



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 **Get Involved** at www.AsianLonghornedBeetle.com 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 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.AsianLonghorned-Beetle.com/report-your-ALB-sightings.php).

Field Trips:

Visit your local science museum to talk to experts about the ALB, and see how they are working to stop the beetle.

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.

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 backyards.





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 “Get Involved” at www.AsianLonghornedBeetle.com
- Classroom Poster
- Slips of paper
- Several relevant articles or other information about the ALB in your area or an area near you

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 **Get Involved**.

INTRO ACTIVITY

Explain to your students that 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 www.AsianLonghornedBeetle.com. 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:

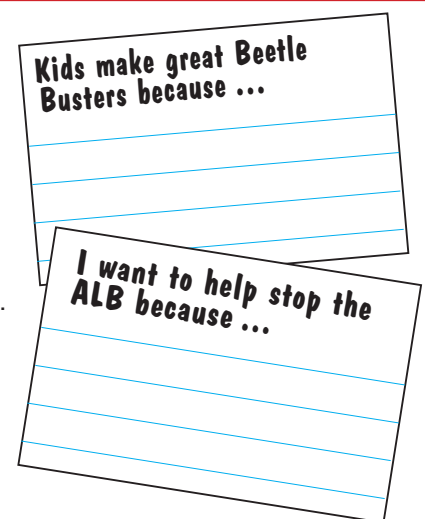
- Kids make great Beetle Busters because ...
- I want to help stop the ALB because ...

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 the **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

 **Understanding Goals:**
UG2, UG3

ADVANCE PREP

Materials

- Classroom Poster
- ALB ID Cards
- Animated ALB: www.AsianLonghornedBeetle.com
- White spotted sawyer photo: in the ALB Photo Gallery
- USDA Reporting Form: www.AsianLonghornedBeetle.com

Tasks

- Make sure you have an **ALB ID Card** for each student. A template card that can be printed and laminated is available online.
- Download and print enough copies of the **white spotted sawyer photo**.

INTRO ACTIVITY

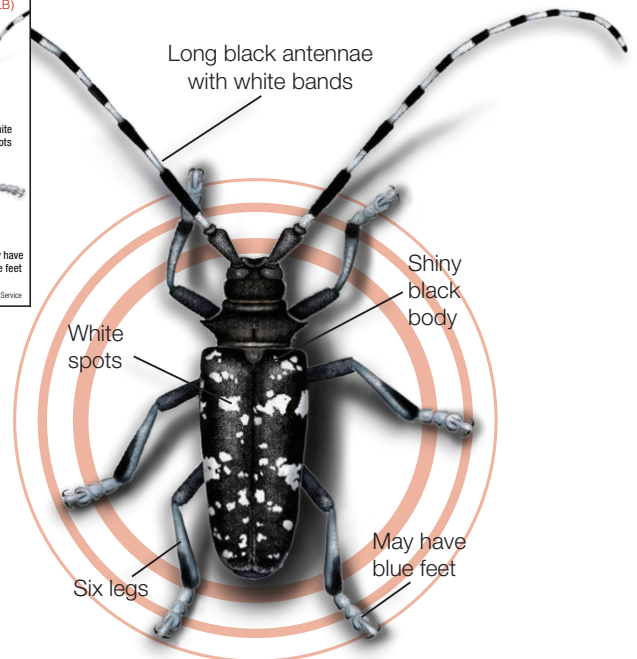
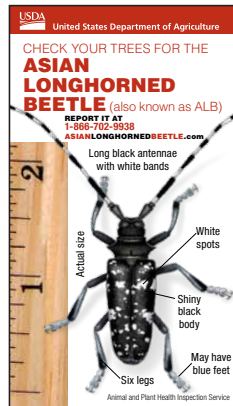
Explain that the most important task for a Beetle Buster is to search for the ALB and then report what he/she has found.

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 www.AsianLonghornedBeetle.com.

