



## ANCHIALINE PONDS

### Concepts

Students will learn about the organisms that make up the unique anchialine pond habitat. By creating models of the organisms they will see the adaptations each organism has to survive in this environment.

### HCPS III Benchmarks

SC.K.1.2

SC.K.3.1

### Duration

1-1.5 hours

### Source Material

MARE Ponds (K)

PRISM

### Vocabulary

Adapt

Environment

Insect

Model

Toxic

Vegetation

## Build an Anchialine Pond

### Summary

In this lesson, students construct a model of anchialine pond and learn anchialine organisms and their habitat. Using recycled materials, students will recreate the animals and plants found in and around an anchialine pond habitat.

### Objectives

- Students will learn what organisms make up the anchialine pond community and how these organisms share the habitat.
- Students will use critical thinking skills to construct a **model** of their organism using recycled materials.

### Materials

Recycled materials (Styrofoam, cardboard, tin foil, plastics)

Construction paper

A large cardboard box

Play-doh

String

Pipe-cleaners (brown, red, green)

Glue or glue sticks

Coloring materials (paints, markers, crayon)

Organism templates (found in “organism templates and photos” folder)

### Making Connections

Organisms need shelter and food. By constructing an anchialine pond, students can visually see how anchialine ponds can be a habitat for certain plants and animals. They can compare the anchialine pond habitat to other types of habitats such as a coral reef system, once they have completed the Coral Reefs unit.

### Teacher Prep for Activity

Collect and purchase construction materials.

### Background

Why do we only find certain animals or plants in or near the anchialine ponds? In anchialine ponds, specialized organisms are adapted to the brackish-water **environment** that is toxic to others. ‘Opae ‘ula are the most abundant animals (see ‘opae ‘ula lesson) in the anchialine ponds. They are food for predatory shrimp, *Metabetaeus lohena*, and species of fish such as Hawaiian flagtail (aholehole), eels, mullets, and gobies.



Plants, or **vegetation** found in anchialine ponds are also adapted to the brackish water. They are marine algae (seaweeds), cyanobacteria (blue-green algae), and native widgeon grass (*Ruppia maritima*). Along pond edges, non-native pickleweed (*Batis maritima*), *makaloa* (*Cyperus laevigatus*), and *akulikuli* (*Sesuvium portulacastrum*) are sometimes found. These plants have the ability to tolerate the salty water near the anchialine ponds.

**Insects** such as native damselflies mate and lay their eggs in the anchialine ponds. Crustaceans, such as the ‘opae’ula which we have studied in detail, and mollusks are found in the anchialine ponds.

## Procedure

1. Prepare materials for model pond by organizing materials into categories (i.e. a box of all cardboard, a bin of construction paper), so it is easy for students to locate a particular material.
2. Provide full-page size of organism assignments (see file called “Organism templates and photos”). For example, give a full page of an ‘aholehole so the student making this organism can see it BIG.
3. Assign four students to construct a 3-D model of coastal landscape with anchialine ponds (teacher may help cutting the materials and directing the construction). HINT: Use a large cardboard box for the pond, with the bottom of the box representing the bottom of the pond. Construct a backdrop on cardboard of a mountain, with a river running down. On the other side of the box, away from the mountain, should be some blue paper to represent the ocean. (See photo below).
4. Assign the rest of the class with an organism for each student, or have the students create their own organisms that live in or near an anchialine pond. They can use the template and photos as guides for coloration of their plant or animal. For fish, they may color the template itself and make it 3D by using cardboard scraps for support. HINT: For plants, green pipe cleaners work well.
5. Have the students construct the organisms and tell them to think about where in the pond their organism would be found.
6. Each student presents her/his organism to the class. The presentation should answer the following questions:
  - What is your organism’s name?
  - Is it an animal or a plant?
  - Where does it live?
  - What does it eat and who eats it?
7. Students constructed the actual model pond can focus their presentation of the physical characteristics of anchialine pond.
8. Administer the post-assessment if time allows of this day, or the next possible time (10 minutes) and compare students drawings from the pre-assessment with the post-assessment.

