



From Salt Ponds to Wetlands

Watch online at <http://www.kqed.org/quest/television/view/585>

In addition:

Go on an exploration at <http://www.kqed.org/quest/exploration/view/23>

Listen The Legacy of Salt online at <http://www.kqed.org/quest/radio/view/314>

QUEST SUBJECTS

Life
Science

Biology
Health
Environment

Earth
Science

Geology
Weather
Astronomy

Physical
Science

Physics
Chemistry
Engineering

CA SCIENCE STANDARDS

Grade 5

Physical Sciences

1. Elements and their combinations account for all the varied types of matter in the world. (i)

Earth Sciences

3. Water on Earth moves between the oceans and land through the processes of evaporation and condensation. (a)

Grade 8

Physical Science

6. Principles of chemistry underlie the functioning of biological systems. (c)

Grades 9-12

Chemistry -- Acids and Bases

5. Acids, bases and salts are three classes of compounds that form ions in water solutions. (a)

Ecology

6. Stability in an ecosystem is a balance between competing effects. (a, b)

PROGRAM NOTES

When you fly into the Bay Area you can't miss the multicolored salt ponds on the bay's southern shoreline. This region has been a center of salt production for more than 100 years. Now biologists are working to restore the salt ponds to healthy wetlands for wildlife in one of the largest restoration projects on the West Coast, an effort that could take 40 years.

In this segment you'll find...



- why wetlands are important to wildlife.
- how biologists will convert 100 years of salt ponds into wetlands.
- how the public and wildlife will benefit from this restoration program.

TOPIC BACKGROUND

What is salt and how is it produced? Sodium chloride (NaCl) or salt, is a chemical compound that occurs naturally in lakes and oceans. Three different processes can be used to make salt: it can be mined underground by drilling and blasting salt deposits; it can be mined from underground salt deposits and evaporated using a partial vacuum with steam heat in a process called solution mining and mechanical evaporation; and it can be produced through solar evaporation. The last method is the one used here in the Bay Area. Salt water is collected in shallow ponds and then evaporated by the sun and wind. As the water evaporates, it leaves a bed of salt on the bottom of each pond. Once all the water is gone, the salt is harvested, washed and packaged for use.

Wetlands are often used for salt ponds. Wetlands are areas covered by water all the time or at varying times during the year. They can be rich in biodiversity and are among the most productive ecosystems in the world. An immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish and mammals make up the complex food webs that can be part of a wetland ecosystem. Wetlands play an important role in the ecology of a watershed. Their shallow water, high levels of nutrients and productivity make them ideal places for organisms to prosper that feed many species of fish, amphibians, shellfish and insects. Many species of birds and mammals rely on wetlands for food, water and shelter, especially during migration and breeding seasons.

Not only are wetlands important to a watershed and its organisms, but they perform many functions that benefit humans as well. They catch runoff from houses and buildings and filter out pollutants before they reach the ocean. Wetlands act as giant sponges to collect excess water and protect against floods and shoreline erosion. And last but not least, wetlands provide beautiful areas for viewing wildlife.

Media Enhance Education

Video and audio can be powerful tools for meaningful learning. It all depends on you, the educator. The key to using media effectively is preparation. Make the most of learning opportunities by encouraging students to become active viewers and listeners. Pick and choose from the suggested questions and activities to offer an engaging media experience.

Questioning

Oftentimes, teachers and students become frustrated during a media segment when students can't find the answers to a long list of questions. Provide a limited number of questions or topics for students. This focuses their attention during a media segment, helps to keep them engaged and generally results in higher quality answers. QUEST Ed. has provided a number of options for focus questions ranging from fact based to opinions, as well as "big picture" ideas.

PRE-VIEWING

- Where does salt come from and how is it produced?
- Brainstorm ideas about what animals you might find in wetlands and marshes.
- What is habitat restoration?
- What do levees do?
- What are some of the different uses of salt besides enhancing the flavor of food?
- What important roles do wetlands play in an ecosystem or watershed?

VIEWING FOCUS

NOTE: You may choose to watch the television segment twice with your students: once to elicit emotional responses and get an overview of the topic and again to focus on facts and draw out opinions.

- Record any facts you find interesting while you watch.
- To what are biologists restoring the salt ponds?
- Why can't they just open up all the salt ponds and let the bay water back in?
- Why are the salt ponds and proposed wetlands important for birds?
- What is "adaptive management"?
- What is the concern about removing the levees?
- How will the public benefit from the restored wetlands?

POST VIEWING – Links to activities mentioned can be found on the following page.

