

Lake Hodges

WATERSHED EXPLORERS



Contents

<u>OVERVIEW</u>	2
<u>Objectives</u>	2
<u>California Performance Expectations & Dimensions</u>	2
<u>INTRODUCTION</u>	3
<u>The San Dieguito River Watershed</u>	3
<u>Lake Hodges</u>	5
<u>Water Quality</u>	5
<u>ACTIVITIES</u>	7
<u>1. What is Citizen Science? (15 minutes)</u>	7
<u>2. Animal Tracking (1 hour)</u>	7
<u>a. Wildlife Corridors & Animal Movement</u>	7
<u>b. Animal Tracks & Signs</u>	7
<u>c. Tracking Surveys</u>	7
<u>3. Birding Hike (1 hour)</u>	8
<u>a. Bird Roles</u>	8
<u>b. Bird Habitats</u>	8
<u>c. Bird Hike and Search</u>	8
<u>4. Water Quality Testing (30 minutes)</u>	9
<u>Pre- and Post-Field Trip Watershed Activities</u>	9
<u>VOCABULARY</u>	10
<u>REFERENCES & SUGGESTED READINGS</u>	12
<u>ACKNOWLEDGEMENTS</u>	14



LAKE HODGES WATERSHED EXPLORERS

OVERVIEW

Led by the San Dieguito River Valley Conservancy, students learn about the importance of Lake Hodges and the surrounding area to local wildlife and overall watershed vitality and health. They are introduced to wildlife monitoring and survey techniques and become citizen scientists for the day collecting valuable data for the San Dieguito Citizen Science Monitoring Program. Students then split into teams to look for animal tracks & scat, search for reptiles & amphibians, look and listen for birds, and test the quality of the water collected in the reservoir.

Objectives

Students will:

- learn about the importance of Lake Hodges and the surrounding area to wildlife, and overall watershed vitality and health;
- be introduced to scientific surveys being conducted within the San Dieguito watershed and become citizen scientists for the day collecting valuable data for the River Park; and
- get hands-on experience with mammal tracking, reptile & amphibian surveys, identifying birds, and testing water quality.

California Performance Expectations & Dimensions

Note: This program can assist with meeting the following Performance Expectations and Dimensions from [California's Next Generation Science Standards \(NGSS\)](#).

Grade 5: 5-PS3-1; 5-LS1-1; 5-LS2-1; 5-ESS2-1; 5-ESS2-2; 5-ESS3-1.

Grades 6-8: MS-LS1-3; MS-LS1-4; MS-LS1-5; MS-LS1-6; MS-LS1-7; MS-LS1-8; MS-LS2-1; S-LS2-2; MS-LS2-3; MS-LS2-4; MS-LS2-5; MS-ESS2-1; MS-ESS2-2; MS-ESS2-3; MS-ESS2-4; MS-ESS2-5; MS-ESS2-6; MS-ESS3-1; MS-ESS3-2; MS-ESS3-3; MS-ESS3-4; MS-ESS3-5.

Grades 9-12: HS-LS2-1; HS-LS2-2; HS-LS2-6; HS-LS2-7; HS-LS2-8; HS-LS4-6; HS-ESS1-5; HS-ESS1-6; HS-ESS2-1; HS-ESS2-2; HS-ESS2-3; HS-ESS2-4; HS-ESS2-5; HS-ESS2-6; HS-ESS2-7; HS-ESS3-1; HS-ESS3-2; HS-ESS3-3; HS-ESS3-4; HS-ESS3-5; HS-ESS3-6.



INTRODUCTION

The San Dieguito River Watershed

When it rains, the falling water runs downhill off the land into nearby creeks, rivers, and lakes. If you were to follow a raindrop from the mountains to the ocean, you would be following the raindrop through a watershed. A watershed is the area of land and waterbodies that collect rainwater. A watershed includes the mountains, valleys, and flatlands, as well as water flowing above ground and underground (groundwater) in creeks, rivers, and aquifers. Most watersheds eventually end at the coast, often at an estuary open to the ocean. Flowing water connects all the communities in a watershed, and what happens upstream affects those living downstream.