## Assessments

Complete model of anchialine pond made by the entire class

Presentation on an organism and its habitat

Post-assessment



## Resources

- MARE Ponds Curricula, Grade K- Build A Pond
- Hawaiian Native plants, University of Hawaii at Manoa, Botany Department. <http://www.botany.hawaii.edu/faculty/carr/natives.htm>.
- Coastal Module Unit 3: Anchialine Detectives, Maui Environmental Education Curriculum. [http://www.hear.org/hoike/pdfs/coastal\\_unit3.pdf](http://www.hear.org/hoike/pdfs/coastal_unit3.pdf).
- Hawaii's Native & Exotic Freshwater Animals, by Mike N. Yamamoto and Annette W. Tagawa. 2000. Mutual Publishing, Honolulu, Hawaii, USA.
- The Smallest Page on the Web, Wim van Egmond, Onview.net Ltd, Microscopy-UK, 1998.
- Hawaiian Reef Plants, by John M. Huisman, Isabella A. Abbott, and Celia M. Smith. 2007. University of Hawaii Sea Grant College Program, Honolulu, Hawaii, USA.

An example of the final product:

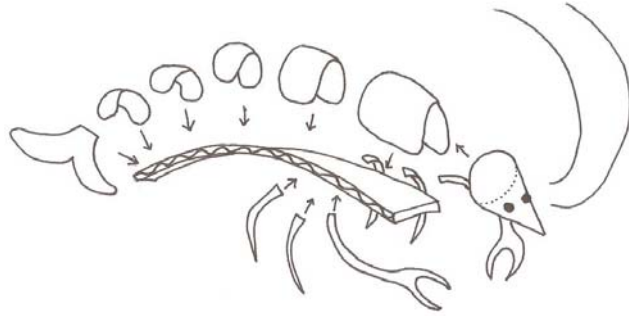


## Build a Pond: Photos and Templates of Organisms

The following is a list of organisms of anchialine pool habitat. The list also includes some suggestions on how to make each organisms for the model pond.

### 1) Anchialine pond shrimps

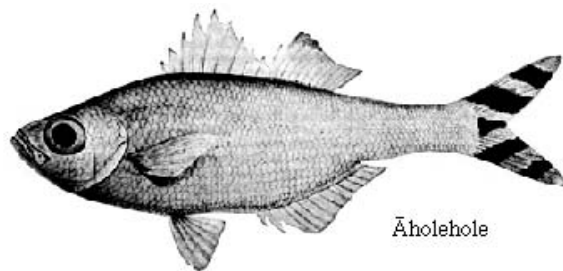
Shrimp models can be made with cardboard and construction paper. You may cut out a strip of cardboard as the frame and glue pieces of paper as shells and legs. Glue pipecleaners to the head as antennae.



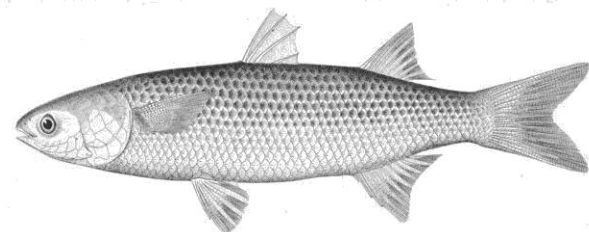
*Metabetaeus lohena* (left) and 'Opae 'ula (right).  
Photo by Yamamoto and Tagawa, *Hawaii's Native & Exotic Freshwater Animal*, Mutual Publishing, 2000.

### 2) Fish

Fish can be made free standing by gluing two sides of fish drawn and cut out on construction paper together by leaving the bottom part open. Or they can be hung from pieces of string.



Aholehole figure is taken from Asia-Pacific Digital Library, Kapiolani Community College,  
<http://apdl.kcc.hawaii.edu/~oahu/stories/ewa/kaihuopalaai.htm>.



Mullet figure is taken from Wikipedia,  
[http://en.wikipedia.org/wiki/Mullet\\_\(fish\)](http://en.wikipedia.org/wiki/Mullet_(fish)).



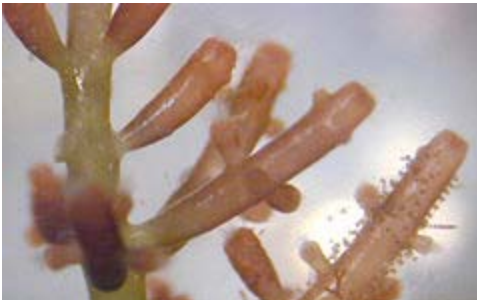
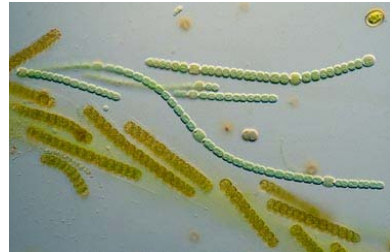
Goby (*Stengobius genivittatus*) illustrated by Patric Ching, courtesy of Division of Aquatic Resources.

