Wetland Walk

Field Trip and Educational Kit Overviews

Plus Supplemental Activities

SANTA CRUZ MUSEUM of natural history

About the Museum

The Santa Cruz Museum of Natural History is a leader in environmental education in Santa Cruz County, serving more than 30,000 children and adults each year.

Our school programs connect youth with nature, engage them in scientific exploration and discovery, and cultivate the next generation of environmental stewards. We cover a wide variety of natural history topics such as watershed science, animal adaptations and habitats, and the history and culture of Native Peoples. All of our offerings aim to create a personal understanding of the natural world around us and our role in it.

All of our programs support state standards and diverse learning styles. Click here for in-depth NGSS, CCSS, and HSS alignment.

Transportation Scholarships

The Museum is happy to offer transportation scholarships to classes who request assistance, but cannot guarantee the availability of funds. Please let us know if you are interested in a scholarship to help either fully or partially cover the cost of a bus.

Sponsors

Thanks to our school program supporters: Captain Planet Foundation · City of Santa Cruz · Community Foundation Santa Cruz County · David & Lucile Packard Foundation · Helen and Will Webster Foundation · Monterey Peninsula Foundation, host of the AT&T Pebble Beach Pro-Am · Project Learning Tree, a program of the Sustainable Forestry Initiative, Inc. · Santa Cruz Beach Boardwalk · Save the Redwoods League

Part I: Wetland Walk Program Overview

Title: Wetland Walk

Grade: 3rd

Topic: Students explore the wetlands of Neary Lagoon and use binoculars to spot and record wildlife along a one-mile hike. By collecting data on their observations and comparing them to past data, students find patterns of seasonal change, migration, and human impacts.

Why is this a relevant and interesting topic? The vast majority of California's wetlands have been historically eliminated, which makes our few remaining wetlands vital, especially for the preservation of the migratory species who use them each year. Through guided, hands on observation activities, students are able to discover the many valuable elements of a local freshwater system, and begin to make connections between seasonal changes to a wetland and the diversity of birds using it. This interactive exploration of a wetland is also an engaging way to help students build confidence in their inherent ability to be a scientist. Through simple observation and recording, students build background knowledge, generate their own data, and ultimately uncover patterns within the wetland system that involve the seasons, animal migrations, and even themselves.

Stewardship Goals: Students create a concrete connection to the natural world through observation and exploration and are inspired not only to return to a local natural setting, but to look closely at it and realize their role in maintaining its integrity. They will be prepared to:

1. Make choices that demonstrate an understanding that changes made to an environment can change the organisms living there
2. Notice ways that wetlands support and benefit life both for animals and humans
3. Take action to educate and inspire others to preserve our local existing wetland habitats

Primary Objectives *By the end of the program, students will:*

1. Use observations and critical thinking skills to connect human and animal uses of wetlands
2. Collect and record data on the abundance and diversity of birds at Neary Lagoon
3. Place their data in a larger context and look for potential cause and effect patterns between seasonal changes and their results
4. Make connections between changes in the wetland (primarily seasonal) and their bird count results.

Standards

We are actively working on developing our curriculum and helping teachers to identify ways in which our program supports and relates to Common Core, CA History-Social Science Frameworks, and Next Generation Science Standards. **Click here** for a more detailed look at the standards and how this program supports them.

Next Generation Science Standards

Performance Expectations

3-LS4-3: Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence	**LS4.C: Adaptation** **LS4.D: Biodiversity and Humans** **ESS2.D: Weather and Climate**	**Cause and Effect** **Systems and System Models** **Patterns**

History-Social Science Standards

HSS3.1.2: Students trace the ways in which people have used the resources of the local region and modified the physical environment.

Part II: Wetland Walk Field Trip Content

Pre-Trip Preparation:

Neary Lagoon is an exciting place to explore, located in the heart of downtown Santa Cruz. Note that we meet at the Neary Lagoon Tennis Courts, where there is a small parking lot. Parking can be fairly limited, so it is best to consolidate space as much as possible if your group is carpooling and arrive 5-10 minutes early. There are bathrooms at the beginning of the trail, but nowhere else along the route, so you may want to have students use the restroom before leaving school or as soon as they arrive. You may also want to go over trail safety (stay together and on the trail, don't pick plants, etc) ahead of time with your class, although our experienced outdoor education team runs through a safety talk on these subjects at the beginning of every field trip.

Outline

We will do our best to adhere to the following outline. Please let our staff know as soon as possible if your class has specific needs with respect to timing, such as needing to leave early. Late arrivals or early departures may result in the exclusion of some parts of the program.

