Chesapeake CLASSROOMS

Teacher's Guide

SAVE THE BAY • SAVE THE BAY • SAVE THE BAY • SAVE THE BAY ®

CHESAPEAKE BAY FOUNDATION

Saving a National Treasure

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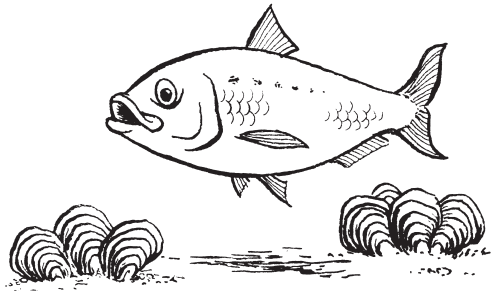


Landscape of Environmental Education

How does my experience with Chesapeake Classrooms integrate with national, regional, and local initiatives?

National: Environmental education (EE) has evolved from a rich assortment of practices, which now includes both formal and nonformal youth and adult education programs, blending principles and skills from several disciplines. Since its origins in the 1970s, EE has become recognized as a practical avenue for students to become informed citizens regarding environmental issues. This educational approach became explicitly identified as Environmental Literacy, and after 2005, the term was used in numerous education and academic references and has become even more prolific since.

- **Every Student Succeeds Act (ESSA)** is the reauthorization of Elementary and Secondary Education Act (ESEA), "the nation's national education law and long-standing commitment to equal opportunity for all students." It was signed in December 2015, and includes provisions for environmental education drawn from the No Child Left Inside Act. www.ed.gov/essa
- **No Child Left Inside Coalition** is an national effort to advance the integration of environmental education in schools throughout the United States. It was a nation-wide initiative to have environmental literacy become available provided that the state department of education had formally adopted an environmental literacy plan (ELP), a roadmap for achieving environmental literacy in each state. www.cbf.org/ncli
- **U.S. Department of Education's Green Ribbon Schools** recognizes schools, districts, and institutions of higher education to strive for 21st century excellence through reductions of environmental impact and costs; improve health and wellness; and provide environmental education incorporating STEM, civic skills, and green career pathways. www2.ed.gov/programs/green-ribbon-schools/index.html
- **The Chesapeake Bay Executive Order** is a two-year strategy (2016-17) for federal agencies to join Chesapeake Bay watershed jurisdictions in establishing milestones, many of which are designed to support the jurisdictions in meeting their water-quality milestones leading to the 2025 implementation goal. executiveorder.chesapeakebay.net

Regional/Chesapeake Bay Watershed: As the largest estuary in the U.S. covering pieces of six states, many organizations and initiatives are informing goals and tracking progress to restore the largest estuary and its watershed while also educating about the importance of doing so.

- **The Chesapeake Bay Program**, formed in 1983, leads and directs the restoration of the Chesapeake Bay, and actively pursues input from citizens, stakeholders, academic institutions, local governments. www.chesapeakebay.net/
- **The Chesapeake Bay Agreement** is a pledge from state and national administrators signed in 1983 and updated in 2014 to require Meaningful Watershed Educational Experiences (MWEE) for students. This plan for collaboration across the Bay's political boundaries establishes goals and outcomes for the restoration of the Bay, its tributaries, and the lands that surround them. www.chesapeakebay.net/chesapeakebaywatershedagreement

- **The Chesapeake Clean Water Blueprint** is a plan put forth by the six Bay states and the District of Columbia to meet the limits for nitrogen, phosphorus, and sediment pollution in the rivers and streams of the Chesapeake Bay Watershed as set forth by the Clean Water Act, enforceable by the Environmental Protection Authority, and was upheld by the Supreme Court in 2016. cbf.org/blueprint

States: All of the Bay watershed states addressed education as a key issue to improving the health and quality of the Bay and have taken unique approaches to address increasing student learning and engagement. Some examples include:

- **Maryland's** Environmental Literacy Standards became part of the nation's first graduation requirement in 2011, supported by other previous initiatives across the state including: the Children in Nature Partnership, the Maryland No Child Left Inside Coalition, the Maryland State Department of Education, and the Maryland Association of Environmental and Outdoor Education. news.maryland.gov/msde/environmentalliteracy

- **Pennsylvania** signed the Environmental Education Act in 1993 and the Department of Education issued Environment and Ecology Standards in 2002. The standards begin with "The Declaration of Rights, Article I of the Pennsylvania Constitution states in Section 27: 'The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and aesthetic values of the environment.'"

- **Virginia's** governor signed an Executive Order in 2015, establishing the Governor's Environmental Literacy Challenge with two components: the Conservation Classroom Challenge and the Environmental Literacy Challenge for Systemic Sustainability, which will provide systemic training for "teachers and administrators on best practices for using the environment as a classroom and provide students with meaningful outdoor experiences." governor.virginia.gov/newsroom/newsarticle?articleId=8238

- **Washington, D.C.** adopted an Environmental Literacy Plan in 2012 and the Sustainable DC plan of 2013. A framework guides curricular resource development for every grade band and is the foundation for the Sustainable DC Model Schools. doee.dc.gov/node/56372

CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

Chesapeake Bay Foundation's Environmental Education Department: The largest EE staff in the country, CBF's Environmental Education Department develops and leads programs that link the natural environment and human culture of the Chesapeake Bay watershed. In addition to using critical thinking skills to evaluate the health of the ecological system, participants also gain a unique perspective in the relationship between water quality, people, and economics. The result is an exceptionally informed and inspired constituency that values the Bay and its watershed as a living, connected system.

- **Professional Learning:** CBF provides high-quality professional learning that meets the evolving needs of school systems across the watershed. Our programs enable teachers and school principals/administrators to involve the entire school community in field-based learning experiences that align with curriculum.

- **Student field experiences and student leadership program:** CBF provides exceptional one-day and multi-day field experiences, connections to action projects, leadership training, and engagement opportunities that enable students to put their knowledge and passion into practice for actively improving the health and vitality of the Bay.

Chesapeake CLASSROOMS

Teachers participating in *Chesapeake Classrooms* will conduct field-based studies, practice using issues investigation methodology, and collaborate with the guidance of a mentor teacher and Chesapeake Bay Foundation educators on how best to use these lessons and experiences to support existing standards and curricula.

