



# BeetleBusters

## An Educator's Guide To Stopping the **Asian Longhorned Beetle**



**Smart Searchers**

*Upper Elementary and  
After-School/Summer Unit*



**Community Leaders**

*Middle and  
High School Unit*



United States Department of Agriculture  
Animal and Plant Health Inspection Service

Issued February 2011  
Program Aid No. 2072



Dear Educator,

**We need your help to save America's trees.** The Asian longhorned beetle (ALB), an invasive species, has infested trees in New York, New Jersey, Illinois, and Massachusetts. **Tens of thousands of trees have been killed or cut down** to try to stop the spread of this harmful pest. Shady cities in New York, New Jersey, Illinois, and Massachusetts have been devastated, and the beauty of our forests and the resources they provide are in danger. Through the cooperation of Federal, State, and local governments and community members, we have successfully eradicated ALB from Chicago, IL, and Hudson County, NJ.

**Community action is critical to stopping the ALB** and the other invasive animals and plants that threaten our environment. Thus far, every infestation was reported first by an alert community member. Here's where your students can help, for there are few community members that are more alert, more active, and more engaged outdoors than your students.

We offer you this fun, inquiry-based program to **empower your students to play a central role in saving your community's trees** while learning important science concepts. Through these flexible, standards-based units—one for Upper Elementary and After-School/Summer Programs, and one for Middle School and High School—you will **easily meet your curricular needs** while challenging your students to apply their knowledge and make a difference in their community.

We look forward to seeing you and your student "Beetle Busters" searching in your backyards, neighborhoods, parks, and forests and raising awareness about the ALB in your communities, in-person, and online.

Sincerely,

National Program Director  
Asian Longhorned Beetle Eradication Program  
Plant Protection and Quarantine



### Special Bonus!

We've enclosed a classroom quantity of **ALB Bookmarks** to share with/engage your students. The bookmarks show the characteristics of the ALB, its host trees, and the signs of ALB infestation. You may wish to use the bookmarks as a program kickoff, or distribute them at a time of your own choosing as you and your students work through the Beetle Busters activities together.

# BeetleBusters

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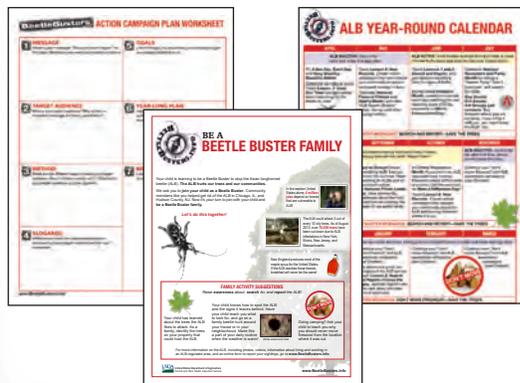
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## Look Here First!

Before using this guide, we suggest you get to know the **Asian longhorned beetle**, otherwise known as the “ALB,” by going to the Beetle Busters Web site at: [www.BeetleBusters.info](http://www.BeetleBusters.info).

There, you'll find information on the ALB's history, current whereabouts, identifying features, and signs of infestation, along with news on current actions to regulate and eradicate the ALB. The site also has a special section just for educators—[www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)—with supplemental educational resources, photos, videos, and links to other sites where you can learn more.



You can also get the latest updates by following the ALB on Facebook ([www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle)) and Twitter (<http://twitter.com/beetlebusters>)!



## Make This Guide Work for You

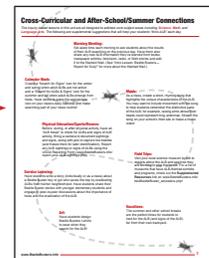
### 1) Choose your grade-appropriate unit.



← You can teach these units sequentially in 1 week, or you can pick and choose activities throughout the year.

Each unit also has **Cross-Curricular Connections** → to take the learning further.

Check out the **ALB Year-Round Calendar** (see p. 32). It offers timing suggestions for teaching the lessons throughout the year.



### 2) Review the integrated components of the program.

The **Classroom Poster** and **ID Card** provide key ALB information at-a-glance while serving as essential components for the lessons in each unit.

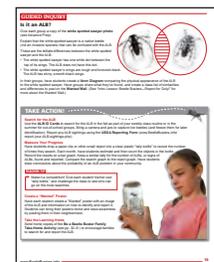
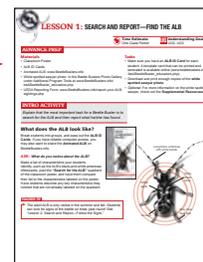
The poster is divided into quadrants. As you teach the unit, you → will “build” the poster as you go, revealing a new quadrant once you have completed the lesson in which it is used. Or, in some cases, you might post the quadrant during the lesson as a visual teaching tool.

Students will start by using the → **ID Card** during the lessons. Afterward, it can be attached to a key chain or slipped into a pocket, enabling students to “take the learning with them” as they search for the ALB.



### 3) Start your ALB adventure!

Each lesson has **Introductory, Guided Inquiry, and Take Action** → components that will enable your students to show what they know. In addition, the lessons are easy to teach, with **Advance Prep** sections and **Supplemental Resources** to make the most out of each one!



## UG UNDERSTANDING GOALS

The Understanding Goals (UG) described in this section and the lessons that support them are aligned with The National Academies Press's National Science Education Standards (NSES), as well as The National Council of Teachers of English and The International Reading Association's *The Standards for the English Language Arts* (NCTE/IRA). The North American Association for Environmental Education's (NAAEE) *Excellence in Environmental Education—Guidelines for Learning (Pre K-12)*, and the standards for 21st Century Skills were also consulted throughout program development.

**UG 1** Students will understand how the invasive ALB can have a large impact on their lives and their communities.

### STUDENT VERSION

*Why should I care about the ALB?*

### STANDARDS

- **NSES:** Content Standards A, C, F, G
- **NCTE/IRA:** 4, 5, 6, 7, 8

**UG 2** Students will understand how, when, and where to search for the ALB (and the signs of its activity) and how to prevent the beetle from spreading to other communities.

### STUDENT VERSION

*Where is the ALB now? How can we stop it?*

### STANDARDS

- **NSES:** Content Standards A, C, F, G
- **NCTE/IRA:** 4, 5, 6, 7, 8

**UG 3** Students will understand how to mobilize their peers, family, and community members to search for, raise awareness about, and eradicate the ALB.

### STUDENT VERSION

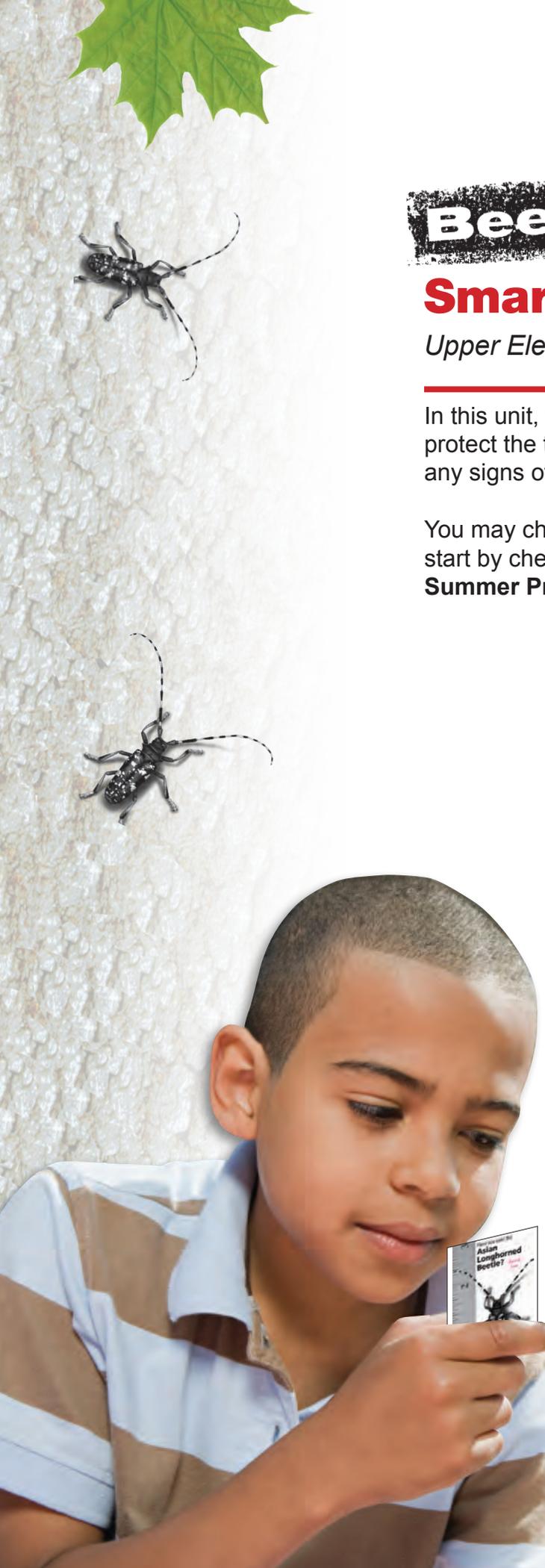
*What can I do about the ALB?*

### STANDARDS

- **NSES:** Content Standards A, C, F, G
- **NCTE/IRA:** 4, 5, 6, 7, 8, 11, 12

**For detailed explanations of the standards cited, go to:**

- NSES: [www.nap.edu/openbook.php?record\\_id=4962&page=1](http://www.nap.edu/openbook.php?record_id=4962&page=1)
- NCTE/IRA: [www.ncte.org/standards](http://www.ncte.org/standards)
- NAAEE's *Excellence in Environmental Education—Guidelines for Learning (Pre K-12)*: [www.naaee.org/npeee/learner\\_guidelines.php](http://www.naaee.org/npeee/learner_guidelines.php)
- 21st Century Skills: [www.21stcenturyskills.org](http://www.21stcenturyskills.org)



# BeetleBusters

## Smart Searchers

*Upper Elementary With After-School/Summer Connections*

In this unit, your students will become **Beetle Busters**, helping to protect the trees in their communities by searching for and reporting any signs of the Asian longhorned beetle (ALB).

You may choose to begin with the lessons starting on page 8, or start by checking out the **Cross-Curricular and After-School/Summer Program Connections** on the next page.

### **SPECIAL NOTE**

*for After-School/Summer Educators:*

This Beetle Busters program offers a number of activities suitable for Scout Troops, 4-H, Boys and Girls Clubs, Girls Inc., summer camps, and other after-school/summer programs.

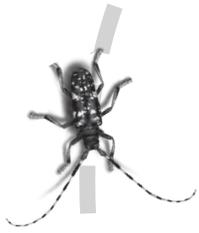
This handy symbol highlights active lessons that can be accomplished with minimal prep time. Look for it throughout this unit!



**Scouting and 4-H Groups:** Wondering what specific badges and activities might connect to the ALB? Check under **Additional Program Tools** on [www.BetleBusters.info/beABetleBuster\\_educators.php](http://www.BetleBusters.info/beABetleBuster_educators.php) for a complete list!