Greeting: 15 minutes
Walking Tour: 1.5 hours
Conclusion:15 minutes

Total program time: 2 hours

Greeting

Time: 15 minutes
Location: Playground
Objectives: Introduce students to Neary Lagoon and discuss its importance as a wildlife refuge. Students also learn how the bird count will be conducted and how to use their binoculars.
Vocabulary: wetland, refuge, migration

Walking Tour*

*Docents have planned activities (listed below) that happen on every tour and allow for hands-on learning about subjects related to communities and ecological interactions. Because our outdoor setting provides many unplanned learning experiences, your docent may not get to every activity.

Bird Count

Time: 1.5 hours
Objectives: Students practice skills in observation while collecting data on the birds at Neary Lagoon. They participate in a group wrap-up using this data as evidence to answer the question "What birds are at Neary Lagoon this time of year and why?"
Vocabulary: migration, physical adaptation, behavioral adaptation
Materials: Binoculars, bird identification cards

Bird Skulls

Time: 10 minutes
Objectives: Students spend hands-on time with replica bird skulls, discussing their adaptations and using them to explain how a large quantity of birds can survive in a small location
Vocabulary: physical adaptations
Materials: replica heron and hawk skulls

Watershed Demo

Time: 10 minutes
Objectives: Students use a model to understand how rain water connects land to sea and the ecosystem services wetlands provide
Vocabulary: watershed, tule, pollution
Materials: plastic sheeting, sponge, rock, spray bottle

Ohlone Artifacts

Time: 10 minutes
Objectives: Students spend hands on time observing ohlone artifact replicas and use them to discover ways people could use the wetlands to survive.
Vocabulary: decoy, Uypi tribe, tule
Materials: replica duck decoy and boat made from tule

Bat Specimens

Time: 5 minutes
Objectives: Students observe a preserved bat and a bat skeleton and draw conclusions about how they survive from their adaptations.
Vocabulary: adaptations
Materials: bat specimens

Conclusion

Time: 15 minutes
Location: Playground
Objectives: Students analyze their data by counting the total number of birds and the number of species found. This is followed by an analysis of why the variety of birds changes seasonally and how migration is an adaptation that helps organisms survive. Staff encourage students to return to Neary Lagoon in different seasons to compare the species found there throughout the year.
Vocabulary: migration, behavioral adaptation, seasonality

Part III: Wetland Walk Educational Kit Outline and Supplemental Activities

Why do we provide the Educational Kit?

This activity kit is designed to familiarize your students with topics presented in the "Wetland Walk" field trip, and to provide a depth of experience and opportunity to apply knowledge after the trip. The activities within this kit will give your students a better understanding of such topics as **adaptations, the wetland habitat, change in environments,** and **data collection** using unique artifacts and hands-on exploration. They are designed to build a strong background for the field trip itself, thereby enhancing your students' outdoor experience.

How does it work?

We recommend that these activities are done in the order that they are presented, for a more comprehensive understanding of relevant concepts. These activities can be adjusted to different age or learning groups. If you feel that your students could benefit from more written analyses, the kit's curriculum includes extensional writing prompts with particular activities, which help to further understanding and scientific observational skills.

Wetland Kit Contents

1. Supplemental Activity Curriculum Descriptions
2. Materials to support curriculum
3. Visual Aids to support curriculum, including habitat photos, diagrams, and worksheets
4. Artifacts to let students get up close and personal with wetland plants and animals

List of Activities and Key Concepts Covered

1. **Bill Nye Wetlands DVD** - *Wetland habitat and ecosystem values*
   This DVD and its related activity help students further understand the important roles wetlands play in our lives and how we can better care for them.
2. **Building a Wetland*** - *Wetland values*
   This activity builds on the Bill Nye video using modeling to show the values of wetlands. (the kit does not include the materials for this activity as they are highly single use, however the materials are easy to come by and relatively inexpensive)
3. **Neary Bird Guide** - *Adaptations, identification skills*
   Students learn about different local birds and create their own field identification cards.