Mentor Teachers provide sustained support for participants of *Chesapeake Classrooms* professional learning courses. Each year select Mentor Teachers collaborate with CBF course leaders to instruct five-day field courses, offer practical advice on integrating environmental literacy into the K–12 curriculum, and coach participants in the developing Meaningful Watershed Educational Experiences. In addition to providing valuable guidance to CBF on program development, Mentor Teachers comprise a network of local environmental literacy leaders.

The Environmental Literacy Model

Chesapeake Classrooms uses the Environmental Literacy Model (ELM) to support teachers in the development and curricular integration of Meaningful Watershed Educational Experiences. ELM has been developed through a partnership between the Chesapeake Bay Foundation, Howard Hughes Medical Institute, The University of Maryland Center for Environmental Science, and other Bay Program Partners.

Culminating Project

As a culminating assignment, each teacher will develop and submit a **Curriculum Integration Project** based on ELM for using environmental issues investigations and civic engagement to meet disciplinary curriculum objectives.

The Curriculum Integration Project is made up of three assignments:

- Planning Document
- "Self-Check" Rubric
- Abstract

Feedback on the Curriculum Integration Project is provided by the course mentor teacher, colleagues on the course, and *Chesapeake Classrooms* education staff.

The Environmental Literacy Model

Chesapeake Classrooms uses the Environmental Literacy Model (ELM) to support teachers in the development and curricular integration of Meaningful Watershed Educational Experiences. ELM has been developed through a partnership between the Chesapeake Bay Foundation, Howard Hughes Medical Institute, The University of Maryland Center for Environmental Science, and other Bay Program Partners.

The Environmental Literacy Model features three primary components:

- Curriculum Anchor
- Issues Investigation
- Civic Engagement Plan

Curriculum Anchor

Serves to situate the issues investigations and civic engagement within the scope and sequence of a particular curriculum.

- **Learning Objectives:** Provide a foundation and connection to standards, curriculum, and/or performance indicators. The learning objectives organize concepts and inform practices emphasized in investigations and civic engagement.
- **Driving Question:** A broad, open-ended, life-relevant question that is based on the standards/learning objectives. The driving question guides inquiry for the investigation(s) and prompts the development of actionable claims through civic engagement.
- **Context:** This component establishes the local connections and life-relevancy of the content and core ideas in the learning objectives and driving question. It could center on photographs, activities, discussions, articles, videos, data displays, explorations of interactive web-based resources, prior lessons, or learning experiences, etc.

Issues Investigation

Provides the opportunity for students to construct knowledge and understandings about the content/core ideas of the learning objectives through the investigation of a life-relevant issue, problem, or phenomenon.

- **Define Issues & Ask Questions:** Students and teachers work together to define the issue, problem, or phenomenon to be investigated and develop questions that are relevant for investigation.
- **Plan & Conduct Investigations:** Students develop plans for collecting, analyzing, and communicating information and/or data to help them answer their questions and understand the problem. Students identify and justify appropriate sources of information and/or data, and determine methodologies for the collection of information and/or data.

- **Analyze & Interpret Data:** Students represent and share information and/or data to reveal patterns that indicate relationships. Students apply disciplinary concepts as they analyze and interpret information and/or data to make sense of the issue or phenomenon.
- **Constructing, Communicating, & Refining Explanations:** Students identify and apply evidence from their investigations (for example, measurements, observations, and patterns) to construct, communicate, and refine explanations about the driving question.

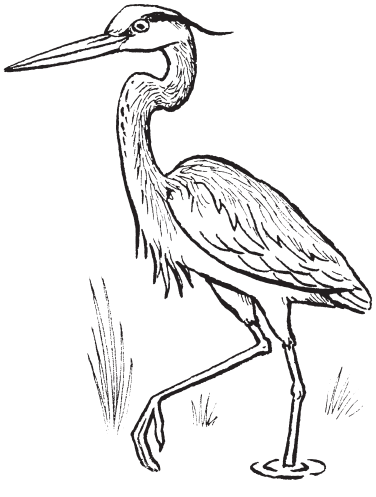
Civic Engagement

Provides the opportunity for students to adapt and apply the knowledge they've constructed through investigation in order to develop skills necessary for active citizenship in the 21st century.

- **Develop a Claim:** Students work together to develop and present a claim (a belief or opinion grounded in factual knowledge that is based on evidence from the analysis of data and constructed explanations from the issues investigation[1]).
- **Design a Solution & Implement Action:** Students work together to assess their individual and collective capacities to take action to address the problem or issue of their claim. Students develop a plan to apply a range of deliberative procedures to take action in their classrooms, schools, and/or in out-of-school civic contexts. Student's Civic Engagement plans should define the criteria for success of the action as a solution to the problem or issue.
- **Evaluate Action:** Students analyze the effectiveness of the action as a solution to the problem or issue based on determined criteria.

1 National Council for the Social Studies (NCSS), The College, Career, and Civic Life (C3) Framework for Social Studies State Standards: Guidance for Enhancing the Rigor of K–12 Civics, Economics, Geography, and History (Silver Spring, MD: NCSS, 2013)

Environmental Literacy Model (ELM) Curriculum Integration Project



SUMMER 2016

Environmental Literacy Model (ELM) Curriculum Integration Project

Purpose

The **ELM Curriculum Integration Project** is designed for teachers to demonstrate ways that the knowledge and skills developed in the field with *Chesapeake Classrooms* transfer into meaningful learning experiences for their students.

The Curriculum Integration Project is made up of three assignments:

1. **Planning Document**—This enables teachers to demonstrate how they might translate knowledge and skills developed in the field into meaningful learning experiences for their students using the three components of the Environmental Literacy Model: Curriculum Anchor, Issues Investigation, and Civic Engagement.
2. **"Self-Check" Rubric**—This serves as a resource for the development and refinement of teachers' ELM Curriculum Integration Plans.
3. **Abstract**—A brief (200-300 word) introduction to and summary of the Curriculum Integration Project. It includes the rationale behind using the Issues Investigation and Civic Engagement approach to teaching the curriculum standards that were chosen. The abstract should be developed as a means for communicating the value of the *Chesapeake Classrooms* experience and the power of the plan.

