



**BEETLE BUSTERS**

SAVING CHICAGO'S TREES



# Teacher's Guide

## for Middle- and High-School Science Classes



**4 Beetle Busters Report Form**

**Directions:** Answer each question. Be sure to write clearly.

Your name: \_\_\_\_\_

Parent/Caregiver name: \_\_\_\_\_

School name: \_\_\_\_\_

Teacher's name: \_\_\_\_\_

Date you searched: \_\_\_\_\_

Street address of property you searched: \_\_\_\_\_

Zip Code of property you searched: \_\_\_\_\_

Location of tree(s) on property (if applicable): \_\_\_\_\_

Did you see an Asian longhorn beetle? \_\_\_\_\_

**Then:** Send it in!

**Mail it to:**  
 USDA APHIS-PPQ  
 3920 N. Rockwell St.  
 Chicago, IL 60618

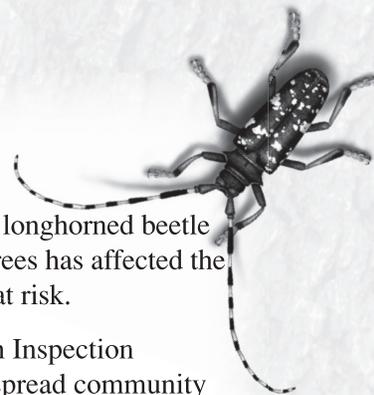
- Inside:**
- 5 Day Project-Based Unit
  - Asian Longhorned Beetle Background Info
  - Family Take-Home Flyer
  - Beetle Busters Outreach Campaign Challenge



*Using real-life science to solve a real community problem*



## Dear Science Teacher,



**Chicago’s trees need your help!** Since its discovery in Chicago in 1998, the invasive Asian longhorned beetle (ALB) has been responsible for the destruction of more than 1,500 trees. The loss of these trees has affected the quality of life of thousands of residents. Until we rid Chicago of the ALB, our trees remain at risk.

That’s why in 1998, the U.S. Department of Agriculture’s (USDA) Animal and Plant Health Inspection Service (APHIS) launched a 10-year plan with a single goal: ALB eradication. With widespread community support, we have made significant strides toward this goal. But for USDA to declare the ALB “eradicated” in an outbreak area, we need *4 straight years* of negative results from field surveys.

This is your chance to make science relevant for your students, *using real-life science to solve a real community problem*. By using the easy, five day, project-based unit in this Teacher’s Guide, you will empower your students to play a central role in saving Chicago’s trees, one field-survey at a time. The supplemental curriculum incorporates biology, fieldwork, and communication into five flexible, skills-building, standards-based lessons that you can adapt to your available time and classroom needs. As your students learn about the ALB, conduct field surveys, and report their results, they’ll be applying their knowledge and making a difference in their communities.

Thank you for inviting your students to be Beetle Busters! Your participation will bring us closer to the day when we can officially declare the ALB “eradicated” in Chicago.

With warm regards,

Christine K. Markham,  
National ALB Program Director  
USDA – APHIS



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United States Department of Agriculture  
Animal and Plant Health Inspection Service

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# Program Objectives



- To improve understanding of the ALB, its potential to destroy Chicago’s trees, and the actions needed to ensure eradication
- To encourage teachers, students, and families to search for the ALB and report their findings — whether or not they see a beetle
- To empower students to become “beetle buster” leaders through student-created, student-led community outreach campaigns

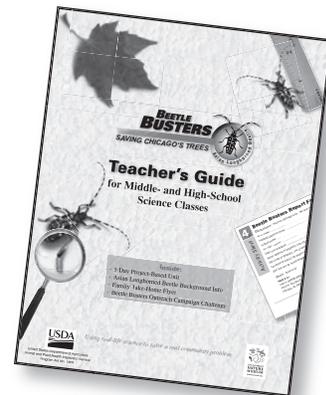
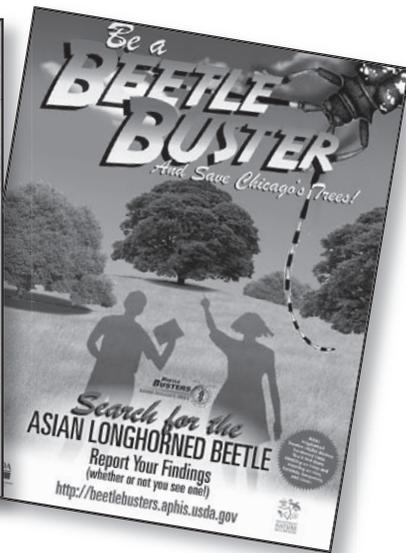
## Components at a Glance



**Beetle Busters 2-Sided Poster**

**Side 1:** *Identify the Asian Longhorned Beetle*

**Side 2:** *Be a Beetle Busters and Save Chicago’s Trees!*

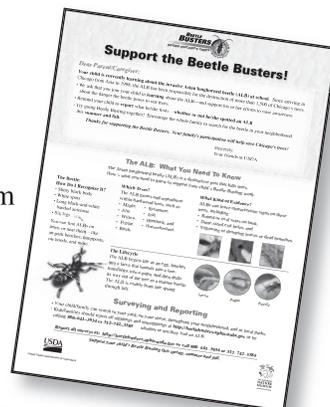


**Teacher’s Guide**

This 24-page guide includes a five day, project-based unit that puts your students at the heart of the campaign to save Chicago’s trees.

### Family Take-Home Flyer: Support the Beetle Busters!

This reproducible flyer for parents introduces the program and encourages parents to support — or join — their student Beetle Busters.



**Asian Longhorned Beetle ID Card**

This credit-card sized, two-sided card provides all the information your students need to carry with them to identify the ALB and report their fieldwork.

# Getting Started

Beetle Busters is a flexible, easy-to-use program that’s ideal for the end of the year. Combining real-life science with relevant community issues, it puts your students’ learnings in the classroom into practice!

## An Easy Way to Make Science Real

- Students extend their science knowledge as they examine the destructive behavior of an invasive species that is harming their own community. In addition, the program provides unique opportunities for them to become part of the solution.
- The project-based activities in this Teacher’s Guide are split over five days, and incorporate standards-based learning models. You can adjust the activities to accommodate your own teaching style and available classroom time.
- The unit culminates with your students going out into “nature” to conduct their own surveys for the Asian longhorned beetle . . . then, they create their own campaigns to spread the word and enlist others in the community to become “Beetle Busters” too!

Now, take a look through this Guide. It’s built with step-by step instructions, clearly stated objectives, and teaching tips that make this program easy to use and easy to teach. What’s more, it’s ready to begin using today.

With Beetle Busters, you can wrap up your teaching year with a program that inspires your students — and challenges them to play a critical role in embracing an important local issue: saving Chicago’s trees!

