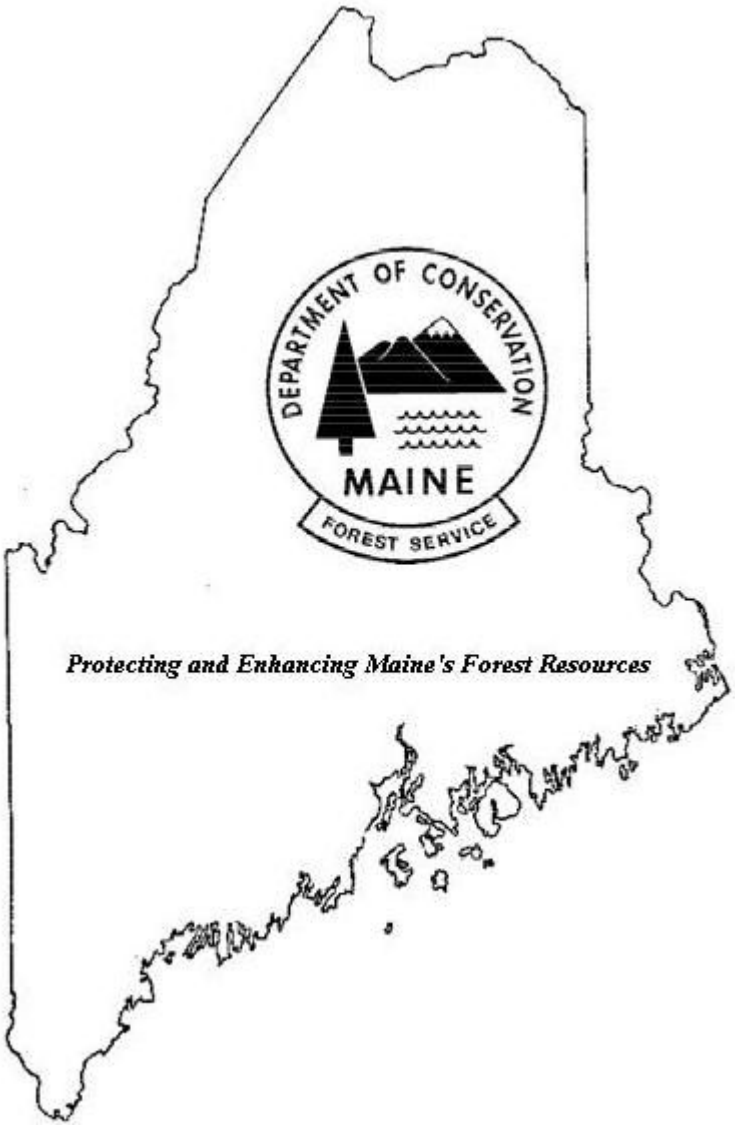
Forest & Shade Tree Insect & Disease Conditions for Maine

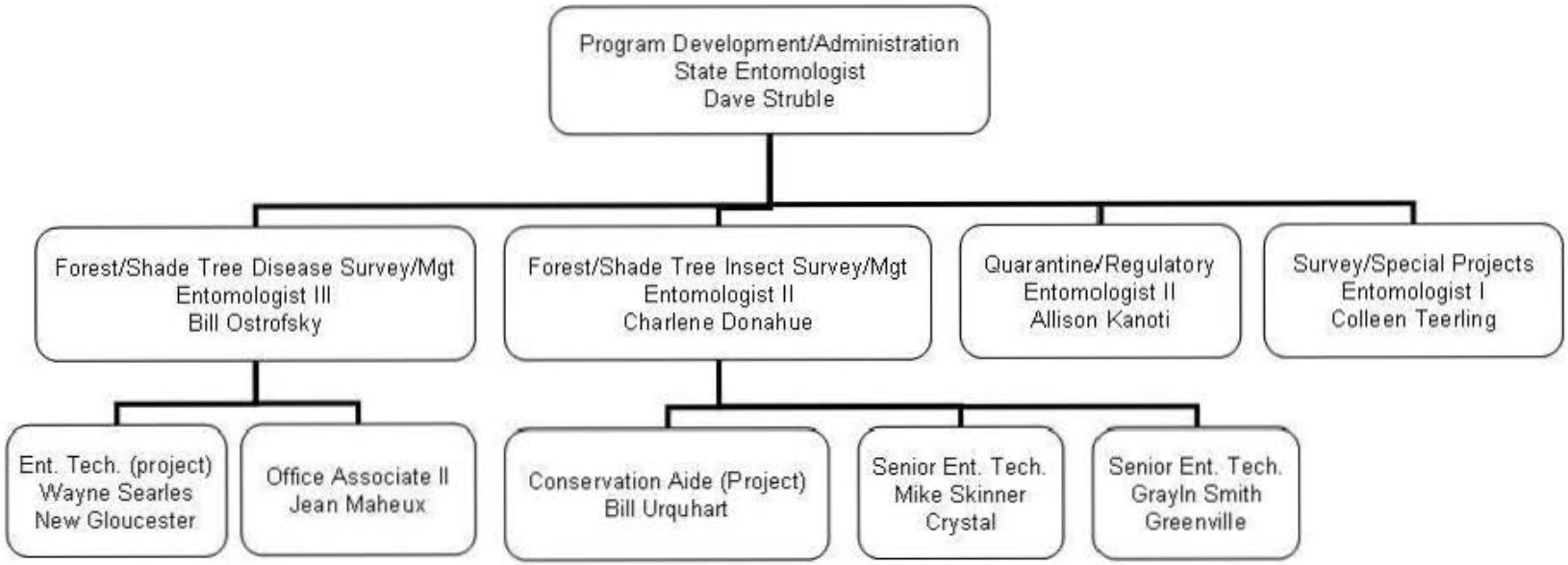
A Summary of the 2008 Situation



Forest Health & Monitoring Division
Summary Report No. 20
March 2009

Maine Forest Service
MAINE DEPARTMENT OF CONSERVATION
Augusta, Maine

Forest Health & Monitoring Division
Insect & 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
ph. (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. 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 Jean Maheux, Office Associate II	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 Grayln Smith, Entomology Technician Box 128 Greenville, Maine 04441 Phone: (207) 695-2452 Radio Call #F-182 * Field staff can be contacted directly for homeowner assistance in their area of the state.

Forest & Shade Tree – Insect & Disease Conditions for Maine
Reports for the 2009 Season

Sign Up/Renewal Form

Please take a moment to consider whether or not you wish to continue to receive our conditions reports and alerts. You may elect to receive a hard copy of the information or an electronic version. If you prefer not to subscribe, you can check our website now and then for updates. Our website will be especially useful for special alerts and quarantine information. The I&DM Lab will still maintain information sheets on a variety of pest problems, available also on our website, and will continue with diagnostic services as time and manpower permit.

You must complete and return this form if you wish to remain/be on our mailing list. All addresses must begin with individual's names, not corporations or position titles. Please take a moment to fill this out.

Individual's Name _____

Mailing Address _____

_____

_____

Telephone_____

E-Mail Address_____

I prefer to receive (check one):

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Area of Interest (check one):

- ☐ Academic Institution
- ☐ Arborist
- ☐ Forester
- ☐ Christmas Tree Grower
- ☐ Government Agency
- ☐ Library
- ☐ Nursery/Greenhouse
- ☐ Interested Individual

Comments:_____

_____

Return Your Completed Form To: **Insect & Disease Laboratory**
168 State House Station
Augusta, Maine 04333-0168

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

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

Acknowledgements

This summary has been compiled by William Ostrofsky, Allison Kanoti, Colleen Teerling and Charlene Donahue. The information has been collected from a variety of projects which represents the efforts of the entire staff of the Forest Health and Monitoring Division's Insect & Disease Management Work Unit. The Entomology Laboratory and Field Staff have the lead responsibility for most projects and activities reported here, but all the information also reflects the work of many other cooperating individuals and organizations.

Most information in this report has been generated with cooperative projects supported by funds and staff of the USDA Forest Service, the Pine Tree State Arboretum, and other state agencies, and from cooperators in other New England states and the Maritime Provinces of Canada. Administrative and field staff in the Forest Inventory Work Unit of the Forest Health and Monitoring Division also have provided critical support that facilitates our work. Special recognition is due to members of the Maine Entomological Society who assist with insect identification work; to the USDA Forest Service, State and Private Forestry personnel at Durham, New Hampshire who have provided field assistance with the larch canker eradication effort and with the Hemlock Woolly Adelgid biological control projects; and to the Maine Indian Basketmakers Alliance, who have greatly assisted with the "*Don't Move Firewood*" campaign.

Finally and most importantly, our thanks go to all our clients; the woodland owners, managers, arborists, Christmas tree growers, foresters, and landscape professionals, for support in keeping us informed of what you see on your properties and during the course of your work.

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FOREST & SHADE TREE INSECT & DISEASE CONDITIONS

FOR MAINE – A SUMMARY OF THE 2008 SITUATION

State Entomologist's Comments

It is again the time of year when I share my reflections and comments on division activities and challenges facing us. And this year there is considerable to reflect upon.

Internally, little has changed: the mission of the Forest Health & Monitoring Division, "within the limits of funds available", continues to be to monitor and maintain the overall health and sustainability of Maine's forest, shade and ornamental tree resources, and to protect them from significant insect and disease damage for the benefit of present and future generations. And, at this point, budgets and staffing appear stable. However, as a result of the events of the past year, the situations we face will challenge our internal capacity to respond effectively.

For years I have mentioned the threat posed by foreign pests. Our forests and shade tree stocks are still adjusting to the impacts of past introductions of chestnut blight, Dutch elm disease, white pine blister rust, gypsy moth, browntail moth and balsam woolly adelgid. In recent years, European larch canker, pine shoot beetle and hemlock woolly adelgid have joined this rogue's gallery. Some of these exotic pests continue to cause serious damage. Others, like gypsy moth, appear to be less virulent as they become naturalized. Still others, like pine shoot beetle, were always less a threat to our forests than they were to other areas of the country; so that the challenge in dealing with those situations was to contain the agent without unnecessarily constraining economically critical commerce.

In recent years one of my primary concerns has been introduction of yet more of the serious exotic pests. Sadly, with the detection this past year of Asian longhorn beetle (ALB) in Worcester, Massachusetts and emerald ash borer (EAB) south of Montreal, it appears that this scenario is becoming more imminent. These are not pests we want to find in Maine, or anywhere else close by.

I am particularly concerned about the Asian longhorn beetle situation. This beetle has apparently been present but undetected in Worcester for more than 10 years. Even if there is no further spread, with the current infested area covering more than 60 square miles, there is a very real possibility that incidental movement of personal firewood or other raw wood products may have established as-yet-undetected infested spots in Maine.

The situation is analogous to a cancer: you definitely do not want to test positive, but if you do have the disease, you want to know as soon as possible. And this is the model we are using to address the current situation. We and cooperating state and federal agencies from surrounding states are engaged in what can be considered a series of "screening procedures" and risk reducing behaviors:

- The USDA-Animal & Plant Inspection Service (APHIS) and the US Forest Service are leading and underwriting cooperative regional public awareness outreach and survey initiatives.
- The National Association of State Foresters is working with APHIS and the National and Regional Plant Boards to develop a regional framework to regulate interstate movement of firewood.
- The Northeastern Area Association of State Foresters, working through their Forest Health and Urban & Community Forestry committees, are in the process of developing procedures to facilitate and expedite locally conducted urban tree monitoring.

The FHM Division is engaged in all of these initiatives. None is a silver bullet, but in aggregate they do provide the best suite of current options to detect and slow the spread on these two tree killing pests.
Detection of the vast majority of EAB and ALB infestations elsewhere in North America has resulted from incidental reports by the public. And the assistance provided by an interested and vigilant public in detecting and reporting hemlock woolly adelgid here in Maine over the past few years clearly indicates to me that this approach is a productive path forward in this instance too.

You, our client cooperators, represent a crucial resource for early detection and for dispersing information about these pest threats. Although we will continue to target internal resources to what we think are high risk areas, we do not have the capacity to look at all the areas that should be checked. The help you have provided in the past has

been critical to pest detection and management. I am soliciting your help again as we move forward on the initiatives mentioned above. I can not overstate the extent of our reliance on you or our appreciation for your contribution.

Although the threat of these pests is very real, that is no justification to abandon the fight. Research and development efforts continue; new tools will be developed. Our responsibility is to contain and slow the spread of these pests until such new pest management tools are available. This is within our ability if we work together.

The Forest & Shade Tree Insect & Disease Condition Reports have served as one of the primary vehicles for communication; we will continue to utilize them as we move forward. Despite my current obsession with the ALB situation, this is not the only forest health issue that you and we need to respond to. We want these reports and the information they contain to be broadly useful to you. We sincerely hope that you will read them, use them, and keep in touch with us regarding information or suggested improvements so that they continue to meet your needs.

Insect Conditions

Insects: Softwood pests

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

Arborvitae leaf miners are a perennial problem but populations are rising. 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. Ornamentals are also showing leaf miner damage.

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

Galls formed by the larvae were visible on the foliage of fir trees this year and the population is on the rise. The midge adults are active in the spring; laying eggs on newly expanding needles. The larvae feed on the needles causing premature needle drop that can result in unmarketable trees for 2-4 years until the damage can be corrected with shearing. Tips are unusable for wreaths due to the needle loss as well. This is an insect to watch for in 2009 if you grow balsam or Fraser fir for Christmas trees or wreath tips.

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

Balsam woolly adelgid populations continued at low levels in 2008. As in the past few years, trunk phase has been reported on scattered trees in northern reaches of the adelgid's distribution, perhaps related to the mild winter and spring temperatures. Mortality of heavily damaged fir continues to occur but it becomes less obvious as old stands are salvaged or fall to the ground. This winter's colder then normal temperatures may push the populations back down. Fir grown for Christmas production should still be watched closely for signs of this pest. Christmas trees generally exhibit the gout phase of the balsam woolly adelgid, with branch tips becoming swollen with misshapen or dead tips in subsequent years.

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

No changes in eastern larch beetle status; pockets of dead and dying larch infested with this species are still common in southern and central portions (including Downeast) of the state. Most tree mortality is in association with other stress factors, particularly extremes in water availability.

Exotic Bark Beetles and Woodborers
Scolytinae, Buprestidae, Cerambycidae

In order to be proactive in protecting Maine's forests we look for exotic insects that have the potential to be invasive and damaging to Maine's forests. As Dave Struble said, detecting and managing an early infestation is much more effective than coming across one at a later stage. One of the methods of detecting bark beetles in particular is to use traps. Lindgren funnel traps baited with lures are effective in attracting bark beetles and allow us to monitor many locations. Using Lindgren traps over the years we have detected a number of exotic beetles, including pine shoot beetle. To date that is the only beetle that has resulted in a quarantine as the other exotic beetles found have not been deemed a threat to forest health. Hopefully we will continue to have negative results. (For more detailed information on the exotic bark beetle and woodborer survey see Appendix A.)

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

Hemlock woolly adelgid (HWA) was first detected in native hemlocks in Maine in 2003. It has been found scattered over approximately 15,000 acres in five towns in the southernmost tip of the state (Kittery, Wells, York, Eliot and South Berwick). Populations continue to thrive within the previously infested area. Two new spot infestations have been found outside the core infested area in the towns of Kennebunkport and Saco (at Ferry Beach State Park). Intensive delimiting surveys are underway and are planned for 2009. Known forest infestations are still all within York County (Figure 1).

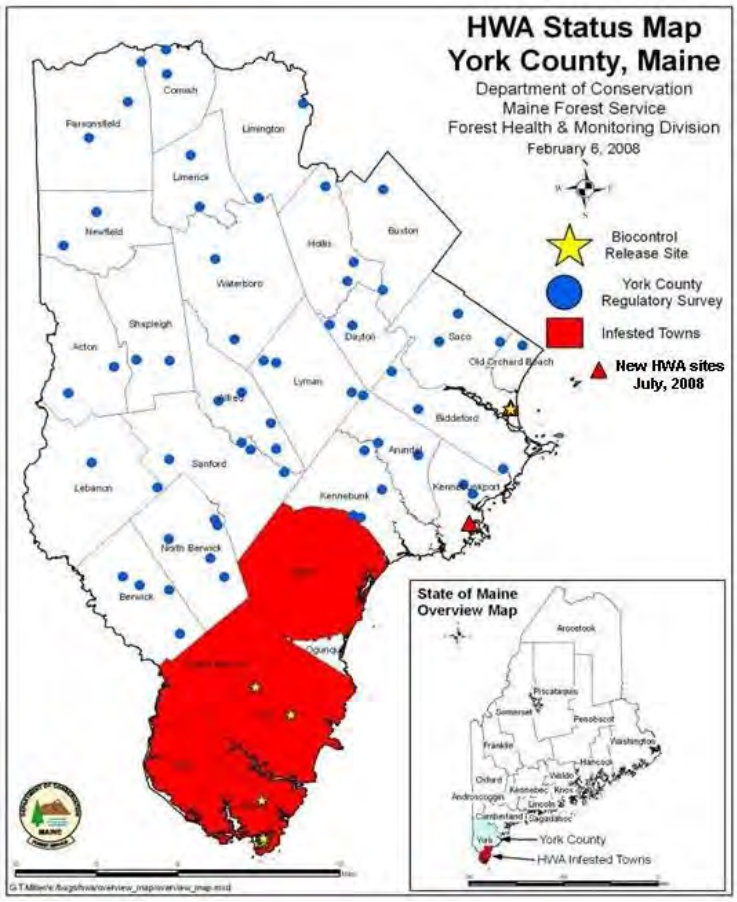


Figure 1. Overview map of HWA in Maine.

The detection in Saco was made by a Ferry Beach State Park ranger who the Maine Forest Service had trained to identify HWA. The infestation in Kennebunkport was reported by the landowner following a press release regarding the detection in Saco. In addition, infested out-planted nursery stock was reported in South Portland, 14 miles from the nearest known forest infestation.

The Maine Forest Service cooperated with the Bureau of Parks and Lands to implement a multifaceted management approach for the Ferry Beach State Park infestation. Physical controls, including branch pruning and tree removal were conducted in areas with high levels of human use including trails, picnic and parking areas and the access road. These efforts were both reactive (removal of infested material) and proactive (removal of material likely to come in contact with HWA). Chemical control was used at two targeted spots along the access road. In addition, 500 individuals of the biological control agent *Laricobius nigrinus* were released at an infested site in the park interior.

The Maine Forest Service cooperates with the Maine Department of Agriculture to eradicate HWA outside of the core infested area. Because of the proximity of the South Portland infestation to the northern edge of the known forest distribution of HWA, it was decided that chemical treatment for eradication would be offered as an option for control. At sites further removed from the infested area, this would not be an option. The landowner opted for chemical treatment, and a contractor applied a combination of an imidacloprid soil drench (imidacloprid) and horticultural oil hydraulic spray to the infested trees. Imidacloprid was chosen because its long-lasting control of HWA. Horticultural oil was used for quick population reduction because imidacloprid can take more than a year for full effects to be realized. The infested site and hemlocks within the neighborhood will be monitored for 5 years, or until HWA is found in South Portland forests, for signs of re-infestation.

