

Mud Creatures Study

Adapted with permission from Salt Marsh Manual: An Educator's Guide, and Wetlands & Wildlife.

Grade Level: all levels

Duration: throughout the field trip

Skills: application, observation, collection and interpretation of data, comparison, discussion, evaluation, critical thinking, forming hypotheses, and teamwork

Subjects: science and math

Concepts

- Bridge the classroom and the local environment.
- Gain firsthand knowledge through an outdoor experience.
- Discover the ecosystem through multisensory experiences.
- View shorebirds, their habitats, and what they eat.
- Utilize the scientific method as a process for inquiry and discovery.

Vocabulary

- mudflat
- rocky-intertidal habitat
- invertebrate
- stopover site
- migration
- phytoplankton
- food pyramid
- autotrophs
- producers
- zooplankton
- bottom sample
- core sample

Overview

Students use the sampling equipment made previously in a pre-trip activity to count the numbers and identify the types of invertebrates found in the sand and mud at their field trip site.

Objectives

After this activity, students will be able to:

- Describe the life hidden in the water, mud, or wetland.
- Define the term invertebrate.
- Give three examples of invertebrates found in the habitat studied.
- Explain how shorebirds depend on invertebrate foods.
- Demonstrate the proper way to sample invertebrates in the field.
- Explain the connection between the numbers of invertebrates in a sample to the number of shorebirds observed at the site.
- Explain the connection between the type of invertebrates present and water quality.

Materials

- Hand lens
- Millimeter ruler
- Sieve
- String
- **Bottom sampler** (water) or shovel (exposed habitat)
- One copy of **Mud Creature Study** for each student or team
- **Core sampler**
- **Underwater viewer**
- One copy of the **invertebrate key** for each student
- **Invertebrate Identification Key** or **Marvey Mud Meals Diagram**

Shorebird Journal

- **Invertebrate Data Forms 1 and/or 2** (found in this section under journals)

Introduction

The viewing procedures described in this activity are for a water habitat. Modify the equipment and procedures for use in exposed mud or sand habitats where an underwater viewer would be unnecessary and a bottom sampler

would be replaced with a small shovel. For rocky intertidal habitat, simply turn over rocks for “bottom sampling” (remembering to carefully turn them back over) and watch for any changes apparently caused by the rise and fall of the tide. You can also compare tidepool animals with temporarily exposed animals.

Limit the number of bottom and core samples taken for this activity as these are very disruptive to habitat. This is especially true if the area you plan to visit receives a large number of visitors already.

Ask older students to identify the invertebrates they find-- if not by species, then at least by order or family (for example, crustacean, amphipod).

Activity Preparation

1. Refer to the pre-activity **Making Sampling Equipment**. Divide the class into teams and have the students make the sampling equipment they will need on the field trip.
2. Pass out the copies of the **Mud Creature Study** for students to review before the field trip. Answer any questions students may have about the handouts.
3. Include **Invertebrate Data Forms 1 and/or 2** in the Shorebird Journals you prepare for the class.
4. If you choose to use the **Invertebrate Identification Key** or **Marvey Mud Meals**, photocopy one for each team. Laminate the keys if students will be using them in the field.



Procedure

1. Decide on several sampling stations for student teams to rotate through at specified times, collecting different information at each station. For example, select one site for using underwater viewers and bottom samplers and another for taking core samples. Make sure each team has an adult chaperone to monitor the activities.
2. Lead the whole class to each site and explain what the students are to do there and how long they will have to work.

Station 1: Underwater Viewing

Examine the water surface carefully; then use your underwater viewer to look under the surface. How many different kinds of invertebrates are visible?

Station 2: Surface Sampling

With stakes and string, mark out a one-meter square area of shallow water along the wetland's edge. Move back for one minute.

Using Invertebrate Data Form 1
Are there any small animals (invertebrates) on the water surface? Take a close look at each animal. Assign each kind a number, and record the number of legs, wings, body segments, color, length, and type of mouth parts (if visible).

Using Invertebrate Data Form 2
Draw a detailed picture of the animal on a separate piece of paper. Be sure to number the picture so it matches the number on your data form. Then list the animals by number and record the number of each kind that you found in the "surface sample" column.

Station 3: Bottom Sampling

Collect a bottom sample with the bottom sampler, and assign each new animal a number.

Using Invertebrate Data Form 1
Record their characteristics on Invertebrate Data Form 1.

Using Invertebrate Data Form 2
Record the numbers you found of each kind of animal on Form 2 in the "bottom sample" column.

Station 4: Core Sampling

Using Invertebrate Data Form 2
Collect a core sample within the transect using the core sampler. Repeat the above steps using the "core sample" column on Form 2.

