



Essex County Public Schools

ENVIRONMENTAL LITERACY PLAN



This project is funded by NOAA's Chesapeake Bay Watershed Education and Training Program under federal grant NA22NMF4570322, awarded to the Hanover-Caroline Soil and Water Conservation District. The partner team included Friends of the Rappahannock, the Alliance for the Chesapeake Bay, and Essex County Public Schools.

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

TABLE OF CONTENTS

Endorsements	4-6
Introduction	7-16
• Executive Summary.....	8
• Community Focused Approach.....	14
Goals	17-19
Environmental Literacy Guide	20-46
• Kindergarten.....	22
• First Grade.....	23-24
• Second Grade.....	25-27
• Third Grade.....	28-29
• Fourth Grade.....	30-31
• Fifth Grade.....	32
• Sixth Grade.....	33-36
• Life Science.....	37-41
• Earth Science.....	42-43
• Biology.....	44
• Environmental Science.....	45-46
Conclusion	47-48
Appendices	49-53
• Appendix 1: Map of Schools in Essex County.....	50
• Appendix 2: Community Partners.....	51-52
• Appendix 3: Outdoor Community Spaces in Essex County	53
Acknowledgements	54-55



ENDORSEMENTS



MESSAGE FROM SUPERINTENDENT THOMAS

On behalf of Essex County Public Schools, I am pleased to share this inaugural Environmental Literacy Plan developed with our administration, staff, community partners and Essex Steering Committee members. This plan represents a significant milestone in our shared commitment to equip students with the knowledge and skills necessary to tackle complex environmental issues.

Our Environmental Literacy Plan reflects our mission to serve the individual educational needs of our students and our vision to create Pathways to Excellence. By integrating environmental literacy into our curriculum, ECPS is providing students with critical tools to address and resolve pressing ecological, economic, and social challenges. This holistic approach not only enhances students' academic experience but also prepares them to be active, informed participants in our global community.

One of the key strengths of the Environmental Literacy Plan is its collaborative foundation. The plan reflects a broad range of perspectives and expertise from staff, parents, higher education and local leaders. This collaborative spirit not only strengthens the quality of the plan but also fosters a sense of shared purpose and responsibility within our school community.

The natural resources and geographic location of Essex County provide a remarkable advantage in our environmental education efforts. The county's boundary along the Rappahannock River allows for access to hands-on activities such as oyster restoration, kayaking, and exploring wildlife refuges. All these efforts enhance our students' ability to connect with their environment, fostering a deeper understanding of local ecosystems and reinforcing the principles they learn in the classroom.

As we move forward with the implementation of the Environmental Literacy Plan, I am confident that it will inspire our students to become environmental stewards and equip them with the tools necessary for leading sustainable and meaningful lives. We are committed to the continued integration of environmental literacy into our educational framework and look forward to the positive outcomes this plan will bring.

Respectfully,

Dr. Harry R. Thomas, III

Dr. Harry R. Thomas, III
Division Superintendent, Essex County Public Schools



Pictured from left to right: Superintendent Dr. Harry Thomas and Cyndee Blount, Chief Academic Officer attending a PROJECT W²ONDER event for Administrators from Caroline, Essex and Middlesex Public Schools on March 11, 2024.

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

“—
| The world is facing and will continue to face critical environmental demands, therefore it is our responsibility to prepare students to understand these issues and create meaningful impact towards these needs.

—”
- **Lauren Comly** |

“—
| Preparing Students for the Future: As the world faces significant environmental challenges, it's crucial that students are equipped with the knowledge and skills to understand these issues and contribute to community solutions.

—”
- **Cyndee Blount** |

“—
| The importance of protecting the environment is something that will never go away. In this age of disinformation and digital distractions, it is more important than ever to instill a sense of respect, appreciation, and responsibility in younger generations so that they will understand the consequences of ignoring environmental protection.

—”
- **Tim Manley** |

“—
| Now more than ever we need to prepare the next generation of world leaders that connect how the environment directly impacts each and everyone of our livelihoods. That feels lost among many adults today and needs to be remedied for everyone's positive future.

—”
- **Anonymous** |



ECPS STEERING COMMITTEE

HOLLY BEAZLEY

Biology Teacher,
Essex County Public Schools

CYNDEE BLOUNT

Chief Academic Officer,
Essex County Public Schools

GRACE DAUGHTREY

Education and Outreach Coordinator,
Three Rivers Soil and Water Conservation District

ALEXANDREA “LEXI” DUSCHER

Instructor, Chesapeake Bay Governor's School,
Warsaw Rappahannock Community College

LAUREN COMLY

Fourth Grade Teacher,
Essex County Public Schools

TIMOTHY MANLEY

Executive Director,
Essex County Museum and Historical Society

BETH ROHNE

Youth Services Specialist,
Essex County Public Library

INTRODUCTION



EXECUTIVE SUMMARY

The Essex County Public Schools (ECPS) 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 Essex 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. Simultaneously, right next door, in Caroline and Middlesex Counties, environmental literacy plans are being published. Once implemented, a regional network across Virginia's Middle Peninsula 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 with the most recent plans coming out of Prince William County Public Schools and Richmond Public Schools. Like those plans, the ECPS 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 protect and restore their local 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.

What is environmental literacy in Essex County Public Schools?

ECPS defines an environmentally literate person as someone who, both individually and collectively:



1.

makes informed decisions to improve the well-being of other individuals, societies, and the global environment



2.

participates in civic life, and



3.

takes appropriate action

Enabling students to become environmentally literate includes implementing lessons and activities that help students deepen their understanding of self, community, and the global environment. One such project that encourages this type of learning is a Meaningful Watershed Educational Experience (MWEE).

NOAA's Meaningful Watershed Educational Experience (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.









ECPS is dedicated to environmental learning through multiple opportunities and partnerships. For example, the Essex County School Board holds a NOAA B-WET grant for an Essex Environmental Literacy Collaborative through 2026. This grant has enabled teachers to participate in training opportunities and to develop MWEEs. ECPS has partnered with Friends of the Rappahannock, The Center for Educational Partnerships (TCEP), and Three Rivers Soil and Water Conservation District (TRSWCD) to help implement this programming. Building upon these existing partnerships, the ECPS ELP outlines that MWEEs will take place in grades 5, 6, and in Environmental Science. These MWEEs will include all four required components and will enable students to learn about their watershed using the natural resources in and around Essex County.