Did you know that you live in a watershed? We all do. Do you know which one you live in? If you live between Julian and Del Mar, you probably live in the San Dieguito River Watershed. This watershed starts at Volcan Mountain near Julian and stretches 55 miles through portions of Julian, Wynola, Santa Ysabel, Ramona, Poway, Rancho Bernardo, Escondido, Del Dios, Santa Fe Valley, Rancho Santa Fe, Fairbanks Ranch, San Diego and Del Mar through the San Dieguito Lagoon to the Pacific Ocean.

In terms of land area, most of the watershed (79.8%) is within the unincorporated area of San Diego County. The San Dieguito River Watershed is presently divided into vacant/undeveloped (54%), parks/open space (29 %), and urban (18%) land uses. Nearly half of the vacant land area is open to future development, most of which is zoned for residential use. The current watershed population is approximately 125,000; however, this level is projected increase to over 210,000 residents by 2020.

There are several important natural areas within the watershed that sustain a number of threatened and endangered species. Among these are the 92,000-acre San Dieguito River Park Focused Planning Area, the 150-acre San Dieguito Lagoon, and five water storage reservoirs including Lake Hodges, Lake Hodges, and Lake Poway.

This curriculum focuses on the San Dieguito River Watershed; however, the environmental and water-quality issues found there are pertinent to most coastal California watersheds. Click on this [link](#) to find out information on other watersheds in San Diego County. Note: See the watershed map below for the location of these watersheds.





Lake Hodges

Lake Hodges lies within the San Dieguito River Park, just south of Escondido, and is a very important feature of the park, having a variety of recreational opportunities for people and providing critical habitat for a variety of living things. The Conservancy works with many partners within the watershed to help preserve and protect its natural and cultural resources. These natural and cultural resources include everything from land and water to culturally sacred places and artifacts. By working together, we are keeping natural areas healthy and accessible for recreational and educational uses, including Watershed Explorers!

Water Quality

Lake Hodges provides a potable, or usable, water source for neighboring communities and a habitat for many different animals. However, Lake Hodges didn't become a lake naturally- it is a man-made water reservoir! Lake Hodges' water levels are maintained by the Lake Hodges Dam, which was built in 1918. The dam stops the natural flow of the San Dieguito River, causing it to build up over time into the lake you see today.

Human population growth and development throughout San Diego County has led to significant habitat loss and a reduction in watershed ecosystem services. As water flows through our neighborhoods, it picks up pollution from yards (fertilizers and pesticides), streets (oil and grease), and walkways (trash and pet poop), and carries the pollutants down the watershed.

Today's polluted water no longer encounters the cleaning services that wetlands used to provide. Over the past 200 years, nearly 85% of Southern California's wetlands have been destroyed. With fewer wetlands, the job for those that remain is bigger and more challenging. Too much pollution and trash can overwhelm wetlands' cleansing abilities and destroy their usefulness. This disrupts the lives of the plants and animals living there, and ultimately affects the health of habitats throughout the watershed.

Ecosystem health is crucial to ecosystem services. Scientists and technicians use different tests to measure a watershed's health, just like doctors use different tests to measure your health. One way to determine the health of a watershed is to monitor the water quality.



Almost everything we do affects water quality. When the physical, chemical and biological components of water are altered, it causes the watershed to become unhealthy. There are several different measurable characteristics of water that can give us clues to a watershed's health including ambient measurements (temperature, pH and dissolved oxygen) and pollutants (nitrate and phosphate). As you visit the different sites included in this program, you will observe and record these measurements to determine water quality and overall health of the San Dieguito Watershed.