## Highlights of the Program

- **Real Science:** Information about the ALB, the trees it destroys, and efforts made to save Chicago’s trees for students to learn and share with others.
- **Student-Friendly Activity Sheets:** Worksheets are included to help students learn about the beetle, create their own outreach campaigns, and conduct and report beetle surveys.
- **Hands-on Tools for Learning and Identification:** Program tools (like a full-color poster and personal “ALB ID Cards”) empower students to identify the problem and become leaders in Chicago’s fight against the ALB.
- **Vocabulary Words:** New words are highlighted in bold. Concepts relate to biology, ecology, communication, and community service.

## Learning Standards of the ALB Program

The Beetle Busters Program satisfies the following Illinois State Goals and Learning Standards for Middle/Junior High & High School

Subject	Illinois State Goal	Concepts and Principles
English/ Language Arts: 1	Read with understanding and fluency.	<p><b>A.</b> Apply word analysis and vocabulary skills to comprehend selections.</p> <p><b>B.</b> Apply reading strategies to improve understanding and fluency.</p>
English/ Language Arts: 4	Listen and speak effectively in a variety of situations.	<p><b>A.</b> Listen effectively in formal and informal situations.</p> <p><b>B.</b> Speak effectively using language appropriate to the situation and audience.</p>
English/ Language Arts: 5	Use the language arts to acquire, assess, and communicate information.	<p><b>A.</b> Locate, organize, and use information from various sources to answer questions, solve problems, and communicate ideas.</p> <p><b>C.</b> Apply acquired information, concepts, and ideas to communicate in a variety of formats.</p>
Science: 13	Understand the relationships among science, technology, and society in historical and contemporary contexts.	<p><b>B.</b> Know and apply concepts that describe the interaction between science, technology, and society.</p>



# Day 1 Meet the Beetle

Introducing a destructive pest . . . and what YOU can do about it!

**Approximate Time:**  
45 minutes  
(1 class period)

## Day at a Glance

On Day 1, students are introduced to the ALB infestation problem by reading a real press release. They form campaign teams and begin brainstorming for community-outreach campaign projects.

### Vocabulary:

eradication  
infestation  
quarantine  
vascular system  
larvae  
host trees  
exit holes  
regulation

### Objectives

Students will be able to:

- Identify and discuss the ALB infestation problem,
- Identify successful treatment methods used thus far,
- Propose ways to promote community involvement in the eradication effort, and
- Work cooperatively to produce an effective outreach campaign.

### Advance Preparation:

- Display Poster, side 1: *Identify the Asian Longhorned Beetle.*
- Make transparency copy of *Press Release* (see page 7) — refer to Teaching Tips below.
- Divide the class into campaign teams; 4–6 students per team.
- Photocopy Activity Sheet 1: *Beetle Busters Outreach Campaign Plan* (see page 8) — one per student or team.

### Materials:

- Overhead projector
- Students:** Paper and pencils/pens for taking notes

## Part 1

Day 1

### Introduction to the ALB

#### Introduction:

Over the course of the next week, students will have the exciting opportunity to put *real* science into *real* action! They'll be learning about efforts that are being made to save local trees from a destructive insect called the Asian longhorned beetle. They will become trained "Beetle Busters" and will be going out into the field to conduct a scientific survey. And, as new "experts," students will also be working in teams to create campaigns to get others in the community involved!

#### Discussion:

1. Ask the students what they already know about the ALB. Have they heard of it? Do they know what it looks like? Have them share and discuss for a few minutes.
2. As a kick-off activity, read the *Press Release* (page 7) aloud to the students. Ask them to take notes while you read, noting important points they hear. After the reading, use the following questions to guide a class discussion:
  - What is the problem described in the *Press Release*? (ALB infesting trees)
  - What is being affected? (parks, neighborhoods, people, animals, etc.)
  - How was the ALB stopped in the past? (authorities chipped infested trees to kill beetles and burned the chips)
  - How does insecticide help eradicate the ALB? (kills adult beetles and larvae when they are feeding on the tree)
  - What can the community do to help? (search for the beetle and report findings)
 Finish the discussion by alluding to the next part of the activity, asking students:
  - What can *you* do to help? (create a campaign, spread the word!)

### TIPS

### TEACHING

- To accommodate a variety of learning styles, it may be helpful to make a transparency copy of the *Press Release* for students to read along with you.
- Prior to reading the *Press Release* aloud, you may want to conduct a short vocabulary lesson.

## Outreach Campaign Project—Brainstorming

### Introduction:

Since the ALB was first discovered in Chicago, the public has been an important partner in the **eradication** effort. In fact, it was residents of **infested** areas that first discovered the ALB! Since then, USDA's Animal and Plant Health Inspection Service (APHIS) has made great strides in eradicating the beetle—but some areas are still under **regulation**. This means that scientists have to go out and survey all the trees in those areas, looking for the ALB. They hope they won't find another ALB—but they need to know for sure.

**Explain:** *That's where you come in.* Community members are needed to go out and look for the beetle, and **report what they DO or DON'T see**. This will enable scientists to keep up with all the trees and ensure that Chicago doesn't lose any more of its trees. Starting today, students will work in teams to develop community outreach campaigns to get the community involved in looking for the ALB, thus helping to **eradicate** it.

### TIPS

### TEACHING

- You will need to guide the students throughout the planning process to ensure that the campaigns are workable (cost is low and materials are available), appropriate for the target audience, etc.
- Be sure to collect Activity Sheet 1: *Beetle Busters Outreach Campaign Plan* at the end of the period, because students will need to use them throughout the unit.

### Activity:

#### Kicking Off the Beetle Busters Outreach Campaign Plans

1. As a class, brainstorm the different ways in which people get new information. The *Press Release* discussed earlier was one example. What are some others? Make a list of the ideas presented by the students. Some examples are flyers, postcards, brochures, television or radio, posters, Web sites, and word of mouth.
2. Remind the students that they are *using real-life science to solve a real community problem*. They are learning about the ALB—and it's up to them to teach others about it.
3. Divide the students into campaign teams of 4 to 6 students to begin planning their community-outreach campaigns. Provide each team with Activity Sheet 1: *Beetle Busters Outreach Campaign Plan*. Let the students know that you will be circling the room, offering assistance where needed.
4. Students should begin by determining what they want to say, whom they want to say it to, how they want to say it (theme), and how they want to present it (flyer, poster, Web page, etc.). To help students get started, use the following list as idea-starters for campaign titles and headlines. Have the students brainstorm other ideas for creating a catchy campaign.
  - Wanted Ad/Poster: *Wanted! Dead or Alive*
  - Hippies/Retro: *Save Trees, Not Beetles* or *Hug a Tree—Not a Beetle*
  - T.V. commercials: *Got Beetles?*
  - Movies: *Dude! Where's my tree?*

### Wrap Up:

While the campaign teams are working, remind students to choose a theme that will appeal to their target audience(s). Explain that in the next few lessons, they will be learning more about the ALB and will work on incorporating the new information into their campaigns.



