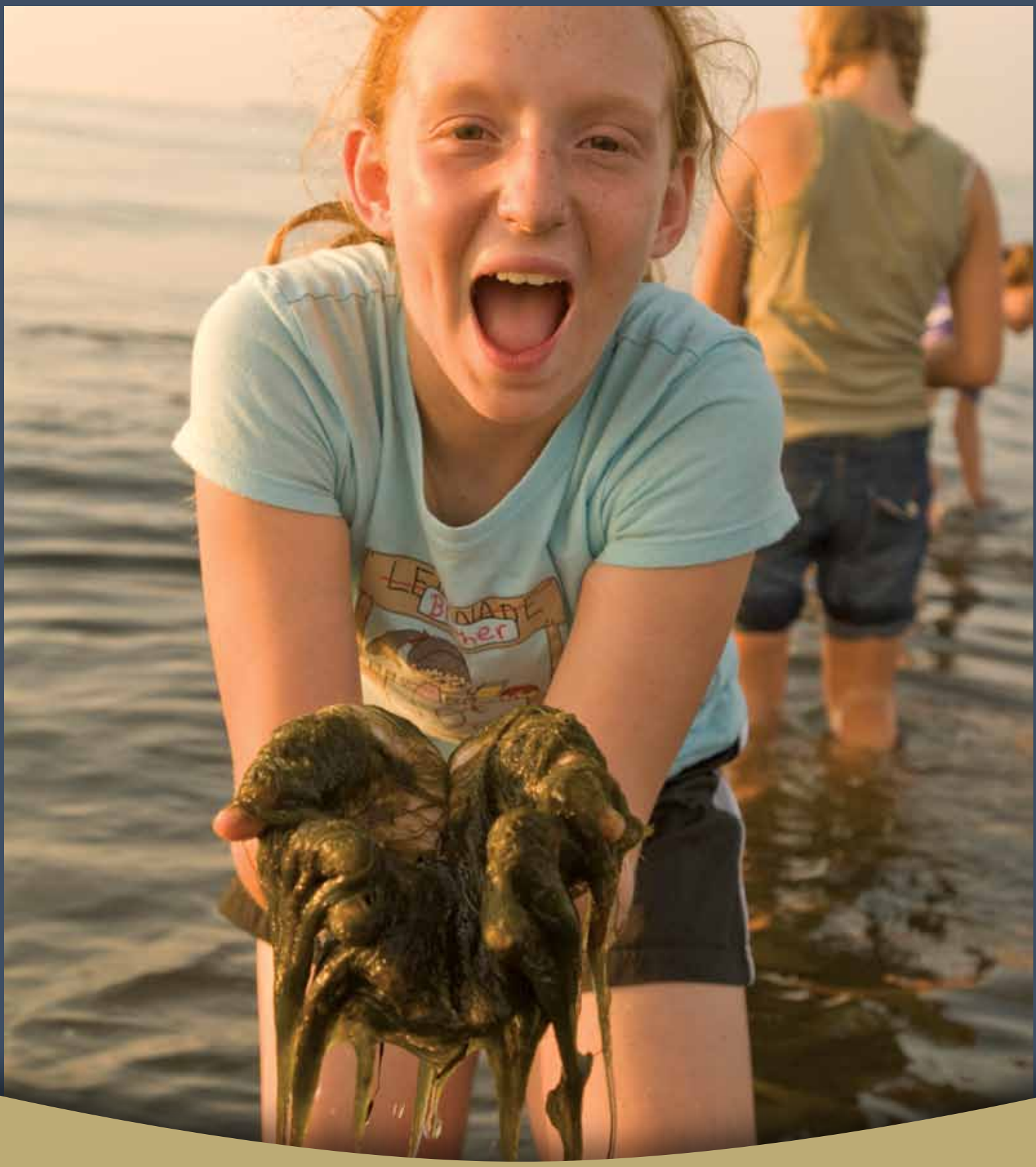


MID-ATLANTIC ELEMENTARY AND SECONDARY ENVIRONMENTAL LITERACY STRATEGY

EXECUTIVE SUMMARY

Managers are making tremendous progress identifying and tackling environmental issues facing the Chesapeake Bay. However, many of the remaining challenges to a healthier ecosystem are complex, diffuse, and directly in the hands of citizens, including energy use, automobile emissions, and urban and suburban runoff. These issues force individuals, businesses, and communities to make hard decisions, and require a thoughtful public engagement strategy that begins in the schools with our youngest citizens.

The Mid Atlantic Elementary and Secondary Environmental Literacy Strategy draws on the full strength of the federal government to support state efforts to transform their schools to provide the next generation of citizen stewards the knowledge and skills they need to make informed environmental decisions.

It builds upon the long history of federal-state cooperation of the Chesapeake Bay Program to create a model that showcases how the federal government can support and influence sophisticated state environmental education efforts, which is important because of the highly localized nature of pre-kindergarten through twelfth grade (PK-12) education.

The strategy calls upon federal, state, and nongovernmental partners to advance shared priorities in four key areas—students, educators, schools, and the environmental education community. Together, these partners have the vision, expertise, and resources to create and support schools that foster citizen stewardship and graduate environmentally literate students.

GOAL 1: Every student in the region graduates with the knowledge and skills to make informed environmental decisions.

Outcome 1.1: States engage students at every grade level in outdoor activities designed to increase environmental literacy.

Outcome 1.2: Students participate in interdisciplinary and scaffolded instruction about the key relationships between dynamic earth, energy, and human systems, including STEM content knowledge and thinking skills.

Outcome 1.3: Students have information about career opportunities and requisite skills for environment-based jobs and the opportunity to participate in programs that prepare them for a future in these careers.

Outcome 1.4: Students have the opportunity to pursue enrichment programs and experiences that support in depth understanding of environmental issues and solutions.

GOAL 2: All educators in the region responsible for instruction about or in the environment are provided with sustained professional development, tools, and resources that support their role in providing students with high-quality environmental education.

Outcome 2.1: Educators have access to high-quality, curriculum-based lesson plans, resources, and information on training opportunities that focus on environmental issues for all grade levels and subjects.

Outcome 2.2: Teachers have sustained professional development related to environmental education content, outdoor learning strategies, and pedagogy to promote environmental literacy in their students.

Outcome 2.3: Pre-service teachers enter the workforce with knowledge and experience in interdisciplinary environmental education content, outdoor learning strategies, and pedagogy.

Outcome 2.4: Informal environmental educators in the region understand and can communicate current scientific findings and have knowledge of research-based environmental education best practices.

Outcome 2.5: Federal, state, and local natural resource personnel are actively engaged in environmental education and outreach and have adequate training in instructional techniques and the needs of educational audiences.

GOAL 3: Every school in the region maintains its buildings, grounds, and operations to support positive environmental and human health outcomes.

Outcome 3.1: School buildings, grounds, and operations are models of sustainability for the community, making continual progress towards net-zero environmental impacts, including carbon, solid waste, wildlife habitat, and hazardous waste.

Outcome 3.2: The school environment has a positive effect on the health of students, staff, and the surrounding community.

GOAL 4: The education community in the region functions in a unified manner and coordinates with key national, regional, and state programs to represent the full suite of information and opportunities available for PK-12 audiences.

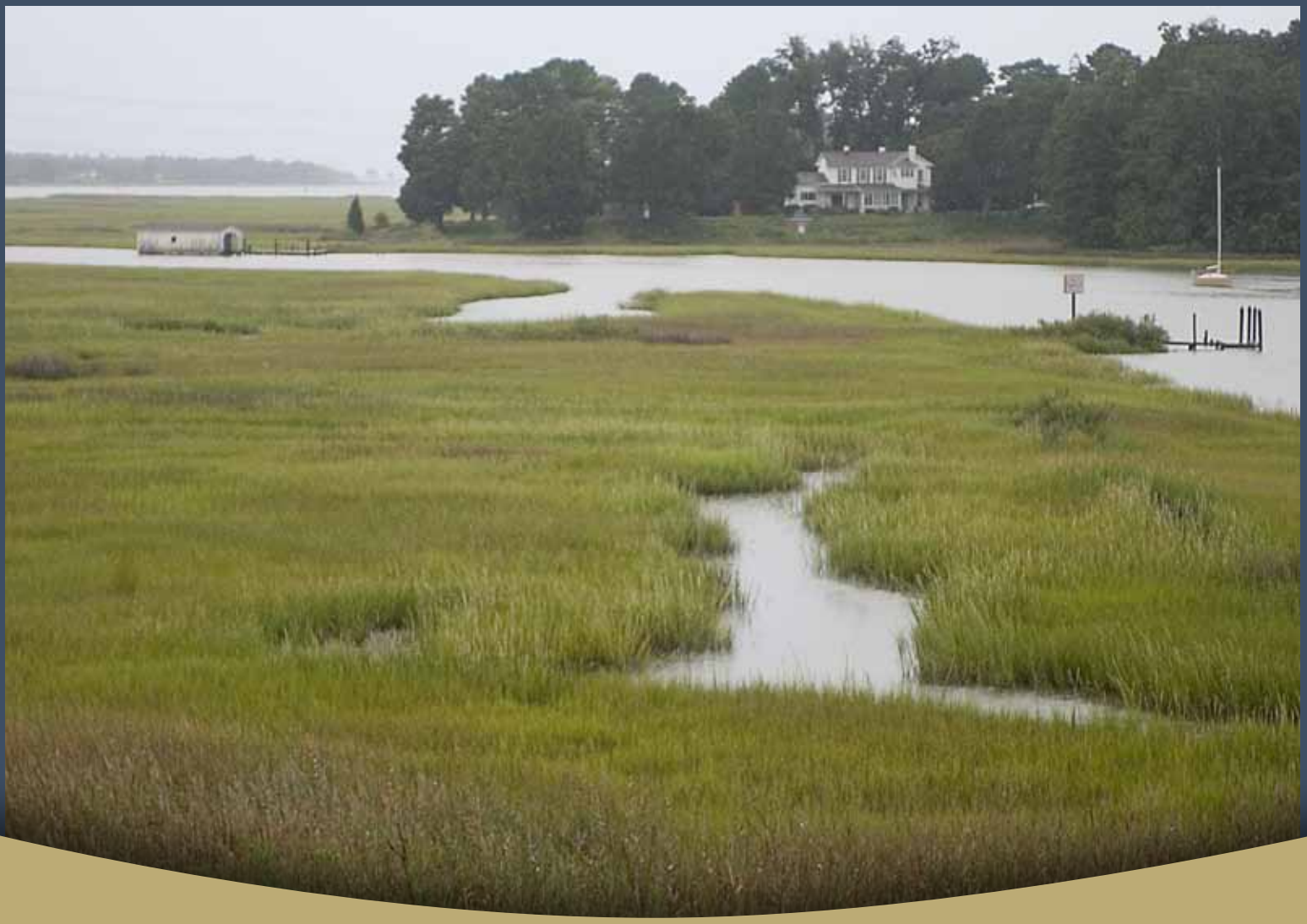
Outcome 4.1: States in the mid-Atlantic establish and implement a robust plan for ensuring that all students graduate environmentally literate.

