Kansas Emerald Ash Borer Readiness and Response Plan

revised February 12, 2010

Adapted from Minnesota's Emerald Ash Borer Response Plan with input from Kansas' stakeholders and partners

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BACKGROUND

The Emerald Ash Borer (EAB), *Agrilus planipennis* (Fairmaire) (Coleoptera: Buprestidae), is a pest of ash trees native to Asia and first discovered in North America in 2002 in the Detroit, Michigan area. It has killed millions of ash trees and thousands of ash trees have been removed. Since this initial discovery, the core area affected by EAB has expanded. It has been detected in Windsor, Ontario (2003), Ohio (2003), Indiana (2004), Illinois (2006), Maryland (2006), Pennsylvania (2007), West Virginia (2007), Toronto, Canada (2007), Virginia (2008), Wisconsin (2008), Missouri (2008), Minnesota (2009), Kentucky (2009) and New York (2009).

The United States Department of Agriculture restricted the importation and movement of ash nursery stock from Canada into the United States in August 2007 to prevent the spread of Emerald Ash Borer. States and some counties in states with emerald ash borer have quarantined areas also.

All ash trees native to Kansas are susceptible to infestation by EAB. Trees become infested when adult beetles lay eggs on the bark, which hatch into larvae that bore into the tree. The larvae tunnel in the phloem layer (between bark and wood) and disrupt the movement of water and nutrients, eventually killing the tree. EAB appears to prefer trees under stress, but is capable of killing perfectly healthy trees.

While it has been several years since EAB was discovered in North America, dendrochronologists suggest it has been here since 1982. The delay between introduction and discovery was probably due to the difficulty in detecting this insect, especially at low population densities. This difficulty in early detection has also confounded efforts to limit the distribution of EAB via eradication of satellite populations.

This response and readiness plan will be used as a guideline for the processes and decisions to be followed in responding to an EAB introduction. If eradication proves not to be a feasible option it will still be important to mitigate damages by preventing and slowing artificial spread through quarantine and preventing natural spread through sanitation.

PURPOSE OF THE EAB RESPONSE AND READINESS PLAN

1. To identify how ICS will be used to manage efficient communication and coordination among responding agencies and affected groups.

2. To provide guidance in outlining action steps to be taken by responding agencies.

3. To provide guidance in establishing criteria for choosing a course of action to an EAB infestation.

STATUS OF EAB RESPONSE PLAN

The EAB Readiness and Response Plan is a dynamic document and, as such, changes over time in response to new information about EAB biology and management. The most current Response Plan will be posted at:
www.ksda.gov/includes/document_center/plant_protection/Miscellaneous%20Plans%20Reports%20and%20Guidelines/KSEABResponsePlan.pdf
.

RESPONSE TEAM MEMBERS AND ROLES

The EAB Response Team will be made up of agencies/groups with legal responsibilities in the event of EAB detection (through statute or ownership of lands). Response Team members and roles relative to emerald ash borer are as follows.
(For list of contacts in agency/group see Appendix C)

1. **KDA** – Kansas Department of Agriculture is the lead state regulatory agency to prevent the introduction into and the establishment or spread within Kansas of plant pests. (K.S.A.2-2112)

2. **USDA-APHIS, PPQ** – United States Department of Agriculture-Animal and Plant Health Inspection Service, Plant Protection and Quarantine is the lead federal regulatory agency to prevent the introduction into and establishment or spread within the United States of plant pests.

3. **KFS** – Kansas Forest Service is the lead agency in wood utilization and reforestation of lands potentially affected by EAB. (KS 76-425d)

4. **KDOT** – Kansas Department of Transportation is responsible for all aspects of the design, construction and maintenance of right-of-way vegetation.

5. **KDWP** - Kansas Department of Wildlife and Parks is responsible for the state park lands potentially affected by EAB.

6. **U.S. Army Corps of Engineers** – United States Army Corps of Engineers is responsible for the federal park lands potentially affected by EAB.

7. **USDA-NRCS Forestry** – United States Department of Agriculture-Natural Resources and Conservation Service Forestry will provide leadership in a partnership effort to help private land owners and managers with their natural resources.

8. **KAA** – Kansas Association of Arborists will help with removal and restoration and provide list of certified arborists.

9. **KSU Extension** – Kansas State University Extension will provide the public with information and outreach.

10. **Kansas League of Municipalities (KLM)** – There are approximately 645 municipalities in Kansas, each owning lands potentially affected by EAB.

11. **Kansas Association of Counties** – There are 105 counties in Kansas, each owning lands potentially affected by EAB.

12. **Tribes** – Kansas Tribes: Iowa Tribe of Kansas, Kickapoo Tribe of Kansas, Prairie Band Potawatomie Nation and Sac and Fox Nation. There are approximately 244,000 acres of Native-American owned lands in Kansas that could potentially be affected by EAB.

13. **Utilities** – Kansas Electric Power Cooperatives, KCP&L and Westar would be involved in tree removal near utility lines.

14. **KNLA –** Kansas Nursery and Landscape Association would help with the nursery industry in preventing the introduction of plant pests from nursery stock.

15. **Science Advisory Panel** – Panel of knowledgeable people to provide objective analysis of the situation and give recommendations. This includes the Kansas Entomologist, KSU Extension Entomologist and USDA Forestry-Michigan State.

RESPONSE ORGANIZATION – INCIDENT COMMAND SYSTEM

Incident Command System (ICS) = *"…ICS is the combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resource during incidents…"* From the Kansas/National Incident Management System.

Responding agencies and groups will be organized in an ICS structure so as to facilitate coordination and communication during all phases of the response. At the top of the ICS organization is the Incident Commander (IC) – the Incident Commander is responsible for all actions in response to the incident. In the event of EAB detection in Kansas, a Unified Command will be established. A **Unified Command** combines individuals from different agencies and/or groups when multiple jurisdictions are involved. For an EAB response, if the detection is on non-tribal land the **Unified Command** will be comprised of a representative from **KDA** and from **PPQ**. If EAB detection is made on **tribal land** the **Unified Command** will be comprised of a representative from the **tribe** and from **PPQ**. **(Appendix F-**Kansas Incident Command Structure Flowchart**)**

In addition to the Incident Commanders, the EAB Unified Command Staff will also include the following:

• **Safety Officer(s)** – As a response may involve felling trees, **KDA or their designee** would be best suited to supply a safety officer as the primary official. The Safety Officer reports directly to the ICS and is responsible for monitoring response actions for potentially unsafe situations. The Safety Officer may halt response actions at any time if unsafe conditions are present. Safety Officers from other responding groups may also participate to monitor response actions taken by staff from that group.

• **Liaison Officer(s)** – The Liaison Officer's role is to coordinate with representatives from other agencies or groups. **KDA staff or their designee** will fill the Chief Liaison Officer role, but other responding agencies or groups will also need to designate a Liaison Officer to communicate with other groups relative to their actions.

• **Joint Information Center (JIC)** – The JIC is the clearinghouse for all media information related to the incident. Since an EAB find will likely cross multiple jurisdictions, a JIC will be established. The JIC will be made up of a **Public Information Officer (PIO) from each Unified Command** agency and, if desired, **any groups listed above with lands directly affected** by the find. The JIC will operate from the EAB Communications Plan **(Appendix A)**.

In any ICS there are four general branches under which most response actions occur:

• **Planning** – This branch is responsible for collecting, evaluating and disseminating data throughout the ICS as well as determining short- and long-term strategies related to the incident. Planning actions will be **led by the KDA** who will oversee collection, management and publication of delimiting data. **Affected landowning groups** will also fall into the planning branch regarding public meetings and planning restoration activities.

- **Science Advisory Panel** – **KDA Entomologist, USDA Forest Service Michigan-State and KSU Extension Entomologist** have the role of the Science Advisory Panel. The Science Advisory Panel is to provide an objective analysis of the situation and the scientific merit of various approaches. The Science Advisory Panel will review potential action plans developed by the Planning Branch and provide a third-party recommendation to the Incident Command who will either decide to proceed with the plan as written or return it to the Planning Branch to incorporate the Advisory Panel's recommendations. **(Appendix C**-List of contacts in agency/group**)**

• **Operations** – This branch is responsible for implementing the action steps for rapid response. Since there are multiple distinct action steps that will be taken if EAB is detected, this branch will be split into **five sections**:

- **Regulation** – **KDA and PPQ** are the only response team members with quarantine authority in this situation. The KDA will be responsible for intrastate quarantine while PPQ will be responsible for interstate quarantine.

- **Delimitation** – Delimitation is the survey to determine the extent of the infested area. **KDA will lead** the delimiting survey with the expectation that **affected groups** would also contribute man-hours to the delimiting survey.

- **Investigation** – In addition to delimiting the infested area, the source and age of the infestation as well as whether the infestation has been spread artificially to new areas needs to be determined. Due to experience in conducting interviews, trace backs and trace forwards, **PPQ** would be best suited to **lead** the investigation effort with the **KDA** lending **support** with man-hours and the expectation that **affected groups** would also contribute man-hours to the investigation. This work will have the added benefit of notifying property and business owners within the affected area of the find and its implications.

