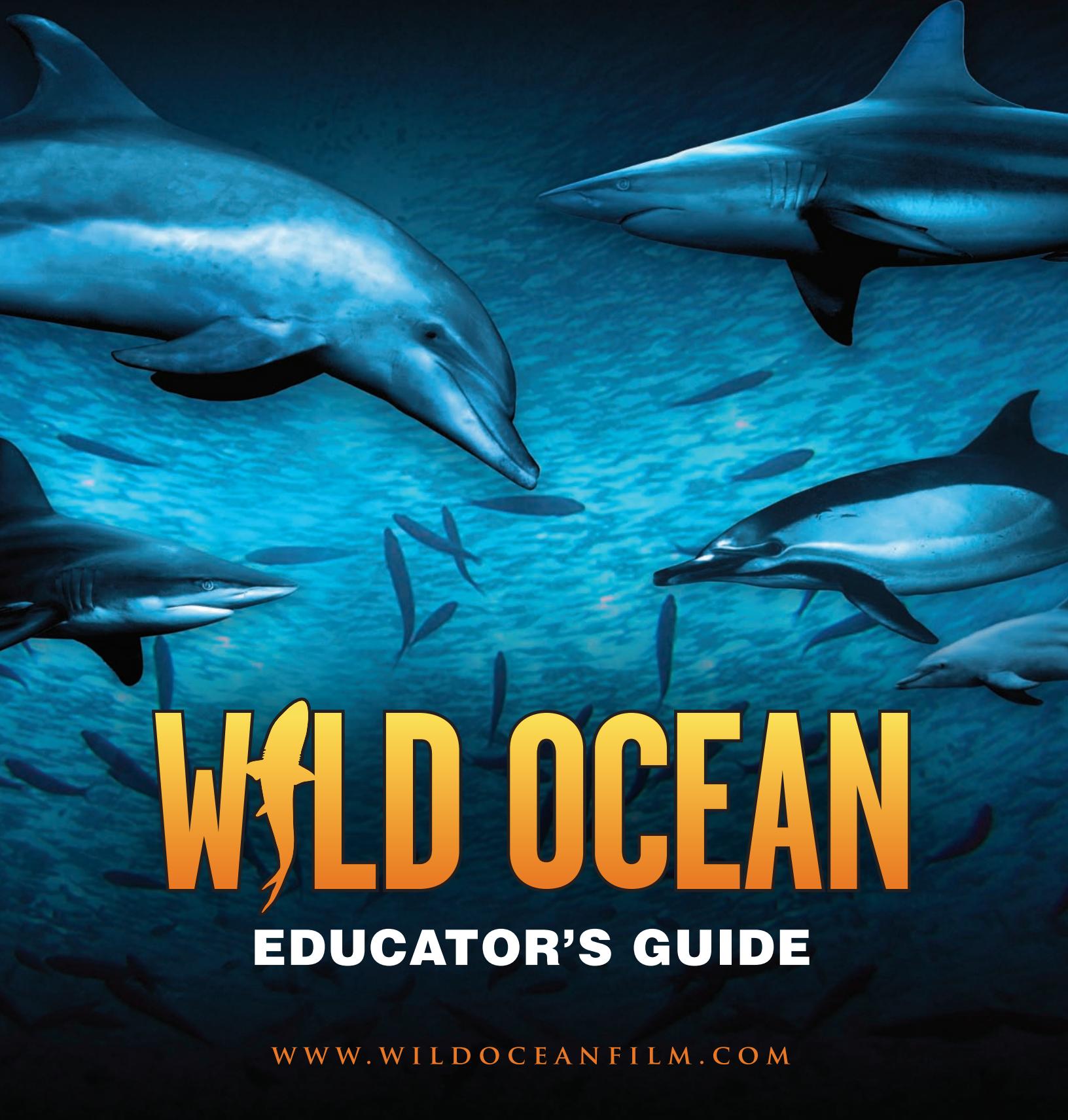




AFRICA MEETS THE SEA



# WILD OCEAN

## EDUCATOR'S GUIDE

[WWW.WILDOCEANFILM.COM](http://WWW.WILDOCEANFILM.COM)

# WHAT ARE AQUATIC ECOSYSTEMS?

How do organisms interact within an aquatic ecosystem?

How does human activity impact the survival of an aquatic ecosystem?

