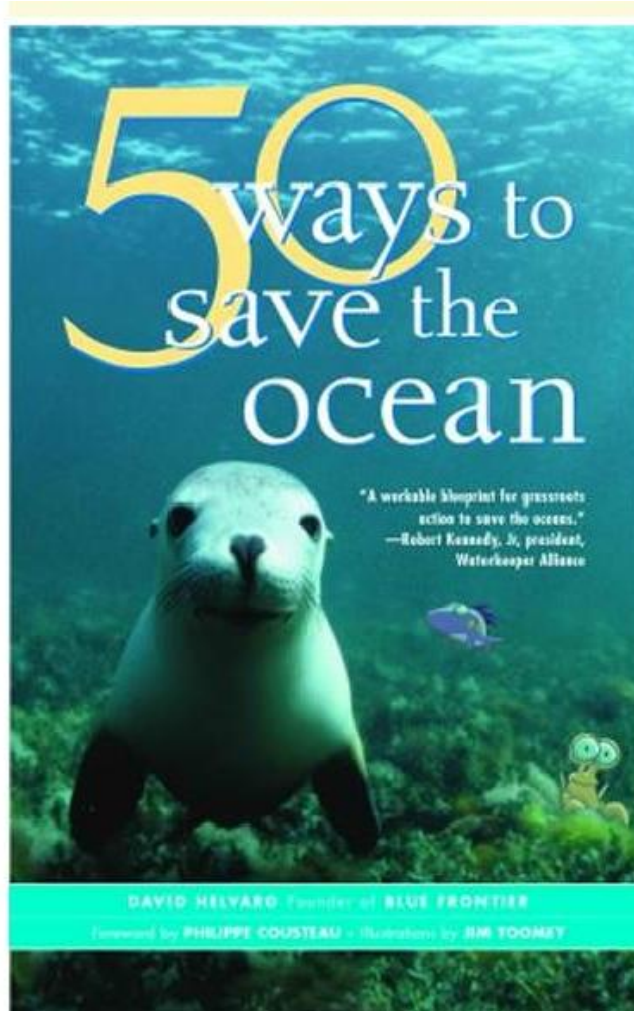


50 Ways to Save the Ocean



Teacher's Guide Supplemental Lesson Plans

A Project of Blue Frontier Campaign



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Introduction

As a child, I spent a lot of time gazing at the stars and I remember feeling cheated because I was born a generation too soon to explore distant planets. It wasn't until I discovered snorkeling and scuba diving at the age of 15 that I realized there were whole other worlds of wonder right off our shores. And I've never looked back.

The ocean remains a largely uncharted and unexplored frontier wilderness, filled with unique habitats and innumerable 'alien' species that scientists are only now beginning to identify. The ocean drives both climate and weather and is the source of over half the oxygen on earth, an essential ingredient for all life forms. It provides us with recreation, transportation, protein, energy, security, medicine and a sense of awe and wonder from sea to shining sea.

Unfortunately, it is also at risk from a cascading series of human impacts including pollution, over-fishing, loss of coastal and marine habitat and climate change. The ocean is in short a great and challenging subject in which one can engage high school students, grades 9-12, from a science, social studies or marine ecology perspective.

Blue Frontier Campaign (BFC) works to promote unity and build the constituency needed to enact solutions to the challenges faced by our ocean, our coasts and the communities that depend on them. We are dedicated to providing tools for marine education

One of our tools is my book 50 Ways to Save the Ocean which was illustrated by Sherman's Lagoon cartoonist Jim Toomey and contains a foreword by Philippe Cousteau. This teacher's guide has been prepared by Blue Frontier Campaign's Samantha Elkoni and is intended to augment the book in the classroom.

50 Ways to Save the Ocean includes a resource guide on the last 39 pages covering ways to expand one's engagement with the ocean, and is referenced to each of its chapters. If you would like to purchase 50 Ways to Save the Ocean for your classes you can do so by contacting the publisher New World Library sales & marketing at www.newworldlibrary.com. For more information on Blue Frontier Campaign visit www.bluefront.org or e-mail info@bluefront.org

Thank you for your service to our future.

Regards and best fishes,

David Helvarg

Author and Founder of Blue Frontier Campaign



How to Use this Guide

This guide is intended to supplement the use of *50 Ways to Save the Ocean* in the classroom by bundling reputable and relevant lesson plans from existing resources into one, easy to use document. This supplemental guide focuses on those parts of *50 Ways to Save the Ocean* that are most appropriate for high school teachers' lesson plans, so not every *Way* in *50 Ways to Save the Ocean* is covered.

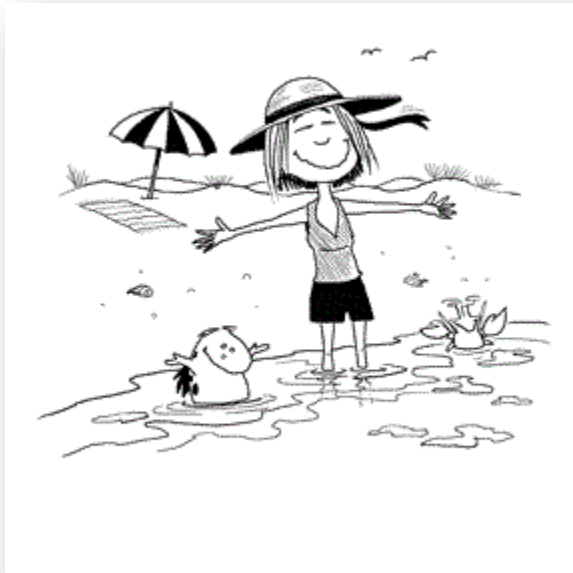
Each *Way* in this document is numbered and corresponds with the appropriate *Way* in *50 Ways to Save the Ocean*. Each *Way* contains a short description of the lesson plan so teachers can decide if it is something they want to use. To access the lesson plan, please use the associated URL, which will take you directly to the source. Sources are cited at the top of each lesson plan.

All descriptions contained within this document were taken directly from the lesson plans. All URLs were accessible at the time of the publishing of this document. Blue Frontier Campaign is not responsible for broken links. If you come across any broken links, please let us know and we'll do our best to resolve the issue. We hope you find this Teacher's Guide useful.

We are interested in collaborating with marine-based organizations and individuals. If you are interested in submitting a lesson plan for any of the 50 Ways including those not listed here, please contact us at info@bluefront.org.



1: Go to the Beach



Enjoy the sand and the water and leave it as clean, or cleaner than you found it.

For many of us, our sense of wonder over our blue-marble planet began with a trip to the beach. The beach still remains the number one outdoor recreational activity for all Americans, with some 68 million of us hitting the ocean sand every year.

Looking out over a vast and seemingly unknowable ocean, or looking through a face mask into a world of brightly colored fish and corals, can also begin a child's transformation—the realization that each of us is something much larger than ourselves, something both mysterious and deeply attractive.

To keep this time special we need to take care of the beaches we visit, whether for a day, a weekend or a summer. And to take care of the beaches, we need to enlist the help of the younger generations.