- **Mitigation** – Mitigation is the process of minimizing the affects of EAB within reasonable bounds of expense, collateral environmental damage and a reasonable expectation of achieving the actions objectives. EAB mitigation could consist of a number of alternatives including:

  - **Eradication** – removal of infested and healthy trees for a specified distance around the delimited boundaries of the infestation

  - **Sanitation** – removal of infested trees within the boundaries of the infestation

  - **No action** – no tree removal – EAB is limited to natural spread via quarantine

The course of action to follow regarding mitigation will be decided by the **Unified Command** with input from the **Response Team** and **Science Panel**. It is anticipated that **affected groups** would contribute man hours to mitigation efforts, if possible.

- **Utilization** – Utilization is the process of maximizing the usage of ash wood resulting from mitigation measures and/or the effects of EAB. Regardless of the course of action taken in responding to an EAB infestation, a significant amount of ash wood will need to be dealt with. Ideally, a more valuable usage can be found than simple disposal via chipping. **Kansas Forest Service** is best suited to investigate utilization possibilities and oversee utilization efforts in collaboration with the **affected groups**.

• **Logistics** – This branch is responsible for acquiring facilities, supplies and equipment for the incident. Most of the logistical needs for the response will be supplied by the **KDA or their designee**, including the Incident Command Center (KDA in Topeka), Internet resources, and some of the supplies and equipment. It is anticipated that **affected groups** may also be able to supply supplies and equipment for staff working on the incident. In particular, an affected group may supply an Operations Center somewhere within or near the affected area, while all other branch activities will be coordinated within or as near as possible to the affected area.

• **Finance** – This branch is responsible for tracking expenditures, work hours, grants and contracts. It is anticipated that **each agency or group** will track expenditures for staff working on the incident, including labor and expenses. It is also anticipated that the **KDA** will arrange the procurement of the bulk of needed supplies and equipment. As lead on restoration efforts, the **KFS** would facilitate restoration activities in collaboration with local jurisdictions.

SUBMISSION OF SUSPECT SPECIMENS

Objective: Immediate submission of specimen for confirmation or refutation of positive EAB report.

Until EAB is confirmed in Kansas, all suspect EAB specimens and wood/bark samples should be submitted to KDA for initial diagnosis and handling. If KDA supports the EAB diagnosis, a specimen will be recovered (if only wood/bark originally submitted) and sent to:

J. E. Zablotny
USDA, APHIS, PPQ
11200 Metro Airport Center Drive, Suite 140
Romulus, Michigan 48174
734-942-9005
734-942-7691 (fax)
James.E.Zablotny@usda.gov

This process will also need to be followed after EAB is confirmed in Kansas each time EAB is found in a new county.

Specimens will be accompanied by a **PPQ Form 391 (Appendix E**-sample PPQ Form 391**)**, samples identified as **"Urgent"** and a copy sent to the USDA State Plant Health Director (SPHD). The Identifier will be notified before the specimen is sent to ensure that they are expecting it and the address is correct.

After initial finding and identification is made in a county, specimens will be sent to the Entomology Department at KSU:

Entomology Department
Insect Diagnostician
123 W. Waters Hall
Kansas State University
Manhattan, Kansas 66506

NOTIFICATION AND INITIAL RESPONSE

Objective: Notify all relevant authorities in an organized manner. Provide information updates to all relevant parties in an organized manner.

The KDA Plant Protection and Weed Control program has a **Plant Pest Emergency Response Fund of $15,000** as a resource to be used for emergency actions, if needed.

If the KDA believes an **EAB specimen has been recovered** in Kansas, the specimen will be submitted immediately to USDA-APHIS, PPQ per the submission protocol, and the following steps will be taken:

- SPRO will notify PPQ SPHD of detection. **(Appendix G)**
- Communications Plan activated by Lead Public Information Officer (KDA) **(Appendix A)**
- SPRO will notify local officials (land manager and most relevant government authority) that a specimen has been submitted.

If **PPQ determines** the specimen is **not EAB**, these steps will be taken:

- SPHD notifies SPRO of negative finding.
- Communications Plan deactivated.
- SPRO will notify local officials by phone that the report was false.

If **PPQ determines** the specimen **is EAB**, these steps will be taken:

- SPHD notifies SPRO of confirmation.
- SPRO initiates emergency response at KDA (Topeka) within 24 hours.
- SPRO schedules **Operations** briefing meeting within the affected region within 48 hours for operations team and local officials.
- **Incident Command** consults with **Science Advisory Panel.**
- **Incident Command** briefing at KDA (Topeka) – within 24 hours of confirmation
    - SPRO or designee gives briefing of situation
    - Finalize Incident Command Structure (**Appendix F**)
    - Prepare specific short-term and general long-term action steps
    - Review Communications Plan in preparation for information release to media
- Confirmation communicated to **Strategic Planning Team** by **Liaison Officer** with materials developed at IC briefing
- Operations Meeting in affected region – within 48 hours of confirmation
    - Assess local resources available to aid implementation of action steps and prepare implementation plan for action steps
- **Planning Section Chief** schedules a town hall meeting in affected area within one week of confirmation
    - Distribute Incident FAQs from Communications Plan **(Appendix A)**
    - Distribute Action Steps from IC Briefing

After initial response, these activities will occur on a **daily basis**:

- IC meeting at KDA (Topeka) led by the **Incident Commander**
    - Review/develop daily incident action steps.
    - Safety briefing – **Lead Safety Officer** (KDA).
    - **Operations Section Chief** in attendance by phone if needed.
- Operations meeting within affected area led by **Operations Section Chief**
    - Review/develop daily operation action steps.
- Update information for media – **Lead Public Information Officer**
- Respond to inquiries – **Liaison Officers**
- Update EAB website with daily data – **Operations Section Chief** – at end of each day

After initial response, these activities will occur on a **weekly basis**:

- Weekly progress report condensed from daily briefings – **Incident Commander, Lead PIO,** and **General Staff (Chiefs for Planning, Operations, Logistics and Finance)**.

Science Panel consultation will occur on an as needed basis.

EMERGENCY QUARANTINE

Objective: Prevent the artificial movement of EAB beyond the currently affected area.

Regardless of what other action steps are decided upon, an intrastate quarantine will be established by the KDA to contain EAB to the affected region. Natural spread of EAB is approximately 5-8 miles/year and this will buy some time for not yet infested regions of Kansas to prepare before EAB also reaches them. However, if artificial movement of EAB is not prevented it could be distributed all over the state within a matter of just a few years. EAB could be spread in any ash wood that has not been treated to prevent EAB survival including ash logs, firewood and nursery stock. Treatments to eliminate EAB from these materials include debarking (including outer ½" of sapwood), chipping to <1" diameter in two dimensions and kiln drying, (maximum thickness 3 inches, fumigation with MB or heat treatment.

The area quarantined for EAB will be situational. Initially an emergency quarantine will be established and, after delimiting is conducted, a formal quarantine will be established. **(Appendix H-Potential Situations and Emergency Quarantine Action)**

Boundaries of quarantined areas as well as other information pertinent to the quarantine will be maintained at the KDA EAB website: www.ksda.gov/plant_protection/

Communicating quarantine information to affected industries as well as the general public will be critical. These steps should be taken to publicize quarantine restrictions:

- **Within the delimiting area**
  - Relevant businesses as well as property owners will be contacted personally as part of the investigation procedure. Materials describing the quarantine and action steps will be left for home or business owner's not available **(Appendix D).**

- **Within the quarantine area**
  - Relevant businesses will be contacted by mail with materials describing the quarantine as well as the action steps being implemented and FAQs.
  - Businesses at greatest risk for violating EAB quarantine restrictions will be contacted personally to inform them of the restrictions.
  - Ads will be placed in newspapers and on radio stations targeting the market within the quarantined area.

- **Outside the quarantine area**
  - Relevant businesses will be contacted by mail with materials describing the quarantine as well as the action steps and FAQs.
  - Media opportunities will be targeted to inform the public of the EAB situation.

The Quarantine Unit will be contained within the Operations Branch. **KDA will lead the Quarantine Unit** and be responsible for communicating quarantine restrictions to affected parties. However, **some of this responsibility will be covered by the Delimitation and Investigation Units**. Consequently, the main activity of the Quarantine Unit will be mailing information to affected businesses and property owners not contacted by the Delimitation or Investigation Units.

DELIMITATION

Objective: Establish boundaries of area infested by EAB.

After establishing the quarantine boundaries, the **Operations branch** will begin conducting a delimiting survey and investigation. Progress and specific actions related to delimitation and investigation will be determined at daily Operations Meetings in the affected area.

The area to be delimited will be subdivided into a grid and teams of surveyors will be assigned to individual cells. Depending on the situation, two possible survey scenarios are possible, point source or nonpoint source. **(Appendix I-**scenarios**)**

Surveyors will contact local homeowners and businesses as needed while accessing trees and will distribute informational packets. The informational packets will be left for property owners not available at the time of the visit.

Training for surveyors will be conducted on site by the **Operations Branch**. One to two hours of training may be needed depending on the level of surveyor expertise. Training will cover survey tactics, ash identification, identification of EAB and its damage relative to that of other ash insects, computer/equipment operation and data recording.

If a **State Contract for Tree Removal** is made, it will be by the **Finance Section Chief**. The **Delimiting Unit** will be contained within the **Operations Branch**. The **KDA will lead the Delimiting Unit**.

