USDA-APHIS-PPQ-EAB
2008 Emerald Ash Borer Survey Guidelines

Introduction

Survey for EAB since its discovery in 2002 has undergone an evolution of tactics, scope, and application. Survey was originally based on visually detectable symptoms (exit holes, bark cracks, epicormic branching, woodpecker feeding sites, etc.) to determine presence or absence of EAB. Visual survey was applied at various levels of intensity and techniques (ground surveys vs. ladders, climbing sticks, bucket trucks, etc.) Overall results were poor, and newly infested areas were often left undiscovered. It soon became apparent that destructive sampling of suspect trees was necessary.

Artificially stressed (girdled) trap trees offered an alternative to visual survey that was adopted program-wide in 2005. This technique is an improvement for defining or delimiting the extent of the EAB infestation and has been used to evaluate areas treated for EAB (eradication cuts). Trap trees, however, are expensive to establish and evaluate, and offer liability problems for workers and the public. Uniformity of survey is also an issue because of difference in size, species, and locations of trees as well as methodology and timing of stressing prior to flight.

Recent developments in trap design and lure design have enabled the program to implement in 2008 a survey based on attractant-baited traps. Traps offer several advantages over trap trees including expense, uniformity of sampling unit, safety, fewer logistical problems, more precision in sampling, and repeatability.

Scope

In 2008, the EAB national management program seeks to accomplish two goals through survey activities:

1) Conduct a **national survey** to determine whether additional pockets of infestation may exist undetected outside the known infested areas. This trapping survey will target high risk sites and establishments in non-infested states where potentially infested articles such as nursery stock, ash logs, or firewood may have moved a long distance from the generally infested area either prior to regulation or in violation of current regulations. In addition, the survey supports a public outreach component to raise awareness and facilitate reporting of the pest.

2) Conduct a **grid-based survey within a 100 mile band of the last known EAB positive** to better define the leading edge and identify areas to provide support for mitigation activities to reduce the impact and spread. A strong public awareness component and a targeted high risk site survey are also components of this survey.

All survey and public outreach activities should be coordinated with tribes and other federal, state, and local agencies and organizations to ensure efficient use of resources.

National Survey

Criteria for Participation: Prioritization may be required due to limited funding. Criteria to consider, from most important to least, include: proximity to the generally infested area (areas

available to both long and short range pathways), states with native ash species and states with non-native ash species prevalent in the urban environment (primarily long range pathways involving nursery stock).

Participating States: Parts of states outside the 100 mile band and states outside the regulated area are encouraged to participate in the national survey. Alaska, Arizona, Arkansas, California, Colorado, Idaho, Iowa, Kansas, Louisiana, Missouri, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming in the Western Region, and Alabama, Connecticut, Delaware, Georgia, Massachusetts, Maine, Maryland, Minnesota, Mississippi, New Hampshire, New Jersey, North Carolina, Rhode Island, South Carolina, Tennessee, Vermont, and Virginia in the Eastern Region are participating in the '08 national survey, as well as, 15 Parks in the National Park Service.

Site Selection: Outside the generally-infested area and the adjacent 100 mile band, survey personnel will need to identify up to **fifty** "high risk sites" in each state listed above using all available information sources including, but not limited to, aerial photographs, road maps, plat maps, and ash density maps.

Site selection should be coordinated with State Plant Regulatory Officials (SPRO) and tribal governments when tribal lands are involved. Coordination also should occur with other federal, state, local government and non-government organizations involved in the program. Examples of high risk sites suggested for this trapping activity are listed below in order of priority:

1. Declining ash (Ash trees exhibiting two or more of the symptoms listed below should also be examined using destructive sampling techniques; e.g., the removal of bark to inspect for EAB):
    - Canopy stress/dieback
    - Epicormic shoots/suckering
    - Bark splits
    - Woodpecker damage
    - D-shaped exit holes (3-4mm diameter)
    - Serpentine larval galleries
2. Nurseries, sawmills, arborist/landscape firms and firewood dealers
3. Campgrounds, recreation areas, cottage communities, summer camps
4. Recently landscaped residential and commercial properties
5. Sites of high attendance/ high profile cultural events: pow wow grounds, hunting lodges, NASCAR race tracks, horse trail ride sites, motor cross sites, rafting guide huts, fishing camps, etc.
6. Major transportation arteries, rest areas
7. Waterways and fencerows
8. Rural residences