Outcome 4.2: Education programs are developed and refined using the best available research on the effectiveness of environmental education, and support continued research in this field.

Outcome 4.3: Federal, state, and nongovernmental organizations with PK-12 programs actively communicate to increase collaboration related to environmental literacy planning and implementation.

Photo of fossilized scallop shell by David Harp

INTRODUCTION



Foundation for Environmental Literacy Begins in School

Environmental issues are discussed regularly at dinner tables, over water coolers, and in boardrooms and legislative chambers across the nation. Despite significant accomplishments, challenges to maintaining and restoring a healthy Bay ecosystem will continue due to runoff, energy use, atmospheric deposition, and other issues that result from the everyday lives of the watershed's population.

As environmental decisions become more complex and widespread—forcing individuals, businesses, and communities to make hard decisions—an environmental protection and restoration strategy built solely on the ability of trained environmental management experts cannot succeed. Like any other successful long-term strategy, natural resource management must be built on the collective wisdom of all citizens, gained through targeted education.

This position is supported by the National Science Foundation's Advisory Committee for Environmental Research and Education, which stated in a 2003 report that

"in the coming decades, the public will more frequently be called upon to understand complex environmental issues, assess risk, evaluate proposed environmental plans and understand how individual decisions affect the environment at local and global scales. Creating a scientifically informed citizenry requires a concerted, systematic approach to environmental education."

But our citizens do not have the environmental literacy needed to tackle these challenges. Unfortunately, studies commissioned by the National Environmental Education Foundation find that:

"The average American adult, regardless of age, income, or level of education, mostly fails to grasp essential aspects of environmental science, important cause/effect relationships, or even basic concepts such as runoff pollution, power generation and fuel use, or water flow patterns…There is little difference in environmental knowledge levels between the average American and those who sit on governing bodies, town councils, and in corporate board rooms, and whose decisions often have wider ramifications on the environment."

A clearer picture is also emerging about the environmental literacy of our students. The National Environmental Literacy Assessment, which was completed in 2008 by the North American Association for Environmental Education (NAAEE) and funded by NOAA and EPA, established a baseline literacy rate for middle school students in 6th and 8th grades. A follow-up study showed that schools that have environmental education programming scored significantly higher on environmental knowledge, verbal commitment, environmental sensitivity, and behaviors. In 2015, the United States will learn how the environmental literacy of its students compares to other developed nations when the high-profile Programme for International Student Assessment, or PISA, will for the first time include an optional exam on student environmental literacy. This group is responsible for findings over the past decade showing relatively poor performance of American students in science and math.

Children aged 8 to 18 spend more than 53 hours a week online or in front of electronic media, which equals around seven-and-a-half hours a day.

Studies such as the National Environmental Literacy Assessment have shown that students exposed to outdoor environmental education have an increased stewardship ethic, however, learning outdoors is not common in the United States. The problems associated with a lack of understanding of environmental systems may be exacerbated by a society increasingly disconnected from their natural environment.

The Henry J. Kaiser Family Foundation estimates that children aged 8 to 18 spend more than 53 hours a week online or in front of electronic media, which equals around seven-and-a-half hours a day.

Richard Louv argues in his 2005 book *Last Child in the Woods* that because children are spending less time outdoors, American children suffer from "nature deficit disorder"—or a disconnect from nature. Budget cuts and testing mandates can result in schools perpetuating the disconnect from nature by limiting recess, scaling back off-site field experiences, and restricting the use of school grounds for teaching. This loss of contact with the outdoors may ultimately lead to a citizenry with no physical and emotional connection to the natural world and no desire to actively take part in protection and restoration efforts.

Building environmental literacy takes time and ongoing commitment. The concepts are too complex to be taught by the media (which, according to the National Environmental Education Foundation, is where children get 83% of their environmental information[1]); a human's connection to the environment is too personal to be taught solely within the walls of a classroom. While environmental literacy should be reinforced throughout a child's life experiences, the foundation of knowledge and journey of inquiry is necessarily grounded and takes root in school.

The good news is that Americans overwhelmingly support environmental education. According to Roper Reports, approximately 95% of Americans support environmental education (96% of parents) and **85% agree that government agencies should support environmental education**. These statistics are playing out in our nation's schools where there has never before been so much attention focused on how to systemically embed environmental literacy requirements and activities into schools. More than 40 states have in place or are actively working on environmental literacy plans that draw on the collective strengths of a variety of partners,

[1]The National Environmental Education Foundation, *Environmental Literacy in America*, 2005, p. x. http://www.neefusa.org/pdf/ELR2005.pdf

The Strategy draws on the full strength of the federal government to support state efforts to transform their schools.

including the state natural resource agencies, departments of education, locally based federal government offices, and nongovernmental partners to enhance environmental education in schools. In many states, this affords the federal government an unprecedented opportunity to engage in education policy discussions with state decision makers.

The plan for administering President Obama's Executive Order 13508 on Chesapeake Bay Protection and Restoration called on the federal government to develop an Elementary and Secondary Environmental Literacy Strategy. The Strategy—outlined in this document—draws on the full strength of the federal government to support state efforts to transform their schools to provide the next generation of citizen stewards the knowledge and skills they need to make informed environmental decisions.

Chesapeake Bay Program Commitments Provide a Strong Foundation

The future well-being of North America's largest and most productive estuary, the Chesapeake Bay, its thousands of tributaries, and its 64,000 square miles of watershed will soon rest in the hands of its youngest citizens. These citizens, three million strong in kindergarten through 12th grade, are tomorrow's leaders. They also will be the stewards of the Bay's precious resources including its fish, crabs and oysters, forests and wetlands.

This statement, which launched a federal-state partnership in the Chesapeake Bay watershed in support of environmental education on December 8, 1998, as part of Directive 98-1 of the Chesapeake Bay Program, remains as true today as the day it was written. The youngest students from that day are now entering the workforce, the oldest now assuming positions of leadership in business and government. Perhaps not coincidentally, conversations about protecting and restoring our shared environment are increasing in number and sophistication despite a challenging economic climate.

Through Directive 98-1, the forward-thinking governors from the states of Maryland, Pennsylvania, and Virginia, the mayor of the District of Columbia, and representatives from the federal government invited the state departments of education to more fully engage in the restoration and protection effort to increase the level of environmental literacy for the more than three million students who live in the region. They recognized that a student's school years are a unique opportunity in which to deliver the set of skills necessary to think critically about multifaceted and evolving environmental challenges.

We acknowledge our duty to impart to these young people a sense of individual responsibility and our hope that they develop the skills to form a personal ethic regarding the natural world. Further, we acknowledge that the Chesapeake Bay, its rivers and its watershed provide an authentic, locally relevant source of environmental information and data that should be used to help advance student learning skills and problem-solving abilities across the entire school curriculum.

In the Chesapeake 2000 Agreement signed on June 28, 2000, the commitment deepened as the partners included inquiry-based, outdoor meaningful watershed educational experiences—MWEEs—for every student in the watershed as one of ten "keystone commitments" identified as essential to achieve successful Chesapeake Bay restoration and protection. MWEEs define how classroom learning can be seamlessly connected with outdoor learning to create a deeper understanding of the natural environment that cannot be achieved within the walls of a classroom. It also fostered partnerships between local education agencies, universities, natural resource agencies, and nongovernmental organizations to provide a broader suite of opportunities for both students and teachers.

The federal government has played an important role in advancing environmental education in the region. The National Oceanic and Atmospheric Administration (NOAA) has led the effort by fostering federal-state coordination and providing critical funding for the development of model programs in support of the Chesapeake Bay Program's MWEE commitment.

The robust partnerships and programs in the region have created a culture where systemic environmental education is poised to become the norm.

In addition:, U.S. Fish and Wildlife Service staff has worked with partners to plan and implement habitat projects on school grounds and at environmental education centers; the Environmental Protection Agency's Environmental Education grant program has funded environmental education programs in schools in the region; and the National Park Service has expanded access to the Chesapeake Bay for students and teachers as well as the general public and periodically provided grants to support the use of Gateways sites by school groups.

The increased coordination of these and other federal environmental education programs evidenced in this strategy along with their thoughtful alignment with state environmental literacy objectives will leverage individual federal investments into a powerful, cohesive presence in the region.

A little over a decade after the initial education agreement was signed in 1998, the robust partnerships and programs in the region have created a culture where systemic environmental education is poised to become the norm; where local education agencies increasingly embrace inquiry-based environmental education as a way to spark student curiosity, improve content knowledge and test scores, and provide critical life skills.

2009 Presidential Executive Order Ushers in New Era of Federal Leadership

President Obama's Executive Order 13508 focuses on Chesapeake Bay Protection and Restoration, calling for a new era of federal leadership, action, and accountability that brings the full weight of the federal government to address the challenges facing the Chesapeake Bay.

This provides a key opportunity to better engage the broader federal community in environmental education. The plan for implementing the Executive Order recognizes the importance of citizen stewardship, calling for a dramatic

increase in the number of citizen stewards of every age who support and carry out local conservation and restoration. It specifically commits the federal government to develop an Elementary and Secondary Environmental Literacy Strategy that expands upon the MWEE to ensure that students are graduating environmentally literate.

This federal Strategy represents the first effort by the government to create a coherent, coordinated approach across all relevant federal agencies with the broad goal of increasing the environmental literacy of our students.

It builds upon the strong foundation in the region to create a regional model for federal-state-nongovernmental coordination in the field of environmental education, which is particularly important because of the highly localized nature of pre-kindergarten through twelfth grade (PK-12) formal education and the critical importance of utilizing nongovernmental environmental education providers for both student and teacher education programs.

To implement this vision for a robust elementary and secondary environmental literacy initiative, NOAA, along with the Department of the Interior, reached out to key federal agencies–including the Corporation for National and Community Service, the Department of Agriculture, Department of Education, Department of Energy, the Environmental Protection Agency, the National Science Foundation, and the National Aeronautics and Space Administration—that are engaged in any form of environmental education. These organizations collaborate on education related to everything from land use to energy and water conservation to scientific observations to better understand and organize the federal investment in the region (available online at chesapeakebay.net/groups/group/education_workgroup) and create a shared vision and plan to work together to advance state environmental literacy planning and implementation.

