

# WAVES, WETLANDS, AND WATERSHEDS

## California Coastal Commission Science Activity Guide



C A L I F O R N I A  
**C O A S T A L**  
C O M M I S S I O N

**Curriculum Developer**

Julia Copple Davenport

**Editors**

Annie Kohut Frankel

Christiane M.R. Parry

**Artwork**

Mary Sievert



*Waves, Wetlands, and Watersheds* is a classroom based hands-on activity guide that integrates California Coastal Commission areas of critical concern (wetlands, coastal processes, marine debris and pollution, and endangered species) with California Science Content Standards for grades three through eight. Also included are community action activities for all ages and grades.

The California Coastal Commission was established by voter initiative in 1972 and made permanent by the Legislature in 1976 with the passage of the California Coastal Act. Its mission is to protect and enhance the resources of the California coast and ocean for current and future generations. In addition to planning and regulatory functions, the Commission carries out a public education program that includes the annual California Coastal Cleanup Day; the Adopt-A-Beach Program; the Boating Clean and Green Campaign; the Waves, Wetlands, and Watersheds school program; and the Whale Tail License Plate Program. The Commission's Whale Tail License Plate gives drivers a way to support California's coast and ocean. Proceeds fund the Commission's public education programs, as well as the Whale Tail Grants Program, which supports marine education at the local level.

For more information, or to order copies of this activity guide, contact the California Coastal Commission: 45 Fremont Street, Suite 2000, San Francisco, CA, 94105, (415)904-5200, [coast4u@coastal.ca.gov](mailto:coast4u@coastal.ca.gov), or [www.coastforyou.org](http://www.coastforyou.org)

©2003, ©2007 The California Coastal Commission. Student pages may be reproduced without permission.

*Waves, Wetlands, and Watersheds* is printed on 100% post-consumer recycled paper with soy based ink.

# Contents

<b>Advisors and Acknowledgements</b> .....	<i>iv</i>
<b>Foreword</b> .....	<i>v</i>
<b>Introduction</b> .....	<b>1</b>
<b>How to Use this Book</b> .....	<b>3</b>
<b>Some Like it Wet (Grade 3)</b> .....	<b>5</b>
3.1 Wetlands at Work .....	7
3.2 Marsh Munchers .....	14
3.3 The Perfect Beak .....	21
<b>Moving Mountains, Shifting Sands (Grade 4)</b> .....	<b>27</b>
4.1 Moving Mountains to the Sea .....	29
4.2 No Ordinary Sandy Beach .....	35
4.3 Beach in a Pan .....	40
<b>Water, Water Everywhere (Grade 5)</b> .....	<b>43</b>
5.1 A Drop in the Bucket .....	45
5.2 Alice in Waterland .....	49
5.3 Branching Out.....	56
<b>Powerful Forces Shape Our Coast (Grade 6)</b> .....	<b>61</b>
6.1 Beaches: Here Today, Gone Tomorrow? .....	63
6.2 Shifting Sands .....	69
6.3 Rollin' Down the Sand Highway .....	74
<b>Alert! Species in Danger (Grade 7)</b> .....	<b>81</b>
7.1 What's So Special About Native Species? .....	83
7.2 Adapted for Survival? .....	90
7.3 Survivor: California .....	97
<b>That Sinking Feeling (Grade 8)</b> .....	<b>103</b>
8.1 Keep Your Head Above Water.....	105
8.2 You Are What You Eat: Plastics and Marine Life .....	110
8.3 The Edge of the Wedge .....	117
<b>Community Action Activities (all grades)</b> .....	<b>121</b>
CA1 Marine Debris: It's Everywhere! .....	123
CA2 Searching Out Nonpoint Sources of Pollution .....	126
CA3 Clean Shorelines, Clean Oceans: Shoreline Cleanup.....	131
CA4 Preventing Pollution at the Source .....	138
<b>Appendices</b> .....	<b>141</b>
Environmental Organizations and Programs .....	142
Wetlands of California .....	146
Overfishing: There's a Limit to Fish in the Sea .....	148
Make Your Views Known .....	149

# Advisors

## California Coastal Commission

John Dixon  
Lesley Ewing  
Kristina Finstad  
Annie Kohut Frankel  
Miriam Gordon  
Susan M. Hansch  
Mark Johnsson  
Vivian Matuk  
Laurinda Owens  
Christiane M.R. Parry  
Eben Schwartz  
Janna Shackeroff