How do marine mammals use sound waves for navigation and survival?

In *Wild Ocean*, we see life and death within the ocean waters along the KwaZulu-Natal Coast of South Africa. Survival within the aquatic ecosystem depends entirely on the food web and the relationships between predator and prey. Humans play a part, too, as diminishing resources make the struggle for survival even more intense.

Use the following resources and activities to learn more about the ocean ecosystem and the predator-prey relationship. Make your own aquatic ecosystem and observe how it changes over time. Think about ways to conserve water—and protect the oceans. Learn about echolocation and how animals can use their ears to see.



## VOCABULARY

**Baitball** – a swirling mass of thousands of small baitfish that begins to look like a giant silvery ball as they swim in circles.



**Breach** – the act of leaping forcefully up out of the water, usually by Humpback Whales.

**Guano** – seabird droppings, usually found coating the surface of their nests.

**Parasites** – organisms that attach to and depend on a host for their survival.

**Pelagic** – related to the open seas or oceans, far from land.

**Predator** – an organism that survives by preying on other, usually smaller, organisms.

**Pods** – groups of seals or whales.

**Prey** – an organism hunted or caught for food.

**Shoal** – a large collection of things, especially a large school of fish.

# CREATE AN AQUATIC ECOSYSTEM



## Try This!

### How does an aquatic ecosystem work?

An aquarium is a miniature aquatic ecosystem. Try constructing your own aquarium from the materials you have available. Some suggested ideas follow, but you can experiment with any combination of living (fish, plants) and non-living (shells, clay) aquatic populations.

#### THINGS YOU NEED:

- glass or clear plastic tank that has a cover (large hard plastic canisters also work)
- water
- small stones or gravel
- at least two small fish of the same species
- at least two small aquatic plants (any plant that grows well in water)
- fish food
- natural shells or very small clay pots



#### DIRECTIONS:

- Place the small stones or gravel on the bottom of your tank.
- Weight the shells (or clay pots) by putting a few stones inside them.
- “Plant” the aquatic plants by securing their bottoms in the stones.
- Fill the tank nearly to the top with water.
- Allow the water to come to rest at room temperature.
- Carefully introduce the fish to their new habitat! Be sure to watch their behavior.
- Cover the tank. Make sure it is near a source of light, but not near extreme temperatures.
- Each day, keep a log of observations.
- Three times a week, add a flake of fish food for each fish and observe their behavior.
- Continue observing your aquarium for at least two weeks. Ecosystems grow and change over time. To notice growth and changes, you’ll need at least two weeks of observation.
- Discuss how the fish survived (or, if necessary, didn’t survive) in the covered tank.

#### EXTENSIONS:

- After two weeks of observation, add other species of fish to the aquarium.
- How do aquatic ecosystems survive in the darkness at the bottom of the ocean? Place your aquarium in a dark closet for a week and see what happens.

# WHERE IN THE WORLD?

 The dramatic scenes that we see in *Wild Ocean* take place in the Indian Ocean along the KwaZulu-Natal Coast of South Africa.



The Indian Ocean is the third largest ocean on Earth. The Pacific and Atlantic Oceans are larger, while the Southern and Arctic Oceans are smaller.

KwaZulu-Natal is a province within the country of South Africa and has a long coastline along the Indian Ocean. As in many countries around the world, the seashore is a destination for seasonal recreation. Towns along the coast draw tourists from throughout the country in search of sunshine and sea breezes. Some stretches of the KwaZulu-Natal coastline are among the world's most beautiful beaches.

After the Summer tourists return to their homes and Autumn turns to Winter, the coastal waters begin to cool. All eyes begin to watch for the telltale signs of the coming sardine run. Millions of sardines begin their migration Northward in search of warmer waters, following currents that bring them so close to the KwaZulu-Natal coast that many of the fish actually wash up on the beach. The huge shoal of sardines attracts thousands of predators in a remarkable demonstration of the predator-prey relationship within the ocean's food web.



## Why is it called KwaZulu-Natal?

The KwaZulu-Natal province used to be two separate regions: KwaZulu and Natal. In 1994, the two regions were united into one province.

In the Zulu language, KwaZulu means "place of the Zulu." Indeed, the Zulu kingdom still exists within the province. The Zulu people are an African tribal culture still lead by a ceremonial king.

