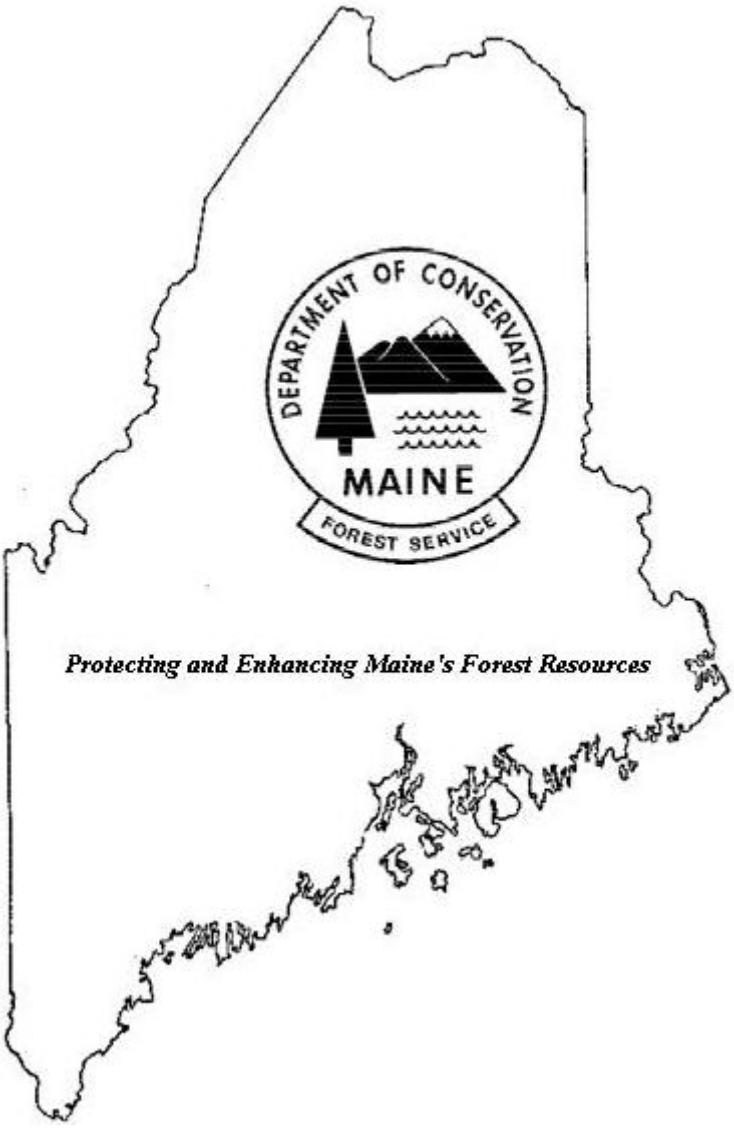
Forest & Shade Tree Insect & Disease Conditions for Maine

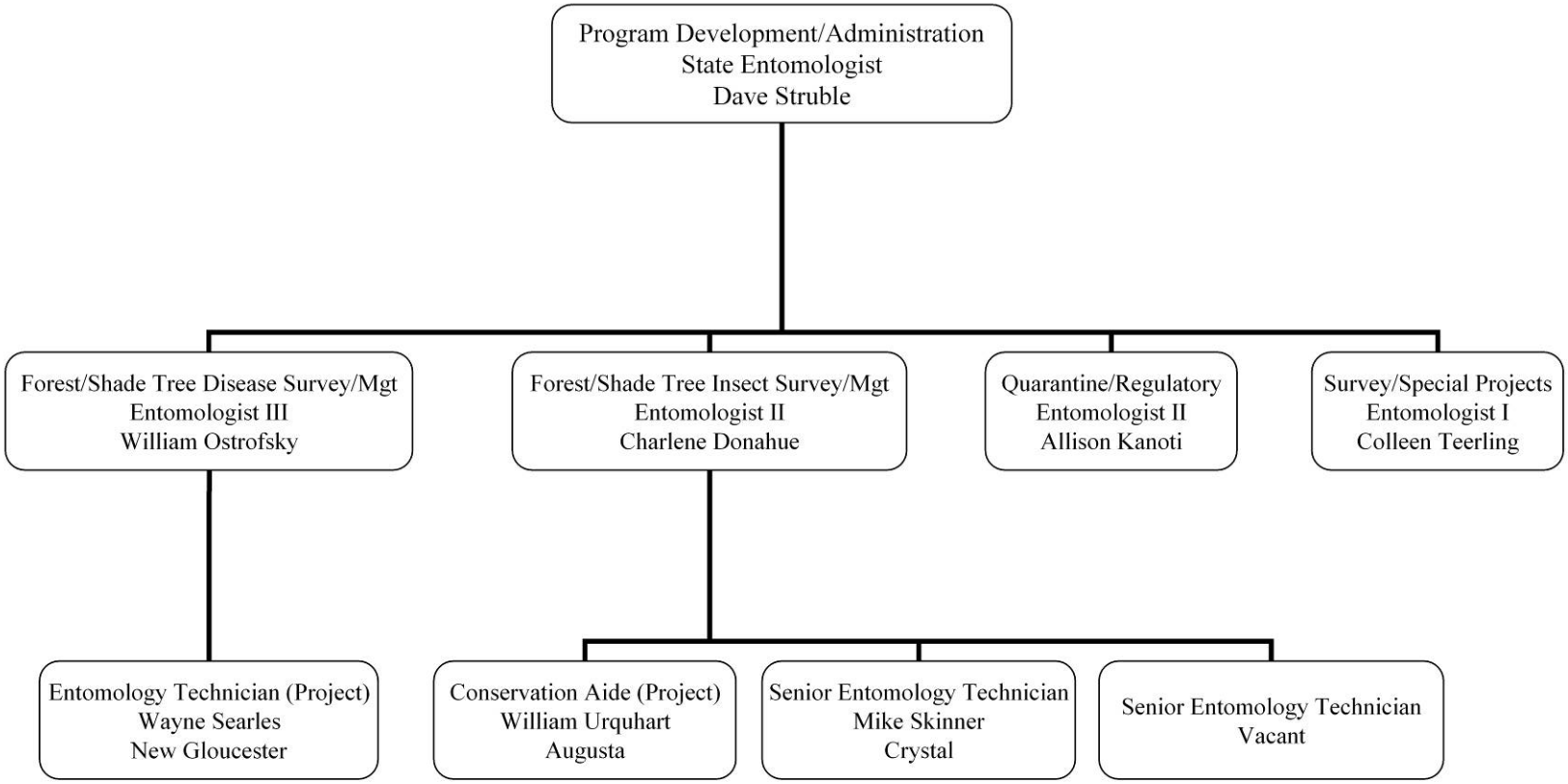
A Summary of the 2011 Situation



Forest Health & Monitoring Division
Summary Report No. 23
March 2012

Maine Forest Service
MAINE DEPARTMENT OF CONSERVATION
Augusta, Maine

Forest Health and Monitoring Division—Insect and Disease Management Unit



Forest Insect & Disease—Advice and Technical Assistance

Maine Department of Conservation, Maine Forest Service
Insect and Disease Laboratory
168 State House Station, 50 Hospital Street, Augusta, Maine 04333-0168
phone (207) 287-2431 fax (207) 287-2432

http://www.maine.gov/doc/mfs/idmhome.htm

The Maine Forest Service/Forest Health and Monitoring (FH&M) Division maintains a diagnostic laboratory staffed with forest entomologists and a forest pathologist. The staff can provide practical information on a wide variety of forest and shade tree problems for Maine residents. Our technical reference library and insect collection enables the staff to accurately identify most causal agents. Our website is a portal to not only our material and notices of current forest pest issues but also provides links to other resources. A stock of information sheets and brochures is available on many of the more common insect and disease problems. We can also provide you with a variety of useful publications on topics related to forest insects and diseases.

Submitting Samples - Samples brought or sent in for diagnosis should be accompanied by as much information as possible including: host plant, type of damage (i.e., canker, defoliation, wilting, wood borer, etc.), date, location, and site description along with your name, mailing address and day-time telephone number or e-mail address. Forms are available (on our Web site and on the following page) for this purpose. Samples mailed to the laboratory should be accompanied by all necessary information and insects should be in crush-proof containers (such as mailing boxes or tubes). Live insects should be provided with adequate host material for food. Disease samples should be enclosed in plastic bags. Mail containers for prompt shipment to ensure they will arrive at the Augusta laboratory on a weekday.

Insect & Disease Laboratory	State Entomologist	Field Staff*
168 State House Station 50 Hospital Street Augusta, Maine 04333-0168 Phone: (207) 287-2431 Fax: (207) 287-2432 Hours: Mon.-Fri. 7:30 a.m. - 4:30 p.m. (call ahead as we are often in the field) Charlene Donahue, Forest Entomologist (207) 287-3244 charlene.donahue@maine.gov Allison Kanoti, Forest Entomologist (207) 287-3147 allison.m.kanoti@maine.gov Colleen Teerling, Forest Entomologist (207) 287-3096 colleen.teerling@maine.gov William Ostrofsky, Forest Pathologist (207) 287-3008 bill.ostrofsky@maine.gov Wayne Searles, Entomology Technician Bill Urquhart, Conservation Aide	David Struble 22 State House Station Augusta, Maine 04333-0022 Phone: (207) 287-2791 Fax: (207) 287-8422 dave.struble@maine.gov	Mike Skinner, Entomology Technician 185 Crystal Road Island Falls, Maine 04747 Phone: (207) 463-2328 Radio Call #F-181 * Can be contacted directly for assistance in his area of the state.

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168 Statehouse Station
Augusta, Maine 04333-0168

Phone (207) 287-2431 Fax (207) 287-2432
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Acknowledgements

The information in this Annual Summary Report has been assembled and reviewed by Charlene Donahue, Allison Kanoti, William Ostrofsky, Dave Struble, and Colleen Teerling of the Maine Forest Service, Forest Health and Monitoring Division. Many other individuals and organizations have contributed significantly to the information on forest health presented here, including Wayne Searles, Mike Skinner, William Urquhart and the rest of the Forest Health and Monitoring Division.

The Forest Inventory and Analysis Unit of our Division provided invaluable assistance in a number of areas including: setting and retrieving traps for gypsy moth and spruce budworm, conducting sampling for hemlock woolly adelgid predators, and collecting data on hemlock impact plots.

We extend our thanks to Greg Miller, Greg Lord, and Ken Laustsen, Maine Forest Service, for their assistance with mapping, computer, and statistical tasks. Our summer work was greatly enhanced by the efforts of Natalie Marceau and Kaileigh Sweeney, our two Maine State Government interns for 2011. Thanks also to Rachel Mack, a former intern, who again provided expert assistance with data analysis of an earlier study and data entry for the Spiders of Maine project.

A significant amount of work is completed through the assistance of volunteers. Our deepest thanks go to those who volunteer in survey and monitoring as well as other tasks. In particular we thank David Bourque and Dana Michaud for their taxonomic contributions and additions to the insect collection. Also, Kathy Urquhart for her patience in sorting through old specimens and her many volunteer hours of field work.

Sincere thanks are also extended to many other administrative and field staff of the Maine Department of Conservation, and to our many contacts in the USDA Forest Service Northeastern Area – Forest Health and Protection, the USDA-APHIS, Maine Department of Agriculture and to our other cooperators in the northeastern states of the U.S. and Maritime Provinces of Canada.

Special thanks are extended to Jeanne Curran, Dept. Conservation, for her continued support in getting forest pest information to the public in an informative and timely fashion using many media outlets, and to Jen Wright, Maine Forest Service, for her able assistance in producing this report.

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State Entomologist's Comments 2011

It's that time of year again. Punxsutawney Phil has been rousted out of his comfortable den to make his prognostication that no one will remember in a month. It's time for me to roust myself and do the same. In looking at my crystal ball, I see considerable activity and a state of flux. It reminds me of a stirred anthill except I'd like to think that this activity is proactive versus reactive. And the "stir" is preparations for responding to possible arrival of one or more of the currently threatening forest pests.

Pest threats are continuing to mount. The current situations are detailed in the body of this annual report, but in summary, my prediction is that we will continue to see intensification of those threats.

- Emerald ash borer is continuing to expand. We do not yet have a management solution for forested situations and trees are dying. Known established infestations in eastern New York and south of Montreal are within a hundred miles of our border.
- Asian longhorn beetle, while not spreading as rapidly, is established in Worcester, Mass. I have no sense that this infestation is yet corralled, or that we even know the location of its leading edge.
- Brown spruce longhorn beetle, which was confined to Nova Scotia, was recovered from a trap in eastern New Brunswick last year. We can hope that this catch represents a single lonely beetle that was transported on firewood; but that is not a good basis for strategic planning.
- And just recently we have credible evidence that we have an established population of winter moth in Harpswell.
- In the meantime, none of the other exotic pests established in Maine appear to be subsiding; and native pests like spruce budworm are resurging next door in Quebec.

For many of these exotic pests our efforts are a rear guard action focused on denying them a beachhead, and, once they do get here in Maine, slowing their spread and reducing their impacts. Simply put: our efforts buy time so that tools can be developed to manage the situation. And such tools are being developed. There is research being conducted to discover and cultivate resistant varieties of host trees and on discovering biocontrol agents and then developing them into usable tools to lessen pest population pressures. Neither of these types of tools will completely eradicate such threats but they could make them manageable. And in that situation we maintain a viable forest capable of responding to other stresses while providing the raw materials and amenities to support our local communities and economy.

Compounding this situation, we are in the midst of a recession nationally. State budgets are stretched thin and federal funding sources that have provided support in the past are shrinking. The latest financial advice I've received from the US Forest Service shows that the forest health management budget lines for next year will be down on the order of 18-25%. Funding from USDA-APHIS is facing similar retrenchment. This reality, and the current uncertainty regarding how the Legislature will address revenue/expenditure imbalances in the overall state budget, means that we have to work smarter, squeezing more out of what we have.

Along those lines, the governor has proposed a plan to merge the Departments of Conservation and Agriculture. There are no wild claims of mega-savings but there is a clear message that the administration expects that the new structure will facilitate resource sharing. Where this process is just starting through the Legislative process, the details regarding how pest management - in all its aspects- will fit into the final structure are unclear. But that said, the one thing that I have repeatedly been told is that the relationship between the MFS Insect and Disease Management unit and the Plant Industry unit at Agriculture is the poster child example that the administration is looking to replicate and institutionalize. For us, this process may simply "formalize" what is an already functional reality. I do not expect anything that will feel alien.

It is this current functional collaborative relationship and its many counterparts with other agencies in this state and in neighboring jurisdictions, and the long-term cooperative program development and delivery mechanisms that we share with our federal and academic partners that serve as the basis for my optimism. Over my career, the size of the Insect and Disease Management unit has shrunk to 20% of what it was when I hired on in 1973 - before the spruce budworm build up. However, despite the shrinkage, our alliances and shared efforts - instate and out - have provided the necessary resources to address the pest situations we've encountered. This model continues to be our best path forward.

In terms of current real world examples: Emerald ash borer (EAB) is on our doorstep. Barring some immediate silver bullet, it seems inevitable that it will become established in Maine in the not too distant future. Passively waiting for this to occur is NOT the best response. Recognizing this:

- As part of a national initiative, the MFS and the Me Dept. of Ag are working with USDA-APHIS and the Penobscot Nation to conduct an enhanced statewide EAB trapping survey this year. None of us individually had the resources to meet this national goal. Working together, with help from the Forest Protection Division (forest fire rangers) it is achievable.
- We are working with the US Forest Service and the University of Maine on a joint project to better define the high priority ash resource in Maine, evaluate our possible options for Maine's forest and shade tree ash resource and develop and implement a response strategy.
- Concurrently we have, with our counterparts in the rest of the Northeast, been exploring ways to facilitate sharing resources between states. Last spring, many of us provided staff to help survey the EAB infestation in eastern NY. The project provided professional assistance to our neighbors, and in the process kept the front line of the battle in their back yard (vs. ours). Although a success, we can not continue such efforts on an ad hoc basis. As I write this, we and the neighbors are actively discussing ways to build a formal resource sharing response process.

I could have generated a similar set of bullets regarding options for addressing the threat posed by Asian longhorn beetle (ALB): some analogous activities are underway while others are still in the development mode. We are involved in these efforts. It is in Maine's best interest to get the Worcester, MA infestation contained. If we are not successful, ALB will surely spread to Maine and infest our hardwood forests.

The key message is that interagency sharing/cooperation is a proven effective path forward, whether we are working with federal or neighboring state/province partners on exotic pests or whether we are engaged in interagency support within Maine for managing spruce budworm and/or hemlock woolly adelgid response. The old "many hands make light work" proverb is still true; and I'm still using the model.

In talking about these interagency cooperative efforts, I in no way want to minimize my appreciation for the support of our multitude of individual client/cooperators such as you. You are our eyes and ears - and the source of most initial pest detections. We depend on you.

You are also vitally instrumental in delivering our messages to the rest of the public. No matter how well we publicize a situation, one-on-one communication between neighbors is still the most persuasive and effective vehicle for reaching out and influencing perceptions and behaviors.

Over 50 years ago, a former coworker, when assessing the challenges associated with the priority exotic pest of the day, stated: *"My annual report for 1966 stated that apathy was second only to Dutch elm disease itself. Perspective of the overall problem is perhaps best served if these two positions were reversed"*. Insightful as that statement may have been, we do not have to resign ourselves to repeating that trajectory.

We have better tools at our disposal today; federal and academic institutions are actively working to develop new and improved survey and management instruments. Things are moving forward. If we can buy time for these tools to come to fruition, we will be able to mitigate the impact of the threats we face. Your support is critical to the success of these efforts. I sincerely appreciate the help you have already provided and ask that you stay the course and hang tough. Thank you.

Personnel

Jean Maheux, who provided Division secretarial support at both the main office and at the lab since the late 1970's, retired at the end of December. Along with her tenure in our shop she also served a stint as secretary for the State Forester, and in recent years was one of the cornerstone Maine Forest Service data entry persons. She is missed. Her position has not yet been refilled.

Grayln Smith, who was originally hired as an Insect Ranger for the Western Region in 1975, retired as a Senior Entomology Technician in August 2010. Although Grayln's headquarters remained in Greenville for his entire career, he worked across the state on most of the major projects of the day. Much of the effort in his early career was focused on spruce budworm survey and management in western and northern Maine. In more recent years he was involved in everything from gypsy moth monitoring in western and central Maine to browntail moth and hemlock woolly adelgid survey and assessment in south coastal Maine. Even after he retired, he returned in an acting capacity position to finish out the year and assure that we completed all of the season's projects for which he had previously been responsible. His dedication to the job and cheerful demeanor were a hallmark of his career. He left a hole that will be difficult to fill.

Insect Conditions

Insects: Softwood Pests

Arborvitae Leaf Miners
A complex of four species
Host: Northern White-Cedar (*Thuja occidentalis*)

Arborvitae leaf miners are a perennial concern and cedar stands across northern and eastern Maine continue to be thin and off-color due to a variety of factors with arborvitae leaf miner being one of them. The leaf miner populations are up in the north and eastern parts of the state. Damage continued to be high in the eastern part of Aroostook Co., moderate to low in the rest of the state. Aerial surveys mapped 46,689 acres of cedar exhibiting discoloration and decline, primarily in swampy areas.

Balsam Gall Midge
Paradiplosis tumifex
Hosts: Balsam Fir, (*Abies balsamea*), Fraser Fir (*A. fraseri*)

Populations of balsam gall midge remain at moderate to heavy levels especially in Downeast Maine and across central Maine. Christmas tree growers and wreath tippers are noticing the problem as it causes current year growth to turn brown and fall off in the fall. This year's damage may rival 1999 in intensity. This is a minor forest problem and does not affect tree health long term. Populations should drop next year.

Balsam Woolly Adelgid
Adelges piceae
Hosts: Balsam Fir, (*Abies balsamea*), Fraser Fir (*A. fraseri*)

Balsam woolly adelgid populations continued at low levels in 2011 and fir trees are recovering from past balsam woolly adelgid infestations. This is a pest that will be back causing deformed growth and mortality.

Eastern Larch Beetle
Dendroctonus simplex
Host: Eastern Larch (*Larix laricina*)

Pockets of dead and dying larch infested with this species have been common since the mid 1970's and continue to be a common sight throughout the range of larch in Maine. Stands of larch in southern, central and Downeast regions of the state exhibit the highest mortality. Most tree mortality is generally in association with other stress factors, particularly extremes in water availability. Areas around beaver flowages, ponds and streams have been particularly affected.

Elongate Hemlock Scale
Fiorinia externa
Hosts: Hemlock (*Tsuga* spp.), Fir *(Abies* spp.) and other conifers

Elongate hemlock scale was first detected in Maine in 2009 when it was found in Kennebunk and Kennebunkport (York Co.) on planted hemlocks. In 2010 it was found on planted hemlocks in Cape Elizabeth (Cumberland Co.) and Old Orchard Beach (York Co.). In 2011 we saw a marked increase in detections of elongate hemlock scale, with nine sites with infested planted trees reported (Table 1). This year also marked the first time we had reports of scale on planted fir. There is a possibility that *some* of the scale found on planted trees is from insects that have found

their way to plantings from as yet undetected forest infestations. However, it appears likely that for the majority of those sites, the trees were already infested when planted.

