National Marine Sanctuaries
National Oceanic and Atmospheric Administration

NATIONAL MARINE SANCTUARIES

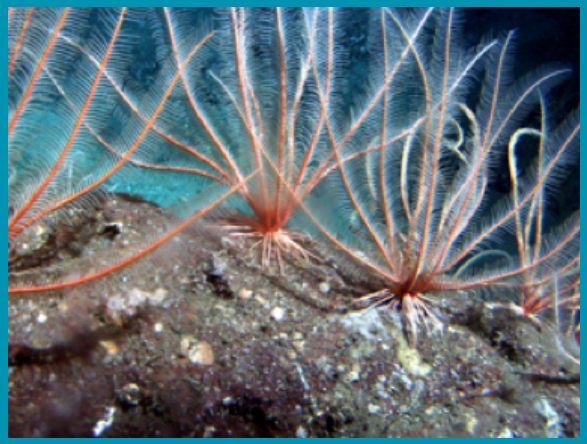
NATIONAL MARINE SANCTUARIES

NOAA Educational Resources

Claire Fackler, National Education Liaison

Our National Marine Sanctuaries

California Sanctuaries



Place-Based Locations

- 3 NERRS
- 4 National Marine Sanctuaries
- COSEE Facilities

EDUCATION
NATIONAL MARINE SANCTUARIES
National Marine Sanctuaries are Living Classrooms where People can See, Touch, and Learn about the Nation's Great Lakes and Ocean Environments.
NOAA

Ocean Literacy

Bring the ocean and watershed into your classroom

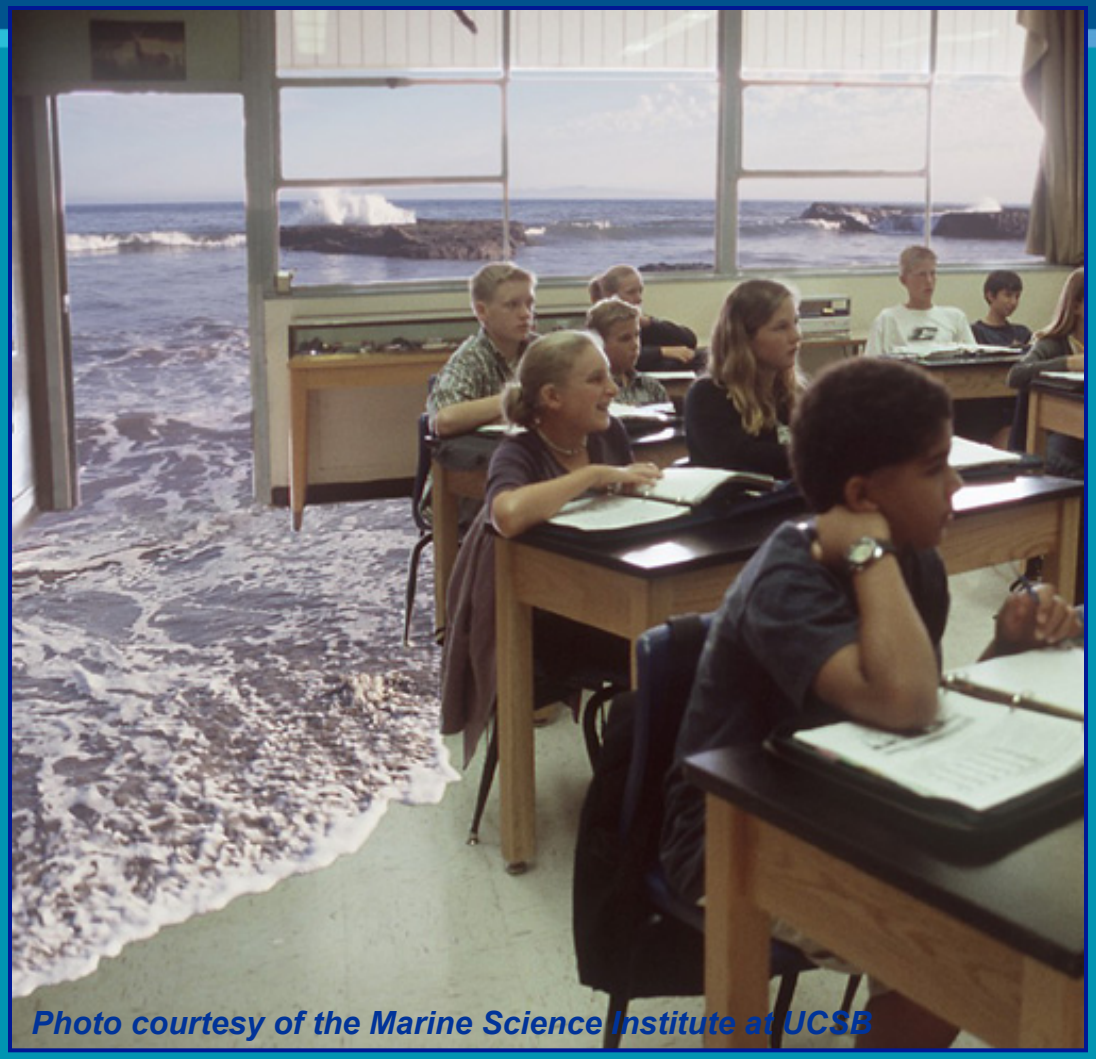
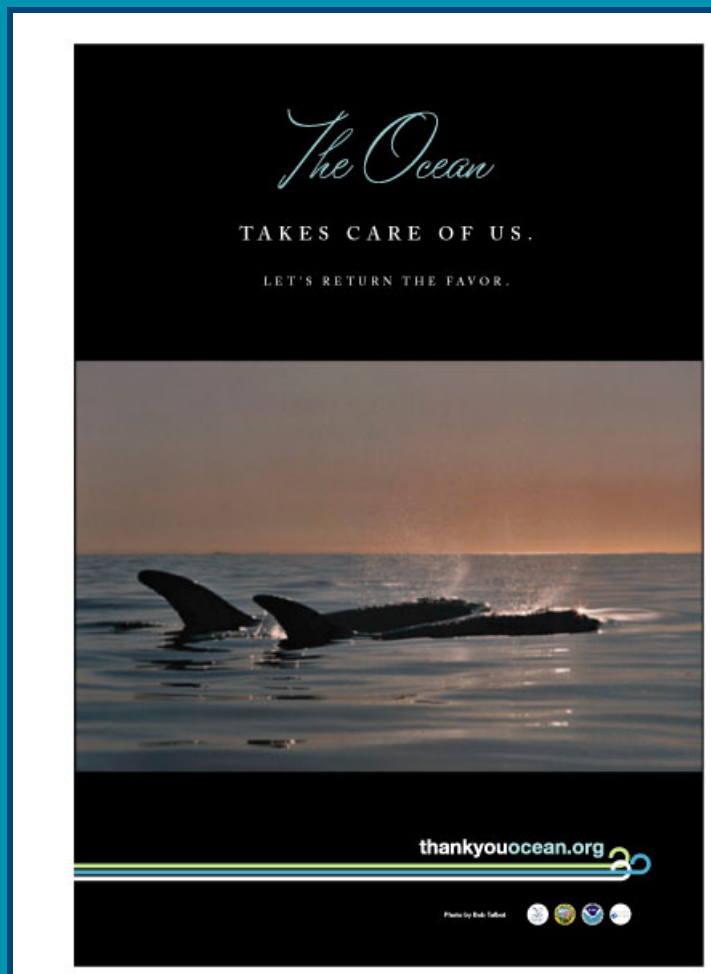


