



What Is Ocean Literacy & Why Is It Important in Teaching & Learning?

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Georgia Association of Marine Educators Conference:
Ocean Literacy Rebooted

November 12, 2021





Why did you choose to attend this conference?

Take 1 minute to jot down a few thoughts in the chat.
...Be sure to read what your colleagues post too!

Our goals for the conference are to ...

- Describe what Ocean Literacy is and how it is relevant to educators in Georgia.
- Share tools for educators—the *Ocean Literacy Framework*—to help incorporate ocean literacy into your practice.
- Help educators get a better understanding of what ocean science concepts are important to teach to **your** learners.
- Engage in activities chosen specifically to build learners' conceptual understanding.
- Provide an opportunity for colleagues (**i.e., you**) to share ideas & expertise about how to increase learners' ocean literacy.
- Learn about opportunities to get involved in promoting ocean literacy.

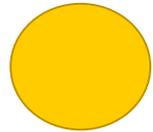
Agenda



Part 1: History of the Ocean Literacy Campaign
Introducing the Framework
Exploring Essential Principle 4



Part 2: Resources, Applications, & Impacts



Part 3: Getting Involved in & Future Directions of
the Campaign



Part 1

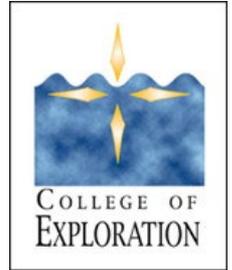
History of the Ocean Literacy Campaign & Development of the Framework

- Who has been involved
- The challenge and need for a campaign
- Description & exploration of the Ocean Literacy Framework
- Explore the scope & sequence through EP4

Who's Been Involved



COSEE



100s of individuals and many organizations

See online Honor Roll

The Challenge

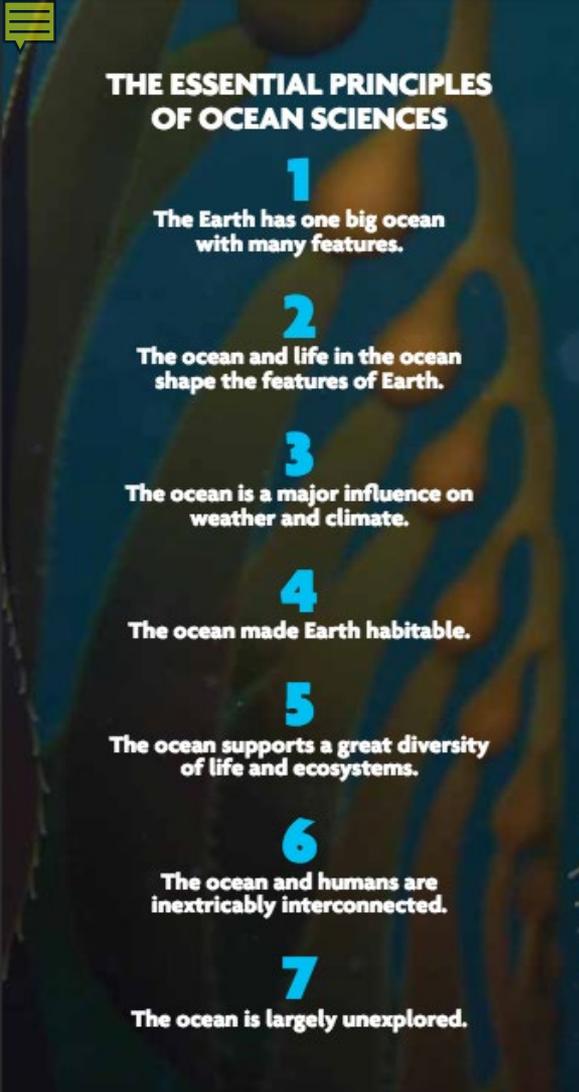
- American public largely unaware of importance of ocean in their lives
- Ocean-related topics were often ignored in K–12 classrooms because deemed irrelevant to existing national education standards.
- Few ocean scientists were involved in education & outreach





The Response to the Challenge

- Consensus reached...
 - Inclusive, democratic, transparent process, work mostly done online
 - Built on and credited past efforts
 - No single institution had (or has) ownership
 - Institutions, educators & scientists lent authority and credibility
- Developed a definition & the first guide of 7 Essential Principles and 44 Fundamental Concepts of Ocean Literacy



THE ESSENTIAL PRINCIPLES OF OCEAN SCIENCES

1

The Earth has one big ocean
with many features.

2

The ocean and life in the ocean
shape the features of Earth.

3

The ocean is a major influence on
weather and climate.

4

The ocean made Earth habitable.

5

The ocean supports a great diversity
of life and ecosystems.

6

The ocean and humans are
inextricably interconnected.

7

The ocean is largely unexplored.

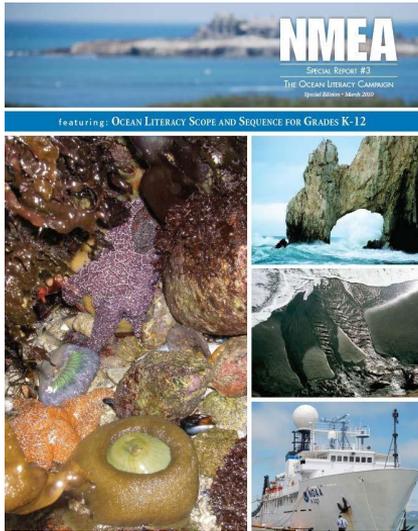
Ocean Literacy is...

... an understanding of **the ocean's influence on you**—and **your influence on the ocean**.

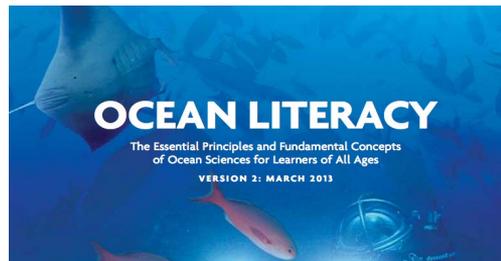
An ocean-literate person:

- **Understands** the Essential Principles and Fundamental Concepts about the ocean;
- **can communicate** about the ocean in a meaningful way; and
- is able to **make** informed and responsible **decisions** regarding **the ocean and its resources**.

What Else Happened?



- Development of Scope & Sequence
- Revision of the Guide in 2013 & 2020
- Alignment between Ocean Literacy & Next Generation Science Standards
- International Ocean Literacy Survey (IOLS)





Tools for You to Use

- Ocean Literacy Guide - 2020 version
- Scope & Sequence
- NGSS Alignment
- IOLS



**“The
Framework”**

- Recordings of 2017 Webinars
- Translations & OL Presentation Kit
- A Handbook for Increasing Ocean Literacy (2021)



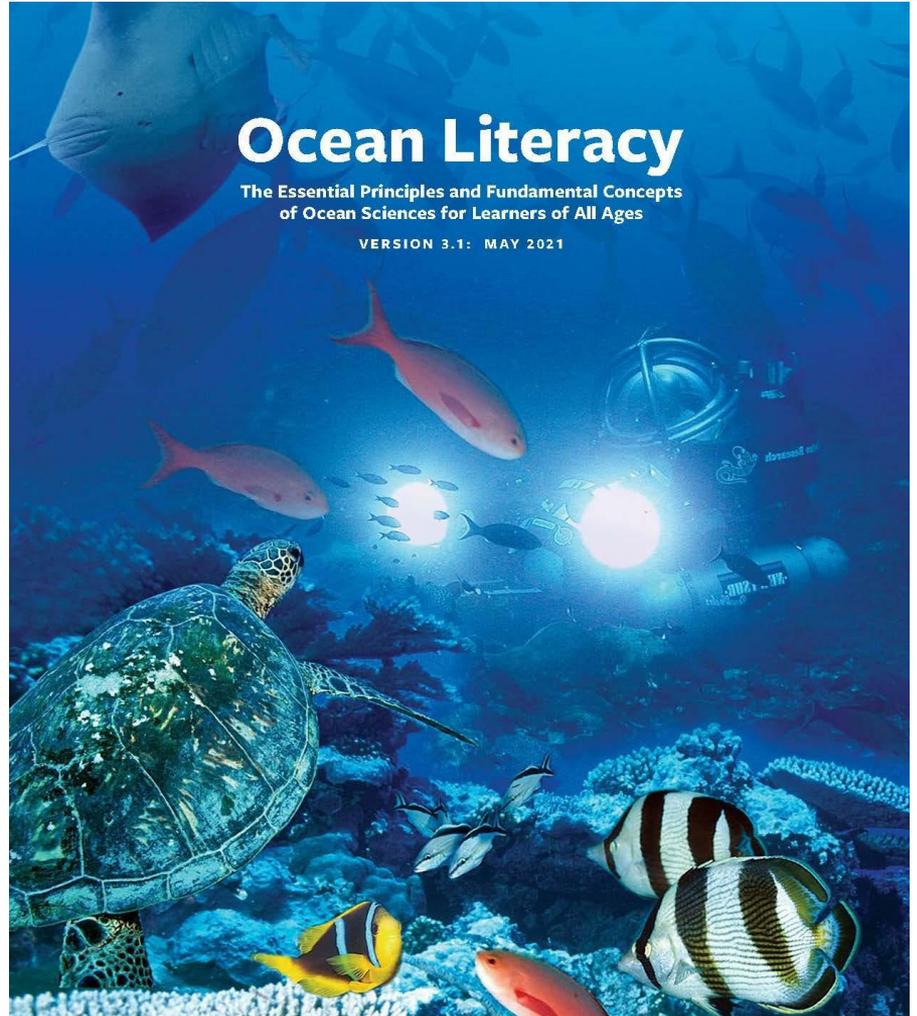
Exploring the Ocean Literacy Guide



Ocean Literacy Guide:

The Essential Principles & Fundamental Concepts of Ocean Sciences

<http://www.marine-ed.org/ocean-literacy/guide>



The Ocean Literacy Guide defines ocean literacy and presents 7 big ideas and 45 concepts supporting those big ideas that an ocean literate person should know.

1 Earth has one big ocean with many features.



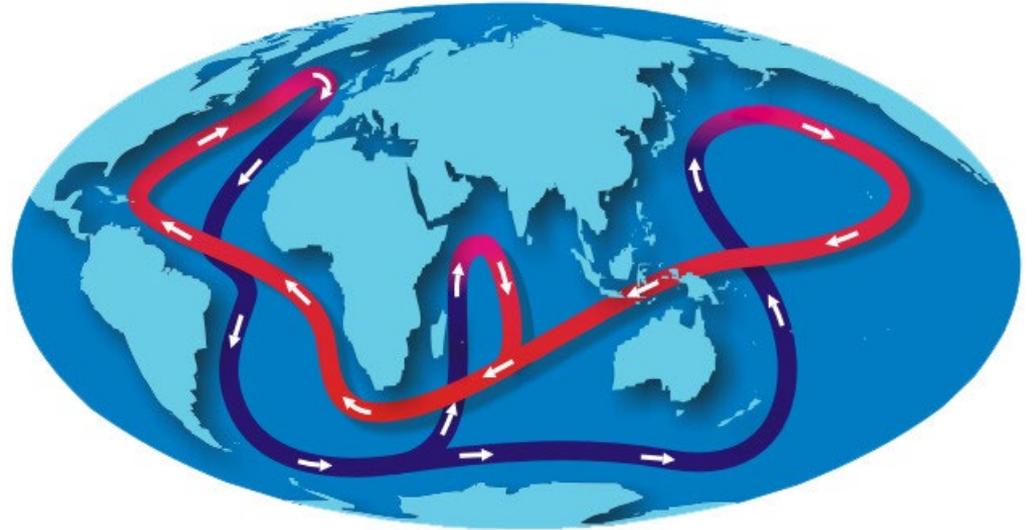
THE OCEAN FROM SPACE. This infrared image from the GOES-11 satellite shows the Pacific Ocean. Photo: NASA

- A** The ocean is the defining 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, Southern, and Arctic.
- B** Ocean basins are composed of the seafloor and all of its geological features (such as islands, trenches, mid-ocean ridges, and rift valleys) and vary in size, shape and features due to the movement of Earth's crust (lithosphere). Earth's highest peaks, deepest valleys and flattest plains are all in the ocean.
- C** Throughout the ocean there is one interconnected circulation system powered by wind, tides, the force of 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. This "global ocean conveyor belt" moves water throughout all of the ocean basins, transporting energy (heat), matter, and organisms around the ocean. Changes in ocean circulation have a large impact on the climate and cause changes in ecosystems.
- D** Sea level is the average height of the ocean relative to the land, taking into account the differences caused by tides. Sea level changes as plate tectonics cause the volume of ocean basins and the height of the land to change. It changes as ice caps on land melt or grow. It also changes as sea water expands and contracts when ocean water warms and cools.
- E** Most of Earth's water (97%) is in the ocean. Seawater has unique properties. It is salty, its freezing point is slightly lower than fresh water, its density is slightly higher, its electrical conductivity is much higher, and it is slightly basic. Balance of pH is vital for the health of marine ecosystems, and important in controlling the rate at which the ocean will absorb and buffer changes in atmospheric carbon dioxide.
- F** The ocean is an integral part of the water cycle and is connected to all of 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 coastal estuaries and to the ocean.
- H** Although the ocean is large, it is finite, and resources are limited.

Exploring the Ocean Literacy Guide

Essential Principle #1

Earth has one big ocean with many features



The Great Ocean Conveyor Belt - The dark blue line represents the deep cold and saltier water current; the red line indicates shallower and warmer current.

Image: NOAA, National Weather Service



Exploring the Ocean Literacy Scope & Sequence



How Was the Scope & Sequence Created?

Goal

- Determine which ocean sciences concepts to include at each grade band to build a complete understanding of the Ocean Literacy principles and fundamental concepts by the end of 12th grade

Collaborative grassroots effort

- Dozens of ocean scientists, science educators (formal and informal), education policy makers, & others

Thorough, iterative undertaking

- Multiple draft conceptual flows & reviews over 4 years
- In-person meetings nationwide; online public/scientist/educator reviews

