



HABITAT COMPARISON WALK

Overview: In this activity students will observe plants and animals in three different habitats while hiking from the back deck of the Environmental Education Center (EEC) to the salt pond levee

Content Standards Correlations: Science, p. 307, History/Social Science, p. 310.

Grades: K-6

Key Concept: A habitat is a living community for an animal or plant. A habitat provides the animal or plant with suitable food, water, shelter, and space. Each habitat supports plants and animals that have adapted to living there.

Objectives:

Students will be able to:

- identify and compare three different habitats on the refuge.
- identify one plant or animal found in each habitat.
- name one value of each habitat.

Materials:

Provided by the Refuge:

- 1 bird identification chart
- 1 plant identification book
- 1 poster of tidal slough habitat
- 1 poster of aquatic life
- 1 plant display
- 12 pair binoculars (grades 3-6)
- 12 clipboards

Provided by the educator:

- Copies of Habitat Hunt data sheet and pencils, K-2, p. 223 or 3-6, p.224 (one copy per student)

TIME FRAME FOR CONDUCTING THIS ACTIVITY

Recommended Time: (30 minutes)

Introduction (8 minutes)

- discuss the definition of a habitat
- name the different habitats seen on the walk
- identify plants in the display to look for on the hike
- hand out clipboards, pencils, and *Habitat Hunt* sheets (if provided)

Habitat Hike (15 minutes)

- hike the trail from the building to the salt pond
- stop at the numbered stops on the map: discuss the characteristics of the habitat; identify plants and animals dependent on that habitat; complete the *Habitat Hunt* sheet

Wrap-Up (2 minutes)

- go over the *Habitat Hunt*, (for grades 3-6 use the answer sheet)
- discuss the importance of preserving habitat for wildlife and people

Travel Time (5 minutes)

- Students travel to their next station, leader returns to the back deck.

HOW THIS ACTIVITY RELATES TO THE REFUGE'S RESOURCES

What are the Refuge's resources?

- significant wildlife habitat
- endangered species
- migratory birds

What makes it necessary to manage the resources?

- Bayland habitats are being developed at an alarming rate leaving less room for wildlife.
- Salt marsh habitat is being converted into freshwater habitat.
- Invasive, non-native plant species out-compete and displace native plant species, reducing the food supply for many native animals (esp. insects such as butterflies).

What can students do to help?

- Refuge staff work with water pollution control plants to lessen the amount of freshwater being released into tidal sloughs, but we need your help.
- Conserve your use of water and ask your family to do the same.
- Protect habitat for wildlife by keeping your cat indoors (cats catch migratory birds).
- Teach others about the importance of planting native California plants

SUPPORTING INFORMATION FOR THIS ACTIVITY

- A habitat is a community (made up of living and non-living things) for a plant or animal, providing food, water, shelter, and space suitable to its inhabitants' needs.
- Each habitat has its own unique characteristics (e.g., a lake is very different from an ocean).
- A description of each habitat you will be exploring on the Habitat Comparison Walk (upland, salt marsh, and tidal slough) is found below. For more information, see the Overview of Refuge Ecosystems starting on p. 22.

Upland

- The upland can be described as the land that is higher and drier than the salt marsh. There are a variety of native and nonnative (introduced by people) plants in the upland. In the upland, the plants may grow taller and have broader leaves than plants living in the marsh.
- An old landfill covered with dirt, upon which the building is built, comprises most of the upland at the EEC.
- Levees are also upland habitat.
- Plants that may be identified on the Habitat Comparison Walk include: black sage (native), bunch grass (native), California buckwheat (native), California sage brush (native), ceanothus (native), coyote brush (native), lemonade berry (native), live oak (native), (non-native), soap root plant (native), and toyon (native).
- For a complete list, and descriptions of these plants, please refer to the upland plant list beginning on p. 47.
- Many animal species live in the upland — students may see:
 - A variety of butterflies, western fence and alligator lizards, cotton-tail and jack rabbits, California ground squirrels, gopher and garter snakes
- For a complete list, and descriptions of these animals, please refer to the upland animal list beginning on p. 30.

Salt Marsh

- Approximately 80% of the salt marsh surrounding San Francisco Bay has been destroyed, primarily by the construction of landfills, salt ponds, roads and buildings.

