

Final (January 1 – December 31) Accomplishment Report for FY 2008
USDA-APHIS Cooperative Agricultural Pest Survey
Cooperative Agreement: 08-8223-0360-CA

Year: 2008

State: Maine

Agency: Maine Department of Agriculture, Food & Rural Resources

I. Core level funding activities

A. State Survey Coordinator (SSC)

Karen Coluzzi

Maine Department of Agriculture, Food & Rural Resources (MDAFRR)

Division of Plant Industry

28 State House Station

Augusta, ME 04333

(207) 287-7551 (phone)

(207) 287-7548 (fax)

Karen.L.Coluzzi@maine.gov

B. No state member serves on the National CAPS committee

C. Objectives of Core level funding activities:

1. Determine Maine's training needs to further develop CAPS programs, and provide and assist in training.
2. Coordinate actions of agencies involved in surveys through oversight of survey work plans.
3. Facilitate the distribution of funds to other cooperating parties conducting surveys.
4. With the State Plant Health Director and the State CAPS Committee, create new and reinforce existing networks with other state, county, federal and public entities to evaluate risks, conduct surveys and manage cooperative pest programs.
5. Rapid response – Initial survey activities and contingency plans would be coordinated so that if an exotic pest or an invasive species is detected, it can be appropriately addressed in a timely manner with minimal disruption to Maine's food supply and plant resources.
6. Network with other survey programs through attendance at state, regional and national CAPS committee meetings.
7. Organize pest detection data and maintain information in NAPIS database.

Accomplishments of Core level funding activities for January 1 thru December 31, 2008:

Note: The SSC was on leave from November 30, 2007 to March 10, 2008, then part time from March 11 to September 14, and full time from September 15 to December 31, 2008.

1. The SSC participated in monthly website development meetings and trainings to improve upon electronic outreach. The SSC provided training in trap deployment and insect identification.

2. The SSC coordinated with MDAFRR staff, the Maine Forest Service (MFS), and the University of Maine Cooperative Extension (UMCE) to conduct the following surveys for the 2008 CAPS Program. Other coordination efforts include selecting survey sites, obtaining trapping supplies, tracking expenses, disseminating funds, and requesting reports.
 - a. MFS; exotic woodborer and bark beetle, gypsy moth, European larch canker, pine shoot beetle, Siberian silk moth, National emerald ash borer trapping.
 - b. UM Cooperative Extension; light brown apple moth
 - c. MDAFRR; exotic woodborer and bark beetle, nursery pest survey, *Phytophthora ramorum* confirmed nursery survey, National *Globodera spp.* seed potato field survey
3. Funds for above surveys were distributed upon submission of bills and / or completion of required reports.
4. Pest risk evaluation and survey selection were based on information obtained through existing state and federal networks by means of state pest committee meetings and pest risk assessments provided through the CAPS Program.
5. Rapid response mechanisms are in the works.
6. The SSC attended and participated in the following meetings and conferences to enhance the Maine CAPS Program through education and networking:
 - a. EBB Survey Preparation Meeting w/MFS; Augusta, ME 3/25/08
 - b. Nursery Survey Preparation Meeting; Augusta, ME 3/25/08
 - c. State CAPS Steering Committee Meeting; Hermon, ME; 7/24/08
 - d. BugMaine-ia – Outreach event to schools; Augusta, ME 9/17/08
 - e. Common Ground Fair; Unity, ME; 9/20/08
 - f. Soil and Water District Conservation Fair; Union, ME; 9/24/08
 - g. Eastern Plant Board Planning Meeting; Augusta, ME; 10/29/08
 - h. “Got Pests” Website Development Meetings; 10/08 – 12/08
7. Data from CAPS surveys have been entered into NAPIS.

D. Objective accomplishments were met.

E. There were no cost overruns.

F. State CAPS Committee:

Name	Organization	Title
Robert Batteese	MDAFRR	Director, Plant Industry
Karen Coluzzi	MDAFRR	Entomologist, SSC
Ann Gibbs	MDAFRR	State Horticulturist; SPRO
Kathy Murray	MDAFRR	IPM Entomologist
Vikram Bisht	MDAFRR	Plant Pathologist
Dave Struble	Maine Forest Service (MFS)	Director, MFS; Entomologist
Dave Lambert	University of Maine (UMO)	Plant Pathologist
Jim Dill	UMaine Coop. Ext. (UMCE)	IPM Specialist
Bruce Watt	UMCE	Plant Pathologist
Terry Bourgoin	USDA-APHIS-PPQ	SPHD
John Crowe	USDA-APHIS-PPQ	Pest Survey Specialist

