Discover Our Ocean Module Standard Correlations: Grades 3-7

Next Generation Science Standards

Italics indicate connections between NGSS and Discover Our Ocean Module.

Performance Expectation	Disciplinary Core Idea	Science and Engineering Practice	Crosscutting Concept
3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.	**LS4.C: Adaptation** • For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. *Online Activity: Students examine different environments within the ocean to observe what survives well in each.* *In Ocean Homes Activity students examine characteristics of different habitats within the ocean to observe what survives well in each (My Science Notebook and Educator Resources).*	**Engaging in Argument from Evidence** • Construct an argument with evidence. *N/A*	**Cause and Effect** • Cause and effect relationships are routinely identified and used to explain change. *N/A*
4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	**LS1.A: Structure and Function** • Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. *Online Activity: In the Ocean Homes activity students learn about the Deep Sea Anglerfish and its appendage for fishing.*	**Engaging in Argument from Evidence** • Construct an argument with evidence, data, and/or a model. *N/A*	**Systems and System Models** • A system can be described in terms of its components and their interactions. *N/A*

4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.	**ESS2.B: Plate Tectonics and Large Scale System Interactions** • The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. *Video: Students see the location of each of Earth's ocean basins on a world map.* *My Science Notebook: Students label each of Earth's ocean basins on a world map.*	**Analyzing and Interpreting Data** • Analyze and interpret data to make sense of phenomena using logical reasoning. *N/A*	**Patterns** • Patterns can be used as evidence to support an explanation. *N/A*
5-ESS2-2. Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	**ESS2.C: The Roles of Water in Earth's Surface Processes** • Nearly all of Earth's available water is in the ocean. Most fresh water is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere. *Online Text and Video: Percentages of saltwater vs. fresh water and ocean vs. land are addressed.* *My Science Notebooks: Students create a pie chart showing the percentage of Earth's surface covered by ocean.*	**Using Mathematics and Computational Thinking** • Describe and graph quantities such as area and volume to address scientific questions. *N/A*	**Scale, Proportion, and Quantity** • Standard units are used to measure and describe physical quantities such as weight and volume. *N/A*

MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.	**LS1.C: Organization for Matter and Energy Flow in Organisms** • Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. **PS3.D: Energy in Chemical Processes and Everyday Life** • The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules and release oxygen. (secondary) *Online Activity: Phytoplankton are introduced as the base of the food chain.*	**Constructing Explanations and Designing Solutions** • Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. **Connections to Nature of Science** Scientific Knowledge is Based on Empirical Evidence • Science knowledge is based upon logical connections between evidence and explanations. *N/A*	**Energy and Matter** • Within a natural system, the transfer of energy drives the motion and/or cycling of matter. *N/A*

Common Core ELA Standards

Assumes students read and discuss Critical Thinking Questions (Educator Resources)

3rd Grade	4th Grade	5th Grade	6th Grade	7th Grade
RL.3.1,	RL.4.1	RL.5.1	6.1, 6.2, 6.4	7.1, 7.2
RI.3.1, RI.3.2, RI.3.3, RI.3.4, RI.3.5, RI.3.7, RI.3.8, RI.3.9	RI.4.1, RI.4.2, RI.4.3, RI.4.4, RI.4.5, RI.4.7, RI.4.8	RI.5.1, RI.5.2, RI.5.3, RI.5.4, RI.5.7, RI.5.8	6.1, 6.2, 6.3, 6.5, 6.6, 6.7, 6.8	7.1, 7.2, 7.3, 7.4, 7.5, 7.7, 7.8
RF.3.3.a, RF.3.3.b, RF.3.3.c, RF.3.3.d, RF.3.4.a, RF.3.4.c,	RF.4.3.a, RF.4.4.a, RF.4.4.c	RF.5.3.a, RF.5.4.a, RF.5.4.c	N/A	N/A
W.3.7, W.3.8	W.4.7, W.4.8	W.5.7, W.5.8	W.6.7	W.7.7
SL.3.1.a, SL.3.1.b, SL.3.1.c, SL.3.1.d, SL.3.2	SL.4.1.a, SL.4.1.b, SL.4.1.c, SL.4.1.d, SL.4.2	SL.5.1.a, SL.5.1.b, SL.5.1.c, SL.5.1.d, SL.5.2	SL.6.1.a, SL.6.1.b, SL.6.1.c, SL.6.1.d, SL.6.2, SL.6.3, SL.6.4, SL.6.6	SL.7.1.a, SL.7.1.b, SL.7.1.c, SL.7.1.d, SL.7.2, SL.7.3, SL.7.4, SL.7.6
L.3.1.f, L.3.1.g, L.3.1.i, L.3.2.a, L.3.2.g, L.3.4.a, L.3.4.b, L.3.4.c, L.3.4.d, L.3.6	L.4.3.a, L.4.4.a, L.4.4.b, L.4.4.c, L.4.6	L.5.1.c, L.5.2.e, L.5.4.a, L.5.4.b, L.5.4.c, L.5.6	L.6.1.e, L.6.2.a, L.6.2.b, L.6.4.a, L.6.4.b, L.6.4.c, L.6.4.d, L.6.6	L.7.2.b, L.7.3.a, L. 7.4.a, L.7.4.b, L.7.4.c, L.7.4.d, L.7.6
			RH.6-8.1, RH.6-8.4, RH.6-8.5, RH.6-8.7, RST.6-8.1, RST.6-8.2, RST.6-8.4, RST.6-8.5, RST.6-8.6, RST.6-8.7, RST.6-8.8, RST.6-8.9, WHST.6-8.7, WHST.6-8.9	

