**ON SANDY SHORES**

**Reviewers: Julia Marte, Ryan Kelly, Nanette Parnham**

**I. Alignment to the NGSS**

The lesson or unit aligns with the conceptual shifts of the NGSS:

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| Criteria | Specific evidence from materials and reviewers’ reasoning | Suggestions for improvement |
| A. Grade‐appropriate elements of the science and engineering practice(s),  disciplinary core idea(s), and crosscutting concept(s), work together to  support students in three‐dimensional learning to make sense of  phenomena and/or to design solutions to problems.  i. Provides opportunities to develop and use specific elements of the  practice(s) to make sense of phenomena and/or to design solutions to  problems.  ii. Provides opportunities to develop and use specific elements of the  disciplinary core idea(s) to make sense of phenomena and/or to design  solutions to problems.  iii.Provides opportunities to develop and use specific elements of the  crosscutting concept(s) to make sense of phenomena and/or to design  solutions to problems.  iv.The three dimensions work together to support students to make sense  of phenomena and/or to design solutions to problems. | i. Over the course of the unit, students will have the chance to engage in all of the science and engineering practices as they make sense of ecosystems and use that knowledge to design a method of cleaning an oil spill. 1. Asking questions (for science) and defining problems (for engineering): Developing and using models.  Students use models when exploring how pollutants impact ecosystems, and then they create their own methods of cleaning an oil spill and discuss how pollution can move through an environment. **Planning and carrying out investigations:** Students carry out investigations of how well different materials and processes clean oil out of a model waterbody. **Analyzing and interpreting data:** Students analyze and interpret data when sharing findings in Lesson 3 and improving and sharing their oil spill clean-up designs.  **Constructing explanations** (for science) and designing solutions (for engineering): Students design their own oil spill clean-up methods to meet a set of criteria and constraints. **Engaging in argument from evidence**: Students work in groups and decide on oil spill clean-up methods and discuss their ideas and argue from evidence. | It could be beneficial to strengthen the use of models by having kids look at images or video of real-world oil spill cleaning technologies and comparing form/function to the oil spill cleaning technologies they are working with in the classroom.  Students could use math and computational thinking when quantifying the effectiveness of their oil spill clean-up designs |

A unit or longer lesson will also:

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| Criteria | Specific evidence from materials and reviewers’ reasoning | Suggestions for improvement |
| B. Lessons fit together coherently targeting a set of performance expectations.  i. Each lesson links to previous lessons and provides a need to engage in  the current lesson.  ii. The lessons help students develop proficiency on a targeted set of performance expectations. | The oil spill cleanup unit is designed to build upon previous student learning ● (Activity 1 Beach Bucket Scavenger Hunt) allows students which allows students to sort materials into groups based on their properties. |  |
| C. Where appropriate**, disciplinary core ideas** from different disciplines are used together to explain phenomena. | This unit incorporates use of a DCI from the Life Sciences (Interdependent Relationships in Ecosystems) and Earth and Space Sciences (Human Impacts on Earth Systems) with Engineering, Technology, and Applications of Science.  This unit focuses on developing proficiency in performance expectations under the Engineering Design domain (3-5- ETS1-2 and 3-5-ETS1-3). |  |
| D. Where appropriate**, crosscutting concepts** are used in the explanation of phenomena from a variety of disciplines. | Several crosscutting concepts appear throughout this unit, including Systems and System Models (an ecosystem can be described in terms of its components and their interdependencies), Cause and Effect (oil spills cause damage to organisms within an ecosystem), and Structure and Function (the shape and makeup of a material impacts how well it can perform a specific task - in this case, removing oil from water). | Crosscutting concepts are not explicitly called out within the body of each lesson. Creating a supplementary document to indicate where crosscutting concepts are used would be beneficial. |
| E. Provides grade‐appropriate connection(s) to the Common Core State  Standards in Mathematics and/or English Language Arts & Literacy in  History/Social Studies, Science and Technical Subjects. | EiE units include cross-curricular connections, particularly to English Language Arts and Literacy and History/Social Studies through the use of the storybook in Lesson 1 and applied mathematics and science throughout the unit where appropriate. For a table showing how this unit links to the Common Core English Language Arts standards, click here: http://eie.org/sites/default/files/oilspillsela.pdf For a table showing how this unit links to the Common Core Mathematics standards, click here: http://eie.org/sites/default/files/oilspillsmath.pdf If the lesson or unit is not closely aligned to the Next Generation Science Standards, it may not be appropriate to move on to the second and |  |

**Reviewer Name: Julia Marte Grade: MS6-8 Lesson/Unit Title: Sandy Shore/ Sand on Stage - Activity 2**

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| **Disciplinary Core Ideas (DCIs)** | **Element** | **Evidence** |
| [**ESS2.A: Earth’s Materials and Systems**](http://www.nap.edu/openbook.php?record_id=13165&page=179)  [**All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems. This energy is derived from the sun and Earth’s hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth’s materials and living organisms.**](http://www.nap.edu/openbook.php?record_id=13165&page=179) | **Nearly all solid materials in the world, both living and non-living, will eventually be eroded into sand.**  **Mountains, rocks, minerals, shells, corals, bones, metals, and glass are all worn down over time by wind, waves, rivers, earthquakes, and other forces into smaller and smaller particles.** | **Students examine the different samples of sand provided.**  **Students will be able to identify the sand by its size and shape.** |

