VOICES of the BAY

A Voyage of Science, Community and Heritage Through Local Fisheries Knowledge

Lisa Uttal & Sabrina Beyer
NOAA-Monterey Bay National Marine Sanctuary

Seaberry Nachbar
NOAA-National Marine Sanctuary Program

In Partnership with: Monterey Maritime and History Museum, NOAA Fisheries, NOAA Preserve America Initiative Grant, Monterey County Office of Education, California Department of Fish and Game, Monterey Bay Fishermen

Monterey Bay National Marine Sanctuary

Incredible diversity of marine habitats and species

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Rich History and Tradition of Fishing in Monterey Bay

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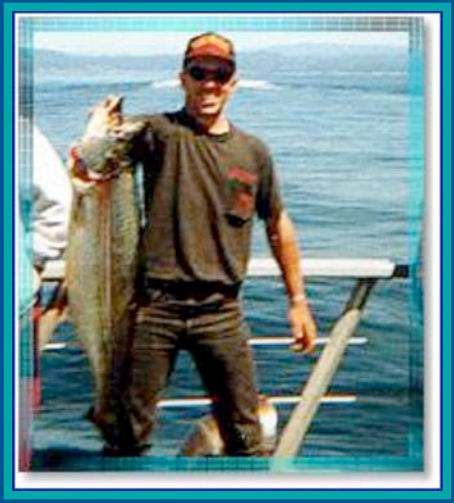
Fisheries in the Monterey Bay
Predominant Gear Types

Trawl
(groundfish)

Purse seine
(wetfish)



Hook & Line
(salmon/ tuna)

Traps
(crab/ black cod)

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Fisheries Education Project

Needs assessment survey:

- High interest by teachers for fisheries education.

- There is little *place-based* fisheries education in current curriculum.

- Generally, those that live on our coast don't even know what is fished in their backyard ocean.

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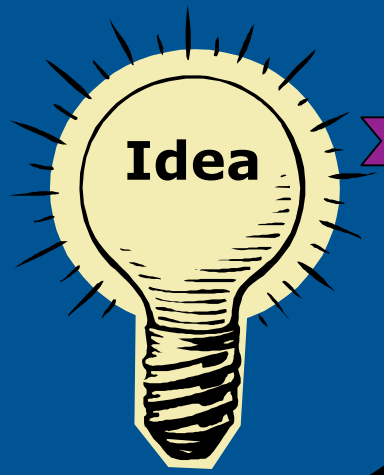
Laying the Groundwork



Partners:
National Marine Sanctuary,
Monterey Maritime Museum,
Monterey County Office
of Education

Advisory Group:
Experts to provide
guidance

Social Scientists, Fishermen
Fisheries Scientist,
Curriculum Developers, Teachers,

Curriculum Development
Grades 8-12, Community College

Fish Curricula search

Needs Assessment

Fisherman in the Classroom Program

Pilot in Schools

Need and interest is established
3 workshops
Mission developed

Train 20 teachers

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Fisheries Education Project

Mission: *"To create a place-based education project where local fisheries, fishing communities and their rich maritime history and culture are a focal point for students to learn about the marine environment, the ecological and human dimensions of marine resource use and its management."*