The fifth grade will partner with Friends of the Rappahannock and TRSWCD to participate in an outdoor field experience and civic engagement activity for a Reduce, Reuse, and Recycle themed MWEE. The 6th-grade MWEE is a natural fit with the Standards of Learning (SOLs). At this grade level, students will develop environmental action projects centered around watershed runoff and its impacts on the ecosystem. At the high school level, 9th-grade students in Environmental Science will complete a full MWEE with student-generated issue definition and action projects. All of these activities are supported by ECPS in their division-wide planning, which includes teacher creation of MWEEs that encourage students to ask and answer deeper questions. Friends of the Rappahannock will continue the strong partnership with ECPS to foster in-class programs, outdoor field experiences, and resources for environmental action projects.



Currently, MWEE programming in ECPS includes outdoor field experiences for grades 3, 4, 5, 6, 7, 8, environmental science, and biology. Essex teachers have completed professional development about the following:

 <p>MWEE Think Cloud</p>	 <p>Best practices for gathering scientific data</p>
 <p>Environmental Literacy Models (ELM)</p>	 <p>Project Learning Tree's Green Jobs</p>
 <p>Issue definition</p>	 <p>Project WILD</p>



The teachers participated in Gallery Walks of the Standards of Learning to align experiences from their training with the 2018 Science Standards and to vertically align Environmental Science concepts from 3rd grade to high school biology. By the end of the Essex BWET grant in 2026, Friends of the Rappahannock and ODU will have provided 18 days of professional development with Essex teachers. Students in Essex will reap the benefits from this trained cohort of teachers for years to come.

WHY IS ENVIRONMENTAL LITERACY IMPORTANT TO ESSEX COUNTY?

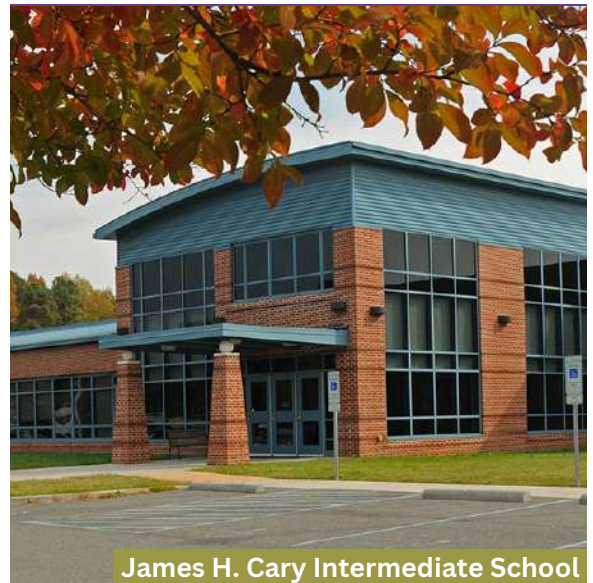
Essex County Public Schools serves students in preschool through grade 12 at three schools. The division contains one elementary school, one middle school and one high school.

Enrollment in the Essex County Public Schools (ECPS) for the 2023-2024 is 1,164 students.

In ECPS, 73.1% of students are people of color and 68.9 % are classified as economically disadvantaged, representing more than two thirds of the school population as a vulnerable part of the community.



Tappahannock Elementary School



James H. Cary Intermediate School



Essex High School



Located on the eastern side of Virginia's Middle Peninsula, Essex County is situated south of the Rappahannock River, with access to the Chesapeake Bay and other major tributaries. With 94% of the county land use classified as forested or in agriculture in the **2015 Essex County Comprehensive Plan**, the two clearly dominate as the major industries. Situated on the Rappahannock river is the historic town of Tappahannock, which dates back to a 17th century port settlement. Tappahannock is one of the major commerce hubs, and is home to the Essex County Museum, and a number of public parks and recreation areas (**Appendix 1: Map of Schools in Essex County**).

Students living in Essex County have the opportunity to engage with a rich array of natural and historic resources in and out of school. Recognizing the opportunities presented in Essex, the ELP outlines how students can learn using the natural resources of Essex County and how educators take advantage of cross-curricular opportunities, especially considering historic resource use. As outlined by the ELP, students will visit "outdoor classroom" spaces that allow students to study unique characteristics of their local watershed and develop a deeper connection to the environment.



Essex faces numerous challenges, including invasive species, pollution, soil and shoreline erosion, coastal flooding, and climate change. By instilling environmental awareness early on, students become advocates for the conservation and protection of their 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 was created prior to the 2024-2029 ECPS District Comprehensive Plan, which is currently being finalized. The District Comprehensive Plan and the ELP both include goals for supporting outdoor and hands-on learning experiences for students. There is division level support for the ELP in the following ways, including alignment with the ECPS mission and vision:

Mission: provide innovative education by empowering minds, opportunities, and futures through collaboration and partnership	 Vision: empowering minds, opportunities, and futures
DISTRICT COMPREHENSIVE PLAN	ENVIRONMENTAL LITERACY PLAN
Goal 1: Raise student achievement by providing exciting and rigorous learning experiences.  Objective 1.1: Quality Classroom Objective 1.2: Quality Resources	Goal 1: Provide MWEEs  Goal 2: Cross-curricular Learning  Goal 4: Environmental Careers 
Goal 2: Recruit and retain highly qualified staff.  Objective 2.1: We Grow Objective 2.3: We Retain	Goal 2: Cross-curricular Learning  Goal 3: Professional Development 

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.