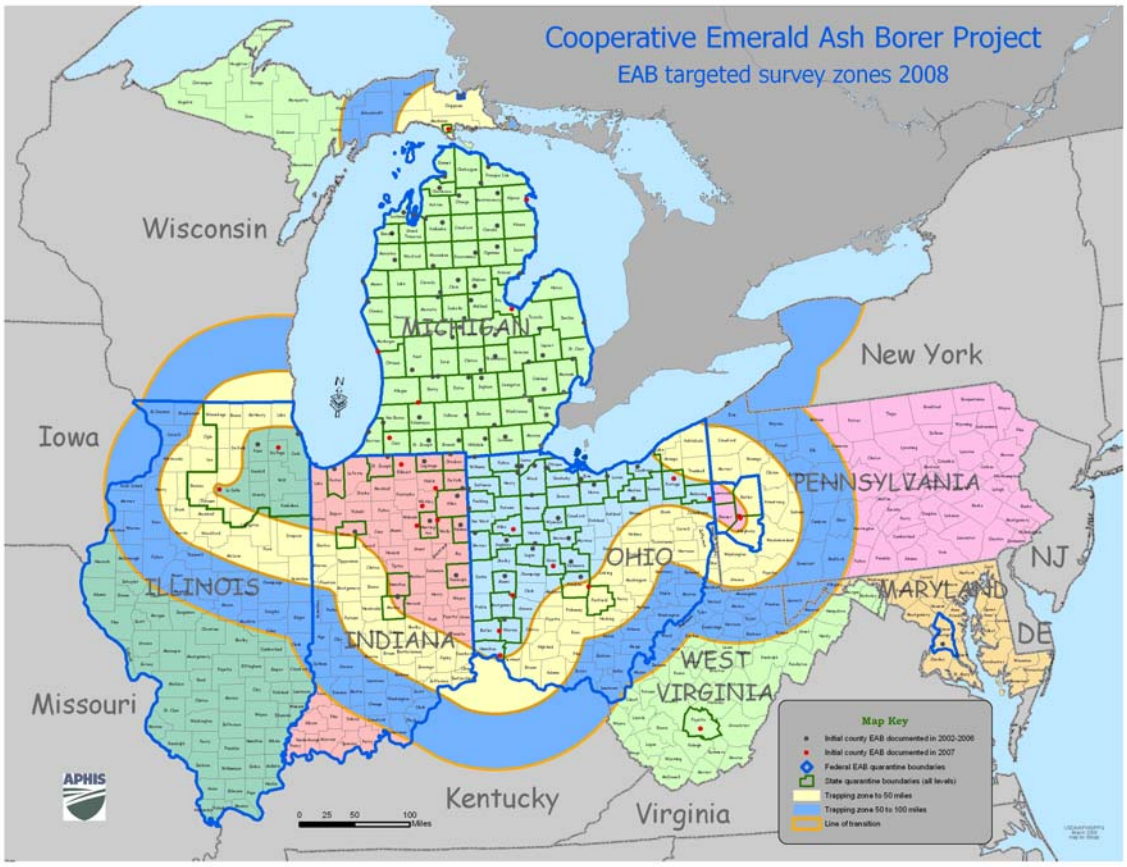
Conducting survey and inspections: Activities include:

- Identification of high risk sites
- Contacting and visiting high risk sites and establishments
- Distributing educational material where appropriate
- Selection of trees and placement and maintenance of traps
- Visual survey of the environment in proximity of the traps for symptoms of EAB.

Trap Density: The target density for a selected site is at least **one trap/mi^2, and up to four traps/site**. However, sites associated with known pathways from the generally infested area may be surveyed using up to **four traps/mi^2 and up to 16 traps/site**. Local knowledge of high risk site should be used to determine distribution and density of trap placement.

Delimiting Survey within a 100 Mile Band of the Currently Known EAB Positives

Criteria for Participation: States within a 100 mile band as identified below. Individual states will be contacted to refine and finalize the area to be surveyed.



List of States: Illinois, Indiana, Iowa, Kentucky, Maryland, Michigan, New York, Ohio, Pennsylvania, West Virginia, Wisconsin

Conducting survey and inspections: Activities include:

- Development of a trapping grid and identification of high risk sites
- Selection of trees and placement and maintenance of traps
- Visual survey of the environment in proximity of the traps for symptoms of EAB
- Contacting and visiting high risk sites and establishments
- Distributing educational material where appropriate

***Trap Density*:** A trap should be placed within each square of a **1.5 x 1.5 mile grid** where ash is found growing. Traps should be spaced as evenly as possible within the grid taking into consideration easy access to roads and the presence and condition of ash trees.

(High risk sites within the Grid-based Survey Zone should be targeted and prioritized as a trap location)

General Trapping Protocols:

Trap: A prism trap consisting of three 14" x 24" panels will be used, with several holes for trap and lure attachment (Fig. 1). The trap is constructed of "Coroplast" corrugated plastic (Fig. 2), in their stock purple color.

Spreaders will be attached to the trap at holes labeled **(3)** in Fig. 1. Lures are attached to a loop on the spreader using a cable ties (Fig. 2).

