Ocean Literacy Program Next Generation Science Standards (NGSS) Alignments

Unit 1 | *Ocean Ecosystems*	**Unit 2** | *Seawater & Sediments*	**Unit 3** | *Ocean Mechanics*	**Unit 4** | *Oceans & Climate*	**Unit 5** | *Ocean Engineering*	**Action Plan*** | *Empowerment*
Marine Populations 3-LS2-1 Construct an argument that some animals form groups that help members survive.	***Freshwater and Saltwater*** 5-ESS2-2 Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	***Ocean Floor Geology*** 4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.	***The Atmosphere and Ocean*** 5-ESS2-1 Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	***Build-A-Buoy*** 3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	***Curricular Anchors*** Establish relevant Ocean Literacy Principles, NGSS, environmental literacy, and state specific alignments ❖ Tie to existing curricula ❖ Context setting strategies ❖ Create a storyline ***Issues Investigations*** Science & Engineering Practices ❖ Students drive place-based inquiry to determine a local environmental issue ❖ Students perform field investigations and gather data (either on schoolyard or field trip partners) ❖ Analyze and interpret data ❖ Use data to make a claim about how to address the issue ***Take Action*** Application & Personal Relevance ❖ Students use data driven findings to propose or plan a "solution" to the issue under investigation ❖ Teachers select which action plan is most suitable or grade and schoolyard ❖ Students plan action projects and recruit local partners ❖ Evaluate the Action * This action plan is draws from the Environmental Literacy Model developed by A. Oshry with the Howard Hughes Medical Institute (HHMI).
Marine Food Web 5-PS3-1 Use models to describe that energy in animals' food was once energy from the sun.	***Salinity*** 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	***Waves*** 4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.	***Hadley Cells*** 3-ESS2-2 Obtain and combine information to describe climates in different regions of the world.	***Marine Architecture*** 3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	
Marine Specialists 3-LS3-2 Use evidence to support the explanation that traits can be influenced by the environment.	***Surviving in Seawater*** 4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.	***Surface Currents*** 3-PS2-2 Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.	***Shoreline Erosion*** 4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	***GPS Mechanics*** 4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information.	
Migration in the Ocean MS-LS2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.	***The Ocean's Watershed*** MS-ESS2-4 Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	***Intermediate Ocean Floor Geology*** MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.	***The Earth-sun-moon System*** MS-ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.	***Intermediate Build-A-Buoy*** MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.	
Advanced Marine Food Web MS-LS2-3 Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.	***Ocean Sediments*** MS-ESS3-1 Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.	***Major Ocean Currents*** MS-ESS2-1 Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.	***Weather Patterns*** MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.	***Intermediate Marine Architecture*** MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	
Evolution in the Ocean MS-LS4-4 Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.	***Seawater Properties*** MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.	***Search and Rescue*** MS-PS2-2 Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	***The Coriolis Effect*** MS-ESS2-6 Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.	***Intermediate GPS Mechanics*** MS-PS4-3 Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.	
Measuring Ecosystems HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	***Advanced Seawater Properties*** HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.	***Plate Tectonics*** HS-ESS1-5 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.	***Climate Feedbacks*** HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.	***Advanced Build-A-Buoy*** HS-ETS1-2 Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	
The Carbon Cycle HS-LS2-5 Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.	***Dissolved Oxygen*** HS-PS1-2 Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.	***Advanced Ocean Floor Geology*** HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.	***Energy and Earth's Systems*** HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.	***Advanced Marine Architecture*** HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.	
Evolution and the Ocean HS-ESS2-7 Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.	***Biogenous Sediment*** HS-LS2-6 Evaluate the 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.	***Motion in the Ocean*** HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	***Carbon Sinks*** HS-ESS2-6 Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.	***Advanced GPS Mechanics*** HS-PS4-5 Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.	

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