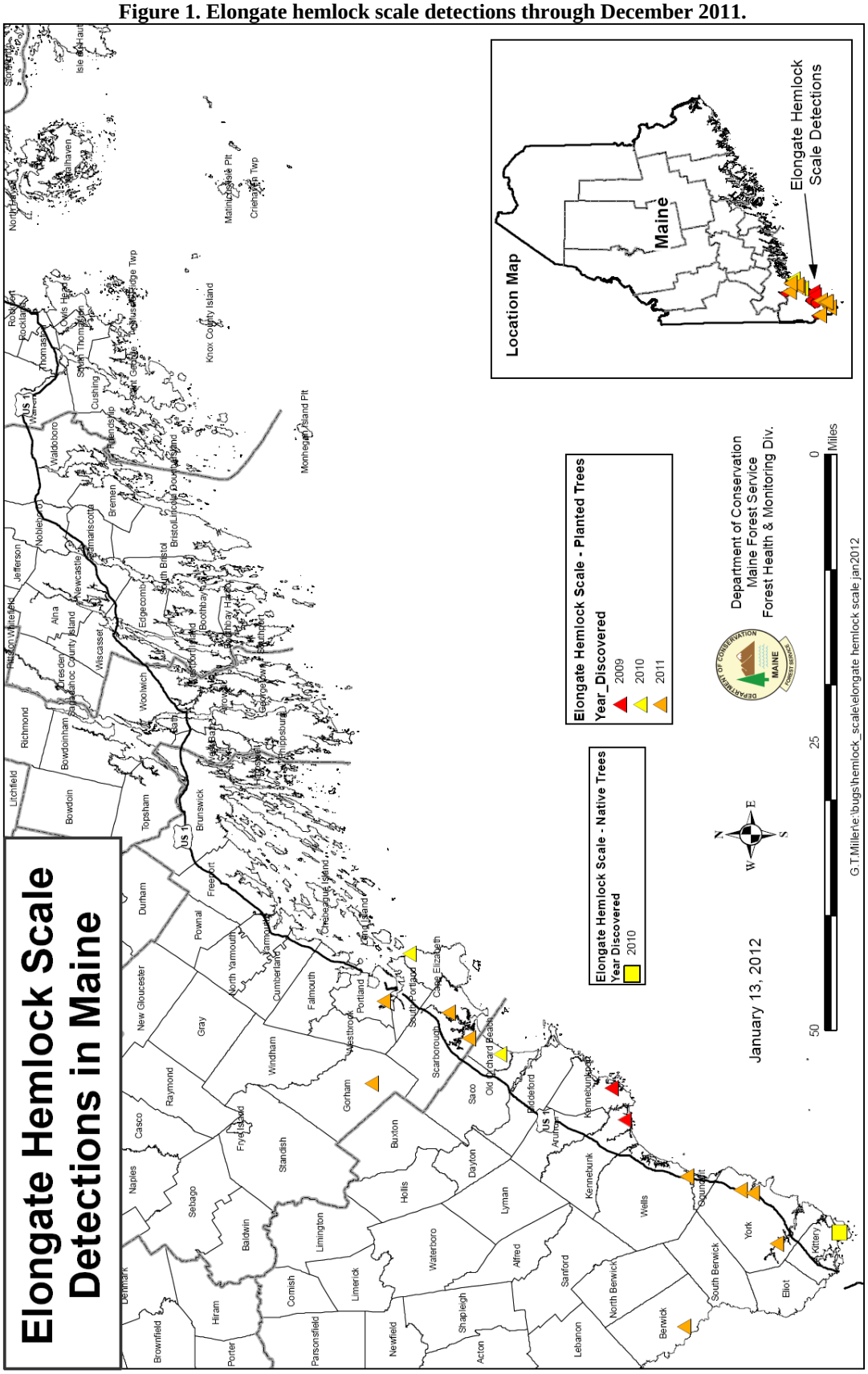
Table 1. Elongate hemlock scale detections through February 2012.

Town	County	Type	Year Found	Host	reported by
Kennebunk	York	Planted	2009	Hemlock	Homeowner
Kennebunkport	York	Planted	2009	Hemlock	Homeowner
Cape Elizabeth	Cumberland	Planted	2010	Hemlock	Arborist
Kittery	York	Forest	2010	Hemlock	MFS
Old Orchard Beach	York	Planted	2010	Hemlock	Homeowner
Gorham	Cumberland	Planted	2011	Fir	Lawncare professional
Portland	Cumberland	Planted	2011	Hemlock	Arborist
Scarborough	Cumberland	Planted	2011	Fir	Lawncare professional
Scarborough	Cumberland	Planted	2011	Fir	Lawncare professional
Berwick	York	Planted	2011	Fir	Lawncare professional
Wells	York	Planted	2011	Hemlock	MFS
York	York	Planted	2011	Hemlock	Lawncare professional
York	York	Planted	2011	Fir	Lawncare professional
York	York	Planted	2011	Fir	Lawncare professional
York	York	Panted	2012	Fir	Lawncare professional
Kittery	York	Forest	2012	Hemlock	MFS

The first forest infestation of elongate hemlock scale in Maine, that actually does represent natural spread of the insect, was detected while sampling for hemlock woolly adelgid predator beetles in Kittery (York Co.) in 2010. Light scale populations were found in mid canopy samples. A return to the site in 2011 revealed the infestation had intensified, with scale easily detected on lower branches and regeneration. A study site installed at the location in December revealed elongate hemlock scale on 40 of 58 (69 percent) measured hemlocks greater than 8 cm (3.1in.) diameter and on hemlock regeneration on all three plot centers. A second forest infestation was discovered in February of 2012 less than a mile from the first.

Beyond the ecological harm caused in the forest, elongate hemlock scale establishment in Maine could have economic consequences for Christmas tree growers and wreath makers. In December this year wreaths from Maine were turned away in California because they contained fir brush infested by a native armored scale, *Abgrallaspis ithacae* (hemlock scale). When the State Horticulturalist made an inquiry into the rejections the inspector commented that they were also rejecting a lot of wreaths from outside of Maine due to elongate hemlock scale infestations.

Figure 1. Elongate hemlock scale detections through December 2011.



Hemlock Woolly Adelgid
Adelges tsugae
Host: Hemlock (*Tsuga* spp.)

This year marked the end of the *Slow-the-Spread Management of Hemlock Woolly Adelgid at the Northern Edge* redesign grant awarded to Maine Forest Service and New Hampshire and Vermont counterparts by the USDA Forest Service Northeastern Area. The regional report covering hemlock woolly adelgid-related activities during the July 2009 through October 2011 grant period can be found on-line: www.maineforestservice.gov/documents/HWA_S-T-S_FinalReport.pdf. In 2011 the three states were awarded a follow-up competitive grant from the USDA Forest Service titled *Hemlock Resource Protection in Northern New England.* This will allow us to build on work completed under the redesign grant, with a slight refocusing of efforts to strengthen monitoring, include elongate hemlock scale, and produce guidelines for managers of threatened hemlock resources.

New detections of hemlock woolly adelgid slowed in 2011 compared to 2010. However Cape Elizabeth (Cumberland Co.) joined the list of towns known to have forest infestations in June of 2011. The Maine Forest Service annual detection survey conducted by Wayne Searles has uncovered infestations in four new towns to date: Alfred, Arundel, Biddeford and Kennebunk (York Co.). There were four detections since fall 2011 of hemlock woolly adelgid on planted trees in Mount Desert: three in the southern part of town, and the one in the northern part. It is conceivable that these trees were infested when planted, however further surveys are necessary to determine whether there is a broader infestation of adelgid in the town.

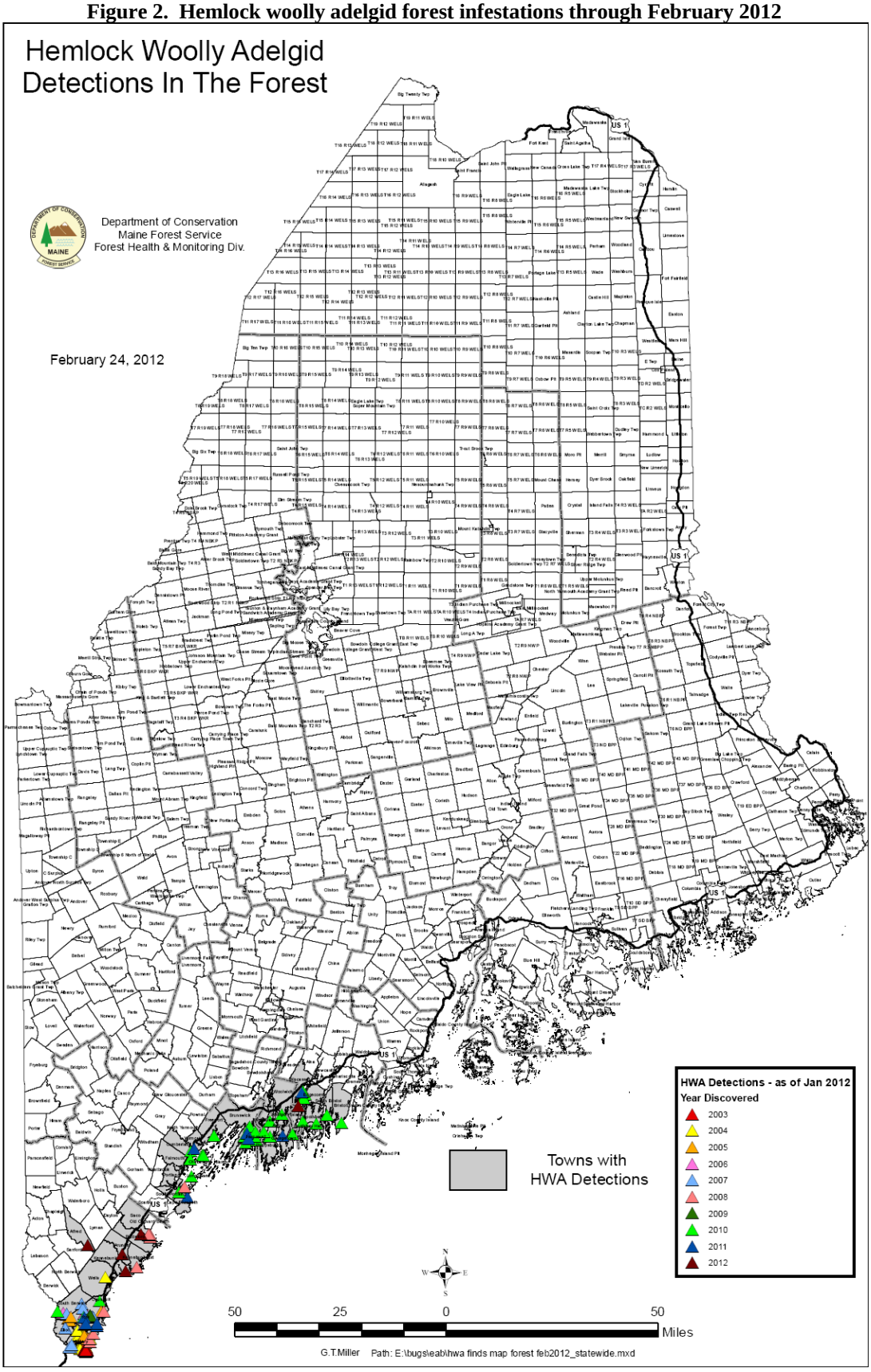
Calls from homeowners with hemlock woolly adelgid infested trees in the towns of Kittery and York increased noticeably in 2011. Infestations in those towns are fairly widespread, and increasingly homeowners are faced with the decision of whether or not to treat their infested ornamental hemlocks. Aesthetics of adelgid infested ornamental hemlocks can be successfully managed with chemical controls, but it is a costly and long term endeavor.

Hemlock woolly adelgid related decline is readily observable in scattered coastal and southern York Co. locations. Five hemlock impact assessment sites were established in November and December of 2011 with permission from public and private land owners and field assistance from the MFS forest inventory unit. The sites are similar to those already established by Harvard Forest scientists in Connecticut and Massachusetts. Data from these sites and similar locations in Vermont and New Hampshire will be analyzed by David Orwig of Harvard Forest. Preliminary numbers from crown classification measures are reported below. Crown classification measures follow those established for USDA Forest Service, Forest Inventory and Analysis Phase 3 plots. Infestation status (infested or not) of individual trees is based on what observers can see from the ground.

Table 2. Hemlock impact assessment plots

Location	Infestation Status	No. Infested Hemlock/ No. Hemlock	Average Crown Density	Average Foliage Transparency
Pownal	No HWA detected	0/59	56%	20%
Wiscasset	Light HWA infestation, detected 2011	0/50	60%	18%
Freeport	Moderate HWA infestation, detected 2010	2/50	48%	21%
York	Light HWA, detected 2006	6/63	45%	25%
Kittery	Heavy HWA and EHS, detected 2003 (HWA) and 2010 (EHS)	58/58 (HWA) 40/58 (EHS)	34%	37%

Figure 2. Hemlock woolly adelgid forest infestations through February 2012



The Maine Forest Service continued to pursue opportunities to establish hemlock woolly adelgid biocontrol in 2011. Support for beetle acquisition and release came from USDA APHIS, PPQ, Maine Outdoor Heritage Fund, Maine Bureau of Parks and Lands, and local citizens and organizations. Our Maine Outdoor Heritage Fund grant application to purchase beetles for release in two Maine State Parks received more than 20 letters of support from park users, businesses and organizations. In 2011, 7000 *Sasajiscymnus tsugae* beetles were purchased from a commercial producer and 10,000 were received from the North Carolina Department of Agriculture laboratory through a USDA APHIS, PPQ grant. The beetles were released in Freeport and Harpswell (Cumberland Co.); South Berwick and York (York Co.); and West Bath (Sagadahoc Co.). In addition, 37 beetles collected from a release site in Kittery were liberated in South Berwick. See Table 3 for a summary of beetle releases since 2004.

Table 3. Hemlock woolly adelgid biological control releases 2004-2011.

Species (Strain)	Town	Total Released	Number/ Release	Site	Date Released
Sasajiscymnus tsugae		**49,818**			
	Freeport	3,500			
			3500	***WNW1***	***14 Apr, 13 & 18 May 2011***
	Harpswell	7,500			
			2,500	HPWL1	May 2010
			3000	***HPWL1***	***6 May 2011***
			2000	***HPWL2***	***6 May 2011***
	Kittery	17,734			
			7,500	GI1	May-Jun 2004
			2,602	GI2	Apr 2005
			2,553	GI3	Apr 2005
			2,548	GI4	Apr 2005
			2,531	GI5	Apr 2005
	Saco	2,750			
			2,750	FBSP2	May 2010
	South Berwick	3,037			
			3000	***VWSP1***	***21 Apr & 5 May 2011***
			37*	***VWSP1***	***20 Nov 2011***
	West Bath	4,000			
			4,000	***GPP1***	***18 May 2011***
	York	11,297			
			6,000	YWD1	Apr 2007, Jun 2008
			1,500	YWD5	Apr 2010
			1,750	YWD3	Apr 2010
			500	YWD4	May 2010
*collected in Kittery			47*	YWD3	Nov 2010
near GI4			***1500***	***KWD1***	***28 Apr 2011***
Laricobius nigrinus		**5,172**			
(Pacific Northwest)	Kittery	800			
			300	GI6	Oct 2006
			500	KLT1	Oct - Nov 2007
	Saco	500			
			500	FBSP1	Oct 2008
	York	3,872			
			400	MTA1	Oct - Nov 2007
			500	YWD1	Oct - Nov 2007
			622	YWD2	October 2008
			1,500	YWD3	Oct, Dec 2008, Nov 2009
			100	YWD4	Oct 2008
			750	YWD5	Dec 2009, Mar 2010
Laricobius nigrinus		**100**			
(Intermountain)	Kittery	100			
			100	KIT1	Apr 2008
Total St and Ln Released 2004-2011:		**55,090**			

Sampling to detect predator beetle establishment was conducted in all release sites with accessible live hemlock branches in the fall of 2011 (Table 4).

Table 4. 2011 Predator recovery information.

Location	Species Recovered	Number Recovered	Release Year	Number Released
Kittery	*Laricobius nigrinus*	2	2006	300
Kittery	*Sasajiscymnus tsugae*	37	2004	2548*
Harpswell	*Sasajiscymnus tsugae*	3	2010	2500
West Bath	*Sasajiscymnus tsugae*	1	2011	4000

* 17,734 total *Sasajiscymnus tsugae* beetles released within ½ mile of this site in 2004 and 2005

Larch Casebearer
Coleophora laricella
Host: Larch (*Larix* spp.)

The early season browning caused by the larch casebearer was spotty in 2011.

Pine Shoot Beetle
Tomicus piniperda
Hosts: Pines (*Pinus* spp.)

There is a State and Federal quarantine on pine shoot beetle and its host trees (pines) in all Maine counties except Aroostook and Washington. The Maine Forest Service and USDA-APHIS-PPQ trap to monitor for the spread of pine shoot beetle in unregulated counties. Neither organization caught pine shoot beetle in Aroostook or Washington counties. No pine shoot beetles were recovered in Maine in 2011.

Table 5. 2011 Pine shoot beetle trap sites.

Town	County	Site Type
Ashland - Boralex	Aroostook	Biomass Plant
Ashland - Fraser	Aroostook	Lumber Mill
Crystal	Aroostook	Red Pine Plantation
Dyer Brook	Aroostook	Scots Pine Plantation
Easton	Aroostook	Red Pine Plantation
Fort Fairfield	Aroostook	Biomass Plant
Monticello	Aroostook	Red Pine Plantation
Moro Plantation	Aroostook	Red Pine Plantation
New Limerick	Aroostook	Mill
Washburn	Aroostook	Red Pine Plantation
Jonesboro	Washington	Biomass Plant

Spruce Beetle
Dendroctonus rufipennis
Hosts: White Spruce (*Picea glauca*), Red Spruce (*P. rubens*)

Decadent spruce trees along the coast continue to succumb to spruce beetle. Infestations are widely scattered and a reflection of tree age and poor sites. This is a continuation of an ongoing problem.

Spruce Budworm
Choristoneura fumiferana
Hosts: Balsam Fir (*Abies balsamea*), White Spruce (*Picea glauca*), Red Spruce (*P. rubens*), Black Spruce (*P. mariana*), Hemlock (*Tsuga canadensis*)

Spruce budworm catches in pheromone traps have increased significantly this year. There are still no reports of larval feeding and no adults were caught in light traps in Maine. New Brunswick budworm pheromone trap catches are rising and Quebec is experiencing a large budworm outbreak north of the Saint Lawrence Seaway with defoliation now south of the seaway as well. Spruce budworm infestations can start from either moth flights coming in from infested areas – such those currently in Quebec – or an infestation can come from a build up of the endemic budworm population or from a combination of the two.

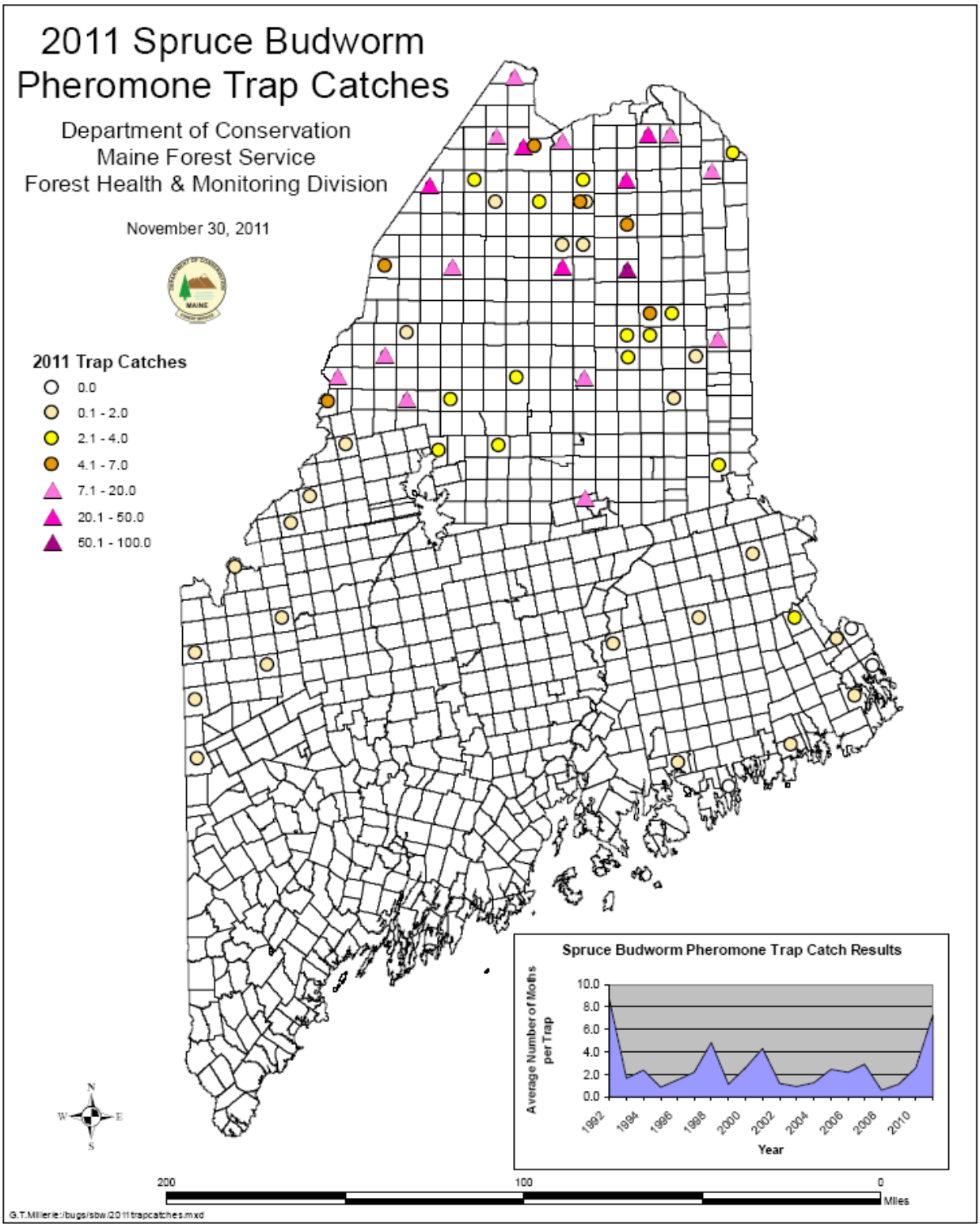
The last Maine spruce budworm outbreak started forty years ago in the early 1970's. The forest has once again matured and could support a spruce budworm outbreak. This insect is extreme in its population size going from rare when the spruce and fir forest is young to huge numbers during an outbreak that kills trees once the forest matures. Fir and spruce had heavy cone crops this year and pollen cones are a rich food source for spruce budworm. This may well be the start an upward trend to a population explosion in the near future.

