

ENVIRONMENTAL LITERACY PLAN





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To learn more about B-WET, visit www.noaa.gov/office-education/bwet.

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ENDORSEMENTS



MESSAGE FROM SUPERINTENDENT SEITZ

The Environmental Literacy Plan, developed by our dedicated team of teachers, administrators, and community members here in Middlesex County, represents a significant step forward in our commitment to preparing students with the essential knowledge, skills, and dispositions needed to address and resolve the complex environmental issues of our time.

The Environmental Literacy Plan aligns seamlessly with our district's mission to engage, inspire, and empower students, fostering their development into confident, passionate, and responsible citizens. By integrating environmental literacy across our curriculum, we are equipping our students with the tools to think critically about ecological, economic, and social stability. This holistic approach is crucial for nurturing informed and active participants in our global community.

One of the key strengths of the Environmental Literacy Plan is its collaborative foundation. The inclusive process that brings together educators, administrators, and community members ensures that the plan reflects a diverse range of perspectives and expertise. This collaborative spirit not only enhances the quality of the plan but also strengthens our school community by fostering a sense of shared purpose and responsibility.

In particular, the plan emphasizes the development of problem-solving skills and the ability to work collectively toward sustainable solutions. These competencies are essential for our students as they navigate an increasingly interconnected and interdependent world.

I am confident that the implementation of the Environmental Literacy Plan will have a profound and lasting impact on our students and the wider community. It embodies our strategic priorities by promoting deeper learning, creating a positive and supportive learning environment, building capacity among educators and students, and enhancing community engagement.

As we move forward, I am eager to support the continued integration of environmental literacy into our educational framework. Together, we can inspire our students to become stewards of the environment, equipped with the knowledge and skills to lead sustainable and meaningful lives.

Thank you for your unwavering dedication to the educational advancement of our students and for supporting this vital initiative.



Dr. Tracy Seitz
Division Superintendent



Pictured from left to right: Dr. Byron Bishop, Nicole Huntley, Macy McNamee, Superintendent Dr. Tracy Seitz attending a PROJECT W^{ONDER} event for Administrators from Caroline, Essex and Middlesex Public Schools on March 11, 2024.



MCPS STEERING COMMITTEE

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ERICA WILLIAMS

Second Grade Teacher, Middlesex County
Public Schools

Why does working on the Environmental Literacy Plan matter to you?

Sara Chaves Beam

“

I want to live in a community that has a multigenerational commitment to a healthy and sustainable environment where people and nature both thrive and prosper.

Nicole Huntley

“

Equipping our students (our future leaders) with the tools and skills they need to make informed, responsible decisions and find creative, effective solutions to environmental issues will help ensure a brighter future for our planet and all its inhabitants.

Jennifer Mahr

“

It is important for students to understand the cause-effect relationship of their actions and their long lasting impact on the natural environment.

Erica Williams

“

I want to be a part of making a positive impact in our community by ensuring students are aware of how important the environment and land is in our area. I want to help build an appreciation for the environment and encourage others to be a good steward of the land we use.



INTRODUCTION



EXECUTIVE SUMMARY

The Middlesex County Public Schools (MCPS) Environmental Literacy Plan (ELP) was built out of a desire to create robust, outdoor learning experiences for all students. It is a community forward approach that relies on collaboration between the school division and community partners who provide a bridge to the natural resources in Middlesex County. The goals contained in the plan ensure that across their school career, students will discover their local watershed, understand their place in it, grow into active environmental stewards, and ultimately, feel equipped to enter any environmental field. Caroline and Essex Counties have environmental literacy plans being published. A regional network is being created across Virginia's Middle Peninsula that will exist to share resources, support outdoor learning and contribute to a more resilient community in the face of a changing climate.

WHY AN ENVIRONMENTAL LITERACY PLAN?

Environmental Literacy Plans are being adopted across the Commonwealth of Virginia. The MCPS ELP was created as a result of the Environmental Literacy Goal and Outcomes outlined in the [Chesapeake Bay Watershed Agreement](#) signed in 2014 by the Governors of Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia, a Council member from the District of Columbia, and a representative from the Chesapeake Bay Commission. The Environmental Literacy Goal states, “Enable every student in the region to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed.” In order to meet this Goal, the Bay Agreement, as well as the [Virginia Department of Education \(VDOE\)](#) use a [Student Outcome](#), a [Sustainable Schools Outcome](#) and an [Environmental Literacy Planning Outcome](#) to measure success. An Environmental Literacy Plan, such as this one, can provide a school division from its School Board, administrators, teachers, students to its families and communities with an equitable, systemic and sustainable path forward to achieving local, state and regional goals.

Environmental Stewardship



WHAT IS ENVIRONMENTAL LITERACY IN MIDDLESEX COUNTY PUBLIC SCHOOLS?

Environmental Literacy is having the knowledge, skills and mentality to solve problems and resolve issues individually and as part of our community. Using the MCPS Core Values, we will develop an ethic of stewardship that sustains and preserves ecological, economic and social stability.

MCPS Core Values



CITIZENSHIP:

Contributing to the greater good of the community

- Understanding thoughts, feelings, needs of others
- Treating others with respect
- Acting with others' best interest in mind
- Taking responsibility for own actions
- Standing up for your beliefs



COLLABORATION:

Working together to pursue our mission

- Earning and giving trust
- Communicating clearly and listening generously
- Accepting different perspectives
- Navigating conflict with respect
- Leading by example



CREATIVITY:

Using imagination to solve problems & implement new ideas

- Thinking critically
- Taking healthy risks and trying new things
- Being curious
- Learning from success and failure
- Persisting through challenges



LEARNING:

Discovering our purpose and potential

- Mastering skills
- Cultivating a love for learning
- Passionately pursuing interests
- Applying knowledge
- Believing in oneself



MCPS places priority on environmental initiatives. In 2020, MCPS, in collaboration with Sun Tribe, became the first school district in the country to have its schools 100 percent powered by on-site solar energy. Soon after, MCPS received their first two electric buses as part of Dominion Energy's Electric School Bus Program in January 2021, and received another two in October 2022 through Virginia's Department of Environmental Quality (DEQ) School Bus Program.

MCPS has continued to show its dedication to environmental learning through multiple opportunities and partnerships. For example, funding from the [Marine Science Legacy Program](#) “brings knowledge and understanding for the Chesapeake Bay ecology, history and future to Middlesex County area students.” Additionally, participation in outdoor field experiences through Friends of the Rappahannock, Friends of Dragon Run, Chesapeake Bay Governor’s School and during Urbanna’s Oyster Festival Education Day, bring attention to the local ecosystem and watershed. MCPS will use these established partnerships and expand them in grades 5, 6 and Environmental Science to include the placement of full MWEEs including all four essential elements. By fifth grade, students are ready to apply their science knowledge during real-world, outdoor learning experiences. As a result, students are encouraged to take action through civic engagement. Sixth grade provides a natural fit for a full MWEE due to the alignment with the Virginia Standards of Learning and to honor the existing community partnership between MCPS and the Friends of the Rappahannock. The Tidal Education Manager provides high quality MWEE programming to MCPS students by conducting classroom visits, leading water quality stations with community volunteers and assisting classes with action projects. To reinforce science skills and promote environmental careers, Environmental Science teachers will incorporate MWEE elements within their high school level courses.

NOAA’s Meaningful Watershed Educational (MWEE) “is a learner-centered framework that focuses on investigations into local environmental issues and leads to informed action.” The framework contains four essential elements: issue definition, outdoor field experiences, synthesis and conclusions, and environmental action projects.



MCPS currently uses a digital portfolio platform, Wakelet, to house student work in grades 3 through 12. Each year, students upload examples of their projects and local alternative assessments into collections for Science, Social Studies, Language Arts, and Art. Teachers and more importantly, students, access Wakelet to view personal progress beyond formal tests on an annual basis. MCPS plans to add a MWEE specific collection to Wakelet to allow students to have a place to capture their environmental literacy activities, data, and action projects. With three established MWEEs before graduation, students gain the skills and knowledge for deeper learning in science, engage with community partners, explore local watersheds and take action. Through this journey, MCPS inspires passionate and responsible environmental leaders within their community.



WHY IS ENVIRONMENTAL LITERACY IMPORTANT TO MIDDLESEX COUNTY?

Middlesex County Public Schools serves students in preschool through grade 12 at three schools. The division contains one elementary school, one middle school and one high school. MCPS enrollment for the 2023-2024 academic year is 1,226 students. In MCPS, 65.7% are classified as economically disadvantaged.

Located on the eastern side of Virginia's Middle Peninsula, Middlesex County "remains a rural community dependent upon the gifts of the earth: productive farmland and timberland, and tremendous access to the waters of the Chesapeake Bay. Tidal marshes extend along two-thirds of the County's shoreline ([Middlesex County Comprehensive Plan](#)). It is bordered on the east by the Rappahannock River with the Piankatank River on the southeast wrapping around the southeast tip of the county near Deltaville, home to the Deltaville Maritime Museum. Situated at the center of the county is the town of Saluda at the intersection of Route 17 and Route 33 ([Appendix 1: Map of Schools in Middlesex County](#)).

Due east of Saluda is Urbanna, home to the annual Urbanna Oyster Festival, Virginia's official celebration of oysters. Finally, located along the Middle Peninsula covering parts of Middlesex County is the Dragon Run watershed. This "203-acre tract of Dragon Run swampland" is a pristine ecosystem and has been "ranked second (first in Virginia) in ecological significance among 232 areas investigated in the Chesapeake Bay watershed" (dragonrun.org). Friends of Dragon Run (FODR) currently manages this unique ecosystem and hosts paddles and environmental education opportunities while controlling for human impact on the area.

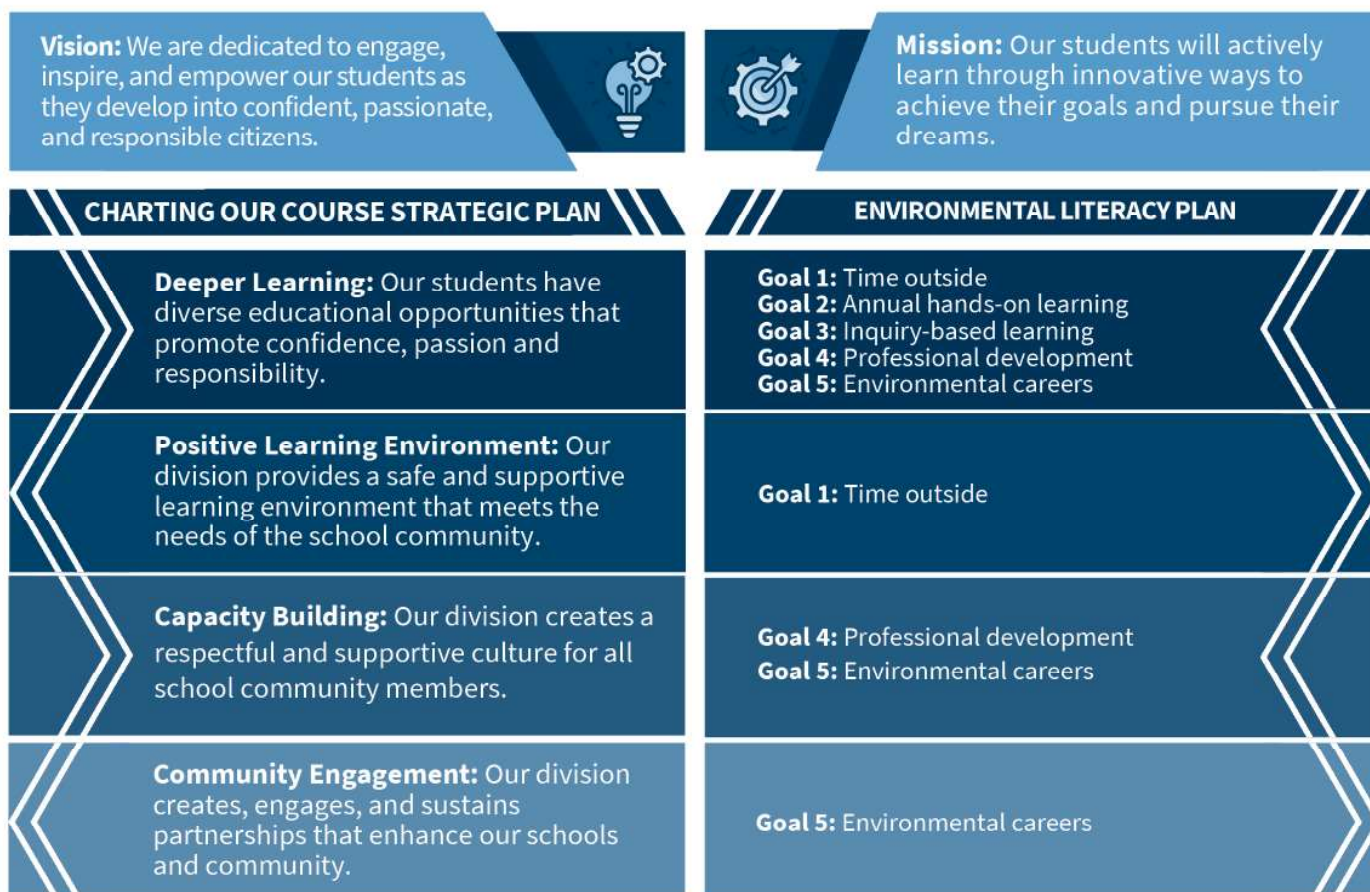


The call for environmental literacy is woven into the fabric of daily life in Middlesex County. The community, with its estuaries and rivers, diverse marine life, and rich maritime history, serves as an invaluable classroom for children. For this reason, the ELP highlights the importance of community spaces that are accessible for the public and for schools. Visits to these “outdoor classroom” spaces are critical; they allow students to study unique characteristics of their local watershed and develop a deeper connection to the environment. Middlesex faces numerous challenges, including pollution, habitat loss, and climate change. By instilling environmental awareness early on, students become advocates for the conservation and protection of their cherished home.

With an ELP in place, collaboration between schools and community is necessary. Community partners and experts can act as guides to inspire students to think creatively about solutions to establish a healthy and thriving ecosystem. From understanding the importance of responsible waste disposal to appreciating the significance of native plant species, students become agents of positive change. Through fully implemented MWEEs, they learn how their daily choices impact the health of the Chesapeake Bay and its inhabitants and participate in environmental action projects to contribute to solutions.

HOW DOES THE ENVIRONMENTAL LITERACY PLAN ALIGN WITH OUR STRATEGIC PLAN?

The Environmental Literacy Plan leans heavily on the Middlesex County Public Schools 2023-2029 Strategic Plan, [Charting Our Course](#), as a guiding document. Success of the ELP will contribute to the success of the Strategic Plan.



COMMUNITY FOCUSED APPROACH

WHAT IS PROJECT W²ONDER?

The pandemic highlighted the essential need for all students to spend time outside exploring, wondering and connecting with the natural world. The North American Association of Environmental Education cites research that reinforces the connection between outdoor learning and its benefits including improved physical, mental and social well-being (NAAEE.org). For some school divisions, an emphasis on outdoor learning can be challenging and disjointed as outdoor experiences may not be distributed equally among classes or schools within the division.



PROJECT W²ONDER ROADMAP

STEP 2: PROJECT FRAMING

Meetings with school administrators and teachers.

STEP 4: COMPLETE ELP

Evaluate and refine ELP drafts, come to consensus about final drafts, and present to School Board.

STEP 1: COMMUNITY COLLABORATION

Meetings with school administrators, teachers and community organizations. Community outreach events and community survey.

STEP 3: GUIDED DRAFTING

Teacher survey. Convene Steering Committees and begin meeting to advise and create ELP.

In addition, community partners, who facilitate MWEES, were interested in bringing them to rural school divisions, but wanted to be efficient in their approach. Therefore, PROJECT W²ONDER was formed to bring equitable, systemic and sustainable Environmental Literacy Plans to Essex and Middlesex Public Schools in Virginia's Middle Peninsula and the adjacent Caroline County Public Schools to create a regional effort to the Chesapeake Bay.

This project was funded by a National Oceanic and Atmospheric Administration (NOAA) Bay Watershed Education and Training (B-WET) grant. PROJECT W²ONDER stands for a “Win-Win on Designing Environmental Relationships.” It refers directly to the two-way benefit of having solid, community partnerships that can support schools. Community partners benefit because they have access to students to carry out their missions. Schools benefit because they receive support in activities that build environmental awareness but also meet academic standards of learning. The grant is held by Hanover-Caroline Soil and Water Conservation District, and has included a partner team with representatives of the Alliance for the Chesapeake Bay, Friends of the Rappahannock, each school division, and members of each community.