Coastal Clash

Source: KQED – Classroom Science

Project: Water Motion

Link: www.kqed.org/w/coastalclash/classroom-science.html

In this lesson:

Students are given an opportunity to interact with the aspects of physical oceanography that affect development of our ocean fronts. There are four separate units, each designed to build upon each other, but each can be used individually as well.

These lesson plans focus on:

1. Energy must be provided to move water. Movement of water determines the ability of water to transport materials.
2. Sand Movement Cycle: Sources of sand movement along the shore and the removal of beaches into trenches
3. What happens when human activity interferes with the normal sand cycle?
4. Why does the beach pattern change as it does between summer and winter? How does an El Nino year affect the pattern?

Currents: Bad for Divers, Good for Ocean

Source: NOAA – Ocean Explorer – Northwestern Hawaiian Islands Exploration

Project: Deep Sea Currents

Link: www.coralreef.noaa.gov/education/educators/resourcecd/lessonplans/resources/current_lp.pdf

In this lesson:

Students will learn about deep sea currents. Students will be able to discuss the general effects of topography on current velocity. Students will be able to describe, compare, and contrast major forces that drive ocean currents. Students will be able to discuss how velocity affects the ability of a current to transport sand. Students will be able to explain why deep-sea precious corals are more frequently found in areas having strong currents.



3: Dive Responsibly



**Take only pictures and leave only bubbles,
while exploring underwater wonders.**

Today, diving and snorkeling have become hugely popular activities, with some 5 to 10 million Americans scuba-certified and 2 million actively diving on a regular basis. Divers and snorkelers often become leading advocates for the protection and restoration of marine wilderness.

Ironically, through careless behaviors, lack of experience, or lack of awareness, underwater visitors can also damage the very wonders they go below the surface to enjoy.



Dive In!

Source: NOAA's Aquarius Inner Space Station

Project: Physics of Underwater Diving

Link: www.aquarius.uncw.edu/education/lessons/Aq%20Dive%20In.pdf

In this lesson:

Students will learn how buoyancy, pressure and light affect underwater research. Students will be able to explain Archimedes' Principle, and explain how this principle applies to scientists working underwater. Students will be able to identify the source of atmospheric and underwater pressure, and explain how these pressures vary with altitude and depth. Students will be able to identify two ways in which light is affected when it passes through water.

Designing an Underwater Habitat for Humans

Source: NOAA's Aquarius Reef Base – The World's Only Undersea Research Station

Project: Engineering and Life Support

Link: www.aquarius.uncw.edu/education/lessons/habitat_design.pdf

In this lesson:

Students will be able to identify the basic needs for human life support in a non-terrestrial environment. They will also be challenged to use critical thinking skills to make the optimum use of a limited space, which must provide a base for research and day-to-day life. Students must also identify and mitigate safety risks.



8: Take Kids Surfing, or Have Them Take You



Surfing and body boarding (or boogie boarding) are non-consumptive ways to enjoy the ocean.

He'e nalu or “wave sliding” is how the old Hawaiians described the ancient Polynesian sport that later became known as surfing. Observers and participants from Captain Cook to Lord Byron, Jack London to the Beach Boys have noted the wonders of surfing. It is a totally renewable use of the sea but one, like so many, that we have to work to protect from the impacts of coastal development and pollution.

If you live in a coastal area, it is likely that some of your students are well acquainted with surfing and the ocean.



Motion in the Ocean, What Causes Currents and Waves?

Source: NOAA Ocean Service Education

Project: What Causes Ocean Currents and Waves?

Link: www.oceanservice.noaa.gov/education/lessons/ocean_motion.html

In this lesson:

Students will identify the primary causes for ocean currents and waves. They will explain how and why ocean currents vary with increasing latitude. Students will explain the cause of the Coriolis effect, and how this effect influences ocean currents. Students will calculate the magnitude of ocean currents, given data from drifter studies.



9: Fish for Fun, Food, and the Future



**Responsible recreational fishing can
benefit ocean conservation.**

Some 12 million Americans enjoy recreational saltwater fishing, according to the National Oceanic and Atmospheric Administration. They range from urban fishers taking their kids out on municipal piers to catch crappie, bass and queenfish for dinner to the owners of powerful deep-sea fishing boats going after big blue-water gamefish such as marlin.

Recreational fishermen and women were among the first to promote conservation of ocean fish and their habitat. Unfortunately, recreational fishers do not always protect the environment and as more and more people are attracted to the sport, they have to continue educating themselves to protect both the fish and their homes waters.



Net Results

Source: PBS.org

Project: Marine Fisheries and Aquaculture Series

Link: www.pbs.org/emptyoceans/educators/activities/net-results.html

In this lesson:

Students will study and replicate a model of the factors affecting fisheries populations in the Chesapeake Bay (or any other bay). Through a game they will investigate how decisions by watermen, recreational fisher people, and lawmakers influence and are influenced by economics and the abundance or scarcity of fish and shellfish stocks.

Also available in .pdf format:

www.pbs.org/emptyoceans/educators/activities/docs/Activity-Net-Results.pdf

No Fishing?

Source: NOAA – Protecting Natural and Cultural Resources

Project: International Collaboration

Link: www.coralreef.noaa.gov/education/educators/resourcecd/lessonplans/resources/no_fishing_lp.pdf

In this lesson:

Students will learn how marine protected areas are used in various countries to protect natural and cultural resources. Students will be able to identify Internet resources containing information on international Marine Protected Area projects. Students will be able to describe a process for evaluating the effectiveness of marine protected areas. Students will be able to explain the relationships between biophysical, socioeconomic, and governance issues in marine protected areas.



Gone Fishin’

Source: My Science Box

Link: www.mysciencebox.org/fishing/lesson (Lesson plan)

www.mysciencebox.org/fishing (Summary with downloads)

In this lesson:

Students will become familiar with the tragedy of the commons – where a limited common resource is overused because each individual person thinks, “If I don’t use this resource first, then somebody else will.” Students in this activity act as fishermen and women who need to share an ocean of fish and take in a catch. Groups soon realize that if they don’t set fishing limits and monitor the fish population, soon there are no fish left in the ocean.

To Fish or Not to Fish

Source: PBS – Jean-Michel Cousteau Ocean Adventures

Project: Exploring the Decision Making Process for Marine Reserve Designations

Link: www.pbs.org/kqed/oceanadventures/educators/pdf/OceanAdv-ToFish.pdf

In this lesson:

Students learn about marine policy. The role-playing game is modeled after a decision-making process that occurred at the Channel Islands National Marine Sanctuary in Santa Barbara, California. In this activity, students will participate as members of the community to discuss resource management. Seven constituencies are represented: sanctuary managers, marine ecologists, squid fishers, lobster fishers, recreational fishing boat captains, recreational fishers and recreational divers.



12: Eat Organic and Vegetarian Foods



Understand the impact of your food choices on the sea.

Every spring, surplus fertilizer and other agricultural chemicals wash down the Mississippi River into the Gulf of Mexico where they encourage the growth of a massive algal bloom. When the algae decay they are fed on by bacteria, which suck the dissolved oxygen out of the water. The lack of oxygen creates a “dead zone” larger than New Jersey that kills every form of sea life that cannot flee its reach.