## **USDA TO TREAT TREES IN ILLINOIS FOR ASIAN LONGHORNED BEETLE**

CHICAGO: April 9, 2004 (updated March, 2006)—The U.S. Department of Agriculture’s Animal and Plant Health Inspection Service (APHIS) is treating approximately 89,000 trees susceptible to the Asian longhorned beetle in Illinois. On April 6, APHIS implemented its ongoing Asian longhorned beetle (ALB) Cooperative **Eradication** Program in an effort to prevent further **infestation** of this destructive pest.

The trees will be injected with the insecticide imidacloprid, which has displayed promising results in past treatments. USDA will continue to use this insecticide to treat a greater portion of the 34.5-square-mile **quarantine** area in Illinois.

Project officials will administer the treatments either by injecting the insecticide into the tree through small capsules placed at the base of the tree’s trunk or by injecting it into the soil surrounding the tree. Each site will be closely monitored. The insecticide is dispersed through the tree’s **vascular system**. This enables the insecticide to reach ALB adults feeding on small twigs and leaves and the **larvae** feeding beneath the bark of **host trees**. Imidacloprid currently is used in some over-the-counter lawn and garden products, by some lawn service companies to kill lawn grubs, and in some domestic pet treatments to kill fleas.

The ALB, native to China, bores into healthy hardwood trees and feeds on living tree tissue during the **larval** stage. Later, throughout the summer, adult beetles emerge from **exit holes** and briefly feed on the small twigs and leaves of host trees. To fight this destructive invader, agriculture officials have already removed and destroyed 1,551 trees in and around the city of Chicago.

Since the ALB was first discovered in Illinois in 1998, destroying infected trees has been the only method for controlling it. APHIS officials are optimistic that using imidacloprid will decrease beetle populations and future tree loss but advise that, if a tree is infested, it will be removed regardless of treatment. The goal is to eradicate this highly destructive insect from Illinois.

Residents can assist in the **eradication** effort by allowing project officials access to their property to treat trees. For more information on the treatment program, call 800–641–3934 or 312–742–3385. The public can also help by looking for the ALB, which is about 1 to 1.5 inches long and has a shiny, jet-black body with distinctive white spots and long antennae that are banded with black and white.

To report a sighting or nonsighting of this insect, call **800–641–3934 toll free or 312–742–3385** or visit **<http://beetlebusters.aphis.usda.gov>** on the Web.

— end —

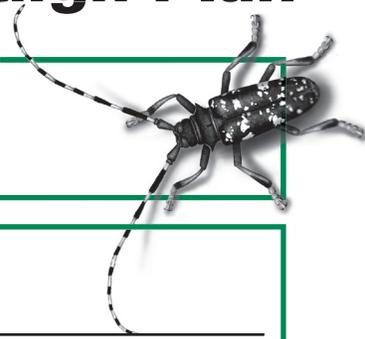
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Adapted from [http://www.aphis.usda.gov/lpa/news/2004/04/alb\\_illinois.html](http://www.aphis.usda.gov/lpa/news/2004/04/alb_illinois.html)

APHIS, USDA’s Forest Service, the Illinois Department of Agriculture, the Chicago Department of Streets and Sanitation, and the Chicago Bureau of Forestry participate in the ALB Cooperative Eradication Program.

For more information, visit the APHIS Web site at <<http://www.aphis.usda.gov>>, click on the search button, and type “ALB.”

# Beetle Busters Outreach Campaign Plan



**Team Name:**

**Team Members:**

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**Directions:**

Use this Activity Sheet to plan your campaign. Remember to pick a campaign theme that will be interesting to your target audience.

**1. Message** (what are you trying to let people know?)

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**2. Target audience** (to whom will you give the message?)

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**3. What theme has your team chosen** (a popular movie, song, commercial, etc.)?

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**4. How will you present the message** (poster, flyer, letter to officials, etc.)?

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**5. Materials** (what will you need to present the message?)

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**6. What is your plan of action for presenting your campaign?**

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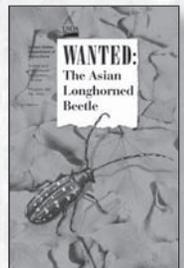
**Campaign Ideas**



Poster



Door hanger



Brochure



Tent Card



# Day 2 Get To Know the ALB

*What it is, what it does, and why it's a problem*

**Approximate Time:**

45–90 minutes

(1 to 2 class periods)

## Day at a Glance

On Day 2, students will work in cooperative learning groups to research and record specific information about the ALB. Additionally, campaign teams will continue to work on the planning phase of their Beetle Busters Outreach Campaigns.

### Vocabulary:

<i>antenna(e)</i>	<i>exotic species</i>
<i>larva(e)</i>	<i>invasive species</i>
<i>pupa(e)</i>	<i>elytra</i>
<i>surveyed</i>	<i>regulated</i>
<i>bore</i>	
<i>(non) host species/trees</i>	

### Objectives

Students will be able to:

- Work cooperatively to identify the main idea and restate the three most important details of their assigned *ALB Background Information* sections, and
- Work cooperatively to design an effective outreach campaign.

### Advance Preparation:

- Divide the class into eight cooperative learning groups. (There are eight *ALB Background Information* sections to review and research.)
- Make photocopies
  - *ALB Background Information*, pages 11–14. Note: Each student will need a copy of the group’s assigned *ALB Background Information* section.
  - Activity Sheet 2: *ALB Research Log*, page 15, one copy per student
  - Activity Sheet 3: *Beetle Busters Outreach Campaign Rubric*, page 16, one copy per student
- Display Poster, side 2: *Be a Beetle Buster and Save Chicago’s Trees!*
- Return *Beetle Busters Outreach Campaign Plans* to students (from Day 1).

### Materials:

- Scissors (to cut up *ALB Background Information* sections)

## Part 1

### Get To Know the ALB

**Day 2**

#### Introduction:

Remind students that in order to create successful campaigns, they need to know the topic! Today, they will be working together in groups to learn all about the ALB, such as: what it is, what it does, how it got to the United States, and why it’s a problem. There is a lot to learn, so each group will take one section. Students will become “experts” on their assigned section, and then, in a jigsaw grouping activity, they will teach their peers what they have learned (see nos. 3 and 4 on page 10).

#### TIPS

- Prior to this activity, it may be helpful to conduct a short vocabulary lesson.
- As students convene into groups to share knowledge from their *ALB Research Logs* (Step 5 adjacent), it is more important that students discuss the questions in depth, rather than spend the time writing. To save time, do not require written answers; or have one team member record the answers and turn it in for the whole team.

#### Activity:

1. Divide the class into eight cooperative learning groups. Assign each group one *ALB Background Information* section and pass out the photocopied sections; provide one *ALB Research Log* section to each student.
2. Have students read their *ALB Background Information* sections. Remind them to look for the main idea and three important details. Students should record their answers in Part 1 (the first section) of their *ALB Research Logs*. Allow about 10 minutes for this exercise.
3. While the students work, visit each group and have the students count off to 4, assigning them each a number.
4. Once the “experts” are prepared, have the students form four new groups: all “1”s together, “2”s together and so on. With each subject group divided up in this way, each new group will have an “expert” from every section of the *ALB Background Information*. (Note: You’ll have eight students per group in a class of 32.)
5. Have all the “experts” share their newly acquired knowledge with the other members of their new group. This should be a 1- to 2-minute presentation per student.
6. For Part 2, have the groups discuss the problem further, based on what they learned from the *Press Release* and *ALB Background Information*.

