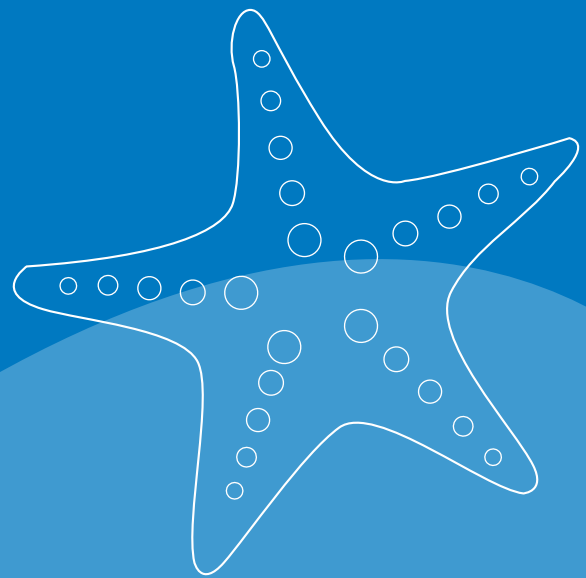


# California Coast Educator Guide

Preschool - Grade 2



What's Inside:

- A. EXHIBIT OVERVIEW**
- B. EXHIBIT MAP**
- C. KEY CONCEPTS**
- D. VOCABULARY**
- E. MUSEUM CONNECTIONS**
- F. RESOURCES**



CALIFORNIA  
ACADEMY OF  
SCIENCES

## The mix of sunshine, wind, water and geology has created one of the world's richest temperate marine communities. Come see why it's special and protected.

**Welcome to the Northern California Coast, home to some of the world's richest temperate marine ecosystems.** In this exhibit, students can learn about the coastal ecosystems of the Northern California Coast on both Level 1 and the Lower Level.

Upstairs on Level 1, students can follow a walkway along a transect of the coast from the San Francisco Bay estuary to the rocky coastline. Downstairs on the Lower Level, students will have several underwater views into the rocky coast tank, modeled on the habitats of the Gulf of the Farallones National Marine Sanctuary, including a dramatic floor-to-ceiling window. Students will walk through a gallery of medium-size and smaller tanks displaying characteristic habitats of the California coast, including rocky coast, rocky reef and sandy bottom.

Through interactive stations, students can learn more about the Gulf of the Farallones National Marine Sanctuary and California marine life. Students can also interact with docents and use magnifiers to explore a variety of marine organisms at the Tidepool.

Understanding the variety of animals and habitats on our California coast, our coastal resources, and how marine sanctuaries can play a role in protecting those resources sets the stage for fostering conservation awareness and environmental stewardship.

Students will encounter two major themes throughout the exhibit:

