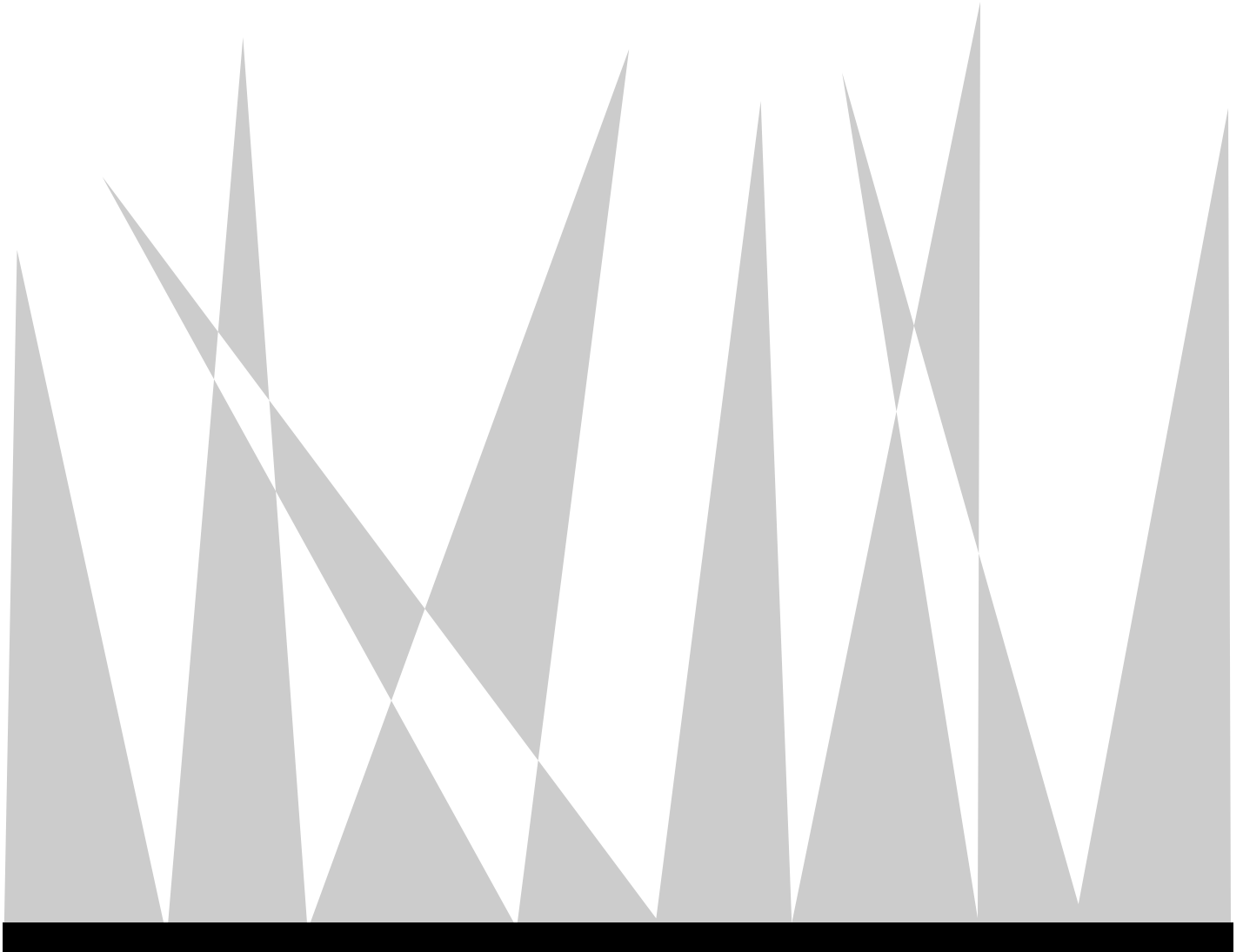




## **Section Two**

# **Field Lessons**

(for the field trip)





## Field Research Station: Plants

45 minutes

### Objective

Students will learn how to identify plants of the uplands and marsh habitats.