Completed in 2010

- *Ocean Literacy Scope and Sequence for Grades K–12*

<https://www.marine-ed.org/ocean-literacy/honor-roll>

Ocean Literacy Scope & Sequence



Grades 9-12

Grades 6-8

Grades 3-5

Grades K-2



Grades 9-12

Grades 6-8

Grades 3-5

Grades K-2



Grades 9-12

Grades 6-8

Grades 3-5

Grades K-2



Grades 9-12

Grades 6-8

Grades 3-5

Grades K-2



Grades 9-12

Grades 6-8

Grades 3-5

Grades K-2



Grades 9-12

Grades 6-8

Grades 3-5

Grades K-2



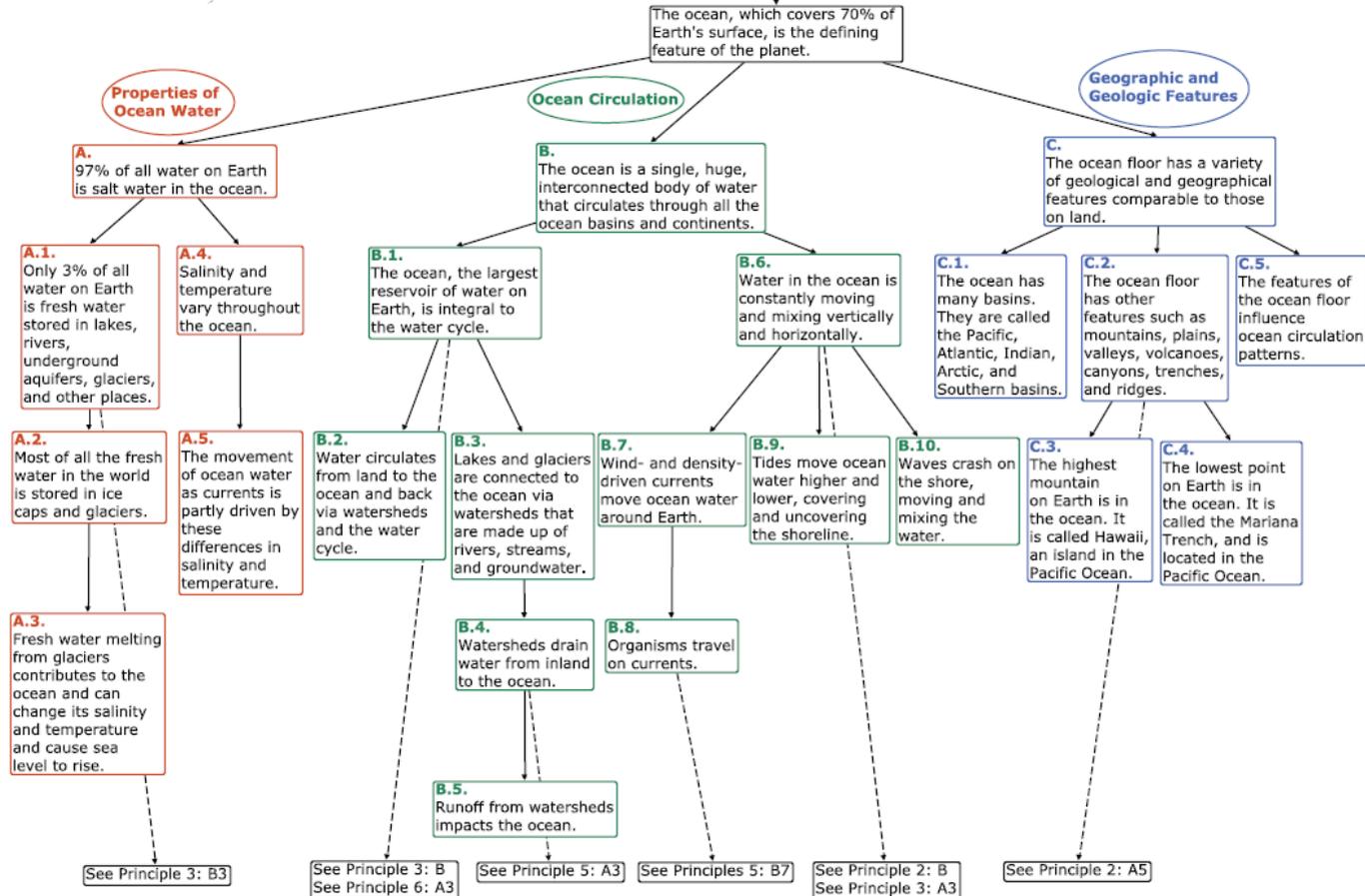
Grades 9-12

Grades 6-8

Grades 3-5

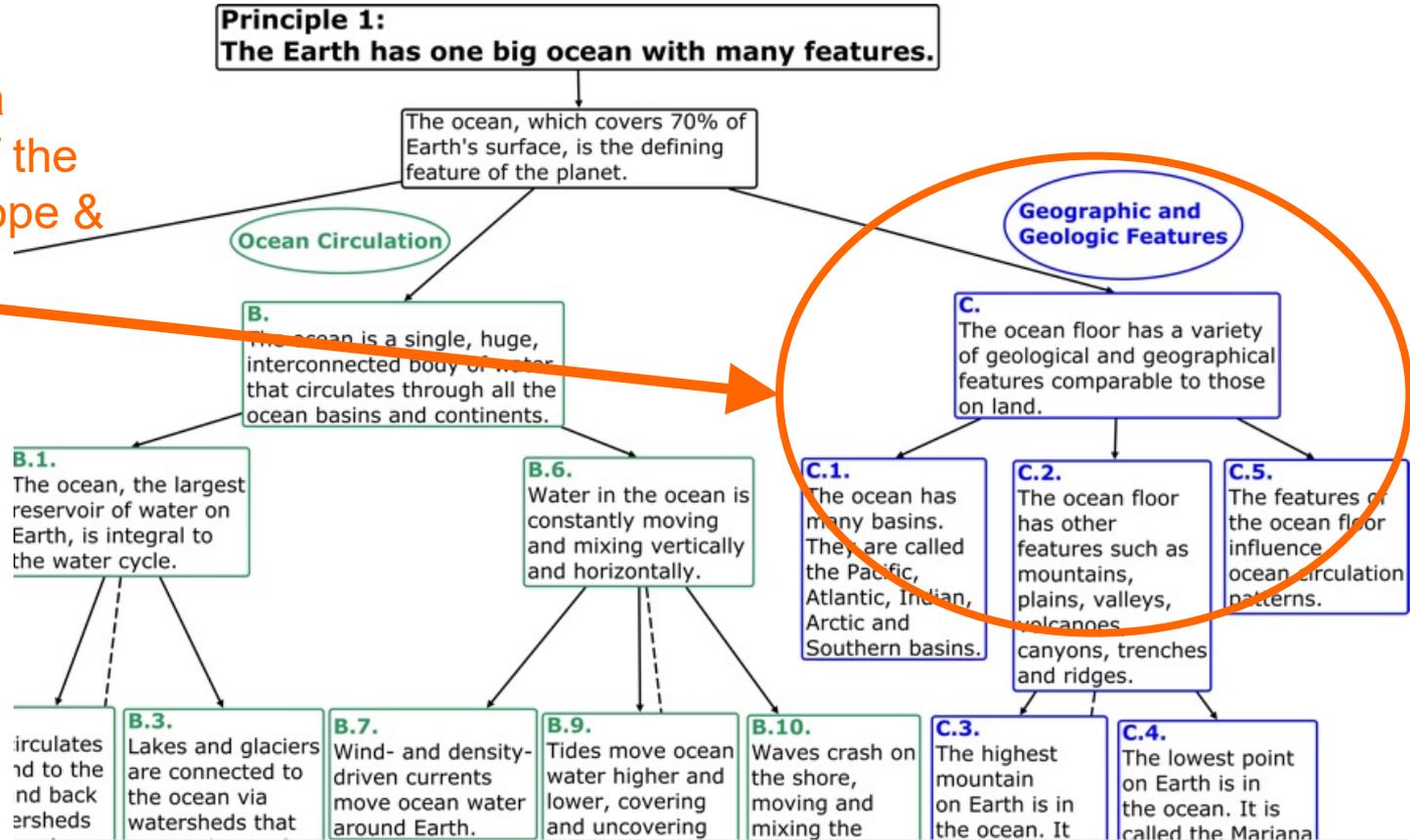
Grades K-2

Principle 1:
Earth has one big ocean with many features.



Exploring the Scope & Sequence

S&S P1 C strand: a particular portion of the Ocean Literacy Scope & Sequence



**Principle 1:
Grades 3-5**

Strand Topic

Properties of Ocean Water

97% of all water on Earth is salt water in the ocean.

Major concept of this strand

A.1.
Only 3% of all water on Earth is fresh water stored in lakes, rivers, underground aquifers, glaciers, and other places.

A.4.
Salinity and temperature vary throughout the ocean.

2 ideas that support bigger ideas in this strand

A.2.
Most of all the fresh water in the world is stored in ice caps and glaciers.

A.5.
The movement of ocean water as currents is partly driven by these differences in salinity and temperature.

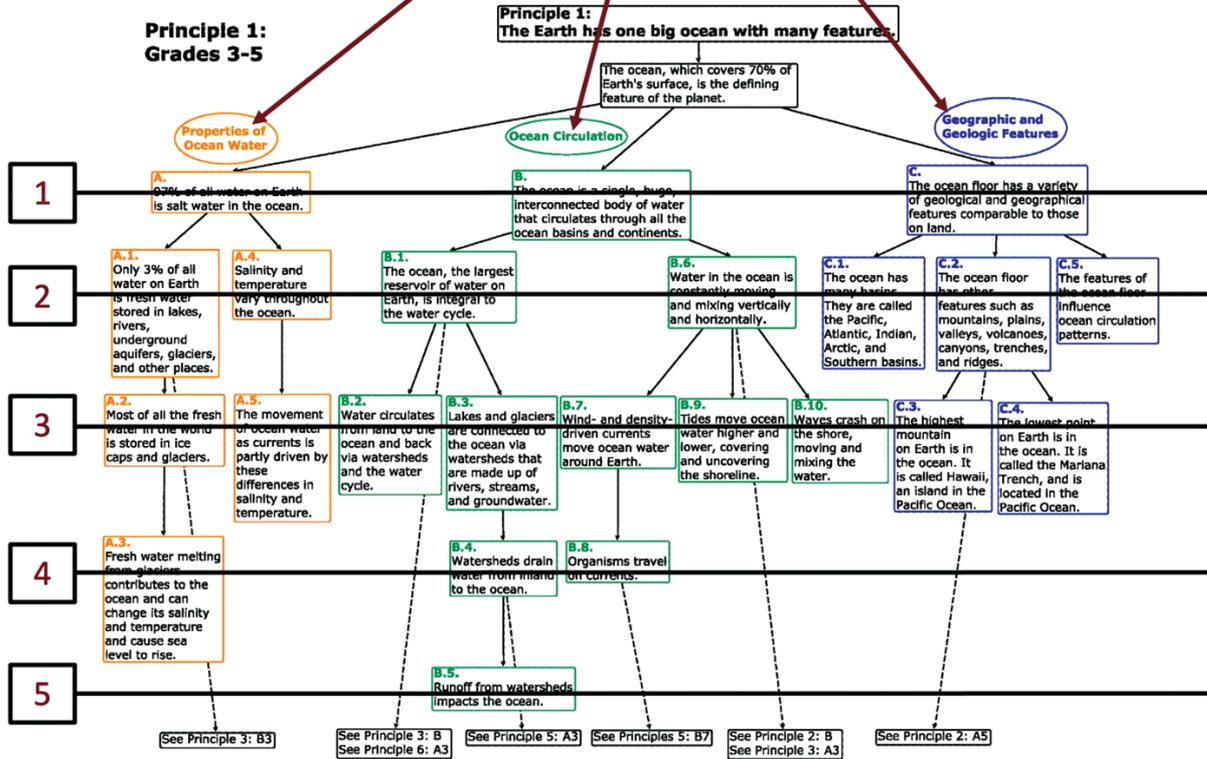
Supporting ideas on properties of ocean water discussed in further detail

A.3.
Fresh water melting from glaciers contributes to the ocean and can change its salinity and temperature and cause sea level to rise.