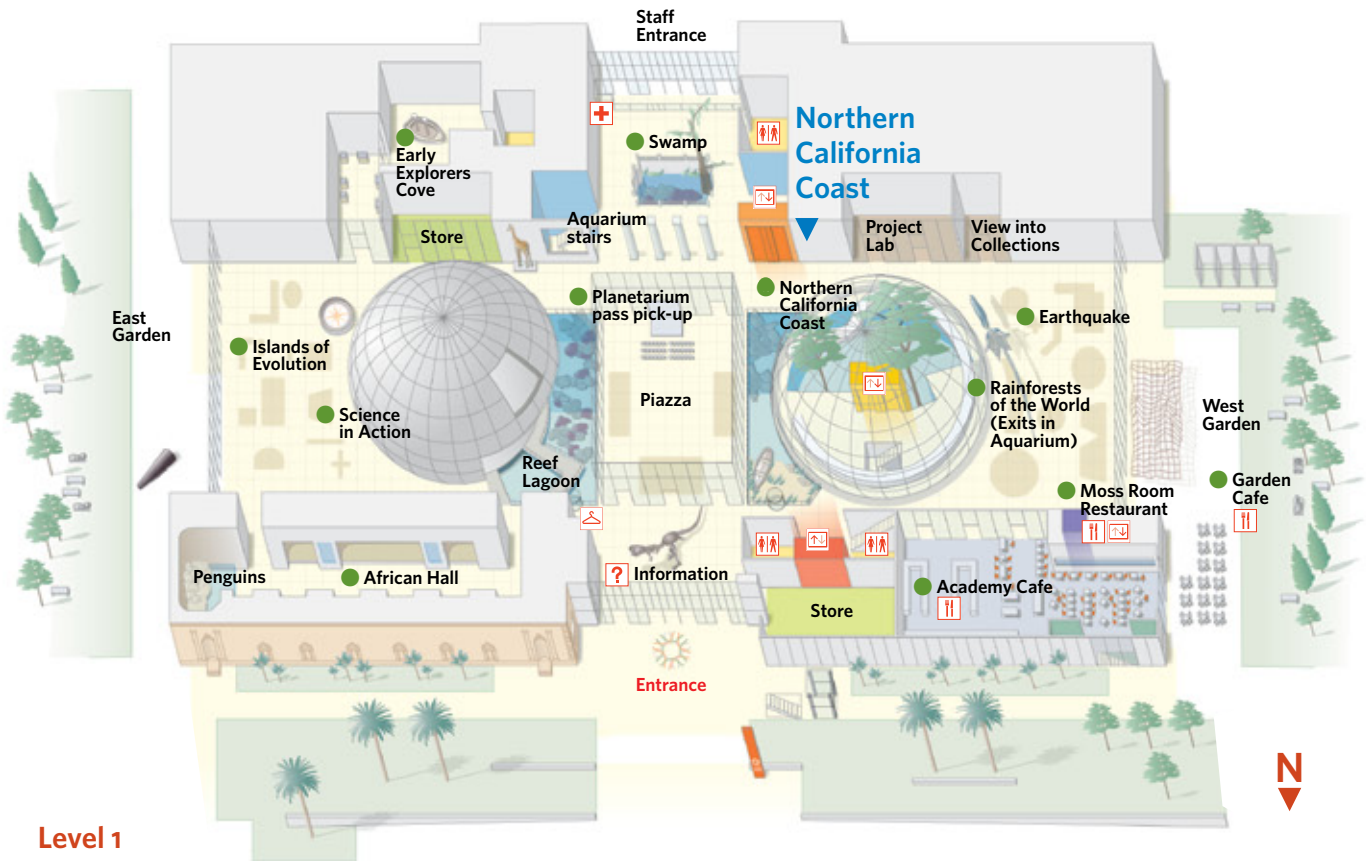
- » California coastal habitats
- » Conservation efforts

### Use this guide to:

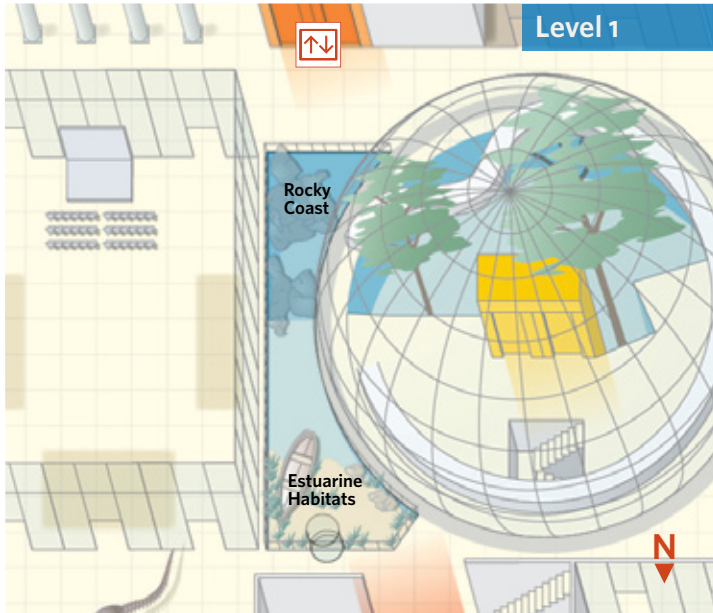
- » Plan your field trip to the California Academy of Sciences' Northern California Coast exhibit.
- » Learn about exhibit themes, key concepts and behind-the-scenes information to enhance and guide your students' experience.
- » Link to exhibit-related activities you can download.
- » Connect your field trip to the classroom.



