

2009 Vermont Cooperative Agricultural Pest Survey Program Final Report



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Acknowledgments

The Vermont Cooperative Agricultural Pest Survey (CAPS) program would like to thank that following individuals, agencies and institutions:

Vermont Agency of Agriculture, Food and Markets: Jon Turmel, Tim Schmalz, Alan Graham, Rhonda Mace.

Vermont Department of Forests, Parks and Recreation, Forest Protection Division: Barbara Burns, Trish Hanson, Kathy Decker, Jim Esden, Jay Lackey.

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CAPS - Accomplishment Report

State: Vermont

Year: 2009

Agency: Agriculture, Food and Markets

I. Vermont Cooperative Agricultural Pest Survey Infrastructure

A. State Survey Coordinator: Name: Emilie Inoue
Agency: Vermont Agency of Agriculture, Food and Markets
Address: 103 South Main Street
Waterbury, VT 05671
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B. Member name , if applicable, of National CAPS Committee: N/A

C. Funding for the infrastructure of the VT CAPS program allowed for the position of State Survey Coordinator to be maintained throughout the year. Due to the maintenance of the CAPS infrastructure, goals achieved during 2009 include:

- (i) Preparation of activity reports per the regional guidelines and upon request by State or Federal officials.
- (ii) Coordination of actions of agencies involved in surveys through oversight of survey work-plans.
- (iii) Successful implementation of survey activity as outlined in workplans.
- (iv) Facilitation of the distribution of funds to other cooperating parties conducting surveys.
- (v) Public outreach on CAPS related pests and survey activities.
- (vi) Maintenance and further development of the VT CAPS webpage.
- (vii) Publication of pest alerts and educational posters regarding CAPS related pests (brochure/card publications included)
- (viii) Complete data collection from CAPS surveys and entry into required systems
- (ix) Continued improving relations and awareness with stakeholders all around the state regarding CAPS program
- (x) Successful planning for 2010 CAPS surveys

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

E. *Where appropriate, explain any cost overruns:* No cost overruns.

F. *State CAPS Committee narrative* – The Vermont CAPS Committee met on July 8th, 2009 at the Vermont Agency of Agriculture, Food and Markets lab building in Waterbury, VT. Agenda items included a synopsis of 2009 survey activities and workplan overviews for 2010. Attendees included the following: Mark

Michaelis, Andrea Rosin, Trish Hanson, Ron Kelley, Timothy Schmalz, and
Emilie Inoue, Jon Turmel.

G. *NAPIS database submissions*: Data has been submitted to NAPIS

Laminated Forest Pest Outreach Card



Emerald Ash Borer

Emerald Ash Borer

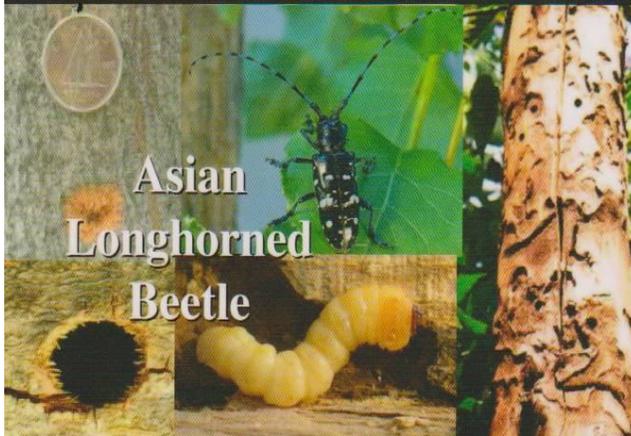
Trees Affected:

- Attacks only ash trees

What To Look For:

- Dieback begins in top one-third of canopy; progresses until tree is bare
- Sprouts grow from roots and trunk
- Galleries weave back and forth across the wood grain
- Adults form D-shaped holes upon emergence in spring

Photo Sources: Art Wagner, USDA APHIS PPQ, Bugwood.org, David Cappaert, Michigan State University, Troy Kimoto, CFIA, Howard Russell, Missouri Department of Conservation



Asian Longhorned Beetle

Asian Longhorned Beetle

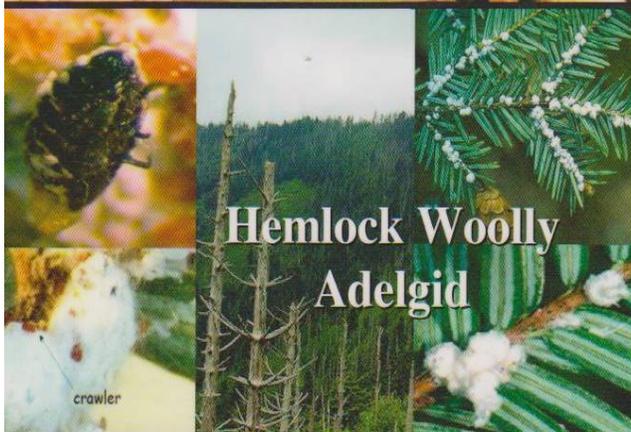
Trees Affected:

- Attacks living, dead, cut or fallen maple and other hardwoods

What To Look For:

- Parts of tree turning brown and dying
- Adult beetle active between June and October
- Adults 1 to 1 ½ inches in length
- Adults have a shiny, jet black body with distinctive white spots
- Dime-sized (1/4" or greater), perfectly round exit holes

Photo Sources: Dennis Haugen, USFS, Steven Katovich, F. Herard, Canadian Food Inspection Agency, Bugwood.org



Hemlock Woolly Adelgid

Hemlock Woolly Adelgid

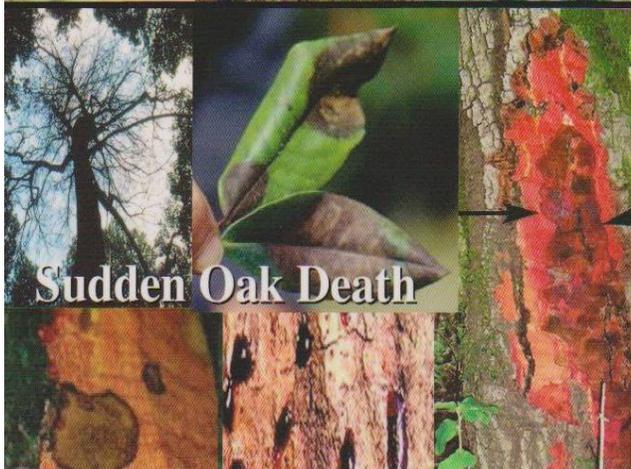
Trees Affected:

- Hemlock trees

What To Look For:

- Twig dieback and/or premature needle drop
- White woolly masses at the base of needles of young twigs
- Unhealthy grayish-green needles that normally are dark green

Photo Sources: Michael Montgomery, USFS, Bugwood.org, CT Ag. Experiment Station, PA Dept. of Conservation and Natural Resources, National Park Service



Sudden Oak Death

Sudden Oak Death

Plants Affected:

- Over 45 different tree species including oak, lilac, rhododendron and viburnum (for complete list go to: www.aphis.usda.gov/plant_health/plant_pest_info/pram/)

What To Look For:

- Droplets of dark, reddish brown liquid on the bark of host trees
- Infection on foliar hosts is indicated by dark grey-to-brown lesions with indistinct edges

Photo Sources: Joseph O'Brien, Bugwood.org, USFS, Associated Press, mdinvasivesp.org

VERMONT AGENCY OF AGRICULTURE, FOOD and MARKETS
Plant Industry Section
Cooperative Agricultural Pest Survey Program



For more information: www.vermontagriculture.com

Design and information: www.treecareindustry.org

Preventing the Spread of Asian Longhorned Beetle

• Firewood is an easy pathway for pests such as Asian Longhorned Beetle to spread.

Don't Bring Firewood Into Vermont From Out of State!!

Burn Firewood Where You Buy It!!

To report any signs of Asian longhorned beetle please contact the Vermont Agency of Agriculture, Forest Resource Protection or the U.S. Department of Agriculture APHIS PPQ.

**FIREWOOD
ALERT**

For general information visit us on the web:

<http://www.vermontagriculture.com>

Vermont Agency of
Agriculture

Plant Industry Section

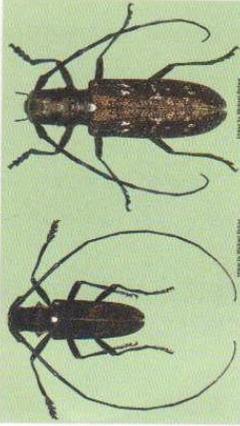
103 South Main Street

Waterbury, VT 05671-0101

(802)241-3544

Don't Be Fooled By ALB Look Alikes!

White Spotted Sawyer



Male

Female

These beetles are most commonly misidentified as ALB. Males are metallic black with one white dot at the base of the wing covers. Females are brown with speckles and also have the white dot at the base of the wing covers.

ALB does **not** have this white dot, though it has many white spots on its wing covers.

Western Conifer Seed Bug



Daniel Handfield

The western conifer seed bug can be

distinguished from ALB by its brown color, the lack of distinct white spots on the wing pads, and the presence of a straw-like sucking mouthpart.

Information: UVM Entomology Department

Asian Longhorned Beetle
(Anoplophora glabripennis)

An Exotic Pest of Hardwood Trees



**Vermont Agency of
Agriculture, Food and
Markets**

Cooperative Agricultural Pest
Survey Program



What is Asian Longhorned Beetle?

Emerging Adult ALB



Photo: Beetlebusters.info

This insect is native to China and other areas of the Far East.

The Asian longhorned beetle (ALB) has caused tens of thousands of hardwood trees to be destroyed in IL, MA, NJ and NY.

Hardwood trees in forests and cities all across America are at risk.

Trees at risk include all species of maple, as well as poplar, willow, birch, ash, elm and hackberry.

Damage Caused by ALB



Photo: E. Richard Hoebeke, Cornell Univ.

How Do I Identify Asian Longhorned Beetle?

Adult ALB with Bluish Tinge



Photo: Beetlebusters.info

- Adults are 1 to 1 ½ inches in length
- Adult beetles are most active during the summer and early fall.
- Shiny, jet black body with distinctive white spots
- Long antennae banded in black and white (longer than the insect's body)
- Feet and antennae may have a bluish tinge
- Antennae have alternating black and white bands

Adult ALB



Photo: PA Dept. of Conservation & NR

What are the Signs of an ALB Infestation?

3/8" Round ALB Exit Hole



Photo: Dennis Haugen, USDA-FS.

- Dime-sized (1/4" or greater), perfectly round exit holes
- "Frass" or sawdust/wood shavings may be apparent around the base of infested trees
- Wounds caused by the beetles may ooze sap
- Adult females dig bowl-shaped holes in the bark, typically about 1/2 inch (15mm) in diameter, to bury their eggs in. These "oviposition pits" often appear orange in color.

ALB Exit Holes Exuding Sap



Photo: Emilee Inoue, VAAFM

**Preventing the Spread of
Emerald Ash Borer**

- Firewood is an easy pathway for pests such as Emerald Ash Borer to spread.

Don't Bring Firewood Into Vermont From Out of State!!

Burn Firewood Where You Buy It!!

To report any signs of emerald ash borer or dying ash trees please contact the Vermont Agency of Agriculture, Forest Resource Protection or the U.S. Department of Agriculture APHIS PPQ.

**FIREWOOD
ALERT**

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Agriculture**
Plant Industry Division
 103 South Main Street
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Photos

Adult Emerald Ash Borer



Photo: USDA

Emerald Ash Borer Larvae



Photo: USDA

Emerald Ash Borer
(Agrilus planipennis)

An Exotic Pest of Ash Trees



**Vermont Agency of
Agriculture, Food and
Markets**

Cooperative Agricultural Pest
Survey Program



What is Emerald Ash Borer?

Adult Emerald Ash Borer



Photo: USDA

- An exotic insect pest of many **ASH** trees (*Fraxinus* spp.).
- This insect is native to parts of Asia.
- First detected around Detroit, MI in 2002 and has since spread Illinois, Indiana, Kentucky, Minnesota, Missouri, New York, Ohio, Ontario, Pennsylvania, Quebec, Virginia, West Virginia, and Wisconsin. EAB has killed tens of millions of ash trees throughout infested areas.
- A significant threat to ash trees in nurseries, landscapes and woodland areas of the U.S.

Emerald Ash Borer Larva



Photo: USDA

How Do I Identify Emerald Ash Borer?

Damage Caused by EAB Larvae



Photo: Velvet S, McNeil, The Detroit News

- Adults are metallic green, 8.5 to 13.5 mm long and slender.
- Adult beetles are present mid-May to late-July.
- Larvae are slender, flattened and cream colored with a brown head.
- Larvae typically go undetected until the tree shows symptoms of infestation.

Adult Emerald Ash Borer



Photo: Canadian Forest Service

What are the Signs and Symptoms?

D-Shaped Emergence Hole



Photo: Deborah McCullough, MI State Univ.