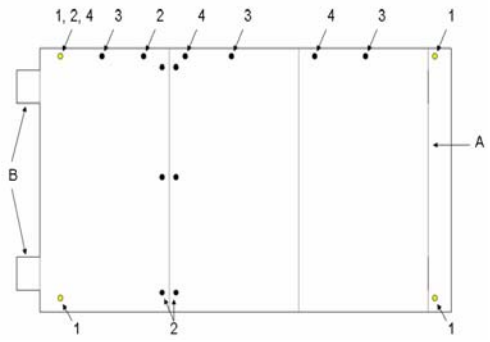


FIGURE 1: Prism trap diagram

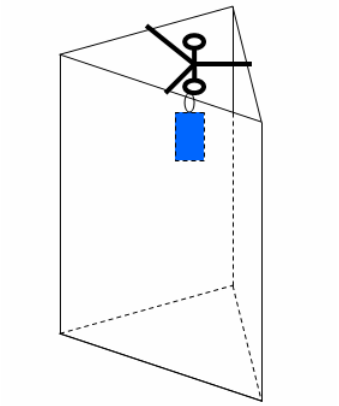


FIGURE 2: Lure hung from loop on spreader using a cable tie

Lure: A Manuka oil lure with a **50 mg/day** release rate is recommended. The Manuka lure provided by commercial firms is produced as a pouch that is designed to last in the field for 60 days.

Trap Placement: Traps should be placed in host ash trees when available. If possible, ash trees should be 8" or greater in DBH (larger or largest ash tree in a stand of trees is preferred). Also, trees should be located along edges, in open areas, or in open stands such as in parks. Traps should be placed in the lower to mid-canopy or as high as possible, but no lower than 5 feet above the ground. They should be placed on the sunny side of the tree, most typically, the south or southwest side.

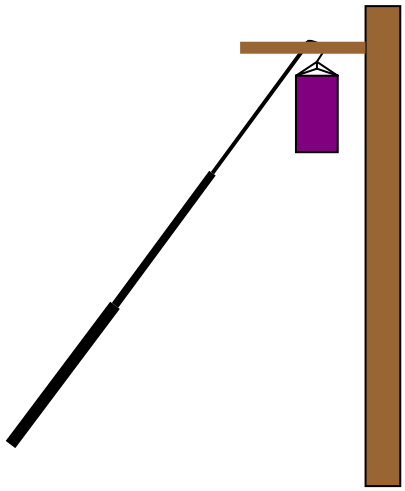


FIGURE 3: Trap hung using a telescoping pole

Traps should be hung as high as possible from a branch or limb. A wire hanger will be used to facilitate trap hanging. An 8' telescoping pole that extends to 23'+ (several sources including "Mr. Long Arm", are available at Home Depot, or http://www.excelsails.com/telescopingextensionpoles.htm, or http://www.briarwoodproducts.com/newtools.htm , or http://www.woosterbrush.com/products.asp?=200) and can be fitted with a hook to place the trap in one of the lower limbs. The full extension of the pole may be necessary. If all limbs are too high for trap placement, a throw line may be tossed over a limb, and a rope and trap may be hoisted up into the lower canopy (Fig. 4).

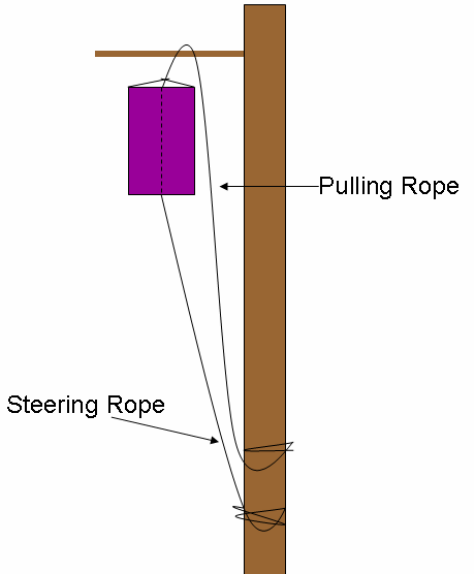


FIGURE 4: Trap hung using a rope

If it is not possible to place traps high, then traps should be hung along the edge of an ash stand, as close to ash trees as possible. They can be attached to an ash tree using the tree trunk hanger (Fig. 5) with the top of the trap 4.5 feet above the ground.

FIGURE 5. Trap hung from tree trunk hanger strapped to a host tree.

Research suggests that an accumulation of 450 growing degree days (base 50°F) results in initial emergence of EAB adults. This same research suggests that in the 900-1100 growing degree days range EAB adult activity reaches a peak. Traps should be placed prior to 450 growing degree days and lure replacement is recommended to occur just prior to projected peak activity. In order to assist states with trap placement and lure maintenance, maps of the Continental U.S. depicting predictive bands of initial emergence and peak activity are attached to this document and will be available at:

http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/index.shtml

Trap Maintenance: Traps should be checked at least once during the season. Lures will last approximately 60 days, so depending upon how far in advance of EAB flight traps are deployed, the lure may need to be replaced halfway through the season. (Timing of placement and/or revisiting the trap should take into account the growing degree day initial emergence date and peak activity date to coincide with placement or revisiting to rebait trap prior to that date)

If trap surfaces are loaded with debris, they should be renewed by removing the debris and combing the glue. Combing can be accomplished with a toothed trowel or a serrated putty knife. If necessary, glue can be added by rolling it on using a paint roller.