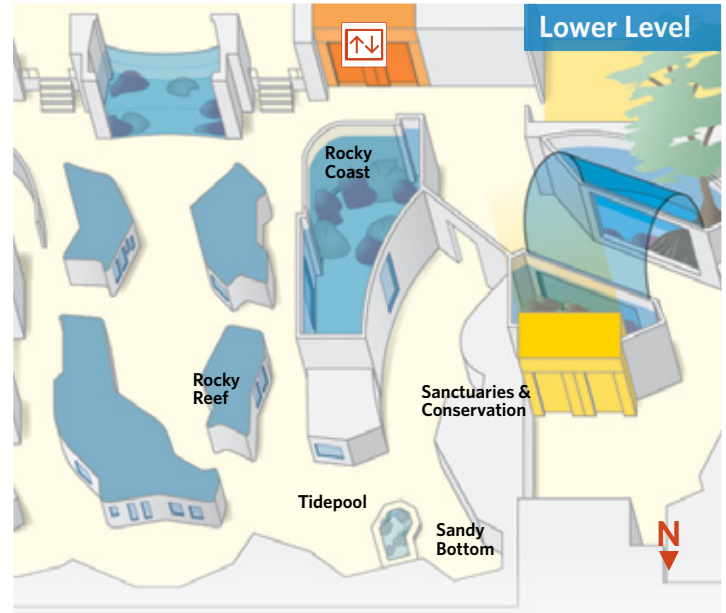
# California Academy of Sciences Map



## Aquarium Map



**Northern  
California  
Coast**



**Northern  
California  
Coast**

Found on Level 1 and the Lower Level of the Aquarium, the Northern California Coast exhibit focuses on two main themes: California coastal habitats and conservation.

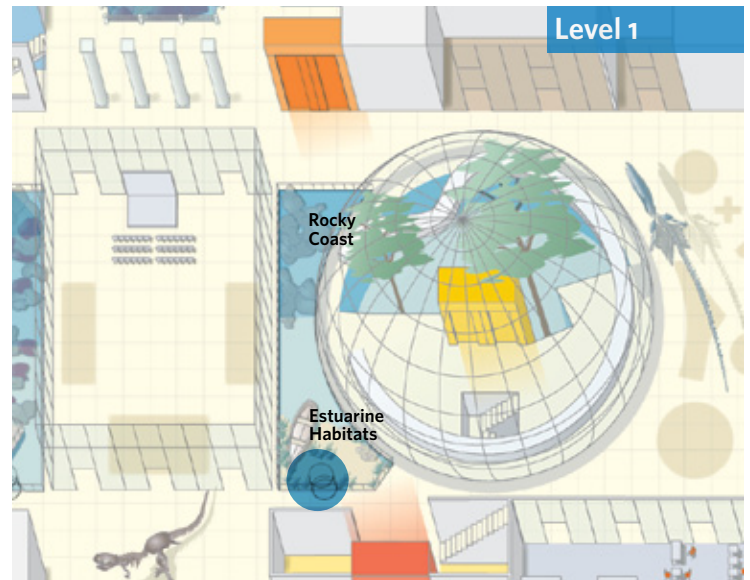
Your students will encounter an abundance of organisms, as well as interactive stations, video presentations and information panels. Spend some time viewing the information on the Academy's website at [www.calacademy.org](http://www.calacademy.org) to begin planning your visit.

## Estuarine Habitats

Estuaries include many types of habitats such as salt marsh and mudflats.

### Main ideas:

- » San Francisco Bay is an estuary, a mixture of fresh water from rivers and salt water from the ocean.
- » San Francisco estuary is vitally important to us, and to the health of the Pacific Ocean and onshore ecosystems.
- » Protection and restoration of San Francisco Bay benefits inland and marine ecosystems as well as the Bay itself and enriches our lives.



## Take a closer look!

These animals call the San Francisco Bay home.

### Bay pipefish

*Syngnathus leptorhynchus*

Look closely among the blades of eelgrass to spot the bay pipefish. They blend right in. Similar to their seahorse relatives, it is the male pipefishes that tend the eggs in a brood pouch until they hatch.

Diet: small crustaceans

Distribution: eastern Pacific Ocean, Alaska to southern Baja California



Photo: Ron DeCloux © California Academy of Sciences

### Dwarf surfperch

*Micrometrus minimus*

Adults and young dwarf surfperch live in shallow waters throughout San Francisco Bay. Like their other surfperch cousins, these little fish give birth to live young rather than laying eggs!