### Subject

Science

### Materials

Laminated Plant Samples

Plant Field Guide (4)

Plant Search Game Board (4)

Clipboards (4), (in addition to the four clipboards, in the student backpack)

Colored Pencils (8)

Plant Drawing/Identification Worksheet (8-located on student clipboards)

Pencils (8)

Pencil sharpener (1)

### Background Information

The plants in the salt marsh, called halophytes (meaning “salt-loving”), have become adapted to living in salty soils and salty water. They excrete salt through special cells and expend enormous energy to actively draw water into their roots. The plants in the salt marsh are also adapted to being covered by tidal waters part of the time. Salt marsh plants grow in distinct zones, referred to as lower, middle and upper zones. Bacteria promote decay of the dead plants, creating detritus—a rich food source for worms, crabs, insects, snails and other small invertebrates.

Each zone is dominated by a particular plant species. The distribution of each species is determined by the amount of time the plant can be under tidal water and the amount of salt it can tolerate.

**Lower Marsh zone:** Cordgrass is one of the most important plants of the marsh. Cordgrass grows in patches in Sweetwater Marsh and tolerates long periods of being covered by tidal waters. When cordgrass dies, it decomposes into detritus, an important food for small estuary animals.

**Middle Marsh Zone:** Pickleweed dominates the middle marsh zone and covers the broadest area of the marsh. This succulent plant begins growing where the cordgrass stops. Pickleweed tolerates less time under water than cordgrass.

Pickleweed is a very salt-tolerant plant. It has special cells for getting rid of salt. These cells transport salt to the tips of the branches, which turn red in the fall, dry up, and eventually break off. The compressed leaves look like a series of green, slender pickles attached end to end.

**Upper Marsh Zone:** This area is more diverse than the lower and middle marsh in its plant composition, which includes alkali heath and salt grass. These plants “sweat” salt out of their systems through the pores of their leaves, leaving tiny crystals on the surface.

**Uplands:** The upland areas of Gunpowder Point have been degraded over the past century by human activities. When the Kumeyaay people were living here, they were able to effectively utilize native plants and animals as resources, without having a negative impact on the ecosystem. The building of the kelp processing factory and farming caused most of the native mammals, birds, reptiles and plants to disappear. The Nature Center and the U.S. Fish and Wildlife Service are now working together to restore the uplands.

Volunteers are planting coastal sage scrub plants such as lemonadeberry, sagebrush, toyon, a variety of sages and bush sunflower. In time, we hope that the plants will mature enough to provide the shelter and food for the native mammals, birds and reptiles that once lived here.

## Procedure

1. **Do:** Use the laminated sample of plants to review the plants of the Refuge. Use the cards to compare and contrast the leaf types, stem types, and when possible, the flower types.
2. **Do:** Organize students into pairs. On the clipboards, student pairs will find a “Plant Search” game board and bag with Velcro tokens. Walk along the garden trail in front of the circle driveway at the Nature Center.

Tell students that the group is going to look at the various plants found in the area. Each time they find a plant which looks like a photo on their game board, students are to place a Velcro token on the plant. Students should use the “Did You Know” information on the back of the game board to assist them in their search. All pairs are to continue playing until they have three in a row—Tic Tac Toe.

3. **Do:** Having packed away the Plant Search boards, walk to the main trail head (see map) and begin to walk west. Walk along half to two thirds of the trail looking at the different species of plants.
4. **Read:** “Why are the plants in this area not as lush as the plants in the first garden?” (*The plants along the driveway are irrigated; plants here in the uplands are natural and not watered.*)
5. **Do:** Ask students to choose one plant that they find interesting. Have students work individually to complete their data collection forms about their chosen plants. Once the data collection form is complete, students create illustrations of their plant using colored pencils.
6. **Read:** “Each of you will share with the group your illustration and why you chose to illustrate this.”
7. **Do:** Return all colored pencils to the boxes and move all Data Collection Forms and Plant Illustrations to the back of the student clipboards.
8. **Do:** Hike with students to the beginning of the Animal Research Station. Return to the beginning of the Plant Research Station to greet new students.