Beyond the Chesapeake Bay Executive Order, the federal government has a suite of important environmental initiatives that call for conservation and stewardship beginning in the school-aged years, including America's Great Outdoors[2], the National Ocean Policy[3], and the new U.S. Department of Education Green Ribbon Schools Program[4]. In drafting this Strategy, careful

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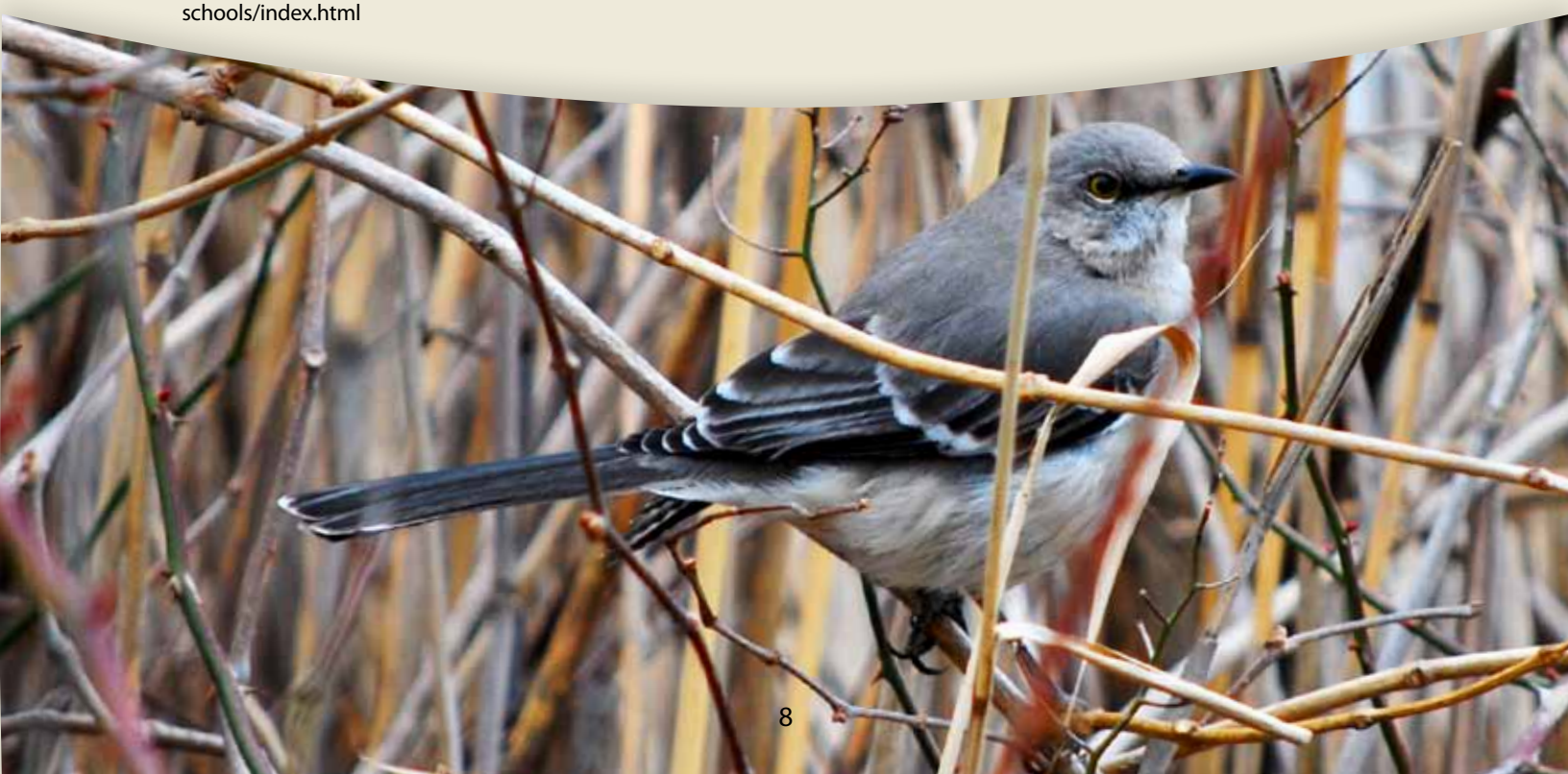
[2] America's Great Outdoors (AGO) Initiative, *America's Great Outdoors: A Promise to Future Americans*, Accessed Oct 5, 2011. http://americasgreatoutdoors.gov

[3] The White House, *National Ocean Policy*, Accessed Jan 18, 2012. http://www.whitehouse.gov/administration/eop/oceans/policy

[4] U.S. Department of Education, *Green Ribbon Schools*, Accessed Oct 5, 2011. http://www2.ed.gov/programs/green-ribbon-schools/index.html



attention was paid to avoid duplication with these other Administration initiatives. This Strategy is meant to integrate the relevant themes and recommendations from the national level initiatives with regional priorities into a single cohesive plan that can be used to better market and apply federal priorities, programs, and funding to state environmental literacy efforts.

In recognition of the importance of federal and state collaboration in advancing each of these national initiatives, the policy work represented by this document is being looked at as a model for regional collaboration, and there is active and ongoing coordination among the federal programs. These efforts should be seen as part of a shared vision and this document as a collective implementation Strategy for the region to be implemented under the umbrella of the Chesapeake Bay Program Partnership.

Strong Partnerships Advance a Shared Vision

The Executive Order acknowledges that although the federal government should assume a strong leadership role in the restoration of the Bay, success depends on a collaborative effort involving state and local governments, businesses, nongovernmental organizations, and the region's residents.

This has long been the goal of environmental literacy planning and implementation in the region, and sharpening this focus on collaboration is critical to successful federal engagement because PK-12 education is fundamentally a state and local responsibility. With this in mind, the federal Strategy is designed to build upon and support the important work that states throughout the region are doing to create exemplary environmental education policy.

Many of the states in the region have had a focus on environmental education for many years. However, over the past several years there has been an effort to renew and strengthen these programs. Examples of recent state commitments to environmental education are as follows:

- **In 2011, Maryland passed the nation's first environmental literacy graduation requirement** mandating schools to implement a multidisciplinary environmental education program, with a specific focus on the state's natural resources[5]. This solidified work began in 2008 by a gubernatorial Executive Order that established the Maryland Partnership for Children in Nature, which is cochaired by the Maryland State Department of Education and the Department of Natural Resources. That Executive Order also called for a comprehensive environmental literacy plan, which was completed in 2010.
- **In 2010, the Council of the District of Columbia signed into law the *Healthy Schools Act of 2010*.** This act requires District Department of the Environment to draft an environmental literacy plan as part of a broad effort to "substantially improve the health, wellness, and nutrition of the public and charter school students in the District of Columbia."[6]

[5] Maryland Department of Natural Resources, Governor O'Malley Commends Board Of Education On Approving The Environmental Literacy Graduation Requirement, Accessed January 9, 2012. http://www.dnr.state.md.us/dnrnews/pressrelease2011/sgg_062111.asp

[6] Office of the State Superintendent of Education, *Healthy Schools Act*, Accessed January 9, 2012. http://seo.dc.gov/sites/default/files/dc/sites/osse/publication/attachments/Healthy_Schools_Act_Legislation.pdf

- **Delaware passed a resolution in 2011 supporting the Delaware No Child left Inside/ Children in Nature Initiative.** A taskforce with representatives from the Delaware Department of Natural Resources and Environmental Control, Department of Education, and other public and nongovernmental organizations formed "to develop a statewide plan to increase opportunities for children to engage in nature, both in school, at home, and on public lands."[7]

- **The Virginia Science Standards of Learning adopted in 2003 and revised in 2010 integrate environmental literacy concepts throughout K-12 education.** The Virginia Resource-Use Education Council, an interagency team of state and federal partners led by the Virginia Department of Education, works to implement the standards through Virginia Naturally, the Commonwealth's environmental education program. Measurable goals for specific Virginia Naturally projects—Meaningful Watershed Experiences, Classroom Grants, Professional Development and School Recognition are outlined in the state's Business Plan for Environmental Education.

- **The Pennsylvania Advisory Council on Environmental Education adopted an environmental literacy plan in 2012.** Pennsylvania long has had rigorous, stand-alone environment and ecology standards, which include content about the Chesapeake, watersheds, and the environment. This content is included in standardized tests in the state.

In addition to working closely with states to align the federal and state priorities, the federal effort has aligned with the North American Association for Environmental Education state affiliates[9]—autonomous state associations whose purpose is to promote and enhance environmental education through capacity building, networking, and sharing information related to the field. In the mid-Atlantic, these groups are the primary state organizations representing nonprofits and other environmental education practitioners. The affiliates have been actively engaged throughout the development of this Strategy and are committed to advancing a shared vision.

The following four goals, and their associated outcomes and strategies, outline the interdependent actions that the mid-Atlantic education community will pursue to achieve the vision of developing environmental literacy in the region. Coordination for these actions will occur through the Mid-Atlantic Education Workgroup—an interjurisdictional group comprised of federal, state, academic, and nongovernmental partners convened under the Chesapeake Bay Program.

GOAL 1: Every student in the region graduates with the knowledge and skills to make informed environmental decisions.

GOAL 2: All educators in the region responsible for instruction about or in the environment have access to sustained professional development opportunities, tools, and resources that support their efforts to provide students with high-quality environmental education.

GOAL 3: Every school in the region maintains its buildings, grounds, and operations to support positive environmental and human health outcomes.

GOAL 4: The education community in the region functions in a unified manner and coordinates with key national, regional, and state programs to represent the full suite of information and opportunities available for PK-12 audiences.

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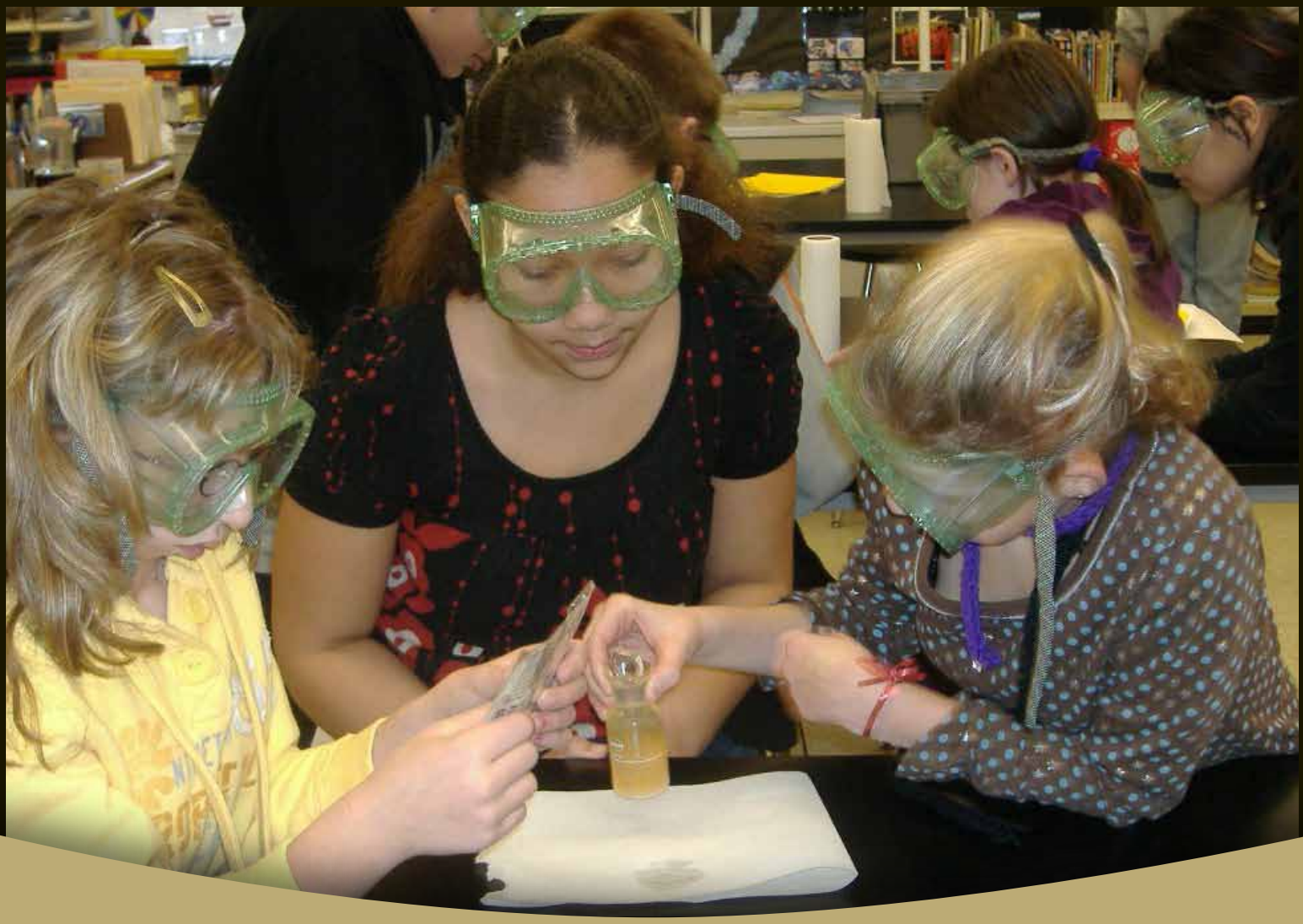
[7] State of Delaware, *Children in Nature*, Accessed Nov 1, 2011. http://www.dnrec.delaware.gov/Pages/NoChildLeftInside.aspx