G. NAPIS Database submissions

Submission Date	Project	Pest Scientific Name	Pest Common Name	Last Observation Date	Observation	
					+	-
20081015	EAB	<i>Agrilus planipennis</i>	Emerald Ash Borer	20080911	0	64
20090127	EBB	<i>Hylurgops palliatus</i>	Lesser Spruce Shoot Beetle	20081002	0	20
20090127	EBB	<i>Hylurgus ligniperda</i>	Redhaired Pine Bark Beetle	20081002	0	20
20090127	EBB	<i>Ips sexdentatus</i>	Sixtoothed Bark Beetle	20081002	0	20
20090127	EBB	<i>Ips typographus</i>	Spruce Bark Beetle	20081002	0	20
20090127	EBB	<i>Monochamus alternatus</i>	Japanese Pine Saywer Beetle	20081002	0	20
20090127	EBB	<i>Orthotomicus erosus</i>	Mediterranean Pine Engraver	20081002	0	20
20090127	EBB	<i>Pityogenes chalcographus</i>	Sixtoothed Spruce Bark Beetle	20081002	0	20
20090127	EBB	<i>Tomicus destruens</i>	Pine Shoot Beetle	20081002	0	20
20090127	EBB	<i>Tomicus piniperda</i>	Pine Shoot Beetle (Psb)	20081002	0	20
20090127	EBB	<i>Trypodendron domesticum</i>	Eur. Hardwood Ambrosia Beetle	20081002	0	20
20090127	EBB	<i>Xyleborus glabratus</i>	Redbay Ambrosia Beetle	20081002	0	20
20090127	EBB	<i>Xyleborus seriatus</i>	Asian Ambrosia Beetle	20081002	0	20
20090127	EBB	<i>Xyleborus similis</i>	European Shot-hole Borer	20081002	0	20
20090128	ELC	<i>Lachnellula willkommi</i>	European Larch Canker	20080508	8	0
20090128	ELC	<i>Lachnellula willkommi</i>	European Larch Canker	20081031	0	3
20090128	ELC	<i>Lachnellula willkommi</i>	European Larch Canker	20081124	1	1
20090128	ELC	<i>Lachnellula willkommi</i>	European Larch Canker	20081215	1	0
20081008	GM-MFS	<i>Lymantria dispar</i>	Gypsy Moth (European)	20080910	64	8
20081023	GM-MFS	<i>Lymantria dispar</i>	Gypsy Moth (European)	20081021	2	0
20081008	GM-USDA	<i>Lymantria dispar</i>	Gypsy Moth (European)	20080922	17	8
20081008	LBAM	<i>Epiphyas postvittana</i>	Light Brown Apple Moth	20080902	0	24
20081008	LBAM-PPQ	<i>Epiphyas postvittana</i>	Light Brown Apple Moth	20080829	0	10
20081010	NCS	<i>Adelges tsugae</i>	Hemlock Woolly Adelgid	20080827	0	8
20081010	NCS	<i>Adoxophyes orana</i>	Summer Fruit Tortrix	20080827	0	11
20081010	NCS	<i>Anoplophora glabripennis</i>	Asian Longhorned Beetle	20080827	0	23
20081010	NCS	<i>Epiphyas postvittana</i>	Light Brown Apple Moth	20080827	0	16
20081010	NCS	<i>Lymantria dispar dispar</i>	Asian Gypsy Moth	20080827	0	14
20090203	PCN	<i>Globodera pallida</i>	White Potato-cyst Nematode	20081015	0	249*
20090203	PCN	<i>Globodera rostochiensis</i>	Golden Nematode	20081015	0	249*
20080714	PCN-TF	<i>Globodera pallida</i>	White Potato-cyst Nematode	20080528	0	3*
20080714	PCN-TF	<i>Globodera rostochiensis</i>	Golden Nematode	20080528	0	3*
20081014	PSB-MFS	<i>Tomicus piniperda</i>	Pine Shoot Beetle (Psb)	20080715	13	15
20081009	PSB-PPQ	<i>Tomicus piniperda</i>	Pine Shoot Beetle (Psb)	20080807	0	11
20090127	SOD	<i>Phytophthora ramorum</i>	Sudden Oak Death; Ramorum Blgt	20080701	0	21

*seed lots, not samples

EAB	EAB Purple trap survey (MDAFRR/MFS/PPQ)
EBB	National Exotic Bark Beetle/Woodborer (MDAFRR/MFS)
ELC	European Larch Canker (MFS)
GM-MFS	Gypsy Moth (MFS)
GM-USDA	Gypsy Moth (USDA)
LBAM	Light Brown Apple Moth Survey (UMCE & PPQ)
NCS	Nursery Commodity Survey (MDAFRR)
PCN	Potato Cyst Nematode (MDAFRR)
PSB-MFS	Pine Shoot Beetle (MFS)
PSB-USDA	Pine Shoot Beetle (USDA)
SOD	CNP <i>Phytophthora ramorum</i> (Sudden Oak Death (SOD)) (MDAFRR/UMCE)

II. CAPS Survey Activities (January 1 thru December 31, 2008)

A. Pest Detection Surveys (Part II):

1. National Exotic Bark Beetle/Woodborer (**MDAFRR/MFS**)
2. Nursery Commodity Pest Survey (emerald ash borer (EAB), Asian longhorned beetle (ALB), hemlock woolly adelgid (HWA), light brown apple moth (LBAM), summer fruit tortrix moth (SFTM), Asian gypsy moth (AGM), pink gypsy moth (PGM)) (**MDAFRR**)

1. National Exotic Bark Beetle/Woodborer – MDAFRR/MFS

The 2008 program continues to build upon the surveys from 2004 to 2007, monitoring identified higher risk sites to detect artificial spread of exotic beetles at risk of entering the state in pallet wood and other wood sources. The work also is generating a reference collection of bark beetles and woodborers common around Maine sites (which will facilitate future detection of new species).

The specific achievements detailed in the final report are consistent with the approved work plan.

- a. Survey Methodology (trapping protocol) – The 2008 trapping survey to detect exotic woodborers and bark beetles was conducted using three 12-funnel Lindgren traps at each of 20 sites. Each trap was baited with one of the following lures or lure combinations – ethanol, UHR alpha-pinene and ethanol, exotic Ips. The MDAFRR-conducted portion of this survey consisted of trapping at 10 high-risk sites in Androscoggin, Kennebec, Knox, Sagadahoc and Oxford counties. The MFS-conducted portion of this survey consists of trapping at 10 high-risk sites in York, Cumberland, and Aroostook counties. Traps were placed in or near trees bordering the properties of these sites. Some examples of these high-risk sites include landfills, wood and/or bark processing facilities, wood recycling centers, biofuel generating company, solid waste transfer station, retail goods warehouse, intermodal yard, and state park campgrounds. Traps were visited biweekly, and any beetles collected. Trapping period was April to October. All beetles in Cerambycidae, Buprestidae and Scolytinae were identified to species. Those specimens that could not be identified as native and that cannot be diagnosed using available taxonomic keys were considered “suspect exotic”, and sent to a National Identifier. All data were entered into the NAPIS database according to national protocols.
- b. Rationale underlying survey methodology – The CAPS program has identified the exotic bark beetles and woodborers as having a high risk of potential introduction and establishment, and has identified trapping with Lindgren traps as the appropriate survey tool. Specific pests targeted in the Maine survey for 2008 include:

National List:

<i>Agrilus planipennis</i>	<i>Anoplophora chinensis</i>	<i>Anoplophora glabripennis</i>
<i>Callidiellum rufipenne</i>	<i>Chlorophorus annularis</i>	<i>Hesperophanes campestris</i>
<i>Hylurgops palliatus</i>	<i>Hylurgus ligniperda</i>	<i>Ips sexdentatus</i>
<i>Ips typographus</i>	<i>Monochamus alternatus</i>	<i>Orthotomicus erosus</i>
<i>Pityogenes chalcographus</i>	<i>Sirex noctilio</i>	<i>Tetropium castaneum</i>
<i>Tetropium fuscum</i>	<i>Tomicus minor</i>	<i>Tomicus piniperda</i>
<i>Trypodendron domesticum</i>	<i>Xyleborus spp.</i>	<i>Xylotrechus spp</i>

State List:

<i>Agrilus biguttatus</i>	<i>Chlorophorus strobilicola</i>	<i>Dendroctonus micans</i>
<i>Hylobius abietis</i>	<i>Monochamus sutor</i>	<i>Tomicus destruens</i>
<i>Platypus quercivorus</i>	<i>Scolytus intricatus</i>	<i>Urocerus gigas gigas</i>

Xyleborus maiche

Xylosandrus mutilatus

- c. Survey dates – Trapping period: 4/1/08-10/2/08; Screening: 4/15/08-12/31/08
- d. Taxonomic services – Sent three non-target bark beetles to Robert Rabaglia, USFS and E. Richard Hoebecke, Cornell University for verification of new state record species. They verified that we did not have new state records.
- e. Benefits and results of survey –
 - A representative sample of high risk sites was surveyed during target period.
 - While none of the target exotic species were recovered. The following finds were made:
 - One exotic bark beetle (*Xyleborus seriatus*) established only in Massachusetts and first found there in 2005 was recovered for the first time in Maine. This recovery represents a range extension of this potential pest.
 - Two flatheaded woodborer were found for the first time. *Agrilus cyanescens* is a European introduction and may be widespread across Maine. The *Anthaxia fisheri* find is apparently a major range extension for this species with the closest known location for it in Pennsylvania.
 - Four new state records of Cerambycidae were found at either a sawmill or a bark processor. Two of these species appear to be major range extensions while it is not surprising to find the other two in Maine.

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

- All target genera of Scolytidea, Buprestidae, Cerambycidae and Siricidae identified to species; approximately 12,600 specimens identified.
 - Internal expertise was fostered: All prescreening and screening was done by MFS and/or Maine Dept of Ag employees.
 - 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. Also, a spider expert has been identifying spiders caught in the traps and is finding it a rich source.
- f. Compare actual accomplishments to objectives established for the period – Twenty trap sites established jointly by MDAFRR and MFS; traps serviced every 2 weeks; all trap material processed.
 - g. If appropriate, explain why objectives were not met* - All objectives were met.
 - h. Where appropriate, explain any cost overruns*- No cost overruns.
 - i. NAPIS database submissions – All data entered into NAPIS.

2. Nursery Commodity Pest Survey – MDAFRR

This proposal is to conduct a detailed nursery survey looking for exotic invasive insects that could impact landscape plantings and the surrounding forests. Maine businesses import the majority of nursery stock sold in the state. This is a major pathway for invasive pests including emerald ash borer, Asian longhorned beetle, light brown apple moth and Asian gypsy moth, to name a few.

The horticulture industry in Maine is a thriving part of the economy. Currently there are 1477 businesses licensed to sell plants within and industry valued at \$315 million according to a 2006 survey. Maine is the most heavily forested state in the nation contributing \$6.4 billion to the state's economy (based on an IMPLAN data set 2001). Many of the exotic pests imported could have a major impact on the forest resource in Maine.

- a. Survey Methodology (trapping protocol) – Eleven (11) nurseries in nine Maine counties (Androscoggin, Cumberland, Hancock, Kennebec, Knox, Oxford, Penobscot, Waldo, York) were chosen to be surveyed due to their size, location and variety of ornamental trees. Some locations did not have required host material for all targeted pests. Each pest's survey methodology is outlined below:
 - i) EAB – One purple delta sticky trap baited with manuca oil was deployed in the canopy of native ash at each of 8 nursery locations in 8 counties (all but Hancock Co.). Traps were checked every 2 weeks and were replaced after 6 weeks.
 - ii) ALB – Visual inspections for symptomatic damage of hardwood species at all nursery locations.
 - iii) HWA – Visual inspections of hemlock for HWA presence at 9 nurseries in 7 counties (all but Kennebec and Oxford Cos.).
 - iv) LBAM – Two Jackson traps baited with LBAM pheromone were deployed in either crabapple, Manchurian apricot, maple, pear and white pine at all nurseries. Traps were checked or replaced every 2 weeks.
 - v) SFTM – one wing trap baited with SFTM pheromone was deployed in crabapples at all nurseries. Traps were checked or replaced every 2 weeks.
 - vi) AGM – one milk carton trap and one delta trap, each baited with gypsy moth pheromone were deployed in oak at all 11 nurseries. Traps were emptied and/or replaced every 2 weeks.
 - vii) PGM – no traps were deployed since no lures were available for our use.
- b. Rationale underlying survey methodology – Followed the protocols outlined in either the mini PRAs or commodity survey guidelines that were established for each pest.
- c. Survey dates – All traps were deployed between June 11 and July 8; all sites visually inspected at least twice.
- d. Taxonomic services – Samples were screened by MDAFRR personnel; no suspect samples. Gypsy moth trap contents were sent to John Molongoski, USDA, APHIS, PPQ, Otis Pest Survey Detection and Exclusion Lab, Bldg. 1398, West Truck Road, Buzzards Bay, MA 02542-1329.
- e. Benefits and results of survey - By treating the nursery as a commodity group, we surveyed a broad range of exotic pests at each visit using the tools established for each pest. This saved time, money and other resources. No target pests were found, though two out of 228 GM samples so far analyzed, contain the Asian allele, which John Molongoski says is typical of the North American population.