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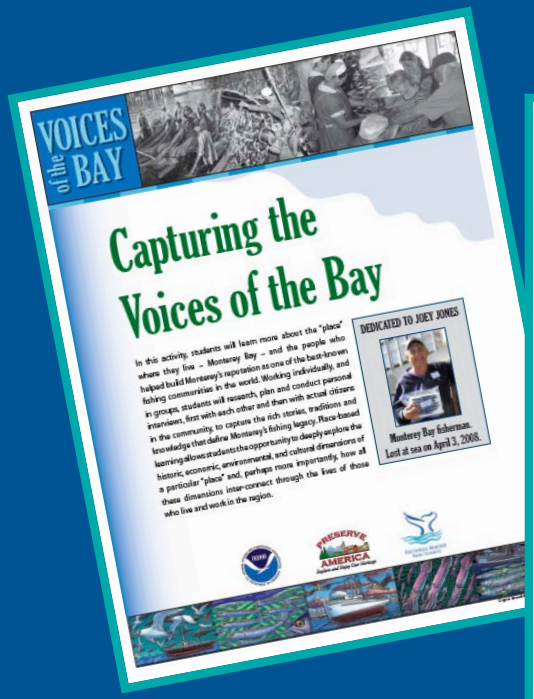
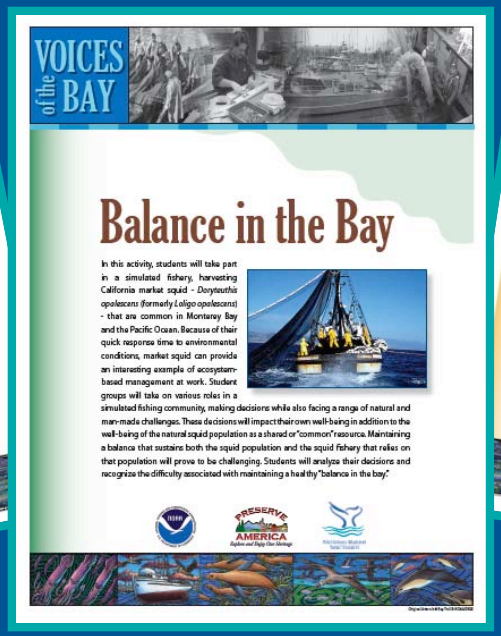
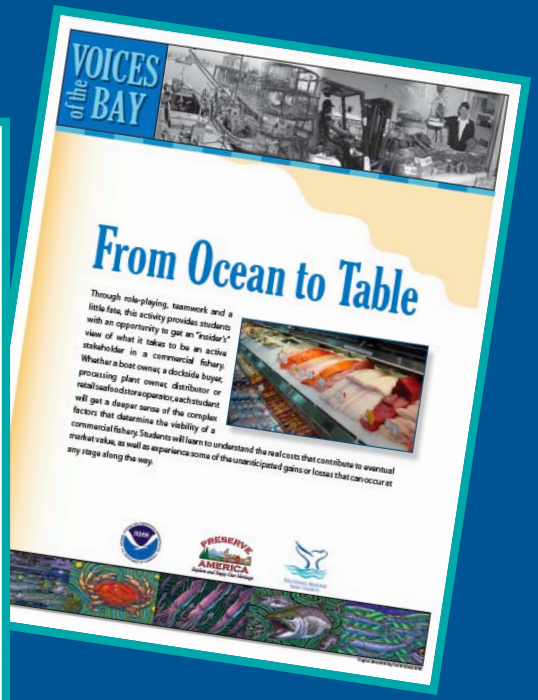
Curriculum

