

Bluegill Behavior (or a Study in Ethology)

Grade Level: Upper Elementary, Middle School, High School

Subject Areas: Life science, environmental science

Duration: Variable; usually 45 minutes or one class period

Next Generation Science Standards:

- 3-LS2-1 – Construct an argument that some animals form groups that help members survive
- 4-LS1-1 - Construct an argument that... animals have internal and external features that function to support survival, growth, behavior...
- MS-LS2-1 – Analyze and interpret data to provide evidence for the effects of resource availability on organisms and population of organisms in an ecosystem
- MS-ETS1-4 – Develop a model to generate data for iterative testing and modification of a proposed process
- HS-LS2-8 – Evaluate the evidence for the role of group behavior on individual and species’ chances to survive and reproduce
 - Practices of science
 - Asking questions
 - Planning and carrying out investigations
 - Analyzing and interpreting data
 - Constructing explanations
 - Cross cutting concepts
 - Patterns
 - Cause and effect:
 - Systems and system models.
 - Stability and change.

Common Core State Standards

- ELA/Literacy
 - SL.1-3.1 - Participate in collaborative conversations with diverse partners about grade appropriate topics with peers and adults in small and larger groups.
 - SL.4-5.1 - Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade appropriate topics and texts, building on others’ ideas and expressing their own clearly.
 - SL.7.1 - Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade appropriate topics, texts, and issues, building on others’ ideas and expressing their own clearly.
 - SL.9-12.1 - Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade appropriate topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.



- RST.9-12.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
- WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
- Math
 - 3.MD.B.3 - Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories

Objectives:

- Students will understand the process of studying animal behavior (ethology)

Teacher Background:

An ethologist is someone who studies animal behavior. A well-known example would be Jane Goodall and her study of chimpanzees. An ethologist does not necessarily have to be a scientist. In fact, often the less the ethologist knows about the animal to be studied the better because he or she has no pre-conceived notions about how the animal ought to behave. However, he or she does have to be an extremely careful observer.

An ethogram is a measurable description of an animal’s behavior or activity and its relationship to its environment – how the animal behaves alone or with other animals. It is a recording of the animal’s behavior at specific intervals of time.

This activity can be as simple as a 45 minute activity on one day or as complex as a multi-day study, depending on the abilities or interest of the students. This lesson is written assuming a class, working in groups of three, in one class period.

Materials:

- Stopwatch or digital watches that measure seconds/minutes
- Worksheet

Activity:

- Engage
 - Ask the students if they have ever heard of Jane Goodall or Dian Fossey. What did they study and how? If they don’t know anything about them, have them do some quick research. (They may be familiar with the movie “Gorillas in the Mist” with Sigourney Weaver as Fossey)
 - Explain that studying gorillas or chimps is exciting but they will be using the same techniques to study the behaviors of their bluegills
 - Have them read <http://www.wisegeek.com/how-do-i-become-an-ethologist.htm> to learn more about the field
- Explore
 - Before they can begin, they will have to observe the fish. Everyone in the class must agree on the following:
 - Have them make a list of the behaviors they see.



- Have them agree on a definition or description of each behavior. For example, how many fish constitute a “school”?
 - Have them agree on how long they will observe the fish and the time interval between observations (e.g.; every 15 seconds for 10 minutes)
 - Divide the class into groups of three – a timer, an observer and a recorder. Give the recorder the worksheet.
 - Depending on the space, two groups may be able to work at the same time but they should observe different fish.
 - At the agreed-upon interval, the timer will call “time”; the observer will identify the behavior and the recorder will put a check mark next to the behavior.
 - If they cannot see their fish, they should not guess what it is doing; put a check mark next to “Not Seen”
- Explain
 - Depending on the students’ abilities, they can either graph their results or calculate what percent of the time the fish spends in each behavior.

$$\frac{\text{number of checks for one behavior}}{\text{total number of observations}} \times 100 = \% \text{ time spent on behavior}$$

- Do different fish behave differently? Does one fish seem to be dominant (the “boss” fish)? How could they tell? How do the other fish react?
 - Do the fish seem to have territories?
 - Do they see any patterns in the behaviors?
 - How might these behaviors be adaptations to life in the wild?
- Extend
 - For high school students, this can be an extended research project. Students can explore such questions as:
 - Does the time of day affect behavior?
 - Do the fish behave differently in the fall compared to the spring?
 - Does the amount of light affect behavior?
 - Is the behavior different before and after feeding?
 - Does external sound affect behavior? (Be sure not to bang on the tank!)
 - Is one fish dominant? How does this affect the behavior of the other fish?
 - These projects should be done as a scientific experiment – question, hypothesis, procedure, etc.



