

Unit 3: Marine Ecology
Marine Science
15 Classes

Created February 2026

Essential Questions

- How does energy and nutrients transfer between organisms and their environment?
- How do organisms impact one another and their environment?

Enduring Understandings with Unit Goals

EU 1: Energy and Nutrients transfer between organisms and their environment.

- Energy can be transferred between living and nonliving factors
- Nutrients can be transferred between living and nonliving factors

EU 2: Organisms can impact one another and their environment

- Some organisms can have a greater impact on ecosystems than others
- Humans impact living and non-living factors in the environment

Standards

Common Core State Standards

- **CCSS.ELA-LITERACY.RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts.
- **CCSS.ELA-LITERACY.RST.6-8.3** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- **CCSS.ELA-LITERACY.RST.6-8.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

Next Generation Science Standards

- **MS-ETS1-2 Engineering Design** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- **MS-ESS3-5 Earth and Human Activity** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

ISAAC Vision of the Graduate Competencies

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- Competency 1:** Write effectively for a variety of purposes.
Competency 2: Speak to diverse audiences in an accountable manner.
Competency 3: Develop the behaviors needed to interact and contribute with others on a team.
Competency 4: Analyze and solve problems independently and collaboratively.
Competency 5: Be responsible, creative, and empathetic members of the community.

Unit Content Overview

1. Food Webs and Energy Transfer
 - Foods Webs and Energy Transfer in marine ecosystems
 - Photosynthesis and Cellular Respiration
 - Importance of Phytoplankton
 - Bioaccumulation in marine ecosystems - mercury in fish

2. Marine Ecology
 - What is Ecology
 - Identifying Symbiotic Relationships
 - Otters as a Keystone Species in Kelp Forests (Case study)
 - Trophic Cascades in marine ecosystems
 - Population dynamics and carrying capacity
 - Sharks balance marine ecosystems -OCEARCH shark tracking and Virtual Visit from Scientist
 - Lionfish Case Study with graphing
 - Invasive species of Long Island Sound Wanted Poster Project

3. Nutrient Cycling in the Oceans
 - How Nutrients Cycle in oceans
 - Carbon Cycle Game
 - From the sea to Grizzlies and Forests

4. Climate Change
 - Indicators of climate change
 - Ocean acidification lab - shelled organisms within Long Island Sound

KeyTerms and Vocabulary:

Carrying Capacity, Organism, Abiotic Factors, Ecology, Habitat, Community, Biotic Factors, Niche Ecosystem, Biome, Limiting Factor, Populations, Photosynthesis, Bioaccumulation, Symbiotic, Trophic Level, Invasive species, Keystone species, Climate change, Ocean acidification, Trophic Cascade

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Interdisciplinary Connections: Language Arts, Mathematics, Science

Daily Learning Objectives with TWPS

Students will be able to...

- Describe how matter and energy moves through the food web of the ocean.*
 - *What are the trophic levels and how does an organism's position determine the amount of energy it receives?*
 - *How much does energy diminish as it moves through the food web?*
 - *How does plastic move through the food web?*
 - *How can toxins accumulate within organisms?*
 - *Why are populations limited by a carrying capacity?*
- Investigate how plants convert the sun's energy into usable energy for organisms.*
 - *How do plants convert the sun's energy into usable energy for organisms?*
 - *Why are plankton important for marine ecosystems?*
- Analyze the various relationships organisms can have with one another within an ecosystem.*
 - *What types of interactions can two organisms have with one another in an ecosystem?*
 - *How can the disappearance of one species impact the entire ecosystem?*
 - *How can the appearance of one species impact the entire ecosystem?*
- Analyze the relationship between climate change and ocean changes.*
 - *How do scientists know climate change is occurring?*
 - *How is climate change impacting the ocean environment?*
 - *How does carbon cycle throughout the oceans and terrestrial ecosystems?*
 - *What can people do to combat the effect of climate change on our oceans?*
- Understand ocean acidification and its effects on marine life.
 - *How does ocean acidification affect shelled organisms and water parameters?*

Instructional Strategies/Differentiated Instruction

- Daily Warm Up Activities
- Lecture slides with guided note-taking
- Flexible grouping
- Exit slips
- Graphic Organizers
- Creating authentic connections for students

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- Rephrasing and restatement of information and concepts
- Student use of headphones
- Independent reading
- Outlining of text
- Determining central ideas, paraphrasing
- Laboratory Experiences

EL Differentiated Instruction:

- Sentence starters
- Simplified direction
- Prompting and questioning
- Alternate responses when needed
- Explicit modeling
- Key vocabulary
- Visuals
- Graphic organizers
- KWL charts
- Venn diagram
- Glossary

Assessments

FORMATIVE ASSESSMENTS:

- Warm Up Activities
- Daily check-ins with students

SUMMATIVE ASSESSMENTS:

- Quiz on EU 1
- Quiz on EU 2
- Unit Task
- Unit Test

Unit Task

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Unit Task Name: “Wanted Organisms within the Sound”

Description: Students will create a marine ecology digital project by researching an invasive species (EU 2) found in Long Island Sound. Students will investigate how this organism impacts the native species within Long Island Sound and how this organism impacts the food web within the estuary. (EU 1)

Evaluation: Teacher Created Problem Solving Rubric

Unit Resources

- Chromebook
- Internet Access
- Marine Touch Exhibit
- Pear Assessment
- Newsela