INVESTIGATION

Objective: Determine source of infestation and if artificial movement of infested materials has occurred.

Investigation into the source of the EAB infestation and any movement of infested materials to new areas will be conducted concurrently with the delimiting survey. Depending on the situation in which EAB is detected, the investigation may be focused or broad in scope.

If EAB is **detected at a point source (nursery, firewood, etc.)**, an order will be issued to immediately halt all movement of ash material. In each circumstance, trace backs will be conducted to determine the source of the infested material.

- If the **detection is before the adult emergence** period, all potentially infested material will need to be **destroyed prior to April 1**.

- If the **detection is during the adult emergence** period, all potentially infested material will need to be **destroyed within 48 hours of the detection**. Trace forwards will be conducted to determine where potentially infested material has been moved to and those destinations investigated.

- If the **detection is after the adult emergence** period, all ash material will need to be **destroyed prior to April 1 of the next year** in case some larvae remain in the material. **Trace forwards** will be conducted to determine where potentially infested material was moved to and to investigate those destinations.

If EAB is **detected at a non-point source (standing tree**) an order will be issued prohibiting any movement of ash material from the property. Investigators will begin at the epicenter of the infested area and work outwards, targeting relevant businesses and recreation areas that could be potential sources of the infestation. Like surveyors, investigators may also visit property owners in searching for the source of the infestation (i.e., a homeowner with firewood), as well as to determine whether potentially infested ash material has been moved to new locations. Information packets will be left for property owners unavailable at the time of visit. Tree cores will be taken from infested trees before tree removal for dendrochronological analysis at CPHST Otis Lab at Otis Air National Guard Base in Massachusetts to help recreate the history of the infestation.

The **Investigation Unit** will be contained within the **Operations Branch**. **PPQ** would be best suited to **lead the Investigation Unit** due to experience assessing pathways and commercial movement of materials.

FORMAL QUARANTINE

Objective: Revise emergency quarantine boundaries if necessary and implement formal quarantine.

The emergency quarantine should be established on an area larger than the EAB infestation to insure no movement of EAB-infested materials occurs from an infested area. After delimiting the extent of the infestation and investigating the source and any destinations of the infestation, a formal quarantine will be instituted. The formal quarantine may be implemented on the same boundaries as the emergency quarantine, or a smaller or larger area could be implemented based on the results of delimitation and investigation. **Before a formal quarantine can be established**, these steps must be followed **(per Plant Pest and Agriculture Commodity Certification Act Statute 2-2112):**

- A public meeting(s) will be held to communicate the specifics of the pest problem as well as the reasons for and terms of the quarantine – this will be an opportunity for public comment.

- Upon establishment of the quarantine, notice will be sent to all affected parties, including local, state and federal authorities as well as affected businesses.

  Like the emergency quarantine, implementation of the formal quarantine will occur within the **Operations Branch**. **The KDA will be responsible for intrastate quarantine.**

MITIGATION

Objective: Minimize impact of EAB infestation through treatment if feasible.

There are a number of potential actions that could be taken to mitigate an EAB infestation. While realizing that it will be impossible to plot a specific course of action until a full understanding of the circumstances surrounding an infestation are known, it is useful to establish some criteria that will be considered when determining a course of action for dealing with an EAB infestation. Ultimately, the most effective approach to limit EAB population growth will be removing potential hosts from the system. Every tree removed before EABs emerge means fewer beetles in the system. However, host removal could also have the affect of pushing dispersal farther out of the system and moving the problem to new areas sooner.

Potential measures to be enacted to mitigate the affect of an EAB infestation:

Eradication: The purpose of eradication is to remove small, isolated populations of a pest before the population size grows beyond control. Eradication may be justified if the target is truly a small, isolated population and the economic and environmental costs of the treatment are not too great.

Eradication treatments of EAB involve removal of all host material (known infested trees and trees of unknown status) within an area encompassing the delimited infestation borders and some additional distance. This approach has been controversial due to the ultimate removal of infested as well as healthy trees from the treatment area. However, it is impossible to undertake eradication via the removal solely of infested trees, because a tree cannot be determined to be free of EAB through visual inspection alone. Symptoms associated with EAB infestation may not be manifested until several years after the tree is first infested. EAB infestations tend to begin in the canopy of trees and proceed downwards. Even with careful inspection by tree climbers, the characteristic D-shaped exit hole will be difficult to find in beginning infestations and are not present when trees are first attacked. The only way to be certain that a tree is not infested with EAB is to fell the tree and remove the bark in search of larvae – which obviously defeats the purpose of trying to avoid removing healthy trees.

In EAB eradication, trees are removed from within the delimited edges of the infestation and a buffer because of difficulty in detecting EAB. The buffer is a means to catch the true edges of the infestation in which the population density is too low to be detected. Generally this distance has been a half mile, but could be as much as 1½-miles. The size of the treatment area increases exponentially with the size of the buffer. Obviously, the smallest buffer that can be used with confidence will be the optimum. The buffer size to use would depend primarily on two factors:

- The confidence in the results of the delimiting survey. If there is high confidence that the edges of the infestation have been accurately captured, then a smaller buffer may be adequate.

- The population density of ash in the affected area. If ash is very abundant in the affected area, EAB dispersal would likely be less than if ash is not abundant. Conversely, eradication will be more economically practical with a lower density of hosts present.

The practicality of eradication depends not only on the size of the area to be treated and the number of trees to be removed, but also the potential for the eradication to be successful. Probably the primary reason that eradication has not worked elsewhere is the difficulty in detecting low-level EAB infestations and, therefore, difficulty in accurately delimiting the edges of an infestation. This problem is likely to continue; therefore, a higher buffer would be preferable.

Suppression or "Slow the Spread": When a pest infestation grows beyond a size that can be eradicated, suppression efforts may still be able to slow the pest's population growth and spread.

Suppression of EAB may involve one or more of the following tactics:

- **Sanitation** – removal of infested trees. Removal of all known infested host material will reduce EAB population growth; however, the problem is determining what trees are infested without first cutting them down. Removal could be limited to trees expressing symptoms. Symptomatic

trees aren't necessarily infested with EAB, but may be more likely to be infested than healthy trees. However, symptoms take two or more years to develop, and therefore many infested trees would be missed and left to produce beetles.

- **Suppression with trap trees**. In addition to removing symptomatic trees, trap trees could be created by girdling potential hosts prior to adult emergence (before summer), allowing the trees to be colonized (summer), and then removing the trees before the next generation of adults can emerge (before subsequent summer). Targeting large trees as trap trees would have the dual affect of potentially "soaking" up beetles and also removing a host from the system that could generate many beetles. Large trees have a much greater surface area of phloem and therefore may produce many more EAB than a small tree.

- **Pesticide treatment of asymptomatic trees**. Insecticide applications can be made to trees as a trunk injection or trunk spray (McCullough, 2007). Trials have shown good protection of pesticide treated trees, but certain conditions apply.
  - Smaller trees are more easily protected and a larger tree would require more chemical (plus additional year head start).
  - Application must occur every year.

- **Containment via quarantine**. Simply limiting EAB to natural spread only will reduce the rate of spread of this pest. If human movement of materials is stopped then the yearly expansion of the front should not exceed the maximum flight capability of EAB (at this time estimated to be 6 miles – Taylor et al, 2005). In the initial stages of an infestation, the infestation should expand much more slowly than this, but then likely increase with increasing population density.

- **Other methods to suppress EAB** populations are also being researched in Michigan, including biological control agents and a Bt variety potentially effective against EAB. Any methods that significantly suppress EAB populations will both slow the spread of this pest and provide better opportunities to protect trees with pesticide applications.

(Appendix J-EAB detection scenarios and potential mitigation methods**)**

Before any action is taken, the pros and cons will need to be weighed regarding the cost, potential for damage to sensitive sites through mechanical tree removal, and the potential for the action to reach the intended goal for any specific site. Decisions on mitigation measures will be made by the **Unified Command** and **Response Team** in consultation with the **Science Panel** and the affected groups.

The **Mitigation Unit** will be contained within the **Operations Branch**. **The KDA will lead mitigation**. It is anticipated that **affected groups** will participate in mitigation efforts.

UTILIZATION & RESTORATION

Objective: The Utilization and Restoration Units will be contained within the Operations Branch. Kansas Forest Service would be best suited to lead both of these Units and develop plans for their implementation with local jurisdictions. **Affected groups** would also have a role in these activities.

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APPENDIX A – COMMUNICATIONS PLAN

The Challenge

Emerald Ash Borer (EAB) is a highly aggressive, Asian insect that is responsible for the death and/or damage of approximately 20 million ash trees in Michigan, Indiana, Ohio and Ontario. With no natural predators, EAB threatens nearly 8 billion ash trees in Canada and the U.S. Destruction caused by EAB could be similar to Dutch elm disease, which has decimated American elm from our forests.

Financially, the U.S. risks an economic loss of $20 billion to $60 billion. A complete devastation of ash trees could also seriously affect the eco-system.

Without agency action and cooperation from the public, firewood dealers, arborists and the nursery industry, EAB will be introduced here. EAB is 100% fatal to all Kansas' ash trees. Preventing the introduction of this invasive pest is far more cost-effective than containing an established pest.

