

# Aquatic Animal Diversity Background

*Background information for The Water Pixies: The Life Cycle of Aquatic Animals and Aquatic Animal Adaptations.*

Animals have unique strategies for development that also applies to aquatic species. This great diversity in aquatic life teaches about life cycles. There are representative species of mammals, amphibians, insects, fish, and birds that live most or all of their lives in the water.

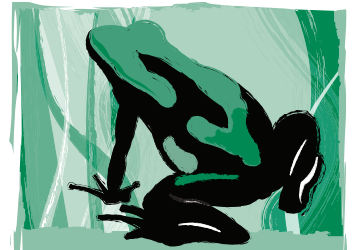
Aquatic insects exhibit two different types of life cycles. Many animals look significantly different in their early stages of development when compared to adulthood. This is often very true for aquatic insects. Many aquatic insects undergo metamorphosis, or change during growth. Some insects experience simple metamorphosis, while others undergo complete metamorphosis.

In simple metamorphosis, the insect egg develops into a nymph. Nymphs resemble adults, but they still vary considerably from their adult form. Many nymphs transform into adulthood by splitting open the exoskeleton so that the mature adult can emerge. This is true for dragonflies, damselflies, stoneflies, and mayflies.

In complete metamorphosis, eggs develop into larvae. The larvae grows through several

stages and changes into pupae. Pupae are usually encased in a protective cover for their next stage of growth. From the pupae, emerge the soft-bodied, often pale-colored adults. They differ remarkably in appearance from earlier appearance, but are not yet completely formed. Gradually the soft pale bodies develop firmness and color. In complete metamorphosis, there is little resemblance between adults and larvae. Examples of this are caddis flies, most aquatic beetles and flies, as well as butterflies.

When a habitat changes, either slowly or catastrophically, the species of animals with adaptations (that allow them many options) are the ones most likely to survive. Some species have adapted to such a narrow range of habitat conditions that they are extremely vulnerable to change. These species are usually more susceptible than other animals to death or extinction. Each animal has its own unique physical adaptations to the watery world. Here are a few examples of adaptations to look for: streamlined body shape to move easily through the water; gills for underwater breathing; sharp hooks or claws to grasp the bottom in rushing water; camouflage colors for evading predators; dense fur to retain heat; webbed feet for more efficient paddling; and oil glands to repel water.



# Aquatic Animal Adaptations

Respect Rule: Look, Listen, Learn, and Leave Alone (until instructed).

## Overview

The students can experience a hands-on exploration of the creek environment which will engage the students in learning first hand about aquatic animal adaptations.

## Before-the-Field-Trip Activity

**Activity:** Fashion A Fish  
**Time:** 45 minutes  
**Materials:** Fish Fashion Cards

1. Assign students to find a picture or make a drawing of a species of animal that has a special adaptation. For example, giraffes have long necks for reaching vegetation in tall trees, while owls have large eyes that gather light and aids with night vision.
2. Conduct a class discussion on the value of different kinds of adaptation to animals. As a part of the discussion, ask the students to identify different kinds of adaptations in humans.
3. Collect the students' pictures or drawings of adaptations. Categorize them into the following groups: protective coloration and camouflage, body shape/form, mouth type/feeding behavior, reproduction/behavior, other (one or more categories the students establish, in addition to the four above that will be needed for the rest of the activity).
4. Divide class into five groups of four cards each, one for coloration, mouth type, body shape and reproduction.
5. Pass one complete set of cards to each group of students.
6. Ask the students to "fashion a fish" from the characteristics of the cards in the set they receive. Each group could: create an art form that represents their fish, name the fish, describe and draw the habitat for their fish.
7. Ask each group to report on the attributes of the fish they have designed, including

identifying and describing its adaptations. Ask the students to describe how this kind of fish is adapted for survival. Ask the students to make inferences about the importance of adaptations in fish and other animals.