4. **Using Binoculars** - *Identification/observation skills, using scientific equipment*
   Students practice using binoculars in the classroom to hone skills prior to using them on the field trip.
5. **Bird Beak Buffet** - *Adaptations, ecological niche*
   Students use stimulated beak types to pick up different food sources to show importance of beak adaptations.
6. **History of Neary Lagoon** - *Changing environments, adaptations*
   Students learn the history of neary lagoon using a timeline in the classroom.
7. **Wetland Draw Along** - *Changing environments, wetland values*
   Students follow along with teacher in learning the flow of wetlands through different scenarios.
8. **Importance of Wetlands** - *Wetland values*
   This activity reviews the classroom presentation covering the 6 reasons why wetlands are important.
9. **Bird Report*** - *Adaptations, data, research*
   Students pick a local bird and do a research report on it
10. **Migration Hopscotch -** *Wetland values, data collection*
    Students learn the challenges of bird migrations and the important roles wetlands play in this annual event.
11. **"Who Am I" Game** - *Adaptations*
    Students play 20 questions to try to figure out what animal identity they have been given.

* These activities are described below. The Wetland Kit includes the visual aids and materials for all activities, but many can be recreated with materials in most classrooms.

Bird Report

Learning Objectives

Through this activity, students will:

- Learn about several birds found in Santa Cruz County
- Become an “expert” on a single bird that they may see at Neary Lagoon
- Find unique traits to identify and distinguish specific birds
- Practice researching and communicating scientific information

Background Information

There are a multitude of birds that inhabit Santa Cruz County. Some are **residential** inhabitants, staying in this area their whole lives, and some are **migratory**. Migratory birds stop through Santa Cruz on their way to other places that are rich in food or safe to raise young. Both are a valuable part of ecosystems, including Neary Lagoon.

However, when there are many birds in one area, there may be high **competition** for resources such as food and shelter. Birds have many different **adaptations** to help them compete. An adaptation is a trait (physical or behavioral) that allows an organism to survive better in a particular environment. In many cases, birds have differently shaped beaks (a physical adaptation) allowing them to eat different types of food in the same area. Each has a different **niche** -- a role in the ecosystem defined by what the organism eats, where it finds shelter, and how it interacts with its surroundings. If organisms share the same habitat but eat different food -- or, alternatively, eat the same food but **forage** for it in different areas -- they occupy different ecological niches and will not need to compete.

For example, a Scrub Jay can eat the acorns from an oak tree and a Red Tailed Hawk can eat mice running along the forest floor -- they occupy the same **habitat** but do not compete. They may have **behavioral adaptations** that help them use a habitat in non-competitive ways. For example, migrating at different times of the year allows a large amount of birds to use Neary Lagoon without all occupying it at once. Birds may also choose to forage at different times of the day, limiting competitive interactions.

A combination of physical and behavioral adaptations distinguishes the many birds we see in Santa Cruz apart. Scientists use these discernible traits to identify birds at Neary Lagoon throughout the year. They monitor the different types and quantities found and use this information to assess this wetland’s level of **biodiversity** -- a measure of how many different kinds of animals are in a habitat at once. More types of birds and higher quantities of each type combine to make Neary Lagoon a place of high biodiversity. Learning how to identify birds and monitoring their populations are two qualities of an **ornithologist**, a scientist who studies birds.

Preparation

This activity involves relatively little preparation. This can be a small or large-scale report, depending on your interests and classroom time.

Materials

- List of commonly found birds in Santa Cruz County
- Bird books and resources

Procedure

Optional: Take a few minutes to walk out to the school yard or a close green space and look for what kinds of birds inhabit your school's locale.

1. Have students discuss birds they have seen or know from this area. How do they tell those birds apart from other ones?
2. Discuss adaptations and ask students to think of examples in the birds they know (camouflage colors, differently shaped beaks, etc).
3. Pass out a list of the common birds of Santa Cruz County to each student and let them select a bird to become an "expert" on. They will research their bird's:
    a. *Physical Characteristics* (size, weight, wingspan, eye location, beak, feet, colors)
    b. *Behaviors* (what they eat, hunting techniques, nest location/design, migration, grooming, etc)
    c. *Special Adaptations* (specialized body parts like beaks or feet, camouflage)
    d. *Life History Facts* (lifespan, average young raised, predators, habitat)
    e. Interesting Facts (characteristics that make it unique or different from other birds)
4. Choose how you would like to have your students present. It may be a written report, an artistic poster, or a combination of both. Encourage your students to see this as an opportunity to research and share findings just like real bird scientists.