Photo courtesy of the Marine Science Institute at UCSB

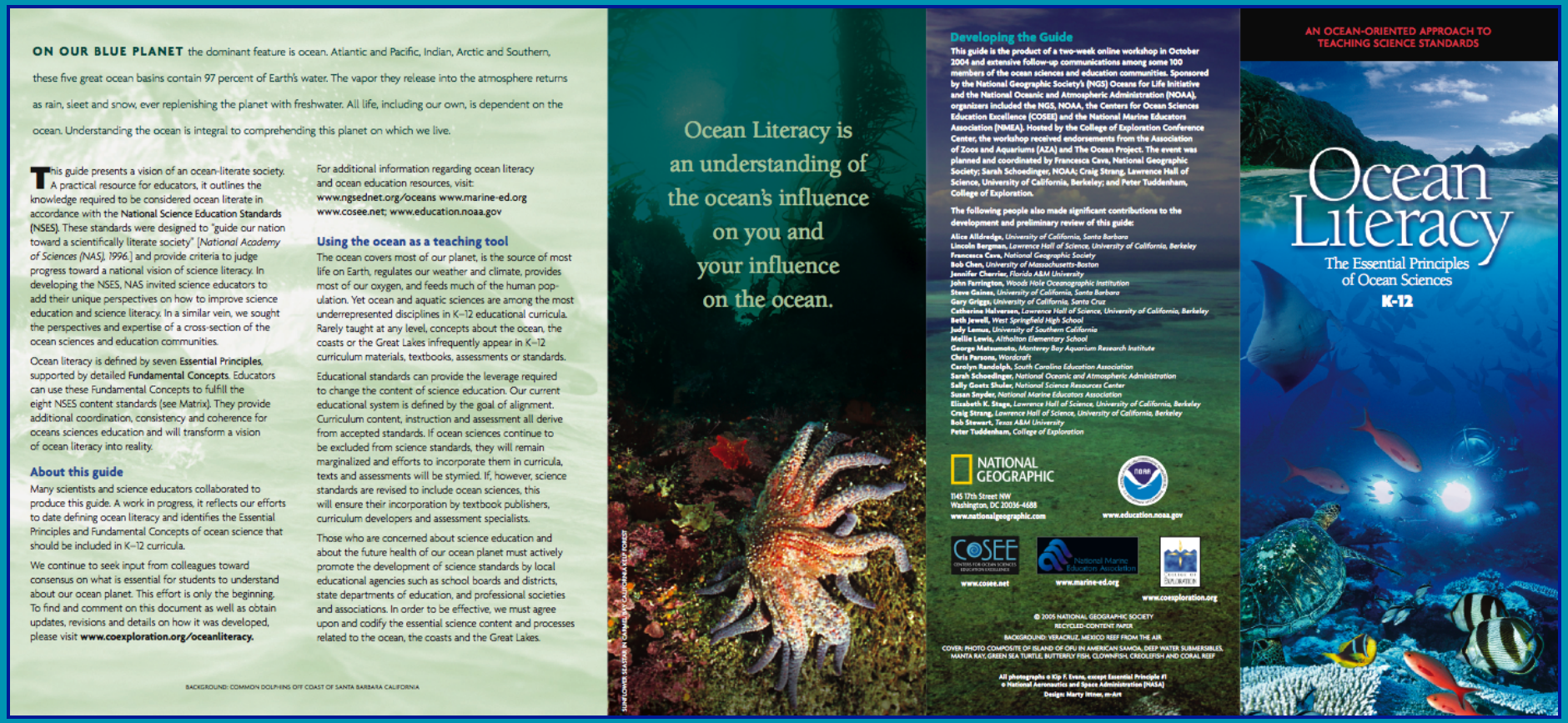
Thank You Ocean

The ocean takes care of us. Let's return the favor.

http://thankyouocean.org



Ocean Literacy



ON OUR BLUE PLANET the dominant feature is ocean. Atlantic and Pacific, Indian, Arctic and Southern, these five great ocean basins contain 97 percent of Earth's water. The vapor they release into the atmosphere returns as rain, sleet and snow, ever replenishing the planet with freshwater. All life, including our own, is dependent on the ocean. Understanding the ocean is integral to comprehending this planet on which we live.

This guide presents a vision of an ocean-literate society. A practical resource for educators, it outlines the knowledge required to be considered ocean literate in accordance with the National Science Education Standards (NSES). These standards were designed to "guide our nation toward a scientifically literate society" [*National Academy of Sciences (NAS), 1996.*] and provide criteria to judge progress toward a national vision of science literacy. In developing the NSES, NAS invited science educators to add their unique perspectives on how to improve science education and science literacy. In a similar vein, we sought the perspectives and expertise of a cross-section of the ocean sciences and education communities.

Ocean literacy is defined by seven **Essential Principles**, supported by detailed **Fundamental Concepts**. Educators can use these Fundamental Concepts to fulfill the eight NSES content standards (see Matrix). They provide additional coordination, consistency and coherence for oceans sciences education and will transform a vision of ocean literacy into reality.

About this guide

Many scientists and science educators collaborated to produce this guide. A work in progress, it reflects our efforts to date defining ocean literacy and identifies the Essential Principles and Fundamental Concepts of ocean science that should be included in K–12 curricula.

We continue to seek input from colleagues toward consensus on what is essential for students to understand about our ocean planet. This effort is only the beginning. To find and comment on this document as well as obtain updates, revisions and details on how it was developed, please visit **www.coexploration.org/oceanliteracy.**

For additional information regarding ocean literacy and ocean education resources, visit:
www.ngsednet.org/oceans www.marine-ed.org
www.cosee.net; www.education.noaa.gov

Using the ocean as a teaching tool

The ocean covers most of our planet, is the source of most life on Earth, regulates our weather and climate, provides most of our oxygen, and feeds much of the human population. Yet ocean and aquatic sciences are among the most underrepresented disciplines in K–12 educational curricula. Rarely taught at any level, concepts about the ocean, the coasts or the Great Lakes infrequently appear in K–12 curriculum materials, textbooks, assessments or standards.

Educational standards can provide the leverage required to change the content of science education. Our current educational system is defined by the goal of alignment. Curriculum content, instruction and assessment all derive from accepted standards. If ocean sciences continue to be excluded from science standards, they will remain marginalized and efforts to incorporate them in curricula, texts and assessments will be stymied. If, however, science standards are revised to include ocean sciences, this will ensure their incorporation by textbook publishers, curriculum developers and assessment specialists.

Those who are concerned about science education and about the future health of our ocean planet must actively promote the development of science standards by local educational agencies such as school boards and districts, state departments of education, and professional societies and associations. In order to be effective, we must agree upon and codify the essential science content and processes related to the ocean, the coasts and the Great Lakes.

BACKGROUND: COMMON DOLPHINS OFF COAST OF SANTA BARBARA CALIFORNIA

Ocean Literacy is an understanding of the ocean's influence on you and your influence on the ocean.

SUNFLOWER SEASTAR IN GIANT KELP, CALIFORNIA KELP FOREST

Developing the Guide

This guide is the product of a two-week online workshop in October 2004 and extensive follow-up communications among some 100 members of the ocean sciences and education communities. Sponsored by the National Geographic Society's (NGS) Oceans for Life Initiative and the National Oceanic and Atmospheric Administration (NOAA), organizers included the NGS, NOAA, the Centers for Ocean Sciences Education Excellence (COSEE) and the National Marine Educators Association (NMEA). Hosted by the College of Exploration Conference Center, the workshop received endorsements from the Association of Zoos and Aquariums (AZA) and The Ocean Project. The event was planned and coordinated by Francesca Cava, National Geographic Society; Sarah Schoedinger, NOAA; Craig Strang, Lawrence Hall of Science, University of California, Berkeley; and Peter Tuddenham, College of Exploration.

The following people also made significant contributions to the development and preliminary review of this guide:

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1145 17th Street NW
Washington, DC 20036-4688
www.nationalgeographic.com

www.education.noaa.gov

COSEE
www.cosee.net

National Marine Educators Association
www.marine-ed.org

www.coexploration.org

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RECYCLED-CONTENT PAPER

BACKGROUND: VERACRUZ, MEXICO REEF FROM THE AIR

COVER: PHOTO COMPOSITE OF ISLAND OF OFU IN AMERICAN SAMOA, DEEP WATER SUBMERSIBLES, MANTA RAY, GREEN SEA TURTLE, BUTTERFLY FISH, CLOWNFISH, CREOLEFISH AND CORAL REEF

All photographs © Kip F. Evans, except Essential Principle #1
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Design: Marty Ittner, m-Art

AN OCEAN-ORIENTED APPROACH TO TEACHING SCIENCE STANDARDS

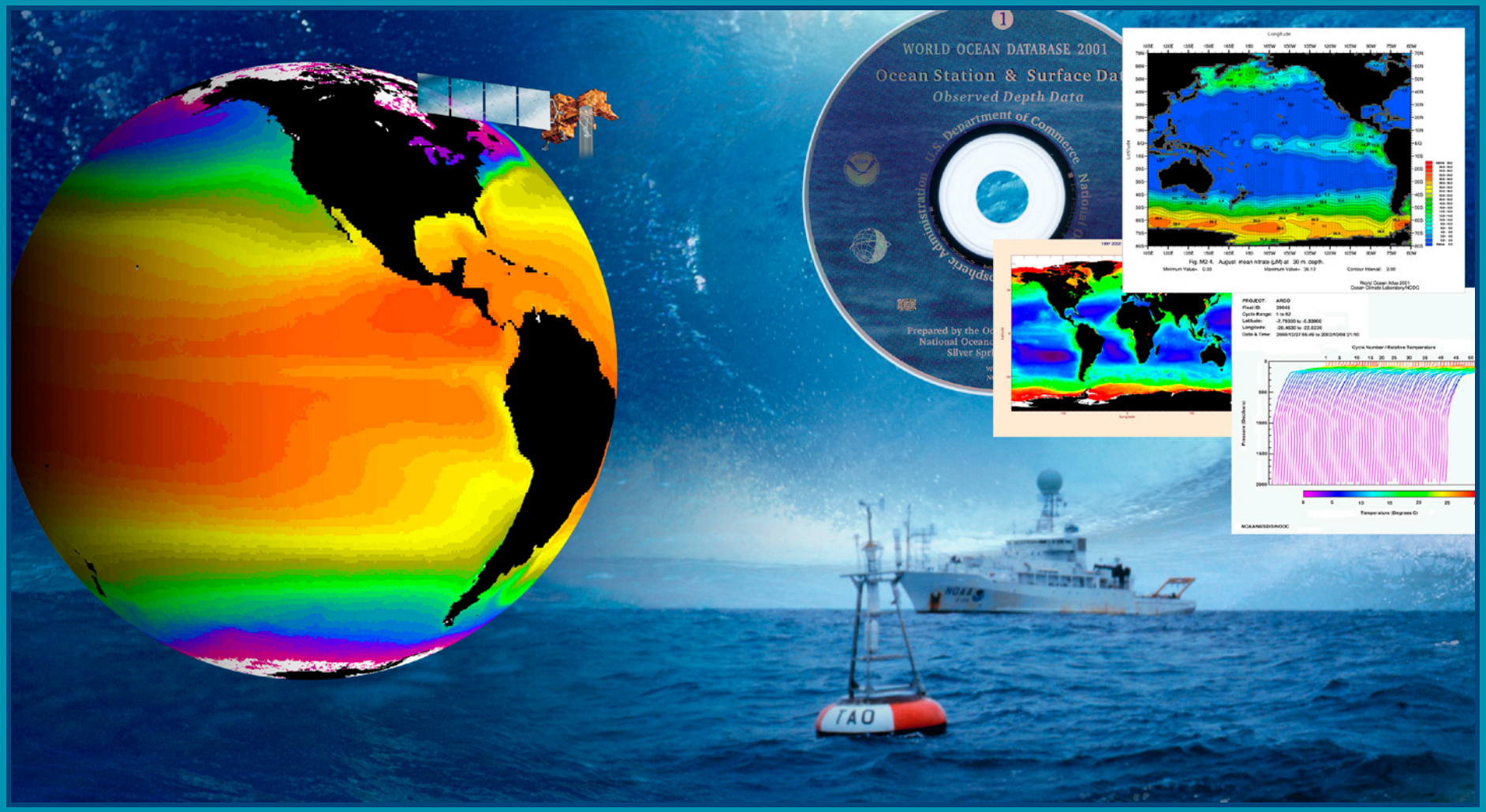
Ocean Literacy
The Essential Principles of Ocean Sciences
K-12