# Plant Identification

## CHECK OUT YOUR PLANT'S HABITAT

Answer the following questions:

1. Where is it found? \_\_\_\_\_

2. Is the soil:                      WET              DAMP              DRY

3. Is your plant:                      TALL              LOW TO THE GROUND

4. Is your plant:                      SLENDER              BUSHY

5. How many stems are there?:              ONE              MANY

6. Does the stem feel:                      SOLID              HOLLOW

7. Is the stem:                      ROUND              ANGLED (with edges like a pencil)

8. Does the stem have leaves?:              YES              NO

9. Does the stem feel:                      SMOOTH              HAIRY              STICKY              THORNY

### ***Now feel the leaves.***

10. Are they:                      THICK              THIN

11. Is the texture:                      STICKY              WAXY              SMOOTH              HAIRY

12. Do the leaves smell?:              YES              NO



# Plant Drawing Worksheet

THE NAME OF MY FAVORITE PLANT IS:

---

*Instructions: Draw and color your plant below with the colored pencils provided.*



## **Field Research Station: Animals**

45 minutes

### **Objective**

Students will learn how different mammals of the uplands move by mimicking their movements.  
Students will learn how to find clues to identify which animals live in the upland habitat.

### **Subjects**

Science  
Physical Education

### **Materials**

Animal Field Guide (8)  
Animal Movement Cards (8 cards—4 sets of 2)  
Animal Puzzles (4)  
Animal Evidence Data Collection Worksheet (4- located on student clipboards)  
Coyote Pads

## **PART I: ANIMAL MOVEMENT**

### **Background Information**

Why do animals move? Animals move for a variety of reasons—Some reasons include: to find food, to escape predators, to find a mate and to look for shelter. Different kinds of moving animals include walkers, runners, jumpers, diggers, swingers, gliders, fliers and swimmers. Sometimes an animal will be able to do more than one type of movement.

### **Procedure**

1. **Do:** Distribute an animal movement card to each student. Have students act out their described movements while walking along the trail to the circle area by the water. At the end of the trail, hand out the field guides and challenge the students to find their animals in the guide. Ask students to share their animals with the group. Explain that each animal is found here in the uplands area of the refuge.

## PART II: LOOKING FOR ANIMAL CLUES

### Background Information

There are many wild animals living within the Refuge. Some are easy to see, but many are hard to find. Wild animals leave clues wherever they go. They dig tunnels. They make footprints. They chew plants and leave scat (droppings) along the path. They build nests. And bits of skin, fur and scales are often left behind.

Remind students to look carefully for clues and signs, because they often blend in with the surroundings. If students see something that is not identified in the animal guide, have them use the blank sheet provided to draw what they see.

**Tracks**—are animal footprints. Tracks are often found in muddy areas along a path or dirt road. The mud at the edge of water is a good place to start to look for tracks. Sandy beaches are another good spot. When hunting for tracks, students should note the number of toes, the shape of the toes and whether there are claws (tiny dots made which represent claws.) The size of the track is also very important.

**Scat**—is the droppings from a wild animal. Wild animal scat tells a story about what an animal ate. Rabbit scat is shaped like round marbles and has twigs and leaves in it, while fox scat often has mouse fur and bones in it. Scat comes in all shapes and sizes.

**Other Signs**—that indicate where an animal has been or what it is doing are homes, food, beds, etc. A pile of feathers indicates that a bird may have been killed by a cat or hawk. A clump of white dots on the underside of a leaf may be insect eggs.