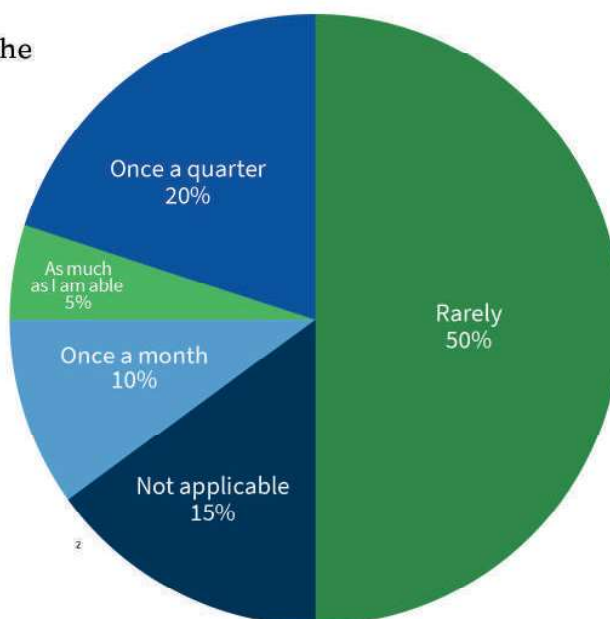
HOW WAS THE ENVIRONMENTAL LITERACY PLAN CREATED?

Each step of the Environmental Literacy Plan creation process, the partner team gave equal voice to the school division and the community. In 2022, PROJECT W²ONDER kicked off with a tour of the schoolyards at St. Clare Walker Middle School and Middlesex Elementary where the Partner Team saw the solar panel field and electric bus charging area. The Partner Team spent time listening to the needs of MCPS administrators and listening to the needs of the community through one on one conversations and ultimately collecting feedback through a Community Survey. Additional community needs, potential partners, and interested parents were identified through the survey and the results were shared back to MCPS and eventually used to inform membership for the MCPS Steering Committee.



Community Partner site visit with Nicole Huntley with Middlesex County Public Schools

Following the community engagement from the prior year, the partner team presented a progress update to the Middlesex County School Board in November 2023. Next, with the recommendation of MCPS administrators, the partner team created and distributed a Teacher Survey to the MCPS teachers to identify their successes, needs and barriers related to existing environmental programming, specifically, MWEEs. Data from the survey underscored the importance of community partner support and an Environmental Literacy Plan.



Survey results from the teacher survey indicated that 65% of respondents indicated either “not applicable” or “rarely” when asked “How often do you use the outdoors to teach?” The ELP was created based on this response and other teacher concerns discovered through the survey results including access to and knowledge of outdoor spaces, community partnerships, and teacher training.

“—
“I teach reading and history. I would LOVE to add in meaningful experiences utilizing the vast green space and water access that we have locally... I can correlate any type of literature to environmental experiences.”

- Teacher Survey Respondent —”

Collaboration between MCPS and the community continued as the partner team used input from administrators and results from the Community Survey to form a MCPS Steering Committee. The committee included administrators, teachers and community partners. Steering committee meetings were held monthly from January through June 2024. Members contributed and edited ELP



The participants from the “Seeing Through the Eyes of a Student” standing in front of Dragon Run.

content, shared their lived experience, connections, and deep knowledge of Middlesex County. On March 11, a region-wide “Seeing Through the Eyes of a Student” event was held at Dragon Run, in Middlesex County with steering committee members attending from all three school divisions involved in PROJECT W² ONDER. Friends of Dragon Run volunteers collaborated with the partner team to facilitate the morning stations including a nature walk, and water quality testing. After lunch, only administrators remained for the networking portion of the event, including Superintendents from all 3 school divisions who shared their experiences related to professional learning, funding, and developing Environmental Literacy Plans. This unique opportunity to gather Superintendents and Science Specialists in an outdoor setting worked to boost the regional network for MWEs and ELPs.

“Remember the importance of collaboration and partnerships! Utilize the resources in the region to benefit MCPS kiddos. Our watershed is so important.”

- Event attendee

In Fall 2024, the partner team reviewed and refined ELP content, as directed by the Steering Committee. A small celebratory boat trip hosted by Captain Murray of W.H. Murray Marine & Guide Services and luncheon at Merroir was held from the Urbanna Town Marina to pause and appreciate the collaborative work accomplished by the Steering Committee. A graphic designer was brought on board to assist the partner team in creating the final document that you are reading today.





GOALS



ENVIRONMENTAL LITERACY GOALS

GOAL 1



Every student will have access to time outside, within the school setting, to develop an appreciation for the outdoors.

Objectives:

- Create opportunities for intentional social-emotional learning (SEL) integrations to develop appreciation for the outdoors
- Create and maintain specific resources and activities for teachers for use within the school setting
- Opportunities for outdoor learning are cross-curricular and is encouraged under any discipline

GOAL 2



Every student each year engages in a thoughtful and impactful hands-on outdoor learning experience.

Objectives:

- Identify the vertical alignment of experiences through grade bands
- Develop school calendars with specific dates for schoolyard field experiences
- Create internal processes and standard operating procedures (SOPs) for teachers regarding schoolyard field experiences
- Create pacing that allows ample time for schoolyard field experiences
- Generate and maintain a list of existing outdoor spaces at schools that all MCPS teachers and students have equal access to
- Use a list of recurring community events to tap into as experiences for students (ex// FoR, Earth Day)

“—
Our future generations need to understand the complex interactions between the living and non-living parts of the natural world in order to improve humankind's impact to ensure a healthy future for all. We live here, we need to know how to take care of the place.

— Terry Skinner —”

GOAL 3



Every student will participate in an authentic inquiry-based learning experience to understand and apply the principles of environmental literacy.

Objectives:

- Identify grade appropriate areas and opportunities for authentic IBL within the Middlesex community
- Define years when full MWEE will occur
- Teachers will utilize the “student portfolio” system to record their experiences as they continue through grades

GOAL 4



Interdisciplinary environmental literacy professional development will be provided to all teachers.

Objectives:

- Teachers take MWEE 101 training, incorporate IBL (inquiry based learning) into the training
- Create a teacher training plan that covers: stipends and funding, opportunities for teachers to collaborate and share experiences, outdoor safety/risk management, local needs
- Emphasize cross-curricular opportunities, and activities within subject area; incorporate math and reading across curriculum
- At least once a year collaborate with other middle peninsula school districts on environmental literacy professional learning opportunities



“—

This plan can help educate students about environmental issues and sustainability. By integrating environmental education into the curriculum, students can develop a deeper understanding of the environment and learn how to make informed decisions to protect it.

— Macy McNamee |

—”

GOAL 5



All students will gain an awareness of different career pathways related to the environment and natural resource-based fields.

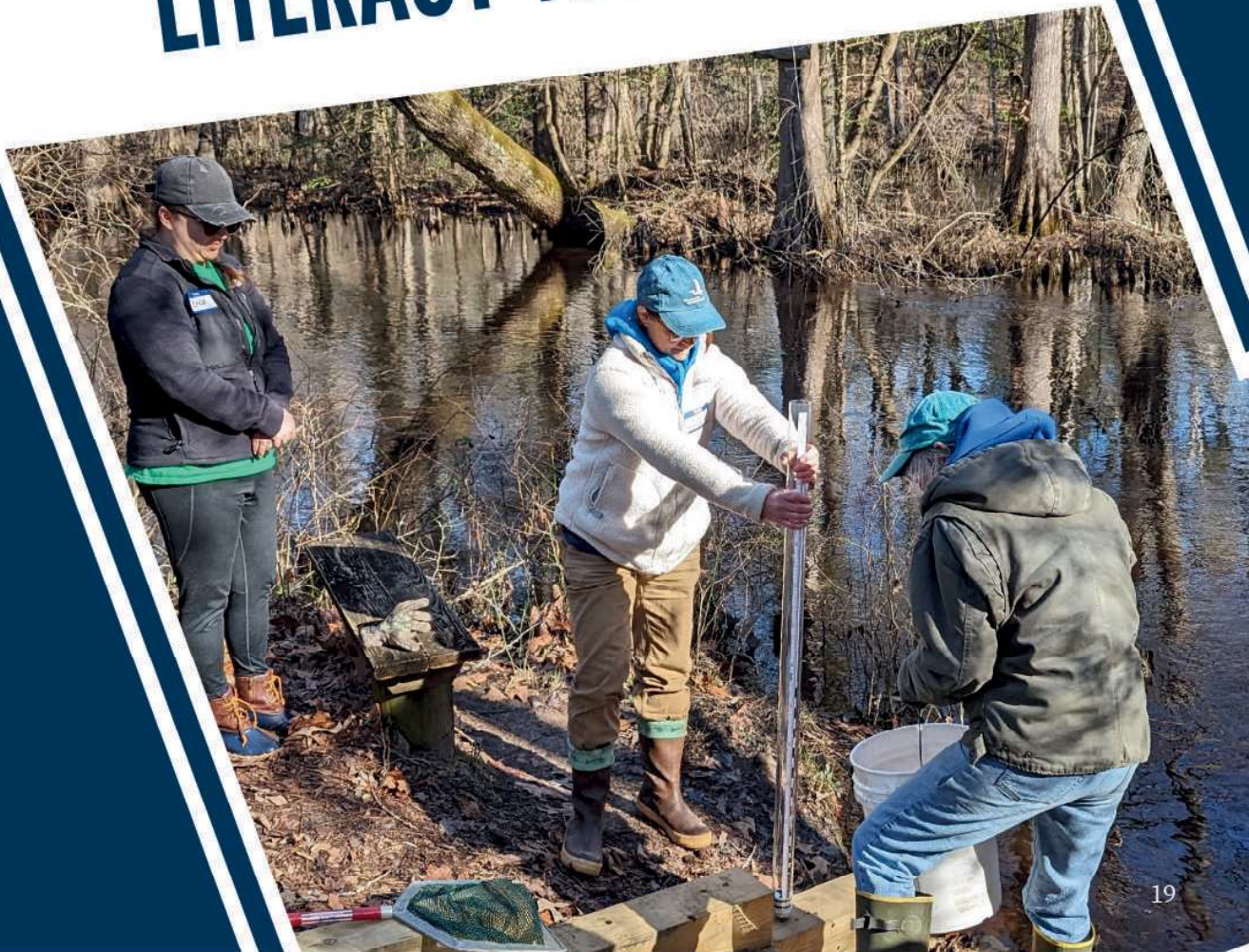
Objectives:

- Develop a list of local speakers and community partners available to talk about their careers to all grade levels
- Incorporate environmentally-related careers into existing career day events
- Provide opportunities for students to research a career of interest and explore how all careers interact with the environment





ENVIRONMENTAL LITERACY THEMES



ENVIRONMENTAL LITERACY THEMES

Environmental literacy is having the knowledge, skills and mentality to solve problems and resolve issues individually and as part of our community. As students travel through their school career, themes emerge. Student interpretations of the themes are included as illustrations below.

EARLY ELEMENTARY: Kindergarten, First and Second Grade

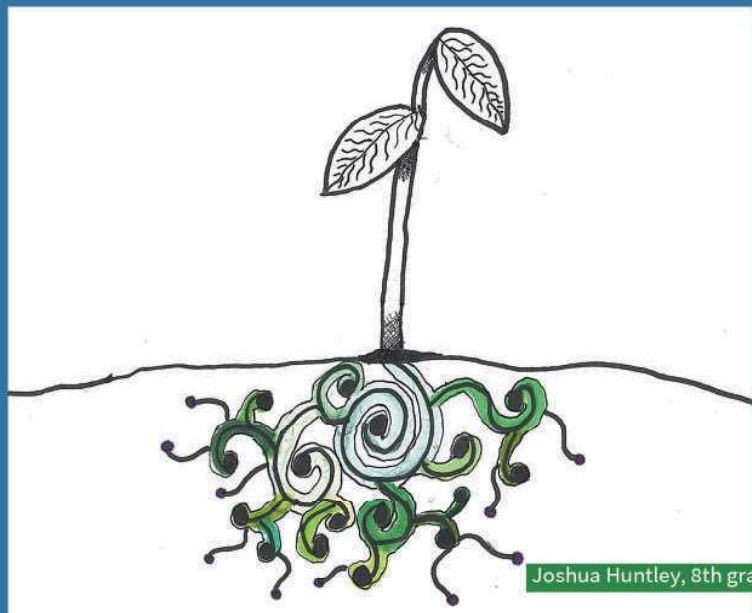
Nature is all around me. I use my senses to explore my environment and learn about living things. I interact with nature on the playground, in the garden, in the classroom and in my county. My class watches change around us in nature, and we learn to understand our environment by observing and learning together!



Nadya Crader, 7th grade

LATE ELEMENTARY: Third, Fourth and Fifth Grade

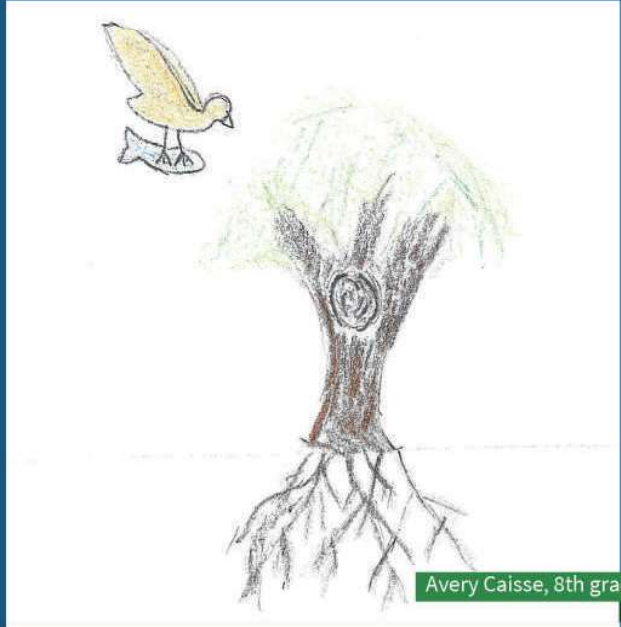
Interactions and relationships are a big part of our lives, and a big part of the environment around us. We are part of our terrestrial ecosystem with plants, animals, trees and all the life in our community. We value our local estuarine environment with oyster reefs, crabs, fish and all the life in our local rivers. Our school uses the sun to make energy that keeps everything running. We have a solar farm that transforms sunshine into renewable energy that helps keeps our air clean and our county more sustainable.



Joshua Huntley, 8th grade

MIDDLE SCHOOL: Sixth, Seventh and Eighth Grade

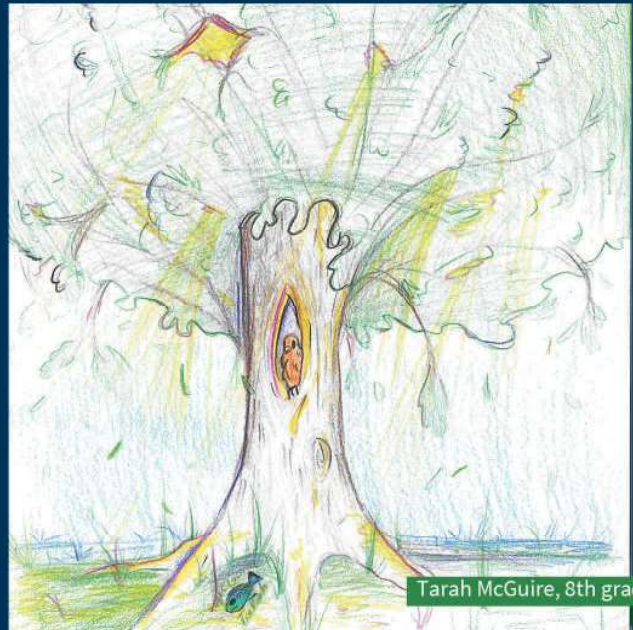
Our community is part of the Chesapeake Bay watershed and we have to work together to take care of it. Oysters are important to our community and our Chesapeake Bay watershed too. Photosynthesis fuels the foodweb from phytoplankton at the bottom to mighty Seahawks at the top! We learn that life in our community is interconnected and we are an important part of taking care of it. Our local environment is in our hands and we find opportunities to grow new trees, expand our oyster reefs, reduce trash and pick up litter to keep Middlesex healthy and beautiful.