### Extensions:

- Have the student groups to take an adaptation card from any category and research a real fish with that adaptation. **Note:** A collection of books about fish is useful. Do not be as concerned about reading level as much as the accuracy of the illustrations.
- Have students look at examples of actual fish. Describe the fish and speculate on its habitat by examining its coloration, body shape and mouth.

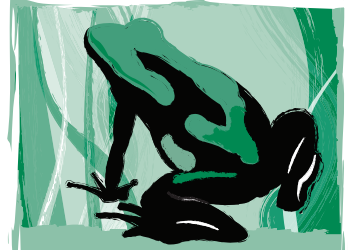
## Field Trip Activity

**Activity:** Aquatic Adaptation Observation  
**Time:** 1 to 1.5 hours  
**Materials:** Aquatic Animal Adaptation Observation Student Worksheet, collecting cups and nets, large water collecting containers, magnifiers, water quality test kit, thermometer, a stereomicroscope

1. Follow the steps 1–7 in Field Trip Activity from the lesson Aquatic Animal Life Cycles (previous lesson).
2. Using the Aquatic Adaptation Observation Student Worksheet, have each student or team of students observe, identify and draw the animals. Discuss any adaptations they observed.

## After-the-Field-Trip Activity

**Activity:** Creature Feature  
**Time:** 45 minutes  
**Materials:** Aquatic Animals Adaptations Chart, My Creature Feature Student Worksheet, various materials can be used:



### Objectives

Students will describe the adaptations of two animals to life in the aquatic environment.

**Grade Level**  
3

**Adult/Student Ratio**  
1 adult to  
10 children

### Where

Riparian Habitats: small, shallow, streams or ponds where students can access the water safely and with minimal impact to the streamside vegetation.

### Skills

Observing, discussing, applying, interpreting

### Key Words

Adaptation  
Aquatic  
Camouflage  
Coloration  
Macro invertebrate,  
Habitat

“  
**Only I can  
discover.**  
”

—Betty Van Der Smissen  
and Oswald H. Goering,  
*A Leader's Guide to  
Nature-Oriented Activities*

sand at a beach, crayons and paper, or an assortment of construction paper, pipe cleaners, egg cartons, etc., pictures of aquatic animals in the Aquatic Animal Life Cycle Lesson

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1. Have students create an imaginary animal that is adapted to living in water. The animal can be sculpted with sand by the creek, or created in the classroom using a variety of art materials and techniques.
2. Have the students include at least 3 specific adaptations from the Aquatic Animals Adaptations Chart, the pictures of aquatic animals in the Aquatic Animal Life Cycle Lesson and the Creature Feature Student Worksheet.
3. When the students' imaginary animals are completed, have students explain the adaptations that they used and why.

## Source

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Adapted with permission from *Project Wild Aquatic*.

## Resources

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### For the Teacher

Berger, *Dragonflies, a WILD Guide*.  
Hausman, Leon, *A Beginner's Guide to Fresh-Water Life*, Putnam's Sons.  
Hughes, Dave, *A Handbook of Hatches*.  
Johnson, Sylvia, *Water Insects*, Lerner Publications.  
Reid, George K., Herbert S. Zim, *Golden Guide to Pond Life*, Western Publishing Company.

### Videos

Chatsworth, *Ecosystem of a Pond*, California: AIMS Media, 1992.  
*Wonders in A Country Stream*. Los Angeles: Churchill Media, 1992.

# My Creature Feature

## Student Worksheet

Observe and draw an organism that can defend itself against its predators and complete the chart below. Drawing of the organism:

Point out by using an arrow at least three characteristics of the organism you illustrated.

<b>Description of organism:</b> <ul style="list-style-type: none"> <li>• Number of legs</li> <li>• Number of body parts</li> <li>• Color</li> <li>• Other</li> </ul>	<b>Name of organism</b> (If you don't know it, make one up.) <b>Is this an adult?</b>	<b>What do you think it eats            and what might eat it?</b>

Observe and draw an organism that eats other animals and complete the chart below. Drawing of the organism:

Point out by using an arrow at least three characteristics of the organism you illustrated.