Directions:

1. Identify a place in your curriculum where the environment currently is or could be used as a context for learning through Issues Investigation and Civic Engagement.
2. Use the Planning Document to develop a plan for using an environmental issue, problem, or phenomenon as the foundation for achieving curricular learning goals. In addition to descriptions of how the components of the plan will be addressed, include links for lessons and resources that are necessary to complete the Curriculum Integration. (The lessons do not need to be original, but please cite sources.)
3. Use the rubric to help guide the development of your plan. Once your plan is completed, use the rubric to 'assess' your plan based on the identified criteria.
4. Create an abstract for your project. This is a summary and rationale for your plan to using Issues Investigations and Civic Engagement to address the curriculum standards that you've chosen. The abstract is a means for communicating the value of the *Chesapeake Classrooms* experience and the power of your plan.
5. Submit all materials through SharePoint by September 1, 2016. For detailed instructions on accessing and uploading materials to SharePoint, refer to page 15 in this guide.

ENVIRONMENTAL LITERACY MODEL ELM

PLANNING DOCUMENT

Planning Document

Title	
Author	
School, District	
Audience (grade, course)	

Curriculum Anchor

Learning Objectives and Curriculum Connection

Curriculum indicators, performance expectations, and/or learning objectives.

Driving Question

A broad, open-ended, life-relevant question that is based on the standards/learning objectives. Guides inquiry for the investigation(s), prompts the development of actionable claims.

Context

Establishes local connections and life-relevancy of the core ideas in the learning objective and driving question.

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ENVIRONMENTAL LITERACY MODEL ELM

PLANNING DOCUMENT

Planning Document

Issues Investigation

Asking Questions, Defining Issues and Problems

Students define the issue, problem, or phenomenon to be investigated and develop questions that are relevant for investigation.

Planning & Conducting Investigations

Students develop plans for collecting, analyzing, and communicating information and/or data to help them answer their questions and understand the problem. Students identify and justify appropriate sources of information and/or data, and determine methodologies for the collection of information and/or data.

Analyzing and Interpreting Data

Students represent and share information and/or data to reveal patterns that indicate relationships. Students apply disciplinary concepts as they analyze and interpret information and/or data to make sense of the issue or phenomenon.

Constructing, Communicating, & Refining Explanations

Students identify and apply evidence from their investigations (for example, measurements, observations, and patterns) to construct, communicate, and refine explanations about the driving question.

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ENVIRONMENTAL LITERACY MODEL ELM

PLANNING DOCUMENT

Planning Document

Civic Engagement Plan

Develop a Claim

Students develop and present a claim (a belief or opinion grounded in factual knowledge that is based on evidence from the analysis of data and constructed explanations from the issues investigation).

Design a Solution and Implement Action

Students assess their individual and collective capacities to take action to address the problem or issue of their claim. Students develop a plan to apply a range of deliberative procedures to take action in their classrooms, schools, and/or in out-of-school civic contexts. Student's Civic Engagement plans should define the criteria for success of the action as a solution to the problem or issue.

Evaluate Action

Students analyze the effectiveness of the action as a solution to the problem or issue based on determined criteria.

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ENVIRONMENTAL LITERACY MODEL ELM

Curriculum Anchor

Issues Investigation

Civic Engagement

RUBRIC

Rubric

Title	
Author	
School, District	
Audience (grade, course)	

Curriculum Anchor	Advanced	Accomplished	Emerging	Comments
Learning Objectives The Learning Objectives are clearly defined and clearly indicate where in the curricular scope and sequence the lesson or unit plan would be placed.				
Driving Question The Driving Question is broad, open-ended, and directly speaks to the core ideas that are targeted in the learning objectives.				
Context The local connections and life-relevancy of the content and core ideas in the learning objectives and driving question are clearly established. The Context component may center on photographs, activities, discussions, articles, videos, data displays, explorations of interactive web-based resources, prior lessons, or learning experiences, etc.				

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ENVIRONMENTAL LITERACY MODEL ELM

RUBRIC

Rubric

Issues Investigation	Advanced	Accomplished	Emerging	Comments
Defining Issues and Asking Questions The plan includes: · Brief description (1-3 sentences) of how the teacher and students will go about defining the issue or problem under investigation and developing investigative questions (include examples of possible investigative questions). · Brief description and/or bullets of particular resources that students may use to support their plans (articles, websites, data sources, data displays, etc.) · Brief explanation (1-3 sentences and/or bullets) of the criteria for student success. In other words, what the teacher will be looking for in students' participation and/or work products.				
Planning and Conducting Investigations The plan includes: · Brief description (1-3 sentences) of expectations for how the students will go about developing plans for collecting, analyzing, and communicating data. · Brief description and/or bullets of the types of resources, services, and processes that may be available for students to use to implement their action plans. · Brief description and/or examples of the "products" that students will create to communicate their plans (for example, worksheets, journal, etc.). · Brief explanation (1-3 sentences and/or bullets) of the criteria for student success. In other words, what the teacher will be looking for in students' participation and/or work products.				
Analyzing and Interpreting Data The plan includes: · Brief description (1-3 sentences) of how the students will go about the presentation, analysis, interpretation, and communication of data. · Brief description and/or bullets of the disciplinary core ideas, principles, resources, and tools that may be relevant in supporting the analysis. · Brief explanation (1-3 sentences and/or bullets) of the criteria for student success. In other words, what the teacher will be looking for in students' participation and/or work products.				
Constructing, Communicating, and Refining Explanations The plan includes: · Brief description (1-3 sentences) of expectations for how the students will go about constructing and communicating their conclusions. · Brief explanation (1-3 sentences and/or bullets) of the criteria for student success. In other words, what the teacher will be looking for in students' participation and/or work products.				

