

# Lost Ladybugs

## About the 4-H Science Toolkit Series: Lost Ladybugs

Some species of native ladybugs in North America are disappearing. In just the last 20 years, these beneficial predators of farm and garden pests have become extremely rare. This rapid decline is of great concern.

In completing this series of units, both age groups will learn about:

- Insect life cycles and the food web
- Biological control of insect pests
- The importance of biodiversity and the process of sampling
- Building their own sweep net
- Searching for, capturing, cataloguing and storing insects
- Submitting data to the Lost Ladybug Project

Students from both age groups will contribute to real scientific inquiry, and begin to explore their own scientific research questions.

All of these adventures call on students to predict what will happen, test their theories, then share their results. They'll be introduced to ladybug vocabulary, gain an understanding of the life cycles of ladybugs and their importance in the food web and collect bugs themselves to identify, observe and report about to the Lost Ladybug Project.

The lessons in this unit were developed by the Lost Ladybug Project based at Cornell University in the Department of Entomology.

### About the project:

The Lost Ladybug Project was set in motion at a small number of schools in New York State in 2004. Now it is active in many states in the U.S. It is a citizen science project that asks anyone of any age to look for any ladybugs they can find, and then send in pictures of each one. One of the first major discoveries came in 2006 when Jilene (age 11) and Jonathan (age 10) Penhale found a rare nine-spotted ladybug near their Virginia home. This was the first nine spotted ladybug seen in the eastern U.S. in 14 years. Their finding confirmed that the species was not extinct and that with enough people working together we can find even these rare species. With recent funding from the National Science Foundation the Lost Ladybug Project has expanded and now anyone in North America can participate. Both common and rare ladybugs, whether native or introduced, are important to find. They all contribute to understanding where different species of ladybugs can be found and how rare they really are. Once we know where the rare ladybugs can be found, we can try to protect their habitat and save them!

General information about ladybugs and their life cycle are on the following pages. This information may be useful for the activities as well.

To find out more about the Lost Ladybug Project, visit [www.lostladybug.org](http://www.lostladybug.org). To find numerous resources related to the insects, outdoor exploration and the environment, check out the 4-H Resource Directory at [www.cerp.cornell.edu/4h](http://www.cerp.cornell.edu/4h).

# All About Ladybugs

## What are ladybugs?

Ladybugs are insects in the Coccinellidae family of the beetle order, Coleoptera. They are characterized by their oval-shaped body and distinctive coloring.

## Is there a difference between lady beetles and ladybugs?

Although these insects are commonly called “ladybugs,” they are members of the beetle order, Coleoptera. The Coleoptera are unique from other orders in that they undergo complete metamorphosis (that is, have larva and pupa stages in their life cycle), and their forewings have modified into a hardened cover (elytra) that protects the insect. “True” bugs belong to the order Hemiptera, and include boxelder bugs, plant bugs, and squash bugs.



### Immature True Bug

Though taxonomically incorrect, lady beetles are still commonly referred to as ladybugs. Other frequently used common names are ladybirds or ladybird beetles.

## How did ladybugs get their name?

The most common legend as to how ladybugs got their name is that during the middle ages in Europe, swarms of aphids were destroying crops. The farmers prayed to the Virgin Mary for help – and help came in the form of ladybugs that devoured the plant-destroying pests and saved the crops! The grateful farmers named these insects “Our Lady’s beetles,” a name which had endured to present day.

## What do ladybugs eat?

Both adult and larval ladybugs are known primarily as predators of aphids but they also prey on many other soft-bodied insects and insect eggs. Many of these are agricultural pest such as scale insects, mealybugs, spider mites and eggs of the Colorado Potato Beetle and European Corn Borer. A few ladybugs feed on plant and pollen mildews and many ladybugs supplement their meat diet with pollen.

