Lost Ladybug Project Curriculum 3-14-09
For Science Toolkit Grades 3-6

Introduction to the Lost Ladybug Project

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.

The Lost Ladybug Project was set in motion at a small number of schools in New York State in 2004. 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 ninespotted ladybug near their Virginia home. This was the first ninespotted 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!

In completing this series of units, both age groups will learn about insect life cycles, biological control of insect pests, biodiversity, conservation, and citizen science. Students from both age groups will be citizen scientists themselves who will contribute to real scientific inquiry, and they will begin to explore their own scientific research questions.

SIX UNIT SCIENCE TOOLKIT FOR Grades 3 - 6

Unit ONE

The Lost Ladybug Project

Food Webs and Biodiversity

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

Motivator -- A single ladybug larva will eat about 400 medium-size aphids during its development to the pupal stage. Males may eat less but 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! Beetles chew from side to side, not up and down, like people do.

Pre-Activity Questions -- Did you know that ladybugs use their antennae to touch, smell, and taste? What do ladybugs eat and what eats ladybugs? What would happen if all the ladybugs were gone?

Activity -- Food Web/Biodiversity Game

Supplies: a copy of the Food Web Game Plan (from www.lostladybug.org Curriculum Collection) showing how the game works for representative small, medium, and large groups of participants.
This will show the appropriate number of half-page size owls, toads, ladybugs, aphids, and plants that you will need to print out for the game.the right number of printed (from www.lostladybug.org Curriculum Collection) 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 Plan (Excel 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.

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. And let's say:

You have One Owl that eats 2 Toads (Predation rate = 2, cell #D3).

After predation there is still One Owl and now only One Toad (cell #E4).

Each Toad would eat 2 Ladybugs. But now there is only One Toad so this toad eats 2 of the 4 (cell #C5) Ladybugs, leaving 2 Ladybugs (cell #E5).

Each of the 2 Ladybugs (one of each species) eats 2 aphids, leaving only one aphid (cell #E6).

Each aphid eats 6 plants. But now there is only one Aphid left and therefore 9 - 6 = 3 plants get eaten.

That's the First Part of Round One.

2. Now 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).

There is One Toad with a recruitement (by reproduction or calling in) rate of 2. So, 1 + 2 new = 3 Toads in Generation 2 (cell #H4)

There are 2 Ladybugs (one of each species) with a recruitment rate of 1 each. So, 2 + 2 = 4 Ladybugs (2 of each species) in Generation 2 (cell #H5).

There is One Aphid with a recruitment rate of 4. So 1 + 4 = 5 Aphids in Generation 2.

There are 3 plants with recruitment rates of 2. So, 3 + 6 = 9 Plants.

Voila! This is a STABLE Population!

3. 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.

4. Round Three allows for only ONE species (half the number) of Ladybugs to participate. In real life predation and reproductive rates do no stay exactly the same with changes in population numbers. So, here we have also slightly changed these rates. Predation rates for toads is less because now it is harder to find ladybugs. Predation rates for ladybugs is higher because there is more prey available to fewer ladybugs. The result, by the second generation, looks almost stable. But the difference that should be discussed is that if now there are fewer species of ladybugs, then the possibility for one factor (e.g. disease) to drastically reduce the population is much increased. This will lead to the results they have seen in Round Two.

> The take home message is if you have any trophic level comprised of a single species it can be vulnerable to a sudden decline and then you lose stability. Different species are more likely to have varying vulnerabilities (e.g. to disease or weather conditions) and thus not decline at the same rate due to a single mortality source. Higher diversity acting in concert with density dependence (e.g., in predation and reproductive rates) leads to a lower probability that a sudden perturbation will destabilize a community of organisms. In other words: DIVERSITY =STABILITY.

How to Play the Food Web Game:

1. Determine the size range that your group falls within (e.g. a group with 41 individuals would be a *Medium group*).

2. Get ready by calculating the right number of owls, toads, ladybugs, aphids, and plants to start the game and printing or drawing 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. The students can 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.*
--- If you have fewer participants than the total number of plants and animals in the *Initial population,* then represent some animals or plants with pictures or other objects (e.g. toy toads).
--- If you have more participants than the total number of plants and animals in the *Initial population,* then allow some to be observers in the first round of predation. They can join in during the first round of reproduction.
--- Note that you should start with equal numbers of two species of ladybugs.

