Teachable Science: Ocean Edition
June 14-15, 2012
Lathrop E. Smith Environmental Education Center

Ocean Resources

**NOAA Education**
NOAA Education Homepage
http://www.education.noaa.gov/
http://www.education.noaa.gov/about.html

NOAA Fisheries Protected Resources (sea turtles, marine mammals...)
http://www.nmfs.noaa.gov/pr/education/kids.htm
http://www.fpir.noaa.gov/PRD/prd_outreach_education1.html

NOAA National Centers for Coastal Ocean Science http://coastalscience.noaa.gov/education/

NOAA National Marine Sanctuaries
http://sanctuaries.noaa.gov/education/welcome.html
http://sanctuaries.noaa.gov/education/teachers/curriculum.html
http://sanctuaries.noaa.gov/education/teachers/

NOAA National Ocean Service: http://oceanservice.noaa.gov/education/
Lesson Plan Library: http://oceanservice.noaa.gov/education/lessons/welcome.html

NOAA Ocean Explorer
http://oceanexplorer.noaa.gov/edu/welcome.html
http://oceanexplorer.noaa.gov/edu/lessonplans/lessonplans.html
http://oceanexplorer.noaa.gov/edu/guide/welcome.html
http://oceanexplorer.noaa.gov/gallery/gallery.html
http://oceanexplorer.noaa.gov/edu/materials.html
http://oceanexplorer.noaa.gov/explorations/03portland/background/edu/edu.html

NOAA Ocean Research & Exploration: http://www.oar.noaa.gov/education/
http://www.oar.noaa.gov/k12/

NOAA Ocean Service Education
http://oceanservice.noaa.gov/education/literacy.html

NOAA Office of Ocean Exploration and Research
http://oceanexplorer.noaa.gov/edu/welcome.html

NOAA Olympiad: National STEM Competition Resources
http://www.education.noaa.gov/Special_Topics/Science_Olympiad.html

NOAA Primarily for Teachers: http://www.education.noaa.gov/teachers.html
NOAA Science on a Sphere:  http://sos.noaa.gov/What_is_SOS/index.html

NOAA Curriculum
NOAA Estuaries 101:  http://estuaries.noaa.gov/Teachers/Home.aspx


**Portals and Bibliographies for the Ocean**

The Bridge -- An ocean of teacher-approved marine education resources http://web.vims.edu/bridge/?svr=www

EPA Educational Resources:  http://www.epa.gov/students/teachers.html

Federal Resources for Educational Excellence Lesson Plans (search for more!) http://free.ed.gov/subjects.cfm?subject_id=50&toplvl=47&res_feature_request=1


For Kids and Educators (NOAA):  http://celebrating200years.noaa.gov/edufun.html

Maryland Department of Natural Resources Complete List of Resources for Educators http://www.dnr.state.md.us/education/completelist.asp


NOAA and You http://celebrating200years.noaa.gov/edufun/activities.html

NOAA Year of Science:  http://oceanservice.noaa.gov/education/yos/welcome.html


Southwest Fisheries Science Center Resource Guide for Teachers of Marine Science http://swfsc.ucsd.edu/BIBLIOGRAPHY/GUIDE.htm

**Educational Sites: Ocean Literacy**

Ocean Literacy  *(Highly Recommended!)* http://oceanliteracy.wp2.coexploration.org/

Bay Backpack:  http://www.baybackpack.com/
Beyond Weather: http://beyondweather.ehe.osu.edu/

The Bridge – Resources for Marine Educators: http://web.vims.edu/bridge/?svr=www


Centers for Ocean Sciences Education Excellence *(Highly Recommended!)*
http://www.cosee.net/
http://www.cosee.net/resources/educators/

Chesapeake Bay Field Guide: http://www.chesapeakebay.net/fieldguide

The Chesapeake Bay Foundation: http://www.cbf.org/
http://www.cbf.org/page.aspx?pid=328 (Resources for Teachers)

ChesSIE (Chesapeake Science on the Internet for Educators)
http://www.bayeducation.net/