### Procedure

1. **Do:** Lead students through a review of the Animal Guide. Assign pairs of students one of the following animals. Pairs are then to locate their animal in the flip-book and read the information to the group.

Opossum  
Coyote  
Raccoon

Weasel  
Cottontail Rabbit  
Skunk

Gray Fox  
Ground Squirrel  
Pocket Gopher

2. **Do:** Ask students to work with partners during this activity. Give each pair a puzzle board. Puzzle pieces are located in the attached envelope.
3. **Do:** Direct students to take out their puzzle pieces and begin to put the puzzle together by attaching the puzzle pieces onto the puzzle board (Velcro is used). When the students have completed the puzzle they should use their animal flip-books to identify their puzzle animal. This becomes their focus animal when searching for animal evidence. Place puzzle pieces back into the envelopes and return them to the backpack.
4. **Read:** “We are going to hike the trail in search of evidence of your focus animal. If a pair finds evidence of another animal, you should alert the group and share the information.”
5. **Read:** “Record your discoveries on the Animal Evidence Record Sheet. This data sheet provides space for your focus animal and for evidence of other animals found.” Provide time for the students to share their discoveries with each other.
6. **Do:** Collect data sheets and walk students to the beginning of the Plankton Research Station. Return to greet new arriving students at the beginning of the Animal Research Station.





# Field Research Station: Plankton

45 minutes

## Objective

Students will learn the definition of plankton and the different types of plankton living in the Sweetwater Marsh National Wildlife Refuge.

## Subjects

Science  
Reading/Comprehension

## Materials

Clipboards with Data Collection Form (student backpacks)  
Background cards (1 each of 3 cards)  
Plankton Identification Guides (4)  
Plankton nets (4)  
Discovery Scopes, collecting boxes, and pipettes (8)  
Pre-made plankton slides (8)  
Towel  
Tarp—used for protecting equipment when not in use  
Plant Field Guide (in all backpacks)

## Background Information

(See three background cards in backpack)

## Procedure

### PART I: LEARNING ABOUT PLANKTON

- Do:** There are three background information cards. Starting with card #1, hold up the card so that the illustration is facing the research team.
- Do:** On the backside of the card, you will find information and questions to share with the group.  
Card #1: *An Introduction to Plankton*  
Card #2: *What is Phytoplankton?*  
Card #3: *What is Zooplankton?*
- Do:** Walk with the group to the Overflow Pond

## PART II: EQUIPMENT DEMONSTRATION

Location: Overflow Pond

1. **Read:** “As we have learned, there are many different types of phytoplankton and zooplankton in the marsh. We are going to collect our own plankton samples at the pond using a plankton net. Once you collect your samples you will be putting them in a collecting box to look at your plankton through your Discovery Scopes.”
2. **Do:** Demonstrate how to use Discovery Scope.
3. **Do:** Show students the plankton nets.
4. **Read:** “The thin netting of the plankton net will allow water to flow through, but not all of the plankton. Very small plankton will get through, but larger plankton will be collected in the bottle attached to the bottom of the net.”

## PART III: COLLECTING PLANKTON

**Note:** *This research section involves the use of plankton nets, collecting tubes and Discovery Scopes. To help keep the equipment organized and safe, lay out the tarp and instruct students to lay any equipment not being used on the tarp. This will prevent damage from dirt and from the equipment being stepped on.*

1. **Do:** Take a plankton net and stand at the area where the plants have been eroded from the edge. Avoid stepping on established plants.
2. **Do:** Demonstrate how to throw the net into the pond and filter water without dragging it on the bottom (to avoid collecting a muddy sample).
3. **Do:** When the sample is pulled in, remove the bottle from the bottom of the net (do not remove metal brace; lift bottle up through the net). Be careful not to spill the sample. Pour the sample into the white bowl.
4. **Do:** Allow student pairs to now use the plankton nets to collect further samples of pond water. All samples should be added to the white bowl for group use.