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ENVIRONMENTAL LITERACY MODEL ELM

RUBRIC

Rubric

Civic Engagement Plan	Advanced	Accomplished	Emerging	Comments
Developing Claims The plan includes: · Brief description (1-3 sentences) of how the students will go about developing and presenting claims that are grounded in factual knowledge and based on evidence from the analysis of data and constructed explanations from the issues investigation. · Brief description and/or examples of how students will share their claims with the teacher and their peers. · Brief explanation (1-3 sentences and/or bullets) of the criteria for student success. In other words, what the teacher will be looking for in students' participation and/or work products.				
Designing Solutions and Implementing Action The plan includes: · Brief description (1-3 sentences) of how the students will go about assessing their individual and collective capacities to take action to address the problem or issue of their claim. · Brief description and/or examples of the 'products' that students will create to communicate their plans (for example, worksheets/ work plans, journal, etc.). · Brief description and/or examples of how the students will go about determining the criteria for the success of their action plans. · Brief description and/or bullets of the types of resources, services, and processes that may be available for students to use to implement their action plans. · Brief explanation (1-3 sentences and/or bullets) of the criteria for student success. In other words, what the teacher will be looking for in students' participation and/or work products.				
Evaluating Action · Brief description (1-3 sentences) of how the students will go about analyzing the effectiveness (or potential effectiveness) of the action as a solution to problem or issue based on determined criteria. · Brief explanation (1-3 sentences and/or bullets) of the criteria for student success. In other words, what the teacher will be looking for in students' participation and/or work products.				

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ENVIRONMENTAL LITERACY MODEL ELM

ABSTRACT

Abstract

Title	
Author	
School, District	
Audience (grade, course)	

This is a brief (200-300 word) introduction to and summary of the Curriculum Integration Project. It includes the rationale behind using the Issues Investigation and Civic Engagement approach to teaching the curriculum standards that were chosen. The abstract should be developed as a means for communicating the value of the *Chesapeake Classrooms* experience and the power of the plan.

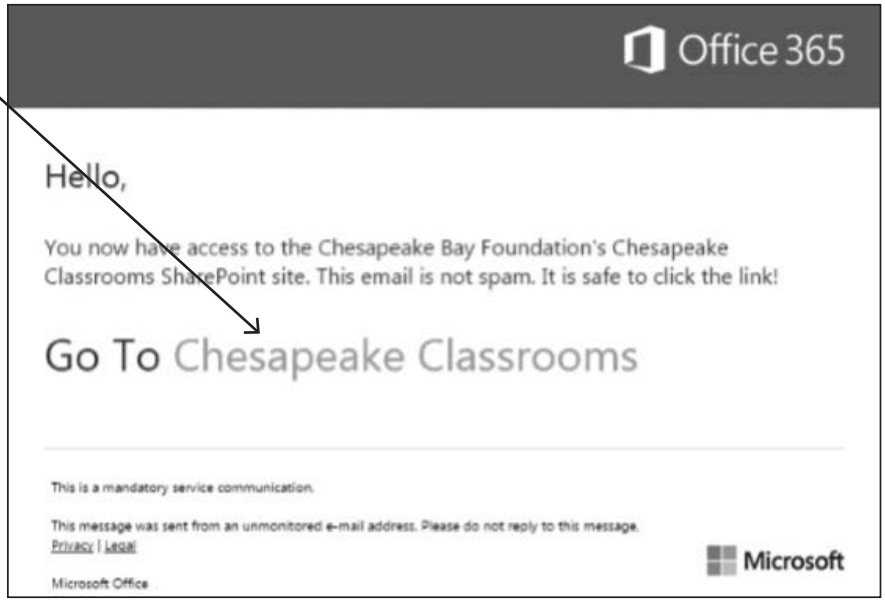
Chesapeake CLASSROOMS

Uploading Your Final Project to SharePoint

This is a step-by-step guide to get your Final Project uploaded to the *Chesapeake Classrooms* SharePoint site.

Step 1: After you register for a *Chesapeake Classrooms* course, you will receive an e-mail from Microsoft Online Services Team (msonlineservicesteam@email.microsoftonline.com) to the email address you provided on the registration form.

Step 2: Click the orange text **"Chesapeake Classrooms."** It is a direct link to the *Chesapeake Classrooms* SharePoint site. (If you have a Microsoft account, make sure you are logged-in, and you should have automatic access to the *Chesapeake Classrooms* SharePoint page.)



Step 3: If you do NOT have a Microsoft account, clicking the orange text will prompt you to create an account with a Microsoft service of your choice. Click your choice or "Create a Microsoft account" and follow the prompts. Once you've created an account, click the orange text again to get access to the site.

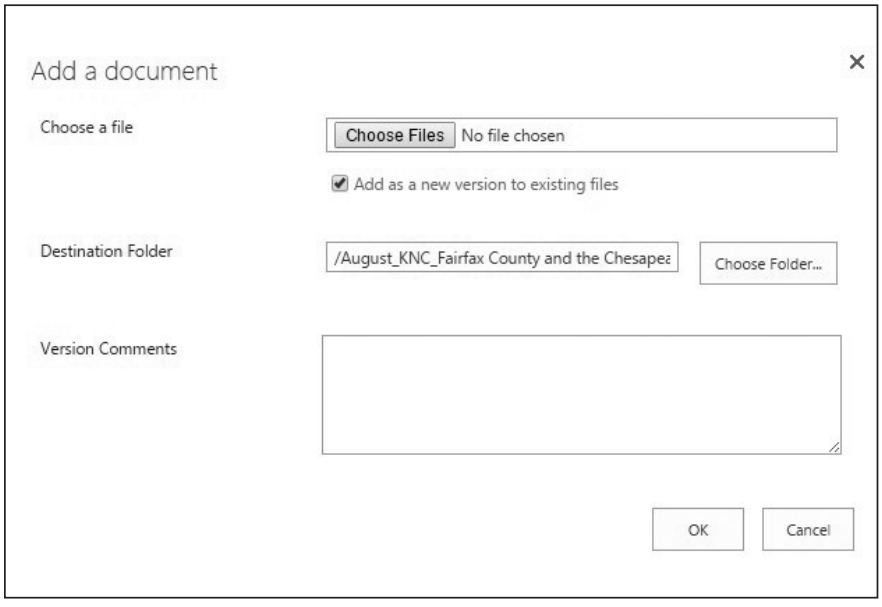
Step 4: When you arrive at the *Chesapeake Classrooms* homepage, click on the "**Course Information and Final Project: Upload Here**" option on the top of the list on the left side of the page.

Step 5: Your summer course will have a folder listed by date and location. Click on your course folder.

Step 6: Click the folder with your name.

Step 7: Click "**Upload**" or drag your file to the folder.

Step 8: Choose the file from your computer and upload it to your folder. If your Final Project has multiple documents, add each of them separately. Please give them each a clear and appropriate title.