The MFS monitors for spruce budworm using pheromone traps and light traps. Highest pheromone trap catches for 2011 were in the northwestern part of the state particularly the far north (Figure 3). Only three pheromone traps sites Downeast in Washington Co. continue to have zero moths, all other locations caught some number of budworm moths. The overall average from 66 sites across the northern half of the state was 7.3 moths/trap; up from 2.5 moths in 2010 and the highest it has been since 1992. The highest moth count was 58.7 moths in Garfield, Aroostook Co.. Ten moths/trap (average of three traps at each site) is the threshold where more intensive monitoring should be considered. In 2011 there were 16 sites with more then 10 moths/ trap. The MFS will increase surveying for this serious pest in 2012. Light traps did not pick up any spruce budworm in 2011. Thank you to cooperators who are running spruce budworm traps on their lands.

Spruce budworm overwinter as tiny larvae on host trees. The larvae emerge before budbreak and mine buds, last year's needles and male pollen cones. They then move to the new foliage feeding on it and spinning silk between the needles and shoots. Once the new foliage has been consumed the larvae move to the old foliage feeding there until they are full grown. Spruce budworm pupate on the trees and the adults emerge in late June through July.

There is increased need for vigilance, because budworm could very well show up in Maine in the next year. Look for needlemining in early spring, defoliation in June, and moth flights in July. Please report any potential spruce budworm damage.

Figure 3. 2011 spruce budworm pheromone trap locations and catches in Maine.



Insects: Hardwood Pests

Aspen Leafroller Complex
Host: Quaking Aspen (*Populus tremuloides*)

Quaking aspen has had leaf roller damage on it for a number of years now particularly in the central part of the state. Although large aspen tortrix (*Choristoneura conflictana*) is responsible for damage to aspen in some locations, over a broader area it is a complex of species that is causing moderate levels of damage. Defoliation in Aroostook Co. totaled 5,162 acres.

Birch Leafminer
Messa nana
Hosts: Birch species (*Betula* spp.)

Birch trees across Maine had low levels of birch leafminer damage this year.

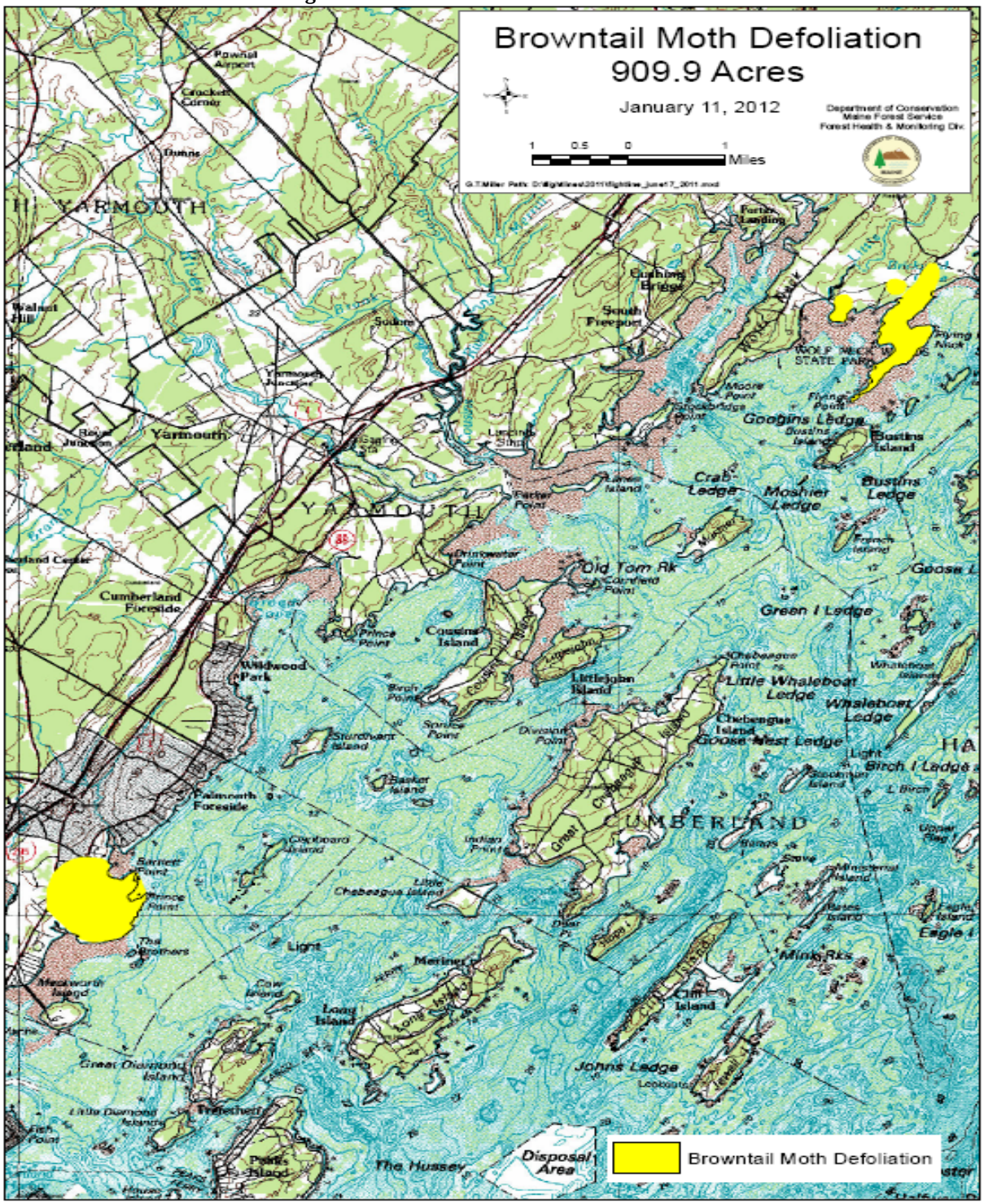
Browntail Moth
Euproctis chrysorrhoea
Hosts: Red Oak (*Quercus rubra*), Apple (*Malus* spp.), Birch (*Betula* spp.), and Other Hardwoods

2011 Browntail moth winter web counts were extremely high in Bowdoinham, Bath, West Bath, Brunswick, and Topsham at the southern terminus of Merry Meeting Bay. Feeding began as normal in April and early May. The weather then turned cool and wet and the larvae slowed their feeding spending more time then usual in their webs. The high population, reduced feeding and cold wet weather probably contributed to the ensuing *Entomophaga aulicae* outbreak that decimated the population. The browntail moth population crashed to the point where it was difficult to find any larvae at all within the core area. The Kennebunkport infestation also disappeared as did the ones in Lewiston and Turner. There are still remnants of the Augusta population.

However, browntail numbers are increasing in Falmouth and parts of Freeport where 910 acres of moderate to severe defoliation was mapped in the two towns (Figure 4). Reports of an increase in browntail moth came from Peaks Island in Portland Harbor as well. In 2012, people in those areas should check their trees for browntail moths. The Maine Forest Service is conducting the winter web survey as it has for the past two decades and will contact towns where higher levels of discomfort due to this insect are expected.

Field trials cooperatively funded by USDA APHIS, PPQ with the naturally-occurring browntail moth nucleopolyhedrovirus, EcNPV, were performed in May in Bowdoinham and in September in Freeport. These locations will be monitored for long term control of the browntail by the virus.

Figure 4. Browntail moth defoliation in 2011.



Bruce Spanworm
Operophtera bruceata
Hosts: Maples (*Acer* spp.), Aspens (*Populus* spp.), American Beech (*Fagus grandifolia*), Birches (*Betula* spp.) and other hardwoods


Bruce spanworm male moths
Photos: C. Donahue, MFS (left); Joe MacDonald, Bancroft ME (right)

There were reports of light Bruce spanworm feeding in Piscataquis and Penobscot Counties this summer in maple stands. It was restricted primarily to understory trees or at low levels in larger trees. This fall high numbers of the moths were flying, indicating there may be an outbreak in the making across the central part of the state. Spanworm outbreaks usually last only 2-3 years. There may be reduced sapflow in heavily defoliated sugarbushes and some branch dieback. This pest usually does not warrant control efforts as it is gone in such a short time.

Bruce spanworm damage
Photo: Ron Kelley, Vt Dept Forests, Parks and Recreation

Bruce spanworm overwinter as eggs on host trees. The tiny green inchworms hatch at bud break and feed on the expanding new foliage causing the leaves to look like Swiss cheese. When the larvae finish feeding they drop to the ground and pupate in the soil. The adults emerge in November. Adult females have no wings and crawl up on host trees where the males fly to them to mate. Males are very fragile looking moths that are beige with very light tan strips. This native insect is a very close relative of the invasive winter moth that is a serious problem in Massachusetts (see winter moth below for more information).

Any reports of large numbers of moths in the fall (either last year or in the future) or larvae feeding or damage in the spring would be greatly appreciated.

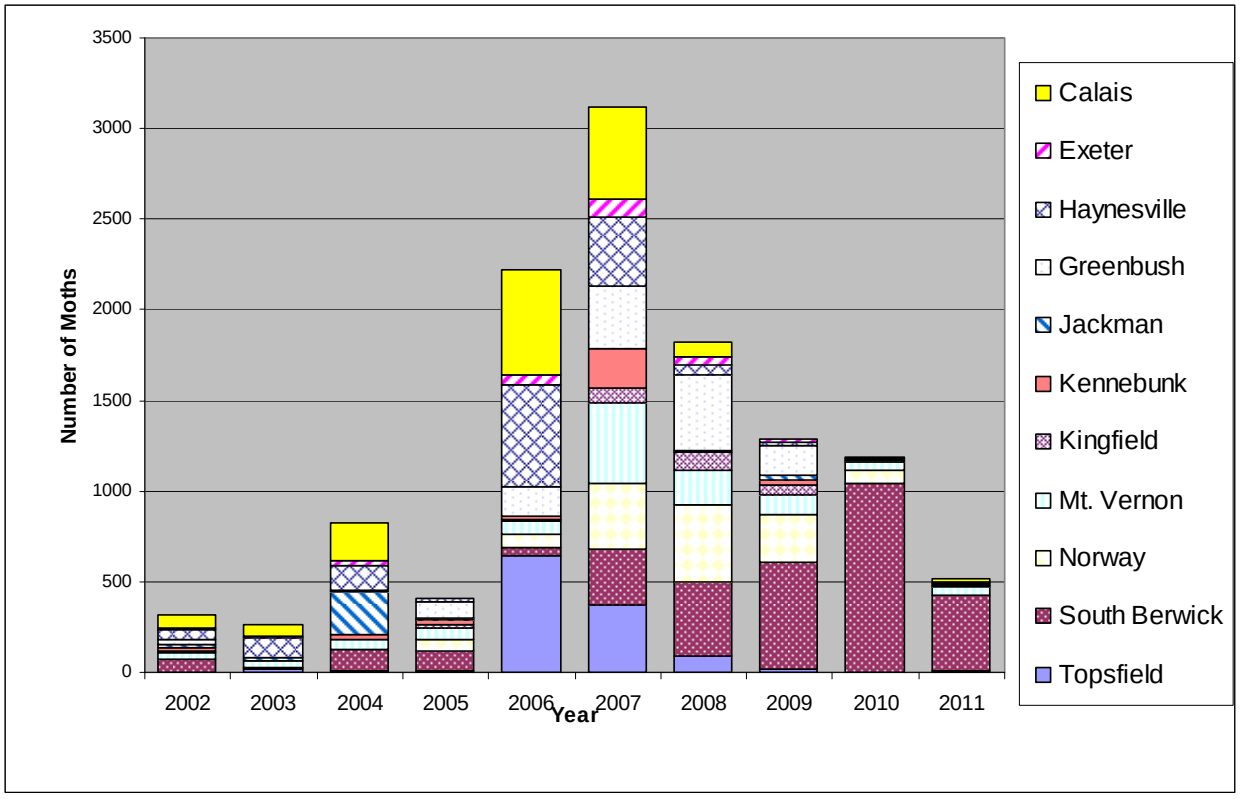
***Chrysomela* Beetle**
***Chrysomela* sp.**
Host: *Populus balsamifera*

As expected by the number of parasites found in the beetle larvae in 2010 this beetle disappeared from the scene in 2011.

Fall Webworm
Hyphantria cunea
Hosts: Ashes (*Fraxinus* spp.), Apples (*Malus* spp.), Cherries (*Prunus* spp.), Oaks (*Quercus* spp.), Birches (*Betula* spp.) and other hardwoods

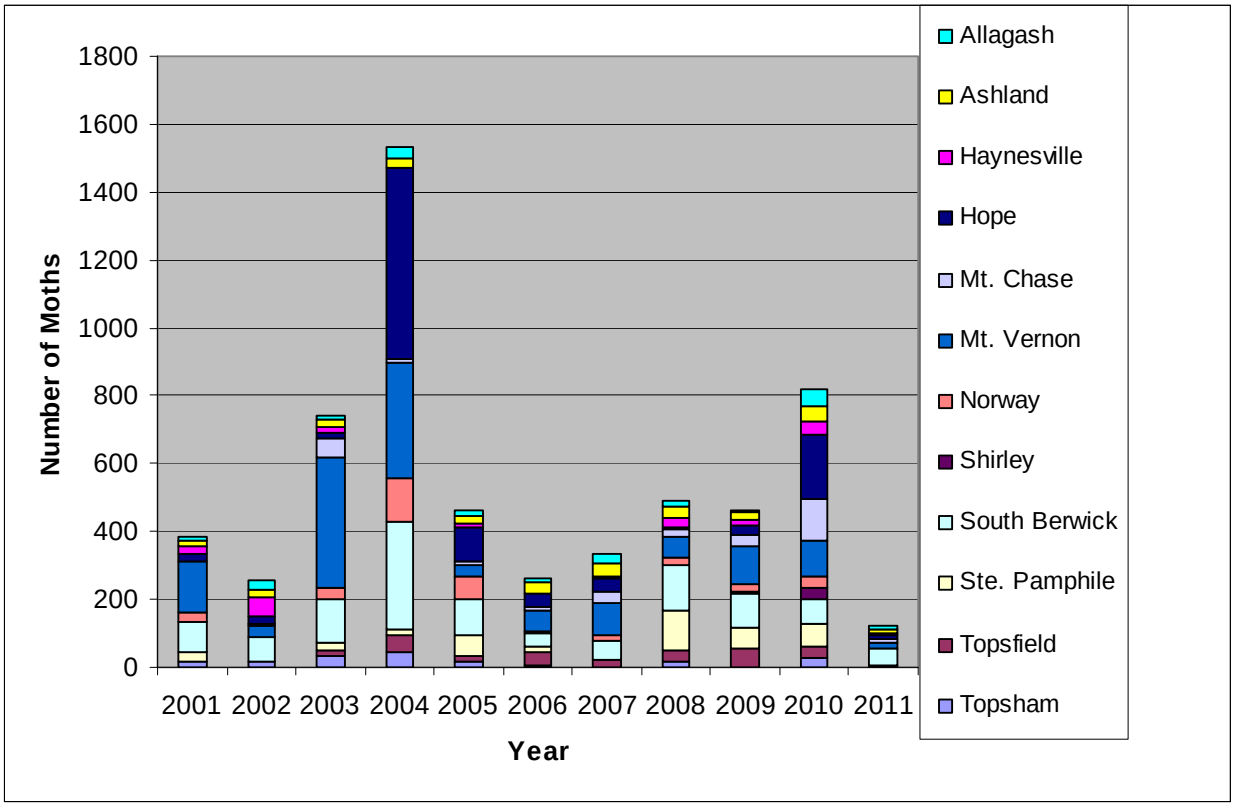
Fall webworms create large webs in hardwood trees, especially ash and apple, starting in mid-summer. The larvae feed inside the webs so the webs expand as the larvae grow and need more leaves to eat. Fall webworm numbers were low across the state with the exception of moderate numbers in York Co..

Figure 5. Total number of fall webworm moths caught in selected light traps.



Forest Tent Caterpillar
Malacosoma disstria
Hosts: Aspens (*Populus* spp.) and other hardwoods

No defoliation from forest tent caterpillar; populations remained low in 2011. Light trap catches dropped significantly this year. Forest tent caterpillars feed on hardwood foliage in the spring especially on maple. Although they are called tent caterpillars they do not form webs like their relatives. Maine escaped the forest tent outbreaks in recent years that affected surrounding states.Figure 6. Total number of forest tent caterpillar moths caught in selected light traps.



Gypsy Moth
Lymantria dispar
Hosts: Various (300+ trees and shrubs)

No defoliation of hardwoods resulting from gypsy moth larval feeding was recorded in 2011. The fall egg mass survey indicated populations may be building in some areas. Towns with higher observations on and off plots included Millinocket, T10 SD and Skowhegan. Although map-able defoliation may not occur next year, this is an insect to watch.

Two hundred thirty (230) pheromone baited milk carton traps were set and retrieved in towns adjacent to the gypsy moth quarantine zone (transition zone) and these traps captured approximately 2250 male moths. Seventy percent of the traps in the transition zone had fewer than 10 male moths (n=162). Towns with the highest counts were in the area between Baxter State Park and Mount Chase south to the quarantine line. Searches for additional life stages of the moth continue in those towns.

In early 2011 federal register was corrected and amended to bring the register in line with the state quarantine boundaries.

Hickory Tussock Caterpillar
(***Lophocampa caryae***)
Hosts: Hardwoods

Although defoliation from the hickory tussock was minor, the furor created by the caterpillar definitely was not. Rashes caused by contact with these caterpillars were reported from across the state of Maine in late summer. Hickory tussock caterpillars feed on a wide range of hardwood trees. In Maine the favored trees are birch, quaking aspen, basswood and black locust. Hickory tussocks over winter in furry grey cocoons under debris on the ground. The cocoons can also cause a rash if you come in contact with them. The yellow moths emerge in May and June and the females lay their eggs in clusters on the underside of leaves. Caterpillars hatch in June and July and begin feeding. They feed gregariously when newly emerged; first skeletonizing the leaves and then eating whole leaf. After feeding on the foliage of hardwood trees the caterpillars tend to wander looking for overwintering sites. They are attractive and active and this is when people usually encounter them. Numbers may be high again in 2012.

Large Aspen Tortrix
Choristoneura conflictana
Hosts: Aspens (*Populus* spp.)

This early season defoliator stripped widely scattered stands of quaking aspen from northwestern Aroostook Co. down to central Penobscot Co.. Aerial surveys picked up 1,578 acres of heavy defoliation attributed to this pest. Light traps did not pick up moths of this species this year so the population may be on its way down.

Satin Moth
Leucoma salicis
Hosts: Aspens (*Populus* spp.)

Poplar yard trees from Fort Fairfield to Portland are being attacked by satin moth caterpillars. Isolated poplar stands in northwestern Aroostook Co. have also been defoliated resulting in 664 acres of defoliation. Satin moths have been mostly absent in the past few years but may be on the way up. Light trap catches were up in Allagash and Ashland in Aroostook Co. A pest to watch.

Winter moth
Operophtera brumata
Hosts: Oaks (*Quercus* spp.), Maples (*Acer* spp.), Ashes (*Fraxinus* spp.), Cherries (*Prunus* spp.), Apple (*Malus* spp.), Spruces (*Picea* spp.)

Winter moth is an invasive insect from Europe that feeds on the leaves of hardwood trees. It was first found in North America in Nova Scotia in the 1930's, then in the Pacific Northwest in the 1970's and most recently in eastern Massachusetts in the early 1990's. Since the introduction into Massachusetts it has spread into Rhode Island, Connecticut, and as far as west as the Connecticut River valley in Massachusetts.

The winter moth has been at outbreak levels in eastern Massachusetts since the 1990's. In 2010 Massachusetts had 65,000 acres of defoliated forest and three counties with tree mortality associated with the winter moth damage. When winter moth invaded Nova Scotia in the 1930's, some areas had 40% mortality of the red oak after four years of continuous defoliation. Winter moth not only feeds on forest trees but also on apple and blueberry as well. This is a serious pest.

In 2005 and 2006 we participated in a regional survey for winter moth across the northeast. We used pheromone traps that attract the male moths (the female moths have no wings). Male moths were caught in Bristol (Lincoln Co.), Jonesport (Washington Co.), Kennebunkport and South Berwick (York Co.), Portland (Cumberland Co.). No female moths were found until the fall of 2011 in Kennebunk when a photograph was taken of one female. No larvae or defoliation from winter moth has been reported to date in Maine. Also, no winter moths were found in traps placed further inland in Maine.

Winter moth is very closely related to a native moth, the Bruce spanworm (*Operophtera bruceata*). They are so closely related they can mate with one another and produce offspring and we can not tell them apart. However, there are differences. Their preferred hosts vary as does their place in the forest ecosystem. There is an outbreak of the native Bruce spanworm about every 17 years in Maine. South of here it can be found in the woods but rarely if ever becomes a problem. The invasive winter moth, on the on the other hand, once established stays at very high levels and has only been brought under control in North America when a parasitic fly (*Cyzenis albicans*) from Europe is released. In Nova Scotia an ichneumonid parasitoid wasp (*Agrypon flaveolatum*) also contributes to keeping winter moth below economic thresholds of damage.