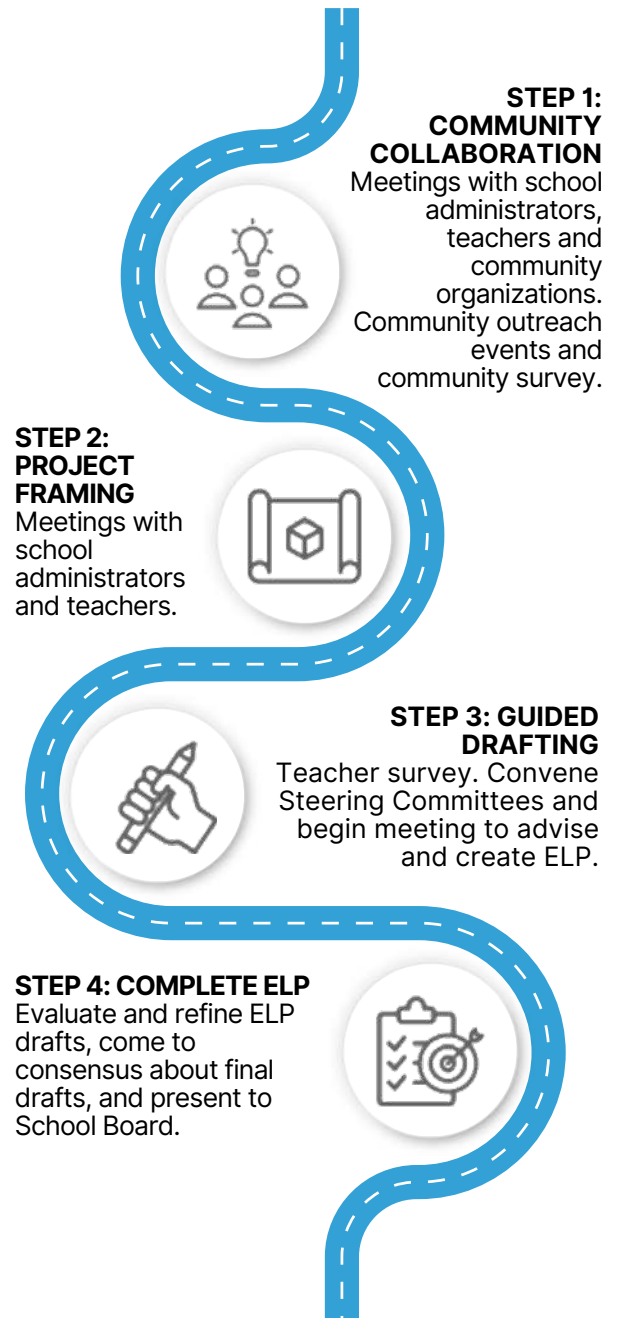
In addition, community partners, who facilitate MWEs, were interested in bringing them to rural school divisions, but wanted to be efficient in their approach. Therefore, PROJECT W²ONDER was formed to bring equitable, systemic and sustainable Environmental Literacy Plans to Essex and Middlesex Public

Schools in Virginia's Middle Peninsula and the adjacent Caroline County Public Schools to create a regional effort to support 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.

PROJECT W²ONDER ROADMAP



HOW WAS THE ENVIRONMENTAL LITERACY PLAN CREATED?

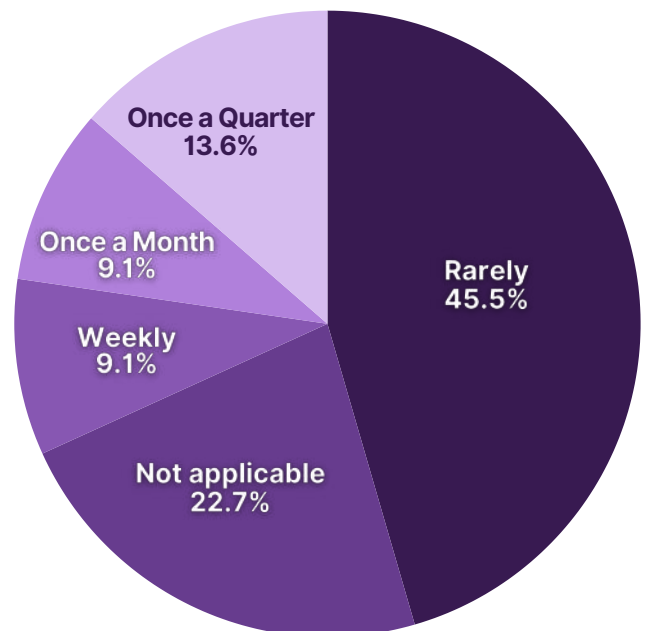
Each step of the Environmental Literacy Plan creation process, the partner team gave equal voice to the school division and the community. In 2022, PROJECT W²ONDER kicked off with the Partner Team listening to the needs of ECPS administrators and listening to the needs of the community through one on 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 ECPS and eventually used to inform membership for the ECPS Steering Committee.



Following the community engagement from the prior year, the partner team presented a progress update to the Essex County School Board in November 2023. Next, with the recommendation of ECPS administrators, the partner team created and distributed a **Teacher Survey** to the ECPS 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.

“—
I would like to teach students gardening practices...Gardening teaches students principles of photosynthesis thesis and respiration, characteristics of living things, life at a cellular level, classification and taxonomy, principles of symbiosis and ecology, and environmental stewardship. To achieve this goal, I would like to eventually build an outdoor classroom and gardening space...

- Teacher Survey Respondent |



Survey results from the teacher survey indicated that 68.2% 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.



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

Collaboration between ECPS and the community continued as the partner team used input from administrators and results from the Community Survey to form an ECPS steering committee. The committee included administrators, teachers and community partners. Steering committee meetings were held monthly from February through July 2024. Members contributed and edited ELP content, shared their lived experience, connections, and deep knowledge of Essex 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 W²ONDER.

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 MWEEs and ELPs.

“—
Working on the Environmental Literacy plan matters to me because I believe it is important to have a deep connection with your local landscape, involving both giving and taking from the environment and I want to help students develop this connection.

— Holly Beazley —”

In Fall 2024, the partner team reviewed and refined ELP content, as directed by the Steering Committee. A small celebratory kayaking trip with Friends of the Rappahannock and potluck dinner hosted by the Essex County Museum & Historical Society provided steering committee members an opportunity 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

All students in ECPS will have at least 3 opportunities to engage in fully integrated Meaningful Watershed Educational Experiences (MWEEs) that use the natural resources in and around Essex County by graduation.

Objectives:

- Identify grade levels that MWEEs would occur starting with 9 (environmental science) & 10 (biology); followed by MS and elementary levels
- Build mini MWEE experiences that scaffold to the full MWEE - start in K to build their skills outdoors
- Build in SOL alignment for each grade level with MWEE
- Create pacing guides that include the MWEE activities



“—
A lot of students have mixed understanding on what is going on with the environment due to lack of proper education; working on an environmental literacy plan helps to eliminate confusion and guide future generations.

- Anonymous —”



GOAL 2

ECPS Environmental Literacy Plan (ELP) will take advantage of cross curricular connection opportunities.