- **Review** students' answers to the Viewing Focus Questions.
- **Create** your own salt pond restoration plan. What would be your concerns if you had to restore salt ponds back into wetlands? What research would you do before you started the process?
- **Explore** a Bay Area wildlife refuge by discovering the hidden treasures within it. View pictures and hear facts about this beautiful area in our region's backyard.
- **Watch** a video on how ecologists find lost wetlands. Pick an area near your house or school and see if you can find out what it looked like in the past. Go to your local library and look for historic photos of the area.
- **Participate** in a wetlands restoration project through Save the Bay. Students can collect native plant seeds, grow plants in their nurseries, sow native plants along the shoreline, check water quality and monitor the health of wildlife populations.

More than one-third of the United States' threatened and endangered species live only in wetlands. -- EPA

LESSON PLANS / ACTIVITIES



Don Edwards SF Bay National Wildlife Refuge Exploration

<http://www.kqed.org/quest/exploration/view/23>

- Take a virtual trip through the wildlife refuge and discover the unique features and structures found there. Find out what a wetland is, learn the history of the bay's wetlands and check out photos of the area taken by other visitors.



Wetlands Time Machine

<http://www.kqed.org/quest/television/view/416>

- Watch a QUEST video segment on what historical ecologists are doing to recreate San Francisco Bay wetlands that existed decades ago.

Water Density

<http://pbskids.org/zoom/activities/sci/waterdensity.html>

- Experiment with the density of salt water.

ARTICLES / READING



The Salty Water Solution

<http://www.kqed.org/quest/radio/view/525>

- Listen to one of QUEST's radio programs on osmosis and desalination to learn more about one Bay Area agency's idea to build the largest desalination plant in San Francisco.

South Bay Salt Pond Restoration Project

<http://www.southbayrestoration.org/>

- Find in-depth information for the salt pond restoration project, such as meetings and events, project description and management, maps and wetland resources.

San Francisco Estuary Institute

<http://www.sfei.org/wetlands/programs.html>

- Find out all about this wetlands program, including its objectives, history and recent discoveries.

Don Edwards SF Bay National Wildlife Refuge U.S. Fish & Wildlife Service

<http://www.fws.gov/desfbay/>

- This Web site contains information for visiting the refuge, including recreational activities, environmental education programs, documents and brochures.

Earth Observatory

http://earthobservatory.nasa.gov/Newsroom/NewImages/images.php3?img_id=16685

- See some great images of the salt ponds in the South Bay.

Look for the



indicating resources from QUEST partner organizations

QUEST QUAD

FIELD NOTES

Go outside and ...

- ◉ Restore wetlands
 - Volunteer with one of Save the Bay's wetlands restoration projects.
- <http://www.savesfbay.org/site/pp.asp?c=dgKLLSOwEnH&b=488965>

FIELD TRIP

Visit ...

- ◉ Don Edwards SF Bay National Wildlife Refuge
<http://www.kqed.org/quest/exploration/view/23>
 - Use the QUEST printable pocket guide to explore the wildlife refuge on your own.
 - Contact the wildlife refuge and participate in one of their environmental education programs.
- <http://www.fws.gov/desfbay/enviro.htm>

FIELD RESEARCH

Find out more about...

- ◉ Salt production
 - What types of salt are there?
 - Where else can you find salt ponds?
 - What impact do salt ponds have on wildlife and surrounding areas?
- ◉ Habitat restoration
 - Why do we conduct restoration projects?
 - What are common areas where habitat restoration occurs?
 - If you had to pick, what area would you choose to restore?

FIELD TEST

Experiment with...

- ◉ Creating your own salt through evaporation
 - Following the guidelines on the Salt Institute Web site below to experiment with salt evaporation.
- <http://www.saltinstitute.org/42j.html>
- ◉ Different types of salt
 - What is the difference between table salt, kosher salt and sea salt? Look at them under a microscope.
 - Where does each one come from?
 - Try evaporating all three types of salt. Do they all evaporate at the same rate?

VISIT OUR PARTNERS

The Bay Institute
www.bay.org

California Academy of Sciences
www.calacademy.org

Chabot Space and Science Center
www.chabotspace.org

East Bay Regional Park District
www.ebparks.org

Exploratorium
www.exploratorium.edu

Girl Scouts of San Francisco Bay Area
www.girlscoutsbayarea.org

Golden Gate National Parks Conservancy
www.parksconservancy.org

Lawrence Berkeley National Laboratory
www.lbl.gov

Lawrence Hall of Science
www.lawrencehallofscience.org

Oakland Zoo
www.oaklandzoo.org

The Tech Museum of Innovation
www.techmuseum.org

UC Berkeley Museum of Paleontology
www.ucmp.berkeley.org

OTHER WAYS TO PARTICIPATE IN QUEST



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LISTEN

**KQED 88.5 FM San Francisco &
89.3 FM Sacramento
Fridays at 6:30am and 8:30am**



WATCH

**KQED Channel 9
Tuesdays at 7:30pm**

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