ANCHIALINE PONDS

Concepts
Students will focus on an endemic animal that lives in anchialine ponds, the ‘opae’ula. They will observe and describe the body, structure and function, and behavior of this animal through drawings and discussion.

HCPS III Benchmarks
SC.K.1.1
SC.K.1.2
SC.K.1.3

Duration
1 hour

Source Material
PRISM
Micro-lobster homepage
Anchialine ponds detective story

Vocabulary
Endemic
Filter feed
Habitat

Body parts:
- Antennae
- Eyes
- Head
- Mouth parts
- Swimming legs
- Tail
- Walking legs

An Introduction to ‘opae ‘ula

Summary
In this lesson, students learn the major body parts of ‘opae ‘ula (*Halocaridina rubra*) by observing a live specimen in the classroom. From their observation, students discuss in groups and learn the functions of each body part of the shrimp.

Objectives
- Students will construct habitat jars for ‘opae ‘ula.
- Students will identify and discover the functions for the major body parts (structures) of ‘opae ‘ula.
- Students will observe ‘opae ‘ula behavior.

Materials (per pair of students)
1 large jar
Five live ‘opae ‘ula (sold at local pet stores).
1 magnifying glass or one digital microscope for the entire class
1 cup of sand
1 or 2 rocks covered in algae (you can find these in the intertidal zone)
For the entire class:
1 enlarged figure of ‘opae ‘ula with body parts labeled (see below).
1 piece of blank paper or science journal for each student.

Making Connections
We see shrimp almost every day. They are on our dinner tables, in our refrigerators, and on the food shelves at the grocery store. They are being sold in the seafood markets, farmer’s markets and supermarkets. We eat shrimp as food and use them as fish bait to catch more food. Shrimp are used in various recipes and as ingredients for many types of processed food. Shrimp are embedded to our everyday lives.

Teacher Prep for Activity
Purchase shrimp in advance at the local pet stores (see Background section on how to take care of them shrimp). Make copies of enlarged ‘opae ‘ula figure and purchase (or borrow) magnifying glasses. Set up an assembly line with the materials (sand, beach rock or dead coral, food and water) ready in boxes on a table before the lesson.

Background
‘Opae ‘ula, a.k.a. ‘opae, or the Hawaiian anchialine pond shrimp is the most common **endemic** (unique to one place) shrimp found in the

anchialine ponds of Hawai‘i. In Hawaiian,‘opae means shrimp and ‘ula is red. It is believed that the deep ocean current transported the larvae of ‘opae ‘ula from one island to the next, and they colonized the anchialine ponds by traveling through small underground fissures (tiny openings in porous lava substrates). Although an ‘opae ‘ula is smaller than a dime, it can tolerate a wide range of environmental conditions such as fluctuating water salinity and temperatures. ‘Opae ‘ula **filter feeds** on algae, plankton, bacteria, and diatoms in the water. ‘Opae ‘ula is easy to maintain in captivity and is a popular household pet.

Native Hawaiians used ‘opae ‘ula as fish food in their fishponds. It is believed that ‘opae ‘ula used to be so abundant in the anchialine ponds that, from a distance, the water in the pools appeared to be red. Today, ‘opae ‘ula live in much lower densities (quantity), and are coping with habitat loss due to human activities.

To create an ‘opae ‘ula **habitat**, you will need a wide-mouth gallon jar, beach rocks, sand and water. Some people collect water from anchialine ponds, but ‘opae ‘ula can survive in clean distilled water as well. You should place a baby food jar in the gallon jar to hold a piece of dead coral and some black sand. The ‘opae ‘ula jar should be placed in an area that gets 3-4 hours of sunlight everyday for algae to grow. ‘Opae ‘ula feeds on algae and the oxygen that algae create. You may feed ‘opae ‘ula supplemental food such as blue-green algae (spirulina flakes from health food or pet stores), but this is not necessary as long as there is enough algae growing in the jar. A one-gallon jar should sustain five ‘opae ‘ula. After the lesson, ‘opae ‘ula jar can be kept in the classroom as class pets.

Procedure

1. Go over new vocabulary (save the body part vocabulary for later) and write new vocabulary on the ongoing Anchialine Ponds Vocabulary chart paper.
2. Be sure the assembly line for the habitat jars is set-up and ready (see teacher prep).
3. Begin the lesson by introducing vocabulary and the shrimp body parts using the provided figure of ‘opae ‘ula (see attached page).
4. Introduce "habitat" and ask students what animals need in a habitat to live (water, food, shelter).
5. Put the students into partner pairs. One partner gathers habitat materials from assembly line table, then passes the jar to the other partner after putting together the habitat. The other partner receives 4 to 5 ‘opae ‘ula from the teacher.
6. For each pair, they should have a jar of ‘opae ‘ula, magnifying glasses, and a figure of ‘opae ‘ula (print out your own or use the attached figure).
7. Based on observations, each student draws a picture of ‘opae ‘ula on a piece of blank paper or in their science journal. Their drawings should be detailed and big (fill up the whole page). The vocabulary words on the different body parts can be reviewed while the students are drawing. See attached suggestion page on how to draw a shrimp.