Objectives:

- Inventory existing cross curricular activities within the ELP
- Identify existing opportunities for co-planning and create new opportunities for teachers to co-plan
- Write the identified cross curricular opportunities into the pacing guides
- Develop a plan for tracking the cross-curricular opportunities



GOAL 3



ECPS will sustain and collaborate with three or more community partners to facilitate professional learning opportunities for educators or student experiences in relation to MWEs and environmental education per year.

Objectives:

- Update and build upon the existing list of community partners (**Appendix 2: Community Partners**)
- Update the Activity Guide, including community partners and spaces, as a living document
- Recognize and celebrate achievements resulting from collaboration with community partners to foster a sense of pride in the community



“—

Now more than ever we need to prepare the next generation of world leaders that connect how the environment directly impacts each and everyone of our livelihoods. That feels lost among many adults today and needs to be remedied for everyone's positive future.

— Anonymous —”

GOAL 4



Introduce students to a wide range of green career fields through multiple formats.

Objectives:

- Include guest speakers, internships and externships, local community partners, local STEM Events, and Project Learning Tree Green Job career highlights
- Provide opportunities for students to volunteer and engage with a wide variety of green career choices
- Highlight success stories of individuals who have pursued green careers and made a significant impact on the environment

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 Essex 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 Essex County Public Schools, all students will have at least 3 opportunities to engage in fully integrated Meaningful Watershed Educational Experiences (MWEEs) that use the natural resources in and around Essex County by graduation. 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 local botanical garden, public garden, or other natural area with a wide diversity of plants and animals
- Visit to the children’s garden at [Deltaville Maritime Museum](#) to observe plants and trees

Community Partners

- Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park
- Just Harvest, Essex Community Garden
- 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 \(K.11 a, b\)](#) 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 Essex Convenience Sites (Convenience Centers at Brays Fork, Center Cross, or Champlain) to examine the variety of materials that can be recycled
- Visit a compost facility, one local facility is: [Virginia Peninsula Public Service Authority Compost Facility](#)

Community Partners

- Staff, Essex Convenience Sites
- Lesley Newman, Project Learning Tree
- Monte Pulley, [Virginia Peninsula Public Service Authority Compost Facility](#)

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	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> • 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) • Visit to the children's garden at Deltaville Maritime Museum to observe plants and trees 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Kay Carlton, Essex County Parks and Recreation • Lesley Newman, Project Learning Tree • Pat Anderson, Deltaville Maritime Museum and Holly Point Nature Park

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: How I interact with my world (continued)**STANDARD 1.7** (continued)

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
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.	<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 Visit Rappahannock River Valley Wildlife Refuge for a presentation 	<ul style="list-style-type: none"> Staff, National Weather Service, Wakefield Office Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit Kay Carlton, Essex County Parks and Recreation 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
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.	<ul style="list-style-type: none"> Visit one of the Essex Convenience Sites (Convenience Centers at Brays Fork, Center Cross, or Champlain) to examine the variety of materials that can be recycled Request a tour or visit the Virginia Peninsula Public Service Authority (VPPSA) to demonstrate 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 Essex County Parks and Recreation to participate in the "Clean Essex Project" 	<ul style="list-style-type: none"> Kay Carlton, Essex County Parks and Recreation Staff, Essex Convenience Sites Grace Daughtrey, Three Rivers Soil and Water Conservation District Robin Didlake, Friends of the Rappahannock Lesley Newman, Project Learning Tree Richard Siciliano, Tidewater Oyster Growers Association Monte Pulley, Virginia Peninsula Public Service Authority Compost Facility Kay Carleton, Essex County Parks and Recreation

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](#) (2.4 b), 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 iPads or other technology devices to photograph the steps in the lifecycle of the living things they observe
- Visit [Rappahannock River Valley Wildlife Refuge](#) for a presentation
- Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program

Community Partners

- DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park
- Kay Carlton, Essex County Parks and Recreation
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit
- 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 (2.5 b, c).

Outdoor Field Experiences

- Visit a natural area and locate a decomposing log to investigate the interactions of living organisms
- Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program
- Visit [Rappahannock River Valley Wildlife Refuge](#) for a presentation

Community Partners

- Courtney Hallacher, Project WILD
- Kay Carlton, Essex County Parks and Recreation
- DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit

SECOND GRADE: Change occurs all around us (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	Outdoor Field Experiences	Community Partners
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 (2.6 a, b, c) examines how water flow and seasonal weather changes are related by simulating stream flow using ping pong balls.	<ul style="list-style-type: none"> • Visit a public natural area and rotate through stations using tools to collect and record weather data • Visit Rappahannock River Valley Wildlife Refuge for a presentation • 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 	<ul style="list-style-type: none"> • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • Kay Carlton, Essex County Parks and Recreation • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit • Staff, National Weather Service, Wakefield Office • Staff, 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	Outdoor Field Experiences	Community Partners
This standard enhances the students' understanding of weather conditions and the seasons. An example activity is using soil runoff boxes (2.7 b) to compare and contrast erosion using a demonstration of pouring water (simulating stormwater runoff) over land with exposed soil and land with cover crops.	<ul style="list-style-type: none"> • Investigate a local natural area using the Schoolyard Report Card criteria, and compare the results from school to the natural area • Attend the State Fair of Virginia's Ed Expo to explore demonstrations and exhibits about natural resources and agriculture • Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program • Visit Rappahannock River Valley Wildlife Refuge for a presentation 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • Kay Carlton, Essex County Parks and Recreation • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit • Sarah Jane Thomsen, Meadow Event Park/State Fair of Virginia

SECOND GRADE: Change occurs all around us (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	Outdoor Field Experiences	Community Partners
<p>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", (2.8 b) students can explore how plants and trees provide food for humans and practice using their sense of smell and taste.</p>	<ul style="list-style-type: none"> • Visit a natural area to observe and collect data about what types of foods animals eat • Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program • Visit Rappahannock River Valley Wildlife Refuge for a presentation 	<ul style="list-style-type: none"> • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • Kay Carlton, Essex County Parks and Recreation • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit • Lesley Newman, Project Learning Tree

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

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
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. (3.4 a)	<ul style="list-style-type: none"> • Visit a natural area to compare the population of species that appear today to what appeared in the space historically • Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program • Contact Tidewater Oyster Growers Association or Friends of the Rappahannock for oyster programming 	<ul style="list-style-type: none"> • Courtney Hallacher, Project WILD • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • Kay Carlton, Essex County Parks and Recreation • Richard Siciliano, Tidewater Oyster Growers Association

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

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
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. (3.5 b)	<ul style="list-style-type: none"> • Visit a natural area for a hike to identify living components in a food web • Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program • 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 	<ul style="list-style-type: none"> • Robin Didlake, Friends of the Rappahannock • Lesley Newman, Project Learning Tree • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • Kay Carlton, Essex County Parks and Recreation • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit • Terry Skinner, Friends of Dragon Run

THIRD GRADE: Interactions in our world (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.

