmaeus manteo*	*Lymantria dispar*	*Malacosoma disstria*	*Symmerista spp.*
Allagash	0	0	0	0	11	0	0	0	0
Arundel*	-	-	-	-	-	-	-	-	-
Ashland	0	0	0	0	9	0	0	0	0
Bar Harbor	-	-	-	-	-	-	-	-	-
Biddeford	0	0	13	0	0	0	0	0	0
Blue Hill	0	0	67	0	0	0	0	0	2
Brunswick	0	0	12	0	0	0	0	0	1
Calais	0	0	16	0	1	0	2	0	3
Chesuncook	0	0	15	3	7	0	0	0	14
Dennistown	-	-	-	-	-	-	-	-	-
Elliotsville	-	-	-	-	-	-	-	-	-
Exeter	0	0	10	0	0	0	0	0	8
Greenbush	0	0	13	0	0	0	0	0	2
Guerette	0	0	0	0	4	0	0	7	1
Haynesville	0	0	6	0	0	0	0	0	0
Kingfield	0	0	1	1	0	0	0	0	5
Millinocket	0	0	110	1	6	0	0	0	10
Mt. Vernon	2	8	11	26	0	9	41	120	65
No. Bridgton	0	0	21	0	0	0	0	0	11
Rangeley	0	0	0	0	1	0	0	0	0
Shin Pond	0	0	0	0	21	0	0	0	5
South Berwick	0	0	72	0	1	0	4	0	36
Ste. Aurelie	0	0	1	0	0	0	0	0	0
Ste. Pamphile	0	0	0	0	1	0	0	15	0
Steuben	0	0	32	1	0	0	6	1	0
Topsfield	0	0	12	0	2	0	0	12	0
Washington	0	0	17	0	0	0	0	0	28
Total Moths	**2**	**8**	**429**	**32**	**64**	**9**	**53**	**155**	**191**

* Intermittent/incomplete operation

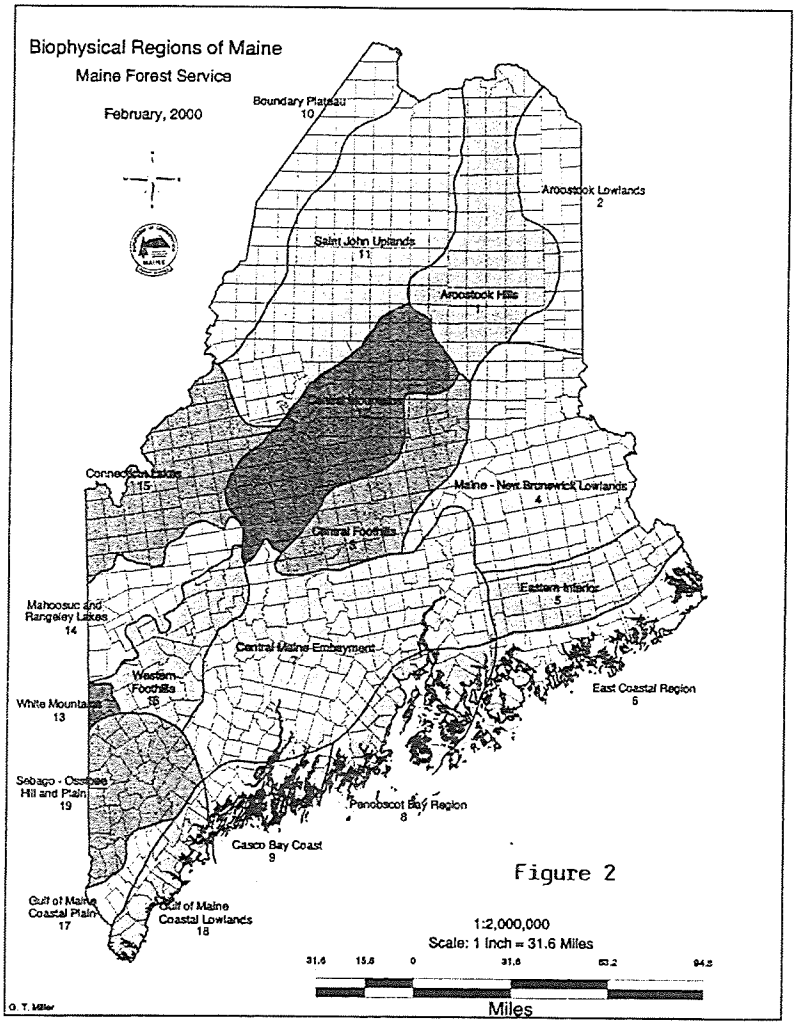


Figure 2

Phenology

Tracking insect and disease development and trying to correlate this to host development and climatic events is at best a juggling game. Over the years we have kept records on a variety of items and now with computerization of many of our records some association may become evident. Although survey procedures are changing, there is increasing interest in assigning quantifiable impact assessment to climatic events. The drought of 1995 continues to leave its mark on some stands, especially white pine on sandy sites. The severe ice storm events of January 1998 also have had an impact that will take years to evolve as well. Drought-like conditions in many areas of the state in July and August of 1999 followed by excess moisture in September and October and a much milder than normal period through December may also prove to be significant weather events. In 2000 weather conditions were less striking but there were definite extremes of moisture or lack thereof which may influence the long term (see 2000 at a Glance). And more relationships between different events are sure to evolve.

In keeping with past practices we continue to use a biophysical region system in breaking the state into logical compartments. Since Janet McMahon first developed a system of regions specifically for Maine in 1990 there have been a number of modifications. The integration of her system with the national system proposed by Keys and Carpenter in 1995 resulted in the plan now set forth by the Maine State Planning Office (McMahon, Janet 1998 (July). An Ecological Reserves System Inventory. Augusta, Me. Me. State Planning Office. 122 pp.). This is the system shown in Fig. 2. All records in FH&M's Collections and Historical databases can be queried using this regional system.

INSECT Problems Associated With Trees in 2000

(A) Softwood Insect Pests

Adelgids (various) - These insects are often incorrectly referred to as aphids and they are closely related. Adelgids are generally considered more serious tree pests than aphids, however, and are more difficult to control as well. More than ten species of adelgids occur in Maine. Four of these; the **balsam woolly adelgid**, **eastern spruce gall adelgid**, **hemlock woolly adelgid** and the **pine bark adelgid** complete their entire life cycle on a single host. Most if not all of the others require two conifer hosts with a species of spruce being the gall bearing host. Among this second group it is the **Cooley spruce gall adelgid** and the **pine leaf adelgid** which generate the most concern, primarily in regard to damage to the non spruce host. See species entries for details.

Aphids (especially *Cinara* spp.) - These very gregarious, usually dark, aphids are locally abundant nearly every year. Hosts most often affected are balsam fir, spruces and eastern white pine. While the aphids themselves can be a nuisance it is the presence of the sooty mold fungus that causes the greatest concern. Damage is primarily aesthetic.

Arborvitae Leafminer (a complex of four species) - Populations rose slightly overall in 2000 but continued to be spotty and heaviest primarily in central and eastern Maine. The heaviest infestations in Hancock, Kennebec, Penobscot, Waldo and Washington counties exhibit varying degrees of mortality ranging from 5-25% in some forest stands. **Northern cedar bark beetles** (p.14) were found to be associated with some of this mortality. See also **Japanese (cedar) longhorned beetle** (p.17).

Severe damage also occurs on commercial arborvitae varieties, especially some columnar forms which may be so severely damaged that only a green crown of foliage is left. In some of such situations native arborvitae nearby show only spotty damage.

Balsam Fir Sawfly (*Neodiprion abietis*) - Populations remain very low.

Balsam Gall Midge (*Paradiplosis tumifex*) - Populations of this pest remained moderate to high throughout much of Maine in 2000. Damage was most notable on balsam fir in the understory, along field margins or in mixed wood situations. Most Christmas tree growers treated for this insect in 2000 with good results. Uninfested wreath brush on the other hand was difficult to find in some cases and shipments to states with strict quarantines such as California were again limited.

Balsam Shoot Boring Sawfly *(Pleroneura brunneicornis)* - Adults were more abundant in 2000 than in 1999 but numbers were far below the extremely high numbers seen in 1998. The population continues the trend of larger numbers of sawflies in even years and smaller numbers in odd years. This would indicate that they have a two year life cycle with the insect normally spending almost two years in the soil. Damage was light from this insect in 2000.

Balsam Twig Aphid (*Mindarus abietinus*) - Light to moderate populations of this pest could be found over much of Maine in 2000 with levels high enough to warrant treatment in most Christmas tree plantations. Damage was scattered in forest stands and was a hindrance to persons collecting balsam tips for wreath production.

Balsam Woolly Adelgid (*Adelges piceae*) - This introduced species (BWA) is a perennial problem in Maine but seems to be spreading inland. While the gout phase continues to kill and deform fir along the coast, the woolly trunk phase has been scattered and relatively light. In recent years, however, the "flat-topped" fir resulting from gout phase feeding have begun to show up more commonly in south central Maine and reports of the woolly trunk phase have been received from as far north as Medway. Some workers have expressed the feeling that milder winters of late have allowed this northward movement to occur. Whether or not this is true remains to be seen but with concerns expressed as to the winter hardiness of another adelgid import, the **hemlock woolly adelgid**, the BWA bears watching.

Bark Beetles (various) - Bark beetle populations tend to fluctuate greatly in response to the availability of susceptible host trees. During 2000 we again encountered a variety of species from isolated situations and in preliminary bark beetle surveys for the **pine shoot beetle**, which has now been found in Maine. Species most often found in association with declining red and white pine were the **pine engraver** and ***Pityogenes hopkinsi***. The **eastern larch beetle** and **spruce beetle** continued to infest stressed larch and spruce trees respectively. A number of new reports of activity of the **northern cedar bark beetle** (*Phloeosinus canadensis*) on arborvitae and ***Ips latidens*** **on hemlock** showed a possible increase due to increased stress of these hosts. A variety of other bark beetles were also noted in 2000.

Brown Spruce Longhorn Beetle (*Tetropium fuscum*) - This European import, a relative of two native species, has now been implicated in widespread mortality of healthy, mature red spruce in Pleasant Point Park near Halifax, Nova Scotia. Although the beetle appears to have been in the area for 8-10 years, it has only recently been identified as the cause of increasing tree mortality. Although we have not had a similar problem in Maine, specimens of this genus of beetle from our collection were sent to Canada to be checked as our native species closely resemble their European counterpart. So far we have not found *T. fuscum* in Maine but will be conducting surveys in 2001 to be sure.

Conifer Sawflies (various) - In contrast to hardwood feeding species, conifer sawfly populations were generally down in 2000. The **larch sawfly** was the only species causing notable defoliation while most of the remaining 15 or so species including the **balsam fir, introduced, jack pine** and **yellowheaded spruce sawflies** were down in numbers and damage.

Cooley Spruce Gall Adelgid (*Adelges cooleyi*) - Galls of this species are fairly common on Colorado blue spruce around home grounds almost every year. Damage to its alternate host, Douglas fir, especially in Christmas tree plantings, continues to be a problem as well. See also Rhabdocline and Swiss Needlecasts (p. 54).

Eastern Larch Beetle (*Dendroctonus simplex*) - Populations of this opportunist continued to increase in 2000 especially in Hancock and Washington counties. Spotty larch mortality was again observed throughout the state. Larch continues to be under stress from a variety of causes (see larch stressors p.17) and this may result in further increases in larch beetle related mortality of larch in future years.

Eastern Pine Looper (*Lambdina pellucidaria*) - This pest of pitch pine has not yet become a problem in Maine as it has further south although the species does occur here. Defoliation is much more severe when high populations of this species occur coincidentally with those of the **pine needleminer** (*Exoteleia pinifoliella*). Needleminer populations rose slightly in 2000 especially in Cumberland and York counties.

Eastern Spruce Gall Adelgid (*Adelges abietis*) - This is a perennial and often severe problem in Maine and annually causes heavy gall production and shoot mortality, especially on white and Norway spruce in plantations and ornamental situations. Trees seem to exhibit varying degrees of susceptibility to this adelgid. The most susceptible trees may not die but growth will be greatly retarded and annual treatment is necessary to maintain high aesthetic value. It may be best in the case of highly susceptible trees to simply remove and/or replace them.

European Pine Shoot Moth (*Rhyacionia buoliana*) - Populations of this species and resulting damage, especially in red pine, remain chronic in coastal areas from Rockland to Wells. No new areas were reported in 2000 except possibly in Scarborough (Cumberland County). See **pine tip moths** (p.19).

Fir Coneworm (*Dioryctria abietivorella*) - Damage by this species was spotty and generally light in 2000.

Hemlock Borer (*Melanophila fulvoguttata*) - The hemlock borer and **Armillaria root rot** continue to take out stressed hemlock locally but there was little change in the incidence of these secondary hemlock problems in 2000. This could change with increased hemlock looper populations especially in conjunction with other stressors. Declining hemlock are also frequently infested with **carpenter ants** which are simply opportunists taking advantage of ideal nesting sites in the sapwood and heartwood. During this past season we more frequently encountered significant **bark beetle**, *Ips latidens*, populations in hemlock than we have for some time. An excellent color photo sheet on the hemlock borer has been prepared by VT-FP&R and the USDA/FS.

Hemlock Looper

(Fall-flying) (*Lambdina fiscellaria*) - For the first year since the last hemlock looper outbreak (1989-1993) (Table 4) a small area of looper defoliation was found in the Town of York (York County). About 100 acres of mature hemlock exhibited moderate defoliation. The stand manager had noticed larvae during late summer and heavy moth activity in the fall.

Table 4. Total acres defoliated by hemlock looper in Maine by year from 1988 to 2000

Year	Acres Defoliated	Year	Acres Defoliated
1988	<100	1993	42,100
1989	450	1994	<100
1990	20,000	1995-1999	0
1991	225,000	2000	>100
1992	218,000		

Although hemlock looper larvae seemed more common in 2000 in many portions of the state it was primarily the high moth activity that alerted Division staff to a possible rise in populations statewide. Many reports of heavy looper moth activity were noted in forested areas of east coastal, central, and northern Maine.

In addition to anecdotal reports, large numbers of looper moths were caught in **spruce budworm** and **gypsy moth** pheromone traps that were deployed during the looper flight period and in light traps operated during the flight period. Budworm and gypsy moth pheromone traps placed in several central and northern Maine locations caught in excess of 100 looper moths each. The highest looper catches (>500 moths) were from budworm pheromone traps placed in north central Maine. During 2000, seven light traps were operated during the flight period of *L. fiscellaria*. These traps were in Calais, Chesuncook, Greenbush, Millinocket, Mount Vernon, Steuben and Topsfield. All except the trap at Millinocket were in operation during our last outbreak. All caught more moths than when last operated for looper in 1995 and the total numbers of moths caught (2,608) greatly exceeded that for the same locations in 1992 during the outbreak (1,586) (see Table 5). Catches in the light traps seemed to be concentrated between September 1-26 with distinct spikes in catch numbers (Fig. 3) indicating possible flights.

This problem again bears watching. No winter surveys are planned.

Table 5. Total number of fall-flying hemlock looper *(Lambdina fiscellaria)* moths collected at light, 1991-1995 and 2000

	Year					
Location	1991	1992	1993	1994	1995	2000
Calais	5,402	1,416	43	6	6	755
Chesuncook	46	16	13	145	92	255
Greenbush	51	6	1	1	0	66
Millinocket	-	-	-	-	-	1,247
Mt. Vernon	32	34	5	1	3	13
Steuben	387	29	4	26	3	1,517
Topsfield	142	85	13	13	1	2
Total Moths	**6,060**	**1,586**	**74**	**192**	**105**	**3,855 (2,608)**

* total in ( ) is without Millinocket

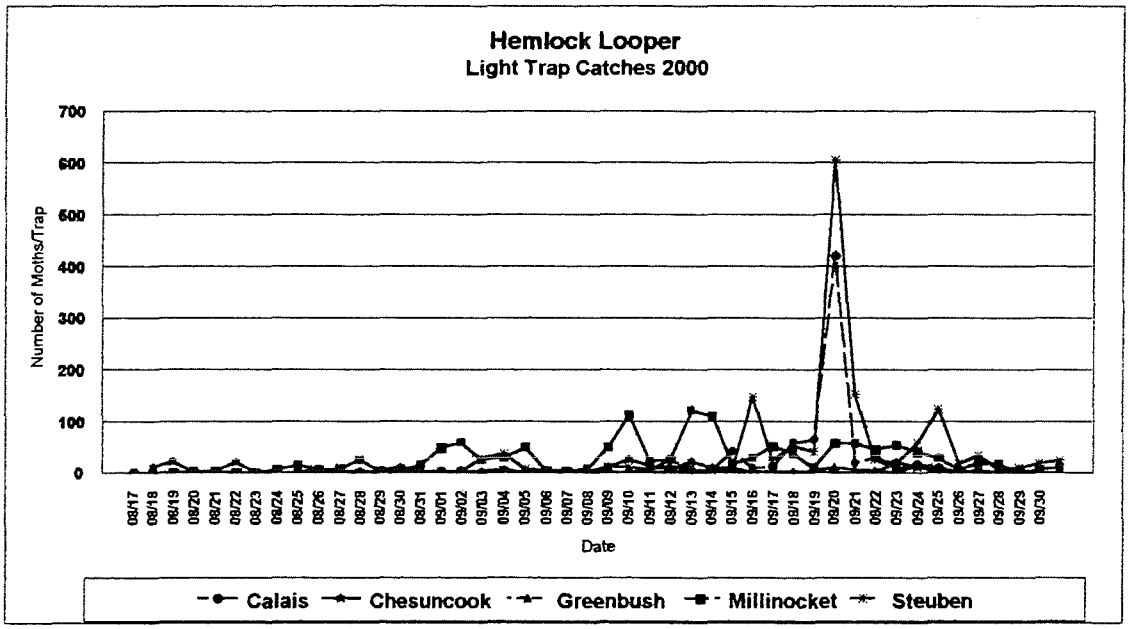


Figure 3

Spring-flying (*Lambdina athasaria*) - Populations of this species remained low in 2000 (Table 6) even in southwestern Maine where it has historically been a problem. Fall not spring moth activity in the York infestation precluded this species as causal in that situation. **Hemlock needleminer** (*Coleotechnites* spp.) activity in southwestern Maine hemlock stands remained light and spotty in 2000.

Table 6. Total number of spring-flying hemlock looper *(Lambdina athasaria)* moths collected at light, 1993-2000

	Year							
Location	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Arundel	-	10	0	7	1	1	1	-
Mount Vernon	7	11	5	4	3	2	0	8
North Bridgton	34	49	152	272	320	106	38	72
South Berwick	0	6	0	2	3	2	12	2
Washington	0	0	6	0	0	2	0	2
Total Number of Moths	**41**	**76**	**2,158**	**2,281**	**2,324**	**113**	**51**	**84**
Total Number of Traps	**4**	**5**	**5**	**5**	**5**	**5**	**5**	**4**

Hemlock Woolly Adelgid (*Adelges tsugae*) - In an overall effort to detect and intercept hemlock woolly adelgid within the state, Maine launched media releases in the spring alerting owners of tree nurseries, landscapers, and the general public to report the presence of hemlock woolly adelgid on ornamental hemlocks. The response was overwhelming. Over 450 requests and inquiries were received and approximately 200 site inspections were made. The pest was identified in ten (10) ornamental out planting sites in central, coastal and southern Maine counties of Penobscot, Hancock, Knox, Lincoln, Sagadahoc, and York. Hemlocks found to be infested were chemically treated and/or slated for removal. Surveys and searches conducted in areas surrounding each of the infested ornamentals failed to find signs or symptoms of hemlock woolly adelgid in any of the native hemlocks. Despite these intensive survey efforts, and additional late winter/spring monitoring of an extensive series of hemlock stands in southern Maine, along major travel routes and around log yards receiving hemlock logs from outside Maine, the adelgid has not yet been detected anywhere but on outplanted nursery stock from states known to be infested with HWA. The state's hemlock woolly adelgid quarantine regulations were also reviewed and revised in 2000 to prevent further entry of hemlock nursery stock from infested counties into Maine (Quarantines p. 60).

Introduced Pine Sawfly (*Diprion similis*) - Populations of this species were generally light and spotty across southern Maine in 2000 and very low elsewhere.

Jack Pine Budworm (*Choristoneura pinus*) - Moth activity of this species dropped noticeably at light traps in both Mt. Vernon and Steuben in 2000. No defoliation was observed.

Jack Pine Sawfly (*Neodiprion pratti banksianae*) - Populations of this species remained a chronic problem in 2000 as they have for several years. Spotty defoliation of mature jack pine occurred in coastal areas of Hancock and Washington counties from Mt. Desert to Steuben. Most of the infested trees were again on rocky, poor growing sites and stunted. These trees frequently had other problems as well such as the **northern pitch twig moth** (p. 18) and **pine-pine gall rust** (p. 53).

Japanese (Cedar) Longhorned Beetle (*Callidiellum rufipenne*) - This introduced cedar longhorn beetle is native to Japan, Korea, Taiwan, and eastern China and was first found in the United States in Milford, Connecticut in 1998 in the branch of a live arborvitae, *Thuja occidentalis*. Arborvitae/cedar trap logs have since been used by states in the northeast to detect this exotic pest. Seven (7) counties were sampled in Maine for *C. rufipenne* during 2000. The trap logs were placed in natural cedar stands, garden centers, and cedar processing yards in Androscoggin, Aroostook, Cumberland, Kennebec, Knox, Waldo, and Washington counties. Five groups of two logs were used at each of the sites. The beetle was not found in Maine in 2000.

