Exotic Wood Borer/Bark Beetle Survey Reference

2014 Version

Cover: *Agrilus biguttatus* adult. Credit: Natasha Wright, Florida Department of Agriculture and Consumer Services, Bugwood.org

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Draft Log

October 2012: Final 2013 Version posted to CAPS website.
July 2012: Final 2012 Version posted to CAPS website.
July 2011: Final 2011 Version posted to CAPS website.
September 2010: Revised 2010 Version Draft posted to Cooperative Agricultural Pest Survey (CAPS) website for CAPS community review.

2014 Revisions

1) *Hylurgus ligniperda* was removed as a survey target for the EWB/BB survey. In 2012, PPQ and the National Plant Board concurred on deregulating *Hylurgus ligniperda.*
2) Changed common name of *Trichoferus campestris* from Chinese longhorned beetle to velvet longhorned beetle.

July 2012 Revisions

1) The dry collection cup method in multi-funnel traps was deleted from the manual. The wet collection cup method is mandatory for 2012 surveys.
2) The EWB/BB Trap and Lure Combinations for 2012 table was revised to include the IPHIS Survey Supply Ordering System product names. Product names were inserted into all datasheets.
3) Full datasheets were added for PPQ Program Pests (Asian longhorned beetle, Emerald ash borer, Pine shoot beetle, and *Sirex noctilio*).
4) Biology and Ecology sections were added to datasheets.
5) *Agrilus coxalis* was changed to *Agrilus auroguttatus*.
6) *Cerceris* wasps were added as an approved method for *Agrilus biguttatus* and *Agrilus auroguttatus*.
7) The visual survey protocol for *Agrilus biguttatus* was revised.
8) A trap and lure combination was added as an approved survey method for *Pityophthorus juglandis*.
9) The lure for *Platypus quercivorus* was listed as available.

10) Black light traps were added as an approved survey method for *Trichoferus campestris*.
11) Appendix B: Using *Cerceris* Wasps to Locate *Agrilus* Species was removed from the manual. There is now a *Cerceris* Wasp Survey Protocol, available as a stand-alone document.
12) Appendix C: How to Submit Bark Beetle Specimens for Identification C.1 Specimens from Wet or Dry Traps was removed from the manual. It has been replaced with Appendix B: How to Submit Bark Beetle Specimens for Identification from Wet Traps.
13) Appendix E: Data Entry Guide for *Xyleborus* and *Xylotrechus* Pests at the Genus and Species Level was removed from the manual.
14) Five *Xylotrechus* species were added for reference only.
15) The new chapter section, Section III: Pests for Reference Only (no negative data reporting) was added. *Xyleborus* spp., *Xylotrechus* spp., and the new *Xylotrechus* species were placed here.
16) Negative data is not allowed at the genus or species level for *Xyleborus* or *Xylotrechus*.

July 2011 Revisions

1) States were strongly encouraged to use the wet collection cup method in multi-funnel traps. The wet collection cup method will be mandatory in 2012.
2) The *Sirex noctilio* trapping protocol was added and trap options were updated.
3) The EAB lures were updated.
4) The Thousand Cankers Disease Survey Guidelines for 2011 was posted as the CAPS-approved survey method for *Pityophthorus juglandis*.
5) All host and distribution references were verified from primary sources.
6) The survey method for *Platypus quercivorus* was changed from trap and lure to visual (the lure was not available in time for the 2011 survey season).
7) New/ revised NAPPFAST maps were added.
8) References for each target species were moved to the end of each target species datasheet. General references remain at the end of the document.
9) The instructions for trap placement were changed from “25-50 meters from trees” to “on or near host trees.”
10) The instructions for trap height were changed from “0.2-0.5 meters above ground” to “0.5-1 meters above ground.”
11) Cross-vane panel trap assembly instructions were added.

September 2010 Revisions

1) Eleven new pests were added.
2) The following datasheet sections were added: CAPS-approved Survey Method, Reason for Inclusion in Manual, Pathway, Pathogens Vectored, Countries of Origin, Current Distribution, Distribution in United States, and CAPS-approved Identification Method.
3) Pests were split into two sections based on survey method (trap and/ or lure or visual).
4) New NAPPFAST maps were added.

5) General survey instructions were revised.
6) The EWB/BB Trap and Lure Combinations table was added.
7) The following pest datasheet survey subsections were added: Survey Site Selection, Trap and Lure Trap Placement, Time of year to survey, and Lure Information Tables.
8) A visual survey protocol for *Agrilus biguttatus* was added.
9) Tools and forms for determining high risk locations were added: "Determination of Risk Assignment for Businesses," "Hot Zone Trapping Program," and "Firewood Dealers, Sawmills, Logging, & Pallets."
10) The following appendices were added: "Using Cerceris Wasps to Locate *Agrilus* species," "How to Submit Bark Beetle Specimens for Identification," and "Data Entry Guide for *Xyleborus* and *Xylotrechus* Pests at the Genus and Species Level."

March 2006: Original version prepared by PPQ/EDP/EP Staff

Exotic Wood Borer/Bark Beetle National Survey Guidelines

Planning an Exotic Wood Borer/ Bark Beetle Survey

Survey Guidelines, National and Local Coordination

This document provides standardized guidelines for conducting exotic or non-native wood borer and bark beetle surveys in the United States. The target species of the survey were selected by the national committee of the Cooperative Agricultural Pest Survey (CAPS) Program, in cooperation with the USDA-APHIS Forest Service (FS). Target species are either exotic pests, not known to occur in the United States, or pests with limited distribution. Surveys are planned and coordinated through each Plant Protection and Quarantine State Plant Health Director's office and state cooperators (state departments of agriculture). The goals of the national survey are to obtain information about:

- The presence, distribution, or absence of the target species,
- The distribution of additional exotic wood borer and bark beetle species,
- Patterns of distribution throughout the United States and possible pathways for introduction of target and other exotic wood borer and bark beetle species,
- The phenology of target species in the United States and their selection of hosts.

The following elements are pivotal to the success of the National Survey:

- Interviews, inspection, and trapping activities in and around high-risk areas;
- Timely and accurate data reporting;
- Public outreach programs that create an awareness of wood pests and encourage reporting from warehouse personnel and the public.

How to Use This Manual

Introduction

In 2013, this manual was broken down into an Introduction document and free-standing pest datasheets. The Introduction contains information on the background of the survey, survey planning, trapping instructions, and sample submission guidance. The individual pest datasheets are posted as free-standing documents. The Introduction and datasheets combined form the Exotic Wood Borer/Bark Beetle Survey Reference.

Pest Datasheets

Section I: Pests with Traps and/ or Lures

The National CAPS Committee (NCC) has decided to use the most specific attractant for each target species. When pheromones or specific attractant combinations have been documented in the scientific literature to be more attractive than generic attractants (ethanol, alpha-pinene, etc.), the specific attractants will be recommended over the generic attractants. Specific attractants strengthen negative data reporting.

Section II. Pests with Visual Survey Methods

Pests that do not have attractants or traps identified require visual inspection. A species-specific protocol has been developed for one species, *Agrilus biguttatus*. More protocols will be developed in the future, using this protocol as a template. Protocols will be very similar in terms of the number of sites and trees to be inspected; however, hosts, signs of damage, and additional survey methods may vary by species.

Section III: Pests for Reference only (no negative data reporting)

Negative data should not be reported at the genus or species level for *Xyleborus* or *Xylotrechus*. Information on the genus *Xyleborus* and five high-impact *Xylotrechus* species is listed in this section for reference purposes only.

Host information (in all Sections)

In general, host information in pest datasheets is based on host species present in areas where the target is distributed. These hosts may or may not be present in the United States. Therefore, surveys should be broadened to native species within the host genera or family (i.e., if the pest attacks oaks, and none of the host species are found in the United States or within the survey sites, broaden the survey to include native oak species).

Table 1. Target Insects for Survey

Shaded rows denote insects that only have a visual survey method.

