

Bluegills and the Alien Invasion

Grade Level: Middle School

Subject Areas: Life science, environmental science, social studies (economics, geography), language arts, technology

Duration: 3- 45 minutes periods in class, plus time to do research (either in class or as homework)

Next Generation Science Standards:

- MS-LS2- 1 – Analyze and interpret data to provide evidence for the effect of resources availability on organisms and populations of organisms in an ecosystem
- MS-LS2-4 – Construct an argument based on empirical evidence that changes to physical or biological components of an ecosystem affect populations
 - Practices of science
 - Asking questions
 - Planning and carrying out investigations
 - Analyzing and interpreting data
 - Constructing explanations
 - Obtaining, evaluating, and communicating information
 - Cross cutting concepts
 - Cause and effect:
 - Stability and change.

Common Core State Standards – ELA/Literacy

- RST.6-8.1 - Cite specific textual evidence to support analysis of science and technical texts.
- RST.6-8.7 - Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
- 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.
- W.6-8.2 - Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Environmental Literacy:

- 1.A.1 - Identify and describe a local, regional or global environmental issue.
- 1.B.1 - Identify and describe that ecosystems can be impacted by human activities.
- 4.C.1 – Explain how the interrelationships and interdependencies of organisms and populations contribute to the dynamics of communities and ecosystems.

Objectives:

- Students will understand the potential impact of non-native species on bluegill populations



- Students will understand that there may be several ways that non-native aquatic species can spread.

Vocabulary:

- Invasive species - a non-native plant or animal that is so successful that it can out-compete native species
- Native species – a plant or animal which originated in a specific ecosystem, not as a result of an accidental or deliberate introduction.
- Non-native species - a plant or animal species found outside its natural range but which is capable of surviving and reproducing without human help

Teacher Background:

A “non-native species” is usually defined as a plant or animal species found outside its natural range and which is capable of surviving and reproducing without human help. An “invasive species” is defined as a non-native species that is so successful that it can out-compete native species. In other words, not all non-native plants or animals are considered invasive. For example, honeybees are not native but are not considered invasive. In contrast, Asiatic stink bugs (which are becoming far too familiar to many people) are both a non-native and an invasive species. They have no natural predators and are very destructive because they damage fruit trees, soybeans and nursery plants.

Some non-native species were deliberately introduced. Honeybees are native to Southeast Asia, but were brought to this country by European colonists who wanted honey as a sweetener. Many, however, have arrived accidentally; Asiatic stink bugs probably arrived in this country by stowing away in cargo.

Unfortunately, many non-native species become invasive when introduced into a new ecosystem. Many of them are very quick to adapt to new food sources and can out-compete native species for food. In some cases, they can alter the habitat to the point that native species can no longer use it. They may also be able to reproduce more rapidly than native species. Also, in their new range, there are often no natural predators to keep the populations in check. As a result, they often have a negative effect on native plant and animal species.

Materials:

- Large picture of a honey bee and an Asiatic stink bug
- Computers with access to the Internet, reference books

Activity:

- Engage
 - Have students research honey bees and stink bugs; tell them to focus on where they came from, how they got here, and whether they are considered a pest.
 - Honey bees - http://en.wikipedia.org/wiki/Western_honey_bee
 - Stink bugs - http://en.wikipedia.org/wiki/Brown_marmorated_stink_bug



- Have the students read the document “Definition and Characteristics of Invasive Species” - <http://www.fs.usda.gov/detailfull/r8/landmanagement/resourcemanagement/?cid=stelprdb5316137&width=full>
- Based on their research and the definition of an invasive species, are honey bees and stink bugs invasive? *Both are non-native but honey bees are not invasive because they do not cause harm; stink bugs are invasive because they damage crops*
- Explore
 - Now that the students understand the difference between a species that is non-native and one that is also considered invasive, they are going to do some research on the possible impact of non-native species on bluegill populations.
 - Have students work in groups to research the impact of one of the following organisms: rudd, Eurasian ruffe, round goby, Northern snakehead, blue catfish, rusty crayfish, zebra mussel, New Zealand mud snail, Asiatic carp, VHS (viral hemorrhagic septicemia). An alternative is to have students do their own research on invasive aquatic species in Maryland, and then choose one and research its possible impact on bluegills.
 - They should answer the following:
 - Name of the organism?
 - Description (What is it?)
 - Where did it originally come from? (What is its native range?)
 - How did it probably get to this country? What is its current invasive range?
 - Has it reached Maryland? If so, how did it probably get here?
 - What is the possible impact on bluegill populations? Is there a possible economic impact?
 - Why would the organism be considered invasive?
 - What, if anything, is being done to prevent its spread?
- Explain
 - Once their research is done, the students should be prepared to share their information with the rest of the class. This can be done in the form of an oral report, a PowerPoint presentation or a poster.
 - Based on the reports, which organism or organisms do the students feel might have the most impact on bluegill populations? Why?
- Extend
 - Public information campaigns are often the best way to stop the spread of invasive species. Have students work in groups to create a 30 second public service announcement, a sign, or brochure that includes pictures and/or description of the organism, the impact on native species or habitat, and what the public can do to stop the spread of the organism.



- Although originally not native to Maryland, they are now considered to be native. But they have been introduced into many places where they are also not native, and in some cases, have become the “alien invaders”.
- Have students research situations in which bluegills have become invasive:
 - In this country - Maine, Oregon, Lake Tahoe, among others
 - Other countries, such as Japan, South Africa, Australia
- They should try to answer the questions:
 - How did bluegills get there? Why were they introduced?
 - What impact have they had?
 - What, if anything, is being done to get rid of them?
- Many people do not realize that several common species of sunfish found in Maryland (largemouth bass and smallmouth bass,) are not native. Do the students consider these fish to be invasive? Why or why not?

Resources:

- <http://www.dnr.state.md.us/invasives/>
- <http://www.invasivespeciesinfo.gov/aquatics/main.shtml>
- Non-Indigenous Aquatic Species - <http://nas.er.usgs.gov/queries/>