# Cross-Curricular and After-School/Summer Connections

The inquiry-based lessons in this unit are all designed to address core subject areas including **Science, Math, and Language Arts**. The following are supplemental suggestions that will help your students “think ALB” each day.



## Morning Meeting:

Set aside time each morning to ask students about the results of their ALB searching on the previous day. Have them also share any new ALB information they’ve learned from books, newspaper articles, television, radio, or Web stories and add it to the Wanted Wall. (See “Intro Lesson: Beetle Busters—Report for Duty!” for more about the Wanted Wall.)

## Calendar Work:

Create a “Search for Signs” icon for the winter and spring when adult ALBs are not active and a “Search for ALBs & Signs” icon for the summer and fall when adult ALBs emerge from trees. Have students place the appropriate icon on your class’s daily calendar and make searching part of your class routine!



## Music:

As a class, create a short, rhyming song that highlights the unique characteristics of the ALB. You may want to include movement with the song to help students remember the distinctive parts of the ALB; for example, raising arms above their heads could represent long antennae. Stream the song on your school’s Web site or make a music video!

## Physical Education/Sports/Recess:

Before, during, or after physical activity, have an “ALB break” to check for ALBs and signs of ALB activity. Bring a camera to document sightings and signs, along with jars to capture live beetles (and freeze them for later identification). Report any ALB sightings or signs of ALBs using the USDA Reporting Form ([www.BeeleBusters.info/report-your-ALB-sightings.php](http://www.BeeleBusters.info/report-your-ALB-sightings.php)).

## Service Learning:

Have students write a story (individually or as a class) about a Beetle Buster boy or girl who saves the day by eradicating ALBs from his/her neighborhood. Have students share their Beetle Buster stories with younger elementary students and engage in peer-to-peer discussions about the importance of trees and the eradication of the ALB.

## Field Trips:

Visit your local science museum to talk to experts about the ALB and see how they are working to stop the beetle. For a list of museums that have ALB-themed exhibits and programs, check out the **Supplemental Resources** link on [www.BeeleBusters.info/beABeeleBuster\\_educators.php](http://www.BeeleBusters.info/beABeeleBuster_educators.php)!

## Art:

Have students design Beetle Busters t-shirts to wear when they search for the ALB!

## Vacations:

The summer and other school breaks are the perfect times for students to look for the ALB (and signs of the ALB) far from their own backyard.





# INTRO LESSON: BEETLE BUSTERS—REPORT FOR DUTY!

**Time Estimate:**  
One Class Period

**Understanding Goals:**  
UG1, UG2, UG3

## ADVANCE PREP

### Materials

- Bulletin board/wall space
- Public Service Announcement (PSA)/TV ad: Under “Additional Program Tools” at [www.BeeleBusters.info/beABeeleBuster\\_educators.php](http://www.BeeleBusters.info/beABeeleBuster_educators.php)
- Classroom Poster
- Slips of paper
- Several relevant articles or other information about the ALB in your area or an area near you
- *Optional:* Supplemental Resources for this lesson: [www.BeeleBusters.info/beABeeleBuster\\_educators.php](http://www.BeeleBusters.info/beABeeleBuster_educators.php)

### Tasks

- Create the **Wanted Wall**. Designate a bulletin board or wall space and label with the words “Wanted: ALB.” Post local articles or other information about the ALB.
- Make **Beetle Busters slips**. See “What Can I Do To Help?” (below) for sample phrases.
- *Optional:* For articles and videos on the ALB and how it came to the United States, check out the **Supplemental Resources**.

## INTRO ACTIVITY

*Explain to your students that the USDA/APHIS needs their help. USDA is encouraging them to be Beetle Busters to help catch a dangerous insect that has come to the United States and is killing our trees—the Asian longhorned beetle, code name: ALB.*

### What is the ALB?

If you have reliable computer access, show your students the **PSA/TV ad** from [BeeleBusters.info](http://BeeleBusters.info). If not, show them the “**Search for the ALB**” quadrant of the classroom poster. Explain that the ALB is an invasive species that came to the United States in wooden packing material from Asia. Since it was first found in Brooklyn, NY, in 1996, the ALB has destroyed thousands of trees.

Introduce the **Wanted Wall** as the place for students to post questions they have about the ALB.

**ASK:** *What do you already know about the ALB? What would you like to learn?*

Record their answers to both questions and post them on the **Wanted Wall**.

### TEACHER TIP

As you complete the other lessons in this unit, have your students revisit and answer the questions they posted on the **Wanted Wall** during this Intro Lesson. They can also post new questions as they come up!

### What can I do to help?

**ASK:** *Why do you think kids like you make good Beetle Busters?*

Pass out the **Beetle Busters slips** and have your students fill them out, completing the following statements:

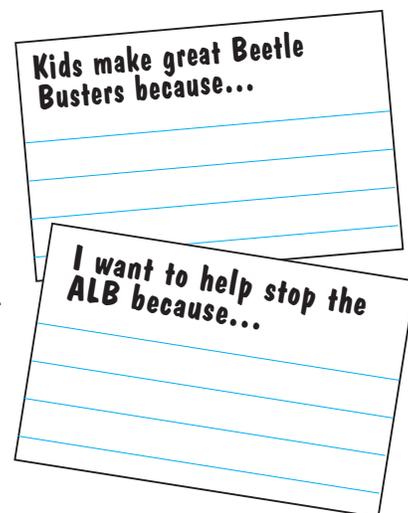
- Kids make great Beetle Busters because...
- I want to help stop the ALB because...

Discuss their answers as a class, and add their Beetle Busters slips to the **Wanted Wall**.

Show students the “**Report: Be a Beetle Buster**” quadrant of the classroom poster. Ask them to repeat the Beetle Busters’ pledge aloud:

*As a Beetle Buster, I will search for the beetle and report to the USDA when I see the ALB or the signs it leaves behind. I will tell my friends, family, and community how to stop the ALB so they can be Beetle Busters, too!*

Post this quadrant on **Wanted Wall** so students can remember their pledge, and quickly see how to report ALBs.





# LESSON 1: SEARCH AND REPORT—FIND THE ALB

**Time Estimate:**  
One Class Period

**UG Understanding Goals:**  
UG2, UG3

## ADVANCE PREP

### Materials

- Classroom Poster
- ALB ID Cards
- Animated ALB: [www.BeetleBusters.info](http://www.BeetleBusters.info)
- White spotted sawyer photo: In the Beetle Busters Photo Gallery under Additional Program Tools at [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)
- USDA Reporting Form: [www.BeetleBusters.info/report-your-ALB-sightings.php](http://www.BeetleBusters.info/report-your-ALB-sightings.php)
- *Optional:* Supplemental Resources for this lesson: [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Make sure you have an **ALB ID Card** for each student. A template card that can be printed and laminated is available online ([www.beetlebusters.info/beABeetleBuster\\_educators.php](http://www.beetlebusters.info/beABeetleBuster_educators.php)).
- Download and print enough copies of the **white spotted sawyer photo**.
- *Optional:* For more information on the white spotted sawyer, check out the **Supplemental Resources**.

## INTRO ACTIVITY

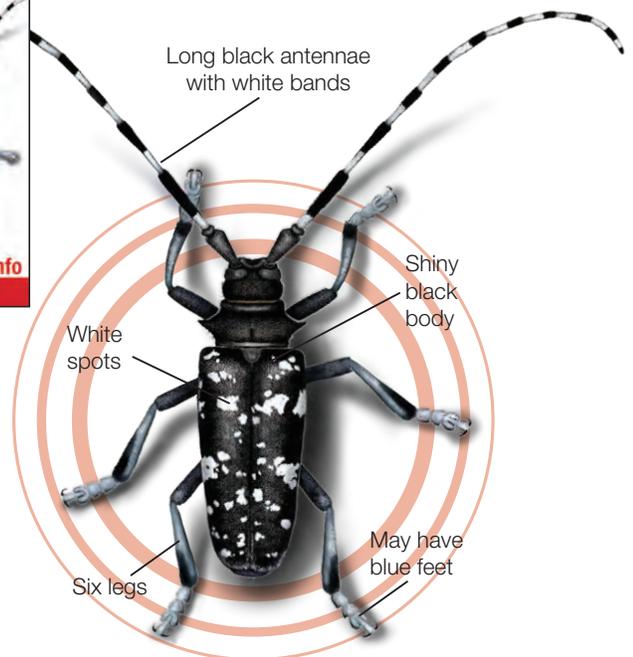
*Explain that the most important task for a Beetle Buster is to search for the ALB and then report what he/she has found.*

### What does the ALB look like?

Break students into groups, and pass out the **ALB ID Cards**. If you have reliable computer access, you may also want to share the **Animated ALB** on [BeetleBusters.info](http://BeetleBusters.info).

#### **ASK:** *What do you notice about the ALB?*

Make a list of characteristics your students identify, such as the ALB's black-and-white antennae. Afterwards, post the "**Search for the ALB**" quadrant of the classroom poster, and have them compare their list to the characteristics labeled on the poster. Have students describe any key characteristics they noticed that are not already labeled on the quadrant.



### TEACHER TIP

➤ The adult ALB is only visible in the summer and fall. Students can look for signs of the beetle on trees year-round! See "Lesson 2: Search and Report—Follow the Signs."

## GUIDED INQUIRY

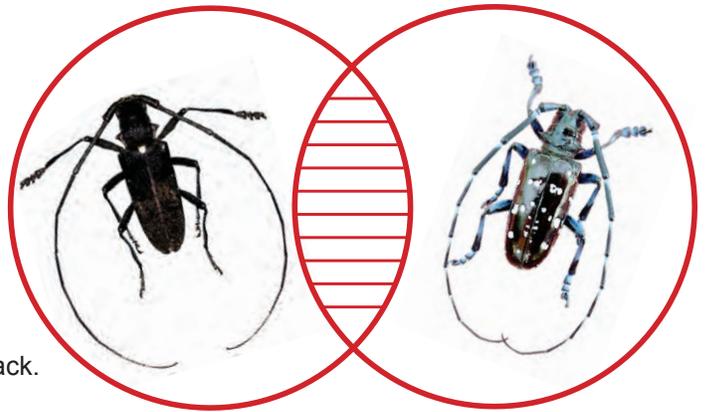
### Is it an ALB?

Give each group a copy of the **white spotted sawyer photo** (see Advance Prep).

Explain that the white spotted sawyer is a native beetle (not an invasive species) that can be confused with the ALB.

These are the telltale differences between the white spotted sawyer and the ALB:

- The white spotted sawyer has one white dot between the top of its wings. The ALB does not have this dot.
- The white spotted sawyer's wings are rough and bronzish-black. The ALB has shiny, smooth black wings.



In their groups, have students create a **Venn Diagram** comparing the physical appearance of the ALB to the white spotted sawyer. Have groups share what they've found, and create a class list of similarities and differences to post on the **Wanted Wall**. (See "Intro Lesson: Beetle Busters—Report for Duty!" for more about the Wanted Wall.)