### What eats ladybugs?

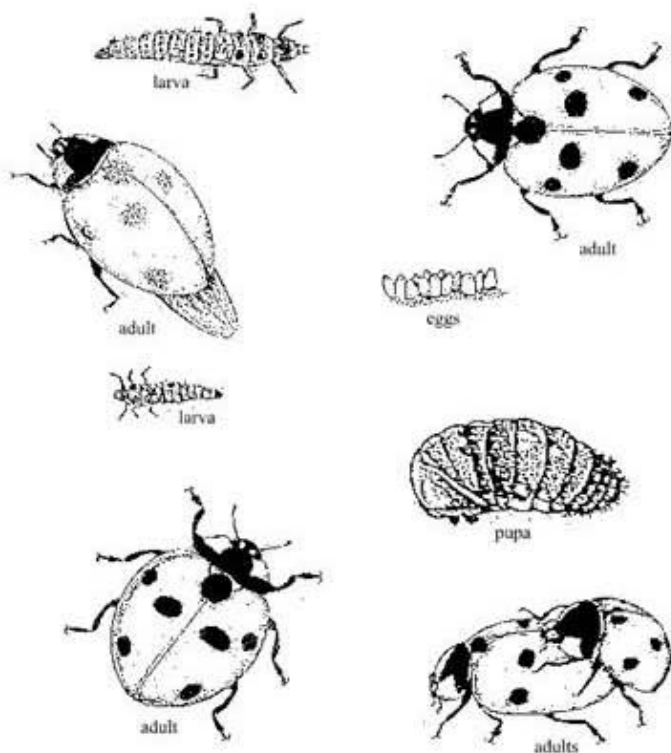
Ladybugs are not commonly eaten by birds or other vertebrates, who avoid them because they exude a distasteful fluid and commonly play dead to avoid being preyed upon. However, several insects, such as assassin bugs and stink bugs, as well as spiders and toads may commonly kill lady beetles.

### How many different species are there in the US? In the world?

There have been over 500 species of ladybugs identified in the United States, and over 4500 in the entire world.

### How long do they live?

After a female lays her eggs, they will hatch in between three and ten days, depending on ambient temperature. The larva will live and grow for about a month before it enters the pupal stage, which lasts about 15 days. After the pupal stage, the adult ladybug will live up to one year.



### What do the different stages of the life cycle look like?

#### Life Cycle Stages

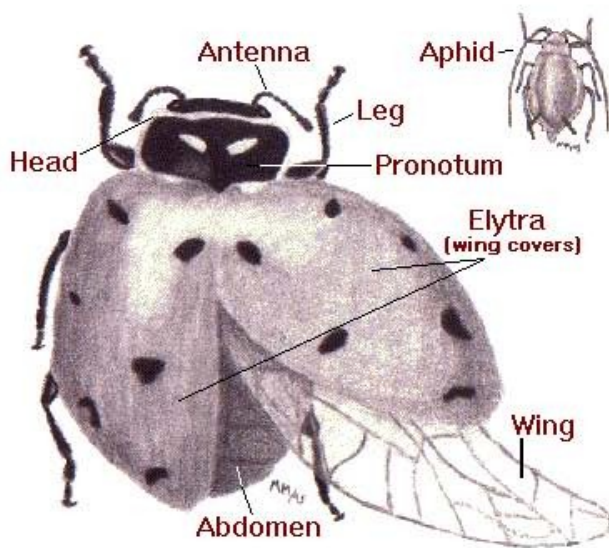
**Eggs** are tiny, spindle-shaped, and arranged in clusters.

**Larvae** are usually elongated, "alligator" shaped, slightly pointed at the rear, and their body is covered in tiny bristles.

**Pupae** are slightly round and dark colored. You can find them attached to a surface by their hind ends.

**Adults** are sphere-shaped, smooth, and have easily recognizable colors and markings.





**What about ladybug anatomy?**

### Ladybug Anatomy

**Ladybug in Flight**  
 Photo by Alex Wild, Champaign, Illinois, 2008



### **Why are they so brightly colored?**

Ladybugs bright colors serve as a warning – they indicate any potential predators of the distasteful repellents the beetle will release if attacked. Ladybug spots are part of the bright warning pattern discussed in the previous question.

### **What's with them in my house during winter?**

During the winter months, ladybugs seek out a warm place to hibernate. Many seek out cracks around buildings, including people's homes. They mass together to stay warm throughout the winter. Don't worry, they will not harm you or any part of your home, and they will be gone by spring.

### **How did non-native species get here?**

Non-native ladybug species may have been introduced to the United States by scientists as an attempt to control crop-damaging aphids, or they could have hitched a ride with any vegetation that was brought over from Europe, Africa, or Asia.

## Lost Ladybug Project: Food Webs & Biodiversity

**Activity Series:**  
Lost Ladybug  
**Grade Level:** 3-6  
**Clock On:** 45 min.

### Main Idea

Learn about Food Webs and what can happen when they are disrupted, learn the value of biodiversity.

### Motivator

A single ladybug larva will eat about 400 medium-size aphids during its development to the pupal stage. An adult female will eat about 300 medium-size aphids before she lays eggs. She can eat about 75 aphids in a day and may consume more than 5,000 aphids in her lifetime! What would happen if all the ladybugs were gone?

### Pre-Activity Questions

Before you start the activity, ask the students:

- What do you think ladybugs use their antennae for? (A: to touch, smell, and taste).
- What do ladybugs eat and what eats ladybugs?