Similar harmful algal blooms, dead zones and diseases along our coasts are linked to “nutrient” pollution from agricultural chemicals and factory farms. At the same time, factory farming offers little or no benefit in terms of the health and flavor of the meat, fruit, grain and dairy products we consume. Our food choices as consumers can significantly affect these trends.



The Dead Zone

Source: NOAA, US Dept of Commerce, National Marine Fisheries Service

Project: What is the Dead Zone and Who Will Survive the Dead Zone?

Link: www.st.nmfs.noaa.gov/nemo/documents/lessons/Lesson_5/Lesson_5-Teacher's_Guide.pdf

In this lesson:

Students will learn about the effects of nutrients and eutrophication in the ocean. The lecture describes ways that human activities can cause excess nitrogen to enter the water. The formation of “dead zones,” large areas with little to no dissolved oxygen and a virtual absence of marine life, is described. In the activity, students evaluate data to determine when dead zones are forming.

The Dead Zone – A Marine Horror Story

Source: Bridge

Link: www2.vims.edu/bridge/DATA.cfm?Bridge_Location=archive1099.html

In this lesson:

Students will track the Dead Zone using water quality data from the Nutrient Enhanced Coastal Ocean Productivity (NECOP) Program. They will define nutrient loading and hypoxia, and identify the causes of these phenomena. Students will also explain the relationship between dissolved oxygen, water temperature, and nitrogen in marine systems and construct a graph illustrating the "dead zone" in the Gulf of Mexico using dissolved oxygen data from the NECOP research database.

Additional Resources:

Sustainable Table celebrates local sustainable food, educates consumers on food-related issues and works to build community through food, and has a wealth of resources for teachers wanting to examine the differences between factory farming and sustainable farming. For more information, see:

www.sustainabletable.org/schools/teachers/



13: Eat Seafood that's Healthy and Sustainable



Eating the right fish protects your health; eating the wrong fish may leave the plate empty for the next generation.

With a globalized seafood market and growth of aquaculture, we often don't know the origins or environmental implications of what we're eating. Many seafood products are contaminated with ocean pollutants such as mercury.

Julie Packard, Director of the Monterey Bay Aquarium, explains that, "Overfishing is an environmental problem whose solution is in people's hands every time they buy seafood." Pietro Parravano, a commercial fisherman from Half Moon Bay, California, and former president of the Pacific Coast Federation of Fishermen's Associations agrees. "I think the consumer can play an increasingly important role helping fish, fishermen and coastal communities."



Teachers Guide to Sustainable Seafood in the Classroom

Source: Seachoice.org for Healthy Oceans

Project: Educator's Guide to Sustainable Seafood

Link: www.sierraclub.bc.ca/quick-links/publications/SeaChoiceKit_DL_01062011.pdf

In this lesson:

You will find a kit designed to help teachers educate their students about the value of the oceans and marine conservation issues, with a focus on the global fisheries crisis. Students will learn why the ocean is important and why it is in trouble. They will learn how some kinds of fishing can be harmful for the ocean and what sustainable seafood is. Students will also learn how scientists decide which kinds of wild and farmed seafood are sustainable and which ones aren't.

Do You Know the Fish You're Eating?

Source: PBS.org

Project: Marine Fisheries and Aquaculture Series

Link: www.pbs.org/emptyoceans/educators/activities/fish-youre-eating.html

In this lesson:

Students design and conduct research to discover firsthand what type of fish is being sold in their community, where this fish comes from, and whether that fish is an overfished species. This lesson gives students a chance to do their own market research and discover firsthand what type of fish is being sold to the public. It also provides an introduction to fish as an important food source and as an industry controlled partly by supply and demand. The results that emerge from this lesson plan will likely lead your students to question the role of public education in seafood choices for sustainable fisheries.

Also available in .pdf format:

www.pbs.org/emptyoceans/educators/activities/docs/Activity-Know-the-Fish.pdf



Marine Migration

Source: National Geographic Education

Project: Marine Migration

Link: http://education.nationalgeographic.com/education/activity/marine-migration/?ar_a=1

In this lesson:

Students will describe the migratory habits and biogeography of marine animals and explain the ways in which anthropogenic threats impact the migratory habits and biogeography of marine animals. They will learn about the three threats that affect our seafood supply, They will learn about the Census of Marine Life, what types of technologies the scientists are developing and using in their research and some of the outcomes scientists hope to achieve with this research.



15: Conserve Water



Water you save helps to keep clean rivers flowing to the sea.

Climate change, driven by fossil fuel consumption, is increasing the frequency and severity of droughts, flooding and other extreme weather events, which makes fresh water less available. It makes sense to conserve water, even in areas with abundant water supplies because the less water flowing into local septic, sewage, and storm-drain systems, the better our waste facilities can process their loads and reduce polluted runoff into our bays and oceans. Conserving water also saves money and energy.



Water Use and Conservation

Source: Planet H₂O

Project: Water Use and Conservation

Link: www.thirteen.org/h2o/educators_lesson4.html

In this lesson:

Students learn what it means to conserve water. Using an H₂O Diary, students will monitor their family's water use and propose methods for home water conservation. Students will be able to define vocabulary related to water conservation, summarize why all the Earth's water is not drinkable, and discuss the different types of water on Earth. They will also examine and calculate personal water use, formulate a personal water conservation plan and evaluate the effectiveness of their water conservation plan.

Life in a drop of Water

Source: Planet H₂O

Project: Life in a Drop of Water

Link: www.thirteen.org/h2o/educators_lesson5.html

In this lesson:

Students investigate just what lives in a drop of water, appreciating how much life a single water drop can support and how the population can vary depending on whether the drop is from a freshwater lake or a pond, bottled water, or from the tap. Students use microscopes to observe single-cell organisms in water samples and draw conclusions about diseases and water filtration.

Additional Resources:

Surfrider Foundation is an excellent resource for teachers. Their mission is “the protection and enjoyment of oceans, waves and beaches through a powerful activist network”. They have a wealth of relevant information on their website, www.surfrider.org.



16: Conserve Energy to Help the Seas and Yourself



Energy conservation reduces the impact of power plants, which can poison ocean waters and fish.

Many power plants in the United States are still coal-fired. Coal is the oldest and most polluting fossil fuel used to generate electricity. Coal plants release both sulfur dioxide, which causes acid rain, and nitrogen oxide, which creates smog. Coal-generated power plants also release mercury, a neurotoxin that builds up in the flesh of top ocean predators such as tuna and swordfish.

We need to learn about and advocate for clean energy alternatives: wind, solar, biomass, geothermal, and tidal power, as well as hydrogen fuel cells for energy storage.



Global Warming

Source: PBS.org – NOW

Link: www.pbs.org/now/classroom/global-warming-lesson-plan.pdf

In this lesson:

Students will form definitions of the greenhouse effect based on prior knowledge, class discussion, and viewing diagrams. Participate in group brainstorming sessions and class discussions related to the impact of the greenhouse effect and global warming. Analyze global warming diagrams and resources to obtain a clear understanding of this scientific process. Hypothesize about the effects of global warming on the climate and the world's populations. Conduct research using a variety of primary sources to explore perspectives in the global warming debate. Complete a Venn diagram that compares various points of view on global warming issues. Take a position on global warming and support this viewpoint with reasons, facts, and examples gathered during lesson activities. Create a project that supports their point of view about global warming issues.