- Historically, all salt marshes around San Francisco Bay were tidal wetlands, serving as a transition zone between the bay or sloughs and the upland habitat.
- At the Environmental Education Center, New Chicago Marsh is a nontidal, managed salt marsh. The slough channels feeding New Chicago Marsh were connected to the bay prior to the 1960s. The construction of levees (to create salt ponds) disconnected the sloughs in New Chicago Marsh from the Bay.
- To maintain this important habitat, refuge staff installed a water gate that can be opened to allow Bay water to flow from the higher elevation of the Bay into the marsh.
- The plants in the salt marsh are low-growing and have adapted to living in salty soils. Pickleweed, the predominant plant, is very salt tolerant. Other plants in the salt marsh include salt grass, alkali heath and Australian saltbush.
- Animals use the salt marsh for food and shelter. The endangered salt marsh harvest mouse (“Salty”) lives in New Chicago Marsh. Other small mammals include rabbits, voles and shrews.
- Many birds depend on the marsh for feeding and/or nesting, including ducks, geese, plovers, egrets, herons, and northern harriers (marsh hawks).

Tidal Slough (fresh water)

- Tidal sloughs are natural waterways that carry water from the ocean or bay into the salt marshes as the tide comes in and return the water as the tide goes out. At low tide, when the slough water is carried out to the bay, the mudflats beneath the water are revealed.
- If the palm of one's hand is used to represent San Francisco Bay, a tidal slough may be thought of as a “finger of the Bay.”
- The tidal slough at the Environmental Education Center is called Artesian Slough. Because it receives the effluent from the San Jose/Santa Clara Water Pollution Control Plant, up to 100 million gallons each day, it is a fresh water habitat. Cattails and fresh water tule grow along the banks.
- Many birds depend on the slough and mudflats for feeding and/or nesting, including ducks, geese, shorebirds, egrets, herons, and northern harriers (marsh hawk).

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

Introduction (8 minutes)

Do

Begin the activity with an introduction on the back deck.

Read

"Welcome to the Habitat Comparison Walk. In this activity you will observe plants and animals in three different habitats while hiking from here to the salt pond levee." [POINT]

Ask

? **We will be spending a lot of time talking about habitats. So, can anyone tell me what a habitat is?** [A community (place to live) for an animal or plant.]

? **What does a habitat provide for an animal or plant to live?** (Suitable food, water, shelter, and space.)

? **Are all habitats the same?** (No.)

? This building is built on the upland. What animals live in the upland? (Gopher and garter snakes, rabbits, ground squirrels, lizards, and a variety of birds, such as sparrows and swallows)

? **Can you see the second habitat, called the salt marsh, from here?** (Yes.)

? **Where is it?** (The low, flat wetland just below the upland.)

Read

"The third habitat we will be talking about is way over there [POINT]. We cannot see it from here. It is called the tidal slough."

Do

Hold up the poster of the tidal slough.

Read

"We will have a chance to take a closer look at the real slough later during our hike. While we are hiking we will be looking for plants and animals."

Do

Show the students the plant display.

Read

"Here are some of the plants we need to find along the way. Listen closely while I show you each plant and tell you its name."

Do

[HOLD UP THE BOTTLE WITH EACH PLANT WHILE YOU READ THE NAME]

California sagebrush, black sage, coyote brush, toyon, Lemonade Berry, pickleweed, and tule.

Read

"Okay, we're almost ready to head out. While we are hiking we will be doing a habitat hunt. So before we start our hike, we need to get our materials. You will need a clipboard with a copy of the habitat hunt and a pencil."

Do

To each student, hand out a habitat hunt sheet and a pencil (must be provided by the educator) with a clipboard.

Grades 3-6

Read

- "We will also be using binoculars on our hike. As I pass them out, I want you to place the strap around your neck.
- "Take a minute to get used to using the binoculars.
- "While we are hiking, we will be observing each of the habitats, looking for plants, animals, and evidence of animals.
- "We will have designated binocular stops. Please wait until we get to a binocular stop to use the binoculars."

Grades K-6

Read

- "You will be working on the habitat hunt sheet. Begin by writing your name on the sheet. I will collect it later. Let's start the hike!"

Habitat Hike (15 minutes)

UPLAND

Do

- Start by walking down the steps, turn right at the bottom, and walk down the trail about 10 feet.
- You will be in front of the California sagebrush (the leaves are silvery green, very soft and aromatic) and St Catherine's lace (gigantic buckwheat plants) that grow on the hillside.

Stop #1**Ask**

? **The bushes closest to the trail are native to California. What does native mean?** (The plants grew in California before it was settled by Europeans.)

Read

“Run your hands gently over the thin, narrow leaves and smell the aroma on your fingertips. Be careful not to pick the plant.”

Ask

? **What does it smell like?** (Spicy.)
 ? **Does anyone remember the name of this plant?** (California sagebrush.)

Read

“This plant is not a true sage. It got its name because of its spicy scent.”