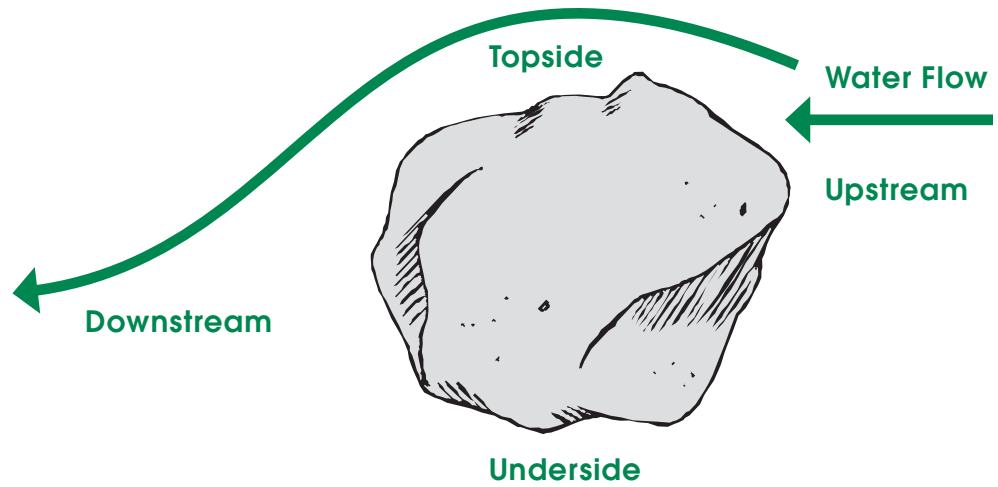
<b>Description of organism:</b> <ul style="list-style-type: none"> <li>• Number of legs</li> <li>• Number of body parts</li> <li>• Color</li> <li>• Other</li> </ul>	<b>Name of organism</b> (If you don't know it, make one up.) <b>Is this an adult?</b>	<b>What do you think it eats            and what might eat it?</b>

# Aquatic Animal Adaptations Chart

Real Aquatic Insect	Adaptation
Water boatman, water bugs	Swims through water
Water strider, whirligig beetle	Swims on water surface
Damselfly nymphs, darners	Clings to weeds and vegetation
Caddisfly larvae, water penny beetle larvae, some mayfly nymphs	Eats periphyton (algae on rocks)
Caddisfly larvae, mayfly nymphs	Eats detritus (decomposing organic matter)
Dragonfly nymphs, Damselfly nymphs, water striders, water bugs, larger stoneflies, beetles (larvae and adult), Dobson flies, fishflies, alderflies	Eats other insects
Mosquito larvae	Eats zooplankton
Burrowing mayflies	Hides in sediments
Water pennies, flathead mayflies, stoneflies	Fits between rocks and crevices
Net-spinning caddisfly larvae, blackfly larvae, some mayfly nymphs	Filters out fine particulate organic matter
Predacious diving beetle	Dives from surface of water to bottom
Common stoneflies	Clings to top rocks on stream bottom
Burrowing mayflies	Burrow into mud
Cranefly larvae, case-building caddisfly larvae, small stonefly nymphs, scuds, aquatic sowbugs	Eats coarse particulate organic matter
Mosquito larvae	Floats on surface