Larch Casebearer (*Coleophora laricella*) - Defoliation of larch early in the season by this species was again common in 2000 as it has been since 1994. While "scorching" of infested trees was spotty, yellowing of foliage by lower numbers of larvae was more widespread. The most notable damage occurred in Hancock and Washington counties where casebearer feeding mixed with that of other defoliators resulted in very thin larch (see **Larch Stressors**).

Larch Sawfly (*Pristiphora erichsonii*) - Larch sawfly feeding activity was again observed in a number of stands in central and eastern Maine in 2000. Most of the 2000 defoliation occurred near or within stands which have been defoliated somewhat chronically since the current outbreak began in 1995. Defoliation has varied from year to year but the hardest hit stands have been in central Penobscot, southeastern Piscataquis, southern Aroostook, Hancock and Washington counties. Nearly complete defoliation of larch for two successive seasons has caused branch, top, and whole tree mortality in several areas.

It was again difficult to evaluate damage due to the presence of a variety of other stressors such as bark beetles, casebearer, diseases and drought (see **Larch Stressors**).

Larch Stressors - Larch Sawfly (*Pristiphora erichsonii*), Eastern Larch Beetle (*Dendroctonus simplex*), Larch Casebearer (*Coleophora laricella*) and Variable Water Levels - Native eastern larch and some larch hybrids continue to exhibit high levels of stress from several pests and significantly fluctuating water levels in the recent past and areas of mortality continued to increase slightly in 2000.

Larch sawfly has caused nearly complete defoliation on scattered larch since 1994. Final acreage figures of defoliated areas from 2000 are not yet complete but are expected to be at or below the 8500 acre figure from 1999. Defoliated stands have varied from year to year but the hardest hit areas include, central Penobscot, eastern Piscatiquis, south eastern Aroostook, and southern Washington counties. Near complete defoliation of larch for 2 successive seasons has caused branch, top, and whole tree mortality in several areas.

Pockets of mortality ranging in size from several trees to several acres resulting from attack by the eastern larch beetle seemed to expand in frequency only slightly in 2000. Most of the affected stands were heavily defoliated by either casebearers or sawflies or had been subjected to extreme water variation prior to becoming infested with beetle.

While water levels remained more constant in 2000 than the previous three years, inundation of larch stands caused by very high beaver populations in the State have continued to cause larch mortality across Maine. This problem affects many tree species growing in riparian zones and has be on the increase for several years reflecting the decline in trapping activities.

Northern Pine Weevil (*Pissodes approximatus*) - The northern pine weevil occurs throughout the state on a variety of pines and spruces. Normally considered a secondary problem, it can become more aggressive when numbers build following logging or storm damage. In recent years a series of **droughts** and other stressors have predisposed stands of red and white pine to weevil and bark beetle attack. Like bark beetles such as the **pine engraver** and ***Pityogenes hopkinsi***, the northern pine weevil is an opportunist which is always ready to take advantage of a stressed stand. No new infestations were reported in 2000.

Northern Pitch Twig Moth (*Petrova = Retinia albicapitana*) - "Gobs" of pitch containing larvae or pupae of this species were still very common and unsightly on twigs and branches of jack pine especially in Hancock and Washington counties. Most of these pitch masses were at the base of small branches or around buds. Damage by this insect is usually limited to minor twig and branch mortality and the unsightly pitch masses. This species has a two year life cycle and occurs statewide to some degree on jack pine. In plantations in west central Maine it is the **jack pine resin midge** (*Cecidomyia resinicola*) which causes much of the resinosis (see Summary Rpt. #10 p. 15).

Pales Weevil (*Hylobius pales*) - No pales weevil activity was detected in 2000.

Pine Bark Adelgid (*Pineus strobi*) - This continues to be a local problem especially on stressed urban trees.

Pine Engraver (*Ips pini*) - This widespread species breeds in all species of pine and spruce in Maine and, being an opportunist, will take advantage of stressed trees. Heavy populations can successfully invade healthy trees. Pine engraver populations were still active but spotty in 2000.

Pine False Webworm (*Acantholyda erythrocephala*) - This introduced species which has been very destructive to white and red pines over thousands of acres in upstate New York has still not appeared in Maine, at least at destructive levels.

Pine Gall Weevil (*Podapion gallicola*) - This insect continues to show up wherever red pine is found. It is seldom a serious problem, however, branches of some trees may have sufficient numbers of galls to cause branch mortality.

Pine Leaf Adelgid (*Pineus pinifoliae*) - Populations and damage were light and spotty in 2000. Although odd years are normally the gall years on spruce we seem to be seeing more galls every year on black spruce in some areas as we did in 2000.

Pine Needleminer (*Exoteleia pinifoliella*) - This species is primarily a pest of jack and pitch pine in Maine. Damage has been locally heavy in southwestern Maine in the past, but populations have remained generally low for the past couple of seasons. Population increases were however noted in some areas of Cumberland and York counties in 2000. When populations of this species are high in conjunction with those of the **eastern pine looper**, defoliation can be severe.

Pine Needle Scale (*Chionaspis pinifoliae*) - This species is a perennial pest on a wide variety of conifers. Populations always seem heaviest on Scotch and mugo pine in Maine and thus the problem is more oriented to urban and occasionally plantation situations. High populations were noted locally in 2000. Some even turned up in **hemlock woolly adelgid** reports.

Pine Root Collar Weevil (*Hylobius radicis*) - No further reports of activity by this species were received in 2000. It so far remains a relatively rare problem associated with Austrian, red and Scotch pine nursery stock in southwestern Maine.

Pine Shoot Beetle (*Tomicus piniperda*) - The pine shoot beetle (PSB) is an important bark beetle of pines that was first recorded in the United States in 1992 in Ohio. Trapping surveys in Maine for this exotic bark beetle were first conducted in 1999 with a total of 20 funnel traps in Oxford and Franklin counties (Fig. 4). In 2000, the survey was expanded to a total of 40 traps in the central and south western Maine counties of Androscoggin, Cumberland, Franklin, Kennebec, Oxford, Penobscot, Sagadhoc, Somerset, Waldo, and York. Trap sites were set in areas of red pine or near log yards and mills that process red pine. The bark beetle was found for the first time in Maine in 2000 with one beetle trapped in Adamstown, a town in northern Oxford county. No trees were found to be infested.

The Maine Forest Service is working with surrounding jurisdictions, APHIS, and the Canadian Food Inspection Agency to address quarantine issues associated with this pest.

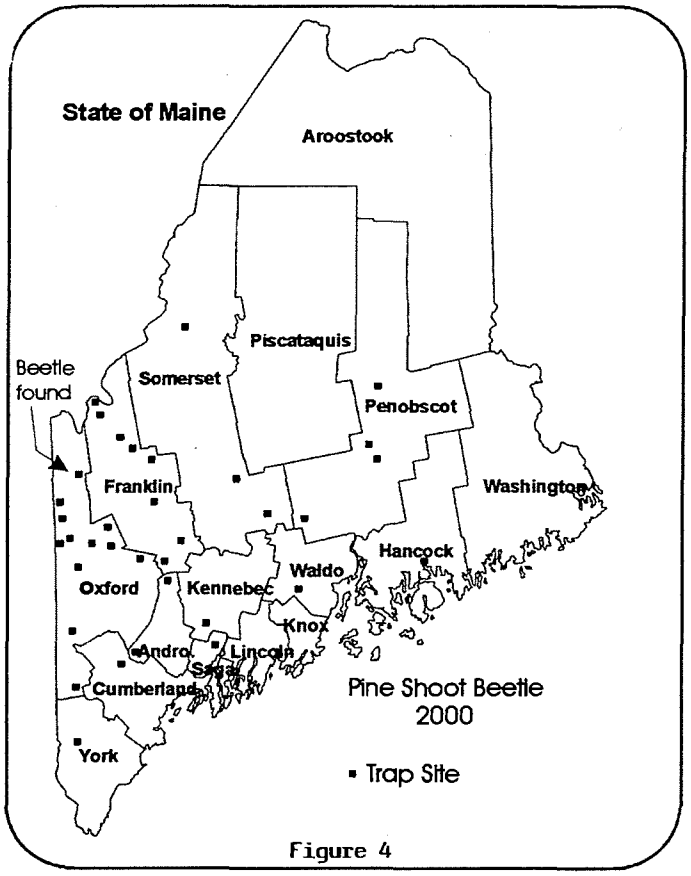


Figure 4

Pine Spittlebug (*Aphrophora parallela*) - Spittle masses containing the pale yellow and black nymphs of this species were again abundant on a variety of conifers in 2000. Populations changed little from 1997 levels and were locally heavy on mugo, Scotch and eastern white pine. We even had reports of pine spittlebug on hemlock associated with **hemlock woolly adelgid** calls!

Pine Tip Moth(s) (? *Rhyacionia* spp.) - Pitch pine in one area of Scarborough were found to be heavily infested with larvae of one or more species of tip moth in 2000. The infestation was severe enough to cause some branch mortality. We hope to look into the nature of the problem as time permits in 2001.

Pitch Mass Borer (*Synanthedon pini*) - Large globs of pitch, containing reddish brown frass and wood chips, covering larval workings of this clearwing moth seemed to be less common in 2000 than in 1999. It seems to be most common on the boles of large, usually stressed, white pine and Colorado blue and Norway spruce.

Red Pine Scale (*Matsucoccus resinosae*) - We have not yet found this species in Maine although it has been reported from Massachusetts. This serious pest of red pine could move into Maine stands with increasing movement of logs and nursery stock so we will be watching out for it.

Red-topped Fir (caused by larval activities of the whitespotted sawyer beetle, *Monochamus scutellatus*) - Balsam fir along Interstate 95 from Clinton to Carmel and in adjacent areas still show active populations of this woodborer and resultant damage.

Red Turpentine Beetle (*Dendroctonus valens*) - This continues to be a low-key and very local problem affecting red pine in southern Maine.

Saratoga Spittlebug (*Aphrophora saratogensis*) - No new infested areas were reported in 2000. Very limited areas are currently impacted by this pest in Maine.

Spruce Beetle (*Dendroctonus rufipennis*) - The condition of many of Maine's coastal spruce stands continued their gradual decline in 2000. The most immediate cause of spruce stand deterioration continues to be spruce beetle, *Dendroctonus rufipennis*, but the underlying predisposing causes of poor stand condition, in almost all cases, are tree overmaturity, a total lack of stand management, and sites where tree longevity is severely limited by shallow, rocky soils. The current spruce beetle infestation remains confined predominantly to the central Maine coast, especially Penobscot Bay (Fig. 5). The area infested by spruce beetle increased slightly in 2000 but the intensity of attack in infested stands appeared to decline. As of November 2000 several Penobscot Bay stands had lost more than 50% of all their red and white spruce over 15" in diameter.

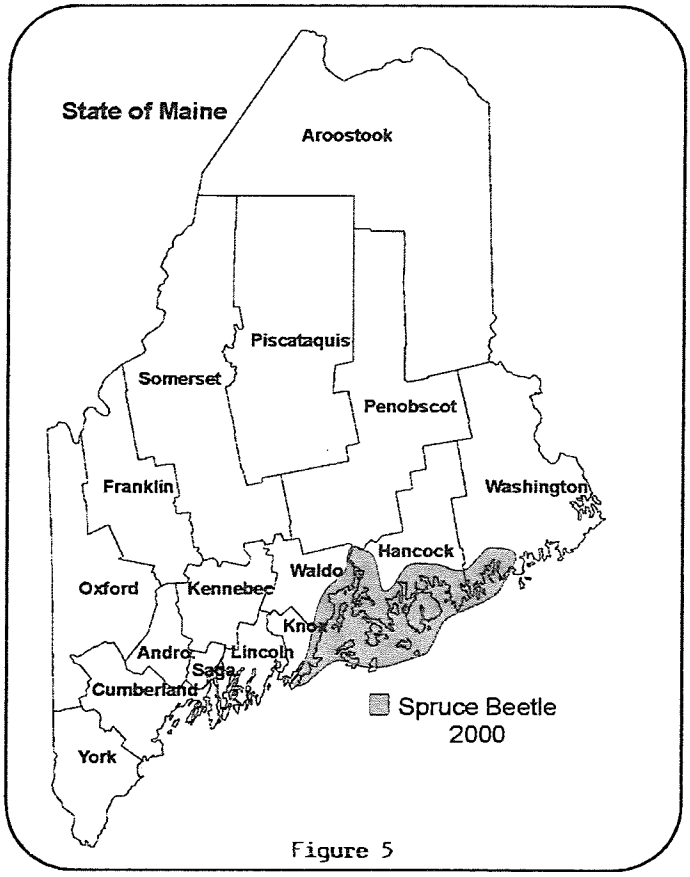


Figure 5

Two newly attacked stands were found in 2000 in Castine and on Roque Island. As of November 2000, 2,810 acres of 30 to 50percent mortality and 465 acres of greater than 50 percent mortality have been mapped.

Informational meetings, stand evaluations, and recommendations to landowners continued in 2000 but salvage opportunities remain limited by rapid decay and logging and transportation difficulties.

Spruce Budmoth (*Zeiraphera canadensis*) - This chronic problem affecting white spruce varies in intensity from year to year. No noticeable defoliation was observed in 2000 although larvae could be found in low numbers throughout the state.

Spruce Bud Scale (*Physokermes piceae*) - This scale often remains inconspicuous until populations reach high levels and sooty mold and discoloration of growing tips draw attention to the problem. Populations continue to remain locally high on plantation spruce throughout the state especially in Hancock, Kennebec, Waldo and Washington counties.

Spruce Budworm (*Choristoneura fumiferana*) - Monitoring of low level spruce budworm populations continued in 2000 in the form of field observations, a statewide light trap network, and pheromone baited traps. Results were somewhat conflicting.

Field observations were made by FH&M staff in 2000 but, no larvae were found and no defoliation was detected. Light traps were operated through the budworm flight period at 23 locations statewide (Fig.1). Spruce budworm moth catch in the statewide network of light traps was much lower in magnitude and distribution to that seen in 1999. Budworm moths were caught at only 1 of the 23 light trap locations in 2000 compared to catches in 10 of 25 in 1999 and 15 of 25 traps in 1998 (Table 7). The number of budworm moths caught per trap decreased from 1.7 in 1999 to 0.3 in 2000 making the 2000 catch the lowest in more than 40 years (Table 8).

In 2000, 38 pheromone trap locations, 3 more sites than in 1999, were evaluated for spruce budworm moth activity. Moth catches increased sharply in 2000 returning to levels similar to 1997 and 1998 (Table 9). Moth catches in 1999 had been the lowest recorded since 1995. Budworm moths were caught in 71% of the traps deployed in 2000 compared to 48 % of traps in 1999 and 92% positive traps in 1998. In 2000, moth catch per trap was five or more in 6 locations compared to only 1 location in 1999 and 15 locations with 5 or more moths in 1998. The highest 2000 catch per trap was 14 in Parkertown.

In 2000 as in 1999, one industrial forest landowner cooperated with the FH&M budworm survey effort by placement and retrieval of pheromone traps in additional locations in northern Maine. Moth catches in these additional locations had counts similar to traps placed by MFS staff. This additional survey effort, in north portions of the state, added valuable data to the MFS survey.

Table 7. Total number of spruce budworm (*Choristoneura fumiferana*) moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	1	7	0	2	0	0	0	0	0
Arundel			0	3	2	0	2	0*	-*
Ashland	0	0	0	0	0	1	2	0	0
Bar Harbor						0		0	-*
Biddeford									0
Blue Hill	0	4	0	0	0	8	0	1	0
Brunswick	0	0	0	1	0	3	6	2	0
Calais	0	0	0	0	0	3	1	0	0
Chesuncook	0	1	0	0	0	2	2	0	0
Clayton Lake									
Dennistown	0	0	0	1	0	0	1	0	-*
Elliotsville	0	2	0	1	0	8	5	0	-*
Exeter	5	21	16	6	3	4	38	19	0
Greenbush	0	1	0	0	0	0	0	0	0
Guerette	0	0	0	0	0	4	0	0	0
Haynesville	0	0	2	0	2	1	2	0	0
Kingfield	0	2	2	0	1	1	0	1	0
Matagamon	1	2							
Millinocket	0	0	0	4	9	11	1	1	0
Mt. Vernon	0	2	1	2	12	2	0	1	8
No. Bridgton	1	0	0	2	0	5	4	3	0
Rangeley	2	8	0	1	0	8	6	1	0
Shin Pond			0	0	3	1	0	0	0
South Berwick	0	2	0	0	0	0	1	2	0
Ste. Aurelie	0	0	0	0	0	0	6	0	0
Ste. Pamphile						0	0	0	0
Steuben	0	0	5	0	3	2	0	0	0
Topsfield	0	0	0	1	12	0	0		0
Washington	6	0	0	0	1	5	9	13	0
Total Number of	**16**	**52**	**26**	**24**	**48**	**69**	**86**	**44**	**8**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

Table 8. Spruce budworm seasonal light trap summary - 1963-2000

Year	Total # of Moths	# of Traps	Average # of Moths/Trap
2000*	8	23	0.3
1999	42	25	1.7
1998	86	25	3.4
1997	69	26	2.6
1996	48	24	2
1995	24	24	1
1994	26	24	1.1
1993	52	23	2.3
1992	16	23	0.7
1991	21	23	0.9
1990	107	24	4.4
1989	731	22	30.7
1988	209	20	10.4
1987	464	20	23.2
1986	1,365	20	68
1985	13,233	20	661
1984	17,983	20	895
1983	144,673	18	8,037
1982	49,200	20	2,460
1981	39,724	20	1,986
1980	100,537	19	5,291
1979	95,811	16	5,988
1978	220,264	17	12,957
1977	24,212	15	1,614
1976	22,308	16	1,394
1975	149,874	23	6,516
1974	158,784	24	6,616
1973	39,069	24	1,628
1972	15,959	24	665
1971	20,653	25	826
1970	1,076	24	45
1969	5,415	27	201
1968	948	24	39.5
1967	120	26	4.6
1966	51	24	2
1965	83	24	3.5
1964	159	25	6
1963	133	24	5.5
1962	258	23	11.2
1961	763	17	44.9

* Suspected miscount

Table 9. Spruce budworm pheromone trap catch in Maine - 1994 to 2000**

Location	Year							Location	Year						
	1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*		*1994*	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*
Allagash	<1	<1	1	1	<1	<1	<1	Jonesboro	<1	<1	<1	1	<1	<1	<1
Calais *	<1	<1	<1	1	<1	<1	<1	NE Carry		<1	<1		2	1	1
Chesuncook	<1	<1	<1	1	3	1	2	Princeton		<1	<1	1	1	3	1
Clayton Lake	<1	<1	<1	<1	2	<1	1	Steuben *	2	2	<1	<1	2	1	1
Coburn Gore	<1	1	1	3	11	2	3	St. Pamphile	1	1	<1	<1	4	<1	4
Connor	<1	<1	2	<1	1	<1	3	Topsfield *	<1	<1	<1	<1	1	1	2
Daaquam	<1	<1	1	<1	1	<1	<1	Waltham	4	<1	<1	1	4	1	1
Dennistown *	<1	1	2	5	14	3	8	Smith Pond *	<1	<1	<1	5	3		3
Dickey Brook*	<1	<1	1	<1	1		2	St. Frances Lake	<1	2	3	3	8	<1	<1
Duck Lake	<1	<1	<1		1			Oxbow	<1	<1	1	2	6	<1	4
Franklin	37	4	<1	3	11	1	1	Ragmuff			4	1	18	2	2
Garfield	<1	<1	2	<1	6	<1	3	Rangeley	2	<1	3			1	5
Greenbush *	<1	<1	<1	5	10			Ste. Aurelie *	<1	1	12	9	24	<1	5
Haynesville *	<1	<1	<1	3	7		4	Matagamon	1	1	2	1	6	<1	3
NEW TRAPS IN 1997															
Dallas Twp.				2	6	1	3	Magalloway				3	3	1	8
Edmonds				<1	1	<1	<1	Parkertown				9	5	2	14
Grafton				<1	4			Perry				1	1	<1	<1
Holeb				7	8	8	8	Round Pond				2	3	<1	2
T11R9				<1	3	<1	1	T5R16				1		<1	3
Big 20				<1	<1	<1	1	T5R20				5	5	<1	3
Baker Lake				1	1	<1	1								

*Light trap locations **These figures reflect a per trap average from a cluster of three traps

Spruce Spider Mite (*Oligonychus ununguis*) - Mites, and in particular the spruce spider mite, are present to some degree on most conifers every year and the characteristic mottling often detracts aesthetically from otherwise lush green foliage. Populations remained generally chronic in 2000 or up somewhat and were locally heavy enough to warrant control on some ornamental conifers and in some balsam fir Christmas tree plantings.

Taxus Mealybug (probably *Dysmicoccus wistariae*) - Mealybugs on *Taxus* (yew) have not been uncommon in Maine over the years but this has normally been relegated to a nursery problem. As a result of the **hemlock woolly adelgid** surveys in 2000 we didn't realize how much *Taxus* there was out there! We received a number of reports during the season from homeowners who thought that this mealybug was HWA even though the hosts were off.

Western Conifer Seed Bug (*Leptoglossus occidentalis*) - This species has now spread across much of the southern two thirds of the state since we first observed it in 1994. The relatively large (3/4"+ long) and attractive adults are camouflaged brownish in color and seldom seen out-of-doors, however, they become easily seen (and smell) after they enter homes to spend the winter.