Avery Caisse, 8th grade

HIGH SCHOOL: Ninth, Tenth, Eleventh and Twelfth Grade

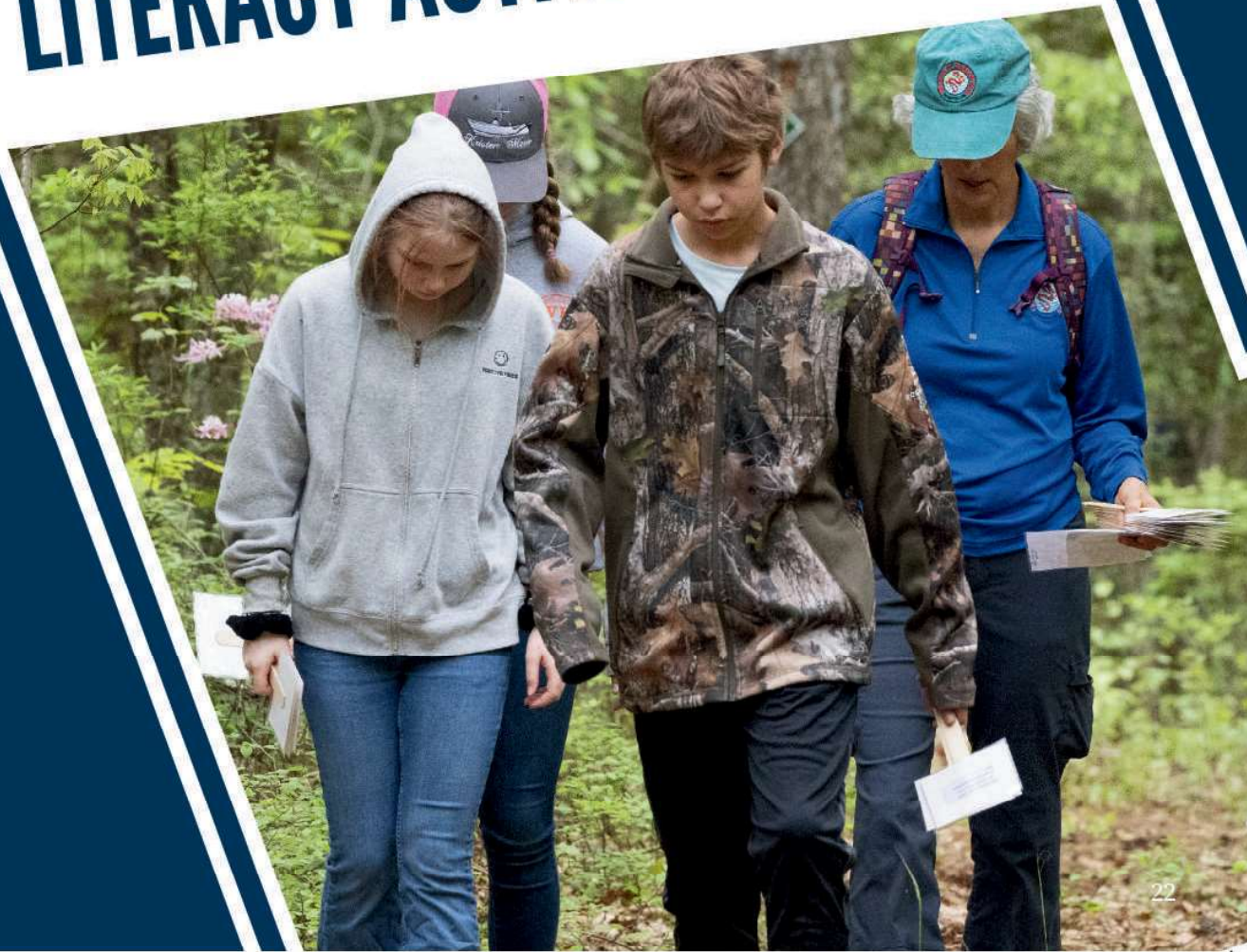
We are future decision makers and caretakers of our community and we learn about roles and responsibilities in our environment. Our rivers, forests and farms are important engines of our local economy and hold the jobs that we will fill in the future. The waters of the Chesapeake Bay and our local tributaries hold critical natural resources and shape our lives here. Our knowledge and protection of the environment helps us create a resilient, healthy community with a sustainable future for us all to enjoy.



Tarah McGuire, 8th grade



ENVIRONMENTAL LITERACY ACTIVITY GUIDE



ENVIRONMENTAL LITERACY ACTIVITY GUIDE

Welcome to the Environmental Literacy Guide. This tool is designed for educators interested in exploring a subject through the lens of environmental literacy. The guide is organized by grade level, aligned to Virginia Department of Education Standards of

Learning (SOL) and accompanied by suggested activities based in two categories. Classroom/Schoolyard Activities take place within the walls of the school building or outdoors surrounding the school building. Outdoor Field Experiences transport students to a different location ([Appendix 3: Outdoor Community Spaces in Middlesex County](#)). Each activity also contains associated Community Partners ([Appendix 2: Community Partners](#)). A majority of activities were sourced from nationally recognized environmental education curriculum that require educator training, including [Project WILD](#), [Project WILD Aquatic](#), [Project WET](#), and [Project Learning Tree](#). This guide highlights SOLs that are considered by VDOE to be [Environmental and Sustainability Standards](#).

According to the goals outlined by Middlesex County Public Schools, all students will participate in an authentic inquiry-based learning experience to understand and apply the principles of environmental literacy. Students will experience a full MWEE in grades 5 and 6, and when they take Environmental Science.



Look for this icon to indicate where the full MWEE will occur.



KINDERGARTEN

Using my senses to understand my world

STANDARD K.10

VA Dept of Education Standards of Learning (SOLs)

K.10 The student will investigate and understand that change occurs over time. Key ideas include

- a) natural and human made things change over time;
- b) living and nonliving things change over time;
- c) changes can be observed and measured; and
- d) changes may be fast or slow.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- describe things in nature that change over time (**K.10 a**)
- describe human-made things that change over time (**K.10 a**)
- identify some changes that people experience over time (**K.10 b**)
- use observations to describe the change of an object or living thing over time (**K.10 c**)
- classify examples as fast changes or slow changes (**K.10 d**)

Classroom/Schoolyard Activities

Common activities used to support this standard include making observations outdoors and using description to identify how living things change over time. For example, in the Growing Up WILD activity, [Grow as We Go \(K.10b,c\)](#), students explore life cycles of familiar wildlife by classifying what they find as a “baby” or “adult.”

Outdoor Field Experiences

Visit a children's garden, local park or other natural area with a wide diversity of plants and animals

Community Partners

- Robin Didlake, Friends of the Rappahannock
- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Karen Reed, Middlesex County Parks and Recreation
- Courtney Hallacher, Project WILD

STANDARD K.11

VA Dept of Education Standards of Learning (SOLs)

K.11 The student will investigate and understand that humans use resources. Key ideas include

- a) some materials and objects can be used over and over again;
- b) materials can be recycled; and
- c) choices we make impact the air, water, land, and living things.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- describe the difference between recycle and reuse (**K.11 a, b**)
- identify materials that can be reused (**K.11 a**)
- give examples of objects that can be recycled (**K.11 b**)
- explain why recycling and reusing resources is good for the community (**K.11 c**)
- communicate solutions that will reduce the impact of humans on the land, air, water, and on other living things in the local environment (**K.11 c**)

Classroom/Schoolyard Activities

Natural resources make up the common objects and materials we use so students can investigate how to best conserve and protect these resources. An example activity is [Project Learning Tree: GreenSchools for Early Childhood - Waste & Recycling Investigation \(K.11a,b\)](#) where students investigate their waste and recycling practices at their school, and from their investigation they can develop an action plan.

Outdoor Field Experiences

Visit one of the [Middlesex Convenience Sites](#)

Community Partners

- Staff, Middlesex Convenience Sites
- Lesley Newman, Project Learning Tree

FIRST GRADE

How I interact with my world

STANDARD 1.4

VA Dept of Education Standards of Learning (SOLs)

1.4 The student will investigate and understand that plants have basic life needs and functional parts that allow them to survive. Key ideas include

- a) plants need nutrients, air, water, light, and a place to grow;
- b) structures of plants perform specific functions; and
- c) plants can be classified based on a variety of characteristics.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- describe the basic life needs of plants (**1.4 a**)
- with guidance, plan and conduct an investigation to determine if plants need sunlight and water to grow (**1.4 a**)
- explain the functions of the root, stem, and leaf (**1.4 b**)
- create and interpret a physical model/drawing of a plant, including roots, stems, leaves, and flowers to identify and explain the functions of each plant part (**1.4 b**)
- classify plants by characteristics (**1.4 c**)

Classroom/Schoolyard Activities

To support this standard, teachers can focus on the structures of plant systems and the specific characteristics of plants. For example, Project Learning Tree's activity, [Tree Factory \(1.4b\)](#) where students act out different parts of a tree to learn their role in how a tree grows.

Outdoor Field Experiences

- Visit a natural area to collect natural objects that could be sorted into the parts of plants and trees (Ex. acorns, fallen leaves, twigs, pieces of bark).
- Connect with [Friends of Dragon Run](#) to take a nature hike.

Community Partners

- Robin Didlake, Friends of the Rappahannock
- Meredith Rose, Tidewater Soil and Water Conservation District
- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Lesley Newman, Project Learning Tree

STANDARD 1.7

VA Dept of Education Standards of Learning (SOLs)

1.7 The student will investigate and understand that there are weather and seasonal changes. Key ideas include

- a) changes in temperature, light, and precipitation occur over time;
- b) there are relationships between daily weather and the season; and
- c) changes in temperature, light, and precipitation affect plants and animals, including humans.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- identify types of precipitation as rain, snow, and ice and describe the temperature conditions of each type of precipitation (**1.7 a**)
- observe, record, and compare seasonal data throughout the year, including relative temperature, amount of precipitation, and relative amount of sunlight (**1.7 a, b**)
- represent data in tables and graphic displays to describe typical weather conditions during a season (**1.7 b**)
- observe and record seasonal changes in plants, including budding, growth, and losing leaves; recognize the seasons during which budding and losing leaves will most likely occur (**1.7 c**)
- compare the physical characteristics of some common plants during summer and winter (**1.7 c**)
- compare the activities of some common animals during summer and winter by describing changes in their behaviors and their body coverings (**1.7 c**)
- infer the season based on humans' dress and recreational activities (**1.7 c**).

FIRST GRADE (CONTINUED)

STANDARD 1.7 (continued)	Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
	<p>In this standard, students participate in activities that examine how changes in temperature, light and precipitation can help predict weather. They can also note how these changes may affect plants and animals in an ecosystem. For example, using the Project Learning Tree activity Tree Cookies (1.7 c) to allow students to make connections between the changes in weather and how a tree grows.</p>	<ul style="list-style-type: none"> Request a tour at the Wakefield National Weather Service office. Visit a natural area and collect data about the type of weather observed for several weeks to notice seasonal differences. Request a field trip to the Science Museum of Virginia for a Science on the Sphere program about weather. 	<ul style="list-style-type: none"> Staff, National Weather Service, Wakefield Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park Karen Reed, Middlesex County Parks and Recreation DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge Guest Services, Science Museum of Virginia Lesley Newman, Project Learning Tree

STANDARD 1.8

VA Dept of Education Standards of Learning (SOLs)

1.8 The student will investigate and understand that natural resources can be used responsibly. Key ideas include

- most natural resources are limited;
- human actions can affect the availability of natural resources; and
- reducing, reusing, and recycling are ways to conserve natural resources.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- identify natural resources such as plants, animals, water, air, land, forests, minerals, and soil (**1.8 a**)
- compare ways of conserving resources (**1.8 c**)
- determine a resource in the school or home that may be conserved, brainstorm solutions, and implement a plan to address the conservation concern (**1.8 a, b, c**).

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
<p>This standard has a focus on our natural resources, including air, and undeveloped land. Students will learn how these resources are limited and how to act responsibly to protect them. For example, Project Learning Tree: GreenSchools for Early Childhood - Waste & Recycling Investigation (1.8c) allows students to conduct an audit in their school and take action based on their findings.</p>	<ul style="list-style-type: none"> Visit one of the Middlesex Convenience Sites to examine the variety of materials that can be recycled. Contact Tidewater Oyster Growers Association or Friends of the Rappahannock for programming on oyster shell recycling. Connect with Friends of Dragon Run to participate in a trash cleanup. 	<ul style="list-style-type: none"> Staff, Middlesex Convenience Sites Meredith Rose, Tidewater Soil and Water Conservation District Robin Didlake, Friends of the Rappahannock Lesley Newman, Project Learning Tree Richard Siciliano, Tidewater Oyster Growers Association Terry Skinner, Friends of Dragon Run



SECOND GRADE

Change occurs all around us

STANDARD 2.4

VA Dept of Education Standards of Learning (SOLs)

2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes as they grow and develop.

Key ideas include

- a) animals have life cycles; and
- b) plants have life cycles.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- explain how animals and plants change as they grow (**2.4 a, b**)
- analyze a model of the life cycle of an insect and describe the changes that occur within the life cycle (**2.4 a**)
- analyze a model of the life cycle of a mammal and describe the changes that occur with the life cycle (**2.4 a**)
- compare life cycles of an insect and a mammal (**2.4 a**)
- investigate the question, "What is the life cycle of a flowering plant?" and record observations using a table and/or graph; explain the results of the investigation (**2.4 b**)
- compare life cycles of a plant and an animal (**2.4 a, b**)
- develop models to describe the concept that organisms have unique and diverse life cycles but they all have in common birth, growth, reproduction, and death (**2.4 a, b**)

Classroom/Schoolyard Activities

Activities in this standard build students' knowledge of animal and plant life cycle. In Project Learning Tree's activity [Tree Lifecycle \(2.4b\)](#), teachers can use the variation called Plant Personification to have students use movements to act out the life cycle of a tree.

Outdoor Field Experiences

- Take a nature hike and allow students to use phones or other technology devices to photograph the steps in the lifecycle of the living things they observe.
- Visit to the children's garden at [Deltaville Maritime Museum](#).

Community Partners

- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Lesley Newman, Project Learning Tree

STANDARD 2.5

VA Dept of Education Standards of Learning (SOLs)

2.5 The student will investigate and understand that living things are part of a system. Key ideas include

- a) plants and animals are interdependent with their living and nonliving surroundings;
- b) an animal's habitat provides all of its basic needs; and
- c) habitats change over time due to many influences.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- explain how living things are part of a system composed of living and nonliving components (**2.5 a**)
- analyze a model of a habitat and describe the living and nonliving components (**2.5 b**)
- describe how a habitat provides for an animal's or plant's needs (**2.5 b**)
- predict and describe natural changes in habitats and their effects on plants and animals (**2.5 c**)
- describe the changes in a habitat due to various influences (**2.5 c**).

Classroom/Schoolyard Activities

Living organisms interact with other living organisms and their surroundings. With this standard, activities should explore how living organisms have their basic needs met. For example, students can investigate a field study plot in their schoolyard to observe plant and animals interactions using [Field Study Fun](#) from Project WILD's Growing Up WILD (**2.5b, c**).

Outdoor Field Experiences

- Visit a natural area and locate a decomposing log to investigate the interactions of living organisms.
- Request a nature hike and/or paddle with [Friends of Dragon Run](#).

Community Partners

- Courtney Hallacher, Project WILD
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run

SECOND GRADE (CONTINUED)

STANDARD 2.6

VA Dept of Education Standards of Learning (SOLs)

2.6 The student will investigate and understand that there are different types of weather on Earth. Key ideas include

- a) different types of weather have specific characteristics;
- b) measuring, recording, and interpreting weather data allows for identification of weather patterns; and
- c) tracking weather allows us to prepare for the weather and storms.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- identify and describe common types of storms, including the precipitation that may be associated with each (2.6 a)
- compare droughts and floods (2.6 a)
- observe, describe, and record daily weather conditions using weather instruments; graph and analyze data to identify patterns; predict weather based upon identified patterns (2.6 b)
- observe and describe seasonal weather patterns and local variations (2.6 c)
- describe how tracking weather data helps to prepare for storms and other weather conditions (2.6 c).

Classroom/Schoolyard Activities

In this standard, students investigate different types of weather on Earth and learn how weather data can be used to identify and predict weather patterns and storms. For example, Project WET's [Blue River](#) (2.6a,b,c) examines how water flow and seasonal weather changes are related by simulating stream flow using ping pong balls.