[8] State of Pennsylvania, *Environment and Ecology Education*, Accessed Nov 1, 2011. http://www.pa3e.ws

[9] Maryland Association for Environmental and Outdoor Education; Pennsylvania Association for Environmental Education; Virginia Resource Use Education Council; DC Environmental Education Consortium; Delaware Association for Environmental Education; and West Virginia Association for Environmental Education

GOAL 1



Every student in the region graduates with the knowledge and skills to make informed environmental decisions.

Creating high school graduates who understand complex environmental concepts and who can make environmentally responsible decisions will take the collective efforts of state and federal governments in partnership with a diverse community of nongovernmental organizations. As part of this effort, **students must be taught environmental content and inquiry skills, participate in outdoor learning experiences, and have access to enrichment opportunities every year of their academic career.** Environmental content should be sequenced, cross-cutting and embedded in multiple disciplines, including the "STEM" subjects—science, technology, engineering, and mathematics, to allow them to retain and apply basic definition and principles. Students, especially those from underserved populations, must have access to environmental enrichment opportunities that go beyond the classroom, such as after-school and green job training programs.

The federal government under President Obama is taking action on several levels to improve student environmental literacy, including reconnecting students to nature through America's Great Outdoors, making the intentional connection between science education and increased

stewardship through natural resource policies such as the National Ocean Policy, and including student environmental literacy in the newly launched U.S. Department of Education Green Ribbon Schools Program. Specifically:

- **The President launched America's Great Outdoors in 2010**, charging federal agencies to develop a 21st century conservation and recreation agenda that addresses Americans' disconnect from nature. The plan that followed includes several youth-focused goals, including "Engage young people in conservation and the Great Outdoors" and "Build upon a base of environmental and outdoor education, both formal and informal."[10]
- **The Interagency Ocean Policy Taskforce stated in its final recommendations for enhancing the country's ability to maintain healthy ocean and coastal resources,** "United States policies, programs, and activities should enhance formal and informal education about the ocean, our coasts, and the Great Lakes and their uses to build a foundation for greater understanding and improved stewardship, and build capacity to produce future scientists, managers, and members of a dynamic and innovative workforce." [11]
- **The U.S. Department of Education established the Green Ribbon Schools recognition program** in 2011 to focus on environmental impact and energy efficiency, a healthy school environment, and student environmental literacy. The program establishes specific criteria to ascertain how well schools are teaching students about the environment and sustainability to prepare them for citizenship and employment in the 21st century.

As noted in the National Ocean Policy, environmental literacy is inextricably linked to science education. The National Science Board of the National Science Foundation outlines the direct connection between STEM and environmental education in the report *Environmental Science and Engineering for the 21st Century*:

"The twin goals of learning are to acquire knowledge and gain skills such as problem solving, consensus building, information management, communication, and critical and creative thinking. Environmental issues offer excellent vehicles for developing and exercising many of these skills using a systems approach."

Substantiating the claim that the environment provides an excellent educational subject, the No Child Left Inside Coalition reports that "Science fair administrators note that 40 percent of all science fair projects relate directly to the environment, and the Corporation for National and Community Service reports that more than 50 percent of the service-learning programs they fund are focused on the environment." *Environmental Science and Engineering for the 21st Century* goes on to emphasize that "changes should be made in the formal educational system to help all students, educators, and educational administrators learn about the environment, the economy, and social equity as they relate to all academic disciplines and their daily lives." [12]

Unfortunately, American students are falling behind many developed countries in science and math—both critical to addressing national and global environmental issues. According to the 2009 Programme for International Student Assessment (PISA) assessment, which compares scores in math and science from 65 developed and non-developed countries and education systems, American students are well below average in math learning, and just one point above average in science.

Overall, 30 countries had higher scores in math, while 22 scored higher in science.[13]

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[10] U.S. Department of the Interior, *America's Great Outdoors Report: A Promise to Future Generations*, 2011. http://americasgreatoutdoors.gov/report/

[11] The White House Council on Environmental Quality, *Final Recommendations of the Interagency Ocean Policy Task Force*, 2010, pg 17. http://www.whitehouse.gov/files/documents/OPTF_FinalRecs.pdf

[12] The National Science Foundation, *Environmental Science and Engineering for the 21st Century, 2000*, pg 45. http://www.nsf.gov/pubs/2000/nsb0022/start.htm

[13] Programme for International Student Assessment (PISA), 2009 *Technical Report*, 2010.

American students fall to the bottom half of the rankings in both subjects when compared to only G-8 countries.[14] To address STEM achievement, the White House launched an "Educate to Innovate"[15] campaign to improve the participation and performance of America's students in STEM subjects. This campaign includes efforts from both private and public sector groups to work with young people across America to promote science and math.

In the face of a global economic downturn, a new economy is emerging that offers tremendous opportunities to create new jobs for the 21st century. Students must be inspired and have the requisite skills to succeed in this new economy, which increasingly will include green careers. Environmental education is well suited to assist in expanding the academic pipeline for STEM and prepare a workforce ready for the innovation and challenges of the 21st century. In his 2011 State of the Union message, President Barack Obama noted, "If we want to win the future–if we want innovation to produce jobs in America and not overseas–then we also have to win the race to educate our kids." Environmental literacy is an important part of winning that race.

Targeted outcomes and strategies support progress toward achieving Goal 1:

Outcome 1.1: States engage students at every grade level in outdoor activities designed to increase environmental literacy.

- **Strategy 1:** Increase awareness of and access to federal funding, staffing, and materials to support the development and implementation of model programs that support state environmental literacy priorities.
- **Strategy 2:** Promote and maintain a strong network of formal and informal programs that fund or deliver outdoor environmental education to support broad implementation of high-quality programs.

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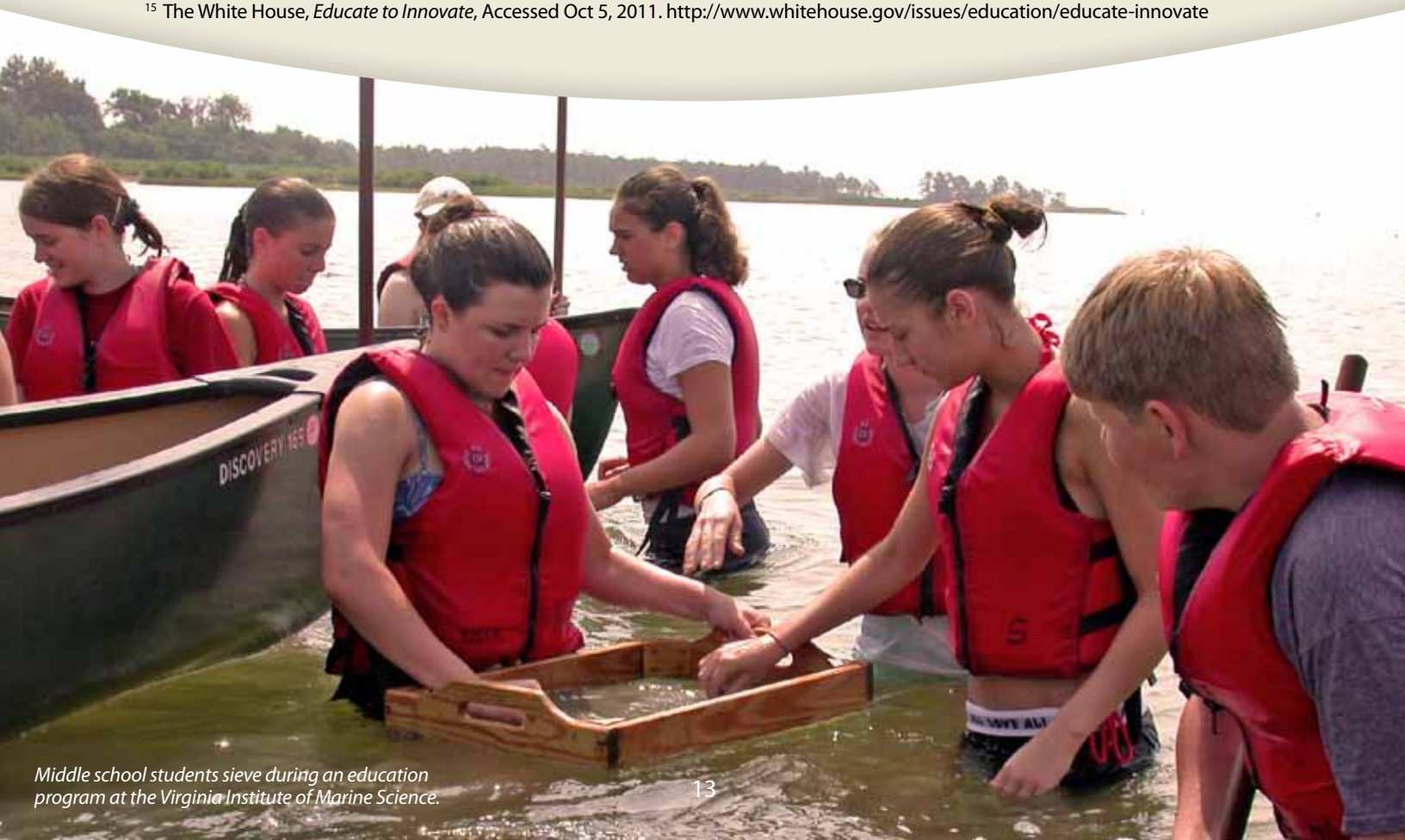
[14] National Center for Education Statistics, *Comparative Indicators of Education in the United States and Other G-8 Countries*, 2011. http://nces.ed.gov/pubs2012/2012007.pdf

[15] The White House, *Educate to Innovate*, Accessed Oct 5, 2011. http://www.whitehouse.gov/issues/education/educate-innovate



Middle school students sieve during an education program at the Virginia Institute of Marine Science.