## TAKE ACTION!

### Search for the ALB

Use the **ALB ID Cards** to search for the ALB in the fall as part of your weekly class routine or in the summer for out-of-school groups. Bring a camera and jars to capture live beetles (and freeze them for later identification). Report any ALB sightings using the **USDA Reporting Form** ([www.BeetleBusters.info/report-your-ALB-sightings.php](http://www.BeetleBusters.info/report-your-ALB-sightings.php)).

### Measure Your Progress

Have students drop a paper clip or other small object into a clear plastic "tally bottle" to record the number of times they search. Each month, have students estimate and then count the objects in the bottle. Record the results on a bar graph. Keep a similar tally for the number of ALBs, or signs of ALBs, found and reported. Compare the search graph to the report graph. Have students draw conclusions about the probability of an ALB problem in your community.

### TEACHER TIP

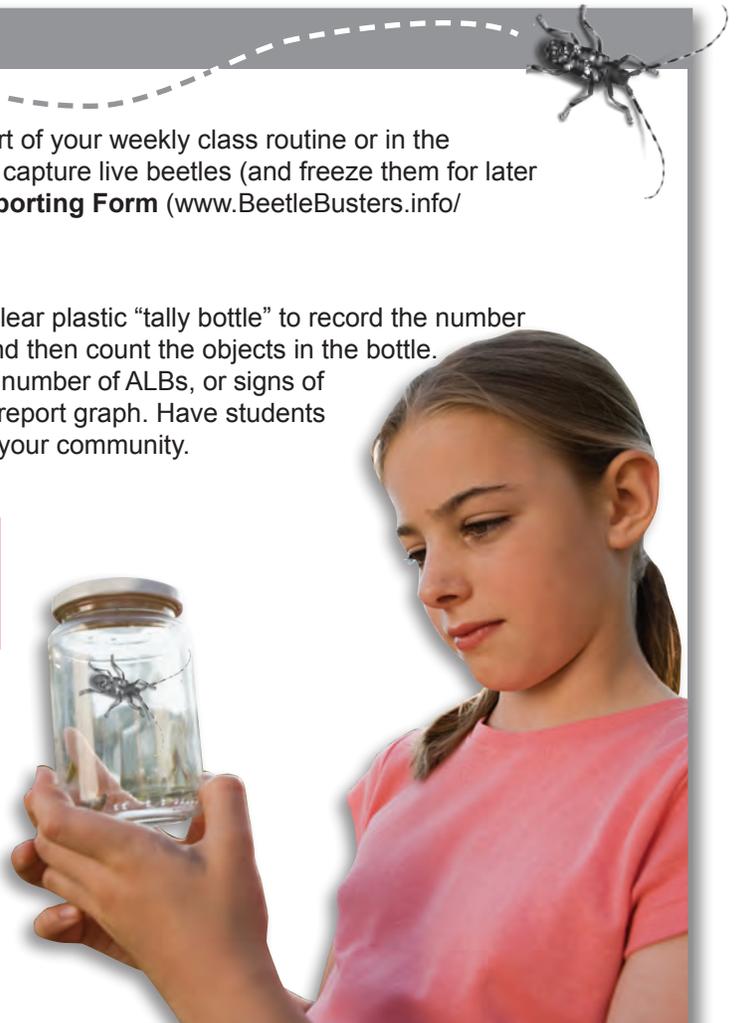
➔ Make it a competition! Give each student his/her own "tally bottle," and challenge the class to see who can go on the most searches.

### Create a "Wanted" Poster

Have each student create a "Wanted" poster with an image of the ALB and information on how to identify and report it. Students can bring their posters home and raise awareness by posting them in their neighborhood.

### Take the Learning Home

Send home copies of the **Be a Beetle Buster Family Take-Home Activity** (see pp. 30-31) to encourage families to search for and report the ALB.





# LESSON 2: SEARCH AND REPORT—FOLLOW THE SIGNS

**Time Estimate:**  
One Class Period

**UG Understanding Goals:**  
UG1, UG2, UG3

## ADVANCE PREP

### Materials

- Classroom Poster
- ALB ID Cards
- USDA Reporting Form: [www.BeetleBusters.info/report-your-ALB-sightings.php](http://www.BeetleBusters.info/report-your-ALB-sightings.php)
- *Optional:* Supplemental Resources for this lesson: [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Create a **modified “Follow the Signs” quadrant**. Cover the outer signs circle (the purple circle). The inner life cycle (the red circle) and the tree in the center should remain visible. Make copies of this modified quadrant for your students. *Note: To copy the 17” x 22” version of the poster, fold the poster so that only the “Follow the Signs” quadrant is visible.*
- Make sure you have an **ALB ID Card** for each student. A template card that can be printed and laminated is available online ([www.beetlebusters.info/beABeetleBuster\\_educators.php](http://www.beetlebusters.info/beABeetleBuster_educators.php)).
- *Optional:* For additional information on the ALB’s life cycle, images of ALB signs, and short, helpful videos on how to spot them, check out the **Supplemental Resources**.

## INTRO ACTIVITY

*Share with students that—to be good Beetle Busters—they need to know not only what the ALB looks like, but also how, where, and when to find it. In addition, they need to be able to recognize the signs of ALB activity, so that they can spot and report all year round!*

### Where is the ALB?

Explain that to know how to find the ALB and to understand why it is such a threat to our trees, students need to learn about the ALB life cycle. Show the class your **modified “Follow the Signs” quadrant** and give them their own copies to follow along.

**ASK:** *Why do you think the tree is at the center of the diagram?*

Explain that a hardwood tree (broad leaves, usually deciduous) is the most important thing in an ALB’s life. It provides food and shelter.

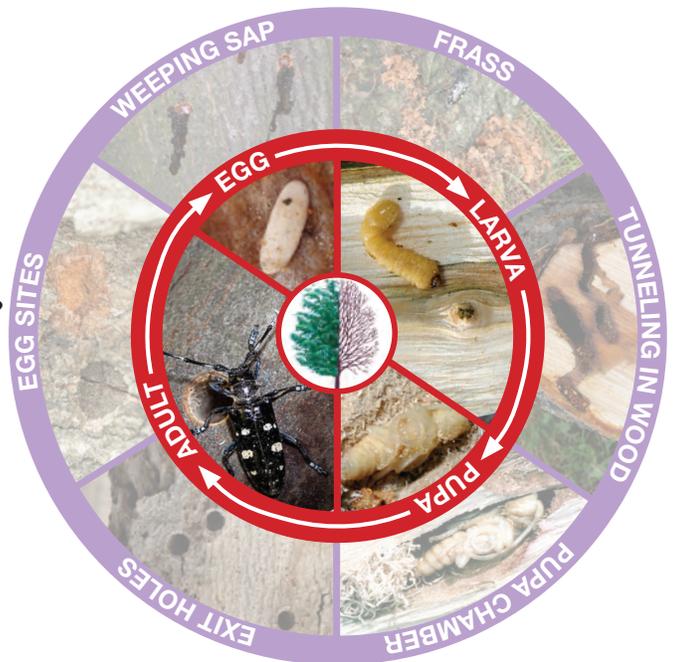
**ASK:** *How does the tree in the diagram relate to the ALB’s life cycle?*

- Adult ALBs are only visible during the summer and fall, when they are feeding on trees and the adult females are laying their eggs in the bark.
- After the adult female ALB lays an egg under the bark, a larva comes out of the egg and then burrows deep into the tree. The larva becomes a pupa inside the tree. When it’s ready, about 1 year later, the adult beetle breaks out of its pupal casing and chews a perfectly round hole to exit the tree.

**ASK:** *How do you think this life cycle harms trees?*

As students offer responses, you may want to prompt them by reminding them that trees transport water and minerals up from the roots (through the xylem) and nutrients down from the leaves (through the phloem) in order to survive. The tunnels they create in a branch will also weaken that branch.

Explain that unlike most other native wood-boring beetles (like the white spotted sawyer from *Lesson 1: Search and Report—Find the ALB*), ALB feed on living trees. By feeding on the xylem and phloem and burrowing to and then back from the heartwood of the tree, the ALB creates permanent wounds in the tree that deprive the tree of the sustenance it needs to survive and weakens the tree, causing branches to break and the tree to eventually die.





# GUIDED INQUIRY

## What should I look for?

Share with students that good Beetle Busters know how to find clues that show where the ALB has been. It's time to play **Whose Clues!** Break students into groups, and have them flip their **ALB ID Cards** to the side with the signs of ALB activity. Have students match each sign on the card with a life cycle phase on their copies of the **"Follow the Signs"** quadrant. Students should match the exit hole and the egg site with the adult ALB and the frass with the larva. Larvae push frass (wood shavings and excrement) behind them and out through their egg tunnels as they burrow into the tree. Have them explain how the ALB makes each sign.

Once all groups have completed the game successfully, uncover the rest of your **modified "Follow the Signs" quadrant**. Explain that the signs on the card are the most visible signs of the ALB, but there are more signs to search for! Discuss how each sign is related to a phase in the life cycle of the ALB. Tree sap can froth and "weep" from egg sites. Larvae and their tunnels and pupae and their pupal chambers can be found in cut wood, like firewood. Students should check their trees and firewood and never move firewood from the place it is cut. They could be moving the ALB!



### TEACHER TIP

➔ Egg sites will look raw and light-colored when fresh and grayish in color when older. Look for both types of sites when you are searching with your students!



### TEACHER TIP

➔ To further challenge your students, you could include more "clue" images, using those from Worcester, MA's ALB infestation: <http://massnrc.org/pests/albimages/20080802-Worcester/>.