## Beetle Busters Outreach Campaign—Planning

**Introduction:**

The students are on their way to becoming trained “Beetle Busters.” They’ve done the research to learn about the ALB infestation problem and are ready to develop outreach campaigns that will spark the community to take interest too!

 **TIPS****TEACHING**

- At the end of the activity, collect the *Campaign Rubrics* and keep in a place where students can refer to them throughout the project.
- Review and provide feedback to students’ *Campaign Plans* in preparation for the next class.

**Activity:****Exploring Messages and Materials**

1. Pass out one *Beetle Busters Outreach Campaign Rubric* to each student. Explain that the rubric will be used both as a checklist for the students throughout the project and as a self-assessment tool upon project completion.
2. Display the Poster, side 2: *Be a Beetle Buster and Save Chicago’s Trees!* and point out the *Performance Elements* included. Encourage students to refer to the poster throughout the process as a model campaign; it’s a great reminder because it contains all the required elements. Remind them, though, that their campaign doesn’t need to be a poster—it could be prepared using any medium they choose.
3. Have students reassemble into their campaign teams. Ask them to scan and discuss the *Performance Elements* listed on the rubric and then brainstorm ideas for each. They should ask themselves the following questions:
  - *How can we grab the attention of our audience?* This will be the headline.
  - *How will we illustrate the ALB?* Students can draw and/or download images of the ALB, evidence of ALB, and ALB host trees at <http://beetlebusters.aphis.usda.gov>.
4. Ask the teams to make a list of the materials they will need as well as what preparations they need to make in order to create and present the campaign.
5. Have the teams complete their *Beetle Busters Outreach Campaign Plans* and turn them in for review and approval; they should also turn in their *Campaign Rubrics*, which will be used at a later time.

**Wrap Up:**

As students work to complete their *Campaign Plans*, explain that on Day 3 they will be learning how to identify the ALB in nature. The teams will then need to decide how to incorporate this new knowledge into their campaigns.

# Asian Longhorned Beetle (ALB) Background Information

**Teachers:** After determining your cooperative learning groups, photocopy the following pages. Then, cut out each section along the dotted line. Make sure each student has a copy of his/her assigned section. *Note:* Vocabulary words are highlighted in **bold**.

## Section 1

### *What Is the ALB?*

The ALB is native to China and parts of Korea and Japan. Adult beetles are big—up to 1.5 inches long—with shiny, black bodies covered with white spots. They have long **antennae**, or feelers, that are banded in black and white. These **antennae** are longer than the beetle's body. (*See 1A.*)

Like butterflies and many other insects, the ALB goes through metamorphosis. That is, the beetle changes form throughout its life, starting as an egg and then becoming a **larva**, then a **pupa**, and finally an adult. Female beetles chew into the bark of trees, where they lay their eggs. They can lay from 35 to 90 eggs.

When an egg hatches, the immature beetle, or **larva**, which is wormlike, chews a tunnel into the center of the tree. (*See 1B.*) The larva feeds on the heartwood deep inside the tree and continues to grow until it becomes a **pupa**, the nonfeeding transition stage between **larva** and adult. (*See 1C.*)

The **pupa** develops into an adult ALB and chews its way out of the tree. Adult beetles can be seen from late spring through fall, eating twigs and leaves and searching for mates.



**1A** ALB adult



**1B** ALB larva



**1C** ALB pupa

## Section 2

### *What Does the ALB Do?*

The ALB loves to eat wood. Some of its favorite tree species are maple, elm, willow, poplar, birch, sycamore, ash, hemlock, and horsechestnut. These trees are called **host species**. When feeding, the beetles **bore**, or chew tunnels, into the wood. The **larvae** feed on the living tissue of the tree, which prevents sap from flowing through the tree. Without the flow of sap, the tree cannot move water and nutrients easily between its roots and its branches and leaves. When the population of beetle **larvae** on and in a tree is large, the tree will be killed quickly.

Even if only a few beetles **bore** into a tree, other harmful insects and diseases can use those holes to get inside the tree and weaken or kill it. The ALB has been responsible for the destruction of more than 11,000 trees in New York, New Jersey, and Illinois since it was first discovered in the United States in 1996.

## Section 3

### *How Did the ALB Get to the United States?*

The ALB is not native to the United States. Scientists believe that the beetle “hitchhiked” to this country in wooden crates and pallets and other wooden packing materials used to import cargo and products from Asian countries. (See 4A.) That scenario is possible because the ALB **larvae** and **pupae** live inside the wood of trees.

Some of the **larvae** and **pupae** can survive the process of chopping down a tree, cutting it into lumber, and building a crate. They can then be shipped, along with the cargo contained in the crate, to other countries. In the United States, the beetles emerged from the wood of the crates and moved into the trees of several cities.

They were first discovered in Brooklyn, NY, in 1996 and soon spread to Long Island, NY. In 1998, they were found in Chicago, and in 2002 and 2004, they were found in several cities in New Jersey. Once inside the United States, the ALBs can spread by flying up to 400 yards to new trees, or they can be moved unintentionally to new areas through infested firewood, wooden crates, or other wooden materials.



**4A** ALB “hitchhiked” in shipping crates.

## Section 4

### *Why Is the ALB a Problem?*

In the United States, the ALB is an **exotic** and **invasive species**. An **exotic species** is one that does not occur naturally in the U.S. The predators, diseases, and environmental conditions that keep the ALB’s population under control in its native land do not occur here. An **invasive species** is one that spreads readily. This situation means that beetle populations can increase quickly and destroy thousands of trees in a short time.

Because the ALB attacks many different tree species, it could greatly disrupt forest ecosystems by changing the types of trees found in a forest. That, in turn, could change the types of animals living there. The ALB could hurt industries that depend on wood, such as the lumber and furniture industries. The maple syrup industry could also be harmed because the beetle loves to feed on maple trees. It is estimated that if the ALB infestation is not stopped, these industries could lose more than \$41 billion.

Trees in urban and suburban areas provide beauty and shade, improve air quality, and shelter animals like birds, squirrels, and native insects. If trees become infested with the ALB, those trees must be cut down and destroyed, which decreases the quality of life of the people living nearby.

## Section 5

### *How Can an Infestation Be Identified?*

Because the ALB is large and has distinctive white markings on its **elytra**, or wing case, the beetle is easy to identify when it is flying and moving around, from late spring through fall.

The beetles also leave characteristic signs of their presence that are easy to identify. When the female beetle chews into the bark to lay her eggs, she leaves a round or oval scar, or wound, in the tree that can be seen from the ground. (See 5A.) The exit holes, created when an adult beetle emerges from a tree, are perfectly round and about the size of a dime. (See 5B.) A tree infested with ALBs may also have yellow and drooping leaves or dead branches. (See 5C.)