Currently Dr. Joseph Elkinton, University of Massachusetts, is working on rearing and releasing *C. albicans* flies in Massachusetts. The fly has become established in a five out of six MA locations and they are monitoring these sites waiting for the parasite population to increase to where it will significantly impact the winter moth population. In the mean time releases continue. The MFS has stayed in contact with Dr. Elkinton concerning this project and will work collaboratively with them if or when winter moth becomes a problem in Maine. Because winter moth is very closely related to Bruce spanworm we will be supplying the researchers at UMass with spanworm larvae this spring to further the understanding of the two species, particularly the Bruce spanworm parasites.

Now the story begins to get complicated. This past year we saw light Bruce spanworm damage - mostly on understory maples across the central part of the state. This fall we had reports of moth flight and increased numbers of moths in November and early December from the same area. We also received some reports of increased moth activity in mid-coast Maine as well. Because of the concern about winter moth on both sides of our borders I asked for some moth samples and sent them off to be checked. The report for the Harpswell (Cumberland Co.) sample came back as winter moth.

The winter moth caterpillar is a pale green inchworm that eats the leaves of many hardwood trees. Their preferred hosts are oak, maple, ash, and apple. They will also drop onto understory plants and feed on them as well. The caterpillars hatch very early in the spring and feed on both the flower and leaf buds and then on the expanding leaves. Light to moderate damage looks like 'Swiss cheese' leaves. Heavy winter moth feeding results in only the petioles and a bit of the veins remaining. The caterpillars finish feeding in mid-June and drop to the ground where they stay as pupae until early winter. In late November the moths emerge and are active in December mating and laying eggs on bark of host trees. The females have only vestigial wings and do not fly.

This spring we will be surveying the mid-coast area to see if winter moth becomes established in Maine and if so, how widespread it is at this point or if the fall sightings are male moth flights from Massachusetts with no breeding populations here.

Reports of unusual numbers of moths flying this past November and December and early spring feeding would be greatly appreciated.

Insects: Invasive Forest Insects Not Yet Detected in Maine

There have been no confirmed reports of the following insects in Maine: Asian longhorned beetle (ALB), brown spruce longhorned beetle (BSLB) and emerald ash borer (EAB). All three are woodboring beetles and can move in firewood and other untreated solid wood material. Because of this mode of transport and difficulty in detecting nascent populations of these insects it is important to realize that we cannot say with certainty that these insects are not in Maine, only that they have not yet been found in Maine. Lifestyles make brown spruce longhorned beetle and emerald ash borer more easily moved than Asian longhorned beetle, but firewood movement has been tied to spread of all three of these insects. **All are serious threats to Maine's forest and our forest-dependant economy.**

If you suspect you have found these insects or their damage please contact us as soon as possible: forestinfo@maine.gov; (207) 287-2431 or 1-800-367-0223 (in Maine).

If have found damage you suspect was made by any of these insects, please note the location and take pictures if possible. Pictures can be sent to forestinfo@maine.gov. Do not move the damaged material unless you can do so safely—two layers of contractor-grade garbage bag tightly sealed will contain these pests short-term.

If you suspect you have found any of these insects please collect a sample in a secure container (pill bottles, or other sealed plastic or glass containers work well). Store the sample in a cool location such as a refrigerator or freezer until you can contact our office for identification of the specimen.

If you use social media you can follow news about these insects on Twitter (@MaineBugWatch) or Facebook: (Maine Bug Watch).

Asian Longhorned Beetle
Anoplophora glabripennis
Hosts: Maple (*Acer* spp.), Birch (*Betula* spp.), Poplar (*Populus* spp.), Elm (*Ulmus* spp.), Horse Chestnut (Aesculus spp.).

The Maine Forest Service in cooperation with the Maine Department of Agriculture, USDA APHIS, PPQ and the USDA Forest Service continues to monitor for the presence of this pest, and more importantly to elevate public awareness of the pest. Nearly every detection of ALB in North America has been made by the general public. It is a large, showy beetle, and eventually the damage caused by larval feeding and adult emergence becomes very noticeable.

Images of the beetle, its look-alikes and the damage it causes can be found at: www.albmaine.org.

In 2008, Asian longhorned beetle was found in Worcester, Massachusetts. In the ensuing years it has become clear that the insect arrived prior to 1995. Approximately 110 square miles are now under quarantine and thousands of trees have been cut down. Asian longhorned beetle was also found in Boston in 2010. An informed citizen noticed the symptoms early in the infestation, and only six trees were infested and needed to be cut down. This demonstrates the importance of public involvement in finding new ALB infestations. In July of 2011 ALB was detected in a rural area outside of Cincinnati, Ohio. Movement of firewood was blamed for spread from that location to a second county in Ohio.

Brown Spruce Longhorned Beetle
Tetropium fuscum
Hosts: Primarily spruce (*Picea* spp.), occaisionally Fir (*Abies* spp.), Pine (*Pinus* spp.) and Larch (*Larix* spp.)

Up until 2011 known North American occurences of BSLB were confined to the province of Nova Scotia. In 2011 a single beetle was trapped near a campground within the Kouchibouguac National Park in eastern New Brunswick. The Maine Forest Service, Maine Department of Agriculture and USDA APHIS, PPQ with cooperation of landowners trapped at 48 sites covering the length and breadth of Maine, no BSLB were recovered.

Stressed (e.g. drought, root disease), dying, recently felled, *or healthy* trees can be attacked. Middle aged and mature spruce trees are preferred. Affected trees may exhibit dying crowns, excessive resin flow down the bole, flattened larval galleries packed with fine-grained frass beneath the bark, and L-shaped pupation galleries into the sapwood.

Emerald Ash Borer
Agrilus planipennis
Hosts: Ash (*Fraxinus* spp.)

The MFS continues to work with cooperators to look for this destructive insect that has already become established as close as eastern New York and south of Montreal (See Appendix A). Most visible in 2011 were the 200 traps set in Maine by USDA APHIS, PPQ, Penobscot Nation, Maine Department of Agriculture and the MFS. In 2012, 955 traps will be hung across Maine.

Emerald ash borer attacks all species of ash (*Fraxinus* spp.) and threatens the survival of ash on our continent. Infested trees often exhibit crown dieback from the top down, epicormic (excessive) shoots, bark splits, and woodpecker damage to the outer bark. Meandering larval feeding tunnels can be found etched into the inner bark and sapwood. Pupation occurs either in the sapwood or inner bark. Emerging adults create 1/8th inch wide "D" shaped exit holes.

Insects: Miscellaneous

Wood Gnat
Sylvicola fenestralis

Update: Last year we reported on wood gnats breeding on and under the algal/fungal mat growing on the log piles at a lumber mill. The wood gnats swarm in large numbers during the summer months and are a nuisance for the neighbors. We investigated the problem along with Dr. Kathy Murray from the Maine Department of Agriculture, determined where the gnats were breeding, what species they were and researched possible methods of control. Very little has been written about this insect as it is rarely a pest in wooded situations and only occasionally a problem in water treatment plants. There was no information about how to control the insects in log piles. We came up with some possible solutions and the mill hired a consultant to work on the problem.

They decided to add an algaecide to the log spray water to kill the algal/fungal mat which would remove the food source for the gnats and hopefully bring the numbers down to a bearable level. The algaecide is a material that is used in swimming pools and other such applications. The active ingredients are hydrogen peroxide and peroxyacetic acid and it is extremely caustic before being mixed with water. The company therefore had to devise a way to deliver the product in the right concentration to the logs while protecting the expensive pumping equipment from the caustic concentrate before it was diluted with the water. The system was up in running by the end of June.

We were called again in July as the gnats were still a problem and they were concerned that the algaecide was not the solution. It may have been too late for control in 2011 as the wood gnats overwinter as larvae and were probably already pupating by that time. A visit confirmed that larvae were still present although there was a huge reduction in the amount of organic matter available for them to feed on. In the fall samples were taken from the organic matter below the log pile showed gnat larvae still there. A decision was made to apply the biological insecticide Bti to that area when there were no logs present in order to push the gnat population even lower.

This spring the company will begin apply the algaecide as soon as the sprayers start in the spring. Hopefully the previous treatments and the continued use of the algaecide will bring the wood gnat problem under control. If not, we will continue to work with the company to find a solution for this nuisance pest.

Diseases and Injuries

Diseases: Native

Anthracnose of Hardwoods
Hosts: Ashes (*Fraxinus* spp.), Birches (*Betula* spp.), Maples (*Acer* spp.), Oaks (*Quercus* spp.)

Anthracnose diseases on hardwoods were widespread and damaging in 2011. Early spring weather conditions were highly conducive to fungal infections of the newly expanding leaves. Specifically, the entire month of May was excessively wet in most regions of the state. Maples and oaks appeared to be the most heavily affected, but damage was also observed on ashes and birches, as well. Infected leaves of maples developed typical spots and marginal necrosis. In many cases the affected trees began shedding foliage as early as late July. The less severely-damaged leaves that remained then became susceptible to loss during the late August hurricane, *Irene*. Leaf infections and the loss of foliage, particularly of maples contributed to subdued fall foliage displays.

Oak anthracnose and oak leaf blister were also widespread in 2011, and resulted in a thin crown and early off-color appearance of affected trees. The effect of this on fall color display was less noticeable than was the damage to maples.

Samples of maple anthracnose came from over thirty different towns, including Kittery (York Co.), Portland (Cumberland Co.), Rockport (Knox Co.), Farmington (Franklin Co.), Millinocket (Penobscot Co.), Searsmont (Waldo Co.), Otisfield (Oxford Co.), and Wayne (Kennebec Co.). Oak anthracnose was reported from Berwick (York Co.), Washington (Knox Co.), Farmington (Franklin Co.), Dayton (York Co.), and Milton Twp. (Oxford Co.).

***Armillaria* Root Rot**
Armillaria ostoyae, A. mellea, and other species
Hosts: Hardwoods and Conifers

Tree decline and mortality from *Armillaria* root rot, a widespread disease on a large number of host species, was observed this year in Vinalhaven (Knox Co.) and Winthrop (Kennebec Co.). Several trees in a northern white-cedar (Arborvitae) hedge were being killed as a result of the root rot in Vinalhaven. The source of the infection was undetermined but the trees, planted approximately twelve years earlier, had significant root restrictions from improper planting of the nursery stock. The symptoms on trees that were still alive were typical of those seen for the past few years on Arborvitae, with one or a few individual stems of a multi-stemmed plant dying, with the rest remaining alive.

In Winthrop, roots and butts of over-mature oaks located on the shoreline of a lake were heavily decayed as a result of *Armillaria* infection. Shore site influences, along with intensive recreational use of the property for over eighty years had resulted in multiple root, butt and stem injuries.

Ash Leaf and Twig Rust
Puccinia sparganioides
Hosts: White Ash (*Fraxinus Americana*); Green Ash (*F. pennsylvanica*)

Only trace levels of ash leaf rust were reported in 2011. A single report of the disease on white ash was noted from Berwick (York Co.).

Balsam Fir Tip Blight
Delphinella balsameae
Hosts: Balsam Fir (*Abies balsamea*); Concolor Fir (*A. concolor*)

Balsam fir tip blight was identified from a few infected trees in Falmouth (Cumberland Co.), and was again reported from a few Christmas tree plantations in Aroostook Co.

Cedar Leaf Blight
***Didymascella thujina* (= *Keithia thujina*)**
Hosts: Northern white-cedar (*Thuja occidentalis*)

Two occurrences of cedar leaf blight were reported; one from Scarborough (Cumberland Co.) and one from Kennebunk (York Co). Cedar leaf blight is a well-known disease of western redcedar (*Thuja plicata*) in the western United States and Canada. It has also been reported previously from a few eastern U.S. states, including Maine, on northern white-cedar. Although the disease can occur on trees of any age or size, most damage has been reported on young seedlings and saplings. Damage this year was reported from mature hedge plantings, and was most severe where dense shading and high foliage moisture levels occurred. Symptoms first appear as light brown areas on the individual scale-like leaves. The fruiting bodies (apothecia) of the fungus appeared in June on the upper surface of infected needles. The apothecia rupture through the needle epidermis which then often stays attached to the needle. Heavily infected needles and twigs are shed later in the fall.

***Cylindrocarpon* Root Rot**
***Cylindrocarpon* spp.**
Hosts: Conifer seedlings

A *Cylindrocarpon* species was found associated with young balsam fir seedling mortality in a transplant bed in Nobleboro (Lincoln Co.). The fungus was identified by the University of Maine Cooperative Extension pathologist. *Cylindrocarpon* species are soil-borne pathogens, and are generally considered only weakly parasitic, sometimes causing a condition known as "damping off" of new germinants and very young seedlings of conifers. While unlikely a serious or widespread problem, roots of very young seedlings can become colonized by a wide variety of soil microbes. No other obvious pathogens, pests or abiotic conditions likely to have resulted in the mortality were found.

***Entomosporium* Leaf Spot**
Entomosporium mespili
Hosts: Apple (*Malus*), Hawthorn (*Crataegus*), Pear (*Pyrus*), Serviceberry (*Amelanchier*)

Entomosporium leaf spot was diagnosed on hawthorn from Scarborough (Cumberland Co.). Damage was minor and primarily aesthetic.

Fir-Blueberry Rust
Pucciniastrum goeppertianum
Hosts: Balsam Fir (*Abies balsamea*), Blueberry (*Vaccinium* spp.)

A localized but high incidence of fir-blueberry rust was reported from a site location in Skowhegan (Somerset Co.). A reduction in disease incidence in the blueberry crop can be mitigated by removal of the naturally established fir seedlings adjacent to the blueberry field. The management practice is sound, but it will be difficult to achieve a complete elimination of the disease.

Fir Broom Rust
Melampsorella caryophyllacearum
Hosts: Balsam fir (*Abies balsamea*)

Fir broom rust, which causes a yellow "witches-broom" on branches of balsam fir, was noted in Christmas tree plantations in Drew Plantation (Penobscot Co.) and Houlton (Aroostook Co.). Damage was considered to be moderate on some individual trees, but of low incidence throughout the plantations. The alternate host for this rust is chickweed (*Stellaria* spp.).

Fir-Fern Rust
***Milesina* spp., and *Uredinopsis* spp.**
Hosts: Balsam Fir (*Abies balsamea)* and Ferns (including species of *Dryopteris*, *Polypodium*, P*teridium*, and other genera)

Samples of fir-fern rusts were recorded from Belfast (Waldo Co.), Presque Isle (Aroostook Co.), and Cape Elizabeth (Cumberland Co.). Although the disease occurs statewide, it is of little significance except to Christmas tree growers. In all reported cases this year, infection levels were light to moderate on scattered individual trees.

Fir Needle Casts
Lirula nervata, Lirula mirabilis, Isthmiella faullii, Rhizosphaera pini
Hosts: Balsam Fir (*Abies balsamea*); Fraser Fir (*A. fraseri*)

Several needle cast diseases of balsam fir were again common in forest areas and in Christmas tree plantations throughout the state. This year, the most common pathogen appeared to be *Rhizosphaera pini.* Although not reported to be an especially aggressive needle cast pathogen, it is causing some concern because of the extended infection period, which may necessitate multiple applications of fungicide. The continued wet weather conditions, particularly the early spring seasons for several consecutive years, have likely led to a build-up of these needle pathogens in some plantations.

Hemlock Tip Blight
Sirococcus tsugae
Host: Eastern hemlock (*Tsuga canadensis*)

The primary forest disease survey effort conducted in 2011 involved detecting and evaluating damage resulting from hemlock tip blight to eastern hemlock. This disease, first recognized and reported on eastern hemlock in 2010, has been found in Androscoggin, Cumberland, Hancock, Kennebec, Knox, Lincoln, Oxford, Sagadahoc, Washington and York counties.

In cooperation with USDA Forest Service personnel at Durham, New Hampshire, eleven stands in Maine were surveyed (Alfred, Lyman, and Wells (two stands) (York Co.); New Gloucester and Pownal (Cumberland Co.); Waldoboro (two stands) (Lincoln Co.); Livermore Falls and Turner, (Androscoggin Co.); and Bethel (Oxford Co.) Additional stands were surveyed in New Hampshire by USDA Forest Service and New Hampshire state personnel.

At each stand in Maine three plots were established, each with a minimum of twenty hemlock sample trees. Sample trees included those at least one ft. or taller in height, and one in. or less in diameter at breast height. Data taken included the presence or absence of tip blight and an estimate of the percentage of branch tips affected with blight. Hemlock trees larger than one in. in diameter were also assessed for tip blight incidence, but severity ratings on large trees was problematic. In addition disease incidence and severity, stand density and estimates of stand light intensity were also obtained

Data are currently being analyzed. The Bethel stand was used as a "control," since tip blight incidence on hemlock there was extremely low (as yet to be confirmed) or possibly absent. The pathogen was confirmed at all other locations, with varying levels of severity depending on location. A preliminary analysis of stand conditions

indicated that higher levels of infection occurred where hemlock regeneration was well-shaded with a dense overstory than in more open stands.

As the current data is summarized, an effort has been planned for expanding the survey on incidence and severity to additional northern Maine counties where a significant population of hemlocks occur, as well as to other states.

Ozone Damage Monitoring
Suscepts: All woody and herbaceous vegetation

The formal national USDA Forest Service survey for ozone damage to vegetation has been suspended for the foreseeable future. The program in which Maine participated was initiated in 1994, with yearly surveys since that time. In past years, 18 sites were monitored for ozone damage in Maine. This year, time and resources were available for the survey of only three sites: Bowdoinham (Sagadahoc Co.), Hope (Knox Co.), and Swanville (Waldo Co.). Suspected ozone damage was observed on white ash samples from Bowdoinham and Swanville, and on milkweed from Bowdoinham. These samples have been submitted for verification to the USDA. Because of the termination of the federal program, additional surveys for ozone damage to vegetation in Maine are not expected to continue.

***Phyllosticta* Leaf Spot**
***Phyllosticta* spp.**
Hosts: Many species of woody ornamental plants

An incidence of *Phyllosticta* leaf spot on *Forsythia* spp. was diagnosed from Saco (York Co.). Damage was to aesthetic value only.

Pine Tip Blight
***Diplodia pinea* (*Sphaeropsis sapinea*)**
Hosts: Red Pine (*Pinus resinosa*), Scots Pine (*P. sylvestris*), and Austrian Pine (*P. nigra*)

Weather conditions conducive to the development and spread of *Diplodia* tip blight continued this year. Formal surveys were not conducted, but observations indicate that the disease is increasing in severity wherever found. Damage was especially serious in older red pine plantations in mid- and south-coastal Maine, in southern Maine, and most recently north-central Maine. Mortality in plantations and in ornamental and roadside plantings is scattered but not uncommon.

Red Pine Root Rot
***Heterobasidion irregulare* (= *annosum*)**
Hosts: Red Pine (*Pinus resinosa*); occasionally White Pine (*P. strobus*)

Root and butt rot of red pine (and other conifers) caused by *Heterobasidion irregulare* continues to threaten the long-term productivity of many plantation stands recently thinned or in need of thinning. No new locations or sites in Maine were identified as being infected with *H. irregulare* this year.

Sapsucker Damage
Sphyrapicus varius
Suscepts: Hardwoods and Conifers, especially Birches (*Betula* spp.), Maples (*Acer* spp.), and Eastern Hemlock (*Tsuga canadensis*)

Injury caused by the yellow-bellied sapsucker is commonly observed. The birds can use almost any tree species to obtain sap, but fruit trees such as apple and pear are often favorites. Hemlock is also commonly damaged in Maine. This year, one incident of damage on American elm was reported from Gardiner (Kennebec Co.).

***Sirococcus* Tip Blight**
Sirococcus conigenus
Hosts: Red Pine (*Pinus resinosa);* other hard pine spp.

Infection of red pines with the *Sirococcus* shoot blight pathogen continues be a concern, particularly in the northeastern and Downeast regions of Maine, where a significant acreage of plantations has been established. Infection levels apparently have been increasing slowly over the past several years.

Spruce Needle Cast
Rhizosphaera kalkhoffii
Hosts: White Spruce (*Picea glauca*) and Colorado Blue Spruce (*P. pungens*)

Spruce needle cast is widespread and locally severe, and remained the second-most reported tree disease occurring in Maine this year. Spruce needle cast has taken a heavy toll in ornamental trees, with arborists reporting many removals over the past several years.

Tar Leaf Spot of Norway Maples
Rhytisma acerinum
Hosts: Norway Maple (*Acer platanoides*)

Tar leaf spot of Norway maples was significant and apparent statewide, wherever the host occurred. The disease responded to the wet spring weather as did the other leaf and needle diseases. Although leaf damage was high, infection levels did not reach those experienced in 2009. One report from Millinocket (Penobscot Co.) indicated that Norway maples defoliated by heavy infections of tar leaf spot in mid-August had re-foliated by late September, and were still holding green foliage as late as early November. When re-foliation occurs so late in the growing season, a significant stress is placed on the trees. The late-setting buds may be susceptible to fall frosts, and tree energy reserves will be more depleted than in normal years. It is expected that the affected trees will survive, but may exhibit some branch die-back by next spring.

Diseases: Non-Native

Beech Bark Disease
Cryptococcus fagisuga* and *Neonectria faginata
Hosts: American Beech (*Fagus grandifolia*)

Additional work was completed on a survey to assess beech bark disease intensity and beech scale populations as related to biophysical regions across Maine. This was the second year of the two-year study, with analysis of final results expected by spring of 2012.

Last year, one hundred American beeches were surveyed in each of two stands in each of five townships per biophysical region. Five biophysical regions were surveyed across the central portion of the state. The biophysical regions selected were a subset of those defined by McMahon (1990). A total of 5000 trees were assessed for beech scale population levels and other disease characteristics. In 2011, a quality check on sampling was conducted, where one stand in each of the five biophysical regions was randomly selected and re-evaluated for beech scale population levels. Data analysis will continue through the winter of 2011-2012.

Dutch Elm Disease
Ophiostoma ulmi* and *Ophiostoma novo-ulmi
Hosts: American Elm (*Ulmus Americana*)

Dutch elm disease appears static at moderate levels throughout the state. Requests for disease diagnosis and treatment recommendations were received from Byron (Oxford Co.), Readfield (Kennebec Co.), and Palermo (Waldo Co.).