Do

Walk a bit further down the trail and gather students around the large shrub on the right. This plant is the black sage.

Stop #2**Ask**

? **Does anyone recall the name of this plant?**
 (Black sage)

Read

“This is a true sage. It, too, is native to California. Find a fairly large stem near the base of the plant and determine its shape.”

Ask

? **What shape are the stems?** (Square)

Read

“Black sage is in the mint family. All plants in the mint family have square stems. Pinch a leaf between your fingers, being very careful not to pull it off.”

Ask

? **What does it smell like?** (Spicy too)
 ? **Can you see how this sage got its name?**
 (Hopefully the response is affirmative)

Read

“The black sage is an important food source for adult butterflies.”

Ask

? **What are the butterflies eating?** (Nectar)

Do

Turn around and focus the students’ attention on the plants across the path (coyote brush).

Stop #3**Read**

“Now let’s take a closer look at the coyote brush. It is another native plant. Coyote brush is an evergreen shrub. The green leaves are small, waxy, and serrated. The female plant has white flowers with fluffy seeds. Insects are attracted to these flowers that bloom in the late summer.”

Ask

? **What does evergreen mean?** (Leaves stay green and remain on the plant year-round.)
 ? **How do you think this plant got its name?**
 (Take all answers, then read)

Read

“No one knows for certain. Some people say that the fluffy white seeds look like the fur of a coyote. Another story is that a coyote walked by the brush and its fur stuck to the plant!”

Do

Continue a little further down the trail until you reach the spot where a trail intersects to your right. Focus attention to the large evergreen bush on your left. (toyon)

Stop #4**Read**

“This large evergreen bush is called toyon or Christmas berry.”

Ask

? **Who remembers what evergreen means?**
 (Leaves stay green and remain on the plant year-round.)
 ? **Look closely at the leaves. How have the leaves adapted to protect the plant from foragers?** (The leaves are tough and have a serrated edge.)
 ? **Why do you think some people call this plant Christmas berry?** (This plant has holly-like leaves and bright red berries and can be seen November

through March. In winter the answer will be obvious.)

? **What type of animal might use this plant for food?** (Butterflies drink the nectar and many species of birds eat the berries.)

Do

Walk down the trail (go just past the end of the low wire fence) until you observe the large shrub on the left side of the trail.

UPLAND

Stop #5 - optional

Check the time. Skip this upland section if you are running behind schedule.

Ask

? **This plant was introduced into the Bay Area. What does introduced mean?** (It was brought here by humans. It normally grows in the coastal areas of Southern California and Baja Mexico.)

Read

“**This large shrub is called Lemonade Berry.**

Can anyone guess how it got its name?”

(Its small red berries can be soaked in water to make a lemonade-like drink.) But remember, NEVER taste plants on your own because some may be poisonous.

Ask

? **What habitat is the Lemonade Berry growing in?** (Upland.)

? **What type of animals might like this plant?**

(Its fruit is enjoyed by many bird species and thirsty humans)

SALT MARSH

Do

Walk down the trail until you reach the overlook on your left. Direct the group’s attention to the habitat at the lower elevation (salt marsh).

Stop #6

Grades 3-6

Read

“This is a binocular stop. Use your binoculars to view the habitat below.”

Grades K-6

Do

Allow students some time to look out into the salt marsh.

Read

“The habitat we see below us is where the pickleweed grows. Historically it was a transition habitat between the upland and the Bay.”

Ask

? **Who remembers the name of the habitat down there?** (Salt marsh.)

? **What are some of the differences you can see between the salt marsh and the upland?** (The marsh is at a lower elevation than the upland; there are no trees or tall bushes in the marsh; the color, the amount of standing water)

? **Why don’t we see trees growing in the salt marsh?** (Trees are not adapted to living in salty soil. Plants that live in the salt marsh have adapted to live in salty soil and use much of their energy for getting rid of salt. Upland plants, like coyote brush and trees, can use their energy to grow tall.)

? **Can you see any plants we saw in the display out in the salt marsh?** (Pickleweed is the predominant plant.)

? **Can you see any animals in the salt marsh?** (Look for birds, such as egrets, and small mammals,

? **What endangered species lives in the salt marsh and uses the pickleweed for food and shelter?** (salt marsh harvest mouse.)

? **What animals might eat a salt marsh harvest mouse?** (northern harriers, hawks, owls, eagles, egrets, herons, and other birds.)

? **If the salt marsh harvest mouse were to become extinct, would it affect anything?** (The animals that feed on it would have one less source of food. We would only be able to see the salt marsh harvest mouse in pictures.)