- **Strategy 3:** Leverage the federal investment in public lands and facilities by encouraging their use by schools and local education agencies to deliver offsite, outdoor education, and ensuring that those facilities meet school requirements for safety and logistics.
- **Strategy 4:** Work with states and local education agencies to reduce barriers to outdoor educational programming for students, including transportation and access to natural areas for outdoor experiences.

Outcome 1.2: Students participate in interdisciplinary and scaffolded instruction about the key relationships between dynamic earth, energy, and human systems, including STEM content knowledge and thinking skills.

- **Strategy 1:** Work with states and local education agencies to integrate content related to the environment and sustainability throughout the curriculum.
- **Strategy 2:** Provide opportunities for students to participate in authentic scientific experiments at research institutions with emphasis on groups traditionally underrepresented in STEM careers, including women and girls.
- **Strategy 3:** Support the development of civic engagement knowledge and skills, and students' application of them through service learning, to build connections with their community while addressing sustainability and environmental issues.

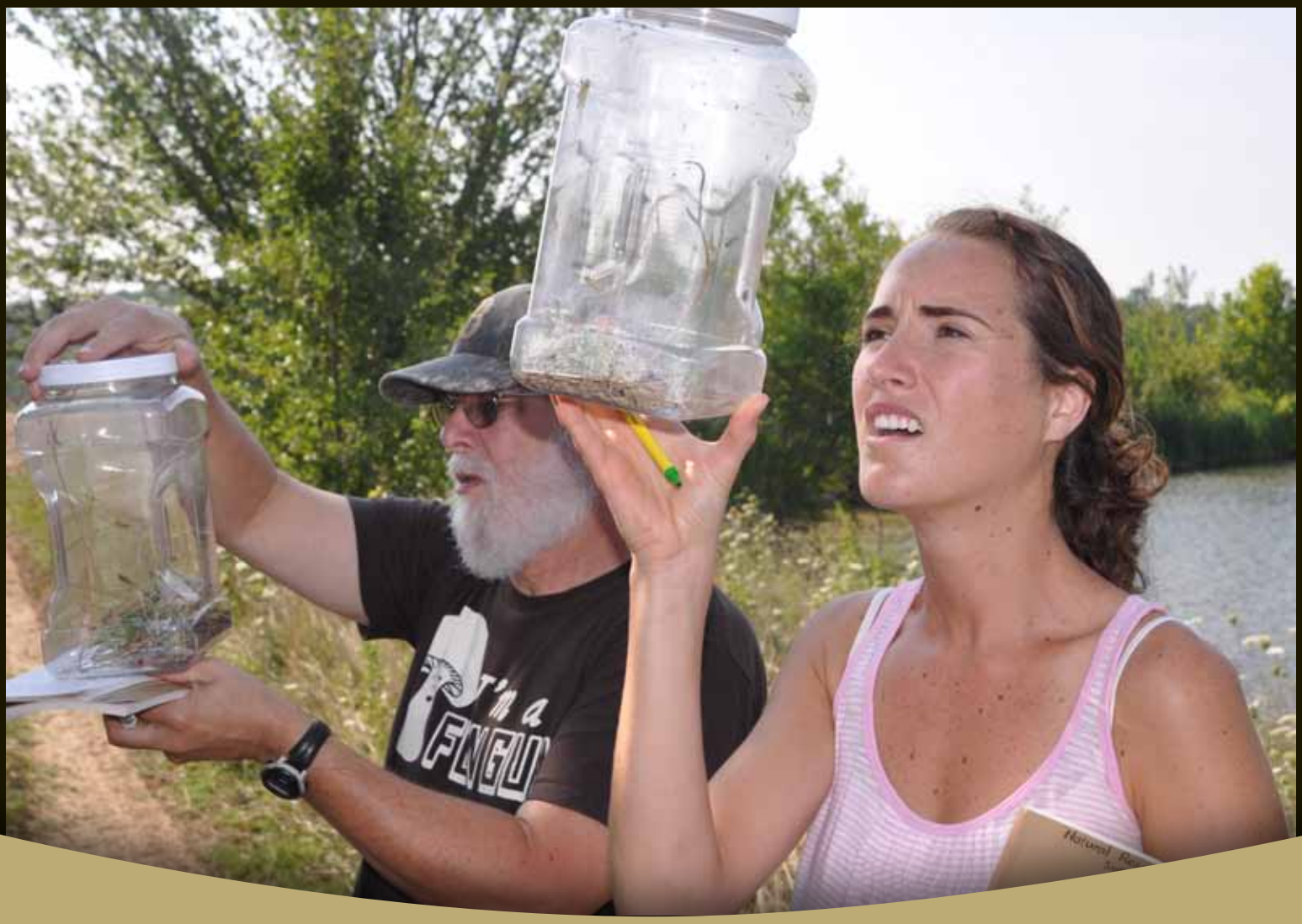
Outcome 1.3: Students have information about career opportunities and requisite skills for environment-based jobs and the opportunity to participate in programs that prepare them for a future in these careers.

- **Strategy 1:** Create and encourage school year and summer internships, service learning opportunities, and mentoring programs for students at federal agencies, research institutions, and partner sites, including youth conservation corps.
- **Strategy 2:** Ensure that high school guidance counselors have the training, information, and materials needed to counsel students on entry-level and advanced environmental jobs and related college and vocational programs.
- **Strategy 3:** Encourage federal offices to support staff involvement in mentoring, job fairs, career days, and job shadowing as part of their official duties to increase student awareness of career opportunities.
- **Strategy 4:** Increase the diversity of students participating in career development programs by actively recruiting and mentoring underrepresented students, and reaching out to underserved schools.

Outcome 1.4: Students have the opportunity to pursue enrichment programs and experiences that support in depth understanding of environmental issues and solutions.

- **Strategy 1:** Encourage the development of and participation in after-school, weekend, and summer enrichment programs centered around science and the environment at or in partnership with schools, including participation in national competitions such as the National Ocean Science Bowl, underwater robotics, and science fairs.
- **Strategy 2:** Support opportunities for student leadership related to environmental planning and implementation, including encouraging youth advisory groups, to increase confidence and sense of empowerment related to environmental issues.
- **Strategy 3:** Provide opportunities to intentionally connect classroom learning with family recreation, youth groups, community, and other out-of-school opportunities for outdoor learning and exploration.

GOAL 2



All educators in the region responsible for instruction about or in the environment are provided with sustained professional development, tools, and resources that support their role in providing students with high-quality environmental education.

Environmentally literate educators are needed in order to produce environmentally literate students. High-quality formal and informal environmental educators can equip their students with an understanding of the essential principles of environmental literacy, the critical thinking skills needed to assess scientifically credible information related to the environment, the ability to communicate what they have learned in a meaningful way, and the ability to make informed and responsible decisions regarding the environment. Before educators can effectively pass these critical skills along to their students, they must acquire them themselves.

PK-12 classroom teachers are essential to ensuring the repeated exposure of students to environmental content and outdoor learning; these educators have the greatest opportunity to deliver content systemically throughout a child's education. However, they are not exclusive providers of environmental education. Individuals from a wide variety of occupations can lend their skills and enthusiasm to deliver programming for students or otherwise support student

exposure to the environment and environment-based careers. Professional environmental educators, guidance counselors, facility and maintenance staff, and school administrators are all important to graduating environmentally literate students, but often they lack the content knowledge, funding, and resources to meet the full potential of these opportunities. Further, professional environmental educators are responsible for delivering a significant portion of environmental learning, but unlike teachers, they have no requirement for continuing education. Federal, state, and local natural resource personnel also can provide a critical link between those resources and the education communities, but frequently are not trained in educational pedagogy, grade-appropriate content matter, or administrative policies that would allow them to engage students in their work.

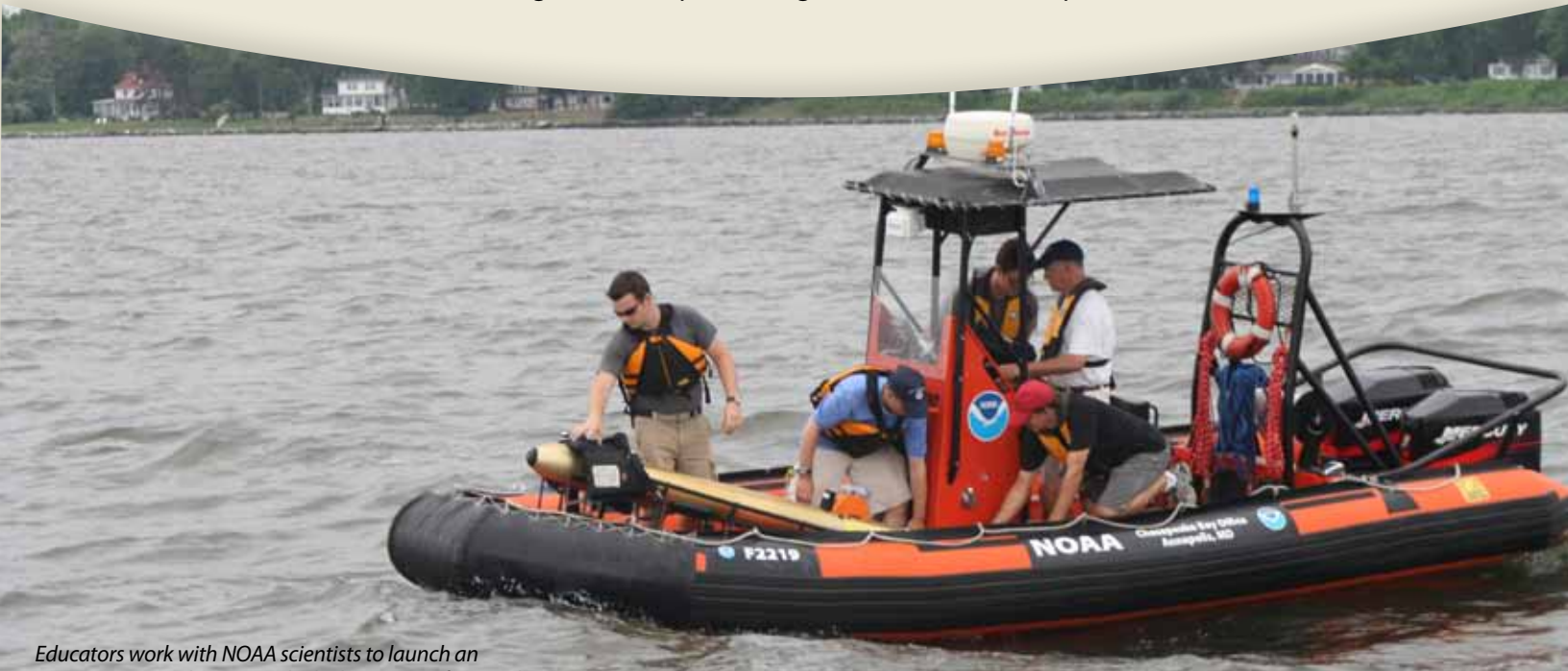
The importance of providing teachers with professional development on environmental topics is explicitly called for in virtually all comprehensive environmental education strategies, including America's Great Outdoors, the National Ocean Policy, and Green Ribbon Schools. This universal inclusion results from the recognition that good professional development is essential for student learning, keeps educators engaged and reinforces their value in the community, and serves a critical function of introducing new information as it becomes available through scientific research to the education community.