The western conifer seed bug can destroy a fairly high number of seeds within developing cones. Although their food (seeds) range is wide, they seem to like pines and Douglas-fir and are especially abundant in homes in or near pine stands. We are not sure as to whether or not this insect will feed on balsam fir, larch or spruce. So far no significant seed damage has been reported.

Whitemarked Tussock Moth (*Orgyia leucostigma*) - No damage and only reports of scattered individuals were received in 2000.

White Pine Weevil (*Pissodes strobi*) - The white pine weevil is undoubtedly the most economically damaging pest of white pine in Maine, rivaled only by **white pine blister rust** (p. 56). This is one of those chronic problems in most areas and seriously limits growth of good straight white pine unless controlled. Young trees (three to 30 feet in height) normally bear the highest incidence of attack. Although weevil populations remain fairly stable at high levels; annually visible new damage to high value stock fluctuates, due in part to limited availability or improper use of effective, registered pesticides. Corrective pruning will help in the case of ornamental white pine as well as Colorado blue and Norway spruce.

Whitespotted Sawyer Beetle (*Monochamus scutellatus*) - Whitespotted sawyer beetles are very common in Maine but have caused increased anxiety in recent years due to their appearance which is similar to that of the **Asian longhorned beetle** (p. 25). Once you see the two together, however, they are distinct. See **red-topped fir** (p. 19).

Yellowheaded Spruce Sawfly *(Pikonema alaskensis)* - Damage from this sawfly dropped to low levels in 2000. Most areas had only trace amounts of damage, although in northern Maine 100 acres of a sawfly infested plantation was treated with Spintor, a biological product. In stands that were heavily damaged in past years the surviving trees are recovering. Infested stands treated in 1997-1999 have little noticeable damage.

(B) Hardwood Insect Pests

NOTE: This section includes all insect pests of deciduous trees and shrubs in forest, ornamental and urban settings

Alder Insects - Browning of alder was widespread and obvious in 2000. The most common defoliator was again the **alder flea beetle** (*Altica ambiens alni*). Associated species which were often associated with the browning as well were the **alder leaf beetle** (*Chrysomela mainensis mainensis*), **Alder sawfly** (*Arge* sp.) and **striped alder sawfly** (p. 36). A surprise in 2000 was an infestation of what appeared to be the **alder woolly sawfly** (*Eriocampa ovata*) spread over several hundred acres in central Maine. This could be our first record of this introduced insect.

Aphids, Leafhoppers, Treehoppers and Scales (various) - The activities of these "suckers of sap," occasionally a problem as their overflow of honeydew drizzles down on cars, were again noticeable in 2000. Our only measure of abundance for these insects is based on the frequency of reports and these were spotty in number.

Ash Flowergall Mite (*Aceria fraxiniflora*) - White ash showing the characteristic bud proliferation resulting from the activities of this mite remained prevalent in 2000. Surveys are not done specifically for this pest but comments from staff and a variety of observers indicate that damage seems highest in Kennebec County. Some twig and branch mortality is associated with this activity. For a discussion of this phenomenon see our Summary Report #8 for 1993, p. 33.

Asian Longhorned Beetle (*Anoplophora glabripennis*) - This potentially serious woodboring pest of deciduous trees, especially maples, has still not been found in Maine. We continue to receive reports of suspected infestations but all have proven negative. Many of these reports concern sightings of our common softwood boring **whitespotted sawyer beetle** which somewhat resembles ALB adults. We have also investigated a number of trees/stands exhibiting damage caused by the **sugar maple borer**.

We continue to keep public awareness of the potential seriousness of this problem at a high level to encourage early detection. Please notify the Insect and Disease Lab of any suspected infestations. Any beetles suspected of being this species should be retained for confirmation. A wallet-sized color photo card showing how to recognize and report this species was made available for distribution in 2000.

Barklice or Psocids - "Herds" of these interesting "little cattle" are often very noticeable on the bark of various trees across much of Maine. Although colonies are usually more abundant and evident on hardwoods, they also occur on a variety of softwoods as well. The psocid species most commonly noticed in numbers on tree bark in Maine is *Cerastipsocus venosus*. Barklice feed on lichens and fungi on the tree bark and pose no threat to the trees themselves.

Beech Problems (various) - Beech throughout the state continues its hard struggle for existence and many stands showed extensive wilting, discoloration, deformed foliage and twig dieback in 2000. This was especially true across central and eastern Maine where **beech bark disease** (p. 48) is heavy on trees on poor sites. These trees may also be supporting locally heavy populations of **oystershell scale** (p. 34). Fortunately most of the lepidopterous defoliators such as the **variable oakleaf caterpillar** did little damage in 2000.

Beech Scale - See beech bark disease (p. 48).

Birch Casebearer (*Coleophora serratella*) - Birch casebearer populations were low and spotty in 2000.

Birch Leafminer (*Profenusa thomsoni*) - This late June blotch miner starts its mines away from the leaf margin unlike *Messa nana* which starts its mines along the edge. While *M. nana* populations were down in 2000 populations of *P. thomsoni* seemed to produce noticeably heavier damage locally especially in north central Maine. Where there was still green left, some free feeding sawfly defoliation of birch was also noted in particular, the **striped alder sawfly** (p. 36).

Birch Skeletonizer (*Bucculatrix canadensisella*) - Populations of this species remained low in 2000.

Bronze Birch Borer (*Agrilus anxius*) - Dead-topped birch resulting from boring activities of larvae of this insect continue to show up where stress of one kind or another exists. Birch on **drought**-prone sites, recently thinned woodlots and "abused" landscape situations are most susceptible. Once birch are infested with this borer there is little that can be done to prevent eventual tree mortality. Damage from this opportunist increased slightly in 2000 but was still spotty.

Browntail Moth (*Euproctis chrysorrhoea*) - Populations levels of the browntail moth continued to decline along the coastal headlands and islands in Maine in 2000 (Fig. 6). Northern portions of Casco Bay maintained high numbers of this pest with many residents within the towns of Harpswell, Brunswick and Freeport reporting discomfort as a result of contact with the toxic hairs of the larval stages of this insect (see rashes p. 41). Preliminary data from the winter web survey (January 2001) show a continuation of the decline in 2001. Damaging populations should be limited to Harpswell and Freeport in the coming season with a significant reduction within Harpswell in comparison to past years. Final figures from the 2001 web survey (now being completed) will be made available in the first conditions report for 2001.

Municipal control projects were conducted in three towns in 2000 using aerially applied tebufenozide (Mimic 2F) on a total of 2380 acres. The acreage was broken up as follows: Freeport - 770 ac., Brunswick 545 ac. and Harpswell - 1065 ac. Larval reduction resulting within treated areas was only 80% but there was a very significant drop in the numbers of overwintering webs resulting in a very large drop in acreage to be treated in 2001. Control will be required within these three towns in 2001 but municipal spray projects are not likely to be recommended due to either the scattered pattern of winter webs in some localities or the lack of contiguous control acreage due to individuals not wanting pesticides on their lands in others.

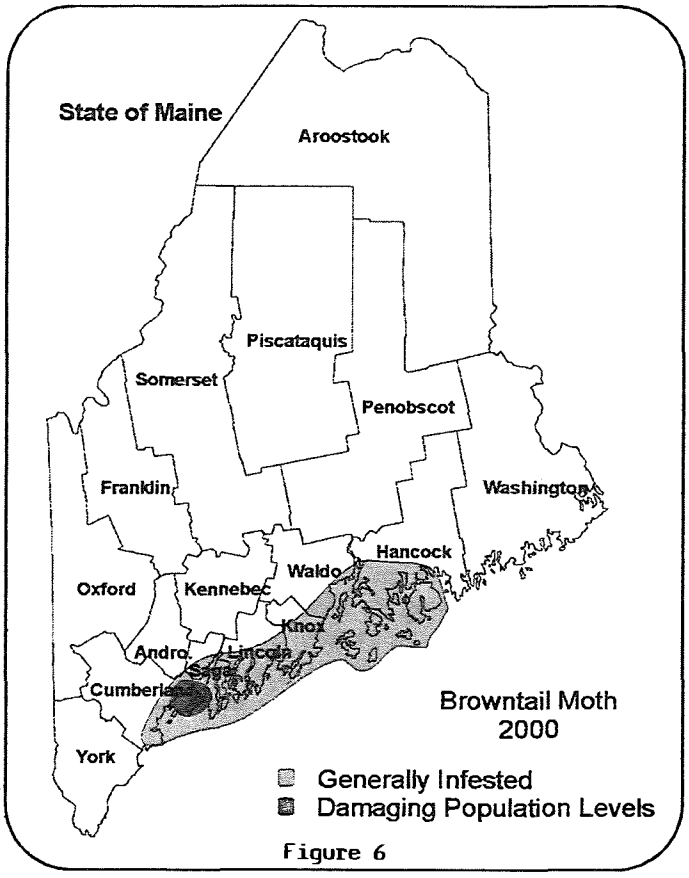


Figure 6

The annual aerial survey of defoliation in 2000 found 1,537 acres of hardwood stands which had 30% or greater leaf loss which was the result of feeding by browntail moth larvae. This is down from the previous year when 2187 acres were recorded as defoliated. Defoliation caused by browntail larvae may occur as early as mid May allowing host species to refoliate as early as the first week in June. This early refoliation often causes the acreage figures recorded from aerial surveys to be less than what was actually defoliated so caution should be used in making year to year comparisons.

Moth numbers in our light trap survey were down in 2000 and the only catches were in the Brunswick trap as expected (Table 10).

Table 10. Total number of browntail moths *(Euproctis chrysorrhoea)* collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	0	0	0	0	0	0	0	0	0
Arundel			0	0	0	0	0	0*	-*
Ashland	0	0	0	0	0	0	0	0	0
Bar Harbor						0*		0	-*
Biddeford									0
Blue Hill	0	0	1	0	0	0	0	0	0
Brunswick	1	1	1	59	101	54	120	245	141
Calais	0	0	0	0	0	0	0	0	0
Chesuncook	0	0	0	0	0	0	0	0	0
Clayton Lake									
Dennistown	0	0	0	0	0	0	0	0	-*
Elliotsville	0	0	0	0	0	0	0	0	-*
Exeter	0	0	0	0	0	0	0	0	0
Greenbush	0	0	0	0	0	0	0	0	0
Guerette	0	0	0	0	0	0	0	0	0
Haynesville	0	0	0	0	0	0	0	0	0
Kingfield	0	0	0	0	0	0	0	0	0
Matagamon	0	0							
Millinocket	0	0	0	0	0	0	0	0	0
Mt. Vernon	0	0	0	0	0	0	0	0	0
No. Bridgton	0	0	0	0	0	0	0	0	0
Rangeley	0	0	0	0	0	0	0	0	0
Shin Pond			0	0	0	0	0	0	0
South Berwick	0	0	1	0	0	0	0	0	0
Ste. Aurelie	0	0	0	0	0	0	0	0	0
Ste. Pamphile						0	0*	0	0
Steuben	0	0	0	0	0	0	0	0	0
Topsfield	0	0	0	0	0	0*	0		
Washington	0	0	0	0	0	0	0	0	0
Total Number of Moths	**1**	**1**	**3**	**59**	**101**	**54**	**120**	**245**	**141**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* intermittent/incomplete operation

Bruce Spanworm (*Operophtera bruceata*) - Defoliation by this species continued to decline in 2000 becoming very spotty. Moths were, however, fairly common in late fall (see **Hunter's moths** p. 31).

Butternut (?) Weevil (*Polydrusus ? sericeus*) - A variety of little green weevils occur on a variety of hosts in Maine from arborvitae and white pine to willow and birch but this little "beast" was different. Two small (5-7 mm), slender green weevils were brought in from Waterville in 2000 where they and others like them were purported to have defoliated a butternut. Under a microscope the weevils were actually black with rows of round sparkling, metallic-green scales covering most of the surface, a different sort of animal. Tentative identification led to this introduced species, a possible first record for Maine.

Cherry Scallop Shell (*Hydria prunivorata*) - This nesting or tent-making geometrid causes damage to cherry south of Maine but populations in Maine remain rather low and spotty.

Eastern Ash Bark Beetle (*Hylesinus aculeatus*) - This species is common statewide and profuse production of powdery sawdust from its workings can be seen in most woodpiles or on stressed and dying ash. Little change in numbers was noted in 2000. Damage by this species is minimal in Maine most seasons except occasionally in recently thinned stands.

Eastern Tent Caterpillar (*Malacosoma americana*) - Populations rose slightly in 2000 but this species remains more of a nuisance than destructive.

Elm Flea Beetle (*Altica carinata*) and Elm Leaf Beetle (*Pyrrhalta luteola*) - Defoliation of elm by either or both of these species was noticeable locally in 2000 indicating a possible rise in populations.

European Chafer ***(Rhizotrogus (= Amphimallon) majalis)*** - Unconfirmed reports of swarming activity at dusk by what appears to be this species were first received from York and Augusta in 1999 and reappeared in 2000. If confirmed these should be new Maine records.

Fall Cankerworm ***(Alsophila pometaria)*** - Populations collapsed to endemic levels in 2000, however, some low level moth activity was seen statewide in the fall. See **Hunter's moths** (p. 31).

Fall Webworm ***(Hyphantria cunea)*** - Populations of and damage by this species were extremely high again in 2000 especially in southwestern Maine (Cumberland, York and southern Oxford counties). Many trees were totally stripped and webbed by mid August. More than 10,000 acres was affected. Locally moderate to high defoliation occurred in many other areas of the state as well.

Forest Tent Caterpillar ***(Malacosoma disstria)*** - Populations were low and endemic in 2000 and no defoliation was observed. Numbers of moths in our light trap survey fell noticeably in most traps as well (Table 11).

Table 11. Total number of forest tent caterpillar *(Malacosoma disstria)* moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	54	78	64	27	8	4	0	6	0
Arundel			82	150	39	18	20	19*	-*
Ashland	124	169	117	157	57	33	51	35	0
Bar Harbor						0*		12	-*
Biddeford									0
Blue Hill	43	47	221	62	17	4	2	14	0
Brunswick	17	9	35	32	33	6	8	4	0
Calais	23	279	52	28	3	1	3	5	0
Chesuncook	1	0	2	1	0	0	0	8	0
Clayton Lake									
Dennistown	58	44	89	79	10	10	18	6	-*
Elliotsville	78	55	53	145	18	15	3	16	-*
Exeter	2	1	8	4	0	1	0	3	0
Greenbush	24	30	87	95	149	41	24	35	0
Guerette	8	12	32	18	4	5	14	4	7
Haynesville	36	45	176	64	9	6	2	11	0
Kingfield	18	20	97	95	32	20	13	29	0
Matagamon	126	56							
Millinocket	43	7	73	75	0	0	2	6	0
Mt. Vernon	107	39	187	192	46	28	23	37	120
No. Bridgton	153	297	223	102	51	9	5	3	0
Rangeley	47	48	57	11	3	2	1	7	0
Shin Pond			124	217	30	72	110	92	0
South Berwick	324	377	371	195	91	31	26	16	0
Ste. Aurelie	13	9	28	15	6	5	16	18	0
Ste. Pamphile						25*	37*	89	15
Steuben	0	2	169	11	7	2	4	1	1
Topsfield	45	102	178	40	14	0*	24		12
Washington	36	53	111	41	45	16	4	14	0
Total Number of Moths	**1,380**	**1,779**	**2,636**	**1,856**	**672**	**329**	**373**	**490**	**155**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

Greenstriped Mapleworm ***(Dryocampa rubicunda)*** - Larval populations of this species remained low in 2000 and no defoliation was reported. This species is primarily a feeder on red maple in Maine. Numbers of the familiar pink and yellow adults, the **rosy maple moth**, rose slightly in our light trap survey (Table 12).

Table 12. Total number of greenstriped mapleworm (*Dryocampa rubicunda*) moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	0	2	0	0	0	0	0	0	0
Arundel			468	531	130	208	402	109*	-*
Ashland	0	1	0	0	0	0	0	0	0
Bar Harbor						-*		10	-*
Biddeford									13
Blue Hill	46	104	46	113	30	120	19	19	67
Brunswick	16	4	27	20	8	10	4	2	12
Calais	4	13	29	240	19	79	41	24	16
Chesuncook	1	3	8	51	3	20	2	0	15
Clayton Lake									
Dennistown	1	1	5	1	2	1	0	0	-*
Elliotsville	11	14	30	103	18	39	12	3	-*
Exeter	1	3	9	7	2	2	4	0	10
Greenbush	12	13	14	48	34	60	11	0	13
Guerette	0	0	0	0		0	0	0	0
Haynesville	2	8	12	34	5	23	24	0	6
Kingfield	0	0	0	0	4	0	0	0	1
Matagamon	0	0							
Millinocket	27	38	66	93	23	120	0	1	110
Mt. Vernon	18	5	11	32	16	3	18	19	11
No. Bridgton	6	2	6	24	20	8	10	15	21
Rangeley	0	1	0	0	0	0	0	0	0
Shin Pond			0	1	1	7	0	0	0
South Berwick	373	340	189	276	171	110	189	100	72
Ste. Aurelie	0	0	0	0	1	2	0	0	1
Ste. Pamphile						2	0	0	0
Steuben	84	22	33	56	11	36	27	7	32
Topsfield	12	31	37	133	24	0	1		12
Washington	48	90	101	181	34	24	30	38	17
Total Number of Moths	**662**	**695**	**1,091**	**1,944**	**556**	**874**	**794**	**347**	**429**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent /incomplete operation

Gypsy Moth (*Lymantria dispar*) - Gypsy moth populations increased in southern and central Maine in 2000 and larval feeding in 2001 may result in widespread defoliation of hardwoods next summer. This pest species has not been abundant in recent years and, until this past summer has been kept at endemic levels largely by the activity of a fungal disease caused by *Entomophaga maimaiga*.

Aerial surveys done in July of 2000 delineated 2,543 acres of hardwood defoliation (> 66 % leaf loss) in the Shapleigh-Newfield area (York County) (Fig. 7) which is highest level of defoliation seen since 1993 (Table 13). This area has been the first to exhibit heavy defoliation in both the previous outbreaks of gypsy moth within this State, so past experience would indicate it is best to prepare for continuing and more widespread defoliation in the coming season. While defoliation was not observed in other counties during the aerial survey, several arborists reported increases in egg mass numbers in parts of York, Cumberland and Androscoggin counties in August of 2000. Egg mass levels determined during the annual fall survey also show small increases throughout southern Maine and indicate very heavy populations in the Shapleigh-Newfield area. Numbers of moths in our light trap survey remained low (Table 14).

Barring high egg mortality due to cold winter temperatures or heavy losses of early larvae from disease, scattered areas of defoliation could occur in oak stands from Turner south to Sanford in 2001.

The **Asian gypsy moth** has still not been found in Maine.

Table 13. Total acres defoliated by gypsy moth in Maine by year from 1924 to 2000*

Year	Acres Defoliated	Year	Acres Defoliated	Year	Acres Defoliated	Year	Acres Defoliated
1924	0.71	1944	21,221	1964	<100	1984	4,881
1925	-	1945	210,881	1965	<100	1985	10,496
1926	1	1946	203,813	1966	30	1986	13,697
1927	4,985	1947	-	1967	825	1987	849
1928	5,575	1948	60	1968	777	1988	100
1929	15,187	1949	-	1969	460	1989	34,280
1930	55,174	1950	2	1970	1,080	1990	270,432
1931	20,938	1951	8,195	1971	820	1991	620,933
1932	42,298	1952	82,715	1972	40	1992	278,485
1933	19,718	1953	174,999	1973	490	1993	50,694
1934	60,403	1954	170,485	1974	860	1994	1,706
1935	92,630	1955	10,810	1975	110	1995	0
1936	80,944	1956	7,285	1976	100	1996	100
1937	140,026	1957	120	1977	2,010	1997	<100
1938	120,432	1958	-	1978	4,120	1998	0
1939	202,193	1959	1,000	1979	23,350	1999	0
1940	204,041	1960	6,350	1980	223,810	2000	2,543
1941	122,386	1961	41,245	1981	655,841		
1942	850	1962	5,198	1982	578,220		
1943	10	1963	1,970	1983	26,353		

* Acreage figures used in this table for 1924 to 1960 were taken from USDA/APHIS/PPQ records. From 1960 to 1999 records are from FH&M files. The presence of a hyphen (-) generally indicates no detectable defoliation for the year.