> 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?

5. 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 (e.g. 2 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).

6. 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.

7. Repeat for 2-3 generations.

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?

8. Simulate a sudden disappearance of all ladybugs by having them all exit the web. Begin the predation and recruitment with the ladybugs absent. (Note that you may not have enough prey or recruits - calculate what the numbers would be.)

OBSERVATION: Did the toads have enough to eat? What happened to the aphids and plants? Is this food web stable?

9. Assuming 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.)

10. 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?

OBSERVATION: How did the rates of predations and recruitment change? Why might they have changed like that? Compare numbers after recruitment to initial population numbers. Is this food web headed back to stability? What does this imply about having multiple ladybug species (or species at any trophic level) instead of just one?

Vocabulary (to be filled in later)

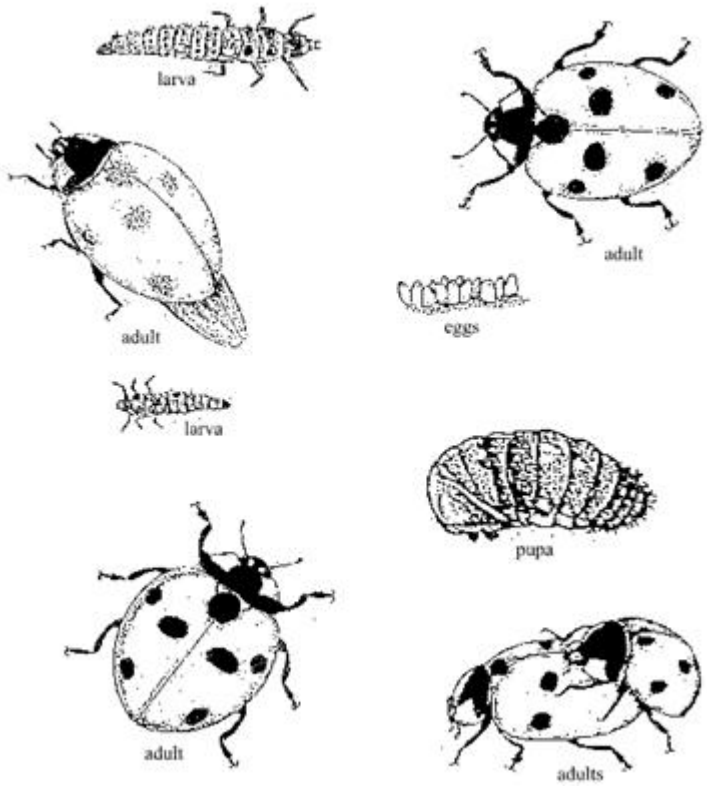
Predator
Prey
Herbivore
Trophic Level
Ecological Stability

Science Checkup

Instructors may wish to review the following introductory information about ladybugs (from All About Ladybugs at www.lostladybug.org)

Are ladybugs really beetles? Although commonly called "lady bugs," they are in the Coccinellidae family of the beetle order, Coleoptera. They are characterized by their oval-shaped body and distinctive coloring. The Coleoptera undergo complete metamorphosis (that is, they have egg, larval and pupal stages in their life cycle). The four life stages of beetles look extremely different. They are unique from other insect orders in that their forewings have modified into a hardened protective cover (elytra). "True" bugs belong to the insect order Hemiptera, and include box elder bugs, plant bugs, and squash bugs.

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



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

How did ladybugs get their name? The most common legend as to how ladybugs got their name is: During the middle ages in Europe, swarms of aphids were destroying crops. The religious farmers prayed

to the Virgin Mary for help – and help came in the form of lady beetles 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.

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 lady beetle will live up to one year.

Why are they so brightly colored? Lady beetles bright colors serve as a warning – they indicate any potential predators of the distasteful repellents the beetle will release if attacked.