As environmental topics become increasingly relevant in the education community and policies are developed to ensure they are fully integrated and systemic throughout the curriculum, federal agencies and their partners can support formal and informal educators by providing high-quality professional development, relevant and up-to-date information on environmental topics, funding, and easily accessible teaching resources and tools that will help educators succeed in reconnecting children with nature. Sustained support for environmental educators is essential for facilitating the timely and accurate representation of environmental issues in schools and place-based educational settings.

The following outcomes and strategies will help educators achieve Goal 2:

Outcome 2.1: Educators have access to high-quality, curriculum-based lesson plans, resources, and information on training opportunities that focus on environmental issues for all grade levels and subjects.

- **Strategy 1:** Develop and refine classroom resources that use the local environment to teach broader national and global concepts and align with Administrative priorities.



Educators work with NOAA scientists to launch an autonomous underwater vehicle during a professional development workshop in Annapolis, Maryland.

- **Strategy 2:** Make scientific data sets publicly available in an easy-to-use format to support their use in inquiry-based learning.
- **Strategy 3:** Maintain the Bay Backpack website as an online resource to advance environmental education in the mid-Atlantic region, including curricular resources, outdoor education and teacher professional development providers, and best practices documents.
- **Strategy 4:** Ensure that content, resources, and research from universities and other federally funded programs, including Land Grant and Sea Grant institutions, are easily available to and used by partners.

Outcome 2.2: Teachers have sustained professional development related to environmental education content, outdoor learning strategies, and pedagogy to promote environmental literacy in their students.

- **Strategy 1:** Adopt a definition of "high-quality educator professional development specific to environmental education."
- **Strategy 2:** Encourage states to include professional development in environmental education for teacher recertification in science and other appropriate fields.
- **Strategy 3:** Provide incentives for teachers to participate in professional development and incorporate learning objectives into their classroom focused on federal and state environmental literacy priorities, including teacher fellowship programs.
- **Strategy 4:** Support programs designed to increase appreciation of the importance and value of environmental education by principals and local education agency administrators.
- **Strategy 5:** Connect teachers with STEM professionals to facilitate teacher participation in authentic research experiences.

Outcome 2.3: Pre-service teachers enter the workforce with knowledge and experience in interdisciplinary environmental education content, outdoor learning strategies, and pedagogy.

- **Strategy 1:** Work with colleges and universities to provide pre-service elementary, science, and other appropriate teachers with training in content, outdoor learning strategies, and pedagogy related to the environment.
- **Strategy 2:** Work with colleges and universities to develop coursework for pre-service teachers related to integrating the environment into non-science classes, including civics, history, and art.
- **Strategy 3:** Encourage states to include professional development in the area of environmental education as a requirement to receive teacher licensure and/or certification in elementary education, science, and other appropriate fields.

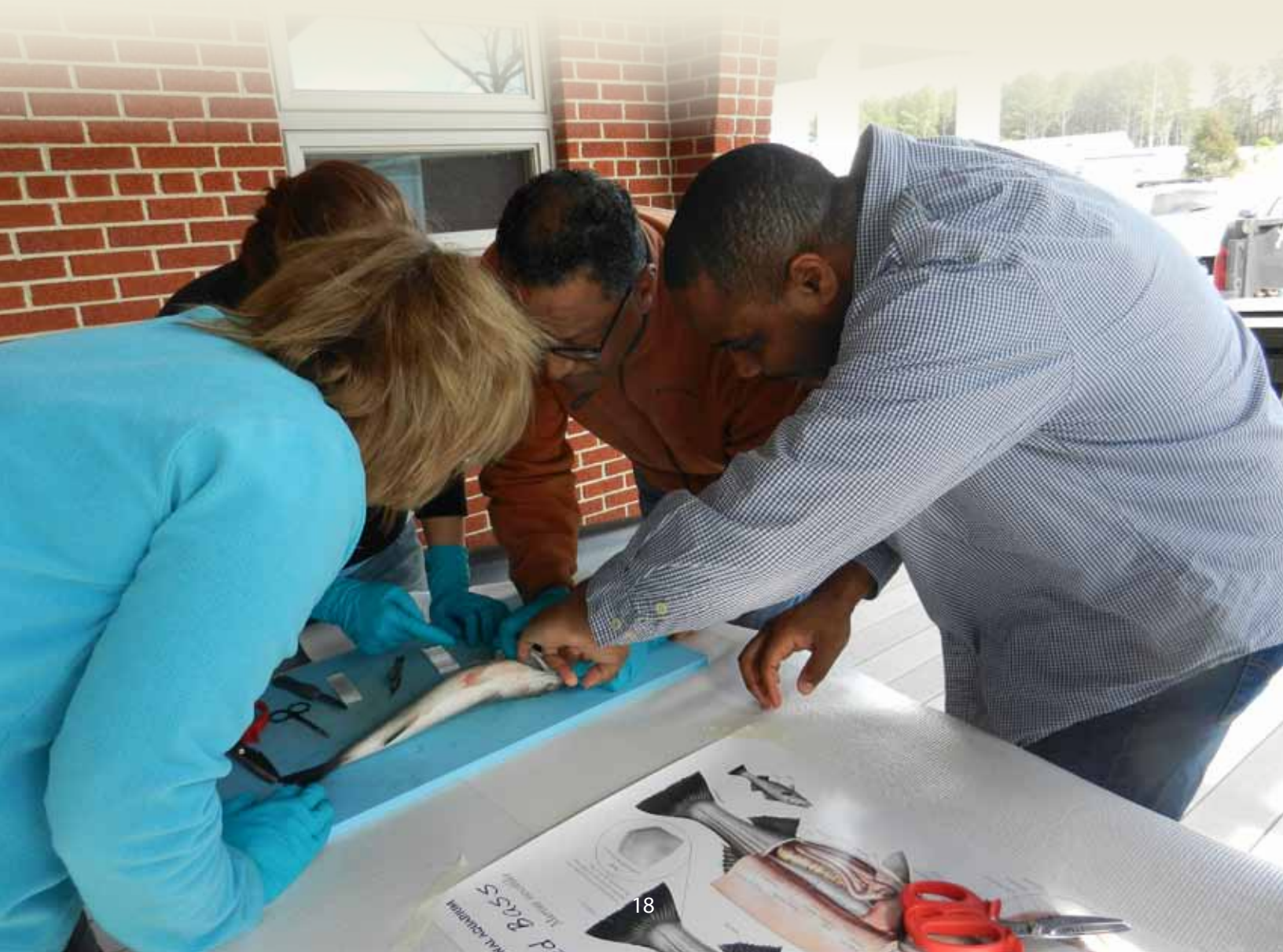
Outcome 2.4: Informal environmental educators in the region understand and can communicate current scientific findings and have knowledge of research-based environmental education best practices.

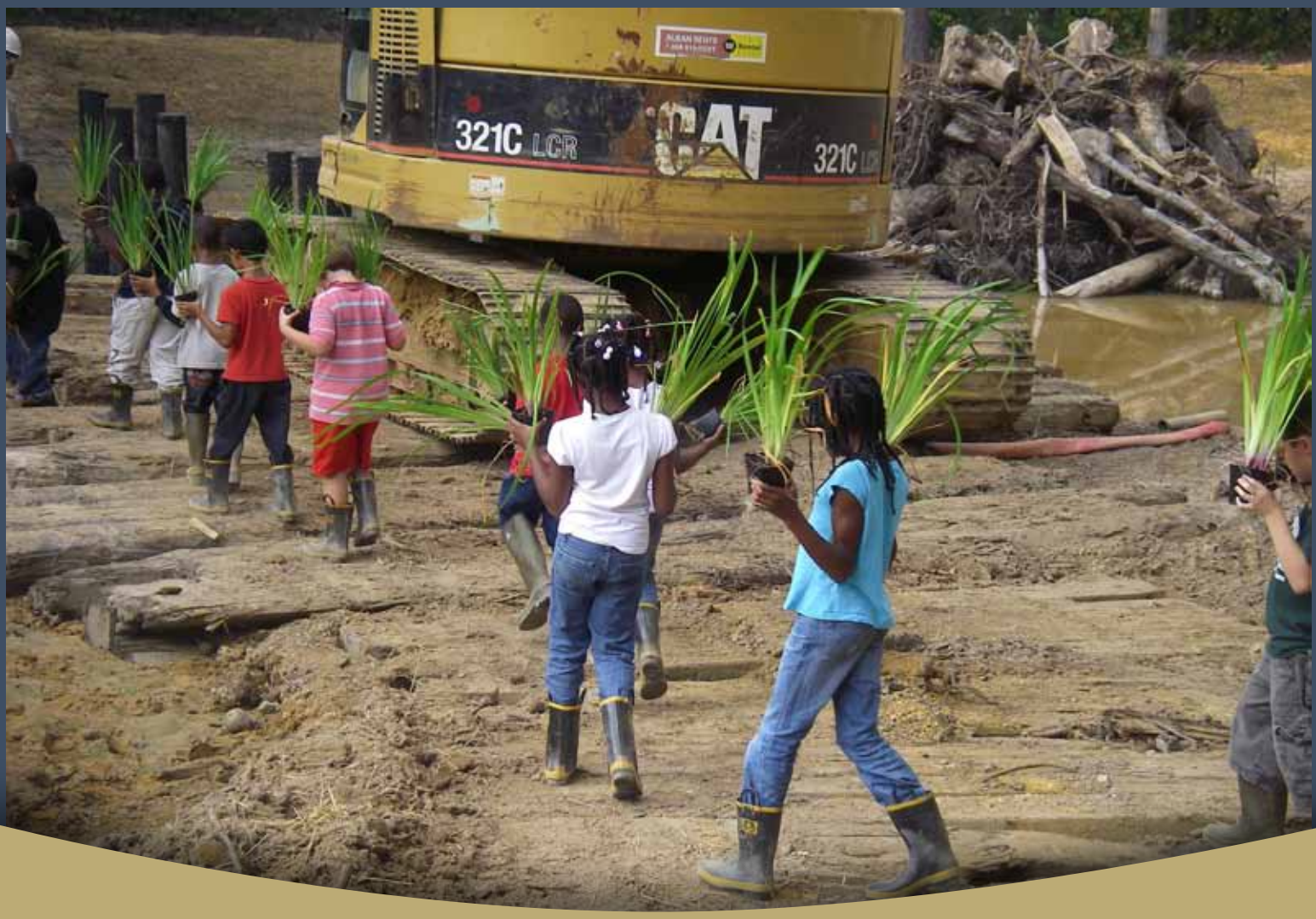
- **Strategy 1:** Provide targeted professional development opportunities for informal environmental educators, including staff from museums, aquaria, and outdoor schools.
- **Strategy 2:** Increase collaboration and communication between formal and informal environmental educators to support classroom learning related to the environment to ensure that informal education programs are aligned with formal education requirements.