Table 14. Total male gypsy moths *(Lymantria dispar)* collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	0	0	0	0	0	0	0	0	0
Arundel			0	1	0	0	0	0*	-*
Ashland	0	0	0	0	0	0	0	0	0
Bar Harbor						7		0	-*
Biddeford									0
Blue Hill	0	1	4	0	0	0	1	0	0
Brunswick	6	0	0	0	0	0	5	9	0
Calais	5	0	0	0	0	0	0	0	2
Chesuncook	0	0	0	0	0	0	0	0	0
Clayton Lake									
Dennistown	0	0	0	0	0	0	0	0	-*
Elliotsville	0	0	0	0	0	0	0	0	-*
Exeter	0	0	0	0	1	0	1	1	0
Greenbush	29	0	0	0	0	0	2	0	0
Guerette	0	0	0	0	0	0	0	0	0
Haynesville	0	0	0	0	0	0	0	0	0
Kingfield	0	0	0	0	0	0	0	9	0
Matagamon	0	0							
Millinocket	0	1	7	0	2	0	1	3	0
Mt. Vernon	78	1	27	12	0	0	29	0	41
No. Bridgton	17	1	2	0	0	1	3	0	0
Rangeley	0	0	0	0	0	0	0	0	0
Shin Pond			0	0	0	0	0	0	0
South Berwick	315	153	4	23	1	0	27	9	4
Ste. Aurelie	0	0	0	0	0	0	0	1	0
Ste. Pamphile						0	0	0	0
Steuben	3	0	0	0	0	0	0	1	6
Topsfield	1	2	0	0	0	0	0		
Washington	19	0	0	0	0	1	1	0	0
Total Number of Moths	**473**	**159**	**44**	**36**	**4**	**9**	**70**	**33**	**53**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

The gypsy moth quarantine boundary [(Fig. 7) and **Quarantines** (p. 59)] is checked and maintained annually by monitoring for advancing or emerging populations by means of a pheromone trapping survey. This survey is known as the regulatory survey. Survey materials are furnished by USDA-APHIS-PPQ under a cooperative agreement. The survey is conducted with Delta and milk carton style pheromone traps baited with + Disparlure to catch male moths and detect significant expansion of populations in the transition zone, the uninfested area outside of the quarantine boundary. The traps are set out by FH&M entomology technicians and are primarily placed within two to three towns of the quarantine boundary at varying distances apart, usually 1 to 2 miles, along travel routes and at rest areas, campgrounds and similar high use areas. Traps are also placed at and around all mills and yards under gypsy moth compliance agreement. Intensified egg mass searches are conducted around trap sites that yield catches of 10 or more moths.

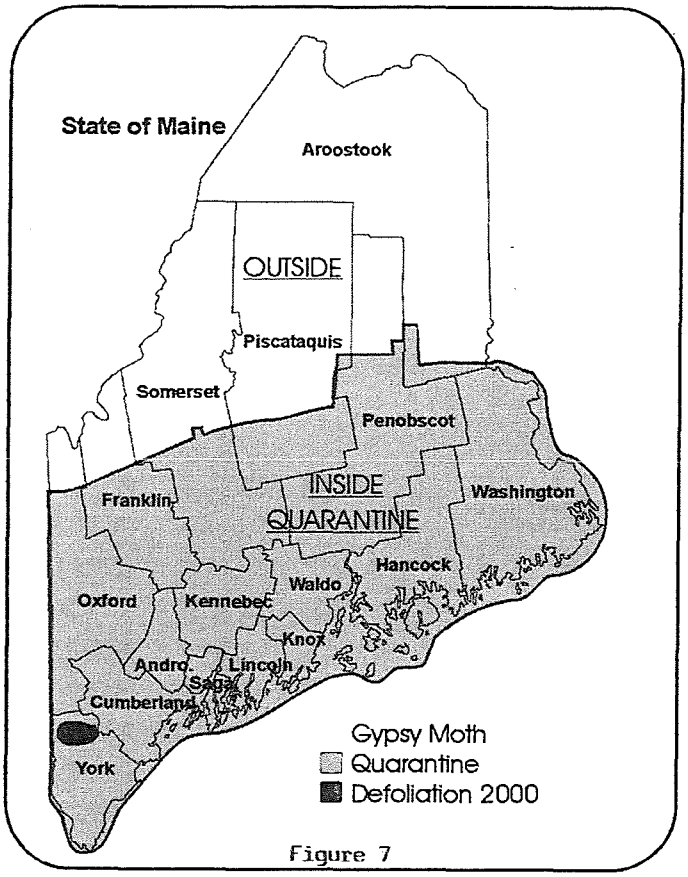


Figure 7

A total of 256 pheromone traps were placed in the transition zone and at mill sites with compliance agreements in 2000. Male gypsy moth catches have continued to increase in a number of sites around Eustis, Greenville, Elliotsville and the area around T1R11, TAR10 and TAR11. Scouting surveys for egg masses have been conducted and during the fall I&DM entomology technicians found single egg masses in Elliotsville and TAR11, both towns located in Piscataquis county. One egg mass was previously found in TAR11 next to the TAR10 town line in December of 1999. The Maine forest Service will be working with APHIS to adjust the quarantine zone boundary.

Surveys to monitor gypsy moth populations in quarantine zone towns within 20 miles of the zone boundary were first intensified in1997 to define the occurrence of gypsy moth life stages in proximity to the zone boundary. Though egg mass surveys were conducted throughout this area in the fall of 1996 and winter of 1997, no egg mass surveys were performed in this portion of the regulated zone in 1998, 1999 and 2000. The number of pheromone traps in the quarantine area has also been increased. A total of 74 traps were placed in the quarantine zone in 2000. Male moth catches within the quarantine zone were variable.

Hunter's Moths (adults of several species of cankerworms) - The adults of a number of species of loopers/cankerworms fly late in the season from September through November. Over the years these small (1-1.5" wingspan), frail, tan, day-flying (warmer nights too) moths have come to be known as hunter's moths because of the season. Basically three species, **Bruce spanworm, fall cankerworm** and **fall-flying hemlock looper** make up the group. During the past season the hemlock looper moths led off with periods of great activity in September. Literally clouds of moths could be seen at times during the month. As looper moth activity dropped by October Bruce spanworm and fall cankerworm activity picked up through November but numbers were a literal sprinkling compared to looper.

Lace Bugs (*Corythucha* spp.) - Lace bug populations again remained at nuisance levels in 2000 especially on birches and butternut. The tiny nymphs, and lacy adults accompanied by an assortment of cast skins and waste material (frass) gave a messy appearance to the undersurface of infested leaves. Heavy feeding caused foliage to become yellow and mottled by July.

Large Aspen Tortrix (*Choristoneura conflictana*) - Populations of large aspen were very low in 2000 and no damage was observed. Moth catches in our light trap survey were down as well (Table 15).

Table 15. Total number of large aspen tortrix (*Choristoneura conflictana*) moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	0	5	0	0	1	1	0	0	0
Arundel			0	12	1	4	1	0*	-*
Ashland	0	0	0	0	3	0	0	0	0
Bar Harbor						0		0	-*
Biddeford									0
Blue Hill	14	2	1	5	2	27	0	0	0
Brunswick	3	0	0	0	2	31	0	0	0
Calais	2	0	0	0	0	10	0	0	0
Chesuncook	0	0	0	0	0	0	0	0	0
Clayton Lake									
Dennistown	0	2	0	1	0	0	0	0	-*
Elliotsville	42	14	0	2	17	19	2	0	-*
Exeter	4	15	6	12	3	18	0	0	0
Greenbush	28	29	0	0	0	3	0	0	0
Guerette	0	0	2	0	0	0	0	0	0
Haynesville	3	0	0	0	0	0	3	0	0
Kingfield	3	0	0	0	0	0	0	0	0
Matagamon	3	0							
Millinocket	5	0	0	3	1	0	0	0	0
Mt. Vernon	2	2	0	5	2	8	6	0	2
No. Bridgton	2	0	0	2	0	14	1	0	0
Rangeley	47	92	0	13	14	44	36	0	0
Shin Pond			1	0	0	0	0	0	0
South Berwick	4	0	0	0	2	31	2	1	0
Ste. Aurelie	0	1	0	0	0	0	2	0	0
Ste. Pamphile						29	10	0	0
Steuben	2	1	0	0	0	2	1	0	0
Topsfield	15	1	0	0	4	0	3		0
Washington	14	0	0	2	6	5	1	3	0
Total Number of Moths	**193**	**164**	**10**	**57**	**58**	**246**	**68**	**4**	**2**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

Linden Looper (*Erannis tiliaria*) - Low numbers of moths were seen in 2000 and no defoliation was reported.

Locust Leafminer (*Odontota dorsalis*) - Locust leafminer defoliation was moderate to extreme throughout the range of black locust in Maine in 2000.

Maple Clearwing Woodborers (Sesiidae) - Populations of the **maple callus borer** (*Synanthedon acerni*) on sugar maple and **red maple borer** (*S. acerrubri*) on red maple appeared to remain stable in 2000. No further surveys were conducted.

Maple Leafcutter (*Paraclemensia acerifoliella*) - Larval feeding discs were visible on sugar maple foliage over much the same area as in 1999 but defoliation appeared lighter and more diffused. The heaviest defoliation was observed in northern York County but light defoliation was also reported from Franklin and Kennebec counties and on Mount Desert Island. The acreage involved was estimated at less than 500 acres.

Other late season defoliators of sugar maple such as the **maple trumpet skeletonizer** (*Epinotia aceriella*) and **maple webworm** (*Tetralopha asperatella*) were present in all areas checked as well. Defoliation by these species was about the same as in 1999. Late season pests such as these usually are not a problem unless late refoliation occurs or if there are three or more successive years of high populations.

Maple Leafroller (*Sparganothis acerivorana*) - Populations of maple leafroller remained low in 2000 and no defoliation of its preferred Maine host, red maple, was observed.

Mountain Ash Sawfly (*Pristiphora geniculata*) - This introduced species is on our list of perennial problems affecting ornamental mountain ash. The 2000 season was no exception with the usual complaints in spite of the fact that control of the problem is easy to achieve. This sawfly is not a problem on native mountain ash in the wild.

Oak Insects (various) - Oak is a favorite food source for many insects of both a destructive and curiosity nature. These run the gauntlet from sucking insects (**aphids**, **leafhoppers**, **scales** and **tree hoppers**), which produce the stickum which coats cars, to a variety of foliage and twig **galls** to an equal variety of defoliators. One of the more unusual problems encountered in 2000 was an infestation of white oak by **walking sticks** (p. 38). Other than those species singled out in this summary we saw continued moderate to high populations of the **leafrolling weevil** (*Attelabus bipustulatus*) in 2000. These small shiny black, red-spotted weevils cut and roll leaves into tiny, pellet-like rolls within which the larvae develop. These rolls usually drop to the soil but some, especially incomplete ones, may remain attached to the foliage. The **oak leaftier (shredder)** (*Croesia semipurpurana*), **oak leafroller** (*Archips semiferana*), **oak trumpet skeletonizer** (*Epinotia timidella*) and the **oak webworm** (*Archips fervidana*) continued to turn up in calls as well and caused light but spotty defoliation throughout the range of oak in Maine in 2000. Populations of the **pinkstriped oakworm**, **redhumped oakworm** and the **variable oakleaf caterpillar** remained low in 2000.

Oak Leaf Shot-hole Fly (*Japanagromyza viridula*) - No defoliation by this species was observed in 2000. Fly populations, emergence and bud expansion must be in sync for damage to occur.

Oak Sawflies - A variety of species were observed in 2000 but numbers were extremely low and individuals scattered.

Oak Skeletonizer (*Bucculatrix ainsliella*) - The intensity of second generation larval feeding by the oak skeletonizer decreased noticeably in 2000 from 1999 levels although the infested area was roughly the same (Fig. 8). Over 8,000 acres of non-contiguous defoliation was evident by early September. Most defoliation fell in the light category with less than 500 acres of spotty moderate to heavy defoliation. Larvae in some areas were however numerous enough to prompt concern as they became unwelcome guests at many cookouts and other outdoor activities. The tiny, white, ribbed, rice-like cocoons spun up by these larvae added a questionably festive touch as they stuck to all objects beneath infested trees.

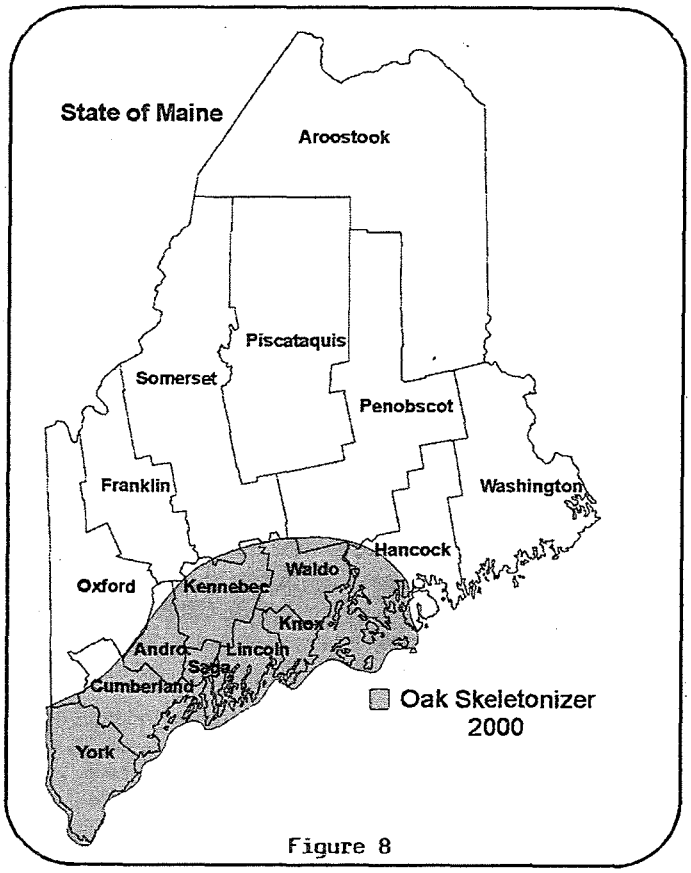


Figure 8

Oak Twig Pruner (*Anelaphus parallelus*) - For some time we have wondered which species of *Anelaphus* was the more common twig pruner on red oak in Maine. Samples were collected from a number of localities in 1998 and reared. Only *A. parallelus* beetles emerged in 1999. Twig pruning by this species in 2000 remained fairly stable at 1997/98 levels.

Orangehumped Mapleworm (*Symmerista leucitys*) - Populations of this species were low again in 2000 and no defoliation was observed. Numbers of moths of *Symmerista* spp. rose slightly in 2000 for the third consecutive year (Table 16).

Table 16. Total number of *Symmerista* spp. moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	0	0	0	0	0	0	0	0	0
Arundel			4	3	3	3	0	0*	-*
Ashland	0	0	0	2	1	0	0	0	0
Bar Harbor						0*		2	-*
Biddeford									0
Blue Hill	1	6	32	33	7	1	1	0	2
Brunswick	0	1	5	17	3	0	0	1	1
Calais	3	0	0	41	13	3	10	3	3
Chesuncook	0	1	2	20	3	7	2	1	14
Clayton Lake									
Dennistown	0	0	0	0	0	0	0	0	-*
Elliotsville	5	4	1	50	2	5	1	3	-*
Exeter	0	1	3	15	7	1	0	5	8
Greenbush	0	0	0	10	3	1	0	1	2
Guerette	0	0	0	0	0	0	0	0	1
Haynesville	0	0	0	2	1	0	3	2	0
Kingfield	0	0	0	5	0	0	0	0	5
Matagamon	0	0							
Millinocket	0	0	0	4	0	0	1	2	10
Mt. Vernon	4	4	23	141	42	9	22	32	65
No. Bridgton	8	21	12	73	7	10	2	7	11
Rangeley	0	0	0	2	3	0	0	0	0
Shin Pond			0	26	1	1	0	1	5
South Berwick	30	4	1	5	3	6	13	33	36
Ste. Aurelie	0	0	3	0	0	0	0	0	0
Ste. Pamphile						0*	0	0*	0
Steuben	0	0	3	13	7	7	2	0	0
Topsfield	3	0	13	152	11	0*	0		0
Washington	9	10	44	322	12	0	5	28	28
Total Number of Moths	**63**	**52**	**146**	**936**	**129**	**54**	**62**	**121**	**191**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

Oystershell Scale (*Lepidosaphes ulmi*) - Populations of oystershell scale remained at moderate to high levels on scattered beech in central and eastern Maine in 2000. High populations and resulting branch mortality were noted in the Brownville and Millinocket areas. Lower populations and scattered branch mortality were noted in beech stands in Crystal, Silver Ridge, Mt. Chase, and Topsfield. Branch mortality was predominantly on lower portions of the tree crowns and the hardest hit stands were those most affected by drought conditions in 1995 and 1999. The oystershell scale is part of a complex of problems that have contributed to a steady decline of beech stands in Maine.

Pear Thrips (*Taeniothrips inconsequens*) - Populations remained low and spotty on **sugar maple** in 2000. No damage was observed.

Pigeon Horntail (*Tremex columba*) - This colorful wood wasp and its very large and striking parasites (***Megarhyssa* spp.**) continue to draw attention. The horntails infest sugar maple and are followed by the large wasp parasites which are drawn to the woodboring larvae. The pigeon horntail continues to be associated with decayed wood on older and/or stressed trees. Reports of activity in 2000 were very similar to 1999. Many observers were more interested in the *Megarhyssa* (we have at least 3 species) parasites which could be seen assembling, mating and laying eggs by the dozens on a single tree bole.

Pinkstriped Oakworm (*Anisota virginiensis*) - Numbers of this species remained very low in 2000.

Redhumped Oakworm (*Symmerista albifrons* and *S. canicosta*) - Both of these species occur in southern Maine and due to similarities between the two in all stages, our surveys have not separated them. Numbers of larvae remained very low and scattered in 2000. The numbers of *Symmerista* spp. moths collected through our light trap surveys (Table 16) however, rose slightly in 2000 for the third consecutive year.

Saddled Prominent (*Heterocampa guttivitta*) - No larvae of this species or defoliation was observed in 2000. Moth catches also remained low (Table 17).

Table 17. Total number of saddled prominent (*Heterocampa guttivitta*) moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	1	3	1	1	0	0	0	0	0
Arundel			0	0	0	0	7	0*	-*
Ashland	0	0	1	0	0	1	1	0	0
Bar Harbor						0*		5	-*
Biddeford									0
Blue Hill	1	1	2	5	0	0	0	1	0
Brunswick	0	0	0	0	0	0	0	0	0
Calais	3	0	0	0	0	0	6	0	0
Chesuncook	12	13	10	37	18	13	18	8	3
Clayton Lake									
Dennistown	0	0	0	2	0	0	0	0	-*
Elliotsville	4	4	0	0	3	0	2	0	-*
Exeter	10	0	0	1	1	0	5	2	0
Greenbush	1	1	4	0	0	1	0	0	0
Guerette	0	0	1	0	0	0	0	0	0
Haynesville	0	1	1	1	0	0	0	0	0
Kingfield	1	0	2	0	1	0	0	0	1
Matagamon	1	0							
Millinocket	10	5	2	7	12	2	1	0	1
Mt. Vernon	19	1	1	13	6	2	23	18	26
No. Bridgton	15	9	2	0	0	0	0	0	0
Rangeley	4	0	0	1	2	0	0	3	0
Shin Pond			1	1	0	0	0	0	0
South Berwick	53	3	0	1	0	0	12	4	0
Ste. Aurelie	0	0	0	0	2	0	0	0	0
Ste. Pamphile						0	0	0*	0
Steuben	17	28	1	3	12	3	4	0	1
Topsfield	11	4	0	7	0	0*	0		0
Washington	23	1	0	0	0	0	1	4	0
Total Number of Moths	**186**	**74**	**29**	**80**	**57**	**22**	**80**	**45**	**32**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

Satin Moth (*Leucoma salicis*) - Defoliation of woodland aspen by this species increased again in 2000 for the third consecutive year. The infestation continued its expansion from previously infested areas in central Penobscot and Piscataquis counties (Fig. 9) and went from 150 acres of moderate to heavy defoliation in 1998 to 3,767 acres in 1999 up to 5,337 acres in 2000. This was the highest level of woodland defoliation seen since 1983 (Table 18). Defoliation elsewhere across the state was limited to scattered trees, usually eastern cottonwood (*Populus deltoides*) or willow. Moth catches in our light trap survey rose only slightly (Table 19).

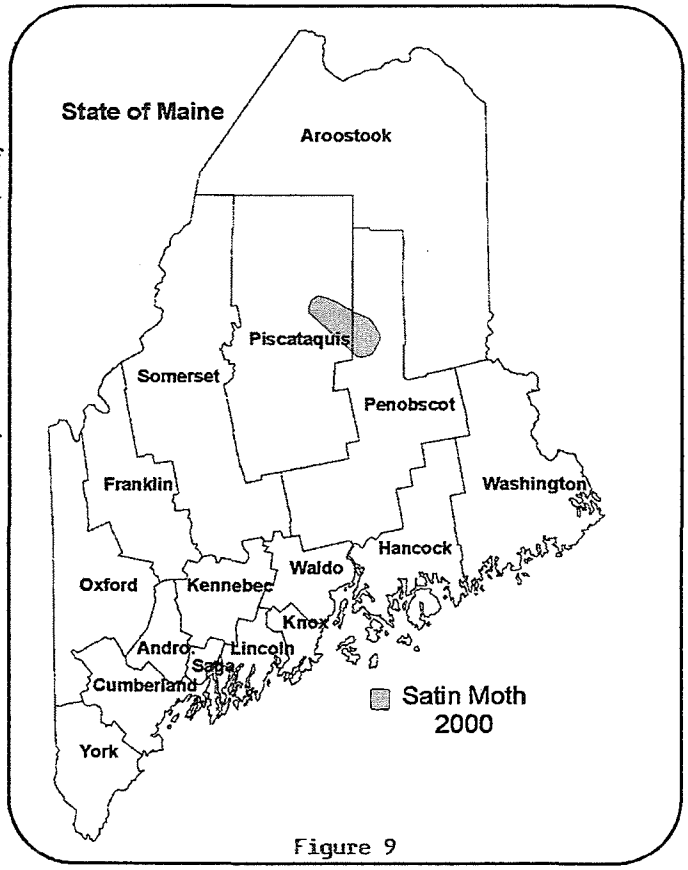


Figure 9

Table 18. Total acres of woodland aspen defoliated by satin moth in Maine by year from 1945 to 2000

Year	Acres Defoliated	Year	Acres Defoliated	Year	Acres Defoliated
1945	>50*	1972	<500*	1990	<50*
1946	<50*	1973	<6,000*	1991	-
1947	-	1974	<1,000*	1992	2,600
1948	-	1975-1981	-	1993	1,430
1949	-	1982	1,172	1994	1,600
1950	>100*	1983	5,967	1995	2,260
1951-1966	-	1984	1,258	1996	-*
1967	<1,000*	1985	<100*	1997	-*
1968	<10,000*	1986	-	1998	150
1969	30,000*	1987	-	1999	3,767
1970	40,000*	1988	<50*	2000	5,337
1971	9,250	1989	<50*		

* These figures are either best guess or based on ground surveys. Where no figure is given it may be due to lack of data.