Biological control establishment efforts continue in Maine. In 2008, 3000 *Sasajiscymnus tsugae* (St) and 1818 *Laricobius nigrinus* (Ln) beetles were released in York County*:* 3000 St and 1221 Ln beetles in York, 500 Ln in Saco and 100 Ln in Kittery. For the first time, a St adult was recovered from a previous release site in York. Additionally, St adults and larvae continue to be recovered at a release site on Gerrish Island in Kittery (More on HWA Biological Control can be found in Appendix B).

Landowners should monitor their forest and shade tree hemlocks for the presence of HWA. Suspected HWA specimens can be bagged in a Ziploc-style bag and mailed to the insect and disease lab (Allison Kanoti, Insect and Disease Lab, 168 State House Station, Augusta, ME 04333-0168). Information that should be sent with samples includes: Contact Name, Address, Phone Number, E-mail and Tree Location (Latitude/Longitude coordinates and a map preferred).

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

Populations of larch casebearer were lower this spring than had been seen in years. Even the trees Downeast and in mid-Maine that seem to have perennial populations had lovely lush green foliage with only the occasional casebearer.

Larch Sawfly
Pristiphora erichsonii
Host(s): Larch (*Larix* spp.)

A few stands scattered around central Maine have been defoliated by larch sawfly this year. There has been relatively little larch sawfly in the past few years, so it will bear watching to see if the population expands.

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

Pine shoot beetle and its hosts are under State and Federal quarantines 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 (Table 1). Neither organization caught pine shoot beetle in Aroostook or Washington Counties in 2008.

To monitor the known population trends and spread, the Maine Forest Service re-trapped several sites that had yielded pine shoot beetle in previous years, as well as some sites in surrounding towns (Table 2). Traps were hung in Carrabasset Valley, Eustis, Freeman, Rangeley, Adamstown and Byron on March 18, 2008. Thirty-one pine shoot beetles were trapped at three sites: six at Eustis, 21 at Rangeley, and five at Adamstown. All beetles were caught between April 9th and July 14th (the date traps were pulled). The peak catch, 13 beetles, was in the batches from Eustis and Rangeley with trap dates of April 9th to April 22nd. Visual surveys for damage were conducted in the last week of August at the three positive sites. No evidence of pine shoot beetle damage was found. Where it is established, populations of pine shoot beetle remain low and below damage thresholds.

Table 1. Maine Forest Service pine shoot beetle trap locations.

County	Town	Site Type	Latitude	Longitude	# Traps	Date Set
Aroostook	Ashland	Biomass Plant	46.63294	68.43564	2	4/3/08
Aroostook	Ashland	Lumber Mill	46.62339	68.41144	2	4/3/08
Aroostook	Dyer Brook	Scots Pine Plantation	46.03697	68.17883	2	4/3/08
Aroostook	Easton	Red Pine Plantation	46.63108	67.86783	2	4/3/08
Aroostook	Fort Fairfield	Biomass Plant	46.77319	67.84667	2	4/3/08
Aroostook	Hersey	Red Pine Plantation	46.05483	68.36386	2	4/3/08
Aroostook	Monticello	Red Pine Plantation	46.28225	67.84131	2	4/3/08
Aroostook	Moro Plantation	Red Pine Plantation	46.20408	68.33131	2	4/3/08
Aroostook	New Limerick	Mill	46.11058	67.95919	2	4/3/08
Aroostook	Washburn	Red Pine Plantation	46.83131	68.09933	2	4/3/08
Washington	Deblois	Biomass Plant	44.73489	68.03428	2	3/18/08
Washington	Jonesboro	Biomass Plant	44.68069	67.54519	2	3/18/08

Table 2. Pine shoot beetle survey summary, within the infested area.

County: **Town:**	**Franklin** **Carrabasset Valley**	**Franklin** **Eustis**	**Franklin** **Freeman**	**Franklin** **Rangeley**	**Oxford** **Adamstown**	**Oxford** **Byron**
Latitude: **Longitude:**	45.08661 70.21831	45.16075 70.44635	44.92825 70.20523	44.96247 70.69323	45.01261 70.83313	44.7647 70.64872
Type:	Red Pine Plantation	Red Pine Plantation	Red Pine Plantation	Scots Pine Plantation	Scots Pine Plantation	Red Pine Plantation
No. Traps:	2	2	2	2	2	2
Date Set:	3/18/08	3/18/08	3/18/08	3/18/08	3/18/08	3/18/08
Serviced: **No. PSB:**	4/9/2008 0	4/9/2008 0	4/9/2008 0	4/9/2008 0	4/9/2008 0	4/9/2008 0
Serviced: **No. PSB:**	4/22/2008 0	4/22/2008 3	4/22/2008 0	4/22/2008 10	4/22/2008 0	4/22/2008 0
Serviced: **No. PSB:**	5/5/2008 0	5/5/2008 1	5/5/2008 0	5/5/2008 3	5/5/2008 0	5/5/2008 0
Serviced: **No. PSB:**	5/19/2008 0	5/19/2008 2	5/19/2008 0	5/19/2008 4	5/19/2008 1	5/19/2008 0
Serviced: **No. PSB:**	6/2/2008 0	6/2/2008 0	6/2/2008 0	6/2/2008 1	6/2/2008 0	6/2/2008 0
Serviced: **No. PSB:**	6/16/2008 0	6/16/2008	6/16/2008	6/16/2008 3	6/16/2008 2	6/16/2008
Serviced: **No. PSB:**	6/30/2008 0	6/30/2008 0	6/30/2008 0	6/30/2008 0	6/30/2008 1	6/30/2008 0
Serviced: **No. PSB:**	7/14/2008 0	7/14/2008 0	7/14/2008 0	7/14/2008 0	7/14/2008 1	7/14/2008 0
Total/Site:	0	6	0	21	5	0
First Catch: 4/9-4/22/2008 (red pine, Scots pine) Last Catch: 6/30-7/14/2008 (Scots pine)			Traps Pulled: 7/14/2008 Total Catch: 32			
8/28/2008: Rangeley and Adamstown sites visual survey, no evidence of PSB. 8/26/2008: Eustis site visual survey, *Conophthorus resinosae* found in red pine. No evidence of PSB.						

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

Spruce beetle has been a problem along the coast of Maine for many years now. In the 1990's there was a severe infestation of bark beetles that resulted in many stands succumbing to the beetle. The beetle is native to North America and attacks stressed trees. Water level fluctuations, overmaturity for the site and poor soil are underlying stressors that contribute to making trees susceptible to beetle attack.

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

Monitoring spruce budworm (SBW) populations continued in 2008 with traps deployed at 66 locations throughout the northern part of the State (Figure 2). These traps were tended by Maine Forest Service, Irving Woodlands and Baxter State Park personnel. The SBW population remains at very low levels with an average of one moth per site and only 56% of the traps catching any moths at all.

There had been a slight upward trend in the catches from 2005-2007 with 77-89% of the sites positive for moths and an average of 2.5-2.9 moths per site (Table 3). This year the number of sites with moths and the number of moths trapped dropped at most sites. Historically budworm outbreaks occur after a few years of slightly increasing populations and we are looking for that trend (Table 4). Spruce budworm were found in only the Topsfield, Calais and St. Pamphile light traps this year, but light trap catches of all species of moths in all traps were very low. No larval activity or defoliation was observed during field surveys. The MFS will continue to monitor this serious pest.

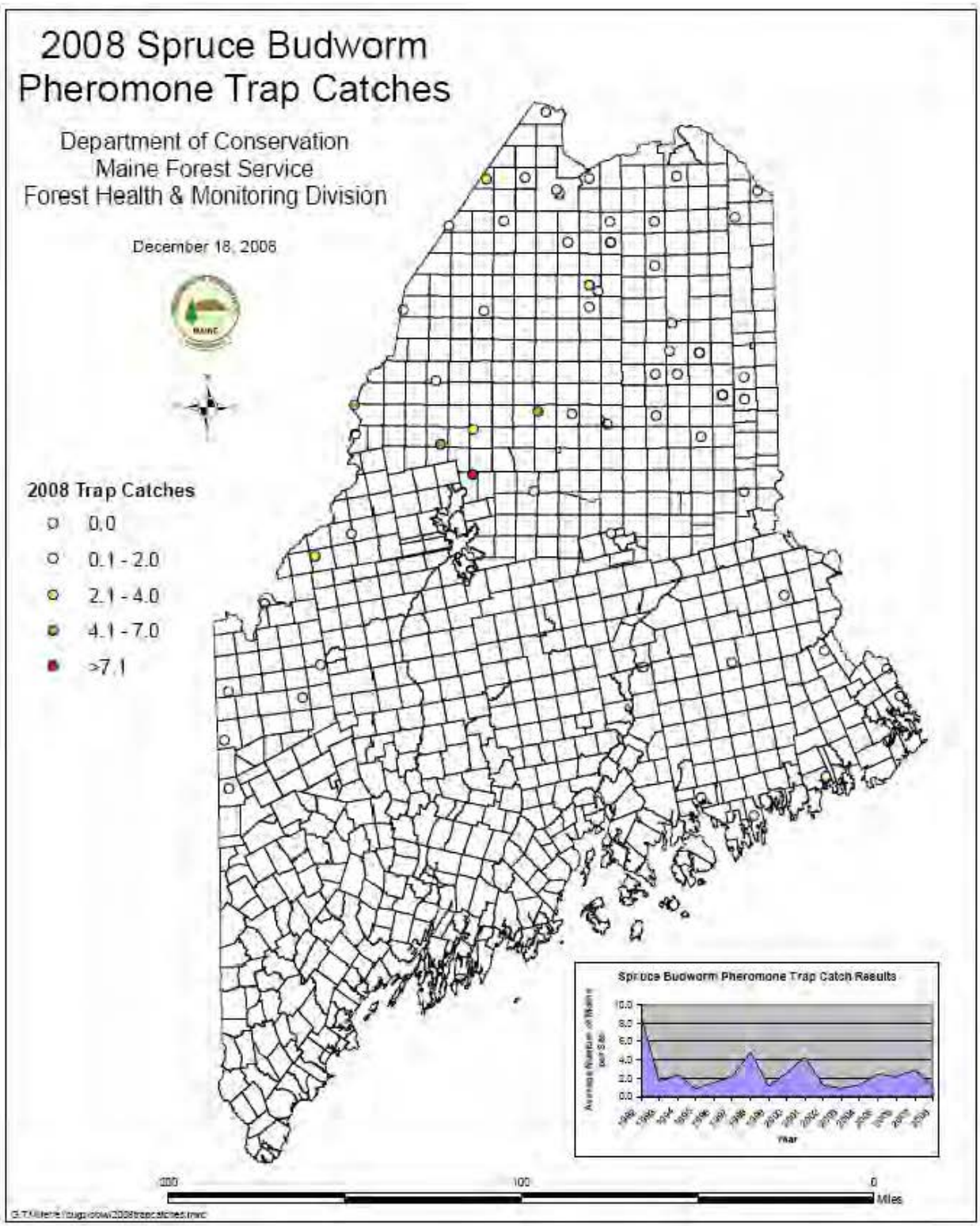


Figure 2. 2008 Spruce budworm pheromone trap locations and catches in Maine.

Table 3. Spruce budworm pheromone trap catch in Maine 2004-2008.

Average count of three traps

Location	Year				
Township	2004	2005	2006	2007	2008
Allagash	1.0	2.0	3.7	5.0	0.0
Big 20 - Escourt	2.0	4.0	3.3	12.0	0.7
Calais			0.3	0.7	0.0
Coburn Gore		1.0	1.0	11.7	0.0
Connor	0.5	1.0	2.0	1.3	1.0
Dallas Twp.		4.0	1.3	4.0	0.0
Dennistown	4.0	0.7	3.7	5.0	0.3
Dudley		0.7	0.0	0.0	0.3
Dudley		0.0	0.0	0.0	0.0
Dyer Brook	0.0	0.0	0.0		0.0
Edmonds				0.7	0.0
Franklin			0.3	0.0	0.0
Garfield	3.0	0.7	6.3	1.7	0.7
Grafton			2.3	1.0	0.3
Greenbush			1.0	1.0	0.0
Hamlin	0.0	7.0	0.5	0.3	0.0
Hammond		1.0	0.0	0.0	0.0
Haynesville	2.0	3.0	0.7	0.7	0.0
Jonesboro		14.0	0.0	0.7	0.3
Magalloway			1.7	5.0	0.0
Parkertown		13.0	0.7	4.3	0.0
Perry			0.0	0	0.0
Portage	0.0	2.0	0.7	1.0	0.3
Princeton			1.0	2.3	0.7
St. Francis		1.0	1.7	2.3	0.7
Steuben		4.0	2.0	2.3	1.0
Stratton				3.7	0.0
T11 R14 - Clayton Lake	2.0	4.0	1.7	1.3	0.3
T11 R17 - Daaquam	3.0	0.3	0.0	0.0	0.0
T11R9	0.0	4.0	3.3	1.0	0.3
T12 R8	1.0	3.0	3.0	2.0	0.0
T12 R9	1.0	6.0	0.7	1.0	3.5
T14 R10	0.0	1.0	1.3	1.3	0.0

Location	**Year**				
Township	2004	2005	2006	2007	2008
T14 R12	6.0	0.3	1.7	0.0	0.3
T14 R8	0.5	1.0	0.3	0.7	0.3
T14 R8	0.5	1.0	0.7	1.7	0.0
T15 R13		3.0	5.3	1.0	0.7
T15 R15 - St Pamphile	2.0	6.0	5.3	6.7	0.7
T15 R6	0.5	0.3	3.5	0.3	0.3
T15 R8	2.0	1.0	1.3	0.3	0.0
T17 R11	3.0	0.0	1.3	0.0	0.3
T17 R12		5.0	7.0	4.0	2.0
T17 R14		2.0	0.7	0.5	3.0
T17 R5 - Dickey Brook	0.0	2.0	1.5	10.3	1.7
T3 Indian Purchase - Smith Pond	0.5	0.7	4.3	4.0	1.0
T3 R12 - Chesuncook	1.0	2.0	1.0	2.7	2.0
T3 R15 - NE Carry	2.0		4.7	10.0	8.0
T4 ND - Duck Lake			0.3	0.0	0.0
T5 R14 - Ragmuff	0.0	2.0	4.3	3.0	4.0
T5R16	0.5	3.0	5.3	12.7	7.0
T5R20	0.5	0.6	3.7	4.0	0.0
T6 R1 NBKP - Holeb	6.0	0.0	10.3	24.0	4.0
T6 R10 WELS			8.5		1.7
T6 R11 - Round Pond	0.0	1.0	3.0	1.0	6.0
T6 R19 - St Aurelie	3.0	3.0	8.7	11.7	7.0
T6 R8 - Matagamon	2.0	8.0	2.0	1.7	1.0
T7 R17 - Baker Lake	0.0	0.0	1.7	1.3	0.0
T7 R6			0.3	0.0	0.0
T8 R16 - St Frances Lake	0.0	2.0	5.5	6.3	2.0
T8 R5		0.0	2.0	0.3	0.7
T8 R6	0.0	0.5	0.0	0.0	0.3
T9 R4	0.5	2.0	0.0		0.0
T9 R4	1.0	1.0	0.3	0.0	0.0
T9 R5 - Oxbow	1.0	1.0	3.0	1.3	1.7
TCR2	0.0	5.0	2.3	0.0	0.0
Topsfield			1.0	0.0	0.0
Average number moths/site	**1.2**	**2.5**	**2.2**	**2.9**	**1.0**
% positive sites	**64**	**89**	**84**	**77**	**56**

Blank = no trap samples

Table 4. Spruce budworm light trap catch in Maine 1961-2008.

Year	Total Number of Moth Caught	Number of Sites	Average Number of Moths/Site
2008	6	25	0.2
2007	7	25	0.3
2006	9	25	0.4
2005	6	25	0.2
2004	32	25	1.3
2003	3	25	0.1
2002	3	25	0.1
2001	162	22	7.4
2000	8	23	0.3
1999	42	25	1.7
1998	86	25	3.4
1997	69	26	2.6
1996	48	24	2
1995	24	24	1
1994	26	24	1.1
1993	52	23	2.3
1992	16	23	0.7
1991	21	23	0.9
1990	107	24	4.4
1989	731	22	30.7
1988	209	20	10.4
1987	464	20	23.2
1986	1,365	20	68
1985	13,233	20	661
1984	17,983	20	895
1983	144,673	18	8,037
1982	49,200	20	2,460
1981	39,724	20	1,986
1980	100,537	19	5,291
1979	95,811	16	5,988
1978	220,264	17	12,957
1977	24,212	15	1,614
1976	22,308	16	1,394
1975	149,874	23	6,516
1974	158,784	24	6,616
1973	39,069	24	1,628
1972	15,959	24	665
1971	20,653	25	826
1970	1,076	24	45
1969	5,415	27	201
1968	948	24	39.5
1967	120	26	4.6
1966	51	24	2
1965	83	24	3.5
1964	159	25	6
1963	133	24	5.5
1962	258	23	11.2
1961	763	17	44.9

Twig Borer
***Pityophthorus* sp.**
Host(s): White Pine (*Pinus strobus*)

The twig borer damage on white pine trees that was noticeable in 2007 decreased dramatically in 2008. Flagging branches could still be found but it was nothing like the outbreak seen the year before.

White Pine Weevil
Pissodes strobi
Host(s): White Pine *(Pinus strobus*)

Stem deformities, resulting from the loss of the terminal leader, are very common on white pine and cause heavy economic losses to landowners annually. While this perennial problem continues to impact the growth of white pine as well as Colorado blue and Norway spruce in Maine, the situation appears static.

Insects: Hardwood Pests

Aspen Serpentine Leafminer
Phyllocnistis populiella
Host(s): Quaking Aspen (*Populus tremuloides*)

Quaking aspen in Aroostook county from the Allagash down to Patten were heavily infested with serpentine leafminers winding their way through the leaf tissue. This tiny moth usually does not create lasting problems for the trees.

Browntail Moth
Euproctis chrysorrhoea
Host(s): Red Oak (*Quercus rubra*)

The browntail moth population in Maine retreated to a hold-out population at the tip of Merrymeeting Bay in Cumberland and Sagadahoc counties. There were 643 acres of heavy defoliation in Bath, Brunswick, Topsham and West Bath (Figure 3) with a slightly wider area having enough larvae to cause discomfort for residents. It is surprising how quickly the population drops off outside the core infestation. Some ground spraying was undertaken by individuals with more planned for 2009. Other isolated locations in the mid-coast area had just a few trees with light feeding.

Winter web surveys are currently underway but preliminary checks indicate that populations in the outbreak area remain extremely high and webs are beginning to show up around Casco Bay in other locations. Portland, Yarmouth, Falmouth and Bowdoinham all have at least some browntail webs. This indicates that browntail moth maybe on the rise again. Hopefully the January cold will push the population back down but the larvae usually survive the cold quite well. We will be doing overwintering survival checks in late March.