Climate Curriculum for Teachers

Source: World Wildlife Fund

Project: Climate

Link: www.worldwildlife.org/climate/curriculum/item5944.html

In this lesson:

You will find a high school-level curriculum about climate change. It is divided into fifteen lessons which include handouts, a glossary of terms and additional resources for ongoing discussions and research. Please feel free to use the lesson plans you believe your students will most benefit from.



How Big is Your Footprint?

Source: US Department of Energy

Project: Energy Efficiency and Conservation

Link: www1.eere.energy.gov/education/lessonplans/plans.aspx?id=252

In this lesson:

Students increase their awareness of the impact of their choices on the Earth by studying the ecological footprint concept. They also learn how to calculate the mean, median, mode, and standard deviation of a set of data.

Energy Awareness Quiz

Source: US Department of Energy

Project: Energy Basics

Link: www1.eere.energy.gov/education/lessonplans/plans.aspx?id=250

In this lesson:

Students will identify their level of knowledge about energy issues and calculate the CO₂ emissions caused by their lifestyles. They will then formulate a plan to reduce and/or counteract their emissions. Class discussion follows on issues involved with energy use in the United States and other countries and our role in climate change.



Energy in Today's Global Society

Source: US Department of Energy

Project: Energy Basics

Link: www1.eere.energy.gov/education/lessonplans/plans.aspx?id=311

In this lesson:

Students will create their own innovative resource cards which show them that all fossil fuel-based energy provides many benefits for those that can take advantage of the power, but comes at a high environmental cost. One of these is the enhancement of global climate change by increasing anthropogenic carbon dioxide and methane emissions. Students will weigh these costs and benefits against those of other energy sources. Electricity alternatives include nuclear, hydro, biomass, solar, geothermal, hydrogen fuel cells, and wind. Heating alternatives include geothermal, biomass and solar. Transportation alternatives include biofuels such as ethanol and biodiesel, hydrogen fuel cells, and electric/hybrid engines.

An Exploration of Wind Energy & Wind Turbines

Source: US Department of Energy

Project: Wind Energy

Link: www1.eere.energy.gov/education/lessonplans/plans.aspx?id=317

In this lesson:

You will find both a pre and post test on wind power that engages students by allowing them to explore connections between wind energy and other forms of energy. Students learn about and examine the overall design of a wind turbine and then move forward with an assessment of the energy output as factors involving wind speed, direction and blade design are altered. Students are directed to work in teams to design, test and analyze components of a wind turbine such as blade length, blade shape, height of turbine, etc Student worksheets are included to facilitate the design and analysis process.



Green Fuel

Source: US Department of Energy

Project: Solar Energy

Link: www1.eere.energy.gov/education/lessonplans/plans.aspx?id=310

In this lesson:

Students will explore different methods for collecting solar energy and using that energy for heating, creating electricity and applying that energy to an industrial process. Experimenting with different types of materials will also allow them to understand how the properties of different materials can drastically affect the outcome of their experiment.

Additional Resources:

NOW on PBS has programs related to global warming to inspire discussion, critical thinking and debate.

For more information please go to www.pbs.org/now/classroom/globalwarming.html.

Northern teachers and educators from **ClimateChangeNorth.ca** have developed lesson plans to help high school students understand climate change, its impacts, and possible solutions. For more information please go to www.climatechangenorth.ca/section-LP/C8_P_LessonChart.html



18: Prevent Sea Turtles from Going the Way of Dinosaurs



Taking simple actions and smart vacations can help protect these ancient wanderers.

Seven species of turtles have been swimming and grazing through the world's oceans for 120 million years. Unfortunately, today's sea turtle populations are threatened by a number of human activities. Hotels and houses on or near turtle nesting beaches have reduced their habitat, and artificial lighting disorients new hatchlings.

Turtles also die from ingesting plastic bags, balloons and other garbage. They drown in fishing nets intended for other marine life, are injured by long-line fishing hooks and their eggs and meat are still consumed in some parts of the world. As a result several species, such as the Kemp's Ridley and the Leatherback, the largest turtle in the world are on the brink of extinction.



Introduction to Sea Turtles

Source: SEE Turtles

Project: Get to Know Sea Turtles

Link: www.seeturtles.org/files/115.pdf

This lesson plan introduces students to basic background information of the seven sea turtle species. The main goal of this lesson plan is for students to learn about sea turtles in enough detail to differentiate between species. They will research their general characteristics, size, habitat, nesting habits and migration information and/or population trends.

Sea Turtle Science

Source: Bridge – An Ocean of Free Teacher-Approved Marine Education Resources

Project: Survivor!

Link: www.marine-ed.org/bridge/seaturtlescience.pdf

In this lesson:

Students will identify threats to sea turtle nests, hatchlings, and adults. They will define factors limiting the development and survival of eggs, hatchlings, and adults. Discover characteristics of the nest environment. Investigate the life history stages and habitats of threatened and endangered species. Learn about conservation and protection of threatened and endangered marine species. Discuss percent mortality, survival of the fittest, and management concepts.

Food Webs, Part I

Source: SEE Turtle

Project: Sea Turtle Food Webs

Link: www.seeturtles.org/files/113.pdf

In this lesson, students will:

This lesson plan teaches students the basics of food webs and gives the teacher basic guidelines for the structure of a food web. The teacher will create the specific format they want the students to use when



creating their own food webs. This lesson plan gives three options for differentiation, depending upon the level of the students.

Additional Resources:

SEE Turtle's website has a number of additional resources relating to turtles and their environment. For more information, see: www.seeturtles.org/1352/classroom-resources.html

NOAA Office of Protected Resources has a comprehensive webpage about sea turtles. For more information, see: www.nmfs.noaa.gov/pr/species/turtles/



19: Use Less Plastic



**The plastic that finds its way into the ocean
never stops polluting.**

Plastic food wrappers, single-use bags, balloons, bottles, cigarette filters and packaging, monofilament fishing nets and line, Styrofoam pellets, and other plastic objects make up about 60 percent of the trash found on beaches and about 90 percent of the debris found floating in the world's oceans.

Bits of plastic are absorbed or eaten by marine animals who mistake the pieces for food. While oil spills are a terrible environmental threat, oil is not nearly as destructive as the accumulation of everyday plastic items; oil eventually biodegrades, but plastic lasts forever.

Plastic polymers are broken down into pellets and fine dust in a process called photo degradation. Researchers who have been tracking marine debris believe plastic in the ocean may be one of the most alarming and least known environmental stories of our time.

By reducing demand for plastic and limiting its use to essential purposes we can help save the greater part of our blue planet.



You are what you eat: Plastics and Marine Life

Source: PBS – Jean-Michel Cousteau Ocean Adventures

Link: www.pbs.org/kqed/oceanadventures/educators/pdf/OceanAdv-WhatYouEat.pdf

In this lesson:

Students will learn about animals that live in the ocean and come into contact with discarded plastic. Students will also learn where ten marine species feed in the water column, make connections between where a marine organism lives and feeds and the types of debris to which it is exposed.