Table 19. Total number of satin moth (*Leucoma salicis*) moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	2	2	0	0	2	0	0	0	11
Arundel			0	0	0	2	0	0*	-*
Ashland	7	3	5	1	0	0	0	0	9
Bar Harbor						0*		0	-*
Biddeford									0
Blue Hill	0	0	9	2	0	0	0	0	0
Brunswick	0	2	0	0	0	1	1	0	0
Calais	0	0	3	2	0	2	1	0	1
Chesuncook	0	1	0	0	0	0	2	0	7
Clayton Lake									
Dennistown	1	5	1	0	0	0	0	0	-*
Elliotsville	5	2	0	0	0	0	0	0	-*
Exeter	0	0	0	0	0	0	0	0	0
Greenbush	0	0	1	1	1	3	0	1	0
Guerette	3	16	7	9	0	1	0	4	4
Haynesville	2	18	5	1	0	0	2	0	0
Kingfield	1	0	0	0	1	0	0	0	0
Matagamon	0	0							
Millinocket	17	3	4	0	1	0	1	0	6
Mt. Vernon	0	0	0	0	0	0	0	0	0
No. Bridgton	0	0	0	0	0	0	0	0	0
Rangeley	1	0	0	0	0	0	0	0	1
Shin Pond			14	0	4	2	3	0	21
South Berwick	1	1	0	0	0	0	0	0	1
Ste. Aurelie	0	0	0	0	0	0	0	0	0
Ste. Pamphile						0	1	18	1
Steuben	2	2	8	5	0	1	1	0	0
Topsfield	0	3	18	12	1	0*	0*		2
Washington	0	0	0	0	0	0	0	0	0
Total Number of Moths	**42**	**58**	**75**	**33**	**10**	**12**	**12**	**23**	**64**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

Striped Alder Sawfly (*Hemichroa crocea*) - Isolated infestations of this sawfly can be found nearly every year on alder and birch but populations rose more sharply and unexpectedly than usual in 2000. Defoliation was spotty but noticeable over several thousand acres across central Maine in July and August. Some of the heaviest defoliation included roughly 40 acres of birch in Skinner Twp. and a variety of hosts over 100 acres just east of Baxter Park (Penobscot County) and in the Brownville area.

Sugar Maple Borer (*Glycobius speciosus*) - Populations of the sugar maple borer seemed to remain stable in 2000 unlike those of the **pigeon horntail**. This may be due to the improved health and vigor of many stands of sugar maple now that drought damage has begun to stabilize. Sugar maple borer seems to prefer stress but still fairly sound trees to breed in.

Tussocks (various) - Tussocks are those fuzzy, variably-colored, caterpillars which often show up as defoliators of a variety of trees and shrubs. In most situations defoliation is light and the caterpillars are more of a curiosity. Occasionally, however, populations boom and defoliation becomes noticeable. Unfortunately it is the associated medical aspects of the problem of which is of most concern. The hairs of some species can *physically* cause skin irritation although unlike those of **browntail moth** (not a tussock) which *chemically* cause a **rash** as well. "**Caterpillar rash**" or "**tussockosis**" is especially a problem during periods of hot weather. The **hickory tussock** (*Lophocampa caryaė*), **rusty tussock** (*Orgyia antiqua*), **pale tussock** (*Halysidota tessellaris*), **spotted tussock** (*Lophocampa maculata*) and **whitemarked tussock** are most common. Numbers of hickory, pale and spotted tussocks were up in 2000 and although defoliation was negligible, human encounters (children) caused some anxious moments. Unfortunately these tussocks feed on a wide variety of trees and shrubs and seem to occur everywhere. When they do some such as the white and black hickory tussock really show up against the green foliage as does the black and lemon-yellow, spotted tussock. As a result children pick them up and cuddle (!) them and "voila" a rash occurs. One youngster even put the fuzzy hairball-like cocoon of one in their mouth! We do not want to discourage youngsters from becoming afraid of insects but they should limit their familiarity with fuzzy caterpillars to the friendly black and orange **banded woollybear** (p. 39) which is least likely to cause any rash.

Uglynest Caterpillar (*Archips cerasivorana*) - Populations and damage were down in 2000.

Variable Oakleaf Caterpillar (*Lochmaeus manteo*) - Populations of this insect dropped to low and endemic levels in 2000. No defoliation was observed. Numbers of moths from the light trap survey dropped in 2000 as well (Table 20).

Table 20. Total number of variable oakleaf caterpillar *(Lochmaeus manteo)* moths collected at light

	Year								
Location	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Allagash	1	0	0	0	0	0	0	0	0
Arundel			0	1	0	0	7	6*	-*
Ashland	6	0	1	14	0	0	3	0	0
Bar Harbor						3*		4	-*
Biddeford									0
Blue Hill	5	0	9	30	9	0	5	15	0
Brunswick	0	0	0	3	0	0	0	2	0
Calais	3	0	0	3	0	0	2	4	0
Chesuncook	0	0	10	62	27	2	2	18	0
Clayton Lake									
Dennistown	0	0	0	5	0	0	0	0	-*
Elliotsville	42	5	0	57	3	1	1	15	-*
Exeter	0	0	0	6	4	3	0	10	0
Greenbush	3	0	7	11	4	14	17	3	0
Guerette	0	0	3	1	1	2	0	0	0
Haynesville	21	6	39	14	7	4	5	0	0
Kingfield	14	0	7	7	3	4	3	9	0
Matagamon	1	0							
Millinocket	122	85	148	185	18	86	23	12	0
Mt. Vernon	0	2	12	1	0	5	13	1	9
No. Bridgton	0	0	3	0	0	1	3	1	0
Rangeley	0	0	0	4	0	0	0	0	0
Shin Pond			2	15	4	20	5	12	0
South Berwick	3	8	0	4	0	0	6	34	0
Ste. Aurelie	0	2	1	0	0	0	1	0	0
Ste. Pamphile						0*	2*	0	0
Steuben	0	0	2	3	0	2	0	0	0
Topsfield	250	83	235	50	3	0*	11		0
Washington	1	0	2	17	2	4	8	26	0
Total Number of Moths	**472**	**191**	**481**	**493**	**85**	**148**	**115**	**172**	**9**
Total Number of Traps	**23**	**23**	**24**	**24**	**24**	**26**	**25**	**25**	**23**

* Intermittent/incomplete operation

Viburnum Leaf Beetle (*Pyrrhalta viburni*) - Larval feeding continued to decimate many viburnum hedges and roadside plantings throughout southwestern Maine in 2000 especially in the area south of U.S. Rte. 2 from Rumford to Old Town and from Hancock County west. At least low numbers of these beetles have now been found east to Machias and north to Millinocket. Damaging populations have also been found on native viburnums in openings in wooded areas several miles from planted stock.

Mortality of heavily infested shrubs is fairly common. To add to the problem we now suspect that one or more of the **clearwing (moth) borers** (Sesiidae) is beginning to impact some plantings. The two species we are looking at are *Synanthedon fatifera* and *S. viburni*.

Walking Stick (*Diapheromera femorata*) - This species occurs throughout the range of white oak in Maine (SW Quarter) but is almost never common. There are a few references to forest defoliation in York County around 1932 and again in York and western Cumberland counties around 1948. Scattered individuals have been seen as far north as Augusta.

Light defoliation of white oak caused by walking sticks was, however, observed in 2000!. The infestation covered less than 10 acres in the town of Woolwich (Sagadahoc County).

Willow Insects (various) - Willow, especially black and weeping, browned up later in 2000 due to cool moist conditions in June. Much of the damage which was still striking by August was caused by the mining **willow flea weevil** (*Rhynchaenus rufipes*) and the **imported willow leaf beetle** (*Plagiodera versicolora*). ***Chrysomela*** spp. larvae were also involved in some areas.

MISCELLANEOUS Insects and other Arthropods of Medical, Nuisance or Curiosity Significance in 2000

Ants (various) - There never seems to be a shortage of ants and 2000 was no exception. **Carpenter ants** (*Camponotus* spp.) were again a common structural concern but in woodland situations these creatures serve in the important process of wood breakdown. Those pesky little mound forming **lawn ants** (several species) were also common and resisted many homeowner efforts at control.

For those who thought we might have true **fire ants** in Maine - we don't! But we do have a couple of species which are aggressive and pack a potent sting. One of our more widespread stinging species in Maine is one of the **acrobat ants**, *Crematogaster lineolata* which often occurs in rough areas around gardens, in fields or the edge of woods. An introduced (from Europe) species, ***Myrmica rubra***, inhabits coastal areas from Kittery to Eastport. This species is very aggressive and has a powerful sting and unfortunately appears to prefer nurseries and more open areas which have been landscaped and thus often comes in contact with human activities. Highest populations seem to occur at Boothbay Harbor and on Mount Desert Island and some spread has been noted over the past few years.

Another species which may also occur in coastal areas and which may seem to sting is ***Formica integra***. Rather than sting, this species bites and then injects formic acid into the wound producing a burning sensation. *Formica integra* is a close relative of our infamous **Allegheny mound builder ant** *(Formica exsectoides)* which can be a serious problem in plantations and forest regeneration areas where these ants will actually kill small trees to keep an area open to the sun.

Ant flights involving the **cornfield ant** (*Lasius alienus*) were not reported in 2000.

A new ant species, the **ghost ant** (*Tapinoma melanocephalum*) has recently been introduced into Maine. This species was found in greenhouse settings in southwestern Maine in 1999. The species is tropical so is likely to remain a nuisance in heated structures where it seems to prefer wood mulch, decaying wood and some potting mixes. Check as you bring home greenhouse materials.

Banded Woollybear (*Pyrrharctia isabella*) Winter Weather Prediction Survey - Those familiar, fuzzy, red-banded, black caterpillars which children love to play with were fairly common again in 2000 primarily in October. A series of popular articles on predicting winter weather from the width of the red or middle band (the wider the red band the milder the winter) prompted one reporter in Augusta to gather information for local stories in both 1997 and 1998 and we continued our survey in 1999 and 2000.

Folklore has it that when the red makes up more than one third of the color, the upcoming winter will be milder. When the black makes up more than two thirds, the winter will be more severe. A one-third red and two-thirds black is considered an indication of a normal winter. The woollybears predicted a mild winter in 1997 and an even milder winter in 1998 which was actually borne out. 1999 was more questionable. To see how accurate the forecast would be this winter we again decided to pit the woollybears against the various farmers almanacs and the woolly bears have predicted a slightly more colder than normal winter! We'll see!!

Normal = 4.33 red segments on average based on 13 segments per caterpillar

1997/98 = 4.73 red segments on average - mild winter predicted

1998/99 = 5.05 red segments on average - milder winter predicted

1999/00 = 4.3 red segments on average - slightly colder than normal winter predicted

2000/01 = 5.14 red segments on average - milder than normal winter predicted

Boxelder Bug (*Boisea trivittata*) - This colorful red and black true bug was found in high numbers again in 1999 in traditionally infested areas of York County, especially Sanford. High numbers were also seen in Augusta (Kennebec County) and low numbers as far north and east as the Bangor area. This species feeds primarily on the developing foliage and seeds of boxelder which is of relatively low importance in Maine and the hosts survive any way. It is the massing and movement of the boxelder bug in the fall that draws the most attention. In this process numbers can be enormous. This species hibernates in litter and in buildings and may easily be confused with the **small milkweed bug** (*Lygaeus kalmii*) adults of which have a similar appearance and habit of entering homes to hibernate.

Dogwood Sawflies (*Macremphytus tarsatus* and *M. testaceus*) - Dogwood, especially gray and red osier, are often stripped of their foliage by the larvae of one or more sawflies and populations seemed to be very high locally in 2000, especially in Kennebec County. The larvae are basically yellow with (*M. tarsatus*) or without (*M. testaceus*) black spots at maturity. Early larval stages are covered with a white, waxy bloom. Larvae wander in search of a place to pupate. At this stage they may even bore into relatively soft wood (siding, decking, etc.) as much as one inch to find a protected place to change (pupate) and spend the winter.

Euonymus Caterpillar (*Yponomeuta cagnagella*) - No defoliation was observed in 2000.

Fall Insects - As most homeowners prepared for the coming winter on warm fall days, many insects were doing the same. Some of the common ones which we encountered in 2000 were **ants, banded woollybears, bumble bees, boxelder bugs, cluster flies, hunter's moths, multicolored Asian lady beetle, paper wasps, tussocks, western conifer seed bugs, woolly alder aphids** and **yellow jackets**.

Garden (or Snailcase) Bagworm (*Apterona helix*) - No new infestations have been found outside of Sanford. Our only infestation of this small introduced European bagworm continues to be in Sanford. As the females are wingless, the only means of spread is by movement of infested items. Watch for this one and report any suspected sightings. For more information see Summary Report #13 p. 36.

Japanese Beetle (*Popillia japonica*) - Populations of this species appeared to be up in infested areas of southern Maine from Old Town south in 2000. Numbers still appeared to be highest west of the Penobscot. Interestingly areas which have traditionally been "hot spots" seemed to experience lower numbers in 2000 while areas nearby, within a mile or two, which had low numbers in the past were inundated with clumps of the voracious insects. We had reports that the ground in some areas was sometimes covered with a bed of the crunchy critters. Our host list based on current reports has now been expanded to include larch and sensitive fern. Control efforts can be difficult and often disappointing.

Lily Leaf Beetle (*Liliocerus lilii*) - The activities of this introduced leaf beetle extended their range to the Augusta, Gardiner and Lewiston areas in 2000 in addition to locations in Cumberland (Bridgton, Gorham and Portland) and York (Ogunquit, Wells and York) counties. The adults are striking red beetles with a black head and legs and the larvae are slimy and ugly. Damage to lilies can be severe.

Medical Entomology - Maine state government still does not have a designated medical entomologist position. As a result, our FH&M staff receive requests for advice and assistance in dealing with an array of insect and other arthropod related problems. Included in these requests are questions relating directly to such things as **bedbugs, bird mites, black flies, bot flies, deer flies, fleas, horse flies, lice, mosquitoes, no-see-ums, spiders, stinging insects** and **ticks**. Also included are insect/arthropod vector related disease problems such as **eastern equine encephalitis, heartworm** and **lyme disease** and a series of **allergies, rashes** and **reactions**. The actual numbers of requests are not high except for those associated with ticks and lyme disease but individual concern is often great. Disease questions *per se* are referred to medical professionals. In addition to these problems, the outbreak of the mosquito transmitted **West Nile Virus** (WNV) in the New York city area in 1999 prompted concerns and many questions in Maine as well. In 2000 FH&M and Maine Medical Center staff conducted some preliminary mosquito surveys and plan to coordinate efforts to address both vector and disease related questions associated with the WNV in 2001. This will undoubtedly include additional mosquito surveys as well. The **vector borne disease group/lyme disease working group** with which we are associated, is keeping abreast of the situation and fielding questions. As of 2000, the West Nile Virus has not been found in Maine although it has been found as near as New Hampshire.

Biting Flies (black flies, deer flies, mosquitoes and no-see-ums) - Comments about biting fly activity in 2000 again ranged from "wow-no bugs" to "I can't stand it". Overall we found biting fly activity to be low this season as in 1999 except along the coast where salt marsh mosquitoes are a perennial problem. There were hot spots especially with locally high numbers of **no-see-ums** in wetter areas of northern and western Maine. **Deer fly/horse fly** populations were up in some areas as well. The highest populations of upland mosquitoes occurred in the vicinity of swamp land and the infamous **Penobscot River black fly** populations picked up through September as usual. The infamous **salt marsh greenhead fly** (*Tabanus nigrovittatus*) and its cohorts again plagued bathers along the coast south and west of Penobscot Bay from mid July through mid August.

Rashes related to insects were again of concern in 2000 in response to activities of the **browntail moth** (p. 26) in the Casco Bay area (Cumberland County) and with increased frequency of **tussocks** (p. 37) elsewhere.

Spiders - Questions and concerns over spiders were less common in 2000 than in 1999 and most questions dealt with the larger lycosids or some of the nonpoisonous cellar and house spiders.

Stinging insect populations in Maine seemed similar in 2000 to those of 1999 at least in southern Maine. Numbers of **bald-faced hornets, bumble bees, honey bees** and **yellow jackets** were still low while some **ground nesting solitary bees** and **paper wasps** (*Polistes* spp.) seemed to fare better. The **paper wasps** were probably the number one problem species as far as stinging species go as they occur in greatest numbers around buildings especially as they seek hibernation sites in the fall. Colonies of those interesting greenish, fuzzy, **ground nesting bees** (*Agapostemon* sp.) were again reported from southern Maine in 2000. The large beneficial **great golden digger wasp** (*Sphex ichneumoneus*) was even more common and active in 2000 than in 1999 from central Maine south. While fruit and vegetable growers remain concerned about a noticeable reduction in pollinators, campers and picnickers welcomed the relatively low numbers of yellow jackets.

Ticks (Ixodidae) - The number of requests for tick identification received at the Insect and Disease Lab exploded from 396 in 1999 to 631 in 2000. This is the highest number of requests processed to date in any one year. Tick submissions, however, were more evenly distributed throughout the season and with regard to species in 2000 than in 1999. Roughly 50% (316) (down from 60% in 1999) of the requests involved the lyme or deer tick *(Ixodes scapularis)*. It appears from submitted ticks that the lyme tick populations are continuing to extend eastward and inland. Our data will again be pooled with that of the Maine Medical Center Lyme Disease Research Laboratory for use by the lyme disease working group.

The highest numbers and greatest diversity of ticks occur in southern Maine (Fig. 10). The two most common ticks other than the lyme tick were the **woodchuck tick** (*Ixodes cookei*) and the **American dog tick** (*Dermacentor variabilis*). Of these the American dog tick was by far the most abundant in the field in 2000 but our clients appear to be more sure of the identification of this species and tend to report it to us less frequently. Populations of this species continued to spread slowly north and east as well. Larvae of the **moose** or **winter tick** (*Dermacentor albipictus*) were again common in November and December as far north as Fort Kent.

Lyme disease in Maine - The incidence and risk of acquiring lyme disease in Maine is still relatively low overall although the situation continues to change as populations of the tick vector expand eastward and northward. The area of greatest risk continues to fall along the coast west of the Schoodic Peninsula (Fig. 10). Lyme disease is a complex issue in Maine made even more complex due to the limited nature of the problem here and by expanding media coverage nationally. In 1986 a lyme disease working group was established to follow the progression of the then relatively new and local problem within the state and to try and set levels of risk based on vector populations. As results became available they were provided

through a variety of publicity channels. Although we now have a fairly good handle on the problem there are still questions associated with individual interpretation of the significance of what is known of disease ecology, dramatic variability in the distribution of infected deer ticks, human mobility, testing protocols and simple problems of clinical diagnosis and reportability. Unfortunately we are now left to further address the vaccine issue including appropriate use following its approval late in 1998. A set of guidelines on the vaccine was prepared to aid in the process of evaluation. Further discussions on the vaccine and on lyme testing protocols are sure to continue in 2000 and beyond.

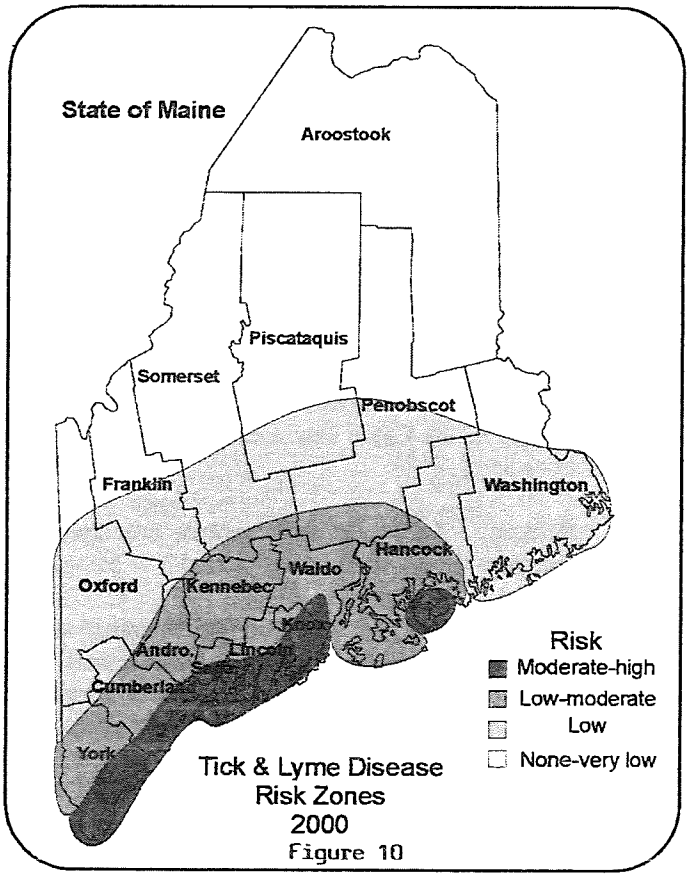


Figure 10

From 1986 through 1999 (the latest year for which a total is available), a total of 419 Maine residents have been diagnosed with lyme disease with 278 (66%) of these cases believed to have been Maine acquired. There were 90 cases reported in 1999 alone of which 66 (732) were Maine acquired. (Editors note: These figures differ slightly from those put forth in our last summary report due to changes reported to us by the Department of Human Services after that issue went to press). Although the three-shot vaccine has been in use for over a year now, no statistics are available on the extent of its use.