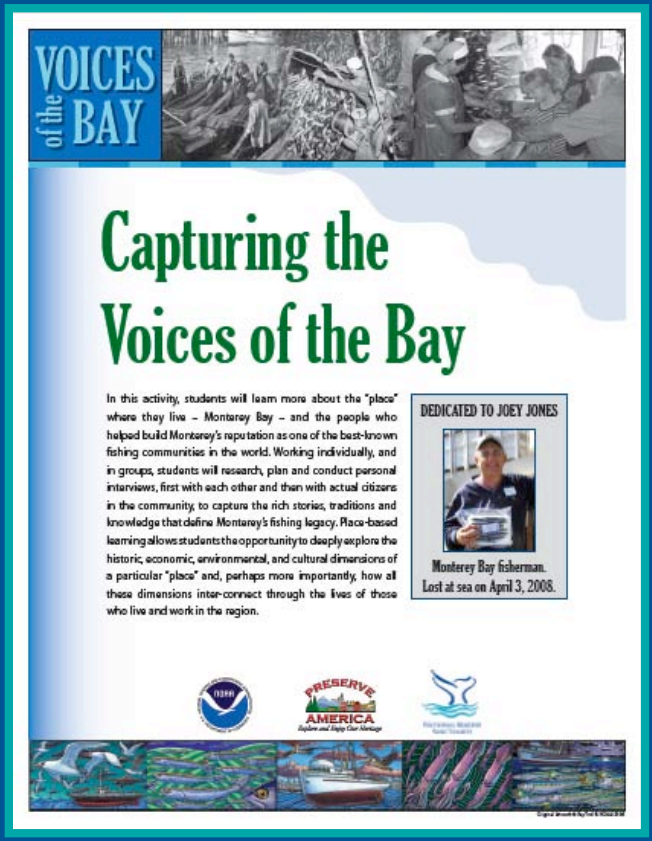






Original Artwork: © Ray Troll & NOAA/2008

Green Seas, Blue Seas: The California Current Ecosystem, Sustainable Fisheries and Climate Change



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Capturing the Voices of the Bay

In this activity, students will learn more about the "place" where they live – Monterey Bay – and the people who helped build Monterey's reputation as one of the best-known fishing communities in the world. Working individually, and in groups, students will research, plan and conduct personal interviews, first with each other and then with actual citizens in the community, to capture the rich stories, traditions and knowledge that define Monterey's fishing legacy. Place-based learning allows students the opportunity to deeply explore the historic, economic, environmental, and cultural dimensions of a particular "place" and, perhaps more importantly, how all these dimensions inter-connect through the lives of those who live and work in the region.

DEDICATED TO JOEY JONES

Monterey Bay fisherman.
Lost at sea on April 3, 2008.

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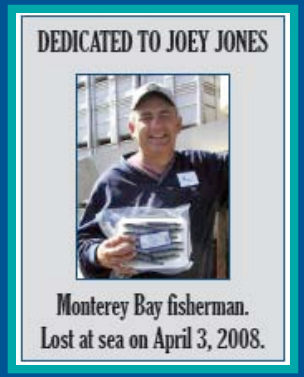

Dedicated to Joey Jones

David Crabbe- retired commercial squid fisherman talks with students

Mike Stiller- Santa Cruz Salmon fishermen is interviewed by students

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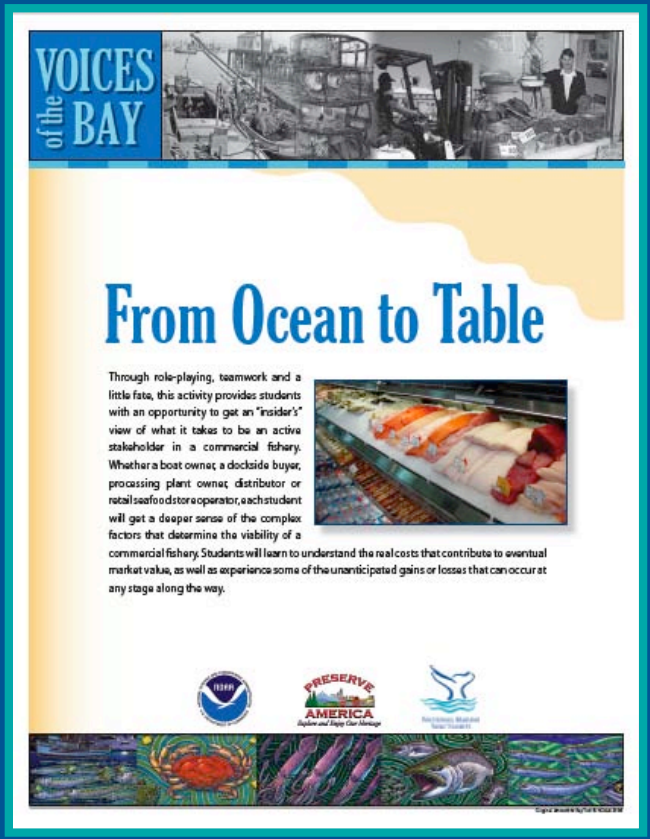