Environmental Concern: http://www.wetland.org/

EPA http://water.epa.gov/type/wetlands/index.cfm
Kids Pages http://water.epa.gov/learn/kids/index.cfm


GLOBE (Global Learning and Observation to Benefit the Environment): www.globe.gov


Maryland Association for Environmental and Outdoor Education (MAEOE):
http://www.maeoe.org/

Maryland Department of Natural Resources—Aquatics
http://www.dnr.state.md.us/education/envirothon/aquatics.html

Maryland Department of Natural Resources “Be Part of Something Big!” Curriculum
http://www.dnr.state.md.us/education/are/big.asp

Maryland Department of Natural Resources Education
http://www.dnr.state.md.us/education/

Maryland State Department of Education Ocean Education Resources
http://www.msde.maryland.gov/MSDE/programs/environment/oceanscience.htm?WBCMODE=PresentationUnpublish%25

Monterey Bay Aquarium: http://www.montereybayaquarium.org/

Montgomery County Public Schools Outdoor Environmental Education Program (OEEP)
http://www.montgomeryschoolsmd.org/curriculum/outdoored/
Museum of Science: Oceans: http://www.mos.org/oceans/

The National Aquarium in Baltimore and Washington, D.C.  
http://www.aqua.org/

National Geographic Society Oceans Alive  
http://www.nationalgeographic.com/xpeditions/lessons/15/g68/seatoshiningsea1.html  
http://oceana.nationalgeographic.com/ocean/

National Marine Educator’s Association (NMEA):  
http://www.marine-ed.org/  
http://www.marine-ed.org/bridge/four.html (Grade 4)

National Science Teachers Association: http://www.nsta.org


NOAA: See “NOAA Education” section, above

NOAA Learning Objects: http://www.montereyinstitute.org/noaa/

North American Association for Environmental Education  
http://eelinke.net/pages/EE-Link+Introduction

Ocean Facts: http://oceanservice.noaa.gov/facts/welcome.html

Ocean Planet: Smithsonian traveling exhibit http://seawifs.gsfc.nasa.gov/ocean_planet.html

River of Words Art and Poetry Contest: http://riverofwords.org/contest_rules.html

The Science Education Resource Center at Carleton College:  
http://serc.carleton.edu/index.html  
Teach the Earth: http://serc.carleton.edu/teachearth/index.html  
K-12 Science http://serc.carleton.edu/k12/index.html

Scripps Institution of Oceanography, Birch Aquarium  
http://aquarium.ucsd.edu/Education/Learning_Resources/

SEA: Service Education Adventure:  
http://www.serviceeducationadventure.org/curricula.php

The Smithsonian Ocean Portal: http://ocean.si.edu

Teach Ocean Science: http://www.teachoceanscience.net/

U.S. Fish & Wildlife Service: http://www.fws.gov/educators/S_habitat.html  
Their National Wetlands Inventory: http://www.fws.gov/wetlands/


Virginia Department of Education "Lessons from the Bay" (Tip: See also the "Resources" section for each Bay lesson plan!)

Virginia Department of Environmental Quality Ideas and Resources for Educators and Students Aquatic Stewardship
http://www.deq.state.va.us/Portals/0/DEQ/ConnectwithDEQ/EnvironmentalInformation/VirginiaNaturally/AquaticStewardshipWeb.pdf

Woods Hole Oceanographic Institution: http://www.whoi.edu/main/k-12

**Habitats and Ecosystems**

**Coral Ecosystems**
http://www.education.noaa.gov/Marine_Life/Coral_Ecosystems.html
Coral photos: http://www.photolib.noaa.gov/reef/
http://coralreef.noaa.gov/education/educators/resourcecd/lessonplans/
http://coralreef.noaa.gov/education/educators/resourcecd/activities/
http://coralreef.noaa.gov/education/educators/
http://coralreef.noaa.gov/education/

