

Bug Blitz - A Study in Biodiversity

Developed by Tracy Tomm in 2016, <http://sciencespot.net>

Grade Level: 7th & 8th (May be used with high school students)

Background/Description:

In past years our district had money for field trips to local nature areas for the [Butterfly Brigade](#) project; however, budget cuts made it difficult to pay for transportation. I decided to adapt the project to a smaller level using our school garden, which is a quick walk to our front schoolyard! I started this new project in the fall of 2016 as part of my Ecology unit for my 8th grade students. The goal of project was to investigate biodiversity by documenting the bug populations that could be found there. This project was a huge hit with the students - not only catching/documenting the bugs, but also implementing their strategies in the spring as we redid the school garden.

Unit Objectives:

- Define biodiversity and give examples of each type (species, habitat, genetic)
- Develop and conduct a scientific study that results in data that is accurate and reliable
- Utilize scientific methods and practices used for the identification of arthropods
- Explain the differences between the various classes of arthropods
- Analyze and compare data from different classes, dates, etc. to draw conclusions about the biodiversity of an area based on weather and availability of resources (food)
- Recommend strategies to improve the biodiversity of a local park, garden, or natural area
- Develop food webs using local plants and animals to show the flow of energy through an ecosystem



Bug Blitz Project Information (cont'd)

Next Generation Science Standards:

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Project Example: Students were asked to identify reasons for differences in population counts - lack of plants, increase in predators, etc.

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

Project Example: Students applied their knowledge of common species of arthropods to help them develop food webs to show how energy flows in our schoolyard garden habitat.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

Project Example: Students analyzed and compared data from all three blitzes (all classes) based on the total number of species, weather, human impact (failure to catch the bugs or document them). The students are challenged to relate weather conditions with the increase or decrease in the number of species found on a given day.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Project Example: Students research strategies that could be implemented to improve the biodiversity of the schoolyard garden by increasing the diversity of the plants that grow in that area. The classes work together to select strategies that are feasible based on our resources.

Resources

[Bug Blitz PowerPoint](#)

[Bug Blitz Project Worksheets](#)

[Bug Blitz Procedures & Rules](#)

Copies of [Bug Blitz Identification Checklist](#)

Insect collecting supplies - Nets, collection jars, ziploc bags, etc.

Index cards and markers for labeling specimens

Smart Phones or Digital Cameras with access to Google Drive

Printed and/or online resources for identification

Access to Google Drive for submitting data

Project Phases

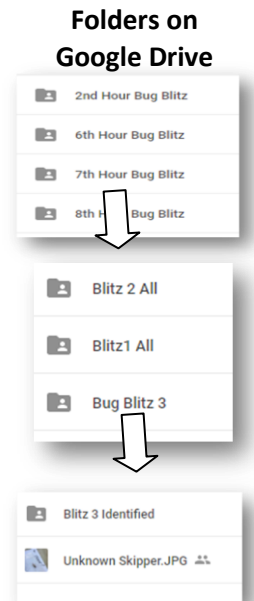
The project consists of four phases - blitzing the garden for bugs, identifying and reporting species, analyzing the data, and then developing strategies/recommendations for the to improve the biodiversity of the schoolyard garden. Check out the [Bug Blitz PBL PowerPoint](#) for a ready-to-use presentation for your classroom.

Bug Blitz Project Information (cont'd)

1st - Developing/Conducting the Blitzes

- After discussing the definition of biodiversity (based on previous classroom lessons) and identifying what critters would be considered "bugs", students work in teams to develop the procedure(s) they will use to "blitz" the garden. The first page of the [Bug Blitz Project Worksheets file](#) contains the page I used with my students. Also check out the [Bug Blitz PowerPoint](#) for suggested answers.
- As this was the first "scientific study" most of the students had conducted, we had discussions on how to conduct a study and what we would need to do to make sure our data was correct (accurate and reliable).
- After receiving input from all the groups, I lead the class in a discussion to streamline all the ideas into one procedure, which is outlined in the [Bug Blitz PowerPoint](#) presentation and on the [Bug Blitz Procedures & Rules](#) page.
- We held three different blitzes in our schoolyard over a 6 week period in September and early October. The students quickly learned how to catch the insects and modified their procedures to make the process as efficient as possible. I also allowed one class period after each blitz day for students to identify and report the species they found.

NOTE: For the upcoming school year and my new schedule with back-to-back classes, I plan to stagger the days each class goes out for a blitz. The odd # periods will go out on one day and the even # classes the following day.



2nd - Identification & Reporting

- The images at right show the folders I set up for each class prior to the first blitz day. The "clickers" were able to upload their pictures to Drive for everyone to see.
- During the identification phase, students used online and printed resources to identify each species found (as specific as possible) using the tips on the [Bug Blitz Identification Checklist](#).
- Students worked together to rename the images that were saved in Drive and sort them into the "identified" folder once they were sure. The students learned how to "pay attention to the small details" to help them classify and identify the many bugs we found.
- They also learned firsthand the importance of having accurate and reliable data - frustration from incorrectly numbered specimens to poor pictures that were too difficult to identify topped the list!
- Students used my [online form](#) (see image at right) to submit the species they had identified. Each class had a few people who were responsible for entering all the data.

