



Feet, Beaks, & Eats (2-6)

Overview: In this activity, students will match the beaks and feet of Bay birds to photographs and use tools that represent a variety of birds' beaks to discover that birds have adaptations to feed on different foods in different habitats.

Content Standards Correlations: Science, p. 309

Grades: 2-6

Key Concepts: Birds are dependent upon the five Refuge habitats (upland, salt marsh, former salt pond, slough, and mudflats) partially due to the adaptations of their beaks and feet.

Objectives:

Students will be able to:

- define adaptation
- describe how birds' beaks and feet are adapted to live in certain habitats and to eat certain types of food
- name five habitats at the Refuge

Materials:

Provided by the Refuge:

BEAKS & FEET MATCH-UP

- 1 set mounted beaks and feet
- 1 set of photos of birds
- 1 set of question cards

FOOD AND HABITATS

- 5 clue cards with photos
- 2 posters of birds & habitats
- 12 cups (*stomachs*)
- marbles (*mud creatures*) in holes drilled in board of wood (*mudflats*)
- green plastic pieces (*plankton*) floating in water (*slough*)
- red plastic pieces (*shrimp*) floating in water (*salt pond*)
- ping pong balls (*small mammals in salt marsh*)
- water in bottles (*nectar in flowers in upland*)

BEAKS (one beak per student)

- 4 spoons
- 4 tweezers
- 4 eyedroppers
- 4 tongs

TIME FRAME FOR CONDUCTING THIS ACTIVITY

Recommended Time: 30 minutes

Introduction (3 minutes)

- discuss beaks and feet adaptations
- show the bird beak poster

Beaks and Feet Match-up (8 minutes)

- hand out all of the beaks and feet to the students (at least one per student)
- direct the students to place their beaks and feet next to the pictures of the matching bird
- after all of the beaks and feet are matched to the correct picture, ask the discussion questions

Habitat Clues (4 minutes)

- walk to each habitat, reading the clue card for each
- when the students name the correct habitat, turn the label right side up

Foraging Activity (10 minutes)

- distribute "beaks" and "stomachs" to the students
- discuss rules of play
- begin each type of beak at a different habitat and allow students to "feed" for 1 to 2 minutes
- have the students rotate through all five of the habitats

Closing Discussion (5 minutes)

- ask students which habitat was easiest to feed in with their beak
- show the poster with birds, habitats, and food
- discuss the importance of the refuge's habitats for birds

HOW THIS ACTIVITY RELATES TO THE REFUGE'S RESOURCES

What are the Refuge's resources?

- significant wildlife habitat
- endangered species
- migratory bird

What makes it necessary to manage the resources?

- Birds may eat or become entangled in trash, such as balloons, fishing line, and styrofoam peanuts.
- Loss of wetland habitats for migratory birds due to development, such as landfills, salt ponds, buildings, roads, airports, etc.

What can students do to help?

Refuge staff conduct a Coastal Clean-Up and acquire and preserve wetland habitats, however, we need your help!

- Be responsible for your own trash
- Reduce, reuse, and recycle, decreasing the need for landfills
- Participate in a Coastal Clean-Up
- Teach others what you have learned about birds and habitats

Supporting Information for This Activity

- San Francisco Bay National Wildlife Refuge provides a variety of habitats for many species of birds. Birds rely on the habitats at the Refuge to rest, eat, nest, and raise their young.
- The wetland habitats at the Refuge are especially vital to the survival of migratory birds.
- Millions of birds migrate through the South Bay area every year as they follow the Pacific Flyway, stopping in at wetland habitats to feed and rest.
- Some birds are flying from their breeding grounds in Baja California or South America; others nest here, but migrate to milder climates in the south for the winter; some birds spend their winters in the marshes and fly north to breed; other birds do not migrate at all and they remain in the area as “permanent” residents.
- Birds using the habitats around the Bay have specialized beaks and feet that determine the type of food they eat and the type of habitat they live in. Look at the Beaks and Feet Identification Chart below to get an idea of the variety of these adaptations.
- At Don Edwards San Francisco Bay National Wildlife Refuge, there are a number of habitats.
 - The **upland** is the higher and drier land at the refuge. Freshwater plants grow in the upland, and small upland birds feed and nest in the upland.
 - The **salt pond** is a human-made habitat that was used for the production of salt. In the 1930's levees (dirt walls) were built around the salt marsh (the natural habitat) and the land was flooded with water from the bay to make solar salt evaporation ponds that were used to make salt. Today, these ponds are part of the Salt Pond Restoration Project. This project will