European Larch Canker
Lachnellula willkommii
Hosts: Eastern Larch (*Larix laricina*), European Larch (*L. decidua*), Japanese Larch (*L. leptolepis*)

No new locations were found or reported in 2011 for this disease. Assistance was again provided for the larch canker intensification project in Washington Co. being conducted by Dr. David Houston (Retired, USDA Forest Service). Disease intensification information was collected at the one remaining site (Deblois; Washington Co.) where stand development still allows assessment methods to be practically used. Additional stand information on stem density and mortality was collected at two of the initial study sites (Jonesboro and Addison; Washington Co.), for inclusion in the final report. Preliminary statistical analyses have been conducted, and a draft report is in progress. The final report of findings will be available after analyses have been completed.

White Pine Blister Rust
Cronartium ribicola
Hosts: White Pine (*Pinus strobus*)

White pine blister rust continues to be a threat to natural and plantation stands of white pines, and to white pines used in ornamental plantings. With the suspension nearly two decades ago of state-run efforts to monitor and eradicate large infestations of *Ribes* that directly threaten white pine stands, populations of native Ribes are likely to be increasing. This population increase may be accelerating as land-clearing and site disturbance activities occur which are favorable to *Ribes* spp. development, especially in the southern half of the state.

A State quarantine remains in place to help control this disease. Maine law prohibits the planting and cultivation of currants and gooseberries in most of southern Maine, and prohibits the planting and cultivation of European black currants and their hybrids anywhere within the state.

As an example of the importance of maintaining this quarantine, in the fall of 2011 it was discovered that a popular cultivar of blister rust-immune black currant (*Ribes nigrum* cv. Titania) has now lost it's immunity to *Cronartium ribicola*, the white pine blister rust fungus. This is significant in that development of *Ribes* cultivars highly resistant or immune to white pine blister rust has resulted in other states relaxing their quarantine regulations on *Ribes* plants, and specifically on black currants.

Fortunately for Maine, the Maine Forest Service has maintained its quarantine on *Ribes* importation and cultivation for over ninety years. Both New York and Massachusetts have initiated a significant currant/gooseberry fruit industry based on putatively "immune" *Ribes* cultivars, which may now be at-risk of developing the rust disease, as well as jeopardizing nearby white pine stands.

Diseases: Unknown Origin

Ash Decline
Hosts: White Ash (*Fraxinus americana*), Green Ash (*F. pennsylvanica*), and Brown Ash (*F. nigra*)

Occasionally mortality of individuals or small groups of ashes is observed with no apparent explanation as to cause. This year three such stands of white ashes were reported from the towns of Madison (Somerset Co.), Lincolnville (Waldo Co.), and Industry (Franklin Co.). Ashes are always examined for evidence of emerald ash borer,

Armillaria root rot, and for ash yellows symptoms. However, in these locations no obvious indications were found of these, or of any other single or known cause that could be responsible for the decline and mortality.

White Pine Needlecasts
Mycosphaerella dearnessii, Canavirgella banfieldii,* and *Bifusella linearis
Hosts: White Pine (*Pinus strobus*)

Several white pine needle cast diseases have long been known to occur in Maine. Three principal pathogens that result in needle infection and subsequent premature needle shedding are *Mycosphaerella dearnessii* (brown spot), *Canavirgella banfieldii*, and *Bifusella linearis*. During the past several years, an increased incidence and severity of needle casts has been observed. These diseases have been observed on white pine throughout the state, but have been most severe in western and southern counties.

The recent widespread distribution of needle casts and the intensity of infections appear to be without precedent in Maine and the northeastern United States. These disease conditions are likely to have been fostered by the above-average precipitation during the spring and summer seasons that Maine has experienced for the past several consecutive years. The fungi require free moisture to germinate and infect the needles. Only needle tissue is susceptible to infection.

Most damage in northern New England has been shown to be caused by the brown spot pathogen. For brown spot, current-season needles become infected and, over the course of a year, become yellow and eventually turn to brown. The needles are then shed during the following spring. White pine normally retains needles for at least two years before they are shed, thus needle infections can result in the loss of up to 50 percent of the normal complement of needles.

To date, there has been no documented direct tree mortality from these diseases, but some trees do have very thin crowns. Pine understory regeneration is also affected, and may be more at risk of succumbing than the mature overstory trees. Some trees on poor sites and those along shorelines of rivers and lakes may be most susceptible to mortality if significant needle loss occurs in successive years.

Management options are limited, but include maintaining healthy crown development with appropriate thinning protocols. Adequate spacing will also promote more rapid drying of needles, although in very wet years this may be of little help. Affected stands should be entered either very cautiously or not at all during years of heavy defoliation, or for one or two years following the excessive needle loss. Stands should be monitored to estimate crown density recovery before thinning and other stand disturbance operations can be safely resumed.

White Pine Needle Cast Survey - 2011: A regional survey to clarify the range and identity of the pathogens associated with white pine needle cast diseases was organized and led by Dr. Isabel Munck, USDA Forest Service pathologist, in cooperation with the Maine Forest Service, the Vermont Department of Forests, Parks and Recreation, and the New Hampshire Division of Forests and Lands.

Samples were collected from 6/14/2011-6/22/2011 from five sites in Maine (Augusta, Bethel, Leeds, Lyman, and Sangerville), six sites in New Hampshire (Blackwater, Cloush, Fox, Hillsboro, Hopkinton-Everett, and Mast Yard), and three sites in Vermont (Lyndon, Springfield, and Waterbury). At each site, branch tips from at least three and up to five trees were collected. All branch tips were examined for fruiting bodies and symptoms. Needles from one representative branch tip per tree were incubated for at least 24 hr in a moist chamber at 25^{o} C. Fruiting bodies on these needles were examined with the aid of dissecting and light microscopes and photographed. Additional samples were collected from two sites in Vermont, Bethel and Brookfield, on July 11 2011.

The most common symptom observed in most samples collected in May was necrosis. Most needles looked healthy but affected needles had tips or a greater portion of the needles that were dead. In contrast, the most common symptom from June samples was chlorosis, yellowing needles, and defoliation. The most frequently observed pathogen on the June samples was *Mycosphaerella dearnessii*, the pathogen that causes brown spot (Table 6). Brown spot was only observed on a few of samples from the May collection. Brown spot was associated with the yellowing and defoliation observed on many samples collected in June. *Canavirgella* was observed on samples

from one site in each state: Sangerville, ME; Blackwater, NH; and Lyndon VT. *Bifusella* was observed in samples from two sites in Maine (Augusta and Lyman) and two sites in New Hampshire (Hillsboro and Mast Yard). The three pathogens can co-occur at the same site. For example, brown spot and *Bifusella* and were observed in May samples and *Canavirgella* was observed in June samples from Lyndon, VT. Similarly, *Bifusella* and brown spot co-occurred in Bethel, VT and two sites in Maine, Augusta and Lyman.

Table 6. Summary of white pine needle diseases found from needle samples collected in June 2011.

Location	*Bifusella linearis*	*Mycosphaerella dearnessii* (Brown spot)	*Canavirgella banfieldii*	Grand Total
ME	**7**	**17**	**1**	**25**
Augusta	5	1		6
Bethel		7		7
Leeds		3		3
Lyman	2	2		4
Sangerville		4	1	5
NH	**3**	**9**	**1**	**13**
Blackwater		3	1	4
Cloush St Park				
Fox		3		3
Hillsboro home	1			1
Hop-Eve		3		3
Mast Yard	2			2
VT		**6**	**1**	**7**
Lyndon			1	1
Springfield		2		2
Waterbury		4		4
Grand Total	**10**	**32**	**3**	**45**

Division Activities

Aerial Survey

Aerial survey flights were flown from June through August 2011 for both delineating forest pest problems and overflights detecting potential damage and stress situations. Damage by the following pests was mapped: aspen leafroller complex, browntail moth (*Euproctis chrysorrhoea*), large aspen tortrix (*Choristoneura conflictana*), and satin moth (*Leucoma salicis*). Trees along the margins of ponds, beaver flowages, heaths etc. are in poor health across the entire state due to fluctuating water levels in recent years. Birch at high elevations is in poor condition overall. Beech in northwestern parts of the state where beech bark disease is killing trees on the hardwood ridges is also noticeable.

We continue to balance the need to survey the forest with the cost of flights. Most of the survey flights are made in a Cessna 180 float plane although a Bell Jet Ranger helicopter which allows us more flexibility is sometimes used. In addition, trained, unaccompanied MFS pilots conduct initial aerial reconnaissance in sections of the state where no new detectable stress events are anticipated. This effort is incorporated into fire detection and other MFS routine flight activities. If they see anything unusual in the forest they give a call to the Entomology Lab. We also solicit ancillary ad hoc reports from outside cooperators. These efforts augment our internal capacity and provide a cost effective initial detection tool for triggering targeted survey and evaluation.

We have been using digital aerial sketch mapping (DASM) for the past five years and find it an improvement over using paper maps and a pencil. Although like any other electronic devise it is always wise to bring a mechanical backup. The computers and software are supplied through a grant with the USDA Forest Service who also help trouble shoot problems both in the air and in interpreting the data. Greg Miller, MFS GIS Coordinator, handles the data and produces maps from the surveys.

Ants

The Maine Forest Service Insect & Disease Laboratory serves as an auxiliary State of Maine Museum facility housing the Maine Forest Service insect collection – the only State insect collection. We accept specimen donations, especially important collections from unique habitats. One of the collections donated to the State of Maine came from a biodiversity study on The Nature Conservancy's (TNC) Waterboro Barrens property. The majority of the insect specimens collected in this study, with the exception of the ants, were identified and catalogued. At the time of the study, in 1996 and 1997, there was no taxonomist interested in identifying over 5,000 ants collected in the study. The ant specimens were all carefully labeled and stored in vials in jars of alcohol.

Early in 2011 Dr. Aaron Ellison, a researcher from Harvard University Forest, inquired if we might have ant (Hymenoptera: Formicidae) specimens that he could look at and add to his body of knowledge on ants of the northeast. He came and inspected the eight species currently identified in the MFS collection and borrowed the hundreds of unidentified specimens as well as all 5,000+ TNC ants. Over the summer we saved ants collected in traps and on field trips, encouraged Maine Entomological Society members to share their ant specimens and sent them all to Dr. Ellison. This fall all 6,000 plus specimens were returned. They were all identified, labeled, in new numbered vials in new numbered boxes with a spreadsheet documenting all the specimens. Hundreds of them had also been pinned and labeled. It was an incredible amount of work that benefited both parties. This winter Bill Urquhart has gone through the material and pinned and labeled representative specimens of the sixty species added to the collection. Some of these are new species records for the state.

Dr. Ellison will be publishing a field guide to ants of New England in 2012 and he has plans for at least one and possibly more publications based on the ants from here and other sources in Maine. As an aside - high school students assisted Dr. Ellison in his work and they can now say they have worked on a research project at Harvard.

The State greatly benefits from these cooperative projects that require a small amount of coordination and produce results difficult to obtain in any other way. This type of information is the basis for understanding ecosystems, documenting presence of beneficial and potential pest organisms, tracking expansion and contraction of ranges in response to climate and other factors, and making management decisions.

Bioblitzes at Acadia National Park

The Maine Forest Service has been co-sponsoring bioblitzes in the Schoodic District of Acadia National Park (ANP) for the past eight years along with ANP, the Maine Entomological Society and the University of Maine. A bioblitz is a 24-hour period of time when as many different species are collected as possible within a certain area. The ANP blitzes have focused on one insect (or spider) taxon each year; for example beetles, or moths & butterflies. Participation and support of these events has a number of paybacks for the MFS. We have an opportunity to survey the insects in an area rarely studied, we learn of invasive species that may be found there, we develop and maintain interagency connections, we build new relationships with participating taxonomists and we spark an interest in participants for forest insects. Plus, excess specimens are deposited in the MFS collection. The MFS provides lab and field equipment; personnel to assist in running the blitz; and participants for collecting, processing and identifying specimens. A publication on the past eight years work is forthcoming.

For more information on the blitzes go to: http://www.nps.gov/acad/naturescience/bioblitz.htm

Firewood and Invasive Insects Awareness Campaign

Once again, a major focus this year was training and outreach on the issue of how firewood movement spreads invasive pests. For a third year, the Maine Forest Service partnered with the Maine Department of Agriculture on invasive insect outreach - in particular the Asian longhorned beetle (ALB) and emerald ash borer (EAB). This

project included training volunteers to take the invasive insect issue to the public and putting the message out in as many venues as possible. Similar activities occurred in other states across the northeast.

On April 1, 2010, emergency legislation was passed banning the movement of firewood from out-of-state into Maine. The regulation went into effect on the Labor Day weekend of 2010. Several out-of-state firewood exchanges were held at the northbound Kittery rest stop to raise awareness of the new legislation and the link between invasive insects and firewood.

Tens of thousands of pieces of literature were handed out over the past year. Materials for outreach were supplied by the USDA Forest Service, and USDA APHIS, PPQ. In addition to using the already popular "Marshmallow" ad, we borrowed heavily from a model developed and shared by the Iowa Dept of Agriculture (Thank you, Iowa) to design a Maine-specific "*Guns, ~~Bugs~~, Ammo, Camo*" to reach hunters with the message to leave firewood at home. A second poster on the same slightly humorous theme aimed at ice fishermen was "*~~Shiners~~, ~~Smelts~~, ~~Bugs~~: Out-of-State Bait and Firewood Not Wanted*". Both have proved to be very popular.

As much 'face time' as possible was put into the effort this year as that has a greater impact on people than passive displays. Wallet cards, bookmarks, posters, flyers and factsheets were put up or distributed in town offices, convenience stores, libraries, at trail heads and other venues. The "*Leave Your Firewood at Home*" and/or "*Be on the Lookout for Invasive Insects*" message were promoted at fairs, festivals, camper shows, outdoor shows, various industry shows, and other gatherings. We ran multiple training sessions for roadside tree trimming crews and loggers as these are some of the folks "on the frontline" when it comes to looking at trees. In cooperation with the Maine DOT, training sessions were held for municipal and Public Works personnel on how to recognize invasive insects if encountered during their work on park and roadside trees.

Personal contact was made with campground owners to remind them of the new legislation and impress on them the importance of campers not moving firewood. Notices about the new out-of-state firewood ban were printed and given to campground owners to help them inform their out-of-state campers of the new legislation **before** they came to Maine. These notices were also mailed to property owners in the unorganized territories of Maine.

The Maine Forest Service Public Service Announcement (PSA) has continued to be broadcast on television stations and the internet across the State and beyond. News releases covering invasive insects and firewood movement started in early spring and continued throughout the year as events warranted. Both the MFS and Maine Department of Agriculture have websites on firewood and/or invasive insects. The MFS firewood Web pages had just over 15,000 hits in 2011 and the invasive insects pages had over 31,000 visits. Groups with an outdoor connection were contacted and asked to put a message on their website promoting leaving firewood at home. Maine State Parks, Maine Campground Owners Association (MECOA) and a race track that has camping all have notices about firewood as do some individual campgrounds.

Several ads in various camping magazines and newspaper supplements were printed. The goal of these ads was to reach out-of-state campers before they left home with their firewood.

The effort to educate the public about firewood is a broad program across the Northeast with funding from both USDA Forest Service and USDA-APHIS. These agencies have also put their time and effort into the outreach effort along with states and private groups. The Nature Conservancy's "*Don't Move Firewood*" campaign has also been instrumental in spreading the word through their internet presence, videos and PSA's.

Insect Collection

The Maine Forest Service Insect Collection has over 60,000 specimens in the reference portion of the collection. Additionally there are now more than 5,000 ant specimens stored in alcohol, more than 60,000 spider records, and in excess of 10,000 bark beetle and woodborer specimens. Besides having most of the specimens themselves here we also have computerized records of all this material. We are continually adding to the collection and upgrading it as time – *and volunteers* – allow. Without the assistance provided by Maine Entomological Society and other volunteers we would not be able to maintain and manage this valuable reference collection.

In 2010 the MFS took ownership of thousands of insect samples collected by the University of Maine that had never been fully processed. The samples are stored at the Maine State Museum warehouse and are slowly being processed by volunteers from the Maine Entomological Society. Samples were collected from a variety of forested sites with the bulk of the collection coming from the USDA-FS Penobscot Experimental Forest in Bradley. This work will result in information about the insects that live in these locations. Already two rare wasps have been identified and a beetle that is considered rare has been recovered from a number of the samples processed to date. More information will be forthcoming as the specimens get identified and catalogued. More help is needed if anyone is interested!

Light Trap Survey

The Maine Forest Service has been monitoring forest insect pest populations with an array of light traps across the State for 69 years. Twenty-four traps were run in 2011 in locations from South Berwick to Allagash to Topsfield (Table 7). Rothamstead light traps are used in most locations with blacklight traps at the remaining sites. The Rothamstead trap has a 150W light bulb inside a protective casing with an entry for moths. The moths fall down a funnel into a can where they die. Blacklight traps have metal fins that the moths hit as they fly toward the light and then fall down into a collecting can. One light trap runs on batteries as there is no power at Frost Pond. Trap operators collect the catch on a daily basis and send the catch in weekly to be processed. The timeframe for trap operation in 2011 ranged from 30 to 45 days depending on the location and flight season of the moths of interest. The results are used in predicting forest pest outbreaks. A heartfelt thank you goes out to the trap operators each year. Although it is not difficult to operate a trap and they are minimally compensated for it, attention to detail and daily attendance is required and very much appreciated.

Table 7. 2011 Light trap locations.

Trap Location	County	Start date	End date	Number of nights
Allagash	AROOSTOOK	7/3/2011	7/31/2011	30
Ashland	AROOSTOOK	7/3/2011	7/31/2011	30
Bowerbank	PISCATAQUIS	6/17/2011	7/31/2011	45
Calais	WASHINGTON	6/17/2011	7/31/2011	45
Crystal	AROOSTOOK	7/3/2011	7/31/2011	30
Exeter	PENOBSCOT	6/17/2011	7/31/2011	45
Frost Pond – T3 R11 WELS	PISCATAQUIS	6/17/2011	7/31/2011	45
Haynesville	AROOSTOOK	6/17/2011	7/31/2011	45
Hope	KNOX	6/17/2011	7/31/2011	45
Jackman	SOMERSET	6/17/2011	7/31/2011	30
Kennebunk	YORK	6/17/2011	7/31/2011	45
Kingfield	FRANKLIN	7/3/2011	7/31/2011	30
Millinocket	PENOBSCOT	6/17/2011	7/31/2011	45
Mount Desert	HANCOCK	6/17/2011	7/31/2011	45
Mount Vernon	KENNEBEC	6/17/2011	7/31/2011	45
New Sweden	AROOSTOOK	7/3/2011	7/31/2011	30
Norway	OXFORD	6/17/2011	7/31/2011	45
Rangeley	FRANKLIN	6/17/2011	7/31/2011	45
Sedgwick	HANCOCK	6/17/2011	7/31/2011	45
Shirley	PISCATAQUIS	6/17/2011	7/31/2011	45
South Berwick	YORK	6/17/2011	7/31/2011	45
Ste. Aurelie - Big Six Twp	SOMERSET	7/3/2011	7/31/2011	30
Topsfield	WASHINGTON	6/17/2011	7/31/2011	45
Topsham	SAGADAHOC	6/17/2011	7/31/2011	45

A checklist of significant insect defoliators is used in sorting the moth catch material. Trap catch records for some of these insects are available for over 30 years worth of trapping. Other insects that are trapped and occur in unusual numbers or have not been seen before are noted in the light trap records. A portion of the moth catch is saved for use in outreach programs during the remainder of the year. This year we continued cooperating in a nationwide study of two tussock moths *Lophocampa maculata* and *L. caryae*. Specimens of these two species were retained and sent to the researcher at Lewis and Clark College in Portland, Oregon along with the associated trap location and date information.

Pest populations of significance are reported in the appropriate section of this report. These traps are also used to monitor for invasive species coming into the State.

New Publications

Checklist of the Beetles of Maine, USA. Christopher G. Majka, Donald S. Chandler, and Charlene P. Donahue, 2011: Empty Mirrors Press, Halifax, Nova Scotia, Canada. 328 pp.

MFS Forest Entomologist Charlene Donahue is co-author of a new reference book that lists almost 3,000 established Maine beetles. The book, "Checklist of the Beetles of Maine, USA," is a list of all insects collected and recorded in Maine, including those in the extensive Maine Forest Service collection and private and museum collections. Two years in preparation, the book is based on a previous 1993 checklist published by the MFS.

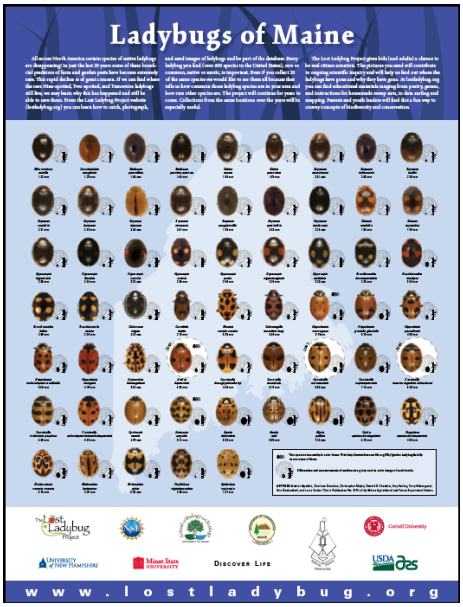
The 328 page checklist of the Coleoptera of Maine provides the first comprehensive listing of the 2,871 beetles (2,466 native Nearctic species, 121 native Holarctic species, and 284 introduced species) recorded in the state of Maine, USA. Four hundred and seventeen are newly recorded in Maine while 58 are herein excluded from the state faunal list. For each species a chronological listing includes studies that have recorded it in Maine, and its distribution in the states and provinces of northeastern North America. Full collection data of all specimens for each newly recorded species are included. Recent synonymies and points of particular relevance are indicated in endnotes.