? **Why is the salt marsh harvest mouse endangered?** (Loss of habitat. Less than 20% of the salt marsh remains in the South Bay; the rest has been destroyed to build landfills, salt ponds, roads, airports, and other buildings.)

? **Why should we protect the remaining salt marsh?** (It is the home of many plants and animals, including the salt marsh harvest mouse and other endangered species.)

Do

- Walk along the trail (go down and up a set of steps) until you reach the T-intersection. Turn left and continue on this trail called a levee. You will see an opening in the plants called tules.
 - This is a good place to view the tidal slough.
- Direct the group's attention to the slough.



Salt Marsh Harvest Mouse

TIDAL SLOUGH

Stop #7

Grades 3-6

Read

"This is another binocular stop. Use your binoculars to view the habitat."

Grades K-6

Do

Allow students some time to look out at the tidal slough.

Read

"This body of water is a tidal slough. Tidal sloughs are natural waterways that carry water from the ocean or bay into the salt marshes as the tide comes in and return the water as the tide goes out."

Demonstrate and Read

"Let's pull out our bay and slough model. Hold up your left arm. You now have a model of the San Francisco Bay."

Ask

? **What is a model?** (A model is a representation of something else; for example, a model airplane.)

Read

[POINTING] "Use the pointer finger on your right hand to follow along. In our model, your arm represents the Pacific Ocean and your wrist is the Golden Gate."

Ask

? **What is represented by the palm of your hand?** (San Francisco Bay)

Read

"We are going to create a model of the San Francisco Bay Area."

[DEMONSTRATE and POINT as you speak] "I want you all to hold up your left hand."

Ask

? **If your forearm represents the Pacific Ocean and your wrist is the Golden Gate, what is the palm of your hand?** (San Francisco Bay)

Read

- "Wiggle your fingers. These are the sloughs around the Bay. As the tide comes in, water moves from the ocean (*forearm*), [FOLLOW THE PATH WITH YOUR FINGER] through the Golden Gate (*wrist*), flooding the Bay (*palm*).
- "The water continues to move through the Bay into the sloughs (*fingers*) and then floods the salt marsh in places where there are no levees (*in between fingers*).
- "After high tide is reached, the water moves back through the sloughs (*fingers*), to the Bay (*palm*), and out the Golden Gate (*wrist*) into the ocean (*forearm*).
- "At low tide, when the slough water is carried all the way out to the ocean, the mudflats beneath the water are revealed. You may put down your arms."
- "At low tide, when the slough water is carried all the way out to the ocean, the mudflat habitat beneath the water is revealed.
- "You may put down your arms."

Ask

? **How is the tidal slough habitat different from the upland?** [It's an aquatic (water) habitat.]

? **What larger body of water is this slough connected to?** (The San Francisco Bay and ultimately the ocean.)

? **Recall the plant display. What plants do we see growing at the edge of the slough?** (Tule.)

? **Is the tide in or out? How can you tell?** (When the tide is out the mudflats are exposed.)

Read (Do not read if it is very low tide and the tule is not in any water)

“The water level in the slough goes up and down throughout the day due to the Bay’s tides. Use your binoculars and look at the base of the tule where it meets the water. Look for water marks on the tule stems.

“If the stem of the tule is wet just above the water line, it means the tide is going out.”

Ask

? **So, if the stem is dry immediately above the water line, what does that mean?** (The tide is coming in.)

? **Is the tide coming in or going out?** (This will depend on your observation)

Read

“Birds, such as the marsh wren, make nests in the tule and eat tule seeds. During low tide, the shorebirds can be seen busily searching for food in the mudflats.”

Ask

? **What might the shorebirds be eating?** (Worms, snails, and other mud creatures.)

Read

“Another type of bird that can be seen on the mudflat at low tide is the California clapper rail. It is another endangered species on the refuge.”

Read

“During high tide, ducks and coots can be seen swimming with their tails in the air or diving underwater in search of food.”

Ask

? **What might these birds be eating?** (Phytoplankton such as algae, zooplankton such as copepods, insects such as water boatmen, fish such as juvenile striped bass.)

? **Can you see any birds feeding in the slough waters or on the mudflats?** (Encourage the students to identify any birds they see with the bird identification chart.)

Do

Show the poster of the aquatic life that lives in this tidal slough and mudflats.

? **Why do you think the sloughs and mudflats are important?** (Both provide food for migratory birds, resident birds, and endangered species. Slough waters are home for plankton and fish. Mudflats are a home for mud creatures like worms, snails, and crabs).

Do

If there is time, continue your hike along the levee until you reach the intersection at the salt pond. Otherwise, conduct the wrap-up here.

