

# Building Environmental Literacy One Class at a Time

From 26 Students to 320 in Three Years

By Karen Leggett

**For the past three years, every student in third- through sixth-grade at Imperial Beach Elementary School has come to units of the San Diego National Wildlife Refuge Complex in California twice a year – 320 students from an urban, predominantly minority, low-income school who receive rarely offered hands-on instruction about wildlife and habitat.**

It all started with one teacher who wanted her fourth-graders to know about the natural world around them. “Students learn about how to take care of this habitat,” said Cheryl Evans. “It is literally in some of their backyards.” Gradually more grade levels began coming to the refuge and they came more frequently.

Third-graders come to Tijuana Slough Refuge and the Sweetwater Marsh Unit of San Diego Bay Refuge to learn about estuaries. In fourth-grade, they go to San Diego Refuge to learn about riparian habitats and the impact of upriver activity downriver. By fifth-grade, youngsters are learning about the water quality in the bay by visiting San Diego Bay Refuge and learning about oak woodland habitat at Crestridge Ecological Reserve (a state partner). They are also able to see that the coastal sage scrub they planted in fourth-grade is growing. By sixth-grade,

they are teaching each other: “Oh, don’t you remember when we went there and did this?” “I planted over here.” “This is where I learned to use binoculars.”

A curriculum has been created for each refuge or refuge unit. San Diego Refuge Complex environmental education specialist Chantel Jimenez worked with teachers to write the curriculum and update it to meet changing state objectives. This year for the first time, California teachers must meet specific requirements in environmental literacy. Third-graders, for example, must learn about “structures for survival in a healthy ecosystem;” sixth-graders are to learn about the “dynamic nature of rivers.” The curriculum also meets state standards and objectives in other subject areas, such as language arts and social studies.

## Salt Marsh Bingo

The teacher’s guide for each refuge includes activities (with detailed procedures and required materials), a glossary and background information. One activity uses a specially made bingo game to teach salt marsh plant adaptations. Students receive a hand lens and a bingo card with pictures of different wetland plants. Some plants are excreters, some accumulators. The hand lens enables children to see salt crystals on any plants that are excreters. As they would for a scavenger hunt, students search the salt marsh for plants shown on the bingo cards. They have to identify three in a row and then show their classmates where they found the plants.

After the bingo game, students choose one salt marsh plant to observe more carefully, recording specific information on observation sheets that ask such questions as, “Where is your plant found? Is the soil wet or dry? Is your plant slender or bushy? Are the leaves thick or thin? Sticky, waxy or hairy? Children also have room on their observation sheets to draw a picture of their plant.

For the teachers, the guide explains words like halophyte (a plant that grows in salty or alkaline soil), excretor

*Barren land becomes green one year after students plant coastal sage scrub.*





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### Value of Multiple Visits

“We need programs that don’t take much time, aren’t too expensive and build upon knowledge from previous years,” says Jimenez. Jimenez acknowledges the value of being at a refuge that is on a public trolley line as an important way to reduce transportation costs. Eventually, Jimenez hopes to train a cadre of volunteers or docents who can also be environmental educators on the refuge.

Each of the refuge’s educational experiences is available to any school. Teachers may choose Sweetwater Safari or Tijuana Estuary Explorers – or both. Typically, 12 to 20 classes come to the refuge each year to do a single program.

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and accumulator with examples of each. Picklewood stores salt, sea lavender excretes salt. There is also a brief discussion of how plants survive in salt so that teachers have an understanding of the science their students are expected to learn. Both students and teachers can also learn the same information visually in the refuge exhibit hall.

### Getting Started

A big key to success in initiating a school-wide program is to start small and have a champion at the school. “We started with one classroom of 26 students with one teacher and it grew from there. There were money issues, grants that didn’t come through. But it will happen if you have good people on your team. Take time to find those people,” advises Jimenez, adding that “to have a school that is dedicated to taking time out of the classroom says a lot about the value of this program. And it all started with one teacher.”

Teacher Cheryl Evans credits Jimenez as well. “This works because Chantel

and I work closely together and coordinate our efforts. She makes sure the refuge is ready for us and I make sure the teachers know what is expected of them.”