### Activity

- a copy of the Food Web Game Plan (from [www.lostladybug.org](http://www.lostladybug.org))
- the right number of printed or drawn owls, toads, ladybugs, aphids, and plants.
- a single hole punch
- yarn

### How the Food Web Game Works:

1. **Please look at the Food Web Game Spreadsheet as you read along.** Let's start with Round ONE for a small number of participants. This would be shown in the upper left part of the spreadsheet.
2. To follow the sequence described in the spreadsheet, know that, for the sake of the game, predation begins at the top of this food chain. Let's say:
  - You have one owl that eats two toads (Predation rate = 2, cell #D3).
  - After predation there is still one owl and now only one toad (cell #E4).
  - Each toad would eat two ladybugs. But now there is only one toad so this toad eats two of the four ladybugs (cell #C5), leaving two ladybugs (cell #E5).
  - Each of the two ladybugs (one of each species) eats two aphids, leaving only one aphid (cell #E6).

*(Continued on page 2)*

### Objectives

- To understand all animals are important to the food web
- To understand what happens if one species disappears

### Learning Standards

(See Matrix)

### Common SET Abilities 4-H projects address:

- Predict
- Hypothesize
- Evaluate
- State a Problem
- Research Problem
- Test
- Problem Solve
- Design Solutions
- Develop Solutions
- Measure
- Collect Data
- Draw/Design
- Build/Construct
- Use tools
- Observe
- Communicate
- Organize
- Infer
- Question
- Plan Investigation
- Summarize
- Invent
- Interpret
- Categorize
- Model/Graph
- Troubleshoot
- Redesign
- Optimize
- Collaborate
- Compare

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## Lost Ladybug Project: Food Webs & Biodiversity

(Continued from page 1)

- Each aphid eats six plants. But now there is only one aphid left and therefore  $9 - 6 = 3$  plants are left.

### That's the First Part of Round One.

3. Now each animal has time to recruit more members or reproduce. You have one owl that does not reproduce or "recruit" (call in more owls) very fast, so reproductive rate = 0 (cell #G3), so Generation 2 still has only one owl in it (cell #H3).
4. There is one toad with a recruitment rate of 2 (by reproduction or calling in). So,  $1 + 2 \text{ new} = 3$  toads in Generation 2 (cell #H4)
5. There are two ladybugs (one of each species) with a recruitment rate of one each. So,  $2 + 2 = 4$  ladybugs (2 of each species) in Generation 2 (cell #H5).
6. There is one aphid with a recruitment rate of 4. So  $1 + 4 = 5$  aphids in Generation 2.
7. There are 3 plants with recruitment rates of 2. So,  $3 + 6 = 9$  Plants.
8. **Voila! This is a STABLE Population!**
9. **Round Two is played the same way except that the ladybugs have all been eliminated by something other than the toads.** Aphids take over for a while. Disaster for the plants.
10. **Round Three allows for only ONE species (half the number) of ladybugs to participate.** In real life, predation and reproductive rates do not stay exactly the same with changes in population numbers. So, here we have also slightly changed these rates. The predation rate for toads is less because now it is harder to find ladybugs. The predation rate for ladybugs is higher because there are more prey available to fewer ladybugs. The result, by the second generation, looks almost stable. But one difference is that there are fewer species of ladybugs, so the possibility for one factor (e.g. disease) to drastically reduce the population is greatly increased. This would lead to the same results as Round Two.
11. If any trophic level contains only a single species, it can be vulnerable to a sudden decline and a loss of stability. Different species are more likely to have varying vulnerabilities to disease or weather conditions, so they will not decline at the same rate due to a single mortality source. In other words: DIVERSITY = STABILITY.

### How to Play the Food Web Game:

1. Determine the size range of your group based on the excel spreadsheet.
2. Calculate the right number of owls, toads, ladybugs, aphids and plants by using the spreadsheet and print or draw these on paper or cardstock. If the group is small, the aphids and plants can be manipulated by the students without anyone wearing them.
3. Students should put one hole punch on either side of the pictures and string yarn through these so that they can wear the pictures around their necks.
4. Designate individuals to be the plants and animals in the *Initial population*.
5. --- If you have fewer participants than the total number of plants and animals in the *Initial population*, represent some animals or plants with pictures or other objects (e.g. toy toads).
6. --- If you have more participants than the total number of plants and animals in the *Initial population*, allow some to be observers in the first round of predation. They can join in during the first round of reproduction.
7. --- Note that you should start with equal numbers of two species of ladybugs.
8. **OBSERVATION:** What do you observe about the shape of the web and the numbers in each level? Why do you think the web has this particular shape?
9. Starting with the highest trophic level (an owl in our example), let predation begin. In our example the owl starts by "eating" the number of toads specified in the predation rate column

(Continued on page 3)

Find this activity and more at: <http://nys4h.cce.cornell.edu>

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## Lost Ladybug Project: Food Webs & Biodiversity

*(Continued from page 2)*

(for example, two for the small group size). Toads that are eaten should stand off to the side and surrender their roles to any observers that have not yet been part of the web.