- D-shaped adult emergence holes.
- Branch and crown dieback.
- Epicormic branching around trunk and main branches.
- Woodpecker activity as early warning sign of woodborer activity.
- Serpentine galleries formed by EAB larvae under the bark of affected ash trees

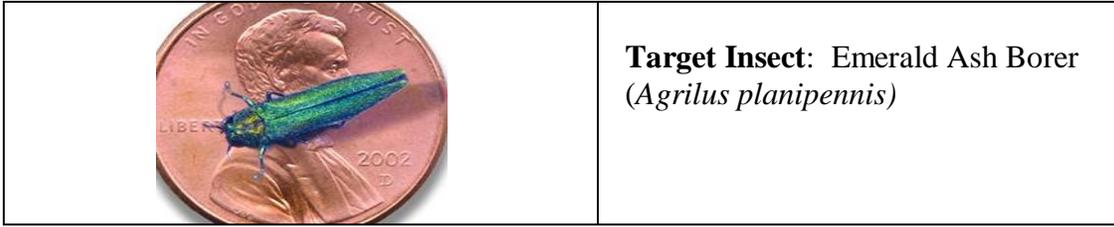
Crown Dieback



Photo: USDA

II. SURVEYS

1) Emerald Ash Borer Nursery Inspection, National Survey of Concern



A. **Survey/Inspection Methodology:**

In 2009, there were 651 licensed nurseries, greenhouses and garden centers in the State of Vermont. Survey activities focused on the presence/absence, biology, distribution and education of Emerald Ash Borer. Nursery inspections included visual surveys for signs and symptoms associated with the following survey pest:

Scientific Name	Common Name	Taxonomic Group	Major Hosts
<i>Agrilus planipennis</i>	Emerald ash borer	Arthropod	Ash trees

A total of 420 nurseries, greenhouses and garden centers were inspected in 2009 (65% of the total number of licensed nurseries). These sites were selected based on data collected as part of the Vermont Agency of Agriculture, Food and Markets (VAAFMM) annual nursery licensing program. Nurseries that are known to deal with large volumes of plant material each year were identified and listed as ‘top priority’ sites to inspect while nurseries dealing with much lower volumes of plant stock were included into the inspection schedule at random.

B. **Rationale underlying survey methodology:**

Nurseries have been identified as a significant pathway for the introduction of invasive species such as the Emerald Ash Borer and can facilitate the artificial spread of many invasive species of concern. It is, therefore, critical to establish regular inspections and focus outreach activities within these environments. In addition to nursery inspections, the CAPS program published and distributed a pest alert about the Emerald Ash Borer which provides a description of the biology and threat the pest poses to ash trees in Vermont.

The emerald ash borer (EAB) is native to China, Korea, Japan and other Asian countries. In the summer of 2002, this insect was discovered in Detroit, MI. Emerald ash borer is also established in Windsor, Ontario, was found in Ohio in 2003, northern Indiana in 2004, northern Illinois and Maryland in 2006, western Pennsylvania and West Virginia in 2007, Wisconsin, Missouri and Virginia in summer 2008, and Minnesota, New York, and Kentucky in the spring of 2009 (Map 1, National EAB Distribution). The larvae can be found beneath the bark of ash trees, in tunnels, from June through the fall. All species of ash appear to be susceptible.

C. **Survey dates:**

The State plant pathologist and one seasonal technician inspected nurseries, greenhouses and garden centers from May through August 2009.

D. **Taxonomic services:**

Suspect samples collected in the field during nursery inspections were initially screened by Agency of Agriculture staff (state entomologist, state plant pathologist, SSC), state Forest Protection staff (entomologist, plant pathologist) and/or by the pest and plant diagnostic labs at the University of Vermont. Additional identification and taxonomic services were provided by USDA APHIS PPQ identifiers.

E. **Benefits and results of survey:**

Two inspectors were able to visit four hundred and twenty (420) nurseries, greenhouses and garden centers distributed throughout Vermont (Table 1, Map 2).

Field inspectors visiting nurseries, greenhouses and garden centers identified the presence or absence of ash trees at each of the 420 nurseries inspected. Data specific to each nursery were collected in the field and were later inputted into the state nursery database. Inspectors were able to conduct outreach regarding Emerald Ash Borer by distributing pest alerts and brochures. One-on-one discussions with nursery owners, nursery managers and staff enabled inspectors to accurately disseminate information regarding the Emerald Ash Borer.

In 2009, data collected during the nursery inspection season indicated that approximately 7% of nurseries inspected sold ash trees (Table 2). No signs or symptoms suggesting the presence of EAB were detected during inspections conducted in 2009. Outreach materials were distributed upon request from the general public, at trade shows, through environmental groups and handed out during inspections. All data has been entered into NAPIS.

F. **Compare actual accomplishments to objectives established for the period.**

In 2009, 420 nurseries (65% of all licensed Vermont nurseries) were inspected for EAB. The number of actual nurseries inspected during the 2009 field season exceeded the required number of inspected nurseries outlined in the 2009 CAPS Emerald Ash Borer Nursery Inspection work plan.

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

H. **Where appropriate, explain any cost overruns*:** N/A

I. **NAPIS database submissions:** All NAPIS data entries were submitted by December 1, 2009.

*indicates information required per 7 CFR 3016.40 and 7 CFR 3019.51

Map 1-Emerald Ash Borer Distribution in the United States (NAPIS data, as of February 2010)

** In conjunction with nursery inspections, VT Ag also participated in the National Emerald Ash Borer Survey (Report filed separately)

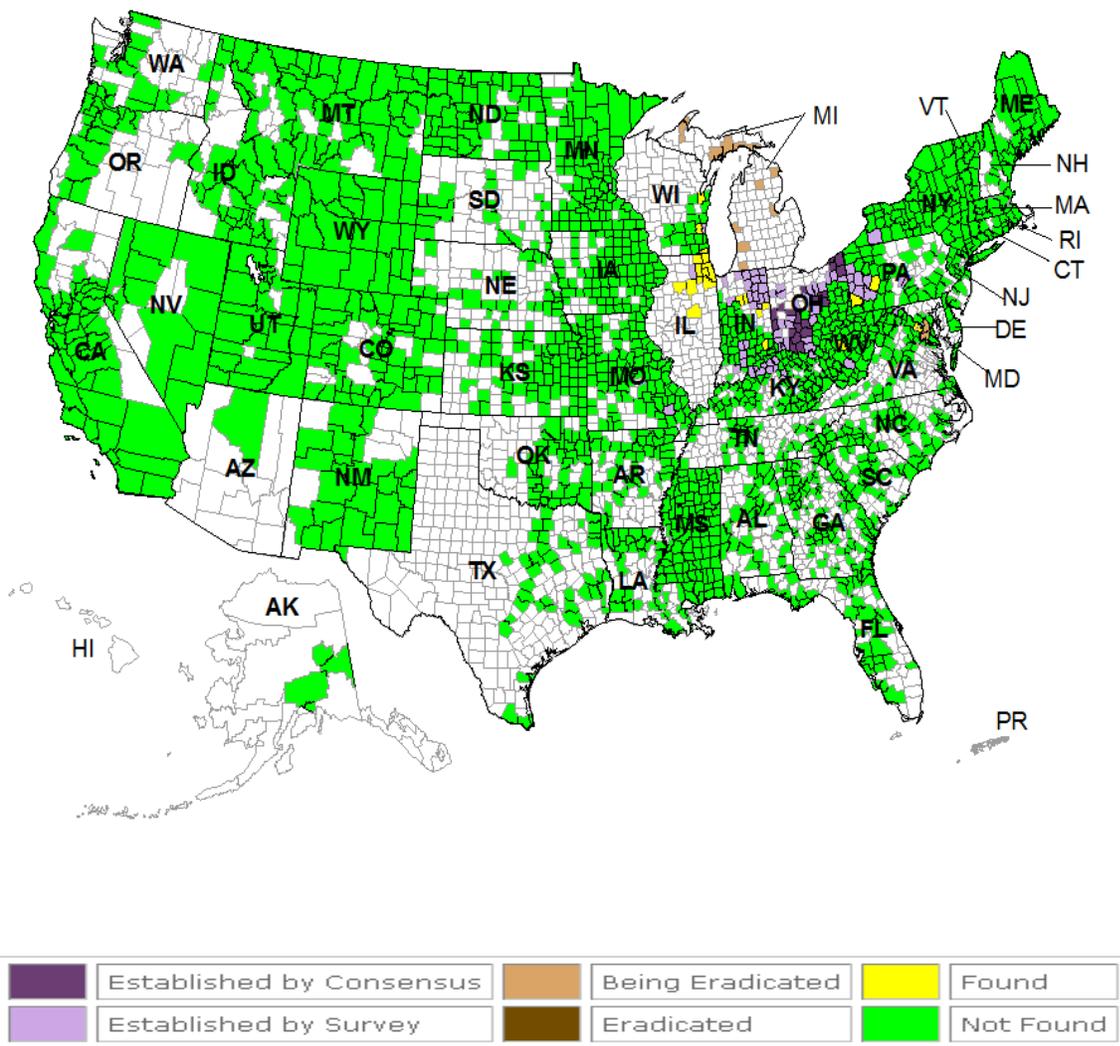


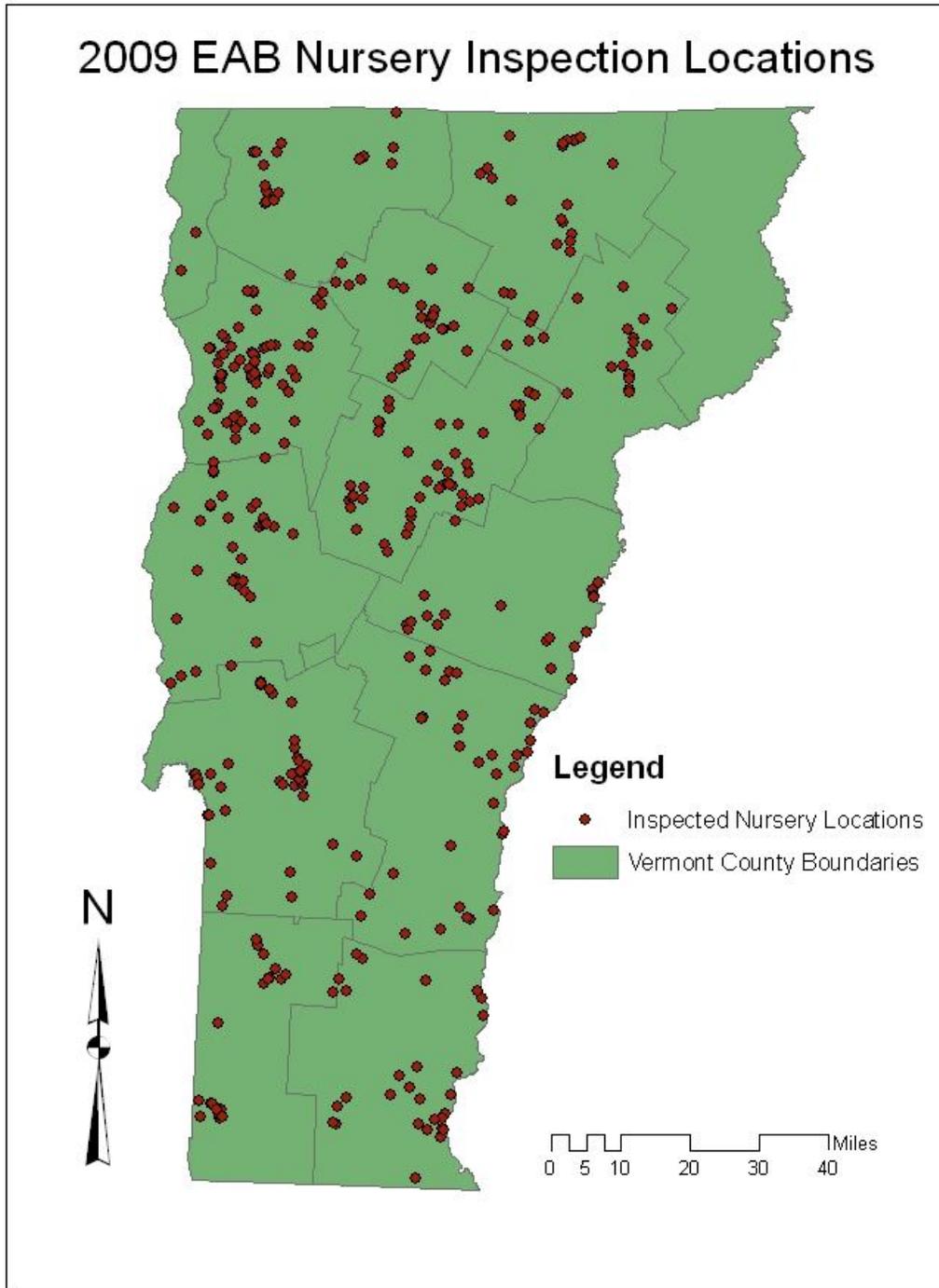
Table 1-The total number of nurseries inspected in each Vermont County, 2009