- a) there are many reservoirs of water on Earth
- b) the energy from the sun drives the water cycle
- c) 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 (3.7 a)
- identify and locate major water sources in the local community (3.7 a)
- identify the origin of energy that drives the water cycle (3.7 b)
- describe the processes of evaporation, condensation, and precipitation as these relate to the water cycle (3.7 c)
- construct and interpret a model of the water cycle (3.7 c).

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> • Take a nature hike in a natural area to find evidence of the different parts of the water cycle • Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program • Visit Rappahannock River Valley Wildlife Refuge for a presentation 	<ul style="list-style-type: none"> • Robin Didlake, Friends of the Rappahannock • Kay Carlton, Essex County Parks and Recreation • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park

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

- a) human activity affects the quality of air, water, and habitats;
- b) water is limited and needs to be conserved;
- c) fire, flood, disease, and erosion affect ecosystems; and
- d) 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	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> • Connect with local environmental groups to participate in a trash cleanup • Connect with Essex County Parks and Recreation to participate in the "Clean Essex Project" • Visit one of the Essex Convenience Sites (Convenience Centers at Brays Fork, Center Cross, or Champlain) to examine the variety of materials that can be recycled 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • Staff, Essex Convenience Sites • Kay Carlton, Essex County Parks and Recreation

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	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> • Visit a local botanical garden, public garden, or other natural area with a wide diversity of flowering plants • Visit a Virginia State Park - Machicomoco, Westmoreland, or Belle Isle to make observations about plants and animals or participate in a park program • Visit Rappahannock River Valley Wildlife Refuge for a presentation 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • Kay Carlton, Essex County Parks and Recreation • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit • Lesley Newman, Project Learning Tree

FOURTH GRADE: Our place in the solar system (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	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Staff National Weather Service Wakefield Office Kay Carlton, Essex County Parks and Recreation

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	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> Investigate a local natural area using the Schoolyard Report Card criteria. Compare the results from school to the natural area. Visit the Essex County Museum and Historical Society with a focus on natural history 	<ul style="list-style-type: none"> Grace Daughtrey, Three Rivers Soil and Water Conservation District Robin Didlake, Friends of the Rappahannock Kay Carlton, Essex County Parks and Recreation Tim Manley, Essex County Museum and Historical Society



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	Outdoor Field Experiences	Community Partners
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.	Tour a Dominion Energy Power Station	<ul style="list-style-type: none"> • Kathy Ash, Chesterfield Power Station • Courtney Hallacher, Project WILD

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
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 Essex County.	<p>Complete a MWEE Field Experience, suggested activities include:</p> <ul style="list-style-type: none"> • Guided nature hike • Water quality testing • Sediment erosion & fossil hunt • Invasive plant and animal activity <p>Suggested locations suitable for a MWEE Field Experience include:</p> <ul style="list-style-type: none"> • Dragon Run • A Virginia State Park • Westmoreland State Park 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • 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	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> • Field Trip to Cat Point Creek with Friends of the Rappahannock in partnership with Three Rivers Soil and Water Conservation District, Rappahannock Wildlife Refuge Friends, and 4H • Visit a local hiking trail or natural area with a stream or creek running through it, and look for evidence of erosion on a nature walk 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • Kay Carlton, Essex County Parks and Recreation • Danielle Brown, Virginia Cooperative Extension • Steve Colangelo, Rappahannock Wildlife Refuge Friends • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit

SIXTH GRADE: Our world; our responsibility**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).

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
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).	<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 • 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"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Kay Carlton, Essex County Parks and Recreation • Staff, Science Museum of Virginia

SIXTH GRADE: Our world; our responsibility (continued)

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) a watershed is composed of the land that drains into a body of water;
- b) Virginia is composed of multiple watershed systems which have specific features;
- c) the Chesapeake Bay is an estuary that has many important functions; and
- d) 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	Outdoor Field Experiences	Community Partners
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.	Complete a MWEE Field Experience, suggested activities include: <ul style="list-style-type: none"> • Guided nature hike • Water quality testing • Macroinvertebrate sampling • Watershed mapping activity Suggested locations suitable for a MWEE Field Experience include: <ul style="list-style-type: none"> • Rappahannock River Valley Wildlife Refuge - Cat Point Creek 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit • Courtney Hallacher, Project WILD

SIXTH GRADE: Our world; our responsibility (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	Outdoor Field Experiences	Community Partners
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.	<ul style="list-style-type: none"> • 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. • Connect with Essex County Parks and Recreation to participate in the "Clean Essex Project" • Visit one of the Essex Convenience Sites (Convenience Centers at Brays Fork, Center Cross, or Champlain) to examine the variety of materials that can be recycled 	<ul style="list-style-type: none"> • Kay Carlton, Essex County Parks and Recreation • Staff, Essex 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 the forest ecosystem.
- Visit [Menokin](#) for an outdoor field experience.
- Contact [Friends of Dragon Run](#) to schedule a visit to the Dragon Run to understand interdependence of species within a food web system

Community Partners

- Lesley Newman, Project Learning Tree
- Grace Daughtrey, Three Rivers Soil and Water Conservation District
- Alice French, Menokin Foundation
- Robin Didlake, Friends of the Rappahannock
- Terry Skinner, Friends of Dragon Run



LIFE SCIENCE (continued)

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).