See Principle 3: B3

For Grades 3-5, concept A2 in Principle 1 is connected to concept B3 in Principle 3

Strand A → Strand B → Strand C



Dashed lines lead to cross-referenced concept statements in other essential principles.



Using the OL Framework with Your Learners

1. **Look at the Guide** to determine the Essential Principles and Fundamental Concepts you want &/or need to address with your learners.
2. Then **look at the Scope and Sequence** for that principle for your grade level, and locate the concepts you decided to focus on.
3. Finally, **choose an activity** that addresses one or more of those concepts, following the flow shown in the scope and sequence.

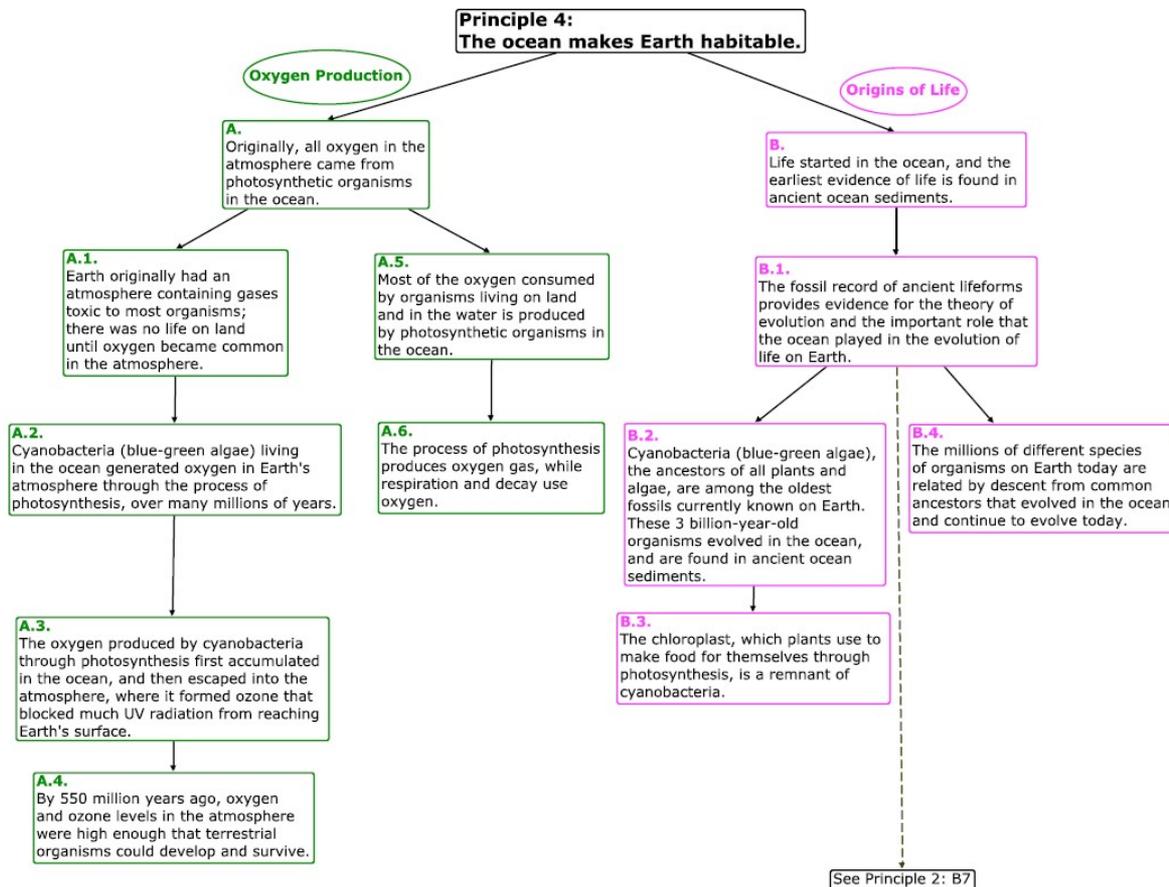


Essential Principle 4

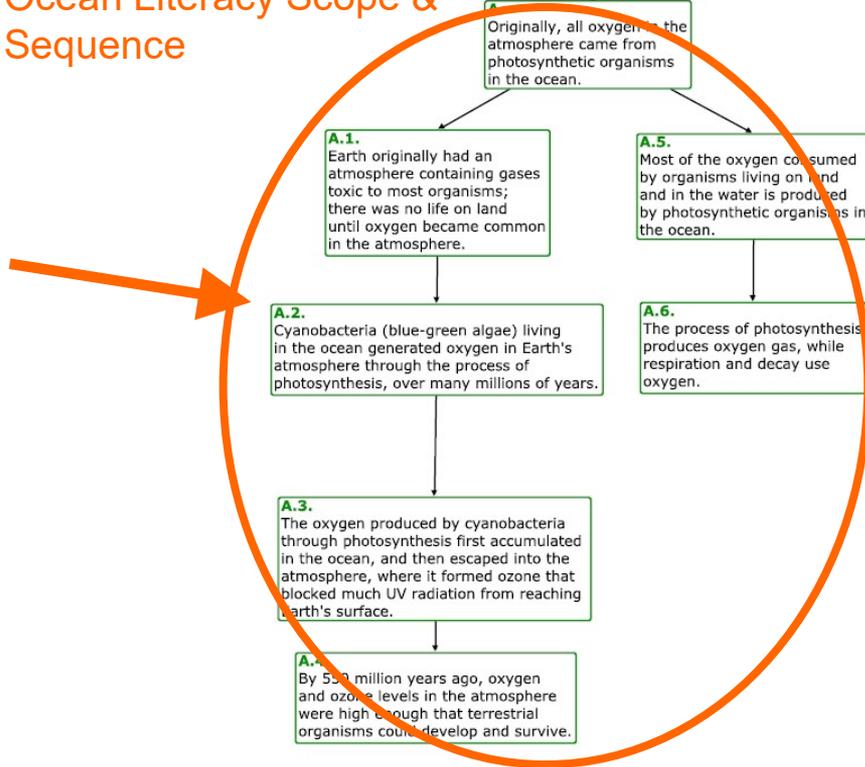


EP 4: The ocean makes Earth habitable.

- a. Most of the oxygen in the atmosphere originally came from the activities of photosynthetic organisms in the ocean. This accumulation of oxygen in Earth's atmosphere was necessary for life to develop and be sustained on land.
- b. The first life is thought to have started in the ocean. The earliest evidence of life is found in the ocean.
- c. The ocean provided and continues to provide water, oxygen and nutrients, and moderates the climate needed for life to exist on Earth (Essential Principles 1, 3, & 5).

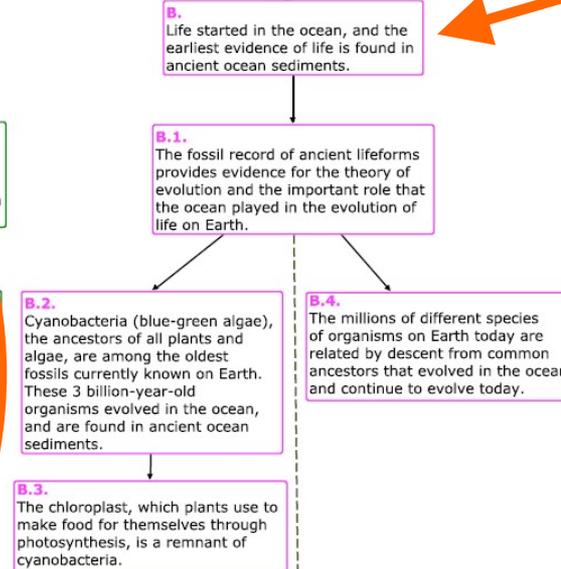


S&S P4A strand: a particular portion of the Ocean Literacy Scope & Sequence



**Principle 4:
The ocean makes Earth habitable.**

Origins of Life



See Principle 2: B7





Essential Principle 4

Activity Demonstration



Session 3.1

Introducing Earth's History

3.1



Image courtesy of NASA. Earth Sciences Department, University of Colorado



Guiding Question:

Over the course of Earth's history, how have Earth's ocean and atmosphere changed?



Student learning is focused on key concepts:

- Early Earth had no ocean or atmosphere, but ever since they formed billions of years ago, they have been constantly changing.
- The first photosynthetic organisms developed in the ocean, and that led to Earth having an atmosphere rich in oxygen.
- Water vapor from volcanoes, comets, and asteroids condensed into liquid water on Earth's surface, forming the ocean.
- Photosynthetic organisms in the ocean released O₂ into the ocean water, which then entered the atmosphere and made it rich in oxygen.



