What Can I Eat with This Beak?

Adapted from "Salt Marsh Manual: An Educator's Guide." San Francisco Bay National Wildlife Refuge.

Grade Level: lower elementary and upper elementary/middle school
Duration: one 40-minute class period.
Skills: comparison, evaluation, problem solving, discussion, vocabulary, visualization, and interpretation of data.
Subjects: science, math, language arts, and fine arts (additional activity)

Concepts:
- Shorebirds have many physical, or morphological, adaptations to help them walk, find food, hide, and reproduce in their habitat and to fly long distances during migration.

Vocabulary
- adaptation
- beak
- invertebrates
- coexist
- feeding success
- crustaceans

Overview
Students collect a variety of simulated shorebird food items, using "tools" that represent four different shorebird beak designs. Then they determine what type of food their beak was designed to collect by sorting and identifying which they were most successful at catching.

Objectives
After this activity, students will be able to:
- Describe how shorebird beaks are adapted for the foods they eat.
- Explain why many types of shorebirds may live in the same habitat at the same time.
- Match four common shorebirds to the foods they eat by looking at their beak design.

Materials (for a group of 30)
- *Shorebirds Across the Americas* poster (included in this education guide)
- Chalkboard/easel paper
- Beaks
  6 spoons
  6 pairs of scissors
  6 pairs of tweezers
  6 spring-type clothes pins
- Bird stomachs
  One paper cup per student
- Food items
  50 marbles (snails)
  100 toothpicks or cut pipe cleaners (worms)
  100 3/16" metal washers *(crustraceans)*
- One copy of the activity sheet *What Can I Eat with This Beak?*(included here) for each student.

Introduction
Mudflats are home to hundreds of different species of organisms that shorebirds eat. Most are *invertebrates*: worms, clams, snails, and crustaceans. Birds have different types of *bills* that allow them to eat different kinds of prey. Their bills are *adapted* to match their food types.

Many shorebirds have tweezer-like beaks. A bird with a "short tweezer" beak will take food near the surface of the mud while a "long tweezer" beak can reach animals that burrow deeper. Some birds like eagles and owls have tearing scissor-like beaks for ripping their food into bite-sized pieces. Other birds use their clothespin-like beaks to crush the hard covering of seeds. Chickadees and Pine Grosbeaks are two clothespin-beaked forest birds. The oystercatcher, a type of shorebird, has a beak that looks like a red clothespin for prying open mussels and chiseling limpets off rocks. Some birds have spoon-like beaks to scoop up small fish or strain plant material from the mud.

Since shorebirds eat different types of foods found in different places within a habitat, many different species can *coexist*. This is why you see many types of shorebirds feeding together in one area.

For additional information, read *Shorebirds Have Special Adaptations in Wetlands* found in the *Shorebird Primer*.

Procedure
1. Discuss with students the many different kinds of shorebird beak adaptations and how they relate to the foods that birds eat. What kinds of beaks have they seen? Show examples of beaks using the Shorebirds Across the Americas poster included in this education guide or your own pictures, study skins, masks, or puppets.

2. Hold up the beak "tools" one at a time and ask the students for examples of birds that have beaks similar to each "tool."

3. After the discussion, ask the class to imagine that they are a flock of shorebirds.

4. Have students count off in fours, with "ones" being spoon-beaks, "twos" being scissor-beaks, etc. Hand one "stomach" (paper cup) and one bird beak to each player.

5. Explain the rules:
   - Each shorebird (student) can only pick up food with its beak.
   - They have to drop the food into their stomachs (the paper cups).
   - Food may not be scooped or thrown into the stomach; the stomach must be held upright.
   - The teacher is a hawk that eats birds. Unruly behavior or violation of rules will result in the hawk capturing the

conspicuous bird and making it sit out for one round. (In reality, unusual behavior of a bird draws attention from a predator.)

6. Have students sit in a large circle (their habitat). Scatter one food type inside the circle and give the signal to start feeding. Feeding may occur only when a signal is given. One option is to simulate a normal feeding cycle. When the classroom lights are out, it is night and the birds are asleep. When the lights are on they can feed. Let them feed for a set time (up to two minutes). Turn off the lights as if the sun had set to signal when the birds should stop feeding.

7. Have similar beak-types get together and count the combined number of food items collected. Record the data for the entire class to see on one poster paper or the chalkboard as shown on the *Example Data Table*. Older students can record averages or graph beak efficiency (the number of items eaten for each beak type).