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. Afterward, 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

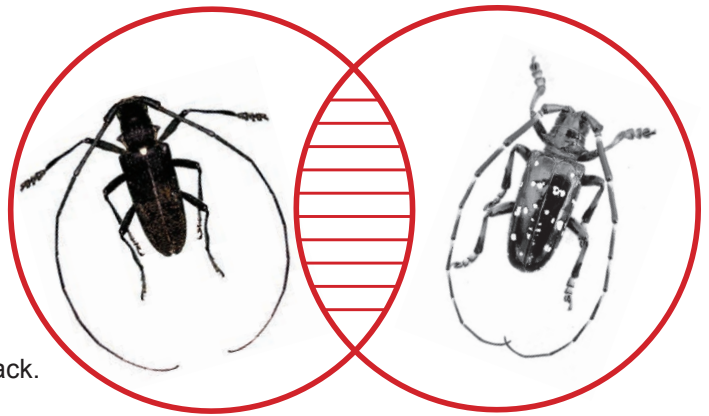
Is it an ALB?

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 tops 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 with white spots.



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**.

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

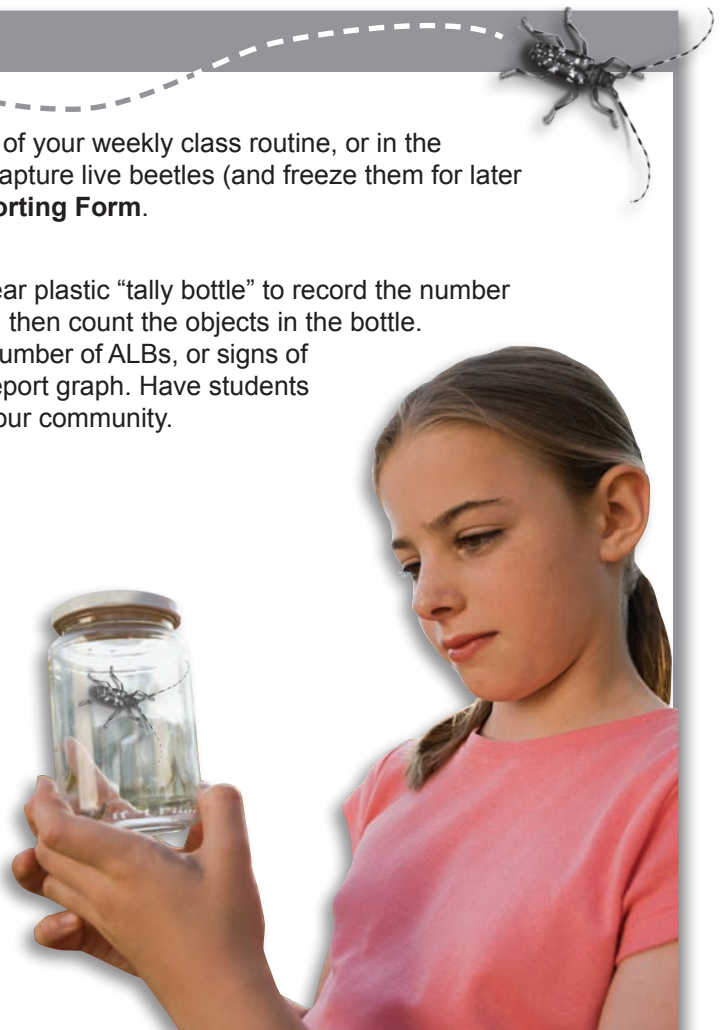
➔ Make it a competition! Give each student his/her own "tally bottle," and challenge the class to see who can go on the most searches.

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

Tasks

- Create a **modified “Follow the Signs” quadrant**. Cover the outer sign’s 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.

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 also weakens the tree, causing branches to break and the tree to eventually die.





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 the students 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!

Have you seen these signs of the **Asian Longhorned Beetle?**

	Round exit holes in trees
	Scar from egg sites on bark
	Frass (wood shavings) on bark or at the base of tree

Search for signs year-round.

Capture beetles, take photos, and report sightings at www.AsianLonghornedBeetle.com

The U.S. Department of Agriculture is pleased to announce the Asian Longhorned Beetle (ALB) National Reporting Form. For more information, visit www.asianlonghornedbeetle.com. Photo: Ken S. 2011. Project No. 02, 2008.

