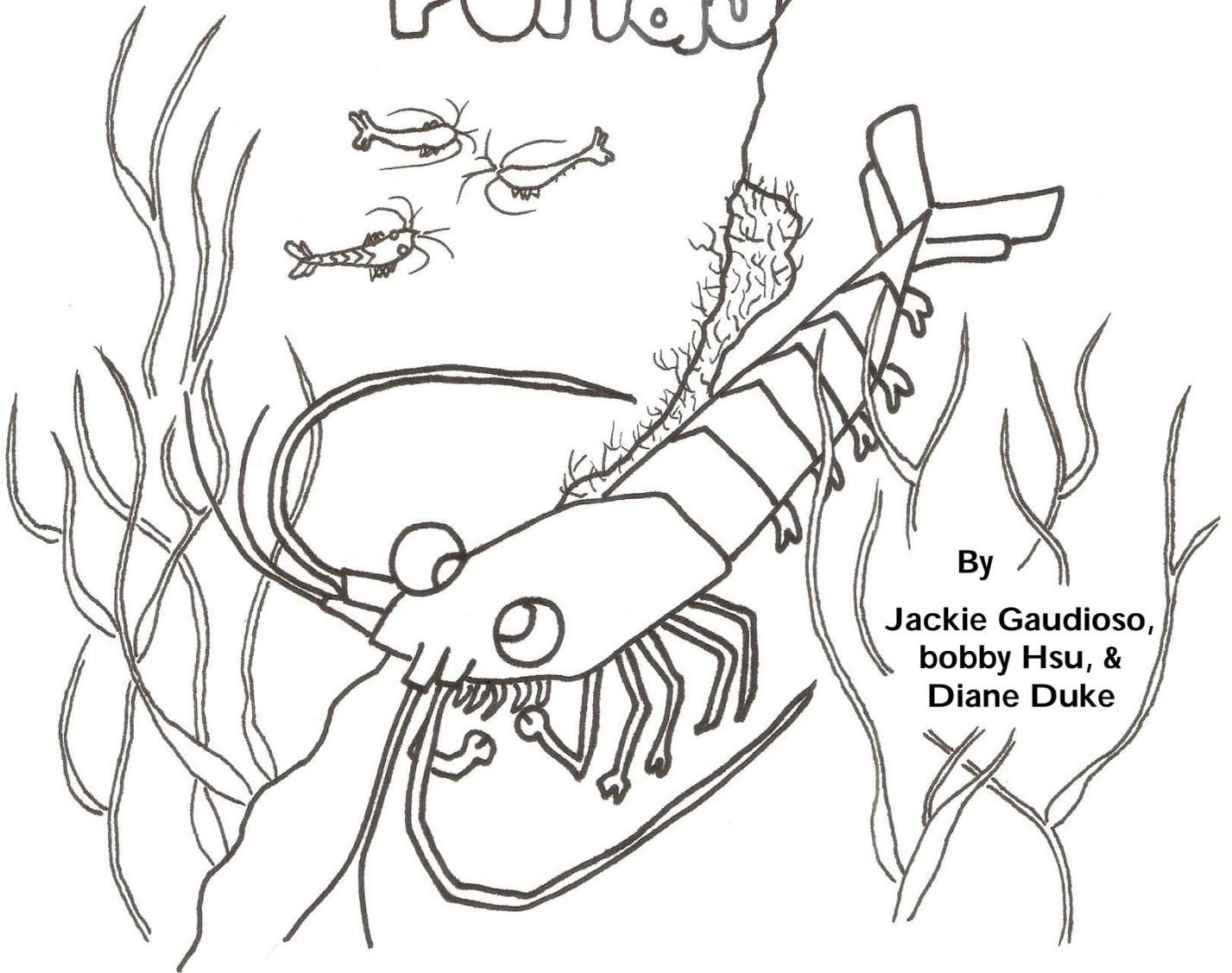


Anchialine Ponds



By

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Hawaii's Anchialine Ponds

**Developed by:
Jackie Gaudioso, Bobby Hsu & Diane Duke**

Grade Level: Kindergarten

Purpose: This curriculum is designed to communicate:

- I. How anchialine ponds of Hawai'i are physically and biologically structured.
- II. What the major natural and human induced impacts to the anchialine habitat are.
- III. How science and conservation are working together to study anchialine ponds and manage the resource within the habitat and the people using this resource.
- IV. How anchialine ponds are culturally important and who uses them.