Miscellaneous - A number of interesting woodboring beetles (mostly cerambycids) were brought in for identification this season. Among them the large brown **broad necked root borer** (*Prionus laticollis*) was most common. As to uniqueness and frequency of responses received (as compared to previous seasons) this was tied only by the large and amazing adults of the **hellgrammite** known as **dobsonflies** (*Corydalis cornuta*), which seemed to be having a banner year.

Multicolored Asian Lady Beetle (*Harmonia axyridis*) - The fall arrival of these pestiferous little lady beetles was much less striking in 2000 than it has been since they first arrived in numbers in 1994 although they are certainly here. Perhaps populations are stabilizing. They also appeared more on cue in October and then were gone. This was true of other fall visitors as well such as **cluster flies**, **paper wasps** and the **western conifer seed bug**.

Powder Post Beetles - Powder post beetles remain an ongoing structural problem in Maine as they attempt to reduce building timbers to organic soil. We annually deal with a few stubborn infestations made more complex due to the unheated nature of some vacation homes and the use of firewood. ***Ptilinus ruficornis*** and ***Hadrobregmus carinatus*** seem to be our most common species. Control is difficult due to the lack of effective registered pesticides.

Public Assistance - The Forest Health and Monitoring Division provides technical assistance to landowners, homeowners, foresters, and others seeking advice with insect and disease pests of trees, household pests, and human health pests. Division personnel also did presentations and were involved in workshops, news conferences, and other similar training activities to inform and educate the public about trees and tree pests.

During the year the FH&M staff handled a total of 3,654 requests for assistance which includes all inquiries, sample diagnoses, insect identifications and site visits. Approxiamately 400 more requests were received in 2000 than than in the previous year. The increase is due to public response to the hemlock woolly adelgid quarantine alert. Requests for tick identifications and public concern about mosquitoes and, West Nile virus, the mosquito borne disease, also generated a high number of calls in 2000. The requests are summarized in Figure 11 and tables 21 through 24.

Specific information about forest and shade tree problems encountered during the year can be found elsewhere in the Insect and Disease Conditions Summary Report.

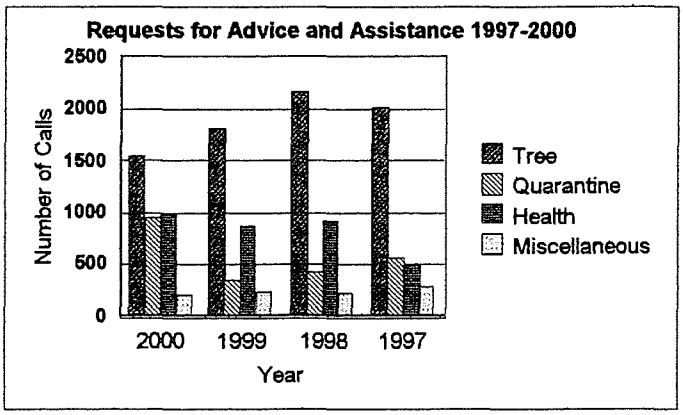


Figure 11

Table 21. Number of requests received in 2000 for advice and assistance about forestry related quarantines

PROBLEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
ELC requests			1	1						1		2	5
Gypsy moth permits	14	12	28	9	25	29	13	14	17	14	23	13	211
HWA requests		3	10	15	76	428	39	36	25	11	8	1	652
Compliance agreements				8					4	13			25
Gypsy moth requests				1			1		1	1			4
Ribes													0
Pine shoot beetle	7	4	1	1	1	2		3	2		2	4	27
Other requests				6	2	4	1	2	1	3	2		21
TOTAL	**21**	**19**	**40**	**41**	**104**	**463**	**54**	**55**	**50**	**43**	**35**	**20**	**945**

Table 22. Number of requests received in 2000 for advice and assistance about pests causing human health problems

PROBLEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Browntail moth	5	2	27	45	39	31	14	3	2	1	4		173
Ticks	2		14	46	144	166	98	48	21	55	130	5	729
Mosquitoes				1	3	11	8	11	2	1	4	2	43
Human health pests	1		4	3	3	5		3	3	2	2		17
Biting flies	1			1	9	7	1						19
Blackflies													0
TOTAL	**9**	**2**	**45**	**96**	**198**	**220**	**121**	**65**	**28**	**59**	**140**	**7**	**990**

Table 23. Number of requests received in 2000 for advice and assistance about forest, shade tree, and ornamental pests

PROBLEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Total
Abiotic factors	2	5		1	3	2	5	2	2		1		23
Animal damage	1		2	1		2						1	7
Anthracnose						8	3	1					12
Arborvitae leafminers			1										1
Asian longhorned beetle	1					2							3
Adelgid galls on spruce													0
Annosus root rot												1	1
Aphids						5							5
Apple scab disease						2		1		1			4
Ash decline				1	1	2						2	6
Ash leaf & twig rust						1							1
Balsam needle gall midge	2		1	5	14	17	5		2	4	6	5	61
Balsam shoot boring sawfly			1										1
Balsam twig aphid				3	8	3							14
Balsam woolly aphid		1		4	4	5	2	1	1				18
Bark beetles				1	1	2		5	1	1			11
Beech bark disease					1					1			2
Birch casebearer													0
Birch leafminers								2					2
Black knot of cherry					1								1
Bronze birch borer					1			2					3
Brown ash decline													0
Bruce spanworm													0
Butternut canker													0
Cankers	1				2	4	2	2					11
Canker worms													0
Chestnut blight fungus								2	2	1			5
Cultural		1		2	1	1	1	2					8
Dogwood anthracnose													0
Drought	1	1	3		2	3	1			1	1		13
Dutch elm disease							4				1		5
Eastern dwarf mistletoe			2	3			12	2	1		4		24
Eastern tent caterpillar					1								1
Elm leafminers													0
European larch canker													0
Fall webworm						1		1	2				4
Fir-fern rust													0
Fir-fireweed rust													0
Forest tent													0
FIA	2	1	8	40	50	55	53	78	56	56	38	12	449
FHM			6	11	19	5	5	2	4		3		55
Frost							1						1
Galls on deciduous trees					1	4	1	1					7
Gypsy moth							8	4	1				13
Hardwood decline													0
Hemlock borer	1	3		1	6	5	5	4	2	1	1	1	30
Hemlock looper		3		4		1		5	16	22	15	6	72
Hemlock woolly adelgid		1			1	2							4
Herbicide	1	1	1	1		1							5
Horse-chestnut leaf blotch													0
Ice storm damage		8	4	7	4	2	2	1	3	1	2		34
Introduced pine sawfly													0
Japanese beetles						2	9	4	2				17
Jap. long horned beetle													0
Eastern larch beetle	2	3	1	1	3	3	7	4		2			26
Larch casebearer													0
Leaf beetles						6	2	3			1		12
Maple decline						1							1
Maple trumpet skeletonizer													0
Mites						3				1			4
Mountain ash sawfly							1						1
NAMP													0
Needle cast disease	1		1	1	1	2		1		2			9
Oak leafroller							1						1
Oak skeletonizer													0
Oak twig pruner							5	3					8
Pear thrips													0
Pine shoot beetle	1												1
Poison ivy										1			1
Psocids								1					1
Root rot										1	1		2
Root weevils													0
Rose chafer						2		1					3
Roundheaded appletree bor.													0
Rusts							1						1
Sapsucker injury						1	1	1					3
Salt injury								1		1			2
Satin moth				1	1	3	1						6
Sawflies	2					2	3	4	2				13
Sawyer beetles				1		2	1	2		1			7
Scale insects	1				1			1	1				4
Shoot boring sawfly													0
SNB													0
Spittlebugs						1							1
Spruce beetle	2	1	6	8	9	6	10	6	1	1	9		59
Spruce budworm	5	3	2	2	4	1	3	3	6	4	1	5	39
Spruce gall adelgids					2	4	2	4					12
Spruce health	2	2	3	4	12	3	7	2	2	10			47
Spruce needleminer				1									1
Tar spot on maple						1							1
Tussock moth caterpillars								3	3	1			7
Variable oakleaf caterpillar													0
White pine blister rust	1	2	1	1	2	2	2	3	1	1		1	17
White pine decline	1	2	15	3		1		1	9	1	3		36
White pine weevil			4	3	2	2	7	6		2			26
Woodborers	1	1	2				3	5		2			14
Yellowheaded spruce sawfly				3		2	11	6			1		23
Other requests	7	11	19	17	31	24	21	29	28	25	8	3	223
TOTAL	**38**	**50**	**83**	**131**	**189**	**209**	**208**	**212**	**148**	**145**	**98**	**37**	**1546**

Table 24. Number of requests received in 2000 advice and assistance about household, public nuisance, and miscellaneous pests

PROBLEM	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
Ants			2	1	1	4	1	4	4	1	1		19
Asian lady beetle	2	1	3		1								7
Bed bugs			4	2	2	1							9
Bees						1	2	2					5
Bird mites				1	2								3
Booklice													0
Carpenter ants			4	1	3	8	2	3	2	1			24
Clothes moths	1							1					2
Clover mite									1				1
Cluster flies										2			2
Cockroaches			2			1							3
Crickets													0
Dermestid beetles		1			4	1		1					7
Earwigs						1							1
Firewood insects			1				1					1	3
Fleas									1		1		2
Flies							3		1				4
Fruit flies													0
Fungus gnats													0
Hornets and wasps	1		1		3	2		7	3	1	3		21
House flies													0
Indian meal moth	1	2			5			1	2				11
Ladybird beetles													0
Mealworms										1			1
Midges					1								1
Misc. insects*		1	1		1	1		4					8
Misc. non-insects**			1	1	3	2	3	2	1	5			18
Pantry pests			2			1	1	3	1		2	1	11
Powder post beetles	1		1	2	2	3		2	1				12
Silverfish			1										1
Spiders		1	1	3	3	2	1	6	4	2			23
Springtails					2					2	1		5
Termites			1							1			2
Western conifer seed bug					1								1
TOTAL	**6**	**6**	**25**	**11**	**34**	**28**	**14**	**36**	**21**	**16**	**8**	**2**	**207**

* include such things as silverfish and non powderposting woodborers ** include such things as house centipedes, millipedes and pseudoscorpions

Root Weevils (various) - Occasionally large numbers of one or more species of root weevils mass over and into homes for whatever reason. This season we have received numerous reports of such activity by the **imported Japanese longhorned weevil** (*Calomycterus setarius*) and another **weevil** (*Stomodes gyrosicollis*). Root weevils such as this are usually associated with lawns where the larvae feed on the roots of clover, grasses and such.

Termites - We again include this reminder that we do in fact have termites in Maine. Although a variety of species have been introduced at times, most did not find our climate suitable for establishment. The **eastern subterranean termite** (*Reticulitermes flavipes*), however, has found some suitable sites here and has become locally established. We now have records from:

Cumberland County - spotty but established in a number of towns
Kennebec County - Augusta only
Oxford County - Bethel only
York County - spotty but established in a number of towns

Spread from existing infestations has been slow and limited even in Cumberland and York counties. The Kennebec and Oxford county infestations have changed little over the past ten years. With the current moderation of climates, however, this may change.

DISEASES and INJURIES Associated With Trees in 2000

Acid Rain (caused by certain pollutants entering the atmosphere and reacting to form sulfuric and nitric acids) - This subject has received much play in the popular media over the years but most reports of damage are unfounded or attributable to other causes. But the perception persists that acid rain is significantly destructive to forest vegetation. Each year we receive calls expressing concern about the effect of acid rain on Maine forests.

Most recent research has concluded that there is no evidence of general, widespread decline of forest tree species due directly to acidic deposition, though there may be local effects due to acid fog at certain coastal or high elevation sites in the northeast. There may also be subtle effects of acid deposition such as increased nutrient leaching from plants and soils which may negatively impact tree growth or winter hardiness. And there is the possibility that effects of acidic precipitation may increase the susceptibility of trees and other plants to certain diseases. Studies are ongoing to elucidate these possible effects.

When the acid rain controversy first commanded national attention in the 1970's and 80's, it was common for weather forecasters to announce the acidity of precipitation events as part of local weather broadcasts. This practice has now largely ceased, but we recently asked our state Department of Environmental Protection about trends in acidic precipitation in recent years. We were interested to note there were no trends. The mean pH of precipitation statewide has held steady at about 4.6 since 1982.

Anthracnose of Ash, Birch, Catalpa, Maple, and Oak (caused by *Apiognomonia errabunda, Marssonina betulae, Glomerella cingulata, Kabatiella apocrypta,* and *Discula quercina* respectively) - These diseases, which cause irregular tan or brown spots or blotches on leaves often followed by defoliation, were quite pronounced in 2000. We received many reports of ash anthracnose in particular (PG 1). The spring of 2000 was quite moist, and abundant rainfall at critical times during leaf expansion in May provided the opportunity for substantial foliage infection on many sites.

Apple Scab (caused by *Venturia inaequalis*) - One of the most common non-forest diseases we encounter when responding to calls from the public is apple scab. Perhaps the most serious disease in commercial apple orchards, apple scab also defoliates and causes lesions on leaves, stems, and fruits of ornamental crabs. This is a fungal disease which is generally worse during moist seasons, such as we experienced in 2000.

Control by spraying fungicides is possible, but the repeated applications which must be timed 7-10 days apart during wet weather become tedious even for commercial growers. A more practical approach for homeowners involves the raking and destruction of fallen leaves and fruits in the autumn, and the planting of resistant varieties. Among those types said to be resistant are the cultivars 'Adams', 'Baskatong', 'Beverly', 'Bob White', 'David', 'Dolgo', 'Donald Wyman', 'Henry Kohanke', 'Liset', 'Ormiston Roy', 'Professor Sprenger', 'Red Jewel', and 'Sugartyme', and the species *Malus floribunda, M. sargentii,* and *M. tschonoskii*.

Ash Leaf and Twig Rust (caused by *Puccinia sparganiodes*) - This disease (PG 2) was last epiphytotic in Maine from 1982-1984. The moderate outbreak of this disease which began in 1995 in the Stockton Springs/Frankfort/Winterport areas of midcoast Maine diminished in 1998 to endemic levels, remained endemic in 1999, but was a bit more conspicuous in 2000.

Ash leaf and twig rust is a spectacular disease when it occurs in epiphytotic situations, often totally defoliating trees. It only occasionally kills trees, but may weaken them so that they succumb to other causes, especially where the disease strikes heavily in successive years.

The trend for this disease is static at low levels.

Atropellis Canker (caused by *Atropellis tingens*) - Atropellis canker is a relatively uncommon fungal disease of pines in Maine which is occasionally a problem in Scotch pine plantations and natural stands of pitch pine, particularly in the southwestern part of the state. This disease is characterized by sunken, perennial cankers on twigs, stems and branches. Wood beneath cankers is darkly stained bluish black in color. The bluish black stain often appears wedge-shaped when branches are cut and cankers are viewed in cross-section. Affected branches flag and needles turn brown in spring and early summer.

We received no new reports of this disease in 2000. The disease is potentially damaging to pines in Christmas tree plantations but usually is not much of a problem in Maine where relatively few pine species are now grown for Christmas trees. Where pines are planted, *Atropellis*-free planting stock is generally used and plantations are rarely established near infected natural stands, so chances for infection are low.

Balsam Fir Needlecasts (caused by *Isthmiella* and *Lirula* spp.) - These needlecast diseases were seen occasionally on balsam fir Christmas trees again in 2000. The causal organisms are generally common among stands of understory wild trees, but only occasionally a problem among cultivated trees.

Symptoms are generally confined to foliage two years old or older; current season growth, even when infected, remains green until the second growing season. But it is the infected third year growth upon which infective spores are generated and which in turn serve to cause infection of current season growth during the summer. Commonly a continuous dark line is noticeable on the undersides of infected third year needles (PG 3), especially if *Lirula nervata* is the causal organism. Often trees infected by *Lirula* and *Isthmiella* needlecast fungi are attacked by other needlecast fungi as well, including species of *Rhizosphaera* and *Lophodermium*, which develop under the same sort of cool, moist conditions which favor the former pathogens.

No chemical control products are presently registered to help manage *Lirula* and *Isthmiella* infection in Christmas tree stands. Cultural control suggestions revolve around practices to open stands to light and promote good air circulation, low branch pruning, and confining shearing to dry weather only.

An excellent booklet How to Manage Needlecast Diseases on Balsam Fir prepared by the United States Forest Service is available free as single copies from this office. Supplies are extremely limited.

Beech Bark Disease [caused by beech scale (*Cryptococcus fagisuga*) and *Nectria coccinea* var. *faginata*] - This disease, which was introduced into Maine in the early 1900's, continues to kill or reduce the quality of beech stems statewide. But beech bark disease does not threaten to eliminate beech from the Maine forest because some trees are resistant, and even susceptible trees sprout profusely from roots when trees are damaged, killed or harvested.

Infected trees exhibit rough patches of dead bark (PG 4) which may contain small, reddish fruiting bodies of the causal fungus. Scattered through most stands are a few smooth barked, resistant trees. Landowners managing for beech may wish to leave these resistant stems during thinning or selective harvesting operations, while poisoning cut stumps of susceptible trees to prevent root sprouting.

Losses attributable to beech bark disease are extensive but assessment of the damage is complicated by the effects of drought, oystershell scale, late spring frosts, and various hardwood defoliators.

Black Knot of Cherry (caused by *Apiosporina morbosa*) - This disease is common in forest situations throughout the state on wild cherry trees and is particularly conspicuous on black cherry where galls a foot or more in diameter may occur (PG 5). Where these galls occur on the main stem the value of cherry for lumber is considerably reduced. Damage often extends internally well beyond the galled area, because the gall canker serves as an entry point for wood decay organisms which spread internally over time.

Frequently we receive reports of black knot infections on cultivated peach, cherry or plum trees in landscape or home orchard situations. All too often by the time we are consulted the disease has progressed to such an extent that the usual control practice of pruning knotted twigs and branches to remove infected tissue would essentially reduce the tree to a stump. It is important to diagnose this disease early, prune any knotted twigs each year before April 1, and spray if necessary with the fungicide thiophanate methyl in order to maintain healthy, productive fruit trees.

Brown Ash Decline (caused by environmental stresses) - Black ash, *Fraxinus nigra*, (called brown ash in Maine) has largely recovered from the statewide decline (PG 6) which first became apparent in 1989.

In 2000 Forest Health and Monitoring staff remeasured nearly half of the brown ash plots which were originally established in 1992 to assess this decline. A subset of 12 of the established plots had been remeasured in 1996 and 1997 but 2000 was the largest remeasurement since 1995 when 36 plots were assessed.

While ash anthracnose caused defoliation in some plots, and led to higher than expected crown transparency readings, the overall conclusion from the 2000 brown ash survey is that plot trees have recovered and continue to rebuild their crowns after the profound decline of the late 1980s.

Bud Abortion of Balsam and Fraser Fir (caused by low ambient air temperatures prior to bud break) - This problem seems to be increasing in recent years, but is nothing like the damage Maine experienced in the late 80's where many trees were rendered unsaleable. Bud abortion in 2000 was generally limited to buds at the tips of side branches of Christmas trees, and terminal and lateral buds (PG 7) of leaders.

Our observations indicate that some seed sources of balsam fir predispose to bud abortion problems. Other contributing factors may be mild winters where warm temperatures lead to a premature loss of winter bud hardiness, excessive (especially nitrogen) fertilization, and nutrient deficiencies or imbalances.

We suggest growers avoid planting stock from seed sources which seem to predispose to this problem under their conditions and apply fertilizer according to recommendations based on foliar test results.

Butternut Canker (caused by *Sirococcus clavigignenti-juglandacearum*) - Butternut canker, a disease which has virtually eliminated butternut in the Carolinas, was first found in Maine in 1993 when we located the disease in Kennebec County. We continued to survey for this disease in succeeding years, and have now located it in all Maine counties except Washington County (Fig.12).

Butternut canker is characterized by dying branches and dead tops, development of epicormic branches, discolored bark which may ooze a thin black inky fluid in the spring, and cankers on the main stem, buttress roots, and branches. When bark in cankered areas is physically stripped away, the sapwood beneath exhibits dark brown, spindle-shaped, stained areas (PG 8).

No effective controls are available to halt the spread of this disease at this time.