KDA, KFS and USDA will use this communications strategy to postpone the introduction of EAB into Kansas and minimize the destruction once the pest arrives.

Basic Messages

- EAB is an invasive pest that threatens to devastate all Kansas' ash trees.
- The Kansas Department of Agriculture (KDA) is taking steps to prevent the introduction of EAB into our state.
- Your cooperation is imperative if we are to contain this invasive pest.
- (EAB discovered in Kansas) Your cooperation with quarantine/survey/mitigation measures is needed to prevent its spread.

Potential Partners

- USDA-APHIS
- KS Nursery and Landscape Association (KNLA)
- US Army Corps of Engineers (USACE)
- Kansas Arborist Association (KAA)
- KS Department of Transportation (KDOT)
- KS Association of Conservation Districts (KACD)
- Tribal Agencies
- KS Travel & Tourism
- Kansas Forest Service (KFS)
- KS Department of Wildlife and Park (KDWP)
- USDA-NRCS Forestry
- International Society of Arboriculture (ISA)
- KSU Extension
- Kansas League of Municipalities (KLM)
- Utility Companies
- KS Highway Patrol (KHP)

Primary Stakeholders

- Arborists
- Cities
- Municipalities
- Tree Boards
- Landowners
- Foresters
- Utilities
- Homeowners
- Environmentalists
- Colleges & Universities
- Campers and recreationalists
- Kansas nursery industry
- Kansas firewood dealers

Secondary Stakeholders

- Media
- Local government officials
- Kansas elected officials

Potential Sources of Conflict

- Citizens who don't wish to change their firewood habits
- Firewood dealers who have issues with protective measures
- Landowners with ash trees
- Nurseries with large stocks of ash trees

Strategy

Provide information to Kansas residents on the threat that EAB poses to our ash trees and what they can do to reduce the likelihood of its introduction to Kansas

- News releases
- Fact sheets public events
- Billboards
- Fact sheets at garden centers
- Mobile information displays for use at public events
- Posters/fliers at campgrounds
- Fact sheet templates for city foresters, extension agents, etc. to distribute

Provide information to firewood dealers on the threat that EAB poses to Kansas' ash trees and what they can do reduce the likelihood of its introduction into Kansas

- Direct mailing
- E-mail updates

Provide information to the nursery industry, tree inspectors and city foresters on the threat that EAB poses to Kansas' ash trees and what they can do reduce the likelihood of its introduction into Kansas

- Direct mailing
- E-mail updates
- Seminar or presentation at licensing meeting

Create and publicize centralized information sources for the public to learn about EAB and what they can do help reduce the likelihood of its introduction to Kansas.

- EAB web site or info on KDA, Kansas Forest Service & USDA web sites
- Toll-free hotline

Encourage residents, firewood dealers, city foresters and nursery growers to be on the lookout for EAB and report possible sightings

- News releases to industry/association publications
- Fact sheets to be distributed by city foresters
- Fact sheets at State Fair, garden centers and other public events
- Posters at campgrounds, music festivals and speedways
- Direct mailing or electronic communication w/dealers, foresters and nursery growers

If quarantine or other restrictions are put in place, provide information to public on how they can comply and why their compliance is important

- News releases
- Signs/posters in quarantine areas
- Fact sheets at State Fair, garden centers and other public events
- Fact sheet templates for city foresters, extension agents, etc. to distribute

If quarantine or other restrictions are put in place, provide information to firewood dealers and nursery growers on how they can comply with the quarantine and why their compliance is important

- News releases to industry publications
- Presentation at licensing meeting
- Direct mailing or electronic communication w/dealers, foresters and nursery growers

Key facts on Emerald Ash Borer

History:

- Discovered in Detroit area of Michigan – July 2002 & Windsor, Ontario, Canada
- As of April 6, 2009 – infestations in Michigan, Ohio, Maryland, Missouri, Pennsylvania, Indiana, Illinois, West Virginia, Wisconsin and Canada.
- Illinois, Indiana, Michigan, Ohio and counties in Maryland, Missouri, West Virginia, Wisconsin and Pennsylvania under Federal Quarantine as of April 6, 2009.
- Infested nursery stock found in Maryland and West Virginia.

Origin/Transmission:

- EAB likely came from China on solid wood packing material
- EAB may have been accidentally transported to the United States in shipments of firewood.
- EAB has not been found in Kansas yet!

Hosts:
- In North America, EAB is only known to attack species of ash trees.
- All native ash (Fraxinus) is highly susceptible to attack.
- Mortality appears to be close to 100% for all species and age classes.

Biology:
- Beetles over winter as pre-pupal larvae in bark.
- Emergence begins in April and continues through August.
- Females lay eggs on bark.
- Larvae tunnel into and feed on cambial layer (this is what kills the tree).

Identification:
- The larvae, which cause the most damage to the tree, get to be about 1-1/2 inches long with a wide, flat head and a segmented, white body.
- The adult insect is a metallic green bug about a half-inch long.
- The larvae feed on the trees, moving in an S-shaped pattern.
- The beetle feeds on all ash trees (Fraxinus) native to North America. Bark that is splitting and that, when pulled back, shows the meandering eating pattern of the larvae, is one of the main warning signs of EAB.
- D-shaped holes, 1/8" in size, where the emerald ash borers have finished pupation and the adult beetles have exited the tree, is another sign. Increased woodpecker activity, dying leaves at the top third of the tree and sprouts growing at the base of the tree are also important indicators of the EAB.

Control:
- Presently the only method of control is to remove infested trees and chip the wood.
- Regulate the movement of the host tree material. Some states have drafted rules that allow only certified wood to enter state-owned parks. Some states prohibit the movement of firewood. Moving firewood and other ash wood materials in areas infested with Emerald Ash Borer is regulated by the infested states and federal government. The following information **www.emeraldashborer.info s**hould help determine whether or not it is acceptable to move firewood within or between states.
- Some states have used holiday weekend roadblocks, and fines to limit the movement of firewood.

KDA activities:
- Summer seasonal staff contacts and surveys campgrounds, firewood dealers, nurseries and communities.
- Area staff tracks any ash shipments into Kansas and inspect all nursery ash as part of general inspection duties.
- Community foresters are monitoring urban ash populations.

What can the public do?
- Learn about the signs and symptoms of EAB infestations (via Pest Alert information sheet, web sites) **www.ksda.gov/includes/document_center/plant_protection/Miscellaneous%20Plans%20Reports%20and%20Guidelines/KansasEABFAQ.pdf**

  www.emeraldashborer.info

- Report any suspicious ash dieback or EAB feeding symptoms to KDA or to their community forestry office.

Key Questions and Answers

1. **Where did the emerald ash borer come from?**
   The natural range of *Agrilus planipennis*, or the emerald ash borer, is eastern Russia, northern China, Japan, and Korea. Before June of 2002, it had never been found in North America.
2. **How did it get here?**
   We don't know for sure, but it most likely came in ash wood used for stabilizing cargo in ships or for packing or crating heavy consumer products.
3. **What types of trees does the emerald ash borer attack?**
   In North America, it has only been found in ash trees. Trees in woodlots as well as landscaped areas are affected. Larval galleries have been found in trees or branches measuring as little as 1-inch in diameter. All species of North American ash appear to be susceptible.
4. **Where has it been found?**
   In 2002, EAB was thought to occur in six counties in southeastern Michigan and in Essex County Ontario. Our ability to detect and find EAB has substantially improved since then, however, and we now realize that a much greater area was infested than what was initially thought. It has also been found in Indiana, Ohio, Illinois, Pennsylvania, West Virginia, Virginia, Wisconsin, Missouri, Maryland, Ontario, and Quebec, making EAB an international pest problem. Most of these infestations are not new (i.e., EAB has not spread this far in the past 5 years). We are simply getting better at finding infestations as survey methods improve. However, it is important to watch for signs and symptoms of EAB in non-quarantine areas where the beetle may have been accidentally transported in ash firewood.
5. **What happens to infested ash trees?**
   The canopy of infested trees begins to thin above infested portions of the trunk and major branches because the borer destroys the water and nutrient conducting tissues under the bark. Heavily infested trees exhibit canopy die-back usually starting at the top of the tree. One-third to one-half of the branches may die in one year. Most of the canopy will be dead within 2 years of when symptoms are first observed. Sometimes ash trees push out sprouts from the trunk after the upper portions of the tree dies. Although difficult to see, the adult beetles leave a "D"-shaped exit hole in the bark, roughly 1/8 inch in diameter, when they emerge in June.
6. **What do emerald ash borers look like?**
   The adult beetle is dark metallic green in color, 1/2 inch-long and 1/8 inch wide.
7. **What is the life cycle of this borer?**
   Recent research shows that the beetle can have a one- or two-year life cycle. Adults begin emerging in mid to late May with peak emergence in late June. Females usually begin laying eggs about 2 weeks after emergence. Eggs hatch in 1-2 weeks, and the tiny larvae bore through the bark and into the cambium - the area between the bark and wood where nutrient levels are high. The larvae feed under the bark for several weeks, usually from late July or early August through October. The larvae typically pass through four stages, eventually reaching a size of roughly 1 to 1.25 inches long. Most EAB larvae overwinter in a small chamber in the outer bark or in the outer inch of wood. Pupation occurs in spring and the new generation of adults will emerge in May or early June, to begin the cycle again.
8. **How is this pest spread?**
   We know EAB adults can fly at least 1/2 mile from the tree where they emerge. Many infestations, however, were started when people moved infested ash nursery trees, logs, or firewood into uninfested areas. Shipments of ash nursery trees and ash logs with bark are now regulated, and transporting firewood outside of quarantined areas is illegal, but transport of infested firewood remains a problem. ***PLEASE - do not move any ash firewood or logs outside of quarantined areas.***
9. **Does it only attack dying or stressed trees?**
   Healthy ash trees are also susceptible, although beetles may prefer to lay eggs or feed on stressed trees. When EAB populations are high, small trees may die within 1-2 years of becoming infested and large trees can be killed in 3-4 years.
10. **What is being done on a statewide basis about this new pest?**
    Many agencies and universities are working together to educate citizens about identification of ash trees and EAB and options for protecting valuable shade trees. Research is underway to learn more about the

biology of EAB, its rate of spread, methods for EAB detection, predators and other natural enemies that may attack EAB, and how insecticides can be used to protect trees in infested areas.