# Aquatic Adaption Observation

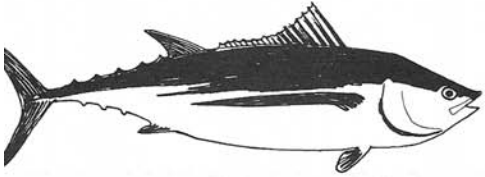
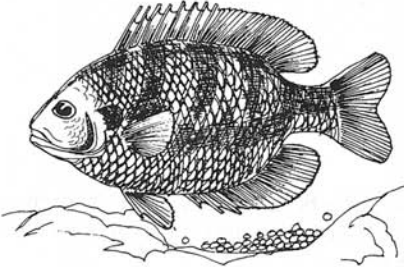
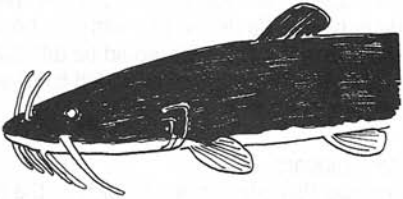
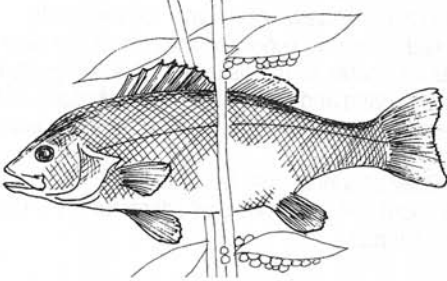
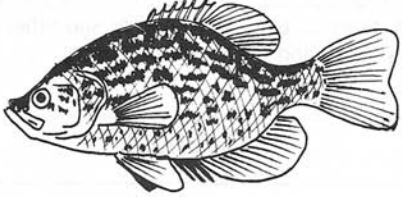
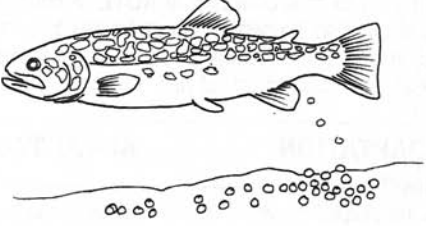
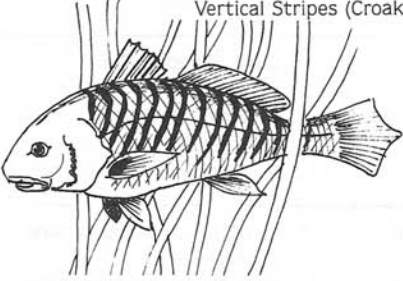
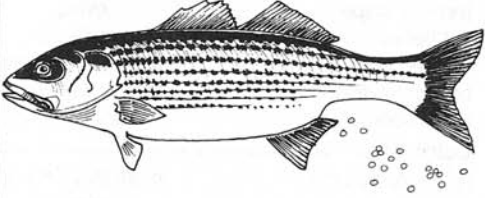
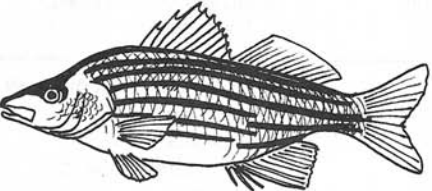
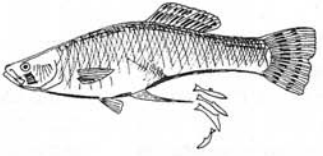
Student Worksheet



Rock Surfaces	Animals and Adaptations
Downstream	
Topside	
Underside	
Upstream	

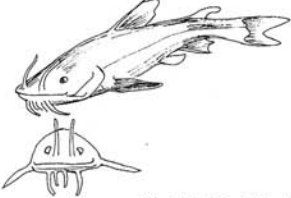
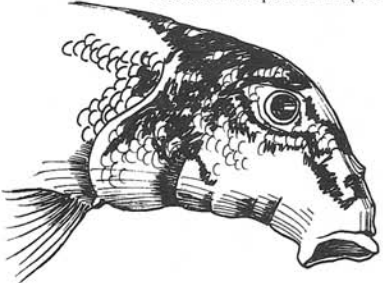
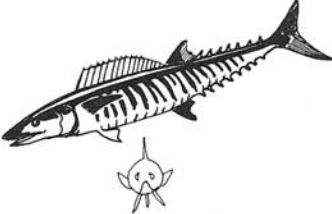