County Name	Number of Nurseries Inspected
Addison	37
Bennington	20
Caledonia	28
Chittenden	87
Franklin	22
Grand Isle	5
Lamoille	32
Orange	28
Orleans	25
Rutland	46
Washington	46
Windham	11
Windsor	33
Total	420

Table 2-Number of nurseries inspected selling ash trees and number of nurseries with positive ID of Emerald Ash Borer, 2009

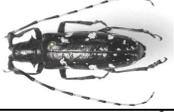
Type of Host Sold	Affiliated Pest/Disease of Concern	Number of Sites Inspected Selling Host	Number of Nurseries with Positive Sample
Ash	Emerald ash borer	30	0

Map 2-Map of all nurseries inspected in Vermont 2009



2) Hotzone/Exotic Bark Beetle Survey

Target Pests:

SCIENTIFIC NAME	COMMON NAME	
<i>Agrilus planipennis</i> (Fairmaire)	Emerald ash borer	
<i>Anoplophora chinensis</i> (Forster) (= <i>Anoplophora malasiaca</i> Thompson)	Citrus longhorned beetle	
<i>Anoplophora glabripennis</i> (Motchulsky)	Asian longhorned beetle	
<i>Callidiellum rufipenne</i> (Motchulsky)	Lesser Japanese cedar longhorned beetle	
<i>Chlorophorous annularis</i> (Fabricius)	Bamboo longhorned beetle	
<i>Hesperophanes (Trichoferus) campestris</i> (Faldermann)	Chinese longhorned beetle	
<i>Hylurgops (Hylurgus) palliatus</i> (Gyllenhal)	Lesser Spruce shoot beetle	
<i>Hylurgus ligniperda</i> (Fabricius)	Red-haired bark beetle, golden-haired beetle	
<i>Ips sexdentatus</i> (Boerner)	Six-toothed bark beetle	
<i>Ips typographus</i> (Linnaeus)	European spruce bark beetle	
<i>Monochamus alternatus</i> (Hope)	Japanese pine sawyer	
<i>Orthotomicus erosus</i>	Mediterranean Pine Engraver Beetle	
<i>Pityogenes chalcographus</i> (Linnaeus)	Six-toothed spruce engraver	
<i>Sirex noctilio</i>	European Woodwasp	
<i>Tetropium castaneum</i> (Linnaeus)	Black spruce longhorned beetle	
<i>Tetropium fuscum</i> (Fabricius)	Brown spruce longhorned beetle	
<i>Tomicus minor</i> (Hartig)	Lesser pine shoot beetle	
<i>Trypodendron domesticum</i> (Linnaeus)	European hardwood ambrosia beetle	
<i>Xyloborus spp.</i>		
<i>Xylotrechus spp.</i>		

A. Survey/Inspection Methodology:

The 2009 Hotzone survey was the 5th consecutive year that the project has taken place in Vermont. 18 'high risk' pathways for 2009 trapping efforts, state and federal agents set traps at these sites in April, 2009(Map 1, Table 1).

Lindgren funnel traps were used at all locations and several different pheromone lures were used as 'bait' for target insects. The lures utilized in this survey included Ultra High Release ethanol, Alpha-Pinene and a triple lure specifically targeting exotic bark beetles. Traps were placed in close proximity of target businesses and trap contents were serviced and screened once every two weeks. For some of the target pests, lures are not known to be effective for survey detections, therefore, visual observations in the immediate vicinity around traps were made for these targets. Host trees of target pests were inspected for signs or symptoms indicating that a target species may be present.

B. Rationale underlying survey:

The Hot Zone Program was developed by USDA APHIS PPQ, to provide a national focus on early detection and eradication of exotic pests through targeting of the introduction pathways and potential pest establishment zones. This concept draws from a number of recommendations in the Safeguarding Review and combines them into a risk-based program that crosses the whole safeguarding continuum. Using this concept allows state and federal agencies to integrate risk information from various databases and other sources (e.g., emergency action notifications, Global Pest and Disease Database) to target areas that might be susceptible to pest introductions. This can help us evaluate domestic program activities and implement sound pest detection strategies. It can also help focus our efforts for rapid response by identifying locations where risk material might be entering the state.

This was the CAPS program's fifth year incorporating these concepts into our pest detection and pathway analysis efforts. The mission is to enhance the ability of state CAPS programs to identify and set up survey traps at target high risk areas and sentinel sites within the U.S. that have the highest potential for exotic pest introduction and to develop appropriate pest detection protocols. These efforts were done in collaboration with USDA APHIS PPQ- State Plant Health Director, Domestic Program Coordinator and Plant Health Safeguarding Specialist.

This survey was conducted (1) to determine the presence and distribution of the target species (2) to monitor the advent of new exotic species over time, (3) to track patterns of infestation throughout the U.S. and possible pathways for introduction, (4) to identify the characteristics of high risk habitats or sites, and (5) to identify the presence of other potential forest pests in survey areas.

C. Survey dates:

Traps were set in April, 2009 and the survey period extended through mid-September, 2009.

D. Taxonomic services:

Trap contents were pre-screened by Agency of Agriculture and USDA APHIS PPQ staff. Screened material was sent to John Crowe of USDA APHIS PPQ in Maine for further analysis and identification when required.

E. Benefits and results of survey:

The VAAF and USDA APHIS PPQ set traps at 18 locations throughout Vermont. All target areas were in close proximity to businesses that are known to import foreign products or are considered 'high risk' sites due to a high rate of traffic from 'out-of-state' travelers. Foreign commodities at the businesses participating in the survey originated from the following countries: China, Canada, Germany, Italy, India, Japan, Taiwan, Mexico, the European Union, Australia, Peru, Spain and Brazil. The frequency of imports ranged from once or twice a year to weekly shipments.

The Hotzone Program continues to help us to forge relationships with businesses in Vermont that deal with importing foreign commodities. Business owners and staff continued to be supportive and intrigued with the Hotzone survey as in the last five years. We have enhanced our outreach efforts by educating these businesses about exotic species that are of great concern to Vermont and increased our 'eyes' on the ground. We know that the target insects we were surveying for currently are not known to occur in Vermont and therefore we have baseline data that we can build upon in future years. The results of this project will help protect the export markets and safeguard agricultural production on the greater national scale (see maps 2-19 for distribution data on specific target pests).

In 2009, with the taxonomic support provided by Plant Survey Specialist, John Crowe, no target exotic pests were identified at any of the surveyed locations.

F. Compare actual accomplishments to objectives established for the period. When the output of the project can be quantified, a computation of cost per unit of output is required when useful: N/A

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: All NAPIS data entries were submitted by December 1, 2009.

*indicates information required per 7 CFR 3016.40 and 7 CFR 3019.51

Map 1: Vermont 2009 Hotzone Trap Locations

2009 Vermont Hotzone Trap Locations

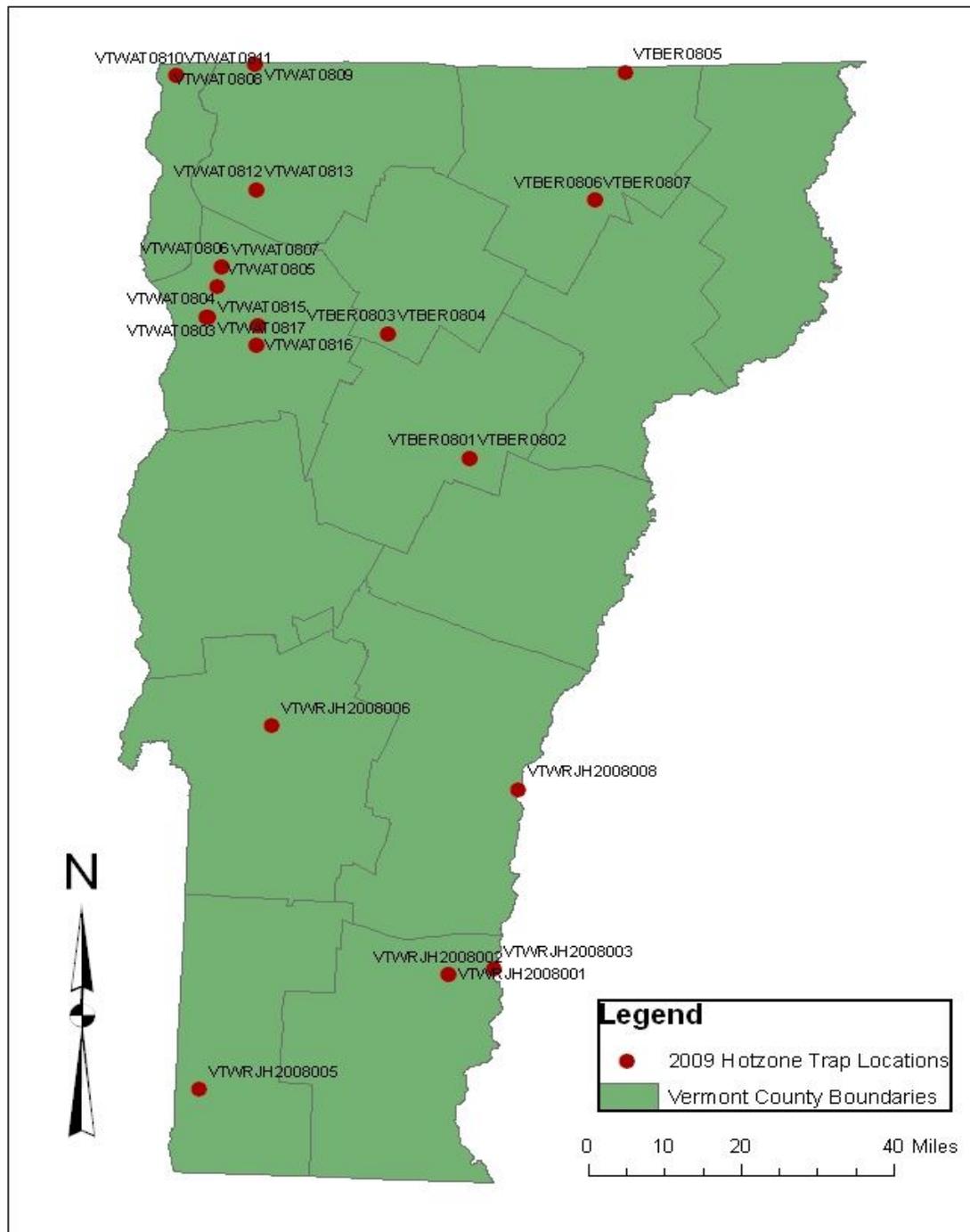
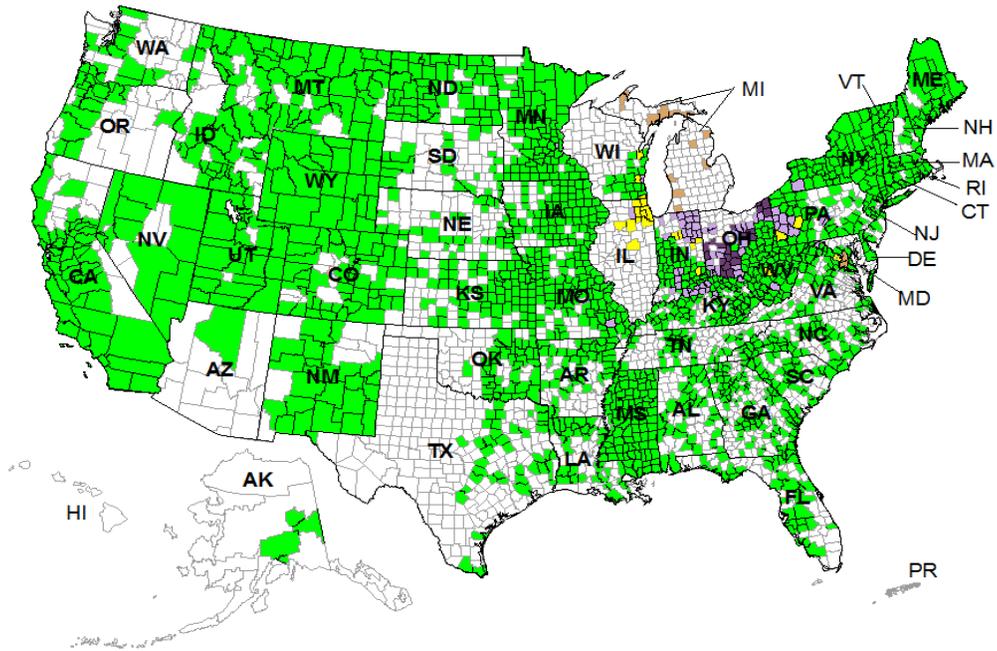