11. **How big a problem is EAB?**
    EAB is becoming an international problem, with infestations in Canada as well as Michigan, Ohio, Indiana, Illinois, Pennsylvania, Missouri, Wisconsin, Maryland, West Virginia and Virginia. The scope of this problem could reach the billions of dollars nationwide if not dealt with. State and federal agencies have made this problem a priority. Homeowners can also help by carefully monitoring their ash trees for signs and symptoms of EAB throughout the year.
12. **Who do I call to get more information on the Emerald Ash Borer or to report an infested tree?**
    Contact your county Extension office or the Department of Agriculture office at 785-862-2180. You may also contact the USDA Emerald Ash Borer Hotline toll-free at 1-866-322-4512.

The key questions and answers were updated by Dr. Deborah McCullough and Robin Usborne, Michigan State University Extension, August 2008.

APPENDIX B – LIST OF CERTIFIED ARBORISTS FOR TREE REMOVAL

Lists of certified arborists for Kansas will be maintained with the Kansas Arborists Association (KAA) and the International Society of Arboriculture (ISA) at:

www.kansasarborist.com

www.isa-arbor.com/findArborist/verifyArbByLoc.aspx

APPENDIX C - KANSAS EAB RESPONSE TEAM & PARTNERS

Agency or Group	Contacts
KDA	SPRO Plant Protection and Weed Control program PO Box 19282, Forbes Field Bldg. 282 Topeka, Kansas 66619 785-862-2180
USDA-APHIS, PPQ	SPHD 1947 NW Topeka Blvd. Topeka, Kansas 66608 785-270-1380
KDOT	Bureau of Construction and Maintenance 785-296-6355
KFS	State Forester 2610 Claflin Rd. Manhattan, KS 66502 785-532-3300
KDWP	Kansas Department of Wildlife & Parks Operations Office 512 SE 25th Ave., Pratt, KS 67124 620-672-5911
Corps of Engineers	Biologist-Tulsa District 1645 S. 101 E. Ave. Tulsa, OK 74128 918-669-7411 Wildlife Biologist-Kansas City District 601 East 12th St., Room 713 Kansas City, MO 64106 816-389-3651
USDA-NRCS Forestry	Plant Materials Specialist 760 S. Broadway Salina, KS 67401 785-823-4500
KNLA	Executive Secretary 785-313-3973
KAA	Executive Director 785-499-6670
KSU Extension	Extension Director 785-532-5820
The League of Kansas Municipalities	Program Manager, Finance & Field Services 300 SW 8th Ave Topeka, KS 66603-3951 785-354-9565 Fax: 785-354-4186 www.lkm.org
Kansas Association of Counties	300 SW 8th 3rd Floor Topeka, KS 66603 785- 272-2585 Fax: 785-272-3585 www.kansascounties.org

Tribes	Iowa Tribe of Kansas and Nebraska 3345 B Thrasher White Cloud, KS 66094 785-595-3258 Fax: 785-595-6610 Kickapoo Tribe Of Kansas 1107 Goldfinch Rd Horton, KS 785-486-2131 Prairie Band Potawatomie Nation Tribal Government Office Mayetta, Kansas 785-966-4000 877-715-6789 Sac And Fox Nation 305 N. Main Reserve, KS 66434 785-742-7471 ext. 2905
Utilities	KCP&L Vegetation Management 816-245-3859 Kansas Electric Power Cooperative, Inc. 600 SW Corporate View Topeka, KS 66604-0877 Phone: 785-273-7010 Fax: 785-271-4888 www.kepco.org Westar Vegetation Manager 316-261-6333 Green Team 785-575-8115
Science Advisory Panel	USDA Forest Service Michigan State University Therese Poland 517-355-7740 ext. 114 State of Kansas Entomologist Glenn Salsbury KDA, Plant Protection & Weed Control program 785-862-2180 KSU Extension Entomologist Ray Cloyd 239 W. Waters Hall Manhattan, KS 66506 785-532-4750

APPENDIX D – Homeowner Flyer for EAB

FLYER FOR EAB

Dear Homeowner:

The Kansas Department of Agriculture is conducting a survey in your neighborhood for the presence of an important insect pest. The insect is known as the Emerald Ash Borer. This borer attacks ash trees in the *Fraxinus spp*. All ash and all sizes of trees are attacked. At present this insect is not known to occur in or near Kansas.

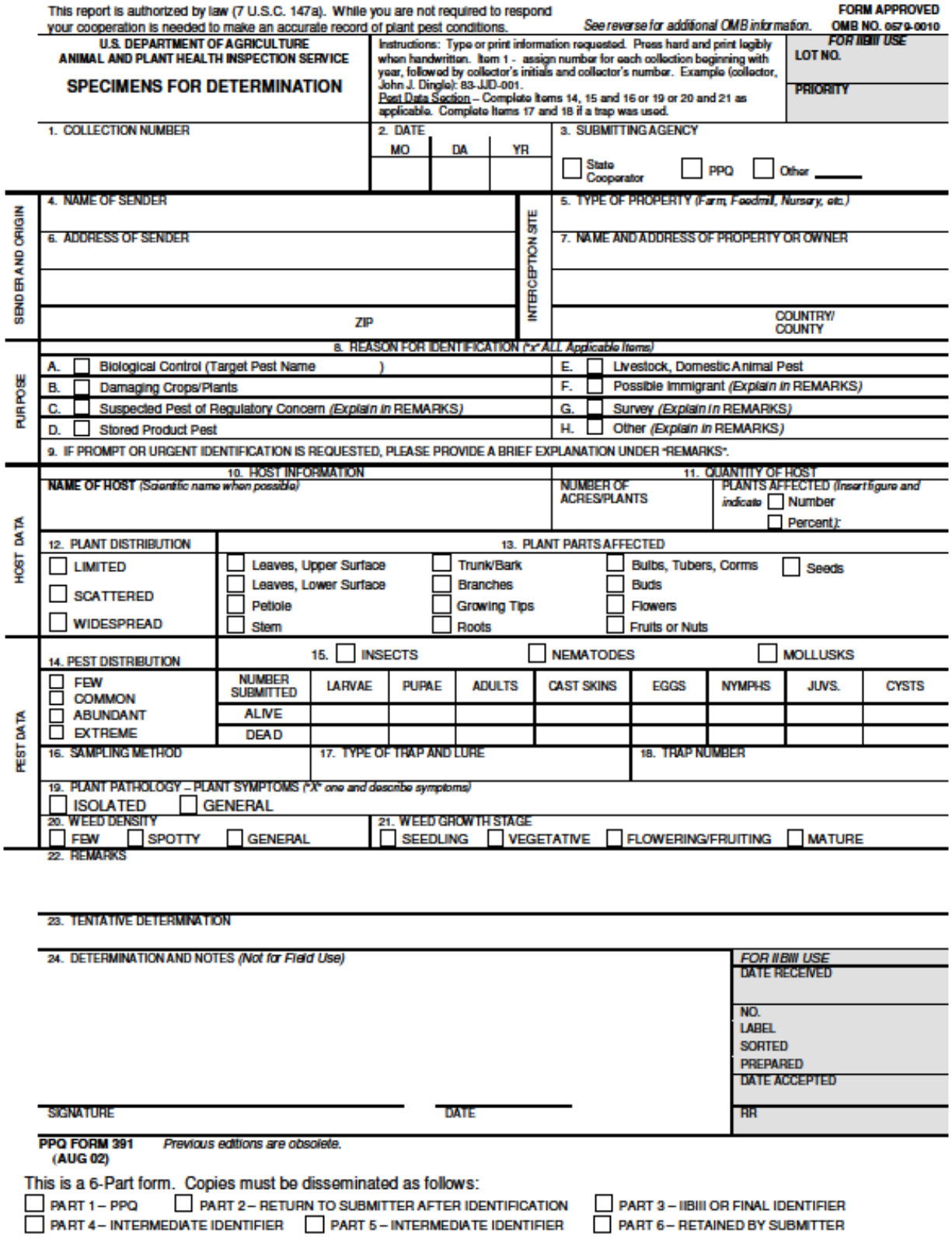
Symptoms that a tree is under attack include dieback of the crown and/or green shoots growing from the trunk of the tree and/or bark splits. Other conditions not related to the borer may also cause the above symptoms. All trees that are infested by his beetle will die, usually within three years. While this borer can fly, the primary means of widespread dispersal is in the movement of infested firewood and nursery stock.