- The uneaten toads then prey on ladybugs and the game continues on through to the lowest predation level (e.g. aphids eating plants).
10. Surviving individuals then "recruit" new members. Note that recruitment can occur through either reproduction or immigration into the area. Observers from the first round should be the first recruits for the next round.
  11. Repeat for two to three generations.
  12. OBSERVATION: What is happening to this food web? Is this food web stable and "sustainable"? Why would a stable food web be a good thing?
  13. Begin Round Two. Simulate a sudden disappearance of all ladybugs by having them all exit the web. Begin the predation and recruitment with the ladybugs absent. (Check the spreadsheet to make sure you have enough prey and recruits.)
  14. OBSERVATION: Did the toads have enough to eat? What happened to the aphids and plants? Is this food web stable?
  15. This time, assume that only one species of ladybug was effected by whatever caused the disappearance and other plants and animals are at initial levels. Begin predation and recruitment again. (Repeat observation above.)
  16. Begin Round Three. Now start again with half the ladybugs (e.g. one species) and all other plants and animals at initial levels but with the adjusted rates provided?

### **Science Checkup—Questions you might ask to evaluate what was learned (note that there are answers in the intro to this series if needed)**

- What do ladybugs eat?
- What eats ladybugs?
- How many different species are there in the US? In the world?
- Can you think of some other "predators" and other "prey"?

### **Extensions**

For a demonstration of the importance of density dependence for stable population regulation check this flash graph made by John Losey in his teaching at Cornell University: ([http://instruct1.cit.cornell.edu/Courses/ipm444/movies/pred\\_pre\\_y\\_curves.html](http://instruct1.cit.cornell.edu/Courses/ipm444/movies/pred_pre_y_curves.html)).

### **Vocabulary**

- **Predator:** An animal that eats other animals in order to survive.
- **Prey:** An animal caught, killed and eaten by another animal as food.
- **Herbivore:** An animal that feeds only or mainly on grass and other plants.
- **Trophic Level:** A stage the a food chain that reflects the number of times energy has been transferred through feeding. For example, plants are on the first level and predators are on higher levels.
- **Ecological Stability:** When conditions are appropriate so that a habitat can support a number of species.

### **Background Resources**

- [www.lostladybug.org](http://www.lostladybug.org)

Find this activity and more at: <http://nys4h.cce.cornell.edu>

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## Lost Ladybug Project: Ladybug Sampling

**Activity Series:**  
Lost Ladybug  
**Grade Level:** 3-6  
**Clock On:** 45 min.

### Main Idea

Ladybugs can be found all over the world and can move between continents. But introducing new species can affect natives. We will learn about and sample the ladybugs in our habitats.

### Motivator

There are more than 4,500 species of ladybugs in the world and more than 500 identified in the U.S. Only about 70 of these are the cute red, yellow and black ones we think of most.

### Pre-Activity Questions

Before you start the activity, ask the students:

- Do you think you will find ALL of the ladybugs in your habitats in only ½ hour?
- About how many different kinds do you think you might find in one place?
- How many of these will be natives?
- How many of the total number of ladybugs your group finds will be natives?

### Bead Game "sampling" Activity

Scientists go out and count the different kinds of insects. This is called sampling. This is done to understand species richness and how the role of each insect fits into the bigger picture. Many non-native lady beetle species have been introduced to the United States by scientists as an attempt to control crop-damaging aphids, or they could have hitched a ride with vegetation that was brought over from Europe, Africa, or Asia. They serve a unique role, perform a special "job". We are going to take a sample to figure out how diverse our beetle (bead) population is.

- 3 big bowls
- About 30 each of several different colored beads
- Paper and pencil for data collection

Explain—"We have different color beads in each bowl. We can pretend each color is a different kind of insect. We can take a scoop or sample from a bowl and find out if the bowl has enough different kinds of pretend-insects." Each group's bowl will have a very different ratio of colors, one with equal numbers of all colors (Bowl A), one with lots of one color and very few of the other three colors (Bowl B), one with only two colors (Bowl C).