3. Have students conduct their study and collect data. Move through the stations as they work, answering any questions, providing feedback, and monitoring student progress. You may choose to incorporate the Invertebrate Identification Keys here (or back in the classroom).
4. Back in the classroom, analyze their data and share their experiences using the post-activities, Sharing Circle and/or Data Analysis.

Additional Activities

Invertebrate Species Identification Poster

A few weeks before the field trip, give your students copies of the Marvelous Mudflat Meals diagram. Note that on one page common names (local, nonscientific, or non-Latin names) for the species are given, while the other gives more general categories. Have your students search for pictures or illustration of these and other local invertebrates. Arrange them on a piece of poster board, and list their key identification features (number of legs, color, body segments, where they are found in the habitat, etc.) under each picture or illustration. Display this poster where the students can study it for several days before the field trip.



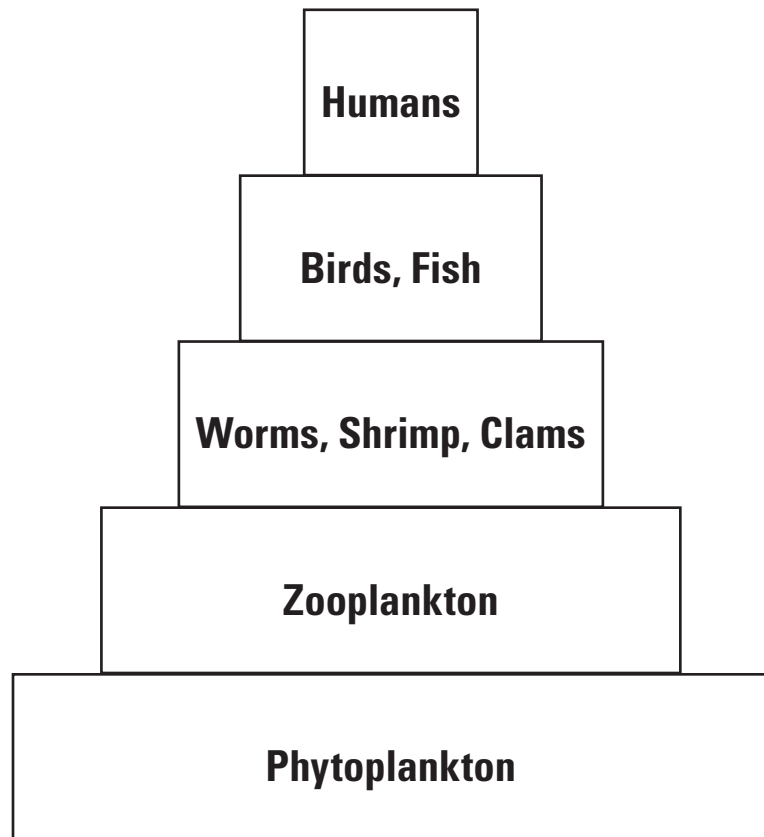
Mud Creatures Study

Wetland stopover sites, the areas where shorebirds stop to feed and rest on their migration flights, support an abundance of life--as many as 40,000 organisms per cubic inch of mud! Shorebirds depend on these invertebrates for the energy to continue on their long migratory journeys.

Phytoplankton and bacteria form the base of the food pyramid that shorebirds depend on. A group of organisms too small to see without a microscope, called autotrophs, use the sun's energy to make their own food. Although they are tiny, these food producers form the largest step of the pyramid because there are so many of them and all other living things depend on them for food energy. Simply put, there would be no animals if there were no plants!

Autotrophs are in turn eaten by zooplankton, microscopic animals that live in water. These tiny consumers are eaten by worms, clams, or crustaceans like crabs, amphipods, and shrimp. Birds and fish then eat these small animals. Humans, foxes, eagles, and other large omnivores and carnivores form the top of the food pyramid.

By studying invertebrates at your site, you can discover the types of food available to the shorebirds of your wetlands and uncover information about the health of the local ecosystem. Since any damage to the health of these critical stopover sites may hurt shorebird populations, invertebrate studies are an important part of shorebird conservation! After you take samples of the mud, sand, or soil, discuss the following questions with your classmates:

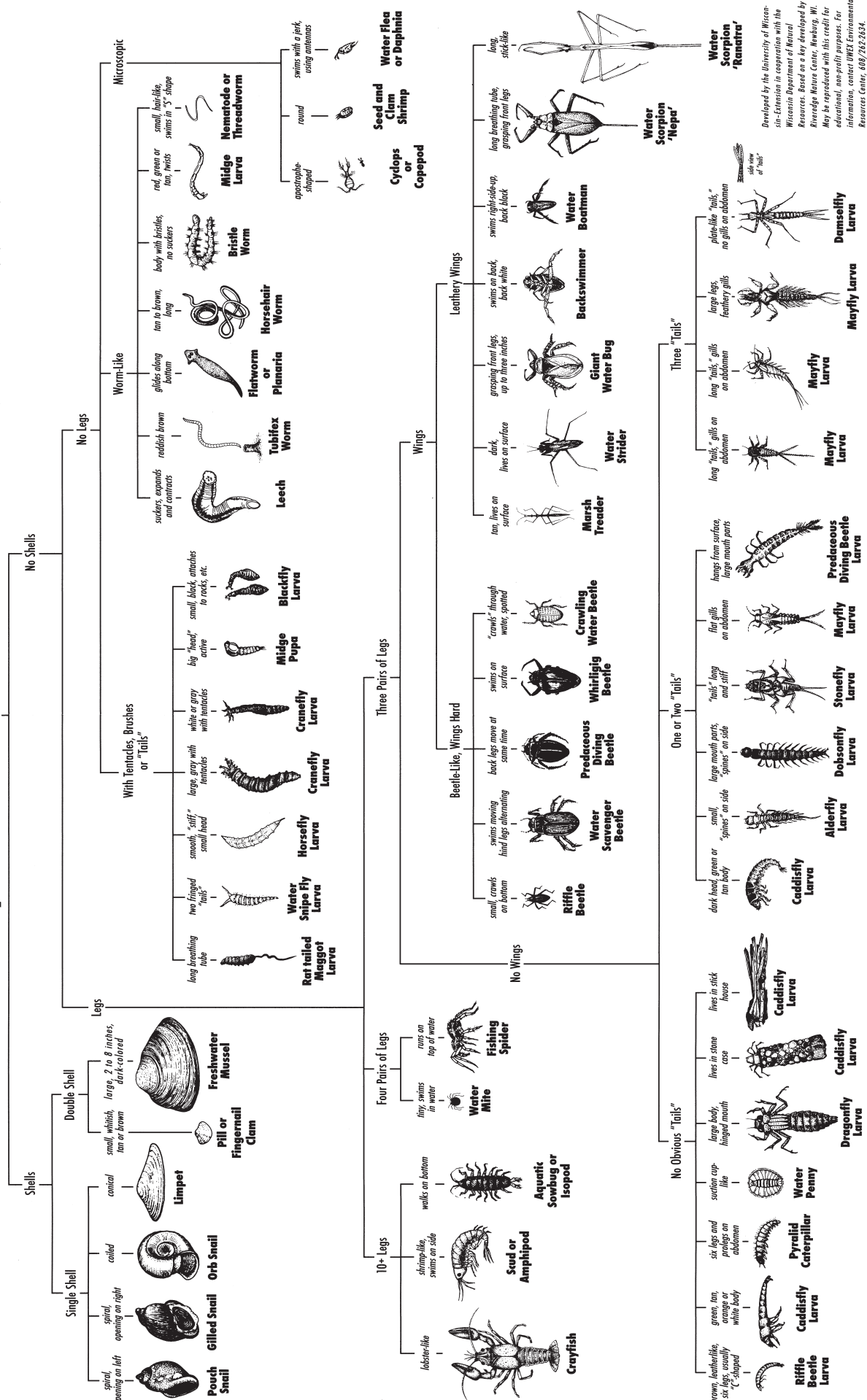


- Which layer contained the highest total number of animals?
- Which sample provided the most different kinds (species) of animals?
- Does the type of invertebrates present tell you anything about the water quality? For example, worms and clams may have different water quality requirements.
- How does the number of invertebrates collected compare to the number of shorebirds observed?
- How does the number of hawks and eagles observed compare to the number of shorebirds you saw?