Enclosed in this envelope is literature concerning the Emerald Ash Borer. Please read it over and if you have any concerns that this insect might be present in your area please contact the number below. If during our survey any suspect trees are located on or near your property you will be notified concerning what action needs to be taken.

Contact information:

Kansas Department of Agriculture
Plant Protection and Weed Control
Forbes Field, Bldg. 282
P.O. Box 19282
Topeka, Kansas 66619-0282
Phone: 785-862-2180
Fax: 785-862-2182

APPENDIX E - PPQ Form 391 (Only for informational purposes)



This report is authorized by law (7 U.S.C. 147a). While you are not required to respond your cooperation is needed to make an accurate record of plant pest conditions. *See reverse for additional OMB information.*

FORM APPROVED
OMB NO. 0579-0010

U.S. DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE

SPECIMENS FOR DETERMINATION

Instructions: Type or print information requested. Press hard and print legibly when handwritten. Item 1 - assign number for each collection beginning with year, followed by collector's initials and collector's number. Example (collector, John J. Dingle): 83-JJD-001.
Post Data Section – Complete items 14, 15 and 16 or 19 or 20 and 21 as applicable. Complete items 17 and 18 if a trap was used.

FOR IIBIII USE
LOT NO.
PRIORITY

1. COLLECTION NUMBER
2. DATE — MO | DA | YR
3. SUBMITTING AGENCY — ☐ State Cooperator ☐ PPQ ☐ Other _____

SENDER AND ORIGIN
4. NAME OF SENDER
6. ADDRESS OF SENDER
ZIP

INTERCEPTION SITE
5. TYPE OF PROPERTY *(Farm, Feedmill, Nursery, etc.)*
7. NAME AND ADDRESS OF PROPERTY OR OWNER
COUNTRY/ COUNTY

PURPOSE
8. REASON FOR IDENTIFICATION *("x" ALL Applicable Items)*

A. ☐ Biological Control (Target Pest Name)	E. ☐ Livestock, Domestic Animal Pest
B. ☐ Damaging Crops/Plants	F. ☐ Possible Immigrant *(Explain in* REMARKS*)*
C. ☐ Suspected Pest of Regulatory Concern *(Explain in* REMARKS*)*	G. ☐ Survey *(Explain in* REMARKS*)*
D. ☐ Stored Product Pest	H. ☐ Other *(Explain in* REMARKS*)*

9. IF PROMPT OR URGENT IDENTIFICATION IS REQUESTED, PLEASE PROVIDE A BRIEF EXPLANATION UNDER "REMARKS".

HOST DATA
10. HOST INFORMATION
NAME OF HOST *(Scientific name when possible)*
11. QUANTITY OF HOST
NUMBER OF ACRES/PLANTS
PLANTS AFFECTED *(Insert figure and indicate* ☐ Number ☐ Percent*)*:

12. PLANT DISTRIBUTION
☐ LIMITED ☐ SCATTERED ☐ WIDESPREAD

13. PLANT PARTS AFFECTED

☐ Leaves, Upper Surface	☐ Trunk/Bark	☐ Bulbs, Tubers, Corms	☐ Seeds
☐ Leaves, Lower Surface	☐ Branches	☐ Buds	
☐ Petiole	☐ Growing Tips	☐ Flowers	
☐ Stem	☐ Roots	☐ Fruits or Nuts	

PEST DATA
14. PEST DISTRIBUTION
☐ FEW ☐ COMMON ☐ ABUNDANT ☐ EXTREME

15. ☐ INSECTS ☐ NEMATODES ☐ MOLLUSKS

NUMBER SUBMITTED	LARVAE	PUPAE	ADULTS	CAST SKINS	EGGS	NYMPHS	JUVS.	CYSTS
ALIVE								
DEAD								

16. SAMPLING METHOD
17. TYPE OF TRAP AND LURE
18. TRAP NUMBER

19. PLANT PATHOLOGY – PLANT SYMPTOMS *("X" one and describe symptoms)*
☐ ISOLATED ☐ GENERAL

20. WEED DENSITY
☐ FEW ☐ SPOTTY ☐ GENERAL

21. WEED GROWTH STAGE
☐ SEEDLING ☐ VEGETATIVE ☐ FLOWERING/FRUITING ☐ MATURE

22. REMARKS

23. TENTATIVE DETERMINATION

24. DETERMINATION AND NOTES *(Not for Field Use)*

SIGNATURE
DATE

FOR IIBIII USE
DATE RECEIVED
NO.
LABEL
SORTED
PREPARED
DATE ACCEPTED
RR

PPQ FORM 391 (AUG 02) *Previous editions are obsolete.*

This is a 6-Part form. Copies must be disseminated as follows:
☐ PART 1 – PPQ ☐ PART 2 – RETURN TO SUBMITTER AFTER IDENTIFICATION ☐ PART 3 – IIBIII OR FINAL IDENTIFIER
☐ PART 4 – INTERMEDIATE IDENTIFIER ☐ PART 5 – INTERMEDIATE IDENTIFIER ☐ PART 6 – RETAINED BY SUBMITTER

OMB Information

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0579-0010. The time required to complete this information collection is estimated to average .25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Instructions

Use PPQ Form 391, Specimens for Determination, for domestic collections (warehouse inspections, local and individual collecting, special survey programs, export certification).

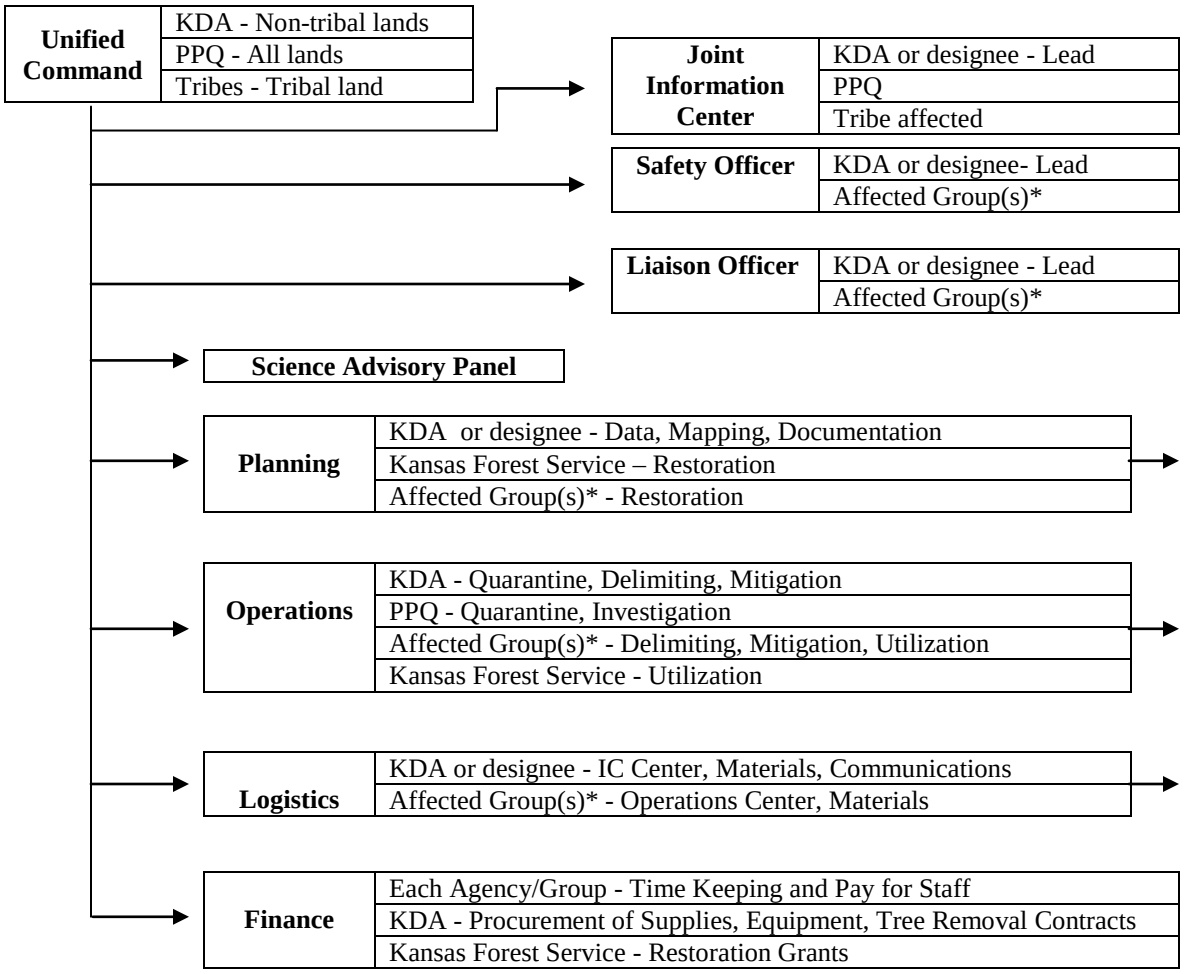
BLOCK	INSTRUCTIONS
1	1. Assign a number for each collection beginning the year, followed by the collector's initials and collector's number **EXAMPLE** In 2001, Brian K. Long collected his first specimen for determination of the year. His first collection number is 01-BLK-001 2. Enter the collection number
2	Enter date
3	Check block to indicate Agency submitting specimens for identification
4	Enter name of sender
5	Enter type of property specimen obtained from (farm, nursery, feed mill, etc.)
6	Enter address
7	Enter name and address of property owner
8A-8L	Check all appropriate blocks
9	Leave Blank
10	Enter scientific name of host, if possible
11	Enter quantity of host and plants affected
12	Check block to indicate distribution of plant
13	Check appropriate blocks to indicate plant parts affected
14	Check block to indicate pest distribution
15	▪ Check appropriate block to indicate type of specimen ▪ Enter number specimens submitted under appropriate column
16	Enter sampling method
17	Enter type of trap and lure
18	Enter trap number
19	Enter X in block to indicate isolated or general plant symptoms
20	Enter X in appropriate block for weed density
21	Enter X in appropriate block for weed growth stage
22	Provide a brief explanation if Prompt or URGENT identification is requested
23	Enter a tentative determination if you made one
24	Leave blank