Diet: algae and small invertebrates

Distribution: eastern Pacific Ocean, Bodega Bay to central Baja California



Photo: Ron DeCloux © California Academy of Sciences



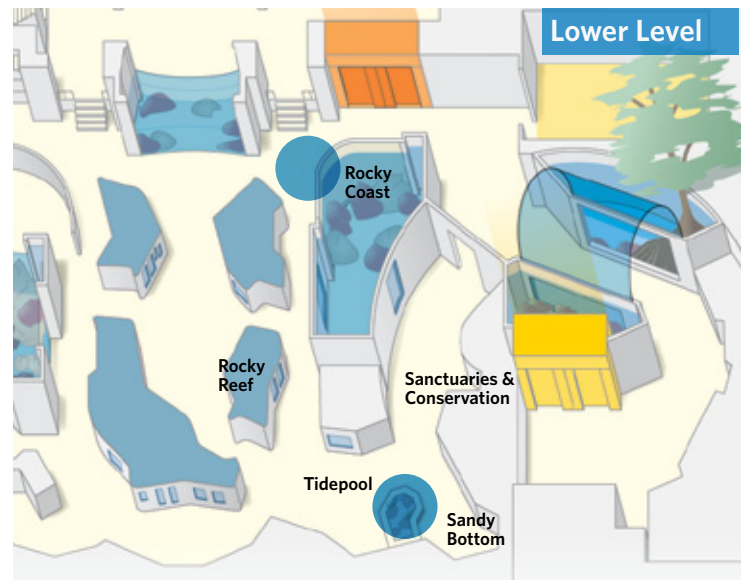


## Rocky Coast Habitat

Life on Northern California's rocky coast is shaped by waves and tides.

### Main ideas:

- » The biodiversity of Northern California's rocky coast is rich and diverse.
- » The daily tidal cycle creates a harsh, changing intertidal environment to which species have adapted.
- » Organisms that live in tidepools face extreme fluctuations in environmental conditions including uv light, oxygen levels, temperature and wave action.
- » Organisms that live on the rocky shore are exposed to waves every day and have adaptations for hanging on and for deflecting waves.



## Take a closer look!

These animals can be found in rocky tidepools.

### Green Sea Anemone

*Anthopleura xanthogrammica*

The green sea anemone has built-in chemicals that prevent sunburn during low tide. Its short body may reduce stress from waves and surge, while the large ring of tentacles increases the chance of capturing prey that happen by.

Diet: mussels, crabs, small fishes

Distribution: eastern Pacific Ocean, Alaska to Panama



Photo: Ron DeCloux © California Academy of Sciences

### Bat Star

*Patiria miniata*

This common sea star lives from the rocky shore down to 300 meters (984 ft) and can be orange, red, yellow, purple or other colors.

Diet: dead animals, algae

Distribution: eastern Pacific Ocean, Alaska to Baja California



Photo: Ron DeCloux © California Academy of Sciences

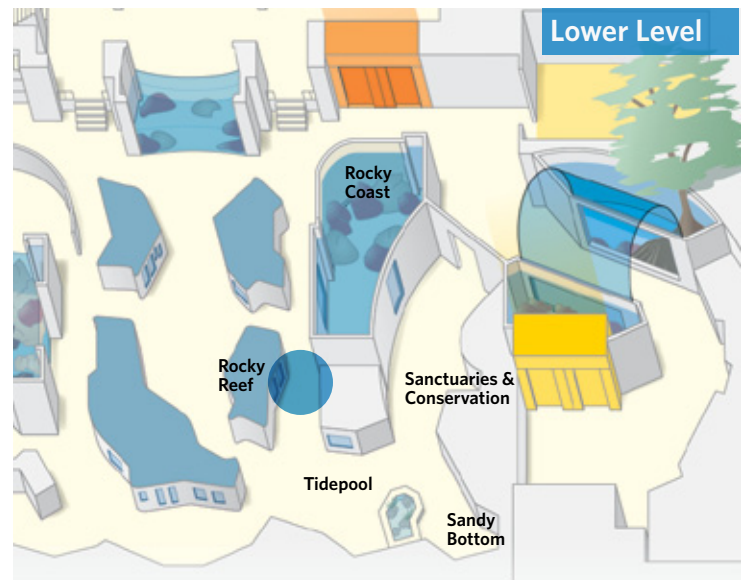


## Rocky Reef Habitat

Rocky reefs are like underwater islands. The rocky substrate provides habitat for a variety of marine organisms.

### Main ideas:

- » Rocky reefs provide habitat for a high diversity of marine invertebrates, algae and fish.
- » The Cordell Bank National Marine Sanctuary, just north of and contiguous with the Gulf of the Farallones National Marine Sanctuary, contains submerged rocky reefs.



## Take a closer look!

These animals make their homes on rocky reefs.

### Cup coral

*Balanophyllia elegans*

Cup corals in cold California waters don't build huge reefs like their tropical cousins do. Instead, these animals build individual limestone homes, or "cups," to live in.

Diet: tiny drifting life (plankton)

Distribution: eastern Pacific Ocean, British Columbia to Baja California



Photo: Ron DeCloux © California Academy of Sciences

### Spiny Brittle Star

*Ophiothrix spiculata*

This sea star relative raises its long arms to catch small animals floating by in the currents. They use the small spines along their arms to move food down to their mouth on the central disc.