Trap Disposition: Traps should be removed late August or after accumulation of 1500 growing degree days. Traps are recyclable and their resin identification code is "5" for polypropylene (PP). It should be noted that polypropylene material may not be accepted at some municipal recycling centers. A list of polypropylene recyclers by state may be found at: http://www.recyclingplasticwaste.com/recyclers/usa/pp/. Since some glue residue and debris will be persistent, it is recommended to consult your recycler. Hangers and spreaders are reusable and should be retained for future use.

Screening for suspect Buprestidae and specimen submission

Any suspect Buprestidae adult or suspect EAB specimen collected from a trap in a **non-quarantined** state should be placed in a vial with 70% ethanol and delivered to the State Plant Health Director or APHIS representative to be packaged and shipped to Dr. James Zablotny along with a completed "Specimens for Determination" PPQ form 391. Be sure to include any survey record number and/or GPS coordinates on the PPQ form 391 so identified specimens can be linked to survey records.

Dr. James Zablotny
USDA, APHIS, PPQ
11200 Metro Airport Center Drive, Suite 140
Romulus, MI 48174

Phone: 734-942-9005
e-mail: james.e.zablotny@aphis.usda.gov

Dr. Zablotny will make a determination and send specimens to the Systematic Entomology Laboratory (SEL) if necessary for first state find confirmation.

Any suspect Buprestidae adult or suspect EAB specimen collected from a trap in a **quarantined** state should be placed in a vial with 70% ethanol and delivered to the State Plant Health Director or APHIS representative to be packaged and shipped to Dr. Bobby Brown along with a completed "Specimens for Determination" PPQ form 391. Be sure to include any survey record number and/or GPS coordinates on the PPQ form 391 so identified specimens can be linked to survey records.

Bobby Brown
USDA, APHIS, PPQ
901 W. State Street
Smith Hall, Purdue University
West Lafayette, IN 47907-2089

Phone: 765-496-9673
e-mail: robert.c.brown@aphis.usda.gov

Data Management Structure For:

Emerald Ash Borer (EAB) – Agrilus planipennis

Introduction:

PPQ wants to make it clear that the utilization of the National "Integrated Survey Information System" (ISIS) as a field data collection tool is not required. We do believe however that operationally specific data is of great importance and therefore have designated the ISIS application to be utilized as the final holding tank (centralized database) for this data.

The ISIS database is housed inside the APHIS network and is accessible to employees who have direct access to the APHIS network and to co-operators with APHIS VPN accounts. After receiving network access and a username and password for ISIS, users can log into the systems and utilize any (or all) of the three (3) data entry tools. These tools include; a web interface, a web upload tool, and a PDA (Hand Held Computer) software application.

We encourage users to use the PDA portion of ISIS, but understand organizations have existing tools and/or applications used to collect data in the field. Organizations utilizing methods other than the PDA (paper, spread sheets, or third party software platforms) can enter data directly into the web interface or "bulk" upload data from flat file spread sheets using the web upload tool.

Note: This survey is NAPIS compliant. NAPIS "required" fields are marked in yellow.

While most issues surrounding connectivity have little to do with ISIS, (but more to do with government security requirements) the ISIS team understands unique connection situations still exist. In these cases, we will make every accommodation and, if needed, upload the data into the system. The ISIS team is always available to discuss end user needs and/or other solutions available regarding data collection and data management issues. Assistance and support is available from the ISIS help desk at the following:

National Support
Email: ISIS.Support@aphis.usda.gov
1-866-910-9091

ER ISIS Support
Deron Medley
Deron.M.Medley@aphis.usda.gov
919-855-7754

WR ISIS Support
Ryan J. Reynolds
Ryan.J.Reynolds@aphis.usda.gov
970-494-7557

For those who do not have direct access to the APHIS network or do not have an APHIS VPN account, please submit your data directly to Brad P. Jones , ER ISIS Data Manager, Brad.P.Jones@aphis.usda.gov, 919-855-7396, preferably in an Excel spreadsheet format.