CBF staff and mentor teachers will review your projects for credit purposes as well as to offer feedback. Fellow *Chesapeake Classrooms* participants are encouraged to view others' projects for new ideas to use in the classroom. If you have comments about another person's project, you can add them.

Contact chesapeakeclassrooms@cbf.org if you have questions.

Resources

Find more education resources at
cbf.org/teacherresources.

Use "Systems Thinking" to Understand Your Local Environment and Choose an Issue to Investigate

"Ultimately, students' success—job prospects and ability to participate in a civil society and contribute solutions necessary for maintaining a healthy environment—depends on their ability to identify, analyze, and balance the multitude of factors that can affect the environment.

For students to succeed in life and be able to resolve the environmental challenges of the twenty-first century requires that they be able to function effectively in society's decision-making processes, and not just 'know' about the environment per se. They need to how human systems (economics, laws, culture, politics, etc.) function and how these systems interact with natural systems in the environment."

—Gerald Lieberman, *Education and the Environment: Creating Standards-based Programs in Schools and Districts*

"The natural and designed world is complex; it is too large and complicated to investigate and comprehend all at once. Scientists and students learn to define small portions for the convenience of investigation. The units of investigations can be referred to as 'systems.' A system is an organized group of related objects or components that form a whole. Systems can consist, for example, of organisms, machines, fundamental particles, galaxies, ideas, and numbers. Systems have boundaries, components, resources, flow, and feedback."

—National Research Council, *National Science Education Standards*

A system is a collection of parts that interact with each other to function as a whole. Systems Thinking, in other words, "seeing the big picture," enables us to see how things are connected, fostering an understanding of how actions affect individual parts as well as the whole system. In the K–12 setting, using systems thinking as a context creates possibilities to connect every content area in meaningful and relevant ways to the students' lives. When students learn about historical occurrences, political events, mathematic principles, scientific concepts, and the use of language within the integrated context a systems approach can provide, they are able to experience how each content area is important and relevant to the understanding of them all.

Systems Thinking trains our brains for seeing connections and consequently solutions that may not initially be obvious by requiring us to work through preconceived notions and culturally ingrained theories to see each problem as unique with a variety of possible and workable solutions. Understanding the world, a problem, an event—anything—through the perspective of systems thinking helps students understand other points of view and value individual contributions.

On a broad level, systems thinking is about relationships and the dynamics produced by them and is especially important for understanding and making public policy decisions and predicting how an action to a piece of the system might affect the entire system and the remaining individual components. The interconnected nature of systems provides real world opportunities for students to investigate the complexity of cause-and-effect relationships relevant in all content areas.

Education and the Environment: Creating Standards-Based Programs in Schools and Districts by Gerald A. Lieberman, (2013) is an excellent resource for a detailed explanation of systems thinking and identifying local environmental issues.

Define the Natural and Social Systems of Your Local Environment

Your local environmental issues are where the natural and social systems connect. List as many different types of systems in or connected to your schoolyard as you can in the boxes below. Once your list for each box is complete, draw a line between these natural and social systems that seem closely related or interdependent. Your questions about how the natural and social systems connect become the Driving Questions for local environmental Issues Investigations.

Natural Systems in your Schoolyard/Community (ex: forest, stream, meadow)	Social Systems (man-made) in your Schoolyard/Community (ex: roads, landscaping, services)

Develop A Driving Question

The Driving Question guides the inquiry for the project. It should be broad, open-ended, and establish the relevance and purpose of the learning for students. Example: How are human activities in Maryland impacting the long-term survival of endangered species?

Driving Questions:

- are broad enough to deal with both natural and social systems.
- provide a framework for creating interdisciplinary activities and investigations.
- require students to propose and evaluate a variety of solutions rather than leading to one "right" answer.
- are stated in simple language that is easily understood by students.
- are relevant and related to everyday life.
- encompass the essential content to be covered.
- provoke inquiry and focus student work.
- require students to revisit the problem frequently as knowledge and understanding evolves.
- have more than one "obvious" answer.

The systems have been underlined in the following examples of Driving Questions:

- In what ways does our schoolyard affect the health of the Chesapeake Bay?
- How has development in our community affected the health of our local river?
- In what ways does the local river affect the local economy?

Driving questions are posed to students before, during, and after investigations have been completed. This will allow students to communicate ways that their understandings change as they learn more through experience and exploration. At the completion of the project, student responses to the Driving Question should demonstrate an understanding of the major concepts emphasized throughout the various investigations.

Develop a Driving Question Using Natural and Social Systems

Directions: Choose at least three of the natural and social systems you previously listed. List each system in the corresponding box below and then write several questions that connect the two systems in the center box. These Driving Questions that connect the systems identify the locally relevant issues to your students. In this way, your Investigative Issue is defined by your Driving Question.

List several <u>natural</u> systems on your schoolyard.

Example: Wetland

List several <u>social</u> systems on your schoolyard.

Example: your school's transportation and parking system

Driving questions that connect the two systems...

Example: In what way is the parking system at our school affecting our wetland?

Meaningful Watershed Education Experiences

The well-being of the Chesapeake Bay watershed will one day rest in the hands of its youngest citizens: the more than three million students in kindergarten through twelfth grade. A student's years in school provide a unique opportunity to build the skills necessary to understand and utilize scientific evidence to make informed decisions regarding multifaceted and evolving environmental issues.

In recognition of this, the Chesapeake Bay Watershed Agreement, signed on June 16, 2014, commits states in the region to prepare every student with the knowledge and skills necessary to responsibly protect and restore their local watershed. The cornerstone of this goal is rigorous student inquiry coupled with participation in teacher-supported Meaningful Watershed Educational Experiences (MWEE) in elementary, middle, and high school. The agreement also highlights the important role of the jurisdictions in promoting and assisting with the implementation of environmental education, and formally recognizes school divisions and schools as essential partners in the protection, restoration, and conservation of the Chesapeake Bay watershed.

The *Chesapeake Classrooms* program is designed to provide the training and resources to enable teachers to engage students in a MWEE during the school year. Through this professional learning course, educators will develop the skills necessary to integrate a MWEE the classroom.

Essential Elements of and Practices to Support a MWEE

MWEEs seek to seamlessly connect standards-based classroom learning with outdoor field investigations to create a deeper understanding of the natural environment. Specifically, MWEEs ask students to explore local environmental issues through sustained, teacher-supported programming that includes, but is not limited to, issue definition, outdoor field experiences, action projects, and sharing student-developed synthesis and conclusions with the school and community.