Remember that if you are treating for browntail moth the Board of Pesticide Control has made permanent rules restricting where, how and what may be used to control browntail moth in order to provide protection for lobsters and other non-target organisms from pesticides.

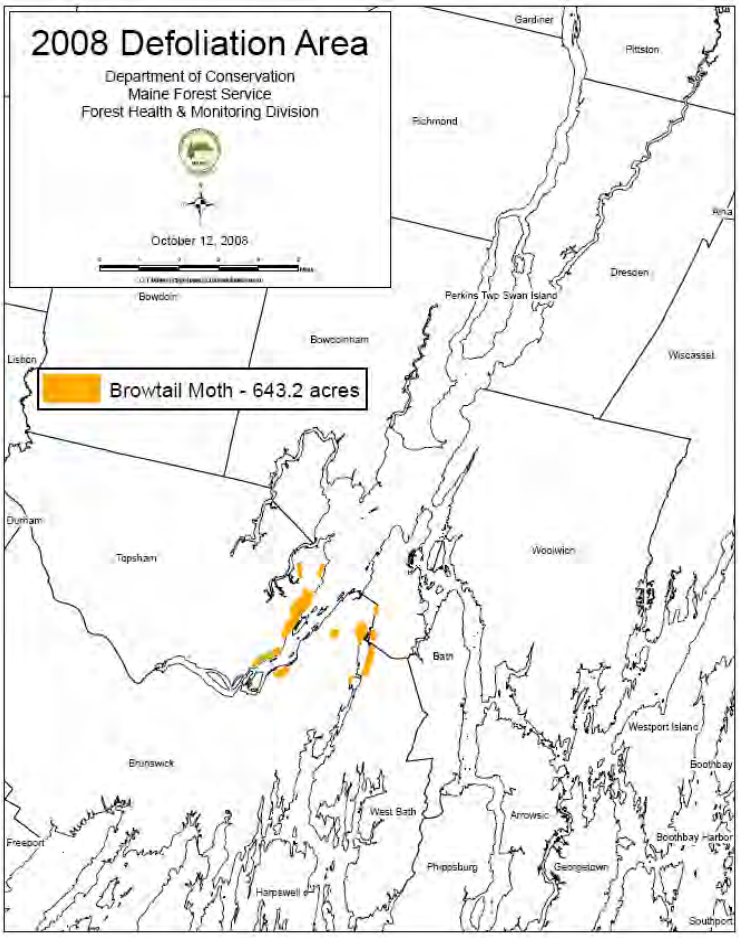


Figure 3. Browntail moth defoliation, 2008.

Birch Leafminer
Messa nana and Fenusa pusilla
Host(s): Birches (*Betula* spp.)

Birch trees in central Maine had relatively few leafminers on them this year. Western and northern areas had spotty, moderate populations. Although the damage could be seen from the ground, it was scattered enough so that the aerial survey did not pick it up.

Birch Skeletonizer
Bucculatrix canadensisella
Host(s): Birches (*Betula* spp.)

Birch skeletonizer populations remained low in 2008.

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

Emerald ash borer (EAB) is a serious invasive pest of ash trees. 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 emerald ash borer and trees die within a few years of attack by EAB. Emerald ash borer was first found in Michigan in 2002, and since then has spread rapidly throughout the Midwest, Atlantic states and Ontario and just south of Montreal, Quebec – less than

200 miles from the Maine Border! EAB has killed over 40 million trees in the last six years, and has the potential to destroy ash in North America in the same way that Dutch elm disease decimated the elm.

Over 75% of new infestations of EAB are caused by people moving infested firewood. People can help slow the spread of EAB and protect the forests they care about by leaving their firewood at home when they travel. The Maine Forest Service has an active "Leave Your Firewood At Home" campaign that is in its second year.

Maine is monitoring for EAB by using purple traps attractive to the adults. The Maine Forest Service also investigates reports of possible EAB infestations. In addition, we are piloting a 'biosurveillance' project, using a native wasp that hunts EAB, to monitor for its presence.

Purple prism trap survey

In the summer of 2008, the MFS participated in a national trapping trial for Emerald Ash Borer (EAB). Traps (photo at right) were placed at sixteen sites (mainly parks and campgrounds) throughout the southern part of the state (Table 5). Thirty-two large purple sticky prism traps were hung in the canopies of ash trees at a height of 30-90 feet. Two traps were hung at each site, one baited with phoebe oil, and the other with manuca oil. Traps were set between June 13 -30, were replaced between July 22-30, and were removed the first week of September.

No EAB were captured on any trap, and it appears that in Maine these traps are less successful at capturing buprestid beetles (the family to which EAB belongs) than they are in states further south. Three buprestids were caught on the traps (Table 6).

Table 5: Locations of purple prism traps.

Town	County	Latitude	Longitude
York (Cape Neddick)	York	43.218	-70.617
Kennebunkport	York	43.39	-70.490
Biddeford	York	43.54	-70.519
Freeport	Cumberland	43.823	-70.079
Durham	Cumberland	43.927	-70.156
Damariscotta	Lincoln	44.029	-69.460
Camden	Knox	44.23	-69.054
Northport	Waldo	44.35	-69.974
Searsport	Waldo	44.438	-68.937
Orland (East Orland)	Hancock	44.549	-68.667
Bar Harbor	Hancock	44.379	-68.207
Southwest Harbor	Hancock	44.298	-68.336
Richmond	Sagadahoc	44.149	-69.874
Thomaston	Knox	44.076	-69.191
Greenville	Piscataquis	45.496	-69.585
Acton	York	43.58541	-70.9552

Table 6: Buprestids caught on purple traps.

Town	Date	Lure	Buprestid caught
Camden	Jun 24 - Jul 24	manuca	1 *Agrillus anxius*
Cape Neddick	Jul 22 - Sep 3	phoebe	1 *Chrysobothris rugosiceps*
Richmond	Jul 22 - Sep 5	phoebe	1 *Chrysobothris sexsignata*

Biosurveillance

The Maine Forest Service also initiated a new project: biosurveillance for EAB. Biosurveillance is the use of a living organism to survey for a pest. *Cerceris fumipennis* is a native, non-stinging wasp which nests in the ground and hunts buprestid beetles, including EAB when present. It is much more efficient at finding EAB than humans are, and has the potential to find a new infestation earlier.

Because there were no records of *Cerceris fumipennis* in state collections, at the beginning of the year we were uncertain whether *Cerceris* existed in Maine. By the end of the summer, with the help of several volunteers, we had searched over 200 potential sites in 83 towns, and had found 37 colonies (Figure 4 and Table 7). The colonies were located in 25 towns throughout 10 counties in southwestern and central Maine (most were found west of Bangor and south of Rangeley). Colonies ranged in size from 3 nests to over 500 nests. Most colonies (24) were found in baseball and softball fields, five were found in abandoned sand pits, and the rest were in airfields, parking lots, dirt roads, etc. *Cerceris* adults appeared to be active in Maine this summer from mid-July to early September.

Of the 37 colonies found, between 14 and 24 should be suitable for biosurveillance in 2009, being within 300 meters of ash trees and having over 25 nests.

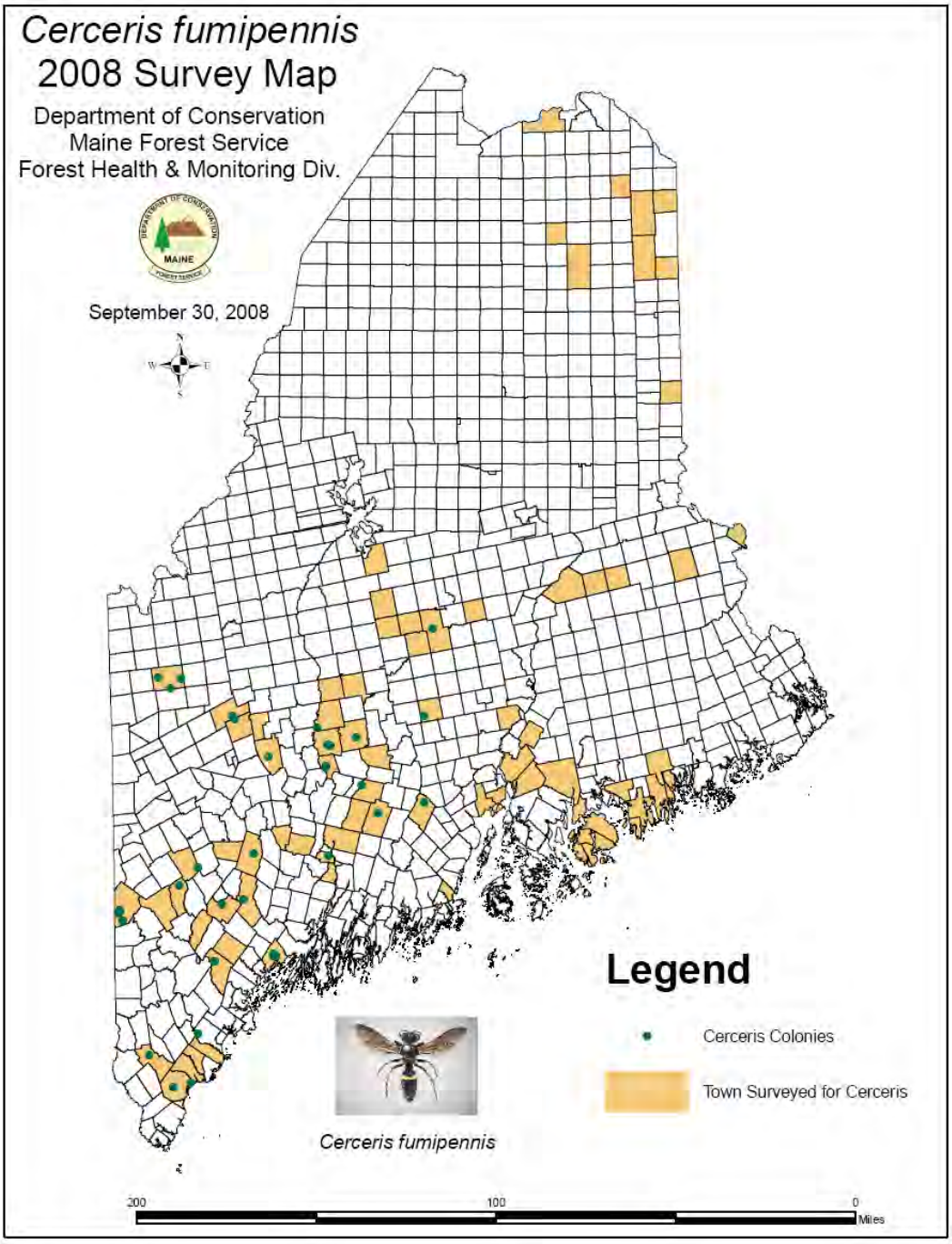


Figure 4: Towns where at least one site was surveyed for *Cerceris*:
Androscoggin: Auburn, Poland, Turner **Aroostook:** Ashland, Caribou, Easton, Fort Kent, Houlton, Limestone, New Sweden, Portage Lake, Presque Isle **Cumberland:** Casco, Freeport, Gray, Harrison, Windham **Franklin:** Avon**,** Farmington, Philips, Rangeley, Strong **Hancock:** Bar Harbor, Bucksport, Ellsworth, Gouldsboro, Mount Desert , Orland, Southwest Harbor, Sullivan, Tremont, Trenton, Winter Harbor **Kennebec:** Augusta, China, Clinton, Farmingdale, Gardiner, Vassalboro, Wayne, Winslow, Winthrop **Knox:** Rockland **Rockland:** Bridgton, Buckfield, Fryeburg, Norway **Penobscot:** Bangor, Hermon, Holden, Kenduskeag, Lee, Levant, Lincoln, Newport, Springfield **Piscataquis:** Abbot, Dover-Foxcroft, Greenville, Guilford, Milo, Monson, Sangerville **Somerset:** Athens, Madison, Norridgewock, Skowhegan, Smithfield, Solon **Waldo:** Montville, Searsport, Stockton Springs **Washington:** Cherryfield, Millbridge, Steuben, Topsfield, Vanceboro **York:** Arundel, Biddeford, Kennebunk, Saco, Sanford, Wells

Table 7: *Cerceris fumipennis* colonies located in 2008

County	Town	Confirmed?	Suitable for biosurveillance?	Latitude	Longitude
Androscoggin	Auburn	yes	no	44.084535	-70.277566
Androscoggin	Poland	yes	yes	44.063564	-70.396067
Androscoggin	Turner Center	yes	yes	44.271896	-70.221629
Cumberland	Freeport	yes	yes	43.86532	-70.1044
Cumberland	Freeport	yes	yes	43.857465	-70.107235
Cumberland	Freeport	yes	yes	43.8575	-70.09
Cumberland	Harrison	yes	yes	44.138401	-70.638935
Cumberland	N. Windham	yes	no	43.832973	-70.432843
Cumberland	N. Windham	yes	no	43.83316	-70.434272
Franklin	Avon	yes	no	44.814294	-70.343073
Franklin	Farmington	yes	no	44.664101	-70.147554
Franklin	Phillips	no	maybe	44.827491	-70.358002
Franklin	Rangeley	yes	maybe	44.973763	-70.651843
Franklin	Rangeley	no	no	44.97747	-70.78333
Franklin	Rangeley	no	no	44.931912	-70.707943
Kennebec	China	yes	yes	44.44162	-69.526354
Kennebec	Farmingdale	yes	yes	44.26652	-69.80127
Kennebec	Winslow	yes	yes	44.551716	-69.619805
Oxford	Fryeburg	yes	no	43.9893	-70.9493
Oxford	Fryeburg	yes	no	43.9893	-70.9493
Oxford	Fryeburg	yes	yes	44.019047	-70.97394
Oxford	Fryeburg	no	maybe	44.022414	-70.967627
Oxford	Fryeburg	no	maybe	44.030636	-70.968055
Oxford	Norway	yes	maybe	44.211642	-70.533949
Penobscot	Newport	yes	maybe	44.832939	-69.2664
Piscataquis	Dover-Foxcroft	no	maybe	45.18944	-69.21989
Somerset	Madison	yes	no	44.784473	-69.87516
Somerset	Norridgewock	yes	maybe	44.71075	-69.79981
Somerset	Norridgewock	yes	no	44.716605	-69.81446
Somerset	Skowhegan	yes	maybe	44.722800	-69.639325
Somerset	Smithfield	yes	no	44.631169	-69.822227
Somerset	Smithfield	yes	yes	44.627413	-69.824133
Waldo	Montville	yes	yes	44.484754	-69.266306
York	Saco	yes	yes	43.54	-70.519
York	Sanford	yes	yes	43.449706	-70.785469
York	Wells	yes	no	43.336931	-70.552197
York	Wells	no	maybe	43.319689	-70.649443

Fall Cankerworm
Alsophila pometaria
Host(s): Oaks, Boxelder, Ashes, Maples, Beech, Basswood, Cherries (*Quercus* spp., *Acer negundo, Fraxinus* spp., *Acer* spp., *Fagus grandifolia, Tilia americana, Prunus* spp.)

The population of fall cankerworm in southern Maine crashed this summer after three years of defoliation. Although some larvae were found early in the season this year no defoliation resulted. Some stands suffered branch dieback but it appears to be minimal.

Fall Webworm
Hyphantria cunea
Host(s): Ashes, Apple, Cherries, Oaks, Birches, other hardwoods (*Fraxinus* spp., *Malus* spp., *Prunus* spp, *Quercus* spp., *Betula* spp.)

Fall webworm continued at relatively high levels in 2008. The webs and defoliation on ash, cherry, apple, birch and other hardwoods was prevalent throughout southern and central Maine. This insect overwinters as a pupa in leaf litter or in bark crevices protected from the winter cold. Expect to see the webs and larvae back again next year.

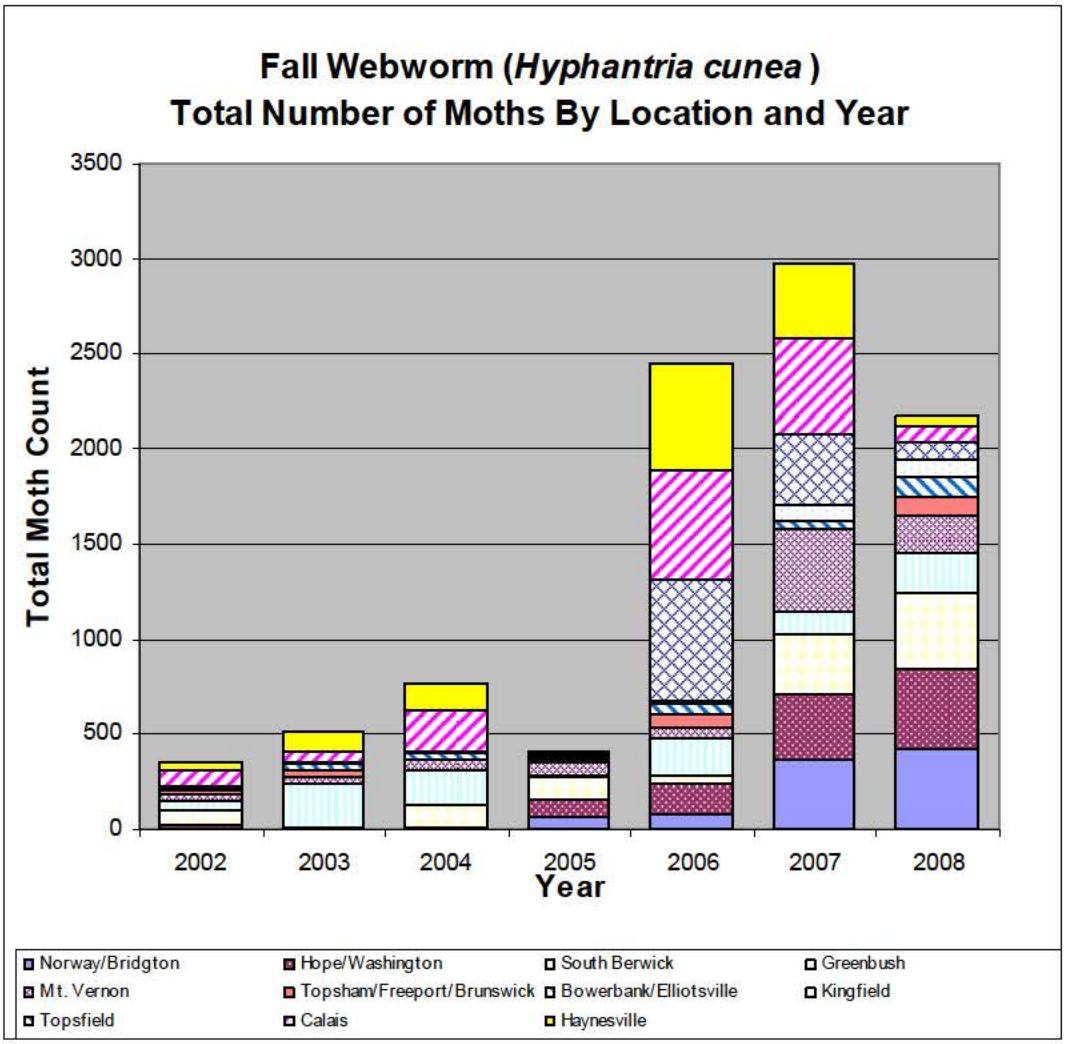


Figure 5: Fall webworm population levels: 2002-2008.