## PART IV: OBSERVING PLANKTON

1. **Do:** Distribute the plankton samples (from the white bowl) among the students' Discovery Scope boxes. *Helpful hint: fill the boxes as full as possible using the eyedroppers to “mound” the water. When the tops are put on, the mounded water will fill the box.* Have the students observe their samples using the Discovery Scopes.
2. **Do:** Using the Data Collection Forms on their clipboards, instruct students to draw several of the organisms they see under the Discovery Scope.
3. **Do:** Using the plankton field guides, ask students to attempt to identify each of the organisms they draw or find. They may not find the exact species on their guide—there are thousands of different kinds of plankton. For example, there are some 20,000 species of diatoms!

Use prepared slides if students are unable to find plankton. Be gentle with slides and place them back in the box after use.

- 4. Do:** Pour contents of collecting boxes back into the pond. Pour contents of white bowl into the pond. Return Discovery Scopes to Research Station teacher. Move Plankton Data Collection forms to back of student clipboards.

## **PART V: HIKE TO PLANTS**

- 1. Do:** Hike with students to the beginning of the Birds of the Refuge Research Station (Front of the Nature Center). During the walk along the stream (which feeds into the Overflow Pond), point out two important plants to this ecosystem: pickleweed and cordgrass. *Note: These plants do not grow along the Plant Research Station trail.*

*For the Instructor Only:*

**Pickleweed:** This annual succulent is a bushy plant that grows 3" - 24" tall. Stems resemble a string of small green beads or pickles. Pickleweed absorbs water and salt through deep tap roots. Turns pink in the fall. Can be made into pickles.

Use the Plant Field Guide to review what pickleweed looks like.

**Cordgrass:** This 2'-4' perennial is found partly submerged at high tide; it grows alone or in small "islands." The long tapered leaves are 6-18" in length. The small dense flowers can be seen July - November. Salt glands on leaves excrete salt from the plant. Cordgrass is the nesting place for the endangered Clapper Rail.

Use the Plant Field Guide to review what cordgrass looks like.

After dropping off students at the beginning of the Bird Research Station, return to the beginning of the Plankton Research Station to greet new students.

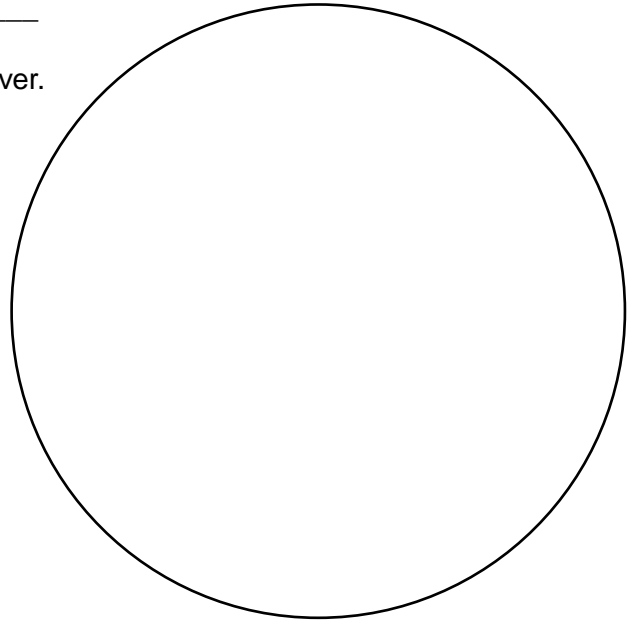
**Note:** *At the end of the last rotation, all equipment should be dried (towel provided) and packed away. Rinse as much plant material as possible from the nets. Return plankton nets and backpack to the Nature Center.*