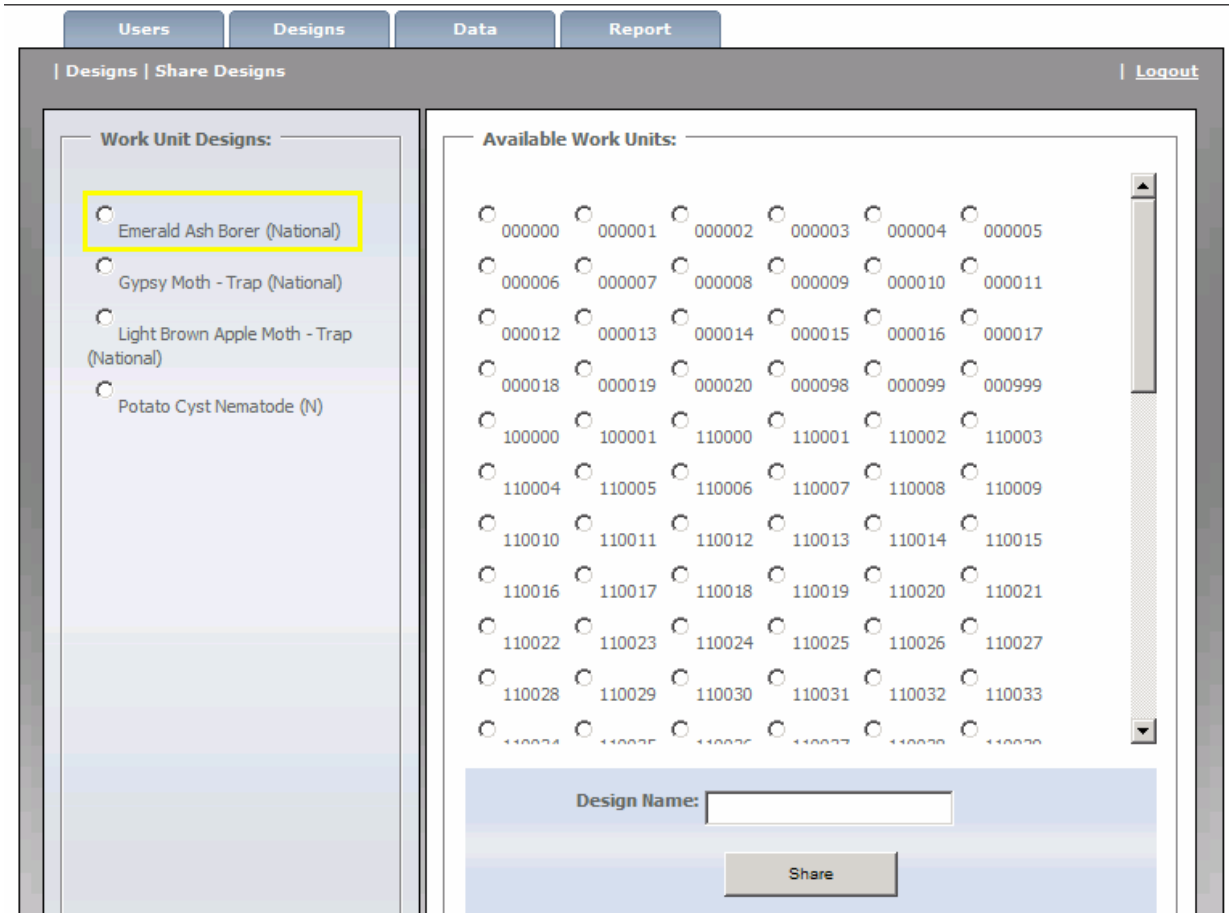
Survey Data Elements and Templates

Data Elements were determined from: National, Eastern, and Western Regional Program Managers, as well as, the 2008 EAB Survey Guidelines Document.

The “Emerald Ash Borer (National)” Template is available at the following work unit:

Username: ISISDesigns
Password: password

This work unit was created as a “Sand Box” work unit, for all users to have access to pre-designed ISIS templates. Users can access the work unit using the above username and password and “share” the template they want to their home work unit(s). If users have any questions regarding this procedure, please contact the ISIS help desk.



ISIS Section	Data Element	Data	Format / Definition	Status	NAPIS
RECORD NAME					
	Record Name	Text or #	Recommend State + Grid + Trap (Delimitated Survey) Recommend State + Trap (Detection Survey)	Required	
MAIN					
	SurveyDate	Date	00/00/0000 (Record Date)	Required	
	SurveyTime	Time	Automatically displayed	Recommended	
	TargetPest	Emerald Ash Borer	Drop Down, Default	Required	
SITE / LOCATION					
	TrapNimber	Text or #	Open Text, Identifier	Required	
	Ash Material	Ash Firewood	Drop Down	Recommended	
		Ash Saw Logs			
		Unplanted Nursery Stock			
		Nursery Stock Planted<5 Years			
		Natural/Planted>5 Years			
		No Ash			
	Dmtr Breast Hgt	Number (size)	Drop Down, User can define	Recommended	
	Method of Survey	Artificial Trap - High	Drop Down, User can define	Recommended	
		Artificial Trap - Low			
		Destructive Sample			
		Detection Tree			
		Visual			
	Location Type	Agricultural	Drop Down, User can define	Recommended	
		Forest etc.			
		Rural residential			
		Urban Commercial			
		Urban Residential			
	Land Ownership	State	Drop Down, User can define	Recommended	
		Federal			
		Municipal			
		Private			
	EPASite (Host)	Ash	Drop Down, Default	Required	NAPIS
	CropSituation	Detection	Drop Down, Default	Required	NAPIS