Climate Literacy

- Priority climate concepts
- Talking points
- Sanctuary-related case studies

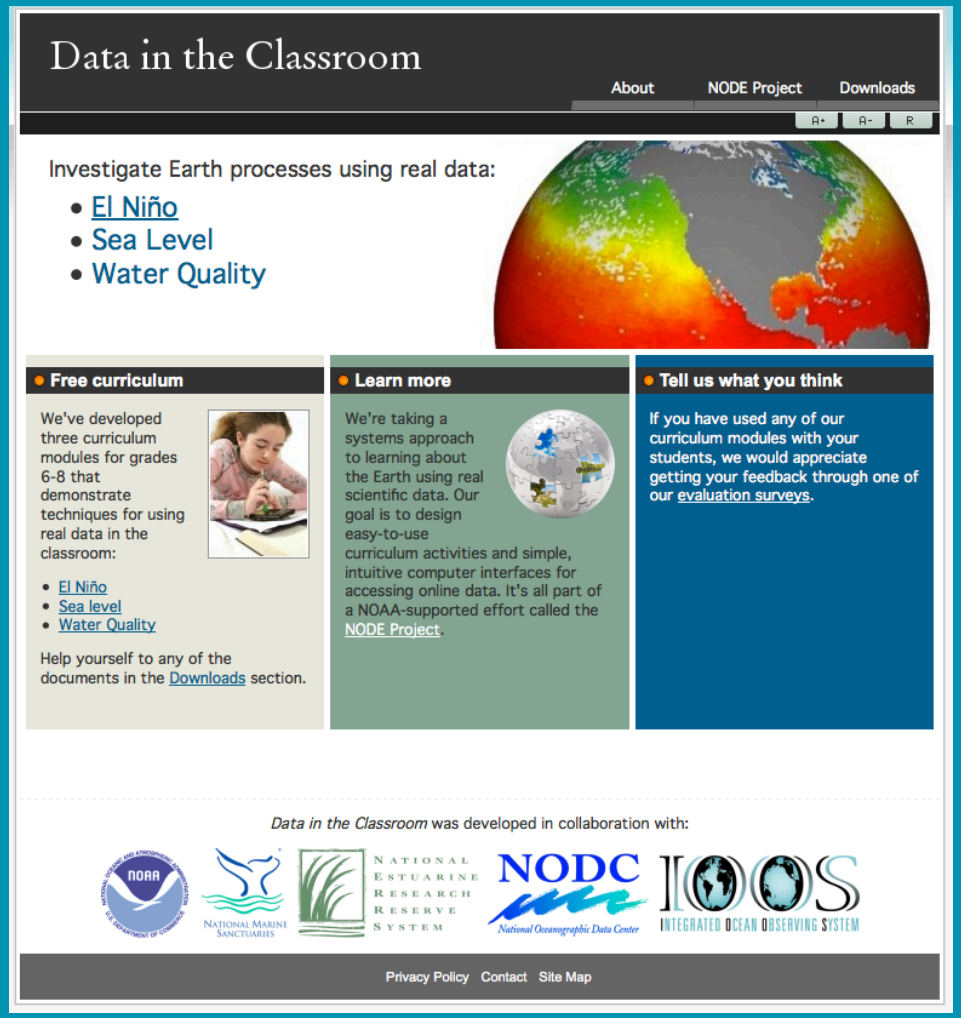
http://www.education.noaa.gov

NOAA Data


WORLD OCEAN DATABASE 2001
Observed Depth Data
U.S. Department of Commerce
TAO

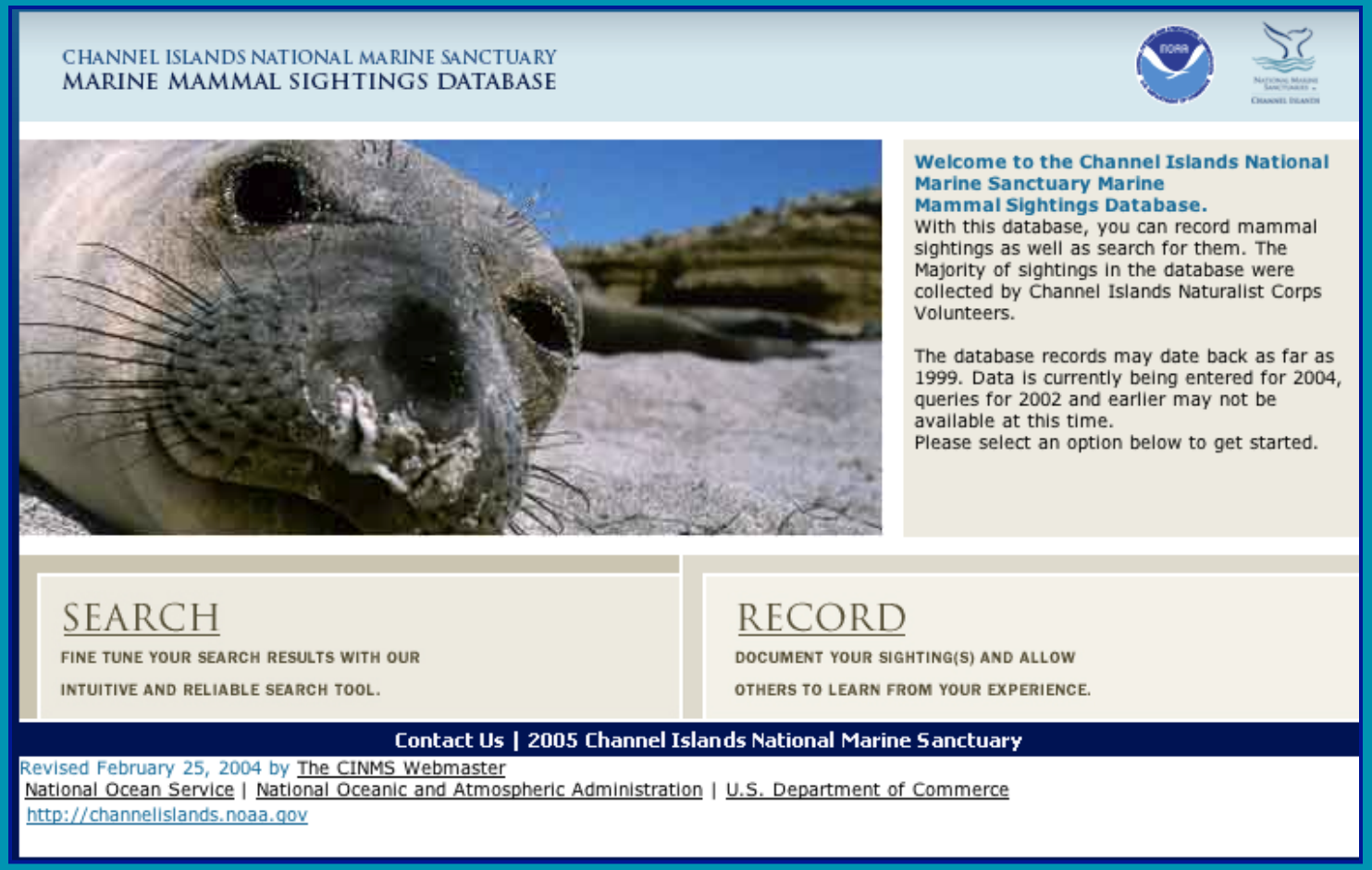
NOAA Ocean Data

NOAA Ocean Data Education (NODE) project



http://dataintheclassroom.org

Sightings Database



http://cisanctuary.org

Sightings Database

CHANNEL ISLANDS NATIONAL MARINE SANCTUARY
MARINE MAMMAL SIGHTINGS DATABASE

SEARCH | RECORD

Instructions: Use the form below to describe your search.