Because the beetles are often in the upper parts of the tree, binoculars can make it easier to spot these signs. Inspectors from local, State, and Federal agencies will also climb trees or use bucket trucks to get a better look at both the tops of trees and the upper portions of the tree branches that may not be visible from the ground. (See 5D.)



**5A** Tree scar left by an ALB.



**5B** ALB exit hole.



**5C** Drooping yellow leaves.



**5D** ALB tree surveyors.

## Section 6

# How Is the ALB Being Controlled and Eliminated?

When an infested tree is found, a **quarantine** area is created and local, State, or Federal inspectors survey all **host trees** (trees that the ALB might infest) in that area. The **quarantine** forbids people to remove wood materials (e.g., logs, stumps, branches, or firewood) from the area. Putting an area under **quarantine** decreases the chance that individuals may accidentally spread the beetle to a new location.

The first **quarantine** areas in Illinois included a total of 35 square miles in and around Chicago.

Infested trees are cut down and turned into wood chips, and the chips are burned, all without removing the trees from the **quarantine** area. Field crews also grind up the stumps of the trees to several inches below the soil surface.

When the beetle was first detected in Ravenswood, 450 infested trees were found and destroyed in just a few days. Since then, a total of 1,551 trees have been cut down in the Chicago **quarantine** areas. (See 6A and 6B.)

When the beetle was first discovered in the United States, all uninfested **host trees** near an infested tree had to be removed to prevent the ALB from spreading. However, in 1999, a chemical treatment was found to be effective in the treatment of healthy host trees. The insecticide, imidacloprid (ih-mid-uh-KLO-prid), is injected into the base of the tree or into the soil around the tree. (See 6C.) The tree takes up the insecticide through its roots and transports it throughout the wood and leaves. Any ALB that then tries to eat part of the tree will also eat some of the insecticide and die. Since 2000, there have been 286,796 trees treated in Illinois.

After treatment, **host trees** in the **quarantine** areas are watched carefully for new signs of the ALB. Areas that have no new sightings of the beetle for at least 2 years straight can be taken out of **quarantine**. As of April 2005, all areas in Illinois except Oz Park in Chicago have been removed from **quarantine**, reducing the **quarantine** area to 9 square miles. (See 6D.) These areas will continue to be **surveyed** for an additional two years. If no new beetles are found, the ALB will be considered completely eradicated from this area.



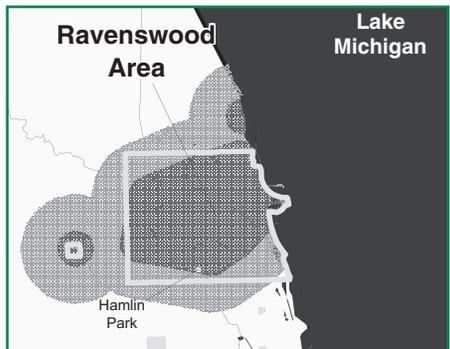
6A Tree being destroyed by ALB.



6B A quarantined area: before and after.



6C Healthy host tree being injected with insecticide.



6D Quarantine areas in Chicago.

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## Section 7

### *What Can Be Done To Prevent New ALB Infestations?*

Since the first **infestations** in New York City and Chicago, all wood packing material being imported from Asia is required to be fumigated or heat-treated before it is shipped to the United States. These materials are also inspected for the ALB before they can enter the U.S. (See 7A.)

The **quarantines**, the quick removal of infested trees, and the treatment of healthy **host trees** with insecticide have helped prevent the ALB from spreading to new areas. **Host trees** that have been removed are being replaced with **nonhost species** so that any potentially remaining ALBs will not have a nearby source of food and shelter. So far, all of these procedures seem to have been successful in preventing new areas in the United States from becoming infested.



**7A** Cargo being inspected

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## Section 8

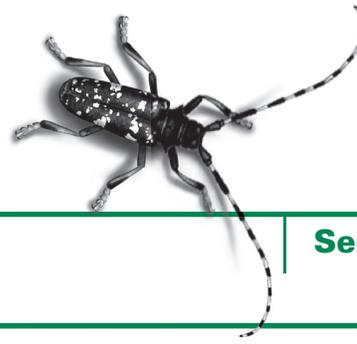
### *What Can the Public Do To Help?*

From the beginning, the public has been essential in finding and fighting ALB **infestations**. Because the beetle and the signs it leaves are unique, people can easily see and identify a tree that may be infested. Most of the ALB sightings by residents have not been on trees, but rather on adjacent surfaces, such as window ledges, outdoor furniture, sidewalks, light poles, and fireplugs. In fact, local residents discovered most of the initial **infestations**, and ordinary citizens—not scientists or experts—continue to be important partners in watching for new ones.

All households with **host trees** are encouraged to check their trees for signs of the ALB. Specifically, communities are encouraged to be “Beetle Busters” by learning how to identify the beetle, learning how to notice evidence of the ALB on trees, knowing where to look, and knowing whom to tell whether they **did** or **did not** spot the ALB. Everyone, from the very old to the very young, can learn to watch out for the ALB—and together we can save our communities from the destruction that this beetle could cause to our trees, neighborhoods, and environment.

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# ALB Research Log



Name: \_\_\_\_\_

Section: \_\_\_\_\_

## Part 1

**Directions:** Read your assigned section and then with your group, identify the **main idea** and **three important details** that you will share in your new group later.

Main idea: \_\_\_\_\_

Important detail # 1: \_\_\_\_\_

Important detail # 2: \_\_\_\_\_

Important detail # 3: \_\_\_\_\_

## Part 2

**Directions:** In your new group, share the main idea and the three most important details you recorded above and then discuss the following questions:

1. What do we know about the Asian longhorned beetle? \_\_\_\_\_

\_\_\_\_\_

2. Why is the loss of trees a problem? \_\_\_\_\_

\_\_\_\_\_

3. What is the importance of trees? \_\_\_\_\_

\_\_\_\_\_

4. What is the major difference between deregulation (removing an area from ALB quarantine) and complete eradication? \_\_\_\_\_

\_\_\_\_\_

5. How can we reduce the threat? \_\_\_\_\_

\_\_\_\_\_

6. How can we teach others how to reduce the threat? \_\_\_\_\_

\_\_\_\_\_

## Beetle Busters Outreach Campaign Rubric

**Directions:** First, use this rubric as a checklist for your outreach campaign. With your team, read the Performance Elements below and the corresponding points possible. Be sure your outreach campaign includes all the elements. After your team has completed the outreach campaign, you will be asked to fill out the points earned for each element and add up your score. The teacher will use your rubric to grade your performance in the Beetle Busters unit.