		Delimitation			
	Address	Address	Open text	Recommended	
	City	City	Open text	Recommended	
	State	State	Drop Down, User Can Define	Recommended	
	FIPS (County)	County Code	Drop Down, User Can Define	Required	NAPIS
	Zip	Zip Code	Open text	Recommended	
	Section (Grid)	Grid Number	Open Text	Required	
	Latitude	Number	Number	Required	NAPIS
	Longitude	Number	Number	Required	NAPIS
SERVICE					
	ServiceDate	Date	00/00/0000 (Activity Date)	Required	NAPIS
	ServiceTime	Time	Automatically displayed	Optional	
	Primary Surveyor	Name or Initials	Open text	Recommended	
	Service Action	Placement	Drop Down, User Can Define	Required	
		Monitor			
		Destructive Sample			
		Tree peel and/or remove			
		Removal			
	Bark Splits	Yes/No	Checkbox	Recommended	
	D-Shaped Exit Hole	Yes/No	Checkbox	Recommended	
	Serpentine Galleries	Yes/No	Checkbox	Recommended	
	Woodpecker Damage	Yes/No	Checkbox	Recommended	
	Epicormic Sprouting	Yes/No	Checkbox	Recommended	
	Crown Dieback	Yes/No	Checkbox	Recommended	
	Sample Taken (Y/N)	Yes/No	Checkbox	Required	
PEST					
	SampleID	Text or #	Open text	Required (If Applicable)	
	SurveyMethod	Trap, EAB	Drop Down, Default	Required	NAPIS

	Pest Status	Positive	Check Box, Multiple select	Required	NAPIS
		Negative			
		Known to be established			
		Not Known to be established			
		Eradication in progress			
	EPAPest (Pest)	EAB	Drop Down, Default	Required (If applicable)	NAPIS
	Count	Number	Open Text	Required (If applicable)	NAPIS
	Descriptor Units	Specimens Submitted	Drop Down	Required (if Applicable)	NAPIS
	Pest Comments	Text	Open Text	Optional	
	Pest Lifestage	Pupae	Drop Down	Required (If Applicable)	NAPIS
		Larva			
		Adult			

Public Outreach:

Introduction: Active participation of target audiences in preventing the spread of Emerald Ash Borer throughout the United States is critical. Outreach is an integral element of the EAB Program that supports regulatory, survey, and control components of the program.

Public relations campaigns focused on industries which may move EAB should be undertaken, and ongoing public awareness campaigns will be designed to provide education to residents about the dangers of moving infested host materials such as firewood. Since the beetle is difficult to detect, the more people trained to spot symptoms and damage of EAB and report these signs, the better the chance of successful eradication Outreach activities should encourage public support in recognizing and reporting possible beetle damage in their area as well as suspected incidents of quarantine violations.

Cooperative Emerald Ash Borer Communication Initiative: The initiative focuses on the development of public awareness campaigns in areas outside the generally infested area. Awareness regarding artificial movement, best management practices and program delivery will be the primary focus of outreach messages within the regulated areas.

Message: Detection of EAB, movement of regulated articles and quarantine awareness.

Goal: As a component of the national and grid-based surveys for EAB, the Cooperative EAB Communication Initiative garners the active participation of target audiences (see below) in the early detection of emerald ash borer. In the development of public awareness campaigns to achieve this goal, each state should consider incorporating a variety of initiatives including:
. Needs assessment/survey of target audience
. Stakeholder and cooperator meetings, industry seminars

. Advertising in professional journals, newsletters and networking opportunities
. Distribution of USDA & Cooperator program materials
. Web-based networking, i.e., e-newsletters, advertising, etc.
. Cooperative advertising or packaging initiatives

