



SALT MARSH MINI-EXPEDITION (K-2)

Overview: In this activity, students will work in one group to closely examine a small section of the salt marsh. They will study the plants, animals, and physical characteristics of the salt marsh.

Content Standards Correlations: Science, p. 294

Grades: K-2

Key Concepts: The salt marshes around San Francisco Bay provide a unique habitat for a specialized group of plants and animals. Human impacts have drastically reduced the salt marsh habitat, causing two species to become endangered: the salt marsh harvest mouse and the California clapper rail.

Objectives:

Students will be able to:

- describe the salt marsh habitat in comparison to the upland
- identify plants and animals of the salt marsh
- describe why the salt marsh is important

Materials:

Provided by the Refuge:

- 1 large boundary rope
- 12 hand lenses
- 4 bug boxes
- 1 discovery scope
- 1 soil thermometer
- 1 scat display
- 1 salt marsh plant book
- 1 bird identification chart
- 1 key to Salty's Home



Northern Harrier

TIME FRAME FOR CONDUCTING THIS ACTIVITY

Recommended Time: 30 minutes

Introduction (5 minutes)

- discuss the salt marsh habitat in comparison to the upland habitat
- discuss the Key to Salty's Home

Exploring the Salt Marsh (20 minutes)

- lay the rope around a section of marsh and gather the students around the rope
- study the plants, animals, and soil of the salt marsh with the students, using the discussion questions and the equipment provided

Discussion (5 minutes)

- discuss the importance of the salt marsh
- collect the materials

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?

- Loss of salt marsh habitat due to development, such as landfills, salt ponds, buildings, roads, airports, etc. The introduction of nonnative plants and animals.

What can students do to help?

Refuge staff acquire and preserve wetland habitat and control introduced plants and animals, but we need your help.

- Reduce, reuse, and recycle, decreasing the need for landfills.
- Adopt a wetland or an endangered species
- Plant native plants
- Teach others what you have learned about habitats and endangered species

SUPPORTING INFORMATION FOR THIS ACTIVITY

Salt Marsh

- Salt marshes once surrounded the San Francisco Bay. Today, less than 20% of the original salt marsh exists. More than 80% of the salt marsh around San Francisco Bay has been lost due to human development. Salt marshes have been diked, filled, dredged, and drained, and landfills, buildings, airports, roads, and salt ponds have been built on top of former salt marshes.
- Salt marshes serve as a transition zone between the open waters of the bay and the dry upland, and salt marshes usually form between the mean (average) high tides and mean (average) tide levels.

Plants

- The plants in the salt marsh are adapted to living in salty soils and salty water.
 - They are called halophytes, meaning “salt-loving”.
 - 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.
- **Cordgrass** grows in a narrow band close to the edge of the slough and mudflats.
 - Cordgrass tolerates long periods of being covered by tidal waters.
 - When cordgrass dies, bacteria decomposes it into detritus, an important food for small estuary animals.
- **Pickleweed** dominates the salt marsh.
 - Pickleweed is a succulent plant that is very salt tolerant. 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.
 - Pickleweed tolerates less time under water than cordgrass; therefore, it grows at a higher elevation in the marsh than cordgrass.
 - The compressed leaves look like a series of green, slender pickles attached end to end.
- Other salt marsh plants include **alkali heath, Australian salt bush, salt grass, brass buttons, ice plant, and sea lavender**.
 - These plants “sweat” salt out of their systems through small openings on their leaves, leaving tiny salt crystals on the surface.
 - These plants grow at a higher level in the marsh than pickleweed.

Animals

- There are two endangered species that live only in the salt marshes of San Francisco Bay and nowhere else in the world: the salt marsh harvest mouse and the California clapper rail.
 - The endangered salt marsh harvest mouse, a nocturnal animal, makes its nest of dry pickleweed, eats pickleweed, and can drink salt water.
 - The endangered California clapper rail also depends exclusively on the salt marsh for its food and shelter, feeding on mud creatures, spiders, insects, and small mammals, and hiding and nesting in the pickleweed and cordgrass.
- Small mammals in the marsh include mice, voles, and shrews.
- Many birds depend on the marsh for feeding and/or nesting, including terns, plovers, sandpipers, stilts, avocets, rails, ducks, geese, egrets, and herons.
- Birds of prey, such as owls, eagles, kites, falcons, and hawks (northern harriers) feed on small marsh rodents and birds.
- There are many smaller animals in the marsh, which you may not notice until you look very closely, including insects (such as butterflies), spiders, mussels, snails, crabs, clams, etc.

Soil

- Soil in a wetland has different physical characteristics than upland soil because of the presence of water.
- Salt marsh soils are, at times, so saturated with water, that they cannot contain much oxygen; these are anaerobic conditions.
 - The color of the soil is changed over time because of the amount of water and lack of oxygen. Salt marsh soils are generally black, dark brown, or gray, while upland soils are yellow, red, tan, or other light colors.
 - Dark colored soils absorb heat, while light colored soils reflect heat. Marsh and upland soils may have different temperatures at the same time of day because of their color.
- Salt marsh soils are generally clay-like. Clay-like soils hold water longer, unlike sandy soils, which water passes through more quickly.
- The color and texture of soil can be used to identify an area as a wetland, even if it is not currently wet.

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

Introduction: (5 minutes)

Do

Gather the students for an opening discussion.