Distribution of PPQ Form 391

Distribute PPQ Form 391 as follows:

1. Send Original along with the sample to your Area Identifier.
2. Retain and file a copy for your records.

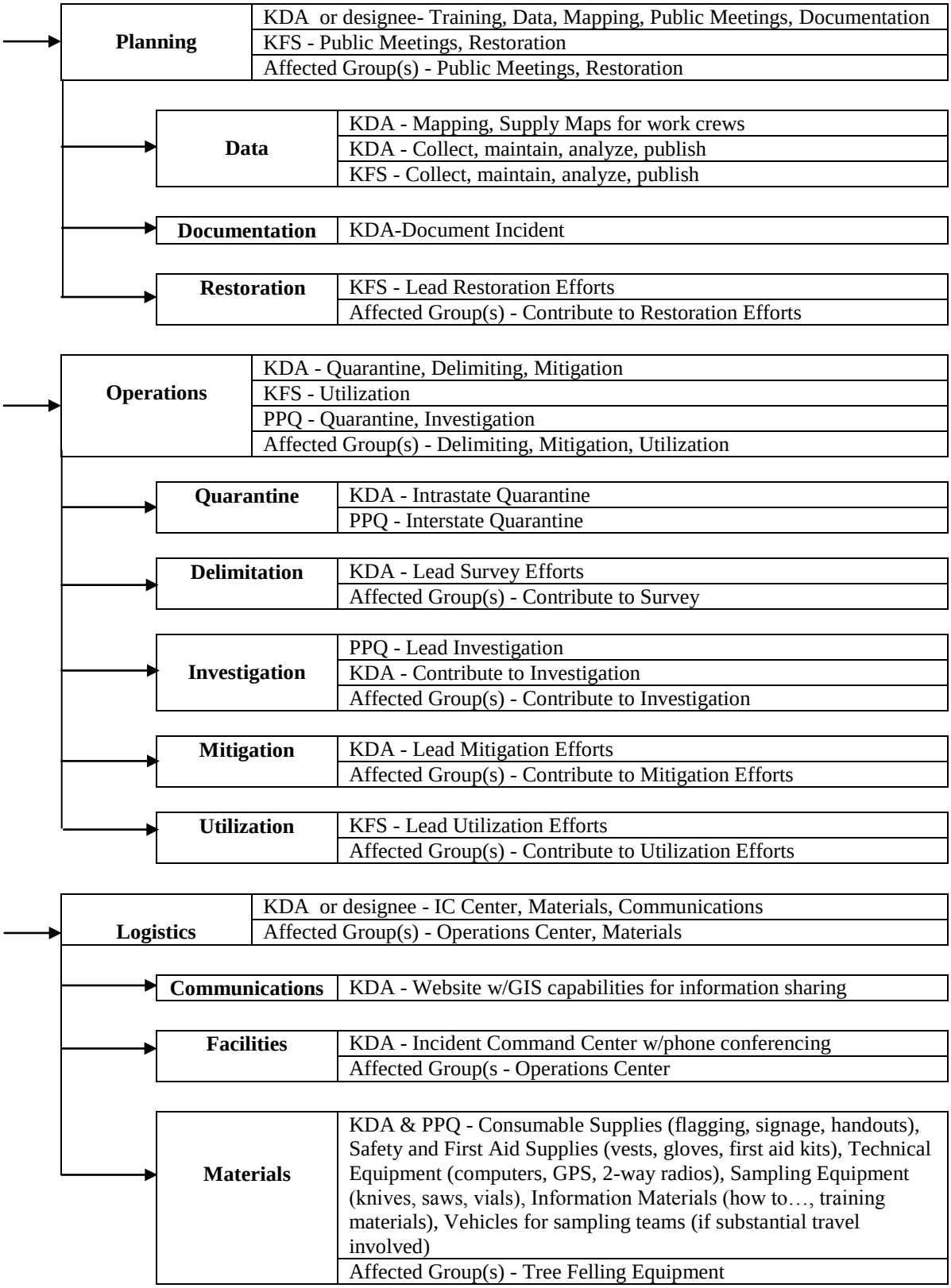
APPENDIX F - KANSAS EAB INCIDENT COMMAND BRANCHES



*

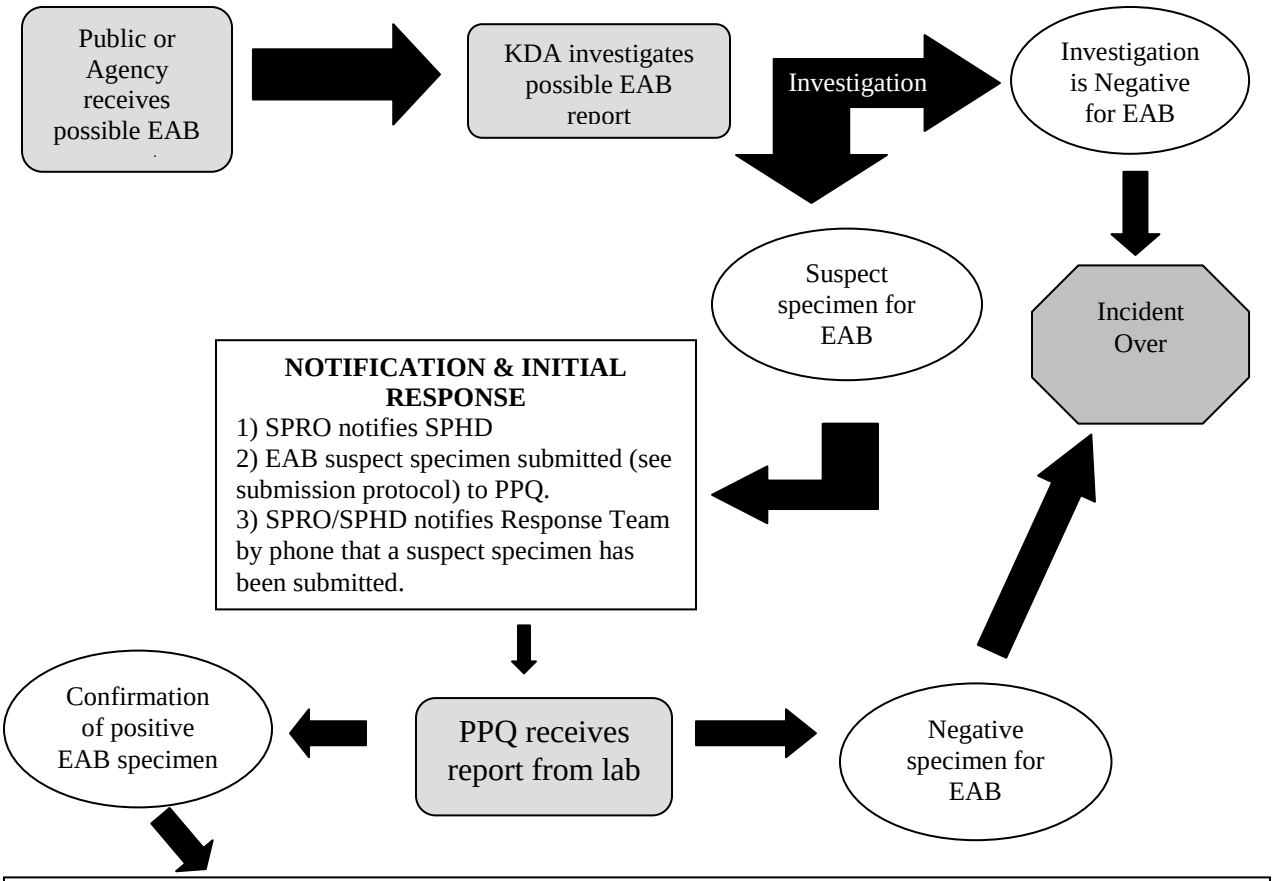
Affected Land	Affected Group(s)
County Owned Land	County Employees
KFS	KFS, KSU
KDOT Owned Land	KDOT Forestry or Maintenance Staff
State & Federal Park Owned Land	KDWP and/or Army Corps of Engineer staff
Live Plant Dealer owned Land	Nursery Employees
Municipality	City Employees
Tribal lands	Tribal Natural Resource Workers
Colleges & Universities	Staff & Students