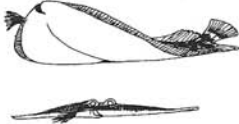
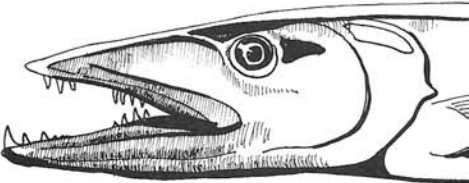
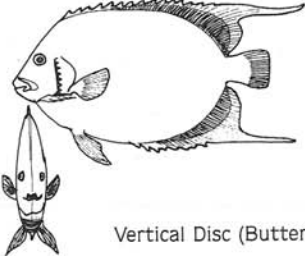
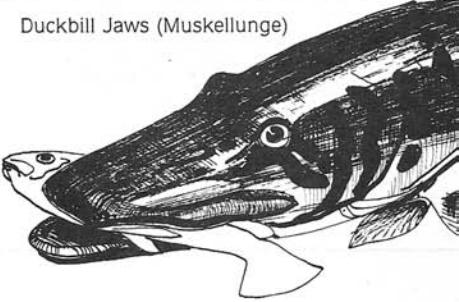
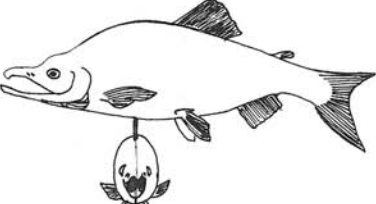
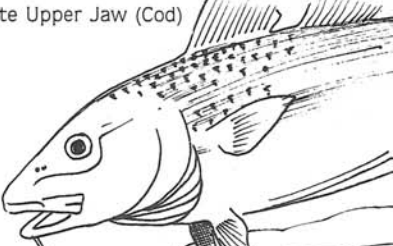
# Fish Fashion Cards

## Student Worksheet

 <p>Light Colored Belly (Albacore)</p> <p>Coloration</p>	<p>Eggs Deposited in Nests (Blue Gill)</p>  <p>Reproduction</p>
<p>Dark Upperside (Catfish)</p>  <p>Coloration</p>	 <p>Eggs Deposited on Vegetation (Yellow Perch)</p> <p>Reproduction</p>
 <p>Mottled (Crappie)</p> <p>Coloration</p>	 <p>Eggs Deposited on Bottom (Trout)</p> <p>Reproduction</p>
<p>Vertical Stripes (Croaker)</p>  <p>Coloration</p>	<p>Free Floating Eggs (Striped Bass)</p>  <p>Reproduction</p>
<p>Horizontal Stripes (Yellow Bass)</p>  <p>Coloration</p>	 <p>Reproduction</p> <p>Live Birth (Gambusia)</p>

# Fish Fashion Cards

## Student Worksheet

<p>Shape</p>  <p>Flat Bellied (Catfish)</p>	<p>Mouth/Feeding</p>  <p>Sucker Shaped Jaw (Sucker)</p>
<p>Shape</p>  <p>Torpedo Shape (Wahoo)</p>	<p>Mouth/Feeding</p>  <p>Extremely Large Jaws (Grouper)</p>
<p>Shape</p>  <p>Horizontal Disc (Halibut)</p>	<p>Mouth/Feeding</p>  <p>Elongate Lower Jaw (Barracuda)</p>
<p>Shape</p>  <p>Vertical Disc (Butterfish)</p>	<p>Mouth/Feeding</p>  <p>Duckbill Jaws (Muskellunge)</p>
<p>Shape</p>  <p>Humpbacked (Sockeye)</p>	<p>Mouth/Feeding</p>  <p>Elongate Upper Jaw (Cod)</p>