**Estuaries**

EPA - National Estuary Program: http://www.epa.gov/OWOW/estuaries/list.htm
NOAA Estuaries 101
http://estuaries.noaa.gov/Teachers/Home.aspx
NOAA Estuaries Discovery Kit
http://oceanservice.noaa.gov/education/tutorial_estuaries/welcome.html
http://chesapeakebay.noaa.gov/habitats
Life in the Estuary: http://www.education.noaa.gov/Marine_Life/Life_In_An_Estuary.html
National Estuarine Research Reserve System: http://cdmo.baruch.sc.edu/
http://oceanservice.noaa.gov/education/kits/estuaries/supp_estuaries_roadmap.html
Education in the National Estuarine Research Reserve System:
http://nerrs.noaa.gov/Education.html

**Fish/Fishing/Seafood**

Alaska Fisheries Science Center Education and Outreach
http://www.afsc.noaa.gov/education/Activities/seafood_intro.html
http://www.afsc.noaa.gov/sep/SEPHome.htm

Alearn
Tons of lesson plans and activities related to fishing/aquaculture
http://www.aces.edu/dept/fisheries/education/lessonplans.php

Elizabeth W. North Education and Outreach
http://northweb.hpl.umces.edu/education_outreach/education_outreach.htm

Fishing for Ocean Facts: http://www.fi.edu/fellows/fellow8/dec98/quiz.html

FishWatch: http://www.fishwatch.gov/
From Physics to Fish: a short movie about how the physical environment affects striped bass in the Chesapeake Bay
http://www.teachoceanscience.net/teaching_resources/education_modules/fish_and_physics/get_started/

From Snails to Whales
http://snails2whales.blogspot.com/2011/07/day-4-striped-bass-anatomy-lesson.html

NOAA Sea Grant Seafood Sustainability Education:
http://www.seagrant.noaa.gov/focus/sss_page.html

PBS Fishing for the Future
http://www.pbs.org/emptyoceans/educators/activities/fishing-for-the-Future.html

PBS Marine Fisheries and Aquaculture
http://www.pbs.org/emptyoceans/educators/activities/net-results.html

Sharks
http://na.nefsc.noaa.gov/sharks/

Striped Bass
http://www.massaudubon.org/saltmarsh/striper/
http://northweb.hpl.umces.edu/education_outreach/education_outreach.htm
http://www.teachoceanscience.net/teaching_resources/education_modules/fish_and_physics/get_started/

Sustainable Seafood
http://sanctuaries.noaa.gov/education/teachers/pdfs/sustain_seafood_lesson2.pdf

Protected Resources (Sea Turtles, Marine Mammals...)
http://www.nmfs.noaa.gov/pr/education/teachers.htm

Marine Mammals – whales, dolphins, seals, and more!
http://nmml.afsc.noaa.gov/education/
http://www.education.noaa.gov/Marine_Life/Marine_Mammals.html

Sea Turtles
http://www.education.noaa.gov/Marine_Life/Sea_Turtles.html
http://www.nmfs.noaa.gov/pr/education/turtles.htm
http://galveston.ssp.nmfs.gov/seaturtles

Water Cycle
Beyond Weather: http://beyondweather.ehe.osu.edu/
http://ga.water.usgs.gov/edu/watercycleoceans.html
http://www.education.noaa.gov/Freshwater/Water_Cycle.html
Video:  
http://ia600402.us.archive.org/12/items/AP_Environmental_Sci_NOAA_Lesson_07/lesson07.html

Freshwater:  http://www.education.noaa.gov/Freshwater/

**Weather and Climate (see also “Observations” section, below)**
Beyond Weather (Climate)
http://beyondweather.ehe.osu.edu/

Changing Seasons
http://www.education.noaa.gov/Climate/Changing_Seasons.html

Climate Change Lessons
http://www.climate.gov/#climateWatch

Climate
http://www.climate.gov/#education
http://www.climate.gov/#education/teaching
http://www.education.noaa.gov/Climate/Climate_Change_Impacts.html
http://www.education.noaa.gov/Climate/
http://www.research.noaa.gov/climate/t_modeling.html
Southeast Regional Climate Center:  http://www.sercc.com/education
Earth System Research Laboratory:  http://www.esrl.noaa.gov/gmd/education/lesson_plans/
Stratosphere:  UV Index  http://www.cpc.ncep.noaa.gov/products/stratosphere/uv_index/
NGDC Paleoclimatology Education and Outreach:  
http://www.ngdc.noaa.gov/paleo/primer.html
http://www.ngdc.noaa.gov/paleo/education.html