Diet: organic particles, small plankton, small animals  
Distribution: Eastern Pacific Ocean, Northern California to Peru; also Galápagos Islands



Photo: Ron DeCloux © California Academy of Sciences

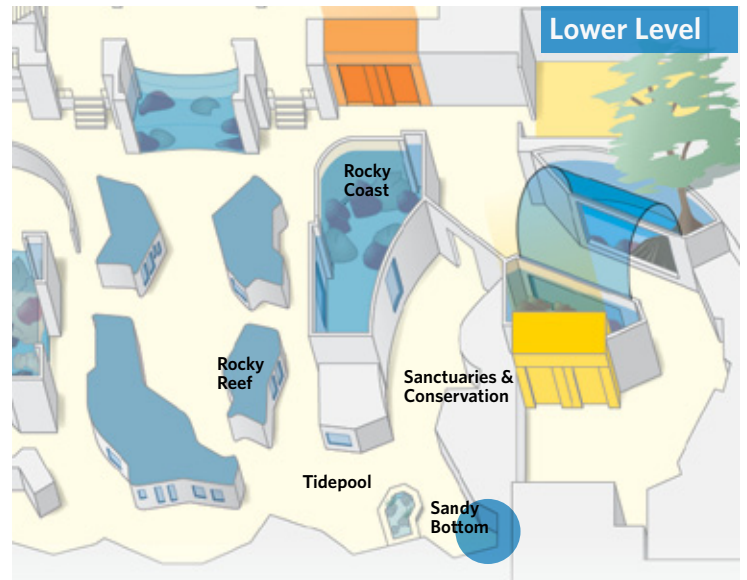


## Sandy Bottom Habitat

Many animals make their homes in the shifting sands.

**Main idea:**

- » Many species live in and on the sandy bottom. Some of them are of commercial value.
- » Trawling for bottom-dwelling fish can harm sandy bottom habitat and bottom-dwelling species.
- » Protection of habitat and sustainable fishing practices are needed to ensure the long-term health of sandy bottom and other ocean ecosystems.



## Take a closer look!

These animals make their homes in the shifting sands.

**Sand dollar**

*Dendraster excentricus*

Sand dollars are well suited for sandy seafloors. They're covered with small spines for burrowing into the sand and have tiny tube feet for collecting food.

Diet: tiny drifting life (plankton)

Distribution: eastern Pacific Ocean, Alaska to Baja California



Photo: Gerald and Buff Corsi © California Academy of Sciences

**Speckled sanddab**

*Cytharichthys stigmaeus*

Blending in with the sandy seafloor helps this small fish avoid predators, but not trawler's nets. Too many end up in nets as part of unwanted bycatch.

Diet: small invertebrates

Distribution: eastern Pacific Ocean, southeast Alaska to Baja California



Photo: Gerald and Buff Corsi © California Academy of Sciences



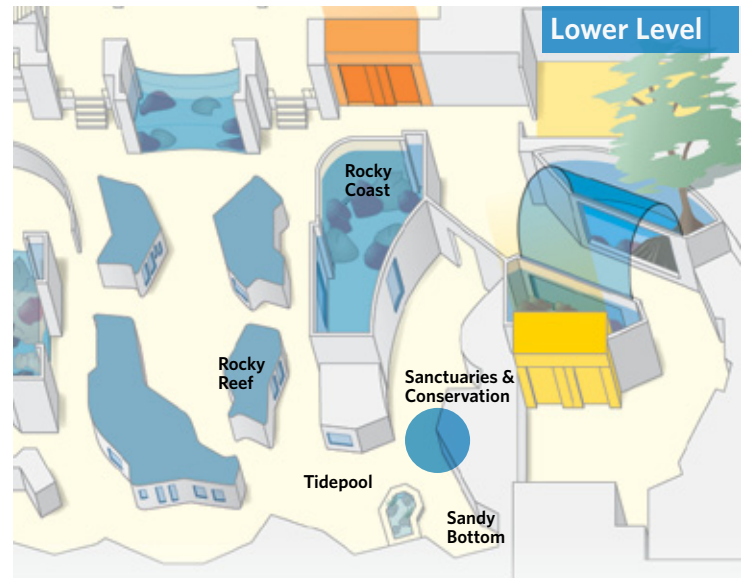


## Sanctuaries & Conservation

We can protect our precious marine resources through more sustainable fishing practices and by designating and enforcing marine sanctuaries.