Scientific Name	Common Name (s)
Agrilus biguttatus	Oak splendor beetle
Agrilus auroguttatus	Goldspotted oak borer
Agrilus planipennis	Emerald ash borer (EAB)
Anoplophora chinensis (= *Anoplophora malasiaca*)	Rough shouldered longhorned beetle, Citrus longhorned beetle
Anoplophora glabripennis	Asian longhorned beetle (ALB)
Chlorophorous annularis	Bamboo longhorned beetle, Tiger bamboo longhorned beetle
Chlorophorus strobilicola	Slender-banded pine cone longhorn beetle
Dendroctonus micans	Great spruce bark beetle
Ips sexdentatus	Six-toothed bark beetle
Ips typographus	European spruce bark beetle
Monochamus alternatus	Japanese pine sawyer
Monochamus saltuarius	Sawyer beetle, Salhalm pine longhorn beetle
Monochamus sutor	Small white-marmorated long-horned beetle
Orthotomicus erosus	Mediterranean pine engraver
Pityogenes chalcographus	Spruce engraver
Platypus quercivorus	Oak ambrosia beetle
Scolytus intricatus	European oak bark beetle
Tetropium castaneum	Black spruce beetle
Tetropium fuscum	Brown spruce longhorned beetle (BSLB)
Tomicus destruens	Pine shoot beetle
Tomicus minor	Lesser pine shoot beetle
Tomicus piniperda	Pine shoot beetle (PSB)
Trichoferus campestris	Velvet longhorned beetle
Trypodendron domesticum	European hardwood ambrosia beetle
Xyleborus glabratus	Redbay ambrosia beetle
Xyleborus spp.*	
Xylotrechus spp.*	

*Only positive data may be reported for **species** in these genera. No negative data may be entered at either the genus or species level.

Table 2. EWB/BB Trap and Lure Combinations

Lure Product Names	Trap Product Names	Target Species
Alpha Pinene Lure (two bottles are needed per trap)	1) Multi-funnel Trap, 8 Funnel, Wet or 2) Multi-funnel Trap, 12 Funnel, Wet	*Tomicus piniperda*
1) Alpha Pinene UHR Lure 2) Ethanol Lure	1) Multi-funnel Trap, 8 Funnel, Wet or 2) Multi-funnel Trap, 12 Funnel, Wet	*Monochamus alternatus*, *Tomicus destruens*
N/A	Black Light Trap	*Trichoferus campestris*
Ips sp. Lure, 3 Dispenser	1) Multi-funnel Trap, 8 Funnel, Wet or 2) Multi-funnel Trap, 12 Funnel, Wet	*Ips sexdentatus*, *Ips typographus*, *Orthotomicus erosus*
Lineatin Lure	1) Multi-funnel Trap, 8 Funnel, Wet or 2) Multi-funnel Trap, 12 Funnel, Wet	*Trypodendron domesticum*
Manuka Oil Lure	1) Multi-funnel Trap, 8 Funnel, Wet or 2) Multi-funnel Trap, 12 Funnel, Wet	*Xyleborus glabratus*
1) Manuka Oil Lure 2) Z-3-hexanol Lure	Prism Trap - Purple	*Agrilus planipennis*
N/A	Prism Trap - Purple	*Agrilus biguttatus* (in addition to visual survey), *Agrilus auroguttatus*
Pityogenes chalcographus Lure	1) Multi-funnel Trap, 8 Funnel, Wet or 2) Multi-funnel Trap, 12 Funnel, Wet	*Pityogenes chalcographus*
Platypus quercivorus Lure	1) Multi-funnel Trap, 8 Funnel, Wet or 2) Multi-funnel Trap, 12 Funnel, Wet	*Platypus quercivorus*
1) Spruce Blend Lure, 2) Geranyl Acetol Lure, 3) Ethanol Lure	Cross Vane Panel Trap	*Tetropium castaneum*, *Tetropium fuscum*

IMPORTANT: Unless noted otherwise, lure combinations should not be placed in the same trap. Some trap and lure combinations are approved for more than one target; however, target host preference should be factored in as well.

IMPORTANT: Unless noted otherwise, when more than one lure/compound is listed, all of the lures are required to report negative data for that species.

Planning a Survey

Choosing Target Species

Determining which target species to survey for should be based on the risk of introduction of the target and pathways of introduction, presence of known or potential hosts, and resources available (financial and staff) for survey and identification of the pest. In addition, see **Appendices A-2, A-3, and A-4** for information on identifying high risk areas within your state.

Trap Sites

When choosing a survey site, select a site that is large enough to hold all the traps that will be placed there. Traps with different lure combinations are normally placed 30 meters (98 feet) apart.

General Site Considerations for Trap Placement

I. Transit sites

- Where exotic woodborers/bark beetles were discovered in previous surveys or inspections.
- Where dunnage is removed from ships, stored, and disposed of.
- Near major seaports or airports of entry, especially those in close proximity to sites handling dunnage, wooden cable spools, wooden crating, and having arrivals of bulk cargo of steel, stone, heavy machinery, and other wood packed items.
- Container de-vanning areas, etc. (Visit the sites and evaluate them as possible survey sites.)

II. Destination sites

- Nurseries and dealers: 1) that receive shipments of foreign bonsai or other living woody plants; 2) that have received ash trees from or near EAB quarantined areas; or 3) that are part of trace-forward or trace-back follow-up sites.
- In which PPQ Smuggling Interdiction and Trade Compliance (SITC) has made seizures from: 1) individuals receiving prohibited products from internet purchases; 2) craft item recalls; or 3) ethnic markets carrying “herbal” remedies including tree bark or twigs with bark.
- Importers that have received Emergency Action Notifications for cargo treated for pests or bark at ports of entry, available at: AQAS database. Bob English can send all PPQ personnel monthly reports via email.

- Importers of wood products.
- Warehouses with foreign solid wood packing material.

III. Wood waste treatment sites

- Pallet recyclers.
- Where large amounts of urban tree and branch debris are collected, stored, and eventually disposed of (e.g., green wood waste recyclers, landfills, firewood dealers and repositories, sawmills, and incinerators) (New York handlers are specifically listed because they handle waste in a particular manner that causes concern for the spread of ALB).

IV. Environment where pests may become established

- Urban forests, urban parks, and arboretums.
- Native production and non-production forested areas outside the immediate port environs and within a given mile radius that is determined at the outset of the survey by availability of personnel and resources.
- Areas that receive recreational users, campers, hunters, racecar fans and/or that may receive, store, or distribute firewood, logs, or wood chips from areas that are currently quarantined for EWB/BB (e.g., Emerald Ash Borer and Asian Longhorned Beetle).
- Cemeteries.

Types of Traps

Several different traps are available for trapping EWB/BBs. Trap selection should be based on the biology of the target pest and the resources available for survey. The four trap types recommended for CAPS EWB/BB targets are:

- Black light traps,
- Cross-vane panel traps,
- Multi-funnel (Lindgren) traps, and
- Purple prism traps.

Refer to **Table 2. EWB/BB Trap and Lure Combinations** for information on which traps to use with which target species.

Black light traps

Black lights are generic trapping devices that capture insects that are attracted to lights. Currently, black lights traps are an approved method for one EWB/BB target, *Trichoferus campestris*. Additional guidance on how to use black light traps will be developed in 2013.

IPHIS Survey Supply Ordering System Product Names:

Black Light Trap and one of the following bulb kits:

1) Black Light Trap, 22 Watt, AC
2) Black Light Trap, 22 Watt, DC
3) Black Light Trap, 12 Watt, AC
4) Black Light Trap, 12 Watt, DC

Cross-vane panel traps

The cross-vane panel trap is a generic trap that is used in conjunction with lure dispensers to attract bark beetles, ambrosia beetles, longhorn beetles, and wood borers (Czokajlo et al., 2001). The trap simulates a tree of large diameter and provides a large surface area to maximize trapping (Czokajlo et al., 2001). The trap is made from light-weight, corrugated plastic and is water- and weather-resistant. The trap consists of two intersecting panels and a top and bottom made of corrugated plastic board. Cross-vane panel traps should be used with the wet method collection cup. Collection cups should contain about 150 mL of low-toxicity anti-freeze (propylene glycol) such as RV & Marine Antifreeze. Avoid anti-freeze brands that contain ethanol.

