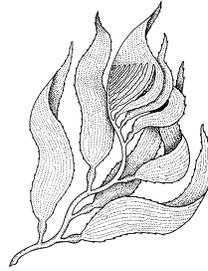


## Kelp Forest Digital Resources Teacher's Guide



### Topics

Kelp Forest, Ecosystem

### Grades

3-5

### Site

Indoors

### Duration

Varies

### Materials

- Internet-connected device
- Headphones

### Vocabulary

adaptation, food web, ecosystem, kelp forest

### Overview

**The Kelp Forest: The Young Explorer's Guide** is an interactive e-book developed for students to learn more about the Kelp Forest ecosystem and the Aquarium's exhibit.

**The Kelp Forest: My Aquarium** is a multi-level game that introduces students to the components and interactions of this ecosystem.

This teacher's guide provides tips for navigating the apps, prompts for adding depth, post-reading writing prompts and suggestions for related science activities.

### Download the Book and Game

<http://www.montereybayaquarium.org/education/classroom-resources/games-and-activities/kelp-forests>

### Book Navigation Tips

- *Table of contents and ecosystem cards:* Tap the top left of the page to access these. Then quickly navigate to different sections of the book.
- *Vocabulary:* Swipe up from the bottom to access definitions of underlined words.
- *Sound:* Make sure students have headphones so that they can hear the clips in the book.

### Game Navigation Tips

- The first time you open up the game, there will be a tour and tutorial.
- Use your finger to move around the aquarium and two fingers to zoom in and out.
- To place an animal in the aquarium, tap the tank that it is in. The tank will tilt, showing it is ready to be put in the aquarium. Then tap where you want the animal to go.
- After going through some of the levels, you'll earn sand dollars you can use to populate your main aquarium. Click on the "Shop" button to choose the species.
- Click on "Species" to get more information about the things that live in the kelp forest.

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**THE MISSION OF THE  
MONTEREY BAY  
AQUARIUM  
IS TO INSPIRE  
CONSERVATION OF THE  
OCEAN.**

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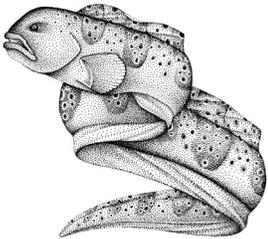


## EL TIPS

This e-book is written at a 4th grade reading level.

For students reading below that level, try partner reading and breaking the text up into smaller sections to read.

Be sure to point out the glossary embedded. The interactives within the book are also helpful for English Learners to understand the content.



## *The Kelp Forest: A Young Explorer's Guide* Post-Reading Writing Prompts by Chapter

### Welcome to the Kelp Forest

- Choose an organism from the species cards. Describe where in the kelp forest it might live (sea floor, mid-layer or canopy) and provide evidence for your idea.
- Compare and contrast a kelp forest and a forest near where you live.
- Different animals live in different layers in the kelp forest. Why do you think the purple sea urchin lives on the sea floor?

### The Giant Kelp Community

- You've read about adaptations. Now choose an animal from the species cards and describe one of its adaptations and why that helps it survive.
- Scavengers, detritivores, and decomposers all have different roles in the kelp forest. What are some examples of organisms that have these roles in your local ecosystem?

### People Who Work in Kelp Forests

- What types of skills do people need to work in the kelp forest?
- What kelp forest job would you like to have? Why?

### The Kelp Forest Exhibit

- What do exhibit designers need to think about when building an exhibit for an aquarium?
- What do you think would be the most difficult part of building a kelp forest exhibit?

### Kelp in Our World

- Why is kelp so special?
- Even if you don't live near the ocean, how can you help keep our kelp forests healthy?

## *The Kelp Forest: My Aquarium* Game Prompt

### Modeling the Kelp Forest Ecosystem

Have students draw a picture (initial model) of the kelp forest before they play the game. After completing each level (Beginner, Advanced, and Bonus) have them return to their drawing with a different colored pencil and add more components and interactions using arrows and short descriptions. At the end, reflect on how their model has changed, what they learned, and what connections they made to their local ecosystems.