### Main ideas:

- » Many resources come from the California coast, including seafood, but harvesting resources can be damaging to marine ecosystems.
- » Many giant-sized marine species are susceptible to overfishing because they are slow growing, long-lived and slow to reach sexual maturity.



## Take a closer look!

These animals were once threatened but are now protected.

### Garibaldi

*Hypsypops rubicundus*

This colorful fish's future was once threatened by overcollecting. In 1995, it became California's official state marine fish and gained full protection.

Diet: invertebrates, small fishes

Distribution: eastern Pacific Ocean, Monterey to central Baja California

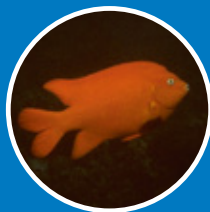


Photo: Ron DeCloux © California Academy of Sciences

### Giant sea bass

*Stereolepis gigas*

Scientists aren't sure how many individuals of this species there are. They do know it's critically endangered due to overfishing, and it is now protected.

Diet: crustaceans, fishes

Distribution: eastern Pacific Ocean, Humboldt Bay to Baja California



Photo: Ron DeCloux © California Academy of Sciences

## Exhibit Highlights



© Charles Kannard

### Tule Reed Boat

**This boat was used by Californian native peoples.**

In San Francisco Bay and along its tributaries, the Ohlone and Coast Miwok people used reed boats for gathering aquatic food plants, fishing and hunting waterfowl. Although the boats are seldom used today, a few artisans keep the tradition alive by building examples like the one shown here.



### Gulf of the Farallones

**Some of the world's richest temperate marine waters are found off the Northern California coast.**

Effective management of California's coastal waters is important to the health of the ocean ecosystem and will ensure the future of its rich biodiversity.

The 100,000 gallon Northern California Coast tank replicates the habitats of the Gulf of the Farallones National Marine Sanctuary (GNMS). Protected under the GNMS, the Gulf of the Farallones is a significant area of marine biodiversity.

Effective management by GNMS allows ongoing, multiple uses by the people of California and beyond. In addition to protecting the habitat and the organisms within it, the GNMS protects these resources for research and recreation.

This tank is home to many species of fish and invertebrates found on the Northern California coast. Use the identification guide on pages 18-19 to try to identify species in the tank.



## Exhibit Highlights



### Tidepool

#### **Seastars, urchins and anemones, oh my!**

At the Tidepool, your students can get their hands wet and meet some creatures that live in Northern California's tidepools. A video microscope lets students get even closer. Docents in orange coats are available to answer questions you or your students may have about the animals you see.



### Giant Pacific Octopus

#### **The octopus has many talents.**

It's smart, stealthy and communicative. Unlike most other animals without backbones, the octopus is highly intelligent and an accomplished escape artist. It's also a master of disguise, changing skin color and texture to match its surroundings. It can even communicate moods, such as "Go away," or "I find you attractive."

After mating, the female octopus lays up to 100,000 eggs. For several months, she tends them until they hatch. That effort ends her short life.

Diet: crabs, mollusks, fishes

Distribution: northern Pacific Ocean, Japan to Alaska to California



## Vocabulary

<b>Algae</b>	plant-like organisms found in many aquatic (water-based) habitats
<b>Bay</b>	an area of water mostly surrounded and protected by land, such as San Francisco Bay
<b>Coast</b>	the land where it meets the ocean
<b>Habitat</b>	the environment in which a plant, animal, or other organism lives, and that provides the resources the organism needs to survive
<b>Invertebrate</b>	an animal that does not have a backbone, such as a jellyfish or a seastar
<b>Jellies</b>	another word for jellyfish, a type of jelly-like (gelatinous) animal with tentacles and without a backbone
<b>Kelp</b>	large brown algae that grow in the shallow regions of the ocean where light can penetrate the water
<b>Kelp forest</b>	a marine habitat where kelp forms distinct layers and provides a home to many animals
<b>Marine</b>	associated with the ocean
<b>Ocean</b>	the body of salt water that covers the majority of the earth's surface
<b>Rocky reef</b>	a marine habitat that is made up of rocks that rise up from the ocean floor





## Science Behind the Scenes

### Discovering the Unknown

**When you think of corals you may think of tropical reefs, but not all corals and their relatives are found in the tropics.**



“Reef-building corals make up only about 15% of all coral diversity” says Dr. Gary Williams, Curator of Invertebrate Zoology and Geology at the California Academy of Sciences. Dr.

Williams researches octocorals (soft corals, sea fans, and sea pens), which don’t build a massive, hard skeleton and therefore do not build reefs. As it turns out, many species of octocorals can be found here in the temperate water off California’s coast. Even though California marine life has been well-studied, species new to science are still being discovered.

