HU GK-12 Activity

TITLE: Fishing for Aquatic Organisms

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DCPS STANDARDS: **E.3.12** and **E.3.5**

GOALS:

1. Scholars will be able to describe the concept of niche.
2. Scholars will be able to describe the relationship between niche and habitat.
3. Scholars will be able to explain the effects of habitat loss on species survival.
4. Scholars will be able to describe producer-consumer, predator-prey, parasite-host, and symbiotic relationships.
5. Scholars will be able to distinguish between competitive and cooperative interactions between organisms.
6. Scholars will be able to analyze the impact of competitive and cooperative interactions on ecosystems equilibrium.

OBJECTIVES:

1. Given an ecosystem, scholars will describe organisms they observe occupying an aquatic habitat, identify the roles these organisms play (niche) and derive a hypothesis on the potential effects of altering ecosystem dynamics (i.e. habitat destruction, species removal, etc.).
2. Scholars will create a chart indicating whether the relationships they observe are competitive or cooperative and provide an example of how each contributes to sustaining an ecosystems equilibrium.

PREREQUISITE KNOWLEDGE:
Background

In order to survive, organisms must have a place to live, a functional role, and adaptations that allow them to reproduce in their environment. A thorough understanding of how organisms survive requires the study of their habitat, ecological niche, and species interactions. It is essential for humans to understand how our biological world operates so that we are able to better protect it. To better understand the environment, we must be familiar with where organisms live, how they interact with their environment, and how they interact with one another. Ecological concepts related to these ideas include: ecological niche, habitat, and species interactions. A niche refers to the way in which an organism fits into an ecological community or ecosystem. Natural selection selects organisms with morphological, physiological, and behavioral characteristics that best suit each species for an environment, thereby creating its niche. In contrast, a habitat is the actual location in the environment where organisms live and consists of all the physical and biological resources available to a species. Some physical resources of an environment are things like land and water availability. Biotic factors in a habitat include all of the species that occur in that habitat. The presence of herbivores, producers, and

predators all control ecosystem stability. For example, rabbits feed on many herbaceous plant species and if they are removed, a more diverse plant population will be allowed to grow. Trees and shrubs act as cover from predators and thermal barriers. All of these physical and biotic factors interact to determine the quality of the habitat for the organisms present. For example, the nutritional quality of plants available as food for herbivores is determined in large part by the quality of the soils present, which is controlled by the diversity of decomposers. Ecologists study all of these factors through collecting data on as many different species as possible in an ecosystem.

ESSENTIAL QUESTIONS:

1. What is the relationship between producers, consumers, predators, prey and parasites?
2. What is the difference between niche and habitat?
3. How does habitat loss affect species survival?
4. How do symbiotic relationships occur?

LABORATORY MATERIALS:

Microscope, fresh water collected from two different standing environments (flower pot, garbage can, ditch, etc.), glass slides, cover slips, iodine, sponge animals (or index cards with photographs of various organisms)- for learning disabled scholars, eyedropper (or pipette).

DIFFERENTIATING INSTRUCTION:

Accelerated scholars will use the microscope to observe organisms. Learning disabled scholars will use sponge animals or index cards with photographs of organisms. English language limited scholars will be paired with bilingual scholars for this activity.

RATIONALE:

This activity is designed to demonstrate how all organisms have a specific niche and how habitat losses may affect species occupying a particular habitat. Scholars will also learn that many organisms interact competitively or cooperatively. Scholars will be able to explain how these organism interactions contribute to ecosystem stability.

RESEARCH ACTIVITY:

1. Break the class into two sections, one of accelerated scholars and the other with learning disabled scholars.

Protocol for accelerated scholars

1. Organize scholars into groups of two.
2. Each group of two scholars will be stationed at a microscope.
    a. Each station should have two containers of water, each one from a different standing water environment.

3. Label six slides A-F
4. Using a pipette or eyedropper, you will withdraw a small amount of water from the top, middle and very bottom of the water for each container.
5. Place two to three drops from each of the three levels on slides A-C for container one and D-F for container two.
6. Place one drop of iodine on each slide.
7. Cover the water-iodine mixture with a cover slip.
8. Place the slide underneath the microscope lens and describe all the different organisms you can see. Remember to distinguish between plants and animals!

Protocol for learning disabled scholars

1. Organize scholars into groups of four.
2. Each group of four scholars will be given ten sponge animal capsules and a small bowl of water.
3. When sponge animals emerge, scholars will identify the animal and make a list of all the organisms found in their ecosystem.
4. Scholars will identify the habitat each animal occupies and describe its role.
5. Scholars will distinguish between competitive and cooperative interactions in their ecosystem.
6. Write a paragraph describing how the removal of habitat will affect the systems equilibrium.

EVALUATION AND ASSESMENT:

Scholars will create a chart indicating the food chain order of all organisms they fish out and compare the types of organisms they found in the top level compared to the bottom level in the two different containers of water. Scholars will indicate the types of relationships they observe (competitive or cooperative). Scholars will turn in a written paragraph explaining how various types of alterations in ecosystems may affect equilibrium.