Since everyone lives in a watershed, everyone affects the quality of the water. We all have a responsibility to protect our limited freshwater resources and the ecosystem services they provide. By caring for and protecting our watershed, we're helping care for the ocean as well. It's critical that we keep the water in our watersheds flowing clean and healthy.



ACTIVITIES

1. What is Citizen Science? (15 minutes)

Students will discuss Citizen Science and how the San Dieguito River Valley Conservancy and San Dieguito River Park JPA are implementing the San Dieguito Citizen Science Monitoring Program throughout the watershed. They will learn how data is being collected and used, and how they can help protect the plants and animals within the River Park.

The Cornell Lab Bird Academy developed the [Investigating Evidence](#) Curriculum that includes pre- during- and post- field visit activities.

2. Animal Tracking (1 hour)

a. Wildlife Corridors & Animal Movement

Students will learn how animals move through the natural environment and be introduced to the concept of “wildlife corridors.” They will then attempt to make their way through a simulated corridor and experience firsthand how human disturbance disturbs the natural movement of animals and why conserving open space is important for their survival.

b. Animal Tracks & Signs

Animals are all around us, even though we may not see them every day. Learning how to recognize the clues and signs they leave behind can provide citizen scientists with useful information on biodiversity and allow them to document patterns in animal movement. Using track replicas and field guides, students will learn how to identify tracks and scat of some of the common animals found within the watershed.

c. Tracking Surveys

Once the new Citizen Scientists are trained in identifying birds, they will head out on the trails to practice their identification skills. Following protocols developed by the San Diego Tracking Team (SDTT), they will conduct their very own Citizen Science survey and collect data to determine which species are found on site and how they are moving through the surrounding habitat.

OPTION: “[Habitat Bingo](#)” may be used as an alternative activity for younger students. In this activity, students are given Bingo cards filled with various native



animals and habitats. Students are led on a hike and work together to locate and identify tracks and sign of the animals shown on their cards.

3. Birding Hike (1 hour)

a. Bird Roles

Birds are an important group of wildlife at Lake Hodges- so much so they are often referred to as “indicator species.” Indicator species are animals that signal the health, or lack of health, of the environment they’re living in. Scientists monitor indicator species, like birds, to make sure the surrounding wildlife, plants, and water quality is healthy.

When bird populations begin to decrease, or show signs of distress, scientists know to look for potential pollutants or other stressors in the nearby habitat. Let’s look at the area surrounding Lake Hodges.

Students will discuss the importance of birds in the natural world, how they contribute to the ecosystem processes, and why we need to conserve them for the health of the watershed.

b. Bird Habitats

Students will be introduced to the concept of “endotherms” and learn how temperature affects birds. Using special equipment, students will compare surface temperatures (e.g., sun vs. shade, north slope vs. south, top of rocks vs. underneath, etc.), and discuss how sun intensity, wind speed and humidity differ between habitats and what our warm-blooded friends need to survive in the environment.

They will be asked to note anything that can potentially pollute the nearby water and habitat? (Did you notice homes, or think of lawn fertilizers, oil from cars on the road, pesticides from upstream, etc?)

c. Bird Hike and Search

While on the hike, students will be asked to take a minute and listen. Many birds, such as the California Quail and the Cactus Wren, have unique calls or songs that can help identify them. Students will also use their eyes (and with the help of binoculars) identify birds by their shape, size, and color.



They will be asked to note the date, the time of day, and the numbers of individuals they observe and identifying by shape and size, and even color and share their observations with their classmates.

The Cornell Lab Bird Academy developed the BirdSleuth Explorer Guidebook for K-12 (in English and Spanish) that can be used for this exercise:

English: [BirdSleuth Explorer Guidebook](#)

Spanish: [BirdSleuth Explorer Guidebook](#)

4. Water Quality Testing (30 minutes)

Students will learn about different factors that affect water quality and the health of our watershed. Working in small groups, students will collect and test water samples for dissolved oxygen, nitrates, phosphates, and pH and rank the water quality on site.