Marine Debris: A Legacy of Litter

Source: National Geographic Education

Link: http://education.nationalgeographic.com/education/activity/marine-debris-a-legacy-of-litter/?ar_a=1

In this lesson:

Students will learn about the sources and impacts of marine debris. They participate in a school site cleanup and then compare their findings to international coastal cleanup data. Students will be able to define marine debris and provide a variety of examples, identify sources of marine debris, describe ways that marine debris negatively impacts marine ecosystems and organisms, collect and analyze debris data based on a school site cleanup, explain how humans contribute to and help solve problems associated with marine debris.

Additional Resources:

PBS.org in conjunction with Jean-Michel Cousteau Adventures offers an excellent video, Trash on the spin cycle. To view the video, see: www.pbs.org/kqed/oceanadventures/video/gyre

Plastic Pollution Coalition is an excellent resource. For more information, see: www.plasticpollutioncoalition.org/

5 Gyres conducts research and communicates about the global impact of plastic pollution in the world's oceans and employs strategies to eliminate the accumulation of plastic pollution in the 5 subtropical gyres. For more information, see: www.5gyres.org/

Algalita is a marine research foundation that focuses on the "coastal ocean", specifically on the restoration of disappearing giant kelp forests and the improvement of water quality through the



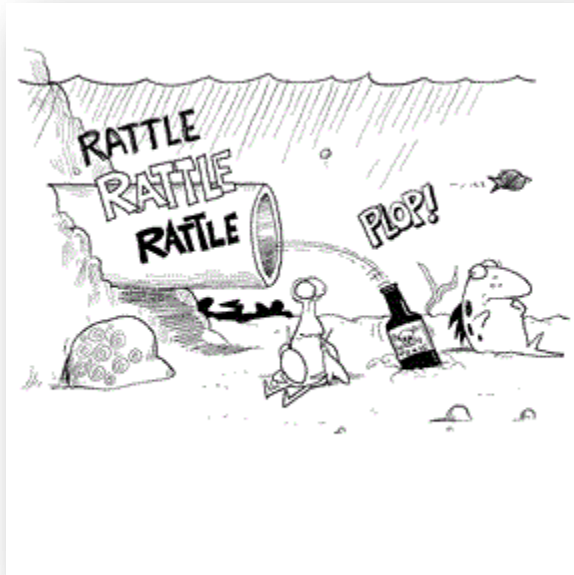
preservation and re-construction of wetlands along the California coast. For more information, see: www.algalita.org/about-us/index.html

NOAA Marine Debris Program offers an excellent webpage on plastic marine debris. For more information, see: www.marinedebris.noaa.gov/info/plastic.html

The Majestic Plastic Bag – A Mockumentary: A 4:00 minute Youtube video narrated by Academy Award-winner Jeremy Irons, this “mockumentary” video hammers home the stark reality of California’s plastic bag pollution situation. See: www.youtube.com/watch?v=GLgh9h2ePYw



23: Keep Your Household Refuse Nontoxic



Chemicals tossed in the garbage find their way into streams, rivers, and eventually the sea.

Many household cleaning products contain toxic chemicals. Lead, mercury and other persistent organic pollutants (POPs) can build up or 'bio-accumulate' in the food chain. Small amounts of these chemicals tossed into the garbage eventually leach out of landfills and into the planet's water system.

Chemical and heavy metal wastes have been linked to increased risks of cancer, birth defects, developmental deficits and neurological diseases. Much of this 'circle of poison' could be eliminated if we'd just begin to replace the toxic chemicals around us with benign and nontoxic alternatives.



Get to the Point

Source: NOAA – Ocean Service Education

Project: Non-point Source Pollution

Link: www.oceanservice.noaa.gov/education/lessons/get_point.html

In this lesson:

Students will describe at least five sources of nonpoint source pollution runoff and identify at least three contaminants likely to be found in urban runoff, and discuss possible sources of these contaminants. Students will also discuss how bioassays may be used to measure toxicity, and describe three examples. Students will compare and contrast toxicity tests and chemical analyses of potential contaminants, and explain how these may be used to identify areas affected by nonpoint source pollution. Students will be able to describe and discuss at least five actions that can be taken to reduce or eliminate contaminated runoff.



24: Drive a Fuel-Efficient Car, Join a Car Pool or Use Public Transit



Tailpipe emissions are a major source of ocean pollution

Our coastal waters are poisoned not only from land-based runoff but also from airborne deposits of nitrogen oxide, a tailpipe pollutant that may account for more than 25 percent of the nitrogen buildup in offshore waters. Fossil-fuel-driven climate change is already affecting the ocean—raising sea levels, water temperatures, water acidity, increasing erosion and storm surges.

While it will be some time before we have pollution-free transportation, it makes sense to drive fuel-efficient vehicles today and to maintain them in ways that reduce their fuel consumption.



Energy and Cars: What does the future hold?

Source: Discovery Education

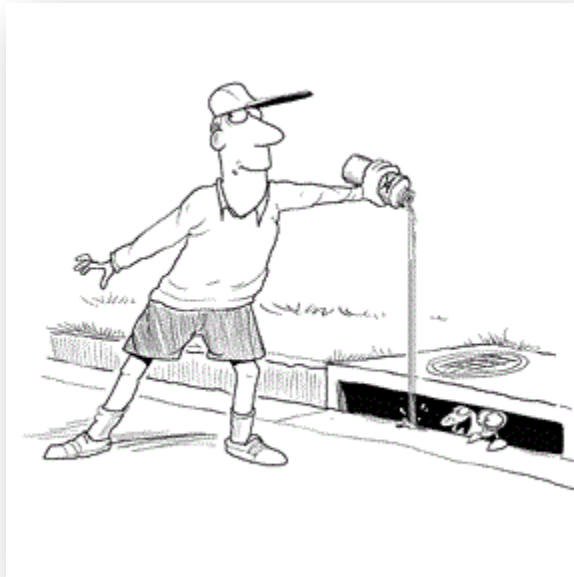
Link: www.discoveryeducation.com/teachers/free-lesson-plans/energy-and-cars-what-does-the-future-hold.cfm

In this lesson:

Students will learn the reasons why attitudes toward fossil fuel use and alternative energy sources may change over the next 50 years. They will learn how changing attitudes toward fossil fuel use and alternative energy sources may affect car technology, will become familiar with the types of alternative energy sources that are currently under research, particularly for use in cars.



25: Don't Use Your Storm Drain as If It Were a Toilet



What goes down the storm drain soon finds its way to the sea

Storm drains flush excess waters from rainstorms, snowstorms and hurricanes into nearby rivers and bays or directly into the sea. People often think that storm drains lead to their local water treatment plant, but most do not.

Some cities have begun to divert part of their storm water to sewage plants for treatment before releasing it into the sea. Others are installing more sophisticated filters on storm drains. Unfortunately, a number of cities that have combined sewage and storm-drain systems find that their waste-treatment plants overflow during heavy rains, adding untreated sewage to the storm water released into local waters.

One obvious way to reduce storm water pollution is to make sure nothing but rainwater goes down your storm drains in the first place.



Where's the Point?