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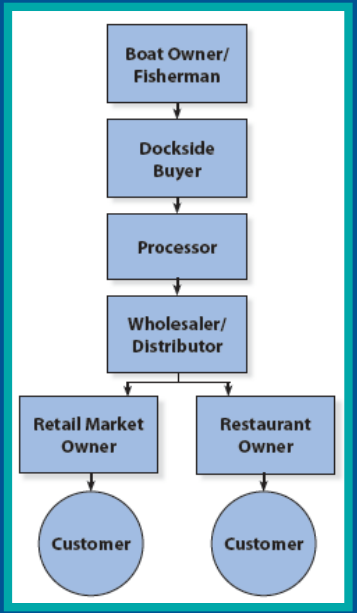
From Ocean to Table

Through role-playing, teamwork and a little fate, this activity provides students with an opportunity to get an "insider's" view of what it takes to be an active stakeholder in a commercial fishery. Whether a boat owner, a dockside buyer, processing plant owner, distributor or retail seafood store operator, each student will get a deeper sense of the complex factors that determine the viability of a commercial fishery. Students will learn to understand the real costs that contribute to eventual market value, as well as experience some of the unanticipated gains or losses that can occur at any stage along the way.

Through role-playing, teamwork and a little fate, students get an "insider's" view of what it takes to be an active stakeholder in a commercial fishery and some of the unanticipated gains and losses that can occur.



Students learn what path seafood takes from the ocean to the table

Processing the catch

Fish sold at market

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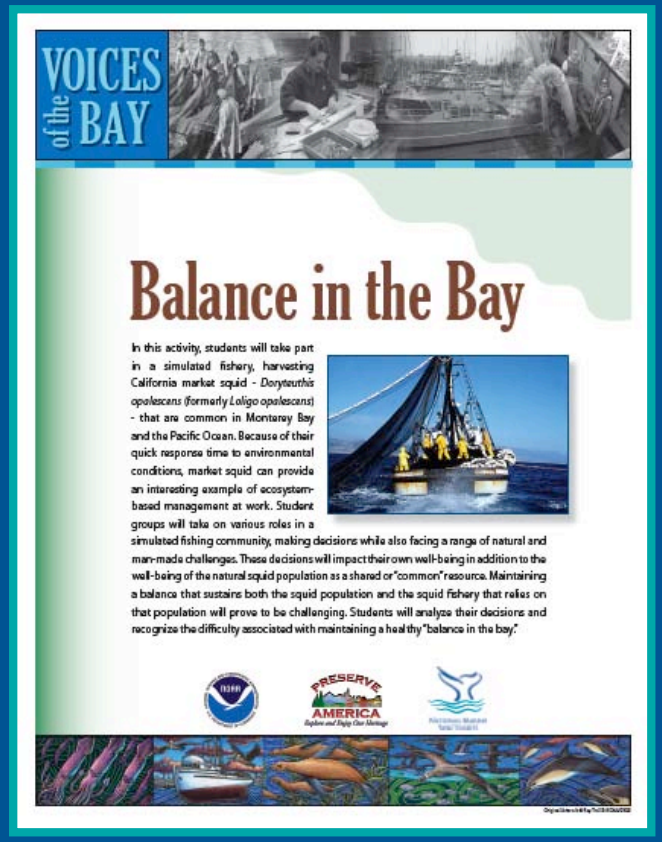

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Balance in the Bay

In this activity, students will take part in a simulated fishery, harvesting California market squid - *Doryteuthis opalescens (formerly Loligo opalescens)* - that are common in Monterey Bay and the Pacific Ocean. Because of their quick response time to environmental conditions, market squid can provide an interesting example of ecosystem-based management at work. Student groups will take on various roles in a simulated fishing community, making decisions while also facing a range of natural and man-made challenges. These decisions will impact their own well-being in addition to the well-being of the natural squid population as a shared or "common" resource. Maintaining a balance that sustains both the squid population and the squid fishery that relies on that population will prove to be challenging. Students will analyze their decisions and recognize the difficulty associated with maintaining a healthy "balance in the bay."

Students take part in a simulated squid fishery taking on various roles in the fishing community. They learn quickly the challenges involved in maintaining a balance that sustains both the natural squid population and the economic well-being of those associated with the fishery that rely on this common resource.