For each of the 96 families of Coleoptera, an introductory section discusses bionomics, taxonomic status, previous compilations of information, and the principal reference works that apply to the North American fauna. A photograph of a selected representative is also included. An introductory chapter recounts the history of Coleoptera research in Maine, while a second chapter presents a preliminary overview and analysis of the Maine beetle fauna. References to 1,171 publications that pertain to the Maine beetle fauna are provided, as is a table of contents. The index includes 1,940 supra-specific names of included taxa.

For those interested in entomology in Maine and neighboring states and provinces, this book will be an indispensable reference. Beetles are the most species-rich order in the world, occupying innumerable ecological niches in virtually every terrestrial and freshwater aquatic ecosystem. Beyond their intrinsic value, and the importance of conserving wildlife and protecting biodiversity for ecological reasons, beetles are potentially valuable in monitoring for climate change, pollution, anthropogenic disturbance, and ecological integrity. Many are important (either as pests or species of value) in relation to agriculture, horticulture, forestry, and pollination. Monitoring the health of the native fauna, and tracking the dispersal of newly arrived species (~10% of the Maine fauna), remain important objectives. This book will be helpful in all these respects.

The Maine Forest Service has copies available for $50 tax included. Make check or money order payable to Treasurer, State of Maine.

Ladybugs of Maine Poster



This highly informative poster was created with the help of MFS Forest Entomologist Charlene Donahue, the University of Maine and several other organizations. Its creation is part of a nationwide effort to look for and document what species of ladybugs are living where. There are a number of native ladybugs that have not been seen in years and the general public is being asked to look for ladybugs, take their picture and upload them to the Lost Ladybug website. For more information on how you can get involved in the Lost Ladybug Project go to http://www.lostladybug.org/identification-tools-1083.php. Posters are available from the Maine Forest Service.

For either of these publications contact:
Charlene Donahue
Insect & Disease Laboratory
State House Station 168
Augusta, ME 04333

Phone: 207-287-3244
Email:charlene.donahue@maine.gov

Public Assistance

Public assistance from the Forest Insect and Disease Unit takes many forms. We speak at workshops and field days to a broad range of audiences, write articles for our own and other publications, speak with television, newspaper and radio journalists, answer questions at trade shows and other venues, and answer the many questions that come in by phone calls, e-mails and walk-in visitors.

We have added more than 100 subscribers to the *Annual Summary* and monthly *Conditions Reports* since the beginning of 2011 (637 electronic and paper subscriptions). Six *Conditions Reports* and a draft *Annual Summary Report* were produced in 2011. In addition, staff prepared articles for other publications, collaborated with Jeanne Curran (DOC) on press releases, and responded to press inquiries.

In 2011, division staff prepared and gave more than 65 presentations, with more than 2000 people in attendance. Audiences included arborists, foresters, landowners, garden clubs, land trusts, road crews, and school children. Invasive insects and firewood were frequent topics.

More than 850 calls were recorded in our pest log database in 2011. This does not account for all calls coming in, as some are inevitably left out of the database. Invasive insects such as hemlock woolly adelgid, Asian longhorned beetle and emerald ash borer accounted for the most calls. Needlecast diseases and foliar diseases, including needlecast on spruce and white pine, also were high on the list.

A subset of the division's Web pages received over 180,000 hits in 2011. This is down significantly from the 2010 hits but in line with counts from 2009 and 2008. Browntail moth, mosquitoes and carpenter ants were very popular factsheets, as they had been the previous year. Invasive insects and firewood also remained popular topics.

Table 8. Summary of Web page hits on of a subset of Forest Health and Monitoring pages in 2010 and 2011.

Category	Sum 2010	Sum 2011
All	***422,452***	***181,392***
Factsheets	**160,021**	**69,157**
Browntail Moth	*18,284*	*11,785*
Mosquitoes	*10,677*	*5,165*
Invasive Insects	**68,461**	**31,400**
Hemlock Woolly Adelgid	*10,677*	*14,358*
Elongate Hemlock Scale	*6,096*	*1,734*
Firewood	**32,450**	**15,215**
Quarantines	**26,252**	**7,746**
Cerceris	**13,086**	**4,511**

Quarantine Administration

The unit administers state quarantines on European larch canker, gypsy moth, hemlock woolly adelgid, pine shoot beetle and white pine blister rust. Parallel federal quarantines exist for European larch canker, gypsy moth and pine shoot beetle. Each quarantine lists regulated articles and areas. Compliance agreements, usually held by receivers, allow controlled movement of regulated articles out of the regulated area for the European larch canker, gypsy moth, hemlock woolly adelgid and pine shoot beetle quarantines. **Questions about forestry related quarantines and moving regulated material and requests for compliance agreements can be directed to Allison Kanoti, e-mail: allison.m.kanoti@maine.gov; phone: (207)-287-2431; Maine Forest Service Insect and Disease Lab, 168 State House Station, Augusta, ME 04333-0168.** More information on the quarantines is contained in the section: **Forestry Related Quarantines in Maine – 2011**.

Spiders of Maine Project

For the past five years the Maine Forest Service has been facilitating a project on spiders (Arachnida: Aranae) in Maine. For over thirty years Dr. Daniel Jennings, Retired Entomologist USDA-FS, has been working on documenting the spider species that live in Maine, their life history and habits. In 2006 the MFS and Maine Inland Fisheries and Wildlife (IF&W) both extended support to Dr. Jennings to continue his studies. There had been very little work done on spiders in Maine prior to Dr. Jennings interest in this class of invertebrates. He has published a number of papers on the subject over his career but the bulk of the information has never been brought together in one place.

The two agencies worked together providing technical support to finish cataloging the more then 60,000 specimens collected for this project. This freed up Dr. Jennings to do the highly technical taxonomic work of identifying the thousands of samples he acquired. The majority of the samples came from collection made by Dr. Jennings himself and colleagues at the University of Maine, the Maine Forest Service and The Nature Conservancy. They cover a wide array of habitats across the state and many different collection methods leading to a rich source of information on this important part of the ecosystem.

The project is now drawing to its conclusion with the completion of the spider identifications and cataloguing. The final part of the project, the writing of a comprehensive publication on the Spiders of Maine is in progress. Both that publication and the data that underlies it will be made available to the scientific community and the general public.

Forestry Related Quarantines in Maine – 2011

The five forestry related state quarantines currently in effect in Maine are: White Pine Blister Rust, Gypsy Moth, European Larch Canker, Hemlock Woolly Adelgid and Pine Shoot Beetle. With the exception of the White Pine Blister Rust Quarantine, the regulated material designated in the rules and regulations may be moved freely within the quarantine area. Movement from the quarantine area to unregulated areas is restricted.

The Maine Forest Service maintains compliance agreements with facilities outside the quarantine areas which allow some movement of regulated materials outside the quarantine zones. Questions about forestry related quarantines and moving regulated material and requests for compliance agreements can be directed to Allison Kanoti, e-mail: allison.m.kanoti@maine.gov; phone: (207)-287-2431; Maine Forest Service Insect and Disease Lab, 168 State House Station, Augusta, ME 04333-0168. More details are available on our Website: www.maineforestservice.gov/idmquar.htm.

The following is only a partial summary of the rules. Refer to the cited statutory authority and related rules for complete quarantine regulations. Information about regulated areas can be found at the end of this section.

I. White Pine Blister Rust

a. Rules and Regulation

i. Title 12 MRSA 1988, Subchapter III, §803:8305 Shipment Prohibited.
ii. Department of Conservation, Bureau of Forestry Rules Chapter One.

b. Summary: *Ribes* spp. (currants and gooseberries) are alternate hosts for the non-native white pine blister rust fungus (*Cronartium ribicola*). This disease causes mortality and severely reduces the commercial value of eastern white pine (*Pinus strobus*). 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. The sale, transportation, further planting or possession of plants of other species in the genus *Ribes* (commonly known as currants and gooseberries) including cultivated wild, or ornamental sorts) is prohibited in all or part of the following counties: York, Cumberland, Androscoggin, Kennebec, Sagadahoc, Lincoln, Knox, Waldo, Hancock, and parts of Oxford, Franklin, Somerset, Piscataquis, Penobscot, Aroostook, and Washington (see map and list of towns at the end of this section).

This quarantine is administered by the Forest Health & Monitoring Division of the Maine Forest Service, phone: (207) 287-2431 or (207) 287-2791.

c. **New in 2011:** See *White Pine Blister Rust* in the *Diseases: Non-native* section of this summary report for a discussion of European black currant news from 2011.

II. Gypsy Moth

a. Rules and Regulation:

i. 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.
ii. Title 12 MRSA, §8305 of the Laws of the State of Maine.

b. Summary: The infested area in Maine is quarantined for the movement of regulated articles, which includes wood of any species such as logs, pulpwood, trees, shrubs, firewood, Christmas trees, and chips, and requires the inspection and certification of such material if movement is *from the infested area* of the state *to non-infested states and foreign countries*. This is administered by the USDA-APHIS, PPQ in Hermon, Maine, phone: (207) 848-5199.

Since **Maine is not completely infested and quarantined**, wood or regulated articles moving *from the infested area* of the state *to the non-infested area* of the state must be accompanied by a certificate or go to a facility 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 (207) 287-2431 or (207)287-2791.

III. European Larch Canker

a. Rules and Regulation:

i. 7 CFR Part 301.91 of the United States Department of Agriculture, Animal & Plant Health Inspection Service, as published in the Federal Register

ii. Title 12 MRSA, §8305 of the Laws of the State of Maine.

b. **Summary:** All parts of larch (*Larix* spp.) including but not limited to logs, pulpwood, branches, twigs, etc., are regulated. Parts of Hancock, Knox, Lincoln, Waldo, and Washington counties are designated as the quarantined area from which their movement is restricted. This is managed by the USDA-APHIS, PPQ in Hermon, Maine, phone: (207) 848-5199; and the Forest Health & Monitoring Division of the Maine Forest Service, phone (207) 287-2431 or (207) 287-2791.

IV. Hemlock Woolly Adelgid

a. Rules and Regulations:

i. 7 MRSA, Chapter 409, §2301-2303 of the Laws of the State of Maine.

ii. Department of Agriculture, Food & Rural Resources, Division of Plant Industry Rules Chapter 266.

b. Summary: Hemlock Woolly Adelgid is quarantined to prevent its spread in the State, in order to protect Maine's forest, timber and wildlife resources from this destructive pest. Any hemlock articles with attached bark, including but not limited to hemlock seedlings and nursery stock, logs, lumber with bark, chips with bark, and uncomposted shipments of bark are regulated. The area currently under quarantine includes the towns of Eliot, Kittery, Ogunquit, South Berwick, Wells and York in York Co. Maine, portions of the northeastern United States to our south and west and the States of Alaska, California, Oregon and Washington in the western United States.

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. 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; phone: (207) 287-2431.

c. New in 2011: Hemlock woolly adelgid is also a quarantine pest in OH, MI, NH, VT, WI and Canada. Many of those areas use the federal list of infested counties to set the quarantine zones. For those external jurisdictions, hemlock from Cumberland, Lincoln and Sagadahoc counties in Maine were added to the "quarantined-county" list in February 2011. Although we are working with the arborist and forestry industries to manage hemlock movement from the infested portions of these counties, the formal process for expanding the internal quarantine has not been completed.

V. Pine Shoot Beetle

a. Rules and Regulations:

i. 7 CFR Part 301.5, United States Department of Agriculture, Animal & Plant Health Inspection Service, Plant Protection and Quarantine as printed in the Federal Register

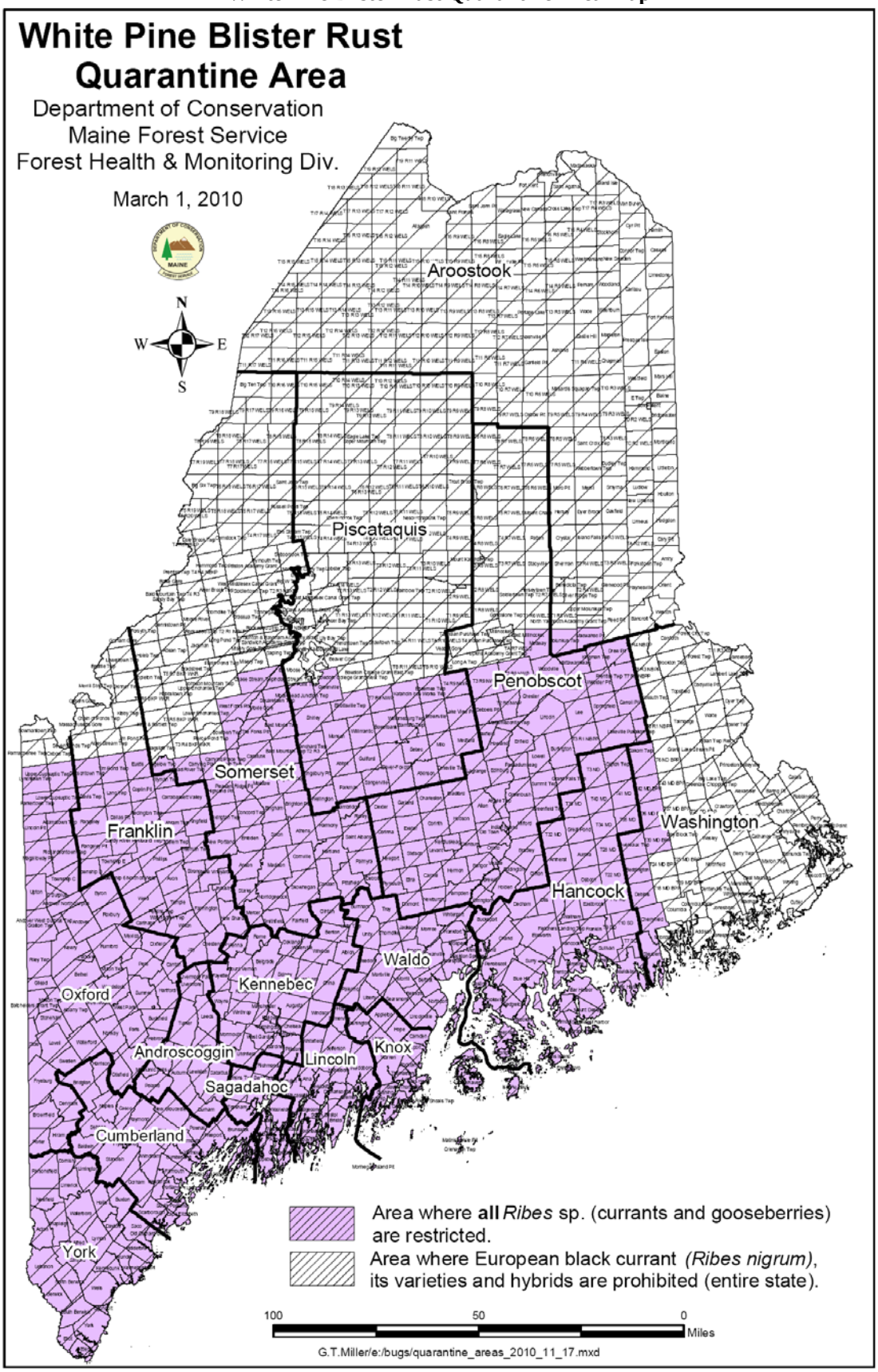
ii. 7 MRSA, Chapter 409, Section 2301 of the Laws of the State of Maine.

iii. Department of Agriculture, Food & Rural Resources, Division of Plant Industry Rules Chapter 268.

b. Summary: This quarantine designates regulated areas in the United States of America including the following areas in Maine: all counties except Aroostook and Washington Counties. Regulated articles are pine products with bark including entire plants, or plant parts such as Christmas trees, nursery stock, branches, boughs and stumps, pine logs and lumber with bark attached and bark mulch, nuggets or wood chips with bark attached. This is managed by the USDA-APHIS, PPQ in Hermon, Maine, phone: (207) 848-5199; and the Forest Health & Monitoring Division of the Maine Forest Service, phone (207) 287-2431 or (207) 287-2791.

NOTE: A summary of forestry related quarantines and links to maps and Federal and State laws and rules can be found on our web-site: www.maineforestservice.org/idmquar.htm.

White Pine Blister Rust Quarantine Area Map



Towns Regulated by Maine's White Pine Blister Rust Quarantine*

Note:** ***Ribes nigrum, **European black currant and its varieties or hybrids are prohibited statewide.**

Androscoggin County: The entire County.

Aroostook County: Macwahoc Plt, Molunkus Twp

Cumberland County: The entire County.

Franklin County: Avon, Carrabassett Valley, Carthage, Chesterville, Coplin Plt, Dallas Plt, Davis Twp, Eustis, Farmington, Freeman Twp, Industry, Jay, Kingfield, Lang Twp, Madrid Twp, Mount Abram Twp, New Sharon, New Vineyard, Perkins Twp, Phillips, Rangeley, Rangeley Plt, Redington Twp, Salem Twp, Sandy River Plt, Stetsontown Twp, Strong, Temple, Tim Pond Twp, Township 6 North of Weld, Township D, Township E, Washington Twp, Weld, Wilton, Wyman Twp

Hancock County: The entire County.

Kennebec County: The entire County.

Knox County: The entire County.

Lincoln County: The entire County.

Oxford County: Adamstown Twp, Albany Twp, Andover, Andover North Surplus, Andover West Surplus Twp, Batchelders Grant Twp, Bethel, Brownfield, Buckfield, Byron, C Surplus, Canton, Denmark, Dixfield, Fryeburg, Gilead, Grafton Twp, Greenwood, Hanover, Hartford, Hebron, Hiram, Lincoln Plt, Lovell, Lower Cupsuptic Twp, Lynchtown Twp, Magalloway Plt, Mason Twp, Mexico, Milton Twp, Newry, Norway, Otisfield, Oxford, Paris, Parkertown Twp, Peru, Porter, Richardsontown Twp, Riley Twp, Roxbury, Rumford, Stoneham, Stow, Sumner, Sweden, Township C, Upper Cupsuptic Twp, Upton, Waterford, West Paris, Woodstock

Penobscot County: Alton, Argyle Twp, Bangor, Bradford, Bradley, Brewer, Burlington, Carmel, Carroll Plt, Charleston, Chester, Clifton, Corinna, Corinth, Dexter, Dixmont, Drew Plt, Eddington, Edinburg, Enfield, Etna, Exeter, Garland, Glenburn, Grand Falls Twp, Greenbush, Greenfield Twp, Hampden, Hermon, Holden, Howland, Hudson, Indian Island, Kenduskeag, Kingman Twp, Lagrange, Lakeville, Lee, Levant, Lincoln, Lowell, Mattamiscontis Twp, Mattawamkeag, Maxfield, Medway, Milford, Newburgh, Newport, Old Town, Orono, Orrington, Passadumkeag, Plymouth, Prentiss Twp T7 R3 NBPP, Pukakon Twp, Seboeis Plt, Springfield, Stetson, Summit Twp, T2 R8 NWP, T2 R9 NWP, T3 R1 NBPP, T3 R9 NWP, Veazie, Webster Plt, Winn, Woodville,

Piscataquis County: Abbot, Atkinson, Barnard Twp, Blanchard Twp, Bowerbank, Brownville, Dover-Foxcroft, Elliottsville Twp, Greenville, Guilford, Katahdin Iron Works Twp, Kingsbury Plt, Lake View Plt, Medford, Milo, Monson, Moosehead Junction Twp, Orneville Twp, Parkman, Sangerville, Sebec, Shirley, T4 R9 NWP, T5 R9 NWP, T7 R9 NWP, Wellington, Williamsburg Twp, Willimantic

Sagadahoc County: The entire County.