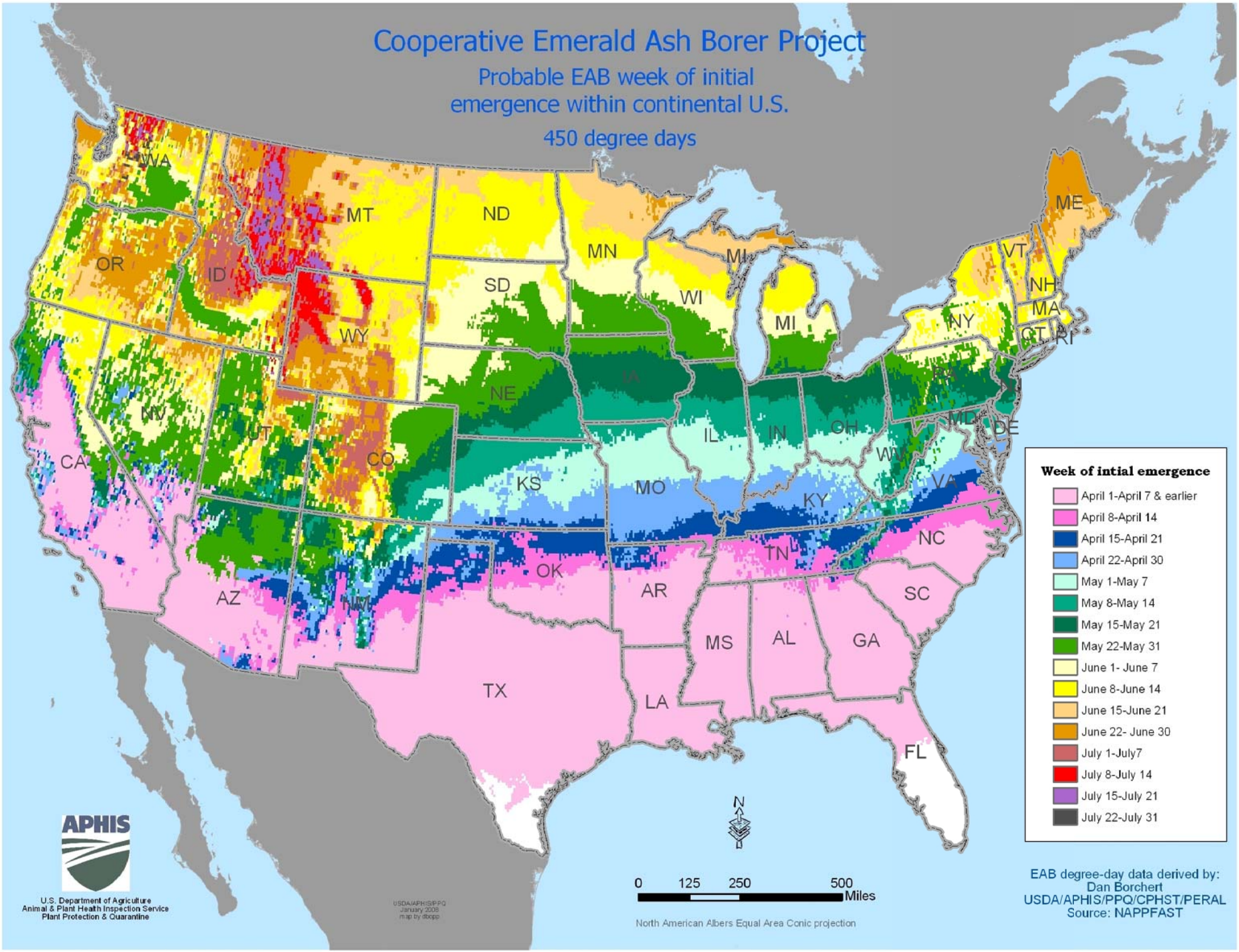
Target Audience: The list below reflects target audiences, who by employment or through associations, have knowledge and/or experience in forestry, wood-processing, plant pathology or pest detection. These individuals are likely to have the greatest opportunity to discover EAB and are more easily engaged.

. U.S. Forest Service, National Parks Personnel, APHIS-PPQ personnel
. State cooperators; Departments of Agriculture, Natural Resources, Parks & Recreation, Fish & Wildlife
. State Cooperative Extension, specifically Master Gardner Program personnel
. Urban foresters, Municipal Departments of Public Works, Public park managers & grounds keepers, commercial facilities managers i.e.) school districts, hospitals, etc.
. Tree care professionals, arborists, nursery owners, landscapers, landscape architects, retail garden centers, etc.
. Foresters, sawmill owners, wood packing material producers, lumber mills
. Firewood dealers
. Alumni of university programs in forestry, urban planning, turf grass, entomology
. Hunters, fishermen, hikers, campers, horse trail riders, nature-loving outdoors people or youth groups, such as scouts

Cooperative Emerald Ash Borer Project

Probable EAB week of initial emergence within continental U.S.