Regulatory Agency Personnel

Monterey Bay squid fishing fleet

Marine Scientists

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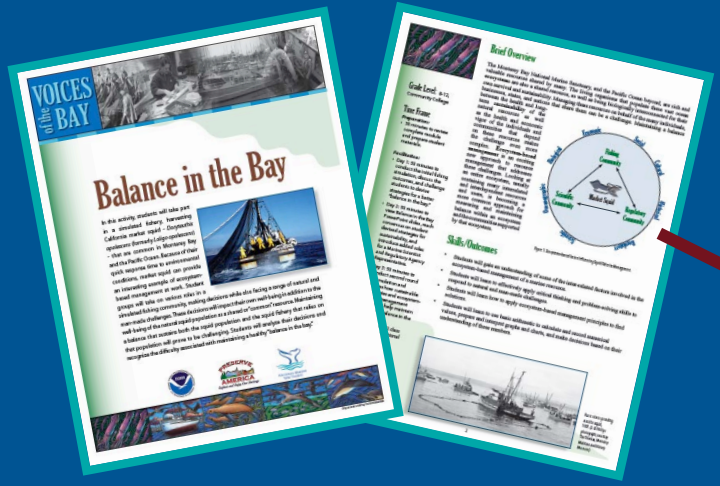

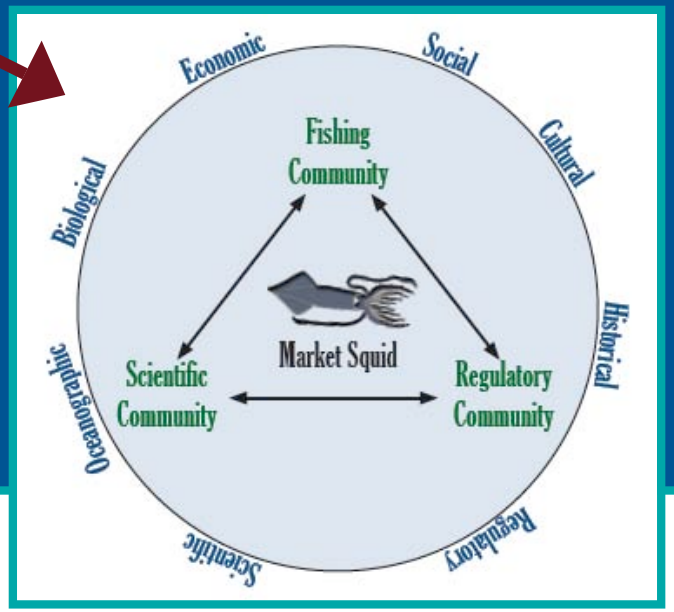

Skills/Outcomes

- Students will gain an understanding of some of the inter-related factors involved in the ecosystem-based management of a marine resource.
- Students will learn to effectively apply critical thinking and problem-solving skills to respond to natural and man-made challenges.
- Students will learn how to apply ecosystem-based management principles to find solutions.
- Students will learn to use basic arithmetic to calculate and record numerical values, prepare and interpret graphs and charts, and make decisions based on their understanding of these numbers.

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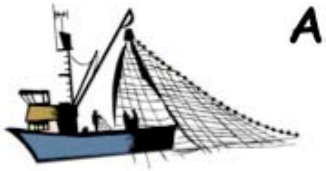
BRING A FISHERMAN TO YOUR CLASSROOM!

The National Marine Sanctuary Program and the Monterey Maritime and History Museum have partnered to provide your students with an opportunity to learn more about the rich culture and history of fishing and fisheries in the Monterey Bay and Gulf of the Farallones National Marine Sanctuaries.

Have a local commercial fisherman come into your classroom to discuss this fascinating field with your students.



ALL FOR FREE!