Beginning with the primary grades, the jurisdictions' academic learning standards in the social and natural sciences call for inquiry, investigation, and active learning that increase in complexity and abstraction throughout the elementary, middle, and high school programs. Likewise, MWEEs should reflect this progression.

With new details regarding the MWEE on the horizon, check the Chesapeake Bay Program website for updates and resources. www.chesapeakebay.net

Taken from the Chesapeake Bay Program's Revised MWEE definition. www.chesapeakebay.net/documents/Revised_MWEE_definition_-_FINAL.pdf

Tips for Taking Students Outside

Classroom Prep

Successful and stress-free outdoor experiences begin in the classroom! It is very important to set the stage for what will follow outside. Establish expectations and make sure that students have the tools they need to carry out the work.

1. Set the Stage:

- Tell students the day before they will be going outside the next day. Students need to dress properly for the weather and site conditions.
- Review rules for outside behavior and the consequences for breaking the rules.
- Package all equipment so that it can be easily carried and used. White compound buckets are great. These can be used to transport materials and make great seats. Include material lists to keep equipment organized.
- Use large dry erase boards to write objectives, directions, and group data.
- Laminate student handouts or place them in zip-loc bags.
- Invest in student clipboards. 12" x 14" masonite boards and binder clips are a cheap and durable alternative. You can get the boards cut to size at a local home supply store.

2. Plan Well:

- Keep outdoor activities simple and focused. Set clear goals for what will be accomplished while outside.
- Plan an activity that requires the student to produce a product. This will help students stay focused and will allow you to assess the success of your day.
- When planning, be sure you allow the group enough time to get back to the classroom and pack up for the next period.

3. Know Your Field Work Site!

- Know where you are going for the activity and set the boundaries in advance.
- Be familiar with the location for the activity—scout it in advance so that there are no surprises.

On the Day of the Activity

- Explain the activity and discuss it with students. Establish clear objectives for the investigations and tell the students exactly what must they must accomplish while outside—what they need to turn in at the end of the activity. The more explaining inside, the less will be necessary outside. It is much easier to get everyone's attention while inside. As a general rule, create a scenario where it isn't necessary to give directions outdoors.
- Allow students to help determine the rules, keeping them few and simple. Quickly review their rules again immediately before actually going outside.
- Decide (with the students) the signal to use for everyone to stop talking and pay attention. A referee's whistle can be a lifesaver!

- Get students organized with their materials before leaving the classroom (take care of bathroom visits before leaving classroom). Small tote bins are great for keeping equipment organized.
- Divide students into their working groups before going outside. This will allow them to begin planning how they will accomplish their task and will minimize confusion once you are outside.

While Outside

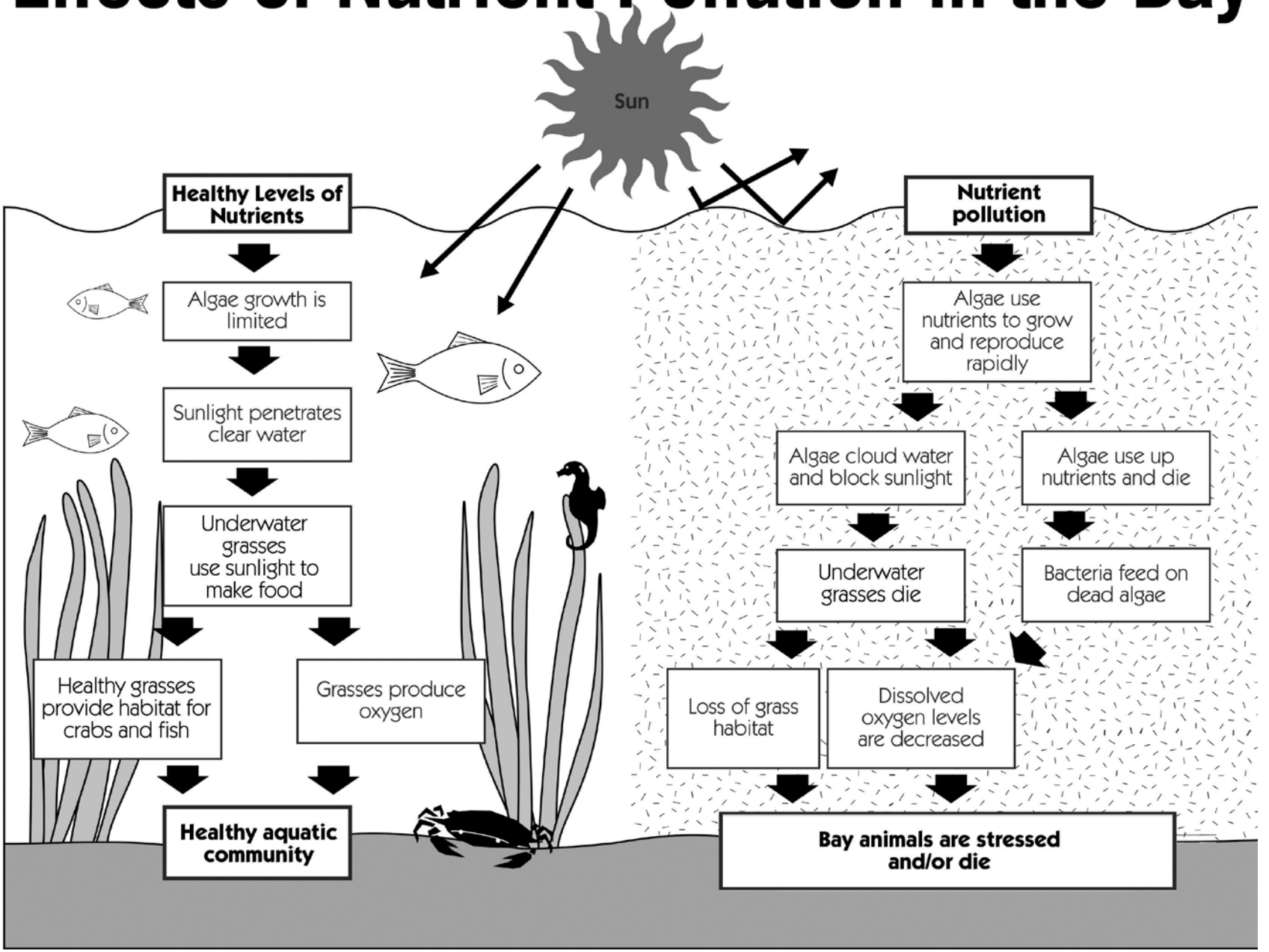
- Keep students together. Use a buddy system to keep track of everyone.
- Circulate among the students to keep them on task.
- Before returning to the classroom, bring everyone together and close the activity. Provide an opportunity for reflection, journal writing, or discussion after the activity.