Source: NOAA – Ocean Service Education

Project: Polluted Runoff

Link: www.oceanservice.noaa.gov/education/lessons/wheres_the_point.html

In this lesson:

Students will be able to explain at least five sources of contaminated runoff. This lesson plan examines some of the causes, impacts, and solutions to contaminated runoff. Students will be able to describe at least five impacts that contaminated runoff may have on coastal ecosystems and resources. Students will be able to describe and discuss at least five actions that can be taken to reduce or eliminate contaminated runoff. Students will be able to construct a three-dimensional model of an actual watershed, and use this model to provide information on contaminated runoff to a specific target audience (that is, an audience that causes or is affected by a specific type of runoff pollution).



26: Upgrade Your House Above Hurricane Code



**We can all learn from the lesson of “The Three Little Pigs”:
build your house to withstand disaster.**

Howling winds, driving rains, eroding sands, mudslides, coastal fires, pounding hurricanes and periodic earthquakes are all part of the natural cycle of the shore. If you live by the shore or are rebuilding there, do the necessary research and invest in the proper precautions to protect your property.

Strong foundations and (in zones that frequently flood), elevation are two key elements for securing coastal homes and businesses. By building tough, you’ll not only spare your house but also spare the beach and ocean from piles of wreckage, plastic, propane, automobiles and other debris left in the wake of hurricanes and tsunamis.



Do you Want to Risk it?

Source: NOAA – Ocean Service Education

Project: Hurricanes

Link: www.oceanservice.noaa.gov/education/lessons/hurricanes.html

In this lesson:

Students will define, compare and contrast the terms “risk” and “vulnerability.” This lesson plan covers how coastal residents plan for the potential effects of natural hazards. Students will determine the history of natural disaster events for a given county. Students will discuss the relative risk from natural hazard events for selected counties based on the history of such events. Students will discuss the impact of population increase on risk from natural hazards. Students will use a geographic information system to investigate storm-related risks to specific facilities in a given community

Images of Katrina

Source: NOAA – Ocean Service Education

Project: Hurricane Damage Assessment

Link: www.oceanservice.noaa.gov/education/lessons/katrina.html

In this lesson:

Students will use maps and online data resources to locate the specific geographic areas included in aerial photographs. Students will use aerial photographic imagery to assess some impacts of Hurricane Katrina. This lesson plan covers how aerial photographs can be used to quickly assess damage from a major natural disaster such as Hurricane Katrina.

Additional Resources:

Blue Frontier offers a collage of photos from Katrina. See:

www.flickr.com/photos/bluefront/sets/72157625128655037/



28: Protect Our Waters from Invasive Organisms (Exotic Critters)



One of the greatest rapidly growing threats to our waters is the introduction of non-native plants, animals, and microorganisms.

Invasive aquatic species have taken up residence in United States waters and have eaten, displaced, spread disease to, or otherwise threatened native creatures and their habitats. Most invasive creatures are released from commercial ships' ballast waters. Large ships take in water for stability before a voyage then release this ballast water when they reach their port of destination.

Commercial ships are not the only contributors to this problem; small boat operators, fishermen, divers, pet owners, aquarium owners, travelers and even seafood lovers also introduce invasive species into our waters. There are many ways we can help reduce this problem.



Alien Invasion

Source: NOAA – Ocean Service Education

Project: Invasive Species

Link: www.oceanservice.noaa.gov/education/lessons/alien_invasion.html

In this lesson:

Students will be able to define, compare, and contrast invasive species, alien species, and native species. Students will be able to describe at least three problems that may be associated with invasive species. Students will be able to describe at least three invasive species, explain how they came to be invasive, and discuss what can be done about them. This lesson plan covers invasive species, what they are, why they are a problem, and what can be done about them.

Ballast and Invasive Species on the Great Lakes

Source: Great Lakes Maritime Research Institute

Project: Transportation

Link:

www.wupcenter.mtu.edu/education/great_lakes_maritime/2007/Lessons/Ballast_and_Invasive_Species_Ojala.pdf

In this lesson:

Students will learn about invasive species of the Great Lakes Region and address the impact of ballast water as a vector of transmitting invasive species to the Great Lakes Region and presents an opportunity for students to investigate government(s) regulations regarding ballast water in the Great Lakes.

Additional Resources:

The US Coast Guard has additional information on ballast water management. For more information, see: www.uscg.mil/hq/cg5/cg522/cg5224/bwm.asp

USGS Southeast Ecological Center has additional information about non-indigenous aquatic species. For more information, see: www.invasivespeciesinfo.gov/resources/educk12.shtml

NOAA's Ocean Service Education department offers a number of high school lesson plans on invasive species. These excellent lesson plans come from a variety of sources. For more information, see: www.oceanservice.noaa.gov/education/stories/lionfish/teachers.html



30: Support Your Local Wetlands



**Swamps are the filters, shelters, and nurseries of the sea;
they are also highly effective storm barriers.**

For generations, coastal wetlands were perceived as dank and dangerous swamps, home to snakes and alligators. Since World War Two, more than 50 million acres of farmland have been paved over by urban and suburban development, while more than 53 million acres of wetlands have been filled in for agricultural use. More than half of the United States' wetlands have been destroyed by development.

The loss of wetlands for agricultural and housing development seemed like a good tradeoff until scientists began to understand the significance of our wetlands. Wetlands act as storm barriers, recharge aquifers and filter pollution, while coastal wetlands provide vital habitat for juvenile fish and shellfish. It is imperative we save and restore the wetlands that still exist.



The Fragile Fringe

Source: USGS – National Wetlands Research Center

Project: Loss of Wetlands: Subsidence

Link: www.nwrc.usgs.gov/fringe/subsiden.html

In this lesson:

Students will be introduced to global warming and sea-level rise as factors in wetland loss, define subsidence and demonstrate the resulting effects on wetlands.

Dirty Mud

Source: NOAA- Ocean Service Education

Project: Sediment Contamination

Link: www.oceanservice.noaa.gov/education/lessons/dirty_mud.html

In this lesson:

Students will identify specific types of wetland habitats and land uses in a watershed. This lesson plan covers how scientists analyze complex scientific data and geographic information to plan projects to restore environmental resources damaged by pollution. Students will explain how data on chemical contaminants, land uses and habitat types can be integrated to develop restoration plans for environmental resources damaged by pollution. Students will use a geographic information system to retrieve and analyze data about specific benthic marine habitats.



31: Restore a Stream, River, or Watershed



**Healthy, flowing waters help assure thriving
coasts and oceans.**

Water is in a constant flow from the sea to the sky, through evaporation, then to the mountains; through precipitation as rain, sleet and snow; and then back to the sea, following gravity in the worlds streams and rivers.

As thousands of rivers and streams empty into our coastal seas, they can add to either the health or the decline of our living ocean, depending on their own health.



Eyes on the Estuaries

Source: NOAA – Ocean Service Education

Project: Monitoring Estuaries

Link: www.oceanservice.noaa.gov/education/lessons/eyes_on_estuaries.html

In this lesson:

Students will retrieve and interpret data on the distribution of selected estuarine animals at various stages in the life history of these animals and relate these distributions to salinity conditions. Students will compare the distribution of selected species in two or more estuaries, and to draw inferences about the ecology of these estuaries. This lesson covers how we can monitor and compare living resources in U.S. estuaries.