### 3) Algae and seaweed

Algae can be drawn on the background and made out of paper cutout.



Blue algae (cyanobacteria). Photo from Tinkerfish, <http://www.tinkerfish.com/aquarium/freshwater/>.



Red algae. Photo from Wikipedia, <http://en.wikipedia.org/wiki/Algae>.



Seaweed. Photo from Wikipedia, <http://en.wikipedia.org/wiki/Codium>.

See more pictures on p.14 (photos from Hawaiian Reef Plants).

#### 4) Plants

Anchialine plants are salt-tolerant, they can be found near the beach, alongside brackish marshlands, surrounding the shores of sandy lagoons, and anchialine pools.



Akulikuli is a low-lying or prostrate herb with trailing branches and fleshy stems. It has attractive white or magenta, five-parted flowers. The fleshy parts of this plant were used as food during times of famine. (<http://www.k12.hi.us/~waianaeh/cyberfair99/plants/akuli.htm>).

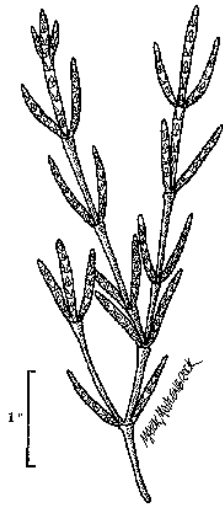


Makoloa. Photo from AECOS Incorporated, <http://www.aecos.com/CPIE/Photos1.html>.



Widgeon grass. Photos from Aquaplant, [http://aquaplant.tamu.edu/database/submerged\\_plants/widgeon\\_grass.htm](http://aquaplant.tamu.edu/database/submerged_plants/widgeon_grass.htm).