Table 1: Individual Hotzone Trap Information

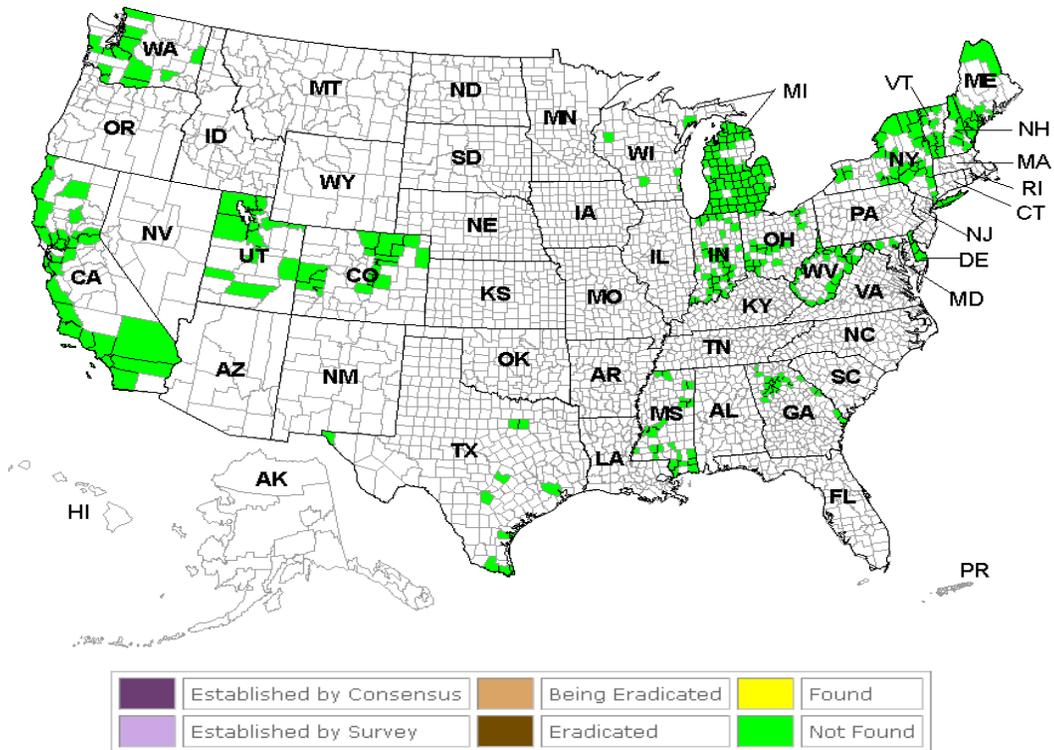
Trap #	Location	Lure Type	Lat.	Long.	Town	County
VTWAT0901	McNeil Plant Chip Yard	Ethanol/AP	44.4943	73.2092	Burlington	Chittenden
VTWAT0902	McNeil Plant Chip Yard	Triple	44.4943	73.2092	Burlington	Chittenden
VTWAT0903	McNeil Plant Wood Recycling	Ethanol/AP	44.494	73.2067	Burlington	Chittenden
VTWAT0904	McNeil Plant Wood Recycling	Triple	44.494	73.2067	Burlington	Chittenden
VTWAT0905	Colchester Weigh Station I-89 Northbound	Triple	44.5565	-73.183	Colchester	Chittenden
VTWAT0906	Brentwood Industrial Park	Ethanol/AP	44.5968	73.1708	Colchester	Chittenden
VTWAT0907	Brentwood Industrial Park	Triple	44.5966	73.1707	Colchester	Chittenden
VTWAT0908	Highgate Visitor Center Southbound	Ethanol/AP	45.0107	-73.087	Highgate	Franklin
VTWAT0909	Highgate Visitor Center Southbound	Triple	45.0107	-73.087	Highgate	Franklin
VTWAT0910	Alburgh Visitor Center	Ethanol/AP	44.9859	-73.296	Alburgh	Grand Isle
VTWAT0911	Alburgh Visitor Center	Triple	44.9859	-73.296	Alburgh	Grand Isle
VTWAT0912	Georgia Welcome Center Southbound	Ethanol/AP	44.7553	73.0823	Georgia	Franklin
VTWAT0913	Georgia Welcome Center Southbound	Triple	44.7553	73.0823	Georgia	Franklin
VTWAT0914	Williston Transfer Station	Ethanol/AP	44.4786	73.0751	Williston	Chittenden
VTWAT0915	Williston Transfer Station	Triple	44.4786	73.0749	Williston	Chittenden
VTWAT0916	Williston Rest Area, Northbound	Ethanol/AP	44.4365	-73.079	Williston	Chittenden
VTWAT0917	Williston Rest Area, Northbound	Triple	44.4365	-73.079	Williston	Chittenden

VTBER0901	VT Granite Industry	Ethanol/AP	44.2074	72.5152	Barre	Washington
VTBER0902	VT Granite Industry	Triple	44.2074	72.5152	Barre	Washington
VTBER0903	Goddard College	Ethanol/AP	44.462	72.7299	Plainfield	Washington
VTBER0904	Goddard College	Triple	44.462	72.7299	Plainfield	Washington
VTBER0905	Derby Line Welcome Center	Ethanol/AP	44.9957	72.1029	Derby Line	Washington
VTBER0906	Northstar Nursery	Triple	44.7351	72.1841	Barton	Orleans
VTBER0907	Northstar Nursery	Ethanol/AP	44.7351	72.1841	Barton	Orleans
VTWRJH2009001	Tradewinds	Ethanol/AP	43.1514	72.5683	Grafton	Windham
VTWRJH2009002	Tradewinds	Triple	43.1514	72.5683	Grafton	Windham
VTWRJH2009003	Riverside Reloading	Ethanol/AP	43.1634	72.4523	Bellows Falls	Windham
VTWRJH2009005	Bennington House of Carpet	Ethanol/AP	42.916	-73.211	Bennington	Bennington
VTWRJH2009006	Vermont Marble Museum	Ethanol/AP	43.66	-73.03	Proctor	Rutland
VTWRJH2009008	Global Timber	Ethanol/AP	43.5308	72.3883	Hartland	Windsor

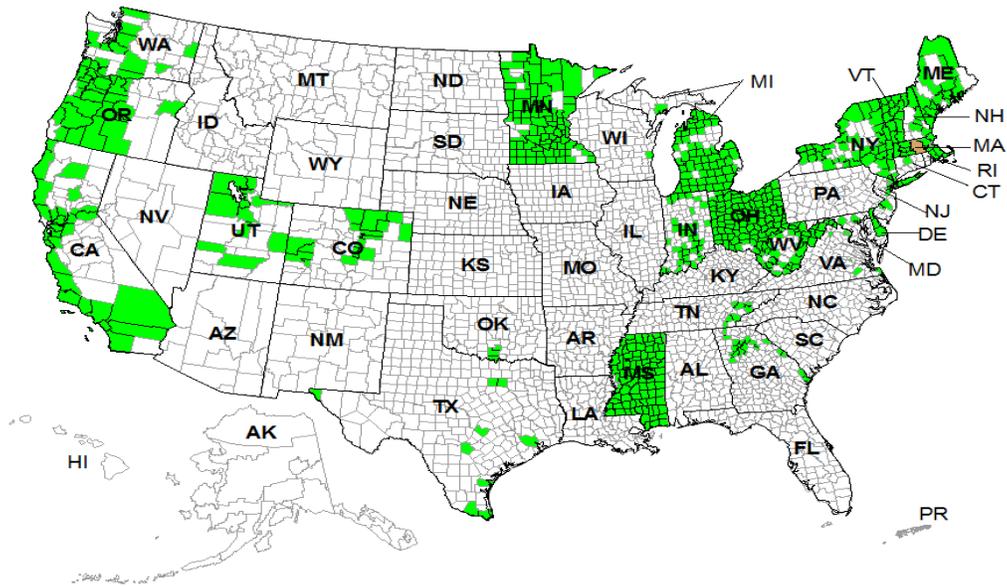
Map 2- Map of all surveyed counties and current pest distribution of *Agrilus planipennis* (Emerald Ash Borer) in the United States (Current as of 3/15/10)



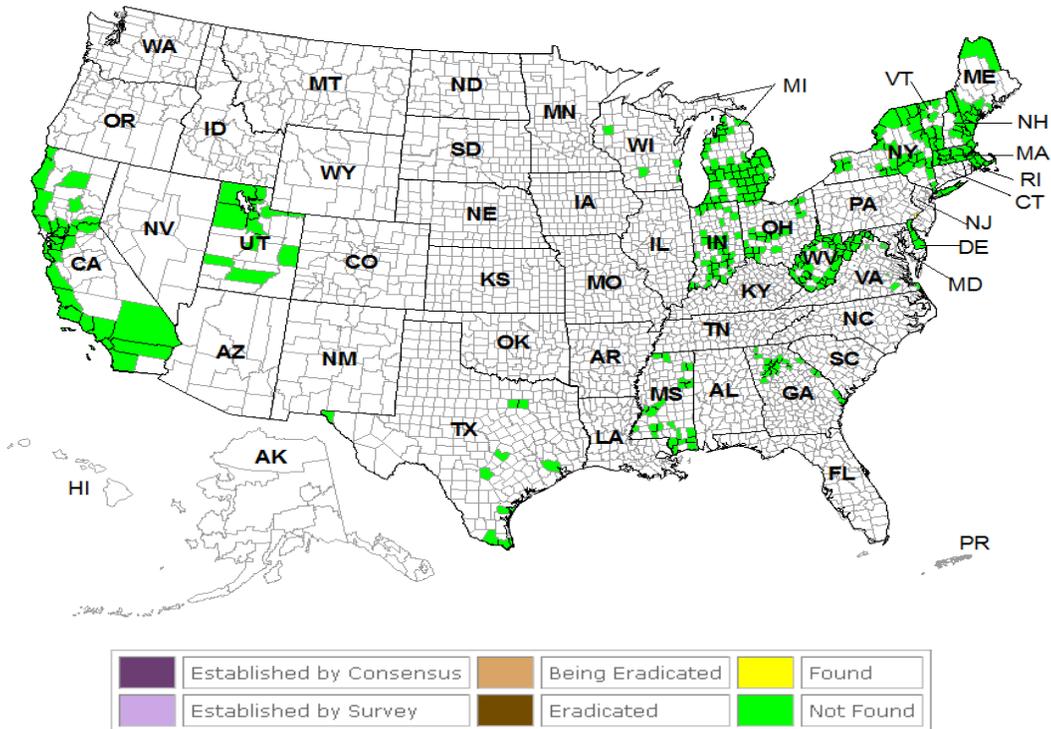
Map 3- Map of all surveyed counties and current pest distribution of *Anoplophora chinensis* (Citrus longhorned beetle) in the United States (Current as of 3/15/10)



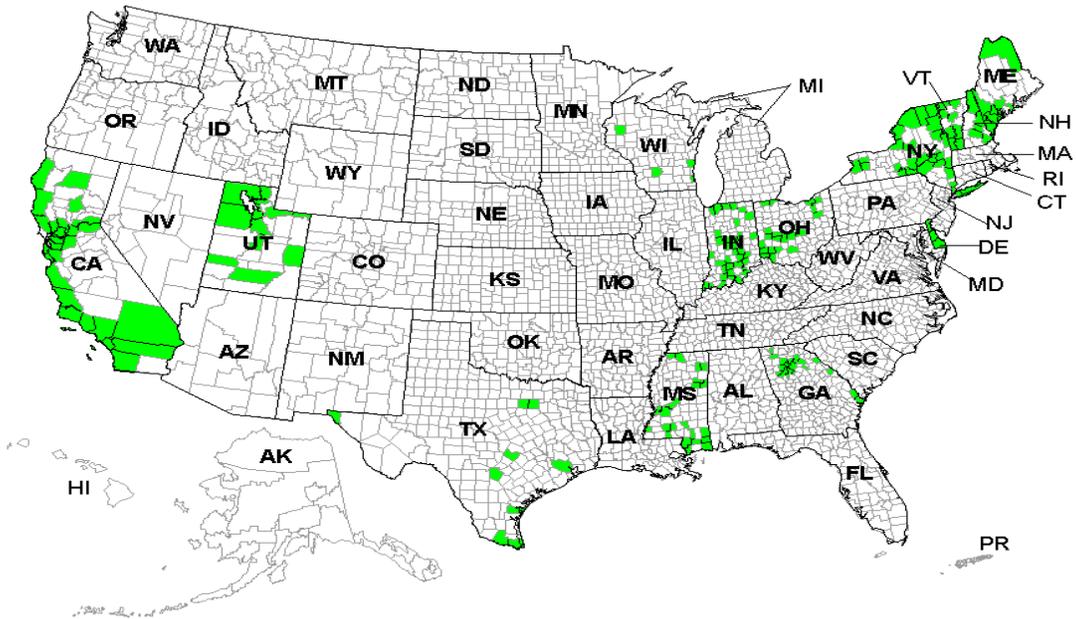
Map 4- Map of all surveyed counties and current pest distribution of *Anoplophora glabripennis* (Asian longhorned beetle) in the United States (Current as of 3/15/10)