Read

"We are going to study the plants and animals in the salt marsh habitat." (point out the salt marsh)

Ask

? **What is a habitat?** (A home for a plant or animal. A habitat provides food, water, shelter, and space.)

? **What are some things you notice about the salt marsh?** (Take a number of responses, such as: the salt marsh is wet, the salt marsh is flat, there are short plants in the salt marsh, etc.)

? **Let's compare the salt marsh to the upland. (Point out the upland hill.) Which habitat, the salt marsh or the upland, is higher?** (Upland.)

? **Which habitat is wetter?** (Salt marsh.)

? **Where do the plants grow taller?** (Upland.)

? **Are there trees in the salt marsh?** (No.)

? **Could a plant from the upland grow in the salt marsh? Why/why not?** (Upland plants usually cannot grow in the salt marsh. The plants in the salt marsh are adapted to drinking salt water and to being covered by the tide periodically.)

Read

- "We are going to have the opportunity to enter the salt marsh and study it close-up. Because we have the Key to Salty's Home (hold up the large, wood key), we have permission to enter the salt marsh.
- We are able to get off the trail and enter this special habitat, but we need to stay in a small area and we need to try not to step on plants.
- You can look at and touch the plants, but only the adults can pick plants."

Ask

? **Why do you think we need to treat the salt marsh so well?** (It is a home for endangered species, such as the salt marsh harvest mouse.)

Read

"We are going to be scientists, exploring the salt marsh habitat. We are going to look at a section of the marsh and study the plants, animals, and the soil in the marsh."

Exploring the Salt Marsh (20 minutes)

Do

- With the students' help, choose a section of the marsh to study.
- Have the group lay out the large rope in a circle on the ground surrounding the area to study.
- Have the students surround the circle and kneel or squat.
- Hand out a hand lens to each student. Use the questions below to guide exploration and to stimulate discussion.

Please Note: Only enter the section of marsh marked on the map. Do not allow the students to wander into other parts of the marsh.

PLANTS

Ask

? **Can anyone find salt crystals on the leaves of plants?** (Use the hand lenses to look at the salt crystals on plants such as alkali heath, Australian salt bush, and fat hen. Leaders may put leaves in the discovery scope and pass the scope around.)



? **Why do these plants have salt crystals on them?** (They drink salt water and have to get rid of the salt. They "sweat" out the salt through openings on their leaves, just like humans sweat through pores.)

? **Can anyone find pickleweed? Do you see salt crystals on the pickleweed?** (No.) **How does pickleweed get rid of salt?** (It sends the salt to the tips of the branches, which turns red and falls off.)

? **What do you think pickleweed tastes like?** (ADULTS should pick pickleweed and give each student a taste. **Students may NOT pick plants.**)

Read

"Remember when you are walking outside to not eat plants unless you are with an adult who can identify plants. Some plants are poisonous and can make you very sick."

Do

Use the [plant book](#) to identify plants you find.



Alkali Heath

ANIMALS

Do

Use the [scat display](#) to identify scat and the [bird identification chart](#) for bird identification.

Ask

? Can anyone find any animals inside our circle? (Students may be able to find insects, spiders, or small crustaceans. Leaders can put these inside the [bug box](#) or [discovery scope](#) for viewing. Be sure to return the animals to the marsh.)

? What evidence of animals could we find? (Webs, scat, feathers, holes, tracks, nests, shells. Place evidence in the [bug box](#) or [discovery scope](#).)

? What endangered animal lives in the salt marsh? (The salt marsh harvest mouse.)

? What does the salt marsh harvest mouse eat? (Pickleweed. It also nests in pickleweed.)

? What animals might eat the salt marsh harvest mouse? (Birds such as hawks, owls, eagles, egrets, herons, and the endangered California clapper rail.)

SOIL

? What does the soil in the salt marsh feel like? Rub some of the soil between your fingers. Is it wet or dry? (It will feel wet if the area you are studying has been flooded with water recently.)

? Does the soil fall apart or stick together?

Does it stick to your fingers? Is it more similar to sand or to clay? (Wetland soils are generally more clay-like; water doesn't drain through clay very quickly. Wetland soil that is currently dry will feel like powder, with very fine particles, unlike the granular texture of sand.)

? What does the soil smell like? (Dead plants and animals in waterlogged soils do not decompose as quickly as in dry soils. The soil may smell.)

? What is the color of the soil? (Wetland soils are generally dark brown, black, or gray.)

? Does the soil feel warm or cold? Let's see what temperature it is. (Measure the temperature of the soil using the [soil thermometer](#) - gently insert the thermometer's rod in the soil. Wait one minute and read the temperature.)

? Is the soil warmer or colder than the air? (Measure the temperature of the air and compare.)



Discussion (5 minutes)

Ask

? Do you think the salt marsh is important? Why/why not? (The salt marsh is a special habitat. It is a home for plants and animals, including endangered species. It is a place to study and enjoy.)

? Why is the salt marsh harvest mouse (Salty) endangered? (Salty's home or habitat - the salt marshes of San Francisco Bay - have been destroyed. There is not very much salt marsh left around the bay.)

? What can you do to help protect the salt marsh and protect Salty? (Reduce, reuse, recycle - to reduce the need for landfills. Don't litter and pick up garbage so animals don't become entangled in plastics. Never dump anything down storm drains - they flow to creeks which enter the Bay. Learn about the salt marsh and teach others.)

Do

At the end of the expedition, collect the materials.

MINI-EXPEDITION MAP (K-2)