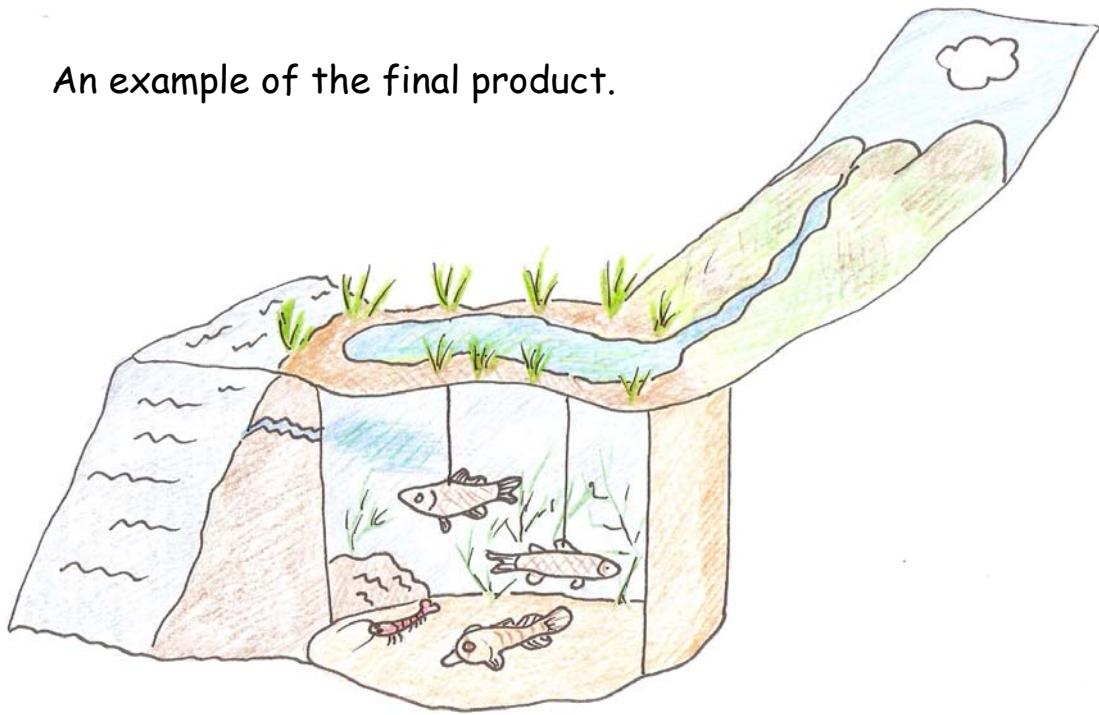


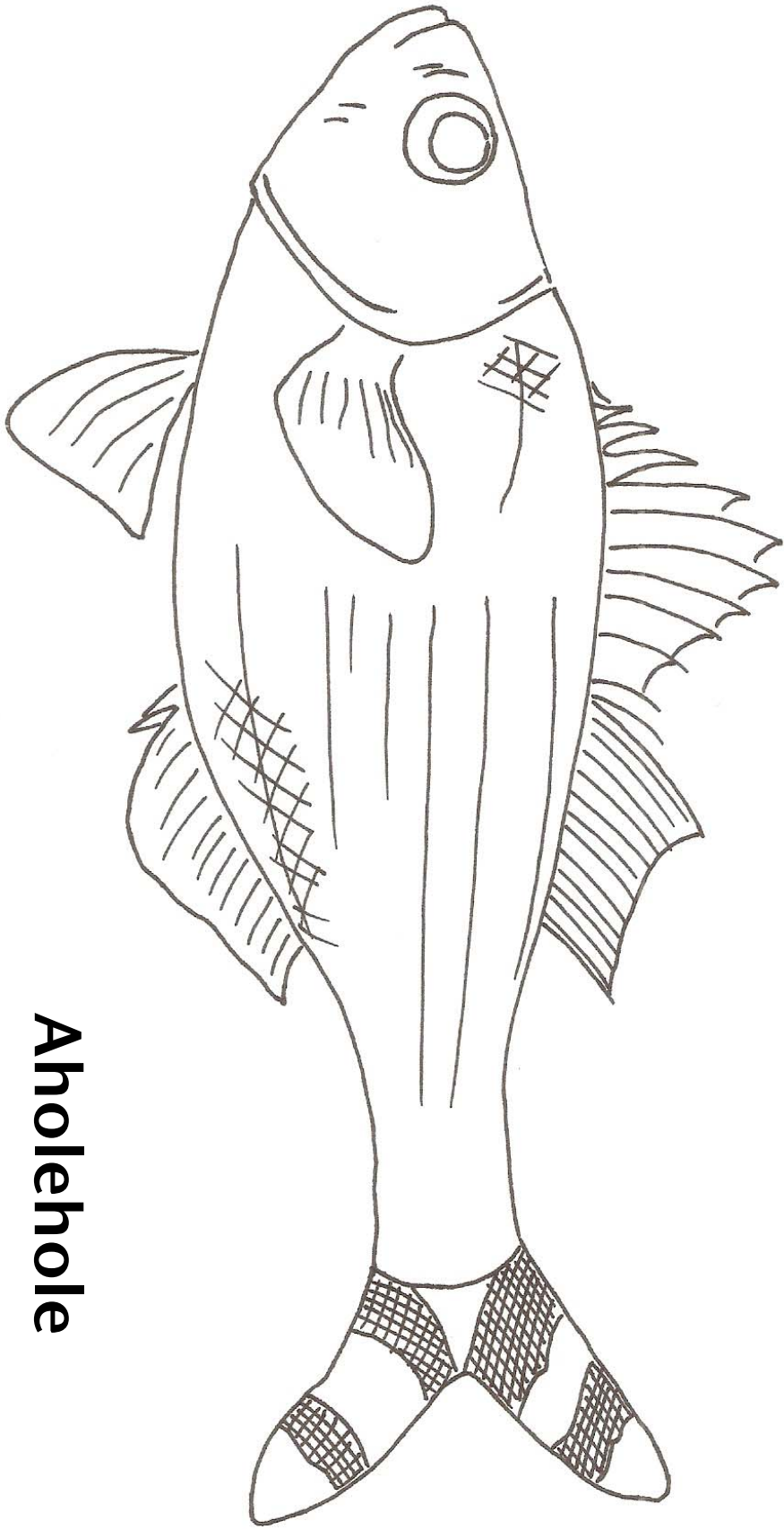


Pickleweed. Photos from <http://people.westminstercollege.edu/faculty/tharrison/gslplaya99/pickleweed.htm> and from <http://www.solpugid.com/cabiota/pickleweed.htm>.