## TAKE ACTION!



ALB YEAR-ROUND CALENDAR			
<b>APRIL</b> <b>ALB INACTIVE:</b> Search for 'Don't Move Firewood' and ALB awareness campaigns. <b>It's Arbor Day, Earth Day, and Tree Week!</b> <b>Beautiful Month!</b> Celebrate our natural world. <b>Search Lesson 2: Save Our Trees and Get Involved!</b> About searching for the beetle in April.	<b>MAY</b> <b>ALB ACTIVE:</b> Search for signs of ALB activity. <b>Search Lesson 4: New Research!</b> Create action campaigns that will reduce your beetle sightings. <b>Get Involved!</b> Join the ALB Search Squad! <b>Physical Fitness and Fun!</b> Search for signs of ALB activity during physical activity.	<b>JUNE</b> <b>ALB ACTIVE:</b> Adult beetles emerge from egg holes in trees. <b>Formal ALB active egg sites on tree bark.</b> Report them!	<b>JULY</b> <b>ALB ACTIVE:</b> Search for signs of ALB activity. <b>Search Lesson 1 and 2: Search and Report, and Get Involved!</b> Join the ALB Search Squad! <b>During Great Outdoors Month,</b> Search for signs of ALB activity during outdoor activities. <b>ALB Search Squad!</b> Search for signs of ALB activity during physical activity.
<b>BEEBLE BUSTER MESSAGE: SEARCH AND REPORT—SAVE THE TREES!</b>			
<b>AUGUST</b> <b>ALB INACTIVE:</b> Search for signs of ALB activity. <b>It's Asian Longhorned Beetle Awareness Month!</b> Let the beetle go! <b>Get Involved!</b> Join the ALB Search Squad! <b>Search Lesson 3: Search and Report—Make the Signs!</b> Search for signs of ALB activity during physical activity.	<b>SEPTEMBER</b> <b>ALB ACTIVE:</b> Adult beetles emerge from egg holes in trees. <b>Formal ALB active egg sites on tree bark.</b> Report them!	<b>OCTOBER</b> <b>ALB ACTIVE:</b> Search for signs of ALB activity. <b>It's Crime Prevention Month!</b> If you see an ALB, report it immediately. <b>Search Lesson 4: New Research!</b> Create action campaigns that will reduce your beetle sightings. <b>Get Involved!</b> Join the ALB Search Squad! <b>During Great Outdoors Month,</b> Search for signs of ALB activity during outdoor activities.	<b>NOVEMBER</b> <b>ALB INACTIVE:</b> Adult ALB, the Asian Longhorned Beetle, hibernates in trees.
<b>BEEBLE BUSTER MESSAGE: SEARCH AND REPORT—SAVE THE TREES!</b>			
<b>DECEMBER</b> <b>ALB INACTIVE:</b> Larvae and pupae are inside the trees. Looking for signs of ALB activity. <b>Continue your "Don't Move Firewood" and ALB awareness campaigns.</b> (See October).	<b>JANUARY</b> <b>ALB INACTIVE:</b> Larvae and pupae are inside the trees. Looking for signs of ALB activity. <b>Continue your "Don't Move Firewood" and ALB awareness campaigns.</b> (See October). <b>The trees are still out!</b> But the signs of the ALB are not.	<b>FEBRUARY</b> <b>ALB INACTIVE:</b> Larvae and pupae are inside the trees. Looking for signs of ALB activity. <b>Continue your "Don't Move Firewood" and ALB awareness campaigns.</b> (See October).	<b>MARCH</b> <b>ALB INACTIVE:</b> Larvae and pupae are inside the trees. Looking for signs of ALB activity. <b>Continue your "Don't Move Firewood" and ALB awareness campaigns.</b> (See October).
<b>BEEBLE BUSTER MESSAGE: DON'T MOVE FIREWOOD—SAVE THE TREES!</b>			

### Search for the ALB—All Year Round!

Take the **ALB ID Card** and search for signs of the ALB. Adult ALBs are only active in the summer and fall, but exit holes and egg sites can be seen year-round. Bring a camera to record student sightings, and report them using the **USDA Reporting Form** ([www.BeebleBusters.info/report-your-ALB-sightings.php](http://www.BeebleBusters.info/report-your-ALB-sightings.php)). Make searching and reporting part of your class's weekly routine!

### Make an ALB Calendar

Using the **ALB Year-Round Calendar** (see p. 32 as a guide), have each student create his or her own 12-month ALB calendar. Remind students to show when the ALB is in each phase of its life cycle, when it makes each of the ALB signs, and when to search for ALBs and their signs.

### Share the Calendar

Have students share their own calendars with their families. Also, consider posting the **ALB Year-Round Calendar** (or one of the student's versions) on the school's Web site. Or, ask that information about searching for the ALB be added to the official school calendar.



# LESSON 3: SAVE OUR TREES!

 **Time Estimate:**  
One Class Period

 **Understanding Goals:**  
UG1, UG2, UG3

## ADVANCE PREP

### Materials

- Classroom Poster
- Wooden baseball bat, maple syrup, paper
- Paper for word pictures
- *Optional:* Supplemental Resources for this lesson: [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Plan this lesson for a time when leaves are on the trees. Check the **ALB Year-Round Calendar** (p. 32) for suggestions!
- Bring in a wooden baseball bat and some pure maple syrup.
- *Optional:* For more information about hardwood trees preferred by the ALB (and a list of products made from those trees), check out the **Supplemental Resources**.

## INTRO ACTIVITY

*Explain to students that the reason they are training to be Beetle Busters is to help save America's trees—particularly the ones in their own community.*



### Which trees are ALB trees?

Explain to students that in order to save the trees from the ALB, they need to know which trees to protect. It's time for an **ALB Tree Hunt!**

Show students the maple, elm, willow, and horsechestnut leaves from the **"Search for the ALB"** poster quadrant. Explain that these are the ALB's favorite trees. Have students search for ALB trees in the schoolyard (or local park, if your schoolyard has few trees) as part of class, during recess, or after school. Assign groups to different locations, so that the whole schoolyard is searched. Have students share what they've found with the class, and post the numbers and types of trees they found on the **Wanted Wall**. (See "Intro Lesson: Beetle Busters—Report for Duty!" for more about the Wanted Wall.)



Maple



Elm



Willow



Horsechestnut

## GUIDED INQUIRY

### Why should we save trees from the ALB?

Show students a wooden baseball bat, a bottle of maple syrup, and a piece of paper.

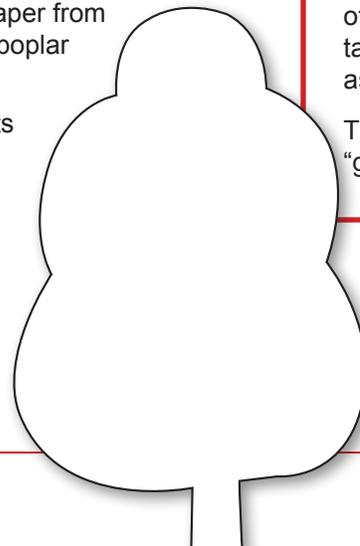
**ASK:** *What do these things have in common?*

Allow students to guess, and if no one guesses correctly, explain that they are all products made from the hardwood trees that the ALB attacks—the baseball bat from an ash tree, the maple syrup from a sugar maple tree, and paper from several other trees that the ALB likes, including birch, maple, and poplar trees.

Post the **"Save America's Trees"** poster quadrant. Share the facts from the quadrant, and discuss what it might be like if hardwood trees disappeared from North America.

Now, discuss the benefits that we can't hold in our hands. *Examples: shade, wind, protection, beauty, oxygen, and animal habitat.*

Have each student create a **Word Picture** by drawing an outline of a large tree and then "drawing" in the rest of the tree using words that represent the benefits discussed as a class.



### TEACHER TIP

➔ Turn your class into an art gallery. Have half the class post their drawings on the wall and stand beside them. Have the other half of the class take a "gallery walk" and ask the artists questions.

Then, switch groups and "go to the next gallery."



### Save the Trees!

Have students create signs encouraging their community to save its trees. *Examples: "Look for ALBs here!" or "Have You Seen This Beetle?"* Laminate the signs and attach them to lengths of string. Students can tie them to the hardwood trees they want to save in their schoolyard and neighborhoods.

### Where Are the Trees?

If your community has already experienced tree loss as a result of ALB infestation, have students make signs that tell people what happened. *Examples: "This tree was taken by Asian longhorned beetles. Please help stop them!" or "Where is this tree? Ask the ALB! Find and report Asian longhorned beetles!"* Laminate the signs, and attach them to sticks that students can push into the ground where trees have been removed.

### Share the Trees

Have students share their tree **Word Pictures** with their families and lead them on an **ALB Tree Hunt** in their backyard and neighborhood.

### TEACHER TIP

➔ All signs should direct people to **[www.BeetleBusters.info](http://www.BeetleBusters.info)** for more information.



# LESSON 4: NEW RECRUITS

**Time Estimate:**

One class period (and ongoing throughout the year)

**Understanding Goals:**

UG1, UG2, UG3

## ADVANCE PREP

**Materials**

- Beetle Busters Action Campaign Plan Worksheet (see p. 29)
- Paper for “Community Webs”
- *Optional:* Supplemental Resources for this lesson:  
[www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

**Tasks**

- Make one copy of the **Beetle Busters Action Campaign Plan** worksheet for each student.
- *Optional:* For more ALB ads, check out the **Supplemental Resources**.

## INTRO ACTIVITY

Share with students that, as Beetle Busters, they need to tell people about the ALB and encourage them to search for and report the beetle. It's time to recruit new Beetle Busters!

### Who should I tell about the ALB?

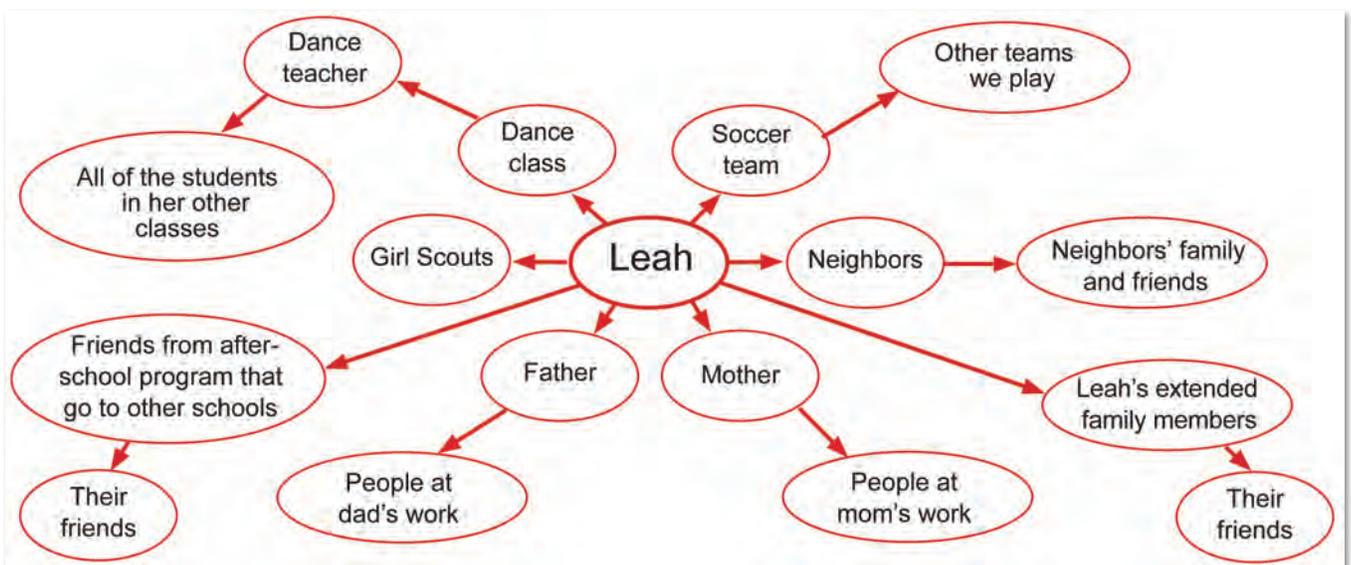
Explain to students that they are going to create their own **Community Webs** to figure out who they can tell about the ALB.

Starting with his or her own name in the center, have each student create a web of the groups and individuals to whom they are connected in the community.

*Examples: families, sports teams, friends in after-school activities, etc.* Encourage them to think about other people/groups to whom these groups and individuals are also connected.