Many new species of octocorals are being discovered in the cold, deep trenches of Monterey Bay, called Monterey Canyon, an area where a lot of ongoing research is focused. Dr. Williams occasionally goes on expeditions to Monterey Canyon with the Monterey Bay Research Institute. They use a remotely operated vehicle (ROV) to investigate the canyon, and when they find a potentially new or interesting species of octocoral, a specially trained technician uses the ROV’s robotic arm to carefully collect the specimen and place it in a special collecting jar. “This technology has changed our ability to describe new species. In the past, we could only get photos of specimens, but



Gary Williams © California Academy of Sciences

now we are able to collect specimens, some of which are brand new to science,” says Dr. Williams.

Even more interesting is that not all of these new species are being discovered from deep water. Many are being discovered in more easily accessible tidepools right on the Pacific coast. This is truly astounding since historically there has been much research done on California marine life, and many research stations are present along the coast. It’s exciting to have new coral species right on our coastal doorstep and shows that there is still a lot of life waiting to be discovered in our own backyard. You may even see some the next time you go tidepooling!

To see some examples of octocorals, make sure to check out the sea pens on display in a tank in the Sandy Bottom area of the California Coast exhibit.





## Specimen Spotlight

### Rockfishes

*Sebastes spp.*

Take a look into the Northern California Coast tank and you are guaranteed to see a rockfish! Like their relatives, lionfish and stonefish, rockfishes have venom glands associated with some or all of their fin spines, though they are not as toxic as their cousins. Most of the fish we call rockfish belong to the genus *Sebastes*, which means “magnificent” in Greek. And magnificent they are! Worldwide, there are about 102 species of *Sebastes*, and California waters are home to between 40 and 60 species.

Rockfishes can be found in a variety of habitats from the rocky intertidal, to the kelp forest, to deeper waters with rocky outcrops. Some common species found off the Central to Northern California coast include Canary, Blue, Black, Vermilion, and Bocaccio, along with many others. How many different species can you find in the tank?

There is a lot of variation in size and life history within the rockfishes. Some species may grow to less than 10 inches in length as adults, while some species may grow up to four feet in length. Some species of rockfishes can live to be quite old, such as the Rougheye Rockfish (*Sebastes aleutianus*), which has been shown to live to be at least 205 years old!

Long-lived rockfishes don't become sexually mature for 20 or more years. These fishes are particularly vulnerable to overfishing. Populations of many species of rockfishes have been severely depleted and because they take so long to mature, it may



Vermillion rockfish (*Sebastes minitus*)



Blue rockfish (*Sebastes mystinus*)



China rockfish (*Sebastes nebulosus*)



Canary rockfish (*Sebastes pinniger*)

Photos © Ron DeCloux/California Academy of Sciences

take tens of years before some of these can recover. As consumers, it is our responsibility to make sure that the fishes we consume are being sustainably harvested. We can do this by checking guides such as the Seafood Watch guide to make sure that the seafood we buy is harvested in a way that doesn't threaten fish populations. As a society, we can designate and protect marine sanctuaries to reduce pressures on marine animal populations and establish fishing quotas to ensure that fishes and other seafood are not overfished. With proper management, we can continue to enjoy the magnificence of our diversity of rockfishes for future generations.



## Related Exhibits

### **Rainforests of the World**

Expand your exploration of life and its connection to water in Rainforests of the World where your journey through this hot and humid environment begins on the forest floor and takes you through the different layers of a rainforest. Explore the diversity of plants and animals found in the tropical rainforests of Borneo, Madagascar, Costa Rica and the Flooded Amazon and discover how life there has adapted to the presence of abundant water and seasonal flooding typical of tropical rainforest ecosystems.

### **Philippine Coral Reef**

Explore a tropical coral reef without getting wet in the stunning Philippine Coral Reef exhibit which focuses on the world's most diverse of marine ecosystems. The 25 foot deep, 212,000 gallon tank offers spectacular underwater views of reef algae and animals and focuses on their unique adaptations and ecological interactions.

### **Water Planet**

Explore the essential connections between life and water. This exhibit displays a variety of animals that live in and without water and have unique adaptations for reproducing, moving, feeding, sensing and defending themselves in their environments. Through interactive stations in the exhibit, students can also explore the different properties of water found on Earth—fresh water, salt water, hot and cold water, surface and subsurface water, frozen, liquid and vapor forms, and how organisms are adapted to each.