Some research has suggested that cross-vane panel traps may be better at catching larger wood borers than multi-funnel traps (McIntosh et al., 2001; Morewood et al., 2002; Dodds et al., 2010). Some large wood borers are able to escape from the funnel trap's collection cup due to the beetles' large size, long legs, and relative agility (Morewood et al., 2002). In recent experiments, cross-vane panel traps performed better or equally well in capturing various cerambycid species compared to multi-funnel traps (Dodds et al., 2010). Dodds et al. (2010) reported no significant difference in mean catch or mean species richness of scolytines between multi-funnel and cross-vane panel traps.

In addition, cross-vane panel traps are less expensive than multi-funnel traps and can be folded flat and stored and transported more easily than multi-funnel traps. For the CAPS program, the cross-vane panel trap is the recommended trap for the two cerambycid species *Tetropium castaneum* and *T. fuscum* (Sweeney et al., 2006). Refer to **Appendix D: Assembly Instructions for Cross-vane Panel Traps** for guidance on trap assembly.

Figure 1. Examples of cross-vane panel traps.

Figure 2. Examples of collection cups of cross-vane panel traps.

Multi-funnel (Lindgren) traps

Multi-funnel traps (also known as Lindgren traps) are made of black plastic funnels, aligned vertically over each other. Multi-funnel traps were originally designed to collect large numbers of scolytines (Lindgren, 1983); however, the traps have also been used to capture cerambycids and other wood borers (Dodds and Ross, 2002). Beetles are attracted both visually to the trap (its dark, vertical silhouette resembles that of a tree) (Lindgren, 1983) and by olfactory cues from the lures. Once attracted, beetles fall through the funnels into a collection cup. Multi-funnel traps come in a variety of lengths and are referred to by their number of funnels (4, 8, 12, or 16). The attractants, in the form of lures, are suspended from the trap.

Figure 3. Multi-funnel trap (John Crowe, PPQ)

Figure 4. Multi-funnel trap (Fengyou Jia, Division of Forest Pest Management, DCNR, PA, Bugwood.org)

Traps use either a wet or dry collection method. The dry method uses an empty collection cup, with a drain hole in bottom, with an insecticide strip. The wet method uses a collection cup with low-toxicity anti-freeze (propylene glycol).

IMPORTANT UPDATE:

In 2012 and beyond, the wet collection cup method is the only method approved for use with multi-funnel traps. Wet option traps have been shown to be more effective than traps using the dry option (Miller and Duerr, 2008). Bark beetle and wood borer trap captures can be reduced by 40 to 97% with the dry trapping option (Miller and Duerr, 2008). The water in the wet method traps collects the insects while the low-toxicity antifreeze acts as a preservative for the captured insects. The liquid in the cup reduces

the chances of the target insects escaping and of non-target predators and large beetles consuming or damaging the target insects.

Miller and Duerr (2008) found larger cerambycids and predatory beetles still alive in the dry cups, even with the use of dichlorvos kill strips, suggesting that the larger beetles have a higher tolerance to the insecticide than smaller beetles. In addition, the dilute anti-freeze in the wet option traps preserves the target specimens which aids in the identification process. Specimens from dry method traps are often too damaged or decomposed by the time they reach the identifiers to be successfully identified.

Collection cups should contain about 150 mL of low-toxicity anti-freeze (propylene glycol) such as RV & Marine Antifreeze. Avoid anti-freeze brands that contain ethanol.

Refer to **Appendix B: How to Submit Bark Beetle Specimens for Identification** for instructions on processing samples from wet method traps.

Purple prism traps

The purple prism trap is a generic trap that is used with or without lure dispensers (depending on the target species) to attract *Agrilus* species (Coleoptera: Buprestidae). The trap has been shown to attract some *Agrilus* species, including *Agrilus planipennis*, the emerald ash borer (Francese et al., 2008). Some *Agrilus* species use visual cues to locate hosts and potential mates (Francese et al., 2008). The purple prism trap consists of three 14" x 24" panels with several holes for trap and lure attachment (Fig. 3). The trap is constructed from a sheet of pre-glued purple corrugated plastic. An instructional video detailing trap assembly and use can be found at:
http://www.aphis.usda.gov/plant_health/plant_pest_info/emerald_ash_b/index.shtml

After the trap is assembled into its prism shape, spreaders are attached to the trap at holes labeled (3) in Fig. 5. Lures are attached to a loop on the spreader using a cable tie (Fig. 6).

Detailed instructions and photos on how to assemble the trap (and hang it for EAB surveys) can be found in the **USDA-APHIS-PPQ-EAB Trapping Protocols 2012 Emerald Ash Borer Survey**.

Figure 5. Purple prism trap diagram

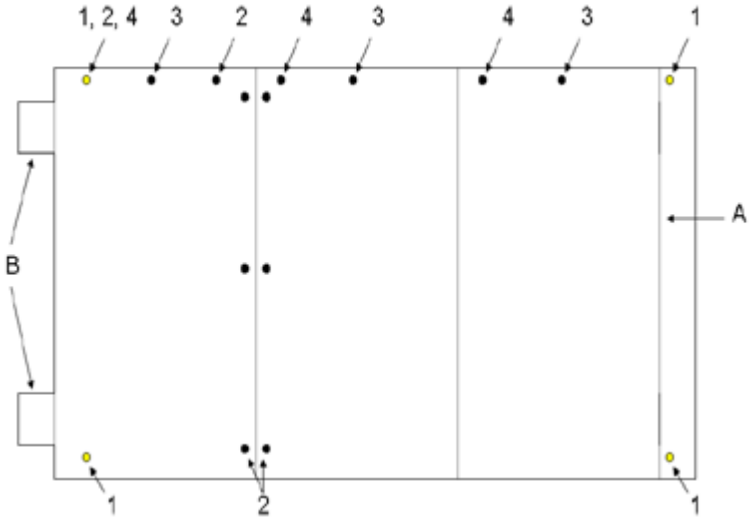
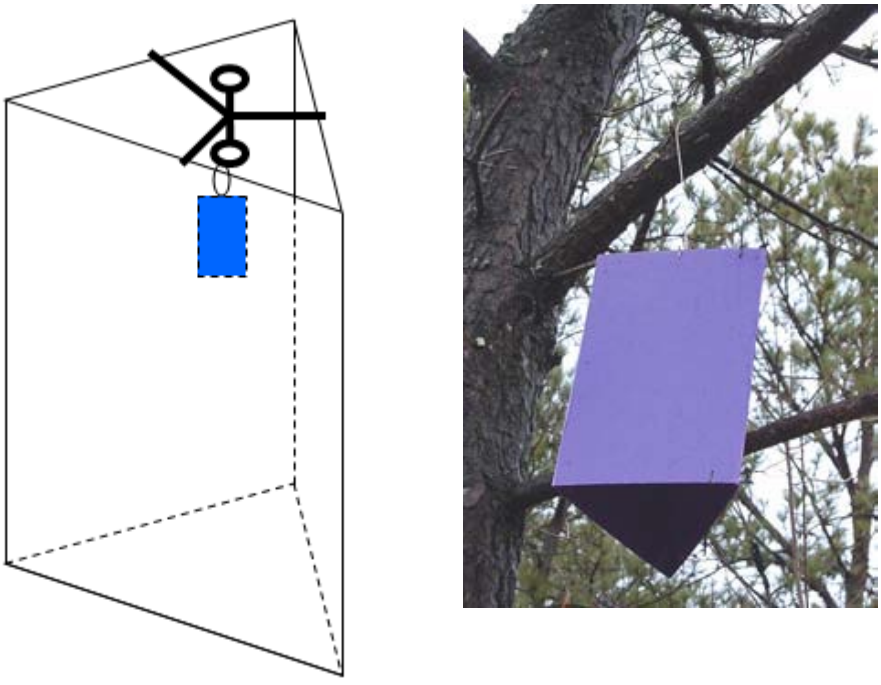


Figure 6. Lure hung from loop on spreader using a cable tie.