Forest Tent Caterpillar
Malacosoma disstria
Host(s): Aspen (*Populus* spp.) and other hardwoods

The small 2007 outbreak of forest tent caterpillars in Aroostook County disappeared in 2008. Populations of forest tent caterpillar remained low in the rest of the state in 2008. Light trap catches also were low indicating this pest will not be a problem in 2009.

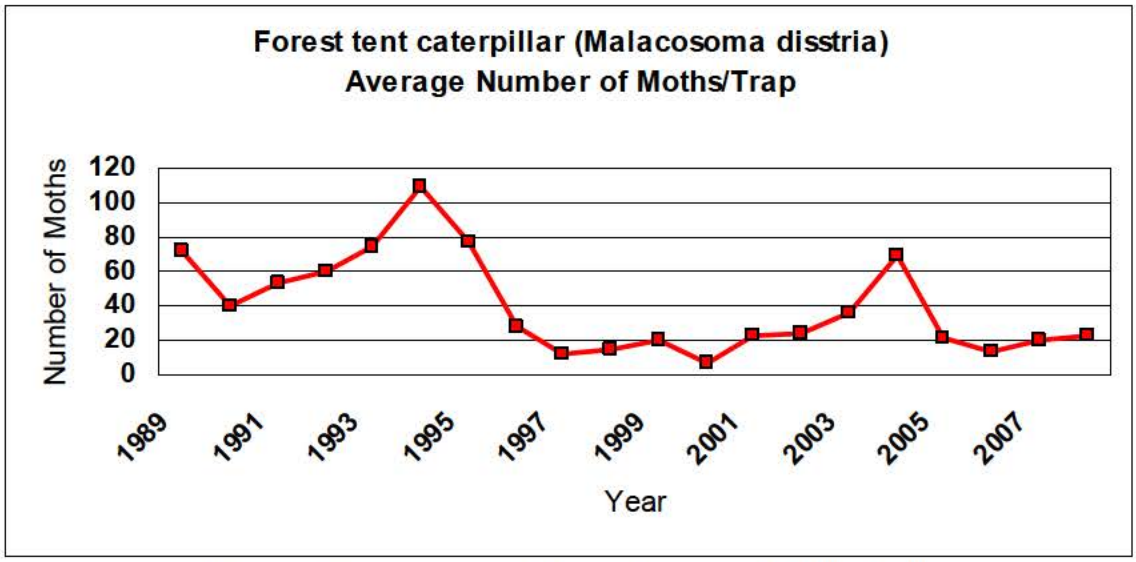


Figure 6: Forest tent caterpillar population levels: 1989 – 2008.

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

No defoliation of hardwoods resulting from gypsy moth larval feeding was recorded in 2008. Due to staff cuts between leaf off and snowfall the full set of egg mass survey plots were not completed in the fall of 2008. Approximately half of the plots in the southern third of the state were completed; all plots in northern and eastern Maine were done. Results from completed plots indicate continued endemic levels of the gypsy moth.

Two hundred eighty-two (282) pheromone traps were set in towns adjacent to the gypsy moth quarantine zone (transition zone, Table 8); eight were missing at the end of the season. The remaining traps captured approximately 3500 male moths. Seventy-two (72) percent of the traps in the transition zone had fewer than 20 male moths. At sites that were trapped before, with the exception of a few towns, catches were down compared to the previous year. Egg mass scouting was conducted in towns with high male moth catches. Egg masses were found in the towns of T6 R10 WELS in Piscataquis County and Mount Chase in Penobscot County.

Table 8: Gypsy moth trap catches in the transition zone

Aroostook County

Town	No. Traps	No. Moths	Avg./Trap
Ashland	1	2	2
Blaine	1	0	0
Bridgewater	4	3	1
Easton	1	0	0
Fort Fairfield	1	0	0
Hammond	2	8	4
Hersey	3	159	53
Littleton	5	31	6
Ludlow	6	56	9
Mars Hill	1	0	0
Masardis	1	0	0
Merrill	4	54	14
Monticello	3	13	4
Moro Plt	4	55	14
Nashville Plt	2	1	1
Portage Lake	2	0	0
Presque Isle	1	3	3
Smyrna	7	37	5
Westfield	5	0	0
Grand Total	54	422	8

Franklin County

Town	No. Traps	No. Moths	Avg./Trap
Alder Stream Twp	5	19	4
Chain of Ponds Twp	4	14	4
Coburn Gore	3	9	3
Jim Pond Twp	6	38	6
Massachusetts Gore	4	9	2
Stetsontown Twp	8	15	2
Tim Pond Twp	7	52	7
Grand Total	37	156	4

Oxford County

Town	No. Traps	No. Moths	Avg./Trap
Lynchtown Twp	5	16	3
Upper Cupsuptic Twp	4	17	4
Grand Total	9	33	4

Penobscot County

Town	No. Traps	No. Moths	Avg./Trap
Mount Chase	7	740	106
T3 R7 WELS	4	143	36
T4 R7 WELS	3	240	80
Grand Total	14	1123	80

Piscataquis County

Town	No. Traps	No. Moths	Avg. /Trap
Beaver Cove	5	6	1
Big Moose Twp	3	8	3
Bowdoin College Grant East Twp	4	11	3
Bowdoin College Grant West Twp	4	9	2
Days Academy Grant Twp	2	1	1
Frenchtown Twp	6	11	2
Harfords Point Twp	2	4	2
Lily Bay Twp	10	13	1
Moosehead Junction Twp	5	33	7
Rainbow Twp	1	5	5
Shawtown Twp	1	4	4
Spencer Bay Twp	6	6	1
T1 R12 WELS	11	229	21
T1 R13 WELS	8	26	3
T2 R12 WELS	5	13	3
T3 R11 WELS	2	11	6
T3 R12 WELS	3	7	2
T3 R13 WELS	1	4	4
T6 R10 WELS	3	890	297
T7 R15 WELS	2	4	2
Grand Total	84	1295	15

Somerset County

Town	No. Traps	No. Moths	Avg/Trap
Attean Twp	1	1	1
Bigelow Twp	7	249	36
Dennistown Plt	2	3	2
Flagstaff Twp	6	185	31
Jackman	7	9	1
Johnson Mountain Twp	3	3	1
King & Bartlett Twp	10	40	4
Long Pond Twp	1	0	0
Lower Enchanted Twp	4	122	31
Misery Gore Twp	1	8	8
Moose River	3	4	1
Pittston Academy Grant	3	3	1
Rockwood Strip T1 R1 NBKP	2	8	4
Sandwich Academy Grant Twp	5	7	1
Sandy Bay Twp	3	3	1
Sapling Twp	1	1	1
Soldiertown Twp T2 R3 NBKP	4	5	1
Squaretown Twp	4	15	4
Taunton & Raynham Academy Grant	3	3	1
Tomhegan Twp	3	7	2
Upper Enchanted Twp	3	13	4
Grand Total	76	689	9

Hickory Tussock Moth
Lophocampa caryae
Host(s): Hickories, Butternut, Birches, Black Locust, Quaking Aspen, Elm and Other Hardwoods (*Carya* spp., *Juglans cinera, Betula* spp., *Robinia pseudoacacia, Populus tremuloides, Ulmus* spp.)

Although Maine does not have a lot of hickory we do have hickory tussock moths and this year the larvae have been spotted in both northern and western Maine feeding on birch. The larvae feed gregariously on leaves of a number of trees including birch, black locust, quaking aspen, elm, butternut and of course hickory. When nearly fully grown the larvae then feed singly and wander quite a bit before pupating on the ground. Although these are lovely looking black and white caterpillars they can cause a rash if the unsuspecting person picks them up for a closer look. Although hickory tussock may be locally abundant, they rarely cause much damage to trees (Figure 7).

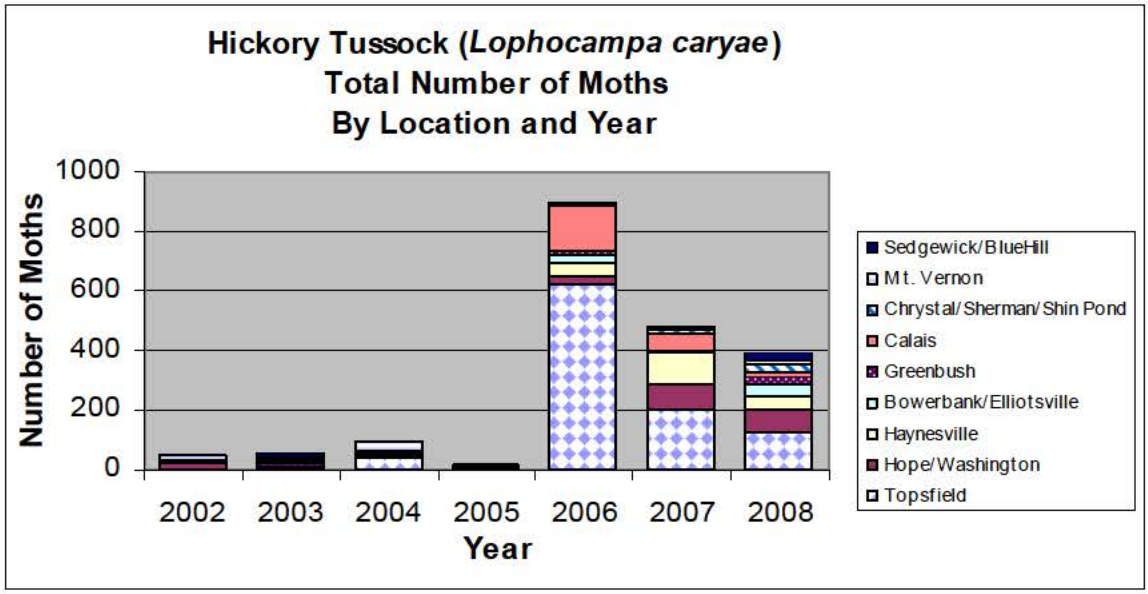


Figure 7: Hickory tussock moth population levels: 2002 – 2008.

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

Large aspen tortrix is a hardwood defoliator that feeds primarily on aspen although during outbreaks it will also feed on other hardwoods. Defoliation in Quebec and an increase in large aspen tortrix moths caught in a number of light traps in 2007 led us to believe we might see defoliation from this insect in 2008. Instead numbers of moths dropped off and no defoliation was seen.

Locust Leafminer
Odontota dorsalis
Host(s): Black Locust (*Robinia pseudoacacia*)

Populations remained low in 2008.

Maple Trumpet Skeletonizer and **Oak Trumpet Skeletonizer**
Epinota aceriella and ***Epinota timidella***
Host(s): Oaks, Maples (*Quercus* spp., *Acer* spp.)

Both of these late season insects have been noticeable this year. Although they make the leaves look odd by folding them up the amount of feeding they do is insignificant.

Oystershell Scale
Lepidossaphes ulmi
Host(s): Beech (*Fagus grandifolia)*

Beech stands in the Greenville area have significant numbers of oystershell scales. Some trees have high enough numbers so that the trees are exhibiting branch dieback. This insect has been in North America for over 100 years and periodically occurs in high enough numbers to cause problems. Beech trees are already stressed from beech bark disease and the oystershell scale may be taking advantage of the weakened state of the trees.

Satin Moth
Leucoma salicis
Host(s): Aspen (*Populus* spp.)

Satin moth has been at low levels since 2002.

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

Winter moth is a European pest that feeds on oak, maple, ash, basswood, apple, crabapple and blueberry. It has been in the Canadian Maritimes for decades and is kept under control by two parasites - a wasp and a fly. More recently, winter moth has been devastating the hardwoods in eastern Massachusetts and has spread throughout that state and Rhode Island.

The Maine Forest Service trapped for winter moth in Maine during the winters of 2005-2007in cooperation with researchers from the University of Massachusetts. Although a few male moths were found along the coast, none were found inland and no populations or other life stages have been found in Maine to date. We will continue to be on the lookout for this pest but have no plans to continue trapping at this point.

Insects: Miscellaneous

Solitary Bees

The winter of 2007-08 was snowy but mild. In fact, the snow cover was so consistent and early that in many places in Maine, the ground never actually froze. This was good news for many of Maine's solitary ground-nesting bees and wasps; large numbers of them survived the winter and emerged this spring. Unlike social bees and wasps which may be aggressive and sting readily, solitary hymenoptera tend to be non-aggressive (they don't have nest-mates to protect), and rarely sting. Some cannot sting at all, and with others, you have to seriously harass them before they will sting (one woman got several bees entangled in her clothing and was not stung).

We had many call this spring from concerned land-owners about the large number of bees they saw. Many were concerned about safety and wanted to know how to kill them, until we explained that these were important pollinators, and that stinging is rarely a problem. Generally high numbers of bees were present only for a few days as they emerged from their overwintering nests. Within a week they usually dispersed and were barely noticeable. When people had gardening or other work to do in the immediate area of the nests, we suggested working for a few days in the morning or evening when the bees were not active. Once informed of their gentle nature, most people were happy to have wild pollinators in their yard. At a time when populations of so many bees and other pollinators are under pressure and declining, it's nice to know they had at least one good year.

Western Conifer Seed Bugs
Leptoglossus occidentalis
Host(s): softwoods

White pines have produced an abundant seed crop this year. That means the numbers of western conifer seed bugs was high as well. These are ¾ inch-long brown bugs that walk or fly around in your house come fall and winter. They come inside to find a warm place to spend the winter. They do not bite, eat anything, lay eggs or do anything destructive, but they can be annoying. They also smell when you squish them. Gently pick them up and show them to the door if they do come in. People living near pines or other conifer species will be most likely to have these uninvited "guests".

White Grubs
Scarabidae

This year lawns across Maine were ravaged by an onslaught of white grubs. White grubs are the immature stage of scarab beetles including native June beetles and rose chafers and exotic Japanese beetles, oriental beetles, Asiatic garden beetles and European chafers. There are many more scarabs that live in Maine but this list covers those that are found in large numbers destroying the root systems of lawns. Depending on where and when the problem was checked, the culprits were Japanese beetles, oriental beetles and/or European chafers. In many locations all three were present and fed on the roots of the grass in succession. They also will feed on crop and woody ornamental roots. Biological and chemical controls are available for these insects if applied at the correct time of year.

Tree Diseases and Injuries

Diseases: Native

Air Pollution – Ozone
Host(s): A Wide Range of Conifers, Hardwoods, and Herbaceous Plants

Since 1994, the Maine Forest Service has been cooperating in a nation-wide survey of ozone injury as it relates to forest health. Ozone is a gas that is a natural component of the atmosphere. In the upper atmosphere, ozone is beneficial in that it protects the Earth from harmful forms of radiation from the sun. In the lower atmosphere, however, ozone is an air pollutant, especially when produced in high levels resulting from vehicle exhaust, electric and industrial facilities, and other human and natural causes. At sufficient concentrations, and depending on duration and timing of exposure and host susceptibility, ozone is an agent capable of causing injury to many plant species.

A total of eighteen separate sites located on a grid pattern across Maine have been assessed on a yearly basis for injury to both woody and herbaceous ozone-sensitive bioindicator plants. Data show that for most years, and throughout most of Maine, the risk to vegetation from ozone damage is low. Occasionally, and particularly in the southern part of the State, bioindicator plants are found that have been injured by ozone. For example in 2008, a year of generally low occurrence of ozone-caused injury throughout most of New England, light ozone injury was recorded from spreading dogbane from one of the survey plots, located in Parsonsfield, Maine (Table 9).

In October of 2008, the USDA Forest Service published an extensive review and summary of the findings, including the survey data from Maine, of the past fourteen years of the National Program to monitor ozone injury and forest health. The report "*Ozone bioindicators and forest health: a guide to the evaluation, analysis, and interpretation of the ozone injury data in the Forest Inventory and Analysis Program*," by G.C. Smith, J.W. Coulston, and B.M. O'Connell. 2008. General Technical Report NRS-34. Newtown Square, PA: USDA Forest Service, Northern Research Station. 100 p, is available on the web at http://www.treesearch.fs.fed.us/pubs/19036.

Table 9: Plot locations and species surveyed for ozone injury – 2008.

Plot Location	Bioindicator Species Surveyed
North Yarmouth	Milkweed, White Ash, Black Cherry, Blackberry
Parsonsfield	Milkweed, Spreading Dogbane*, Black Cherry, Blackberry
Casco	Big Leaf Aster, Milkweed, Spreading Dogbane, Black Cherry, Blackberry
Bowdoinham	Milkweed, White Ash, Black Cherry, Blackberry
North Vassalboro	Milkweed, White Ash, Black Cherry, Blackberry
Hope	Milkweed, White Ash, Black Cherry, Blackberry
Swanville	Milkweed, White Ash, Black Cherry, Blackberry
Andover	Milkweed, Spreading Dogbane, White Ash, Black Cherry
Canton	Milkweed, Black Cherry, Blackberry
New Sweden	Big Leaf Aster, Milkweed, Spreading Dogbane
Ashland	Spreading Dogbane, Black Cherry, Blackberry
T11R9 WELS	Big Leaf Aster, Spreading Dogbane, Black Cherry
Sherman	Big Leaf Aster, Spreading Dogbane, Blackberry
T28 MD	Big Leaf Aster, Spreading Dogbane, White Ash, Blackberry
Charleston	Milkweed, Black Cherry, Blackberry
Seboomook	Spreading Dogbane, White Ash, Black Cherry
Sebec	Milkweed, Spreading Dogbane, Blackberry
Maxfield	Milkweed, Spreading Dogbane, White Ash, Black Cherry

Anthracnose of Hardwoods
Host(s): Ashes, Birches, Maples, American Beech, Oaks (*Fraxinus* spp., *Betula* spp., *Acer* spp., *Fagus grandifolia, Quercus* spp.)

Anthracnose diseases generally caused only light damage to hardwood foliage during 2008. Maple anthracnose, caused by the pathogen *Kabatiella apocrypta*, was found in Auburn (Androscoggin County), Whitefield (Lincoln County), Rome and Readfield (Kennebec County), and in Freeport and the greater Portland area (Cumberland County). The samples observed were from red and sugar maples. Damage was considered to be moderate to light. The most noticeable anthracnose damage was observed on ashes, and resulted from infection by *Gnomoniella fraxini*. Ash anthracnose in central, western, and southern areas of Maine resulted in some early leaf abscission and loss of optimal coloration in the fall, but otherwise was of little significance.

***Armillaria* Root Rot**
Armillaria mellea
Host(s): Hardwoods and Conifers

Long-term plots in hardwood stands damaged by the ice storm of 1998 were re-examined in 2008. Plots were located across the most severely damaged regions of southern and central Maine. While crown damage to affected trees has largely been masked now by healthy recovery in most instances, more significant damage is now becoming evident in some particular cases.