## Teachers

Brita Bautin, Matthew Turner Elementary School  
Brenda B. Cetrulo, Science Explorers Academy  
Trish Hildinger, Green Acres Elementary School  
Kevin Keedy, Seymour Marine Discovery Center,  
Long Marine Laboratory,  
University of California, Santa Cruz  
Ray Millette, Palisades Charter High School  
Liz Vallance, Natural Bridges Elementary School

## Science Education Professionals

Rita Bell, Monterey Bay Aquarium  
Valerie Chase, National Aquarium at Baltimore  
Amy Findlay, South Coast Watershed Resource Center  
Shirely Watt Ireton, Science Education Consultant  
Liz Love, Monterey Bay National Marine Sanctuary  
Nicki Norman, Community Resources for Science  
Lyndell N. Whitley, UC Sea Grant

## Scientists and Technical Advisors

Mark Carr, University of California, Santa Cruz  
Peter Fuller, San Francisco Bay Bar Association  
Gary Griggs, University of California, Santa Cruz  
Isabelle Kay, University of California, San Diego  
Dan Reed, University of California, Santa Barbara  
Seba Sheavly, The Ocean Conservancy  
Kerstin Wasson, Elkhorn Slough National Marine Estuary

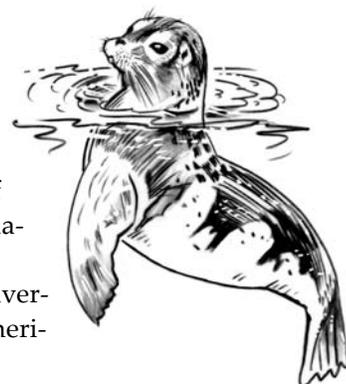
## Photograph Credits

California Coastal Commission (pages 121, 122)  
Gary Griggs (pages 27, 29, 67, 69, 71, 77)  
Mark Johnsson (pages 61, 63)  
Monterey Bay National Marine Sanctuary (page 128)  
Linda Morrow (heron on page 5)  
William Reagan (page 126)  
Lynda Roeller (wetland on page 5)  
John Wall (page 6)

# Acknowledgements

Thank you to the Monterey Bay Sanctuary Foundation for serving as a fiscal agent for this project.

Many thanks to the following organizations that granted permission for use of their activities for adaptation in *Waves, Wetlands, and Watersheds*: Algalita Marine Research Foundation; California Aquatic Science Education Consortium (CASEC); Consortium for Oceanographic Activities for Students and Teachers (COAST); Environmental Concern Inc.; FOR SEA Institute of Marine Science; Lawrence Hall of Science, Marine Activities, Resources & Education (MARE); Massachusetts Executive Office of Environmental Affairs, Massachusetts Bays Program; Monterey Bay Aquarium Foundation; National Aquarium in Baltimore; Project WET International Foundation; Project WILD/Council for Environmental Education; Project WILD Aquatic; Save The Bay; University of Massachusetts Extension; The McGraw-Hill Companies; The Maury Project/American Meteorological Society; The Ocean Conservancy.



# Foreword

The citizens of California established the California Coastal Commission through a voter initiative in 1972. They recognized that the coast is a great treasure and should be preserved for us all. This belief remains a core value in our state and the Commission continues to work to maintain accessible, healthy beaches, and clean, productive ocean waters.

Increasing the public's knowledge and understanding of coastal and marine resources is an important aspect of this work. The more that people know about the coast and ocean, the better able they are to care for these ecosystems. When we introduce our young people to the ocean and its beaches, we shape tomorrow's coastal stewards.

The ocean provides us with food, helps create our weather and climate, shapes our land, and serves to connect us to distant nations and peoples. It is a place of refuge, contemplation, and inspiration. For all these reasons and more, it is important for California's children to understand and respect this powerful force. This science activity guide furthers that goal.

As we learn the value of the ocean, it becomes clear that its health is dependent upon the health of the land that borders it. California's watersheds, rivers, and wetlands all affect the coastal environment with its many plant and animal species, and in turn affect the ocean itself. Even inland communities have a responsibility for and a stake in the health of the ocean. It is my hope that all citizens of our state will learn to understand and appreciate this fascinating resource and join in efforts to protect, preserve, and restore California's coast and ocean for many generations to come.



Mike Reilly  
Chair, California Coastal Commission, 2003