Trap Density

At each survey site, set one trap per each lure combination/ target species that you are surveying for. Note, some lures or lure combinations may be used for more than one species. Use **Table 2. EWB/BB Trap and Lure Combinations** to determine the appropriate trap and lure combination for each species. Traps with different lure combinations should be separated by at least 30 meters (98 feet).

Trapping Season

The trapping period will be the period of expected flight activity of adult beetles. Traps should be placed in the field as soon as adult flight activity begins and remain throughout the active period. Actual trapping seasons may vary by location and target species. Refer to individual pest datasheets in this document to determine the trapping season for each target. Flight period descriptions in the datasheets are usually based on the flight season in the pest's native range. The country/ region is listed in the datasheet. States should compare the hardiness zones of these regions to the hardiness zones of their state to determine the relevant flight period in their state. Degree Days may also be used, where listed.

Ordering Traps and Lures

All traps and lures for the EWB/BB National Survey should be ordered through the **IPHIS Survey Supply Ordering System** during the open ordering season (usually September through October, prior to the next year's survey season). By using the ordering system, PPQ can utilize quality assurance procedures that are not available when ordering directly from manufacturers.

All necessary traps and lures needed for the EWB/BB National Survey are specifically listed in the ordering system. See **Table 2. EWB/BB Trap and Lure Combinations** or the individual pest datasheets for the trap and lure product names. Note: every effort is made not to change the CAPS-approved survey methods during a survey season. However, if changes are necessary (i.e., a trap or lure is not available), a notification will be sent out through the Survey Planning forum from the CAPS Resource and Collaboration Site and a note will be placed on that target's information page on the CAPS Approved Methods page. Please visit the CAPS Approved Methods page for the most current information.

Clarification on two lures:

Ethanol Lure

Note there is currently only one ethanol lure available through the PPQ Ordering Database. The lure is commonly referred to as an ultra-high release (UHR) lure. The product name is "Ethanol Lure." In recent versions of the Exotic Wood Borer/ Bark Beetle (EWB/BB) National Survey Guidelines, the ethanol lure is referred to as "Ethanol Lure." In the 2011 and earlier versions, it was referred to as "ultra-high release ethanol." Please note that the lure has not changed. The ultra-high release rate lure is still the recommendation and is what is being offered through the database. Since there is only one release rate being offered through the database, a distinction of "UHR" is not needed. For all EWB/BB targets, please order the "Ethanol Lure" product.

Alpha-pinene Lures

There are two alpha pinene products available in the IPHIS Survey Supply Ordering System: 1) Alpha Pinene Lure and 2) Alpha Pinene UHR Lure. The Alpha Pinene Lure is an un-gelled lure in a bottle dispenser that is used by the PPQ Program for *Tomicus piniperda* (pine shoot beetle). This lure should only be used for the program survey.

The Alpha Pinene UHR Lure is a polysleeve, ultra-high release dispenser used for other EWB/BB targets. This lure should be used with the Ethanol Lure for the following two EWB/BB targets: *Monochamus alternatus* and *Tomicus destruens*.

Negative data was accepted using the Alpha Pinene UHR Lure for *Tomicus piniperda* in 2012; however, for 2013, only the Alpha Pinene Lure (the un-gelled lure in a bottle dispenser) should be used for *Tomicus piniperda* surveys.

Supplies are shipped via overnight courier, ground transportation, or palletized freight. To avoid problems when receiving supplies, surveyors should specify any particular delivery requirements in the comment box of the order form. For example enter, "Call before shipping in order to arrange for storage, personnel, or equipment to unload the shipment" or "Cannot accept pallets," etc.

Inspect lures upon receiving them from PPQ. Notify the appropriate Regional Program Manager of any lures that are damaged and request replacement lures (see contact information below).

Contact information for trap and lures

For questions about the IPHIS Survey Supply Ordering System or trap and lure quality issues:

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For technical trap, lure, and survey methodology questions:

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Trapping Supplies

Bulk Supplies

The following checklist contains examples of bulk items that can be ordered ahead of time.

✓	**Bulk Supplies**
	Traps, trap hangers, lures
	70-75% ethanol
	Preservative: 50:50 water to propylene glycol (RV and Marine antifreeze or other lower-toxicity propylene glycol-based antifreeze) with a few of drops of liquid detergent added to break up surface tension.
	Disposable latex gloves
	“Locking zipper” type plastic bags
	Labels and data sheets
	Mailing tubes or boxes

Trap Supply Checklist: Supplies for Placing Traps

Items that should be brought to the field for the initial placement of traps.

✓	**Supplies for Placing Traps**
	Traps (8- or 12- multi-funnel trap with "wet" style collecting cup, cross-vane panel trap, or purple prism trap)
	Lures (per target species)
	Sealable plastic container with tight-fitting lids to store and transport lures (one container per lure type).
	Lure holders (nylon cable ties or lure holders provided)
	Disposable latex gloves
	Hammer (for pounding in rebar)
	2 to 3’ length of rebar (for pilot hole for trap hanger)
	Small twine, rope, or twist ties to secure trap to hanger
	50:50 water to low-toxicity antifreeze mix (for using “wet” style collection cups)
	Trap tags
	Trap cards or data sheets
	Water or other hand cleaner for washing up
	Paper towels

Trap Supply Checklist: Supplies for Checking Traps

Items that should be brought to the field when checking traps.

✓	**Supplies for Checking Traps**
For all trap types:	
	Disposable latex gloves for changing lures, insecticidal strips, and anti-freeze
	Small empty can (e.g. tuna fish can) to place collecting cup on to avoid tipping over
	Quart and gallon size “locking zipper” type plastic freezer bags
	Plastic squeeze bottle with 70 to 75% alcohol
	Small paint brush for manipulating small specimens
	Forceps
	Wire cutters
	Lubricant (bar soap or wax for collecting cup rims)
	Adhesive labels for specimen cups
	Permanent marker
	Pencil
	Water or other hand cleaner for washing up
	Paper towels
For multi-funnel and cross-vane panel traps:	
	Several wide mouth containers to pour collection cup contents into (one for each trap)
	Small funnel
	Additional 50:50 water to low-toxicity antifreeze mix for re-filling collection cups
	Disposable paint filters
	Quart and gallon size “locking zipper” type plastic freezer bags containing a paper towel wetted with 70% alcohol.

Trap Placement

- Choose a survey site with the target's host species present.
- Traps may be placed near injured or fallen potential hosts. Host volatiles released from damaged host trees may increase attraction to traps (Dodds et al., 2010).
- Place traps upwind (based upon prevailing winds) of potential sources of target species.
- Place traps in line-of-sight from potential sources of target species (e.g., piles of SWPM, possible host trees, etc.).
- Place traps out of direct sunlight or in partial shade (e.g., at the margin of a stand of host trees).
- Make sure traps are not obscured by vegetation. Clip or remove any such vegetation.
- Separate traps with different lure types by at least 30 meters (98 feet).

Trap Setup

In general, traps may be set up in several ways:

- Traps may be set up on stands,
- Traps may be suspended from rope between trees, or
- Traps may be suspended from tree branches.

Traps should be placed on or near a host tree (or suspected host, i.e., a species in the same genus as many of the target's hosts).

In general, traps should be set up so that the collecting container is from 0.5 to 1.0 meters ($1^{2}/_{3}$ to $3^{1}/_{3}$ feet) above the ground (slightly higher is acceptable as well). It is important for the base of the trap to be above any ground vegetation.

IMPORTANT: Emerald ash borer trapping requirements differ from these general instructions. For these species, it is imperative to hang traps on host trees. Trap height also differs for these species. Consult each pest datasheet for specific trap setup instructions per target species.