CULTURAL HISTORY

BIOLOGY

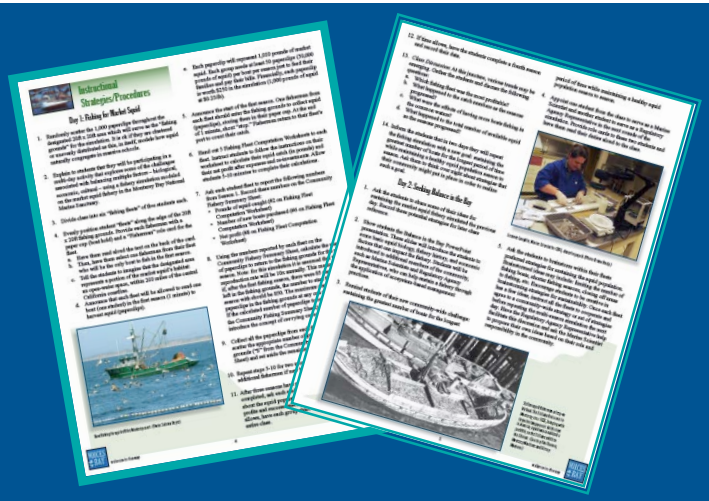
ECONOMICS

SOCIAL SCIENCE

NATURAL HISTORY

For more information or to schedule a fisherman, please contact:
Sabrina Beyer at 831-420-3994, sabrina.beyer@noaa.gov
(Santa Cruz, Moss Landing, Monterey and vicinity)
OR
Peter Winch at 415-425-6450, pwinch@farallones.org
(San Francisco, Coastside, Marin, East Bay and vicinity)

Funding for this program provided by NOAA's National Marine Sanctuary Bay-Watershed Education and Training (B-WET) program



Balance in the Bay

Day1: Fishing for Market Squid

- Introduction to the topic
- All students are fishermen fishing for a common resource in an unregulated environment

Day 2: Seeking Balance in the Bay

- Students brainstorm strategies for sustainability
- View PowerPoint on the Monterey Bay squid fishery to build knowledge for decision making
- Introduction of new roles: Marine Scientist and Regulatory Agency Representative

Day 3: Ecosystem-based Management in Action

- Test student strategies for sustainable fishing while adding new roles and ecosystem-based challenge cards
- Review California state squid fishery regulations
- Discuss the challenges of achieving a “Balance in the Bay”

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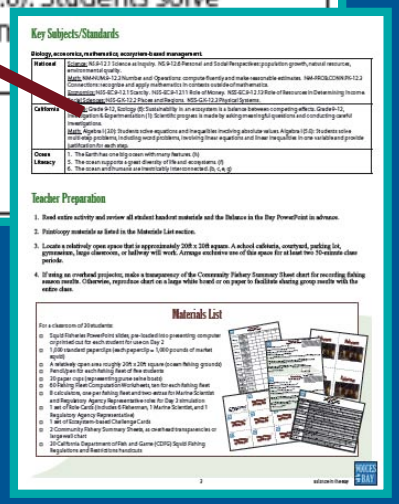
Interdisciplinary, Standards-based Curriculum

Key Subjects/Standards

Biology, economics, mathematics, ecosystem-based management.

National	Science: NS.9-12.1 Science as Inquiry. NS.9-12.6 Personal and Social Perspectives: population growth, natural resources, environmental quality. Math: NM-NUM.9-12.3 Number and Operations: compute fluently and make reasonable estimates. NM-PROB.CONN.PK-12.3 Connections: recognize and apply mathematics in contexts outside of mathematics. Economics: NSS-EC.9-12.1 Scarcity. NSS-EC.9-12.11 Role of Money. NSS-EC.9-12.13 Role of Resources in Determining Income. Social Sciences: NSS-G.K-12.2 Places and Regions. NSS-G.K-12.3 Physical Systems.
California	Science: Grade 9-12, Ecology (6): Sustainability in an ecosystem is a balance between competing effects. Grade 9-12, Investigation & Experimentation (1): Scientific progress is made by asking meaningful questions and conducting careful investigations. Math: Algebra I (3.0): Students solve equations and inequalities involving absolute values. Algebra I (5.0): Students solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.
Ocean Literacy	1. The Earth has one big ocean with many features. (h) 5. The ocean supports a great diversity of life and ecosystems. (f) 6. The ocean and humans are inextricably interconnected. (b, c, e, g)



Key Subjects/Standards

Teacher Preparation

Materials List

Balance in the Bay

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