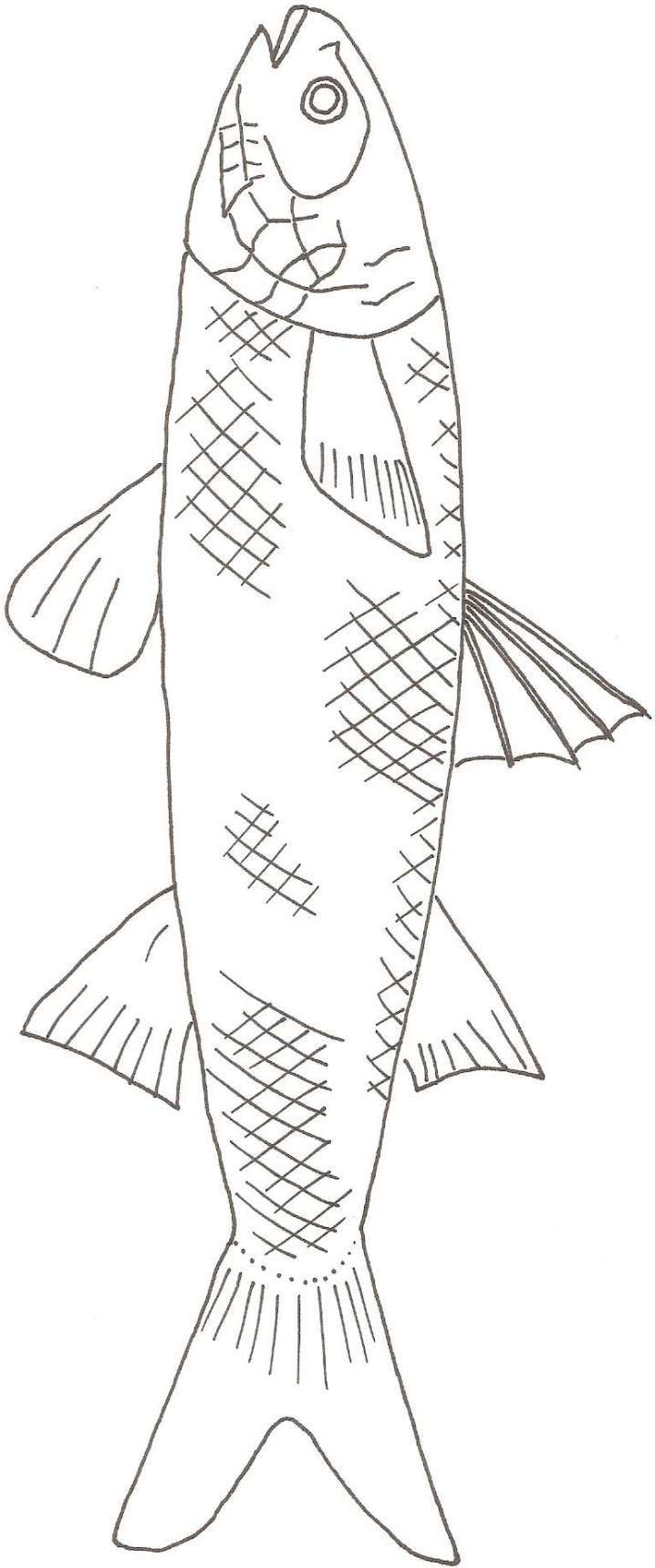


An example of the final product.