8. Repeat steps six and seven for each type of food.

9. To simulate a more natural feeding situation, mix all three food types together and let the "birds" gather food simultaneously. Record the data. The birds should first eat the food they can gather the easiest (as discovered in the earlier rounds), then switch to a secondary food item as it gets harder to gather their first choice.

10. Looking at the data table, discuss the following questions in class:

- Are some beaks better at getting a particular food item than other beaks? How does the feeding success (measured as number of items captured, or number of items per minute) change for each beak type as the food changes? Some birds eat food that lives in mud, some find food in water, and others eat plants. In which habitat does each of these beak types belong?

- Does having a different beak shape cause a bird to use it differently? Which beak types do shorebirds have? Which beak types do shorebirds not have? Why? Looking at the shorebird poster, can you find any other beak types besides the four studied in this activity?

- What other parts of the bird, besides its beak, are important to its feeding success (webbed or differently-shaped feet, length of neck, length of legs, etc.)? What differences do you detect in the feeding behavior of the birds when all food items are available at once? (Hint: More fighting or more relaxed and less fighting?)

11. Pass out a copy of the activity sheet What Can I Eat with This Beak? to each student. This activity sheet can also serve as an evaluation tool.

What Can I Eat with This Beak? Example Data Table

	Food Items			
Beak Type	*Worms*	*Snails*	*Crustaceans*	*All Food Types*
Tweezer				
Scissors				
Spoon				
Clothespin				

Additional Activities

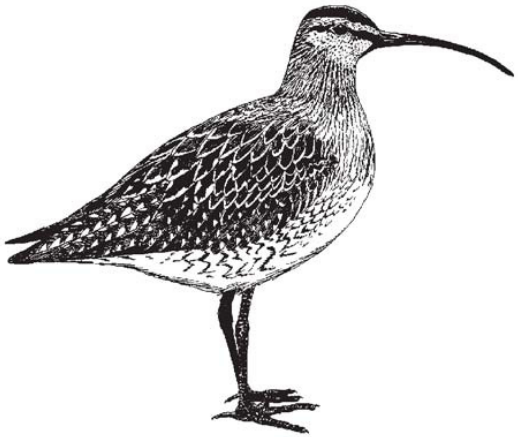
Cultural Connections
Have students research what people eat in one of the countries that shorebirds in their flyway migrate through.

Feeding Techniques
Have your students research different shorebird feeding techniques like probing, picking, crushing, and swirling. Give examples of local shorebird species that use these techniques to catch their food. Draw the bill shapes that go with each feeding technique.

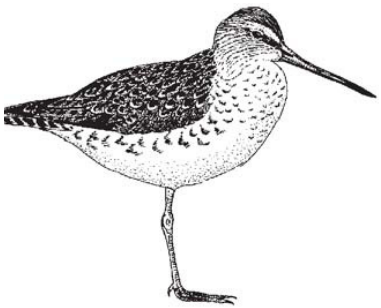
Create a Beak
Ask students to design their own shorebird beaks and then write an advertisement meant to "sell" the design to a shorebird. What could you eat with this beak? Where would you have to live? Are there any other adaptations required to use this design--for example, would you already need to have long legs or a long neck?

What Can I Eat With This Beak?

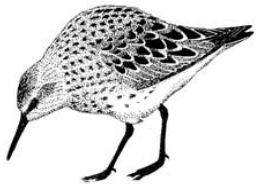
Activity Instructions:
In a wetland or on a beach food is everywhere.
Even though you cannot easily see it--shorebirds can!!!
Each shorebird species has a uniquely adapted beak to find its food.
Below is picture of a beach with food buried in the soil. Your task is to read the clues for each of the shorebirds species and choose which food item in the picture you think the bird is best adapted to eat.



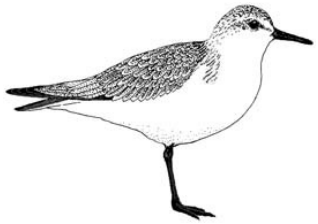
Whimbrel: I am a whimbrel. I use my down curved bill to probe very deeply into the mud for my food.