Weather (NOAA)
http://www.nws.noaa.gov/om/
http://www.nws.noaa.gov/om/reachout/index.shtml
http://www.nws.noaa.gov/om/edures.shtml
http://www.education.noaa.gov/Weather_and_Atmosphere/
http://www.crh.noaa.gov/lmk/?n=general_glossary
http://www.education.noaa.gov/sweather.html
http://www.education.noaa.gov/Weather_and_Atmosphere/Weather_Systems_and_Patterns.html
http://oceanservice.noaa.gov/education/pd/living_weather/
http://www.nws.noaa.gov/os/educ/links.shtml
http://www.swpc.noaa.gov/Education/index.html
http://www.nws.noaa.gov/om/reachout/kidspage.shtml
http://www.nssl.noaa.gov/edu/lessons/
NOAA Earth Activity Book for Student and Family Fun:  
http://weather.about.com/od/lessonplanshighschool/qt/noaabook.htm
Weather Satellites:  http://www.weather.gov/satellite?image=ir

Weather (other organizations)
American Meteorological Society: http://www.ametsoc.org/amsedu/

Drought
http://drought.unl.edu/DroughtforKids.aspx

El Nino/La Nina
http://www.education.noaa.gov/Weather_and_Atmosphere/El_Nino.html
http://www.elnino.noaa.gov/lanina.html
La Nina Page from the Climate Prediction Center:
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/
El Nino Frequently Asked Questions from AOML:
http://www.aoml.noaa.gov/general/enso_faq/

Hurricanes
http://www.nhc.noaa.gov/

Jet Stream
http://www.srh.noaa.gov/jetstream/
http://www.srh.noaa.gov/jetstream//append/lessonplans.htm

Storms
http://oceanservice.noaa.gov/education/lessons/storm_watch.html
http://www.nssl.noaa.gov/edu/
National Severe Storms Laboratory Weather Room http://www.nssl.noaa.gov/edu/
Frequently Asked Questions: http://www.spc.noaa.gov/faq

Ocean Features (Geo-Physical/Oceanography)
Deepwater Caves
http://oceanexplorer.noaa.gov/explorations/11bermuda/background/edu/lessonplans.html

Earth Systems
http://www.esrl.noaa.gov/gmd/obop/mlo/educationcenter/educationcenter.html
http://www.esrl.noaa.gov/gmd/obop/mlo/educationcenter/teachers/lessonplans.html

Mountains in the Sea
http://oceanexplorer.noaa.gov/explorations/03mountains/background/education/education.html

Ocean Currents
http://oceanservice.noaa.gov/education/kits/currents/supp_currents_roadmap.html
http://archive.org/details/AP_Environmental_Sci_NOAA_Lesson_08
Video:
http://ia600303.us.archive.org/21/items/AP_Environmental_Sci_NOAA_Lesson_08/lesson08.html
About water levels, tides, and currents: http://co-ops.nos.noaa.gov/about2.html

Ocean Floor
http://www.education.noaa.gov/Ocean_and_Coasts/Ocean_Floor_Features.html
Oceans and Coasts: http://www.education.noaa.gov/tocean.html
http://www.education.noaa.gov/Ocean_and_Coasts/
Plate Techtonics
http://oceaneplorer.noaa.gov/edu/learning/1_plate_tectonics/plate_tectonics.html
Tides: http://oceanservice.noaa.gov/education/tutorial_tides/
Our Restless Tides: http://co-ops.nos.noaa.gov/restles1.html
About water levels, tides, and currents: http://co-ops.nos.noaa.gov/about2.html
Why is the ocean salty?: http://ga.water.usgs.gov/edu/whyoceansalty.html