- Attach lures using nylon cable ties or the hangers provided.

- For multi-funnel traps, hang lures on the outside of the funnels, near the top portion of the traps. If windy conditions are expected to occur, attach the lure at both the top and bottom portions of the lure to the trap. Try to hang the lures on the side of the trap that receives the most shade.

- Use disposable latex gloves and change them between lure types to prevent cross-contamination. In addition, the compounds in the lures may be absorbed into the skin if gloves are not used.

- For multi-funnel traps, ensure that the rubber stopper is secure inside the bottom of the collecting cup with the large end of the stopper on the inside of the cup to prevent it from falling out.

- For multi-funnel traps, fill the collecting cup with about 150 ml of the 50% water/ 50% non-toxic antifreeze (propylene glycol) solution BEFORE attaching it to the trap. If the bottom funnel is used to pour in the liquid, the funnel may become sticky and ineffective at capturing beetles. Make sure to replace the solution every time the trap is serviced.

- Be sure that all the flanges on the bottom funnel and collecting cup engage properly.

- Record the trap site data on the trap card or into a PDA.

Lure Handling, Changing, and Storage

- Order a few additional lures more than the expected need (a small percentage of lures may leak in transit from the manufacturer).

- Inspect lures upon receiving from the manufacturers; notify the appropriate Regional Program Manager of any lures that are damaged or leaking and request replacement lures.

    - Clear liquid in the over-pack bag is normal for ethanol, alpha-pinene, beta-pinene, and spruce blend lures. The dispensers are designed to release these chemicals and will begin doing so after they are manufactured.

- Store lures as directed by the manufacturer until used (usually by freezing in standard freezer, -15°C).

- In ethanol lures, water vapor pressure that is unable to pass through the lure's plastic membrane can build up inside the lure and cause the lure to leak or explode. To reduce the vapor pressure, when placing lures into a trap, make a

very small pinhole in the black plastic of the ethanol lures, below the top seal but above the liquid in the bag.

- Replace lures as directed by this survey manual, keeping the following information in mind:

  - Length of effectiveness is usually reported by lure manufacturers assuming temperatures of 30°C (86°F) during the day and 20°C (68°F) at night for a daily average of 25°C (77°F) under laboratory conditions. However, release rates of many EWB/BB lures are dependent on several factors including temperature, humidity, and other environmental conditions. In this manual, CAPS has listed a conservative length of effectiveness that should be effective for even the warmest climates. Despite these conservative estimates, it may hold true that microclimate factors such as sun flecks and reflections may adversely impact lure field life. As a result, lures should be visually inspected to ensure there are adequate components available to be released inside the dispensers.

  - Many lure dispensers do not release the chemicals at a constant rate; initial rates are high and then drop off significantly over the life of the dispenser. This is normal. The lure is still attractive at the lower emission rate for the length of time as described by CAPS. Surveyors should be aware of this and not be alarmed by a sharp decline in the amount of lure visible in the dispenser. However, if lures are completely depleted before the length of effectiveness (as defined by CAPS), replace the lure with a fresh lure and record the following information regarding the prematurely expelled lure:

    - Lot number,

    - Number of days the lures have been in the field, and

    - Environmental conditions such as average temperature, sun exposure, etc.

Then contact your regional program manager through the proper channels.

  - Sunlight reduces lure lifespan and may make traps less attractive to target species.

  - The amount of attractant remaining in the lures should be monitored every two weeks, when the traps are checked.

- Record the change date for each lure on the trap card. This will provide information on the longevity of the attractants.

- Transport and store lures separately in a large, sealable plastic container to prevent breakage and contain leaks.

For any questions or concerns regarding quality or effectiveness of traps and lures, contact Brian Kopper.

Brian Kopper
Field Operations Manager – Pest Detection
USDA-APHIS-PPQ
920 Main Campus Dr.
Raleigh, NC 27606
919-855-7318
Brian.J.Kopper@aphis.usda.gov

Checking Traps

- Check traps every two weeks or after bad weather events (rain, strong winds, or snow) which can disturb the sample.
- Examine trap for damage.
- Remove any debris blocking funnels, including leaves, twigs, spider webs, etc.
- Ensure that all lures are still in place and still have fluid in them.
    - Vapor pressure may make empty ethanol and UHR alpha-pinene pouches appear full. These lures are particularly prone to leaking.
    - The fluid levels in the transparent bubble caps are visible.
- For cross-vane and multi-funnel traps:
    - Wear disposable latex gloves.
    - Place a paint filter over a wide mouth container (e.g., a quart-size yogurt or cottage cheese container or other similar container).
    - Pour the contents of the collection cup (anti-freeze and specimens) through the paint filter situated over the cup.

- Squirt the collection cup with the 70 to 75% alcohol to remove all small insects and debris. Pour the remaining insects into the paint filter.
- Fold the paint filter carefully and place in a zippered plastic bag containing a paper towel wetted with 70% alcohol.
- A single sample, in this context, includes all contents of the collecting container. If a sample is large, sub-divide it to several clearly labeled bags rather than overfilling.
- Use a pencil to write the label and stick it to the sample bag. It is good practice to double-label: a label inside the bag and an adhesive label on the outside.
- Place samples in the cooler. Make sure samples sit on top of the ice and are not crushed.
- Refill the collection cup with the anti-freeze solution as described previously.
- Transport the specimens in the container back to the lab.

Survey Trap Card

This is an example of a survey trap card. One card should be used for each trap, and data should be recorded on the card each time the trap is checked. This card may be adapted for use based on the needs of the state, or the state may use its own trap card design. An example card with example data is on the next page. Blank, reproducible cards may be found in **Appendix A: Forms and Other Tools.**

Sample identification numbers are essential to match up any positively identified samples with the trap location. The sample identification number used on the trap card should be used on all correspondence regarding that sample (e.g., PPQ391 forms, identifier's database, etc.)

EWB/BB Survey Card			
Site Number:	**Trap Number:**	**Site Name:**	**Target Location:**

Contact Name:			**Title:**	**Map of Property**  Sketch main features; indicate habitat type, hosts in vicinity. Use "X"s to denote trap locations on map.
Address:			**County:**	
City:	**State:**	**Zip:**	**Phone Number:**	
Latitude:	**Longitude:**		**Host:**	
Trap Type: Enter one of the following: Black light trap, Cross-vane panel trap, Multi-funnel 8 unit wet, Multi-funnel 12 unit wet, Purple prism trap	**Lures:** Enter one of the following: Alpha Pinene Lure; 1) Alpha Pinene UHR Lure and 2) Ethanol Lure; *Ips* sp. Lure, 3 Dispenser; Lineation Lure; Manuka Oil Lure; Manuka Oil Lure and Z-3-hexanol Lure; *Pityogenes chalcographus* Lure; *Platypus quercivorus* Lure; 1) Spruce Blend Lure, 2) Geranyl Acetol Lure, and 3) Ethanol Lure		**Host DBH:**	
Site Type: Example:	**Dominant Hosts:**			
Trap Location Description (Details about finding trap): Provide height from ground, orientation, other information deemed relevant.				

Trap Service Record

Date	Collector	Trap Condition	Trap Action	Sample ID Number	Comments
6/1/10	John Smith	Good	Samples collected	001	
6/15/10	John Smith	Good	Samples collected	002	
6/30/10	John Smith	Poor	Lures changed; samples collected	003	Trap was completely full of rainwater.

Sample Processing

Preparing Specimens for Sorting

Back at the lab, prepare the specimens.

- Wear disposable latex gloves.
- Pour the contents of the container into a sorting pan.
- After samples have been processed, collect the remaining anti-freeze. If the anti-freeze is not too diluted or dirty, it may be stored and re-used in future surveys. If the anti-freeze is too diluted, collect it in the original containers and dispose of according to the package instructions.