List of Commonly Found Birds in Santa Cruz County

1. Wood Duck
2. Mallard
3. Surf Scooter
4. California Quail
5. Pacific Loon
6. Pied-billed Grebe
7. Black-footed Albatross
8. Sooty Shearwater
9. Brown Pelican
10. Brandt's Cormorant
11. Double-crested Cormorant
12. Great Blue Heron
13. Black-crowned Night Heron
14. Turkey Vulture
15. Cooper's Hawk
16. Red-shouldered Hawk
17. Red-tailed Hawk
18. Virginia Rail
19. American Coot
20. Black-bellied Plover
21. Snowy Plover
22. Willet
23. Whimbrel
24. Surfbird
25. Sanderling
26. Long-billed Curlew
27. Western Sandpiper
28. California Gull
29. Western Gull
30. Common Murre
31. Mourning Dove
32. Western Screech-Owl
33. Great horned Owl
34. Anna's Hummingbird
35. Acorn Woodpecker
36. Warbling Vireo
37. Steller's Jay
38. Western Scrub Jay
39. Tree Swallow
40. Bushtit
41. Bewick's Wren
42. Swainson's Thrush
43. American Robin
44. Wrentit
45. California Thrasher
46. Song Sparrow
47. Dark-eyed Junco
48. Brewer's Blackbird
49. House Finch
50. House Sparrow

Building A Wetland

Learning Objectives

Through this activity, students will:

- Learn the beneficial functions of a wetland to the ecosystem
- Be able to identify a wetland
- Use modeling to demonstrate the filtering effect of wetlands

Background Information

Wetlands are a special although limiting habitat along California's coast. Most of our original wetlands have been removed, making this habitat more important than ever. Historically, people saw wetlands as stagnant, smelly places that provided very little. In many places, they were dredged or drained to create space for farms, houses, resorts, and highways. In the past few decades, however, scientists have discovered a vast array of ecosystem services that wetland habitats provide not only to animals, but to humans as well.

Biologically, wetlands are a source of high primary productivity and habitat for birds, many of which are migratory. Migratory birds stop in the wetlands to find food and rest on their extensive journeys across the coast. Many species of fish use lagoons and river outlets as breeding grounds, laying their eggs in the calm wetland waters where large predators can't enter. Some of these fish include ones that are commercially important to California, like salmon, trout, sole, and halibut.

Wetlands also play important roles in providing services for humans. Their dense, submerged grasses create a sponge-like flood control. These plants reduce the speed and force of waves coming in from the ocean and also soak up and slow down heavy rains. The roots of these plants are specially adapted to filter the water for nutrients, which allows them to filter out unnatural pollutants that would otherwise make it out to the ocean. The sponge-like structure of wetland plant roots can even control erosion and reduce the chances of coastal landslides.

Scientists are interested in studying wetlands to better understand the many values they provide us. Monitoring and testing existing wetlands is a key part of learning how they work and discovering ways to restore them.

Preparation

This activity involves several materials, most of which are affordable and/or reusable. There is some time involved in putting the model together. It is possible to have students put the model together if you so choose.

Materials

- Modeling Clay
- Aluminum pan
- Watering can (or recycled milk jug with holes cut into it)
- Strip of carpeting
- Clean and muddy water

Making the Model

1. Spread modeling clay in one-half of the pan to represent the land. Have the land slope down into the empty part of the pan. Leave the other half empty to represent the ocean or lake.
2. Shape the clay to make it look like a watershed. Include meandering streams that lead to the water. Include a few hills and ridges. Be sure to smooth the clay along the sides of the pan to seal the edges.
3. Cut carpet to fill the space across the pan along the edge of the clay. This represents the buffer between the dry land and the open water. This must fit well. The model won't work if there are large spaces under the wetland or between it and the sides of the pan.

Classroom Directions

This activity may be completed as a teacher-led demonstration, or a small group hands-on activity. If you choose a small group activity, 2-4 students per model is recommended. Adjust the amount of materials needed for either case.

1. Ask students: What do we know about wetlands? Has anyone ever been to a wetland? What does a wetland look like? What is special about wetlands? (Make a list on the whiteboard and clarify answers as needed).
2. Tell students: Today we'll be creating a wetland model and exploring how it helps to clean the environment.
3. Show students the materials. The watering can is rain, the clay is the land or watershed, the carpet is a wetland, and the one end of the pan is the ocean.
4. Depending on your choice, either set-up the teacher demonstration, or pass out materials to each group.
5. Make the model.. Assist students to make their models as needed if they are in small groups.
6. Allow students to predict what will happen if we make it "rain" on the watershed before we put in the carpet, or wetland. Then add the carpet in and have them make new predictions about how it will affect the flow of water from the land to the water. The carpet should absorb and slow down the flow, and if you pour water that has dirt or

another object (glitter or something else small) the carpet should trap some of it before it reaches the water, just as real wetlands act as buffers and filter out pollutants.

7. Discuss the results as a class.