Outdoor Field Experiences

- Visit a public natural area and rotate through stations using tools to collect and record weather data.
- Visit to the children's garden at [Deltaville Maritime Museum](#).
- Request a [field trip to the Science Museum of Virginia](#) for a Science on the Sphere program about weather.
- Request a tour at the [Wakefield National Weather Service office](#).

Community Partners

- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, York, Westmoreland State Park, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park
- Staff, National Weather Service, Wakefield
- Guest Services Science Museum of Virginia

STANDARD 2.7

VA Dept of Education Standards of Learning (SOLs)

2.7 The student will investigate and understand that weather patterns and seasonal changes affect plants, animals, and their surroundings. Key ideas include

- a) weather and seasonal changes affect the growth and behavior of living things;
- b) wind and weather can change the land; and
- c) changes can happen quickly or slowly over time.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- identify growth and behavioral responses of plants and animals to weather and seasonal changes (2.7 a)
- identify animals that migrate, hibernate, or show other changes due to seasonal weather changes (2.7 a)
- compare the responses of plants and animals to weather and seasonal changes (2.7 a)
- explain how an animal's behavior may change throughout the year due to food source availability (2.7 a)
- model the effects of weathering and erosion on the land surface (2.7 b)
- design and construct a model of a structure that can withstand changes in land due to erosion or weathering (2.7 b)
- identify examples of weather and seasonal changes that happen slowly and quickly (2.7 c).

Classroom/Schoolyard Activities

This standard enhances the students' understanding of weather conditions and the seasons. An example activity is using soil runoff boxes (2.7b) to compare and contrast erosion using a demonstration of pouring water (simulating stormwater runoff) over land with exposed soil and land with cover crops.

Outdoor Field Experiences

- Request a tour at the [Wakefield National Weather Service office](#).
- Investigate a local natural area using the [Schoolyard Report Card](#) criteria, and compare the results from school to the natural area.
- Request a field trip to the [Science Museum of Virginia](#) for a Science on the Sphere program about weather.
- Attend the [State Fair of Virginia's Ed Expo](#) to explore demonstrations and exhibits about natural resources and agriculture.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Staff, National Weather Service, Wakefield
- Guest Services, Science Museum of Virginia
- Sarah Jane Thomsen, Meadow Event Park/State Fair of Virginia

SECOND GRADE (CONTINUED)

STANDARD 2.8

VA Dept of Education Standards of Learning (SOLs)

2.8 The student will investigate and understand that plants are important natural resources. Key ideas include

- a) the availability of plant products affects the development of a geographic area;
- b) plants provide oxygen, homes, and food for many animals; and
- c) plants can help reduce the impact of wind and water.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- describe useful plant products and the region in which they are grown in Virginia (2.8 a)
- identify where crops are grown in Virginia and predict the impact they have on the area's development (2.8 a)
- explain the roles of plants in meeting the life needs of animals (2.8 b)
- compare different ways animals use plants as homes and shelters (2.8 b)
- construct and interpret a chart illustrating plant foods consumed by different animals (2.8 b)
- construct and interpret models as to how plants help reduce the impact of wind and water (2.8 c).

Classroom/Schoolyard Activities

This standard provides students with the idea that plants have many roles in a system, including providing food for animals and reducing the impact of weather on land. For example, in the Project Learning Tree's Trees&Me activity, "[Follow Your Nose](#)", (2.8b) students can explore how plants and trees provide food for humans and practice using their sense of smell and taste.

Outdoor Field Experiences

- Visit a natural area to observe and collect data about what types of foods animals eat.
- Contact [Friends of Dragon Run](#) to schedule a visit to the Dragon Run to explore the habitat found by the river.
- Visit to the children's garden at [Deltaville Maritime Museum](#).

Community Partners

- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Lesley Newman, Project Learning Tree
- Terry Skinner, Friends of Dragon Run
- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park



THIRD GRADE

Interactions in our world

STANDARD 3.4

VA Dept of Education Standards of Learning (SOLs)

3.4 The student will investigate and understand that adaptations allow organisms to satisfy life needs and respond to the environment. Key ideas include

- a) populations may adapt over time;
- b) adaptations may be behavioral or physical;
- c) fossils provide evidence about the types of organisms that lived long ago as well as the nature of their environments

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- provide an example of how an environmental change may affect the ability of a population to survive (3.4a)
- explain how populations may adapt over time in response to changes in the environment (3.4a)
- differentiate between physical and behavioral adaptations (3.4b)
- explain how an animal's behavioral adaptations help it live in its habitat (3.4b)
- compare the physical characteristics of animals and explain how they are adapted to their environment (3.4b)
- design and construct a model of a habitat for an animal with a specific adaptation (3.4b)
- explain the role of fossils in making inferences about organisms and the environment from long ago (3.4c).

Classroom/Schoolyard Activities

This standard covers students' understanding of how populations of organisms change and adapt over long periods of time and some of those changes are due to the genetics of the populations. In the Project WILD activity, "[Bottleneck Genes](#)" students can simulate the gene-pool of a population of black-footed ferrets using colored beads to understand how the animal can survive in different scenarios. (3.4a)

Outdoor Field Experiences

- Visit a natural area to compare the population of species that appear today to what appeared in the space historically.
- Visit a local waterway to examine the impact of pollution on aquatic species.

Community Partners

- Courtney Hallacher, Project WILD
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge

STANDARD 3.5

VA Dept of Education Standards of Learning (SOLs)

3.5 The student will investigate and understand that aquatic and terrestrial ecosystems support a diversity of organisms. Key ideas include:

- a) ecosystems are made of living and nonliving components of the environment; and
- b) relationships exist among organisms in an ecosystem.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- Describe basic living and nonliving components in different types of terrestrial and aquatic ecosystems (3.5a)
- Compare plant and animals that compose aquatic and terrestrial ecosystems (3.5a)
- Differentiate among producers, consumers, and decomposers and identify examples of each within aquatic and terrestrial ecosystems (3.5b)
- Construct and analyze a food chain that models the relationships and the flow of energy within an ecosystem (3.5b)
- Explain how a change in one part of a food chain might affect the rest of the food chain (3.5b)
- Identify the sun as the source of energy in food chains (3.5b)

Classroom/Schoolyard Activities

This standard explains that ecosystems have a diversity of living and nonliving components that are interdependent. Project Learning Tree's [Web of Life](#) activity allows students to simulate a food web of their choosing by making connections with yarn/string and discover ways the components of the system are connected. (3.5b)

Outdoor Field Experiences

- Visit a natural area for a hike to identify living components in a food web.
- Request a field trip to the [Science Museum of Virginia](#) to visit the Animal Lab to discuss animals within specific ecosystems.
- Contact [Friends of Dragon Run](#) to schedule a visit to the Dragon Run to explore the how animals are adapted to live near the river.

Community Partners

- Lesley Newman, Project Learning Tree
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Guest Services, Science Museum of Virginia
- Terry Skinner, Friends of Dragon Run

THIRD GRADE (CONTINUED)

STANDARD 3.7

VA Dept of Education Standards of Learning (SOLs)

3.7 The student will investigate and understand that there is a water cycle and water is important to life on Earth.

- there are many reservoirs of water on Earth
- the energy from the sun drives the water cycle
- the water cycle involves specific processes.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- identify the ways organisms get water from the environment (3.7)
- compare major waterways including rivers, lakes, ponds, oceans, groundwater, and wells (3.7a)
- identify and locate major water sources in the local community (3.7a)
- identify the origin of energy that drives the water cycle (3.7b)
- describe the processes of evaporation, condensation, and precipitation as these relate to the water cycle (3.7c)
- construct and interpret a model of the water cycle (3.7c).

Classroom/Schoolyard Activities

Water has its own cycle that is important to life on Earth. In this standard, students explore and compare sources of water and what type of processes occur during the water cycle. One activity to highlight the water cycle is the online game called [The Blue Traveler](#) (3.7 b, c) in which students can follow the journey of a water droplet through various parts of the water cycle.

Outdoor Field Experiences

- Take a nature hike in a natural area to find evidence of the different parts of the water cycle.
- Take a paddle on a local waterway and investigate what role it plays in the water cycle. Then create a piece of artwork to show the water cycle.
- Connect with [Colonial Seaport Foundation](#) for a historical program related to the water cycle.

Community Partners

- Robin Didlake, Friends of the Rappahannock
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Roger Collins, Colonial Seaport Foundation

STANDARD 3.8

VA Dept of Education Standards of Learning (SOLs)

3.8 The student will investigate and understand that natural events and humans influence ecosystems. Key ideas include

- human activity affects the quality of air, water, and habitats;
- water is limited and needs to be conserved;
- fire, flood, disease, and erosion affect ecosystems; and
- soil is a natural resource and should be conserved.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- analyze the effects of human influences on the quality of air, water, and habitats (3.8 a)
- describe the effects of fire, flood, disease, and erosion on organisms and habitats (3.8 c)
- explain how conservation efforts can reduce the negative impacts of human activity on a habitat (3.8 a)
- propose a solution or design a device that will reduce the impact of a human activity or a natural event on an ecosystem (3.8 a, c)

Classroom/Schoolyard Activities

Ecosystems are influenced by natural events and humans. Students will explore the different influences and explain solutions that exist or can be implemented to reduce the impact of a harmful activity. For example, in the activity, [The Litter We Know](#) (3.8 a), students have an opportunity to collect and analyze litter from their schoolyard and then take an action such as organizing a trash cleanup.

Outdoor Field Experiences

- Connect with local environmental groups to participate in a trash cleanup
- Visit one of the [Middlesex Convenience Sites](#) to examine the variety of materials that can be recycled.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- Staff, Middlesex Convenience Sites

FOURTH GRADE

Our place in the solar system

STANDARD 4.2

VA Dept of Education Standards of Learning (SOLs)

4.2 The student will investigate and understand that plants and animals have structures that distinguish them from one another and play vital roles in their ability to survive. Key ideas include

- a) the survival of plants and animals depends on photosynthesis;
- b) and animals have different structures and processes for obtaining energy; and
- c) plants and animals have different structures and processes for creating offspring.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- explain the critical role of photosynthesis in the survival of plants and animals within an ecosystem (4.2 a)
- create a model or diagram illustrating the parts of a plant in terms of obtaining energy; explain the role of roots, stems, and leaves (4.2 a, b)
- plan and conduct an investigation to determine how the amount of sunlight a plant receives affects plant growth (4.2 b)
- compare methods by which plants and animals obtain energy and describe how these processes are related (4.2 b)
- compare plant characteristics used for attracting pollinators (4.2 c)
- create and explain a model of a flower, illustrating the parts of the flower and its reproductive processes (4.2 c)
- understand that for animal populations to survive, the animals must be able to successfully reproduce (4.2 c)

Classroom/Schoolyard Activities

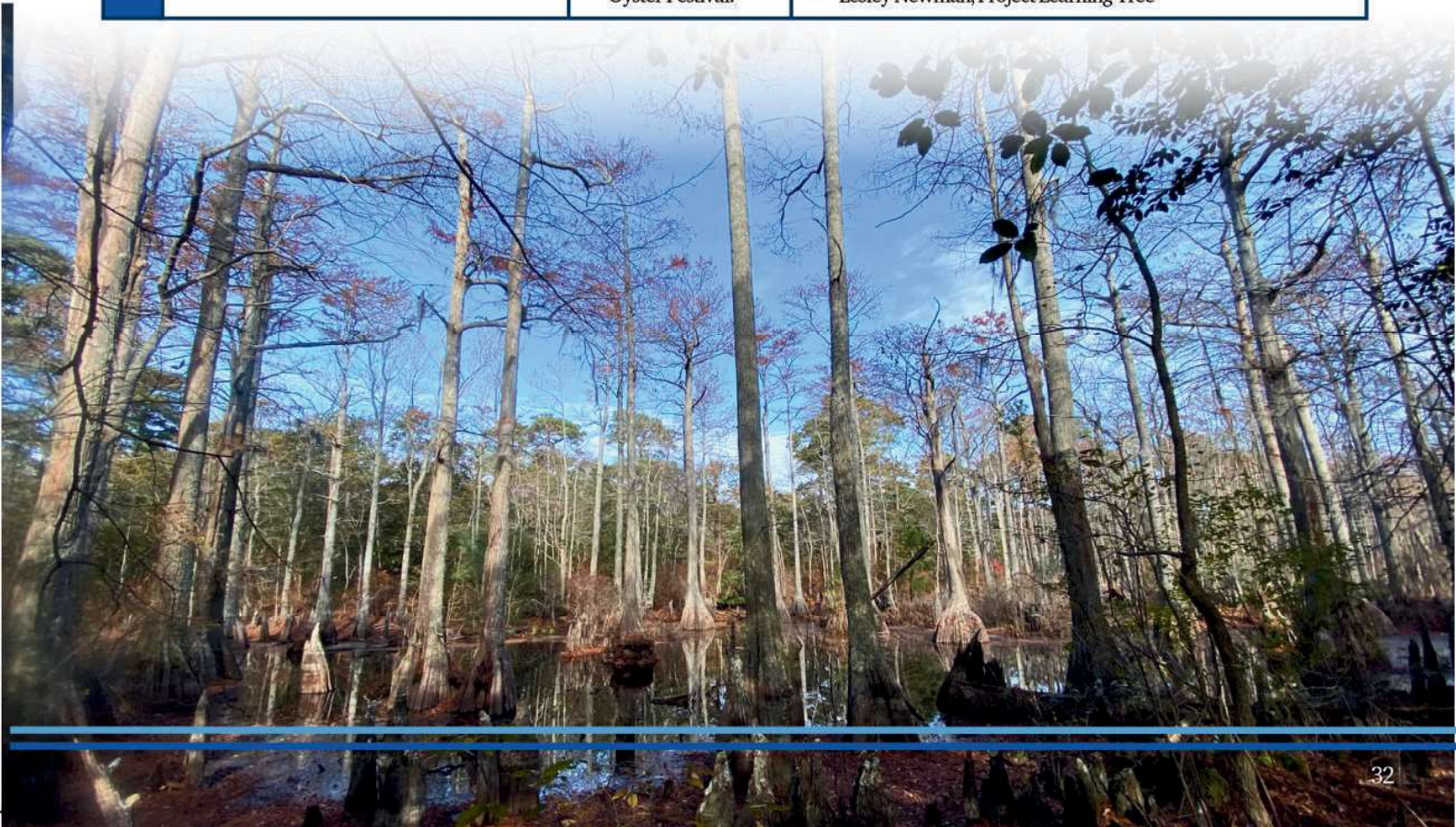
Living things have structures that differentiate them from other species, allowing them to survive and reproduce. Students also explore photosynthesis and the flow of energy. For example, students can complete a [flower dissection](#) (4.2 a, b, c) or the activity "[Here We Grow Again, Variation: Grades 3-5](#)" (4.2 a, b) where they conduct an experiment to determine what plants need to grow and compare growth under different conditions.

Outdoor Field Experiences

- Visit a children's garden, public garden, or other natural area with a wide diversity of flowering plants.
- Attend Oyster Festival Education Day on the Thursday prior to the Urbanna Oyster Festival.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park
- Staff, Marine Science Legacy Program
- Lesley Newman, Project Learning Tree



FOURTH GRADE (CONTINUED)

STANDARD 4.4

VA Dept of Education Standards of Learning (SOLs)

4.4 The student will investigate and understand that weather conditions and phenomena affect ecosystems and can be predicted.

- a) weather measurements create a record that can be used to make weather predictions;
- b) common and extreme weather events affect ecosystems; and
- c) long term seasonal weather trends determine the climate of a region.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- analyze and report data on temperature and precipitation (4.4 a)
- differentiate among the types of weather associated with high-pressure and low-pressure air masses (4.4 a)
- differentiate among cloud types (i.e., cirrus, stratus, cumulus, and cumulonimbus clouds) and the weather associated with each (4.4 a)
- use weather instruments (thermometer, barometer, rain gauge, anemometer) and observations of sky conditions to collect, record, and graph weather data over time; analyze results and determine patterns that may be used to make weather predictions (4.4 a)
- discuss the importance of monitoring weather data to make weather predictions (4.4 a)
- recognize a variety of storm types and the conditions and types of precipitation associated with each; explain when these storms occur (4.4 b)
- research and analyze the effects of extreme weather events on the environment (4.4 b)
- explain the difference between weather and climate and the effect climate has on an ecosystem (4.4 c).

Classroom/Schoolyard Activities

Tools can be used to measure weather conditions and records of those conditions can be used to make weather predictions. Weather has an impact on ecosystems and regions over time. Students can create weather journals (4.4 a) by using weather tools to record weather patterns over time.