Why do they have spots? Lady beetle spots are part of the bright warning pattern discussed in the previous question.

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? Lady beetles 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 may commonly kill ladybugs.

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.

Can you think of some other "predators" and other "prey"?

Extensions

Bio/diversity, Bio=life and diversity = many different kinds. So biodiversity means many different kinds of life.

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_prey_curves.html) Four scenarios can be viewed: 1) no predators, 2) predators with density dependent rates of predation and recruitment, 3) density independent predators with initial prey populations = 51, 4) Density Independent predators with initial prey populations = 50.

Quick Demo of Jobs Concept for Games:

Gather a toolbox or bag with different tools. "Here are different tools that people use to do different jobs. Here's a hammer for, here's a screwdriver for, measuring tape for..….. (Hold up a hammer) So the hammer is good for pounding nails, why don't we just have lots of hammers, why don't we fill our toolbox with just hammers? Why do we need all these different tools?

Each tool does a different job, we need all the tools in order to do lots of different things. Just like each insect does a different job so we need different kinds of insects, not just bees or just beetles."

Alternatively ask participants to think of different jobs that people do in their community.

Each ladybug species lives best, and eats the most pests, like aphids, in specific circumstances. One way of expressing this is that they each have their own "job" like tools in a toolbox. This understanding will become the fundamentals of biodiversity and conservation.

The earth needs to have many different kinds of life forms because each animal, plant, and insect has a special job that keeps our world alive."

Resources

www.lostladybug.org

SIX UNIT SCIENCE TOOLKIT FOR Grades 3 - 6

Unit TWO

The Lost Ladybug Project

Ladybug Sampling and the Concepts of Native and Introduced Species: Two Games

Main Idea -- Ladybugs can be found all over the world and can move between continents. Introductions of new species can affect natives. What you will be doing as part of the Lost Ladybug Project is sampling the ladybugs in your habitats.

Motivator -- There are over 4500 species of ladybugs in the world and over 500 identified in the United States. Only about 70 of these are the cute red, yellow, and black ones we think of most.

Pre-Activity Questions -- 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 you find will be natives?

Activity -- Bead Game about Sampling

"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 groups bowl will have a very different ratio of colors, one with equal numbers of all colors, one with lots of one color and very few of the other three colors, one with only two colors.

Supplies:
- 3 big bowls
- about 30 each of several different colored beads
- paper and pencil for data collection
- several different colors of felt to cut up into squares
- A big felt wall map of the world. (Can be prepared in advance or can be worked on together.)

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.
   A data taker or each child writes down their data on data sheet provided.
   A data taker or whole small group adds up how many of each color they have found.

3. Leader or small group reports their data to the black board 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?"

   Discuss how the numbers of different kinds of pretend –bead -insects differed between the bowls, always connecting with different kinds of insects have different jobs.

"If you have equal numbers of each then all the jobs are getting done. If you have lots of one kind and just a few of another kind maybe all the jobs are getting done but something could happen to the insects with low numbers and jobs would not get done. If you have lots of insects but only two kinds then those jobs are getting done very well but others are not."

4. Final questions for group: what would bowl B and bowl C need to do to get all the jobs done? Older students could work this out on paper.

   What if another color was added to one bowl?

   What if another kind of insect suddenly arrived? Let's see what would happen to the other insects.

5. Transition from sampling game to world game:"In this game let's pretend the different colored squares are different kinds of ladybugs." Bring group over in front of the felt world.

Felt World Game about Invasive Species (refer to set up instructions above)

6. Hand out cards, one per child. If you have extra cards give some to class helpers or have some of the early players play again later.

   Cards (downloadable from www.lostladybug.org Curriculum Collection)have a Continent Number and a sample of one felt color on the front, on the back is a drawing of one of the ways insects travel.

7. As you are handing out cards, ask and have children call out ideas:

   "How might a new kind of ladybug get from it's home to a new place? How do insects travel???"