Examination of one particular site in southwestern Maine has revealed that ash trees which had moderate top damage are now declining and dying from infection by *Armillaria* root rot. Evidence indicates that the trees were rapidly infected with *Armillaria* ten years ago, during the growing season immediately following the ice storm. Damaged ash crowns were found to sprout and rebuild at a remarkable rate. Many ash crowns appeared to be in full health within just a few years following the storm, even though nearly all the branches had been removed in 1998. Rebuilding the crowns likely depleted the energy reserves in the roots which led to rapid colonization of those roots by *Armillaria*. Now, ten years after the damage, the root and butt decay is extensive enough to result in tree decline and mortality. While the most dramatic effects have been observed in ash, other species which were damaged by the ice storm are also experiencing increasing losses from internal decay, root rots, and other defects.

Ash Leaf and Twig Rust
Puccinia sparganioides
Host(s): White Ash, Green Ash (*Fraxinus americana*, *F. pennsylvanica*)

Ash leaf rust was reported from Bucksport, Castine, and Deer Isle (Hancock County), and was likely present in other mid- and south-coastal communities, as well. The first indication of infections occurred during the first week in June. The alternate hosts of this rust are species of salt marsh grasses in the genus *Spartina*. Infection levels on ashes were low again this year. Significant defoliation from this disease has not occurred since the mid- to late 1990's.

Cedar-Apple Rust
Gymnosporangium juniperi- virginiana
Host(s): Eastern-red-cedar, Apple (*Juniperus virginiana*, *Malus* spp.)

Cedar apple rust galls were prevalent on Eastern-red-cedar during the spring of 2008, and were especially noticeable following periods of rainy weather. The disease occurs throughout Maine, wherever the hosts occur. The galls, which appear with orange, gelatinous masses oozing from a central sphere of about ¼ inch to 1 inch in diameter, produce spores which can infect many varieties of apple and crabapple. Leaf spotting, with occasional premature leaf drop, is the main symptom on apple: the galls are found only on the juniper (Eastern-red-cedar and other *Juniperus* spp.) hosts. The disease rarely, if ever, causes serious damage to the junipers, but the galls may appear unsightly for a short time in the spring. Pruning out galls from the juniper host is the most practical and effective control for both apple and juniper. Planting apple and crabapple varieties resistant to cedar apple rust is the best long-term solution.

***Cytospora* Canker of Maple**
Cytospora chrysosperma
Host(s): Poplars, Maples, Birches, Willows (*Populus* spp., *Acer* spp., *Betula* spp., *Salix* spp.)

An unusual occurrence of *Cytospora* canker was observed on an ornamental Norway maple in Yarmouth (Cumberland County). The pathogen was found infecting numerous branches of a tree that had severe mechanical injuries in the root crown region. *Cytospora* canker is more commonly found on aspen, poplars, and willows, but can occur on a variety of maples, birches, ashes and elms, as well. In general, *Cytospora* species are weakly pathogenic, and become a significant problem only on trees that have been injured or weakened by other causes, such as injuries, drought, or defoliation by insects.

Fir Needle Casts
Lirula nervata*, *Lirula mirabilis*, *Isthmiella faullii
Host(s): Balsam Fir, Fraser Fir (*Abies balsamea*, *A. fraseri*)

Several needle cast diseases of balsam fir were common in forest areas, in landscape plantings, and in Christmas tree plantations. *Lirula nervata* was observed on two and three year-old needles from Lincoln and Kennebec counties, but this and the other needle cast fungi are known to occur throughout the state. These diseases are usually not seriously damaging to the long-term health of the trees in forest or landscape settings, but can be an especially significant problem for Christmas tree growers.

***Marssonina* Leaf Spot of Aspen**
Marssonina populi
Host(s): Quaking Aspen, Bigtooth Aspen (*Populus tremuloides*, *Populus grandidentata*)

This disease of aspen was reported from Islesboro (Waldo County), where considerable leaf damage occurred during mid- to late summer of 2008. Occurrence of the disease is common and widespread throughout Maine, although damage is rarely of any long-term significance to tree health. Heavy infection levels in coastal areas this year are likely the result of the extended periods of rain, fog, and high humidity, especially during early in the growing season. Early leaf abscission and loss of coloration in the fall resulted from this leaf disease, which was of particular concern to the coastal communities affected.

Pine Needle Cast
Lophodermium pinastri
Host(s): Pitch Pine (*Pinus rigida*)

The incidence of pitch pine needle cast was light in 2008, with damage at only trace levels. There are approximately 11,000 acres of the pitch pine type in western and southwestern Maine. This year an aerial survey indicated that nearly all stands in the areas affected by this disease during the 2004 – 2006 period have recovered and now exhibit healthy, green crowns.

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

The disease continues to cause significant damage throughout Maine. The continued wet spring and summer seasons during the past several years have allowed the development of high inoculum levels, especially in plantations and roadside plantings. Pine tip blight has been a long-standing problem in southern and coastal areas of the state. Recently however, the disease has become much more noticeable, and appears to be causing accelerated damage to pine plantings in the northern and central regions, as well. Significant damage is now commonly seen in northern Piscataquis County, northern Penobscot County, and in Aroostook County, areas where the disease historically has not been a particular concern.

Red Pine Root Rot
Heterobasidion annosum
Host(s): Red Pine, White Pine (*Pinus resinosa, P. strobus*)

The pathogen *Heterobasidion annosum* (= *Fomes annosus*) is a common problem throughout Maine, with most damage occurring in red pine plantations. The fungus is an aggressive root rot pathogen, and often becomes established in red pine plantations after early stand thinning has taken place. Examination of an infected red pine plantation in Freeman Township (Franklin County) has underscored an additional way in which the disease can affect forest stands. The examined stand has abundant white pine in the understory. While *H. annosum* is resulting in considerable mortality of the overstory red pine, large numbers of young, understory white pine (now averaging six to eight feet in height), are also being killed. While most red pine plantation management plans do not focus on regeneration, this case clearly shows the devastating effect this disease can have not only on stands, but on the site itself. Loss of site productivity as a result of forest diseases will almost always have a more significant negative consequence than simply the loss of the current stand value. Pine stands damaged by *H. annosum* were also examined in Blanchard Township (Piscataquis County), and in Winthrop (Kennebec County).

Sapstreak Disease of Maples
Ceratocystis virescens
Host(s): Sugar Maple and Red Maple (*Acer saccharum, A. rubrum*)

Ceratocystis virescens was isolated from the roots of declining sugar maples from a sugarbush in Smyrna (Aroostook County). While it is likely that sapstreak disease has been always present in Maine, this is the first known confirmed report in the State.

C. virescens is the primary causal agent of sapstreak disease, but is also a common, native saprophyte on freshly-cut stems of several hardwood species. The sugarbush where the disease was discovered had been recently established, with partial-harvest removal of unwanted trees over the past few years. Residual trees received some, but not excessive mechanical injuries during the harvesting process. Sugar maples in certain portions of the stand were showing dieback symptoms typical of post-logging decline. Roots of declining trees showed some light streaking and staining, but not the heavy water-soaking often associated with sapstreak disease. Direct isolations, and stained wood placed in moist chambers resulted in abundant fruiting of the pathogen. While it does not appear to be especially aggressive in this stand, it is now known that the pathogen is present and may be involved in other areas of maple decline in the state. Closer examination of sugar maple in future years, especially in the northern and northwestern region of the state, may reveal a more significant role of this pathogen in the decline of some of these hardwood stands.

***Sirococcus* Tip Blight**
***Sirococcus* spp.**
Host(s): Spruces (*Picea* spp.)

Samples of branch tip dieback of white, blue, and Siberian spruces were received during July and early August. The damage was attributed to *Sirococcus conigenus*, a shoot blight disease of pines, spruces, and other conifers. Recent taxonomic research has shown that there are three distinct species in what was earlier recognized as a single species (*S. conigenus*). Damage was most severe on current-year shoots. The disease was found in Ashland (Aroostook County), Gardiner (Kennebec County), and Greenville (Piscataquis County). All samples examined were from ornamental plantings; the disease has not been found to occur in forest stands.

Snow Damage to Conifer Regeneration

Observations made in Aroostook County and in localized areas throughout central Maine have indicated some substantial branch and stem breakage to natural and plantation conifer regeneration. This damage was the result of the heavy snow loads during the 2007-2008 winter season. In some northern areas, snow accumulations exceeded 200 inches for the season, with many areas receiving in excess of 150 inches. Red pine was considered the most damaged plantation species. In some plantings, the snow damage was exacerbated by previous insect infestations. For example, one plantation in Newport (Penobscot County) was moderately infested with European pine shoot

moth (*Rhyacionia buoliana*), a pest that weakens branch structure and increases susceptibility to branch and stem breakage.

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

While the long-term damage from *Rhizosphaera kalkhoffii* continues to be significant, most trees continue to recover from the devastating years of 2004 through 2006. White spruce and Colorado blue spruce in particular were heavily damaged during that period from excessive needle loss caused by this disease. Observations indicate a small number of ornamental spruces have died during the past two years as a result of this disease. In almost all cases, the trees were larger, mature or near-mature trees, that failed to recover from the severe infections from earlier years.

Tar Leaf Spot of Maples
Rhytisma acerinum*, *R. americanum*, and *R. punctatum
Host(s): Norway and Silver Maples (*Acer platanoides, A. saccharinum*)

Localized severe tar spot to Norway maples was noted in several coastal communities, including Northeast Harbor and the Cranberry Isles (Hancock County), and Camden (Knox County). Heaviest damage appeared to be restricted to a narrow shoreland zone, and was possibly the result of fog conditions enhancing establishment of the pathogen. Light infections of tar leaf spot were reported from many towns in central and southern Maine. Although aesthetically damaging to ornamentals, even severely affected trees are expected to recover fully next spring. The most significant effect of this disease is in reducing fall coloration and aesthetics, which is of particular concern to coastal communities during the autumn tourism season.

***Verticillium* Wilt of Maples**
Verticillium alboatrum*;*Verticillium dahliae
Host(s): Maples (*Acer* spp.)

Symptoms of this widely distributed disease were observed in particularly high levels in Lewiston (Androscoggin County) and Bangor (Penobscot County). Several areas in those towns that have concentrated plantings of Norway maple have been severely damaged, and loss of these street trees is rapidly changing the character of some neighborhoods. Trees in many other areas, including Augusta and Rome (Kennebec County), Dresden (Lincoln County), Presque Isle (Aroostook County) and Topsham (Sagadahoc County) have also been seen with symptoms attributed to *Verticillium* infection. Norway maples were most damaged by the disease, but red and sugar maples were also occasionally observed with symptoms.

Weir's Rust on Spruce
Chrysomyxa weirii
Host(s): Spruces (*Picea* spp.)

Weir's rust was found affecting blue spruce in the towns of Skowhegan (Somerset County), Oxford (Oxford County), Cumberland Foreside (Cumberland County) and Biddeford (York County). The initial report of this disease in 2008 was from the University of Maine Cooperative Extension Pest Management Office. The fungus *C. weirii* causes a needle disease on several spruce species, including white, blue, Englemann, and black spruce. This disease is not considered to be a serious threat to tree health, but occasionally may be severe enough to cause a loss in aesthetic value to ornamentals.

Diseases: Non-Native

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

Beech bark disease occurs statewide, and continues to cause losses in site productivity and timber values, in addition to resulting in decreased wildlife food for a wide variety of birds and small and large mammals. Recent genetics

work by the USDA Forest Service has identified American beech resistant to the beech bark disease. Several parent trees used in the breeding research programs are located in T4 R9 NWP (Seboeis Lake, Piscataquis County). Early results from full-sib families indicate that the proportion of resistant progeny are 25% - 50%, a very encouraging level which is evidence that removal of susceptible trees (and leaving resistant trees) will enhance the proportion of resistant seedlings in managed stands.

Dutch Elm Disease
Ophiostoma ulmi* and *Ophiostoma novo-ulmi
Host(s): American Elm (*Ulmus americana*)

Dutch elm disease continues to take its toll in remnant individuals in forests and landscape settings. The disease has been at moderate and static levels for many years. Castine (Hancock County), a town where a considerable population of very large American elms remain, has reinitiated an intensive elm tree management and preservation program.

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

In 2007, larch canker in Maine was found outside the current State and Federal quarantine boundaries, which have been in place since 1982. The new location for larch canker is the town of Brunswick (Cumberland County). An intensive survey of approximately 700 acres surrounding the newly found infestation was conducted, with 222 larch trees located. Maine Forest Service personnel, with the assistance of personnel from the USDA Forest Service, Durham, N.H., completed individual tree inspections of the larch found. Thirty-two of the 222 larch were found to be infected with the larch canker pathogen. Of these, twenty-six were destroyed on-site this winter. An additional six trees, each with a single branch canker, will be intensively pruned to remove the infection, and monitored in future years. No stem cankers were found. All the infected trees are located on the fairways of a golf course, and all are European larch or European larch hybrids. It is hypothesized that the pathogen may have been introduced on ornamental nursery stock, rather than being spread from existing infested areas. A complete description of the eradication of canker-infected larch from this site is provided as Appendix C in this *Annual Summary Report*.

Sudden Oak Death
Phytophthora ramorum
Host(s): Oaks (*Quercus* spp.), Numerous other tree and shrub species

Based on surveys of four watersheds in 2007 (Gardiner, Brunswick, Wells, and Fryeburg), and three watersheds in 2008 (Clinton, West Paris, and Standish) *Phytophthora ramorum* has not yet been found in natural forest areas in Maine. The survey of 2008 has included six sample periods, one each in April, May, June, and September, and two in October. All sampling was negative for pathogen presence. Currently, the disease is known to occur in natural forest stands (primarily oak species) only in California, Oregon, and Washington. The Maine survey was conducted because this pathogen has a wide woody plant host range, and because many susceptible species are important to the nursery and landscape trades. The pathogen was found from infested lilac landscaping stock during 2006 in Maine, and was promptly eradicated. The pathogen has not been found in any nursery stock in Maine since that time.

Formal surveys for this pathogen will not likely be continued in Maine in 2009, as there has been no evidence, either from nursery inspections or from forest monitoring, that the disease has been introduced or established here during the past three years. However, there will always be the some risk of introduction of the pathogen, as occurred in 2006, and this requires a constant awareness of the threat and a reasonable vigilance.

White Pine Blister Rust
Cronartium ribicola
Host(s): White pine (*Pinus strobus*)

This disease remains static at moderate levels, but is common throughout the state. This destructive disease can affect white pines of any size or age, but has its most damaging consequences in young regeneration and in sapling to pole-sized timber. Aerial reconnaissance in the western Maine region in 2008 has revealed a localized area of

significant recent cankering and mortality in Magalloway Plantation (Oxford County), just west of Upper Richardson Lake. Partial harvesting activities in this Township during recent decades have resulted in increased *Ribes* spp. development, and an increased incidence of blister rust. Magalloway Township is not within the formal *Ribes* quarantine boundary. This occurrence underscores the potential significant impact that silvicultural operations can have on pest distribution and intensity. Occurrences such as this one may signal the need to examine other management strategies in areas at high risk from certain pathogens.

Diseases: Origin Unknown

Bacterial Leaf Scorch
Xylella fastidiosa
Host(s): Primarily Oaks (*Quercus* spp.); Other Hardwoods including Maples, Elms, and Ashes (*Acer* spp., *Ulmus* spp., *Fraxinus* spp.)

A preliminary survey was conducted for bacterial leaf scorch disease during late summer and fall, 2008. Bacterial leaf scorch is a disease that has been known to cause serious damage to oaks and other hardwood species in central New Jersey and other mid-Atlantic and southeastern states. Oaks (and a few other hardwood species) were generally examined across the central and southern Maine areas, with over 30 specific locations surveyed intensively. The towns in the survey included: Androscoggin County (Auburn, Poland, Turner); Cumberland County (Brunswick, Naples, Portland, Sebago); Kennebec County (Augusta, Clinton, Gardiner, Litchfield, Vassalboro, Wayne, West Gardiner); Oxford County (Otisfield); Waldo County (Unity); and York County (Acton, Arundel, Biddeford, Cornish, Eliot, Kennebunk [2 locations], Lyman, Newfield [2 locations], North Berwick, Sanford [3 locations], Shapleigh [2 locations], South Berwick [2 locations], Waterboro, York [3 locations]).

Oaks were found to be in excellent condition overall, and very few problems of any kind were found causing any detectable damage. Only two samples, one from a red oak in York (York County), and one from an American elm in West Gardiner (Kennebec County) were found with possible symptoms of the disease, and were submitted to a regional lab for testing. The lab report received in late 2008 indicated that the American elm sample yielded a weak positive reaction for the disease. Plans are to intensively sample the tree in question during the coming field season, and to continue to survey for the symptoms of bacterial leaf scorch as appropriate. To date, bacterial leaf scorch has not yet been confirmed to occur in Maine.

Butternut Canker
Sirococcus clavigignenti-juglandacearum
Host(s): Butternut (*Juglans cinerea*)

Butternut canker continues to cause damage to the butternut resource. No new information on status or distribution of the disease was obtained by Maine Forest Service personnel in 2008. Because this tree species occurs uncommonly, and is widely scattered as individuals and not as forest stands of any size, the disease often goes unnoticed or unrecognized. The disease has been found in all counties except Washington County.

White Pine Needle Cast
Canavirgella banfieldii
Host(s): White Pine (*Pinus strobus*)

This needle cast of white pine was reported at high levels throughout the central and western regions of the state in 2007. This disease was much less prevalent and noticeable in 2008. It is not considered to be a serious threat to the long-term health of white pine. No controls are recommended or required. A more complete description of the disease and its history can be found in the *Annual Summary Report* for 2007.

Miscellaneous Activities

Aerial Survey

The Maine Forest Service uses aerial flights as one tool in assessing the health of the forest. This work is accomplished in a number of ways.

- MFS-FHM division staff conduct initial "leaf-on" detection aerial overflights for much of Maine (over 70% of the state) to detect potential damage/stress. Some of the flights conducted by division staff are to delineate a known forest problem. In 2008 browntail moth was the only pest to occur in high enough density for the damage to be mapped from the air. Other flights are to conduct general survey; this is in mid-summer after early season defoliators have finished feeding and when late-season defoliators have begun. We try 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 (i.e. indicated by previous-year patterns or from client cooperator network reports). 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.

Firewood Awareness Campaign

The problem of forest insects and diseases being transported long distances with firewood has become an important issue over the last few years. It is a concern both in Maine and throughout much of the country. People in Maine have always moved firewood around. The traditional attitude has been: "Why buy it at your destination when you can take some from the woodpile at home?" Unfortunately there is a new wrinkle: exotic insects and diseases which move with firewood and can destroy our forests.

Commercial movement of wood and wood products can be regulated, but personal movement of firewood is harder to manage. Emerald ash borer (EAB), which kills all species of ash, is one insect moved in firewood. In the 7 years since it was first found in the United States, it has killed over 40 million trees, and over 75% of new infestations are caused by people moving firewood.