Performance Element	No Attempt 0	Low Performance 1	Average Performance 3	Exemplary Performance 5	Points Earned
<b>Campaign Planning</b>	Students made no attempt to meet the objective.	Students did not complete the brainstorming process.	Students completed the brainstorming process, but the plan is not clear and/or attainable.	Students brainstormed a thoughtful, attainable campaign plan.	
<b>How To Identify, Survey and Report; Beetle Busters Web site (visual and/or written)</b>	Students made no attempt to meet the objective.	Student campaign is missing more than one of the listed requirements.	Student campaign is missing up to one of the listed requirements; the requirements included are clear and understandable.	Student campaign includes listed requirements in a clear and understandable manner.	
<b>Picture of ALB (student-drawn or downloaded)</b>	Students made no attempt to meet the objective.	Campaign is missing a clearly visible and accurate image of the ALB.	Campaign includes an image of the ALB, but it lacks visibility or accuracy.	Campaign includes a clearly visible and accurate image of the ALB.	
<b>Headline (a bold title that grabs the viewer's attention)</b>	Students made no attempt to meet the objective.	Campaign is missing a clear and effective tagline.	Campaign includes a tagline, but it is not clear or effective.	Campaign includes a clear and effective tagline.	
<b>Originality and Creativity in Design</b>	Students made no attempt to meet the objective.	Campaign design lacks originality and/or creativity.	Campaign design includes some creativity and originality.	Campaign design is highly creative and original.	
<b>Teamwork</b>	Students made no attempt to meet the objective.	One or two people did all or most of the work; two or more conflicts arose between team members.	Most team members contributed their fair share of work, and/or up to one conflict arose between team members.	The workload was divided and shared equally by all team members; teams worked without conflict.	
<b>Community Outreach</b>	Students made no attempt to meet the objective.	Students attempted to plan and present their campaign but were unsuccessful.	Students planned and presented their campaign to an outside group but lacked a clear objective and/or a handout.	Students planned and presented their campaign to an outside group with a clearly met objective and a handout.	

Name: \_\_\_\_\_

Points earned: \_\_\_\_\_

Points possible: \_\_\_\_\_

35



# Day 3 Identify the ALB

Learning about the beetle and revising outreach campaign plans

**Approximate Time:**

45 minutes

(1 class period)

## Day at a Glance

On Day 3, students will learn about identifying the ALB, evidence of ALB, and ALB host-tree species. Additionally, campaign teams will begin designing their campaigns.

### Vocabulary:

identify  
evidence  
host  
characteristics

### Objectives

Students will be able to:

- Identify the ALB,
- Identify ALB host trees,
- Identify evidence of the ALB, and
- Work cooperatively to revise campaign plans according to teacher feedback.

### Advance Preparation:

- Review the *Beetle Busters Outreach Campaign Plans* and provide feedback to guide the students.
- Review students' needed materials for availability; make recommendations for acquisition.
- Have Poster, side 1: *Identify the Asian Longhorned Beetle* available to display for Discussion #5.

### Materials:

- Flip-chart paper, 2–3 sheets

## Part 1

### Identifying the ALB

Day 3

### Introduction:

To be successful Beetle Busters, students need to know how to locate and identify the ALB. Today, they will spend some time reviewing what they know about the ALB, and learning how to locate the ALB in nature.

### TIPS

TEACHING

- As you work with the students, check for their understanding of vocabulary words and any other new words discussed earlier.

### Activity:

1. Ask the class: *How can we identify the ALB?* Make a list of these **characteristics** on chart paper. Encourage students to mention all the distinguishing **characteristics** that they can remember from their research. The students who were “experts” in this area should provide the most examples.
2. Next, ask students to remember what trees the ALB uses as a **host**. Again, make a list on chart paper. Encourage students to remember the *names* of the trees as well as any distinguishing **characteristics** they may know of.
3. Ask the students to describe **evidence** of ALB infestation of a tree. What kind of signs would a surveyor see? Again, make a list on chart paper.
4. Ask students to name at least three places, other than a tree, where they might see an adult ALB.
5. Display the Poster, side 1: *Identify the Asian Longhorned Beetle*. Have the class look at the poster and compare their lists of information with the information on the poster. Make changes/additions to the lists as necessary.

# Beetle Busters Outreach Campaigns—Making Revisions

## Introduction:

Now that the students are more familiar with the appearance of the beetle and evidence of its infestation of trees, they can begin to think about how to incorporate this knowledge into their outreach campaigns.



### TIPS

### TEACHING

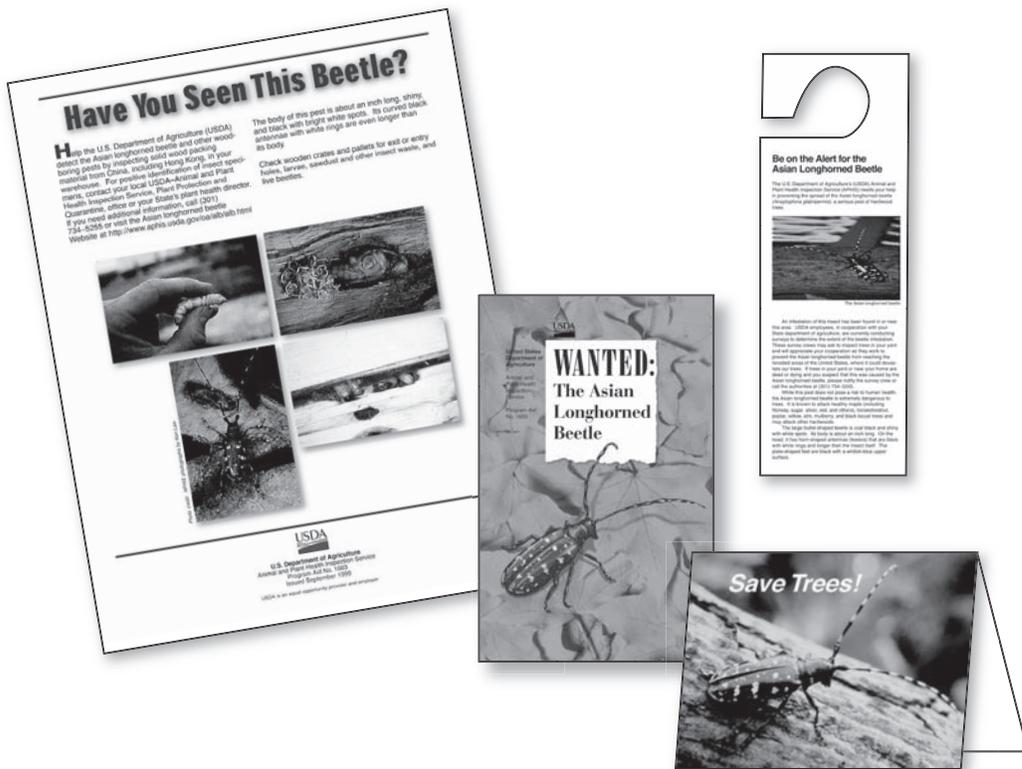
- The Web site <http://beetlebusters.aphis.usda.gov> is a great place for images, sample campaigns and additional information.