   Explain the cards, point out the continents on felt world and their inhabitants. Then have the children take turns going up to felt world, going to the continent number that matches their card and removing the color felt square that matches the swatch on their card. Collect these squares as they are removed. Then the child takes a felt piece from the continent with all one color and moves it to the continent number on their card, replacing the square they removed. Finally the child shows and tells the group how their "invader" traveled to the new continent by describing and holding up the back of their card. Some cards are wild cards with a "?", so the child can make up how their invader ladybug traveled to the new continent.

   When all the cards have been played have the children talk about the new mixture of colors or ladybugs on each continent and the world: on one continent some colors will be totally missing, on another other colors will coexist with many invaders.

Vocabulary

Common versus Rare

Native versus Introduced

Biodiversity

Conservation

Species Richness

Species Evenness

Science Checkup

Name a few ways that ladybugs travel between continents.
Are all introduced species "successful"?
What are some ways that "successful" introduced species can affect species richness and species evenness?

Extensions

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 any vegetation that was brought over from Europe, Africa, or Asia.

"So if you go somewhere, like a forest or a corn field, how could we find out if we have enough different kinds of insects? …. enough different kinds of insects to get all the jobs done?

Scientists go out and count the different kinds of insects, this is called sampling.

Resources www.lostladybug.org

SIX UNIT SCIENCE TOOLKIT FOR Grades 3 - 6

Unit THREE

The Lost Ladybug Project

Getting Ready to Collect Ladybugs

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

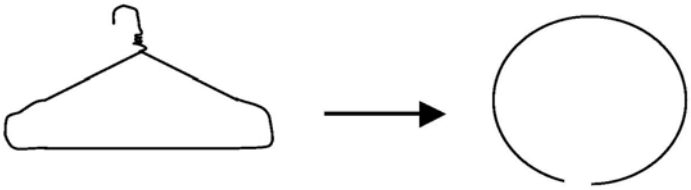
Motivator -- If ladybugs fall from a plant or fall into your net, they may play dead!

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

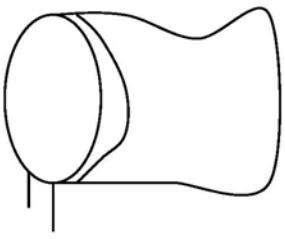
Activity -- How to make a home-made sweepnet.

Supplies:
- Ladybug Field Guides (from www.lostladybug.org)
- pillow cases
- 2 wire coat hangars / pillow case
- 1 piece of wood or dowel approx 2 - 3 feet long for a handle
- scissors
- duct tape
- pliers
- 1 piece of poster board
- crayons or markers

1. Turn your 2 wire hangars into similar circles.

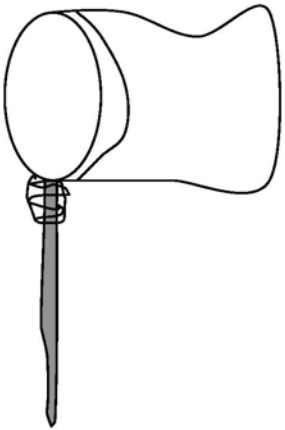


Then tape them together in several places, leaving the open end opened.



2. Now cut holes on either side of the seam where there are two layers of pillowcase fabric. Then feed the wire through the pillowcase hem. Straighten our the ends that are left so that they can be taped to the handle

3. 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!



4. Set up a poster board chart about like this, with different ladybug species at the top

O O O O O O O O O

The students can draw the different species of ladybugs again or cut them out from either the bingo game boards or field guides they have seen before. (Either can be downloaded from www.lostladybug.org)

After each collection (next 2 units) the students will record the dates and habitats and numbers of each type of ladybug they found. At the end of the 5th unit, or during the 6th unit, these can be compared!

Vocabulary

Pliers

Duct tape

Science Checkup

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 your two habitats? How many species will be natives? Will you find more natives or introduced species?

Extensions

Why is "Duct Tape" so strong? Duct tape was originally developed during World War II in 1942 as a water resistant sealing tape for ammunition cases. Permacel, then a division of Johnson & Johnson, used a rubber-based adhesive to help the tape resist water and a fabric backing to add strength. It was also used to repair military equipment quickly, including jeeps, firearms, and aircraft because of these properties.