- f. Compare actual accomplishments to objectives established for the period – Eleven (11) sites in 9 counties were surveyed compared to the proposed 10-15 sites in 7 counties. Also, in addition to visually inspecting ash, as proposed, purple traps were deployed to enhance emerald ash borer survey efforts.
- g. If appropriate, explain why objectives were not met – Objectives were met.
- h. Where appropriate, explain any cost overruns – There were no cost overruns.
- i. NAPIS database submissions: All data entered into NAPIS.

B. EPP or Line Item Surveys (Part III):

- 1. Pine Shoot Beetle (PSB) (MFS)
- 2. Gypsy Moth (MFS)
- 3. European Larch Canker (ELC) (MFS)
- 4. *Phytophthora ramorum* (Sudden Oak Death (SOD)) (MDAFRR)
- 5. National Emerald Ash Borer (EAB) Trap Survey (MFS)
- 6. National *Globodera spp* (PCN) Trace Forward and Field Survey (MDAFRR)
- 7. Light Brown Apple Moth (LBAM) Survey (UMCE)

1. Pine Shoot Beetle (*Tomicus piniperda*) – MFS

The 2008 program expands upon earlier surveys, which yielded positive PSB catches and led to the regulation of 14 of Maine’s 16 counties. This survey monitors to detect both natural and artificial spread of PSB and serves to maintain current the regulated area of the state.

The specific achievements detailed in this final report are consistent with the approved work plan.

a. Survey Methodology (trapping protocol):

For 2008, the MFS and the USDA-APHIS shared trapping responsibilities for Pine Shoot Beetle, *Tomicus piniperda* (PSB) in the uninfested/unregulated counties of eastern and northern Maine (Washington and Aroostook counties); with the MFS conducting PSB detection survey using 8-funnel Lindgren traps (2 per site) in 10 sites in Aroostook County (APHIS national standard protocols). Traps were placed in hard pine plantations and stands or at processing facilities and log yards receiving pine from regulated areas. The MFS also placed and maintained traps at two mill sites in Washington County, which had compliance agreements to receive and process pine materials. These traps were in addition to trapping conducted in Washington County by USDA APHIS. Total MFS PSB trapping in the unregulated area: 24 each 8-funnel Lindgren traps.

MFS crews also placed and maintained PSB traps at 6 sites within the regulated area in Oxford (2) & Franklin (4) Cos. (confirmed infested).

These MFS efforts were integrated with similar work being done by USDA-APHIS in Washington County. The minimum goal of the cooperative effort was to assure PSB detection surveys that met APHIS national standard protocols for both Maine’s unregulated counties.

Traps were visited on a biweekly schedule, and all beetles collected and sent to the MFS Entomology Lab in Augusta. Trap contents were processed and screened as they were collected.

Trapping period: April 1 to June 30.

No suspect PSB specimens found outside regulated area. In-house expertise used to confirm PSB found within regulated area.

All data were entered into the NAPIS database according to national protocols.

This project was further augmented by screening for PSB in catch from EBB traps being maintained by the MFS and MDAFRR. Catch from 18 EBB sites within the regulated area (Androscoggin, Kennebec, Knox, Sagadahoc, Oxford, York & Cumberland Cos.) and 2 EBB sites in Aroostook Co (outside the PSB regulated area) were screened for PSB.

b. Rationale underlying survey methodology:

APHIS has identified PSB as a serious pest, has established regulations to minimize potential for introduction and establishment outside the currently infested portion of the US, and has a standard survey protocol.

The survey protocols used in Maine reflect the approved national PSB survey protocol with additional trapping to address infestation trends and PSB population expansion within the regulated but as yet uninfested area.

c. Survey dates:

Trapping period: 3/18/08-6/30/08

Screening: 4/15/08-8/20/08

Visual: 8/26 & 8/28/08

d. Taxonomic services: None used.

e. Benefits and results of survey:

Detection survey conducted at a representative sample of high risk sites.

Data collected enhanced analysis of risk associated with movement/spread of PSB into new areas in northern New England.

Internal expertise fostered.

f. Comparison of actual accomplishments to objectives established for the period:

****All objectives were met****

Traps were deployed 3/18 in Western Maine and Washington Co., and 4/3 in Aroostook Co. (due to heavy snow fall). Beetles first caught in Western Maine traps between 4/9 and 4/22. Traps were left out longer in response to APHIS' 2007 late season catch of PSB in Coplin Pt. Sirex trap.

Traps were serviced on a 2-week cycle

All screening was done during and after the field season.

No PSB encountered in samples from the unregulated area. Screened samples from western Maine (quarantined) have yielded 33 PSB. This includes: Franklin Co (7 in Eustis, 21 in Rangeley) and Oxford Co. (5 in Adamstown).

Visual surveys for damage were conducted in Eustis, Rangeley and Adamstown. No evidence of PSB or damage found, although *Conophthorus resinosae* was found in red pine in Eustis. Incidental beetle by-catch was screened and identified to species to augment EBB trapping.

g. If appropriate, explain why objectives were not met: All objectives were met.

h. Where appropriate, explain any cost overruns: No cost overruns.

i. NAPIS database submissions: All data entered into NAPIS.

2. European Gypsy Moth (*Lymantria dispar*) – MFS

The 2008 program is primarily addressing survey and monitoring of European Gypsy Moth (GM) in and adjacent to the regulated portion of Maine. Ancillary efforts address monitoring and management activities associated with movement of GM host material, and support of the regulatory framework of the GM quarantine. The specific achievements detailed in this mid year report are consistent with the approved work plan.

a. Survey Methodology (trapping protocol):

1. *Monitoring for Natural Spread at Edge of Regulated Area/Transition Zone*

Conduct pheromone trapping for GM in a band across the following counties: Aroostook, Penobscot, Piscataquis, Somerset, Franklin, and Oxford (2008 target: 240 traps).

Conduct on-ground scouting for life stages in areas outside the regulated zone where 2008 trap catches indicate probable gypsy moth populations.

Complete any remaining ground survey around 2007 pheromone trap sites with high catches before larval emergence.

2. *Monitoring/Managing potential artificial spread: MFS focused considerable cooperative monitoring and management effort on restricting opportunities for artificial spread of GM.*

Visit and inspect all Maine sites receiving wood from the regulated area under gypsy moth compliance agreement.

