

# Alignment of the Ocean Literacy Framework to the NGSS

## Introduction to the *Alignment of Ocean Literacy to the Next Generation Science Standards (NGSS)*

You can't be science literate without being ocean literate. This document provides evidence to prove that statement and tools to achieve it. This innovative and rigorous document aligns Ocean Literacy to the Next Generation Science Standards (NGSS) by detailing why teaching ocean concepts is integral and essential to achieving the vision of NGSS. Intended for teachers, school leaders, informal educators, and curriculum developers, this alignment document provides critical guidance about when and how ocean concepts should be strategically inserted into the K through 12 science curriculum and can be used to influence state, district, and school science implementation plans. The *Alignment of Ocean Literacy to the Next Generation Science Standards* also provides strong justification for educators to provide ocean sciences learning experiences to supplement traditional texts that typically don't adequately address ocean concepts.

The *Alignment of Ocean Literacy to the Next Generation Science Standards* is one part of the Ocean Literacy Framework which includes three other key documents:

- » *Ocean Literacy: The Essential Principles of Ocean Sciences for Learners of All Ages*;
- » *The Ocean Literacy Scope and Sequence for Grades K–12*; and
- » *International Ocean Literacy Survey*.<sup>1</sup>

This alignment document details the correlations between NGSS, specifically the Disciplinary Core Ideas (DCI) and Performance Expectations (PE), and the concepts included in the other Ocean Literacy Framework documents. It provides coherence across the Ocean Literacy Framework and NGSS, leveraging our community's work and making it more valuable and useful.

This alignment is a necessary tool to focus attention on places in the NGSS where Ocean Literacy is essential to understanding the DCI, but the connection may not be obvious. The alignment documents are organized by grade band and provide a 4-point scale with a description for each rating that describes in detail the relationship between the NGSS at each grade level and each of the seven Ocean Literacy principles. There are many examples of Disciplinary Core Ideas in NGSS that directly match content described in *Ocean Literacy: The Essential Principles of Ocean Sciences for Learners of All Ages* and *The Ocean Literacy Scope and Sequence for Grades K–12* (**see #1 in the rating scale below**). There are also many examples of DCIs that do not explicitly mention the ocean, but cannot be fully understood without addressing the ocean component (**see #2 in the rating scale**).

1 For more information and to access online versions of the Ocean Literacy Framework documents, please visit [www.marine-ed.org/ocean-literacy/overview](http://www.marine-ed.org/ocean-literacy/overview)

# Alignment of the Ocean Literacy Framework to the NGSS

---

## Rating Scale for Alignment of the Ocean Literacy Framework to Next Generation Science Standards (NGSS)<sup>2</sup>

---

**1** means there is verbatim or nearly verbatim language in the Ocean Literacy Guide, the Scope & Sequence, and the NGSS. This rating is self-explanatory. The connection and alignment should be obvious and not in need of any explanation.

**2** means that understanding these Ocean Literacy Principles and/or Fundamental Concepts is essential to helping students to achieve full understanding of the Disciplinary Core Ideas (DCIs) and/or Performance Expectations (PE).

This rating is given for all the DCIs that have a terrestrial bias or ignore the uniqueness of ocean systems, such as: decomposition breaks things down into soil; references to only terrestrial habitats, ecosystems and food webs, etc. This rating says that a learner cannot achieve full understanding of the DCI without understanding the ocean component of the concept, e.g., you don't fully understand primary productivity if you don't understand chemosynthesis; you don't fully understand decomposition if you only understand how it relates to soil, but not to detritus and marine snow in the water column; you don't fully understand food webs and trophic levels unless you understand about microbes in the ocean because they play a very different role than plants do on land. The ocean "examples" are more

than just examples; they illustrate different aspects of the concept than the terrestrial examples do.

**3** means examples from the Ocean Literacy Guide or Scope & Sequence (not just any ocean examples) are excellent for teaching and understanding these DCIs and/or PEs.

This rating is given when an example from the Ocean Literacy Guide or the Scope & Sequence could be used to explain a general science DCI and/or PE, but using that example to explain that concept is not essential to ocean literacy, nor is it essential to understanding DCI, such as, ocean waves, as mentioned in some OLPs, are good examples of the physical properties of waves.

**4** means these DCIs and/or PEs are building blocks or foundational ideas that help students to understand these Ocean Literacy Principles and/or Fundamental Concepts.

This rating is given for general science concepts that help students understand the mechanisms behind OL concepts, such as force and motion helping to explain currents or phase change, and conservation of matter helping to explain the water cycle.

---

<sup>2</sup> The Ocean Literacy-NGSS alignments were developed by the National Marine Educators Association Ocean Literacy Committee. Special acknowledgement goes to the Lawrence Hall of Science at the University of California, Berkeley for leading the development and supporting the final editing and design. The following individuals made significant contributions: Lincoln Bergman (Lawrence Hall of Science), Scott Carley (College of Exploration), Catherine Halversen (Lawrence Hall of Science), Kurt Holland (Seventh Generation Advisors), Beth Jewell (West Springfield High School), Lisa Klofkorn (Lawrence Hall of Science), Diana Payne (Connecticut Sea Grant), Sarah Pedemonte (Lawrence Hall of Science), Sarah Schoedinger (NOAA), Craig Strang (Lawrence Hall of Science), Lynn Tran (Lawrence Hall of Science), Peter Tuddenham (College of Exploration), Emily Weiss (Lawrence Hall of Science), Jim Wharton (Seattle Aquarium), Lynn Whitley (USC Wrigley Institute for Environmental Studies and Sea Grant)

# Alignment of the Ocean Literacy Framework to the NGSS

Examples of a rating of 4:

## **K-PS2 Motion and Stability: Forces and Interactions.**

Ocean Literacy Essential Principle 2: These basic ideas are important conceptual building blocks that help us understand waves, erosion, and landforms of the coast.

## **1-LS3 Heredity: Inheritance and Variation of Traits.**

Ocean Literacy Essential Principle 5: DCI introduces the concept of inheritance and variation and provides an introduction to the concept of diversity described in OLFC 5A & C.

**When no rating** is given it means there is no substantive or helpful relationship. There is no rating given when no plausible, helpful, or meaningful relationship appears to exist between the OL Principles and/or Fundamental Concepts and the DCIs and/or PEs.

Example:

## **K-PS2 Motion and Stability: Forces and Interactions**

Ocean Literacy Essential Principle 5: No relationship

*Now that we have explained the rating scale, let's dive in and explore these alignments in more detail!*

## NGSS Terminology

**PS** = Physical Science

**ESS** = Earth and Space Science

**LS** = Life Science

**ETS** = Engineering, Technology, and the Application of Science

**SEP** = Science and Engineering Practice

**CC** = Crosscutting Concept

**DCI** = Disciplinary Core Idea

**PE** = Performance Expectation

## Ocean Literacy Terminology

**OLP** = Ocean Literacy Essential Principle

**OLFC** = Ocean Literacy Fundamental Concept

**S&S** = Scope and Sequence