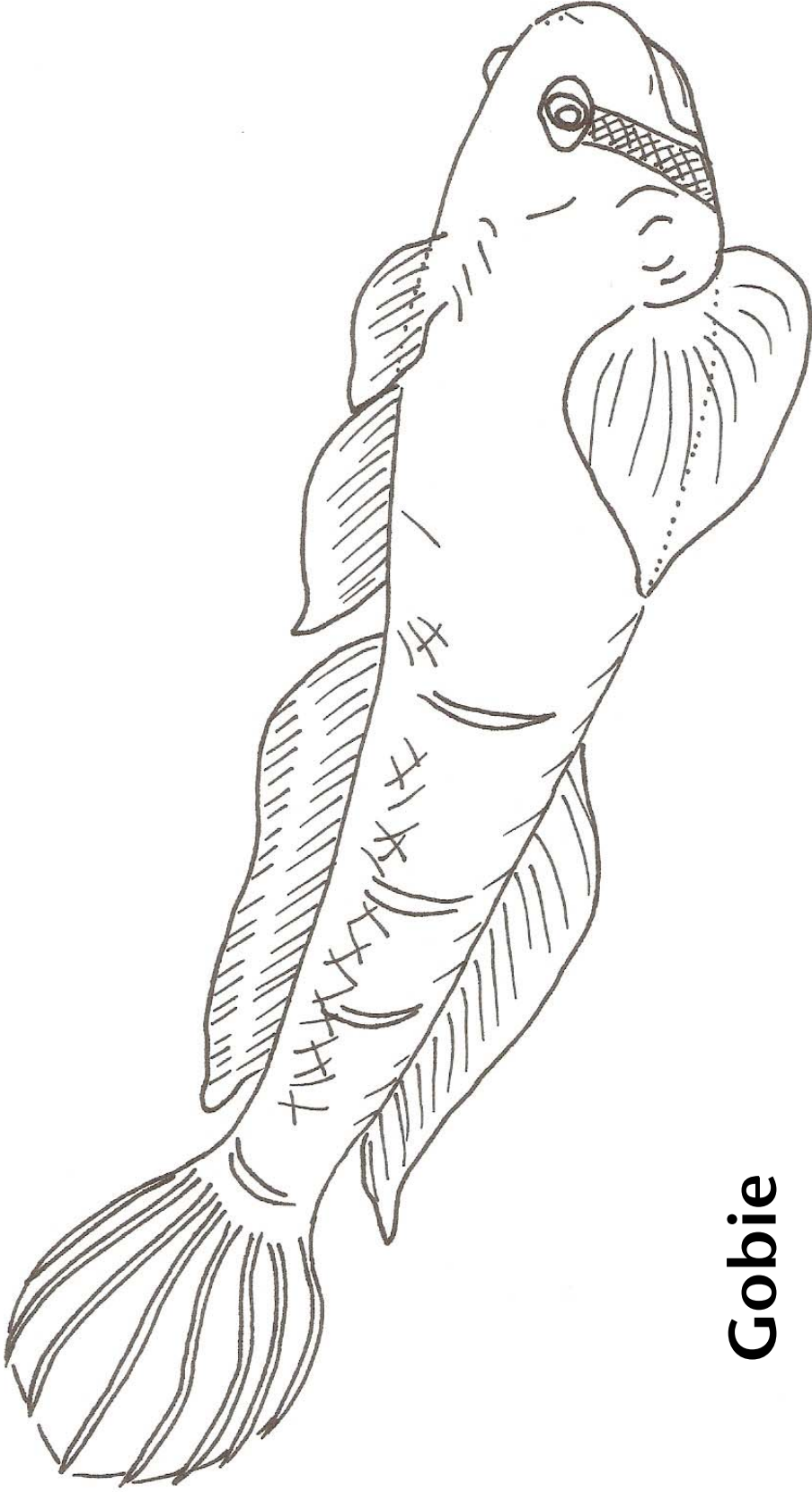


**Aholehole**



**Mullet**





**Gobie**



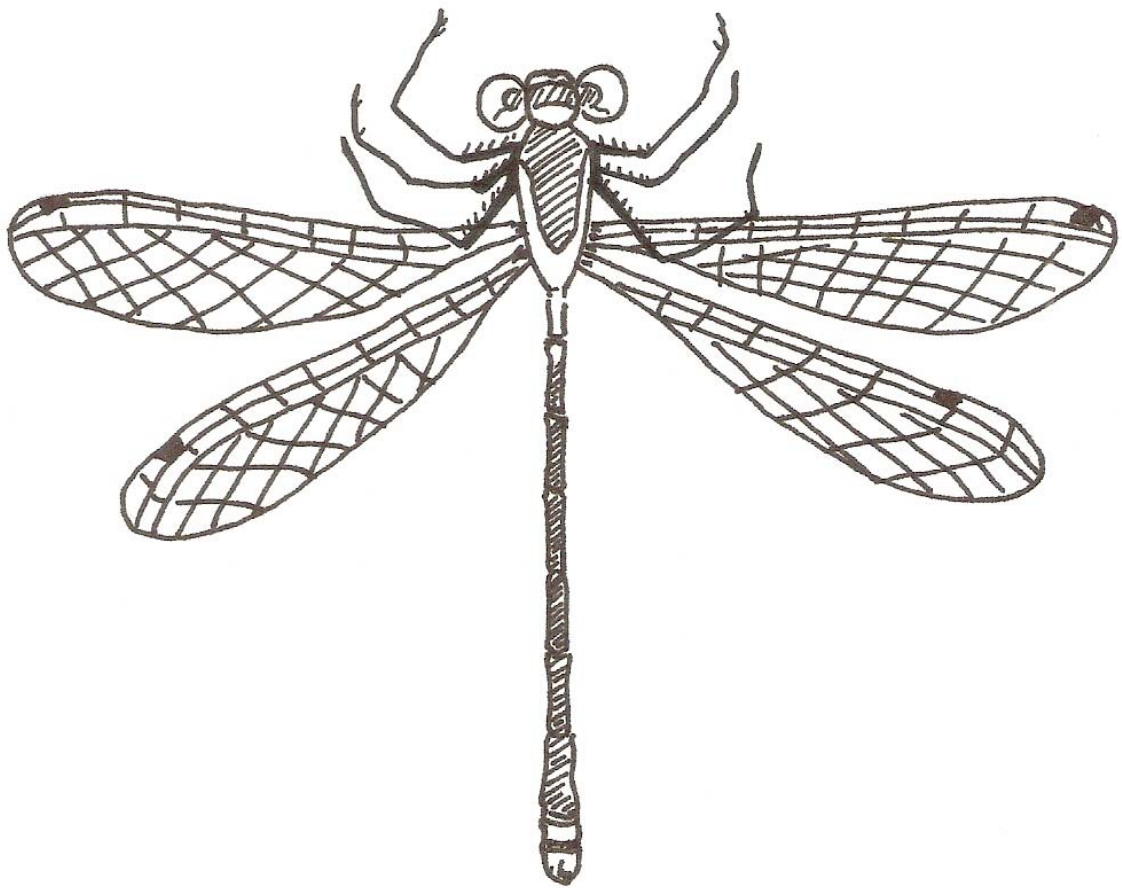