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.	<ul style="list-style-type: none"> • Visit a local outdoor space to make observations to make observations and collect data on forest succession. • Visit Menokin for an outdoor field experience. • Contact Friends of Dragon Run to schedule a visit to the Dragon Run to explore resources within an ecosystem. 	<ul style="list-style-type: none"> • Lesley Newman, Project Learning Tree • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Alice French, Menokin Foundation • Robin Didlake, Friends of the Rappahannock • Terry Skinner, Friends of Dragon Run

LIFE SCIENCE (continued)

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

- 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.	<ul style="list-style-type: none"> Visit a local outdoor space to make observations and collect data on how organisms have adapted to the ecosystem. Visit Menokin for an outdoor field experience. Contact Friends of Dragon Run to schedule a visit to the Dragon Run to make observations of how plants and animals adapt over time. 	<ul style="list-style-type: none"> Grace Daughtrey, Three Rivers Soil and Water Conservation District Courtney Hallacher, Project WILD Alice French, Menokin Foundation Robin Didlake, Friends of the Rappahannock Terry Skinner, Friends of Dragon Run

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

- 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**)

Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
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.8 b, c) and Stroud Online Leaf Pack Simulation (LS.8 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)	<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. Visit Menokin for an outdoor field experience. Contact Friends of Dragon Run to schedule a visit to the Dragon Run to investigate human impacts on the ecosystem 	<ul style="list-style-type: none"> Grace Daughtrey, Three Rivers Soil and Water Conservation District Robin Didlake, Friends of the Rappahannock Alice French, Menokin Foundation Terry Skinner, Friends of Dragon Run

LIFE SCIENCE (continued)

STANDARD LS.9

VA Dept of Education Standards of Learning (SOLs)

LS.9 The student will investigate and understand that relationships exist between ecosystem dynamics and human activity. Key ideas include

- a) changes in habitat can disturb populations;
- b) disruptions in ecosystems can change species competition; and
- c) variations in biotic and abiotic factors can change ecosystems.

SOL Essential Knowledge and Practices

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

- 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
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 Enviroscape (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).	<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. • Contact Friends of Dragon Run to schedule a visit to the Dragon Run to explore the relationships that exist between ecosystem dynamics and human activity. 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • Alice French, Menokin Foundation • Terry Skinner, Friends of Dragon Run

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](#) (**LS. 11 a**), 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.

Outdoor Field Experiences

- Visit a local outdoor space to take a hike in a local forested area to observe tree health and the impact of humans on the health of the trees.
- Visit [Rappahannock River Valley Wildlife Refuge](#) for a presentation.
- Contact [Friends of Dragon Run](#) to schedule a visit to the Dragon Run to do an analysis of tree health

Community Partners

- Grace Daughtrey, Three Rivers Soil and Water Conservation District
- Lesley Newman, Project Learning Tree
- Robin Didlake, Friends of the Rappahannock
- Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge
- Terry Skinner, Friends of Dragon Run



EARTH SCIENCE

STANDARD ES.11

VA Dept of Education Standards of Learning (SOLs)

ES.11 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.11 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.11 b**)
- explain how volcanic activity or meteor impacts could affect the atmosphere, and life on Earth (**ES.11 c**)
- explain how biologic activity, including human activities, may influence global temperature and climate (**ES.11 c**)
- research historical information and scientific data on the impact of major volcanic eruptions and other natural events on the atmosphere (**ES.11 c**)
- research data on the effect of human activities and public policy on Earth's ozone layer since chlorofluorocarbons (CFC) were banned (**ES.11 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.11 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.11 a, b, d**) and [Hands-On NASA Science Lessons](#) (**ES.11 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

- a) interactions within and among populations include carrying capacities, limiting factors, and growth curves;
- b) nutrients cycle with energy flow through ecosystems;
- c) ecosystems have succession patterns; and
- d) 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	Outdoor Field Experiences	Community Partners
<p>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 Enviroscape 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).</p>	<ul style="list-style-type: none"> • Visit a local outdoor space to conduct 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. • Visit Belle Isle State Park to kayak, conduct water quality testing, and make observations about plants and animals. • Visit Rappahannock River Valley Wildlife Refuge for a presentation. • Visit the St. Margaret's School Learning Dock and beach to conduct bioblast using habitat cages, seine nets and cast nets. 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • Marcie Kapsch, Rappahannock River Valley National Wildlife Refuge • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • Richard Moncure, St. Margaret's School, STREAM Program

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	Outdoor Field Experiences	Community Partners
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 an argument as to how the presence of wildlife can be seen as indicator of environmental quality.	<ul style="list-style-type: none"> • Visit a local outdoor space 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. • Visit Westmoreland State Park to make observations about weather, erosion, and litter. 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • 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	Outdoor Field Experiences	Community Partners
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 degradation on populations of migration waterbirds.	<p>Complete a MWEE Field Experience, suggested activities include:</p> <ul style="list-style-type: none"> • Guided nature hike • Water quality testing • Macroinvertebrate sampling • Watershed mapping activity <p>Suggested locations suitable for a MWEE Field Experience include:</p> <ul style="list-style-type: none"> • A Virginia State Park 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park • 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.