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| **Science and Engineering Practice (SEP)** | **Element** | **Evidence** |
| [**Developing and Using Models**](http://www.nap.edu/openbook.php?record_id=13165&page=56)  [**Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.**](http://www.nap.edu/openbook.php?record_id=13165&page=56)  **Asking Questions and Defining Problems**  [**Analyzing and Interpreting Data**](http://www.nap.edu/openbook.php?record_id=13165&page=61)  [**Engaging in Argument from Evidence**](http://www.nap.edu/openbook.php?record_id=13165&page=71) | [**Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions**](http://www.nap.edu/openbook.php?record_id=13165&page=54)  [**Analyze and interpret data to determine similarities and differences in findings**](http://www.nap.edu/openbook.php?record_id=13165&page=61)  **Students at any grade level should be able to ask questions of each other about the texts they read, the features of the phenomena they observe, and the conclusions they draw from their models or scientific investigations.**  **For engineering, they should ask questions to define the problem to be solved and to elicit ideas that lead to the constraints and specifications for its solution.** | **Sand is almost always in constant motion. Sand grains on a beach one day might be entirely replaced by other in a few weeks.**  **Explain to students that one way that sand moves is by the wind.** |

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| **Crosscutting Concepts (CCCs)** | **Element** | **Evidence** |
| [**Influence of Science, Engineering, and Technology on Society and the Natural World**](http://www.nap.edu/openbook.php?record_id=13165&page=212)  [**Patterns**](http://www.nap.edu/openbook.php?record_id=13165&page=98)  [**Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale.**](http://www.nap.edu/openbook.php?record_id=13165&page=98) | **All living activity draws on natural resources and has both short and long term consequences, positive as well as negative for the health of people and the natural environment**  **As students develop their understanding of the relationships between structure and function, they should begin to apply this knowledge when investigating phenomena that are unfamiliar to them.**  **They recognize that often the first step in deciphering how a system works is to examine in detail what it is made of and the shapes of its parts.** | **Sand grains can be made of animals, plants, rocks, or other minerals.**  **Sand grains come in many different shapes, sizes and colors.**  **Sand is important for oil and cement production.**  **Glass is made from melted and reformed sand.**  **Sand is used for sand painting, sand blasting, sandpaper, in hourglasses and in playgrounds and sandboxes.** |

**Evidence that Disciplinary Core Ideas (DCIs), Science and Engineering Practice (SEP) and Crosscutting Concepts (CCCs) were included in this lesson**

**Reviewer Name: Nanette Parnham Grade: 6th Lesson/Unit Title: Activity 4: Build a Sandy Beach**

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| Disciplinary Core Ideas (DCIs) | Element | Evidence |
| MS-LS2-2   |  |  | | --- | --- | |  | **Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.** |  |  |  | | --- | --- | | **MS-LS2- 3** | **Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.** | | [LS2.C: Ecosystem Dynamics, Functioning, and Resilience](http://www.nap.edu/openbook.php?record_id=13165&page=154)  [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 used as a measure of its health. (MS-LS2-5)](http://www.nap.edu/openbook.php?record_id=13165&page=154) | Students construct a mural with three-dimensional models of organisms that live below the sand, as well as magnified models of the living and dead organisms that make up beach wrack washed ashore by the waves. Three displays of different views of the same beach will be constructed – the shore (“Above the Sand”), a cross-section view of under-the sand habitat (“Under the Sand”), and a model of beach wrack magnified 20 times (“Beach Wrack”).  Groups make presentations to the class about what their group discovered. Information will include how the animals and plants live, eat, and protect themselves, habitats, and adaptations. |

**Evidence that Disciplinary Core Ideas (DCIs), Science and Engineering Practice (SEP) and Crosscutting Concepts (CCCs) were included in this lesson**

**Reviewer Name: Nanette Parnham Grade: 6th Lesson/Unit Title: Activity 4: Build a Sandy Beach**

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| Science and Engineering Practice (SEP) | Element | Evidence |
| Developing and Using Models | Develop a model to describe phenomena. (MS-LS2-3) | Students research assigned organisms of the seashore, and construct three-dimensional models (mural) of those organisms and their habitats. |

**Evidence that Disciplinary Core Ideas (DCIs), Science and Engineering Practice (SEP) and Crosscutting Concepts (CCCs) were included in this lesson**

**Reviewer Name: Nanette Parnham Grade: 6th Lesson/Unit Title: Activity 4: Build a Sandy Beach**

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| Crosscutting Concepts (CCCs) | Element | Evidence |
| [Patterns](http://www.nap.edu/openbook.php?record_id=13165&page=85)  Cause and Effect  [Stability and Change](http://www.nap.edu/openbook.php?record_id=13165&page=98) | Patterns can be used to identify cause and effect relationships. (MS-LS2-2)  [Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-LS2-1)](http://www.nap.edu/openbook.php?record_id=13165&page=87)  [Small changes in one part of a system might cause large changes in another part. (MS-LS2-5)](http://www.nap.edu/openbook.php?record_id=13165&page=98) | Students have researched their assigned organisms to learn how the animals and plants live, eat, and protect themselves. They have learned about habitats and adaptations. This information will be displayed on the mural and will be presented to the class during group presentations. |