Solicit additional processing facilities for regulated wood products.

Develop and provide targeted informational materials explaining forestry related quarantines in Maine for shippers and purchasers of wood products.

b. Rationale underlying survey methodology:

1. Current data suggests that GM is slowly expanding its range in Maine, with most expansion associated with natural spread at the edge of the current infested area in Maine or adjacent New Brunswick.

2. The lack of spot infestations at mills north of the regulated zone (several of which have compliance agreements for processing regulated wood) suggests that the existing inter and intrastate GM quarantine regulations continue to be effective in managing major pathways for artificial spread. Therefore, the MFS continues to monitor host movement associated with commerce and manage such movement to minimize the risk of spread of GM.

The MFS works to maintain public awareness of, and support for, regulatory constraints on movement of potentially infested material.

c. Survey dates:

1. Pheromone survey period: 6/15/08-9/15/08

Ground check 2007 sites: 1/1/08-4/15/08

Ground check 2008 sites: 9/15/08-12/30/08

2. Year round, on- going

d. Taxonomic services: None used.

- e. Benefits and results of survey:
1. *GM distribution tracked.*
Verification/adjustment of boundaries of Regulated Zone to incorporate those regions of the Transition Zone that are now harboring permanent GM populations; thereby minimizing the risk of inadvertent artificial spread by commerce of GM.
 2. *Safe, legal markets provided for regulated host material.*
Monitoring system in place to track movement of potentially infested host material.
Compliance Agreements in place allowing monitoring for potential establishment GM at processing facilities outside regulated area.
- f. Comparison of actual accomplishments to objectives established for the period:
All on target
1. All pheromone traps out in the transition zone before moth flightperiod; trapping focused in southern Aroostook County. Traps were picked up in September. Scouting of 2007 high catch trap sites completed before 4/15/08.

Two hundred eighty-two (282) traps deployed; eight were missing at the end of the season.
 2. Currently 16 Compliance Agreements with 14 companies.
All sites have been visited and inspected: no evidence that conditions of Agreement are not being adhered to. Monitoring for potential GM on these 16 sites did not reveal any established populations.
All shipments from commercial harvests accompanied by point of origin certificate (allowing tracking).
Information on regulated pests and quarantines provided at:
 - 2 major garden shows, the State Agriculture tradeshow, 3 camper and camp owner events, and several state fairs
 - 15 workshops (classroom and outdoor)
 - 8 woodlot owner workshops or field trips (~350 attendees)
 - 2 professional forester workshops (~135 attendees)
 - 5 other workshops (~150 attendees)
 - Division publications (conditions reports, summary reports, >400 subscribers)
 - Forest industry and other publications (NeLMA, Forest Products Council, SWOAM)
 - MFS website: <http://www.maine.gov/doc/mfs/idmhome.htm>.
- g. If appropriate, explain why objectives were not met: All objectives met.
- h. Where appropriate, explain any cost overruns: There were no cost overruns.
- i. NAPIS database submissions: Two egg mass finds outside regulated area reported on 10/22/2008 and submitted to NAPIS database.
1. T6R10 WELS (Piscataquis Co.): 46.13867, -68.96407 found on 10/20 on aspen.
 2. Mt. Chase (Penobscot Co.): 46.03639, -68.50550 found on 10/21 on apple (very close to town line, GPS point may be in Patten)

3. European Larch Canker (*Lachnellula willkommii*) – MFS

The 2008 program addressed survey and monitoring of European larch canker (ELC) in and adjacent to the regulated portion of Maine. Ancillary efforts addressed support of the regulatory framework of the ELC quarantine. The specific achievements detailed in this final report are consistent with, and meet the targets of the approved work plan.

a. Survey Methodology (trapping protocol):

1. *Baseline monitoring population dynamics:*

Maine Forest Service (MFS) continued collecting baseline measurements to assess evidence of possible intensification within or expansion from known infested stands. The effort involved annual re-measurement and site specific investigations in and adjacent to selected existing known infestations.

2. *Baseline monitoring tree response/pest impact:*

The MFS continued collecting ground data to assess 5-year changes in larch stocking and mortality across the regulated zone and adjacent area, conducting annualized re-measurement of a ground plot network on a 6000 acre equal area grid.

3. *Monitoring edge of regulated area:*

MFS conducted ad hoc inspection activities in as-yet unregulated near-coastal areas where existing low-level infestations may have been overlooked, specifically, the area in the town of Brunswick, Cumberland County, where a new infestation location was identified in 2007. This location is outside the quarantine boundaries, and was subjected to an intensive ground survey for larch (hosts) and the larch canker pathogen.

4. *Monitoring/Managing potential artificial spread:*

MFS focused the majority of the cooperative monitoring and management effort on restricting opportunities for artificial spread of ELC.

b. Rationale underlying survey methodology (numbers refer to above methodologies):

3. Although MFS has seen little evidence in the past few years that ELC is expanding its range in Maine, we have seen evidence that infection rates in individual stands are intensifying and expanding. This survey effort addresses that situation.

4. There is very little pest risk/impact information for ELC in the eastern US. This monitoring effort continued collecting a host response dataset to address this weakness.

5. Although MFS has seen little evidence in the past few years that ELC is expanding its range in Maine, this survey serves to recheck that premise and assure that no significant infestation of ELC has escaped the regulated area. An exception to this has been the discovery of a new infestation in 2007 outside the quarantine boundaries. An intensive ground survey was conducted to provide the infection and distribution information needed to determine a course of action. As a result of the survey, an eradication effort was planned and conducted at this location in 2008.

6. The MFS believes that the primary threat of ELC spread is from human transport. These activities monitor host movement associated with commerce and manage such movement to minimize the risk of spread of ELC.

c. Survey dates:

1. 5/4/08 to 5/8/08

2. 4/17/08 to 10/31/08

3. 3/20/08 to 12/4/08

4. Year round, on-going

d. Taxonomic services: None required in 2008.