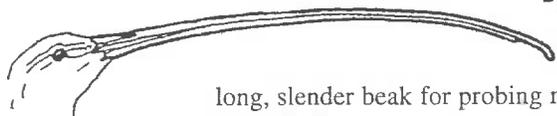
restore and enhance 15,000 acres to salt marshes, mudflats, and other wetland habitats. The water in this pond used to be saltier than ocean water. It is now brackish (mix of fresh and salt) water from the Bay. Some animals that live in the water are zooplankton, shrimp, water boatman, and a variety of fish.

- The **salt marsh** is the transition between the bay and upland. The salt marsh is a tidal, saltwater wetland. Bay water enters the marsh through sloughs twice a day (with the tides) and floods the salt loving plants. Salt marsh harvest mice (endangered species), shrews, and rats live in the salt marsh.
- The **slough** is a finger of the Bay that winds through the salt marsh, carrying bay water into the salt marsh. The slough is full of zooplankton (small, drifting animals, such as copepods, isopods, and the eggs and larva of aquatic animals), phytoplankton (small, drifting plants), and detritus (decomposing marsh plants). The plankton and detritus are important food sources for fish, mud creatures, and birds.
- The **mudflats** are beneath the slough and are exposed when the tide goes out. In a single handful of mud, there may be more than 40,000 living organisms, such as clams, snails, worms, crabs, amphipods, copepods, and isopods. These mud creatures feed on detritus (decomposing salt marsh plants) and plankton (small, drifting plants and animals) and are in turn eaten by birds.
- The habitats at the refuge provide many birds with food. Each bird at the refuge has a unique diet that depends on its beak adaptations.
 - Many birds have **tweezer** beaks, such as sandpipers, dowitchers, and egrets. Tweezer-beak birds can probe in the mudflats for small mud creatures; they can stab at small mammals in the salt marsh. Tweezer-beaks can also feed on shrimp in the former salt pond and plankton and detritus in the slough.

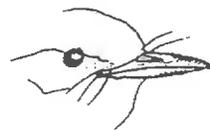


American Avocet

BIRD BEAKS



long, slender beak for probing mud
(shorebirds)



slim, sharp beak for catching flying
insects (swallows and flycatchers)



sharp, hooked beak for tearing meat
(hawks and owls)



short, thick beak for crushing
seeds (finches and sparrows)



long, broad beak for spearing prey
(egrets and herons)

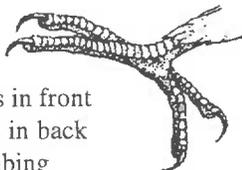


broad beak for scooping plants and
small animals and straining water
(ducks, grebes, and coots)

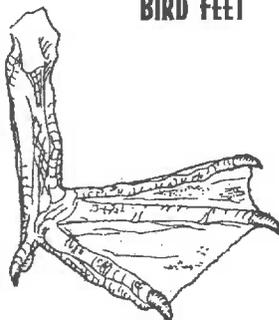


long, hooked beak for catching fish
(cormorants and pelicans)

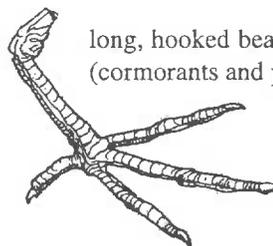
BIRD FEET



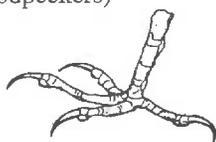
two toes in front
and one in back
for climbing
(woodpeckers)



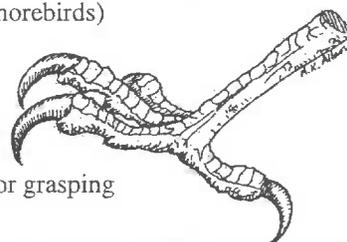
webbed feet for swimming
(ducks, grebes, and coots)



long-toed feet for wading and
walking on mud (egrets and
shorebirds)



three toes in front and one in back for
perching (sparrows and wrens)



sharp-clawed feet for grasping
(hawks and owls)