In Portuguese, Natal means "Christmas." On Christmas Day 1497, the Portuguese explorer Vasco da Gama came ashore and decided to name the area Natal.



## How Can We Protect the Wild Ocean?

As *Wild Ocean* shows us, the magnificent ocean ecosystem is endangered. Even if the Indian Ocean is half a world away from where you live, you can make choices that will help to protect the wild oceans around the world.

## What's for Dinner?

Seafood can be a nutritious and delicious meal. The growing popularity of seafood, however, has impacted the natural balance in the oceans through overfishing and other practices that impact the aquatic ecosystem. You can help protect the oceans by making smart seafood selections.

For example, albacore tuna, anchovies, and wild Alaskan salmon are all tasty choices that are also ocean friendly. Mussels, mackerel, and sardines also make the list of sustainable seafood. At their website, Environmental Defense [[environmentaldefense.org](http://environmentaldefense.org)] offers an Eco-Friendly Seafood Selector. There's even a handy pocket guide that you can print and carry with you when grocery shopping or dining in restaurants.

## Paper or Plastic?

One of the greatest dangers to ocean animals comes from plastic bags and other plastic waste that finds its way into the oceans. Plastic does not deteriorate in salt water, so plastic trash sometimes travels around the world, riding on ocean currents. Sea birds and ocean animals become tangled in the trash, unable to fly, swim, or break free.

Paper bags are a better choice because they will biodegrade in water. The very best choice, though, are reusable canvas bags. Plan ahead! Take tote bags with you to carry your groceries home from the store. If you must use plastic bags, recycle them and dispose of them carefully so that they don't end up ruining the oceans.



# HOW CAN WE HELP THE OCEAN IN OUR OWN NEIGHBORHOODS?

## Water Conservation Ideas and Activities

While the coastal waters of South Africa may seem a world away, even your local water supply is connected to the global water system. The way you use water does impact the Earth's oceans and the creatures that call it home. It is easy to take water for granted, especially if you live in a home with running water. But, every drop of water that you use counts. We all need to use water to survive, but we also need to be careful that we don't waste water. These tips can help.

### CONSERVE WATER

- Take a shower instead of a bath.
- Leave a bottle of water in the refrigerator so you'll always have cold water to drink instead of letting the water run to get cold.
- Collect rainwater to use on plants.
- If you have a lawn at your house, water it early in the morning or in the evening. In the heat of the day, water will evaporate before the ground can drink it up.
- Make sure the sprinklers are not watering the driveway or sidewalk.

### STOP POLLUTION

- If you have a stream near your house, help the Earth by keeping the stream bank clean.
- When you visit the beach, make sure you don't leave any trash behind to pollute.
- Animal waste can pollute water, too. Don't let your pet leave its waste in or near a stream.

### FAST FACTS

- One person uses about 123 gallons of water a day!
- You are about 65% water. If you weigh 60 pounds, that means you are 40 pounds of water!
- About 80% of the Earth is covered by oceans and seas.
- About 97% of the Earth's water is in the oceans and seas.
- About 2% of the Earth's water is ice (from the frozen glaciers.)
- A person can live for weeks without food but can only live a few days without water.
- Apples are 80% water.
- Earthworms are also 80% water.
- A person consumes 2 1/2 quarts of water per day from water and food to stay healthy.
- If a faucet drips one drop per second, it wastes about 888 gallons of water a year.

### Try This!

Can you conserve water by turning the water off when you are brushing your teeth?

#### THINGS YOU NEED:

- toothbrush
- water
- bowl, pot, basin, or small bucket
- measuring cup

#### DIRECTIONS:

##### Day 1

1. Put bowl, pot, basin, or bucket under faucet to collect water.
2. Turn water on.
3. Brush teeth as you usually do.
4. Use measuring cup to measure water in pot.
5. Pour the collected water down the drain.
6. Record results in chart below.

##### Day 2

1. Put pot or bucket under the faucet to collect water.
2. Turn water on.
3. Wet toothbrush.
4. Turn water off.
5. Brush teeth.
6. Turn water back on to rinse toothbrush and mouth.
7. Use measuring cup to measure water in pot.
8. Pour the collected water down the drain.
9. Record results in chart below.

#### Try these other activities at home!

1. Turn liquid water into solid water.
2. Turn solid water into liquid water.
3. Turn liquid water into water vapor. (Hint: use a tea kettle.)