Outdoor Field Experiences

- Visit a public natural area and rotate through stations using tools to collect and record weather data.
- Request a tour at the [Wakefield National Weather Service office](#).

Community Partners

- Staff, Wakefield National Weather Service Office
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run
- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park

STANDARD 4.8

VA Dept of Education Standards of Learning (SOLs)

4.8 The student will investigate and understand that Virginia has important natural resources. Key resources include:

- a) watersheds and water;
- b) plants and animals;
- c) minerals, rocks, and ores; and
- d) forests, soil, and land.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- describe characteristics of Virginia's waterways (including rivers, bays, lakes, and the Atlantic Ocean), name an example of each, and discuss the importance of the waterways to Virginia (4.8 a)
- create and interpret a model of a watershed (4.8 a)
- use evidence to explain the statement, "We all live downstream." (4.8 a)
- explain the importance of Virginia's animals and plants to humans (4.8 b)
- research a Virginia mineral, ore, and/or rock and communicate its use in everyday applications (4.8 c)
- describe a variety of important land uses in Virginia, including natural and cultivated forests (4.8 d)
- investigate the school yard or local ecosystem to identify questions, problems, or issues that affect a natural resource in that area and determine a possible solution to an identified problem (4.8 a, b, c, d).

Classroom/Schoolyard Activities

Virginia's natural resources include water, plants, animals, minerals, rocks, ores, forests, soils, and land. Students can investigate these resources and analyze their use and importance by completing the [Schoolyard Report Card](#) (4.8 a, b, c, d) where students evaluate their school's infrastructure and community habits to determine a "grade" of the schoolyard health.

Outdoor Field Experiences

Investigate a local natural area using the Schoolyard Report Card criteria, and compare the results from school to the natural area.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge

FIFTH GRADE

Transforming matter and energy



STANDARD 5.9

VA Dept of Education Standards of Learning (SOLs)

5.9 The student will investigate and understand that the conservation of energy resources is important. Key ideas include

- a) some sources of energy are considered renewable and others are not;
- b) individuals and communities have means of conserving both energy and matter; and
- c) advances in technology improve the ability to transfer and transform energy

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- compare energy sources, including their benefits and limitations (5.9 a)
- identify the type(s) of energy used in the home or school to power devices and research the origin of the identified energy, including how long it takes to form, and classify it as either a renewable or nonrenewable resource (5.9 a)
- analyze and interpret data showing human consumption of energy over the last century and infer what might happen if the trend in energy consumption continues (5.9 b)
- create and implement a plan to conserve energy in the home or school (5.9 b)
- provide examples of current technology that use energy efficiently (5.9 c)

Classroom/Schoolyard Activities

Energy resources can be classified as renewable or nonrenewable, and energy resources can be conserved through individual and community actions. New technologies can improve the ability to transform and transfer energy. Students can explore these concepts in “[Sustainability: Then, Now, Later](#)” (5.9 a, b) where students model resource consumption in a simulation activity and discuss the connections between the simulation and real-world resources. Then, students analyze three “letters” from students in different time periods, and compare their resource consumption from then to today.

Outdoor Field Experiences

- [Tour a Dominion Energy Power Station](#).
- Use lessons from Solar Powered Schools to learn more about the outdoor classroom, solar field and educational signage behind Middlesex Elementary.

Community Partners

- Kathy Ash, Chesterfield Power Station
- Courtney Hallacher, Project WILD
- Meghan Milo, Madison Energy Infrastructure

Classroom/Schoolyard Activities

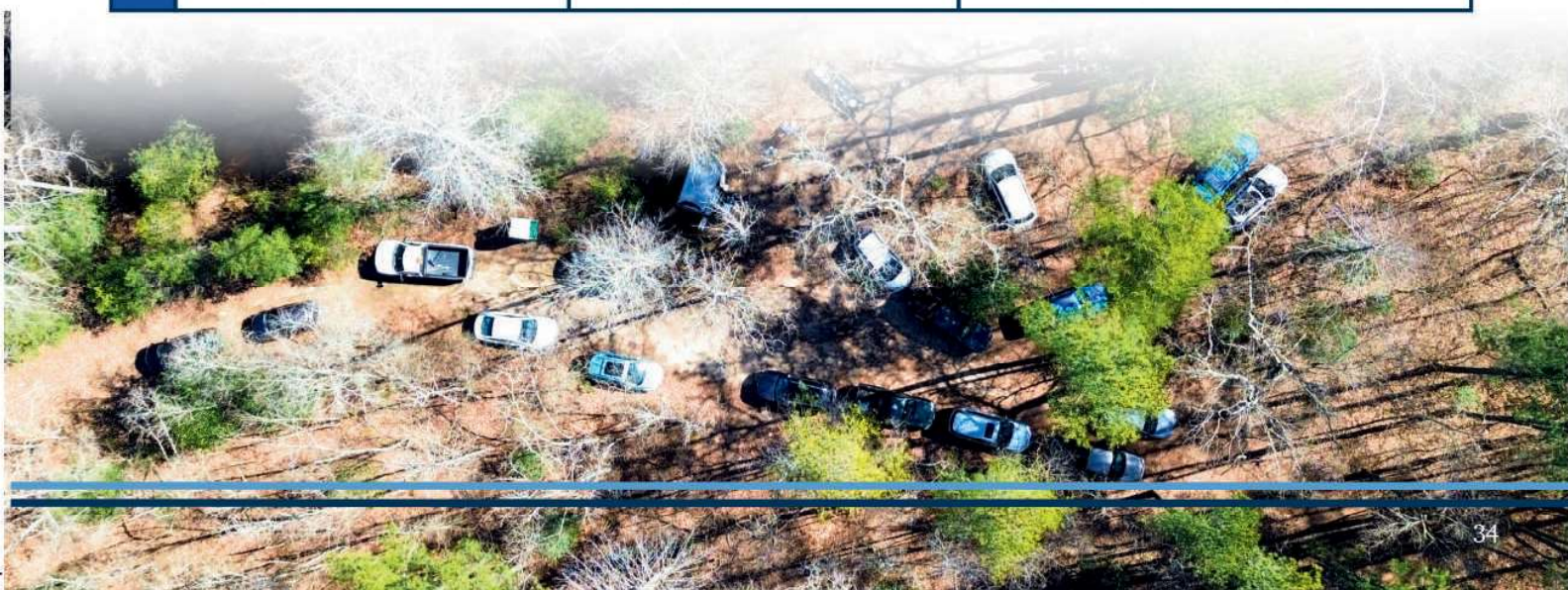
Watershed education that occurred through science SOLs in third and fourth grade culminate in the full MWEE, which takes place in fifth grade. In these activities, students connect watershed ecosystems, human impacts, and natural resources specific to Middlesex County.

Outdoor Field Experiences

- Complete a MWEE Field Experience, suggested activities include:
- Guided nature hike
 - Water quality testing
 - Sediment erosion & fossil hunt
 - Invasive plant and animal activity
- Suggested locations suitable for a MWEE Field Experience include:
- Dragon Run
 - A Virginia State Park

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park
- Karen Reed, Middlesex County Parks and Recreation
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run



SIXTH GRADE

Our world; our responsibility



STANDARD 6.6

VA Dept of Education Standards of Learning (SOLs)

6.6 The student will investigate and understand that water has unique physical properties and has a role in the natural and human-made environment. Key ideas include:

- a) water is referred to as the universal solvent;
- b) water has specific properties;
- c) thermal energy has a role in phase changes;
- d) water has a role in weathering;
- e) large bodies of water moderate climate; and
- f) water is important for agriculture, power generation, and public health.

SOL Essential Knowledge and Practices

In order to meet this standard it is expected that students will

- plan an investigation to demonstrate the ability of water to dissolve materials (6.6 a)
- describe the properties of water and identify examples of cohesion, adhesion, and surface tension (6.6 b)
- compare the effects of adding or subtracting thermal energy to the states of water (6.6 c)
- relate the three states of water to the water cycle (6.6 c)
- model the action of freezing water on rocks (6.6 d)
- plan and conduct an investigation to determine the action of acidified water on building materials such as concrete, limestone, or marble (6.6 d)
- chart, record, and describe evidence of chemical and physical weathering in the local environment (6.6 d)
- analyze and explain the difference in average winter temperatures among areas in central and western Virginia and cities and counties along the Chesapeake Bay and Atlantic coast (6.6 e)
- explain the role of water in power generation (6.6 f)
- describe the importance of careful management of water resources (6.6 f).

Classroom/Schoolyard Activities

Water has unique physical properties that allow it to play a role in weathering, moderating climate, and in human activities. Students will also explore the properties of water. For example, students can complete the “H2Olympics” (6.6 a, b) activity where students compete in several challenges to test the properties of water.

Outdoor Field Experiences

- Outdoor field experience to Urbanna Town Marina with Friends of the Rappahannock. Students will kayak over an oyster reef, conduct water quality tests, and seine for aquatic organisms.
- Visit a local hiking trail or natural area with a stream or creek running through it. On a nature walk, look for evidence of erosion.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge

STANDARD 6.7

VA Dept of Education Standards of Learning (SOLs)

6.7 The student will investigate and understand that air has properties and that Earth's atmosphere has structure and is dynamic. Key ideas include

- a) air is a mixture of gaseous elements and compounds;
- b) the atmosphere has physical characteristics;
- c) properties of the atmosphere change with altitude;
- d) there is a relationship between air movement, thermal energy, and weather conditions;
- e) atmospheric measures are used to predict weather conditions; and
- f) weather maps give basic information about fronts, systems, and weather measurements.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- identify the composition and physical characteristics of the atmosphere (6.7 a)
- analyze and interpret charts and graphs of the atmosphere in terms of temperature and pressure (6.7 b)
- measure and record air temperature, air pressure, and humidity, using appropriate units of measurement and tools (6.7 b)
- predict weather conditions based on air temperature, barometric pressure, and humidity (6.7 b, e)
- differentiate among the layers of the atmosphere in terms of general characteristics and changes in altitude (6.7 c)
- explain the impact of the addition of thermal energy on air movement (6.7 d)
- compare types of precipitation (6.7 e)
- compare weather-related phenomena, including thunderstorms, tornadoes, hurricanes, and drought (6.7 e)
- interpret basic weather maps, including the identification of warm and cold fronts (6.7 f)
- map the movement of cold and warm fronts and interpret their effects on observable weather conditions (6.7 f).

SIXTH GRADE (CONTINUED)

STANDARD 6.7 (continued)	Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
	<p>Air and Earth's atmosphere have unique properties and structure that change with altitude, thermal energy, and weather. Weather maps and atmospheric measures can be used to make predictions about weather. Students can use real time weather maps and historic weather data to explore the interaction of weather and characteristics like pressure, temperature, wind, humidity, and dew point. Students can record the characteristics in real time in a weather journal and can compare them to a weather map (6.7 b, e, f).</p>	<ul style="list-style-type: none"> Visit a site periodically throughout the year and record the air temperature, pressure, and humidity in weather journals. Visit a downtown area to infer the impact of impermeable surfaces during a rain event, and can compare it to that of an area with more permeable surfaces. 	<ul style="list-style-type: none"> Meredith Rose, Tidewater Soil and Water Conservation District Robin Didlake, Friends of the Rappahannock Karen Reed, Middlesex County Parks and Recreation DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge Terry Skinner, Friends of Dragon Run Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park

STANDARD 6.8

VA Dept of Education Standards of Learning (SOLs)

- 6.8 The student will investigate and understand that land and water have roles in watershed systems. Key ideas include
- a watershed is composed of the land that drains into a body of water;
 - Virginia is composed of multiple watershed systems which have specific features;
 - the Chesapeake Bay is an estuary that has many important functions; and
 - natural processes, human activities, and biotic and abiotic factors influence the health of a watershed system.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- identify abiotic and biotic features in the students' local watershed (6.8 a, b)
- use maps to determine the location and size of Virginia's regional watershed systems (6.8 b)
- locate the local watershed and the rivers and streams associated with it (6.8 b)
- explain the importance of the Virginia watersheds (6.8 c)
- explain and appraise the value of wetlands to ecosystems, including humans (6.8 d)
- explain the importance of estuaries, including their importance to people (6.8 d)
- propose ways to maintain water quality within a watershed (6.8 d)
- explain the factors that affect water quality in a watershed and how those factors can affect an ecosystem (6.8 d)
- forecast potential water-related issues that may become important in the future (6.8 d)
- locate and critique a media article or editorial (print or electronic) concerning water use or water quality and analyze and evaluate the science concepts involved (6.8 d)
- argue for and against commercially developing a parcel of land containing a large wetland area (6.8 d)
- design and defend a land-use model that minimizes negative impact (6.8 d)
- measure, record, and analyze a variety of water quality indicators and describe what these mean to the health of an ecosystem (6.8 d).

Classroom/Schoolyard Activities

Watersheds are areas of land where water drains to a common point. There are multiple watersheds in Virginia, and some of them drain to the Chesapeake Bay. Human activities can impact the health of a watershed. Students can investigate their local watershed via models, in-person investigations, and by analysis of resource use. For example, by completing a field-based macroinvertebrate survey and round of water quality tests or by completing "[Watered Down History](#)" (6.8 a, b, d) where students investigate the history of a local waterway, and analyze changes to the waterway and what they expect will impact the waterway in the future.

Outdoor Field Experiences

Complete a MWEE Field Experience, suggested activities include:

- Bioblast of aquatic organisms in Urbanna Creek
- Water quality testing
- Macroinvertebrate sampling
- Watershed mapping activity

Suggested locations suitable for a MWEE Field Experience include:

- [Rappahannock River Valley National Wildlife Refuge Units](#)
- [Dragon Run](#)
- A Virginia State Park
- Urbanna Town Marina

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- Karen Reed, Middlesex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run
- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park
- Courtney Hallacher, Project WILD

SIXTH GRADE (CONTINUED)

STANDARD 6.9

VA Dept of Education Standards of Learning (SOLs)

6.9 The student will investigate and understand that humans impact the environment and individuals can influence public policy decisions related to energy and the environment. Key ideas include

- a) natural resources are important to protect and maintain;
- b) renewable and nonrenewable resources can be managed;
- c) major health and safety issues are associated with air and water quality;
- d) major health and safety issues are related to different forms of energy;
- e) preventive measures can protect land-use and reduce environmental hazards; and
- f) there are cost/benefit tradeoffs in conservation policies.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources affect Earth's systems (e.g., climate, oceans, rainforest) (6.9 a)
- differentiate between renewable and nonrenewable resources (6.9 b)
- describe the role of local and state conservation professionals in managing natural resources, including wildlife protection; forestry and waste management; and air, water, and soil conservation (6.9 b)
- analyze resource-use options in everyday activities and determine how personal choices have costs and benefits related to the generation of waste (6.9 f)
- analyze how renewable and nonrenewable resources are used and managed within the home, school, and community (6.9 b)
- describe ways that water and air pollution affect human health and safety (6.9 c)
- compare energy sources and their effects on human health and safety (6.9 d)
- investigate practices that can reduce environmental hazards or improve land use (6.9 e)
- analyze reports, media articles, and other narrative materials related to waste management and resource use to determine various perspectives concerning the costs and benefits in real-life situations (6.9 f)
- evaluate the effects of resource use, waste management, and pollution prevention in the school and home environment (6.9 f).

Classroom/Schoolyard Activities

Human impact, through individual and collective actions, can impact the environment. People can also influence public policy that relates to energy and the environment. Common activities used to support this standard include those that simulate investigations of the interconnected nature of the environment, and challenge students to balance competing needs for resources. An example of these activities includes "[Color Me a Watershed](#)" (6.9 a, e, f) where students map a watershed and calculate the change over time for the percentage of land in different applications (agriculture, forest, urban, etc.) and then calculate the amount of runoff for each land application type over time, combined with "[Decisions, Decisions](#)" (6.9 b, f) where students balance different priorities and engage with different perspectives as they develop brief proposals to address a chosen "problem" scenario.

