

## NGSS Connections

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Chesapeake Bay Critter Investigation

Grade Level: middle schools

<p><b>Performance Expectations:</b> Students’ ability to complete the following performance expectation(s) will be supported by participation in this activity.</p> <p><b>MS-LS2-1:</b> Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</p> <p><b>MS-LS2-4:</b> Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</p>		
Dimension	NGSS Code or citation	Corresponding student task in activity
<p><b>Disciplinary Core Idea</b></p>	<p>LS2.A Interdependent Relationships in Ecosystems</p> <ul style="list-style-type: none"> <li>• Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with non-living factors.</li> </ul>	<p>Students collect data on water quality (e.g., temperature, salinity, pH) and biodiversity at three different depths in the Inner Harbor. They use the data as evidence to correlate relationships between biodiversity and water quality.</p>
	<p>LS2.C Ecosystem Dynamics, Functioning, and Resilience</p> <ul style="list-style-type: none"> <li>• Ecosystems are dynamic in nature; their characteristic can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations.</li> <li>• Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often a measurement of its health.</li> </ul>	<p>Students measure the temperature and salinity of the Inner Harbor’s water column at three different depths (1 m, 3 m, 5 m), then compare the biodiversity found on biodisks cultured at each of the three depths. They draw the connection between differences in the characteristics in different columns depths with the difference in organisms found there.</p> <p>Students answer the question of if and how the water quality characteristics measured might change over a day, season, year, and how the organisms living there might have to adjust.</p>

		Students answer the questions, “What is biodiversity?” and “Does a healthy environment have greater or lesser biodiversity? Why?”.
<b>Practice</b>	<p>Planning and Carrying out Investigations</p> <ul style="list-style-type: none"> <li>Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions.</li> </ul>	Students collect water quality and biodiversity data then use that to answer the scientific questions regarding biodiversity and differences at different levels in the water column.
	<p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> <li>Analyze and interpret data to provide evidence for phenomena.</li> <li>Consider limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials).</li> </ul>	<p>Students use data collected in their investigations to provide evidence for differences in biodiversity at different depths.</p> <p>In some classes, students consider the number of disks observed and measurements made in data collection in terms of reliability of the data collected.</p>
<b>Crosscutting Concept</b>	<p>Scale, Proportion, and quantity</p> <ul style="list-style-type: none"> <li>Phenomena that can be observed at one scale may not be observed at another scale.</li> </ul>	In some classes, students observe that the organisms on the biodisks are very different and much smaller than the organisms they observe casually walking along the harbor (i.e., we are observing very small organisms on the biodisks and the students consider larger organisms such as large fish and aquatic fowl).
	<p>Stability and Change of Systems</p> <ul style="list-style-type: none"> <li>Small changes in one part of a system might cause large changes in another part.</li> </ul>	Students consider how different parts of the watershed might alter the salinity and pH of the Inner Harbor’s water. For example, a large storm runoff would likely reduce salinity while an extended drought might serve to increase salinity. This, in turn, changes living conditions for the organisms in the Inner Harbor.
<p><b><u>Nature of Science</u></b></p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> <li>Science knowledge is based upon logical and conceptual connections between evidence and explanations.</li> </ul> <p>Science is a Way of Knowing</p>		

- Science is both a body of knowledge and the processes and practices used to add to that body of knowledge.
- Science knowledge is cumulative and many people, from many generations and nations, have contributed to science knowledge.

Science is a Human Endeavor

- Men and women from different social, cultural, and ethnic backgrounds work as scientists and engineers.

**Connections to [Common Core State Standards](#)**

English Language Arts/Literacy

RST.6-8.3

W.6-8.1