- e. Benefits and results of survey:
1. Disease incidence intensifying on the two most coastal plots. Data from the plot network is beginning to quantify intertree/interstand spread rates.
 2. Preliminary cursory analysis of 2004-07 data showing no obvious trends. 2008 augments sample size and tighten variance values. In-depth analysis of tree response trends is currently in progress.
 3. The adequacy of the current boundary of regulated area was verified for most of the regulated area. However, one infected site involving long-planted ornamentals was found in Brunswick Maine. This situation was evaluated, and an eradication program was conducted in 2008. This location will be monitored for the next several years, and follow-up control measures will be conducted as needed.
 4. Automatic system in place to contact all harvest operations within regulated area and notify of ELC regulations. This augmented by outreach to general public.
Safe, legal market provided for potentially infested material.
Monitoring system in place to track movement of potentially infested host material
Compliance Agreements in place allowing monitoring for potential establishment disease at processing facilities outside regulated area.
- f. Comparison of actual accomplishments to objectives established for the period:
All on target
1. All ELC monitoring plots were re-measured.
 2. Impact monitoring ground plots within and adjacent to the regulated zone, previously measured in 2003, were all re-measured to assess 5-year changes in larch stocking and mortality within and outside the regulated zone. With the completion of this panel, the plot network has been completely re-measured once. MFS is planning to begin analysis this data in 2009.
 3. MFS staff (forest pathologist and trained technician) conducted a site specific survey for ELC at one industrial larch seed/scion orchard in Unity. An intensive survey of natural forest stands and residential areas was conducted in Cumberland County, to define eradication protocol for the infestation found outside the quarantine boundary in 2007. Ad hoc spot inspections of natural larch stands in coastal Hancock and Waldo County were also conducted. No new evidence of ELC was detected in 2008.
*****MFS staff did detect ELC on the local golf course in Brunswick Maine in 2007. An intensive survey within/around that infection center during 2007 suggested that the infected area is confined to planted ornamental larches on the golf course. Further survey of the surrounding area was completed in 2008.***** Eradication of all known infected larch and larch material was completed in December, 2008. Owners of the property have been advised of the situation and (citing MRSA 12 §8305) informed that any larch material can not be removed from the site without the approval and oversight of the MFS. Annual re-inspection of the eradication site is planned for the next 5 years.
 4. MFS staff reviewed quarantine regulations to assure that currently designated regulated area include and sufficiently buffer all known ELC infestations. In reviewing the various lists of regulated jurisdictions, it became apparent that there was a difference in the federal and state lists. MFS worked with John Crowe, USDA APHIS PPQ in Bangor to develop a single up-to-date list and rectify the omissions. Despite the difference between the state and federal lists, the state-listed townships did fully capture all known ELC infestations in Maine (i.e. movement of potentially infected material from all infested townships was regulated, whether included on the federal list or not). 100% of commercial timber harvests from regulated area were sent an informational letter regarding ELC regulations and marketing options. A total of 441 such letters were sent in calendar year 2008.

Currently the MFS has 9 Compliance Agreements with 6 companies outside the ELC Regulated Zone, allowing them to receive larch from within the regulated area.

All sites were visited at least once in 2008.

All were inspected:

- a. No evidence that the companies were not abiding by the conditions of their Compliance Agreements.
- b. Scouting while at these 6 sites found no evidence of ELC.

All shipments from commercial harvests in Maine accompanied by point of origin certificate:

- a. No evidence of any certificate falsification at mills under Compliance Agreement
- b. No evidence of receipt of regulated wood at mills without Compliance Agreement

Information on exotic, regulated pests (including ELC) and associated management regulations provided at both the Portland and Bangor Flower/Garden shows

- g. If appropriate, explain why objectives were not met: All target activities were met.
- h. Where appropriate, explain any cost overruns: No overruns. All costs covered by grant or were part of grant match.
- i. NAPIS database submissions: All survey results provided to State CAPS coordinator for inclusion in NAPIS database.

4. *Phytophthora ramorum* (Sudden Oak Death (SOD)) Confirmed Nursery Protocol– MDAFRR

- a. Survey Methodology (trapping protocol): Surveyed according to the *P. ramorum* 2008 Confirmed Nursery Protocol version 8. Following the manual delimiting survey protocol we surveyed the one site that was found positive from trace forward shipments received in 2006.
- b. Rationale underlying survey methodology: Required followup survey according to the Confirmed Nursery Protocol to determine absence or presence of *P. ramorum*.
- c. Survey dates: July 1, 2008.
- d. Taxonomic services: Samples were collected from symptomatic plants and sent to the University of Maine Pest Management Office Insect and Disease Laboratory where they were tested using Agdia's DAS ELISA test system for *Phytophthora*. Any ELISA + samples were sent to Cornell University for DNA extractions which were then forwarded to USDA PPQ in Beltsville, MD for PCR analysis.
- e. Benefits and results of survey: By surveying host plants in the trace forward retail nursery, we were able to determine if this nursery has a recurrent infection. Twenty-one samples were collected and shipped overnight to the Pest Management Office where they were processed the next day. One *Syringa sp.* sample tested positive for *Phytophthora*, but DNA testing at Beltsville confirmed it was negative for *P. ramorum*.
- f. Comparison of actual accomplishments to objectives established for the period: The site was surveyed according to protocol and as proposed.

- g. If appropriate, explain why objectives were not met: All objectives were met, and this concludes Maine’s participation in the Confirmed Nursery Protocol.
- h. Where appropriate, explain any cost overruns: No cost overruns.
- i. NAPIS database submissions: All data entered into NAPIS, and Maine declared eradicated.

5. National Emerald Ash Borer Trap Survey - MFS

The 2008 Emerald Ash Borer (EAB) Survey focused on monitoring EAB with purple traps as part of a national survey effort. The Maine Forest Service (MFS), the Maine Department of Agriculture (MDAFRR), and the USDA APHIS PPQ collaborated on selecting site locations and monitoring traps. This survey was designed to help in early detection of this destructive insect as well provide an opportunity for outreach activities for the general public.