*(Continued on page 2)*

### Objectives

- To understand how sampling can show biodiversity
- To understand the impacts of introducing non-native species

### Learning Standards

(See Matrix)

### Common SET Abilities 4-H projects address:

- Predict
- Hypothesize
- Evaluate
- State a Problem
- Research Problem
- Test
- Problem Solve
- Design Solutions
- Develop Solutions
- Measure
- Collect Data
- Draw/Design
- Build/Construct
- Use tools
- Observe
- Communicate
- Organize
- Infer
- Question
- Plan Investigation
- Summarize
- Invent
- Interpret
- Categorize
- Model/Graph
- Troubleshoot
- Redesign
- Optimize
- Collaborate
- Compare

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## Lost Ladybug Project: Ladybug Sampling

(Continued from page 1)

1. Divide children about equally next to bowls of beads and have each child take one spoonful of beads and put it on their plate.
2. Have each child divide their beads by color and count each color.
3. Leader or small group reports their data to the blackboard or large paper. (Put bowls as columns and colors as rows.) Direct entire group to look at results as they are being put up. "What do you notice about these numbers? How many different kinds of insects are in bowl A? bowl B? bowl C?"
4. Discuss how the numbers of different kinds of pretend -insects differed between the bowls, adding that different kinds of insects have different jobs. A ladybug, for example, eats aphids, but a bee pollinates plants, so it's important to have a mixture of insects of equal numbers.
5. Discuss how you could improve the populations of bowls B and bowl C so that they would have a mixture of insects?

Activity Two — [Lost Ladybug Bingo](#) – learn the common ladybugs, prep for sweep netting survey. Game cards (30 of them!) are available on the lost ladybug website

### Science Checkup—Questions you might ask to evaluate what was learned

Why is it important to have a variety of insects in a sample?

What would happen in a habitat if one kind of insect wasn't present?

How does sampling help you to understand population health?

### Extensions

Visit [lostladybug.org](http://lostladybug.org) and print out the Lost Ladybug Field Guide (under Lost Ladybug pdfs). This will help students identify eight types of ladybugs. There's also a ladybug matching game at this site.

### Vocabulary

- **Common versus rare:** Common items are widely found; rare are less likely to be found.
- **Native versus introduced:** Native species were original to a specific place, while introduced species were brought into a new habitat.
- **Biodiversity:** The range of organisms present in a particular ecological community or system.
- **Conservation:** The preservation, management, and care of natural and cultural resources.

### Background Resources

- [www.lostladybug.org](http://www.lostladybug.org)

## Lost Ladybug Project: Nothing but Net

**Activity Series:**  
Lost Ladybug  
**Grade Level:** 3-6  
**Clock On:** 45 min.

### Main Idea

Prepare a ladybug collection chart and make a good strong sweep net for collecting in the next unit.

### Motivator

If ladybugs fall from a plant or fall into your net, they may play dead! Watch them closely!

### Pre-Activity Questions

Before you start the activity, ask the students:

- What are the differences between a butterfly net and a sweep net
- How many different kinds of ladybugs do you think you will find?

### Objectives

- To create a sweep net to be used in collecting.
- To learn how to organize sample data in a chart.

### Learning Standards

(See Matrix)

### Common SET Abilities 4-H projects address:

- Predict
- Hypothesize
- Evaluate
- State a Problem
- Research Problem
- Test
- Problem Solve
- Design Solutions
- Develop Solutions
- Measure
- Collect Data
- Draw/Design
- Build/Construct
- Use tools
- Observe
- Communicate
- Organize
- Infer
- Question
- Plan Investigation
- Summarize
- Invent
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- Categorize
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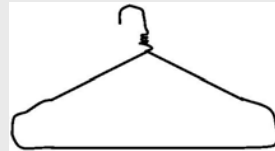
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**Supplies**

### Activity: Making a homemade sweep net

- Ladybug Field Guides (from [www.lostladybug.org](http://www.lostladybug.org))
- Pillowcases
- Two wire coat hangers per pillowcase
- A piece of wood or dowel 2-3 feet long for handle
- Scissors
- Duct tape
- Pliers
- A piece of poster board
- Crayons or markers



1. Turn your two wire hangers into similar circles.
2. Then tape them together in several places, leaving the open end opened.
3. Now cut holes on either side of the seam where there are two layers of pillowcase fabric. Feed the wire through the pillowcase hem.
4. Straighten out the ends that are left so that they can be taped to the handle. Heavily tape the four wire pieces that are out of the pillowcase to the handle. Make sure it is sturdy because it's going to bump into thick grass, alfalfa, clover and other plants!
5. Set up a poster board chart like this, with different ladybug species at the top.

Students can draw the different species of ladybugs again or cut

Species	Species draw pic here	Species draw pic here	Species draw pic here	Species draw pic here	Species draw pic here
Date, location	#	#	#	#	#

## Lost Ladybug Project: Nothing but Net

*(Continued from page 1)*

them out from either the bingo game boards or field guides they have seen before. (Either can be downloaded from [www.lostladybug.org](http://www.lostladybug.org)).