Kansas EAB Incident Command Branches



Kansas EAB Incident Command Branches (continued)

APPENDIX G - KANSAS EAB INCIDENT FLOWCHART



NOTIFICATION & INITIAL RESPONSE

1) SPHD Notifies SPRO
2) EAB Command Unit schedules briefing at KDA within 24 hours for Response Team
3) EAB Command Unit schedules operations meeting within the affected region within 48 hours for operations team and local officials

RAPID RESPONSE EMERGENCY QUARANTINE	KDA - Intrastate Quarantine
	PPQ - Interstate Quarantine
RAPID RESPONSE DELIMITATION & INVESTIGATION	KDA - Lead Survey
	PPQ - Lead Investigation
	Affected Group(s) - Contribute to Mitigation Efforts
RAPID RESPONSE FORMAL QUARANTINE	KDA - Intrastate Quarantine
RAPID RESPONSE MITIGATION	KDA - Lead Mitigation Efforts
	Affected Group(s) - Contribute to Mitigation Efforts
UTILIZATION & RESTORATION	Kansas Forest Service - Lead Utilization & Restoration Efforts
	Affected Group(s) - Contribute to Utilization and Restoration Efforts

APPENDIX H - POTENTIAL SITUATIONS AND EMERGENCY QUARANTINE ACTION

The following are three potential situations in which EAB could be detected and the resulting emergency quarantine action:

1. **EAB detected at a point source (nursery, firewood, etc) prior to adult emergence.**
   If EAB is detected at a point source, we can focus our attention on preventing its movement throughout the region as well as the state as a whole. In this case the location only would be quarantined, provided that no infested material has been moved from the location. If the location is a nursery, firewood dealer or mill, an order would be issued immediately to cease movement of all ash from the property until all infested material can be destroyed. If potentially infested material has been moved from the location, then trace forwards would be conducted to track down destinations of materials, and those materials destroyed as well. As needed, those locations will be prohibited from moving materials as well. If destinations of potentially infested materials are found after adult emergence, then the second scenario (below) is followed. In all cases trace backs will be conducted to determine the source of the infested materials. Trace backs and trace forwards would be conducted as part of the EAB Investigation and would be best led by PPQ (**see Investigation section**).

2. **EAB detected at a point source after adult emergence has begun.**
   Township-level quarantine would be initiated on the township containing the location where the find occurred as well as those bordering the find for a ten-mile radius surrounding the location. The rationale would be that the ten-mile radius should more than cover the maximum dispersal distance of EAB (~six miles) and, therefore, all areas potentially infested would be contained within the initial quarantine. However, the quarantine would be kept as tight to the potential infestation boundaries as possible to limit the spread of EAB within the region as well as the state. As in the first scenario, trace backs and trace forwards will need to be conducted.

3. **EAB detected at a non-point source (standing tree).**
   County-level quarantine would be initiated on the county containing the location where the find occurred. If the find is near a county border then bordering counties may also be quarantined though no EAB has yet been detected within their borders. The rationale in this case is that since EAB has been found in a standing tree, we know that we have not found the source of the infestation. Due to the difficulty in detecting and delimiting EAB infestations, we should begin with the assumption that EAB is established in the region and focus our attention on preventing its movement out of the region and to the state as a whole. A delimiting survey will provide a better idea as to the scope of the infestation.

APPENDIX I - DELIMITATION SCENARIOS

- **Scenario 1**: If EAB is detected at a **point source**, no immediate delimiting survey will be conducted if it has been determined that the EAB-infested materials were infested before entering Kansas. If this is not the case, then a delimiting survey like that described under non-point source detection will be implemented.

    - If the detection is made before adult emergence, EAB traps will be set around point source area.

    - If the detection is made during or after adult emergence, EAB traps will be set around point source area. Also, EAB density within trees is likely to be very light and the larvae difficult to detect during this early period of colonization. Based on studies of EAB dispersal, most adults are unlikely to disperse more than two miles (McCullough et al, 2004). However, mated females may disperse much farther than this – potentially six miles (Taylor et al, 2005). Therefore, while the immediate area (<¼-2 miles from the point source, ¼-16 sq. miles) will likely have the highest numbers of EAB present, the potentially infested area would extend 6 miles from the point source (36 sq. miles).

- **Scenario 2**: If EAB is detected at a **non-point source** (standing tree), then an immediate delimiting survey will be conducted with EAB traps. The survey will be conducted in two phases:

    - During the initial phase, a visual inspection will be conducted to record locations of symptomatic and asymptomatic ash trees. Visual survey will begin at the epicenter of the affected area and proceed outwards. Survey will be targeted towards areas most likely to contain ash rather than randomly selected areas because the purpose of the survey will be to quickly delimit the geographic scale of the EAB infestation rather than describe the population density of ash or EAB. The paths followed by surveyors will be recorded with GPS so that surveyed and not surveyed areas can be differentiated. Surveyors will work in teams of two – with one person responsible for spotting trees and the other for recording data. Data recorded will include site and tree information related to the size and condition of the tree. The time needed to complete the visual survey will depend heavily on terrain.

    - The second phase of the survey will be destructive sampling of visually symptomatic trees and EAB traps being set. Visually symptomatic trees will be targeted to optimize the efficiency of resources used to fell and sample trees. However, it is recognized that EAB may also be present in asymptomatic trees so traps will be set. Surveyors will work in teams of two because of the physical demands of felling and peeling trees. Surveyors may fell small trees on their own with handsaws; however, large trees will be felled by contractors or staff from an affected group with training and access to chainsaws (municipality, KDA, Kansas Forest Service, etc.). Depending on the numbers of symptomatic trees recorded, destructive surveys may begin at the outer edge of the area surveyed for symptomatic trees and proceed inwards. Again, the idea is to quickly determine the geographic scale of the infestation. For instance, if we find an EAB-infested tree a half mile from the initial find, we know that the infestation is at least that large, and we will want to focus our attention outward from that new find rather than inward toward the initial find. At some point, it will likely become necessary to conduct a more thorough census to determine the number of infested ash within the affected area, but the initial focus should be on delimiting the geographic area affected.

APPENDIX J - EAB DETECTION SCENARIOS AND POTENTIAL MITIGATION METHODS

Scenario 1: EAB is found at a **point source** (i.e., nursery, firewood dealer, firewood at a campground) **prior to adult emergence**. Assuming the material in question became infested before entering Kansas, eradication of all potentially infested material at the point source would be the best option. In this circumstance only the ash material at that location would need to be destroyed, though the area would subsequently be intensively monitored for EAB activity in case there was an escape. KDA and USDA PPQ investigations would occur at the locations.

Scenario 2: EAB is found at a **point source during or after adult emergence**. Again, it would have to be determined that the material in question became infested before entering Kansas. Eradication of potentially infested materials at a point source would be the first step. KDA and USDA PPQ investigations would occur. The next step would be to determine the area potentially affected by EAB and EAB traps would be set. This step would require applying what is known regarding **EAB dispersal**:

- Field studies at three outlier sites in Michigan found that most trees became infested within ¼ mile of an EAB point source and a few trees became infested between ¼ and ½ mile of a point source. In none of the studies were trees sampled beyond ½ mile from the point source (McCullough et al, 2004).

- Lab studies have found that EAB flight capabilities without food, water or rest are males = ¼ mile, unmated females = ½ mile and mated females = 1 mile. When mated females were allowed to eat, drink and rest during testing, 50% flew >2.5 miles, 10% flew >4 miles and the maximum were ~6 miles (Taylor et al, 2004, Taylor et al, 2005).

The potentially affected area may be assumed to have a radius of the maximum known flight capability of EAB (6 miles) which results in a potentially affected area 36 square miles in size. An eradication treatment would not be practical over an area this size. However, field studies have demonstrated that the majority of individuals will colonize ash (if available) within ¼ mile of the point source. A few individuals may colonize hosts between ¼ and ½ mile from the point source. It is unknown how many individuals may colonize hosts farther than ½ mile from the source.

Removing the bulk of the population by removing all host material for ¼ mile of the point source may not remove every EAB from the landscape. However, this treatment may reduce the population density of EAB enough that remaining individuals cannot sustain a population (Liebhold and Bascompte, 2003). It is also possible that enough mated females will disperse beyond ½ mile to sustain populations in other areas.

Scenario 3: EAB is found at a **non-point source**. It will be critical to determine the original source of the infestation as well as the time since introduction (responsibility of the Investigation Unit). Each year that has passed since the original introduction means not only an additional generation of EAB dispersing farther from the introduction point, but also greater likelihood that infested material has been moved from the affected area to create new populations elsewhere. The older the infestation, the more difficult it will be to delimit the infestation as well as trace forward material moved from the affected area. Unless non-point source detection can be traced to a very recent introduction, eradication as a treatment method is unlikely to be successful and suppression will likely be a better tactic.