Sorting Specimens

Using soft forceps and fine paint brushes, sort the samples to remove all debris and non-beetle insects. Sort the target Coleoptera families: Burprestidae, Cerambycidae, and Curclionidae (Subfamily Scolytinae). If you have not been trained to screen samples, stop here and prepare the specimens for identification by using **Appendix B: How to Submit Bark Beetle Specimens for Identification**.

Screening Specimens

Screeners should have had some training in recognition of common native bark beetles and wood-boring insects. Familiarity with the CAPS target species is also helpful. Work with your state or university taxonomists for individual training; take advantage of bark beetle/wood borer screening workshops which are offered periodically; and consult the screening aids that are available for some groups at:

http://caps.ceris.purdue.edu/screening_aids

For states without screening ability, there are PPQ domestic identifiers and several other options. If your state would like to take advantage of the arrangements listed below to receive unscreened samples, please contact your PPQ Regional Program Manager for more information prior to the trapping season.

The domestic identifiers who can identify bark beetle and wood borer samples are:

Bobby Brown
PPQ Domestic Entomology Identifier
Purdue University, West Lafayette, Indiana
Area of coverage: primarily PPQ Eastern Region

Kira Metz
PPQ Domestic Entomology Identifier
Texas A&M University, College Station, Texas
Area of Coverage: primarily PPQ Western Region

PPQ has a cooperative agreement with one institution to receive unscreened trap samples for bark beetle/wood borer surveys from any state on a fee per sample basis:

John Rawlins
The Carnegie Museum of Natural History
Pittsburgh, PA
Area of Coverage: primarily PPQ Eastern Region

The Farm Bill has funded an arrangement with a university to handle samples from other states:

Richard Brown
Mississippi State University, Entomology Department
Mississippi State, Mississippi
Area of Coverage: primarily PPQ Eastern Region

And also with a State Department of Agriculture:

James LaBonte
Oregon Department of Agriculture
Olympia, Washington
Area of Coverage: primarily PPQ Western Region

Identification

Prescreened suspect samples of CAPS target species must be sent to the state or university insect taxonomist in your state for identification. If there is no such position, and/or if arrangements are not made with the entities listed in the previous section, as a fall-back procedure, the specimens can be sent to the PPQ Area Identifier that covers the geographic area listed in Appendix G of the PPQ Agriculture Clearance Manual. Check their areas of coverage and notify the identifier prior to sending any specimens.

If a state or university taxonomist, or PPQ area identifier, believes the submitted specimen is a species new to the United States or state, and/or a CAPS target species, it is necessary to send the preserved specimens to the USDA-ARS Systematic Entomology Laboratory (SEL) for final confirmation. If an Area Identifier or other taxonomist is uncertain as to the possibility that the specimen is new or a target species, consider sending the specimens first to one of the contacts listed above first, as an intermediate step before forwarding to SEL.

When sending to SEL, be sure to include the PPQ form 391 marked "Prompt" with the sample going forward. Notify and send an electronic copy of the 391 to the PPQ National Identification Services (NIS) Urgent Team at ppq.nis.urgents@aphis.usda.gov, an e-mail group, with the sample number and date forwarded. If you have any questions, contact your regional survey coordinator or the Domestic Diagnostic Coordinator, Joel Floyd, with PPQ National Identification Service in Riverdale, Maryland.

PPQ identifiers processing domestic samples can notify submitters of non-target and native species identifications without entering the samples in the AQAS database; however, any suspects being forwarded to SEL for final ID must be entered in AQAS prior to sending.

Send the specimen(s) to the following address:

Location Leader
Systematic Entomology Laboratory
Attn: Communication and Taxonomic
Services Unit
Building 005, Room 137, BARC-West
10300 Baltimore Avenue
Beltsville, MD 20705
Phone number for overnight carrier airway bill (301) 504-7041

The specimens will be routed by the SEL location leader to the appropriate specialist for final confirmation. Communications of identification results will be through the PPQ NIS domestic diagnostics coordinator in Riverdale, Maryland.

Communication of Results

Native or non-target species identifications will be communicated directly back to the state taxonomist, identifier, or originator of the sample. If the insect is confirmed by SEL as a CAPS target species or new pest to the United States, the Domestic Diagnostics Coordinator will contact the National Survey Coordinator of the identification. The notification will then go to PPQ headquarters and regional program managers, and the SPHD and SPRO. One of them will then forward the confirmation to the originator of the sample and other state CAPS personnel. Confirmations of CAPS targets or new species to the United States can then be entered in the NAPIS system.

Pests with Traps and/or Lures

Scientific Name	Common Name
Agrilus auroguttatus	Goldspotted oak borer
Agrilus planipennis	Emerald ash borer (EAB)
Ips sexdentatus	Six-toothed bark beetle
Ips typographus	European spruce bark beetle
Monochamus alternatus	Japanese pine sawyer
Orthotomicus erosus	Mediterranean pine engraver
Pityogenes chalcographus	Spruce engraver
Platypus quercivorus	Oak ambrosia beetle
Tetropium castaneum	Black spruce beetle
Tetropium fuscum	Brown spruce longhorned beetle (BSLB)
Tomicus destruens	No official common name, “a pine shoot beetle”
Tomicus piniperda	Pine shoot beetle (PSB)
Trichoferus campestris	Velvet longhorned beetle
Trypodendron domesticum	European hardwood ambrosia beetle
Xyleborus glabratus	Redbay ambrosia beetle

Pests with Visual Survey Methods

Scientific Name	Common Name
Agrilus biguttatus	Oak splendor beetle
Anoplophora chinensis	Rough shouldered longhorned beetle, Citrus longhorned beetle
Anoplophora glabripennis	Asian longhorned beetle (ALB)
Chlorophorus strobilicola	Slender-banded pine cone longhorn beetle
Chlorophorus annularis	Tiger bamboo longhorned beetle, Bamboo longhorned beetle
Dendroctonus micans	Great spruce bark beetle
Monochamus saltuarius	Sawyer beetle, Salhalm pine longhorn beetle
Monochamus sutor	Small white-marmorated long-horned beetle
Scolytus intricatus	European oak bark beetle
Tomicus minor	Lesser pine shoot beetle

Pests for Reference Only (no negative data reporting)

Scientific Name	Common Name
Xyleborus spp.	Ambrosia beetles
Xylotrechus spp.	Longhorned beetles
Xylotrechus altaicus	Altay longhorn beetle
Xylotrechus antilope	No official common name
Xylotrechus arvicola	No official common name
Xylotrechus namanganensis	No official common name
Xylotrechus rusticus	Gray tiger longicorn

Negative data should not be reported at the genus or species level for *Xyleborus* or *Xylotrechus*. Due to the differences in hosts and signs of damage between species of these two genera, visual inspection is not sufficient to report negative data at the genus level. Information on the genus *Xyleborus* and five high-impact *Xylotrechus* species is listed here for reference purposes only. Currently, these five *Xylotrechus* species do not have effective trap and lure combinations. Research on traps and lures for these species will be conducted as funding permits. In the meantime, negative data should not be reported on these species. Any *Xyleborus* or *Xylotrechus* specimens obtained in traps or by visual survey for other targets should be submitted for identification; native species may be present. **All positives must be identified to the species level**.

Negative data may be reported for *Xyleborus glabratus* from manuka oil lures in multi-funnel traps.

General datasheets on *Xyleborus* and *Xylotrechus* at the genus level are provided. Within the *Xylotrechus* datasheet, the five *Xylotrechus* species have abbreviated sections; only images and hosts are provided.