EXAMPLES OF BIRDS TO MATCH BEAK TYPES

tweezer beak

great egret
snowy egret
dowitcher
Ca. clapper rail
western sandpiper
great blue heron

spoon beak

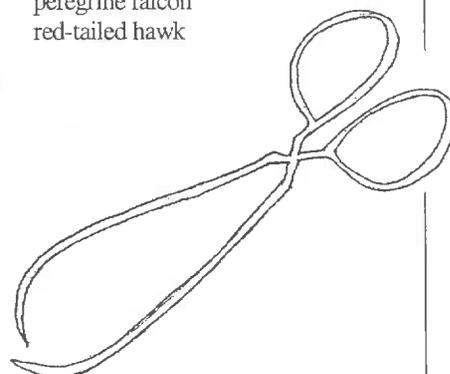
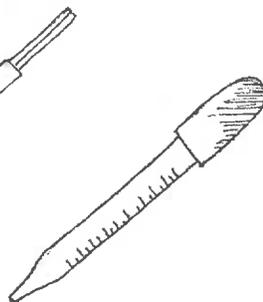
northern shoveler
mallard
white pelican
brown pelican

eyedropper beak

Anna's hummingbird

tong beak

northern harrier
barn owl
peregrine falcon
red-tailed hawk



- Birds such as ducks and pelicans have **spoon** beaks. Spoon-beak birds scoop up plankton (tiny plants and animals) and detritus (decomposing salt marsh plants) in the slough, and aquatic organisms such as shrimp in the former salt pond.
- Hummingbirds have **eyedropper** beaks and feed on the nectar in the upland flowers.
- Birds of prey grab their prey with talons and use their **tong** beak to either tear apart their prey or swallow their prey whole. Tong-beak birds, such as owls, hawks, peregrine falcons, and kestrels, feed on small mammals in the marsh.

HOW TO LEAD THIS ACTIVITY BY FOLLOWING THE "DO, READ, ASK" TEACHING FORMAT

Introduction (3 minutes)

Do

Ask the students to sit facing you and begin the activity with a general discussion about bird beak and feet types.

Read

"The shape of a bird's beak and the design of their feet allow them to eat certain kinds of food. We will find out what types of beaks birds need to feed in the San Francisco Bay's habitats. We will match the beaks and feet on the table to each bird picture. You will also become a bird with a particular beak."

Ask

? **Do all birds have the same beaks and feet?**

(No.)

? **Do all birds feed on the same food?** (No.)

? **What does adaptation mean?** (A change in a living thing that helps it survive; an adjustment to environmental conditions.)

? **Why do birds have different beaks and feet?**

(Birds are adapted to feed on different foods and live in different habitats. Their beaks and feet are designed to feed on certain food and live in certain habitats.)

? **Think about a duck. Can you describe a duck's beak and feet?** (Webbed feet and a wide, flat, spoon-like bill; show students the spoon.)

? **Think about a shorebird, such as a sandpiper, avocet, or a black-necked stilt. Can you**

describe a shorebird's beak and feet? (Long legs and toes, sometimes with webbing between the toes, and a long straight, pointed tweezer-like beak; show students the tweezers.)

? **Think about a hawk. Can you describe a hawk's beak and feet?** (Sharp, hooked beak and sharp-clawed feet.)

? **Think about a small upland bird, like a hummingbird. Can you describe a hummingbird's beak?** (A hummingbird has a beak like a straw or eyedropper; show students eyedropper.)

Do

Show the students the poster with different birds grouped according to their beak type: the tweezer beaks, tong beaks, spoon beaks, and the eyedropper beaks.

Beaks and Feet Match-up (8 minutes)

Read

"Now that you have learned about beaks and feet, we are going to try to match the beaks and feet of actual birds to pictures of the birds."

Do

- Pass out all of the beaks and feet models. Give each student at least one.
- Point out the pictures of the birds laying on the table and assist the students as they match up beaks and feet to the pictures. The names of the birds are on the backs of the mounts.
- (Note: all of these beaks and feet came from birds that were found dead on the refuge.)

Read

"Let's try to answer some questions about these birds and their beaks and feet."

Do

Using the question cards supplied, ask the following questions about the beaks and feet. Answers are also on the backs of the cards.