Whale: Gray
Dolphin:
Porpoise:
Sea Otter:
Pinniped:
Other:
Location: Lat Long
View Map
From Date: Jan / 1 / 2007
To Date: Mar / 30 / 2007
Time of Day: Any
Vessel: Any

SEARCH

Contact Us | 2007 Channel Islands National Marine Sanctuary

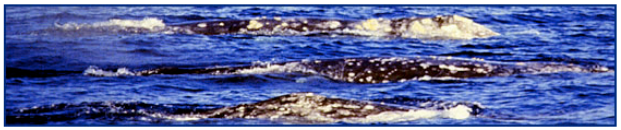
Revised January 1st, 2007 by The CINMS Webmaster
National Ocean Service | National Oceanic and Atmospheric Administration | U.S. Department of Commerce
http://channelislands.noaa.gov

CHANNEL ISLANDS NATIONAL MARINE SANCTUARY
MARINE MAMMAL SIGHTINGS DATABASE

SEARCH | RECORD

Search Summary:

Found 88 Whale



Animal:	Type:	Date:	Time:	Vessel:	Location:
Whale	Gray	01/03/2007	11:00 am	Other	34° 00.619 N 119° 29.462 W
Whale	Gray	01/20/2007	01:00 pm	R/V Shearwater	° 00 N ° 00 W
Whale	Gray	01/23/2007	02:00 pm	Vanguard	34° 06.242 N 119° 22.72 W
Whale	Gray	02/03/2007	03:45 pm	Other	34° 11.725 N 119° 30.866 W
Whale	Gray	01/23/2007	03:00 pm	Vanguard	347° 00 N 119° 21.1 W
Whale	Gray	01/07/2007	03:00 pm	Island Adventure	34° 02.161 N 119° 00 W
Whale	Gray	01/07/2007	11:00 am	Island Adventure	34° 03.626 N 119° 32.164 W
Whale	Gray	01/07/2007	11:15 am	Island Adventure	34° 03.405 N 119° 00 W
Whale	Gray	01/07/2007	11:15 am	Island Adventure	34° 03.405 N 119° 34.448 W
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Whale	Gray	01/11/2007	03:00 pm	Island Adventure	34° 03.205 N 119° 32.534 W
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Whale	Gray	01/14/2007	11:00 am	Island Adventure	33° 58.99 N 119° 28.63 W
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Whale	Gray	01/17/2007	03:45 pm	Island Adventure	33° 55.406 N 119° 31.086 W
Whale	Gray	01/18/2007	03:00 pm	Island Adventure	33° 59.18 N 119° 26.85 W
Whale	Gray	01/19/2007	11:00 am	Island Adventure	34° 01.957 N 119° 29.051 W
Whale	Gray	01/19/2007	02:30 pm	Island Adventure	340° 00 N 119° 31.05 W
Whale	Gray	01/06/2007	11:15 am	Vanguard	34° 00.614 N 119° 00 W
Whale	Gray	01/06/2007	02:45 pm	Vanguard	34° 00.742 N 119° 18.686 W
Whale	Gray	01/06/2007	03:30 pm	Vanguard	34° 57.241 N 119° 21.572 W
Whale	Gray	02/10/2007	10:15 am	Speed Twin	34° 00.771 N 119° 21.027 W
Whale	Gray	02/04/2007	11:00 am	Speed Twin	33° 59.358 N 119° 25.871 W
Whale	Gray	02/04/2007	11:00 am	Speed Twin	33.° 00 N 119° 25.871 W
Whale	Gray	02/01/2007	10:45 am	Speed Twin	33° 59.392 N 119° 23.861 W

1 . 2 . 3 . 4 . NEXT

ENTER NEW SEARCH | RETURN TO PREVIOUS SEARCH

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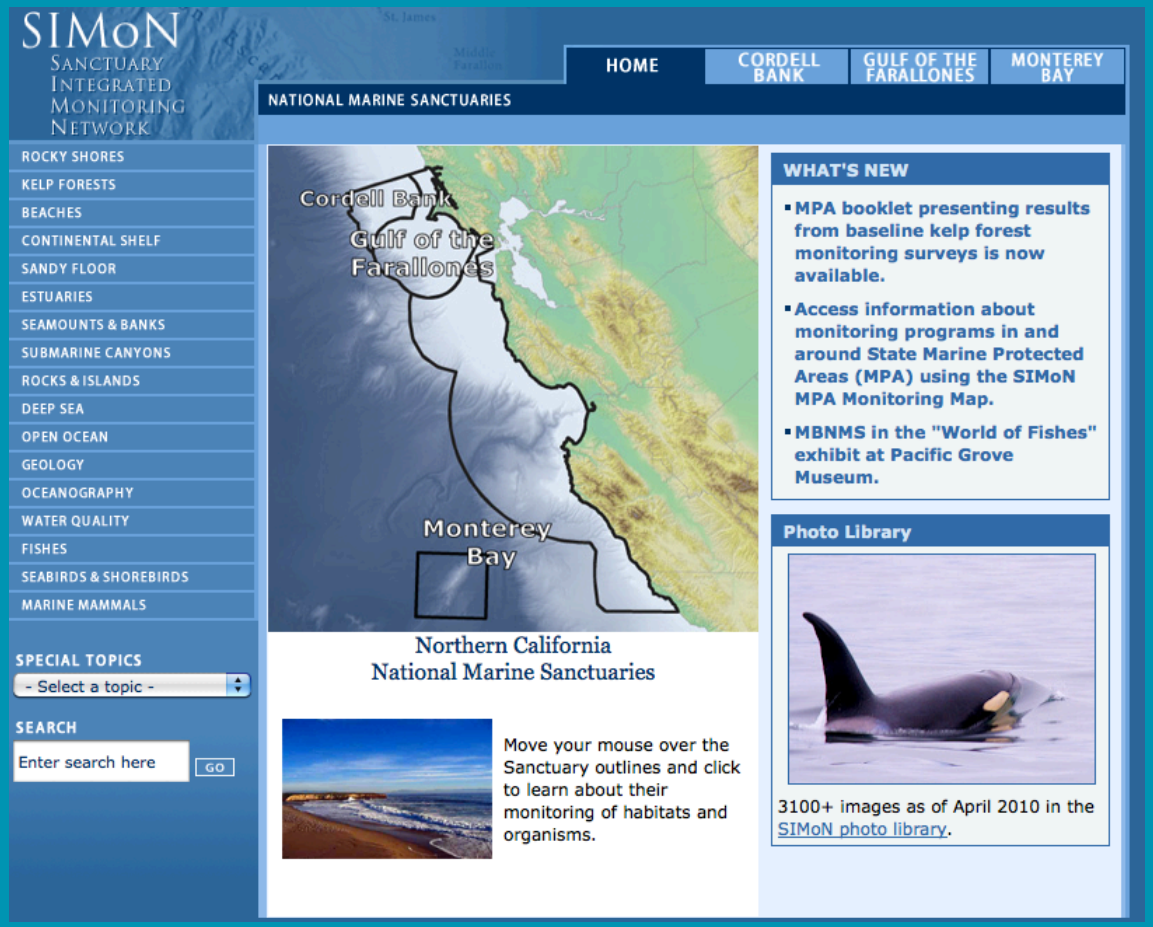
Revised November 19, 2003 by The CINMS Webmaster
National Ocean Service | National Oceanic and Atmospheric Administration | U.S. Department of Commerce

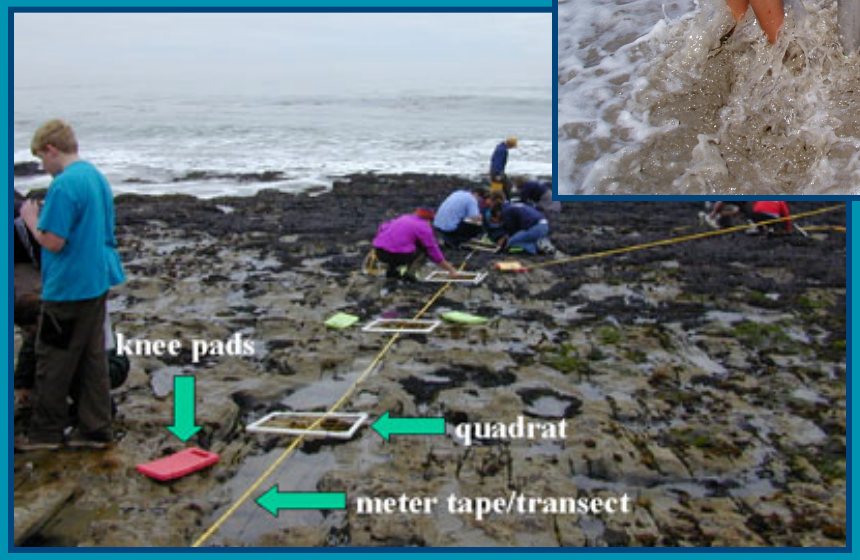
http://cisanctuary.org

Sanctuary SIMoN



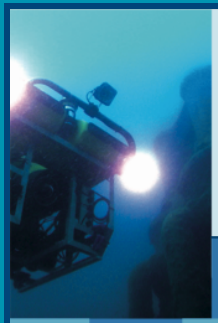
http://sanctuarysimon.org

LiMPETS



http://limpetsmonitoring.org

ROV Workshops



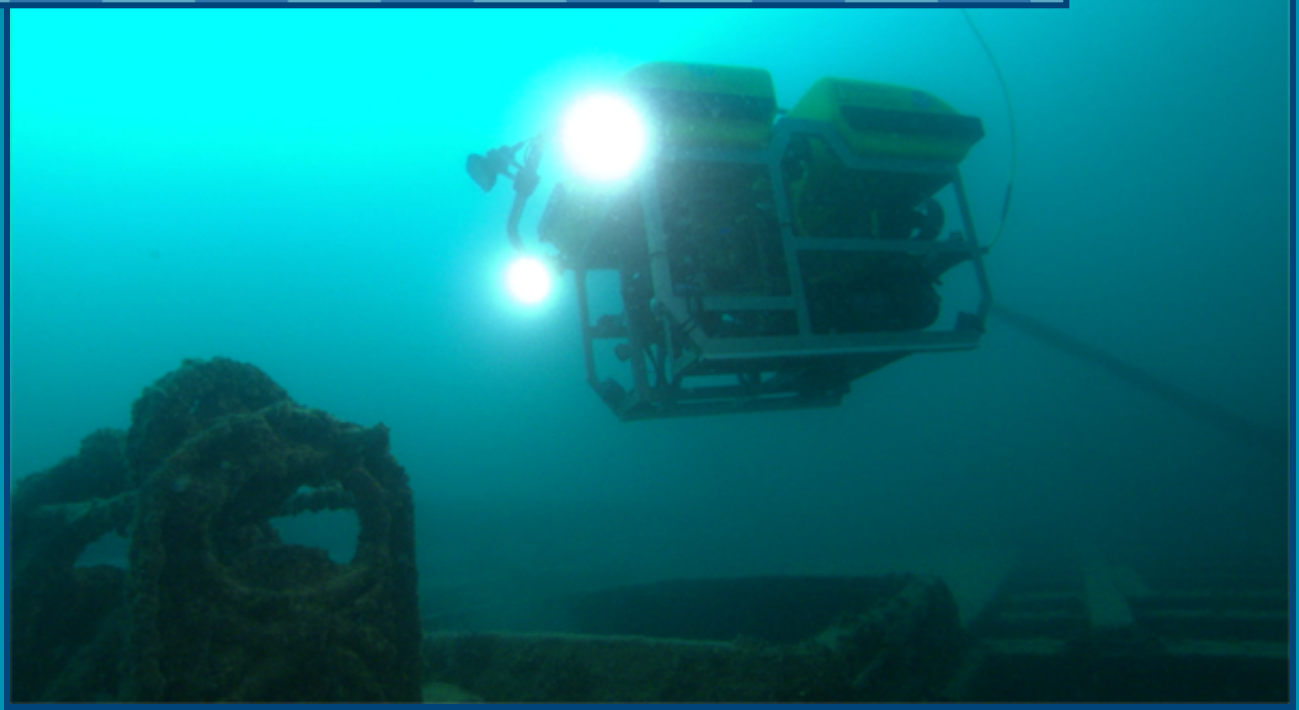
ROVs at work in National Marine Sanctuaries