Other Considerations

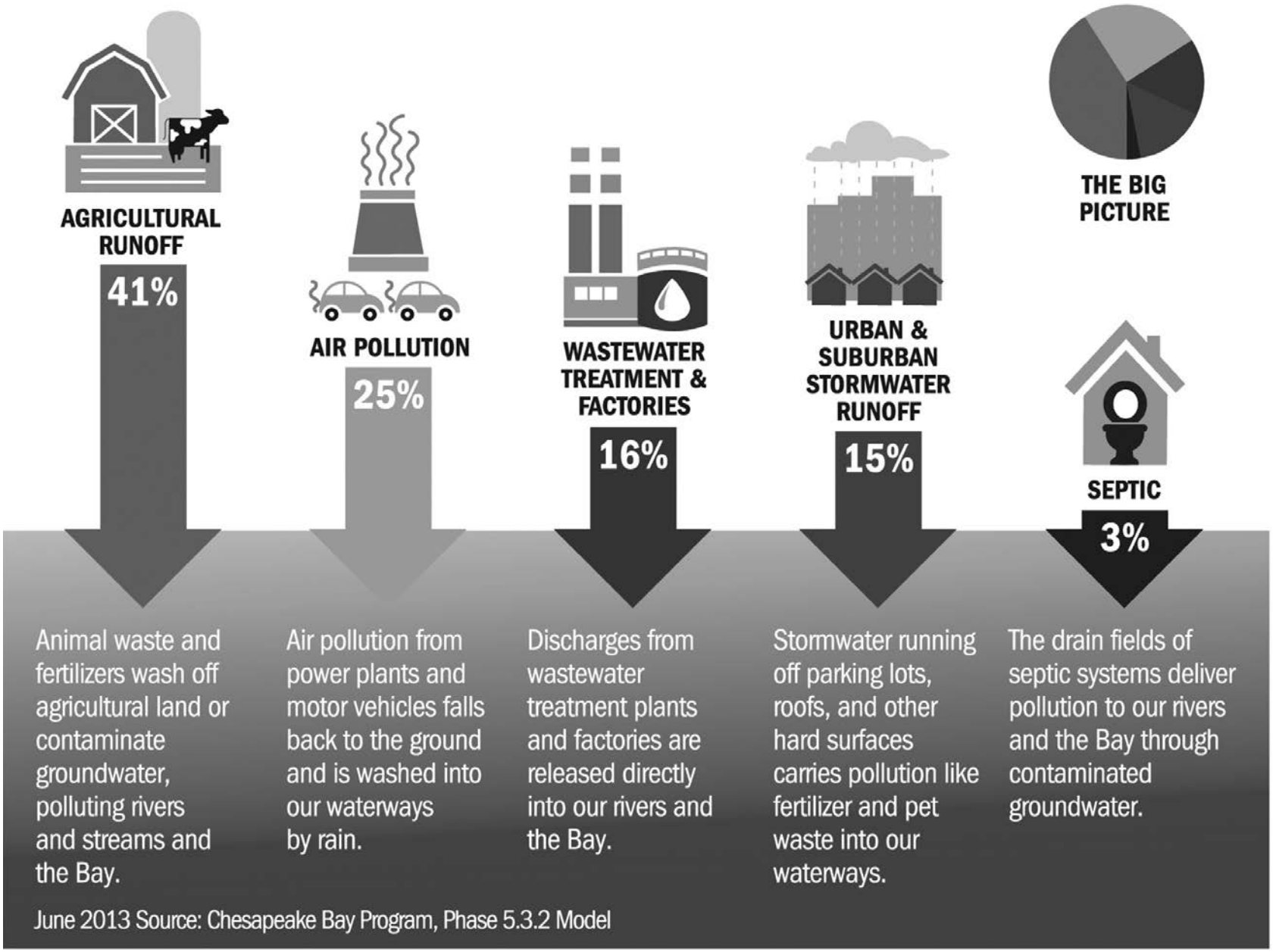
- Consider investing in two-way radios. Keep one with you and leave one with the front office. This will allow the office to contact you if students need to leave early or in case of emergency.
- Be sure to review the medical history of all students. You'll need to be aware of students with allergies (especially bee stings) and asthma.
- If you suspect that ticks are present (assume they are unless you are in the water), have students wear long light colored pants. They should tuck pants inside of socks and check each other frequently.
- Be aware of sun exposure year round. Have sunscreen on hand—don't expect students to have their own.
- **ALWAYS** scout areas before bringing students! Make note of any potential hazards (steep slopes, broken glass or debris, poison ivy, etc.)
- Create opportunities for leadership—especially for "those students" that you feel can easily stray off task. Utilize group leaders, equipment managers, and time keepers to keep everyone on track while freeing you up to supervise.
- Consider using student "reporters" to document the experience. Collect video, digital photos, and quotes from interviewed students. This can be valuable information to share with parents and the community.
- Most importantly—**Have Fun!** Capture the teachable moments and don't get mad when students find a toad on a log more interesting than your verbal directions! That's the whole point of being there!

Chesapeake Bay Watershed

Effects of Nutrient Pollution in the Bay



SOURCES OF NITROGEN POLLUTION IN THE CHESAPEAKE BAY



Glossary

Algae—group of primitive, non-flowering plants that include certain seaweed and microscopic phytoplankton.

Anadromous Fish—fish, such as American shad, that migrate from their primary habitat in the ocean to freshwater to spawn.

Benthic Organisms—plants and animals living in or on the bottom in aquatic environments.

Brackish Water—mixture of fresh and salt water.