How teeth are brushed	How much water did you use?	If you brush 3 times a day	How much water used per day?	If you brush 3 times every day for a year	How much water used per year?
If water is left running during brushing		x 3		x 365	
If water is turned off during tooth brushing		x 3		x 365	

How much water can you save in a year by turning off the water while you brush your teeth?



# ECHOLOCATION: DO YOU SEE WHAT YOU HEAR?



Dolphins use echolocation to navigate around objects in ocean waters, to locate prey, and to avoid predators. Their bodies have adapted to the ocean environment in order to help them survive. They make clicking noises to create sound waves which travel easily through the water. When the sound waves bump into objects, the waves "echo" back to the dolphin. The dolphin recognizes echo patterns which help it "see" what lies ahead.

It is difficult to simulate underwater dolphin echolocation, but this activity will help you understand how, sometimes, we can see by using our ears.

## Try This!

How do dolphins use sound to see?

### THINGS YOU NEED:

- an empty space
- at least 4 students
- one blindfold

### EXTENSIONS:

- Once the students have tried the basic activity, allow the prey, predators, and objects to assume different positions like sitting, squatting, and lying down. The dolphin will hear sounds coming from many different levels, adding to the challenge.
- For an advanced variation, allow the prey and predators to take one step each time they respond to "click, click, click." Prey should move away from the dolphin, while predators move toward it. (Objects should remain still.)

### FAST FACTS

- Echolocation is also called biosonar.
- Bats use echolocation to navigate and hunt in the dark night skies.
- An American Zoologist named Donald Griffin coined the term "echolocation" in 1944.
- Underwater vessels, like submarines, use SONAR to navigate in ocean waters. The ideas for SONAR systems were inspired by animal echolocation.
- Both echolocation and SONAR work so well because water is an excellent conductor.

### DIRECTIONS:

*Note: This activity is a little bit like the game of "Marco Polo."*

- Define the boundaries of your empty space. If you are inside, an empty class room or gymnasium works well. If outside, be careful to make sure all of the students know the safe area for play and that they know not to allow the blindfolded student to go beyond the boundaries.
- Select a student to be the dolphin.
- For each 3 students, assign 1 to be "prey," 1 to be "predator," and 1 to be "object." For example, if there are 26 students in your group, 1 will be the dolphin, 8 will be prey, 8 will be predators, and 9 will be objects.
- Blindfold the dolphin.
- Have the prey, predators, and objects spread out and arrange themselves within the empty space.
- Once the simulation begins, only the dolphin can move. Everyone else stands still in their place.
- The dolphin must now locate and "tag" its prey while avoiding its predators.
- The dolphin begins by calling out "click, click, click."
- Everyone else responds in unison by calling out their role: "prey," "predator," or "object."
- The dolphin can call out "click, click, click" as many times as it wants.
- The dolphin moves throughout the space until it has tagged all of its prey, or, until it tags a predator.
- Tagging an "object" has no effect on the dolphin. Once it "tags" prey, the prey stops calling out. (This simulates the dolphin having eaten its prey.) Once the dolphin stops hearing "prey" in response to its "click, click, click," the dolphin removes its blindfold to end the activity.
- If the dolphin tags a predator, the activity ends, as the dolphin has perished.
- With a small group, the activity should continue until the dolphin either perishes by tagging a predator or successfully tags all of its prey. With a larger group, you may want to set a time limit for the dolphin. Perhaps each student who takes a turn as the dolphin has just 5 minutes to feed.

# **THE FOLLOWING WEBSITES OFFER MORE INFORMATION ABOUT THE TOPICS EXPLORED IN *WILD OCEAN*.**

## **Animal InfoBooks from SeaWorld**

[www.seaworld.org/animal-info/info-books](http://www.seaworld.org/animal-info/info-books)

SeaWorld Adventure Parks offer a chance to see marine animals up close. Their educational outreach efforts include this collection of InfoBooks related to aquatic ecosystems and the species that inhabit them.

## **Florida Museum of Natural History**

[www.flmnh.ufl.edu/Fish](http://www.flmnh.ufl.edu/Fish)

The Ichthyology department at the Florida Museum of Natural History curates this online collection of resources for learning about marine biology. The Image Gallery, Biological Profiles, and Education areas of their website are particularly useful for extending your *Wild Ocean* experience.

