

Unit 2: Marine Ecology
7th Grade Honors Marine Science
20 Class Meetings
Revised June 2026

Essential Questions

- How does energy and nutrients transfer between organisms and their environment?
- How do organisms impact one another and their environment?
- How do changes in an ecosystem impact what lives there?

Enduring Understandings with Unit Goals

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

- Energy can be transferred between living and non-living 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
- Organisms can directly and indirectly have impacts on the ecosystem

EU 3: Humans can use scientific methods to monitor and minimize human impact on people, organisms, and ecosystems.

- Explore how human activity such as pollution, development, and urbanization can disrupt an ecosystem.
- Determine solutions and models that Humans need for sustainable practices and solutions to protect organisms and their habitat.

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.
- **RI 7.1:** Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
- **RI 7.3:** Analyze the interactions between individuals, events, and ideas in a text.
- **RI 7.8:** Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound, and the evidence is relevant and sufficient to support the claims.
- **W 7.1:** Write arguments to support claims with clear reasons and relevant evidence.

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Next Generation Science Standards

- **MS-LS2-1:** Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- **MS-LS2-4:** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- **MS-LS2-2:** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- **MS-LS2-5:** Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
- **MS-ESS3-3:** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- **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

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. Examine Food Webs and Energy Transfer

- Foods Webs and Energy Transfer in marine ecosystems
- Abiotic and Biotic factors within ecosystems
- Importance of Phytoplankton
- Bioaccumulation in marine ecosystems - mercury in fish

2. Investigate 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
- Invasive species - Lionfish Case Study with graphing
- Invasive species of Long Island Sound Wanted Poster Project

3. Explore Nutrient Cycling in the Oceans and how resources impact ecosystems

- Investigate How Nutrients Cycle in oceans

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- Model Carbon Cycle Game

4. Use models to predict and evaluate environmental and human impact on biodiverse systems.

- Identify Indicators of climate change
- Evaluate and compare how disruptions impact biodiversity
- Construct arguments to prove more diverse ecosystems benefit the environment.
- Investigate how changing an ecosystem affects what lives there.

Key Terms 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, Food Chain, producers, consumers, decomposers, model, design, biodiverse systems

Interdisciplinary Connections: Language Arts, Mathematics, Science

Daily Learning Objectives with *TWPS*

Students will be able to...

- Define food chains and food webs
 - *Identify producers, consumers, and decomposers from the food chains/webs.*
- 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?*
 - *Why are plankton important for marine ecosystems?*
 - *How can toxins accumulate within organisms?*
 - *Why are populations limited by a carrying capacity?*
- 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?*
- Evaluate solutions for maintaining biodiversity.
 - *How can we increase the population and biodiversity within the ecosystem?*
 - *How can we maintain a stable population?*
- Apply scientific principles for monitoring and minimizing human impact on the environment.
 - *How would scientists think about and solve this problem?*

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- *Why are solutions to environmental problems complicated?*
- Design and critique solutions and models for maintaining or restoring ecosystems.
 - *What worked? What would I change and why?*
- Create a model of how energy flows through a specific ecosystem. **
 - *Describe the different relationship between organisms in an ecosystem. How does one depend on the other for survival?*
- Compare and contrast the most threatened organisms and their ecosystems.
 - *Which species is most threatened and how would it have the most impact on the ecosystem if it did not survive?*

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
- Rephrasing and restatement of information and concepts
- Independent reading
- Outlining of text
- Determining central ideas, paraphrasing
- Laboratory Experiences
- Whole group instruction
- Accountable Talk
- Homework
- CER (Claim, Evidence, Reasoning)

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

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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

Unit Task Name: “Wanted Organisms within the Sound”

Description: Students will create a marine ecology digital project by researching an invasive or endangered species (EU 2) found in Long Island Sound. If invasive, 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. If endangered, students will predict the impact in the ecosystem if this organism were to disappear from its habitat (EU 1) After compiling all the information, students will analyze and then propose an appropriate solution to protect or save the species (endangered) or manage the species (invasive). (EU3) The final part of the task will be sharing the possible solution(s) and proposed call to action. Students will create a Public Service Announcement or Infographic to share at the class gallery walk.

Evaluation: Teacher Created Problem Solving Rubric

Unit Resources

- Chromebook
- Marine Touch Exhibit
- Pear Assessment
- Science notebooks
- NGSS Interim Assessments PE MS-LS2-1
- Newsela article (Higher Level Text)
- Readworks.com