- **Strategy 3:** Encourage the development or adoption of state-level environmental education certification for informal educators aligned with the criteria defined by the North American Association for Environmental Education.
- **Strategy 4:** Ensure the availability of opportunities for environmental educators to work with natural resource personnel on authentic research experiences.

Outcome 2.5: Federal, state, and local natural resource personnel are actively engaged in environmental education and outreach and have adequate training in instructional techniques and the needs of educational audiences.

- **Strategy 1:** Increase the number of scientists and other government personnel engaged in environmental education, including the development of a strong network of subject matter experts available to answer resource questions.
- **Strategy 2:** Provide government employees who design school programs with adequate training about standards of learning, environmental literacy priorities, and other relevant information to ensure proper alignment with state learning objectives and Administrative priorities.
- **Strategy 3:** Ensure the availability of information and training about effective outreach techniques to educational audiences for all government employees who participate in environmental outreach.





Every school in the region maintains its buildings, grounds, and operations to support positive environmental and human health outcomes.

Schools provide an ideal setting for authentic, place-based education that embraces a student's local community as a primary resource for learning. Exploring their world rooted in what is local—the unique history, environment, culture, economy, literature, and art of their community—students can achieve environmental literacy grounded by their understanding of their immediate environment. While inspiration may be more evident during a field experience to an awe-inspiring natural resource, schools are important community centers offering opportunities to educate not only students but also parents and the broader community about the benefits and cost savings associated with green building, maintaining native habitat, and more sustainable operations – showcasing, for instance, that green schools use 33 percent less energy and 32 percent less water than conventionally constructed schools, significantly reducing utility costs.[16]

Greener schools are healthier schools, by reducing exposure to toxins, mold, and other irritants that adversely affect health and by increasing exposure to healthy foods and opportunities for

[16] Kats, Gregory, et al, *Greening America's Schools: Costs and Benefits* (Capital E: 2006). http://www.healthyschools.org/documents/greening_schools.pdf

exercise. An independent nationwide survey released in 2011 by United Technologies Corp. and the U.S. Green Building Council's Center for Green Schools found that despite pressing budget concerns, nearly three out of four Americans support federal investment in building improvements for schools focused on creating learning environments that are healthier for students and staff, saving tax dollars, or lowering carbon emissions.[17]

To sustainably operate and maintain schools, administrators must continually assess, improve, and monitor each school's effects on health and the environment. From the sourcing of cafeteria food to lighting and heating choices; from the wildlife supported on the school grounds to the materials used for renovations, all environmental indicators can be examined. Every school in the region—no matter what its current infrastructure—can assess its impacts and move forward. This cycle of assessment and improvement provides ongoing, hands-on teaching tools and a sense of empowerment for students.

Bringing renewed attention to this model, the U.S. Department of Education Green Ribbon Schools national recognition program is being piloted in the 2011-2012 school year to encourage "our nation's schools and communities to promote healthy and sustainable environments and educate students to become environmentally literate citizens." An exciting component of the framework is the recommendation that the state departments of education use existing recognition programs to identify exemplary schools to be nominated for national Green Ribbon School recognition. This approach should buoy existing state green schools programs by bringing increased focus and energy to their efforts.

Each mid-Atlantic state is currently operating or developing a program focused on improving the environmental outcomes of their schools. The management of these programs varies by state—some are directly managed by the state government; others are run by a nongovernmental partner. The state of Maryland has a goal of every school achieving Maryland Green School status as part of their state environmental literacy plan; the NAAEE affiliate for the state of Maryland manages this program.

The following outcomes and strategies bring together the important criteria outlined in the Green Ribbon Schools framework along with important regional environmental outcomes and programs to create a singular set of federal priorities for greening the schools of the mid-Atlantic region.

Outcome 3.1: School buildings, grounds, and operations are models of sustainability for the community, making continual progress towards net-zero environmental impacts, including carbon, solid waste, wildlife habitat, and hazardous waste.

- **Strategy 1:** Actively promote the development and implementation of facility management plans for schools and local education agencies that include short- and long-term environmental metrics that inform decision making.
- **Strategy 2:** Reduce or eliminate greenhouse gas emissions through training and support for energy audits or emissions inventories and associated reduction plans, cost-effective energy efficiency improvements, conservation measures, and/or renewable energy.
- **Strategy 3:** Improve water quality, efficiency, and conservation, including encouraging the use of school grounds to meet total maximum daily load and other water pollution prevention strategies.
- **Strategy 4:** Reduce solid and hazardous waste production through increased recycling, reduced consumption, and improved management, reduction, or elimination of hazardous waste streams.

[17] The Center for Green Schools, *Center for Green Schools and UTC Announce New Findings on Green Schools*, Thursday, October 13, 2011, http://centerforgreenschools.org/utility-nav/blog/11-10-13/Center_for_Green_Schools_and_UTC_Announce_New_Findings_on_Green_Schools.aspx

- **Strategy 5:** Actively promote the use of alternative transportation, including safe routes for walking or biking, and support policies and projects that reduce the impacts of traditional modes of transportation, including no-idling zones and incentives for carpooling.
- **Strategy 6:** Encourage and support the development of phased plans and installation of wetlands, forests, gardens, and other habitat on school grounds that promote teaching and learning about the environment.

Outcome 3.2: The school environment has a positive effect on the health of students, staff, and the surrounding community.

- **Strategy 1:** Support the development of integrated school environmental health plans and programs that consider student, visitor, and staff health and safety in all practices related to design, construction, renovation, operations, and maintenance of schools and grounds.
- **Strategy 2:** Promote resources to assess and manage indoor air quality, moisture and mold, contaminants, chemicals, pest management, and other issues that might adversely affect human health at schools.
- **Strategy 3:** Encourage states, local education agencies, and schools to establish high standards and multi-use outdoor areas to support nutrition, fitness, and outdoor time that promotes discovery and play for both students and staff.
- **Strategy 4:** Support the availability of healthy food options through the promotion of local farm-to-school initiatives, onsite food gardens, environmentally preferable foods (organic, fair trade, food alliance, rainforest alliance), and other healthier food programs.

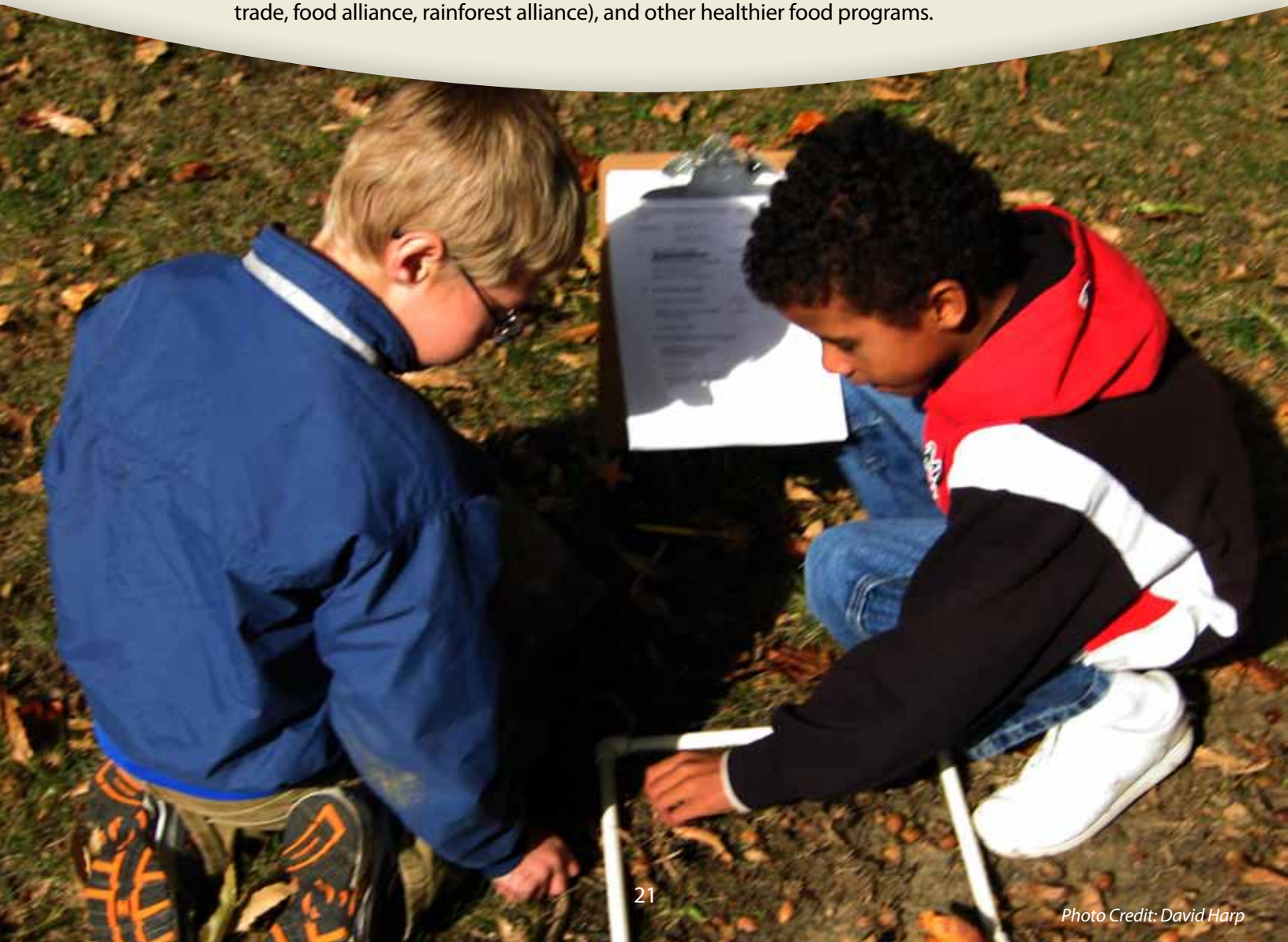


Photo Credit: David Harp

The education community in the region functions in a unified manner and coordinates with key national, regional, and state programs to represent the full suite of information and opportunities available for PK-12 audiences.