**TEACHER TIP**

It takes a community! In every city where the beetle has been found, a community member found it first. What's more, Chicago, IL, and Hudson County, NJ, are now “beetle free” thanks to the people in those communities—residents, elected officials, businesses and Federal, State, and local government agencies. In addition to searching, getting the word out about the ALB is the most important thing your students can do!



# GUIDED INQUIRY

## How should I tell them?

Explain that students will create an advertising campaign that will raise awareness about and encourage community members to search for the ALB.

Ask students individually to identify one or two people or groups from their **Community Web** to whom they will target their message. Encourage students to focus on choosing community members who they know will pass the information along to as many people as possible. *Examples: Those who are “well-connected” and know a lot of people (heads of community organizations, coaches, hairdressers) or those who have a stake in whether or not the ALB is stopped (homeowners, yard work companies, nature lovers).*

Pass out the **Beetle Busters Action Campaign Plan** worksheet and have students outline their plans to engage these individuals or groups.

### TEACHER TIP

➔ Make this lesson a seasonal one! Have students create “don’t move firewood” campaigns during the months when the adult ALB is not visible and “search and report” campaigns when the beetle is out and about.

**BeetleBusters ACTION CAMPAIGN PLAN WORKSHEET**

- 1 MESSAGE**  
What are the different ways to reach your target audience (flyers, videos, events, etc.)? Think about your target audience, and be creative!
- 2 TARGET AUDIENCE**  
Who is your target audience? Why is this an important message for them, specifically?
- 3 METHOD**  
What are the different ways to reach your target audience (flyers, videos, events, etc.)? Think about your target audience, and be creative!
- 4 SLOGAN(S)**  
Write one or more fun, simple sentences or phrases that your target audience will like and remember.
- 5 GOALS**  
List the things you would like your campaign to get your target audience to do.
- 6 YEAR-LONG PLAN**  
Indicate when and how you would like your target audience to take action. Hint: Think about what they should do in different seasons!
- 7 MEASURING SUCCESS**  
Look at the goals you've listed. Write how you plan to measure that you accomplished all of your goals.

www.BeetleBusters.info

## TAKE ACTION!



### Beetle Busters Action Campaigns

Have students enact their **Beetle Busters Action Campaign Plans** and monitor how effective they are. Work with students to make these Campaign Plans more than just a one-time activity. Encourage long-term community awareness efforts that create real results over time.

### Share Your Successes

Post successful campaign slogans and materials on the school Web site, or add your students' campaigns to the **Beetle Busters Facebook Page** ([www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle)) for other Beetle Busters to see. Share your successful campaign stories!



# BeetleBusters

## COMMUNITY LEADERS

*Middle School and High School Unit*

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As **Beetle Busters**, your students will be **community leaders** as they meet content standards while building scientific inquiry, leadership, and civic engagement skills.

Get started with the lessons on page 19, or take a moment and review the **Cross-Curricular Connections** on the next page. Any subject can serve as an opportunity to learn about, search for, and raise awareness about the invasive ALB!

### SPECIAL NOTE

*for High School Science Educators*

**Biology Extensions** at the end of each lesson challenge high school biology, ecology, and environmental science students to explore topics in-depth and show their understanding in complex ways.



# Cross-Curricular Connections

The inquiry-based lessons in this unit are designed to address the core subject areas of **Science** (biology, ecology, and environmental science) and **Language Arts** (persuasive writing, public speaking, and communications). The following are suggestions for extending your students' exploration into all subject areas.



## Social Studies/History:

Discuss how trade (transportation) is one of the main ways invasive species are introduced to a new environment. Examine the current global and interstate trade regulations that are intended to stop ALB and other invasive insects from coming to the United States and to limit the spread of existing ALB infestations. Invite a local business owner to speak with the class about the impact that the ALB and ALB regulations have had, or could have, on that business.

## English Language Arts:

Have students write letters to the editor detailing how young people are addressing this issue by making a difference in their community and encouraging other community members to follow suit. Develop a puppet show or short play with your students that teaches younger children about the ALB. Check out "Lesson 4: New Recruits" for more ideas!

## Art:

Play the ALB PSA/TV ad (under "Additional Program Tools" at [www.BeeleBusters.info/beABeeleBuster\\_educators.php](http://www.BeeleBusters.info/beABeeleBuster_educators.php)) that shows symbols in place of the ALB's characteristic spots. Have students create their own symbols for things that have been, or will be, affected in their community as a result of ALB infestation. Have them add these symbols in place of spots to an otherwise accurate depiction of an ALB they create. Publish their images on the school's Web site or blog. In addition, you could share them with other teachers on the Beetle Buster's Facebook Page ([www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle))!

## Music:

Have students create jingles that raise awareness about the ALB and how to "search and report." Play the jingles on your school radio station or stream them over the Internet on your school's Web page. Create a music video, and post it on the Beetle Busters Facebook Page ([www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle)) to help other teachers empower their own Beetle Buster classes.

## Computer/Digital Media:

Create a Web page, wiki, or blog that highlights the ALB work being done at your school. Link this page to the school's Web site and update it regularly with stories, photos, informational reports, and seasonal suggestions.



## Health:

Research the health benefits of trees in a neighborhood. Discuss the health issues that increase as the number of trees decreases. Have students create flyers outlining the health benefits of trees and how to stop the ALB, and then distribute them at a local health-related event, such as a blood drive.

## Physical Education/Sports:

Before, during, or after outdoor physical activity, take an "ALB break" to check for ALBs and signs of ALB activity. Bring a camera to record sightings and signs and jars to capture live beetles (freeze them for later identification). Report any ALB sightings or signs using the **USDA Reporting Form** ([www.BeeleBusters.info/report-your-ALB-sightings.php](http://www.BeeleBusters.info/report-your-ALB-sightings.php)).

## Languages:

ALB infestation occurs in urban areas where there are often diverse language communities. Have students create ALB posters in the language they are studying. If possible, bring students to a neighborhood in which this language is spoken and raise awareness about the ALB by hanging the posters and talking to residents.

## Service Learning:

Work with your local USDA/APHIS representative or a grassroots organization to have your class assist in an organized ALB search or in the planting of new trees.

## Vacations:

Summertime and other school breaks are the perfect times for students to look for the ALB (and signs of the ALB) far from their own backyards. Encourage your students to search for (and report) ALBs wherever they go!



# INTRO LESSON: CALL TO ACTION

 **Time Estimate:**  
One Class Period

 **Understanding Goals:**  
UG1, UG2, UG3

## ADVANCE PREP

### Materials

- Classroom Poster
- PSA/TV ad: Under “Additional Program Tools” at [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)
- *Optional:* Supplemental Resources for this lesson: [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Create a **Wanted Wall**. Designate a bulletin board or wall space and label with the words “Wanted: ALB.” Post local articles or other information about the ALB.
- *Optional:* For articles and videos on the ALB and how it came to the United States, check out the **Supplemental Resources**.

## INTRO ACTIVITY

*Explain to your students that USDA/APHIS needs their help. USDA is encouraging them to be Beetle Buster Community Leaders. Your students have the opportunity to make a real impact in their community by searching for, reporting, and raising awareness about the Asian longhorned beetle (code name: ALB), an invasive tree-killing pest.*

### ALB: An Invasive Pest

If you have reliable computer access, show your students the **PSA/TV ad** from BeetleBusters.info. If not, show them the “**Find the ALB**” quadrant of the classroom poster. Discuss what they know and questions they have about the ALB and its presence in your community or a neighboring community.

Have students create a classroom **Wanted Wall**. Encourage each student to find information about the ALB from at least two different sources—including (but not limited to) newspaper articles, flyers, stories from neighbors, videos or photos, Web sites, and Facebook groups.

Have students also post the questions they would like answered about the ALB on the **Wanted Wall**.



### TEACHER TIP

➤ As you complete the other lessons in this unit, have your students revisit and answer the questions they posted on the **Wanted Wall** during this Intro Lesson. They can also post new questions as they arise!

### How Students Can Help

Share the “**Report: Be a Beetle Buster**” quadrant of the poster with your students. Explain that, as Beetle Buster Community Leaders, they will:

- Search for and report the ALB and the signs it leaves behind and mobilize the community to join in the search.
- Be ALB experts for their communities, sharing key ALB information with a wide audience.

**ASK:** *Why do you think USDA/APHIS is asking students to get involved? What makes you uniquely qualified to help stop the ALB?*

Have each student respond in writing by completing the following statements:

- I am uniquely qualified to help stop the ALB because...
- I want to help stop the ALB because...

Discuss their responses and add them, along with the “**Report: Be a Beetle Buster**” quadrant, to the **Wanted Wall**.

**I am uniquely qualified to help stop the ALB because...**

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**I want to help stop the ALB because...**

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# LESSON 1: SEARCH AND REPORT—FIND THE ALB

**Time Estimate:**  
One Class Period

**UG Understanding Goals:**  
UG2, UG3

## ADVANCE PREP

### Materials

- Classroom Poster
- ALB ID Cards
- USDA's "ALB Identification and Look-Alikes List:"  
[www.aphis.usda.gov/publications/plant\\_health/content/printable\\_version/alb\\_look\\_alikes.pdf](http://www.aphis.usda.gov/publications/plant_health/content/printable_version/alb_look_alikes.pdf)
- *Optional:* Supplemental Resources for this lesson:  
[www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Research those insects, including the white spotted sawyer, with which the ALB is commonly confused. Identify the ones that are present in your own community using the **USDA's ALB Identification and Look-Alikes List**.
- Make sure you have an **ALB ID Card** for each student. A template card that can be printed and laminated is available online ([www.beetlebusters.info/beABeetleBuster\\_educators.php](http://www.beetlebusters.info/beABeetleBuster_educators.php)).
- *Optional:* Check out the **Supplemental Resources** for more pictures, diagrams, and classification information.

## INTRO ACTIVITY

Share with students that their most important task as Beetle Buster Community Leaders is to search for the ALB and report what they've found.

## Identifying the ALB

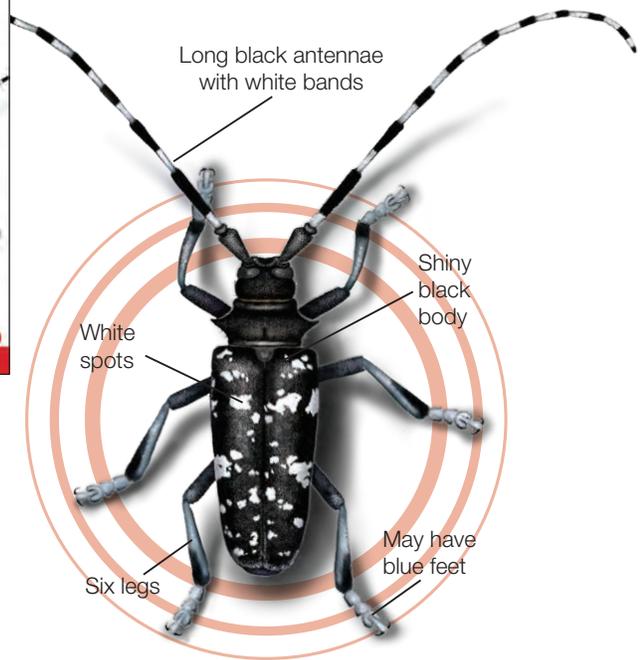
Explain to students that, to find the ALB, they need to know exactly what they are looking for.