# Plankton Data Sheet

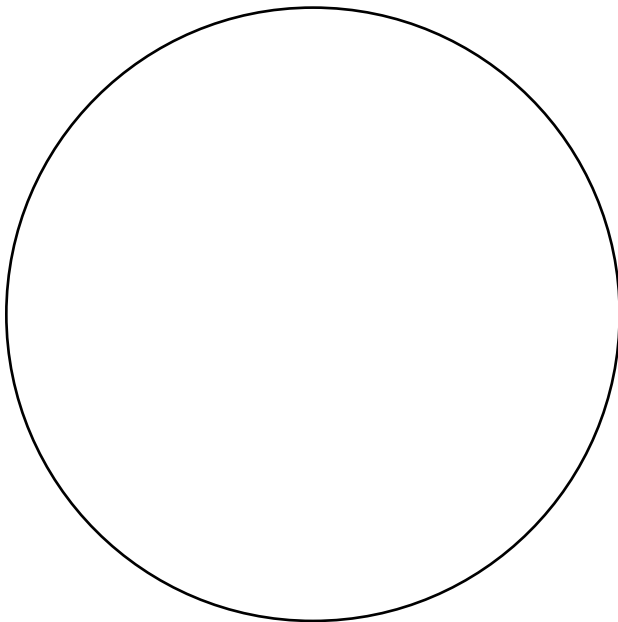
Your Name: \_\_\_\_\_

Draw and identify any plankton that you discover.



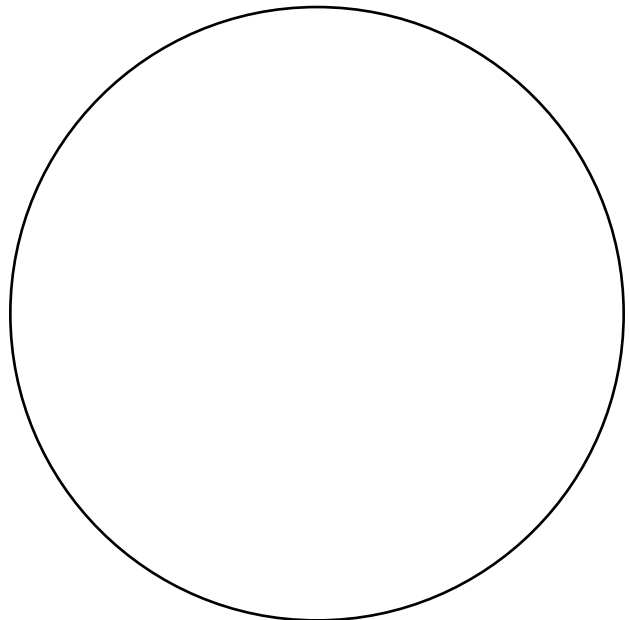
Circle one: phytoplankton or zooplankton

Name: \_\_\_\_\_



Circle one: phytoplankton or zooplankton

Name: \_\_\_\_\_



Circle one: phytoplankton or zooplankton

Name: \_\_\_\_\_



## Field Research Station: Birds

45 minutes

### Objective

Students will learn how to identify birds of the marsh by looking at their beaks, feet, characteristics and behaviors.

Students will learn how to use a simple bird field guide to identify birds.

### Subjects

Science

Reading/Comprehension

### Materials

Student clipboards with *Birds of the Refuge* Data Collection Form

Colored Pencils (8) sets

Bird Prop Bags (4)

Bird Key Booklet

San Diego Bird Guide

Laminated Worksheets: *Not all Birds are Alike* ( in prop bags)

Dry Erase Marker (in prop bags)

Eraser (in prop bags)

### Background Information

Birds gather their food in many ways. On the Refuge, some birds live in the water and swim to search for food. Others look for food by walking across the soft mud. Many birds find their food in trees and bushes. A few birds look for their food by flying over the land, marsh, or water. Each of these birds have different types of feet that help them gather food and move around their habitat.