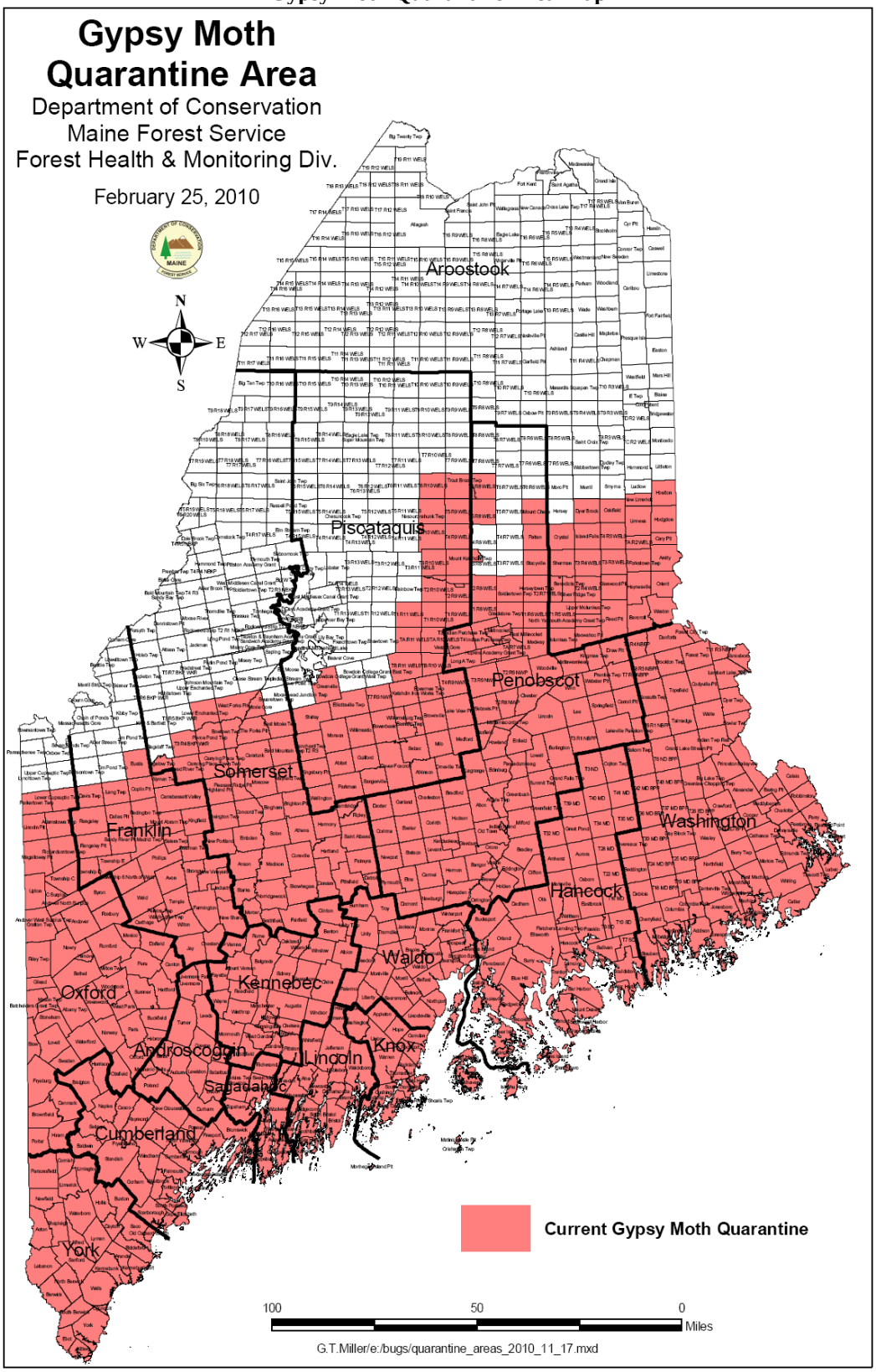
Somerset County: Anson, Athens, Bald Mountain Twp T2 R3, Bigelow Twp, Bingham, Bowtown Twp, Brighton Plt, Cambridge, Canaan, Caratunk, Carrying Place Town Twp, Carrying Place Twp, Chase Stream Twp, Concord Twp, Cornville, Dead River Twp, Detroit, East Moxie Twp, Embden, Fairfield, Harmony, Hartland, Highland Plt, Indian Stream Twp, Lexington Twp, Madison, Mayfield Twp, Mercer, Moscow, Moxie Gore, New Portland, Norridgewock, Palmyra, Pittsfield, Pleasant Ridge Plt, Ripley, Saint Albans, Skowhegan, Smithfield, Solon, Squaretown Twp, Starks, The Forks Plt, West Forks Plt

Waldo County: The entire County.

Washington County: Beddington, Cherryfield, Deblois, Devereaux Twp, Sakom Twp, Steuben, T30 MD BPP, T36 MD BPP, T42 MD BPP

York County: The entire County.

Gypsy Moth Quarantine Area Map



Areas Regulated by Maine's Gypsy Moth Quarantine

Baxter State Park –The entire park (entire townships of: Mount Katahdin Twp, Nesourdnahunk Twp, T3 R10 WELS, T4 R9 WELS, T5 R9 WELS, T6 R10 WELS, Trout Brook Twp and portions of: T2 R10 WELS, T2 R9 WELS, T3 R8 WELS, T4 R10 WELS, T6 R8 WELS)

Androscoggin County- The entire County.

Aroostook County- Amity, Bancroft, Benedicta, Cary Plt, Crystal, Dyer Brook, Forkstown Twp, Glenwood Plantation, Haynesville, Hodgdon, Houlton, Island Falls, Linneus, Macwahoc Plantation, Molunkus, N. Yarmouth Acad.Grant, New Limerick, Oakfield, Orient, Reed Plantation, Sherman, Silver Ridge, T1 R5 WELS, T2 R4 WELS, T3 R3 WELS, T3 R4 WELS, T4 R3 WELS, TA R2 WELS, Upper Molunkus, Weston

Cumberland County- The entire County.

Franklin County- Avon, Carthage, Chesterville, Coplin Plantation, Crockertown, Dallas Plantation, Davis, Eustis, Farmington, Freeman, Industry, Jay, Jerusalem, Kingfield, Lang, Madrid, Mount Abraham, New Sharon, New Vineyard, Perkins, Phillips, Rangeley, Rangeley Plantation, Redington, Salem, Sandy River Plantation, Strong, Temple, Twp 6 North of Weld, Twp D, Twp E, Washington, Weld, Wilton, Wyman

Hancock County- The entire County.

Kennebec County- The entire County.

Knox County- The entire County.

Lincoln County- The entire County.

Oxford County- Adamston, Albany, Andover, Andover North, Andover West, Batchelders Grant, Bethel, Brownfield, Buckfield, Byron, C Surplus, Canton, Denmark, Dixfield, Fryeburg, Gilead, Grafton, Greenwood, Hanover, Hartford, Hebron, Hiram, Lincoln Plantation, Lovell, Lower Cupsuptic, Magalloway Plantation, Mason Plantation, Mexico, Milton Plantation, Newry, Norway, Oxford, Paris, Parkerstown, Peru, Porter, Richardsontown, Riley, Roxbury, Rumford, Stoneham, Stow, Sumner, Sweden, Twp C, Upton, Waterford, Woodstock

Penobscot County- Alton, Argyle, Bangor City, Bradford, Bradley, Brewer City, Burlington, Carmel, Carroll Plantation, Charleston, Chester, Clifton, Corinna, Corinth, Dexter, Dixmont, Drew Plantation, East Millinocket, Eddington, Edinburg, Enfield, Etna, Exeter, Garland, Glenburn, Grand Falls Plantation, Greenbush, Greenfield, Grindstone, Hampden, Hermon, Hersey Town, Holden, Hopkins Academy Grant, Howland, Hudson, Indian Purchase, Kenduskeag, Kingman, Lagrange, Lakeville, Lee, Levant, Lincoln, Long A, Lowell, Mattamiscontis, Mattawamkeag, Maxfield, Medway, Milford, Millinocket, Mount Chase, Newburgh, Newport, Old Town City, Orono, Orrington, Passadumkeag, Patten, Plymouth, Prentiss Plantation, Seboeis Plantation, Soldiertown, Springfield, Stacyville, Stetson, Summit, T1 ND, T1 R6 WELS, T1 R8 WELS, T2 R8 NWP, T2 R8 WELS, T2 R9 NWP, T3 R1 NBPP, T3 R9 NWP, T5 R1 NBPP, T5 R8 WELS, T6 R8 WELS, TA R7, TA R8, TA R9, Veazie, Veazie Gore, Webster Plantation, Winn, Woodville and portions of T3 R8 WELS within the boundaries of Baxter State Park.

Piscataquis County- Abbot, Atkinson, Barnard, Blanchard Plantation, Bowerbank, Brownville, Dover-Foxcroft, Eliotsville Twp., Greenville, Guilford, Katahdin Ironworks Twp., Kingsbury Plantation, Lakeview Plantation, Medford, Milo, Monson, Mount Katahdin Twp, Nesourdnahunk Twp, Orneville, Parkman, Sangerville, Sebec, Shirley, T1 R10 WELS, T1 R11 WELS, T1 R9 WELS, T2 R10 WELS, T2 R9 WELS, T3 R10 WELS,T4 R9 NWP, T4 R9 WELS, T5 R9 NWP, T5 R9 WELS, T6 R10 WELS, T7 R9 NWP, TA R10 WELS, TA R11 WELS, TB R10 WELS, TB R11 WELS, Trout Brook Twp, Wellington, Williamsburg, Willimantic and portions of T4 R10 WELS within the boundaries of Baxter State Park.

Sagadahoc County- The entire County.

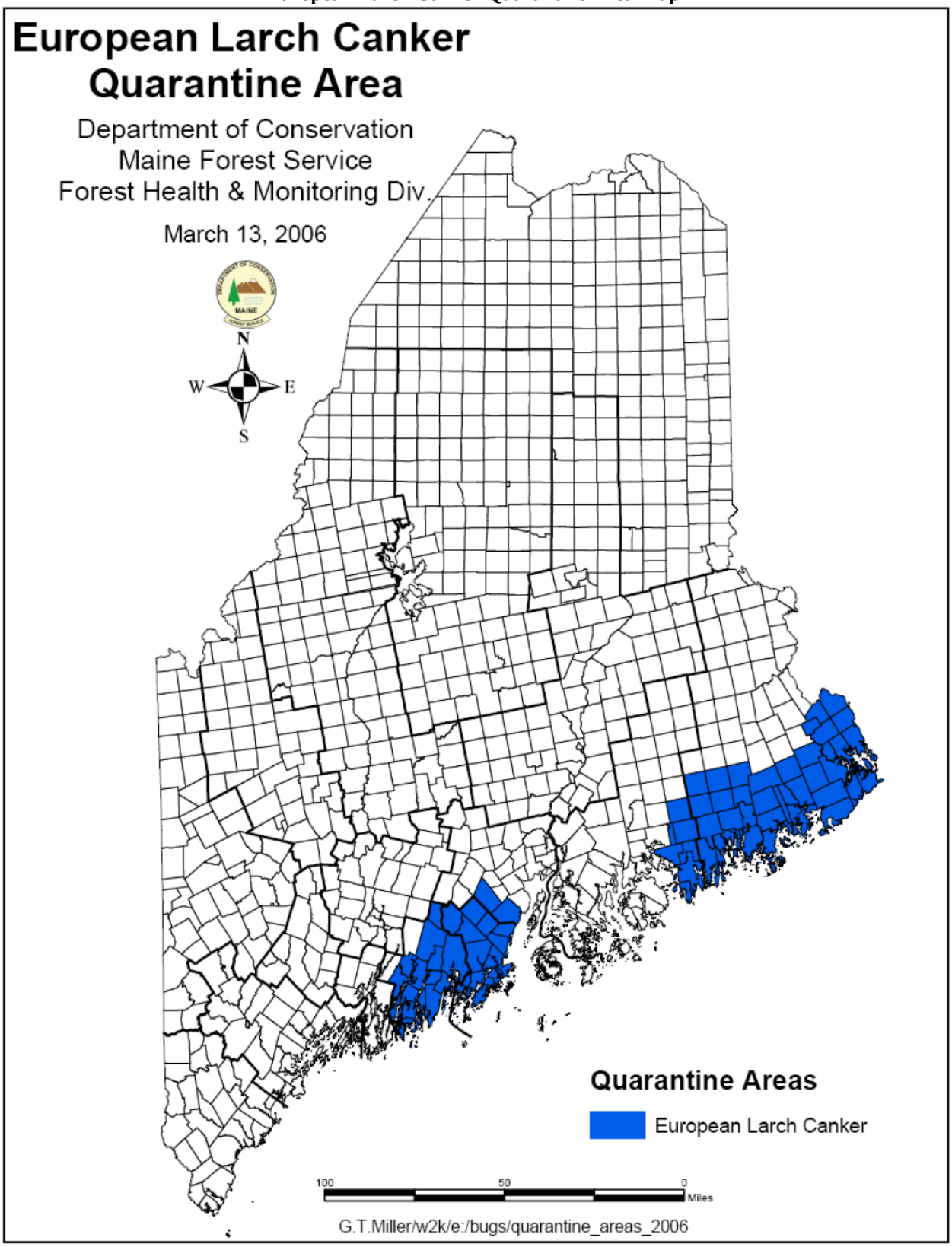
Somerset County- Anson, Athens, Bald Mountain, Bigelow Twp, Bingham, Bowtown, Brighton Plantation, Cambridge, Canaan, Caratunk, Carrying Place, Carrying Place Town, Concord Plantation, Cornville, Dead River, Detroit, East Moxie Twp, Embden, Fairfield, Harmony, Hartland, Highland Plantation, Lexington Plantation, Lower Enchanted Twp, Madison, Mayfield, Mercer, Moscow, Moxie Gore, New Portland, Norridgewock, Palmyra, Pittsfield, Pierce Pond Twp, Pleasant Ridge Plantation, Ripley, Skowhegan, Smithfield, Solon, St. Albans, Starks, T3 R4 BKP WKR, The Forks Plantation, West Forks Plantation

Waldo County- The entire County.

Washington County- The entire County.

York County- The entire County.

European Larch Canker Quarantine Area Map



Towns Regulated by Maine's European Larch Canker Quarantine

Hancock County - Gouldsboro, Sorrento, Sullivan, T7 SD, T9 SD, T10 SD, and T16 MD, and Winter Harbor

Knox County - Appleton, Camden, Cushing, Friendship, Hope, Owls Head, Rockland, Rockport, Saint George, South Thomaston, Thomaston, Union, Warren, and Washington

Lincoln County - Alna, Boothbay, Boothbay Harbor, Bremen, Bristol, Damariscotta, Edgecomb, Jefferson, Newcastle, Nobleboro, Somerville, South Bristol, Southport, Waldoboro, Westport Island, and Wiscasset

Waldo County - Lincolnville and Searsmont

Washington County - Addison, Baring Plantation, Beals, Beddington, Berry Township, Calais, Cathance Township, Centerville Township, Charlotte, Cherryfield, Columbia, Columbia Falls, Cooper, Cutler, Deblois, Dennysville, East Machias, Eastport, Edmunds Township, Harrington, Jonesboro, Jonesport, Lubec, Machias, Machiasport, Marion Township, Marshfield, Meddybemps, Milbridge, Northfield, Pembroke, Perry, Robbinston, Roque Bluffs, Steuben, T18 MD BPP, T19 MD BPP, T24 MD BPP, T25 MD BPP, Trescott Township, Whiting, and Whitneyville

Areas in the United States Regulated by Maine's Hemlock Woolly Adelgid Quarantine

Maine:
York County: Eliot, Kittery, Ogunquit, South Berwick, Wells, York

Detections have been made in the following additional towns, and a quarantine revision to include these towns at a minimum is pending:

Cumberland County: Brunswick, Cape Elizabeth, Cumberland, Falmouth, Freeport, Great Diamond Island (part of Portland) Harpswell, South Portland, Yarmouth

Lincoln County: Boothbay, Boothbay Harbor, Bristol, Edgecomb, South Bristol, Westport Island, Wiscasset

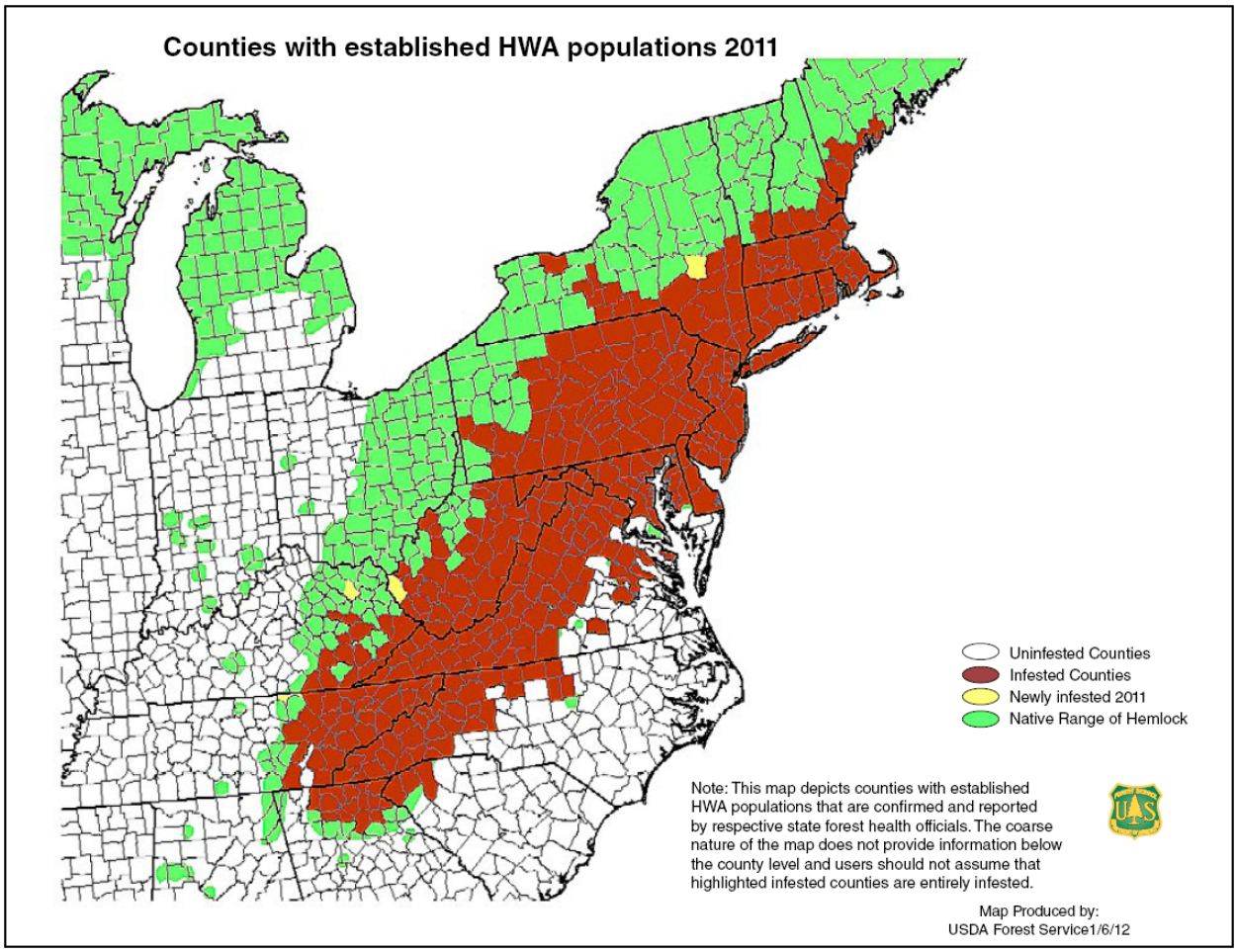
Sagadahoc County: Arrowsic, Bath, Georgetown, Phippsburg, West Bath, Woolwich

York County: Alfred, Arundel, Biddeford, Kennebunk, Kennebunkport, and Saco.

New Hampshire:
Cheshire, Hillsborough, Rockingham, and Strafford Counties

Vermont
Windham County

Eastern United States:
All or parts of: Connecticut, Delaware, Georgia, Kentucky, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New Jersey, New York, North Carolina, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia. See complete list next page.



Western United States: Entire States of: Alaska, California, Oregon, Washington

Eastern US Counties Regulated by Maine's Hemlock Woolly Adelgid Quarantine
(*italics are new listings in 2011*)

Connecticut: Entire State

Delaware: Entire State

Georgia: Banks, Fannin, Habersham, Hall, Lumpkin, Murray, Pickens, Rabun, Stephens, Towns, Union, White

Kentucky: Bell, Breathitt, Clay, Floyd, Harlan, Laurel, Leslie, Letcher, McCreary, Owsley, Pike, Powell, *Rowan*, Whitley, Wolfe

Massachusetts: Barnstable, Berkshire, Bristol, Dukes, Essex, Franklin, Hampden, Hampshire, Middlesex, Norfolk, Plymouth, Suffolk, Worcester

Maryland: Allegany, Anne Arundel, Baltimore, Calvert, Caroline, Carroll, Cecil, Frederick, Garrett, Harford, Howard, Kent, Montgomery, Prince George, Queen Anne's, Talbot, Washington

Maine: Parts of York County, pending additions to in Cumberland, Lincoln, Sagadahoc and York Counties.