Outdoor Field Experiences

- Visit a local utilities site, park, water treatment facility, or waste transfer station to explore ways individual actions have an impact on a community-level scale. Before visiting, reach out to site staff members to schedule a tour or talk about their role managing the natural resources. This can also include a career exploration component for students.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Staff, Middlesex Convenience Sites
- Lesley Newman, Project Learning Tree

LIFE SCIENCE

STANDARD LS.5

VA Dept of Education Standards of Learning (SOLs)

LS.5 The student will investigate and understand that biotic and abiotic factors affect an ecosystem. Key ideas include

- a) matter moves through ecosystems via the carbon, water, and nitrogen cycles;
- b) energy flow is represented by food webs and energy pyramids; and
- c) relationships exist among producers, consumers, and decomposers.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- differentiate among key processes in the water, carbon, and nitrogen cycles and provide examples to illustrate how they support life (**LS.5 a**)
- develop and/or use a model to illustrate the cycling of matter and flow of energy among living and nonliving parts of an ecosystem (**LS.5 a**)
- analyze local aquatic and terrestrial ecosystems, identify biotic and abiotic components, and describe their roles in the cycling of matter and flow of energy (**LS.5 a**)
- explain and provide examples to illustrate the cause-and-effect relationship of human activity on the cycling of matter and flow of energy in an ecosystem (**LS.5 a**)
- explain matter and energy transfer as modeled through food webs and energy pyramids (**LS.5 b**)
- determine the relationship between a population's position in a food web and its size (**LS.5 b**)
- interpret energy pyramids to determine the relative amount of energy available at each trophic level (**LS.5 b**)
- develop and/or interpret a model of a food web using organisms found in a local ecosystem and classify organisms as producers or first-, second-, or third-order consumers (**LS.5 b, c**)
- recognize examples of common producers, consumers, and decomposers and explain the role of each in the flow of energy and cycling of matter through an ecosystem (**LS.5 c**)
- provide examples to illustrate the effects of human activity on the activity of producers, consumers, and decomposers in an ecosystem (**LS.5 c**).

Classroom/Schoolyard Activities

Matter and energy are transferred through food webs. Students will model and simulate local food webs using the local ecosystem. An example of this is the [Web of Life](#) (**LS.5 c**) activity from Project Learning Tree. In this activity, students create a physical web and model the interconnectedness of organisms in an ecosystem. The learners will see how one organism is connected to other organisms in an ecosystem and use a model to understand the interdependence of organisms in an ecosystem.

Outdoor Field Experiences

Visit a local outdoor space to make observations and inferences about the local food web in an ecosystem.

Community Partners

- Lesley Newman, Project Learning Tree
- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- Karen Reed, Middlesex County Parks and Recreation

STANDARD LS.6

VA Dept of Education Standards of Learning (SOLs)

LS.6 The student will investigate and understand that populations in a biological community interact and are interdependent. Key ideas include

- a) relationships exist between predators and prey and these relationships are modeled in food webs;
- b) the availability and use of resources may lead to competition and cooperation;
- c) symbiotic relationships support the survival of different species; and
- d) the niche of each organism supports survival.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- explain how the interactions of populations form communities within an ecosystem (**LS.6 a**)
- formulate inferences based on graphs and other data about predator-prey populations (**LS.6 a**)
- argue based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors help them to obtain resources (**LS.6 a**)
- analyze and interpret data to predict and explain the effects of resource availability on organisms and populations in an ecosystem (**LS.6 b**)
- predict the effect of limiting factors on organisms, populations, and/or communities in a food web/ecosystem (**LS.6 b**)
- provide examples to illustrate how organisms cooperate and/or compete with one another for resources (**LS.6 b**)
- analyze and interpret data about the effects of resource availability on organisms and populations of organisms in an ecosystem (**LS.6 a**)
- differentiate among the types of symbiosis and recognize and/or provide examples of each (**LS.6 c**)
- infer the niche of organisms from their physical characteristics (**LS.6 d**).

LIFE SCIENCE (CONTINUED)

STANDARD LS.6 (continued)	Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
	Resources are limited within an ecosystem. Students will analyze and interpret data on population changes. Activities used to support this standard include activities that provide opportunities for data collection to show changes in populations through the many ecosystem processes. An activity that supports this standard is Every Tree for Itself (LS.6 a). Through an active modeling exercise, learners explore how trees compete with each other for nutrients, sunlight, space, and water. In this activity, learners model how trees compete to meet their essential needs and describe how varying amounts of light, water, and nutrients affect tree growth.	Visit Heritage Trail or other local outdoor space to make observations and collect data on forest succession.	<ul style="list-style-type: none"> Lesley Newman, Project Learning Tree Meredith Rose, Tidewater Soil and Water Conservation District Karen Reed, Middlesex County Parks and Recreation Robin Didlake, Friends of the Rappahannock

STANDARD LS.7	VA Dept of Education Standards of Learning (SOLs)		
	LS.7 The student will investigate and understand that adaptations support an organism's survival in an ecosystem. Key ideas include a) biotic and abiotic factors define land, marine, and freshwater ecosystems; and b) physical and behavioral characteristics enable organisms to survive within a specific ecosystem.		
	SOL Essential Knowledge and Practices In order to meet this standard, it is expected that students will <ul style="list-style-type: none"> compare the biotic and abiotic factors that distinguish land, marine, and freshwater ecosystems (LS.7 a) analyze and describe how physical characteristics and behaviors enable organisms to survive in an ecosystem (LS.7 a, b) investigate how structural adaptations among populations allow organisms to survive with ecosystems (LS.7 b). 		
	Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
	Animals and plants adapt over time to changes to their ecosystem. In the activity Adaptive Artistry (LS.7 b) where students will design and construct a bird and describe the creations' adaptations and habitat.	Visit a local outdoor space to make observations and collect data on how organisms have adapted to the ecosystem.	<ul style="list-style-type: none"> Meredith Rose, Tidewater Soil and Water Conservation District Courtney Hallacher, Project WILD Robin Didlake, Friends of the Rappahannock Karen Reed, Middlesex County Parks and Recreation

STANDARD LS.8	VA Dept of Education Standards of Learning (SOLs)		
	LS.8 The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time. Key ideas include a) organisms respond to daily, seasonal, and long-term changes; b) changes in the environment may increase or decrease population size; and c) large-scale changes such as eutrophication, climate changes, and catastrophic disturbances affect ecosystems.		
	SOL Essential Knowledge and Practices In order to meet this standard, it is expected that students will <ul style="list-style-type: none"> categorize responses as daily, seasonal, or long-term (LS.8 a) construct a scientific explanation based on evidence to explain the benefit(s) of daily, seasonal, and/or long-term responses of organisms to their enhanced survival (LS.8 a) classify as long-term, short-term, or seasonal the various types of changes that occur over time in ecosystems, communities, populations, and organisms (LS.8 b) predict the effect of changes to living and/or nonliving factors on the size and distribution of populations in an ecosystem (LS.8 b) compare the factors that increase or decrease population size (LS.8 b) argue, citing evidence, that changes to physical or biological components of an ecosystem affect populations (LS.8 b) predict the effect of large-scale changes on ecosystems and communities (LS.8 c) analyze data to determine the effect of a catastrophic event on a community (LS.8 c) predict the environmental effects of large-scale changes, such as climate change, ocean acidification, and sea-level rise (LS.8 c) 		

LIFE SCIENCE (CONTINUED)

STANDARD LS.8 (continued)	Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partnerships
	<p>Ecosystems, communities, populations, and organisms are dynamic and change over time by both natural and human events. The following activities allow students to use the physical characteristics of the organism for identification and prediction of how humans have impacted the ecosystem. Two activities that support these standards are Critter Cubes (LS.1 b, LS.3 b, c) and Stroud Online Leaf Pack Simulation (LS.1 b, LS.3 b, c). Both of these activities can complement outdoor field experiences of water quality testing and macroinvertebrate studies. Other activities include water quality testing in the creek by school with a focus on temperature and dissolved-oxygen (LS.8 c)</p>	<ul style="list-style-type: none"> Visit a local outdoor space to collect macroinvertebrate and water samples in the creek. Students will make predictions as to the water quality based on macroinvertebrate study over several weeks to collect macroinvertebrate and water samples in the creek. Contact Friends of Dragon Run to schedule a visit to the Dragon Run to explore the how animals are adapted to live near the river. Attend Oyster Festival Education Day on the Thursday prior to the Urbanna Oyster Festival. 	<ul style="list-style-type: none"> Meredith Rose, Tidewater Soil and Water Conservation District Robin Didlake, Friends of the Rappahannock Karen Reed, Middlesex County Parks and Recreation Terry Skinner, Friends of Dragon Run Staff, Marine Science Legacy Program

STANDARD LS.9	VA Dept of Education Standards of Learning (SOLs)		
	<p>LS.9 The student will investigate and understand that relationships exist between ecosystem dynamics and human activity. Key ideas include</p> <p>a) changes in habitat can disturb populations;</p> <p>b) disruptions in ecosystems can change species competition; and</p> <p>c) variations in biotic and abiotic factors can change ecosystems.</p>		
	<p>SOL Essential Knowledge and Practices</p> <p>In order to meet this standard, it is expected that students will</p> <ul style="list-style-type: none"> describe ways that human interaction has altered habitats positively and negatively (LS.9 a) describe the relationship between human food harvest and habitat stability (LS.9 a) debate the pros and cons of human land use vs. ecosystem stability (LS.9 a) compare population disturbances that affect competition among species and species survival (LS.9 b) use evidence to describe the impact of human activity on the biotic and abiotic factors within an ecosystem (LS.9 c) interpret data obtained through observations and electronic and print resources to determine the effects of human interaction on local ecosystems (LS.9 a, b, c) plan an investigation examining relationships between ecosystem dynamics and human activity (it may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis) (LS.9 a, b, c) analyze and critique the experimental design of basic investigations related to the relationships between ecosystem dynamics and human activity (LS.9 a, b, c). 		
	Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
	<p>Relationships exist between ecosystem dynamics and human activity. Both natural and human events can change a habitat can disturb populations. Common activities used to support this standard include activities that show how humans have altered the ecosystem in both negative and positive ways. In A Plume Problem AKA A Grave Mistake (LS.9 a) students will analyze data to solve a mystery and identify a potential polluter. Other activities include use of an Enviroscope (LS.9 a), a three dimensional model of a watershed. Students can create situations and model human activities on the watershed and learn about best management practices (BMPs).</p>	<ul style="list-style-type: none"> Visit a local outdoor space to make observations of human impacts on the watershed and develop action projects to share this knowledge with the community. Visit Menokin for an outdoor field experience. 	<ul style="list-style-type: none"> Karen Reed, Middlesex County Parks and Recreation DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge Terry Skinner, Friends of Dragon Run Alice French, Menokin

LIFE SCIENCE (CONTINUED)

STANDARD LS.11

VA Dept of Education Standards of Learning (SOLs)

LS.11 The student will investigate and understand that populations of organisms can change over time. Key ideas include

- a) mutation, adaptation, natural selection, and extinction change populations;
- b) the fossil record, genetic information, and anatomical comparisons provide evidence for evolution; and
- c) environmental factors and genetic variation, influence survivability and diversity of organisms.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- interpret data from simulations that demonstrate natural selection (LS.11 a)
- explain the relationship among mutations, variations in traits in a population, and natural selection (LS.11 a)
- compare natural selection and extinction (LS.11 a)
- explain how mutations differ from adaptations (LS.11 a)
- construct an evidence-based explanation about how genetic variations in traits in a population increase some individuals' probability of surviving and reproducing in a specific environment (LS.11 a)
- describe the role of fossils in determining events in Earth's history (LS.11 b)
- explain the evidence for evolution from a variety of sources of scientific data (LS.11 b)
- apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships (LS.11 b)
- explain how genetic variations in offspring, which leads to variations in successive generations, can result from the same two parents (LS.11 c)
- construct an evidence-based explanation about how environmental factors and genetic variation can influence a species' survival, reproduction, and diversity (LS.11 c)
- explain what is meant by the phrase, "survival of the fittest" (LS.11 a, c).

Classroom/Schoolyard Activities

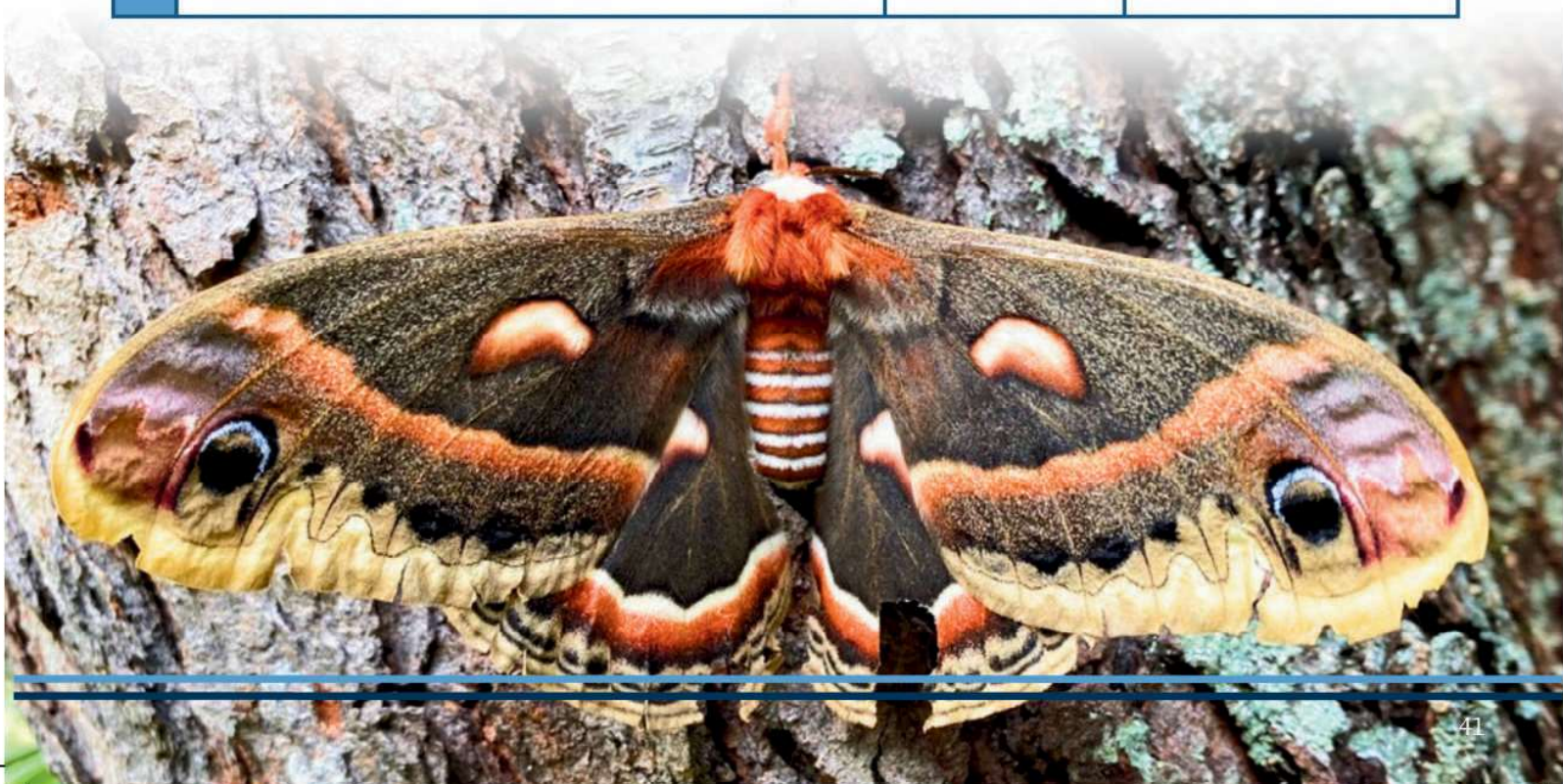
Populations of organisms can change over time. Environmental factors and genetic variation, influence survivability and diversity of organisms. Activities that support this standard include activities that allow students to make observation and nature, collect data, and report their results. The student should also be able to interpret and create cause-and-effect scenarios. In the Project Learning Tree Activity, [Trees in Trouble](#), students will recognize symptoms of unhealthy trees and describe possible causes of their poor health and perform investigations to determine the effects of crowding and fertilization on plant growth (LS.11 a).

Outdoor Field Experiences

Visit the Heritage Trail or other local outdoor space to take a hike in a forested area to observe tree health and the impact of humans on the health of the trees.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Lesley Newman, Project Learning Tree
- Robin Didlake, Friends of the Rappahannock
- Karen Reed, Middlesex County Parks and Recreation



EARTH SCIENCE

STANDARD ES.1.1

VA Dept of Education Standards of Learning (SOLs)

ES.1.1 The student will investigate and understand that the atmosphere is a complex, dynamic system and is subject to long-and short-term variations.