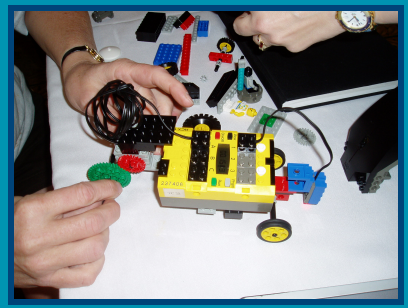
America's Underwater Treasures

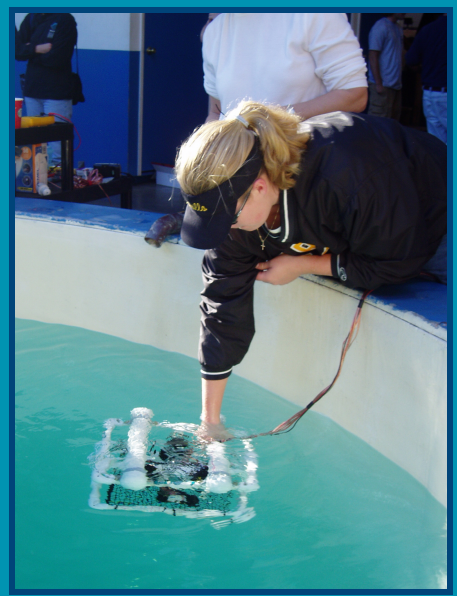
National Marine Sanctuaries

sanctuaries.noaa.gov

Tools for research, monitoring, exploration and education

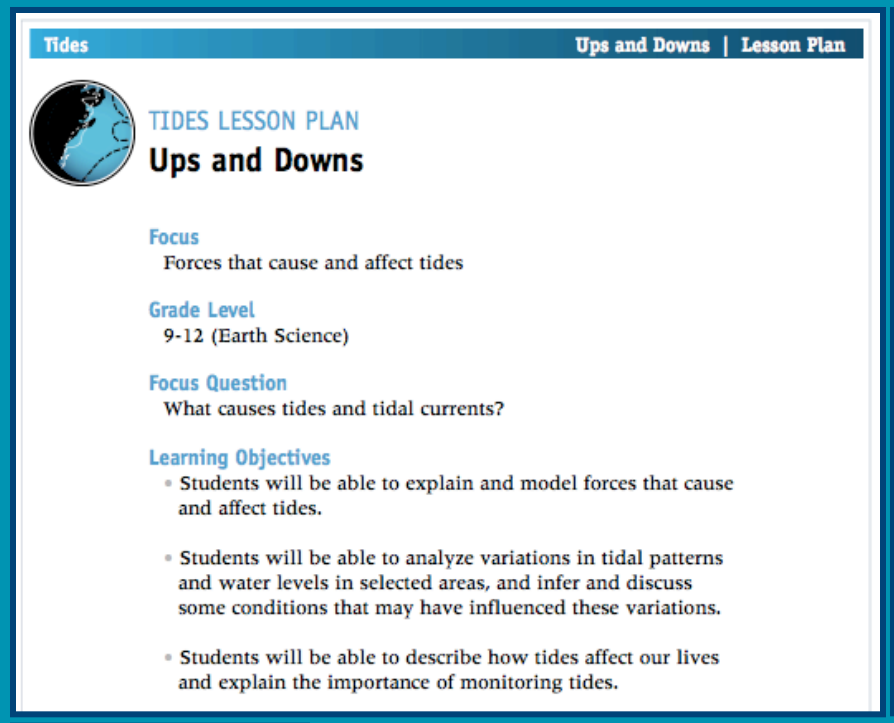






Lesson Plans

Lesson plans, curricular materials, etc.



Tides | Ups and Downs | Lesson Plan

TIDES LESSON PLAN

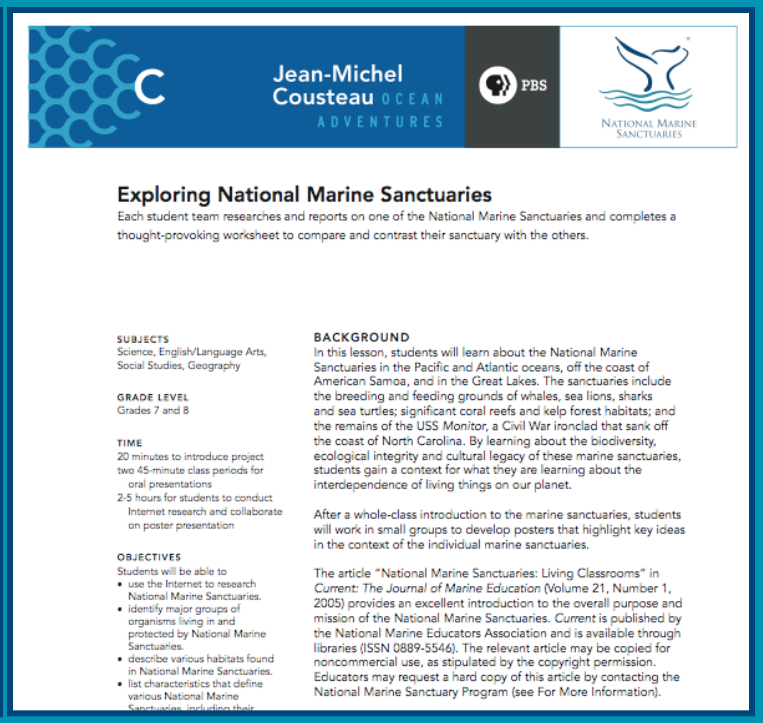
Ups and Downs

Focus
Forces that cause and affect tides

Grade Level
9-12 (Earth Science)

Focus Question
What causes tides and tidal currents?

Learning Objectives
- Students will be able to explain and model forces that cause and affect tides.
- Students will be able to analyze variations in tidal patterns and water levels in selected areas, and infer and discuss some conditions that may have influenced these variations.
- Students will be able to describe how tides affect our lives and explain the importance of monitoring tides.



Jean-Michel Cousteau OCEAN ADVENTURES | PBS | NATIONAL MARINE SANCTUARIES

Exploring National Marine Sanctuaries

Each student team researches and reports on one of the National Marine Sanctuaries and completes a thought-provoking worksheet to compare and contrast their sanctuary with the others.

SUBJECTS
Science, English/Language Arts, Social Studies, Geography

GRADE LEVEL
Grades 7 and 8

TIME
20 minutes to introduce project
two 45-minute class periods for oral presentations
2-5 hours for students to conduct Internet research and collaborate on poster presentation

OBJECTIVES
Students will be able to
- use the Internet to research National Marine Sanctuaries.
- identify major groups of organisms living in and protected by National Marine Sanctuaries.
- describe various habitats found in National Marine Sanctuaries.
- list characteristics that define various National Marine Sanctuaries, including their

BACKGROUND
In this lesson, students will learn about the National Marine Sanctuaries in the Pacific and Atlantic oceans, off the coast of American Samoa, and in the Great Lakes. The sanctuaries include the breeding and feeding grounds of whales, sea lions, sharks and sea turtles; significant coral reefs and kelp forest habitats; and the remains of the USS *Monitor*, a Civil War ironclad that sank off the coast of North Carolina. By learning about the biodiversity, ecological integrity and cultural legacy of these marine sanctuaries, students gain a context for what they are learning about the interdependence of living things on our planet.

After a whole-class introduction to the marine sanctuaries, students will work in small groups to develop posters that highlight key ideas in the context of the individual marine sanctuaries.

The article "National Marine Sanctuaries: Living Classrooms" in *Current: The Journal of Marine Education* (Volume 21, Number 1, 2005) provides an excellent introduction to the overall purpose and mission of the National Marine Sanctuaries. *Current* is published by the National Marine Educators Association and is available through libraries (ISSN 0889-5546). The relevant article may be copied for noncommercial use, as stipulated by the copyright permission. Educators may request a hard copy of this article by contacting the National Marine Sanctuary Program (see For More Information).