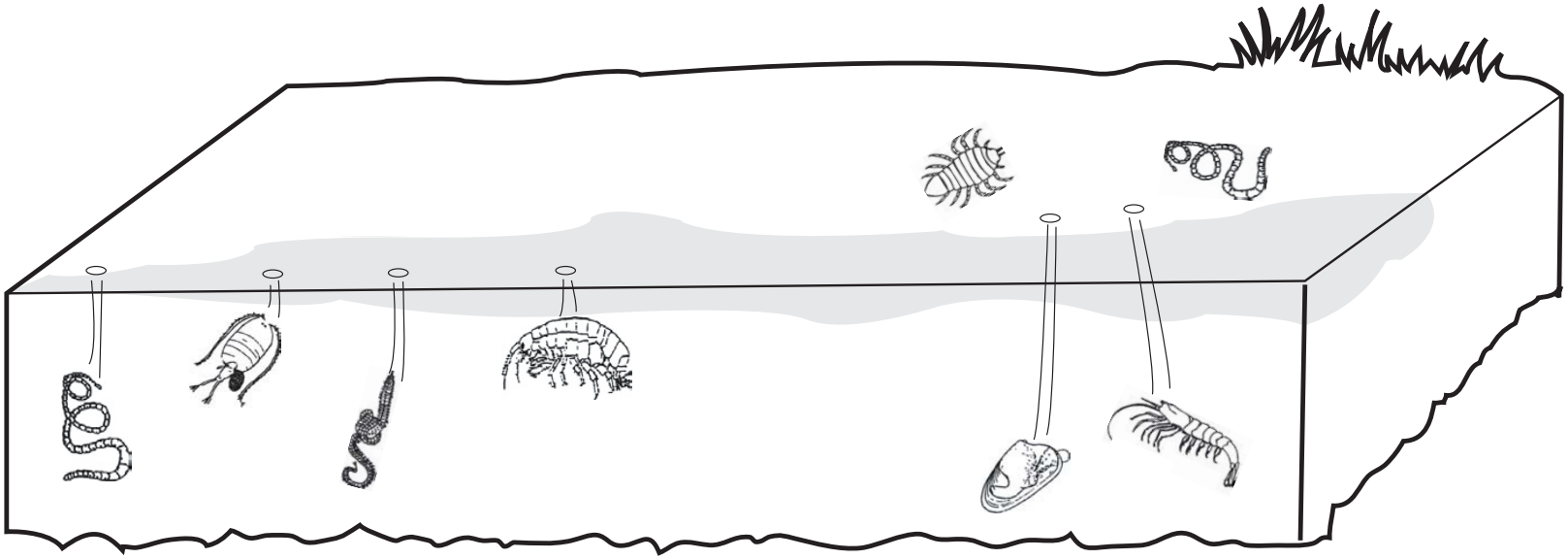
Long-billed dowitchers: The clue is in my name! I probe deeply in the mud for food.



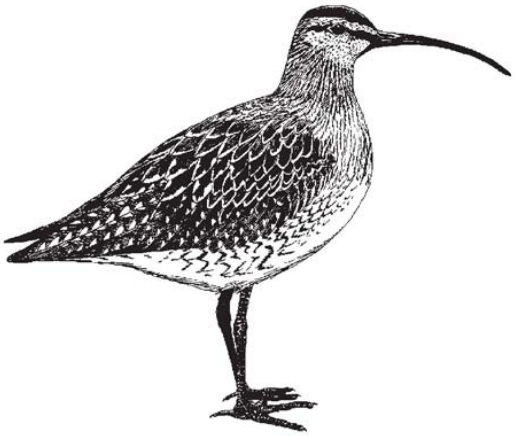
Western sandpipers: Some people think my beak looks like tweezers when i eat. I probe the mud near the surface.



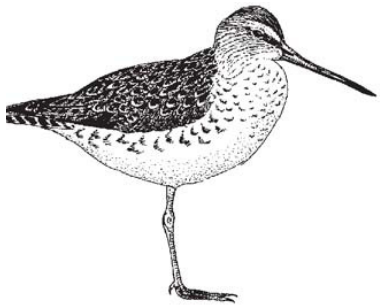
Sanderling: I nab insects on the surfact of the soil with my beak.



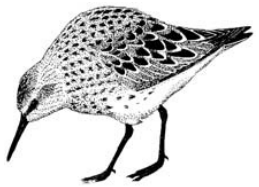
What Can I Eat With This Beak? ANSWER SHEET



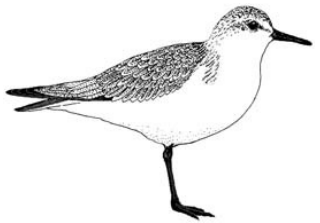
Whimbrel: I am a whimbrel. I use my down curved bill to probe very deeply into the mud for my food.



Long-billed dowitchers: The clue is in my name! I probe deeply in the mud for food.



Western sandpipers: Some people think my beak looks like tweezers when i eat. I probe the mud near the surface.



Sanderling: I nab insects on the surfact of the soil with my beak.