Common Core Math Standards

3rd Grade	4th Grade	5th Grade	6th Grade	7th Grade
3.NF.1	N/A	N/A	6.RP.3.c	N/A

Ocean Literacy Standards

NOAA: Ocean Literacy
The Essential Principles of Ocean Sciences
K-12

1. The Earth has one big ocean with many features.	a. The ocean is the dominant physical feature on our planet Earth – covering approximately 70% of the planet's surface. There is one ocean with many ocean basins, such as the North Pacific, South Pacific, North Atlantic, South Atlantic, Indian and Arctic. c. Throughout the ocean there is one interconnected circulation system powered by wind, tides, the force of the Earth's rotation (Coriolis effect), the Sun, and water density differences. The shape of ocean basins and adjacent land masses influence the path of circulation. e. Most of the Earth's water (97%) is in the ocean. Seawater has unique properties: it is saline, its freezing point is slighter lower than fresh water, its density is slightly higher, its electrical conductivity is much higher, and it is slightly basic. The salt in seawater comes from eroding land, volcanic emissions, reactions at the seafloor, and atmospheric deposition. f. The ocean is an integral part of the water cycle and is connected to all of the earth's water reservoirs via evaporation and precipitation processes. g. The ocean is connected to major lakes, watersheds and waterways because all major watersheds on Earth drain to the ocean. Rivers and streams transport nutrients, salts, sediments and pollutants from watersheds to estuaries and to the ocean. h. Although the ocean is large, it is finite and resources are limited.

2. The ocean and life in the ocean shape the features of the Earth.	c. Erosion – the wearing away of rock, soil and other biotic and abiotic earth materials – occurs in coastal areas as wind, waves, and currents in rivers and the ocean move sediments.
3. The ocean is a major influence on weather and climate.	a. The ocean controls weather and climate by dominating the Earth's energy, water and carbon systems. b. The ocean absorbs much of the solar radiation reaching Earth. The ocean loses heat by evaporation. The heat loss drives atmospheric circulation when, after it is released into the atmosphere as water vapor, it condenses and forms rain. Condensation of water evaporated from warm seas provides the energy for hurricanes and cyclones. c. The El Niño Southern Oscillation causes important changes in global weather patterns because it changes the way heat is released to the atmosphere in the Pacific. d. Most rain that falls on land originally evaporated from the tropical ocean. e. The ocean dominates the Earth's carbon cycle. Half the primary productivity on Earth takes place in the sunlit layers of the ocean and the ocean absorbs roughly half of all carbon dioxide added to the atmosphere. f. The ocean has had, and will continue to have, a significant influence on climate change by absorbing, storing, and moving heat, carbon and water.
4. The ocean makes Earth habitable.	a. Most of the oxygen in the atmosphere originally came from the activities of photosynthetic organisms in the ocean.
5. The ocean supports a great diversity of life and ecosystems.	a. Ocean life ranges in size from the smallest virus to the larges animal that has lived on Earth, the blue whale.

	b. Most life in the ocean exists as microbes. Microbes are the most important primary producers in the ocean. Not only are they the most abundant life form in the ocean, they have extremely fast growth rates and life cycles. c. Some major groups are found exclusively in the ocean. The diversity of major groups of organisms is much greater in the ocean than on land. d. Ocean biology provides many unique examples of life cycles, adaptations and important relations among organisms (symbiosis, predator-prey dynamics and energy transfer) that do not occur on land. e. The ocean is three-dimensional, offering vast living space and diverse habitats from the surface through the water column to the seafloor. Most of the living space on Earth is in the ocean. f. Ocean habitats are defined by environmental factors. Due to interactions of abiotic factors such as salinity, temperature, oxygen, pH, light, nutrients, pressure, substrate and circulation, ocean life is not evenly distributed temporally or spatially, i.e., it is —patchy. Some regions of the ocean support more diverse and abundant life than anywhere on Earth, while much of the ocean is considered a desert. g. There are deep ocean ecosystems that are independent of energy from sunlight and photosynthetic organisms. Hydrothermal vents, submarine hot springs, methane cold seeps, and whale falls rely only on chemical energy and chemosynthetic organisms to support life. h. Tides, waves and predation cause vertical zonation patterns along the shore, influencing the distribution and diversity of organisms.

	i. Estuaries provide important and productive nursery areas for many marine and aquatic species.
6. The ocean and humans are inextricably interconnected	a. The ocean affects every human life. It supplies freshwater (most rain comes from the ocean) and nearly all Earth's oxygen. It moderates the Earth's climate, influences our weather, and affects human health. b. From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security. c. The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures. d. Much of the world's population lives in coastal areas. e. Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (point source, non-point source, and noise pollution) and physical modifications (changes to beaches, shores and rivers). g. Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.
7. The ocean is largely unexplored.	a. The ocean is the last and largest unexplored place on Earth – less than 5% of it has been explored. This is the great frontier for the next generation's explorers and researchers, where they will find great opportunities for inquiry and investigation.

	b. Understanding the ocean is more than a matter of curiosity. Exploration, inquiry and study are required to better understand ocean systems and processes. c. Over the last 40 years, use of ocean resources has increased significantly, therefore the future sustainability of ocean resources depends on our understanding of those resources and their potential limitations. d. New technologies, sensors and tools are expanding our ability to explore the ocean. Ocean scientists are relying more and more on satellites, drifters, buoys, subsea observatories and unmanned submersibles. f. Ocean exploration is truly interdisciplinary. It requires close collaboration among biologists, chemists, climatologists, computer programmers, engineers, geologists, meteorologists, and physicists, and new ways of thinking.

Source: National Oceanic and Atmospheric Administration, et al. 2006. Ocean Literacy: The Essential Principles of Ocean Sciences, K-12. Washington, DC: NOAA.