(**Optional activity**: The teacher can set up 2-3 stations with digital microscopes, depending on the resources and supervision available. Call one pair at a time to each station for observing ‘opae ‘ula under the microscope. It is necessary to place a shrimp in a small, shallow dish with a small amount of water, in order to focus the microscope. This activity can be done while students are making their drawings.)

8. After the students finish drawing, have the partners discuss the following questions with one another (you may come up with more questions):
   - Does an ‘opae ‘ula have a head, legs, a tail, and a body? Where are these parts?

- What does an ‘opae ‘ula use for swimming?
- How does an ‘opae ‘ula swim up and down in the jar?
- How does an ‘opae ‘ula eat?
- What do you think it is eating?
- Where do ‘opae ‘ula like to hide?

9. Encourage students to describe their answers using their drawing or the provided figure. Allow ample time for discussion and presentation of the results.
10. The lesson can be followed by reading “*The Adventures of Ebi the ‘opae ‘ula*”. Add at least ten (10) minutes to the lesson duration.

Note: This lesson can be broken down into two sessions. Before the actual lesson, the teacher may have the students make pencil drawings of the shrimp by looking at pictures of ‘opae ‘ula. On the lesson day, students will color in the body parts with red/orange crayon on their pencil sketch as they locate them on the live specimen.

Assessments

Each student has a drawing of ‘opae ‘ula.
Each pair discusses their findings.

Resources

Micro-lobster homepage (http://www.fukubonsai.com/micro-lobster.html)
Anchialine ponds detective story (www.hear.org/hoike/pdfs/coastal_unit3_act1.pdf)