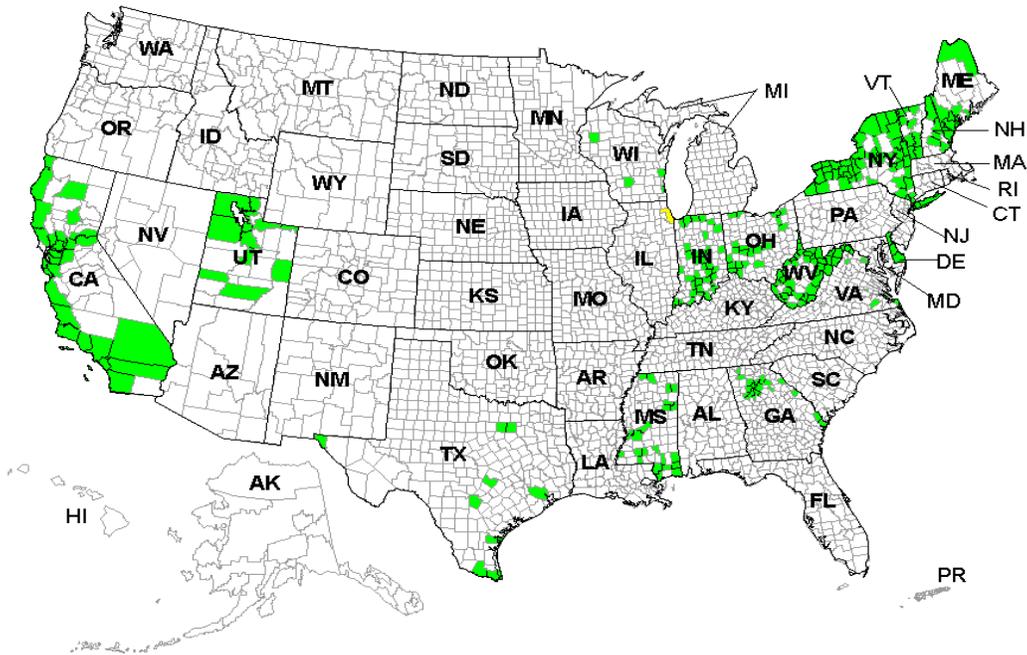
Map 5- Map of all surveyed counties and current pest distribution of *Callidiellum rufipenne* (Lesser Japanese cedar longhorned beetle) in the United States (Current as of 3/15/10)



Map 6- Map of all surveyed counties and current pest distribution of *Chlorophorus annularis* (Bamboo longhorned beetle) in the United States (Current as of 3/15/10)

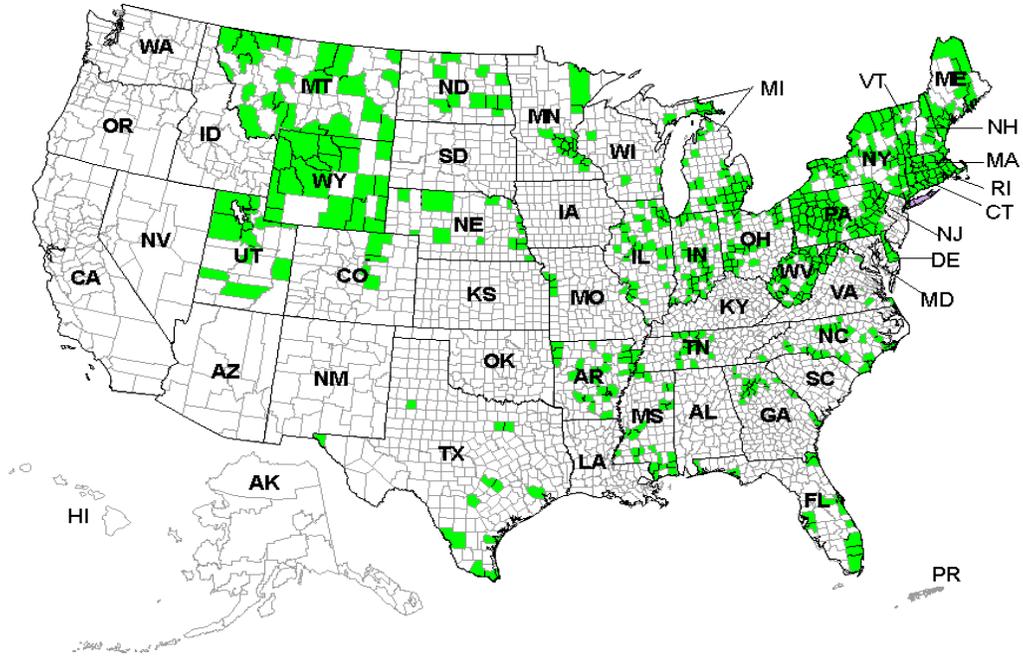


Map 7- Map of all surveyed counties and current pest distribution of *Hesperophanes campestris* (Chinese longhorned beetle) in the United States (Current as of 3/15/10)

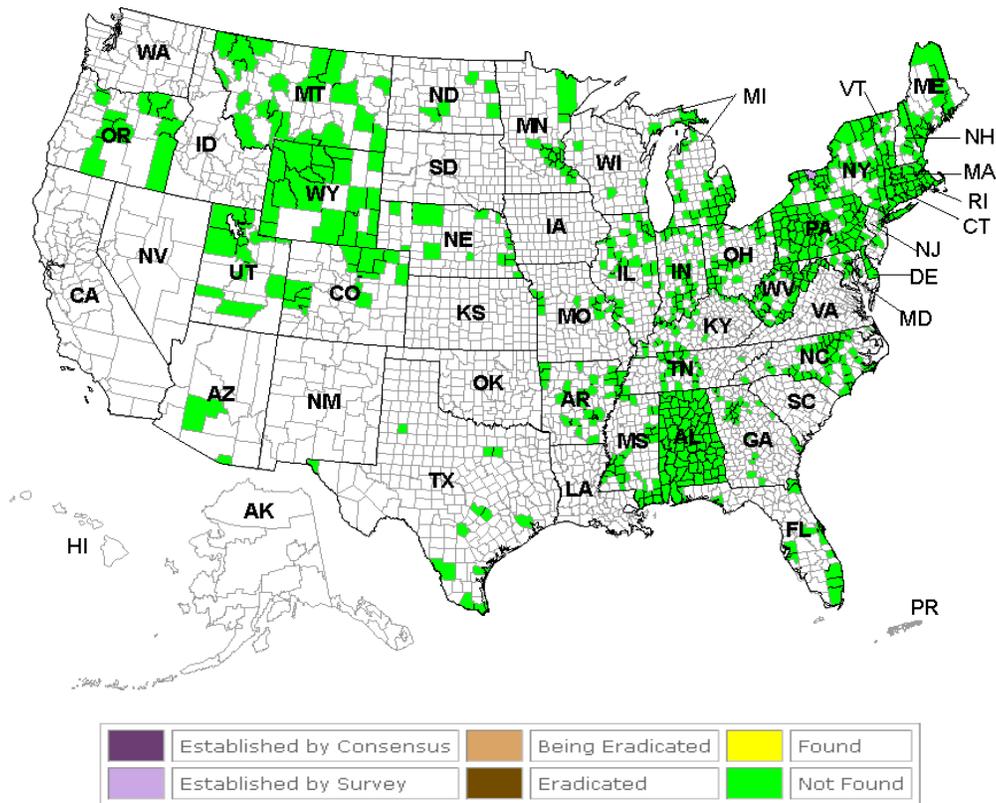


	Established by Consensus		Being Eradicated		Found
	Established by Survey		Eradicated		Not Found

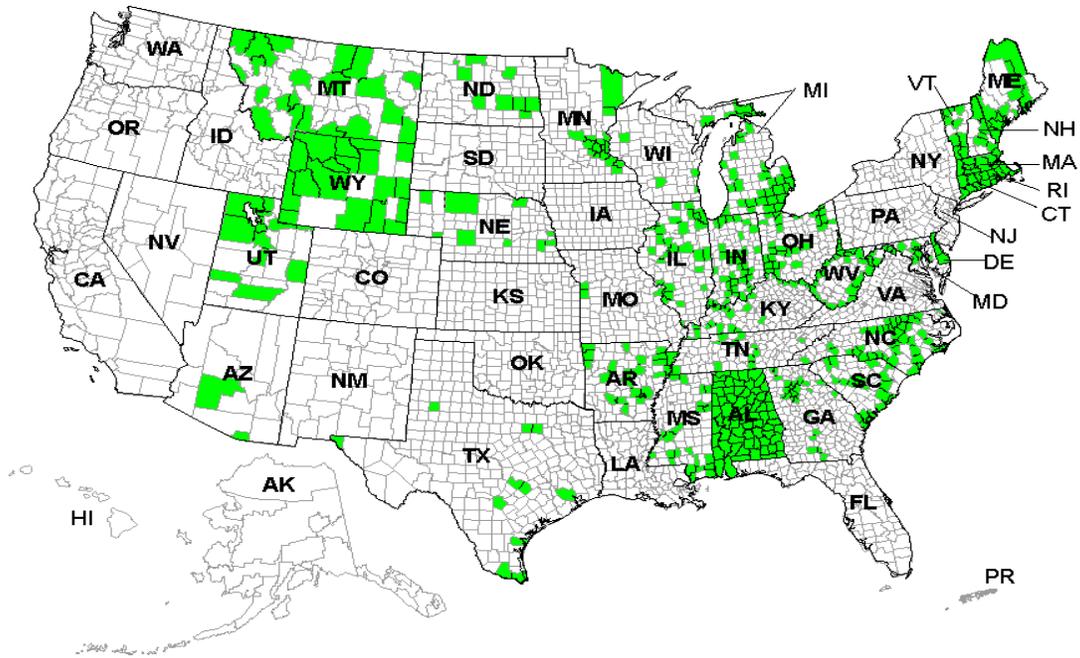
Map 8- Map of all surveyed counties and current pest distribution of *Hylurgops palliatus* (Lesser Spruce Shoot Beetle) in the United States (Current as of 3/15/10)



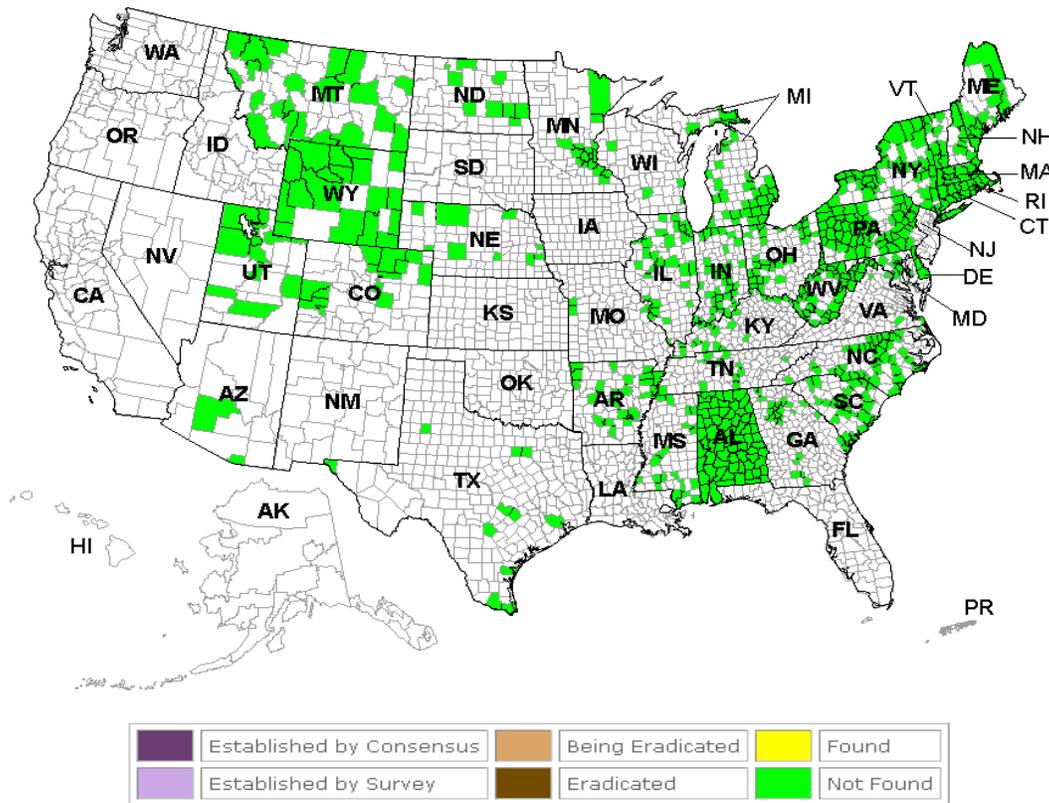
Map 9- Map of all surveyed counties and current pest distribution of *Hylurgus ligniperda* (Red-haired bark beetle) in the United States (Current as of 3/15/10)