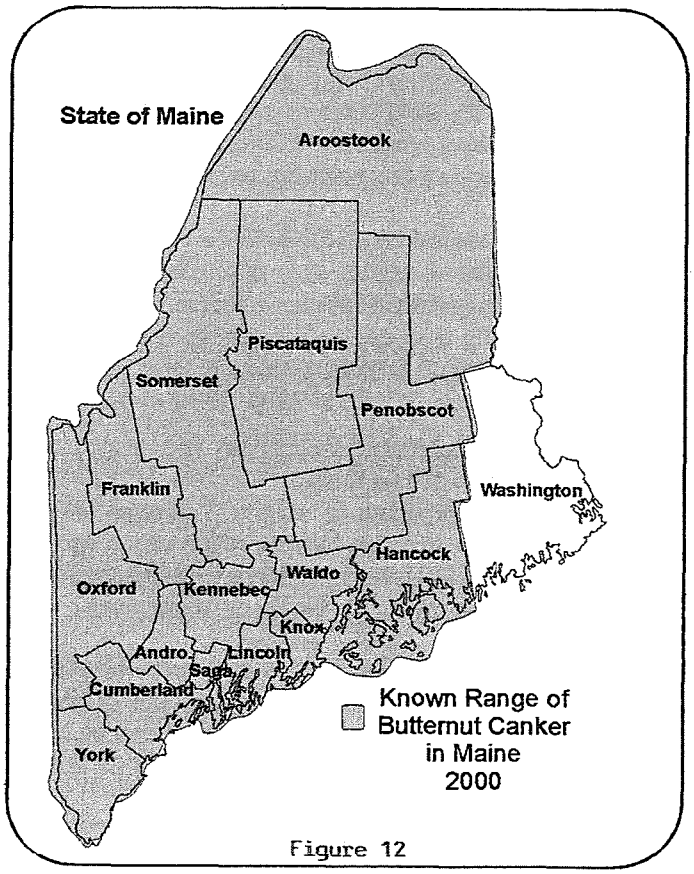


Figure 12

Logging injuries should be minimized when harvesting. In nurseries, and perhaps in some homeowner situations, application of fungicides may be appropriate. In some states, butternut harvesting guidelines and even harvesting moratoriums are now in effect. There is considerable evidence that resistant individual butternut trees exist within the native population and researchers are now beginning to develop strategies to exploit that resistance to protect the species.

The upward trend of this disease is expected to continue into the foreseeable future.

Caliciopsis Canker (caused by *Caliciopsis pinea*) - This is a generally minor, but occasionally important, disease of eastern white pine which is often overlooked. Though we have known about this disease for many years, we are only now becoming aware of its significance and widespread occurrence in Maine. Every year we receive a few inquiries about cankered trees in stagnated white pine stands, and frequently we diagnose Caliciopsis canker as the cause. Drought seems to predispose to Caliciopsis canker (see White Pine Decline).

Cankers may occur anywhere on tree trunks or suppressed branches and usually occur only in small numbers on a single tree. However, severely attacked trees may contain as many as several hundred cankers. Cankers may be superficial or they may extend into the cambium, killing it.

This is primarily a disease of stagnated stands or suppressed trees in dense stands. It may be effectively managed through judicious and timely stand thinnings.

Chemical Injury (phytotoxicity due to chemical pesticide application) - We received many reports of chemical injury to trees and shrubs in 2000. Growers and landscape managers should be especially alert to the possible phytotoxic effects of certain pesticides when applied to tender, emerging plant foliage. Certain evergreens are quite susceptible, especially when applications involve emulsifiable concentrates, mist blower applications, and/or treatment during hot weather. We have repeatedly warned balsam fir Christmas tree growers to be careful of Diazinon AG 500 and Lorsban 4 E when applying them during late May and early June.

Causes of chemical pesticide injury are many and varied. Among the calls we investigated in 2000 was herbicide injury involving application of Roundup Ultra over the tops of small balsam fir Christmas trees. Although the label cautions against allowing Roundup Ultra to contact the foliage of Christmas trees, many growers apparently fail to pay heed to the warning (PG 9). Some of the older formulations of Roundup were more forgiving, but not Roundup Ultra. Read the label!

Chestnut Blight (caused by *Cryphonectria parasitica*) - This disease, which was introduced to North America around 1900 on nursery stock of oriental chestnuts, subsequently spread into Maine and quickly destroyed our native American chestnut resource. A few infected trees persist, often sprouting from old stumps, and occasionally a seedling will grow to considerable size in the woods before succumbing to the disease. American chestnut trees planted as landscape specimens also frequently attain considerable size before fatal infections (PG 10) develop. None of these native trees is truly resistant to the disease.

Recently considerable interest has been expressed in support of an effort to reintroduce the American chestnut into Maine forests. The Maine Chapter of the American Chestnut Foundation is proceeding to breed resistant strains of American chestnut using native Maine chestnut sources. These trees are being crossed with resistant hybrids which are under development by the American Chestnut Foundation in Virginia. Within twenty years or so it is hoped that blight resistant trees with native Maine genes will be ready to reintroduce the species to Maine forests.

Cones on Balsam and Fraser Fir Christmas Trees - After a big cone year in 1998, fir trees took a year off in 1999, then produced moderate numbers of cones again in 2000. Cones were a problem for some Christmas tree growers, especially growers of fraser fir (PG 11), and those with plantations containing early coning strains of balsam fir. Wild fir trees produced significant numbers of cones, as did native white pine and various species of spruce.

The Maine Christmas Tree Association did not harvest cones from its balsam fir seed orchards in 2000 because most of the cone producing tissue was removed from trees during the 1988 seed harvest and has yet to regenerate, and because the association has ample quantities of seed orchard seed in storage at this time.

Cristulariella Leaf Spot (caused by *Cristulariella* spp.) - This disease, which caused extensive leaf spotting and defoliation especially of boxelder in south central Maine in 1990, has since all but disappeared. Apparently the weather conditions which favor this disease, consecutive hot, summer days and nights with high dew points, have not recurred in Maine since that time.

Declining Spruce in Coastal Regions of Maine (caused by a variety of site and biological factors) - The declining health of Maine's coastal spruce stands intensified in 2000, due to extremely dry conditions experienced in 1999. Spruce stands along the central and eastern Maine coast in Hancock, Waldo, Lincoln and Washington Counties exhibited the most significant deterioration. White spruce seemed to be most stressed. Tree crowns exhibit signs of declining vigor such as a sharply reduced foliage complement, numerous dead or dying branches, and poor foliage color. In many stands trees carried only two or three years of needles and foliage was restricted to the top 25% of the crown. Healthy coastal spruce usually carry 5 to 8 years of needle growth. Many 50 to 80 year old coastal white spruce stands are now badly overmature and are growing at an extremely slow rate. This slow growth and poor vigor has made coastal spruce increasingly susceptible to blowdown and biological pests including eastern dwarf mistletoe, spruce beetle, and hemlock looper. Many deteriorating stands have been totally unmanaged since their inception.

Dutch Elm Disease (caused by *Ophiostoma ulmi* and *Ophiostoma novo-ulmi*) - Symptoms of Dutch elm disease (DED) were conspicuous throughout Maine during 2000 and generated occasional inquiries of our staff. One arborist reported that he felt symptoms were more conspicuous than usual.

Many old elms which escaped the initial wave of infection now succumb each year, at least partially the result of the development of more aggressive strains of the disease organism. While protecting these older specimens is the concern of most of our clients, we occasionally receive calls regarding mortality of younger elm trees (4-8" dbh and 20-30 feet tall). Such trees are frequently numerous in old field areas, and along roadsides (PG 12), the progeny of susceptible old elms now long gone. The progeny are, of course, also susceptible to Dutch elm disease and, due to their high numbers and density, are extremely vulnerable to mini-epiphytotics (epidemics).

Eastern Dwarf Mistletoe (*Arceuthobium pusillum*) - Severe damage as the result of infection by this parasitic plant (PG 13) continues to occur in stands of white spruce in coastal areas of Maine. Evidence of significant mistletoe infestation was noted in 2000 on coastal headlands and islands from Machias in the east to the Boothbay region in the west. Trees of landscape value succumb each year in the yards of coastal residences as this organism gradually drains trees of their vigor. Removal of witches'-brooms (infected portions of branches), together with appropriate fertilization, generally helps to maintain the vigor of affected landscape trees. But such measures are impractical in woodland areas, and several islands in Friendship and Port Clyde have recently been extensively harvested in response to mistletoe damage.

Dwarf mistletoe also frequently occurs on black spruce, particularly in inland bogs, and on red spruce in many forest situations. Brooms on red spruce are often more poorly developed than on white or black spruce and may be overlooked. However infected residual trees left during timber harvesting activity can result in the infection of spruce regeneration. Infected trees should therefore be identified if possible and removed during the harvesting operation, and harvested areas revisited every ten years or so to remove any symptomatic trees missed during the initial harvest.

European Larch Canker (caused by *Lachnellula willkommii)* - European larch canker (PG 14) is a fungal disease which originated in Europe and was first found on native larch (tamarack) in southeastern Maine in 1981. Information gathered from existing cankers indicates this disease has been present in Maine since at least the 1960's and perhaps much longer. This disease may infect any species of the genus *Larix* or *Pseudolarix*. Since larch canker has the potential for causing serious damage to both native larch stands and reforestation projects utilizing non-native larches in Maine and elsewhere, the disease is under state and federal quarantine (Fig.13).

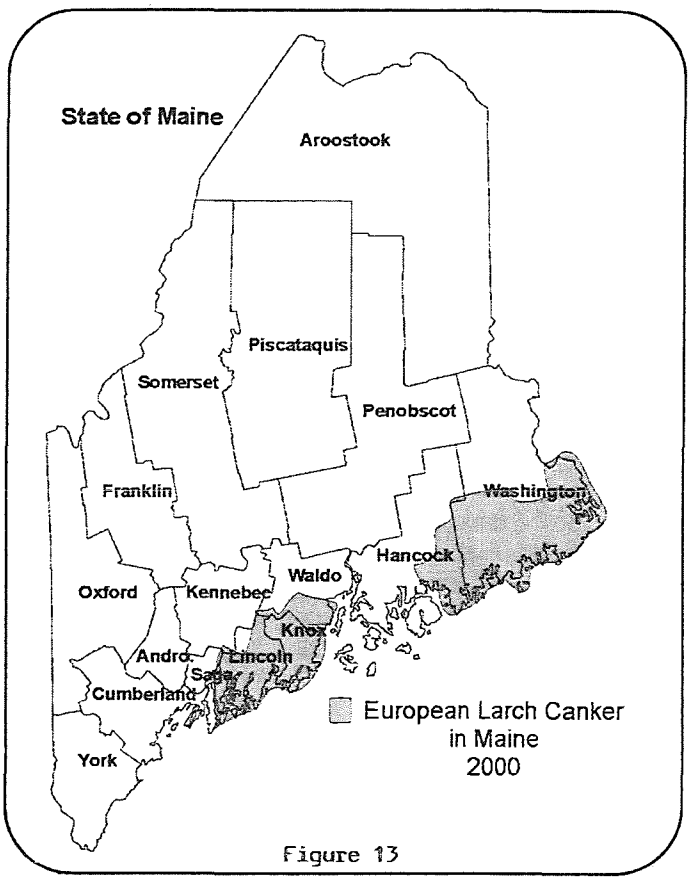


Figure 13

The trend for this disease is static.

Hardwood Decline in Northwestern Maine (caused by multiple stressors) - American beech and white birch crown condition plots established in Maine to augment National Forest Health Monitoring program detection monitoring plots were not measured in 2000. Observations of beech stands in 2000 suggest that significant drought conditions in 1999, increases in beech scale/nectria, and a resurgence in oystershell scale seems to have accelerated beech dieback. Remeasurement of beech and birch plots is planned for 2001.

Northern hardwood throughout the state and especially in northwestern Maine continue to exhibit dieback symptoms. The area affected has not changed significantly compared to areas mapped previously.

Heavy Seed Year - Many hardwoods, as well as most conifers (see "Cones on Balsam and Fraser Fir Christmas Trees"), produced seed prolifically during 2000. Native red maple produced heavy crops of seed early in the season, and by late summer beech nuts and acorns were seemingly abundant everywhere.

Horse-chestnut Leaf Blotch (caused by *Guignardia aesculi*) - This disease, which causes brown, irregular blotches on leaves (PG 15) often bordered by a yellow band, was less severe in 2000 than most previous years, but was still quite conspicuous.

Ice Damage to Trees (caused by the "Ice Storm of 1998") - Most trees damaged by the "Ice Storm of 1998" (PG 16) now show significant recovery of affected crowns. Tree species that possess the ability to produce sprouts in damaged portions of their crowns displayed lush foliage in 2000 and were aided substantially by a moist spring and early summer. Species that have recovered best from significant crown loss in 1998 include white ash, red oak, and sugar maple. Trees that lost more than 75% of their total crown now have smaller (than before the ice storm) but apparently normal crowns. Several other species such as aspen and red maple show improved crown but to a lesser degree. Softwood species that lost significant portions of their crown, except for exotic larches, show little or no crown recovery. Also, several hardwood species such as birch and American beech apparently lack the ability to rebuild their crowns significantly through sprouts and show little recovery.

Lichens - Lichens growing on dead and dying conifers are frequently and falsely accused of having a role in tree decline and death. We had several reports in 2000 from landowners concerned about lichens. Lichens certainly look as though they ought to be parasitic and many people have a hard time believing that they are not. While they do grow profusely on declining and dead trees, those trees are almost certainly dying for other reasons.

Lichens are comprised of fungi and algae growing symbiotically. Since the algal component is a green plant, light is required for growth. Lichens grow more rapidly when exposed to full light, which explains their profusion on dead trees.

Needle Blight of White Pine (caused by ? *Canavirgella banfieldi*) - This disease, which we have called semimature tissue needle blight (SNB) in past years, was again conspicuous in 2000 though less so than in the preceding two years. This disease causes needle tips to turn brown in July which then fade to a grayish tan overwinter. Typically not all needles in a fascicle are affected. During the summer affected needles, though brown at some point beyond the needle base, exhibit no outward signs of fungal infection. By the following spring, however, numerous fruiting bodies of various secondary fungi may be apparent, confounding attempts to identify a causal pathogen. Needle browning is typically more severe on sides and lower crowns of affected trees, while the top is less symptomatic. And some trees are apparently resistant (PG 17), so only a portion of the trees in a stand is typically affected.

Affected needles and fascicles gradually weather from the trees during the spring, and tree appearance improves as new growth emerges.

While this problem generates many calls from homeowners, woodlot managers, and golf course superintendents, it is primarily an aesthetic problem except for Christmas tree growers, a percentage of whose trees may become unmarketable. Even colorants such as Greenzit do not successfully mask the brown discoloration.

Oak Leaf Blister (caused by *Taphrina caerulescens*) - This disease, characterized by raised yellowish blisters on leaf upper surfaces was especially abundant last spring, the result of favorable early infection conditions. Yellowish "blisters" turned brown as the season progressed but defoliation was minimal.

Oak Wilt (caused by *Ceratocystis fagacearum*) - To date there is no evidence that this disease occurs in Maine.

Phomopsis Galls (caused by *Phomopsis* sp.) - Every year we receive a few calls regarding the presence of galls on various species of hardwoods, especially red and black oak. These galls are often very conspicuous, ranging from the size of a pea on smaller twigs to the size of a basketball on larger branches, and are especially evident when leaves are off trees (PG 18). Typically only one or two trees will be affected in the landscape, with neighboring trees apparently not susceptible. Frequently galls will cause dieback of smaller branches, but generally trees seem to tolerate infection fairly well.

This is a difficult disease to diagnose with certainty because no fungal fruiting bodies are apparent on the galls. The fungus must be cultured from infected tissue and allowed to fruit before a positive diagnosis can be made.

Little is known about the etiology of this disease and it is therefore difficult to recommend effective control actions. However we suggest that in forest stands affected trees be harvested early or as encountered to reduce inoculum. In landscape settings affected trees should be diagnosed early so that attempts may be made to prune infected tissue from trees before the disease gets out of hand.

Pine-Pine Gall Rust (caused by *Endocronartium harknessii*) - This disease occurs in natural stands as well as in forest and Christmas tree plantations in Maine. We have found it in natural stands of jack pine in such diverse locales as Parlin Pond and Steuben (PG 19), and in plantations of Scotch and jack pine from all over the state. It occurs especially frequently in Scotch pine plantations, even where no nearby infection is present in the wild, as the result of the planting of infected nursery stock.

Once established in a plantation this disease may be hard to manage. Removal of infected trees (or branches bearing galls) early in the rotation and before the end of April each year will help keep the disease from spreading to healthy trees. It is important when establishing plantations of hard pines to plant only healthy nursery stock.

We had no calls regarding this disease in 2000, but observed the disease frequently on our travels, especially on jack pine in east coastal Maine.

Pinewood Nematode (*Bursaphelenchus xylophilus*) - Pinewood nematode in Maine is primarily a problem of stressed trees, especially those stressed by being planted off site. But many plantations (including ornamental plantings) are in fact established off site and we suspect that pinewood nematode has played a role in the mortality of pine and perhaps other species in such situations, even though the presence of pinewood nematode was never confirmed. The pinewood nematode, which causes the most serious disease of pines in Japan (pine wilt), also occurs in the United States in all states east of the Mississippi River. Although pinewood nematode was not discovered in the United States until 1929, it is considered to be a native, not introduced, pest. There is no indication that pinewood nematode has ever caused large scale mortality of conifers in Maine or elsewhere in North America.

Porcupine Damage (caused by *Erethizon dorsatum*) - Reports of porcupine damage to forest trees, evergreen plantations, and ornamental plantings (PG 20) continue at high levels statewide. It is uncertain whether porcupine populations have actually increased in recent years or whether the more numerous reports simply reflect an increasing acreage of higher value conifer plantation and seed orchard trees, situations where porcupine damage is less easily ignored.

In an attempt to define whether porcupine populations are indeed on the rise throughout Maine, one of our staff members has undertaken a count of porcupines killed by vehicles along roadsides in the course of his travels. This survey, known as SPLAT (Special Porcupine Lethal Automobile Tire survey), does not pretend to be scientific, but it may over time provide a rough approximation of porcupine population trends. The staff member undertaking the count consistently drives about 50,000 miles per year and covers the entire state, although the survey is weighted to the Central Maine area where relatively greater travel occurs.

The SPLAT survey is now six years old and while no trends are yet apparent, there is also no indication that porcupine populations are declining significantly. In 1995, 99 dead porcupines were counted and in 1996 the total was 93. In 1997 the total was 123, in 1998, 109, in 1999, 110, and in 2000 the total was 100.

Rhabdocline and Swiss Needlecasts of Douglas Fir (caused by *Rhabdocline pseudotsugae* and *Phaeocryptopus gaeumannii*) - In recent years we have experienced a gradual reduction in calls related to these two diseases as growers of Christmas trees have cut back or curtailed production of Douglas fir. But a few plantations persist, and where they are established on new sites where Douglas fir was not previously planted, transplants typically grow to almost Christmas tree size before disease becomes epiphytotic.

Many Maine Christmas tree growers lost interest in Douglas fir some time ago because of its extreme susceptibility to *Rhabdocline* (PG 21) and Swiss needle cast fungi under Maine conditions. And in the landscape not only is Douglas fir frequently attacked by these two disease fungi, but it also serves as a powerful alternate host for the buildup of Cooley spruce gall adelgid on Colorado blue spruce when it is planted nearby. So its liabilities often exceed its assets, though it does make a handsome Christmas tree when disease and adelgids are under control.

Rhabdocline and Swiss needlecasts appear similar to the casual eye, and while they have slightly different life cycles, the same spray program if broadly applied will control both diseases. For more information on diagnosis and control of these and other Christmas tree pest problems, you may wish to request our Circular No. 11, Integrated Crop Management Schedule for the Production of Christmas trees.

Root Rot of Balsam and Fraser Fir (caused by apparently native soil fungi attacking trees planted off site) - Losses of balsam and fraser fir Christmas trees due to root rot in plantations established on poorly drained sites seemed to moderate somewhat during 2000. We had noted this phenomenon for many years, particularly with fraser fir, and dismissed it as being due to an intolerance by that species for "wet feet." But balsam fir was also occasionally affected (PG 22), and in 1998 and 1999 losses of both species on certain moist sites became quite pronounced following wetter than normal spring seasons. Based on that observation we had anticipated the disease to become worse in 2000, following a very wet spring, but to our surprise losses seemed to stabilize in many plantations.

Salt Damage (caused by movement of deicing salts from road surfaces to susceptible plant species) - Symptoms of salt damage to roadside vegetation were less conspicuous than usual again this past winter season (1999-2000).

The damage noted, however, was of two types: (1) foliage browning (PG 23), especially of white pine which was growing very close to traveled road surfaces, the result of direct salt deposition on foliage and (2) foliage browning of fir, hemlock and white pine, growing at greater distances from traveled road surfaces, but sited where root systems could take up pooled salty water.

Affected trees recovered as the growing season progressed, with new growth masking the older, browned needles which generally fell prematurely.

Scleroderris Canker (caused by *Ascocalyx abietina*) - No new infestations of Scleroderris canker (PG 24) were located during 2000. This disease remains static at very low levels.

Sirococcus Blight of Red Pine (caused by *Sirococcus conigenus*) - Sirococcus blight of red pine (PG 25) seems to have increased in severity in Maine in recent years, especially in the Eustis-Flagstaff area, but also in plantations elsewhere in the state. Inquiries to us about this disease in managed forest areas generally fit into one of three categories: (1) infection of reproduction in thinned stands beneath infected overstory vegetation (2) infection of plantations established adjacent to infested natural stands or (3) infection within new plantations which were established in locations remote from known inoculum sources, due to the use of infested planting stock.