Scientific Evidence

- Evidence is a clue that helps answer a question or explain something.
- Evidence can come from...
 - our own investigations.
 - other people's investigations.
 - reasoning, thinking, and discussing.
- Scientific explanations are based on evidence.



Earth Forms

Molten Earth

Earth Cools

Ocean Formation

First Life

Photosynthetic Organisms

Land Plants

Oxygen in Atmosphere

Animals on Land

Earth Cools

Earth's surface cools and becomes solid rock. The cooler surface allows gases to stay and form the early atmosphere. These are some of the gases in Earth's early atmosphere:

- CH₄ (methane)
- H₂ (hydrogen)
- CO₂ (carbon dioxide)
- N₂ (nitrogen)
- H₂O (water vapor)



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Molten Earth

Earth is covered in volcanoes and hot, molten lava (melted rock). Volcanoes release a lot of gases, but most of the gases go into space because Earth is so hot.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Earth Forms

Small and giant rocks crash into each other in space and form Earth.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Photosynthetic Organisms

The first living things that could photosynthesize live in the ocean. These plantlike organisms take in CO₂ (carbon dioxide), and give off O₂ (oxygen) into the ocean.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

First Life

Life begins to appear in Earth's ocean. The earliest organisms got their food from chemicals. They did not breathe O₂ (oxygen).



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Ocean Formation

H₂O (water vapor) from volcanoes, comets, and asteroids condenses into liquid H₂O on Earth's surface, forming the ocean.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Animals on Land

Enough O₂ (oxygen) is in the atmosphere for oxygen-breathing animals to live on land.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Oxygen in Atmosphere

Enough O₂ (oxygen) builds up in the surface of the ocean that it starts to enter the atmosphere.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Land Plants

Some photosynthetic organisms from the ocean move onto land. Eventually, the first trees appear. Land plants take in CO₂ (carbon dioxide) from the atmosphere and give off O₂ (oxygen) into the atmosphere.

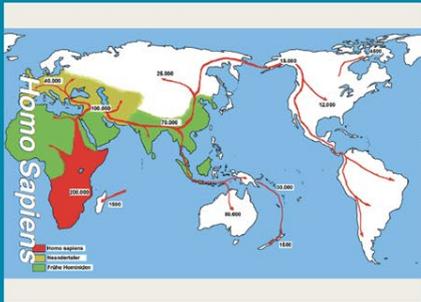


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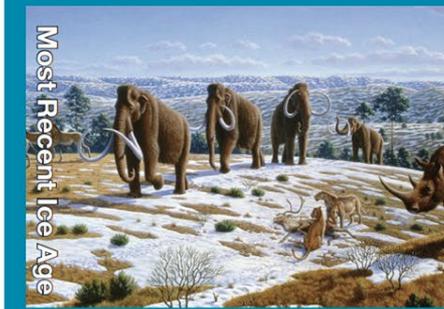
Events in Earth's History—Ocean Sciences Sequence 3.1–3.2



Industrial Revolution



Most Recent Ice Age



Most Recent Ice Age

The average temperature on Earth becomes much colder. Huge sheets of ice cover parts of the ocean and continents. As temperatures get colder, there is less CO₂ in the atmosphere. When the ice age ends and temperatures get warmer, there is more CO₂ in the atmosphere.



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Industrial Revolution

The Industrial Revolution begins. Machines are developed to do the work of people. Machines release a lot of CO₂ into the atmosphere.



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Homo Sapiens

Homo sapiens that look like today's humans live in Africa and begin to spread around the planet.



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 Events in Earth's History—Ocean Sciences Sequence 3.1–3.2



Group Directions

1. Take turns reading the information on each of the cards aloud to the group.
2. Work together as a group to put the cards in order.
3. Use evidence to explain why you think cards should go in a certain order.
4. Be sure all group members share evidence.
5. Be ready to change your ideas when there is convincing evidence.
6. Discuss your group's final decision thoroughly and be sure everyone in the group agrees.
7. Be prepared to share information and evidence (reasoning) with the class about your group's decision.

Earth Cools

Earth's surface cools and becomes solid rock. The cooler surface allows gases to stay and form the early atmosphere. These are some of the gases in Earth's early atmosphere:

- CH₄ (methane)
- H₂ (hydrogen)
- CO₂ (carbon dioxide)
- N₂ (nitrogen)
- H₂O (water vapor)



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Molten Earth

Earth is covered in volcanoes and hot, molten lava (melted rock). Volcanoes release a lot of gases, but most of the gases go into space because Earth is so hot.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Earth Forms

Small and giant rocks crash into each other in space and form Earth.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

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The first living things that could photosynthesize live in the ocean. These plantlike organisms take in CO₂ (carbon dioxide), and give off O₂ (oxygen) into the ocean.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

First Life

Life begins to appear in Earth's ocean. The earliest organisms got their food from chemicals. They did not breathe O₂ (oxygen).



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Ocean Formation

H₂O (water vapor) from volcanoes, comets, and asteroids condenses into liquid H₂O on Earth's surface, forming the ocean.



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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Animals on Land

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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2

Land Plants

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Events in Earth's History—Ocean Sciences Sequence 3.1–3.2



Discussing the event cards

- “What did you notice?” What surprised you? Why?”
- “What are two events that happened with the least amount of time between them?”
 - [Any of the most recent events.]
- “What are some events that changed the Earth’s atmosphere?”
 - [Earth cools; photosynthetic organisms; oxygen in atmosphere; land plants; most recent ice age; Industrial Revolution.]
- “What are some events that changed Earth’s ocean?”
 - [Ocean formation; first life; photosynthetic organisms.]



*Key
Concept*



3.1

- **Early Earth had no ocean or atmosphere, but ever since they formed billions of years ago, they have been constantly changing.**
- **The first photosynthetic organisms developed in the ocean, and that led to Earth having an atmosphere rich in oxygen.**

**Principle 4:
The ocean makes Earth habitable.**

Oxygen Production

Origins of Life

A. Originally, all oxygen in the atmosphere came from photosynthetic organisms in the ocean.

B. Life started in the ocean, and the earliest evidence of life is found in ancient ocean sediments.

A.1. Earth originally had an atmosphere containing gases toxic to most organisms; there was no life on land until oxygen became common in the atmosphere.

A.5. Most of the oxygen consumed by organisms living on land and in the water is produced by photosynthetic organisms in the ocean.

B.1. The fossil record of ancient lifeforms provides evidence for the theory of evolution and the important role that the ocean played in the evolution of life on Earth.

A.2. Cyanobacteria (blue-green algae) living in the ocean generated oxygen in Earth's atmosphere through the process of photosynthesis, over many millions of years.

A.6. The process of photosynthesis produces oxygen gas, while respiration and decay use oxygen.

B.2. Cyanobacteria (blue-green algae), the ancestors of all plants and algae, are among the oldest fossils currently known on Earth. These 3 billion-year-old organisms evolved in the ocean, and are found in ancient ocean sediments.

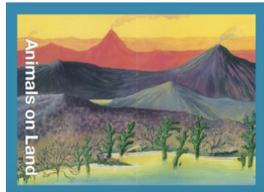
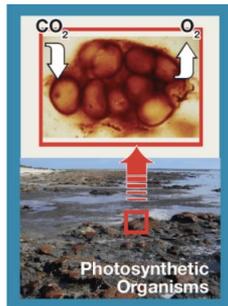
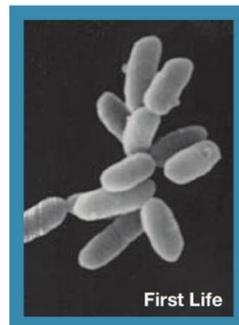
B.4. The millions of different species of organisms on Earth today are related by descent from common ancestors that evolved in the ocean and continue to evolve today.