Pre- and Post-Field Trip Watershed Activities

Excellent pre-and post-field trip watershed activities were developed by the Nature Collective for its education program. These activities can be adapted for use in the Watershed Explorers Program and are found at:

<https://thenaturecollective.org/educational-programs-at-the-nature-collective/>

The Cornell Lab Bird Academy has several curricula that include many pre- and post-field trip watershed activities at: <https://www.birds.cornell.edu/k12/>



VOCABULARY

biodiversity: the number and variety of organisms (plants, animals and others) found within a specified geographic region.

crepuscular: occurring or active during the period immediately after dawn and immediately before dusk.

disturbance: temporary change in environmental conditions that causes a pronounced change in an ecosystem.

endotherm: an animal that is dependent on internal sources of body heat.

environment: all the living and nonliving things that surround and affect an organism.

fragmentation: the process or state of breaking or being broken into small or separate parts.

habitat: a specific type of environment inhabited by particular animal and/or plant species; a place where an animal or plant lives.

birding: the act of searching for and identifying birds.

organism: a living thing, such as an animal, plant, alga, bacterium, or fungus.

nocturnal: occurring or active at night.

protocol: detailed plan or specific methods for a scientific experiment.

reservoir: a place where something is collected and stored, in this case, water in an artificial lake.

species: a group of the same type of living organisms that can mate and produce (reproduce) other living organisms of the same kind.

transect: a straight or narrow section through a natural feature or across the earth's surface, along which observations are made, or measurements taken.

watershed: an area of land that drains rain falling onto it or water running through it into a common body of water, such as a creek or stream, which flows



into a larger body of water, such as a river, lake, or estuary, and eventually flows to the ocean.

wildlife corridor: an area of habitat connecting wildlife populations separated by human activities/disturbance or structures (such as roads, houses, etc.).



REFERENCES & SUGGESTED READINGS

General

San Dieguito River Valley Conservancy: <http://www.sdrvc.org>

San Dieguito Citizen Science Monitoring Program:
<https://sdrvc.org/what-we-do/citizen-science/>

San Dieguito River Park: <http://www.sdrp.org>

San Dieguito Watershed

The San Dieguito River Watershed:

http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=36&Itemid=45

San Diego Coastkeeper. San Diego Watersheds. Interactive map of water quality along watersheds, including San Dieguito:

<http://www.sdcoastkeeper.org/learn/swimmable/san-diego-water-quality.html>

Animal Tracking

[Elbroch, Mark, Michael Kresky & Jonah Evans \(2012\). Field Guide to Animal Tracks and Scat of California. California Natural History Guides. University of California Press, Berkeley-Los Angeles-London.](#)

San Diego Tracking Team website: <http://www.sdt.org> Get Tracking! Wildlife Tracking Basics:

<https://www.wildernesscollege.com/tracking-animals-2.html>

Nature Tracking – Guides to Animal Tracks and Signs:

<http://www.naturetracking.com>

Birds

What is an ornithologist?

<https://www.environmentalscience.org/career/ornithologist>

Bird Atlas of San Diego County: <https://www.sdnhm.org/science/birds-and-mammals/projects/san-diego-county-bird-atlas/>

Palomar Audubon Society: <http://palomaraudubon.org/>



San Diego Audubon Society: <https://www.sandiegoaudubon.org/>

Cornell Lab: Bird Academy: <https://academy.allaboutbirds.org/>

Water Quality Monitoring

U.S. Environmental Protection Agency (EPA). How's My Waterway? (Searchable by location): <https://www.epa.gov/waterdata/how-s-my-waterway> .

Water quality indicators: Biological, chemical, and physical parameters.

Adapted from Healthy Water, Healthy People: Water Quality Educators Guide (www.projectwet.org). Available at:

https://riverexchange.files.wordpress.com/2015/09/water_quality_indicators_final.pdf



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<https://thenaturecollective.org/educational-programs-at-the-nature-collective/>

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