Using their **ALB ID Card** as a reference, have students create scientifically labeled diagrams of the ALB, highlighting the characteristics that make it a **beetle** (the elytra, or hard wing casing over the wings), a **longhorned beetle** (antennae as long or longer than the body), and uniquely an **ALB** (white and black banded antennae, shiny black body with white spots).

Have students compare their diagrams to the one on the "**Search for the ALB**" quadrant of the poster. Have students describe any key characteristics they noticed that are not already labeled on the quadrant.

### TEACHER TIP

➤ Students may want to use the Asian longhorned beetle (*Anoplophora glabripennis*) classification (<http://bugguide.net/node/view/18855>) as a resource when labeling their diagrams!



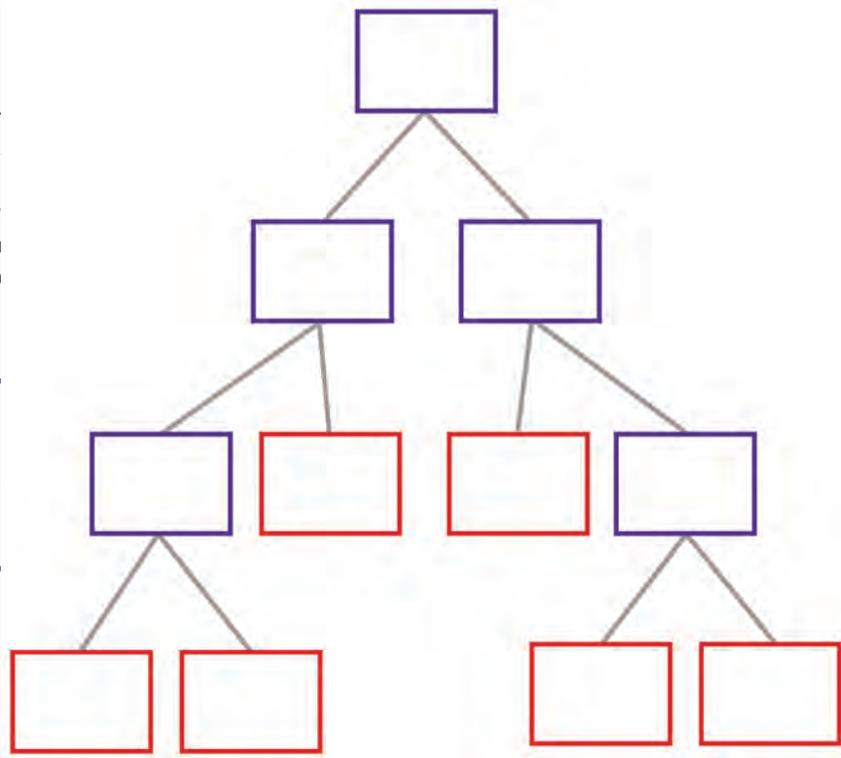
## GUIDED INQUIRY

### Classifying the ALB

Introduce students to three insects that are native and are commonly confused with the ALB (see Advanced students into groups, and have them research the of these local beetles using the **USDA's ALB Identification and Look-Alikes List**. Have them complete a **Classification Tree** outlining the physical similarities and differences between other beetles and the ALB.

#### TEACHER TIP

➤ If you don't have reliable student computer access in the classroom, print copies of the **USDA's ALB Identification and Look-Alikes List** and the images of the beetles you've chosen ahead of time.

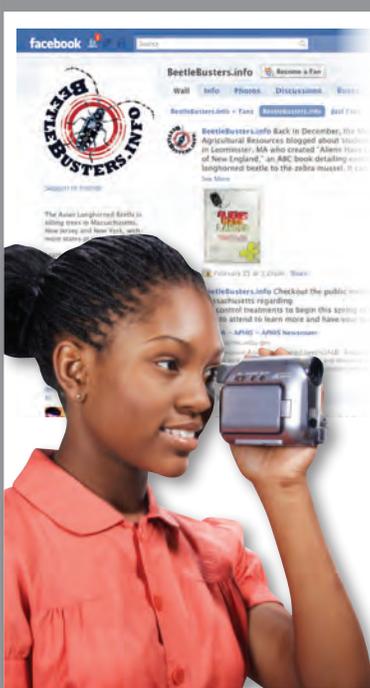


### High School Biology Extension

Have students do their own research about insects that are present in their area and are commonly confused with the ALB. Students can compare these beetles to the ALB using physical characteristics and Linnaeus's classification system. Have students create a **Classification Tree** that shows how these beetles are related to each other.



## TAKE ACTION!



### Search for the ALB

Encourage your students to search for the ALB in the summer and fall. Remind them to bring cameras to record the signs and jars to capture live beetles (and freeze them for later identification). Beetle Busters should always report sightings using the **USDA Reporting Form** ([www.BeatleBusters.info/report-your-ALB-sightings.php](http://www.BeatleBusters.info/report-your-ALB-sightings.php)).

### Beetle Busters Connect

Have students scan and post the diagrams they made in the Intro Activity of this lesson on the **Beetle Busters Facebook Page** ([www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle)) or on the class/school Web site. This will help others to identify the ALB.

### Beetle Busters Educate

Have students create a "Red Light/Green Light"-type game to teach younger grades about how to distinguish the ALB from other beetles. Correct characteristics allow the students to run toward the caller, and incorrect characteristics keep them frozen in place. *Examples: Black and white antennae (run!); brown back (freeze!).* The game ends when someone reaches the caller ("the ALB") and tags him or her.



# LESSON 2: SEARCH AND REPORT—FOLLOW THE SIGNS

**Time Estimate:**  
One Class Period

**UG Understanding Goals:**  
UG1, UG2, UG3

## ADVANCE PREP

### Materials

- Classroom Poster
- ALB ID Cards
- University of Vermont’s ALB Biology page: [www.uvm.edu/albeetle/biology/index.html](http://www.uvm.edu/albeetle/biology/index.html)
- ALB Year-Round Calendar (see p. 32)
- USDA’s “ALB Identification and Look-Alikes List:” [www.aphis.usda.gov/publications/plant\\_health/content/printable\\_version/alb\\_look\\_alikes.pdf](http://www.aphis.usda.gov/publications/plant_health/content/printable_version/alb_look_alikes.pdf)
- Paper or pre-printed blank calendar pages for “Search Calendars”
- USDA’s article on the white spotted sawyer: [http://na.fs.fed.us/spfo/pubs/fidls/ws\\_sawyer/ws\\_sawyer.htm](http://na.fs.fed.us/spfo/pubs/fidls/ws_sawyer/ws_sawyer.htm)
- *Optional:* Supplemental Resources for this lesson: [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Make enough copies of the “Follow the Signs” quadrant of the poster to have one for each student group.
- Make sure you have an **ALB ID Card** for each student. A template card that can be printed and laminated is available online at: [www.beetlebusters.info/beABeetleBuster\\_educators.php](http://www.beetlebusters.info/beABeetleBuster_educators.php).
- *Optional:* Review the **Supplemental Resources** for more photos of ALB signs and short, helpful videos on how to spot them.

## INTRO ACTIVITY

*Share with students that—in order to be good Beetle Buster Community Leaders—they need to not only know what the ALB looks like, but also how, where, and when to find it. In addition, they need to be able to recognize the signs of ALB activity, so they can report those as well.*

## ALB: Destroying Trees

Break students into groups and have them review the signs side of their individual **ALB ID Cards** and a group copy of the “Follow the Signs” quadrant.

**ASK:** *How does the ALB’s life cycle cause the destruction of trees?*

Have each group create its own hypothesis drawing on the information on the card and the quadrant, as well as their prior knowledge of how trees circulate water, minerals, and nutrients.

Using the ALB ID Card, the “Follow the Signs” quadrant, and the information on the **University of Vermont’s ALB Biology Page**, have students research the different phases of the ALB life cycle, and how each sign pictured is created, in order to prove or disprove their hypotheses.

Have groups share their results with the class and discuss how the ALB is a particularly harmful invasive species.



## GUIDED INQUIRY

### ALB—All Year Round

Adult ALBs are only visible in the summer and fall (until the first frost), but you and your students can search for signs all year long!

**ASK:** *Why is it important to search for signs in the winter and spring when the ALB isn’t visible?*

- The majority of the trees the ALB favors are deciduous. When they lose their leaves in the fall, it makes it easier to spot signs, particularly exit holes and egg sites. ALBs usually start at the tops, or crowns, of trees and work their way down,

so you and your students may be able to spot signs high in the branches. Also, if a tree can be identified and removed before the pupae inside become adults, you have prevented even more devastation!

Have students show their knowledge of the ALB life cycle and signs by creating personal **Search Calendars**. Each student's calendar should highlight the different life cycle phases of the ALB, the signs the ALB creates, and how these signs damage trees. Students should also include reminders of when they should be searching for the ALB and its signs and events in their own lives that would provide excellent opportunities for searching—including walks home from school, outdoor sports events, and camping trips.

Post the **ALB Year-Round Calendar** on the **Wanted Wall** and have students compare it to their **Search Calendars** (See "Intro Lesson: Call to Action" for more about the Wanted Wall). Have students add to their personal calendars events from the **ALB Year-Round Calendar** that they would like to participate in.



### TEACHER TIP

Make the calendars a multi-media experience! Students can use images from the Worcester infestation to represent the signs in detail (<http://massnrc.org/pests/albimages/20080802-Worcester/>). Students could also work together to create an online calendar to link to your class blog or school Web site!

### High School Biology Extension

Have students compare the ALB and white spotted sawyer life cycles (and signs of activity) using the **USDA's ALB Identification and Look-Alikes List**, the **University of Vermont's ALB Biology Pages**, and **USDA's white spotted sawyer article** (see Advance Prep). Have students use these resources to explore why the ALB is much more harmful to trees than the white spotted sawyer.



## TAKE ACTION!

### Search for the ALB—All Year Round!

Search for signs of the ALB. Have students bring cameras to record their sightings and report them using the **USDA Reporting Form** ([www.BeeleBusters.info/report-your-ALB-sightings.php](http://www.BeeleBusters.info/report-your-ALB-sightings.php)). Make searching and reporting part of your class's weekly routine!

### Beetle Busters Connect

- Post a version of the **ALB Year-Round Calendar**, or the class-created online **Search Calendar** (see Teacher Tip) on the school's Web site, or ask that ALB search information be added to the school's official calendar. Be sure to include images of what to look for along with a link to [www.BeeleBusters.info](http://www.BeeleBusters.info) for reporting.
- Upload .jpgs or .pdfs of your students' **Search Calendars**, or the class-created online Search Calendar on the **Beetle Busters Facebook Page** ([www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle)). Show other Beetle Busters around the country what your class will be doing throughout the year!