SCILINKS. Selected by Science Educators from NSTA

http://sanctuaries.noaa.gov/education

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NOS NOAA search

noaa ocean service education

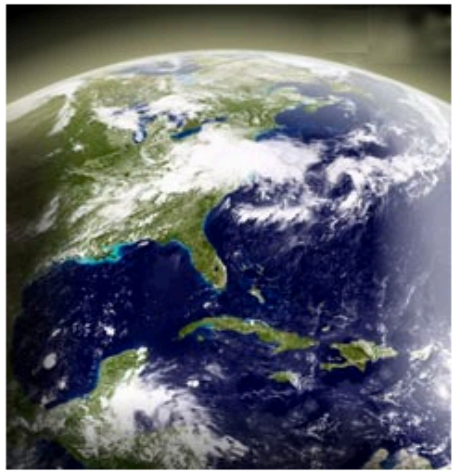
Edu Home | Students | Teachers | For Fun | NOS Home

Estuaries

Estuaries are bodies of water and their surrounding coastal habitats typically found where rivers meet the sea. Estuaries harbor unique plant and animal communities because their waters are brackish—a mixture of fresh water draining from the land and salty seawater.

Estuaries are some of the most productive ecosystems in the world. Many animal species rely on estuaries for food and as places to nest and breed. Humans communities also rely on estuaries for food, recreation, and jobs.

Of the 32 largest cities in the world, 22 are located on estuaries (Ross, 1995). Not surprisingly, human activities have led to a decline in the health of estuaries, making them one of the most threatened ecosystems on Earth. NOAA's National Estuarine Research Reserve System (NERRS), in partnership with coastal states, monitors the health of estuaries, educates the public about these ecosystems, and



Estuarine habitats are typically found where rivers meet the sea. **Mouse over** the image to see some of the estuarine areas highlighted in this tutorial. **Click on image** for more details and a larger image.

Roadmap to Resources

Tutorial PDF
(pdf, 12.9Mb)

Subject Review
(pdf, 240 Kb)

Podcast - Estuaries

Welcome

What is an Estuary?

Why Are Estuaries Important?

- Economy and Environment
- Ecosystem Services

Classifying Estuaries

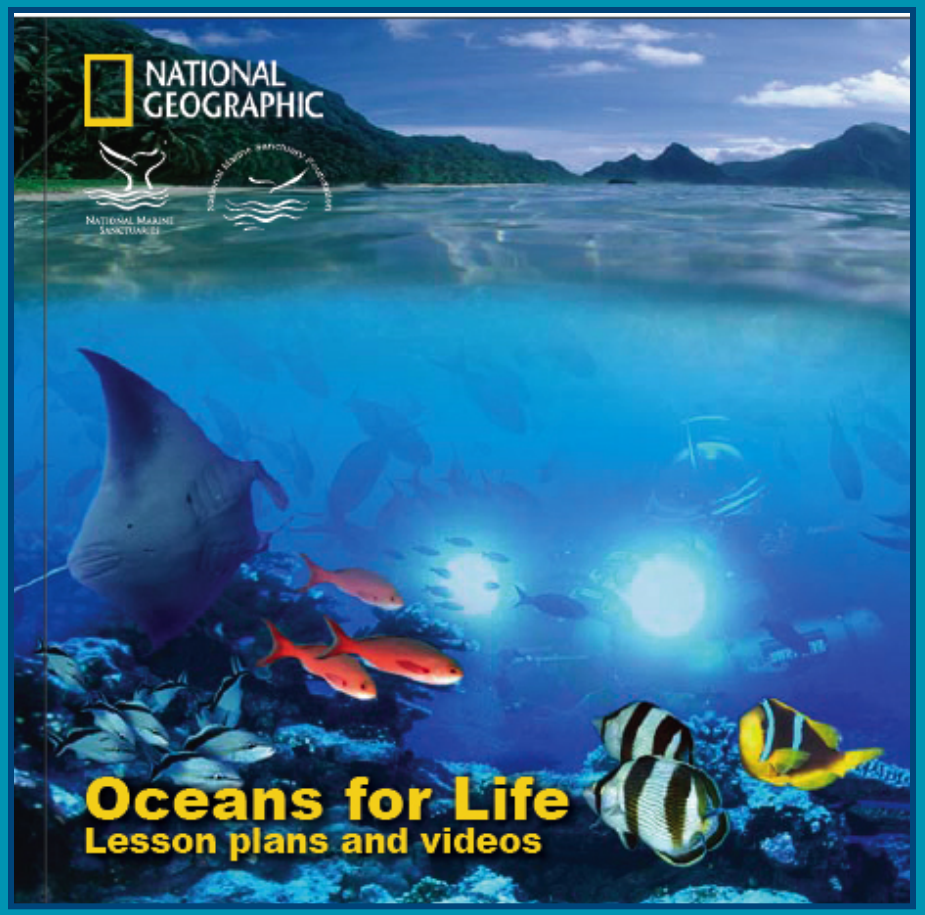
- Geology
- Water Circulation

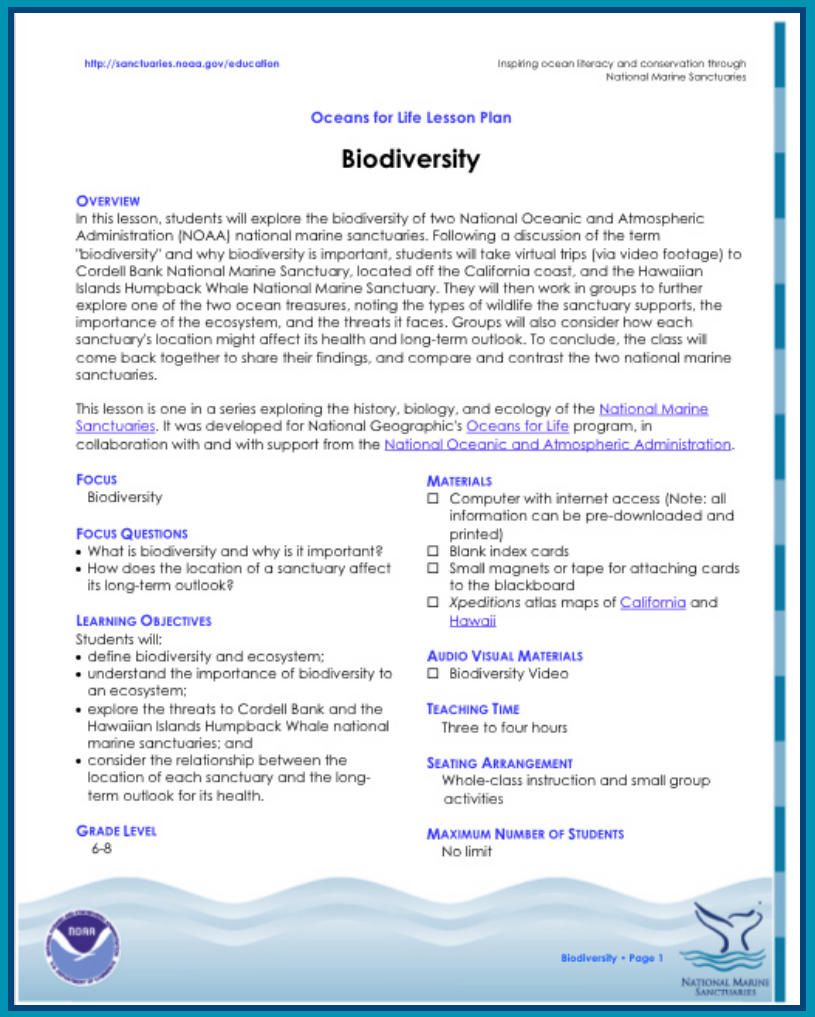
Estuarine Habitats

Adaptations to Life in the Estuary

http://oceanservice.noaa.gov/education

Oceans for Life





http://sanctuaries.noaa.gov/education

Inspiring ocean literacy and conservation through National Marine Sanctuaries

Oceans for Life Lesson Plan

Biodiversity

Overview

In this lesson, students will explore the biodiversity of two National Oceanic and Atmospheric Administration (NOAA) national marine sanctuaries. Following a discussion of the term "biodiversity" and why biodiversity is important, students will take virtual trips (via video footage) to Cordell Bank National Marine Sanctuary, located off the California coast, and the Hawaiian Islands Humpback Whale National Marine Sanctuary. They will then work in groups to further explore one of the two ocean treasures, noting the types of wildlife the sanctuary supports, the importance of the ecosystem, and the threats it faces. Groups will also consider how each sanctuary's location might affect its health and long-term outlook. To conclude, the class will come back together to share their findings, and compare and contrast the two national marine sanctuaries.

This lesson is one in a series exploring the history, biology, and ecology of the National Marine Sanctuaries. It was developed for National Geographic's Oceans for Life program, in collaboration with and with support from the National Oceanic and Atmospheric Administration.

Focus

Biodiversity

Focus Questions

- What is biodiversity and why is it important?
- How does the location of a sanctuary affect its long-term outlook?

Learning Objectives

Students will:

- define biodiversity and ecosystem;
- understand the importance of biodiversity to an ecosystem;
- explore the threats to Cordell Bank and the Hawaiian Islands Humpback Whale national marine sanctuaries; and
- consider the relationship between the location of each sanctuary and the long-term outlook for its health.