## **KwaZulu-Natal Coast**

[wikipedia.org/wiki/KwaZulu-Natal\\_Province](http://wikipedia.org/wiki/KwaZulu-Natal_Province)

Find out more about the KwaZulu-Natal Province of South Africa where the Wild Coast is located. It is along the province's shoreline that the Wild Ocean movie and the magnificent feeding frenzy take place.

## **MarineBio Conservation Topics**

[marinebio.org/Oceans/Conservation](http://marinebio.org/Oceans/Conservation)

Ocean conservation can be a challenging subject for K-12 classrooms, particularly if you don't live near an ocean. This site provides some suggestions for getting started with a simple focus on how to consider the issues that impact the health and survival of Earth's oceans.

## **Monterey Bay Aquarium Conservation Programs**

[www.montereybayaquarium.org/cr](http://www.montereybayaquarium.org/cr)

The Monterey Bay Aquarium in California suggests ways that you can get involved in protecting the oceans. Some activities are based along the California Coastline, but others are relevant no matter where you live.

## **NOAA Education**

[www.education.noaa.gov](http://www.education.noaa.gov)

The Education Office at the U.S. National Oceanic and Atmospheric Administration provides an educational gateway to its vast array of ocean-related resources.

## **Oceanlink**

[oceanlink.island.net](http://oceanlink.island.net)

Provided by the Bamfield Marine Sciences Centre in Canada, Oceanlink offers a variety of resources for students and adults who want to learn more about marine biology.

## **SeaWeb Resources**

[www.seaweb.org/resources.php](http://www.seaweb.org/resources.php)

Dedicated to preserving healthy oceans, SeaWeb publishes a monthly newsletter and other resources that can help you stay informed about happenings in ocean conservation science and activities.

# **SUGGESTED READING FOR CHILDREN AND YOUNG ADULTS**

**A SEA FULL OF SHARKS** by Betsy Maestro and Giulio Maestro (1997) ISBN: 0590431013

**ALL THE WAY TO THE OCEAN** by Joel Harper (2006) ISBN: 0971425418

**BENEATH BLUE WATERS: MEETINGS WITH REMARKABLE DEEP-SEA CREATURES** by Deborah Kovacs and Kate Madin (1996) ISBN: 0670856533

**COME TO THE OCEAN'S EDGE: A NATURAL CYCLE BOOK** by Laurence P. Pringle (2003) ISBN: 1563977796

**DIVE! MY ADVENTURES IN THE DEEP FRONTIER** by Sylvia A. Earle (1999) ISBN: 0792271440

**DOLPHINS** by Sylvia M. James (2002) ISBN: 1590340108

**EARTH'S WATER CRISIS: WHAT IF WE DO NOTHING?** by Rob Bowden (2007) ISBN: 0836881540

**JACQUES COUSTEAU** by Lesley A. Dutemple (2000) ISBN: 0822549794

**LIFE IN THE OCEANS** by Lucy Baker (1999) ISBN: 1854340433

**MARINE MAMMAL PRESERVATION** by Peggy Thomas (2000) ISBN: 076131458X

**MEETING DOLPHINS** by Kathleen Dudzinski (2000) ISBN: 0792271297

**OCEAN FOOD CHAINS** by Emma Lynch (2007) ISBN: 0431119023

**OCEANS: HOW WE USE THE SEAS** by Dana Desonie (2007) ISBN: 0816062161

**PENGUINS!** by Gail Gibbons (2000) ISBN: 0439061326

**SEA CRITTERS** by Sylvia A. Earle (2000) ISBN: 0792255844

**SEA SOUP: ZOOPLANKTON** by Mary M. Cerullo (2002) ISBN: 0884482197

**SEAS OF LIFE: OCEAN WORLD** by BBC Discovery Channel (2002) ISBN: 0606222758

**SEASHORE LIFE ON ROCKY COASTS** by Judith Connor (1993) ISBN: 1878244051

**SHARKS** by Seymour Simon (2006) ISBN: 0060877138

**SHARKS AND OTHER MONSTERS OF THE DEEP** by Philip Steele (1998) ISBN: 0789429675

**THE ILLUSTRATED WORLD ENCYCLOPEDIA OF MARINE FISHES AND SEA CREATURES** by Derek Hall (2007) ISBN: 0754817253

**THE MAGIC SCHOOL BUS ON THE OCEAN FLOOR** by Joanna Cole (1994) ISBN: 0590414313

**THE OCEAN BOOK: AQUARIUM AND SEASIDE ACTIVITIES AND IDEAS FOR ALL AGES** by the Center for Marine Conservation (1989) ISBN: 0471620785