Question Cards

? **Find and describe a bird beak that is used for probing in the mud. Name some birds with this kind of beak.** (Short to long, slender, mostly straight beaks. Shorebirds: plover, dunlin, sanderling, black-necked stilt, willet, yellowlegs, dowitcher, curlew, sandpiper.)

? Find and describe a pointed bird beak that is used for fishing. Name some birds with this kind of beak. (A short to long, sharp-edged beak for holding fish. Birds: tern, egrets, herons, grebes.)

? Find and describe bird feet that are used for swimming. Name some birds with these kind of feet. (Large feet with webbed toes. Birds: ducks, geese, gulls, cormorant, pelicans.)

? Find and describe a bird beak used for tearing into the flesh of an animal. Name some birds with this kind of beak. (A strongly hooked beak, with knife-like edges for tearing into prey. Birds: hawks, eagles, shrike, owls, kites.)

? Find and describe a bird beak that is used for scooping, grasping, and straining. Name some birds with this kind of beak. (A flat, wide beak with toothlike edges for straining and sifting food in the water. This beak has a sensitive lip to identify food textures. Birds: geese, ducks.)

? Find and describe bird feet used for wading. Name some birds with these kind of feet. (Wading birds usually have long legs and long slender toes without webbing. Birds: egrets, clapper rail, coot, herons, shorebirds: dowitcher, black-necked stilt, avocet)

? Find and describe bird feet used for grasping, capturing, and carrying prey. Name some birds with these kind of feet. (Powerful legs and strong feet that can grasp prey with sharp, hooked talons (claws). Birds: eagles, owls, kites, hawks.)

? Find and describe bird feet that are used for perching. Name some birds with these kind of feet. (Feet with 3 toes in front and 1 long toe behind. Feet automatically lock bird to its perch while sleeping. Birds: swallows, sparrows, red-winged blackbird, hummingbirds, marsh wren, owls, hawks, egrets, herons.)

? Find and describe a bird beak used for eating seeds and insects. Name some birds with these kinds of beaks. (Short, sharp, pointed beaks. Birds: ring-necked pheasant, red-winged blackbird, swallows.)

? Find and describe bird feet used for walking on mud. Name some birds with these kind of feet. (Feet with long straight toes. Sometimes with webbing between the toes. Birds: dowitcher, black-necked stilt, avocet, ducks, grebes, pelican, egrets, herons.)

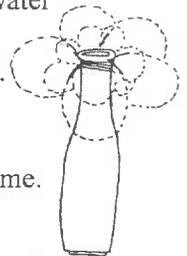
Habitat Clues (4 minutes)

Do

Walk to the five different habitats, reading the clue card for each habitat to help the students guess the habitat. Let the students guess after each clue. Turn the habitat label right side up after the students answer correctly:

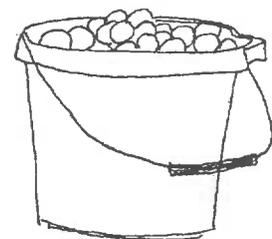
At the **upland** habitat (the "flowers" with water or "nectar"), read the following clues:

1. I am a large piece of land on the Refuge.
2. By standing on me you can get a great view of the Refuge.
3. Plants that cannot stand salty water like me.
4. I am safe from the tides, and trees and shrubs can grow on me.
5. Flowers grow amongst the grasses on my dry land.
6. I am the upland!



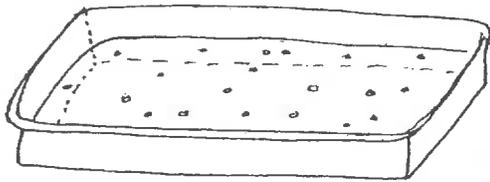
At the **salt marsh** habitat (the ping pong balls or "mice"), read the following clues:

1. 100 years ago, you would have seen me surround the Bay.
2. I am sometimes covered with bay water.
3. Don't try to walk on me or you'll sink in the mud.
4. Only certain plants can live in my salty soil.
5. The salt marsh harvest mouse lives among my pickleweed plants.
6. I am the salt marsh!