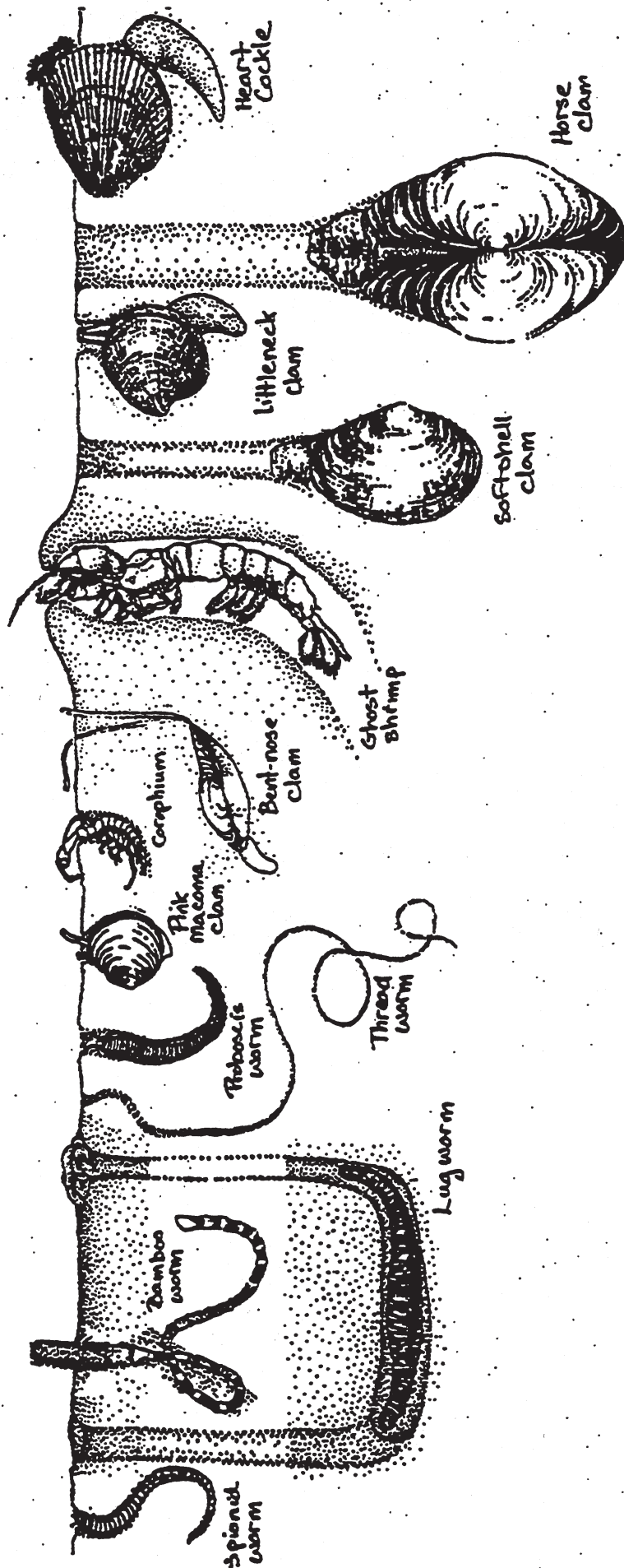
Key to Macroinvertebrate Life in the River

(Sizes of illustrations are not proportional.)



Developed by the University of Wisconsin-Lexington in cooperation with the Wisconsin Department of Natural Resources. Based on a key developed by Riverside Nature Center, Newburg, WI. May be reproduced with this credit for educational, non-profit purposes. For information, contact UNEX Environmental Resources Center, 608/262-2634.

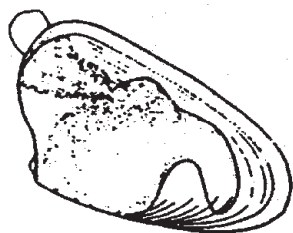
Marvellous MUDFLAT MEALS



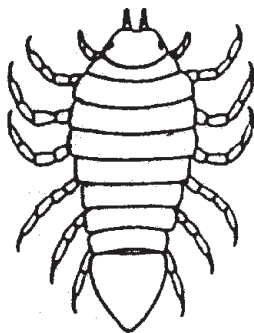
Source: from *Exploring Estuaries & Wondrous Wetlands – Teachers Resource Guide Supplement to "Discover Boundary Bay"*. More details can be obtained by writing FOBB, P.O. Box 1441, Station A, Delta, B.C., Canada. V4M 3YB. <http://www.bcwetlands.com>



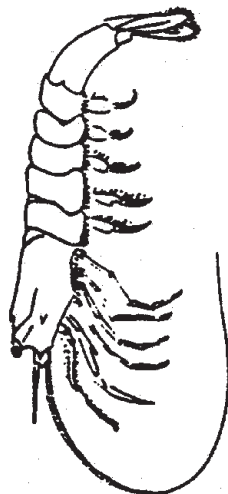
More Marvey Mud Meals



CLAM



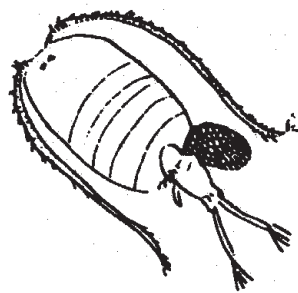
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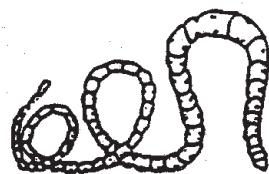
SHRIMP



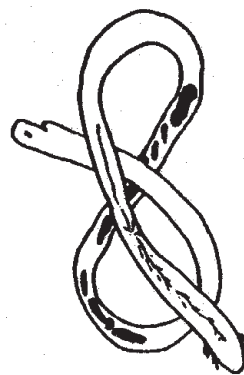
POLYCHAETE



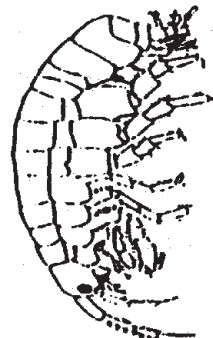
COPEPOD



OLIGOCHAETE



NEMATODE



AMPHIPOD