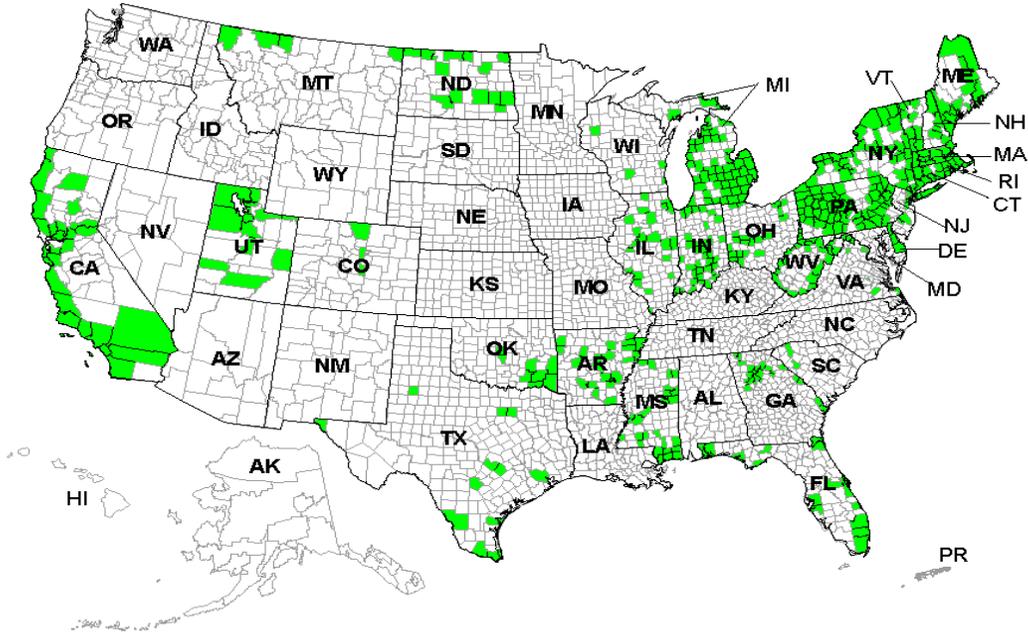
Map 10- Map of all surveyed counties and current pest distribution of *Ips sexdentatus* (Six-toothed bark beetle) in the United States (Current as of 3/15/10)



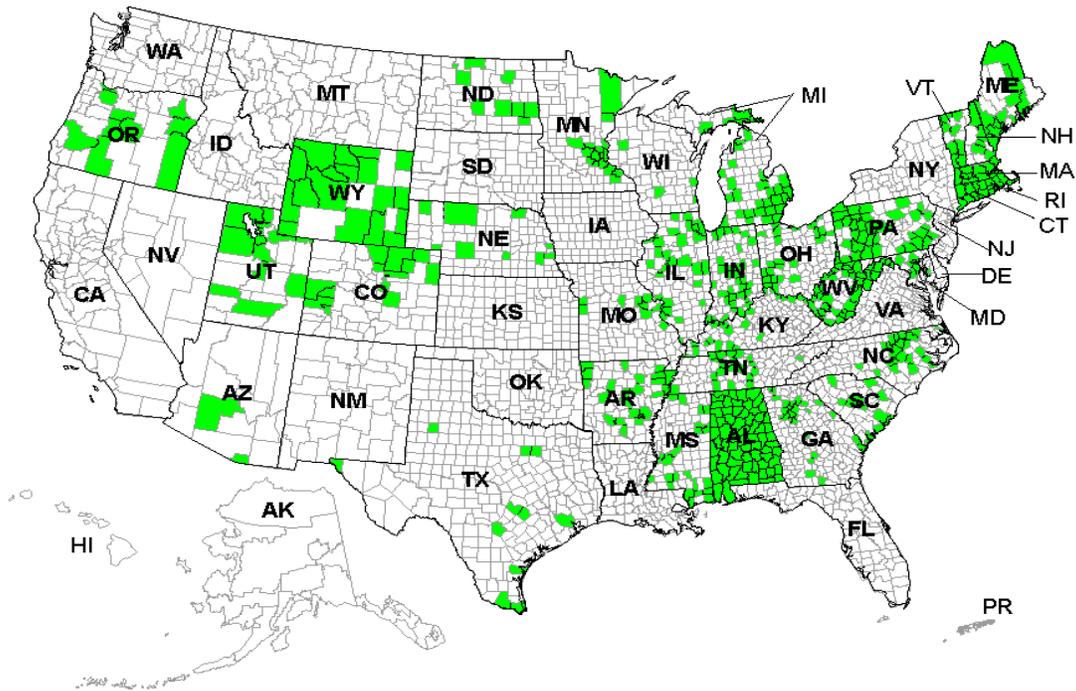
Map 11- Map of all surveyed counties and current pest distribution of *Ips typographus* (European spruce bark beetle) in the United States (Current as of 3/15/10)



Map 12- Map of all surveyed counties and current pest distribution of *Monochamus alternatus* (Japanese pine sawyer) in the United States (Current as of 3/15/10)

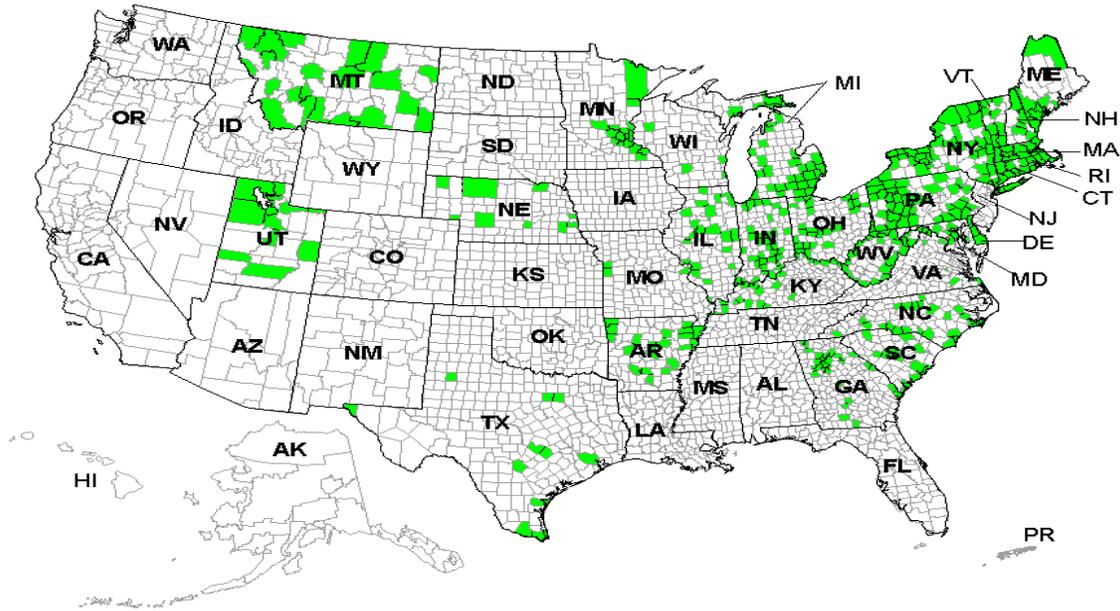


Map 13- Map of all surveyed counties and current pest distribution of *Orthotomicus erosus* (Mediterranean pine engraver beetle) in the United States (Current as of 3/15/10)



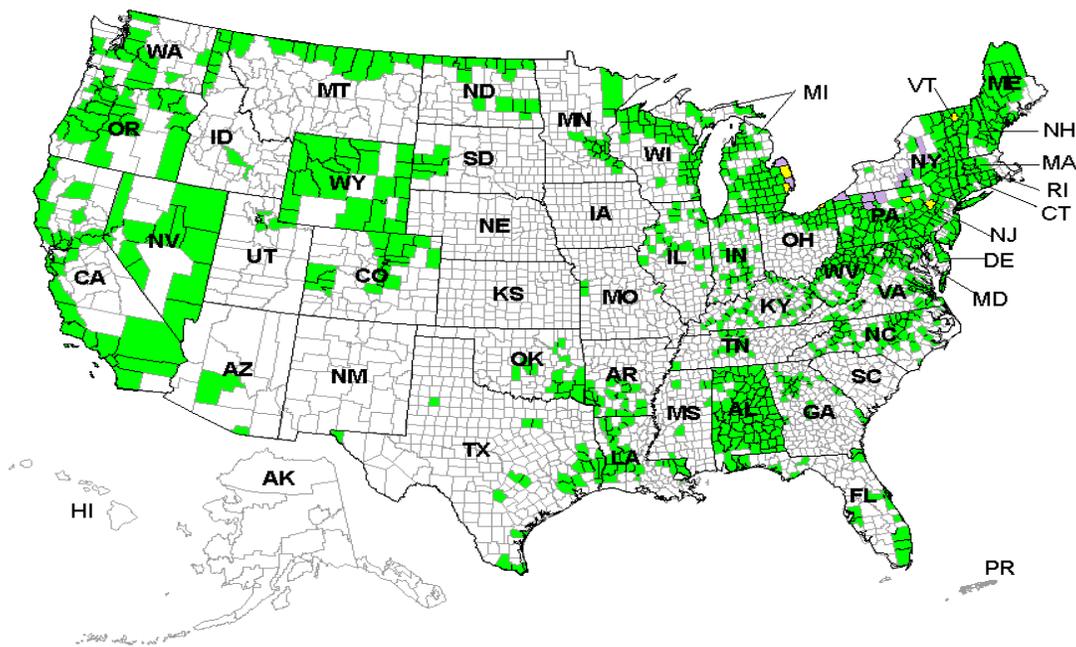
 Established by Consensus	 Being Eradicated	 Found
 Established by Survey	 Eradicated	 Not Found

Map 14- Map of all surveyed counties and current pest distribution of *Pityogenes chalcographus* (Six-toothed spruce engraver) in the United States (Current as of 3/15/10)



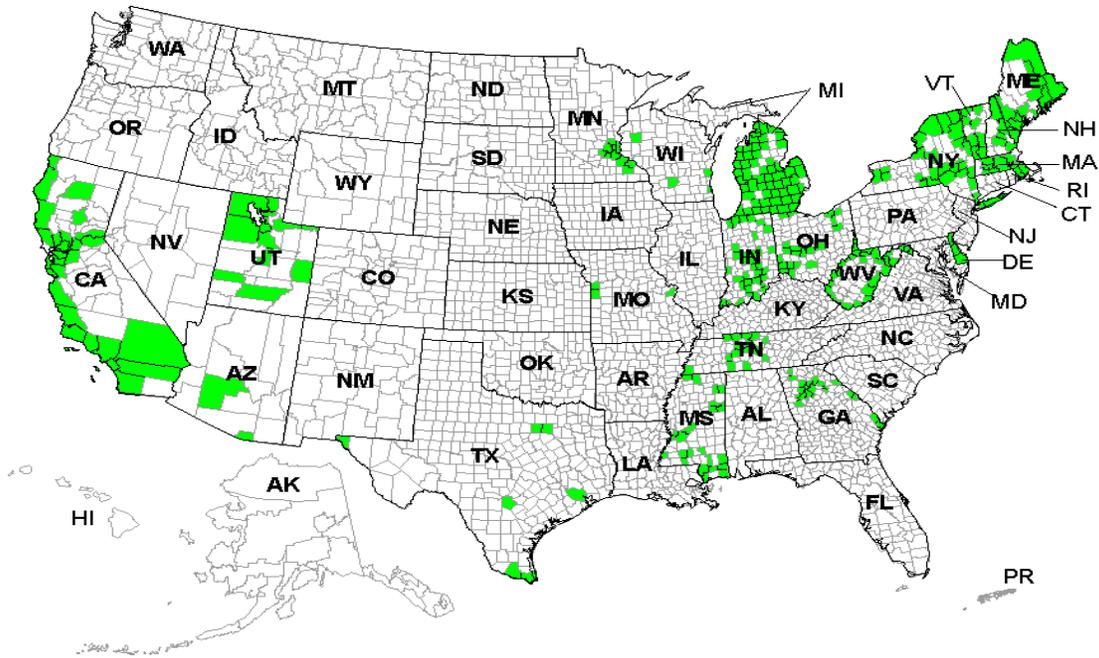
Map 15- Map of all surveyed counties and current pest distribution of *Sirex noctilio* (European woodwasp) in the United States (Current as of 3/15/10)

**Note: USDA-APHIS-PPQ conducted a statewide survey specifically targeting *Sirex noctilio* in 2009 as portrayed in this survey map.