Federal agencies must work together with states and nongovernmental organizations to ensure that a common vision is achieved for environmental education in the mid-Atlantic region. Given the diversity of Obama Administration priorities related to environmental literacy (Green Ribbon Schools, Educate to Innovate, America's Great Outdoors, and the National Ocean Policy), if federal entities work independently instead of collaboratively, they will likely send confusing messages to those working to develop policy and implement programs at the state level. To the extent possible, the federal government should support state-level efforts to develop environmental literacy plans, provide information to increase support of environmental education as an effective way to meet educational priorities, support implementation of the environmental literacy objectives of the Next Generation Science Education Standards, and increase the understanding and use of Environmental Literacy Principles (Ocean[18], Climate[19], Earth Science[20], Atmospheric

[18] College of Exploration, *Ocean Literacy Framework*, Accessed Oct 5, 2011. http://oceanliteracy.wp2.coexploration.org

[19] U.S. Climate Change Science Program, *The Essential Principles of Climate Sciences*, Accessed Oct 5, 2011. http://www.climatescience.gov/Library/Literacy

[20] Earth Science Literacy Initiative, *Earth Science Literacy Principles Guide*, Accessed Oct 5, 2011. http://www.earthscienceliteracy.org/index.html

Science[21], Energy[22], and others as they are developed). Federal funding should be coordinated and, where appropriate, used to fund and participate in research that advances the understanding of environmental literacy. Maintenance of a Mid-Atlantic Education Workgroup that includes representation from federal, state, and nongovernmental organizations and promotes federal-nonfederal partnerships is essential to the implementation of this Strategy.

States need to clearly understand federal priorities to be able to capitalize on and leverage the federal investment in the region. Since most of the action to implement environmental education content and practices takes place at the state level, federal entities must work together with state departments of education to ensure that states are aware of and able to access relevant federal resources. Furthermore, the federal government can support the use of research-based best practices in environmental education programs by maintaining an up-to-date suite of best practices documents on key areas of environmental education for practitioners, funders, and other administrators, and ensuring that they are used when developing, implementing, and evaluating education programs and products. Resources can be further leveraged by creating connections between PK-12 environmental literacy efforts and other citizen stewardship and service learning youth programs, and exploring opportunities for collaboration with partners whose programs are complementary to environmental education, such as physical education.

In today's challenging economic times it is more important than ever that the federal government work with state and nongovernmental partners to avoid duplication of efforts and maximize the efficient use of available resources. States in the Chesapeake region currently track numbers of students receiving MWEEs as a requirement of the Chesapeake 2000 Agreement. Increased effort to work with states to develop other common metrics to assess progress toward student environmental literacy, as well as implementing consistent data collection and reporting methods, will help demonstrate the results of the federal investment and support the many initiatives related to environmental literacy.

The coordinated use of federal, state, and nongovernmental resources is critical to the success of this Strategy and is essential to engage a broader community of partners in creating an environmentally literate society and fostering a stewardship ethic in the mid-Atlantic region in support of a sustainable future.

Outcomes and strategies will foster collaboration among federal, state, and local governments as well as other organizations:

Outcome 4.1: States in the mid-Atlantic establish and implement a robust plan for ensuring that all students graduate environmentally literate.

- **Strategy 1:** Encourage and support the development of state environmental literacy plans that include state departments of education, natural resource agencies, and nongovernmental organizations.
- **Strategy 2:** Provide information and experiences to state education officials to increase support of outdoor, inquiry-based learning, and service learning as effective ways to meet educational priorities.
- **Strategy 3:** Increase the understanding and utilization of Administrative priorities related to environmental literacy and Environmental Literacy Principles by state departments of education, natural resource agencies, local education agencies, and NAAEE affiliates.

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[21] University Corporation for Atmospheric Research, *Atmospheric Science Literacy: Essential Principles and Fundamental Concepts of Atmospheric Science*, Accessed Oct 5, 2011. http://eo.ucar.edu/asl

[22] Department of Energy, *The Essential Principles of Energy Education*, Accessed Oct 5, 2011. http://wiki.citizen.apps.gov/Energy_Literacy/index.php/Main_Page

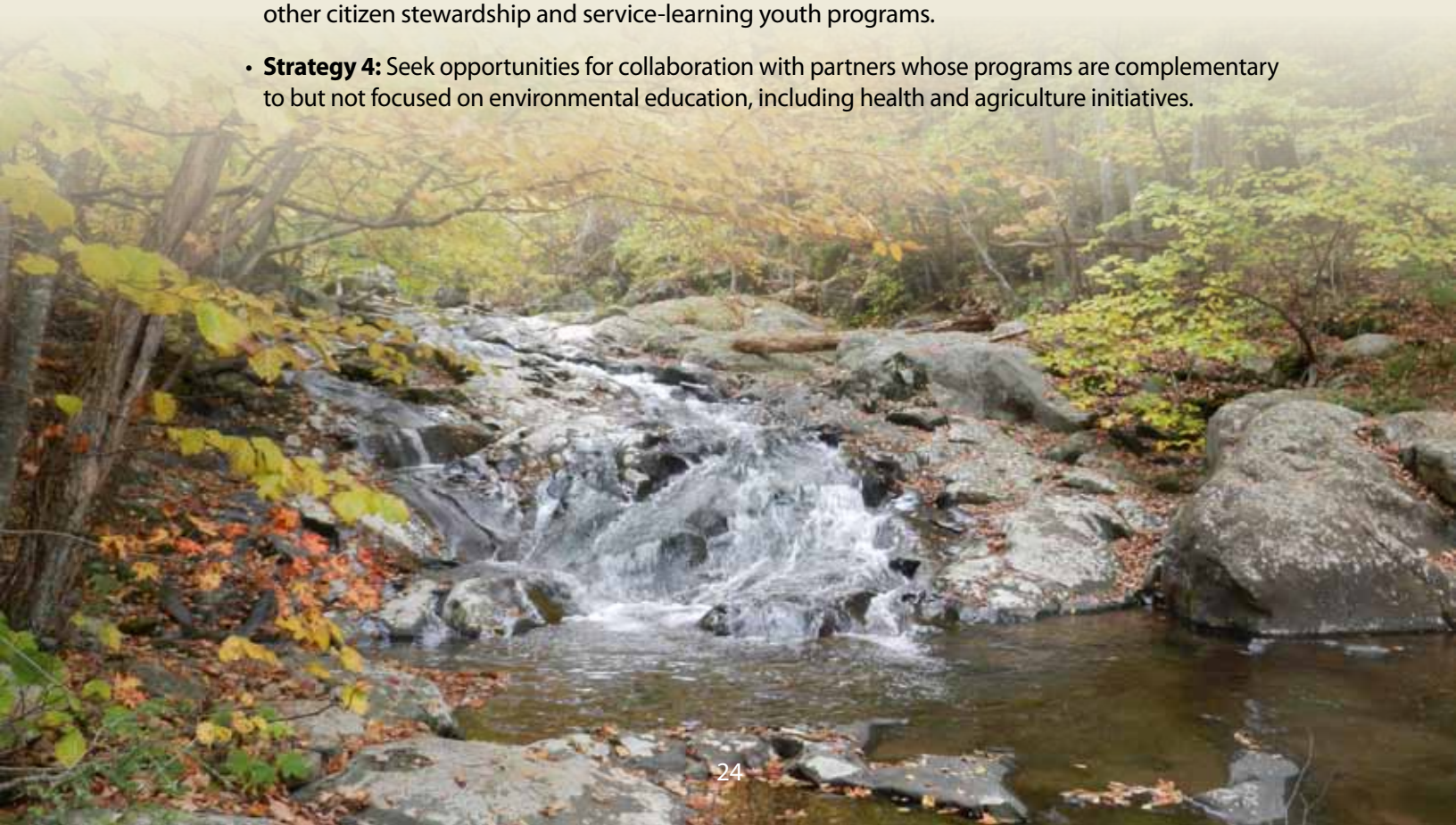
- **Strategy 4:** Support state implementation of the Next Generation Science Education Standards as an effective format for implementing environmental literacy programs.
- **Strategy 5:** Work with states to develop metrics to assess progress toward student environmental literacy.

Outcome 4.2: Education programs are developed and refined using the best available research on the effectiveness of environmental education, and support continued research in this field.

- **Strategy 1:** Maintain an up-to-date suite of best practices documents on key areas of environmental education for practitioners, funders, and other administrators to inform program development and federal funding.
- **Strategy 2:** Support and use research-based best practices when developing, implementing, and evaluating education programs and products, including increasing the use of best practices by recipients.
- **Strategy 3:** Fund and participate in research that advances the understanding of environmental literacy.

Outcome 4.3: Federal, state, and nongovernmental organizations with PK-12 programs actively communicate to increase collaboration related to environmental literacy planning and implementation.

- **Strategy 1:** Maintain an Education Workgroup to implement the Mid-Atlantic Elementary and Secondary Environmental Literacy Strategy that includes representation from federal, state, and nongovernmental organizations and promotes federal-nonfederal partnerships.
- **Strategy 2:** Better coordinate funding programs during both planning of priorities and implementation of awards.
- **Strategy 3:** Create an intentional connection between PK-12 environmental literacy efforts and other citizen stewardship and service-learning youth programs.
- **Strategy 4:** Seek opportunities for collaboration with partners whose programs are complementary to but not focused on environmental education, including health and agriculture initiatives.



Definitions:

Environmental education: The interdisciplinary study of the relationships and interactions between dynamic natural and human systems that couples inquiry-driven, place-based learning in the outdoors with classroom content to build the information and skills necessary for students to make informed environmental decisions.

Environmental educators: All instructors responsible for instruction about or in the environment, including formal PK-12 in-service or pre-service teachers, curriculum writers, administrators, and support staff; informal educators, including staff and counselors from outdoor education centers, parks and gardens, museums, zoos, and aquariums; and federal, state, and local natural resource personnel who conduct environmental outreach or participate in environmental education programming.

Environmental literacy: A fundamental understanding of the systems of the natural world, the relationships and interactions between the living and non-living environment, and the ability to understand and utilize scientific evidence to make informed decisions regarding environmental issues. These issues involve uncertainty and require economic, aesthetic, cultural, and ethical considerations.

Interdisciplinary: A curriculum approach that consciously applies methodology and language from two or more disciplines to examine a central theme or issue. This approach is about creating something new by crossing boundaries, and thinking across them.

Mid-Atlantic region: All jurisdictions with any portion of their land falling within the boundaries of the Chesapeake Bay watershed, specifically the states of Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia as well as the District of Columbia. *Note: The geographic area was chosen because of this strategy's support of the Chesapeake Bay Executive Order along with a recognition of the fact that environmental literacy planning and implementation occurs at the state level for all students enrolled in schools within that state, and therefore, watershed boundaries are less important than jurisdictional boundaries in this policy discussion.*

Scaffolded Instruction: The systematic sequencing of content, materials, tasks, and teacher and peer support to optimize learning. Scaffolding is a process in which students are given support until they can apply new skills and strategies independently.

Service Learning: A teaching and learning strategy that integrates meaningful community service with instruction and reflection to enrich the learning experience, teach civic responsibility, and strengthen communities. Through service-learning, young people—from kindergarteners to college students—use what they learn in the classroom to solve real-life problems. They not only learn the practical applications of their studies, they become actively contributing citizens and community members through the service they perform.

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