- a) the composition of the atmosphere is critical to most forms of life;
- b) biologic and geologic interactions over long and short time spans change atmospheric composition;
- c) natural events and human actions may stress atmospheric regulation mechanisms; and
- d) human actions, including economic and policy decisions, impact the atmosphere.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- describe the role of different atmospheric components in supporting life (**ES.1.1 a**)
- analyze atmospheric change over geologic time and assess the role and evidence of photosynthetic organisms in this transformation (e.g., ice cores, stromatolites, red beds) (**ES.1.1 b**)
- explain how volcanic activity or meteor impacts could affect the atmosphere, and life on Earth (**ES.1.1 c**)
- explain how biologic activity, including human activities, may influence global temperature and climate (**ES.1.1 c**)
- research historical information and scientific data on the impact of major volcanic eruptions and other natural events on the atmosphere (**ES.1.1 c**)
- research data on the effect of human activities and public policy on Earth's ozone layer since chlorofluorocarbons (CFC) were banned (**ES.1.1 d**)
- research and analyze the effects of the development of fossil fuels and other human activity on atmospheric composition; develop a suggestive set of steps or sample policies to monitor and mitigate potential issues and concerns (**ES.1.1 d**).

Classroom/ Schoolyard Activities

The atmosphere is a complex, dynamic system and is subject to long-and short-term variations. Natural events and human actions may stress atmospheric regulation mechanisms; and human actions, including economic and policy decisions, impact the atmosphere. Activities used to support this standard include case studies and community science projects that give students a sense of place and voice in environmental decision-making in their community. Students should complete a problem-based assessment which leads to a better understanding of atmosphere science. For example, a study of how acidification of the ocean is due to an increase in atmospheric carbon dioxide. The [NOAA website](#) suggests some lessons. Other Activities include [Ocean acidification Lessons](#) (**ES.1.1 a,b,d**) and [Hands-On NASA Science Lessons](#) (**ES.1.1 a,b,d**).

Outdoor Field Experiences

Field trip to the [Virginia Institute of Marine Science](#)

Community Partners

Staff, [Virginia Institute of Marine Science](#)



EARTH SCIENCE (CONTINUED)

STANDARD ES.12

VA Dept of Education Standards of Learning (SOLs)

ES.12 The student will investigate and understand that Earth's weather and climate are the result of the interaction of the sun's energy with the atmosphere, oceans, and the land. Key ideas include

- a) weather involves the reflection, absorption, storage, and redistribution of energy over short to medium time spans;
- b) weather patterns can be predicted based on changes in current conditions;
- c) extreme imbalances in energy distribution in the oceans, atmosphere, and the land may lead to severe weather conditions;
- d) models based on current conditions are used to predict weather phenomena; and
- e) changes in the atmosphere and the oceans due to human activity affect global climate.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- research and construct a diagram that demonstrates the interaction of solar radiation, Earth's atmosphere, and energy transfer (conduction, convection, and radiation) (**ES.12 a**)
- predict the direction of local winds and relate these to the presence of fronts and high- and/or low-pressure systems or other atmospheric phenomena (**ES.12 b**)
- over a multi-day period, read and interpret data from a thermometer, a barometer, and a psychrometer; determine if there is a correlation between the data and observed weather phenomena (**ES.12 b**)
- identify types and origins of air masses, fronts and the accompanying weather conditions (**ES.12 b**)
- collect evidence for how the motions and complex interactions of air masses results in changes in weather conditions (**ES.12 b**)
- plan and conduct an investigation to predict weather based on cloud type, temperature, jet stream location, relative humidity, and barometric pressure (**ES.12 b**)
- read and interpret a weather map containing fronts, isobars, and isotherms and relate these factors to potential weather conditions occurring at specific locations (**ES.12 b**)
- analyze the conditions that lead to severe weather events such as tornadoes and hurricanes. (**ES.12 c**)
- describe the effect of satellite technology on weather prediction and storm tracking, including hurricanes, and evaluate the costs and benefits in terms of lives and property saved; predict the impact on storm preparedness if there were no weather satellites (**ES.12 d**)
- describe human and natural factors that have led to the rise in global temperature over the past century (**ES.12 e**)
- analyze geoscience data and the results of global climate models to make an evidence-based forecast of the current rate of global and regional climate change and associated future effects on Earth systems (**ES.12 e**).

Classroom/Schoolyard Activities

Earth's weather and climate are the result of the interaction of the sun's energy with the atmosphere, oceans, and the land. Some changes in the atmosphere and the oceans are due to human activity and affect global climate. Activities used to support this standard include analyzing and synthesizing geoscience data from NOAA websites. In the activity [The Global Climate](#) (**ES.12 e**) students will graph changes in atmospheric levels of carbon dioxide (CO₂) over a 46-year period, and identify possible reasons for those changes. They will also learn about the relationship between CO₂ and the Earth's climate, and explore ways to reduce the amount of CO₂ they generate. Other activities to support this standard include [Bay Backpack](#) (**ES.12 a, b, c, d, e**) on [Hands-On NASA Science Lessons](#) (**ES.12 e**).

Outdoor Field Experiences

- Request a tour at the [Wakefield National Weather Service office](#).
- Request a field trip to the [Science Museum of Virginia](#) for a Science on the Sphere program about weather.

Community Partners

- Guest Services, Science Museum of Virginia
- Staff, Wakefield National Weather Service Office



BIOLOGY

STANDARD BIO.8

VA Dept of Education Standards of Learning (SOLs)

BIO.8 The student will investigate and understand that there are dynamic equilibria within populations, communities, and ecosystems. Key ideas include

- interactions within and among populations include carrying capacities, limiting factors, and growth curves;
- nutrients cycle with energy flow through ecosystems;
- ecosystems have succession patterns; and
- natural events and human activities influence local and global ecosystems and may affect the flora and fauna of Virginia.

SOL Essential Knowledge and Practices

In order to meet this standard, it is expected that students will

- use mathematical representations such as charts, graphs, histograms, and population change data, to support explanations of factors that affect carrying capacity of ecosystems (BIO.8 a)
- make predictions about changes that could occur in population numbers as the result of population interactions (BIO.8 a)
- graph and interpret a population growth curve and identify the carrying capacity of the populations (BIO.8 a)
- interpret how the flow of energy occurs between trophic levels in all ecosystems in a
 - food chain
 - food web
 - pyramid of energy
 - pyramid of biomass (BIO.8 b)
- develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere (BIO.8 b)
- evaluate claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem (BIO.8 c)
- recognize and understand the cause-and-effect relationship between changes in the abiotic and biotic conditions in an ecosystem and succession (BIO.8 c)
- describe the patterns of succession found in aquatic and terrestrial ecosystems of Virginia (BIO.8 c)
- identify factors leading to primary and secondary succession (BIO.8 c)
- describe the characteristics of a climax community (BIO.8 c)

Classroom/Schoolyard Activities

Natural events and human activities influence local and global ecosystems and may affect the flora and fauna of Virginia. Common activities used to support this standard include activities that allow students to evaluate the effects of human activities on Virginia's watersheds and ecosystems. The [Schoolyard Report Card](#) (BIO.8 d) is a good starting point; it allows students to gain a sense of place and responsibility. Other activities include use of an Enviroscope where students can create situations and model human activities on the watershed and learn about best management practices (BMPs), macroinvertebrate sampling, leaf pack examination, a Bioblast, [Critter Cubes](#) (BIO.8 a), or the [Stroud Online Leaf Pack Simulation](#) (BIO.8 a).

Outdoor Field Experiences

Visit an outdoor space with access to a waterway to conduct a bioblast and collect macroinvertebrates. This activity repeated over several weeks will give the students data to make predictions on the impact of humans on the local ecosystems.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park

ENVIRONMENTAL SCIENCE*

*Environmental Science standards are currently being updated by the Virginia Department of Education



STANDARD ENV.5

ENV.5 The student will investigate and understand that the Earth is one interconnected system through which energy and matter flow.

Key content includes

- Earth's terrestrial and aquatic biomes have distinct characteristics and components;
- ecosystem is composed of both biotic and abiotic factors;
- energy and matter flow within an ecosystem;
- the movement of energy through the living world to include food webs, food chains, trophic levels;
- biotic and abiotic factors may limit population growth in a given area (carrying capacity).

Classroom/Schoolyard Activities

Earth is one interconnected system through which energy and matter flow and is made up of both abiotic and biotic factors. Activities that support this standard encourage students to observe, identify, and collect data on populations. In the Project WILD activity [Environmental Barometer](#) where students observe, identify, and count wildlife in two separate outdoor study areas, compare and contrast abiotic and biotic inventories at both study sites, and construct and argument as to how the presence of wildlife can be seen as indicator of environmental quality.

Outdoor Field Experiences

Visit an outdoor space with access to a waterway to collect macroinvertebrates. This activity repeated over several weeks will give the students data to make predictions on the impact of humans on the local ecosystems.

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run
- Courtney Hallacher, Project WILD

STANDARD ENV.9

ENV.9 The student will investigate and understand how human actions impact the environment.

Key content includes

- advantages and disadvantages of balancing short term interests with long term welfare of society;
- individual activities and decisions can have an impact on the environment;
- people affect their environment through the use of natural resources to include how agriculture, forestry, ranching, mining, urbanization, transportation, and commercial fishing impact the land, water, air, and organisms
- the allocation of state and federal lands impacts environmental decisions.

Classroom/Schoolyard Activities

Human actions impact the environment. Activities that support this standard focus on developing a sense of place and how your actions impact the ecosystem. In the Aquatic WILD activity, [Migration Heahache](#), students will describe the effects of habitat loss and desgradation on populations of migration waterbirds.

Outdoor Field Experiences

Complete a MWEE Field Experience, suggested activities include:

- Guided nature hike
- Water quality testing
- Macroinvertebrate sampling
- Watershed mapping activity

Suggested locations suitable for a MWEE Field Experience include:

- [Rappahannock River Valley National Wildlife Refuge Units](#)
- [Dragon Run](#)
- A Virginia State Park
- Urbanna Town Marina

Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run
- Courtney Hallacher, Project WILD

ENVIRONMENTAL SCIENCE (CONTINUED)

STANDARD ENV. 12

ENV.12 The student will investigate and understand that their actions as an environmentally literate citizen will play a role in environmental policies.

Key content includes

- consumer choices in Virginia impact jobs, resources, pollution, and waste here and around the world;
- environmental justice is the study of the impact of environmental policy including resource allocation, pollution regulations, and waste disposal across all communities;
- political, legal, social, and economic decisions may affect global and local ecosystems;
- the media impacts public opinion and public policy;
- individuals and interest groups influence public policy;
- environmental decisions should include a cost-benefit analysis and may lead to trade-offs in conservation policy
- different methods are used by local, state, national, and international governments and organizations with varying results to protect the environment.

Classroom/Schoolyard Activities

Environmentally literate citizens can play a role in environmental policies. To meet this guideline students should research, plan, and complete an action project as part of the MWEE. Guest speakers and students completing a problem-based assessment are key to this guideline. Students should identify an issue, plan an experiment to collect data to synthesize, and complete an action project.

Outdoor Field Experiences

Complete a MWEE Field Experience, suggested activities include:

- Guided nature hike
- Water quality testing
- Macroinvertebrate sampling
- Watershed mapping activity

Suggested locations suitable for a MWEE Field Experience include:

- [Rappahannock River Valley National Wildlife Refuge Units](#)
- [Dragon Run](#)
- A Virginia State Park
- Urbanna Town Marina

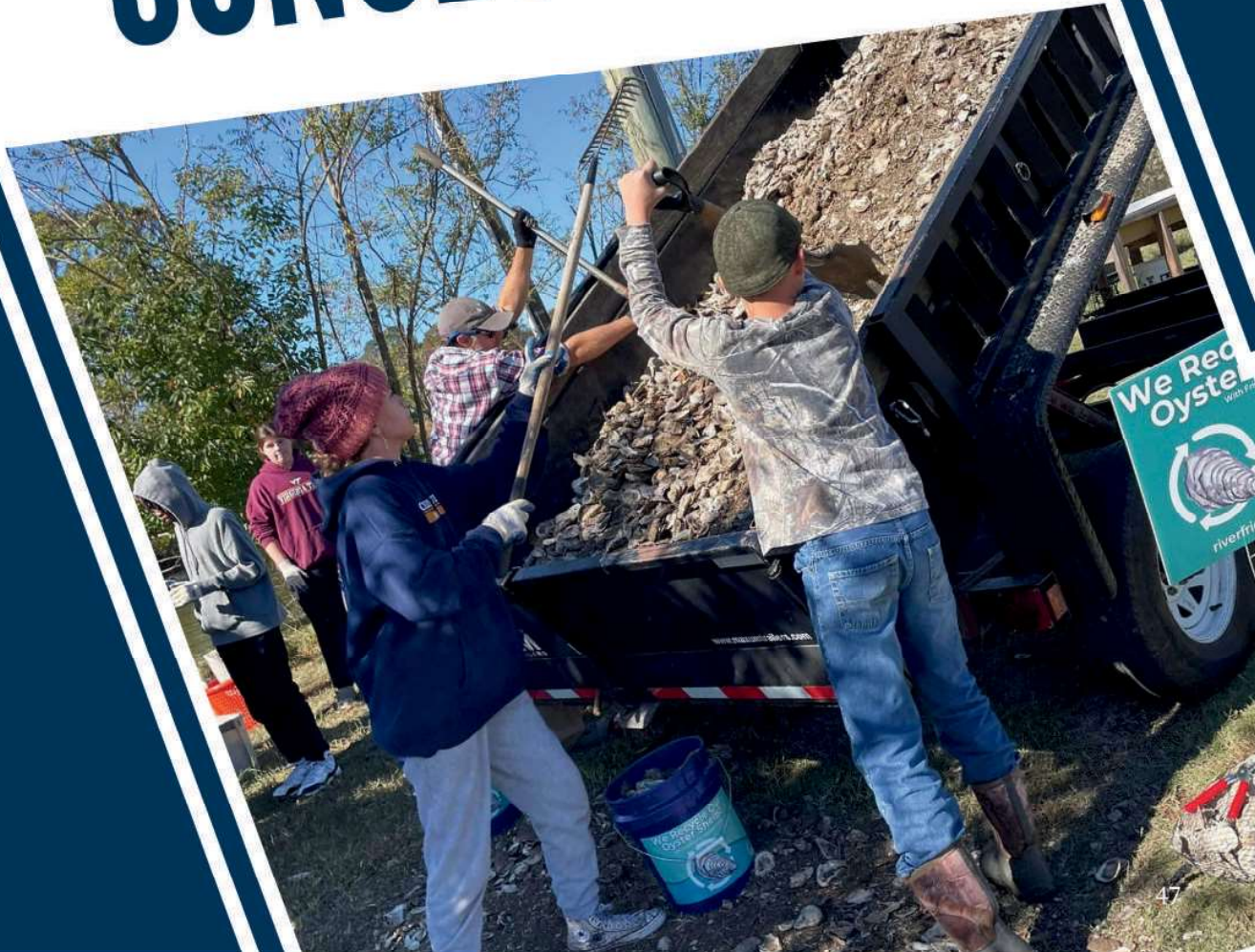
Community Partners

- Meredith Rose, Tidewater Soil and Water Conservation District
- Robin Didlake, Friends of the Rappahannock
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, York, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run
- Courtney Hallacher, Project WILD





CONCLUSION



CONCLUSION

Already, in MCPS, environmental learning is underway. First, the district is a leader in environmental practices through its solar panel field and addition of electric buses to its fleet. Second, established partnerships, like the Marine Science Legacy Program, allow students to reach beyond classroom walls and participate in MWEs during the school year. Third, environmental literacy is not just about safeguarding the natural world but also about preserving cultural heritage. Middlesex has a deep-rooted tie to the bay's maritime traditions, and trips to the Middlesex County Museum and History Society impart environmental knowledge and traditions for generations to come. Through these experiences, children learn how their community's identity is interwoven with the natural environment.

“—
Protecting our environment begins with people who are passionate and concerned and have tools and knowledge to protect and advocate. Tools and knowledge are taught and need to be part of every child's curriculum.

— Macy McNamee —”

As we look forward, it is intended that the MCPS Steering Committee will continue to meet, review and refine the ELP each time the VDOE adopts new science SOLs, and each time MCPS revises its strategic plan. The ELP is intended to be a “living document.” In other words, this plan is intended to change and grow as Middlesex County changes and grows. Our hope is that this Plan celebrates the ongoing efforts of dedicated educators and inspires appreciation and wonder in the outside world.