Bird feet come in all shapes and sizes. Bird toes can be clawed, pointed, webbed, curled or very long. Their feet help them to survive where they live. An interesting fact is that a bird's feet are actually only toes. Their whole foot extends to the bending part in the leg. So, what we think is a bird's knee is actually a bird's ankle.

Students will learn the following three types of bird feet through this lesson:

1. A grasping foot is good for catching food.
2. A long-toed foot is good for walking on the mud.
3. Curled toes are good for perching on branches.

Observing a bird's beak tells you a lot about how birds adapt to their habitat. Beaks come in all shapes and sizes. Each beak is different and serves the purpose of helping the bird find and eat the food it needs to survive in its habitat.

Students will learn the following four types of bird beaks through this lesson.

1. A probing beak is used to dig in the mud for worms, clams and insects (willet).
2. A nut-cracking beak is used to crack open seeds and berries (house finch).
3. A spearing beak is used to spear fish (great blue heron).
4. A tearing beak is used to pull apart flesh (red-tailed hawk).

### **Procedure**

**Note:** *The petting pool to the north of this area is not available on this field trip.*

1. **Do:** Gather your group at the wooden benches overlooking the marsh area behind the Nature Center. Hand a prop bag to each pair of students.
2. **Read:** “In each prop bag you will find clues to identify a bird of the Sweetwater Marsh National Refuge and a worksheet, ‘*Not All Birds are Alike.*’ The clues will include: a feather, a utensil representing its beak, a picture of its feet and one other clue representing your bird. We will use the props in your bag, the worksheet and the Bird Key books to identify your ‘mystery’ bird. Fill out your worksheet by studying your clues. Then use the Bird Key books to guide you to the identity of your bird.”

“When you have identified the props in your bag, look at your *San Diego Birds Field Guide*, located in the prop bag, to see a colored drawing of your bird.” (Below you will find a list of what the students are given in their prop bags.)

“While you wait for others to determine their birds, use your binoculars to begin searching the Refuge for birds.”

*Information for instructors only*

#### **Prop Bag #1: House Finch**

- Clue 1 (Bill) Nutcracker
- Clue 2 (Where/ What it eats) Seeds
- Clue 3 Feather
- Clue 4 Perching toes drawing
- Clue 5 Interesting Fact- male chest, forehead and rump are colored red

#### **Prop Bag #2: Willet**

- Clue 1 (Bill) Chopsticks
- Clue 2 (Where/What it eats) Insect figurine
- Clue 3 Feather
- Clue 4 Long toes drawing
- Clue 5 Interesting Fact – song “pill-will-willet” card

#### **Prop Bag #3: Red-Tailed Hawk**

- Clue 1 (Where/What it eats) Mouse figurine
- Clue 2 (Bill) Wrench
- Clue 3 Feather
- Clue 4 Claws and grasping foot drawing
- Clue 5 Interesting fact – bird of prey picture

#### **Prop Bag #4: Great Blue Heron**

Clue 1 (Where/What it eats) Fish figurine

Clue 2 (Bill) letter opener

Clue 3 Feather

Clue 4 Long toes drawing

Clue 5 Interesting Fact – statue picture

3. **Do:** Once all pairs determine their individual birds, ask them to share with the group their prop bag clues and the bird they identified.
4. **Read:** “Begin completing your *Birds of the Refuge* worksheet from one bird you have discovered in the marsh. Answer the questions using the laminated cards provided and create a drawing of your bird using colored pencils. Share your drawings with others in the group.” *Note: If birds are scarce in the Refuge, bird drawings can be done of birds found in the boardwalk aviaries.*
5. **Do:** Pack away materials and begin to explore the boardwalk area of the Nature Center. Take time to read the signage and discuss the different types of feet and beaks found on the birds.
6. **Do:** Proceed to the front of the Nature Center. Provide time for the students to use the restroom before beginning the Plant Research Station.



## Bird #1

### *Not all Birds are Alike*

#### **Instructions**

Read the following story. Find the clues in your bag. Fill in the spaces below with the correct clues.