## Activity:

1. Ask teams to review teacher feedback on their *Beetle Busters Outreach Campaign Plans* and make adjustments to them, if needed.
2. Circle the classroom to answer individual group questions and to approve final *Campaign Plans*.
3. Have students spend the rest of the period working on designing their campaigns and creating the necessary materials. If available, allow teams to work on computers; they can find images to use within their campaigns and print them at <http://beetlebusters.aphis.usda.gov>.

## Wrap Up:

As the students work on designing their campaigns and creating the materials they need to deliver their messages, explain that in Day 4, they will be learning how to survey for the ALB and how to report a sighting and nonsighting. This knowledge will be an important element to include in their campaigns.





# Day 4 Go Beetle Busting!

Let's take a look . . . and make a difference!

**Approximate Time:**

45–90 minutes

(1 to 2 class periods)

## Day at a Glance

On Day 4, students will go outside and “Beetle Bust”! Afterward, they will report their sightings and/or nonsightings to USDA.

### Vocabulary:

survey  
data  
nonsighting

### Objectives

Students will be able to:

- Conduct an ALB survey, and
- Report findings (sighting or nonsighting).

### Advance Preparation:

- Make arrangements for the class outing (chaperones, survey location, etc.).
- Photocopy Activity Sheet 4: *Beetle Busters Report Form*, one per student.
- Photocopy the *Family Take-Home Flyer: Support the Beetle Busters!* (see page 23), one copy per student.
- As followup, make extra copies of the *Report Form* for students to take home.

### Materials:

- *Asian Longhorned Beetle ID Cards* (included in kit), one per student
- *Beetle Busters Report Form*, one per student
- One clipboard per student, if available
- Computer with Internet access (at least one)

## Part 1

### Get Ready!

Day 4

#### Introduction:

Announce to the class that today they’ll have a chance to use their newly acquired knowledge to go Beetle Busting. Kick off the day by working with the class to define the words **survey**, **sighting**, and **nonsighting**.

#### TIPS

#### TEACHING

- If surveying in one small area, you may want to have students complete all or most of the *Report Form* prior to—or when returning from—the outing. This way, they can focus primarily on the surveying without unnecessary distraction.

#### Discussion:

1. Ask the students to remember why they are learning all about the ALB. Elicited answers can be discussed briefly. Remind the students that to help eradicate the beetle, they should
  - **Survey** for the ALB from late spring through fall. Survey their schoolyard, parks, backyard, and anywhere else they go!
  - Report all findings. Whenever students do an ALB survey, make sure they report—whether they saw an ALB or NOT!
  - Pass their Beetle Busting skills on to others. Teach their family and friends about the ALB and encourage them to survey and report, too!
2. Before going outside to survey, remind them that Chicago quarantine areas must go through four years of surveying without spotting a beetle before they are considered to be free of the ALB. That is why a **nonsighting** of an ALB is just as important as sighting one, because it adds to the collection of **data**, or information, that will help eradicate the ALB.
3. Pass out one *Asian Longhorned Beetle ID Card* to each student, along with a copy of Activity Sheet 4: *Beetle Busters Report Form* and a clipboard (if available). Review the directions on the *Report Form* as a class. (Remind students that, while conducting the survey, they will need to record where they are surveying.)

## Go Beetle Busting!

### Introduction:

As the class prepares to go outside, make sure each student has a pencil or pen, a *Report Form*, a clipboard or hard surface to write on, and an *Asian Longhorned Beetle ID Card*. Then, divide the class into small groups, according to the number of chaperones. Now the class is ready to go Beetle Busting!

### Activity:

1. Lead the class to an outside location that has trees. Walk through the surveying process as a whole-class activity. As you go, point out other types of places where the ALB has been seen by local residents (benches, car hoods, etc.).
2. If possible, after surveying together as a class, split the class into small groups and send them to different areas to survey on their own.
3. When the students have finished surveying, return to the classroom to report the sightings and nonsightings. Together, fill in the *Report Forms*. Ideally, the class will submit its reports online at <<http://beetlebusters.aphis.usda.gov>>. If a computer is available, have the class observe as you model how to complete the online reporting form correctly. Then, have students use the computer to do their own reporting.

### TIPS

### TEACHING

- To ensure a safe and fun outing, it may be helpful to remind the class of the behavior expectations you have for them.

### Wrap Up:

After reporting is done, tell the class that you will have extra *Report Forms* available; encourage the students to take copies with them and continue to survey at home, on their way to school, or while playing in neighborhood parks. To encourage surveying beyond this lesson, this can be assigned as homework. Hand out one *Family Take-Home Flyer: Support the Beetle Busters!* to each student and encourage them to get their families involved today!

# 4

## Beetle Busters Report Form

**Directions:** Answer each question. Be sure to write neatly!

Your name: \_\_\_\_\_

Parent/Caregiver name: \_\_\_\_\_ Phone #: \_\_\_\_\_

School name: \_\_\_\_\_ School Zip code: \_\_\_\_\_

Teacher's name: \_\_\_\_\_ Grade: \_\_\_\_\_

Date you searched: \_\_\_\_\_

Street address of property you searched: \_\_\_\_\_

Zip Code of property you searched: \_\_\_\_\_

Location of tree(s) on property (front yard, back yard, etc.): \_\_\_\_\_

Did you see an Asian longhorned beetle or evidence of ALB at this location? Circle your answer. Yes / No

**Then:** Send it in!

**Mail it to:**  
USDA APHIS-PPQ  
3920 N. Rockwell St.  
Chicago, IL 60618

Or

**Fax it to:**  
312-742-3389

Or

**Go online to:**  
<http://beetlebusters.aphis.usda.gov>  
and complete it there!



# Day 5 Complete Your Outreach Campaigns

*Getting the ALB Message Out*

**Approximate Time:**

45–90 minutes

(1 to 2 class periods)

## Day at a Glance

On Day 5, students will work to complete their *Outreach Campaigns*. Once finished, students will assess their individual performance within their campaign teams, using the *Campaign Rubric*.

### Objectives

Students will be able to:

- Work cooperatively to finish designing an effective campaign, and
- Assess individual student performance.

### Advance Preparation:

*Students:*

- Prepare materials necessary for completion of campaigns.

*Teacher:*

- Display Poster side 2: *Be a Beetle Buster and Save Chicago's Trees!*

### Materials:

- *Beetle Busters Outreach Campaign Rubric*, photocopied previously

## Part 1

### Beetle Busters Campaigns—Completion

**Day 5**

#### Introduction:

Today, campaign teams will work to complete their campaigns. Before the students begin, remind them about the importance of including the information they learned about identifying the ALB, and surveying and reporting all ALB sightings and nonsightings. Tell students that they should refer to the *Campaign Rubric* to be sure they have included each *Performance Element*.

#### Activity:

1. Reassemble students into their campaign teams. Try to give students most of the period to complete their campaigns. As they work, you should circulate among the groups to assist as needed.
2. Once students have finished their campaigns, come together as a class to discuss what the next steps should be in implementing their campaigns in the community:
  - Will the class choose one project and implement it as a group?
  - Will each group implement its own project?
  - How will the students make sure that beetle sightings and nonsightings are reported? (Presentations should include a handout with information on how to search and report.)
3. As a class, brainstorm the next steps needed to present the campaigns to an outside group. Assign tasks to individual students where appropriate. Students who belong to clubs and other organizations could ask for permission to present their campaigns. (See Extension Day 5, Organizing a Campaign Presentation.)