Watersheds and Wetlands

Source: My Science Box

Project: Wetlands Science

Link: www.mysciencebox.org/wetlands/lesson

In this lesson:

Students will build a watershed, add a wetland and then add toxic waste. Students will learn about watersheds and wetlands, and what can we do to help them thrive. This activity should clearly illustrate how a single event in one location can affect a very large area and affects all downstream water users including wildlife in the marsh and the bay. Students will observe that while a wetland can soak up some pollution, some will also leak through into the bay. Can it be cleaned up once it gets into the water? Emphasize that although a waste spill is far more dramatic, urban non-point source pollution accounts for the vast majority of the pollution in most watersheds.

Additional Resources:

Youtube video - Four Things Everyone Needs to Know about Sharks.

www.dhp.disl.org/PDFs/TeachersResor/ACTIVITY%20SHEET%209-12.pdf



32: Live a Reasonable Distance from the Beach



Your commonsense precautions can keep your home from being destroyed and demonstrate how to live in harmony with the sea.

Building on barrier islands, on beaches, or on filled-in wetlands and salt marshes not only puts your home and family at risk, but also contributes to the degradation of coastal ecosystems that normally act as storm barriers and nurseries of the sea.

Coastal living can be a great experience as long as you build and buy with great respect for the natural processes of the coast.



I'll Stay Here if it Kills Me

Source: NOAA – Ocean Service Education

Project: Coastal Decision-Making

Link: www.oceanservice.noaa.gov/education/lessons/if_it_kills_me.html

In this lesson:

Students will be able to identify and discuss four components of “human dimensions” involved in coastal decision-making. Students will be able to describe a process to build public support for coastal resource protection and will be able to explain why this support is important. Students will be able to describe at least three perspectives that exist among different groups of stakeholders regarding a specific coastal resource issue. This lesson plan covers how and why different perspectives should be considered when deciding how to use and protect coastal resources.

Get Smart

Source: NOAA – Ocean Service Education

Project: Smart Growth

Link: www.oceanservice.noaa.gov/education/lessons/get_smart.html

In this lesson:

Students will be able to describe the concepts of sustainability and Smart Growth. Students will be able to identify at least three benefits that may be expected from Smart Growth. Students will be able to discuss at least three different perspectives on Smart Growth that might be found among stakeholders in a coastal community. This lesson plan covers the advantages smart growth has, compared to other approaches to community development.



33: Count the Fish: Then Do Some Light Housekeeping for Them



Dive for science, conservation and adventure.

For centuries, scientists and naturalists have studied and counted terrestrial creatures and their habitats to better understand the world. But it was only on 1992 that Dr. Gary Davis, a scientist with the Channel Islands National Park in California established the Great Annual Fish Count (GAFC) as a way to encourage sports divers to report their fish sightings.

Today the fish count takes place every year in a wide variety of locations from Hawaii to Canada. Underwater Clean-Up Volunteers also use mesh bags to collect sunken trash and abandoned fishing gear and sometimes use air-filled lift bags to remove heavy items such as truck tires from deep water.



Management of Coral Reefs

Source: NOAA – Coral Reef Management

Project: Keeping watch on coral reefs

Link: www.coralreef.noaa.gov/education/educators/resourcecd/lessonplans/resources/keeping_watch_lp.pdf

In this lesson:

Students will be able to identify and explain five ways that coral reefs benefit human beings. Students will be able to identify and explain three major threats to coral reefs. Students will be able to describe major components of the Coral Reef Early Warning System. Students will be able to identify and discuss actions that can be undertaken to reduce or eliminate threats to coral reefs. Students will be able to obtain and analyze several types of oceanographic data from remote-sensing satellites. This lesson plan covers why coral reefs are important, and what can be done to protect them from major threats.

Additional Resources:

Reef Environmental Education Foundation (REEF) coordinates the event, The Great Annual Fish Count (GAFC) that mobilizes and trains volunteer divers and snorkelers in established methodologies to identify and document fish diversity and population trends in marine ecosystems. For more information, see: www.fishcount.org/



34: Protect the Dunes So They'll Protect Us



Sand dunes protect the beach naturally, provided they aren't damaged or removed.

Coastal sand dunes are created and shaped by wind and tide. Sands deposited by rivers and offshore currents build them into physical barriers that protect the coastline and inland areas from saltwater intrusion and erosion while absorbing wave energy in ways that keep the soft beach from washing away.

Beaches, barrier islands and coastal sand dunes are dynamic, changing natural systems. Like geology with the fast-forward button always on, they change with weather, tides and storms. Human construction impairs the health of the dunes. We need to work for the protection and restoration of existing sand dunes, along with wetlands and other natural storm barriers.



Who Moved the Beach?

Source: NOAA – Ocean Service Education

Project: Shoreline Erosion

Link: www.oceanservice.noaa.gov/education/lessons/who_moved_the_beach.html

In this lesson:

Students will identify coastal erosion as a natural process, and explain how human activity can increase the risks associated with coastal erosion. Students will identify options for reducing risks caused by coastal erosion, and discuss the advantages and problems associated with these options. Students will analyze and interpret beach elevation data, and make inferences from these data about the relative vulnerability of different beaches to coastal erosion. This lesson covers the primary causes and impacts of coastal erosion, and how human communities should respond to this process.



37: Work to Create Wilderness Parks under the Sea



**Help to fully protect our last great frontier
wilderness and wildlife range.**

Marine sanctuaries offer tremendous recreational opportunities, but they function like national forests, where logging and other industrial activities still take place, rather than like national parks where wilderness is fully protected.

In the 1990's, marine scientists suggested that as much as 20 percent of the ocean needed to be set aside as no-take zones (or marine protected areas) if we hope to maintain the diversity of life that exists on our blue-ocean planet. Presently less than 0.1 percent of the world's oceans are protected as wilderness areas.



Marine Ecosystem Invention

Source: National Geographic Education

Project: Creating a Marine Ecosystem

Link: http://education.nationalgeographic.com/education/activity/marine-ecosystem-invention/?ar_a=1

In this lesson:

Students will create a marine ecosystem and describe the adaptive, trophic, and symbiotic relationships between the biotic and abiotic components of the ecosystem. Students will be able to describe the abiotic and biotic components of a marine ecosystem and list several marine organisms and explain their trophic relationships using a food web. Students will also be able to describe the adaptations and niches of several marine organisms, as well as predict the effects abiotic changes or trophic imbalances might have upon an ecosystem as a whole.

Marine Protected Areas: Case Studies

Source: National Geographic Education

Project: How are Marine Protected Areas Classified?

Link: http://education.nationalgeographic.com/education/activity/marine-protected-areas-case-studies/?ar_a=1

In this lesson:

Students will compare and contrast two MPA's by evaluating case studies. Then they learn how the MPA classification system works in the United States and apply that system to the MPA case studies. Students will be able to compare and contrast two different Marine Protected Areas and identify characteristics for classifying Marine Protected Areas. Students will also explain the importance of classifying Marine Protected Areas and describe different management practices based on the type of Marine Protected Area.