**THE OCEANS** by Lisa A. Wroble (1998) ISBN: 1560064641

**WHO EATS WHAT? FOOD CHAINS AND FOOD WEBS** by Patricia Lauber and Holly Keller (1995) ISBN: 0064451305

## **SUGGESTED READING FOR ADULTS**

**50 WAYS TO SAVE THE OCEAN** by David Helvarg (2006) ISBN: 1930722664

**DEEP SEA ODYSSEY** by Yves Paccalet (2004) ISBN: 1844300544

**DEFYING OCEAN'S END: AN AGENDA FOR ACTION** by Linda K. Glover and Sylvia A. Earle (2004) ISBN: 1559637552

**ENCYCLOPEDIA OF THE SEA** by Richard Ellis (2000) ISBN: 0375403744

**FISH, MARKETS, AND FISHERMEN: THE ECONOMICS OF OVERFISHING** by Suzanne Iudicello, Michael L. Weber, and Robert Wieland (1999) ISBN: 1559636432

**HEAL THE OCEAN: SOLUTIONS FOR SAVING OUR SEAS** by Rodney M. Fujita (2003) ISBN: 0865715009

**MARINE CONSERVATION BIOLOGY: THE SCIENCE OF MAINTAINING THE SEA'S BIODIVERSITY** by Michael E. Soule, Elliott A. Norse, and Larry B. Crowder (2005) ISBN: 1559636629

**PLANET OCEAN: PHOTO STORIES FROM THE 'DEFENDING OUR OCEANS' VOYAGE** by Sara Holden (2007) ISBN: 1904456790

**SEA CHANGE: A MESSAGE OF THE OCEANS** by Sylvia A. Earle (1996) ISBN: 0449910652

**SONG FOR THE BLUE OCEAN** by Carl Safina (1999) ISBN: 0805061223

**SWIMMING IN CIRCLES: AQUACULTURE AND THE END OF WILD OCEANS** by Paul Molyneaux (2006) ISBN: 1560257563

**THE DEEP: THE EXTRAORDINARY CREATURES OF THE ABYSS** by Claire Nouvian (2007) ISBN: 0226595668

**THE EMPTY OCEAN** by Richard Ellis (2004) ISBN: 1559636378

**THE LIVING OCEAN: UNDERSTANDING AND PROTECTING MARINE BIODIVERSITY** by Boyce Thorne-Miller and Sylvia A. Earle (1999) ISBN: 1559636785

**THE MOST IMPORTANT FISH IN THE SEA: MENHADEN AND AMERICA** by H. Bruce Franklin (2007) ISBN: 1597261246

**THE OCEANS** by Ellen J. Prager and Sylvia A. Earle (2001) ISBN: 0071381775

**THE SEA AROUND US** by Rachel Carson (1991) ISBN: 0195069978

# STANDARDS CORRELATIONS

*Wild Ocean supports the practice of formal science education in the following areas as outlined in the National Science Education Standards.*

## CONTENT STANDARDS: K-4

### CONTENT STANDARD A: SCIENCE AS INQUIRY

Activities meet this standard when students:

- Ask a question about objects, organisms, and events in the environment.
- Plan and conduct a simple investigation.
- Employ simple equipment and tools to gather data and extend the senses.
- Use data to construct a reasonable explanation.
- Communicate investigations and explanations.

### CONTENT STANDARD C: LIFE SCIENCE

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met. The world has many different environments, and distinct environments support the life of different types of organisms.
- The behavior of individual organisms is influenced by internal cues (such as hunger) and by external cues (such as a change in the environment).
- An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment.
- Humans depend on their natural and constructed environments. Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms.

### CONTENT STANDARD F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population.
- Some resources are basic materials, such as air, water, and soil; and some resources are nonmaterial, such as quiet places, beauty, security, and safety.
- The supply of many resources is limited. If used, resources can be extended through recycling and decreased use.
- Changes in environments can be natural or influenced by humans.