#### TIPS

#### TEACHING

- Since campaign presentations require a student-made handout, you may want to dedicate one additional period for the campaign teams to complete this; or assign it as homework.

#### Wrap Up:

Upon completion of the project, encourage students to take time to reflect upon what they have done and learned. Have them assess their individual performance on the *Beetle Busters Outreach Campaign Rubric* and then turn it in. This may be done as homework or as an inclass activity.

# High School Extensions

## Day 1: Trees and the Economy

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### *Examining the Role of Trees in Our Society*

**Activity:** In small groups or individually, have students research the role of trees in society and some of the threats to tree survival. Give them some starting points such as: lumber, recreation, aesthetics, habitat, energy use, etc.

**Assessment:** Students can prepare a written report or an oral/visual presentation using scientific research to defend their position.

## Day 3: Compare/Contrast

---

### *Looking at Other Longhorned Beetles . . . and Beyond*

**Activity:** Have students research other longhorned beetles and compare/contrast biology and signs of evidence, damage they cause, etc. Students can refer to the following Web sites for helpful information: [www.uvm.edu/albeetle/identification/index.html](http://www.uvm.edu/albeetle/identification/index.html) and [http://www.na.fs.fed.us/fhp/alb/pubs/alb\\_cb/alb\\_cb.htm](http://www.na.fs.fed.us/fhp/alb/pubs/alb_cb/alb_cb.htm).

**Activity:** Have students research the biology of other animals that can create holes or wounds in a host tree. Spend time familiarizing the students with squirrels, woodpeckers/sapsuckers, leopard moths, carpenter bees, carpenter ants, and other woodborers.

**Assessment:** Students can share their findings in a report or prepare a visual presentation on poster boards or a slide show.

## Day 5: Organizing a Campaign Presentation

---

### *From the Class to the Community*

**Activity:** Each team can plan a short presentation of its campaign for the class. As the other students watch the presentations, they should think about the following **Presentation Critique Questions** and be prepared to make constructive suggestions for each presenting group about how their campaigns could be improved.

- Is the presentation appropriate for the target audience?
- Will it be effective (why or why not)?
- What about the campaign is good?
- What could be improved?
- Are all the *Campaign Rubric's* requirements met? (e.g., does the campaign address how to survey and report, identify, etc?)

**Assessment:** Encourage students to seek more publicity for their campaigns by approaching local media outlets such as newspapers, radio, and television. Teachers will need to help students gain the appropriate permissions and materials needed. You may want to offer extra credit to students who seek out groups and community organizations that will receive a presentation.

## Day 5: Technology in the Beetle Busters Campaign

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### *Reaching Further with Computer Technology and the Web*

**Activity:** With extra time dedicated, outreach campaigns could be more sophisticated and could include a number of enhancements. Working with a technology teacher, the students could create PowerPoint® presentations or design basic Web sites to showcase their campaigns.

# Support the Beetle Busters!

## Dear Parent/Caregiver:

Your child is currently learning about the invasive Asian longhorned beetle (ALB) at school. Since arriving in Chicago from Asia in 1998, the ALB has been responsible for the destruction of more than 1,500 of Chicago's trees.

- We ask that you join your child in **learning** about the ALB—and support his or her efforts to raise awareness about the danger the beetle poses to our trees.
- Remind your child to **report** what he/she finds—**whether or not he/she spotted an ALB**.
- Try going Beetle Busting together! Encourage the whole family to search for the beetle in your neighborhood this **summer and fall**.

*Thanks for supporting the Beetle Busters. Your family's participation will help save Chicago's trees!*

Sincerely,  
 Your friends at USDA

## The ALB: What You Need To Know

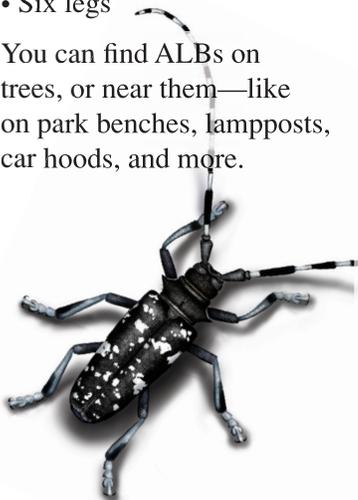
The Asian longhorned beetle (ALB) is a destructive pest that kills trees. Here's what you need to know to support your child's Beetle-Busting work:

### The Beetle:

#### How Do I Recognize It?

- Shiny black body
- White spots
- Long black-and-white banded antennae
- Six legs

You can find ALBs on trees, or near them—like on park benches, lampposts, car hoods, and more.



### Which Trees?

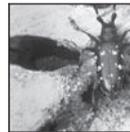
The ALB grows and reproduces within hardwood trees, such as:

- Maple,      • Sycamore,
- Elm,        • Ash,
- Willow,    • Hemlock, and
- Poplar,    • Horsechestnut.
- Birch,

### What Kind of Evidence?

ALBs can leave characteristic signs on these trees, including:

- Round or oval scars on bark,
- Dime-sized exit holes, and
- Yellowing or drooping leaves or dead branches.



### The Lifecycle

The ALB begins life as an egg, hatches into a larva that tunnels into a tree, transforms into a pupa, and then drills its way out of the tree as a mature beetle. The ALB is visible from late spring through fall.



larva



pupa



beetle

## Surveying and Reporting

- Your child/family can search in your yard, on your street, throughout your neighborhood, and in local parks.
- Kids/families should report all sightings and nonsightings at <http://beetlebusters.aphis.usda.gov> or by calling 800-641-3934 or 312-742-3385 — whether or not they find an ALB.

**Report all surveys at: <http://beetlebusters.aphis.usda.gov> or call 800-641-3934 or 312-742-3385**

*Support your child's Beetle Busting this spring, summer and fall.*



## Advisors

Notebaert Nature Museum of the  
Chicago Academy of Sciences  
Advisory Panel:

**Doug Widener**  
*Vice President, Education*

**Debbie Steinberg**  
*Outreach Programs Coordinator*

**Steven M. Sullivan**  
*Natural History Collections Manager*

**Becky Ammann**  
*Museum Educator*

**Rafael Rosa**  
*Manager of Student and Teacher Programs*

**Christine Brabender**  
*Vice President, External Affairs*

Educator  
Advisory Panel:

**Tom Kearney**  
Andrew High School  
Tinley Park, Illinois

**Tom Dix**  
Aspira Haugan Charter Middle School  
Chicago, Illinois

**Marvin Nochowitz**  
Haines Elementary School  
Chicago, Illinois

**Eloise O'Connor Roche**  
Carl Schurz High School  
Chicago, Illinois

<http://beetlebusters.aphis.usda.gov>

*Using real-life science to solve a real community problem.*



United States Department of Agriculture