Grade Level

6-8

Materials

- ☐ Computer with internet access (Note: all information can be pre-downloaded and printed)
- ☐ Blank index cards
- ☐ Small magnets or tape for attaching cards to the blackboard
- ☐ *Xpeditions* atlas maps of California and Hawaii

Audio Visual Materials

- ☐ Biodiversity Video

Teaching Time

Three to four hours

Seating Arrangement

Whole-class instruction and small group activities

Maximum Number of Students

No limit

Biodiversity • Page 1

National Marine Sanctuaries

OCEANSLIVE
OceansLIVE.org
NATIONAL MARINE SANCTUARIES
NBC
Internet-2
School
Aquarium
Home
Bringing Our Ocean To Communities Nationwide.

http://estuaries.gov

Teacher at Sea

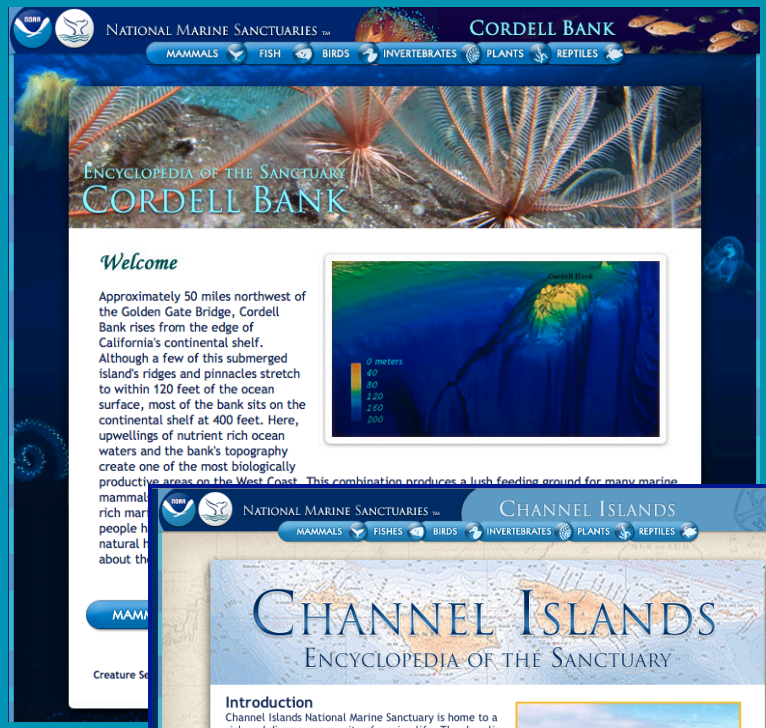
http://teacheratsea.noaa.gov

Ocean for Life

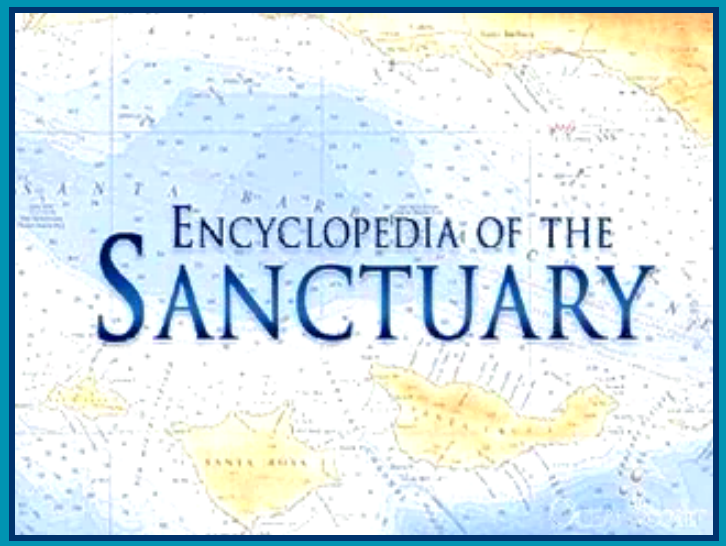
Enhancing cultural understanding through ocean science