Asian longhorned beetle (ALB) is another insect which can be moved with firewood. This beetle attacks many different species of hardwood, although most commonly maples and birches. A very large infestation of ALB was found in Worcester MA last summer. The frightening thing about this infestation is that the beetles were there for 10-15 years before they were noticed. So Massachusetts residents were unwittingly moving ALB with their firewood for years, and may have brought it into Maine when they came to vacation.

In the summer of 2008, the Maine Forest Service carried out a large survey of campers in Acadia National park and other campgrounds on Mount Desert Island. It showed that 13% of people surveyed brought firewood from states or provinces with known infestations of EAB or ALB, and over 30% were unaware that there are regulations on the movement of firewood from some areas of the country. This is down from the 60% of campers surveyed last year who were unaware of the regulations. So awareness may be growing.

Using firewood is not a problem. Transporting it long distances IS a problem. The Maine Forest Service has initiated a campaign to educate people and encourage them to change their firewood habits to help protect our forests and shade trees. We have partnered with various organizations such as the Maine Campground Owners Association, Congress of Lakes Association, and Maine Indian Basketmakers Alliance to spread information about firewood and invasive insects to as wide an audience as possible. We have also had displays at numerous fairs and trade shows.

We would appreciate your help. Let friends and relatives "from Away" know that they should leave their firewood at home. Leave YOUR firewood home when you travel. If you sell firewood, educate your clients; we have material that you can post or give to people. Just call, write or email us or download information off our website at www.maine.gov/firewood .

Light Trap Survey

The Maine Forest Service has been monitoring forest insect populations with an array of light traps across the State for 66 years. Traps are set up in cooperators backyards and operated nightly. The timeframe for trap operation in 2008 ranged from 30 to 45 days depending on the location and flight season of the moths of interest. Material from the light traps is sent to the Maine Forest Service for processing and the results are used in predicting forest pest outbreaks. Twenty-five traps were run in 2007 in locations from South Berwick to Allagash to Topsfield. Moth catches were down this year overall and pest species in particular were down.

Public Assistance

Interest in the Forest & Shade Tree - Insect & Disease Conditions for Maine reports remained high in 2008. Subscribership was divided roughly in half between electronic and print versions of the reports. Six issues were printed and our readership is at just under 500, with both print and electronic versions available. The reports and subscription form are also on our website.

Pest calls include phone calls, walk-ins, emails, letters, pictures or specimens that are responded to verbally, with a written response, a field visit, specimen identification, referral or a combination of the above. One way emails reach our office is through the "What's Ailing My Tree" form on our Website—22 inquiries were submitted through this pathway in 2008, the first full year this option has been functional. Hemlock woolly adelgid was subject of the greatest number of inquiries. This is likely due to widespread press coverage of a new detection in Saco and a beetle release in York. Other common insects were white pine weevil, browntail moth, Asian longhorned beetle, and hemlock borer. Non-forestry inquiries are answered when time and complexity of the question allow or they are referred to some other knowledgeable entity. Stinging insects, bedbugs and ants were most frequent in this category. Anthracnose, Sphaeropsis shoot blight and tar spot were the most frequent disease calls.

The staff was involved in many outreach activities in 2008. These included coordinating and developing programs and workshops, and presenting information at tradeshows and fairs. Lab staff gave more than 45 talks or workshops to audiences including the Maine Arborist Association, the Maine Horticulture and Landscape Association, the Northeastern Forest Pest Council, Maine Licensed Foresters, the Small Woodlands Owners Association of Maine, the Common Ground Fair, the Maine Department of Transportation, the USDI National Park Service, the Maine Christmas Tree Growers Association, the Augusta Agricultural Trade Show, and many others.

Forestry Related Quarantines in Maine – 2009

There are five forestry related quarantines currently in effect in Maine. They 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 material outside the quarantine zone.

The following is only a partial summary of the rules. Refer to the cited statutory authority and related rules for complete quarantine regulations. Maps of the regulated areas and lists of regulated towns can be found at the end of this section. 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.org/idmquar.htm.

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.

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.

c. New in 2008: Pierce Pond Township and T3 R4 BKP WKR in Somerset County were added to the quarantine area. Egg masses were detected in T6 R10 WELS in Piscataquis County and Mount Chase in Penobscot County. The process for adding these towns, as well as Trout Brook Twp in Piscataquis

County, to the quarantine area has been started. Updates will be posted to our Website and in the Conditions Reports.

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.

c. New in 2008: See Appendix C of this report for information about the eradication plan for European larch canker in Brunswick, ME

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 under quarantine includes the towns of Eliot, Kittery, Ogunquit, South Berwick, Wells and York in York county 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 2008: Vermont has declared Windham County infested, therefore hemlock from Windham County Vermont is regulated.

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

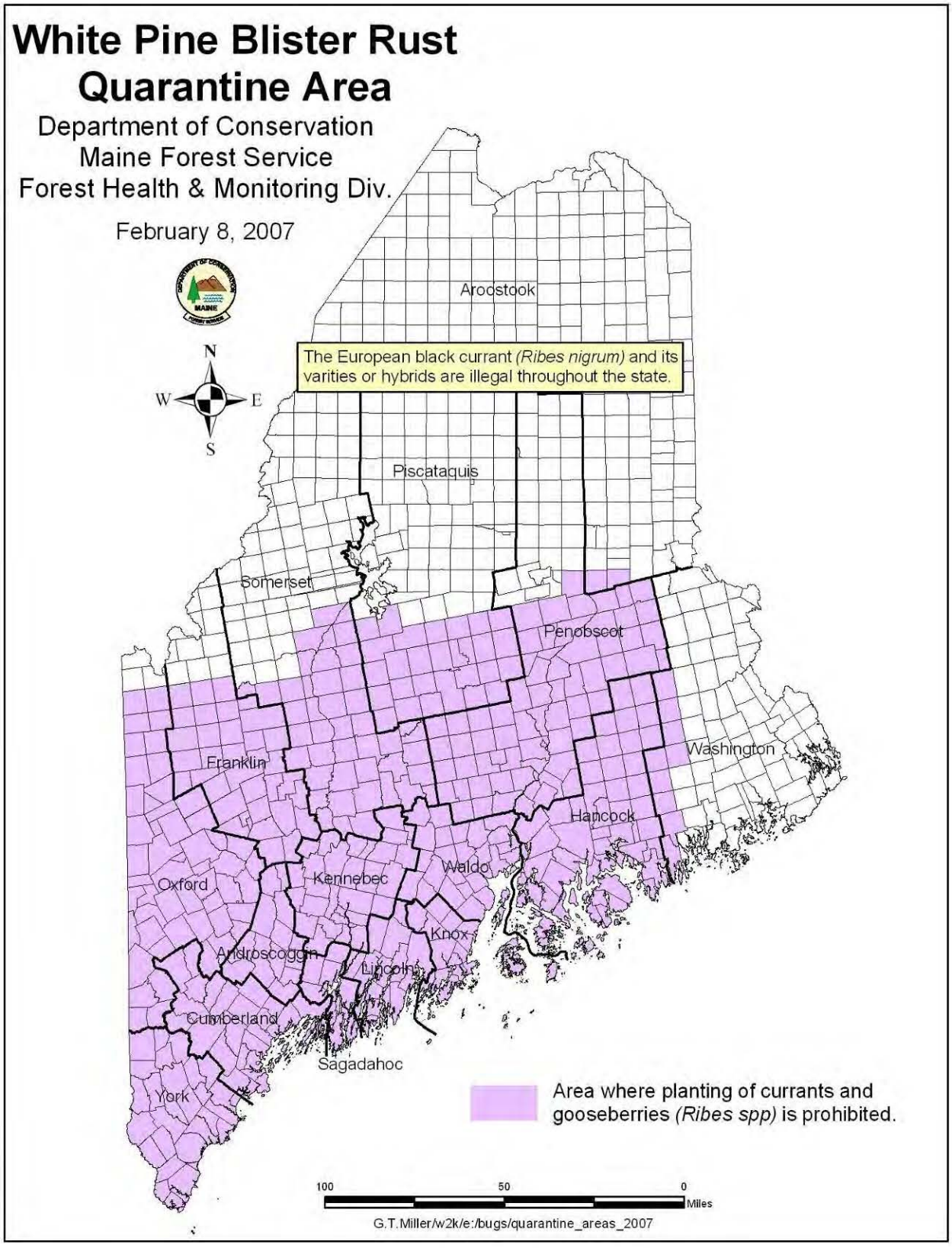
ii. 7 MRSA, Chapter 409, Section 2301 of the Laws of the State of Maine.

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.

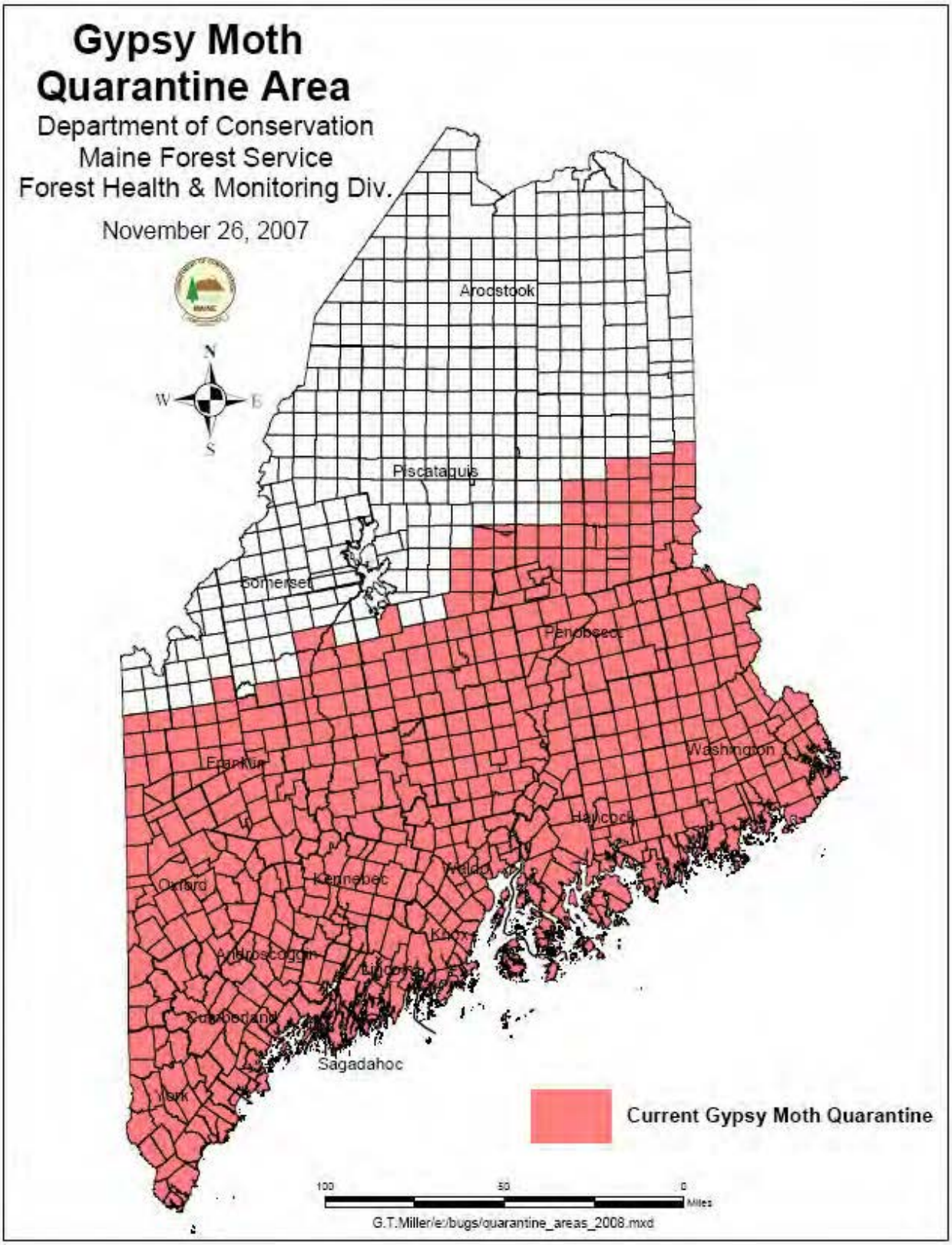
Somerset County: Anson, Athens, Bald Mountain Twp T2 R3, Bigelow Twp, Bingham, Bowtown Twp, Brighton Plt, Cambridge, Canaan, Caratunk, Carrying Place Town Twp, Carrying Place Twp, Chase Stream Twp, Concord Twp, Cornville, Dead River Twp, Detroit, East Moxie Twp, Embden, Fairfield, Harmony, Hartland, 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



Towns Regulated by Maine's Gypsy Moth Quarantine

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, 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, TA R7, TA R8, TA R9, Veazie, Veazie Gore, Webster Plantation, Winn, Woodville

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, Orneville, Parkman, Sangerville, Sebec, Shirley, T1 R10 WELS, T1 R11 WELS, T1 R9 WELS, T2 R10 WELS, T2 R9 WELS, T4 R9 NWP, T5 R9 NWP, T7 R9 NWP, TA R10 WELS, TA R11 WELS, TB R10 WELS, TB R11 WELS, Wellington, Williamsburg, Willimantic

Sagadahoc County- The entire county.

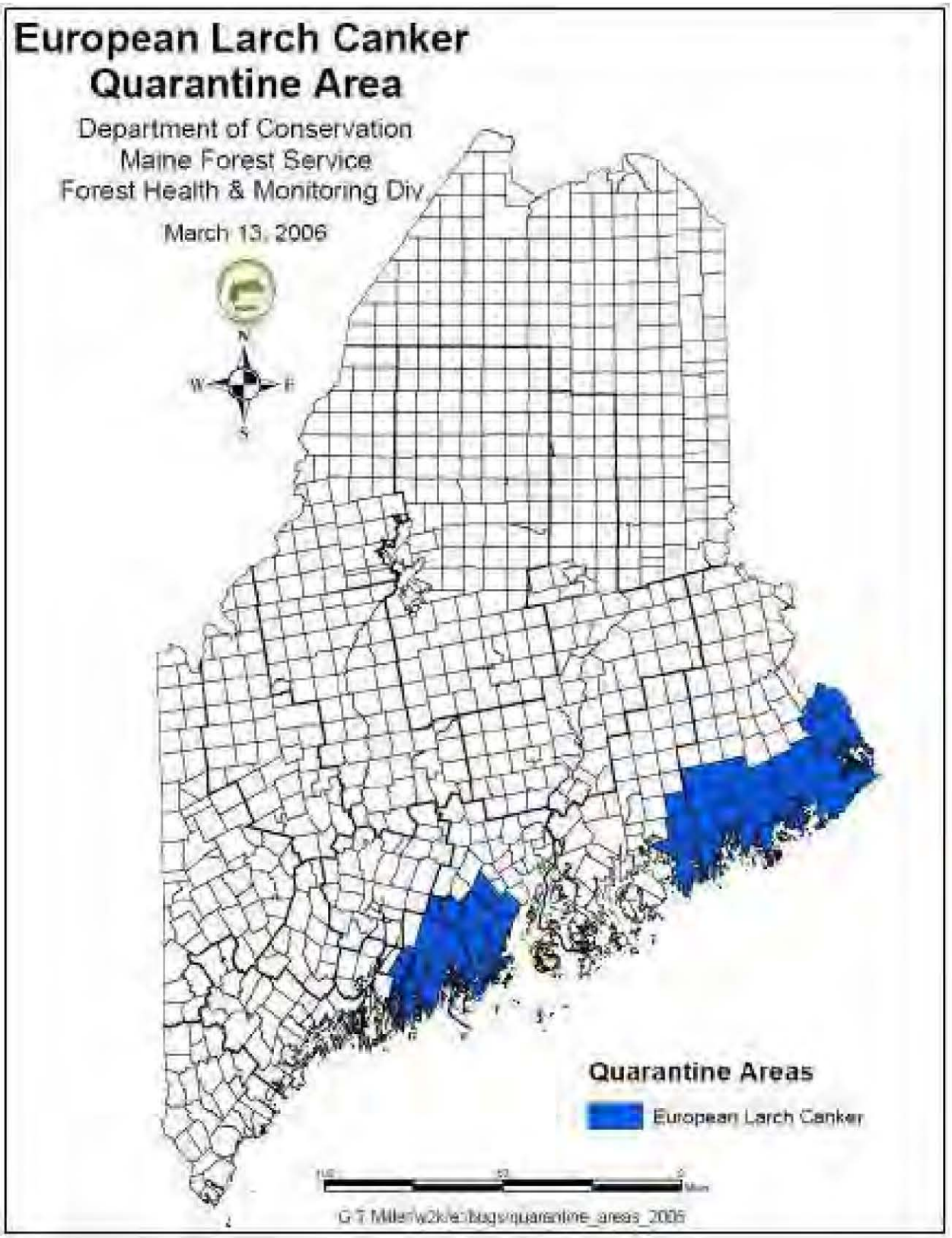
Somerset County- Anson, Athens, Bald Mountain, Bingham, Bowtown, Brighton Plantation, Cambridge, Canaan, Caratunk, Carrying Place, Carrying Place Town, Concord Plantation, Cornville, Dead River, Detroit, East Moxie Township, Embden, Fairfield, Harmony, Hartland, Highland Plantation, Lexington Plantation, Madison, Mayfield, Mercer, Moscow, Moxie Gore, New Portland, Norridgewock, Palmyra, Pittsfield, Pierce Pond Township, 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, T10 SD, T16 MD, T7 SD, T9 SD, Winter Harbor