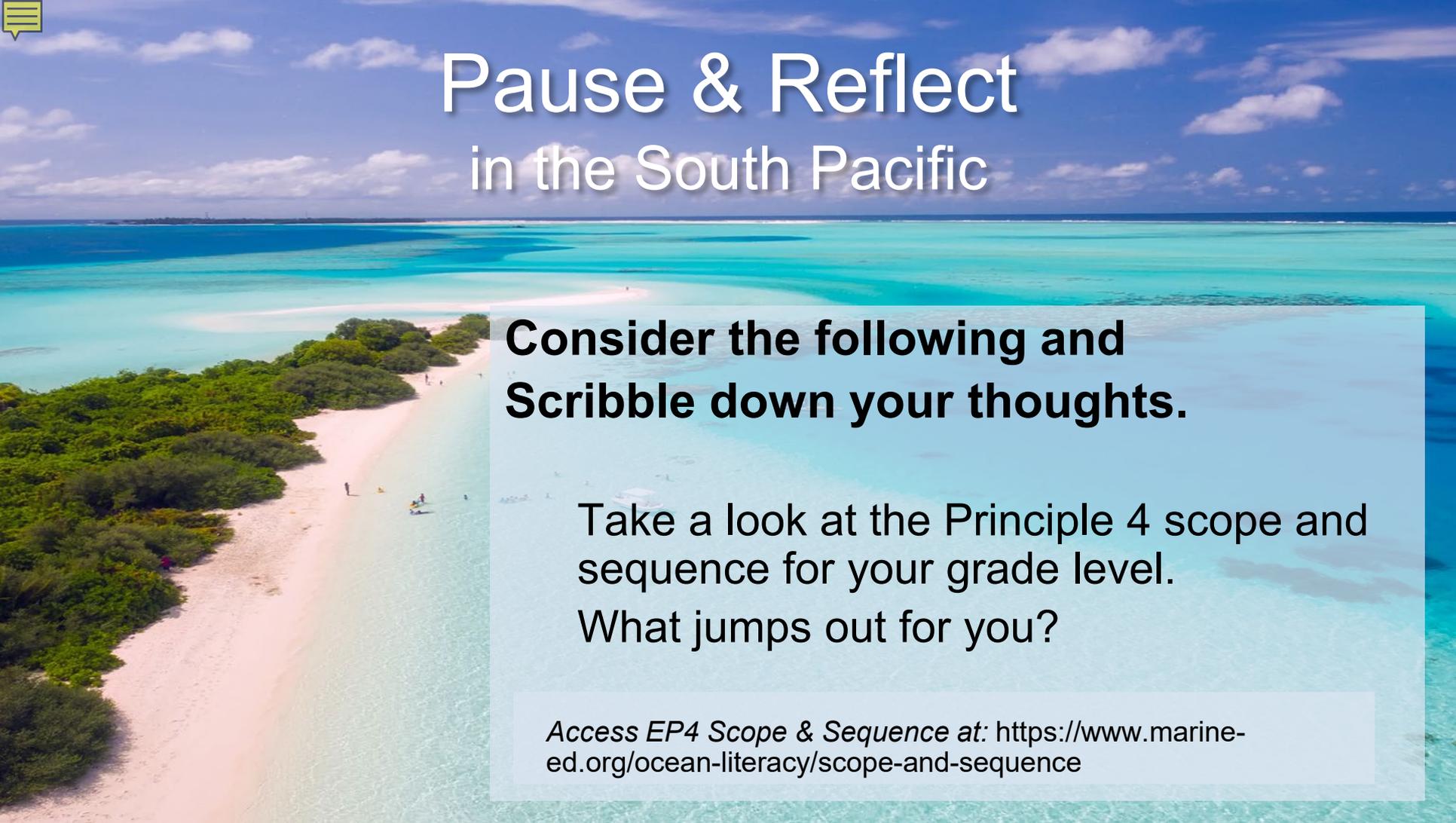
A.3. The oxygen produced by cyanobacteria through photosynthesis first accumulated in the ocean, and then escaped into the atmosphere, where it formed ozone that blocked much UV radiation from reaching Earth's surface.

B.3. The chloroplast, which plants use to make food for themselves through photosynthesis, is a remnant of cyanobacteria.

A.4. By 550 million years ago, oxygen and ozone levels in the atmosphere were high enough that terrestrial organisms could develop and survive.

See Principle 2: B7



An aerial photograph of a tropical beach. The water is a vibrant turquoise color, transitioning to a deeper blue further out. A narrow strip of white sand beach runs along the left side, bordered by lush green vegetation. Several people are visible on the beach and in the shallow water. The sky is a clear, bright blue with scattered white clouds.

Pause & Reflect in the South Pacific

**Consider the following and
Scribble down your thoughts.**

Take a look at the Principle 4 scope and
sequence for your grade level.
What jumps out for you?

Access EP4 Scope & Sequence at: <https://www.marine-ed.org/ocean-literacy/scope-and-sequence>



The S&S flows are a versatile tool for several reasons:

- describe the developmentally appropriate concepts at each grade band;
- graphically illustrate relationships among concepts;
- provide an example of the sequence in which the concepts can be taught;
- provide a foundation for an assessment plan;
- are accessible and useful; and
- are consistent with learning theory and cognitive science.



What is the Ocean Literacy Framework?

- The Ocean Literacy Framework comprises 4 consensus documents:
 - *Ocean Literacy: The Essential Principles of Ocean Sciences for All Ages* (also known as the Ocean Literacy Principles or Ocean Literacy Guide); and
 - *Ocean Literacy Scope and Sequence for Grades K–12* (also known as the Scope & Sequence).
 - *Alignment of Ocean Literacy to the Next Generation Science Standards*
 - *International Ocean Literacy Survey*

THE ESSENTIAL PRINCIPLES OF OCEAN SCIENCES

1

The Earth has one big ocean with many features.

2

The ocean and life in the ocean shape the features of Earth.

3

The ocean is a major influence on weather and climate.

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The ocean made Earth habitable.

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The ocean supports a great diversity of life and ecosystems.

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The ocean and humans are inextricably interconnected.

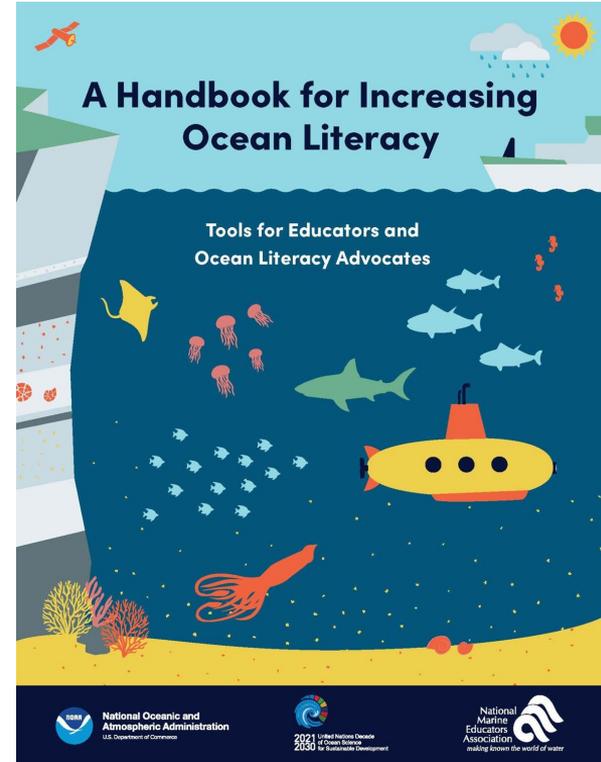
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The ocean is largely unexplored.

Where to find these documents

Visit www.oceanliteracyNMEA.org for:

- Ocean Literacy Guide
- Ocean Literacy Scope & Sequence for Grades K–12
- Alignment of Ocean Literacy to the Next Generation Science Standards
- International Ocean Literacy Survey





Agenda

-  **Part 1: History of the Ocean Literacy Campaign**
Introducing the Framework
Exploring Essential Principle 4
-  **Part 2: Resources, Applications, & Impacts**
-  **Part 3: Getting Involved in & Future Directions of the Campaign**



Part 2

Resources, Applications, & Impacts



Resources: NMEA Webinar Series

Want to learn more? Need a refresher?

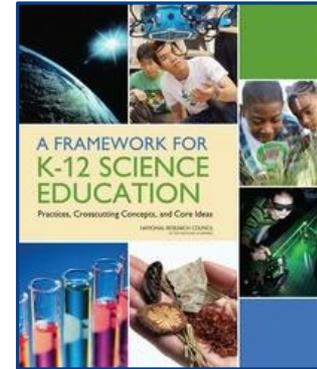
NMEA's Ocean Literacy Committee hosted a series of three webinars exploring the:

1. scope & sequence;
2. alignment of the Ocean Literacy to NGSS; &
3. applications of the Framework in formal & informal education