Hawaii Content and Performance Standards (HCPSIII):

Standard 1: The Scientific Process: **SCIENTIFIC INVESTIGATION**: Discover, invent and investigate using the skills necessary to engage in the scientific process.

Benchmarks:

- SC. K. 1.1 Use the senses to make observations
- SC. K. 1.2 Ask questions about the world around them
- SC. K. 1.3 Collect data about living and non-living things

Standard 3: Life and Environmental Sciences: **ORGANISMS AND THE ENVIRONMENT**: Understand the unity, diversity, and interrelationships of organisms, including their relationship to cycles of matter and energy in the environment.

Benchmarks:

- SC. K. 3.1 Identify similarities and differences between plants and animals

Standard 5: Life and Environmental Sciences: **DIVERSITY, GENETICS, AND EVOLUTION**: Understand genetics and biological evolution and their impact on the unity and diversity of organisms.

Benchmarks:

- SC. K. 5.1 Identify ways in which some offspring are very much like their parents, although not



Topic and Driving Question:

What is unique about the anchialine pond habitat, who lives there, and why should we conserve this habitat?

Rationale:

Anchialine ponds are one of Hawai‘i’s most threatened ecosystems. This unit demonstrates the physical properties of both salt and freshwater using the scientific method, observations of live 'opae 'ula (an endemic shrimp) in the classroom, and a visit to an anchialine pond to survey the flora and fauna. Lessons stress both the biological and cultural importance of this ecosystem. By studying this ecosystem in detail through the inquiry process, students will be encouraged to construct questions and solutions that promote conservation goals.

Concept Map for Unit: See attached sheet

Formative Assessment:

Throughout the unit, students’ learning is re-enforced and assessed through worksheets, data collection, and class discussions.

Summative Assessment:

Students will work cooperatively to express their knowledge of the anchialine habitat and the flora-fauna found there by constructing an anchialine pond model. Each student will be assigned a plant or animal found in the pond and will make a 3D realistic model of the organism. Also, several students will construct the actual anchialine pond habitat diorama, taking into account the properties of the water and from where saltwater and freshwater sources come. Each student will present his or her organism and answer questions about its behavior and where it belongs within the habitat. Students will use critical thinking, creativity, and communication skills to express what they know about anchialine ponds.

Overview of Lessons Chart: See attached sheet

Sources:

Micro-lobster homepage (<http://www.fukubonsai.com/micro-lobster.html>)

Anchialine ponds detective: (www.hear.org/hoike/pdfs/coastal_unit3_act1.pdf)

MARE binder (Ponds for K: Build a Pond lesson)



Partnerships for Reform through Investigative Science and Mathematics

National Geographic:

nationalgeographic.com/ngkids/trythis/trythis_water/floating-egg.html

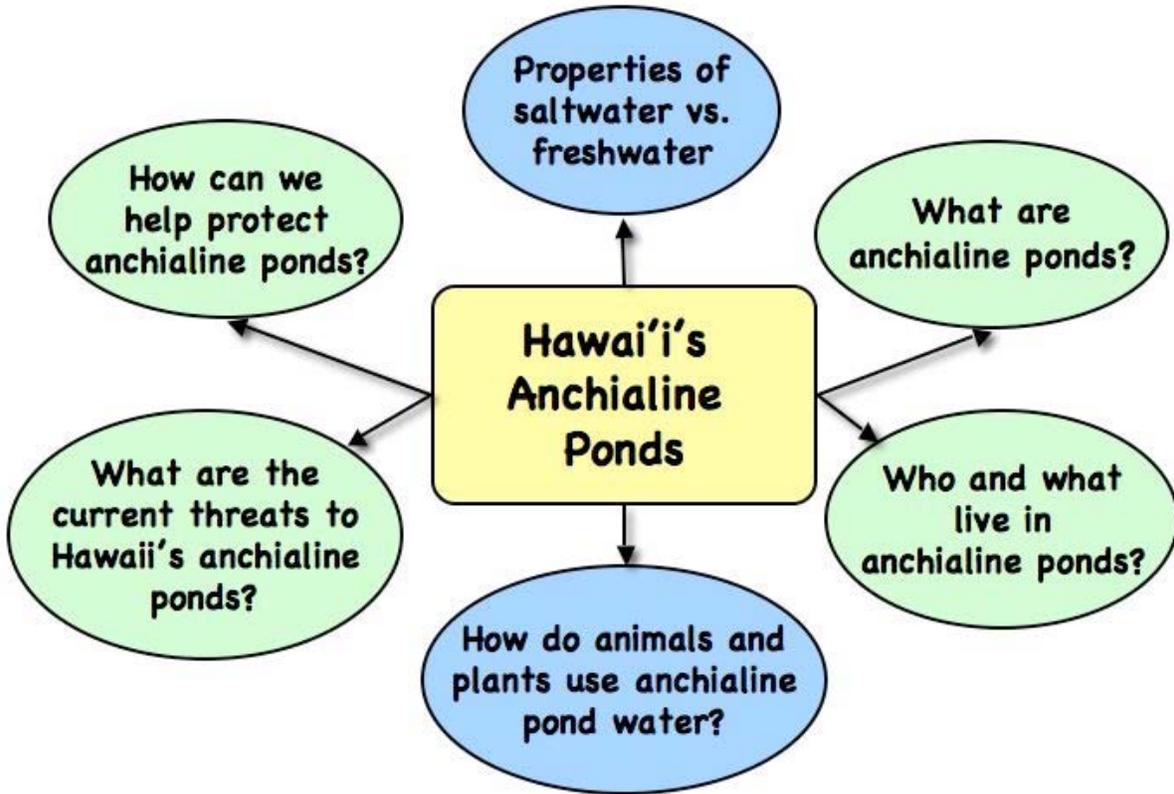
Project Aquatic Wild (Hawaii supplement)

Sandy Shores Curriculum (PRISM)

<http://www.fukubonsai.com/M-L2c1.html>



Unit Concept Map





Timeline	Lesson & Topic	Concepts	Student Objectives	Activity Description	Assessment
Week 1: <i>1 (45 minute) session plus pre-assessment</i>	Saltwater/Freshwater “Egg-periment”	-Properties of Water -Density	Students will make predictions and test them.	The “egg-periment” provides an opportunity for students to predict if an egg floats or sinks in the freshwater and saltwater.	“Egg-periment” worksheet
Week 2: <i>1 (45 minute) session</i>	An Introduction to ‘Opae’ula	-Animals and habitat -Body structure and function -Behavior	They will learn how to observe animals in detail and how to record their observations as scientists.	They make a model of an anchialine pond with freshwater floating on top of saltwater. For the ‘opae’ula introduction, students observe live ‘opae’ula and describe their anatomy.	Drawings of ‘opae’ula anatomy and labeling the ‘opae’ula parts as a class.
Week 3: <i>1 (45 minute) session</i>	‘Opae Obstacles	-Life cycle -Development -Limiting factors to survival	Students will learn the ‘opae’ula life cycle by acting out each stage. They will notice the limiting factors of survival and the cyclic nature of life.	An obstacle course will be laid out with props and each student acts out each stage of development of the life cycle.	Discussion and post-assessment drawing
Week 4: <i>1(45 minute) session plus a field trip plus post-assessment</i>	Build an Anchialine Pond & Field Trip to an Anchialine Pond	-Organisms and their habitat -Adaptation	Students will learn what makes up the anchialine ponds community and how plants and animals share a habitat and depend on one another.	Each student constructs a component of the anchialine pond community using recycled materials.	Final model presentation of organisms (summative)