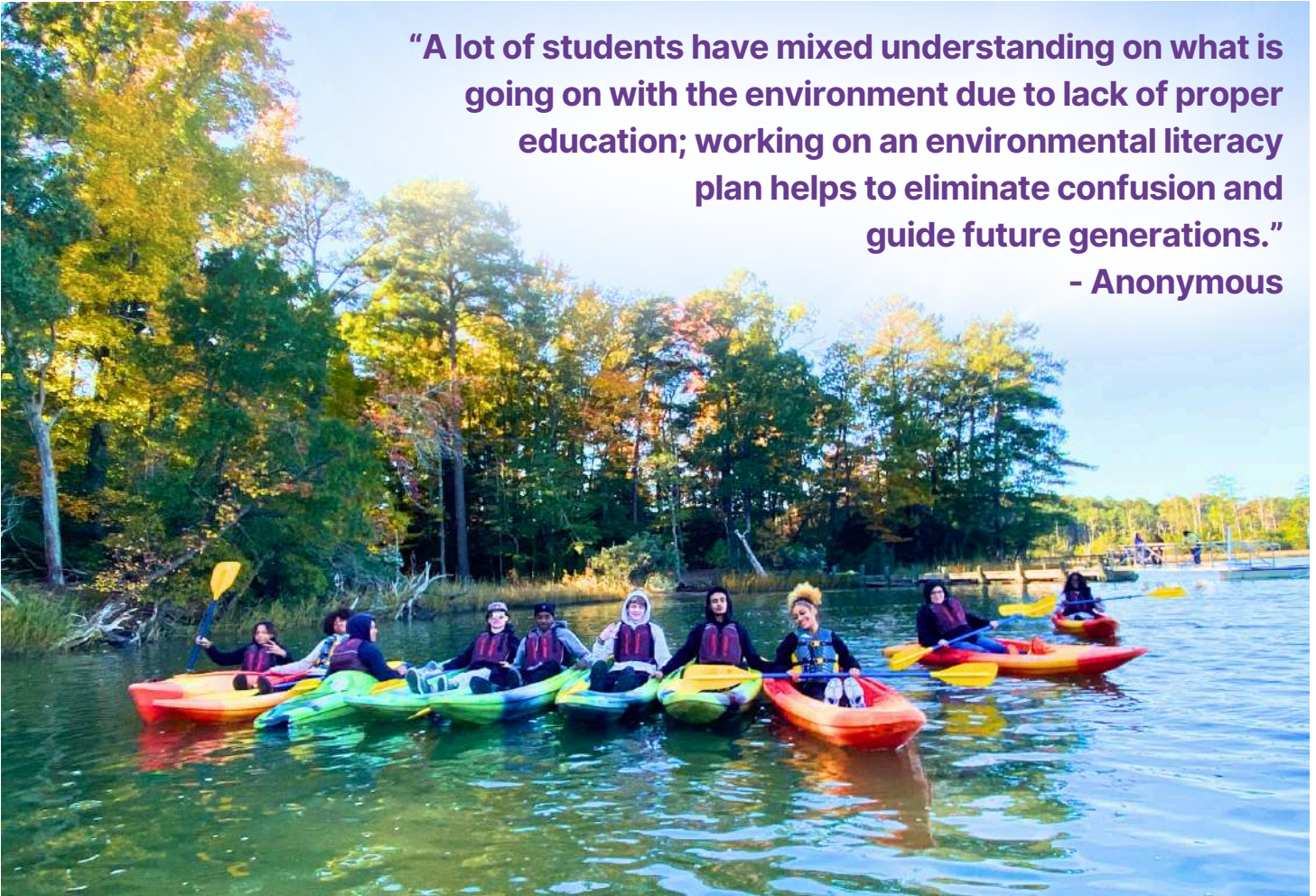
Classroom/Schoolyard Activities	Outdoor Field Experiences	Community Partners
Environmentally literate citizens can play a role in environmental policies. To meet this guideline students should research, plan, and complete an action project as part of the MWEE. Guest speakers and students completing a 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.	Complete a MWEE Field Experience, suggested activities include: <ul style="list-style-type: none"> • Guided nature hike • Water quality testing • Macroinvertebrate sampling • Watershed mapping activity Suggested locations suitable for a MWEE Field Experience include: <ul style="list-style-type: none"> • A Virginia State Park 	<ul style="list-style-type: none"> • Grace Daughtrey, Three Rivers Soil and Water Conservation District • Robin Didlake, Friends of the Rappahannock • DCR Park Superintendent, Machicomoco, Westmoreland State Park, or Belle Isle State Park



CONCLUSION



“A lot of students have mixed understanding on what is going on with the environment due to lack of proper education; working on an environmental literacy plan helps to eliminate confusion and guide future generations.”
- Anonymous



CONCLUSION

Already, in ECPS, environmental learning is underway. First, through established partnerships that reach beyond classroom walls with Friends of the Rappahannock, The Center for Educational Partnerships (TCEP), and the Three Rivers Soil and Water Conservation District, students are already participating in MWEs during the school year. Teachers in ECPS will also continue to receive professional development through a NOAA B-WET Grant held by the Essex County School Board. We are hopeful that the ELP will encourage ECPS to continue to foster partnerships with those highlighted in the ELP (**Appendix 2: Community Partners**).

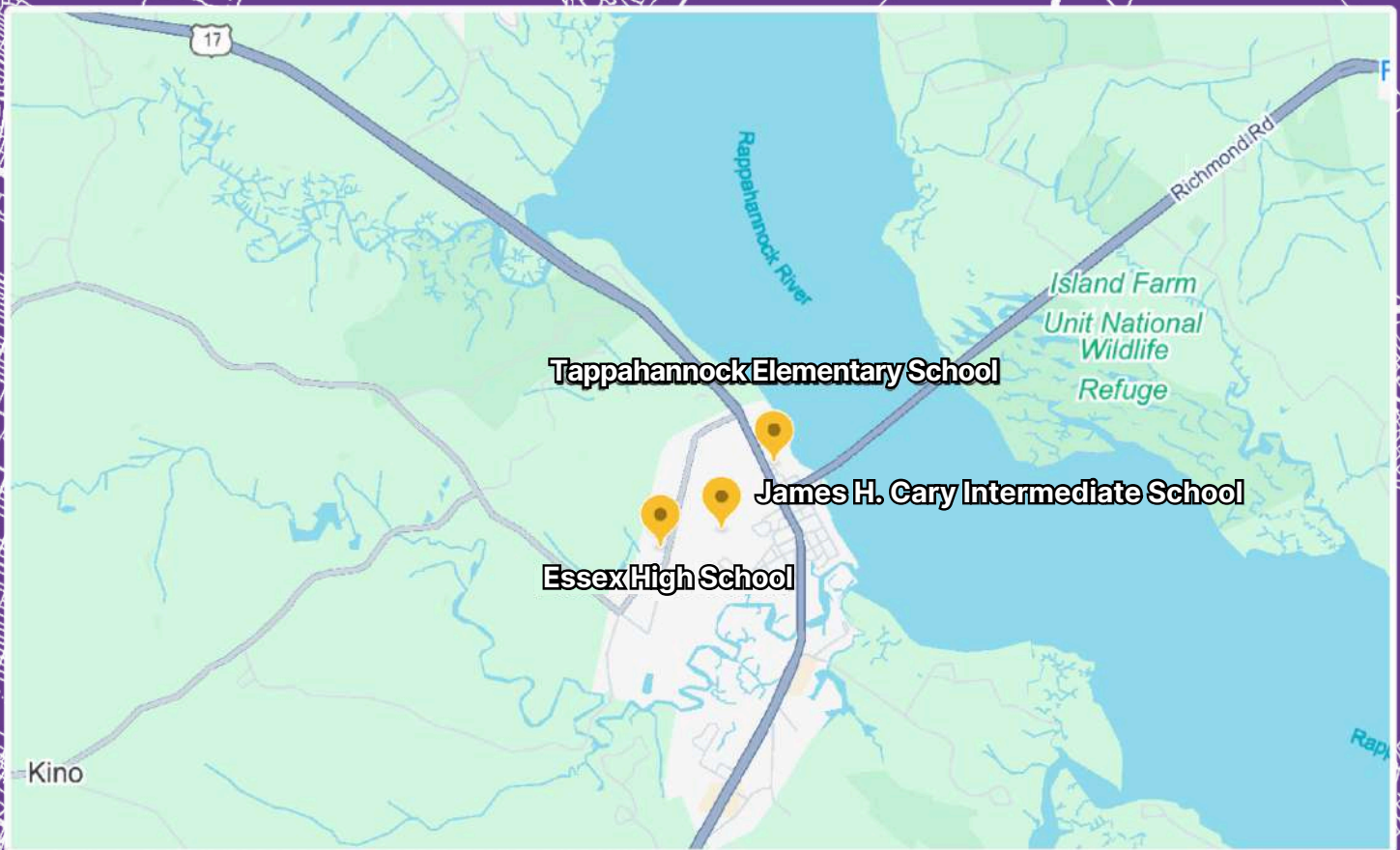
With the sustained support of the community and Essex County School Board, ECPS students will continue to have high-quality field experiences in the years to come. We hope these efforts and others will carry on the goals laid out in the ELP.