Jimenez provides a half-day of training for the teachers before students appear. “The teachers learn what the students learn,” says Jimenez. “What is a tidal salt marsh? What habitats and plants will kids see? What science objectives are they meeting?” Teachers often feel they don’t have the expertise to lead a field trip on their own, so Jimenez’ training is intended to enable them to answer a few questions without feeling as if they need to be the expert.

The San Diego Refuge education program is funded with grants from Sempa Energy Foundation and the California Wetlands Recovery Program, as well as smaller grants and help with transportation funding from the Friends of San Diego Refuge. Most of the instructors are contractors from the Earth Discovery Institute and paid by the refuge.

Jimenez has concluded that “multiple trips in a year and multiple visits over several years have had a greater impact on the students’ connection with nature and desire to be outside.” Jimenez is thrilled when children have an “awe” moment: doing science in the field, putting a plankton net in the water and realizing it is full of living creatures – creatures they didn’t want to touch at first.

By the time children come as sixth-graders, they are more engaged. Not only are they prepared to get wet, but they can also talk about cord grass and plankton, not just bugs and leaves. “Their hands come up quicker to answer questions,” says Jimenez. There is pride of ownership. “I heard a kid say that he brought his mom to water his plants in the summer.”

Evans also believes there is long-term value in helping children feel comfortable in the natural habitat surrounding them. “There are signs posted saying that we have planted in certain areas. Former students are always coming over to tell me what they see when they go over to the refuge. And one student always says, ‘this is the best field trip ever,’ each time we go.”

# Field Lesson: Salt Marsh Plants

## TEACHER'S NOTES

**Duration**  
40 minutes

**Location**  
Outside next to Salt Marsh Plants

**Halophyte**  
(hal e fit) A plant that grows in salty or alkaline soil

**Excreter**  
Releases or gets rid of salt

**Accumulator**  
Holds in salt

**Marsh succulents**  
like *Jaumea* and *pickleweed* store salt inside their tissues

**Salt grass** excretes salt onto its leaves

**Alkali heath** is another marsh grass that excretes salt

**Cordgrass** excretes salt

**Sea lavender** excretes salt

## Overview

This activity uses a specially made bingo game to teach salt marsh plant adaptations. Students will choose one salt marsh plant to observe and record in their journal.

## Objectives

Students will:

- Be able to distinguish how salt marsh plants adapt to a salty environment.
- Know the difference between accumulator and excreter; describe the physical characteristics of both.
- Learn two endangered bird species that are dependent on salt marsh plants.

## Materials

- Salt marsh plant sign
- Explorer plant backpack:
  - Bingo cards
  - Bingo card pieces
  - Hand lenses
  - Explorer journal

## Background

Salt marsh plants live in a very extreme environment. Salt marshes are places where salt water from the ocean fills up the marsh daily during the high tides. The plants that live here must deal with this daily influx of water and salt. They are unique in that they have special adaptations to living with high quantities of salt.

## Procedure

1. Before explaining the rules of the bingo game, give a hand lens to each student. Explain that the hand lens will allow them to see salt crystals on the excreters or any other detail.
2. Explain the rules of the bingo game.
3. Each pair of students gets a bingo card (all the cards are the same). The cards have pictures of different wetland plants. Each plant is either an excreter or an accumulator.
4. One plant is not an excreter or accumulator (salt marsh bird's beak). This plant is located in the upper middle box on the bingo sheet.
5. Explain that this plant is endangered and therefore we are not allowed to be near it. This space on the card is a "freebie" for everyone. The green bingo card piece goes on the salt marsh bird's beak space.
6. The other bingo card pieces are to block out other squares on the card. Some pieces have a clapper rail and some have the Belding's savannah sparrow. Clapper rail pieces go on excreter plants marked "excreter." Savannah sparrows go on accumulator plants marked "accumulator."
7. Each pair of students tries to find the plants on the bingo cards on their own in the salt marsh like a scavenger hunt. They will have to get at least three in a row and be able to share with the class where they found them. Define the boundaries of where they can go.
8. After the plant bingo, each student picks one plant to observe and takes notes in a field journal using the provided observation sheets.



Lisa Cox

*Students choose one salt marsh plant to observe more carefully – such as this salt marsh bird's beak plant – and answer such questions as, "Where is your plant found? Are the leaves thick or thin? Sticky, waxy or hairy?"*