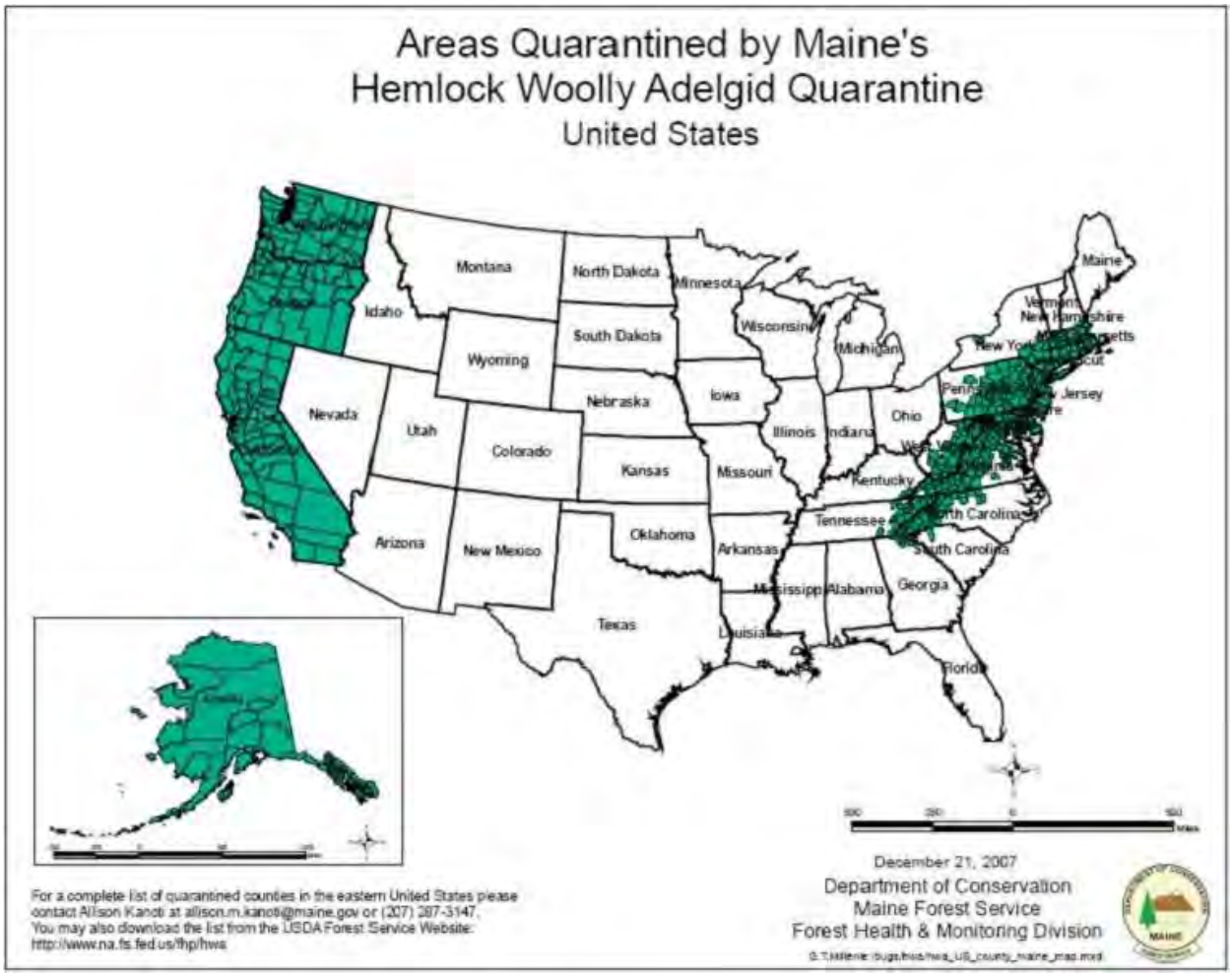
Knox County: Appleton, Camden, Cushing, Friendship, George, Head, Hope, Owls Rockland, Rockport, South St. Thomaston, Thomaston, Union, Warren, Washington

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

Waldo County: Lincolnville, Searsmont

Washington County: Addison, Baring Beals, Beddington, Calais, Centerville, Charlotte, Cherryfield, Columbia, Columbia Falls, Cooper, Cutler, Deblois, Dennysville, East Machias, Eastport, Edmunds, Harrington, Jonesboro, Jonesport, Lubec, Machias, Machiasport, Marion, Marshfield, Meddybemps, Milbridge, No. 14 Twp., Northfield, Pembroke, Perry, Robbinston, Roque Bluffs, Steuben, T18 ED, T18 MD, T19 MD, T24 MD BPP, T25 MD BPP, Trescott, Whiting, Whitneyville

Hemlock Woolly Adelgid Quarantine Area Map—United States



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

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

New Hampshire:
Hillsborough County: Amherst, Brookline, Hollis, Hudson, Litchfield, Merrimack, Milford, Nashua, Pelham
Rockingham County: Atkinson, Brentwood, Danville, Derry, East Kingston, Exeter, Fremont, Greenland, Hampstead, Hampton, Hampton Falls, Kensington, Kingston, Londonderry, New Castle, Newton, North Hampton, Plaistow, Portsmouth, Rye, Salem, Sandown, Seabrook, South Hampton, Stratham, Windham

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

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

Eastern US Counties Regulated by Maine's Hemlock Woolly Adelgid Quarantine

Connecticut: Fairfield, Hartford, Litchfield, Middlesex, New Haven, New London, Tolland, Windham

Delaware: Kent, New Castle, Sussex

Georgia: Fannin, Habersham, Lumpkin, Rabun, Stephens, Towns, Union, White

Kentucky: Bell, Harlan, Powell

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: York (town-by-town quarantine)

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

New Hampshire: Hillsborough (town-by-town quarantine), Rockingham (town-by-town quarantine), Strafford

New Jersey: Atlantic, Bergen, Burlington, Camden, Cape May, Cumberland, Essex, Gloucester, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Salem, Somerset, Sussex, Union, Warren

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

Pennsylvania: Adams, Allegheny, Bedford, Berks, Blair, Bradford, Bucks, Cambria, Carbon, Centre, Chester, Clinton, Columbia, Cumberland, Dauphin, Delaware, Elk, 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: Bristol, Kent, Newport, Providence, Washington

South Carolina: Greenville, Pickens, Oconee

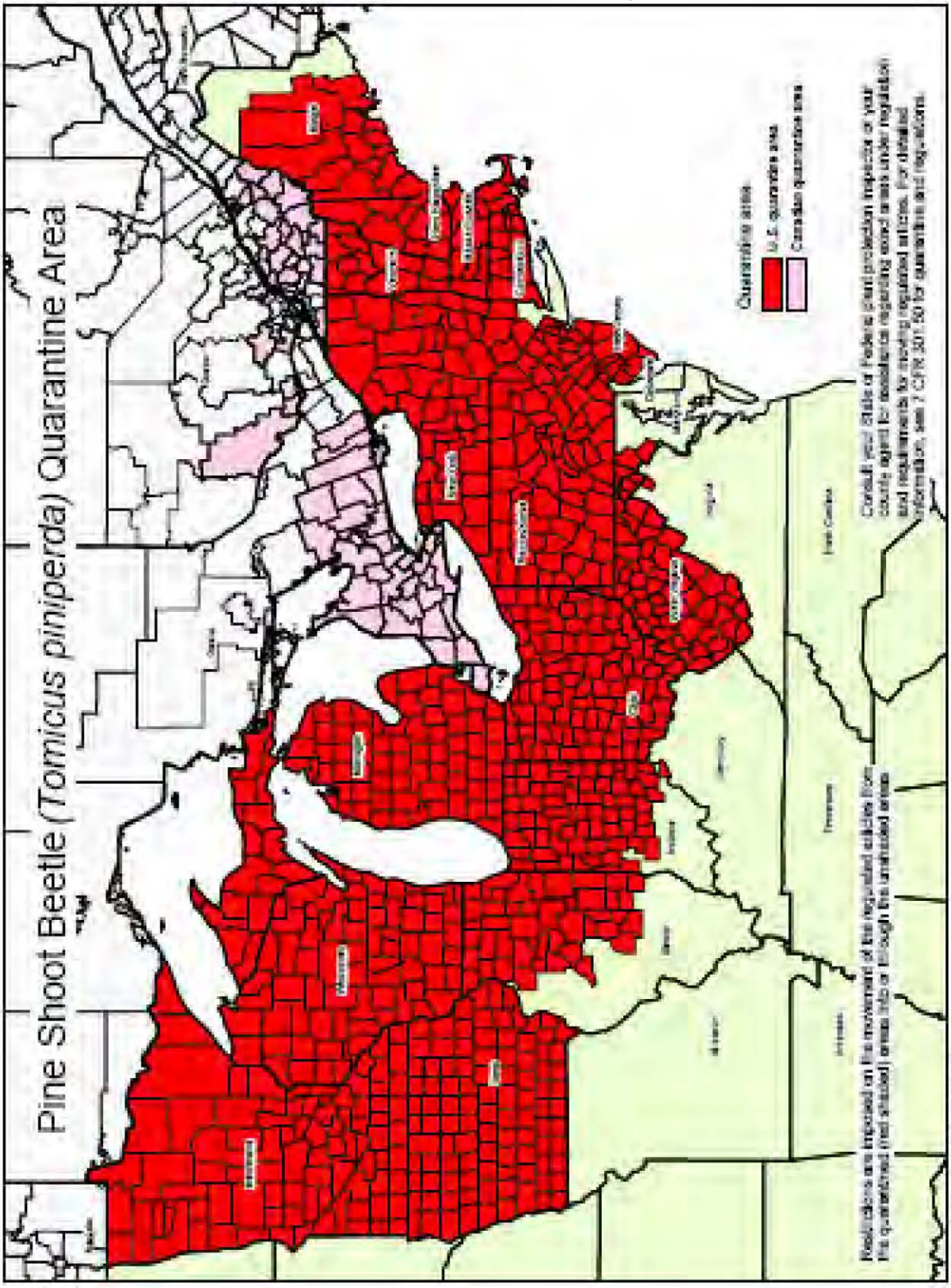
Tennessee: Blount, Campbell, Carter, Cocke, Grainger, Greene, Hamblen, Hamilton, Hancock, Hawkins, Jefferson, Johnson, Knox, Loudon, Monroe, Polk, Rhea, Sevier, Sullivan, Unicoi, Union, Washington

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, 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

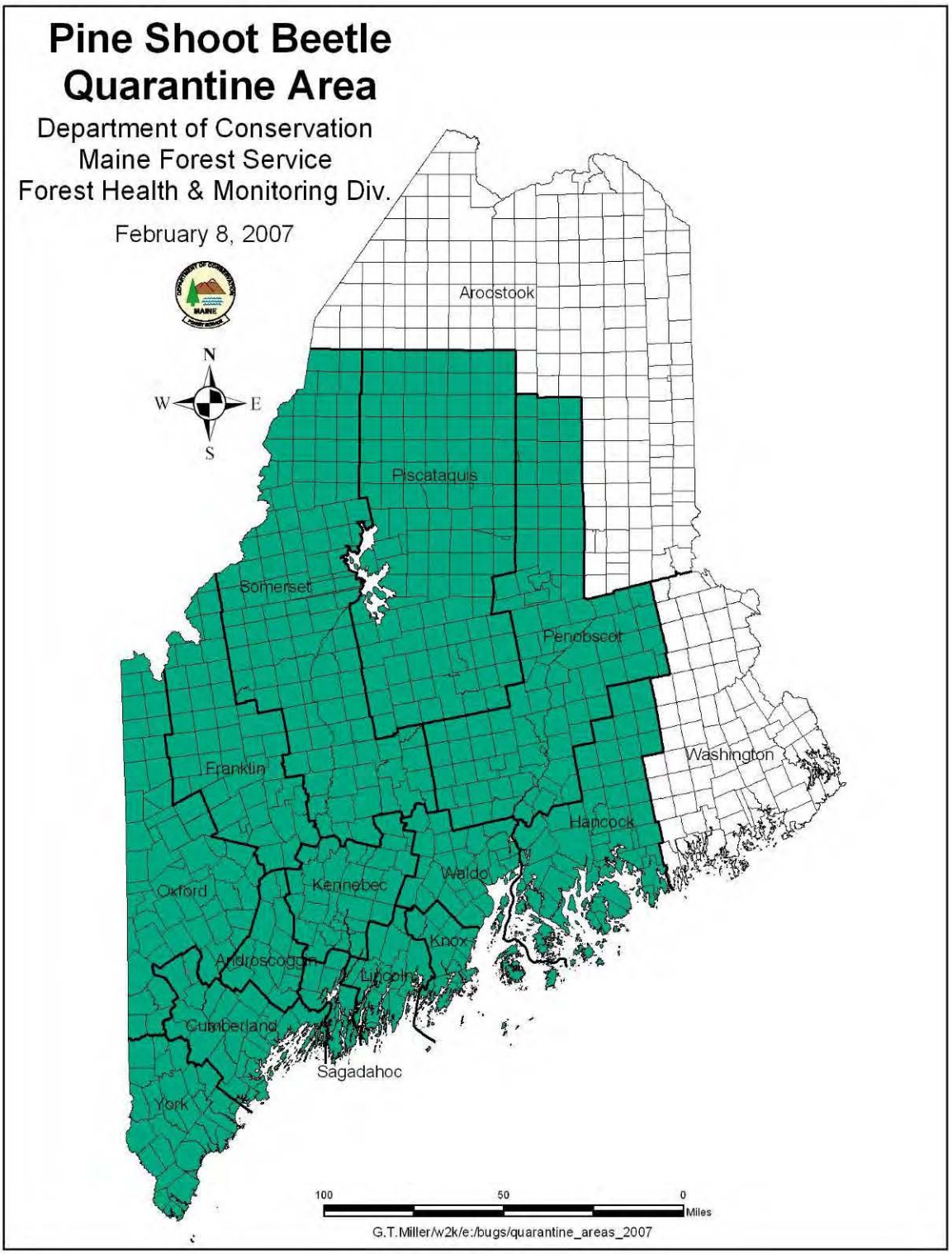
West Virginia: Barbour, Berkeley, Boone, Braxton, Cabell, Fayette, Grant, Greenbrier, Hampshire, Hardy, Jefferson, Kanawha, McDowell, Mercer, Mineral, Mingo, Monongalia, Monroe, Morgan, Nicholas, Pendleton, Pocahontas, Preston, Raleigh, Randolph, Summers, Tucker, Upshur, Webster, Wood, Wyoming

United States and Canadian Pine Shoot Beetle Quarantine Areas



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.
2. Dearborn, R.G., H. Trial, Jr., D. Struble and M. Devine. The Saddled Prominent Complex in Maine with Special Consideration of Eastern Maine Conditions. March, 1978. 20 pp.
3. Maine Forest Service, Entomology Division. Spruce Budworm in Maine: 1977. March, 1978. 80 pp.
4. Devine, M.E., H. Trial, Jr. and N.M. Kotchian. Assessment of Spruce Budworm Damage in the Moosehorn National Wildlife Refuge. August, 1978. 32 pp.
5. Struble, D., H. Trial, Jr. and R. Ford. Comparison of Two Rates of Sevin-4-Oil for Spruce Budworm Control in Maine: 1976. August, 1978. 28 pp.
6. Morrison, T.A. and J.B. Dimond. Field Trials for Control of Spruce Budworm in Maine: A History and Bibliography. September, 1978. 13 pp.
7. Bradbury, R. Spruce Budworm Parasitic Survey in Maine with Special Reference to the 1978 Season. December, 1978. **Unpublished**.
8. Trial, Jr., H. and A. Thurston. Spruce Budworm in Maine: 1978. December, 1978. 109 pp.
9. Trial, Jr., H., W. Kemp and D. Struble. Evaluation of Split Application and Reduced Dosages of Sevin-4-Oil for Spruce Budworm Control in Maine: 1978. November, 1979. 30 pp.
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**.
11. Dimond, J.B., M. Kittredge, D. Schaufler and D. Pratt. *Bacillus thuringiensis*: Operational Project - Spruce Budworm Control in Maine 1978. 1978. 36 pp.
12. Kemp, W.P., H. Trial, Jr. and D. Struble. Sampling and Analysis Design for Departmental Insecticide Monitoring. February, 1979. 32 pp.
13. Connor, J.Y. and H. Trial, Jr. *Bacillus thuringiensis*: Operational Project - Spruce Budworm Control in Maine 1979. November, 1979. 20 pp.
14. Trial, Jr., H. and A. Thurston. Spruce Budworm in Maine: 1979. March, 1980. 111 pp.
15. Bradbury, R.L. and G.A. LaBonte. Winter Mortality of Gypsy Moth Egg Masses in Maine. November, 1980. 4 pp.
16. Devine, M.E. and J.Y. Connor. Resurvey of Spruce Budworm Damage in the Moosehorn National Wildlife Refuge. February, 1981. 21 pp.
17. Trial, Jr., H. and M.E. Devine. Spruce Budworm in Maine: Biological Conditions in 1980 and Expected Infestation Conditions for 1981. February, 1981. 64 pp.
18. Trial, Jr., H. and M.E. Devine. Spruce Budworm in Maine: Results of the 1981 Project, Biological Conditions in 1981, and Expected Infestation Conditions for 1982. April, 1982. 83 pp.
19. Trial, Jr., H. and M.E. Devine. Spruce Budworm in Maine: Results of the 1982 Project, Biological Conditions in 1982, and Expected Infestation Conditions for 1983. March, 1983. 76 pp.
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MFS 03/09

Appendices

Appendix A

Exotic Bark Beetle and Woodborer Survey 2008

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This is the fifth year that the Maine Forest Service (MFS) has been trapping bark beetles and woodborers as part of a nation wide effort to monitor and detect new introductions of beetles into North America.

Methods

Twenty sites in Maine are selected for monitoring in central and southern Maine each year (Table A1) 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 is shared. We also collaborate with the USDA Forest Service (USFS) and other states and provinces.

The trapping period is the approximate adult activity period from early April through the end of September in Maine. Traps are placed in the field as soon as the adult activity period begins.

Three 12-funnel Lindgren traps are placed at each site. Each trap is baited with one of the three lures or lure combinations.

- The ethanol lure is a general attractant for woodboring insects in deciduous hosts.
- Alpha-pinene and ethanol lures together are general attractants for woodboring insects in coniferous hosts.
- The three-component exotic bark beetle lure baited trap is more specific for conifer-feeding bark beetles e.g. *Ips* and *Orthotomicus* species.

All bark beetle and wood borers were identified to genus and most to species. Suspect or unusual specimens were sent to taxonomic experts.

Table A1. Exotic Bark Beetle and Woodborer Survey Sites

			Year surveyed				
Town	**County**	**Criteria[1]**	**2004**	**2005**	**2006**	**2007**	**2008**
Auburn	Androscoggin	SWPM/transportation	x	x	x	x	x
Oxford	Oxford	Warehouse	x	x	x	x	x
Presque Isle	Aroostook	Urban debris	x	x	x	x	x
Limestone	Aroostook	SWPM/industrial		x	x	x	x
Portland	Cumberland	Urban debris		x	x	x	x
Auburn	Androscoggin	Retail Outlet (Importer)		x	x	x	x
Bath	Sagadahoc	Urban debris			x	x	x
Union	Knox	Urban debris			x	x	x
Gorham	Cumberland	Retail Outlet (Importer)				x	x
Lewiston	Androscoggin	Warehouse				x	x
Livermore Falls	Androscoggin	Sawmill/lumberyard				x	x
Old Orchard Beach	York	Campground				x	x
Poland	Androscoggin	Bark/mulch producer				x	x
Sanford	York	Sawmill/lumberyard				x	x
South Portland	Cumberland	SWPM/industrial				x	x
Augusta	Kennebec	Retail Outlet (Importer)					x
Camden	Knox	Campground					x
Casco	Cumberland	Campground					x
Portland	Cumberland	Port of Entry					x
Wells	York	SWPM/industrial					x
Portland	Cumberland	SWPM/industrial		x	x	x	
Freeport	Cumberland	Warehouse				x	
Saco	York	SWPM/industrial				x	
Waterville	Kennebec	SWPM/transportation				x	
Wells	York	Campground				x	
Augusta	Kennebec	SWPM/industrial	x	x	x		
Biddeford	York	SWPM/industrial	x	x	x		
Lewiston	Androscoggin	SWPM/industrial	x	x	x		
Lewiston	Androscoggin	SWPM/pallets	x	x	x		
Portland	Cumberland	Port of Entry	x	x	x		
Sanford	York	SWPM/industrial	x	x	x		
Scarborough	Cumberland	Urban forest	x	x	x		
South Portland	Cumberland	SWPM/industrial	x	x	x		
Waterville	Kennebec	Urban debris		x	x		
Manchester	Kennebec	Wood products			x		
York	York	Nursery			x		
Auburn	Androscoggin	SWPM/plant material	x	x			
Saco	York	SWPM/industrial	x	x			
Sidney	Kennebec	SWPM/pallets	x	x			
Waterville	Kennebec	SWPM/transportation	x	x			
Easton	Aroostook	SWPM/industrial	x				
Gardiner	Kennebec	Warehouse	x				
Lewiston	Androscoggin	SWPM/industrial	x				
Portland	Cumberland	SWPM/industrial	x				
Saco	York	SWPM/industrial	x				
Scarborough	Cumberland	SWPM/pallets	x				

[1]SWPM = Solid wood packing material.
Shaded cells indicate sites not trapped in 2008.