**Issues**
Climate Change Lessons: http://www.climate.gov/#climateWatch
Gulf Oil Spill: http://www.education.noaa.gov/Ocean_and_Coasts/Oil_Spill.html
http://www.noaa.gov/deepwaterhorizon/education/index.html
NOAA Office of Response and Restoration: http://oceanservice.noaa.gov/programs/orr/
Especially for Kids from the NOS Hazardous Materials Response and Assessment Division on Oil Spills: http://response.restoration.noaa.gov/kids/kids.html
Ocean Acidification: http://coralreef.noaa.gov/education/oa/
Ocean Pollution: http://www.education.noaa.gov/Ocean_and_Coasts/Ocean_Pollution.html

**Observations: Technology and Engineering**
Chesapeake Bay Interpretive Buoy System: http://chesapeakebay.noaa.gov/cbibs
Environmental Visualization Laboratory: http://www.nnvl.noaa.gov/
Environmental Technology K-12 Resources:
http://www.noaaiset.org/opportunities/k12resources.php
Global Positioning
The GLOBE Program: http://www.globe.gov/
The Jason Project: http://www.jasonproject.org/
National Data Buoy Center Science Education:
http://seaboard.ndbc.noaa.gov/educate/educate.shtml
NGDC (National Geophysical Data Center) http://nsidc.org.cryosphere
NOAA’s Satellite and Information Education & Outreach
http://www.nesdis.noaa.gov/outreach_edu.html

NODC’s (National Oceanographic Data Center) Ocean FAQ’s
http://www.nodc.noaa.gov/General/NODC-oceanfaq.html

Games
Water Life: http://games.noaa.gov/
Where Rivers Meet the Sea: http://games.noaa.gov/oscar/
Sea Turtle Nesting game: http://games.noaa.gov/seaturtle/

Videos for Teachers
Get ‘em Outside! Chesapeake Bay Foundation
http://www.youtube.com/watch?v=wRR1feHqZPY

Maryland’s Outdoor Bill of Rights (with Governor Martin O’Malley)
http://www.youtube.com/watch?v=tZxER28Z-ww

Maryland State Department of Education
http://www.marylandpublicschools.org/MSDE/video_details/04_22_2010.htm

National Geographic Field Scope

Richard Louv
http://www.youtube.com/watch?v=PY6fBRKPZKg&feature=related

Teach Ocean Science
http://www.teachoceanscience.net/teaching_resources/education_modules/fish_and_physics/get_started/

Videos for Students
Bag It
http://www.bagitmovie.com/

The Majestic Plastic Bag: A Mockumentary
http://www.youtube.com/watch?v=GLgh9h2ePYw

Water Cycle:
http://ia600402.us.archive.org/12/items/AP_Environmental_Sci_NOAA_Lesson_07/lesson07.html

Ocean Currents
http://ia600303.us.archive.org/21/items/AP_Environmental_Sci_NOAA_Lesson_08/lesson08.html

**Get Involved: Stewardship and Hands-on Projects**

Bay Grasses in Classes: http://www.dnr.state.md.us/bay/sav/bgic/

BayVille: http://bayville.thinkport.org/default_flash.aspx

Chesapeake Bay Interpretive Buoy System (CBIBS): http://buoybay.noaa.gov/
http://buoybay.noaa.gov/investigations.html

Data in the Classroom: http://www.dataintheclassroom.org/

Earth Force: http://www.earthforce.org/

EcoCheck Integration and Application Network (How Healthy is your Ecosystem?)
http://ian.umces.edu/ecocheck/

EcoClub: http://www.greenteacher.org/?page_id=280

Evaluate your school yard for Ocean/Bay Protection
http://www.cbf.org/document.doc?id=491

Fieldscope: http://www.fieldscope.org/

GLOBE (Global Learning and Observation to Benefit the Environment) www.globe.gov


The Goundwater Foundation: http://www.groundwater.org/kc/kc.html

Journey of a Raindrop to the Chesapeake Bay

Interactive Watersheds: http://www.interactivewatersheds.net/

Maryland Green School Program: http://www.dnr.state.md.us/education/greenschools.asp

Maryland Department of Natural Resources “Green is Good”
http://www.dnr.state.md.us/green_is_good.html

Maryland Partnership for Children in Nature: http://www.dnr.state.md.us/cin/
NASA and the Chesapeake Bay
http://www.nasa.gov/audience/foreducators/nasaclips/search.html?terms=%22Real%20World%3A%20NASA%20and%20the%20Chesapeake%20Bay%22&category=0000&disp=