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

APRIL ALB INACTIVE: Search for die-cut holes and egg sites. It's Arbor Day, Earth Day, and Keep America Beautiful Month! Celebrate our natural world. Teach Lessons 1-3: Save Our Trees, and get excited about searching for the beetle in June!	MAY ALB ACTIVE: Adult beetles emerge from exit holes in trees. Female ALBs make egg sites on tree bark. Report them! Teach Lessons 4, New Recruits. Create action campaigns that will involve your community to search and report sightings in June. Celebrate National Physical Fitness and Sports Month, and take ALB Search Teams before, during, and after physical activity.	JUNE ALB ACTIVE: Adult beetles emerge from exit holes in trees. Female ALBs make egg sites on tree bark. Report them! Teach Lessons 1 and 2: Search and Report, and get students searching daily for signs of ALB. During Great Outdoors Month, spend time outside each day searching for and reporting signs of ALB. Celebrate National World Environment Day!	JULY Celebrate National Recreation and Parks Month by having a "Search Party" Visit a local park, and search for ALB. Buy Scouts, Girl Scouts, and campers. Buy firewood when you are camping. If you bring it with you, you might bring the ALB. DO!
AUGUST ALB ACTIVE: Adult beetles emerge from exit holes in trees. Female ALBs make egg sites on tree bark. Report them! It's Tree Check Month! Take 15 minutes to check your trees for the beetle and any signs of damage it causes.	SEPTEMBER ALB ACTIVE: Adult beetles emerge from exit holes in trees. Female ALBs make egg sites on tree bark. Report them! Back to School! Share how you're looking for the beetle and any signs of damage it causes. On National Public Lands Day, make a difference in the beauty of our public lands.	OCTOBER ALB ACTIVE: Adult beetles emerge from exit holes in trees. Female ALBs make egg sites on tree bark. Report them! It's Crime Prevention Month. If you live in an ALB infested area, notify firewood outside of that area as a crime. Get the word out on Make a Difference Day! Teach Lesson 4: New Recruits. Create action campaigns that educate your community about the ALB and burning firewood where it is out.	NOVEMBER ALB INACTIVE: Adult ALBs get off their feet; larvae tunnel inside the trees. Continue your "Don't move firewood" and ALB awareness campaigns (see October).
DECEMBER ALB INACTIVE: Larvae and pupae are inside the trees, waiting for spring. Search for older exit holes and egg sites. Continue your "Don't move firewood" and ALB awareness campaigns (see October).	JANUARY ALB INACTIVE: Larvae and pupae are inside the trees, waiting for spring. Search for older exit holes and egg sites. Continue your "Don't move firewood" and ALB awareness campaigns (see October). The leaves are gone, but the eggs of the ALB are not. Teach Lesson 2: Search the Signs, and look higher in the trees and along branches for ALB exit holes.	FEBRUARY ALB INACTIVE: Larvae and pupae are inside the trees, waiting for spring. Search for older exit holes and egg sites. Continue your "Don't move firewood" and ALB awareness campaigns (see October).	MARCH ALB INACTIVE: Larvae and pupae are inside the trees, waiting for spring. Search for older exit holes and egg sites. Continue your "Don't move firewood" and ALB awareness campaigns (see October).

BEETLE BUSTER MESSAGE: SEARCH AND REPORT — SAVE THE TREES

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

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**. Make searching and reporting part of your class's weekly routine!

Make an ALB Calendar

Using the **ALB Year-Round Calendar** (see back cover 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

UG Understanding Goals:
UG1, UG2, UG3

ADVANCE PREP

Materials

- Classroom Poster
- Wooden baseball bat, maple syrup, paper
- Paper for word pictures

Tasks

- Plan this lesson for a time when leaves are on the trees. Check the **ALB Year-Round Calendar** (back cover) for suggestions!
- Bring in a wooden baseball bat and some pure maple syrup.

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.