The specific achievements detailed in this final report are consistent with the approved work plan.

a. Survey Methodology (trapping protocol):

1. Purple Prism (Barney) Emerald Ash Borer traps and lures, two per site, were hung in 16 locations; primarily campgrounds in southern and coastal sections of the state. This is the area most likely to be exposed to artificial introduction on camper-transported firewood.
 - Trap supplies were received June 13, 2008 and all traps were placed by June 30, 2008.
 - Traps, two per site, will be inspected at the end of July, lures changed and traps changed if needed. The EAB traps placed by the MFS are in York, Cumberland, Sagadahoc, Knox, Lincoln, Waldo, Hancock and Piscataquis Counties.
 - One trap at each site was baited with manuka oil lure provided by the CAPS program and one trap baited with phoebe oil, a more attractive compound provided by Damon Crook, USDA APHIS Otis.
 - In addition, Maine Dept. of Agriculture and USDA APHIS efforts expanded the trapping footprint further inland and up the coast at nurseries and other high risk areas.
 - All samples considered as a “suspect positive” were to be sent to a National Identifier for confirmation.
 - Traps were collected and inspected by end of August. Results were tallied and forwarded to the CAPS Coordinator. All data was entered into the NAPIS database according to national protocols.
2. MFS was the agency responsible for taking the lead in the public education and outreach effort. In this capacity the MFS personnel:
 - Has generated and procured educational and outreach materials for display and distribution at local parks and campgrounds and as “stuffers” for inserts with reservations and other mailings.
 - Visited candidate parks and campgrounds in southern and coastal Maine and enlisted managers in promoting use of local firewood (i.e. a “Buy it where you burn it” campaign).
 - Surveyed campers regarding current firewood movement practices.
 - In conjunction with the Maine Dept. of Agriculture put out a press release on EAB and monitoring with purple traps.

b. Rationale underlying survey methodology:

The CAPS program has identified the Emerald Ash Borer as an insect having a high risk of potential introduction and establishment, and has identified trapping with purple sticky traps as the appropriate survey tool.

- c. Survey dates:
Trapping period: 6/30/08-8/31/08
Screening: 7/30/08-9/30/08
- d. Taxonomic services:
None needed.
- e. Benefits and results of survey:
Detection survey conducted at a representative sample of high risk sites to determine the presence or absence of EAB.
Educational outreach opportunities expanded to target audiences.
No EAB were caught on traps.
- f. Comparison of actual accomplishments to objectives established for the period:
16 trap sites established by MFS when materials were received.
A bookmark with the "Leave Your Firewood At Home" message was design and 40,000 printed.
To date 37,000 bookmarks have been distributed to campgrounds, tourism centers, at fairs, camping shows, Indian basketmaker events, lake association meetings and other venues.
Sent out-of-state homeowners in the unorganized towns of Maine informational letters concerning firewood and movement of invasive pests.
Put up and distributed firewood and invasive pest posters and informational sheets.
A local TV station did a special news story on purple traps and EAB in July.
Outreach successful and ongoing.
Established cooperation with industry.
Surveyed over 400 campers at both private and public campgrounds for knowledge of firewood harboring insects, if they brought firewood, where they got it, what would they suggest to use to get people to not bring.
- g. If appropriate, explain why objectives were not met:
All objectives were met.
- h. Where appropriate, explain any cost overruns:
No overruns. All costs covered by grant or were part of grant match activities.
- i. NAPIS database submissions: All data have been entered into NAPIS.

6. National *Globodera spp* (PCN) Trace Forward and Field Survey - MDAFRR

Recent detections of golden nematode (*Globodera rostochiensis*) and potato cyst nematode (*G. pallida*) in the U.S. and Canada have prompted the need to maintain safe movement of articles between the two nations while protecting against the spread of these nematodes. USDA's Plant Protection and Quarantine unit and the Canadian Food Inspection Agency (CFIA) have developed a joint potato certification protocol for all seed potatoes traded between U.S. and Canada. All fields in the U.S. that grow seed potato for export must be sampled and analyzed for these two nematodes. Maine, being one of the major seed potato producers in the country, will sample all potato fields that grow seed for export according to the Potato Cyst Nematode National Survey Plan. Maine will also

conduct a trace forward survey by sampling a 32-acre field that had been planted with seed potato grown in a Canadian field found to be positive for golden nematode.

- a. Survey Methodology (trapping protocol): In accordance with USDA APHIS PPQ's 2008 Potato Cyst Nematode National Survey, MDAFR staff sampled the trace forward field at a rate of 3 5lb soil samples per acre, resulting in 96 samples. The samples were shipped to the USDA APHIS Nematode Laboratory in Avoca, NY. During the potato harvest season, Maine also surveyed all seed potato fields in Aroostook County that grow seed for export. Each acre was sampled according to protocol to collect a 5lb sample, resulting in 3674 samples.
- b. Rationale underlying survey methodology: Based on the PCN National survey plan.
- c. Survey dates:
Trace forward field - 5/19/08 & 5/28/08
Other seed potato fields – 8/28/08 thru 10/15/08
- d. Taxonomic services: All soil samples were analyzed for *Globodera pallida* and *G. rostochiensis* by the USDA APHIS Nematology lab in Avoca, NY on 6/16/08 for the TF, and by 12/15/08 for the rest.
- e. Benefits and results of survey: Neither nematode was found in the 96 TF samples nor the 3674 seed potato field samples. By sampling seed potato fields for these two nematodes, Maine and its trading partners are assured that Maine seed potatoes are risk free.
- f. Comparison of actual accomplishments to objectives established for the period: All seed potato fields, as well as the trace forward field, in Maine that export seed potatoes were surveyed for both *Globodera spp.* according to the latest protocols established for 2008 growing season.
- g. If appropriate, explain why objectives were not met: Objectives were met.
- h. Where appropriate, explain any cost overruns: There were no cost overruns.
- i. NAPIS database submissions: All data entered into NAPIS and ISIS.