### Beetle Busters Educate

Have students share their **Search Calendars** with their families and discuss how the ALB destroys trees. Encourage searching at home for signs or for beetles, depending on the season.





# LESSON 3: SAVE OUR TREES

 **Time Estimate:**  
One Class Period

 **Understanding Goals:**  
UG1, UG2, UG3

## ADVANCE PREP

### Materials

- Classroom Poster
- The Arbor Day Foundation's Tree Guide: [www.arborday.org/trees/treeGuide/index.cfm](http://www.arborday.org/trees/treeGuide/index.cfm)
- Tape measure, string, and paper/pencils (for tree surveying)
- National Tree Benefits Calculator: [www.treebenefits.com](http://www.treebenefits.com)
- *Optional:* Supplemental Resources for this lesson: [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Plan this lesson for a time when leaves are on the trees. Check the **ALB Year-Round Calendar** (p. 32) for suggestions!
- Collect one tape measure and one 8-foot length of string for each student group.
- Familiarize yourself with the **National Tree Benefits Calculator** (see "Guided Inquiry: Tree and Ecosystem Services").
- *Optional:* Learn more about ecosystem services and the ALB's effect on urban forests, including personal stories from Chicago, from the **Supplemental Resources**.

## INTRO ACTIVITY

*Explain to students, that as Beetle Buster Community Leaders, their primary goal is to protect their community's (and our Nation's) trees from the ALB.*

### ALB Host Trees

Share the list of trees that the ALB likes to attack from the "Search for the ALB" quadrant of the classroom poster. Explain that one of the reasons the ALB is a particularly harmful invasive species is that it likes so many *different kinds* of hardwood trees. Scientists call these trees "host trees" because the beetles are able to complete their life cycle in these trees. The ALB is the guest that stays too long and keeps coming back!

Break students into groups and assign each group a host tree to research from the list. Have students use **The Arbor Day Foundation's Tree Guide** to discover more information about that particular tree, including how common it is in areas infested with the ALB and what products, if any, are made from it.

Students should find trees that are made into baseball bats (ash), give us maple syrup (sugar maple), and one that early doctors used for anti-malaria medicine (mountain ash)! Have students share what they've found with the class and post key information about each tree on the **Wanted Wall**. (See "Intro Lesson: Call to Action" for more about the Wanted Wall.)



Maple



Elm



Willow



Horsechestnut

### TEACHER TIP

➤ If students do not have reliable computer access in class, you can easily print the materials needed for the Intro Activity, and then have students complete the Guided Inquiry work with the **National Tree Benefits Calculator** on a home or library computer.

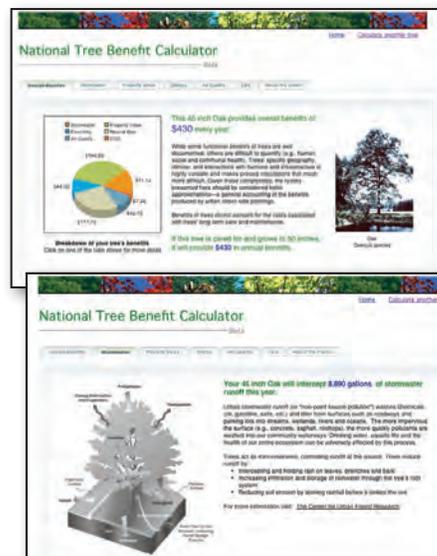
## GUIDED INQUIRY

### What We Could Lose

Explain that we benefit from having trees in our communities, in more ways than just from the products we make from them. Share with students that they will be surveying their schoolyard (or local park, if your schoolyard has few trees) to calculate the benefits trees provide that can't be held in our hands.

Break students into groups and assign each group a separate area. Have students use their previous research to identify the host trees in their assigned area. For each tree, have them record the species and the diameter, taking the measurement approximately 4.5 feet up from the ground (See Teacher Tip below for measurement information).

After returning to the classroom, have students input the data they've collected into the **National Tree Benefits Calculator** and record the results for each tree. Then, have students compile their results and find the total value of the benefits of all of the trees they measured. Discuss the impact the ALB could have on your community if it is not stopped.



### TEACHER TIP

➤ Students should calculate the diameter ( $\text{diameter} = \text{circumference} / \pi$ ) of a tree by first finding the tree's circumference. Students can wrap a length of string around the trunk, using fingers to keep track of the point where the string overlaps. Next, they can straighten the string and measure from point to point with a tape measure to determine the tree's circumference. Then, they can use the formula to determine the tree's diameter.

### High School Biology Extensions

- In addition to calculating the overall benefit of the trees in their area, have students calculate the stormwater, electricity, air quality, property value, natural gas, and CO<sub>2</sub> breakdowns. Discuss the impact of these potential losses on the community.
- Have students explore the **ALB Quarantine Map(s)** for your area, or the area nearest you, and read "**Living and Working in a Quarantine Zone**" (both resources can be found at [www.BeetleBusters.info/qZone.php](http://www.BeetleBusters.info/qZone.php)). Have students prepare a list of "talking points" about ALB quarantine zones to share with their parents.



## TAKE ACTION!



### Beetle Busters Connect

Encourage students to share a link to the **National Tree Benefits Calculator** using their Twitter and/or Facebook accounts. Have them encourage their friends to calculate the benefits of their *own* trees and work to protect them by becoming Beetle Busters at [BeetleBusters.info](http://BeetleBusters.info).

### Beetle Busters Educate

Have students use what they have learned to calculate the benefits trees give to their own homes and neighborhoods. Have them share this information with their families and encourage their families to protect their trees by searching for the ALB and not moving firewood.

In communities already infested with ALB, have students make recommendations for how their families could rebuild their ecosystem services to pre-ALB levels by identifying non-host trees for replanting.





# LESSON 4: NEW RECRUITS—ACTION CAMPAIGNS

**Time Estimate:**  
One Class Period

**UG Understanding Goals:**  
UG1, UG2, UG3

## ADVANCE PREP

### Materials

- Beetle Buster campaign messages: Under “Help Stop the ALB” on [www.beetlebusters.info/beABeetleBuster\\_families.php](http://www.beetlebusters.info/beABeetleBuster_families.php)
- Beetle Busters Action Campaign Plan Worksheet (see p. 29)
- Paper for “Outreach Webs”
- *Optional:* Supplemental Resources for this lesson: [www.BeetleBusters.info/beABeetleBuster\\_educators.php](http://www.BeetleBusters.info/beABeetleBuster_educators.php)

### Tasks

- Make enough copies of the **Beetle Busters Action Campaign Plan Worksheet** for student groups.
- *Optional:* Check out current Beetle Busters TV, radio, and print ads in the **Supplemental Resources**.

## INTRO ACTIVITY

As **Beetle Busters Community Leaders**, students should strive to raise their community’s awareness of the ALB and mobilize their community to take action to stop the ALB’s spread. As socially and virtually connected young people, they are in a unique position to have a lasting impact on the success of the Beetle Busters campaign!

## Community Leaders

Discuss with students how an effective ALB Action Campaign needs to be more than just a one-time advertisement or event. An effective ALB campaign should change the behavior of the people the campaign is trying to reach.

Brainstorm the many different ways in which people get new information. These can include flyers, postcards, brochures, television/radio advertisements, Web sites, blogs, social networking platforms (such as Facebook and Twitter), and word of mouth.

**ASK:** Which of these methods will get you to remember the message and pass it on? Why?

Discuss reasons why a person may be motivated to take on a new activity, and why a person may keep doing that activity once they’ve tried it. Use specific scenarios. *Examples: Why does a child keep playing basketball for many years? Why would a family start—and continue—to recycle?*

**ASK:** What makes you try new things? What makes you embrace something as a part of your regular routine?

Have students discuss specific advertising or awareness campaigns that have convinced them to change their behaviors.

### TEACHER TIP

➤ Remind students that, in every case, it was a local resident who first spotted the signs of ALB in a community. In fact, Chicago, IL, and Hudson County, NJ, are now “ALB free” thanks to the people in those communities—residents, elected officials, businesses, and Federal, State, and local government agencies. In addition to searching, getting the word out about the ALB is the most important thing your students can do!



## GUIDED INQUIRY

### Beetle Busters Action Campaign Plans

Share the core **Beetle Buster Campaign Messages** with your students:

- “Never Move Firewood”
- “Learn the Signs. Look For It. Report It.”
- “Allow State and Federal Officials Access to Your Property To Survey for the ALB”
- “Don’t Plant Host Trees in Infested Areas”

Break students into groups, and have them discuss the best “target audiences” for each message. Have them consider specific groups that are well connected in their community, like heads of community organizations, coaches, and hairdressers. Also, have them consider groups for whom the message is particularly urgent, like homeowners, yard work companies, and those who love nature.

Have groups create an **Outreach Web**, linking the message in the center to the target audiences they brainstorm. Suggest that they put the more important audiences closer to the message/center and the less critical (but still relevant) audiences further away.

Have groups choose the top three target audiences for each message. For each target audience, have the group complete a **Beetle Busters Action Campaign Plan Worksheet**.

BeetleBusters ACTION CAMPAIGN PLAN WORKSHEET	
<b>1 MESSAGE</b> What is your message? This is not your “slogan”; it’s the basic information you want your audience to know	<b>5 GOALS</b> List the things you would like your campaign to get your target audience to do.
<b>2 TARGET AUDIENCE</b> Who is your target audience? Why is this an important message for them, specifically?	<b>6 YEAR-LONG PLAN</b> Indicate when and how you would like your target audience to take action. Hint: Think about what they should do in different seasons!
<b>3 METHOD</b> What are the different ways to reach your target audience (flyers, videos, events, etc)? Think about your target audience, and be creative!	<b>7 MEASURING SUCCESS</b> Look at the goals you’ve listed. Write how you plan to measure that you accomplished all of your goals.
<b>4 SLOGAN(S)</b> Write one or more fun, simple sentences or phrases that your target audience will like and remember.	



www.BeetleBusters.info

### High School Biology Extension

Have students review “**Living and Working in a Quarantine Zone**” ([www.BeetleBusters.info/qZone.php](http://www.BeetleBusters.info/qZone.php)) and then develop relevant campaign messages for a variety of target audiences.



## TAKE ACTION!



### Beetle Busters Connect

Have students post their campaign slogans and materials for the **Beetle Busters Facebook Page** ([www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle)) and share the “success stories” from their campaigns!

### Beetle Busters Educate

Have students enact their **Beetle Busters Action Campaign Plans** and monitor how effective they are using the methods they identified in their Campaign Plans. Work with students to make these Campaign Plans become more than just a one-time activity; rather, promote long-term community awareness work that creates real results over time.