For more fun facts and the history of duct tape, visit Wikipedia (http://en.wikipedia.org/wiki/Duct_tape)

Resources

www.lostladybug.org

Unit FOUR

The Lost Ladybug Project

Collecting Ladybugs Habitat I

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, how rare the rare ones are and how common the common ones are. The children become citizen scientists themselves!

Motivator -- Some ladybugs are found alone while others are found in huge groups of thousands that have gathered together. Some are found swept down out of the air and washed ashore of large lakes!

Pre-Activity Questions --What do you think makes a good habitat in which to find ladybugs? What kind of weather or what time of day do you think would be best? How many different species do you think you will find? (some answers to the first question can be found below)

Activity -- To prepare for going outside and collecting ladybugs locate a collecting site(s). In general the best sites will be areas of more than 100 m2 (120 yards) that contains 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 ladybugs need and thus do not usually support very large populations of ladybugs. Specific collecting site possibilities would include:

Any area that has not been mowed recently, preferably with some weeds,

The plants at the edge of a wooded area, mowed area or field (e.g. a hedgerow, these long thin strips can be excellent sites if they are wide enough to sweep or search visually)

An orchard – sweeping is possible if not to 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.

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

Supplies:
- 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

1. If you will be following the plan of comparing ladybug finds in two different habitats (two consecutive units) you should know that keeping ladybugs cooled in a refrigerator for more than one week is not great for their health. If your group meets one 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, for example, 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, low enough to knock insects into the net but not hit the ground, or show little video clip (will be on the website soon!). 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.

Vocabulary

Habitat

Microclimate

Sampling

Collecting "Effort"

Science Checkup

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

Resources

www.lostladybug.org

SIX UNIT SCIENCE TOOLKIT FOR Grades 3 - 6

Unit FIVE

The Lost Ladybug Project

Collecting Ladybugs Habitat II

Main Idea -- Go outside and collect ladybugs again to see what kinds you find and how many and compare results from two different habitats. All ladybugs are important to the Lost Ladybug Project and help scientists figure out where different species are, how rare the rare ones are and how common the common ones are. Repeat collections from nearby locations and by the same "spotters" is especially valuable. The children become SUPER citizen scientists themselves!

Motivator -- The degree to which specific ladybug species are associated with particular plant hosts (of their prey) is still an unsolved mystery.

Pre-Activity Questions -- 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** -- 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, for example, as much as what is different about the fields themselves (type of plant, etc.). Note recommendations from Unit Four.

Supplies:
- 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)

1. If you will be following the plan of comparing ladybug finds in two different habitats (two consecutive units) this time you should plan to got out fast and come back with time to take photographs.

2. Gather your sweepnets, 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 with slow them down and make them easier to photograph.

7. Once back at headquarters, while the second group of 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 your 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 groups "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 found of any of the ladybugs designated at the top as well as "kinds" you may not know the names of yet. You may well 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 days 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.

Vocabulary

Habitat
Microclimate
Sampling
Collecting "Effort"
Species Richness
Species Evenness

Science Checkup

On which day did you find more ladybugs?
On which day did you find more species of ladybug?
If you found differences, do you think they may be due to habitat, date, 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

Resources

www.lostladybug.org

SIX UNIT SCIENCE TOOLKIT FOR Grades 3 - 6

Unit SIX

The Lost Ladybug Project

Submitting your data to the Lost Ladybug Project

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 -- The Lost Ladybug project received over 1000 ladybug photo submissions in 2008. We would love to receive 10 times that many in 2009 and ten times ten times that many in 2010!

Pre-Activity Questions -- 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

Supplies: 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 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 the length of time spent searching, etc.

2. Congratulations citizen scientists!

3. If you have time, you can access the currently submitted data to the Lost Ladybug Project through www.lostladybug.org. You can ask, and even map questions like:

Where have all the _____ spp. been found so far?
Where have all the native ladybugs been found so far?
Where have all the exotic ladybugs been found so far?
In what month of 2008 were the most _____ spp found?
In what habitats were _____ spp found in 2008?

Vocabulary

Native species

Introduced species

Science Checkup

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 the 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.

Resources

www.lostladybug.org