## CONTENT STANDARDS: 5-8

### CONTENT STANDARD A: SCIENCE AS INQUIRY

Activities meet this standard when students:

- Identify questions that can be answered through scientific investigations.
- Design and conduct a scientific investigation.
- Use appropriate tools and techniques to gather, analyze, and interpret data.
- Develop descriptions, explanations, predictions, and models using evidence.
- Think critically and logically to make the relationships between evidence and explanations.
- Recognize and analyze alternative explanations and predictions.
- Communicate scientific procedures and explanations.
- Use mathematics in all aspects of scientific inquiry.

# STANDARDS CORRELATIONS

*Wild Ocean* supports the practice of formal science education in the following areas as outlined in the National Science Education Standards.

## CONTENT STANDARDS: 5-8 CONT.

### CONTENT STANDARD B: PHYSICAL SCIENCE

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- Energy is a property of many substances and is associated with heat, light, electricity, mechanical motion, sound, nuclei, and the nature of a chemical.
- Electrical circuits provide a means of transferring electrical energy when heat, light, sound, and chemical changes are produced.

### CONTENT STANDARD C: LIFE SCIENCE

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
- An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger are based in the species' evolutionary history.
- A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.
- Millions of species of animals, plants, and microorganisms are alive today.
- Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

### CONTENT STANDARD D: EARTH AND SPACE SCIENCE

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- Oceans have a major effect on climate, because water in the oceans holds a large amount of heat.
- The sun is the major source of energy for phenomena on the earth's surface, such as growth of plants, winds, ocean currents, and the water cycle.

### CONTENT STANDARD F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.
- Causes of environmental degradation and resource depletion vary from region to region and from country to country.

## CONTENT STANDARDS: 9-12

### CONTENT STANDARD A: SCIENCE AS INQUIRY

Activities meet this standard when students:

- Identify questions and concepts that guide scientific investigations.
- Design and conduct scientific investigations.
- Use technology and mathematics to improve investigations and communications.
- Formulate and revise scientific explanations and models using logic and evidence.
- Recognize and analyze alternative explanations and models.
- Communicate and defend a scientific argument.

# STANDARDS CORRELATIONS

*Wild Ocean* supports the practice of formal science education in the following areas as outlined in the National Science Education Standards.

## CONTENT STANDARDS: 9-12 CONT.

### CONTENT STANDARD B: PHYSICAL SCIENCE

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- Waves, including sound and seismic waves, waves on water, and light waves, have energy and can transfer energy when they interact with matter.

### CONTENT STANDARD C: LIFE SCIENCE

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- The great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled every available niche with life forms.
- Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years.
- Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite. This fundamental tension has profound effects on the interactions between organisms.
- Human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected.
- Like other aspects of an organism's biology, behaviors have evolved through natural selection. Behaviors often have an adaptive logic when viewed in terms of evolutionary principles.

### CONTENT STANDARD D: EARTH AND SPACE SCIENCE

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- Heating of earth's surface and atmosphere by the sun drives convection within the atmosphere and oceans, producing winds and ocean currents.
- Global climate is determined by energy transfer from the sun at and near the earth's surface. This energy transfer is influenced by dynamic processes such as cloud cover and the earth's rotation, and static conditions such as the position of mountain ranges and oceans

### CONTENT STANDARD F: SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Activities meet this standard in part when students learn the following fundamental concepts and principles.

- Natural resources have been and will continue to be used to maintain human populations.
- The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.
- Human activities can enhance potential for hazards. Acquisition of resources, urban growth, and waste disposal can accelerate rates of natural change.
- Some hazards, such as earthquakes, volcanic eruptions, and severe weather, are rapid and spectacular. But there are slow and progressive changes that also result in problems for individuals and societies.



# WILD OCEAN

*Wild Ocean* tells the story of an unbelievable feeding frenzy that takes place each year in the oceans of South Africa as billions of sardines migrate up the KwaZulu-Natal Coast. The migration triggers an epic underwater struggle for survival as African Penguins, Cape Gannets, Cape Fur Seals, Sharks, Dolphins, and even Humpback Whales are drawn to the scene, suddenly finding themselves enmeshed in the web of predators and prey that determines if they eat—or get eaten.

**WWW.WILDOCEANFILM.COM**

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