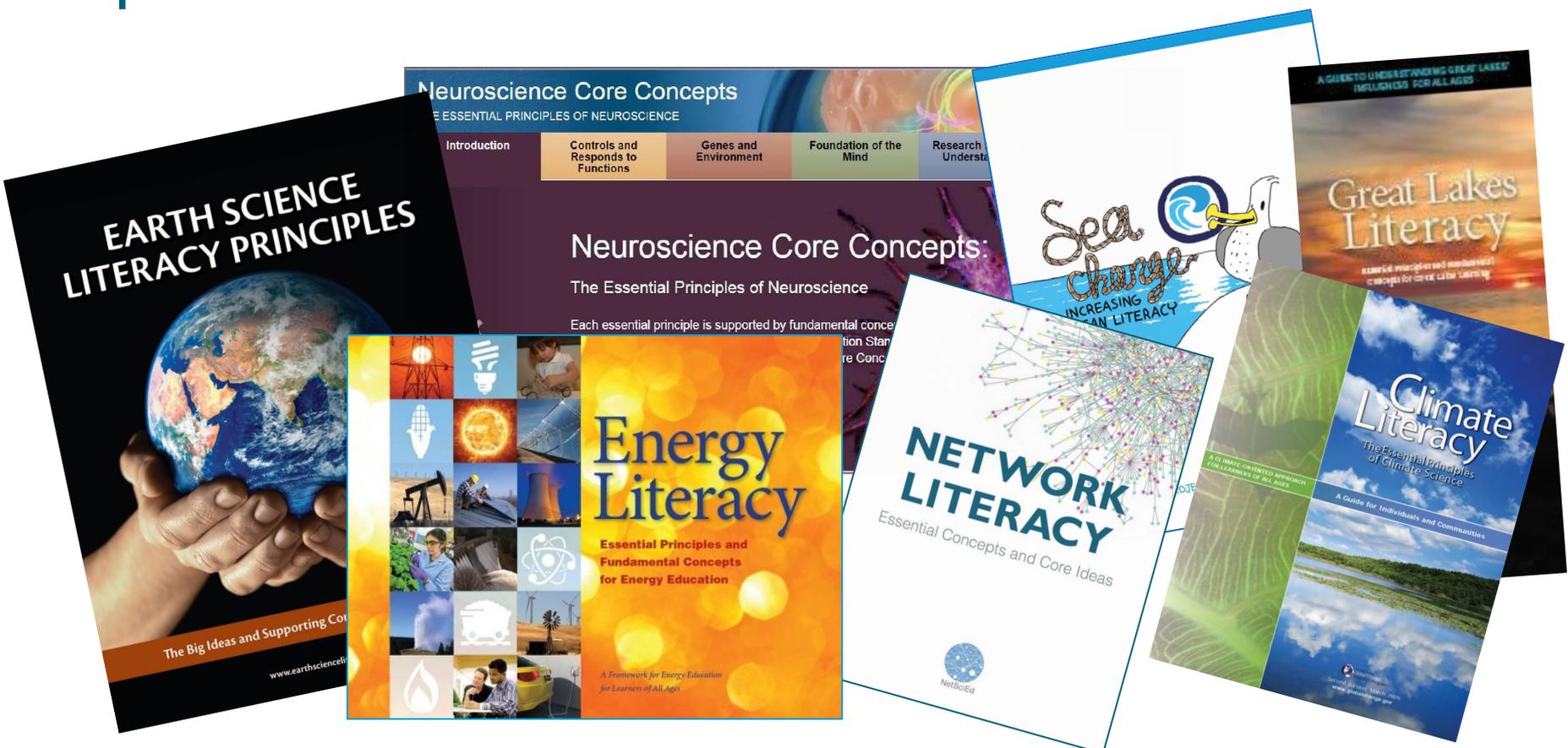
Visit <https://www.marine-ed.org/ocean-literacy/webinars> to access to the archived recordings and materials of these webinars.

Impacts of the Ocean Literacy Campaign: Influencing Curriculum & Instruction

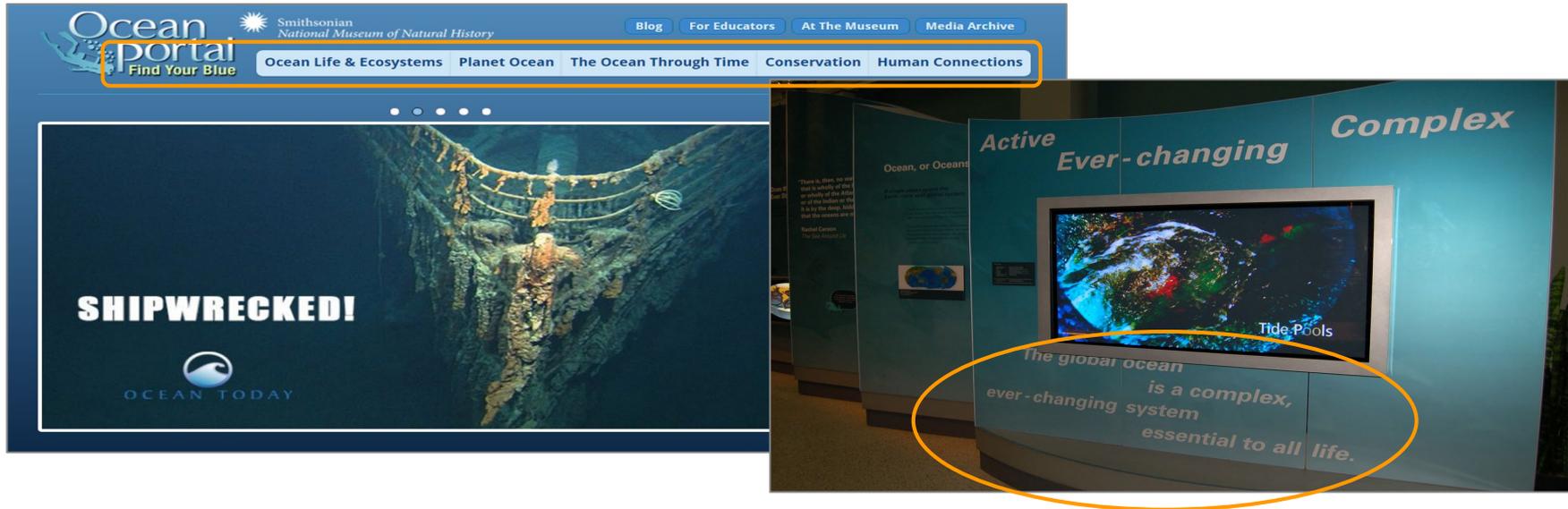
- Ocean Literacy framework influenced a “Framework for K-12 Science Education” & Next Generation Science Standards.
- Translation of the Guide into multiple languages.
- In Korea, Japan, China, Taiwan, and the Philippines provincial & national education policies for curriculum and instruction adopt ocean literacy as a focus.
- South Africa advocates for Ocean Literacy to be included in South Africa secondary curriculum.



Impacts: A Model for Others

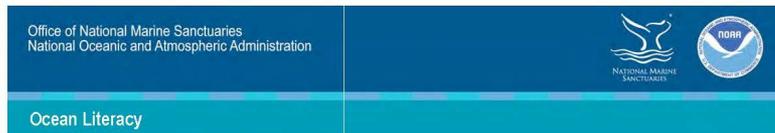


Impacts: Influence on Exhibit Design



“Covering 71% of the Earth's surface and containing 97% of the planet's water, the ocean is a vast and complex ecosystem; it is intrinsically connected to other global ecosystems and is essential to all life, including our own.”

Impacts: Themes & Messaging in Informal Education



Credit: www.shutterstock.com



Ocean Literacy Concepts, Talking Points and Case Studies

Whether you live in Kansas or on Kauai, the ocean affects your life. Covering more than 70 percent of the planet, the ocean is a vital source of life on Earth. Every other breath you take originates from the ocean. Weather patterns and climate are influenced by its currents. Seafood provides 13 to 16 percent of the world's protein.

The health of our ocean and Great Lakes is influenced by global as well as local forces. Human beings depend on the ocean for a wealth of goods and services, yet climate change, overfishing, plastic pollution and other threats are diminishing the ability of the ocean to provide many of these benefits into the future.

The NOAA Office of National Marine Sanctuaries is charged with conserving and managing special ocean areas deemed to be of irreplaceable national significance. Education plays a key role in fulfilling this mandate. Over the past decade, sanctuary education programs have been a powerful force in building stewardship for these unique places and in stimulating marine education, but pressures on sanctuaries and the greater ocean continue to grow. Thankfully, so does the public's attention to ocean health issues. The National Marine Sanctuary System must capitalize on this opportunity to provide our constituents and policy-makers at all levels with the information they need to make intelligent environmental decisions.

One way to do this is to create an ocean-literate public. Ocean literacy is an understanding of the ocean's influence on you and your influence on the ocean.



Ocean Literacy Concept #6c

The ocean is a source of inspiration, recreation, rejuvenation and discovery. It is also an important element in the heritage of many cultures.

Sanctuary-Specific Talking Points

1. National marine sanctuaries are sources of inspiration, recreation, rejuvenation and discovery and they enhance our understanding of our cultural connections to the ocean and Great Lakes.

Possible Sanctuary-Related Case Studies (Each field site should create their own case studies as appropriate. These are just a few examples.)