## Activities and Investigations

These Monterey Bay Aquarium classroom activities will help you teach about the kelp forest ecosystem as you read this book and play the game. Find them here:

[www.montereybayaquarium.org/education/classroom-resources/curriculum/grade#3-5](http://www.montereybayaquarium.org/education/classroom-resources/curriculum/grade#3-5)

- **Decode a Fish:** Students use science skills to decipher how the body parts of a fish affect its ability to move, find food and protect itself.
- **Kelp Forest Engineering Challenge:** Students design and build a wave maker to help keep kelp alive.
- **Ooey Goey:** Students dissect a gelatin-dessert-filled, plastic glove “stomach” of a marine consumer. Students draw a food chain for their animal and then use it to construct a marine food web as a class.
- **Shark Anatomy:** Students explore shark anatomy by becoming “experts” on shark adaptations and physical characteristics. They take part in a debate justifying the importance of their adaptation or characteristic and then do research to see how specific sharks compare.

These Monterey Bay Aquarium field trip experiences will help you teach about the kelp forest ecosystem. Find more information about them here: <http://www.montereybayaquarium.org/education/field-trip-reservations/programs>

- **Kelp Forest Connections:** Conduct close observations of kelp forest animals and their adaptations to feeding in this one-hour discovery lab experience.
- **Fantastic Fish:** What really makes a fish a fish? From tails to scales, explore the awesome adaptations fish have to survive in the ocean in this facilitated auditorium program.

## Standards

**Next Generation Science Standards** [www.nextgenscience.org](http://www.nextgenscience.org)

Supports Disciplinary Life Science Core Idea 2: Ecosystems: Interactions, Energy and Dynamics and Crosscutting Concept Systems and System Models

**Common Core State Standards** [www.corestandards.org](http://www.corestandards.org)

The e-book may be used to support *Reading: Informational Text* Language Arts Standards in grades 3-5.

## Acknowledgements

*The Kelp Forest: A Young Explorer’s Guide* and *The Kelp Forest: My Aquarium* were developed in collaboration with GameCloud Studios and the Monterey Bay Aquarium. Copyright, 2017. The *Young Explorer’s Guide* was adapted from the original ebook developed by Mountain and Sea Productions with the Monterey Bay Aquarium and published in 2014.



### TEACHER TIP

Use the Monterey Bay Aquarium live web cam of the kelp forest as you discuss the kelp forest ecosystem.

[www.montereybayaquarium.org/animals-and-experiences/live-web-cams/kelp-forest-cam](http://www.montereybayaquarium.org/animals-and-experiences/live-web-cams/kelp-forest-cam)

Watch anytime 7:00 a.m.–7:00 p.m. PST or watch a feeding show at 11:30 a.m.

## Background Information

The kelp forest is one of the most biodiverse ecosystems on the planet. Hundreds of types of fish, invertebrates and some marine mammals make their home in or visit the different layers of the kelp forest, relying on it and each other for food, shelter, oxygen and other nutrients. Just like terrestrial (land-based) forests, kelp forests require nutrients and sunlight for photosynthesis and form the base of a food web. Just like on land, the kelp forest is multilayered, with a canopy layer, a mid-layer, and a bottom layer. Like a forest ecosystem, each layer of the kelp forest provides shelter for large numbers of organisms. Kelp forests differ from land-based forests, however, in several ways. Instead of the roots of trees that extend into the soil, absorbing nutrients, taking up water and anchoring them in place, the kelp's holdfasts anchor them to rocky substrates 2 to 30 meters below the ocean surface. Without true roots, kelp must absorb nutrients from the cool, constantly moving water through their blades. From the holdfasts, kelp grows toward the water's surface with air-filled bladders called pneumatocysts along the stipe (similar to a plant's stem). Pneumatocysts keep these large algae afloat where they can access the sunlight at the surface.

The Monterey Bay Aquarium was the first aquarium in the world to grow and exhibit a living kelp forest showcasing an ecosystem similar to the one just off the Aquarium's back deck. The Aquarium employs engineers, water quality specialists, aquarists, veterinarians, and other professionals to keep this exhibit healthy for the animals that live there and the people who come to visit it.

The two digital resources provided allow students to explore and learn more about this fascinating ecosystem. The game, *My Aquarium*, was designed to mirror the progression of the crosscutting concept Systems and System Models from the Next Generation Science Standards. The levels begin by identifying the biotic and abiotic components of the system before exploring the interactions of those components. In *A Young Explorer's Guide*, students can read more about the components and interactions and also explore the functions of the kelp forest ecosystem and how they can help keep it healthy. Focusing students on conservation actions that they can independently enact is a powerful way to support students' development of agency and confidence that they can make a positive difference for the health of the ocean.

