Home Sweet Home – Releasing Your Bluegills

Grade Level: Upper Elementary, Middle School
Subject Areas: Life science, environmental science, chemistry
Duration: Variable

Next Generation Science Standards:

- 3-LS4-3 – Construct an argument with evidence that in a particular environment some organisms can survive well, some survive less well, and some cannot survive at all.
- 3-5-ETS1-3 – Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
- 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.
- MS-ETS1-1 – Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
    - Practices of science
        - Asking questions
        - Planning and carrying out investigations
        - Analyzing and interpreting data
        - Constructing explanations
    - Cross cutting concepts
        - Cause and effect

Common Core State Standards – ELA/Literacy

- SL.4-5.1 - Engage effectively in a range of collaborative texts, discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade appropriate *topics and* building on others' ideas and expressing their own clearly.
- SL.6-8.1 - 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.

Environmental Literacy:

- 1.A.1 – Identify an environmental issue.
- 1.A.4 – Design and conduct the research.
- 1.A.5 – Use data and references to interpret findings to form conclusions.
- 1.B.1 – Use recommendation(s) to develop and implement an environmental action plan.
- 1.B.3 – Analyze the effectiveness of the action plan in terms of achieving the desired outcomes.

Objectives:

- Students will be able to perform basic water quality tests in the field.
- Students will understand the importance of appropriate parameters when choosing a site for releasing captive-raised bluegills.

Teacher Background:

When the time comes to release your classroom raised bluegills, you will have to contact your Regional Fisheries Manager who will tell you where you can release your fish. The release site will be one that has been approved by the DNR fisheries manager based on a number of parameters, including water quality, species of fish already present, and others. Hopefully, your students will be able to visit the release site to do a physical and chemical study of the site, either prior to or at the time of the fish release.

However, if the release site is not close to your school, you might have a pond, slow-moving stream or lake close to your school, and although you may not be able to release your fish there, your students might be curious as to whether the body of water would support bluegills. To satisfy their curiosity, you can have the students do a physical and chemical study of the site, just as they would do if they were able to visit the actual release site.

Either site should be examined to make sure it meets the necessary habitat requirements. This will require that the students examine the physical characteristics, looking for such things as the amount of trash, possible pollution (soap scum, oil sheen, strange smells, etc.), evidence of excessive erosion, and the presence of available cover for the fish.

If the site passes the visual inspection, the next step is to test the water quality. Parameters that should be tested at any site are dissolved oxygen, pH, turbidity and water temperature. If the body of water is near a road or parking lot, salinity should be tested since run-off from road salt could be an issue. If the site is a stream, then water velocity will have to be tested since bluegills do not like fast flowing water.

Bluegills require the following water quality parameters:

- Dissolved oxygen – greater than 5.0 mg/L
- pH – 6.5-8.5
- Turbidity – less than 50 NTU
- Salinity – since your fish were raised in fresh water, the salinity should be less than 1 ppt
- Water temperature – juveniles grow best at 22-34° C (approximately 70-90° F)
- Slow velocity – in the case of a stream, less than 20 feet/minute
- Cover, especially submerged vegetation, overhanging banks, etc.

Materials:

- For water quality testing: The water testing materials will depend on the age and ability of your students. Check with your school system first to find out what types of chemicals are permitted and the protocols for proper disposal.

    - Probably the easiest kit to use is the LaMotte GREEN Estuary Monitoring Kit, which will allow you to test ten samples for salinity, dissolved oxygen, nitrate, pH, phosphate, temperature, turbidity, and coliform bacteria.
        - Advantages: This kit uses non-toxic TesTabs®, so there are no hazardous chemicals to deal with or dispose of (**Students should wear safety goggles just to get in the habit**); directions are easy to follow
        - Disadvantages: Not as accurate as other, more involved, testing methods
        - Even though testing for nitrates and phosphates is not required, you might want to have your students do it.
            - High levels of nitrate may indicate fertilizer run-off
            - High levels of phosphates may indicate raw sewage or animal waste.
    - For older students (Grade 7 and up): LaMotte GREEN Advanced Water Monitoring Kit or other age-appropriate test kit
    - Clean bucket for collecting water samples
    - Empty gallon milk jug for used test samples
- For measuring stream velocity:
    - Two wooden stakes
    - 21 feet of heavy string or rope
    - Tape measure
    - 2 floating objects – oranges work well and are biodegradable if they cannot be retrieved.
    - Stopwatch or watch with a second hand
- Student data sheets, clipboards, and pencils

Activity:

- Engage
    - **Once a site has been identified, either the actual release site, or a site close to your school, you should check it out yourself first to make sure it is easily accessible and hazard-free.**
    - For older students:
        - Have them make a list of the parameters the fish need. Remind them to think not only about water quality, but also physical conditions (e.g., cover, evidence of pollution, stream flow, impact of land use around site, etc.)
        - Have them design a data sheet
    - Before going on a field trip, divide the students into groups and assign specific tasks. It is much easier to do this in the classroom than in the field.
        - Assign one person in each group to be the recorder
        - All of the groups should do the visual inspection

        - Each of the water quality tests should be done by two different groups
        - Go over the directions for each of the tasks, especially the directions for each of the water quality tests.
- Explore
    - Hand out the student worksheet and clipboards to the recorder in each group. Explain that they will only have to record the data for their assigned tasks, not the entire worksheet.
    - All groups should do the visual inspection and fill out that part of the worksheet.
    - Water quality testing – follow the directions that came with the kit you are using.
        - Each test should be repeated by a different group.
        - **Be sure to pour used samples into milk jug for disposal back at school.**
    - Stream velocity
        - Locate an open area along the bank of the stream and set one of the stakes at one end.
        - Use the tape measure to measure 20 feet along the bank and set the other stake. Connect the stakes with the string or rope.
        - Have the person with the stopwatch stand by the upstream stake and toss an orange into the water upstream of the stake. Start timing when the orange passes the stake.
        - Have another person stand by the downstream stake. When the orange passes that stake, yell "Stop"; record the time.
        - Use the same orange (if it can be caught safely) or the second orange and repeat the test.
        - Calculate the average time and calculate rate of flow:

$$\text{Rate of flow} = \frac{\text{Distance}}{\text{Time}}$$

Be sure to express rate of flow as feet per second or feet per minute

- Explain (back in the classroom):
    - Go over the results of the water quality tests. Why did two groups do each test? Did the results of the two groups who did each test agree? If there was a serious difference, what might have happened?
    - Discuss the results of the visual inspection. Did they see (or smell) anything that might be cause for concern?
    - If they have visited the actual release site, have them explain in writing why the site is an appropriate one for releasing their bluegills.

    - If the site is not where they will release their fish, would it be suitable habitat for bluegills? Why or why not?
    - What impact might climate change, especially increased or more intense precipitation, have on the site? Think about erosion, increased nutrients (See “Lake Waterford Fish Kill”)
- Extend
    - Based on the results of their field trip, have the students brainstorm ways that they could make the quality of the site even better. Have them think about what they would like to achieve, then have them develop and implement an action plan.
        - What impact does the land use around the site have on the site itself? Are there ways the impact could be lessened?
        - If the site is near their school, how could they involve the school or local community?
        - How are they going to follow up to make sure their goals have been achieved?
    - Have students create a website or Google Docs to share their data with other schools.