After each collection (next two units) the students will record the dates, habitats and numbers of each type of ladybug they found. At the end of the fifth unit, or during the sixth unit, these can be compared!

### **Science Checkup—Questions you might ask to evaluate what was learned (note that there are answers in the intro to this series if needed)**

- Recall species richness and species evenness. Do you think you will find the same number of different species or the same evenness of species in the two habitats you will visit?
- How many species will be natives? Will you find more natives or introduced species?

### **Extensions**

Check out the Minnesota Dept. of Agriculture's Web page, [www.mda.state.mn.us/kids/actionkit.htm](http://www.mda.state.mn.us/kids/actionkit.htm), for cool activities, including a sweep net safari you could do with your students.

### **Vocabulary**

**Sweep net:** A strong net without holes for collecting insects.

**Species:** A basic biological classification containing individuals that resemble one another and may interbreed.

### **Background Resources**

- [www.lostladybug.org](http://www.lostladybug.org)



## Lost Ladybug Project: Collecting

**Activity Series:**  
Lost Ladybug  
**Grade Level:** 3-6  
**Clock On:** 45 min.

### Main Idea

Go outside and collect ladybugs to see what kinds you find and how many. All ladybugs are important to the Lost Ladybug Project and help scientists figure out where different species are – both rare and common varieties. The children become citizen scientists themselves!

### Motivator

Some ladybugs are found alone while others are found in huge groups of thousands. Some are swept out of the air and wash ashore beside large lakes!

### Pre-Activity Questions

Before you start the activity, ask the students:

- What makes a good habitat for ladybugs? (answers below)
- What kind of weather or what time of day do you think would be best for collecting ladybugs?
- How many different species do you think you will find?

### Activity:

- Your own sweep nets
- Your poster board chart
- Large plain cloth or sheet
- High-sided wash basin or box
- Jars, vials or ziplock bags
- Cooler w/ cold pack or ice

First, locate a collecting site(s). In general, the best sites will be areas of more than 100 square meters (120 yards) that contain herbaceous (not woody or tough) plants that are at least 20 cm (8 in) high. Plants that are too tough cannot easily be swept through and plants that are too short do not host many of the prey insects that ladybugs need, so they don't usually support very large populations of ladybugs.

Collecting sites could include:

- Any area that has not been mowed recently, preferably with some weeds;
- Plants at the edge of a wooded area, mowed area or field (e.g. a hedgerow);
- Orchards, if not too recently mowed; trees themselves are excellent habitat for ladybugs, and while they clearly cannot be swept, lower branches can be shaken or beaten vigorously onto sheets. Note that many orchards are treated frequently with insecticides, so be sure to check on the treatment schedule.

*(Continued on page 2)*

### Objectives

- Learn to efficiently collect a sample from the field
- Learn to identify ladybugs

### Learning Standards

(See Matrix)

### Common SET Abilities 4-H projects address:

- Predict
- Hypothesize
- Evaluate
- State a Problem
- Research Problem
- Test
- Problem Solve
- Design Solutions
- Develop Solutions
- Measure
- Collect Data
- Draw/Design
- Build/Construct
- Use tools
- Observe
- Communicate
- Organize
- Infer
- Question
- Plan Investigation
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## Lost Ladybug Project: Collecting

*(Continued from page 1)*

- Many agricultural fields including alfalfa, clover, small grains (e.g. wheat), potatoes and soybeans. These can make fruitful collecting sites. As with orchards, be sure to check with the grower first.
  

  1. If you will be comparing ladybugs from two different habitats (two consecutive units), you should know that keeping ladybugs in a refrigerator for more than one week is not great for their health. If your group meets once each week, the best plan would be to search for the same length of time, say ½ hour, each time and allow time for photographing the ladybugs on the second week. So, if one habitat is farther from headquarters, that would be the place to go during this unit!
  2. Demonstrate back and forth motion of the net, sweeping low enough to knock insects into the net but not hit the ground, or show video clip from the [lostladybug.org](http://lostladybug.org) Web site. In addition to the insects that will be knocked off the plant, many insects leap for the ground when disturbed and will hopefully land in your nets.
  3. Let everyone go out and sweep, search and beat for a defined period of time.
  4. Empty sweep nets onto open sheets or into wash basins and boxes.
  5. Collect all ladybugs into jars, vials or bags.
  6. Try to identify which species have been found!
  7. Put the ladybugs into a cooler until your reach a refrigerator. Keep them with a small bit of damp paper towel or cotton until they can be photographed (next unit). Cooling slows insects down and makes it easier for them to go without food.