http://sanctuaries.noaa.gov/education/ofl

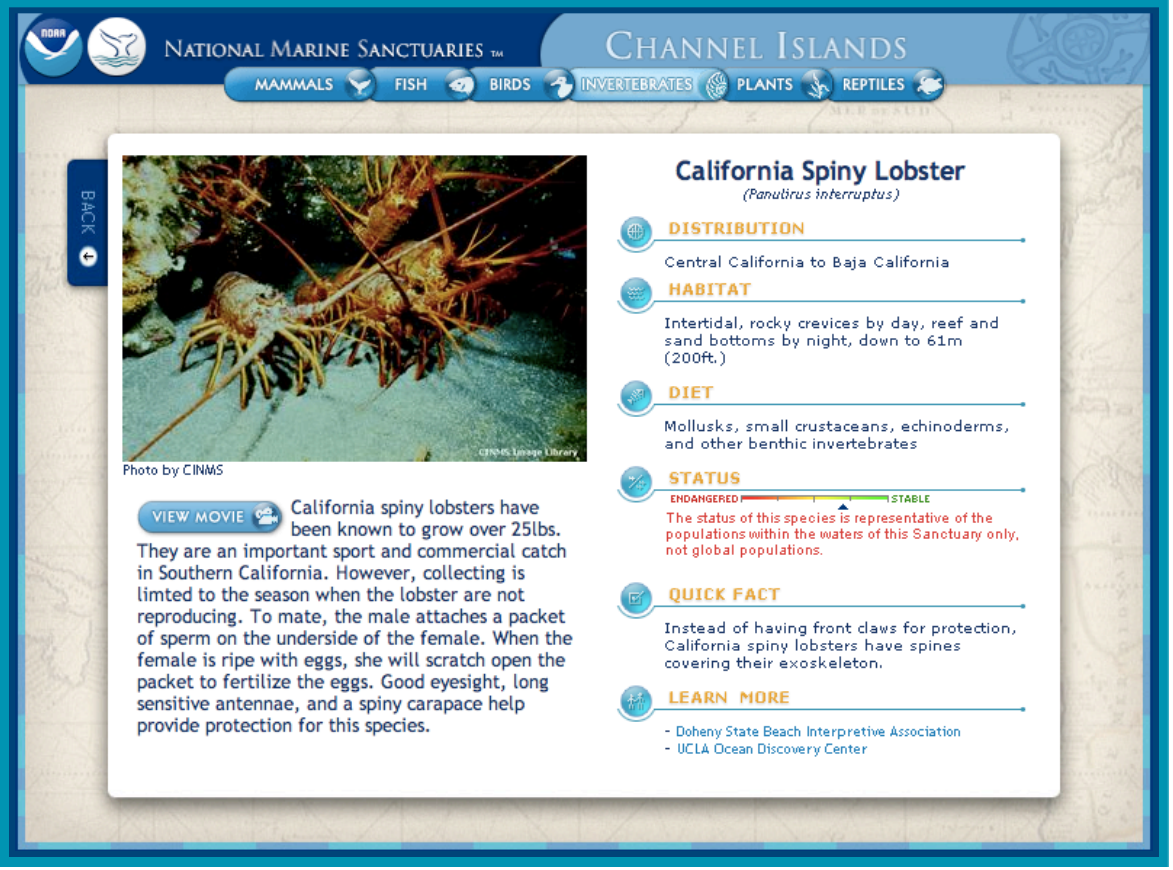
Online Encyclopedia



Online Encyclopedia



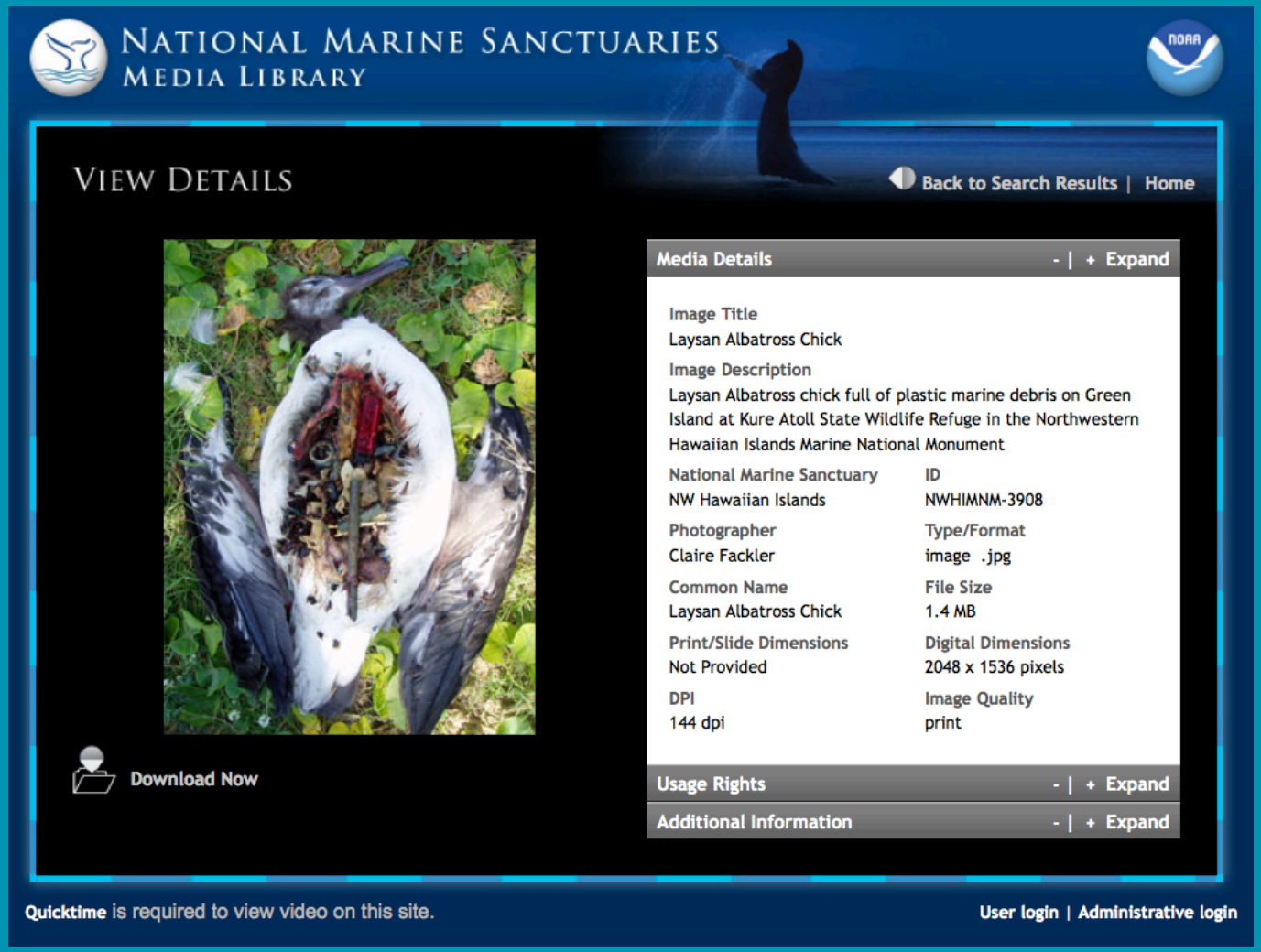
http://marinelife.noaa.gov



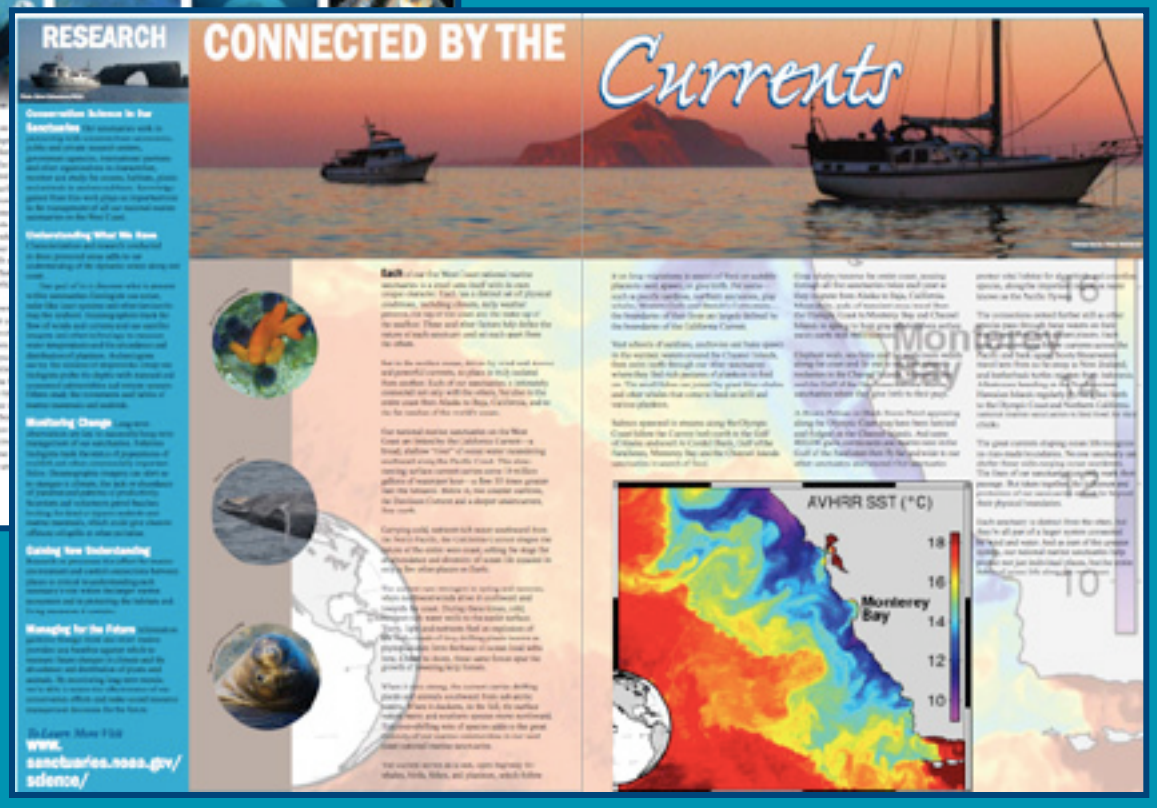
Media Library

http://marinelife.noaa.gov

Media Library



Outreach Products



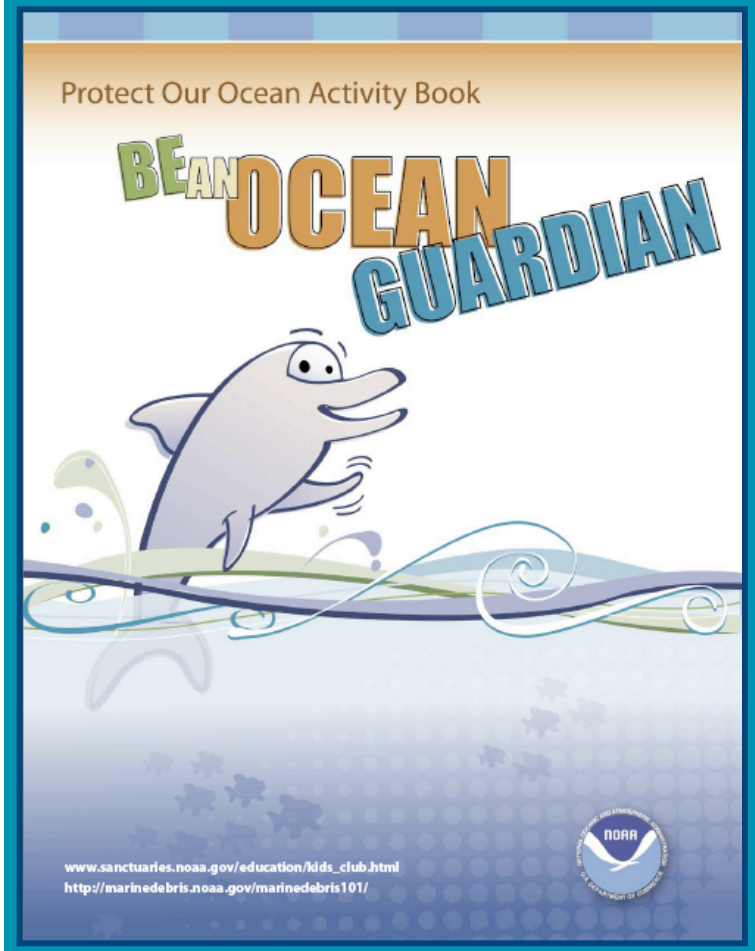
Virtual Submersible Dive

http://sanctuaries.noaa.gov/education/fun

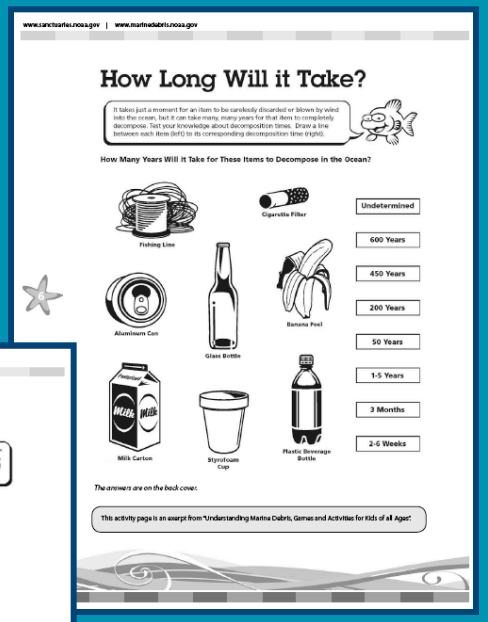
Ocean Guardian Programs

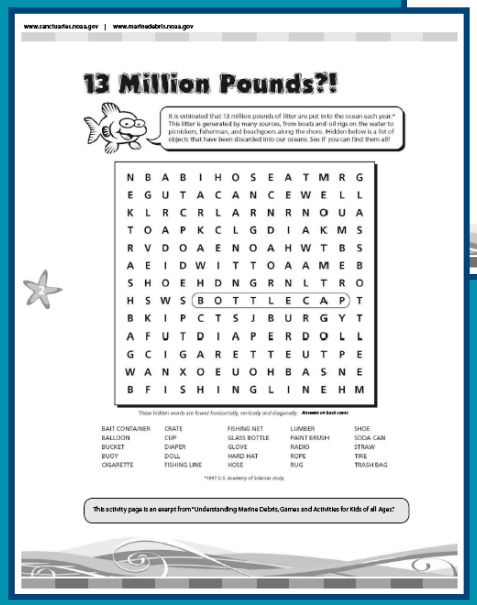
http://sanctuaries.noaa.gov/education/fun

Ocean Guardian Programs



Grades K-3
Activity Book





Hi, ...I'm Sanctuary Sam

I live at SeaWorld and have recently accepted the job of being a spokes-sea lion for the ocean and our national marine sanctuaries. You see, the ocean sustains life on Earth, so we all need to know how to protect it for ourselves and future generations.

Here are some ways you can protect our ocean:

1 Don't trash where you splash

Protect my friends by putting trash in its place...not in the ocean! Help out in a beach cleanup...and always leave the environment in better condition than you found it.

2 Speak up!

We need the ocean and it needs us. But it's in trouble. Speak up and make a difference! Raise your flipper and be counted. Make every effort to preserve our oceans.

3 Be wildlife wise

Practice ocean etiquette. Never feed wildlife or interfere with their natural behavior. Admire animals from a safe distance, and please support and share wildlife-friendly practices...like no-wake zones.

4 Protect our underwater treasures

National Marine Sanctuaries are America's underwater treasures! They're our nation's living laboratories that everyone can enjoy and at the same time, learn how to preserve.

SeaWorld says: Thank you Sanctuary Sam, our resident ambassador on all things oceanic.

Claire Fackler

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http://sanctuaries.noaa.gov/education