Bug Biodiversity: Sampling Ground Invertebrates with Pitfall Traps *by Great Lakes Bioenergy Research Center, US Dept. of Energy (edited by C. Kohn)*

Name: Hour Date:

**Purpose:** To measure differences in biodiversity in different “habitats”. *Safety warning: Bee sting hazard.* Anyone who is allergic to stings should take appropriate precautions. Students will not handle live animals, but fieldwork exposes them to sting potential.

**Materials**

• Spade, post-hole digger, or bulb planter (one per group)

• Multiples of 9 cups for pitfall traps (16 oz disposable cups, yogurt container or steel soup

cans with tops cut off)

• One gallon soapy water (1 tbsp unscented dishwashing soap/gallon)

• Board to cover each trap

• Strainer (one per group)

• Collecting jars (one per group)

• Rubbing alcohol 70% (ethanol or isopropyl)

• Tape measure or yard stick (10 m)

• Hand lens or dissecting scopes

• Multiples of 9 marker flags.

**General notes on procedure**

Pitfall traps can be left in the field for two days to two weeks. For short sampling periods, soapy water is an adequate capture solution. For longer periods, a preservative, such as 70% alcohol with an evaporation retardant like glycol, should be used for a capture solution so that samples do not rot. Alternatively, cups can be emptied every few days. If cups are to be emptied periodically, then it is helpful to use disposable plastic cups for traps, where a trap consists of a removable cup nested within a cup that remains in the soil when traps are emptied.

A trap is sometimes covered with a cover board – a square piece of wood, plastic, or metal that is propped up with rocks or woodchips over the cup so that they allow arthropods to pass underneath but do not allow rain to fall in. Specimens can be placed in a jar with 70% alcohol (ethanol or isopropyl rubbing alcohol) for long term storage. For long term preservation, samples can be dried and pinned using standard insect mounting practices.



**Steps**

1. Complete site description form & questions for your location (*see attached paper*)
2. Locate your assigned location(s). Traps will laid out in a 3 cup by 3 cup grid, with each cup 5 meters (or roughly 15 feet) apart (*see image at the right*)
3. Dig holes and place cups in ground, being careful that the lip of the cup is at the soil surface.
4. Fill cup 1/4 full with soapy water.
5. Cover trap with slightly elevated board over stones *(see image above)*
6. Mark sites with flags.
7. Return to site after sampling period and run trap contents through a strainer.
8. Separate specimens by species and count the number of individuals in each species.
9. Record the total number of species and the number of individuals in each species that you captured.
10. Graph your results.



Data: Bug Biodiversity

* Species 1: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 2: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 3: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 4: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 5: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 6: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 7: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 8: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 9: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval
* Species 10: **Amount**: **Legs** **Color** **Wings**: 1 pair 2 pair Delicate/Small Absent
 No. caught 6 or 8 (Circle One)
 **Hind legs:**  Enlarged Normal **Body**: Segmented Not segmented **Shape**: Wide Long Oval

Data: Bug Biodiversity

1. Number of species caught
2. Total number of individuals caught
3. Number of species ÷ Number of Individuals =  *(this is your biodiversity score)*
4. Number of your site (assigned to you) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. **SHARE RESULTS WITH OTHER GROUPS TO COMPLTE QUESTIONS BELOW**
6. Biodiversity score for each location:

	1. Site 1:
	2. Site 2:
	3. Site 3:
	4. Site 4:
	5. Site 5:
	6. Site 6:
7. Graph the biodiversity scores below. Use the type of graph that your group determines to be the most appropriate. **Be sure to label all axes and provide a key.**
8. In the blanks below, provide a caption for your graph (a caption should describe your graph in enough detail that a blindfolder person could picture your graph exactly as it appears above)

Bug Biodiversity: Questions

*by Great Lakes Bioenergy Research Center, US Dept. of Energy (edited by C. Kohn)*

Name: Hour Date:

**Questions (complete #1, 2, and 3 before collecting data; complete the rest after collecting data)**

1. List and briefly describe the locations that were assessed for biodiversity; then **circle** your group’s site.
2. Site 1:
3. Site 2:
4. Site 3:
5. Site 4:
6. Site 5:
7. Site 6:
8. A hypothesis is really just an educated guess. In scientific research, hypotheses are typically one of the first steps in a research experiment. In the space below, write a hypothesis addressing which site you think will have the **highest** biodiversity and which site will have the **lowest** biodiversity[[1]](#footnote-1).
9. A rationale is the reason why you think your hypothesis is right. In the space below, justify why you chose your hypothesis – why do you chose the site(s) that you did? Why not others?
10. Explain your data. What areas were the highest in biodiversity? What areas were the lowest?
11. Was your hypothesis correct or incorrect? Explain below:
12. Look back at each location and its value for biodiversity. Why do you think the areas with higher scores were richer in biodiversity? List characteristics common among the higher-scoring areas that you think helped to increase the number and amount of species in each area.
13. Conversely, look at the areas with low biodiversity. What factors do you think accounted for this?
14. Rank your enjoyment of this activity: **1 2 3 4 5** (*1 being lowest, 5 being highest)*

1. Rank the educational value of this activity: **1 2 3 4 5** (*1 being lowest, 5 being highest)*

1. Rank your comfort doing this activity: **1 2 3 4 5** (*1 being lowest, 5 being highest)*
2. List any comments below (likes, dislikes, what helped you learn, changes for the future):

Peer Review – Agricultural Sciences Dept

**Name: Date: Hour:**

**Directions**: Please evaluate your group as well as yourself on the basis of contributions and effort on a scale of one to five. For example, a group member who makes an outstanding contribution and did their best would receive a score of five. A group member who did very little might score around a three, and a group member who did little or nothing might get a one or a two. Be sure to provide a reason for your score – why did you assign that score?

**1. Group Member’s Name: Score: 1 2 3 4 5**

Reason:

**2. Group Member’s Name: Score: 1 2 3 4 5**

Reason:

**3. Group Member’s Name: Score: 1 2 3 4 5**

Reason:

**4. Group Member’s Name: Score: 1 2 3 4 5**

Reason:

**5. Group Member’s Name: Score: 1 2 3 4 5**

Reason:

**6. Group Member’s Name: Score: 1 2 3 4 5**

Reason:

**7. *Your* Name: Score: 1 2 3 4 5**

Reason:

1. Biodiversity: the diversity (number and variety of species) of plant and animal life within a region [↑](#footnote-ref-1)