Ocean Literacy Backpacks/bags
http://www.theteacherexpress.com/commotioninoceanliteracynewbag.html
http://www.readingrockets.org/content/pdfs/literacybags/oceans_11.pdf

Plant a Tree at your School: http://www.trees.maryland.gov/school.asp

Project WILD Maryland: http://www.dnr.state.md.us/wildlife/Education/projectwild.asp

Project WILD Aquatic K-12 Curriculum and Activity Guide
http://www.projectwild.org/ProjectWILDK-12AquaticcurriculumandActivityGuide.htm

Project WET Maryland: http://www.dnr.state.md.us/education/are/wet.asp

Project WET (Water Education for Teachers) Curriculum and Activity Guide
http://projectwet.org/water-education-project-wet/project-wet-publications/project-wet-curriculum-activity-guide/

Project WET Healthy Water, Healthy People Activity Guide
http://projectwet.org/water-resources-education/water-quality-education/

Project Learning Tree® Program: http://www.plt.org/

RainScapes:

Save Our Streams K-12 Water Monitoring Resources
http://www.dnr.state.md.us/streams/volunteer/k12.html

Schoolyard Habitats
http://www.maeoe.org/habitat/
http://www.fws.gov/chesapeakebay/schoolyd.html

School Water Audit
http://eeeweek.org/water_wise/water_audit

Stormwater pollution/water quality
http://www.lowimpactdevelopment.org/school/index.html
http://www.green.maryland.gov/mde.html

Stencil Your Storm Drains: http://www.dnr.state.md.us/education/are/stormdrain.asp
Sustainable Schools Project: http://www.sustainableschoolsproject.org/

Trout in the Classroom Program: http://www.troutintheclassroom.org/

Youth in the Great Outdoors: http://www.youthgo.gov/

Canada: http://www.ecokids.ca/pub/eco_info/topics/water/water/index.cfm
Teaching Kids About Water Conservation


**Posters**
Chesapeake Bay
http://www.cbf.org/document.doc?id=1083 (watershed)
http://www.cbf.org/page.aspx?pid=327 (pollution, blue crabs, underwater grasses, and oysters, etc.)

Maryland Children’s Outdoor Bill of Rights
http://www.dnr.state.md.us/cin/images/BillOfRights.jpg

NOAA Marine Debris Program (some posters / materials are multi-lingual)
http://marinedebris.noaa.gov/outreach/resources.html

USGS Water Education Series
http://water.usgs.gov/outreach/OutReach.html

**Funding Opportunities**
NOAA B-Wet: http://www.oesd.noaa.gov/grants/bwet.html
NOAA Environmental Literacy Grants: http://www.oesd.noaa.gov/grants/elg.html

**Professional Development Opportunities**
Audubon Naturalist Society
http://www.audubonnaturalist.org/default.asp?page=552

Chesapeake Bay Foundation
Teacher Professional Development:
http://www.cbf.org/chesapeakeclassrooms

Maryland Association for Environmental and Outdoor Education (MAEOE)
http://www.maeoe.org/eecertification/

Montgomery County Public Schools Outdoor Environmental Education Program (OEEP)
http://www.montgomeryschoolsmd.org/curriculum/outdoored/
Project WILD Maryland
http://www.projectwild.org/GrowingUpWILD/Maryland.htm

**EL Teaching Approaches/Models**
Hungerford-Volk IEEIA issues investigation approach
http://www.cisde.org/pages/ieeiaoverviewpage/ieeiaoverview.htm

Project-based science (PBS)
http://www.umich.edu/~pbsgroup/

Problem-based inquiry (PBI)/Problem-based learning (PBL)
http://www.usc.edu/hsc/dental/ccmb/usc-csp/Quikfacts.htm

MCPS Elementary Integrated Curriculum

Resources compiled by Kim Marshall McLean for the Ocean Literacy Professional Development Opportunity for Grade 4 Teachers in Montgomery County Public Schools
June 14-15, 2012
NOAA Fisheries, kim.marshall@noaa.gov