North Carolina: Alamance, Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Caldwell, Caswell, Catawba, Cherokee, Clay, Forsyth, Graham, Haywood, Henderson, Iredell, Jackson, Macon, Madison, McDowell, Mitchell, Orange, Polk, Rockingham, Rutherford, Stokes, Surry, Swain, Transylvania, Watauga, Wilkes, Yancey

New Hampshire: Cheshire, Hillsborough, Rockingham, Strafford

New Jersey: Entire State

New York: Albany, Bronx, Broome, Chemung, Columbia, Delaware, Dutchess, Greene, Kings, Monroe, Nassau, New York, Orange, Putnam, Queens, Rensselaer , Richmond, Rockland, *Schoharie*, Schuyler, Seneca, Suffolk, Sullivan, Tioga, Tompkins, Ulster, Westchester, Yates

Pennsylvania: Adams, Allegheny, Bedford, Berks, Blair, Bradford, Bucks, Cambria, Carbon, Centre, Chester, Clearfield, Clinton, Columbia, Cumberland, Dauphin, Delaware, Elk, Fayette, Franklin, Fulton, Huntingdon, Juniata, Lackawanna, Lancaster, Lebanon, Lehigh, Luzerne, Lycoming, Mifflin, Monroe, Montgomery, Montour, Northampton, Northumberland, Perry, Philadelphia, Pike, Potter, Schuylkill, Snyder, Somerset, Sullivan, Susquehanna, Tioga, Union, Wayne, Westmoreland, Wyoming, York

Rhode Island: Entire State

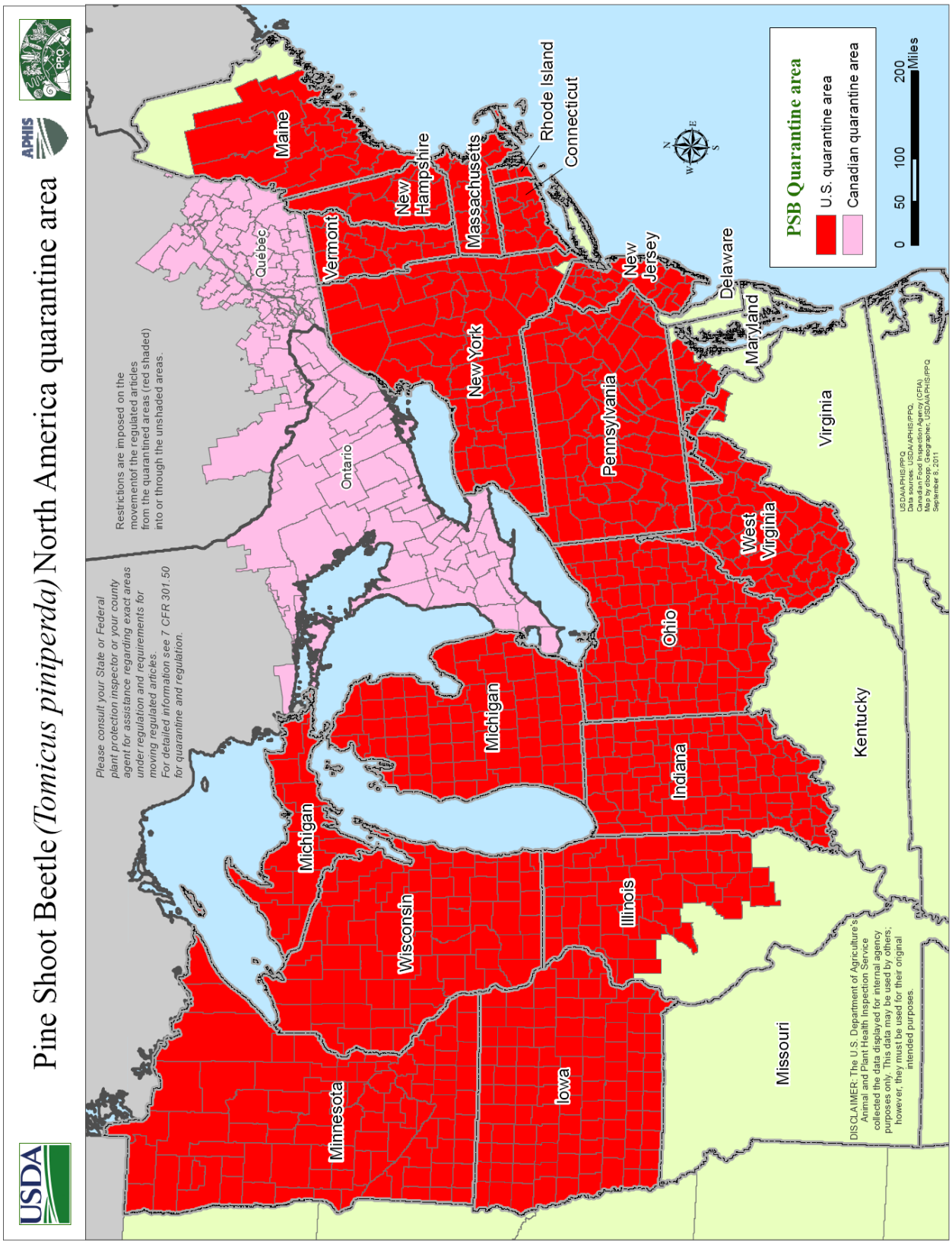
South Carolina: Greenville, Oconee, Pickens

Tennessee: Blount, Campbell, Carter, Claiborne, Cocke, Cumberland, Grainger, Greene, Hamblen, Hamilton, Hancock, Hawkins, Jefferson, Johnson, Knox, Loudon, McMinn, Monroe, Morgan, *Picket*, Polk, Rhea, Sevier, Sullivan, Unicoi, Union, Washington

Vermont: Windham

Virginia: Albemarle, Alleghany, Amherst, Appomattox, Arlington, Augusta, Bath, Bedford, Bland, Botetourt, Buchanan, Buckingham, Campbell, Caroline, Carroll, Chesterfield, Clarke, Craig, Culpeper, Dickenson, Essex, Fairfax, Fauquier, Floyd, Fluvanna, Franklin, Frederick, Giles, Grayson, Greene, Hanover, Henrico, Henry, Highland, King William, Lee, Loudoun, Lunenburg, Madison, Montgomery, Nelson, Northumberland, Orange, Page, Patrick, Pittsylvania, Prince William, Pulaski, Rappahannock, Roanoke, Rockbridge, Rockingham, Russell, Shenandoah, Smyth, Spotsylvania, Tazewell, Warren, Washington, Wise, Wythe

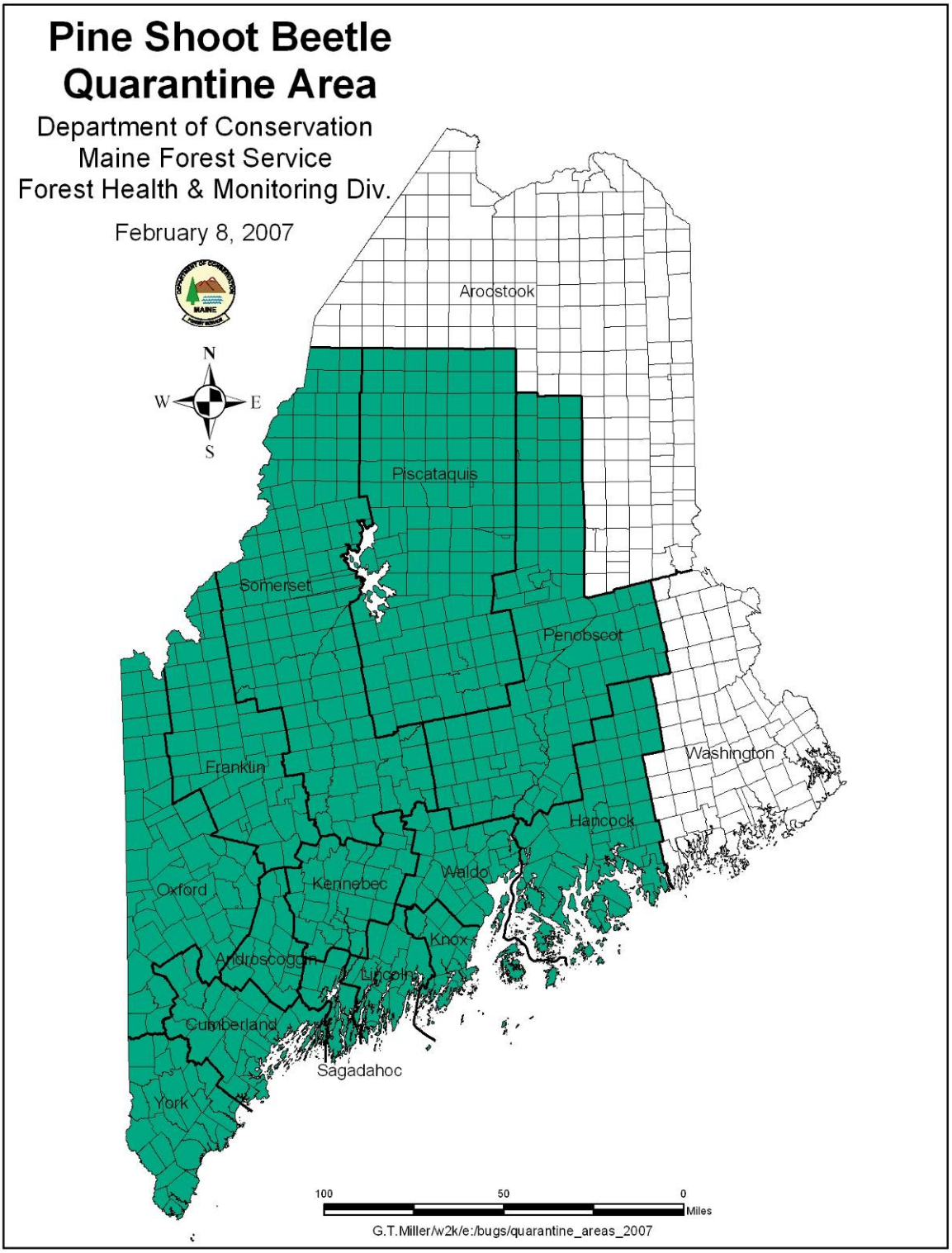
West Virginia: Barbour, Berkeley, Boone, Braxton, Cabell, Fayette, Grant, Greenbrier, Hampshire, Hardy, Jefferson, Kanawha, Lewis, Lincoln, Logan, Marion, McDowell, Mercer, Mineral, Mingo, Monongalia, Monroe, Morgan, Nicholas, Pendleton, Pocahontas, Preston, Raleigh, Randolph, Roane, Summers, Tucker, Upshur, *Wayne*, Webster, Wirt, Wood, Wyoming



United States and Canadian Pine Shoot Beetle Quarantine Areas

The above map is available online at: http://www.aphis.usda.gov/plant_health/plant_pest_info/psb/.

Maine Pine Shoot Beetle Quarantine Area Map



Maine Counties Regulated by the Pine Shoot Beetle Quarantine

Androscoggin, Cumberland, Franklin, Hancock, Kennebec, Knox, Lincoln, Oxford, Penobscot, Piscataquis, Sagadahoc, Somerset, Waldo and York Counties (All *except* Aroostook and Washington)

Maine Forest Service
DEPARTMENT OF CONSERVATION
INSECT & DISEASE MANAGEMENT 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.
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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.
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10. Struble, D., W. Kemp and H. Trial, Jr. Evaluation of a Reduced Dosage of Orthene for Spruce Budworm Control in Maine: 1977 and 1978. December, 1979. **Unpublished**.
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12. Kemp, W.P., H. Trial, Jr. and D. Struble. Sampling and Analysis Design for Departmental Insecticide Monitoring. February, 1979. 32 pp.
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41. Foss, K.A. Variations in Ground Beetle (Coleoptera: Carabidae) Populations Across Ecological Habitats for the Stetson Brook Watershed in Lewiston, Maine. October 2001. 2- pp. + i-ii.

42. Foss, K.A and R.G. Dearborn. Preliminary Faunistic Survey of Mosquito Species (Diptera: Culicidae) with a Focus on Population Densities and Potential Breeding sites in Greater Portland, Maine. November 2001. 35 pp.
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Appendices

Appendix A
Monitoring for Emerald Ash Borer (*Agrilus planipennis*): Purple Prism Traps, Trap Trees, and Biosurveillance with *Cerceris fumipennis*

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Introduction: Emerald ash borer (EAB) is a serious invasive pest of ash trees (*Fraxinus* spp.). This insect is native to Asia and attacks all species of ash in North America. Ash trees on this continent have no defenses against the EAB and usually die within a few years of attack. Emerald ash borer was first found in Michigan in 2002, and since then has spread rapidly throughout the eastern part of the continent. A large outlier infestation was found in the Hudson Valley in New York, close to the borders of CT and MA. EAB has killed millions of trees in the last several years, and has the potential to destroy ash in North America in the same way that Dutch elm disease decimated the elm.

A very large proportion of new EAB infestations are caused by people unknowingly moving infested firewood. Often new EAB infestations are not found for several years, during which time the insects can be unwittingly spread further in firewood from those new areas. People can help slow the spread of EAB and protect the forests they care about by leaving their firewood at home when they travel. As of August 2010, it is unlawful to bring firewood from out of state into Maine. Maine Forest Service has an active "Leave Your Firewood At Home" campaign which is directed toward people from out-of-state, as well as Maine residents.

The Maine Forest Service investigates reports of possible EAB infestations. Maine also monitors for EAB using three methods: purple prism traps, girdled trap trees, and biosurveillance.

Purple prism trap survey: In the summer of 2011, the MFS participated in the fourth year of a national trapping trial for EAB. Large purple sticky traps (photo at right) were placed at 10 sites (mainly campgrounds and parks) throughout the southern and central part of the state (Table A1). At each site two large purple sticky prism traps baited with manuka oil were hung in the canopies of ash trees at a height of 20-30 feet. Traps were set in the third week of June, were replaced in late July, and were removed the first week of September.

No EAB was detected by this trapping method, and in addition, no buprestids of any species were captured on any purple sticky traps in 2011.

Table A1: Location of purple prism traps in 2011.

Town	County	Number of Traps
Biddeford	York	2
Brunswick	Knox	5
Camden	Knox	2
Damariscotta	Lincoln	2
Durham	Cumberland	2
Freeport	Cumberland	2
Kennebunkport	York	2
Whitefield	Lincoln	1
York	York	2

Trap Tree Network: In 2011, in cooperation with the University of Maine at Orono and the Maine Indian Basketmakers Alliance, the Maine Forest Service initiated a trap tree network throughout Maine. Volunteers, including many members of the Small Woodlot Owners Association of Maine and the staff at Camden Hills State

Park, girdled suitable ash trees on their property in June. Girdling an ash tree makes it highly attractive to any EAB that might be nearby.

In January 2012, the trees were felled, cut into bolts, and brought in to the Maine Forest Service where we had two "log-peeling parties". The volunteers worked alongside MFS personnel, basketmakers, and people from the university to peel the bolts and search for evidence of EAB. A total of 61 3-foot bolts of ash were peeled from 9 girdled trees in 9 towns. No sign of EAB was found.

List of Towns where trap trees were located: Auburn, Camden, China, Dixmont, Lovell, New Gloucester, Parkman, Swanville, Topsham

Biosurveillance for emerald ash borer: In 2008, the Maine Forest Service initiated a biosurveillance project for EAB. Biosurveillance is the use of one living organism to survey for another. *Cerceris fumipennis* (pictured on the right with native buprestid prey) is a native, non-stinging wasp which nests in hard-packed sandy ground and hunts buprestid beetles, including EAB when present. In Maine, it is very commonly found in hard-packed baseball diamonds. It is much more efficient at finding EAB than humans are, and has the potential to find a new infestation earlier. We are also using this wasp to monitor for other exotic buprestids of concern.

Biosurveillance was carried out at 21 sites. However, at some sites we were not able to collect beetles. Buprestids were collected at 13 sites in 9 towns. Volunteer Waspwatchers included Girl Scouts, town arborists, Maine Entomological Society members, families, a town councilman, a high school teacher, and other interested individuals. They are an integral part of this program and we greatly appreciate their help in making it successful. Maine's biosurveillance program would not be possible without them.

Towns where buprestids were collected from Cerceris fumipennis wasps: Auburn, Augusta, Casco, Dedham, Farmingdale, Freeport, Fryeburg, Poland, Whitefield.

Biosurveillance Research:

Mobile Colonies: In 2011, we continued experimenting with creating mobile colonies. Since in many parts of Maine there appear to be no naturally-occurring *C. fumipennis* colonies, we feel it is important to create mobile colonies which can be taken to high-risk areas to monitor for EAB. One-gallon buckets were filled with firmly-packed sand from an existing colony. Food, water and nest holes were provided and buckets were covered (see picture at right). The covered buckets were placed outside in open shade out of direct sunlight. Wasps were observed feeding on honey-water, drinking, and excavating nests. Paralyzed beetles were placed beside any hole which showed signs of fresh excavation. About 1/3 of the beetles offered were taken into the nests. After three days, the covers were removed and the wasps were allowed to forage. In the first trial, three of the eight wasps returned after the first day, but on the second day, there was a severe thunderstorm, after which, no wasps returned. In the second trial, only two wasps returned after the first day. One wasp continued to return for 3 days. Then there was another thunderstorm and she was not seen again.

We thank our Waspwatcher volunteers, the Walton and the Brown families, for their help in providing live paralyzed beetles for these experiments.

Degree-Day Modeling: Working in cooperation with Claire Rutledge (Connecticut Agricultural Experiment Station), Philip Careless (independent contractor in Ontario), and Melissa Fierke (State University of New York Environmental Science and Forestry), the Maine Forest Service continued a two-year study to determine a soil degree-day (DD) model for the emergence of *Cerceris fumipennis*. Wasp emergence varies greatly with weather

from year to year, and site to site. Being able to predict the timing of wasp emergence would allow both forest health professionals and volunteers to make more efficient use of *C. fumipennis* for biosurveillance.

Thirty-two temperature probes were buried eight inches below the soil surface in wasp colonies throughout the four states and provinces. Ten probes were buried in Maine. These sites were then monitored closely by both volunteers and entomologists to determine the date of adult wasp emergence. Due to diligent monitoring by Waspwatcher volunteers, temperature and emergence data were collected at nine of the ten sites (one temperature probe was dug up and stolen). In Maine, most of the wasps emerged between July 5 in southern Maine, and July 18 in the northern areas. Data is currently being analyzed to produce a degree-day model. We thank the many Waspwatchers, as well as personnel at the Eastern Slopes Regional Airport in Fryeburg for their assistance with this research.

Appendix B
Exotic Woodborer/Bark Beetle National Survey 2011

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No targeted exotic woodborers or bark beetles were found in the 2011 Survey.

The Maine Forest Service (MFS) has been trapping bark beetles and woodborers for eight years as part of a nation-wide effort to monitor and detect new introductions of beetles into North America. Non-native invasive insects present one of the greatest threats to the integrity and viability of forest ecosystems because increasing world trade and travel have amplified the risks of their inadvertent introduction into forests. While exclusion is the ultimate goal, some exotic insect pests will escape detection and will become established near ports of entry or other inland import sites.

The target species of the survey were selected by the national committee of the Cooperative Agricultural Pest Survey (CAPS), in cooperation with the USDA-APHIS and USDA Forest Service (USDA-FS). Target species are either exotic pests, not known to occur in the United States, or pests with limited distribution(Table 1). Surveys are planned and coordinated through each Plant Protection and Quarantine State Plant Health Director's office and state cooperators (state departments of agriculture). The goals of the national survey are to obtain information about:
• The presence, distribution, or absence of the target species,
• The distribution of additional exotic wood borer and bark beetle species,
• Patterns of distribution throughout the United States and possible pathways for introduction of target and other exotic wood borer and bark beetle species,
• The phenology of target species in the United States and their selection of hosts.

Table B1. 2011 target species for Maine exotic woodborer/bark beetle survey

Common Name	**Scientific Name**		
Goldspotted oak borer	Coleoptera	Buprestidae	*Agrilus coxalis*
Black spruce beetle	Coleoptera	Cerembycidae	*Tetropium castaneum*
Brown spruce longhorned beetle (BSLB)	Coleoptera	Cerembycidae	*Tetropium fuscum*
Japanese pine sawyer	Coleoptera	Cerembycidae	*Monochamus alternatus*
Lesser spruce shoot beetle	Coleoptera	Scolytinae	*Hylurgops palliatus*
Redhaired pine bark beetle	Coleoptera	Scolytinae	*Hylurgus ligniperda*
Six-toothed bark beetle	Coleoptera	Scolytinae	*Ips sexdentatus*
European spruce bark beetle	Coleoptera	Scolytinae	*Ips typographus*
Mediterranean pine engraver	Coleoptera	Scolytinae	*Orthotomicus erosus*
Spruce engraver	Coleoptera	Scolytinae	*Pityogenes chalcographus*
Pine shoot beetle	Coleoptera	Scolytinae	*Tomicus destruens*
Pine shoot beetle (PSB)	Coleoptera	Scolytinae	*Tomicus piniperda*
European hardwood ambrosia beetle	Coleoptera	Scolytinae	*Trypodendron domesticum*
-	Coleoptera	Scolytinae	*Xyleborus* spp.
-	Coleoptera	Scolytinae	*Xylotrechus* spp.
Sirex woodwasp	Hymenoptera	Sircidae	*Sirex noctilio*

Methods
Twenty sites were selected for monitoring throughout Maine (Table 2). The site selection is base on the national criteria set out by the survey program. The workload is shared between the Maine Department of Agriculture and Rural Resources and the MFS. Personnel from APHIS-PPQ in Hermon monitor another set of traps in northern and eastern Maine and all data are shared (Table 2). We also collaborate with the USDA-FS and other states and provinces.

Table B2. Trap locations for 2011 survey

County	Town	Facility Type	Forest Type
Androscoggin	Auburn	Wood processor and railyard	Softwood
Androscoggin	Lewiston	Biomass plant	Hardwood
Androscoggin	Livermore Falls	Biomass plant	Softwood
Androscoggin	Poland	Wood processor	Softwood
Aroostook	Limestone	Warehouse	Softwood
Aroostook	Presque Isle	Tree/green waste recycling	Softwood
Cumberland	Portland	Tree/green waste recycling	Softwood
Cumberland	So. Portland	Railyard	Softwood
Cumberland	Westbrook	Wood processor	Softwood
Cumberland	Windham	Wood processor	Hardwood
Franklin	Farmington	Wood processor	Softwood
Kennebec	Augusta	Warehouse	Softwood
Kennebec	Belgrade	Wood processor	Softwood
Kennebec	Waterville	Warehouse	Hardwood
Knox	Union	Tree/green waste recycling	Softwood
Oxford	Dixfield	Wood processor	Softwood
Oxford	West Paris	Wood processor	Hardwood
Sagadahoc	Bath	Tree/green waste recycling	Softwood
York	Saco	Warehouse	Softwood
York	Sanford	Wood processor	Softwood

Table B3. USDA APHIS,PPQ 2011 survey sites

County	Town	Facility Type	Target Species
Hancock	Sedgewick	Warehouse	Softwood pests
Somerset	Solon	Wood processor	Softwood pests
Washington	Baileyville	Wood processor	Softwood pests

The trapping period is the approximate adult activity period from early April through the beginning of October. Traps are placed in the field as soon as the adult activity period begins and serviced every other week. Four 12-funnel Lindgren traps, each with a different lure for the various bark beetles and woodborers, and a cross-vane trap baited for the *Tetropium* species were deployed at the 16 softwood sites. One 12-funnel Lindgren trap for the European hardwood ambrosia beetle was set at each of the four hardwood sites along with an unbaited triangular purple trap for the Goldspotted oak borer. All bark beetle and wood borers were identified to genus and most to species.

Results

Bill Urquhart microscopically examined several thousand individual specimens and identified to species those appearing unusual for Maine or that closely resembled species on the target list. One individual, *Xyleborus seriatus*, is a targeted species for the USDA-FS. We have picked it up in traps for the past four years at four different locations in two counties. In total, less then a dozen *X. seriatus* have been trapped but we do not know if this will become a pest or not. *X. seriatus* is found only in Massachusetts and Maine.

No USDA APHIS,PPQ targeted exotic woodborers or bark beetles were found in the 2011 Survey.