Marine Protected Area: Stakeholder Debate

Source: National Geographic Education

Project: How are different stakeholders affected by or involved in decisions about Marine Protected Area (MPA) designation?

Link: http://education.nationalgeographic.com/education/activity/marine-protected-area-stakeholder-debate/?ar_a=1

In this lesson:

Students will read a Merritt Island National Wildlife Refuge case study. They consider the location for extended Marine Protected Area (MPA) designation, determine stakeholders, and debate pros and cons of establishing in as a MPA. Students will be able to describe the pros and cons of establishing a new MPA site and identify stakeholders in the MPA designation process. Students will assume a stakeholder's position and engage in a discussion to support or oppose an MPA designation plan. Students will also describe the impacts of establishing Marine Protected Areas from different stakeholder perspectives

Additional resources:

National Geographic Education has excellent information about Marine Protected areas and conservation and management of the oceans. For more information, see http://education.nationalgeographic.com/education/news/marine-protected-areas/?ar_a=1



40: Keep Oil off Our Shore



We can develop ocean-friendly sources of energy on and off the water.

A new anti-oil coalition brings together conservationists and scientists concerned about the threat of fossil-fuel-driven global warming and politically concerned citizens worried about the nation's growing dependence on Middle Eastern oil suppliers, some with links to terrorism. These activists have begun to advocate for new non-carbon energy alternatives.

Energy policy decisions that will affect our ocean, climate, weather, water and food supply are too important to leave to the politicians and the energy industry alone, so let's get involved in the future of our country's energy sources.



To Drill or Not to Drill

Source: Earthday Network

Project: An Examination of the Reliance and Risk

Link: www.eeweek.org/assets/files/EDN%20Ocean%20and%20Oil%20Spill/To_Drill_or_Not_to_Drill.pdf

In this lesson:

Students will examine how much oil was spilled into the Gulf and then perform an assessment activity involving specific details about the reliance and risk of oil extraction from the ocean. This lesson will also provide students with an opportunity to further explore the multifaceted debate surrounding oil drilling. Students will be evaluated on their ability to develop and demonstrate informed opinions on the various economic and environmental issues related to oceanic oil drilling. This lesson plan seeks to impart scientific and historical knowledge surrounding the recent Gulf of Mexico oil spill in addition to other past spills.

Goo-b-Gone: Cleaning Up Oil Spills

Source: Science Buddies

Project: Cleaning Up Oil Spills

Link: www.sciencebuddies.org/science-fair-projects/project_ideas/EnvEng_p025.shtml?from=ParentsGirlScouts

In this lesson:

Students will compare the absorptive properties of different materials (sorbents) used for cleaning up an oil spill to discover which ones are best at removing oil from water.



46: Learn How to Navigate and Read the Tides



**Understanding the movement of the ocean
keeps us safe and connected.**

Tides reflect the regular rising and falling of the ocean's surface caused by forces of gravity beyond the earth, mainly the gravitational field of the moon, but secondarily that of the sun. Tides change not only in depth, but also in the direction of their currents.

Navigating the waters between the tides has been one of the great challenges for ocean explorers so they could accurately chart their courses. While navigational charts are going digital and hand-held satellite global positioning systems (GPS) can tell you within feet your position on earth, learning basic navigation and sailing skills early will give you a powerful edge in living well with and on the seas.



The Moon Made Me Do it

Source: NOAA – Ocean Service Education

Project: The Moon's Effect on Organisms

Link: www.oceanservice.noaa.gov/education/lessons/moon_made_me.html

In this lesson:

Students will discuss some of the effects in living organisms that have been attributed to lunar cycles, and explain in general terms how these effects might be produced. Students will describe investigations that could be done to determine whether lunar cycles affect specific phenomena in living organisms. This lesson plan covers the effects lunar cycles have on living organisms. Students will explain forces that cause and affect tides.

Ups and Downs

Source: NOAA – Ocean Education Service

Project: What Causes Tides?

Link: www.oceanservice.noaa.gov/education/lessons/ups_downs.html

In this lesson:

Students will 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 describe how tides affect our lives and explain the importance of monitoring tides. This lesson plan covers the causes of tides and tidal currents. Students will explain and model forces that cause and affect tides.



Plot Your Course

Source: NOAA Ocean Science Education

Project: Marine Navigation

Link: www.oceanservice.noaa.gov/education/lessons/plot_course.html

In this lesson:

Students will determine distance and direction between selected features on a nautical chart. Students will identify obstacles to navigation on a nautical chart. Students will also identify the characteristics of common aid to navigation described on a nautical chart.

Teachers Notes for Navigating by the North Star

Source: Science-Teachers.com

Project: Navigation

Link: www.science-teachers.com/space/NorthStarTeacher.htm

In this lesson:

Students will look at how sailors used the North Star to navigate the open ocean. Students make a sextant out of classroom materials and measure the angle of elevation of the North Star to determine their own latitude.



48: Go on a Live or Virtual Ocean Expedition



You can be part of ocean science exploration that is helping to preserve our last frontier.

Students and everyday citizens can now observe and participate in scientific projects across the globe. You can join an expedition aboard a Russian icebreaker or deep-diving submersible in the Arctic, or visit Antarctica, and the deepest parts of the ocean as a tourist (for huge sums of money).

Numerous marine conservation science projects, ranging from Australia's Great Barrier Reef to the coast of Maine seek volunteers. If these are not options, go on one of many virtual expeditions including real-time ocean science relayed from research vessels, underwater observatories, even an underwater habitat off the Florida Keys.



Ocean Exploration

Source: NOAA – Ocean Explorer

Project: Designing Tools for Ocean Exploration

Link: www.oceanexplorer.noaa.gov/explorations/deepeast01/background/education/dehslessons1.pdf

In this lesson:

Students will understand the technological applications and capabilities required for ocean exploration. Students will understand the importance of teamwork in scientific research projects. Students will develop abilities necessary to do scientific inquiry. This lesson plan covers the types of tools and technology used in ocean exploration. Students will understand the complexity of ocean exploration.

Underwater forensics

Source: Discovery Education

Project: Underwater Forensics

Link: www.discoveryeducation.com/teachers/free-lesson-plans/underwater-forensics.cfm

In this lesson:

Students will discover how a team of scientists uncover the facts about a shipwreck. Students will describe the roles of scientists and technicians on an underwater forensics team, research a shipwreck and demonstrate understanding of why such incidents occur.

Additional Resources:

Use **Google Earth**'s newest application, Google Ocean to explore the depths of the ocean with your students. See: www.earth.google.com/ocean/



50: Be a Seaweed Rebel



**A marine grassroots movement of concerned citizens—
a “seaweed” upsurge—can help you fight for healthy,
bountiful seas.**

A seaweed rebel is a grassroots member of the solutions-oriented marine movement who works for a healthy ocean, coasts and waterways.

Students can become Seaweed Rebels by routinely practicing any of these 50 Ways to Save the Ocean. Have them tell their friends and families about how they can help save the ocean. Invite them to get involved in a group that practices ocean saving activities in your area, or read the book.

For information on over one thousand “seaweed” groups working on ocean and coastal conservation issues in various states, and to find your local group, visit the Blue Movement Directory online at www.bluefront.org.