### **Science Checkup—Questions you might ask to evaluate what was learned (note that there are answers in the intro to this series if needed)**

- How many ladybugs did you find?
- How many different species did you find?
- How many different ladybug species did you recognize?
- Did you find them all in the same kind of habitat?

### **Extensions**

Find out more about the ladybugs you have found so far at [www.lostladybug.org](http://www.lostladybug.org)

### **Vocabulary**

- **Habitat:** The natural conditions and environment in which a plant or animal lives, e.g. forest, desert, or wetlands
- **Microclimate:** the climate of a confined space or small geographic area
- **Sampling:** Taking a small part, number, or quantity of something as a sample and using it to make observations about the whole group or area.
- **Collecting “Effort”** A way of measuring the number of people and time put into collecting so that densities (of ladybugs can be compared between different trips).

### **Background Resources**

- [www.lostladybug.org](http://www.lostladybug.org)

Find this activity and more at: <http://nys4h.cce.cornell.edu>

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## Lost Ladybug Project: Collecting-Part 2

**Activity Series:**  
Lost Ladybug  
**Grade Level:** 3-6  
**Clock On:** 45 min.

### Main Idea

Go outside and collect ladybugs again and compare results from two different habitats. For the Lost Ladybug, having repeat collections from nearby locations and by the same "spotters" is especially valuable. The children become SUPER citizen scientists themselves!

### Motivator

We still don't know why certain ladybugs live on certain plants and in certain areas. Let's try to learn more about this.

### Pre-Activity Questions

Before you start the activity, ask the students:

- How and why do you think your second ladybug collection may be different from your first?
- How many different species do you think you will find?

### Activity:

- Your own sweep nets
- Your poster board chart
- Large plain cloth or sheet
- High-sided wash basin or box
- Jars, vials, or ziplock bags
- Cooler w/ cold pack or ice
- Camera (preferably digital with a close-up function.
- Printed page of "the perfect grey" (downloaded from [www.lostladybug.org](http://www.lostladybug.org))

Locate a second collecting site, somehow different in habitat than the first. The difference could be related to what surrounds the fields (surrounding vegetation versus neighborhood housing) or differences in the fields themselves (types of plants, etc.). Note recommendations from Unit Four.

1. If you will be comparing ladybugs in two different habitats (two consecutive units), this time you should plan to go out fast and come back with time to take photographs.
2. Gather your sweep nets, cloths, wash basins, jars and cooler.
3. Go out and sweep, search and beat for a defined period of time.
4. Empty sweep nets onto open sheets or into wash basins and boxes.
5. Collect all ladybugs into jars, vials or bags.
6. Put the second collection of ladybugs into a chilled cooler. Cooling will slow them down and make them easier to photograph.
7. Once back at headquarters, while the second group of

*(Continued on page 2)*

### Objectives

- Learn differences between habitats
- Learn to store and photograph insects

### Learning Standards

(See Matrix)

### Common SET Abilities 4-H projects address:

- Predict
- Hypothesize
- Evaluate
- State a Problem
- Research Problem
- Test
- Problem Solve
- Design Solutions
- Develop Solutions
- Measure
- Collect Data
- Draw/Design
- Build/Construct
- Use tools
- Observe
- Communicate
- Organize
- Infer
- Question
- Plan Investigation
- Summarize
- Invent
- Interpret
- Categorize
- Model/Graph
- Troubleshoot
- Redesign
- Optimize
- Collaborate
- Compare

**Contributed By**  
The Lost Ladybug  
Project  
[www.lostladybug.org](http://www.lostladybug.org)



## Lost Ladybug Project: Collecting—Part 2

*(Continued from page 1)*

- ladybugs cools down, you can photograph the first (pre-cooled) collection of ladybugs. To do this, bring out your print of "the perfect grey." This grey background will help avoid the glare that can come off shiny ladybug elytra and make identification more difficult. Glare or reflection off the beetle is often more of a problem than not having enough light.
8. Place one chilled ladybug at a time on the grey background and take the largest photograph you can, while maintaining focus. Shield the beetle from bright light and use the flash only if there is very little light.
  9. As this is happening, someone in the group should be recording the group's "best guess" as to the species of each ladybug being photographed.
  10. Repeat the process with the now chilled newer group of ladybugs and record the "best guesses" separately.
  11. Once all the ladybugs have been photographed, you are ready to fill in your poster board chart and have an interesting discussion! In the upper half, note the date, time, number of "spotters," habitat and numbers of each ladybug species found, as well as "kinds" you may not know the names of yet. You may recognize them as all belonging to the same species even if you don't yet know the name. (This is fine! You do not need to determine the species you find. The Lost Ladybug Project will receive the photo and determine the species.)
  12. Fill in the lower half of the chart with similar data from this day's collection. Discuss how and why your collections from two different habitats may have been similar or different.
  13. Return the ladybugs to where you found them or to another great ladybug habitat.