A screenshot of a "Bug Blitz Report Form". The title "Bug Blitz Report Form" is at the top. Below it, the text says "Use this form to report all the species your class identified - one by one." and "NOTE: If there are multiple pictures of the same bug, only report it ONCE!". A red asterisk indicates required fields. The form has three sections: 1. "Class Period" with radio buttons for 2nd, 6th, 7th, and 8th; 2. "Blitz #" with radio buttons for 1, 2, and 3; 3. "Name of Bug (Common Name)" with a blank line for text entry.

Bug Blitz Project Information (cont'd)

- I had a few tech-savvy kids help me compile the data for all classes and create spreadsheets for each class as shown below.

| ALL CLASSES ALL SPECIES | | | | | |
|----------------------------------|--------------------------|---------------------------|----------------------------------|-----------------------------|-----------|
| American dagger moth caterpillar | Common Buckeye Butterfly | Fungus gnat | Milkweed Bug Adult | Summer Azure | Waved S |
| American Snout | Crab spider | Garden tiger moth | Monarch Butterfly | Swallowtail caterpillar | White Gr |
| Assasin Bug | Crane Fly | Gnat | Monarch caterpillar | Swamp Metelmark | White M |
| Assasin Bug Nymph | Cricket Nymph | Grape Vine Beetle Bug | Mosquito | Syroidid fly | White Mo |
| Bald-Faced Hornet | Cryptid Centipede | Grass Hopper | Mud Dauber Wasp | Termite | White wo |
| Beetle Larva | Dainty Sulfur | Grass Hopper Nymph | Northern Cloudywing | Tiger Moth Caterpillar | woolly be |
| Big Headed Ground Beetle | damselfly | Grasshopper | orange skipper | tiger swallowtail | Yellow B |
| Black beetle | Darkling Black Beetle | Grasshopper Wasp | orange stink bug | Unknown ant | Yellow Fl |
| Black field cricket | Digger/ Mining Bee | Great Black Wasp | Paper Wasp | Unknown bee | Yellow Ja |
| Black flower wasp | Duskywing | Green Bot Fly | Pearl Crescent | Unknown black beetle | Yellow S |
| Black Garden Ant | Earth Worm | Ground Beetle | Pennsylvania Leather-wing Beetle | unknown butterfly | |
| black jacket wasp | Eanwig | Grub Worm | Pill Bug | unknown butterfly | |
| Blow Fly | eastern carpenter bee | Honey Bee | Potter Wasp | unknown butterfly | |
| blue damselfly | Eastern Forktail | house centipede | Praying Mantis | unknown fly | |
| Brown Katydid | Eastern Red Damselfly | House Cricket | Predaceous Beetle | unknown fly | |
| Brown Marmorated Stink Bug | Eastern Tailed Blue | House Fly | Red Ant | unknown fly | |
| Brown stink bug | eastern yellow jacket | Immature crab spider | Red Spider | Unknown Forktail | |
| bumble bee | European Paper Wasp | Japanese beetle grub worm | Roach nymph | Unknown Hairstreak | |
| Cabbage White | False Potato Beetle | Lacewing | Rolly Polly (aka Wood Louse) | Unknown Skipper | |
| caddisflies | field cricket | Lady bird beetle | Scrape Moth | Unknown small bee | |
| Carpenter Ant | Fiery Skipper | Little Glass Wing | Silver Spotted Skipper | Unknown Wasp | |
| Carpet Beetle | Flesh Fly | Longhorn Beetle | Squash Bee | unknown wasp | |
| Chick-weed Geometer moth | Fly | Maggot | Stink Bug Nymph | unknown wasp | |
| cicada shell | Forest-Tint Moth | Margined Blister Beetle | Stone Cricket | Viceroy | |
| Clouded Sulfur | Formica Ant | Milk Bug Nymph | Sulfur Dainty | Virginian Tiger Moth Larvae | |

3rd - Data Analysis

- Students worked in teams to analyze the collected data as well as compare the results for all classes. We discussed the questions listed on the **Part 3: Data Analysis** worksheet in class. (Available on pages 2-3 in the [Bug Blitz Project Worksheets file](#) in class.)
- Students also analyze data on butterfly populations to identify species that were not documented, but should be found in our area. They research the specific needs (habitat/food/etc.) to identify what resources we need to add to our garden to attract them in future years.

4th - Conclusions & Recommendations

- Students worked in teams to research ideas to improve the diversity of the schoolyard garden, which mainly recommended adding good nectar sources and host foods for butterflies in our area. Student teams completed the **Part 4: Conclusions & Recommendations** worksheet. (Available on pages 4-5 in the [Bug Blitz Project Worksheets file](#) in class.)
- During the spring, student suggestions were reviewed and they were able to add some of the plants they recommended to our school garden!

Unit Assessments

- I assess student knowledge through the use of classroom quizzes and tests aligned with the objectives of the ecology unit. For example, what the students learned about biodiversity will be assessed with questions from my Unit 1 Test. To identify if they know local organisms and how they are related in a food web, several questions on the Unit 2 Test are used.
- I also analyze student responses/participation for classroom and small group discussions.
- The project worksheets are evaluated to determine if each student has met the objectives of the project that are not addressed on other assessments.

Questions or comments? E-mail me at ttomm@sciencespot.net.