Internet Keys, Photographic Materials, and other Identification Resources for Trees

Providing an identification key for host trees is beyond the scope of this job aid. Field guides are available, and the internet has many useful sites that provide keys, information and photographs for identifying trees. Listed is a sampling of sites:

Fruit Keys
Ohio Historical Society/Public Library: http://www.oplin.org/tree/

Leaf Keys
Virginia Tech: http://www.fw.vt.edu/dendro/dendrology/idit.htm
Ohio Historical Society/Public Library: http://www.oplin.org/tree/

Name Keys
Ohio Historical Society/Public Library: http://www.oplin.org/tree/name/byname.html

Twig Keys
Virginia Tech: http://www.fw.vt.edu/dendro/dendrology/idit.htm

Online Interactive Keys
Virginia Tech: http://www.fw.vt.edu/dendro/dendrology/idit.htm
Ohio Historical Society/Public Library: http://www.oplin.org/tree/
Oregon State: http://oregonstate.edu/trees/
Iowa State Extension: http://www.extension.iastate.edu/forestry/iowa_trees/tree_id.html

Photos
National Wildlife Federation Online Field Guide: search can be limited by location:
http://www.enature.com/fieldguides/intermediate.asp?curGroupID=10
US Geological Survey Southern Wetlands:
http://www.npwrc.usgs.gov/resource/1999/soutflor/species.htm#group5

Outreach

Public Information for Distribution

All relevant publications are available over the APHIS Legislative and Public Affairs (LPA) website: http://www.aphis.usda.gov/about_aphis/programs_offices/lpa/index.shtml and may be requested from PPQ Public Affairs in Riverdale or from the Regions.

Appendix A: Forms and Other Tools

A-1: Survey Trap Card
A-2: Determination of Risk Assignment for Businesses
A-3: Hot Zone Trapping Program
A-4: Firewood Dealers, Sawmills, Logging, & Pallets

A-1: Survey Trap Card

<table>
<tr><th colspan="7">EWB/BB Survey Card</th></tr>
<tr><td colspan="2">Site Number:</td><td colspan="2">Trap Number:</td><td colspan="2">Site Name:</td><td>Target Location:</td></tr>
<tr><td colspan="3">Contact Name:</td><td colspan="2">Title:</td><td colspan="2" rowspan="8">Map of Property
  </td></tr>
<tr><td colspan="3">Address:</td><td colspan="2">County:</td></tr>
<tr><td>City:</td><td>State:</td><td>Zip:</td><td colspan="2">Phone Number:</td></tr>
<tr><td>Latitude:</td><td colspan="2">Longitude:</td><td colspan="2">Host:</td></tr>
<tr><td>Trap Type:</td><td colspan="2">Lures:</td><td colspan="2">Host DBH:</td></tr>
<tr><td>Site Type:</td><td colspan="4">Dominant Hosts:</td></tr>
<tr><td colspan="5">Trap Location Description (Details about finding trap):</td></tr>
<tr><td colspan="7"></td></tr>
<tr><th colspan="7">Trap Service Record</th></tr>
<tr><th>Date</th><th>Collector</th><th>Trap Condition</th><th>Trap Action</th><th>Sample Number</th><th colspan="2">Comments</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2"></td></tr>
</table>

Date	Collector	Trap Condition	Trap Action	Sample Number	Comments

A-2: Determination of Risk Assignment for Businesses

This is an example of how to identify high risk survey sites in your state. The state may use other methods as well, this is only an example.

Imported Commodities

1. Does this business have any EANs?
2. Is this business a direct importer?
3. Is the country of origin European or Asian?
4. Does this business receive SWPM?
5. Is SWPM stored on site for 2 weeks or longer?
6. Are shipments received monthly or more?
7. Is there host material for establishment within ½ mile?

If the answer is yes to 5 or more of these questions, the risk is HIGH.

If the answer is yes for 3-4 questions, the risk is MODERATE.

If the answer is yes to 2 or less, the risk is LOW.

Sawmills and Firewood

1. Does this business deal in unprocessed (untreated) wood?
2. Does the wood come from other countries or a U.S. state with quarantine areas?
3. Is wood stored on site for 2 weeks or more?
4. Is there host material for establishment within ½ mile?
5. Is wood received from offsite locations once a month or more?

If the answer is yes to 4 or more questions, the risk is HIGH.

If the answer is yes to 3 questions, the risk is MODERATE.

If the answer is yes to 2 or less, the risk is LOW.

A-3: Hot Zone Trapping Program

Inspector Name_____ Date_____

Business Information

Business Name		**Business Type**		
Street Address		**City**	**State**	**Zip Code**
Contact Name		**County**	**Nearest Cross Street**	
Contact Title	**Phone Number**	**Latitude**	**Longitude**	

Commodity Information

Does the business directly receive or import overseas or foreign commodities?	**Yes**	**No**
If YES:		
What commodities does the business receive/import? From what countries?		
How frequently are commodities received?	**What ports do they use?**	
Does the business ship these commodities elsewhere (other businesses)? If yes, please list locations.		
Do they receive SWPM?	**How long have they been at this location?**	
Are the pallets and packing materials discarded or reused? Where and how?		
Have they ever seen any insects on their products or SWPM?		
If NO:		
From where does the business receive its commodities?		
Were they cooperative? If No, state date of contact and with whom you spoke.		

Site Information

The area around the business can be best described as: (Check only ONE)				
Industrial	**Urban**	**Suburban**	**Rural**	**Wooded**
Vegetation around business: Circle One				
Large Trees: **Deciduous Mixed Evergreen None**		**Small Trees:** **Deciduous Mixed Evergreen None**		
Dominant Species:		**General Surrounding Tree Health:** **Good Poor N/A**		
Additional Site Comments:				
Permission to Trap? **Yes No**	**List Nearby State Forests or Parks. If none, list any nearby public property.**			**Hot Zone Risk:** **High Moderate Low**

A-4: Firewood Dealers, Sawmills, Logging, & Pallets

Inspector Name:_____ Date:_____

Wood/ Product Information:

Business Name		**Business Type**	
Street Address		**City**	**County**
Contact Name		**State**	**Zip Code**
Contact Title	**Phone Number**	**Email**	
Latitude	**Longitude**	**Nearest Cross Street**	

Do they process or deal with unprocessed firewood or logs? If yes, please fill out the rest of the form.	
What types of wood does the business sell/process? Softwoods / Hardwoods. List specific genus.	
Where does the wood come from? Out of state, list states	
How frequently?	**Specific Time periods? All year, spring, etc.**
Does the wood stay on site? How long?	**Where does the wood go? Out of state, list states**
How frequently?	**Specific Time periods? All year, spring, etc.**
Additional Comments	

Site Environment:

The area around the business can be best described as: (Check only ONE)				
Industrial	**Urban**	**Suburban**	**Rural**	**Wooded**

Vegetation around business: Circle One	
Large Trees: **Deciduous Mixed Evergreen None**	**Small Trees:** **Deciduous Mixed Evergreen None**
Dominant Species:	**General Surrounding Tree Health:** **Good Poor N/A**
Additional Site Comments:	

Permission to trap? **Yes No**	**List Nearby State Forests or Parks. If none, list any nearby public property**	**Hot Zone Risk:** **High Moderate Low**

Appendix B: How to Submit Bark Beetle Specimens for Identification from Wet Traps

Guidelines for Submitting Wood Borer and Bark Beetle (WBBB) Specimens for identification

USDA-APHIS-PPQ
CAPS Program

The purpose of this document is to outline the proper procedures for preserving, packaging, and shipping WBBB specimens collected in Lindgren multi-funnel traps as part of the USDA-APHIS-PPQ CAPS (Cooperative Agricultural Pest Survey) Program. The quality of specimens and the associated data is paramount to survey effectiveness. As such, this document will focus on the techniques and practices that ensure that high quality specimens are submitted.

ATTENTION: Submit preserved samples only, do NOT send decayed specimens. Make sure the PPQ form 391 is clearly associated with each sample.

General Procedures:

1. Service the traps.
2. Take the samples to the lab and sort to order.
3. Prepare samples for shipment.

1. Service the traps

Multi-funnel trap samples are collected at the bottom of the trap in a container with a wet killing agent. For CAPS surveys, the collection container should be filled with a preservative, such as soapy water (a few drops of dish soap in water) or a 50% concentration of the non-toxic antifreeze (propylene glycol) and water. Make sure to replace the solution every time the trap is serviced.