### **Science Checkup—Questions you might ask to evaluate what was learned (note that there are answers in the intro to this series if needed)**

- On which day did you find more ladybugs?
- On which day did you find more species of ladybugs?
- If you found differences, do you think they may be due to habitat, date or weather?
- How many different ladybug species did you NOT recognize?

### **Extensions**

- Think of all the ways your two collecting expeditions differed. Do you have any hypotheses about where or when you can expect to find more ladybugs?
- Find out more about the ladybugs you have found so far at [www.lostladybug.org](http://www.lostladybug.org).

### **Vocabulary**

- Habitat: The natural conditions and environment in which a plant or animal lives, e.g. forest, desert, or wetlands
- Microclimate: the climate of a confined space or small geographic area
- Sampling: Taking a small part, number, or quantity of something as a sample and using it to make observations about the whole group or area.
- Collecting "Effort"
- Species Richness
- Species Evenness

### **Background Resources**

- [www.lostladybug.org](http://www.lostladybug.org)

Find this activity and more at: <http://nys4h.cce.cornell.edu>

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## Lost Ladybug Project: Submitting your Data

**Activity Series:**  
Lost Ladybug  
**Grade Level:** K-2  
**Clock On:** 45 min.

### Main Idea

Complete the process of giving your ladybug images to the Lost Ladybug Project and begin to explore how your data relates to all the other data collected for the Lost Ladybug Project.

### Motivator

Lost Ladybug project received more than 1,000 ladybug photo submissions in 2008. We would love to receive 10 times that many in 2009 and 100 times that many in 2010! Your data is important to us!

### Pre-Activity Questions

Before you start the activity, ask the students:

- How and why do you think your two ladybug collections were or were not different?
- Do you think your collections were similar or different from collections in other parts of North America?

### Activity:

**(This activity could be hard to do with a group because it really involves one person at a computer. Maybe the group could move on to number 3 while a few members submit data)**

- A computer with online access
- The camera with the ladybug photos in it
- Your data from the two collection times

1. Download your ladybug photos from your camera and submit them online through [www.lostladybug.org](http://www.lostladybug.org) by following instructions. You will be asked for the names and ages and number of "spotters." You will be asked for date, time, habitat data as well as the length of time spent searching, etc.
2. Congratulations citizen scientists!  
In what habitats were \_\_\_\_\_ species found in 2008?

### Supplies

### Science Checkup—Questions you might ask to evaluate what was learned (note that there are answers in the intro to this series if needed)

- On which day did you find more ladybugs?
- On which day did you find more species of ladybugs?
- If you found differences, do you think they may be due to habitat, date or weather?
- How many different ladybug species did you NOT recognize?

### Objectives

- Learn how to submit data to the project
- See the bigger picture of ladybug diversity across the U.S.

### Learning Standards

(See Matrix)

### Common SET Abilities 4-H projects address:

- Predict
- Hypothesize
- Evaluate
- State a Problem
- Research Problem
- Test
- Problem Solve
- Design Solutions
- Develop Solutions
- Measure
- Collect Data
- Draw/Design
- Build/Construct
- Use tools
- Observe
- Communicate
- Organize
- Infer
- Question
- Plan Investigation
- Summarize
- Invent
- Interpret
- Categorize
- Model/Graph
- Troubleshoot
- Redesign
- Optimize
- Collaborate
- Compare

**Contributed By**  
The Lost Ladybug  
Project

[www.lostladybug.org](http://www.lostladybug.org)

## Lost Ladybug Project: Submitting your Data

### Science Checkup—Questions you might ask to evaluate what was learned

- How did your collections compare with the ladybugs already submitted to the Lost Ladybug Project?
- Did you find about the same proportion of native and introduced species?
- Did you find any of the newly rare species? Can you tell from the data in the Lost Ladybug Project where you might expect to find them?
- Be sure to keep in mind that all ladybugs provide good information to scientists. Without pictures of all the ladybugs you find they will not be able to tell how common the common species are or, in turn, how rare the rare ones are.
- Which of your collections had greater species richness?
- Which of your collections had greater species evenness?

### Extensions

Test your own ladybug hypotheses using the mapping and graphing features found at [www.lostladybug.org](http://www.lostladybug.org).

### Vocabulary

- Native species: Native species are plants or animals that were original to a specific place
- Introduced species: Introduced species are brought into a new habitat from another location. They are not original to the area.

### Background Resources

- [www.lostladybug.org](http://www.lostladybug.org)