Results

In 2008 we identified over 12,000 specimens and found seven beetles new to the State of Maine. One was a bark beetle, *Xyleborus seriatus,* found for the first time in 2005 in Massachusetts and nowhere in North America except now Maine. Two flatheaded woodborers, *Agrilus cyanescens* and *Anthaxia fisheri,* were identified. One is another exotic that may be fairly widespread and the other is known no further north then Pennsylvania- and now Maine. The four longhorned beetles are all native to North America. Two are reasonable range extensions, known from New Hampshire, the other two are from further away (Table A2).

Table A2. 2008 New State Records for Bark Beetles and Woodborers

Family	Genus	Species	Author	Location found	Nearest known record	
Curculionidae	*Xyleborus*	*seriatus*	Blandford	2 sawmills	MA	exotic
Buprestidae	*Agrilus*	*cyanescens*	(Ratzenburg)	airport	NH	exotic
Buprestidae	*Anthaxia*	*fisheri*	Obenberger	airport	PA	plum
Cerambycidae	*Encyclops*	*caerulea*	(Say)	bark processor	CT, NY	hardwoods
Cerambycidae	*Strangalia*	*luteicornis*	(Fabricius)	bark processor	NH	hardwoods
Cerambycidae	*Leptura*	*obliterata*	(LeConte)	sawmill	NH	? rare
Cerambycidae	*Oberea*	*ocellata*	Haldeman	sawmill	NY, PA	sumac stem borer

The species that were new records from 2004 are found statewide, they probably had been here for some time but no one had been looking for them so they went unrecorded. Of the five new species in 2005 and 2006, four have not yet been caught again. One species from 2006 has been recovered from four different sites over the past three years and the one from 2007 has bee found again at the same site.

Over the past five years 54,545 beetles have been screened and identified in monitoring for invasive pest species (Table A3.) We have developed expertise in taxonomic identifications at the MFS Insect and Disease Lab and Department of Agriculture. In addition, there is now a network of taxonomists that we have met across North America that can aid us when unusual specimens come in. We have greatly improved our insect reference collection and have increased our knowledge of what beetles live in Maine and when and where they occur. This will allow us to more easily detect unwanted woodborers and bark beetles if (when) they appear.

Table A3. Exotic woodborer and bark beetle survey results

Year	Target Species Found	Number of Beetles identified	Scolytinae Species (Bark & Ambrosia beetles)	Cerambycidae Species (Longhorned beetles)	Buprestidae Species (Flatheaded woodborers)	New State Records
2004	0	7,400	43	26	9	7
2005	0	8,900	54	52	16	1
2006	0	8,031	51	34	11	4
2007	0	17,607	57	57	13	1
2008	0	12,607	55	54	15	7

In addition, all other beetle specimens are given to two beetle collectors who over the past five years have found 48 species of other beetles in the funnel traps that were not in the Maine Forest Service insect collection. Again, some of these are new records for the state. Also a spider expert has been identifying spiders caught in the traps and is finding it a rich source of material with new records of Maine's fauna.

Appendix B

Hemlock Woolly Adelgid Biological Control 2004 through 2008

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Introduction

Several native predators will feed on hemlock woolly adelgid (HWA). However they do not feed heavily enough to prevent decline and mortality of HWA infested hemlocks. Therefore, HWA biological control agents have been and are being investigated by several research facilities. Biological control of this adelgid in the northeastern United States is done with predators from regions where HWA naturally occurs including parts of Asia and northwestern North America. Maine has participated in predator releases offered by the US Forest Service and has released two species of predatory beetles previously approved for release by the federal government. The first agent released in Maine was *Sasajiscymnus tsugae* (St), a Coccinellid, or lady beetle, which is an effective natural predator of HWA in Japan. First released in 2004, St is becoming established at several release sites in the State. The second HWA predator released in Maine, *Laricobius nigrinus* (Ln), is native to the northwestern United States where it is an important component of the community of native predators that feed on HWA. Two strains of Ln are being investigated; the one currently available for large-scale release is native to the Pacific Northwest. The second strain is found in the intermountain region and tolerates more severe winter conditions and would be better suited to Maine's climate. This strain is not currently available for operational releases.

Beetles are preferentially released on sites with some guarantee that they will be forested over the long term, and where we will be allowed access for monitoring. The site's location in relation to the overall infested area (generally preferring release at the edge of distribution) and to other release sites is also considered. Some other factors in choosing a release site are:

- Low likelihood of broad-spectrum insecticide use
- High site quality for hemlock
- High site quality for biocontrol agents
- High hemlock component
- Hemlocks not yet in decline,
- Large stand size
- Landscape connectivity with other hemlocks
- Ease of access

Not all of these preferences are met at all release sites, but they are considered before choosing a release site.

Releases

The Maine Forest Service, in cooperation with the US Forest Service, has released almost 28,000 predator beetles in HWA infested forests of York County as part of its slow-the-spread management plan for hemlock woolly adelgid (Table B1). Releases first took place in 2004; approximately 23,700 St and 3,900 Ln beetles have been released across 14 sites (Figure B1).

Recoveries

Release sites are periodically checked, through visual surveys and beat sheet sampling of infested branches, for the presence of the released biological control agents. Recovery of larvae and new generations of adults indicate survival and possible establishment of the species.

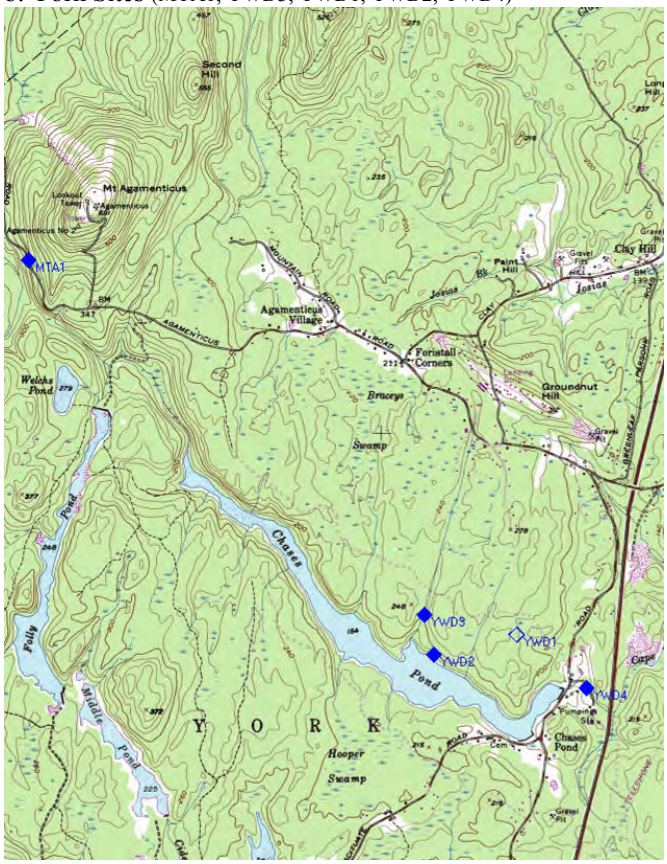
Surveys indicate that St has reproduced and become established in the period from 2004 to 2008 at release sites in Kittery on Gerrish Island (Figure B1a). Additionally, St has reproduced at the release site in York (Figure B1b). Sampling has not yielded Ln. Several factors may contribute to this finding: the beetles were released relatively recently at very low densities; there are limited infested branches within reach for the sampling method; and Maine is at the cold margin of where they may survive. A more sensitive sampling technique requires collecting branch

samples from several canopy levels and shipping them to the Virginia Tech. lab for analysis. This may be used if current techniques do not yield recoveries in 2009.

Note: Release site ID's are listed from north to south in the headings (a., b., c.) below.

a. Kittery Sites (KLT1, KIT1, GI4, GI6, GI1, GI5, GI3, GI2)

b. York Sites (MTA1, YWD3, YWD1, YWD2, YWD4)



c. Saco Release Site (FBSP1)

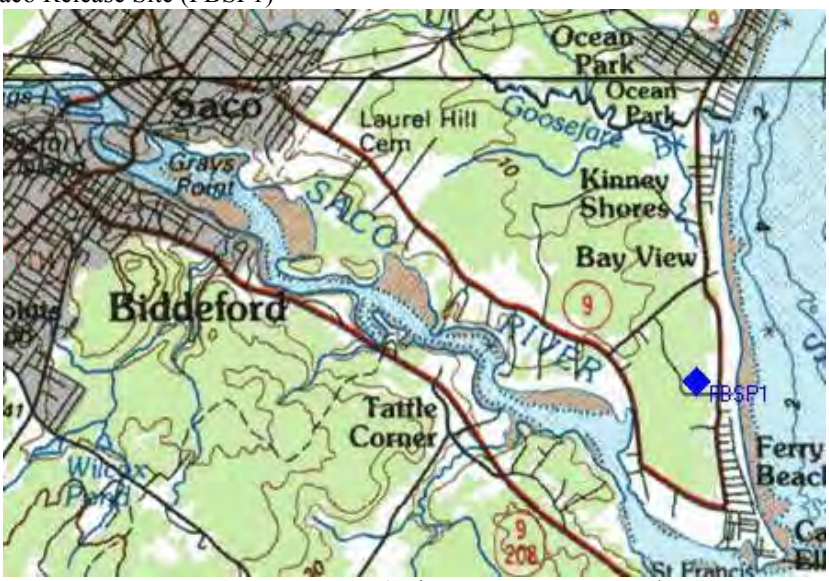


Figure B1. HWA Predator Release Sites in Maine (◆,◇). Open diamonds (◇) indicate evidence of predator reproduction. See Table B1 for predator release dates, numbers and species. (Maps © Maptech, Inc 1997).

Table B1. *Sasajiscymnus tsugae* (St) and *Laricobius nigrinus* (Ln) releases.

Species (Strain)	Town	Site	Date	Number	Total
St					**23734**
	Kittery				17734
		GI1	5/14/2004	2500	
		GI1	6/25/2004	5000	
		GI2	4/14/2005	2602	
		GI3	4/14/2005	2553	
		GI4	4/14/2005	2548	
		GI5	4/14/2005	2531	
	York				6000
		YWD1	4/10/2007	3000	
		YWD1	6/5/2008	3000	
Ln (Pacific Northwest)					**3922**
	Kittery				800
		GI6	10/31/2006	300	
		KLT1	11/21/2007	200	
		KLT1	10/30/2007	300	
	Saco				500
		FBSP1		500	
	York				2622
		MTA1	11/21/2007	100	
		MTA1	10/30/2007	300	
		YWD1	10/30/2007	300	
		YWD1	11/21/2007	200	
		YWD2	10/24/2008	622	
		YWD3	10/30/2008	500	
		YWD3	12/3/2008	500	
		YWD4	11/6/2008	100	
Ln (Intermountain)					**100**
	Kittery				100
		KIT1	4/11/2008	100	
Total Number of HWA Predators Released in Maine's Infested Area 2004-2008:					**27756**

Outlook

Both predators' abilities to survive and flourish in Maine are likely to be limited by cold winter temperatures. St is in the adult stage during the winter and is found in over-wintering sites (Cheah *et al*. 2004), which in one mild winter were infested branch tips (Cheah and McClure 2000). Ln feeds during the winter in the adult stage (Cheah *et al.*2004); therefore it is potentially more exposed to winter cold and susceptible to freezing (and death). Up until the current winter, statewide December through February temperatures have been only slightly below normal or above normal since the first St releases in 2004 (Table B2) (NRCC) and had been well above normal since the first Ln release in 2006.

St has survived temperatures in the field of -7 °F and -5.8 in Connecticut and Maine respectively (Cheah 2004). In Maine, the insects were in bole-sleeves, which kept the insects warmer than ambient temperature. The study began in 2001 and was terminated in 2003 when surviving St were no longer found in the cages (Donahue Unpublished). The beetles survived to -5.8°F, but that temperature occurred during one of the warmest winters on record (2001-2002) in Maine (NRCC). However the study site was in central Maine, an area that normally has colder winters than the currently infested area. St is expected to remain established at release sites in coastal Maine. It has survived a severe winter that decimated its main prey, HWA, in similar climatic zones of interior Connecticut and Massachusetts (Cheah and McClure 2002, USNA).

Table B2. Maine (December through February) winter climate summary 2004-2009 (partial).

Season or Month	Departure from Normal (°F)*	Rank (Since 1895)**
2001-2002	6.5	106th of 107 (warm, ME/CT sleeve study)
2004-2005	-0.4	50th of 110 (~average, 1st release))
2005-2006	4.3	102nd of 111 (warm)
2006-2007	2.1	82nd of 112 (warm)
2007-2008	1.4	68th of 113 (warm)
December 2008	-1.9	41st of 114 (cold)
January 2009	-6.2	8th of 115 (cold)

*1971 to 2000 Normals ** 1 = Coolest

There is even less information about cold tolerance of Ln than of St. Mausel *et al.* (2008) found that the Pacific Northwestern strain of Ln did not survive and establish well in USDA plant hardiness zones 5a and 5b and recommended against releases in zone 5a. Releases in Maine have been in zone 5b, where winters on average are believed to be at the climatic margin of Ln's cold tolerance. Colder than average winters, such as that we have experienced in 2008-2009 may prevent success of Pacific Northwest origin Ln even in extreme coastal Maine. We are hopeful that rearing facilities will begin to produce the more cold-hardy Ln for applications at the northern and higher elevation distributions of HWA. In addition we are in the early stages of exploring the possibility of using field insectaries within the infested area to produce predator beetles.

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Appendix C

An Eradication Plan for Larch Infected with the Larch Canker Pathogen (*Lachnellula willkommii*) in Brunswick, Cumberland County, Maine

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Introduction: In 2007, the fungal pathogen that causes the disease commonly known as larch canker was found infecting several larch trees on property of the Brunswick Golf Club. Pathogen identification was confirmed by Dr. John McKemy of APHIS on November 30, 2007. The pathogen is currently under Federal Quarantine in the Downeast and mid-coastal portions of Maine. A map of the quarantine areas is presented elsewhere in this *Annual Summary Report*.

The Brunswick discovery was a new Town and County record for presence of the disease in Maine. Because the infected trees occur outside the current quarantine area, one of two efforts needed to be undertaken to prevent further spread of the disease, and to limit risk to both nearby and distant larch resources. The quarantine could have been expanded to include the new infestation, or this recently recognized infestation could be eradicated.

Survey: To determine the appropriate action, an intensive survey was conducted during the spring and summer of 2008 to determine the extent of the infestation and the location of any nearby larch resource that may be at risk.

The area selected for intensive survey is bounded by Interstate 295, from the Androscoggin River to the Exit 28, southbound ramp to the Northwest; by US Route 1 from the Exit 28, southbound ramp to the River Road on the South; and by the Androscoggin River to the Northeast. The area is approximately 670 acres in size. The entire area was scouted for the presence of larch (*Larix* spp.), the susceptible host species. GPS coordinates were obtained for all identified larch.

Inspections of individual trees were conducted simultaneously by personnel from the Maine Forest Service, and the USDA Forest Service, Durham, New Hampshire. A total of 222 larch trees (*Larix* spp.) were found in the survey area in Brunswick; 11 were native tamarack (*Larix laricina* (Du Roi) K. Koch), and 211 were determined to be European larch (*Larix decidua* Mill.) or European larch hybrids, based on cone and bark characteristics. No other trees in the survey area are susceptible to the larch canker pathogen.

A total of 32 larch trees were found to be infected. All infected trees were on the golf course grounds proper, and all infected larches have been determined to be European larch. Four of the eleven native tamarack occur on the grounds of the golf course; the others are widely scattered in the native woodlands and a small residential area between the golf course and Interstate 295. None of the native tamarack was found to be infected. All cankers observed on the infected trees were branch cankers. There were no stem cankers. Six trees have but a single branch canker. As near as can be determined, there has been no mortality from larch canker, although a few heavily-infected trees had several dozen branch cankers

Eradication Plan: Because so few trees are infected, because the infected trees were closely clustered in distribution, and because adjacent, susceptible individuals were few and widely scattered, it seemed appropriate to attempt an eradication of the infested trees.

The eradication plan called for felling 26 of the 32 infected trees, and pruning infected braches from the six trees found with only single branch infections. The branch and top material will be burned on-site (on the golf course grounds), prior to April, 2009. The larger stem material was milled into dimension planks and landscape timbers, again to be used on the golf course grounds. Slab material generated from the milling will also be burned on-site prior to April, 2009.

Although the pathogen can survive as a saprophyte for some (unknown) period of time (USDA 1991), it has been shown to be quickly inhibited by competing microorganisms (Yde-Anderson 1979, Sinclair and Lyon 2005), and is not easily isolated from any wood or bark tissues other than those of active canker margins. Tree infection occurs via ascospores infecting wounds through the bark. The development of new ascocarps has not been observed to occur on dead wood or bark. Additional precautions taken included sweeping and disinfesting all milling equipment before it left the site, to eliminate potential for spreading the pathogen or any infected material.

Tree felling and most of the slash burning work was completed by mid-December, 2008. Burning any remaining slash, and burning the slab material generated from the milling process is scheduled for completion by April, 2009. Property managers have been fully cooperative, and have requested the work to be done in the winter season in order to limit damage to the greens from harvesting equipment traffic. This scheduling has also fit well with the disease survey progress.

Future Monitoring: Since all larch tree locations have been mapped, re-surveys will be conducted on at least an annual basis for the next five years, to quickly locate and remove any new infections (infected trees) that may occur, or others that may have been missed. Particularly close monitoring will be conducted on those trees that receive only the pruning treatment for canker removal.

This incidence of larch canker appears to have developed from a separate introduction of the pathogen, and not from the spread of the pathogen from existing known locations already in quarantine. Surveys of larch during 2007 and 2008 in neighboring towns, and in towns located between the Brunswick infestation and the current quarantine boundary have not revealed any other infestations. Additional survey work also will be focused in these adjacent, un-infested towns during the next five years.

Ornamental European larch were likely introduced to this site and established for landscaping purposes, and may have been infected in the nursery. Specific origin locations and tree establishment records are not available. The oldest larches are approximately 80 years of age; the youngest are estimated to be about 35 years of age.

Initial observations indicate that the disease has been at this location for at least fourteen years. European larch is also more resistant to the disease than is native tamarack, which may account for its slow spread and the lack of stem cankers.

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