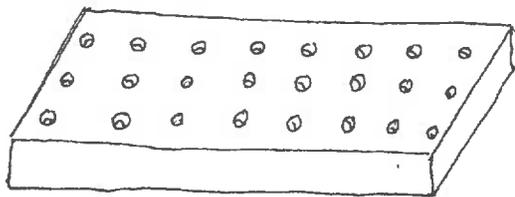
At the **slough** habitat (the water with green plastic bits or “plankton”), **read** the following clues:

1. I am long and winding.
2. Twice a day I am full of water, twice a day I am not.
3. I mix fresh and salt water.
4. I am connected to the Bay.
5. I am full of tiny floating plants and animals, called plankton.
6. I am the slough!



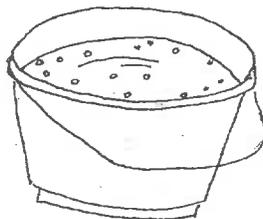
At the **mudflat** habitat (the board with marbles or “mud creatures”), **read** the following clues:

1. I am covered by water twice a day.
2. You can only see me when the tide goes out.
3. Don't step on me or you may sink.
4. I am full of tiny creatures, such as snails and worms.
5. I am the mudflats!



At the **salt pond** habitat (the water with red plastic bits or “shrimp”), **read** the following clues:

1. Birds like to rest and feed on me.
2. I was originally created by humans to make salt, but I no longer make salt.
3. My water comes from the Bay through the tide gates.
4. I am in the process of being restored to salt marshes, mudflats, and other wetland habitats.
5. Zooplankton and fish swim in my waters.
6. I am the salt pond!



Foraging Activity (10 minutes)

Do

- After all the habitats are named and labeled, hand out beaks and stomachs to the students.
- Each student should receive one “stomach” or cup and one beak that they keep for the remainder of the activity.
- Hand out a similar number of each type of beak, i.e. three tweezer beaks, three spoon beaks, two tong beaks, and two eyedropper beaks.

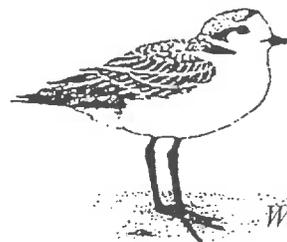
Read

“The tweezer beaks need to gather at the upland habitat, the tong beaks need to gather at the slough habitat, the eyedropper beaks need to gather at the salt marsh habitat, and the spoon beaks need to gather at the mudflat habitat. You have to follow these rules:

- “Birds do not have hands and fingers; use only your beak to pick up food.
- “Place your food in your stomach, but do not scoop up food with your stomach or throw food into your stomach; the stomach must be held upright.
- “You can only feed once you are told to do so.
- “Some of your beaks will only feed at one or two habitats. As you visit the different habitats, you will find where you feed best.”

Do

- Announce that it is time to feed. Allow one or two minutes for feeding; walk among the students, making sure they are following the rules and asking them how they are doing.
- Announce when it is time to stop feeding. Ask the students how easy it was to get food.
- Ask the students to put the food back in the habitat and move in a clockwise direction to the next habitat.
- Allow one to two minutes for feeding. Have the groups feed at each habitat in the same way.
- After all the students have tried all five of the habitats, have the students sit next to the habitat that they feed best at.



Western Snowy Plover

Closing Discussion (5 minutes)

Ask

? Where did the humming birds (eyedroppers) find it easiest to feed? (The upland.)

? Where did the shorebirds, egrets, and herons (tweezers) find it easiest to feed? (Mudflats, former salt pond, slough, possibly salt marsh.)

? Where did the ducks and pelicans (spoons) find it easiest to feed? (Slough, salt pond.)

? Where did the owls and hawks (tong beaks) find it easiest to feed? (Salt marsh.)

Do

Collect the beaks and stomachs. Show the students the poster, with birds and the food of each habitat.

Read

“One reason this refuge exists is to protect migratory birds. Don Edwards San Francisco Bay National Wildlife Refuge provides habitats for many birds to rest, eat, nest, and raise their young.”

Ask

? What happens to birds when habitats around the San Francisco Bay are destroyed? Would the birds be able to go to other habitats? (Some birds would be able to find other food sources, but not all birds because their beak and feet adaptations are specific to habitats and food types.)

? How can you help the refuge preserve habitat for birds? (Reduce, reuse, and recycle to cut down on landfills; write letters to legislators about the importance of preserving habitats; participate in Coast Clean-Ups so that habitats stay clean; learn about the habitats and birds and tell others.)