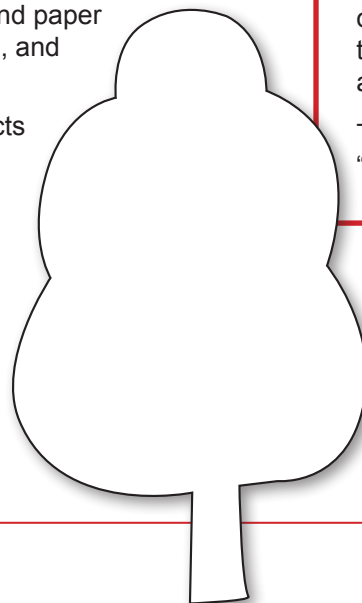
Now, discuss the benefits that we can't hold in our hands. *Examples: shade, wind, protection, beauty, oxygen, and animal habitat.*

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."



TAKE ACTION!



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 Hunt** in their backyards and neighborhoods.

TEACHER TIP

➔ All signs should direct people to www.AsianLonghornedBeetle.com 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”

Task

- Make one copy of the **Beetle Busters Action Campaign Plan Worksheet** for each student.

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!

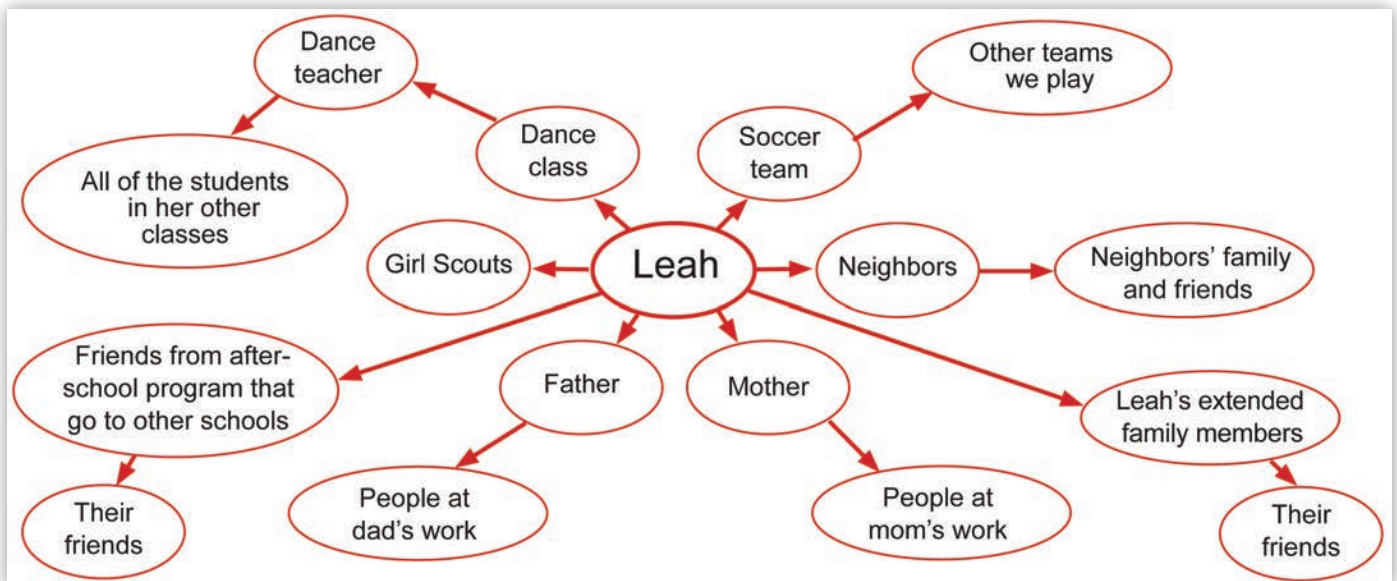
Whom should I tell about the ALB?

Explain to students that they are going to create their own **Community Webs** to figure out whom 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, Illinois and New Jersey 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 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.	

www.AsianLonghornedBeetle.com

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 **ALB Facebook Page** for other Beetle Busters to see. Share your successful campaign stories!