In many areas of Maine, serious infection of red pine reproduction beneath infected overstory trees is so probable that it is not cost effective to thin stands to allow for natural red pine regeneration. However white pine seems resistant and may perform well as an alternative regeneration species in such situations.

Infection of plantations established adjacent to infested natural stands is also highly likely, especially if tall overstory trees are left standing. Sirococcus often moves quickly into new plantations established under such circumstances, and by the time the disease is detected, it is often too late for sanitation pruning to be cost effective.

Infection of new plantations due to the use of infested planting stock is also a problem, since the disease is seed borne and seedlings are likely to be infected in nursery beds or greenhouses where container stock is produced. Use of disease free stock is of paramount importance when establishing red pine plantations.

This disease is also occasionally a problem on various species of spruce in landscape situations, particularly so in 2000, following a moister than normal spring.

For more information on diagnosis and control of this and other conifer plantation problems, you may wish to request our Circular No. 12, Integrated Crop Management Schedule for Softwood Timber Plantations and Conifer Seed Orchards.

Sphaeropsis Blight (caused by *Sphaeropsis sapinea* syn. *Diplodia pinea*) - This disease, primarily of two-and three-needle pines, seems to have increased in severity in recent years, especially on red pine in mid-coastal areas. Plantation pines seem especially hard hit with symptoms ranging from tip blight to the death of entire trees.

Other than in older red pine plantations in coastal areas, this disease is mostly a problem in landscape plantings around homes and estates, parks, along roadsides and on golf courses. It is generally not a problem in the natural forest environment.

Spring Frost Damage - We have received scattered reports of frost damage to balsam fir Christmas trees this spring (PG 26), primarily from Aroostook County, but also from central Maine.

Christmas tree growers culturing fir trees in forest pockets may be well advised to plant Canaan, rather than balsam fir, due to its tendency to flush new growth after danger of frost is past. Fraser fir, of course, also flushes relatively late in the spring, but frost pockets are often also characterized by wet soils, which are tolerated much more poorly by fraser than by Canaan fir.

Tar Spot of Maple (caused by *Rhytisma acerinum*) - This conspicuous but generally benign disease of red, silver and sugar maple foliage was more common than usual in 2000, particularly in the Biddeford and Otisfield areas.

Verticillium Wilt (caused by *Verticillium dahliae*) - This is primarily a disease of maples in ornamental situations but it affects other hardwood species in the landscape as well. Leaves yellow and wilt on branches of affected trees. The disease often progresses until wilt affects the entire crown. Greenish streaks or bands appear in sapwood beneath the bark. The green stain may appear as a partial or complete "ring" in the sapwood when a cut branch is viewed in cross section.

Affected trees may die or recover. Water and fertilizer may stimulate the growth of affected trees and improve prospects for recovery.

The causal fungus is soil borne, so replacing one tree which has succumbed to this disease with another susceptible species on the same site is a very risky proposition. Trees known to be resistant to *Verticillium* include all the gymnosperms, plus apple and crabapple, mountain ash, beech, birch, butternut, oak, poplar and willow.

Although this disease is not uncommon in Maine, we recorded no inquiries regarding it during 2000.

White Pine Blister Rust (caused by *Cronartium ribicola*) - We continue limited control efforts to manage this disease (PG 27) in certain high value pine stands each year. In 2000 a total of 2,970 acres of high quality pine timber was scouted for *Ribes* plants in the Androscoggin County towns of Livermore, Livermore Falls, Leeds, Greene, and Turner. A total of 1,285 *Ribes* was destroyed.

Triclopyr (Garlon 4) remains our herbicide of choice, mixed at the rate of 6 oz./gallon of water. In 2000 a total of 18 ounces of Garlon 4 was mixed with water to provide a total finished volume of 3 gallons.

White pine blister rust continues to be a problem of trees in the landscape as well, often involving trees which were infected when purchased as nursery stock.

This disease remains static at moderate levels, but is common throughout the state.

White Pine Decline - White pines in many forest stands in southwestern Maine continue to succumb to complications of the drought that area experienced during the summer of 1995. While the drought was the "trigger" which started many trees to decline, significant site factors and a variety of secondary organisms have continued to extend the mortality to the present.

Symptoms of this problem are somewhat variable, but typically scattered co-dominant and understory trees develop a complete browning of the crown. Single, dominant pines with large crowns are less frequently affected. In early stages of decline, affected trees often exhibit thinning crowns, shortened needles, and an off-color, chlorotic appearance. Many affected trees exhibit resin flowing from multiple areas of the upper stem, but this symptom is not apparent on all trees. There are patches of dead phloem tissue associated with resin flow, but often no insect activity nor white pine blister infection is apparent. In some cases cankers enlarge and have blue stain associated with them. *Septobasidium* and *Caliciopsis* canker are often abundant in affected stands. Young, regenerating pine do not seem to be affected.

Despite the widespread nature of the 1995 drought, white pine decline is not noted in all stands. It is worse on gravelly, well-drained soils, especially along the Little Ossippe and Saco Rivers in the Acton/ Limerick/Limington/Waterboro areas, but affected trees can be found as far north as Pittston and Skowhegan, even on heavier soils. In many stands, some trees now appear to be recovering (gaining vigor) even as other nearby trees continue to die.

The Maine Forest Service is now leading several studies to better define the etiology of this disease. These studies involve soil profiles and land use history of affected stands, tree ring data (dendrochronology) as it relates to past drought events, and measurement of crown densities to determine the cause of stand recovery or decline. While these studies are still in progress, several preliminary findings are significant. Soils beneath symptomatic stands exhibit shallower potential rooting depths than soils beneath non-symptomatic stands, thereby increasing tree susceptibility to drought events. In fact the average potential rooting depth on non-symptomatic plots was nearly twice the depth of symptomatic plots.

Crown density studies of trees growing on symptomatic and non-symptomatic stands are preliminary, with base lines for crown transparency just now being established. As expected, transparencies are greater among symptomatic trees, 29.8 percent vs. 19.2 percent for non-symptomatic trees. Crown density plots are also yielding data on mortality in affected stands. Plots with symptomatic trees exhibit average stand mortalities of 26%, whereas plots in nearby, healthier stands exhibit only 5% mortality. Mortality is greatest among pole sized trees (6-10" dbh) (PG 28).

Management of pine in affected stands is difficult. We have recommended and continue to recommend selective removal and salvage of symptomatic (dying and dead) trees, while awaiting the stabilization and recovery of healthier appearing trees. But this strategy requires multiple stand entries, as many residual trees decline and die following salvage efforts. And in the most severely affected stands, stocking will be inadequate by the time this problem stabilizes.

We are hopeful that the studies now underway will provide the basis for improved management strategies for white pine decline in future years.

Winter Injury - Winter injury effects on trees and shrubs (PG 29) were generally mild during the winter of 2000-2001. Forsythia over much of southern Maine flowered right to the tops of shrubs indicating little flower bud mortality. Tender ornamental evergreens such as yews, rhododendrons and dwarf Alberta spruce showed much less browning than usual.

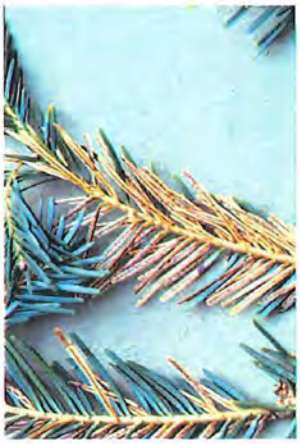
Yellow Witches'-broom of Balsam Fir (caused by *Melampsora caryophyllacearum*) - These perennial, bushy yellowish growths on branches of fir trees (PG 30) have been unusually abundant in Christmas tree plantations throughout the state in recent years. Many are now sufficiently large to leave significant "holes" in the crowns of trees when removed, as they generally are prior to sale of Christmas trees. If growths are not removed a hole is of course not created, but the remaining brushy growths are devoid of needles which were cast earlier in the season, and not at all attractive.

This disease is caused by a fungus which uses chickweed as an alternate host plant. Elimination of the alternate host plant through use of selective herbicides in and around plantations may reduce infection, but most fir Christmas tree growers are content to simply prune brooms from trees while those growths are still relatively small.

PHOTO GALLERY

PG 1 Ash Anthracnose

PG 2 Ash Leaf Rust



PG 3 Lirula Needle Cast

PG 4 Beech Bark Disease

PG 5 Black Knot of Cherry

PG 6 Brown Ash Decline

PHOTO GALLERY

PG 7 Bud Abortion

PG 8 Butternut Canker

PG 9 Roundup Injury

PG 10 Chesnut Blight

PG 11 Cones in Fraser Fir

PG 12 Dutch Elm Disease

PHOTO GALLERY

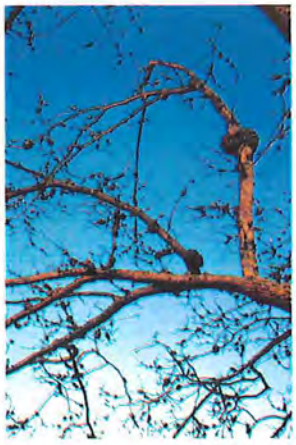
PG 13 Eastern Dwarf Mistletoe

PG 14 European Larch Canker

PG 15 Horse-Chestnut Leaf Blotch

PG 16 Ice Storm of 1998

PG 17 White Pine Needle Blight



PG 18 Phomopsis Gall

PHOTO GALLERY

PG 19 Pine-Pine Gall Rust

PG 20 Porcupine Damage

PG 21 Rhabdocline Needlecast

PG 22 Balsam Fir Root Rot

PG 23 Road Salt Damage

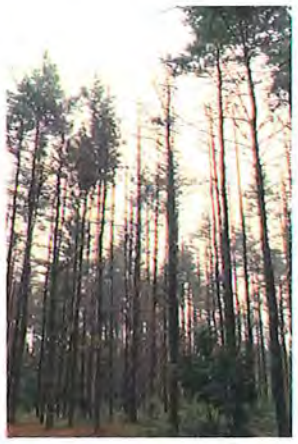
PG 24 Scleroderris Canker

PHOTO GALLERY

PG 25 Sirococcus Blight

PG 26 Frost Damage

PG 27 White Pine Blister Rust



PG 28 White Pine Decline

PG 29 Winter Injury

PG 30 Yellow Witches'-broom

Forestry Related Quarantines in Maine - 2000

There are four forestry related quarantines currently in effect in Maine. They are: White Pine Blister Rust, Gypsy Moth, European Larch Canker, and Hemlock Woolly Adelgid. A quarantine for the **Pine Shoot Beetle**, ***Tomicus piniperda*** in the northeast states is still in the planning phase.

I. The White Pine Blister Rust Regulations and Quarantine are listed under Title 12 MRSA 1988, Subchapter III, §803:8305 Shipment Prohibited.

The director may prohibit, prevent or regulate the entry into or movement within the State, from any part thereof to any other part, of any plants of the genus *Ribes* or other nursery or wildling plants, stock or parts of plants which may cause the introduction or spread of a dangerous forest insect or disease. The director may issue the necessary orders, permits and notices necessary to carry out this section which shall not be considered to require or constitute an adjudicatory proceeding under the Maine Administrative Procedure Act, Title 5, Chapter 375.

Regulation: White Pine Blister Rust, Quarantine on Currants and Gooseberry Bushes.

A. The sale, transportation, further planting or possession of plants of the genus *Ribes* (commonly) known as currant and gooseberry plants, including cultivated wild, or ornamental sorts) is prohibited in the following counties in the State of Maine, to wit: York, Cumberland, Androscoggin, Kennebec, Sagadahoc, Lincoln, Knox, Waldo, Hancock, and parts of Oxford, Franklin, Somerset, Piscataquis, Penobscot, Aroostook, and Washington.

B. The planting or possession of European Black Currant, *Ribes nigrum* or its varieties or hybrids anywhere within the boundaries of the State of Maine is prohibited. This quarantine is administered by the Forest Health & Monitoring Division of the Maine Forest Service, phone 287-2431 or 287-2791.

II. The Gypsy Moth Quarantine is listed under 7 CFR Part 301.45, United States Department of Agriculture, Animal & Plant Health Inspection Service, Plant Protection and Quarantine as printed in the Federal Register.

A. This quarantine designates the infested area in Maine as quarantined for the movement of regulated articles, which includes wood such as logs, pulpwood, trees, shrubs, firewood, Christmas trees, and chips, and requires the inspection and certification of such material if movement is to non-infested states and foreign countries. This is administered by the USDA-APHIS, PPQ in Bangor, Maine, phone 945-0479.

B. Inasmuch as Maine is not completely infested and quarantined, wood or regulated articles moving from the infested area of the state to the non-infested area must be accompanied by a certificate or go to a mill under state compliance agreement which allows the reception of such articles. Regulated articles moving from the non-infested area of the state to other non-infested states or non-infested parts of Canada must be accompanied by a state permit stating that the regulated article originated outside of the infested area of the state. This is managed by the Forest Health & Monitoring Division of the Maine Forest Service, phone 287-2431 or 287-2791.

III. The European Larch Canker Quarantine is listed under 7 CFR Part 301.91 of the United States Department of Agriculture, Animal & Plant Health Inspection Service, as published in the Federal Register, and also under Title 12 MRSA, §8305 of the Laws of the State of Maine.

A. This quarantines all parts of larch (*Larix* spp.) including logs, pulpwood, branches, twigs, etc., as regulated articles.

B. Also any other product, article, or means of conveyance whatsoever, when it has been determined by an inspector that it presents a risk of spread of the disease.

C. Designates parts of Hancock, Knox, Lincoln, Waldo, and Washington counties as the quarantined area from which movement is restricted.

This is managed by the USDA-APHIS, PPQ in Bangor, Maine, phone 945-0479, and the Forest Health & Monitoring Division of the Maine Forest Service, phone 287-2431 or 287-2791.

IV. The Hemlock Woolly Adelgid Quarantine is listed under 7 MRSA, Chapter 409, §2301-2303 of the Laws of the State of Maine.

This quarantine was established to prevent the introduction of the hemlock woolly adelgid (*Adelges tsugae* Annand) into Maine. This serious pest causes mortality of Eastern hemlock (*Tsuga canadensis*) and other ornamental hemlocks in infested states. Since hemlock is a major component of Maine's forest on over one million acres, protection of this valuable resource from damage by the hemlock woolly adelgid is essential. The following is only a partial summary of the rules. Refer to the above cited statutory authority for complete quarantine regulations.

A. The quarantine regulates the shipment into Maine of hemlock woolly adelgid carriers which consists of any hemlock articles with attached bark, including hemlock seedlings and nursery stock, logs, lumber with bark, chips with bark, and uncomposted shipments of bark.

B. The area under quarantine in the northeastern United States consists of the counties included in the USDA Forest Service's publication entitled "List of Counties and States with Known Hemlock Woolly Adelgid Infestations"dated December 2000", In the western U.S., the states of Alaska, California, Oregon, and Washington are included in the quarantine.

C. Hemlock seedlings and nursery stock originating in or previously held in any area under quarantine are prohibited entry into Maine.

D. Hemlock seedlings and nursery stock shipped into Maine from non-quarantined areas must be accompanied by a State Phyto Sanitary Certificate with declarations of origin.

E. Hemlock logs, lumber with bark, chips with attached bark, or uncomposted bark, shipped into Maine from either **quarantined or non-quarantined** areas of other states or Canada can only be received under a written agreement between the shipper and the Maine Forest Service at pre-approved sites.

F. Arrangements or requests for importing hemlock seedlings and nursery stock must be handled through the Plant Industry Division, 28 State House Station, Augusta, ME 04333; Tel. (207) 287-7548.

G. Arrangements or requests for importing hemlock logs, lumber with bark, chips with attached bark, or uncomposted bark must be handled through the Insect and Disease Laboratory, 50 Hospital Street, Augusta, ME 04330-6514; Tel. (207) 287-2431.

Additional information is available in:

Forest Health & Monitoring Division. 2001 (March). Forest & Shade Tree-Insect & Disease Conditions for Maine - A Summary of the 2000 Situation. MFS, FH&M Div. Summary Report No. 15. 62 pp. plus 5 pp. Photo Gallery. Compiled and edited by R.G. Dearborn and C.A. Granger.

On our website:

<http://www.state.me.us/doc/mfs/idmhome.htm>

And in the following two free fold-out leaflets:

FH&M. 1989. European Larch Canker - The European Larch Canker in Maine. Me. DOC, MFS, FH&M Div. and USDA-APHIS. Color fold-out leaflet. 6 pp.

Ouellette, D.E. (Compiler). 1997 (April). Regulations and Guidelines for Shipping Christmas Trees, Wreaths and Decorative Plant Materials - Twigs, Nuts & Fruits Used in Wreath Making. A public information guide from the Plant Industry Div., Me. Dept. of Agr. and the MFS, FH&M Division. A pocket fold-out.

Maine Forest Service
DEPARTMENT OF CONSERVATION
FOREST HEALTH & MONITORING DIVISION PUBLICATIONS
Technical Report Series

No.	*Title*
1.	LaBonte, G.A. The Saddled Prominent Outbreak of 1970-1971 and Its Damages. March, 1978. 20 pp.
2.	Dearborn, R.G., H. Trial, Jr., D. Struble and M. Devine. The Saddled Prominent Complex in Maine with Special Consideration of Eastern Maine Conditions. March, 1978. 20 pp.
3.	Maine Forest Service, Entomology Division. Spruce Budworm in Maine: 1977. March, 1978. 80 pp
4.	Devine, M.E., H. Trial, Jr. and N.M. Kotchian. Assessment of Spruce Budworm Damage in the Moosehorn National Wildlife Refuge. August, 1978. 32 pp.
5.	Struble, D., H. Trial, Jr. and R. Ford. Comparison of Two Rates of Sevin-4-Oil for Spruce Budworm Control in Maine: 1976. August, 1978. 28 pp.
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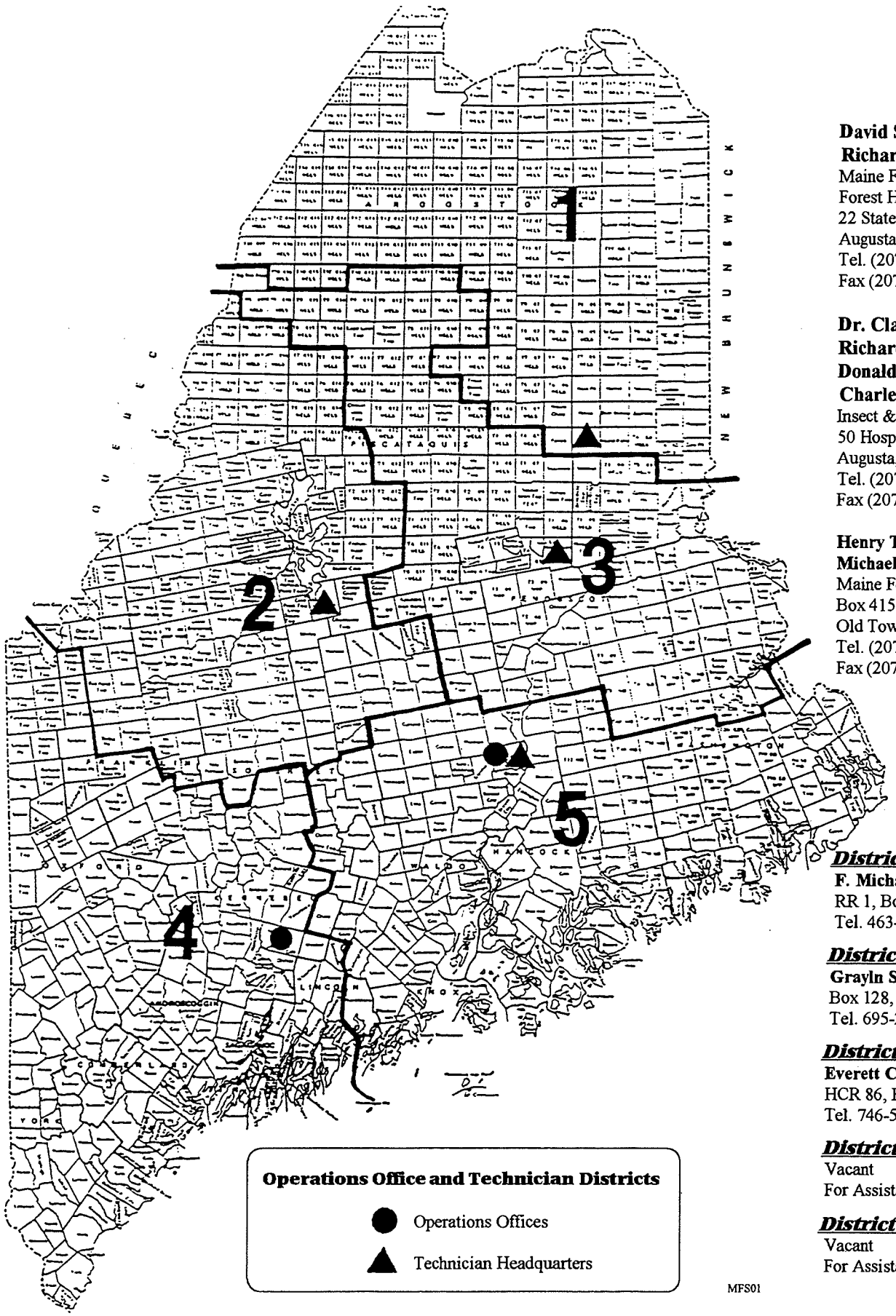

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