7. Light Brown Apple Moth Survey - UMCE

Light brown apple moth (LBAM) *Epiphyas postvittana* is a multivoltine tortricid moth known to be a significant agricultural and nursery pest in its native Australia, and in 14 other countries (Varela et al. 2008). LBAM is highly polyphagous, with a host range of over 150 plant genera in over 70 families, including nursery stock, cut flowers, stone fruit (peaches, plums, nectarines, cherries, and apricots), pome fruit (apples and pears), grapes, and citrus (Kopper and Jackson 2007). Left untreated, LBAM crop damage levels have been estimated to be as high as 40 to 90 percent, and if introduced throughout the conterminous United States LBAM would probably cause additional economic damage to other crops (Fowler et al. 2007). Established populations would also create phytosanitary barriers to domestic and international trade.

A national early warning system for pest detection is a critical component to safeguard agricultural production. Over 15,000 LBAM were found in California in 2007 (Varela et al. 2008). Transport of LBAM infested nursery stock could act as a pathway for LBAM introduction into the Northeast. Maine is a significant port of entry by sea and by land from Canada. Maine is within the national LBAM survey area, with sufficient degree days for two full LBAM

generations per year and the availability of host plants, but is considered a low risk area because of its USDA Plant Hardiness zone characteristics (Jackson et al. 2008).

Plants in the Rosaceae family, which includes apples, are preferred LBAM hosts, and the detections in California have included apple host plants (Varela et al. 2008). There are 3,400 acres of apple orchard in Maine (Anonymous, 2008). The economic analysis for LBAM potential (Appendix V in Fowler et al. 2008) appears to grossly underestimate Maine damage potential. Using the stated damage potential of 2% apple crop value, the risk to Maine for apples alone is \$273,000 a year. Apple, pear, peach and other tree fruits are major crops in the Northeast region. If Maine serves as a gateway for LBAM introduction to those areas, economic damage potential is orders of magnitude higher just for tree fruit crops alone.

Finding LBAM in a low risk area like Maine would greatly alter the national risk map and would indicate need for rigorous detection and eradication efforts to protect susceptible plants and plant-based industries in the Northeastern United States.

a. Survey Methodology (trapping protocol):

Jackson fruit fly traps (Scentry Biologicals Inc., contract #43-6395-5-4074) with lures impregnated with female LBAM male attraction pheromone were provided by John Crowe of USDA-APHIS-PPQ in Hermon, Maine. The lures were acquired from USDA, APHIS, PPQ-CPHST Laboratory at Otis Air Force Base, MA. The female sex pheromone was composed of (E)-11-tetradecenyl acetate and (E,E)-9,11-tetradecadienyl acetate in 20:1 ratio at a 3 mg dose per septum.

Two traps per site were hung in 24 orchards (Table 1). For most sites (19) traps were set the week of June 23-30. Other trap sites were initiated on June 19 (1 site), July 2 (1), July 7 (3), and July 11 (1). Traps were hung on branches in the canopy periphery of apple trees at approximately 1.5-2 meter above the ground. At each site, trap-bearing trees were in an outside row of the planting, adjacent hedgerow or forest.

Traps were inspected every 7-14 days until the final check August 18-21. Pheromone lures and trap bottoms were replaced (i.e. traps were “reset”) in late July. Moths in traps were assessed for likelihood of being LBAM according to photographs and criteria in Passoa et al.

Survey data have been provided to the APHIS Cooperative Agricultural Pest Survey Coordinator, Karen Coluzzi of the Maine Department of Agriculture Food and Rural Resources, for entry into the ISIS (Integrated Survey Information System) and NAPIS (National Agricultural Pest Information System) databases.

b. Rationale underlying survey methodology:

Plants in the Rosaceae family, which includes apples, are preferred LBAM hosts, and LBAM have been found on apple trees in California. There are 3,400 acres of apple orchard in Maine. Maine is within the national LBAM survey area, with sufficient degree days for two full LBAM generations per year and the availability of host plants. Maine serves as a frontier state for detecting possible LBAM introductions into New England.

c. Survey dates:

Traps were deployed in approximately 21 orchards between June 23 and July 3. Traps were set in an additional 3 orchards July 7 – July 17.

d. Taxonomic services:

None were used.

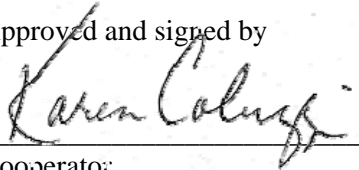
e. Benefits and results of survey:

No suspect LBAM were found in any of the traps.

Finding zero LBAM in 260 trap checks provides some assurance that LBAM are not well established in Maine. The trap-bearing trees in this survey received insecticide and fungicide applications in early and mid June before trap deployment, with an estimated two to four insecticide applications at each location in July and August. Spray records for monitored blocks were not collected. Pheromone traps for other apple-feeding Lepidoptera [codling moth (*Cydia pomonella*), lesser appleworm (*Grapholita prunivora*), obliquebanded leafroller (*Choristoneura, rosaceana*), and oriental fruit moth (*Grapholita molesta*)] were also set in border row apple trees at each trap site. These traps were near the LBAM traps but with no less than 10 meters between traps to prevent cross-species pheromone confusion. Averaged over all sites and monitoring dates, there was an average of 5.4 codling moth, 2.0 lesser appleworm, 2.8 obliquebanded leafroller, and 0.4 oriental moth adults per trap per monitoring date. These captures of other moth species indicate that while insecticide applications certainly had an effect on moth populations at the trap sites, it did not eliminate them. Even without optimal geographic location or host plant characteristics of the trap sites, the lack of any LBAM detections is consistent with an assumption that LBAM are not well established in Maine, and indicates that if present at all, LBAM are less numerous than these other species..

- f. Comparison of actual accomplishments to objectives established for the period: Monitoring of LBAM at 23 orchards in Maine during June was proposed. Actual work accomplished was monitoring 24 orchards in Maine during June through August.
- g. If appropriate, explain why objectives were not met: All objectives were met.
- h. Where appropriate, explain any cost overruns: There were no cost overruns.
- i. NAPIS database submissions: Data was submitted to SSC for entry into NAPIS and ISIS.

Approved and signed by



Date: March 9, 2009

Cooperator:

Date: _____

ADODR