Blueprint—The Chesapeake Clean Water Blueprint is the mandatory federal/state effort to restore water quality in the Bay and its rivers and streams. It comprises EPA's science-based pollution limits for nitrogen, phosphorus, and sediment in the Chesapeake Bay watershed and the Bay states and the District of Columbia's plans to achieve limits.

Catadromous Fish—fish, such as the American eel, that migrate from their primary freshwater habitat to the ocean to spawn.

Copepods—minute shrimp-like crustaceans; often they are the most common zooplankton in estuarine waters.

Decomposer—organisms (chiefly bacteria and fungi) that break down dead organic matter.

Detritus—decomposed or partly decomposed plant and animal matter.

Dissolved Oxygen—oxygen released into the water by photosynthesis and air—water interactions; essential for respiration of aquatic animals.

Ebb Tide—falling or lowering tide.

Ecology—the study of interrelationships of living things to one another and to their environment.

Ecosystem—an interactive system of a biological community and its non-living environment.

Erosion—the wearing away of land surfaces by wind or water; erosion occurs naturally but it is often intensified by land-use practices.

Estuary—semi-enclosed, tidal, coastal body of water open to the sea in which fresh and saltwater mix.

Eutrophication—over-enrichment of a body of water due to excessive nutrient loading, often resulting in depletion of dissolved oxygen.

Flood Tide—rising tide.

Food Web—complex interaction of food chains in a biological community.

Habitat—the place where a plant or animal lives.

Intertidal Zone—the area between high and low tide.

Marsh—low, wet, grassland without trees, periodically covered by water.

Nekton— free swimming aquatic organism such as fish.

Nitrogen—an inorganic nutrient essential for plant growth; excess amounts can cause eutrophication.

Non-point Source Pollution—pollutants entering waterways from a general area, such as polluted runoff from farmland or suburban communities.

Nutrients—chemicals (primarily nitrogen and phosphorous) necessary for organisms to live.

Organic Matter—chemical compounds made with carbon, made in live processes by plants and animals

pH—a measure of the acidity or alkalinity of a material, liquid, or solid; estuarine water is, naturally, slightly base.

Phosphorous—nutrient essential for plant growth and reproduction; usually associated with polluted farmland runoff, sewage, and detergents.

Phytoplankton—the plant form of plankton, most are microscopic; they are important as primary producers in an estuarine ecosystem.

Photosynthesis—process by which plants convert sunlight into living tissue using carbon dioxide, water, and nutrients; primary production.

Plankton—organisms living suspended in the water column, often microscopic but sometimes visible to the naked eye.

Plant Zonation—the distribution of plant species into zones in response to some habitat condition such as salinity or moisture.

Point-Source-Pollution—pollution from a definable source, such as an outfall pipe.

Polluted Runoff—Stormwater becomes polluted runoff when rain collects oil, fertilizers, pet waste, pesticides, toxic metals, and other pollutants from pavement and other hardened surfaces as it runs into local waterways.

Pollution—presence of abnormally high concentrations of harmful substances in the environment, often put there by people.

Primary Producers—organisms using the sun's energy and inorganic nutrients to synthesize organic compounds; provides energy to other organisms.

Phytoplankton—the plant form of plankton.

Salinity—the measurement (parts per thousand/ppt) of the amount of dissolved salts in water; 35 ppt for seawater, 0 ppt for freshwater.

Secchi Disk—a white plate-sized disk attached to a rope, that when lowered down into the water measures turbidity or water clarity.

Sediment—particles that accumulate on the bottom of a waterway.

Sewage Treatment Plant—place where sewage is treated to make it safe to be pumped into a river or the Bay.

Tides—periodic movement of a body of water by the gravitational attraction of the moon and sun with the rotation of the earth.

Tributaries—streams and rivers that supply a larger body of water.

Tropic Levels—the levels at which an organism feeds in a food web (producer, primary consumers etc.).

Turbidity—the measurement of water cloudiness; it may be affected by such things as sediment and plankton concentrations.

Underwater Grasses (Bay Grasses)—rooted vegetation that grows beneath the water surface.

Watershed—an area of land that is drained by a specified river or other body of water.

Zooplankton—the animal form of plankton.

Field Immersion Course Application Journal

Chesapeake CLASSROOMS

Course Title:_____

Dates: _____

Course Leader(s):_____

Course Leader(s) e-mail: _____

Driving Question: _____

Investigative Questions:

1. _____
   _____

2. _____
   _____

3. _____
   _____

4. _____
   _____

5. _____
   _____

Day 1

Date:_____

Location: _____

Weather: _____

Driving Question: _____

Investigative Question: _____

Application Journal Entry: _____

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_____

_____

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_____

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Questions for tomorrow: _____

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Day 1 Sketches/Notes

Day 2

Date:_____

Location: _____

Weather: _____

Driving Question: _____

Investigative Question: _____

Application Journal Entry: _____

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Questions for tomorrow: _____

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Day 2 Sketches/Notes

Day 3

Date:_____

Location: _____

Weather: _____

Driving Question: _____

Investigative Question: _____

Application Journal Entry: _____

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Questions for tomorrow: _____

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Day 3 Sketches/Notes

Day 4

Date:_____

Location: _____

Weather: _____

Driving Question: _____

Investigative Question: _____

Application Journal Entry: _____

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Questions for tomorrow: _____

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Day 4 Sketches/Notes

Day 5

Date:_____

Location: _____

Weather: _____

Driving Question: _____

Investigative Question: _____

Application Journal Entry: _____

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Questions for tomorrow: _____

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Day 5 Sketches/Notes

Species Identification List

1. _____
2. _____
3. _____
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5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____

Species Identification List (continued)

18. _____

19. _____

20. _____

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

33. _____

34. _____

Water Quality Testing Data:

Site #1:

Conditions: _____

Dissolved Oxygen: _____

pH: _____

Salinity: _____

Nitrates: _____

Phosphates: _____

Turbidity: _____

Water Temperature: _____

Air Temperature: _____

Chlorophyll a: _____

Bottom Grab: _____

Site #2:

Conditions: _____

Dissolved Oxygen: _____

pH: _____

Salinity: _____

Nitrates: _____

Phosphates: _____

Turbidity: _____

Water Temperature: _____

Air Temperature: _____

Chlorophyll a: _____

Bottom Grab: _____

Course Contact Information:

	Name	Phone	E-mail
1.			
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3.			
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