**Akulikuli**



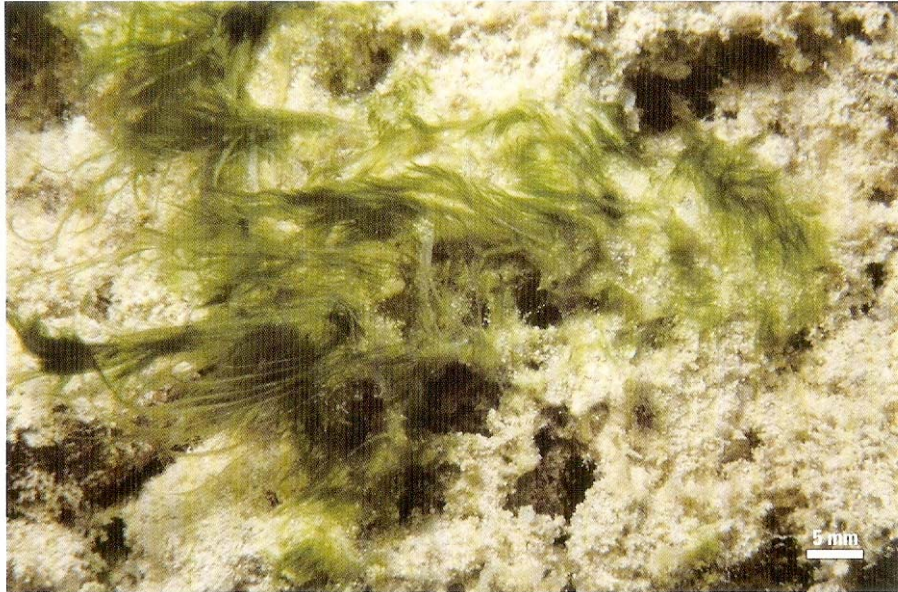


**Widgeon  
grass**





**Damselfly**



**Blue-green algae**