In the end, the call for environmental literacy in Middlesex is a call for a sustainable future. By nurturing a generation of environmentally literate children, our community is sowing the seeds for a resilient, mindful, and harmonious relationship between humanity and our natural surroundings.

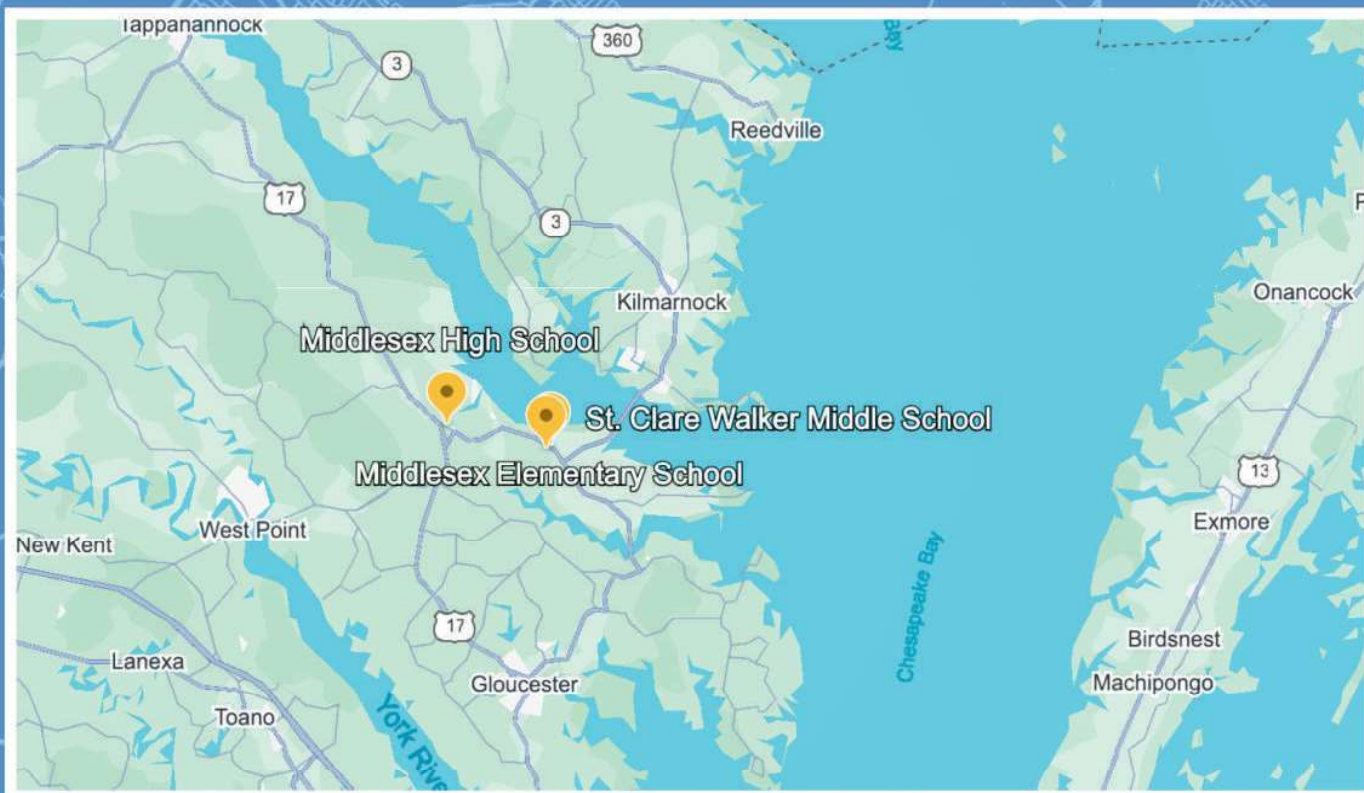
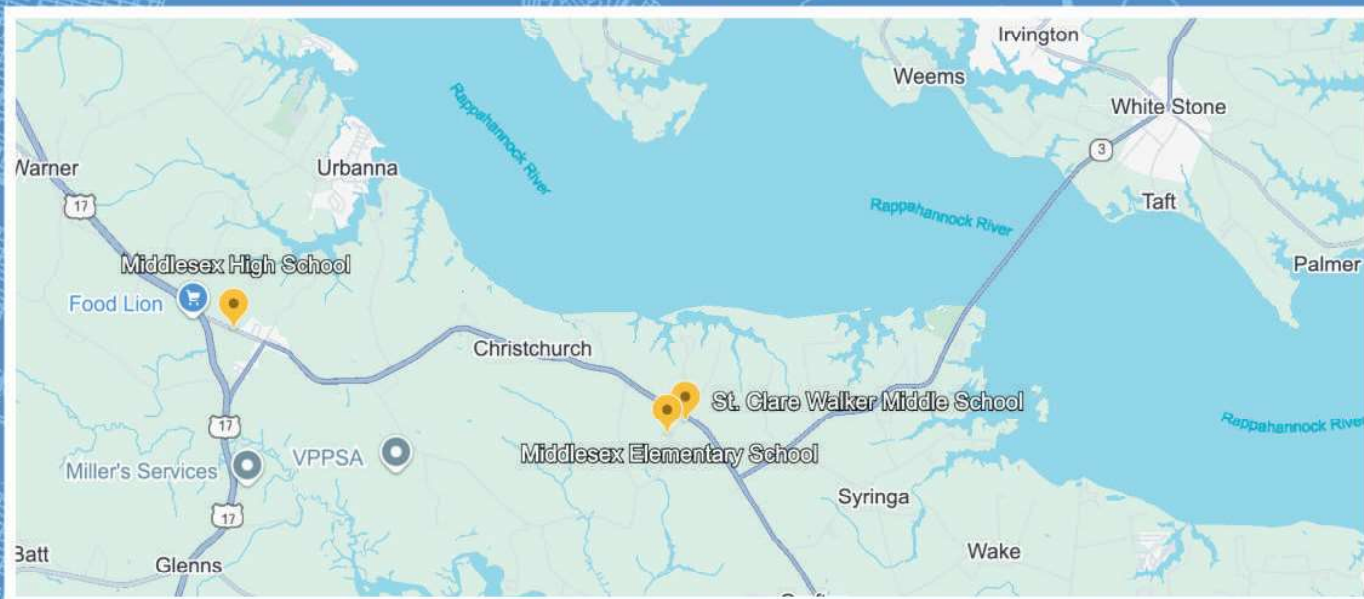




APPENDICES



APPENDIX 1: MAP OF SCHOOLS IN MIDDLESEX COUNTY



APPENDIX 2: COMMUNITY PARTNERS

Community partners are available to support your environmental literacy related activities. You will find community partners highlighted for particular SOLs throughout the Activity Guide but others are listed below who will be able to assist you with your program.

APPENDIX 2: COMMUNITY PARTNERS	Name	Organization	Website	Resources Offered
	Meredeth Dash	Alliance for the Chesapeake Bay	https://www.allianceforthebay.org/	K-12 programming specific to environmental education and watershed education, Professional learning opportunities, Facilitator for Project WET, Project Learning Tree and Flying WILD
	Sara Chaves Beam	Chesapeake Bay Governor's School	https://cbgs.k12.va.us/	Teacher training, outreach events, teacher & student resources, networking, help with field trip planning, outdoor education activities, Teaching experience in Environmental Science, Marine Science, Oceanography, Tropical Marine Ecology, Physical Geology
	Roger Collins	Colonial Seaport Foundation	https://colonialseaport.org/	Navigation, astronomy, colonial maritime history and heritage programs , floating living history classroom "Luna" (under construction)
	Pat Anderson	Deltaville Maritime Museum and Holly Point Nature Park, Middle Peninsula Master Naturalist	www.deltavillemuseum.com	Connection to field trip venue at a local creek and Heritage Park in Saluda, Experience with engaging volunteers with educational activities for schools
	Kathy Ash	Dominion Energy	https://www.dominionenergy.com/our-company/customers-and-community/educational-programs/talks-and-tours	Tours of the Chesterfield Power Station
	Terry Skinner	Friends of Dragon Run, Dragon Run Environmental Educational Mentorship (DREAM)	www.dragonrun.org	Expertise of the Dragon Run watershed, Teaching experience in K-12 science
	Robin Didlake	Friends of the Rappahannock	https://riverfriends.org/	K-12 programming, MWEE support (including Action Projects), Community programs, Professional Learning Opportunities, MWEE 101 Facilitator, Facilitator for Project Learning Tree and Project WILD, Teaching experience in high school science
	Anna Moreau	Hanover-Caroline Soil and Water Conservation District	https://www.hanovercountygov/313/Hanover-Caroline-Soil-and-Water	K-12 programming, MWEE support, community programs, lending library of activities/kits, connections with local resource professionals and state and federal agencies
	Meghan Milo	Madison Energy Infrastructure	https://www.solarempoweredschools.com/	Solar powered schools programming for Middlesex County Public Schools
	Clark Laster	Marine Science Legacy Program	https://www.urbannaoysterfestival.com/2024-urbanna-oyster-festivals-marine-science-legacy-program/	K-12 programming for the Oyster Festival Education Day (Thursday prior to Urbanna Oyster Festival), funding
	Alice French	Menokin	https://www.menokin.org/	K-12 programming about historic preservation and ecological conservation, kayaking, community programs, site of The Glass House
	Staff	Middlesex Convenience Site	https://www.co.middlesex.va.us/421/Solid-Waste/Trash-Convenience-Centers/Recyc	Facilities to visit to observe solid waste and recycling for the public

APPENDIX 2: COMMUNITY PARTNERS	Name	Organization	Website	Resources Offered
	Karen Reed	Middlesex County Parks and Recreation	https://www.co.middlesex.va.us/183/Parks-Recreation	Access to and information on county-owned parks, youth and adult recreation classes
	Dr. Byron Bishop	Middlesex County Public Schools	https://www.mcps.k12.va.us/	Teacher expertise and experience, Technology resources and curriculum, Alignment to SOL, communication with other teachers/administrators, Teaching experience in science, social studies, math, English
	Nicole Huntley	Middlesex County Public Schools	https://www.mcps.k12.va.us/	Instructional Technology Resource Teacher (ITRT), Teaching experience in 6th grade science and social studies
	Jennifer Mahr	Middlesex County Public Schools	https://www.mcps.k12.va.us/	Teaching experience in 6th grade science
	Macy McNamee	Middlesex County Public Schools	https://www.mcps.k12.va.us/	Gifted Coordinator, Resources for teachers and students, Teaching experience in 2nd grade
	Erica Williams	Middlesex County Public Schools	https://www.mcps.k12.va.us/	Teaching experience in 2nd grade
	Staff	Norton Yachts	https://www.nortonyachts.com/	Career connection to sailing/sailboats
	Lesley Newman	Project Learning Tree	https://www.plt.org/network/virginia/	Project Learning Tree workshops
	Courtney Hallacher	Project WILD	https://dwr.virginia.gov/education/project-wild/	Project WILD workshops
	Guest Services	Science Museum of Virginia	https://smv.org/groups/field-trips/	Museum exhibits, STEM learning experiences and demonstrations, The Dome for IMAX movies and Science on a Sphere
	Richard Siciliano	Tidewater Oyster Gardeners Association	www.oystergardeners.org	Connection to field trip venue at Camp Kekoka in Kilmarnock that has a sanctuary oyster reef. Works with other volunteers, Teaching experience as a college professor (retired)
	Meredith Rose	Tidewater Soil and Water Conservation District	https://www.tidewaterswcd.org/	K-12 programming, MWEE support, community programs, connections with local resource professionals and state and federal agencies
	Joyce	Upton's Point/ Urbanna Town Marina	https://urbannava.gov/marina/index.php	Launch point for boats, close to town shops and restaurants
	Marcie Kapsch	US Fish and Wildlife Services ~ Rappahannock River Valley National Wildlife Refuge	https://www.fws.gov/refuge/rappahannock-river-valley	Connection to field trip venue at Rappahannock River Valley National Wildlife Refuge (Cat Point Creek), guest speaking opportunities
	Cassi Camara	Virginia Department of Conservation and Recreation	https://www.dcr.virginia.gov/environmental-education/	Teacher training, state-level environmental education resources, state Environmental Literacy Plan (coming soon!)
	Park Superintendent and/or Park Rangers	Virginia Department of Conservation and Recreation	https://www.dcr.virginia.gov/state-parks/	Connection to field trip venue at York River State Park, Machicomoco State Park, Belle Isle State Park
	Staff	Virginia Institute of Marine Science (VIMS)	https://vims.edu/	K-12 programming, lesson plans, research information

APPENDIX 3: OUTDOOR COMMUNITY SPACES IN MIDDLESEX COUNTY	Name of Community Space	What audience does it reach?	Approximate location? (proximity to schools)	Possible activities in the space	Natural resources in the space	Other logical information
	Outdoor pavilion behind Middlesex Elementary School by Solar Field	K-12	On school grounds	Outdoor classroom space, solar programming	Field, utility site	Solar energy learning signage
	Luna Project (in progress) from the Colonial Seaport Foundation	K-12, community members	Urbanna	Navigation, astronomy, colonial maritime history and heritage programs	Shoreline, water, wildlife, historical resources	Floating living history vessel "Luna" under construction
	Deltaville Maritime Museum and Holly Point Nature Park	K-12, Community Members	Deltaville, 287 Jackson Creek Rd, Deltaville, VA 23043	Holly Point Farmer's market, boatbuilding, trail hiking, museum, exhibit native plant gardens, children's garden, butterfly and bird watching, tour of F.D. Crockett oyster buy-boat, annual first grade field day	Children's garden, shoreline, waterfront, oyster restoration	Bathrooms in building, covered pavilion, sculpture garden
	Dragon Run	K-12, Community Members	Coldwater/Church View area, other properties for land based activities	Nature hike, kayaking, activities in wooded areas, water quality testing, teacher training	Trails, water, forest, wildlife, shorelines	Porta potty, 8 are able to kayak
	Heritage Trail	K-12	Behind the Cook's Corner Office Complex (at 2889 General Puller Highway)	Hiking, tree identification	Woodlands, wetlands	Picnic tables, parking lot restrooms in county building
	Middlesex Museum and Chesty Puller Park	K-12, Community Members	Saluda	Local history	Field	Groups should schedule an appointment before visiting
	Rappahannock Community College, Glenns Campus Nature Trails	K-12, Community Members	Glenns ~ 20 minutes from elementary, 10 from MHS	Forest ecology, carbon storage analysis, ecosystem services of forests, forest succession	Hardwood forest, pond, field, trails	Restrooms available at Rappahannock Community College. Chesapeake Bay Governor's School can assist with planning a visit.
	Rappahannock River	K-12, Community Members	Rt 618 North (1.4) of Saluda	Estuary, aquatic ecology, ecosystem services, boating, kayaking	Rappahannock River, wildlife	Guided kayaking trips may be offered by partners including Friends of the Rappahannock
	Taber Park	K-12, Community Members	Urbanna	Recreation, picnicking	Trees, wildlife, Rappahannock River	Farmer's market location, benches, picnic tables, fenced playground, near community pool
	Urbanna Museum and Visitor Center	K-12, Community Members	Urbanna	Local history and culture (including oyster industry)	Rappahannock River, oysters	Offers a walking tour on local history
	Urbanna Town Marina	K-12, community members	Downtown Urbanna	Estuary investigations, water quality testing, animal observations (jellyfish, periwinkles, crabs, etc)	Shoreline, water, wildlife	Schools must make an appointment, contact Chesapeake Bay Governor's School for access to science equipment
	Waterman's Park	K-12, Community Members	Urbanna	Beach access, water testing	Rappahannock River, shoreline, wildlife	Park is located near a residential area, visitors are asked to be mindful and respectful while visiting.



ACKNOWLEDGEMENTS



ACKNOWLEDGEMENTS

This Plan is the result of collaborative work among schools, the community and the Partner Team. We are grateful to each person who spoke with us, responded to a survey, participated in the Steering Committee or contributed to the Plan in another way. We look forward to continuing to listen and learn from you.



Pictured from left to right: Lesley Newman, Robin Didlake, Meredith Dash, and Karen Fetty



Pictured from left to right: Robin Didlake, Anna Moreau, and Meredith Dash

Environmental Literacy Themes student artwork contributed by:



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Avery Caisse (8th grade)



Tarah McGuire (8th grade)

(Artwork found on pages 23 and 24)

MIDDLESEX COUNTY PUBLIC SCHOOLS
ENVIRONMENTAL LITERACY PLAN
2024