Disposable paint filters. Photo by K. Metz, 2010

Traps should be serviced every 10-12 days or after a bad weather event such as rain, strong winds, or snow, which can disturb the sample. Leaving samples out for too long may damage them beyond recovery. Prior to going out in the field, pack the following items: water and preservative mix to refill the trap, replacement bait (if needed), a pencil, adhesive label paper, disposable paint filters, a cooler with ice, and zippered bags each containing a paper towel wetted with 70% alcohol. At the site, strain the sample through the paint filter and place it in the zippered bag. A single sample, in this context, includes all contents of the collecting container. Use a pencil to write the label and stick it to the sample bag. It is good practice to double-label: a label inside the bag and an adhesive

label on the outside. This minimizes error and ensures data preservation. If a sample is large, sub-divide it to several clearly labeled bags rather than overfilling. Place samples in the cooler. Make sure samples sit on top of the ice and are not crushed.

2. Take the samples to the lab and sort to order

Once the samples are in the lab, place them in the freezer for 24 hours or until you ready to process them. Rinse the samples off of the paint filter over a sorting tray. Then, using soft tweezers and a magnifying glass or a dissecting microscope, pick out all beetles (order Coleoptera) and wood wasps, such as *Sirex noctilio* (order Hymenoptera, family Siricidae). Next, place the beetle or wood wasp sample into a glass vial filled with 70-80% ethanol with a label and packaged with form 391 to be sent to an identifier. Make sure the label in the vial contains the collection number matching the associated entry in the 391 data form. Similar to the field practice, one vial is usually used per sample, but if the sample is too big, sub-divide the sample among several vials and label them.

3. Prepare samples for shipment

Each sample is packaged with form 391: "Specimens for Determination." Fully capturing the collection data is critical to a successful survey so the data form must be filled out thoroughly. There is no such thing as too much data. Section 22 is reserved for survey description, in this case WBBB. Section 24 should be left blank to be used by the identifier.

Vial packaging. Photo by K. Metz 2010

When packaging samples for shipment, there are several ways of ensuring that the form remains with the sample. A paper envelope or a zippered bag work well to contain the sample vial with the data form stapled to the bag. Alternatively, rubber bands can be used to secure the form – a method that works better if there are multiple vials per sample. When securing multiple vials in one shipment, make sure to wrap each one in a paper towel and tape so as to contain the sample in case of breakage.

The vials should then be packed in a cardboard box or mailing tube large enough to have space for packing material on all sides. Packing material prevents the vials from being shaken or broken. Styrofoam peanuts, plastic foam, bubble wrap, or crumpled newspapers are examples of suitable packing materials. The vials can also be sent in padded envelopes sealed with tape not staples.

Mailing tube. Photo by J. Brambila 2005

SURVEY MATERIALS AND SUPPLIES

Alcohol	Isopropyl alcohol, also known as "rubbing alcohol" or 70% ethyl alcohol (ethanol) to rinse and preserve specimens.
Alcohol bottles	Neoprene plastic bottles with spouts to dispense alcohol. Make sure the bottles are clearly labeled with the chemical that they contain.
Propylene glycol	Non-toxic antifreeze. Used as a preservative in Lindgren funnel trap collecting containers. Diluted to 50% concentration with water. An alternative is a few drops of dish soap in water.
Specimen bags	Large zippered bags. Used to hold freshly-collected specimens and specimen vials. Paper envelopes can also be used to contain vials during shipment.
Filters	Disposable cone paint filters are ideal for straining the preservative while catching the smallest of bark beetles.
Vials	Clean, glass screw-top vials, new or recycled. A variety of vial sizes should be available to accommodate samples of various sizes.
Pipettes	Plastic or glass droppers or pipettes to transfer alcohol.
Tweezers	Fine tweezers to move specimens. Soft tweezers should be used to prevent specimen damage.
Sorting trays	Used to rinse and sort specimens in the lab.
Brushes	Fine paint brushes can be used to transfer small specimens.
Rubber bands	Assorted sizes, to tie vials together.
Writing utensils	Both standard ink and Sharpie marker inks are somewhat water soluble and run in alcohol. Micron pens have alcohol-proof ink and can be used alongside pencils. These pens come in a variety of tip widths, with very fine tips being preferable for writing and drawing. A sharp pencil is a good alternative to ink.

Authorship & Acknowledgements:
This document was prepared by Julieta Brambila (2005) and modified by Kira Metz (2010). Charles Brodel, Amanda Hodges, Joseph Beckwith, Robert Brown, and James LaBonte reviewed this work.

Appendix C: Black Light Traps

Black lights are generic trapping devices that capture insects that are attracted to lights. Currently, black lights traps are an approved method for one EWB/BB target, *Trichoferus campestris*. Additional guidance on how to use black light traps will be developed in 2013.

Black Light Maintenance

If the black light trap stops operating for no apparent reason check the following:

- The power cord on the trap is connected and tight.
- The power source end of the power cord is connected properly to the battery.
- Both power connections at the bulb are secure.
- The trap fuse beneath the electrical box is intact.
- The bulb is not burnt out.
- For traps with reset buttons, press this button to restart the light.
- Replace the starter in the electrical box.
- Replace light with a functional black light trap.

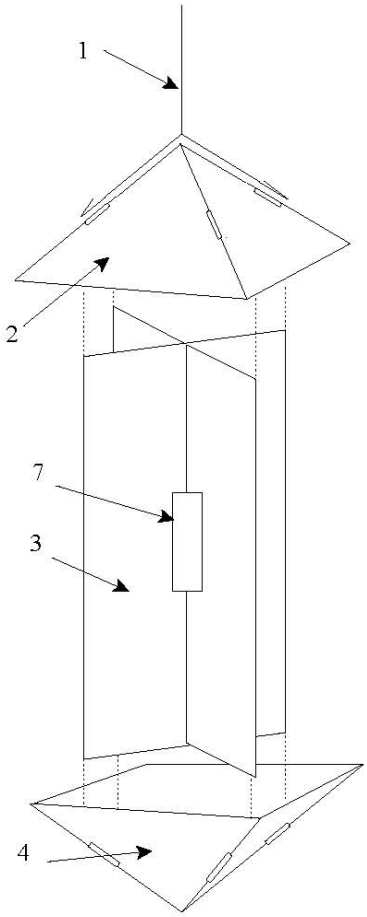
Appendix D: Assembly Instructions for Cross-vane Panel Traps

(Note: The following instructions were developed by the company Alphascents, which was awarded the panel trap contract for PPQ in 2011. Trap suppliers may vary from year to year and traps may differ slightly depending on the supplier.)

AlphaScents
INSECT MONITORING SYSTEMS

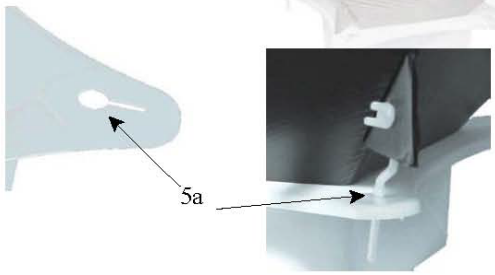
Panel Trap

1. Hanging wire
2. Hood
3. Main Body
4. Collecting funnel
5. Collecting cup
6. Plastic retainer
7. Lure hanging opening
8. Hanging tabs with holes



Assembly instructions:

1. Align the tabs of the main body with the slots in the hood and collecting funnels,
2. Push the tabs through the holes as much as possible,
3. Protrude at least two plastic retainers through the holes in tabs (8)(that emerge from the collecting funnel). Attach collecting cup by hooking ends of the retainers in the keyholes in the corner of the cup (5a),
4. Attach the hanging wire through two holes in the opposite tabs protruding through the hood of the trap,
5. Mount lure into the lure opening (7) by putting the lure holder through the hole located directly above the opening.



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Tel. 315-699-1991 · Fax. 314-271-7297 · sales@alphascents.com
www.alphascents.com

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