- Many native peoples paddle their traditional canoes in Channel Islands, Olympic Coast, and Hawaiian Islands Humpback Whale national marine sanctuaries and the Papahānaumokuākea Marine National Monument as a way to maintain their long-standing cultural connection with the ocean.
- Through time, many national marine sanctuaries have been recognized as irreplaceable areas for recreation, such as fishing, diving, kayaking, snorkeling, surfing, boating, swimming and more.
- National marine sanctuaries serve as important time capsules for our nation's maritime history (e.g., trade routes, shipwrecks).



Photo: www.shutterstock.com, NOAA National Marine Sanctuaries



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Impacts: Themes & Messaging in Informal Education



MISSION AND MESSAGING PLAN

MISSION OUTCOMES

Last modified: September 2016



At the Seattle Aquarium, we believe that the best way to develop an understanding of our relationship with the ocean is through understanding our local marine environment.

Connect people to the life-sustaining oceans through a focus on Puget Sound and the Pacific Ocean. – Seattle Aquarium Strategic Plan 2011-2030

Therefore, to make ocean science accessible and relevant to our audiences, we must place these Principles through two filters: a **regional filter** that considers the principles within the context of Puget Sound and the near Pacific, and a **collections filter** that considers examples relevant to our animal collection. In some cases, animals in our collection may be chosen to represent certain aspects of our outcomes, other times; we may choose to highlight certain outcomes based on our collection. While all the OLPs are important to a complete understanding of the ocean, some aspects are more relevant to our audiences, our region, and our exhibits than others. In some cases, we have adopted the fundamental concepts exactly, where they were particularly relevant to our region or collection.

OCEAN LITERACY OUTCOME 1 (OLO1)

Audiences will know the Earth has one big ocean with many features.

- Puget Sound, its watersheds, the Salish Sea are connected to, and a part of, our one world ocean.
- Circulation systems that flow through the ocean also flow through Puget Sound, bringing organisms, nutrients, energy, and pollution to and from our shores.
- Changes happening here (positive and negative) affect the whole ocean. Changes to the ocean, affect Puget Sound.

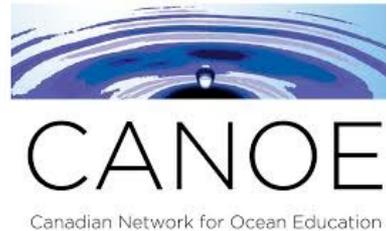
OCEAN LITERACY OUTCOME 2 (OLO2)

Audiences will know the ocean and life in the ocean shape the features of Earth.

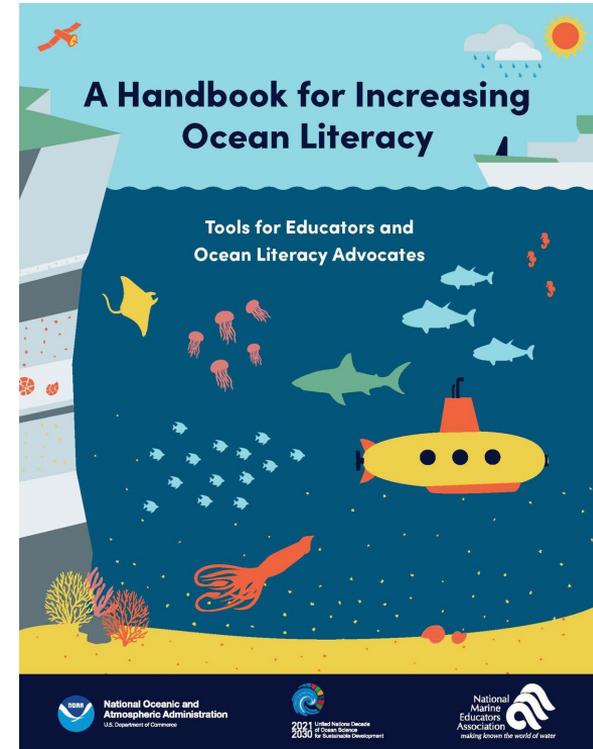
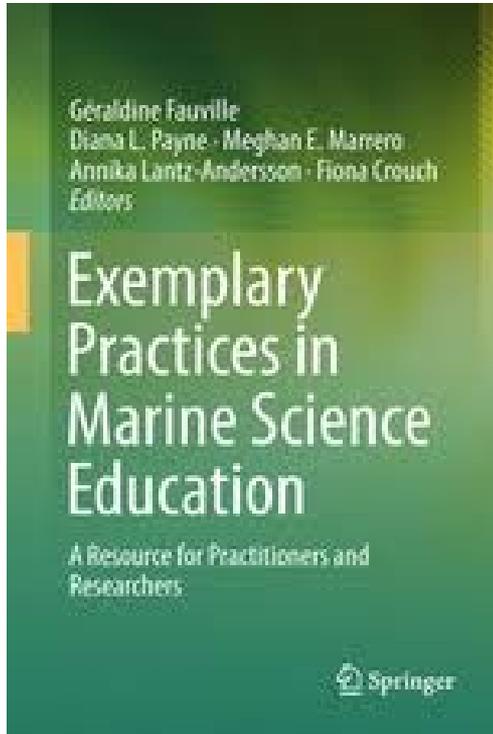
- Erosion—the wearing away of rock, soil, and other biotic and abiotic earth materials—occurs in coastal areas. Erosion creates beach sand and can change the shape of coastlines.
- The ocean is the largest reservoir of rapidly cycling carbon on Earth. Many organisms use carbon dissolved in the ocean to form shells, other skeletal parts, and coral reefs.
- Tectonic activity, sea level changes, and the force of waves influence the physical structure and landforms of the coast.
- Puget Sound was formed after the retreat of the Cordilleran ice sheet. The unique shape and profile of the Sound influences the way species and nutrients move, creating a distinctive ecosystem.

Impacts: International Organizations Formed

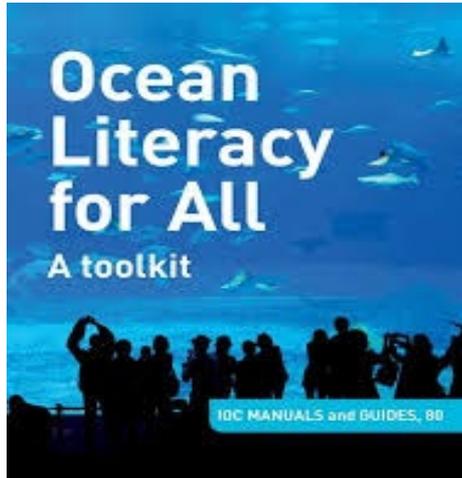
... to support Ocean Literacy in other countries



Impacts: Publications



Impacts: International Efforts



2021
2030 United Nations Decade
of Ocean Science
for Sustainable Development

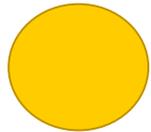
Agenda



**Part 1: History of the Ocean Literacy Campaign
Introducing the Framework
Exploring Essential Principle 4**



Part 2: Resources, Applications, & Impacts



**Part 3: Getting Involved in & Future Directions of
the Campaign**



Part 3

Getting Involved in &
Future Directions of the Campaign



Want to Get Involved in the Ocean Literacy Campaign?

- Obtain copies of the Ocean Literacy Framework documents
- Join an organization that is promoting Ocean Literacy (e.g., NMEA)
- Advocate for Ocean Literacy in your state science education standards & assessments
- Represent the ocean & Ocean Literacy in climate & environmental education conversations, conferences, & communities of practice.
- Attend a conference, activity, and/or online course or workshop to promote Ocean Literacy



How to Get Involved (cont.)

- Promote local aquariums, science museums, & marine education centers as places to be inspired, learn more, & make connections
- Be a voice for Ocean Literacy in public policy discussions
- Get funding for ocean sciences education programs
- Promote on Ocean Literacy social media with #oceanliteracy #environmentalliteracy & @NatlMarineEd



What's Next?

- Continued promotion/spreading of Ocean Literacy via various other regional/national/international organizations and the NMEA
 - New England Ocean Science Education Collaborative (NEOSEC)
 - Ocean Literacy-themed events and presentations at NMEA 2022
- UN Decade of Ocean Science for Sustainable Development (2021-2030)
 - *Ocean Literacy For All: A toolkit* (publication; UNESCO, IOC)
 - Ocean Literacy Portal (online; UNESCO, IOC)
 - Ocean Literacy With All (OLWA) programme
 - [Global Ocean Literacy Research community](#) workshop, Nov 23
 - Ocean Decade [website](#) - join as a Stakeholder



Here's what is planned for Saturday's sessions...

Morning

8:00 - Welcome

8:30 - Principle 1

9:30 - Principle 2

10:30 - Principle 3

11:30 - GAME Mtg

12:00 - Lunch

Afternoon

1:00 - Principle 5

2:00 - Principle 6

3:00 - Principle 7

4:00 - Alignment with GA standards

4:30 - Break

5:30 - GAME anniversary celebration!



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