Wrap-Up (2 minutes)

Ask

? **How are each of the habitats important to wildlife and people?** (They provide food, water, shelter, and space for many different plants and animals. It is a place for people to visit to enjoy and learn about their special features.)

? **What can you do to keep these Bay habitats clean and healthy?** (Never pour anything down storm drains, don’t litter, reduce, reuse, recycle, learn about the habitats and teach others, etc.)

Do

Grades 3-6

Have students write their response to the last question.

Grades K-6

Have several students share their response with the group. Collect the binoculars, pencils, clipboards and habitat hunt sheets.

Travel Time (5 minutes)

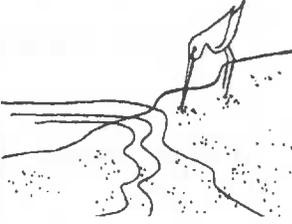
Send students and their chaperone to their next station. Return quickly to the back deck to begin your next rotation.



Dragonfly

HABITAT HUNT DATA SHEET (3 - 6)

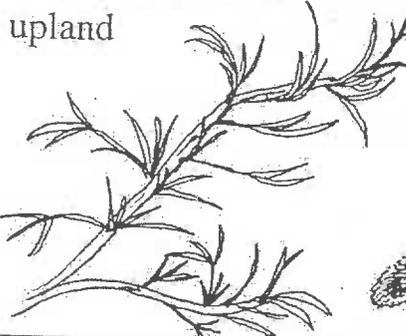
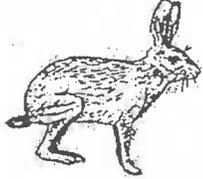
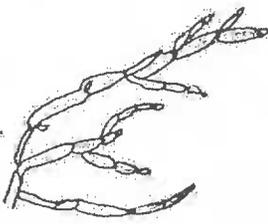
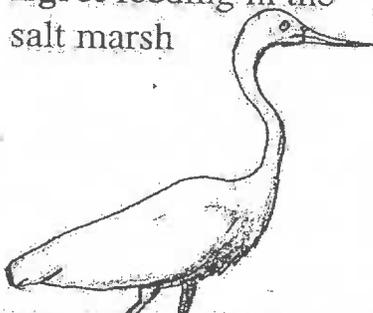
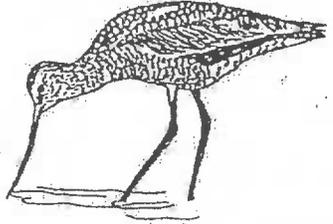
Fill in the blanks or circle the correct answer.

<p>My name is _____</p> 	<p>Today the weather is WET DRY _____ SUNNY CLOUDY _____ COLD WARM HOT</p>	<p>A habitat is a _____</p> 	<p>The building is built on the SALT MARSH UPLAND SLOUGH</p>
<p>California sagebrush grows in the _____ habitat. It smells _____.</p> 	<p>Black sage has a ROUND SQUARE shaped stem. It belongs to the mint family.</p>	<p>The leaves on the coyote brush are SMALL LARGE FUZZY WAXY SMOOTH-EDGED SERRATED</p>	<p>Toyon is DECIDUOUS EVERGREEN</p>
<p>I spotted a _____ with my binoculars in the salt marsh.</p>	<p>Pickleweed grows in the _____ habitat.</p>  <p>I think it would taste _____.</p>	<p>The salt marsh harvest mouse is an _____ species that lives in and eats pickleweed.</p> 	<p>Using my hands as a model of the San Francisco Bay area, sloughs are _____ of the Bay.</p>
<p>Tule grows in the tidal _____</p> 	<p>The slough connects to this larger body of water _____ The tide is IN OUT</p>	<p>In the slough, I found DUCKS GULLS EGRETS COOTS SHOREBIRDS TERNS MUSKRAT CA. CLAPPER RAIL</p>	<p>I can keep the Bay habitats healthy and clean by: _____ _____ _____</p>

HABITAT HUNT (K-2)

Cross off the things you see

Your Name _____

<p>Sagebrush in the upland</p> 	<p>Ground squirrel in the upland</p> 	<p>Square stems on the black sage</p> 
<p>Green toothed leaves on the coyote brush</p> 	<p>Toyon in the upland</p> 	<p>Rabbit in the upland</p> 
<p>Pickleweed in the salt marsh</p> 	<p>Egret feeding in the salt marsh</p> 	<p>Birds feeding in the tidal slough</p> 
<p>The tide is In Out</p>	<p>Tule growing along the tidal slough</p> 	<p>Ducks swimming in the slough or shorebirds feeding on the mudflats</p>  

HABITAT COMPARISON WALK MAP