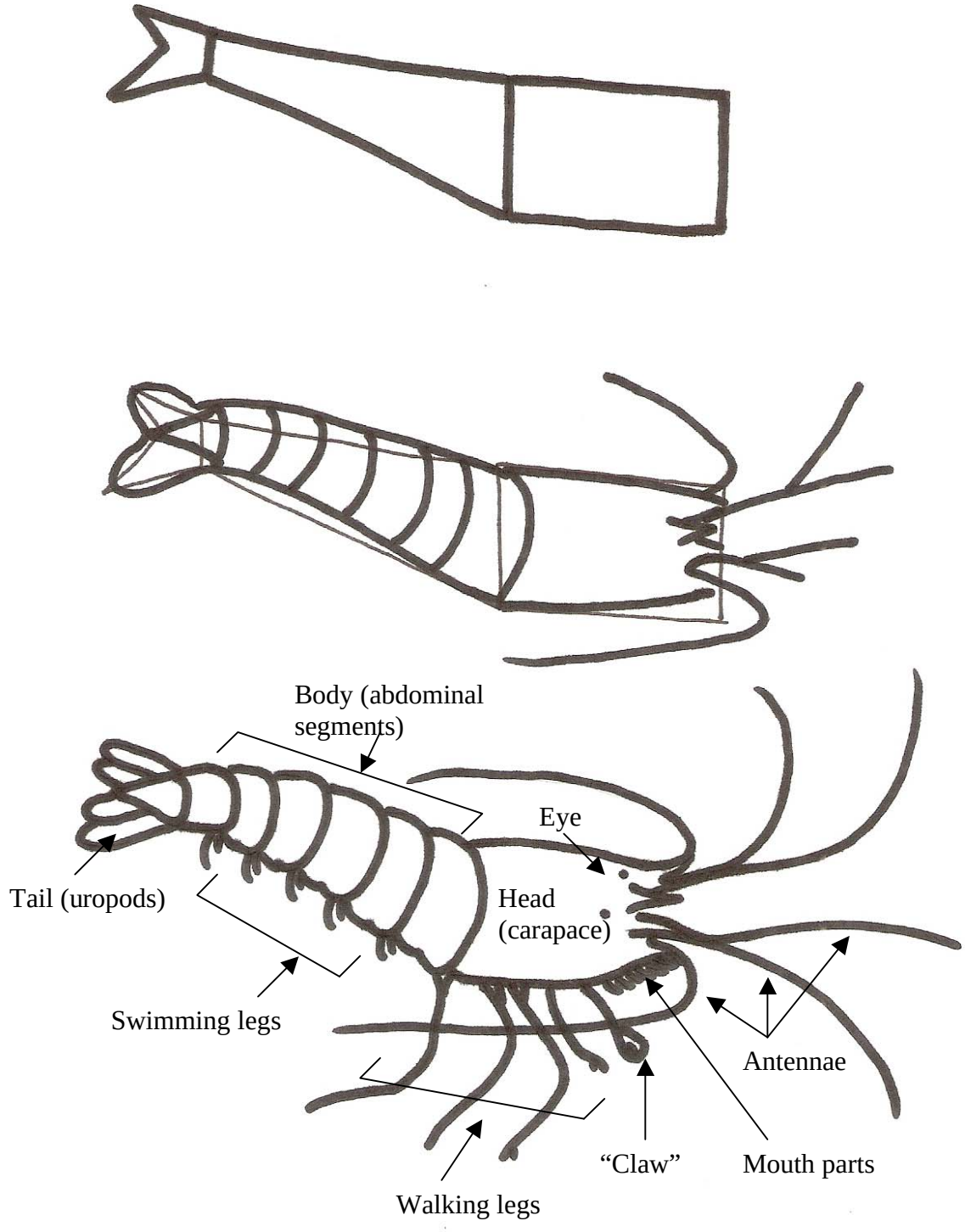
Extension Activities

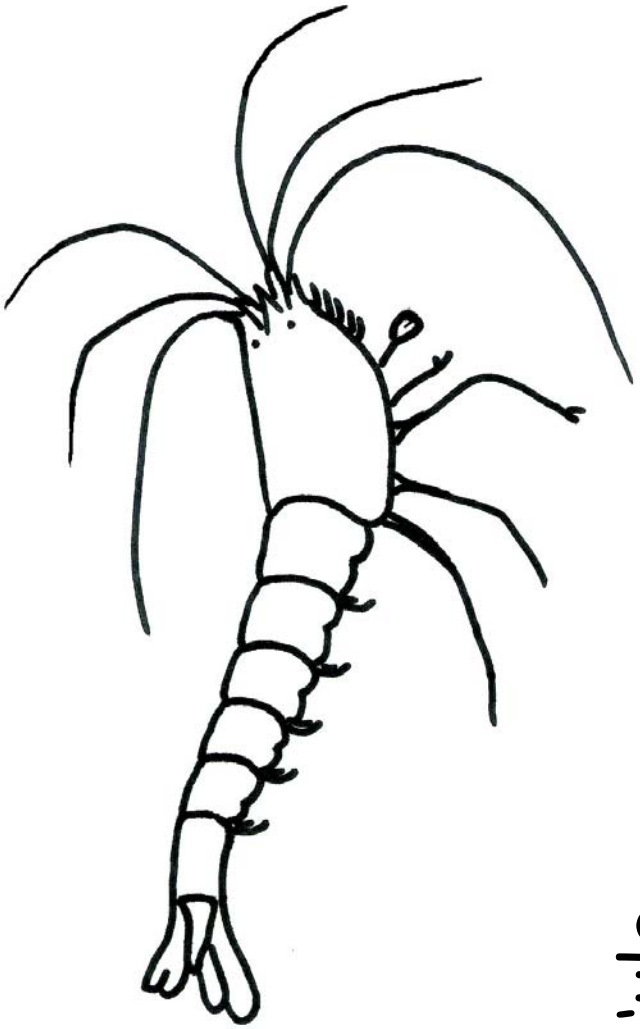
Take the class on a fieldtrip to conduct a census of an anchialine pond site in the North Kona area at the end of the unit as a culminating activity. During the field trip, students will draw the anchialine ponds and what surrounds them (i.e. vegetation). Students will point out what animals and how many they see in the ponds. Use the Anchialine Pond Field Trip Worksheet in the Supplemental Materials folder.

Literature Connection

The Adventures of Ebi the ‘opae ‘ula by Bobby Hsu and Jackie Gaudioso
This book takes students on an adventure with Ebi, a young ‘opae’ula and his life in an anchialine pond. The story provides examples of biological concepts of habitat, predation, foraging, anatomy, and ecological communities while using a social framework that stresses the importance of family, friendship, protection, and sharing within the storyline.

Suggestion on how to draw a shrimp.





'Opae 'ula

ANCHIALINE POND FIELD TRIP! Worksheet

Name_____

Date:_____

Where ?_____

Draw the anchialine ponds you see!

What animals and plants do you see? How many?

	Plants 	Animals 
# How many?		