When you have finished the story, read it through with your partner.

Take out your bird key booklet and use your clues to find out which bird your clues represent.

To see a color image of your bird, take out the *San Diego Birds Field Guide* within your prop bag.

**I fly through the uplands in search for food.**

**I search for plants filled with my favorite food: (Clue 1) \_\_\_\_\_.**

**My special bill is like a (Clue 2) \_\_\_\_\_**

**which helps me crack open my food.**

**My (Clue 3) \_\_\_\_\_ - colored feathers help me to camouflage myself,  
so that predators cannot find me.**

**(Clue 4—circle one)      Webbed      Long-toed      Grasping      Perching**

**feet allow me to grasp onto branches on trees and bushes as I collect my food.**

**If I am male, my forehead, chest and rump are colored (Clue 5) \_\_\_\_\_.**

**I am a \_\_\_\_\_.**



## Bird #2

*Not all Birds are Alike*

### Instructions

Read the following story. Find the clues in your bag. Fill in the spaces below with the correct clues.

When you have finished the story, read it through with your partner.

Take out your bird key booklet and use your clues to find out which bird your clues represent.

To see a color image of your bird, take out the *San Diego Birds Field Guide* within your prop bag.

I spend my time walking the mudflats in search of food.

I probe the mud with my bill, which works like (Clue 1) \_\_\_\_\_

as I pick for (Clue 2) \_\_\_\_\_.

My (Clue 3) \_\_\_\_\_ - colored feathers help me fly across the marsh.

My (Clue 4 – circle one)    webbed    long-toed    grasping    perching

feet keep me from sinking in the mud.

I am a noisy bird. I sing this song: (Clue 5) \_\_\_\_\_,

after which I am named.

I am a \_\_\_\_\_.



## Bird #3

### *Not all Birds are Alike*

#### **Instructions**

Read the following story. Find the clues in your bag. Fill in the spaces below with the correct clues.

When you have finished the story, read it through with your partner.

Take out your bird key booklet and use your clues to find out which bird your clues represent.

To see a color image of your bird, take out the *San Diego Birds Field Guide* within your prop bag.

**I spend my time soaring in the wind or hunting for small animals**

**such as (Clue 1) \_\_\_\_\_.**

**My beak is razor sharp and tears my food.**

**It acts much like a (Clue 2) \_\_\_\_\_ when it grips on to things.**

**My (Clue 3) \_\_\_\_\_ - colored feathers help me fly across a variety of habitats.**

**My (Clue 4 – circle one)    webbed    long toed    grasping    perching**  
**feet help me catch my prey.**

**Because I hunt my own food, such as small mammals, I have been given the name**

**(Clue 5) \_\_\_\_\_.**

**I am a \_\_\_\_\_.**



## Bird #4

### *Not all Birds are Alike*

#### **Instructions**

Read the following story. Find the clues in your bag. Fill in the spaces below with the correct clues.

When you have finished the story, read it through with your partner.

Take out your bird key booklet and use your clues to find out which bird your clues represent.

To see a color image of your bird, take out the *San Diego Birds Field Guide* within your prop bag.

I spend my time walking or standing in shallow water.

I spear snakes and (Clue 1) \_\_\_\_\_ with my bill  
that works much like a (Clue 2) \_\_\_\_\_.

My (Clue 3) \_\_\_\_\_ - colored feathers help me fly across the marsh.

My (Clue 4 – circle one)    webbed    long toed    grasping    perching  
feet keep me from sinking in the mud.

I can stand like a (Clue 5) \_\_\_\_\_ waiting for my food.

I am a \_\_\_\_\_.



## **Birds of the Refuge Worksheet**

Draw the bird you are studying:

Draw or Describe the Following:

Behavior (what is your bird doing?):

Beak:

(Look at your beak card)

Feet:

(Look at your feet card)

Using your field guide, identify your bird.

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