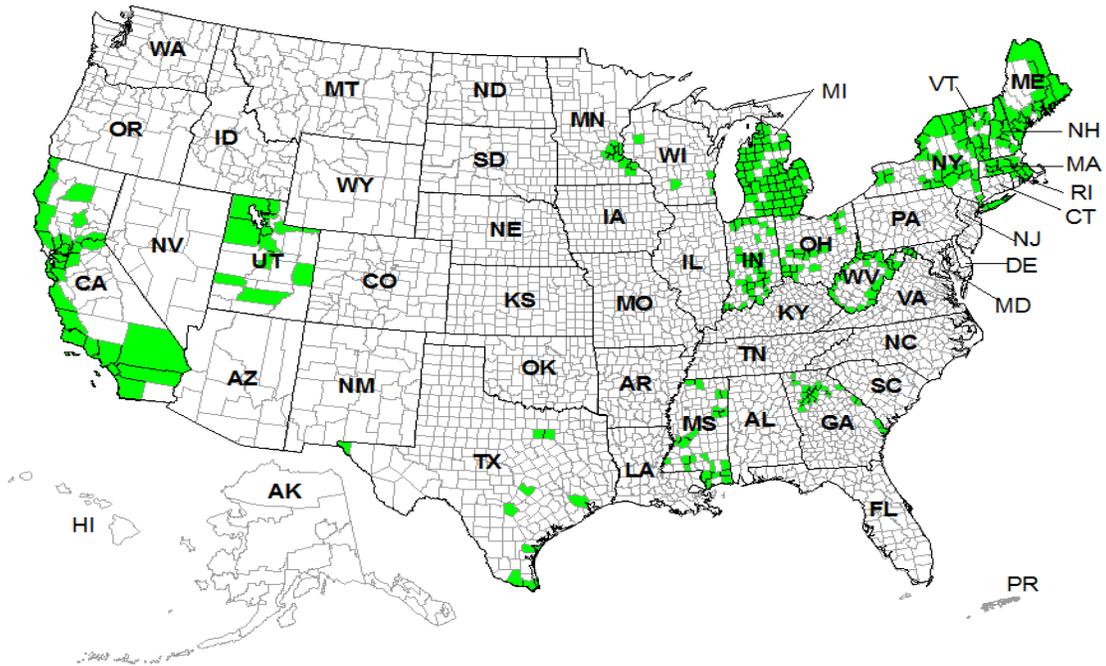


	Established by Consensus		Being Eradicated		Found
	Established by Survey		Eradicated		Not Found

Map 16- Map of all surveyed counties and current pest distribution of *Tetropium castaneum* (Black spruce longhorned beetle) in the United States (Current as of 3/15/10)

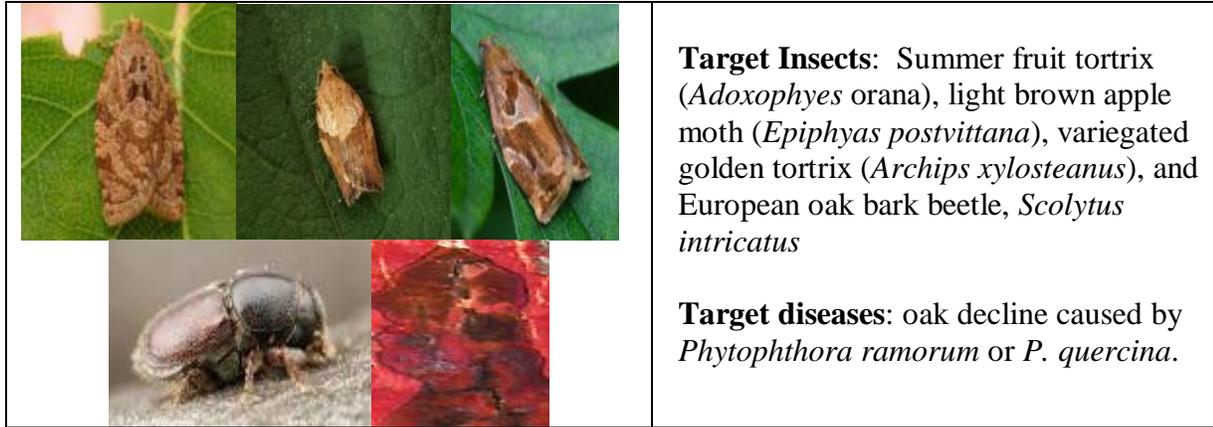


Map 17- Map of all surveyed counties and current pest distribution of *Tetropium fuscum* (Brown spruce longhorned beetle) in the United States (Current as of 3/15/10)



 Established by Consensus	 Being Eradicated	 Found
 Established by Survey	 Eradicated	 Not Found

3) **Oak Commodity Survey, 2009** (Vermont Department of Forests, Parks and Recreation, Forestry Division, Forest Protection Section. Prepared by Trish Hanson, 9 March 2010)



A. Survey Methodology:

This survey involved a combination of visual surveys, trap trees and baited traps at three sites in Vermont (Table 1, Map 1). Pheromone trap target insects included three moths, the summer fruit tortrix (*Adoxophyes orana*), the light brown apple moth (*Epiphyas postvittana*) and the variegated golden tortrix (*Archips xylosteanus*) and visual surveys were conducted at each site for oak decline caused by *Phytophthora ramorum* or *P. quercina*. Bolts and/or branches of trap trees, felled in 2009, will be reared for the European oak bark beetle, *Scolytus intricatus*, in 2010.

- i. During the 2009 field season, three sites containing declining oaks were surveyed for the summer fruit tortrix (*Adoxophyes orana*), the light brown apple moth (*Epiphyas postvittana*) and the variegated golden tortrix (*Archips xylosteanus*).
- ii. Survey locations included sites in Arlington (Bennington County), Jericho (Chittenden County), and Jamaica (Windham County).
- iii. Three pheromone wing traps baited with three different lures were deployed at each survey site.
- iv. Traps were visited every 5 weeks until late August to replace lures and collect insects.
- v. At each collection period, trap bottoms were removed and transported to our Forest Biology Laboratory for examination.
- vi. During site visits, trees at each location were observed for symptoms of Sudden Oak Death, caused by *Phytophthora ramorum* or *P. quercina*.

B. Rationale underlying survey methodology:

It is not known whether oak decline caused by the pathogen *Phytophthora ramorum* or *P. quercina* is present in Vermont. Likewise, we have no records of summer fruit tortrix (*Adoxophyes orana*), light brown apple moth (*Epiphyas postvittana*) or variegated golden tortrix (*Archips xylosteanus*) in our state. The variegated golden tortrix is of special concern because it was found to be infesting various ornamental trees and shrubs in St. John's, Newfoundland in 2005. The European oak bark beetle, *Scolytus intricatus*, which we will attempt to rear in 2010 from host material felled in 2009, has not been found in Vermont.

With increasing tree dieback in the state following recent droughts, this was a good opportunity to investigate declining oaks, trap insects that were attracted to girdled trees and traps with host volatiles, and to rear wood borers from tree boles to determine if any of these worrisome pests is present. This survey was conducted (1) to determine the presence and distribution of the target species, (2) to monitor the advent of new exotic species over time, (3) to aide in tracking patterns of infestation throughout the U.S. and possible pathways for introduction, and (4) to identify the characteristics of high risk habitats or sites.

C. Results:

None of the target defoliating insects was found at any site during the trapping survey, and no symptoms of oak decline caused by *Phytophthora ramorum* or *P. quercina* were observed. Interestingly, traps baited for summer fruit tortrix collected in Jamaica 8 June 2009 and Jericho 10 June 2009, respectively, contained 65 and 20 specimens of the oak leaf tier, *Croesia semipurpurana*.

D. Taxonomic services:

Insects collected in traps were screened and sorted by personnel at the Vermont Department of Forests, Parks and Recreation Forest Biology Laboratory in Waterbury. No suspect insects were collected and none required follow-up taxonomic services outside the Vermont Department of Forests, Parks and Recreation.

E. Benefits and results of survey:

No summer fruit tortrix (*Adoxophyes orana*), light brown apple moth (*Epiphyas postvittana*) or variegated golden tortrix (*Archips xylosteanus*) were collected in traps at any site, and no symptoms of oak decline caused by *Phytophthora ramorum* or *P. quercina* were observed. Trapping for these targets pests in Vermont contributes on a wider scale by providing valuable distribution data at the national level (Maps 2-5).

F. Compare actual accomplishments to objectives established for the period. When the output of the project can be quantified, a computation of cost per unit of output is required when useful.*: We accomplished our survey objectives for the period.

G. If appropriate, explain why objectives were not met:

We met the objectives of this study.

H. NAPIS database submissions: All data were entered into NAPIS in November, 2009. This information is available per state on the NAPIS web site.

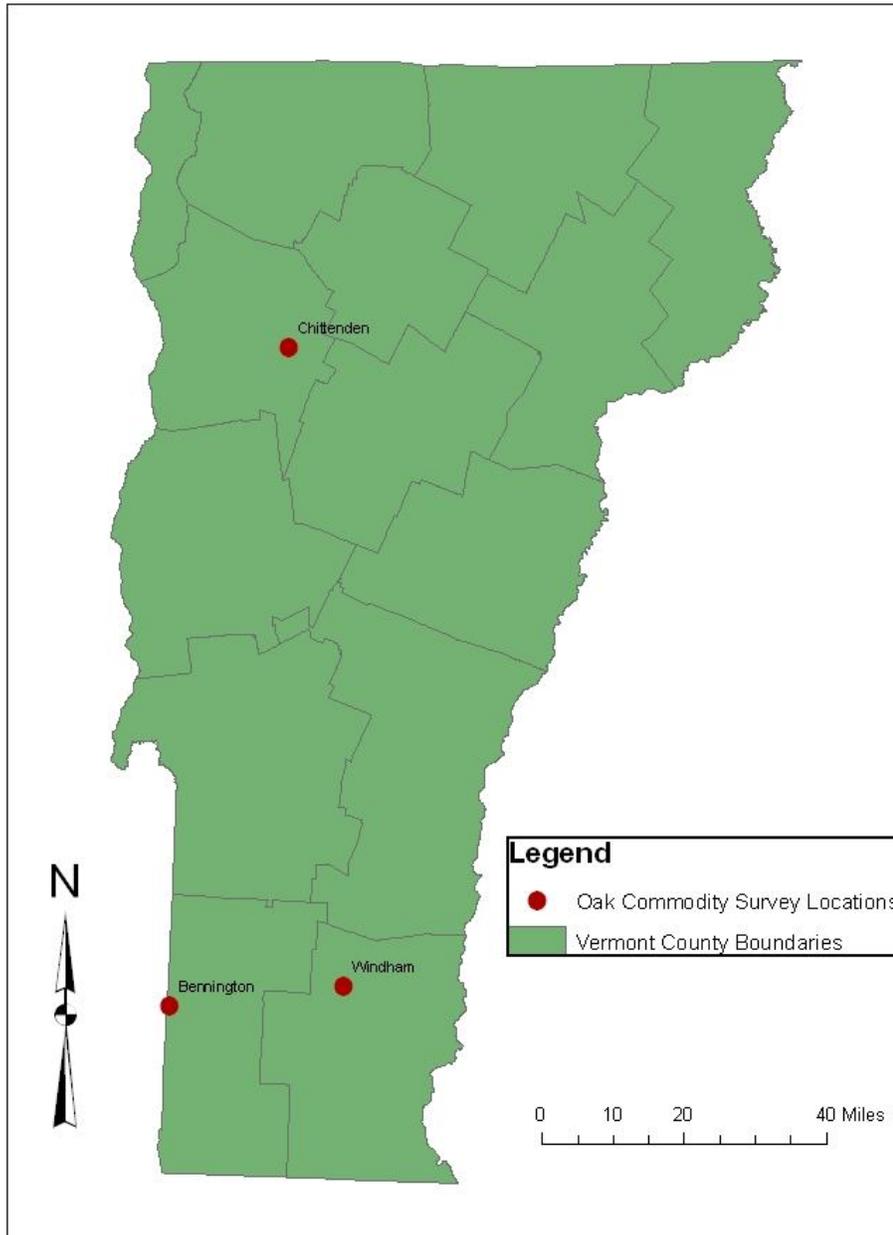
I. Where appropriate, explain any cost overruns. There was no cost overrun.

Table 1. Summary of site and collection data for 2009 Vermont survey for summer fruit tortrix (*Adoxophyes orana*), the light brown apple moth (*Epiphyas postvittana*), the variegated golden tortrix (*Archips xylosteanus*), and oak decline caused by *Phytophthora ramorum* or *P. quercina*. Data include counties, towns, GPS coordinates, dates of trapping survey, and numbers of target species found.