# LESSON 5: NEW RECRUITS—SOCIAL NETWORKING

 **Time Estimate:**  
One Class Period

 **Understanding Goals:**  
UG 1, UG2, UG3

## ADVANCE PREP

### Materials

- Beetle Busters Official Facebook Page: [www.facebook.com/asianlonghornbeetle](http://www.facebook.com/asianlonghornbeetle)
- Beetle Busters Official Twitter Profile: <http://twitter.com/beetlebusters>
- Paper for personal action plans

### Task

- Review the **Beetle Busters Facebook Page** and **Twitter profile**.

## INTRO ACTIVITY

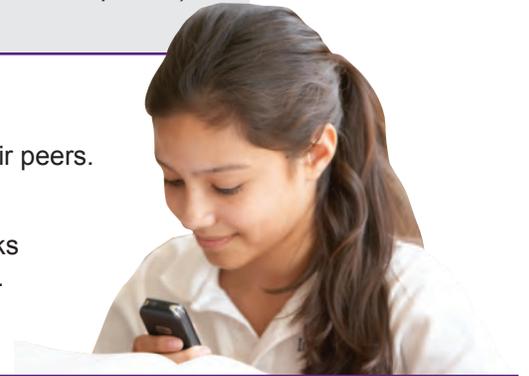
Share with students that, as Beetle Buster Community Leaders, they will make personal action plans that build upon their roles as trend setters and community leaders (online and in-person), in addition to carrying out their larger Beetle Busters Action Campaign Plans.

## Community Leaders

Have students discuss how they currently communicate with and organize their peers.

**ASK:** *What is the best way to tell your friends important information?*

Discuss how the influence they have over their friends and their social networks could make a powerful impact on the success of the Beetle Busters campaign.



## GUIDED INQUIRY

### Youth ALB Organizing Online

Have students review the social networking and other organizing tools currently in use at [www.BeetleBusters.info](http://www.BeetleBusters.info).

**ASK:**

- *How can you contribute to the ALB Facebook and Twitter communities?*
- *How can you use social networking to get your friends involved?*

Have students answer these questions by writing **ALB Online Plans** describing how they will raise awareness about the ALB using social networking. Have students set measurable goals for their plans. *Example: Number of new Facebook Page fans or number of tweets over a certain time period.*

### ALB Outdoor Outreach

Have students make a list of all of the activities they do outdoors with friends.

**ASK:** *How can you and your friends search for the ALB during your outdoor activities?*

Have students consult the personal calendars they created in “Lesson 2: Search and Report—Follow the Signs” and develop **Outdoor Outreach Plans**. *Examples: Search before and after sports practice, or conduct daily “tree checks” on the walk home from school.*

Remind students to set plan goals that can be measured. *Example: The number of new people that they enlist to participate in searching.*

## TAKE ACTION!

### BEETLE BUSTERS EDUCATE AND CONNECT

Encourage students to follow through on these personal plans in their communities—both online and in-person. Have daily, weekly, or monthly progress check-ins with the class. Consider giving a prize to the student who has been most successful with his or her personal plan by the end of the school year.



**1 MESSAGE**

What is your message? This is not your "slogan;" it's the basic information you want your audience to know.

**5 GOALS**

List the things you would like your campaign to get your target audience to do.

**2 TARGET AUDIENCE**

Who is your target audience? Why is this an important message for them, specifically?

**6 YEAR-LONG PLAN**

Indicate when and how you would like your target audience to take action. Hint: Think about what they should do in different seasons!

**3 METHOD**

What are the different ways to reach your target audience (flyers, videos, events, etc.)? Think about your target audience, and be creative!

**7 MEASURING SUCCESS**

Look at the goals you've listed. Write how you plan to measure that you accomplished all of your goals.

**4 SLOGAN(S)**

Write one or more fun, simple sentences or phrases that your target audience will like and remember.





# BE A BEETLE BUSTER FAMILY

Your child is learning to be a Beetle Buster to stop the Asian longhorned beetle (ALB). **The ALB hurts our trees and our communities.**

We ask you to **join your child as a Beetle Buster**. Community members like you helped get rid of the ALB in Chicago, IL, and Hudson County, NJ. Now it's *your* turn to join with your child and **be a Beetle Buster family.**

In the eastern United States alone, **4 million jobs** depend on forests that are vulnerable to ALB!



*Let's do this together!*



The ALB could attack 3 out of every 10 city trees. As of August 2010, over **70,000 trees** have been cut down due to ALB infestations in New York, Illinois, New Jersey, and Massachusetts.

New England produces most of the maple syrup for the United States. If the ALB reaches those forests, breakfast will never be the same!



## FAMILY ACTIVITY SUGGESTIONS

*Raise awareness about, search for, and report the ALB!*



Your child has learned about the trees the ALB likes to attack. As a family, identify the trees on your property that could host the ALB.

Your child knows how to spot the ALB and the signs it leaves behind. Have your child teach you what to look for, and go on a family beetle hunt around your house or in your neighborhood. Make this a part of your daily routine when the weather is warm!



*Dime-sized exit hole*



Going camping? Ask your child to teach you why you should never move firewood from the location where it was cut.

For more information on the ALB, including photos, videos, information about living and working in an ALB-regulated area, and an online form to report your sightings, go to [www.BeetleBusters.info](http://www.BeetleBusters.info).



# CONVIÉRTANSE EN UNA FAMILIA CAZADORA DE ESCARABAJOS

Su hijo está aprendiendo a ser un Cazador de Escarabajos para eliminar el escarabajo asiático de cuernos largos (Asian longhorned beetle, ALB). **El ALB daña nuestros árboles y nuestras comunidades.**

Le pedimos que **se una a su hijo y se convierta en un Cazador de Escarabajos.** Los miembros de la comunidad como usted han ayudado a eliminar al ALB en Chicago, Illinois, y en el Condado de Hudson, Nueva Jersey. Ahora es *su* turno de unirse a su hijo y **convertirse en una familia Cazadora de Escarabajos.**

**¡Hagámoslo juntos!**



En el este de los Estados Unidos solamente, **4 millones de trabajos** dependen de bosques que son vulnerables al ALB.



El ALB puede atacar a 3 de cada 10 árboles de la ciudad. Desde agosto de 2010, sobre **70,000 árboles** han sido talados a causa de infestaciones de ALB en Nueva York, Illinois, Nueva Jersey y Massachusetts.

Nueva Inglaterra produce la mayor cantidad de jarabe de arce para los Estados Unidos. Si el ALB alcanza esos bosques, el desayuno ya nunca será igual.



## SUGERENCIAS PARA ACTIVIDADES FAMILIARES

*Tome conciencia, busque y denuncie la presencia del ALB.*



Su hijo ha aprendido acerca de los árboles que al ALB le gusta atacar. Como familia, identifique los árboles de su propiedad que podrían albergar al ALB.

Su hijo sabe cómo detectar el ALB y los rastros que deja tras su paso. Pídale a su hijo que le enseñe qué debe buscar y salgan de cacería de escarabajos en familia en los alrededores de su casa o en su vecindario. Conviértalo en parte de su rutina diaria cuando el clima esté cálido.



*Orificio de salida del tamaño de una moneda de 10 centavos*



¿Piensa irse de campamento? Pídale a su hijo que le enseñe por qué la leña nunca debe moverse del lugar donde se cortó.

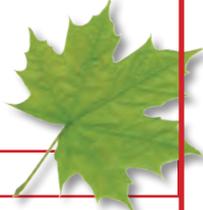
Para obtener más información acerca del escarabajo asiático de cuernos largos, incluidas fotografías, videos, información acerca de la vida y el trabajo en zonas de ALB reguladas, y para acceder a un formulario en línea para denunciar su presencia, visite [www.BeeleBusters.info](http://www.BeeleBusters.info).



# ALB YEAR-ROUND CALENDAR

APRIL	MAY	JUNE	JULY
<b>ALB INACTIVE:</b> Search for older exit holes and egg sites.		<b>ALB ACTIVE:</b> Adult beetles emerge from exit holes in trees. Female ALBs make egg sites on tree bark. Report them!	
<p>It's <b>Arbor Day, Earth Day, and Keep America Beautiful Month!</b> Celebrate our natural world. Teach <b>Lesson 3: Save Our Trees</b> and get excited about searching for the beetle in June!</p> 	<p>Teach <b>Lesson 4: New Recruits.</b> Create action campaigns that will mobilize your community to search and report starting in June. Celebrate <b>National Physical Fitness and Sports Month</b>, and take "ALB Search Breaks" before, during, and after physical activity.</p>	<p>Teach <b>Lessons 1 and 2: Search and Report</b>, and get students searching daily for signs of ALBs.</p> <p>During <b>Great Outdoors Month</b>, spend time outside each day searching for and reporting signs of ALBs, especially on <b>World Environment Day!</b></p>	<p>Celebrate <b>National Recreation and Parks Month</b> by having a "Search Party!" Visit a local park, and search for ALBs.</p> <p><b>Boy Scouts, Girl Scouts, 4-H Groups and campers:</b> Buy firewood where you are camping. If you bring it with you, you might bring the ALB, too!</p> 

**BEETLE BUSTER MESSAGES: SEARCH AND REPORT—SAVE THE TREES**

AUGUST	SEPTEMBER	OCTOBER	NOVEMBER
<b>ALB ACTIVE:</b> Adult beetles emerge from exit holes in trees. Female ALBs make egg sites on tree bark. Report them!			<b>ALB INACTIVE:</b> Adult ALBs die after first frost; larvae tunnel inside the trees.
<p>It's <b>Asian Longhorned Beetle Awareness Month!</b> Use this guide to do "something ALB" each day. Get the whole community involved in searching and reporting!</p> 	<p><b>Back to School!</b> Share "everything ALB" that you did over the summer. Make searching for ALBs part of the school routine. On <b>National Public Lands Day</b>, raise community awareness about the ALB, a pest that can destroy the beauty of our public lands.</p>	<p>It's <b>Crime Prevention Month.</b> If you live in an ALB regulated area, moving firewood outside of that area is a crime. Get the word out on <b>Make a Difference Day!</b></p> <p>Teach <b>Lesson 4: New Recruits.</b> Create action campaigns that educate your community about the ALB and burning firewood where it is cut.</p>	<p>Continue your "don't move firewood" and ALB awareness campaigns (see October).</p> 

**BEETLE BUSTER MESSAGES: SEARCH AND REPORT—SAVE THE TREES**

DECEMBER	JANUARY	FEBRUARY	MARCH
<b>ALB INACTIVE:</b> Larvae and pupae are inside the trees, lurking just out of sight! Search for older exit holes and egg sites.			
<p>Continue your "don't move firewood" and ALB awareness campaigns (See October).</p>	<p>Continue your "don't move firewood" and ALB awareness campaigns (see October).</p> <p>The leaves are gone, but the signs of the ALB are not. Teach <b>Lesson 2: Search and Report—Follow the Signs</b>, and look higher in the trees and along branches for ALB exit holes.</p>	<p>Continue your "don't move firewood" and ALB awareness campaigns (see October).</p>	<p>Continue your "don't move firewood" and ALB awareness campaigns (see October).</p> 

**BEETLE BUSTER MESSAGES: DON'T MOVE FIREWOOD—SAVE THE TREES**