Anchialine Ponds Vocabulary Glossary (organized by lesson):

Saltwater/Freshwater Egg-periment (Lesson 1):

Anchialine pond: a pond formed in the depression of lava, fed by both saltwater and freshwater inputs, yielding a brackish water environment.

Dense: having component parts closely compacted together; crowded or compact; having a higher mass per unit volume.

Float: to be conveyed on the surface of a liquid.

Freshwater: water with very low concentrations of dissolved salts; i.e. rivers, lakes, ponds

Prediction: a statement or claim of an event that will happen in the future; a guess

Saltwater: saline water, containing dissolved salts; i.e. ocean

‘Opae ‘ula: a tiny, Hawaiian shrimp that lives exclusively in anchialine ponds

An Introduction to ‘Opae’ula (Lesson 2):

Endemic: exclusively native to a singular place or biota

Filter feed: a method of suspension feeding on particles and matter by passing and filtering water containing the matter through a specialized filtering structure.

Habitat: The home to a particular organism where the species will attempt to be as adaptive as possible to that particular environment.

Body parts of ‘opae’ula:

Antennae: paired appendages connected to the front-most segments of arthropods; plural for antenna.

Eyes: organs that detect light; they are mounted on stalks and are compound eyes in ‘opae’ula

Head: main part of an animal that contains eyes, brains, mouth, etc.

Mouth parts: appendages adapted for foraging purposes

Swimming legs: ten legs (5 sets) used for swimming on ‘opae’ula; also known as swimmerets

Tail: a flexible appendage at the base of the torso used for locomotion

Walking legs: ten legs (5 sets) used for walking and crawling on ‘opae’ula

‘Opae Obstacles (Lesson 3):

Crustacean: an aquatic arthropod; i.e. crabs, lobsters, shrimp, crayfish, etc.

Introduced species: an organism that is not indigenous to a given location but instead has been accidentally or deliberately introduced to a new location by human activity or by natural means

Predator: an organism that preys on another organism for subsistence

Larvae: a juvenile form of an animal with indirect development

Life-cycle: a period involving one generation of an organism through means of reproduction, whether through asexual reproduction or sexual reproduction



Build a Pond (Lesson 4):

Adapt: to adjust or change the behavior, physiology, and structure of an organism to become more suited to an environment.

Environment: all living and non-living things that occur naturally in one specific region

Insect: a major group of arthropods; A.K.A. bugs

Model: a representation of a realistic entity

Toxic: poisonous

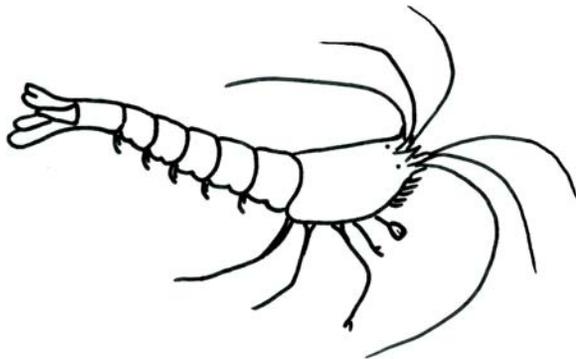
Vegetation: plant composition of an area



Name _____

Anchialine Ponds Pre-assessment

**Draw a picture of where this shrimp lives.
Color your drawing!**





Name _____

Anchialine Ponds Post-assessment

**Draw a picture of where this shrimp lives.
Color your drawing!**