450 degree days

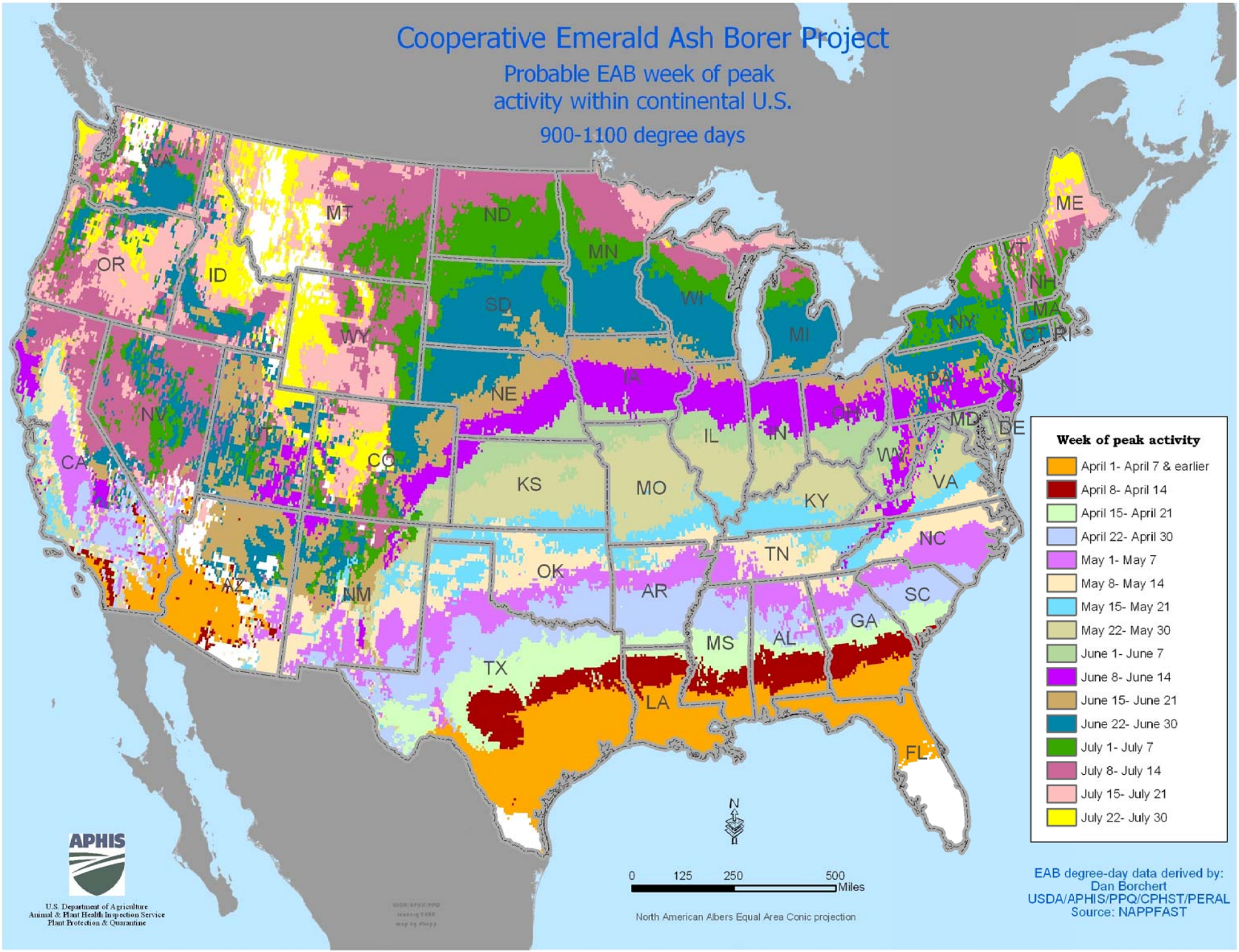


APHIS

U.S. Department of Agriculture
Animal & Plant Health Inspection Service
Plant Protection & Quarantine

USDA/APHIS/PPQ
January 2008
map by dbopp

EAB degree-day data derived by:
Dan Borchert
USDA/APHIS/PPQ/CPHST/PERAL
Source: NAPPFAST


Cooperative Emerald Ash Borer Project
Probable EAB week of peak activity within continental U.S.
900-1100 degree days
WA
OR
CA
ID
NV
MT
WY
UT
AZ
CO
NM
ND
SD
NE
KS
OK
TX
MN
IA
MO
AR
LA
WI
IL
MS
MI
IN
KY
TN
AL
OH
WV
GA
FL
SC
NC
VA
PA
NY
MD
DE
NJ
CT
RI
MA
VT
NH
ME
Week of peak activity
April 1- April 7 & earlier
April 8- April 14
April 15- April 21
April 22- April 30
May 1- May 7
May 8- May 14
May 15- May 21
May 22- May 30
June 1- June 7
June 8- June 14
June 15- June 21
June 22- June 30
July 1- July 7
July 8- July 14
July 15- July 21
July 22- July 30
N
0 125 250 500
Miles
North American Albers Equal Area Conic projection
APHIS
U.S. Department of Agriculture
Animal & Plant Health Inspection Service
Plant Protection & Quarantine
EAB degree-day data derived by:
Dan Borchert
USDA/APHIS/PPQ/CPHST/PERAL
Source: NAPPFAST