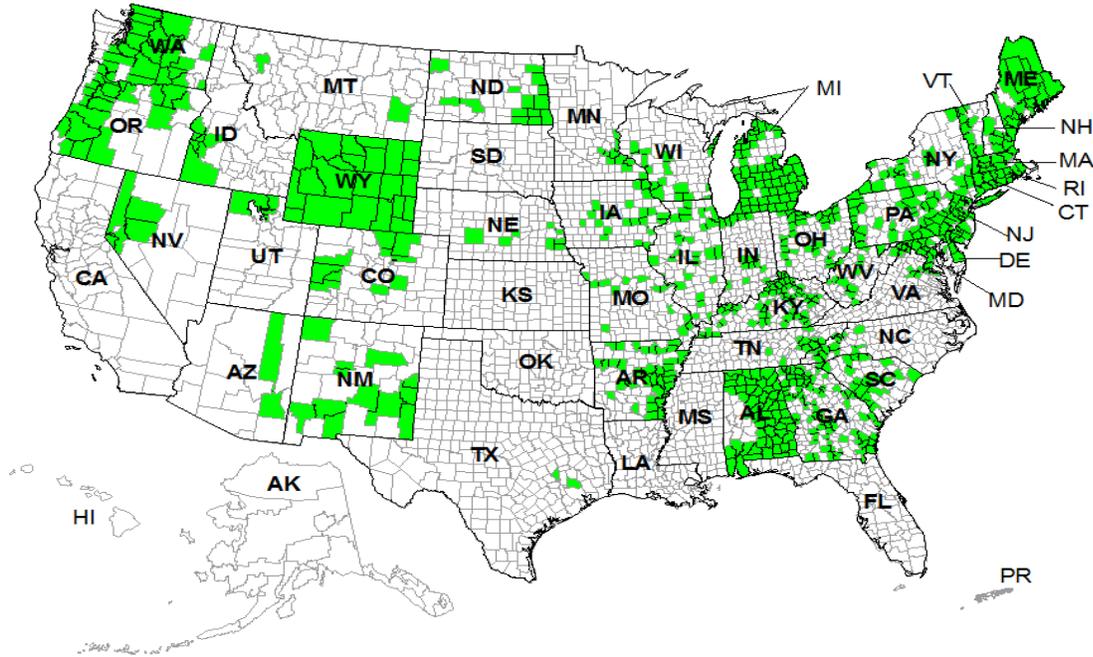
County	Town	GPS Points (NAD83)	Dates of trapping survey	Number of site visits	# of target species found
Bennington	Arlington	N 43.08644 W 73.25983	5/6/09 – 10/14/09	4	0
Chittenden	Jericho	N 44.43158 W 72.93513	5/11/09 – 8/31/09	4	0
Windham	Jamaica	N 43.128189 W 72.77211	5/11/09- 9/21/09	4	0

Map 1-2009 Oak Commodity Survey Locations

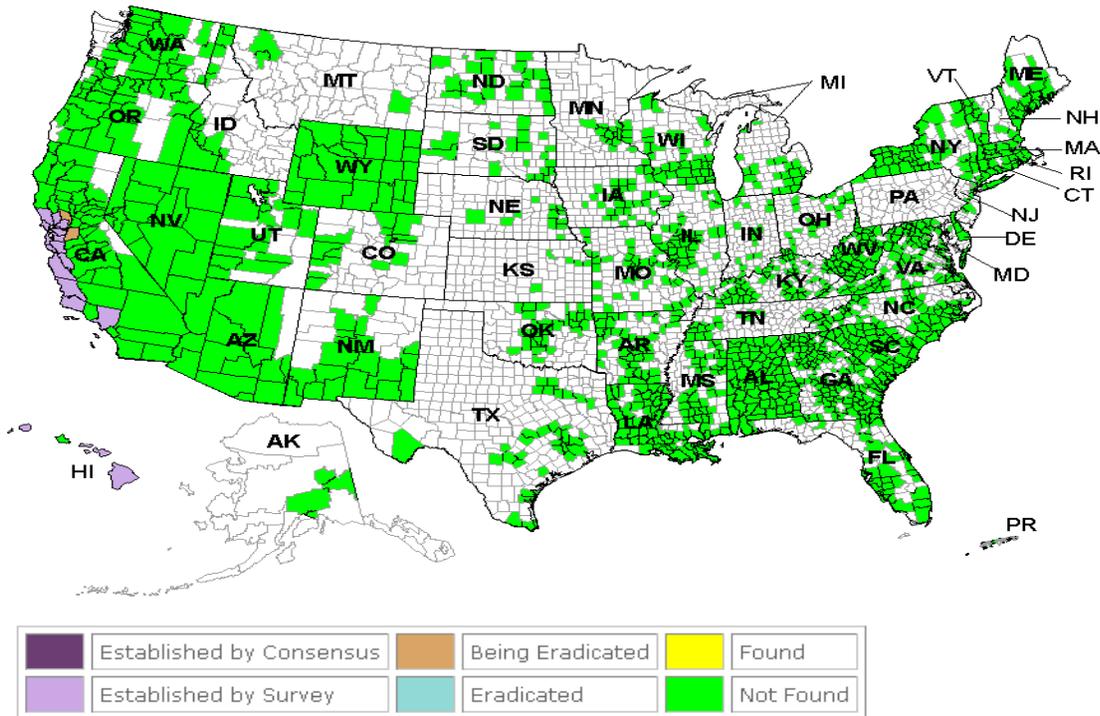
2009 Vermont Oak Commodity Survey Locations



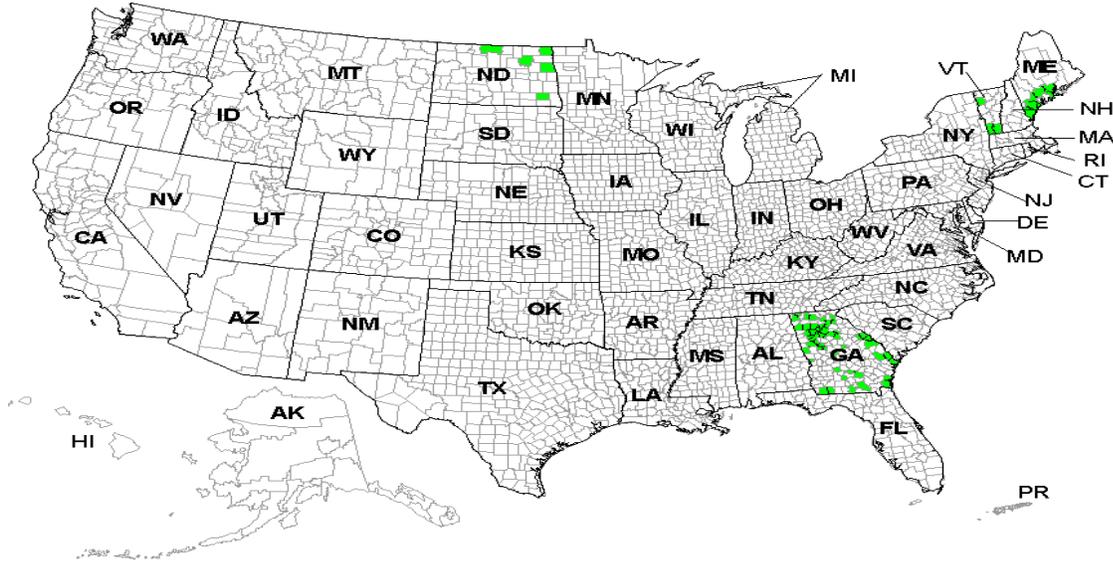
Map 2- Map of all surveyed counties and current pest distribution of *Adoxophyes orana* (Summer fruit tortrix) in the United States (Current as of 3/15/10)



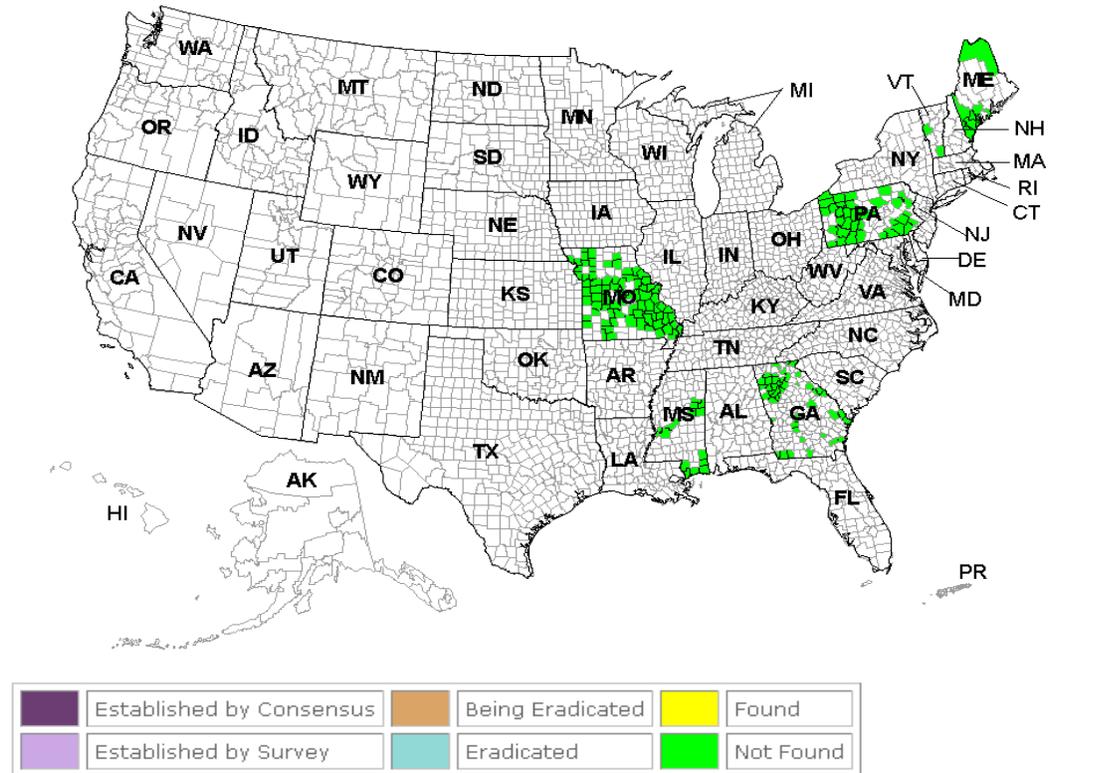
Map 3- Map of all surveyed counties and current pest distribution of *Epiphyas postvittana* (Light Brown Apple Moth) in the United States (Current as of 3/15/10)



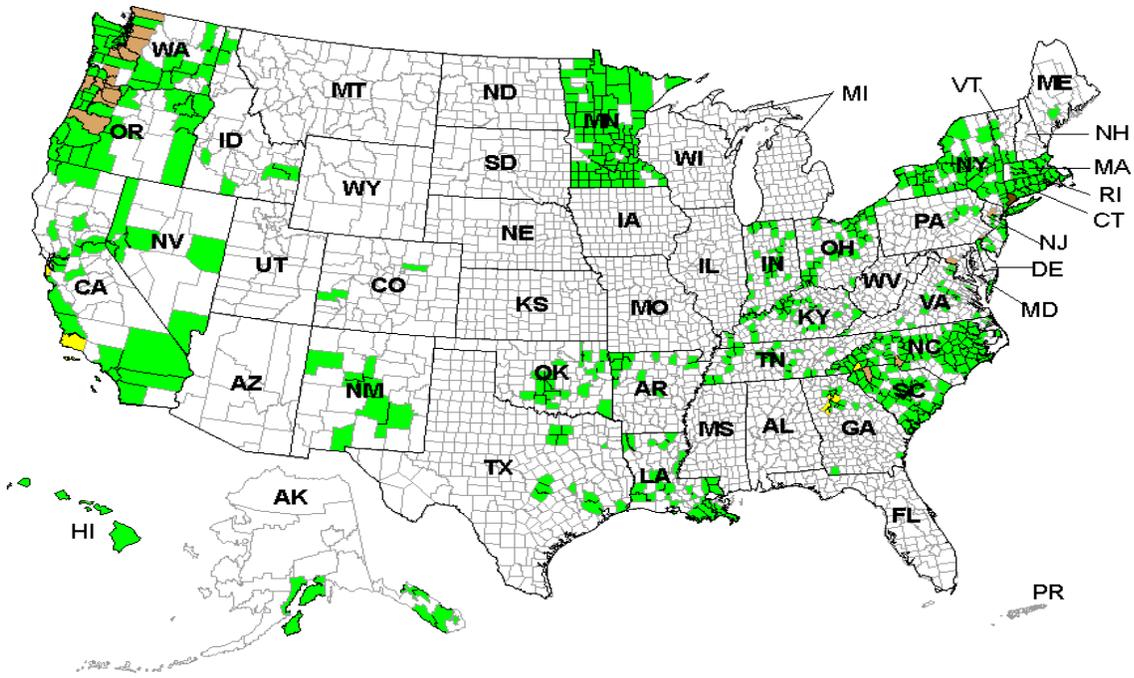
Map 4- Map of all surveyed counties and current pest distribution of *Archips xylosteanus* (Variegated golden tortrix) in the United States (Current as of 3/15/10)



Map 5- Map of all surveyed counties and current pest distribution of *Scolytus intricatus* (European oak bark beetle) in the United States (Current as of 3/15/10)



Map 6- Map of all surveyed counties and current pest distribution of *Phytophthora ramorum* (Sudden Oak Death) in the United States (Current as of 3/15/10)



	Established by Consensus		Being Eradicated		Found
	Established by Survey		Eradicated		Not Found