As we look forward, it is intended that the steering committee will continue to meet and review and refine the ELP each time the VDOE adopts new science SOLs, and each time ECPS revises the strategic plan. The ELP is intended to be a “living document.” This is the first draft of this plan, which is intended to change and grow as Essex 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.

APPENDICES



APPENDIX 1: MAP OF SCHOOLS IN ESSEX COUNTY



Tappahannock Elementary School

James H. Cary Intermediate School

Essex High School

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
	Jason Strong	Chesapeake Bay Governor's School	https://cbgs.k12.va.us/	K-8 environmental programming and student research, teacher collaboration
	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
	Staff	Essex Convenience Site	https://www.essexva.gov/community/page/trash-and-recycling-centers	Facilities to visit to observe solid waste and recycling for the public
	Tim Manley	Essex County Museum & Historical Society	https://ecmhs.org/	Field trips focusing on both natural and human history of Essex County.
	Kay Carleton	Essex County Parks and Recreation	https://essexcountyva.myrec.com/info/default.aspx	Access to and information on county-owned parks, youth and adult recreation classes
	Cyndee Blount	Essex County Public Schools	https://www.essex.k12.va.us/	Expertise and leadership experience in K-12 teacher support
	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.hanovercounty.gov/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
	Staff	Just Harvest, Essex Community Garden	https://www.facebook.com/justharvestva/	Connection to community garden in Tappahannock

APPENDIX 2: COMMUNITY PARTNERS	Name	Organization	Website	Resources Offered
	Sarah Jane Thomsen	Meadow Event Park /State Fair of Virginia	https://www.statefairva.org/	Field trip to State Fair to learn about natural resources of Virginia.
	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	National Weather Service, Wakefield Guest Services	https://www.weather.gov/akq/	Field trips and guest speakers focusing on weather and climate.
	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 Moncure	St. Margaret's School, STREAM Program	https://www.sms.org/	Connection to field trip venue on Rappahannock River and the SMS STREAM program
	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)
	Grace Daughtrey	Tidewater Soil and Water Conservation District	https://www.trswcd.org/	K-12 programming, MWEE support, community programs, connections with local resource professionals and state and federal agencies
	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
	Monte Pulley	Virginia Peninsula Public Service Authority Compost Facility	https://vppsa.org/compost-facility/	Field trips focusing on solid waste and recycling.
	Steve Colangelo	Rappahannock Wildlife Refuge Friends	https://rwrffriends.org/	Supports conservation efforts of Rappahannock Wildlife Refuge, school and community programs, summer work program for teens
	Danielle Brown	Virginia Cooperative Extension	https://essex.ext.vt.edu/	K-12 programming, community programs, connections with local resource professionals and state and federal agencies

APPENDIX 3: OUTDOOR COMMUNITY SPACES IN ESSEX 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
	Essex High School - outdoors	K-12	On school grounds	Outdoor class space, nature trail	Field, nature trail	On school grounds
	Tappahannock Elementary - outdoors (access to waterfront)	K-12	On school grounds	Outdoor class space	Field	On school grounds
	James H. Cary Intermediate School - outdoors	K-12	On school grounds	Outdoor class space	Field	On school grounds
	Rappahannock River Valley National Wildlife Refuge - Hutchinson Unit	K-12, Community Members	19180 Tidewater Trail Tappahannock	Nature hike, kayaking, activities in wooded areas,, water quality testing, teacher training	Trails, water, forest, wildlife, shorelines	Parking, pit toilets, no running water, picnic shelter, electricity
	Max Silver Memorial Courtyard at Essex County Museum and Historical Society	K-12, Community Members	218 Water Lane Tappahannock	Plant identification, picnic	Courtyard	Covered pavilions, small field, picnic tables, restrooms located inside the Museum
	Duke Street Beach	K-12, Community Members	Bottom of Duke Street Tappahannock	Water quality testing, Estuary, aquatic ecology, ecosystem services	Rappahannock River, wildlife, shoreline	River access and views and bench
	St. Margaret's Waterfront	K-12 and Community Members with an appointment	444 Water Lane Tappahannock	Water quality testing, Estuary, aquatic ecology, ecosystem services	Rappahannock River, wildlife, shoreline	Groups should schedule an appointment before visiting
	St. Margaret's Outdoor Lab	K-12, Community Members	444 Water Lane Tappahannock	Water quality testing, Estuary, aquatic ecology, ecosystem services	Rappahannock River, wildlife, shoreline	Groups should schedule an appointment before visiting
	Essex Community Garden	K-12, Community Members	Corner of Church Lane & Duke Street Tappahannock	Plant identification, pollinators	Pollinator garden, community vegetable garden	More information on Just Harvest: https://www.facebook.com/justharvestva/
	Playground in Tappahannock	K-12, Community Members	234 Virginia Street Tappahannock	Plant identification, pollinators	Pollinator garden	Playground equipment
	Rappahannock River Park	K-12, Community Members	Newbill Drive Tappahannock	Water quality testing, Estuary, aquatic ecology, ecosystem services	Rappahannock River, wildlife, shoreline	River access and views, porta potty, and benches
	Essex County Museum and Historical Society	K-12, Community Members	218 Water Lane Tappahannock	Local history	Pavilion and garden	Restrooms on site, historical and cultural exhibits on the river, town, and people, a small library, and a gift shop
	Essex County Convenience Site	K-12, Community Members	Convenience Centers at Brays Fork, Center Cross, or Champlain	Learning about recycling	N/A	Recycling and solid waste facilities
	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 available to kayak

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