### **African Hall**

Explore the wilds of Africa from its hot and dry deserts to high elevation rainforests and discover the adaptations plants and animals have for surviving in harsh conditions when water is scarce. African Hall offers an in-depth look into Africa's diverse and changing ecosystems showcasing iconic animals including lions and zebras. Five living dioramas include pancake tortoises, chameleons and the watery world of an entire colony of African penguins.



# Gulf of Farallones Guide



## Bocaccio rockfish

*Sebastes paucispinis*

Most fishes lay eggs, but all rockfish females give birth to live larval young.

Diet: squid, other invertebrates, small fishes

© Robinson, D. Ross CC-BY-NC  
[http://eol.org/data\\_objects/13235820](http://eol.org/data_objects/13235820)



## Vermillion rockfish

*Sebastes miniatus*

Unlike most other bony fishes, rockfish, like this one, have their eggs fertilized internally.

Diet: fish, squids, octopi

© Ron DeCloux/California Academy of Sciences



## Ocean whitefish

*Caulolatilus princeps*

Widely distributed from Peru to Canada, including the Galapagos, where Charles Darwin caught the first scientific specimen.

Diet: worms, shrimp, crabs, octopi, squids, small fish

© Ron DeCloux/California Academy of Sciences



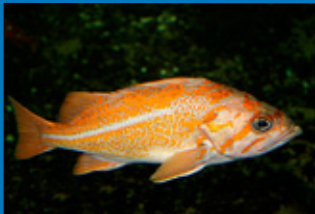
## Walleye surfperch

*Hyperprosopon argenteum*

Named for their large light-reflecting eyes, which allow them to see well in dim light.

Diet: small crustaceans

© Ron DeCloux/California Academy of Sciences



## Canary rockfish

*Sebastes pinniger*

All rockfish are long-lived, with a lifespan of 20 to 50 years. They may not have their first offspring until age 10.

Diet: small fish, krill

© Ron DeCloux/California Academy of Sciences



## China rockfish

*Sebastes nebulosus*

Like all species of rockfish, these fish have mildly venomous spines on their dorsal, anal and pelvic fins.

Diet: fish, crustaceans, brittlestars, squids, octopi

© Ron DeCloux/California Academy of Sciences



## Rainbow surfperch

*Hypsurus caryi*

Selects prey by taking mouthfuls of turf, sand or gravel, then spitting out the rejected items.

Diet: small crustaceans, mussels, snails, brittlestars

© Ron DeCloux/California Academy of Sciences



## Leopard shark

*Triakis semifasciatus*

Look carefully at the underside of the shark's lower rear fin. Does it have 2 fleshy rods between the fins? If it does, it's a male.

Diet: crabs, shrimp, bony fish, fish eggs, clam necks, innkeeper worms

© Ron DeCloux/California Academy of Sciences



## Gulf of Farallones Guide



### Wolf eel

*Anarrhichthys ocellatus*

Not true eels; more closely related to surfperch and freshwater perch. Male-female pairs live in the same shelter for years and may mate for life.

Diet: sea urchins, scallops, various crustaceans

© Ron DeCloux/California Academy of Sciences



### Jacksmelt

*Atherinopsis californiensis*

Schooling, surface fish often caught by pier anglers.

A staple food for early Native Americans.

Diet: small crustaceans, algae, decaying matter

© Ron DeCloux/California Academy of Sciences



### Bat star

*Asterina miniata*

Sensory structures at the ends of each arm detect other bat stars, light and prey.

Diet: surfgrass, algae, colonial tunicates, dead plants and animals

© Ron DeCloux/California Academy of Sciences



### Purple sea urchin

*Strongylocentrotus purpuratus*

Sometimes form large groups that move slowly, grazing on living kelp forests.

Diet: algae, plankton, kelp, decaying matter

© Ron DeCloux/California Academy of Sciences



### Club-tipped anemone

*Corynactis californica*

Also known as strawberry anemone, it is really a colonial soft coral closely related to anemones.

Diet: crustacean larvae, copepods, other zooplankton

© Ron DeCloux/California Academy of Sciences



### Fish-eating anemone

*Urticina piscivora*

Fish called painted greenlings lie amongst the tentacles of this animal for protection.

Diet: shrimp, small fish

© Marty Snyderman/Visuals Unlimited



### Giant plumose anemone

*Metridium giganteum*

When attacked, these animals force special stinging cells out from their mouth and body wall.

Diet: small zooplankton, small worms, fish, squid

© Ron DeCloux/California Academy of Sciences



## Suggested Activities to Download

Download these activities from our website to enrich your field trip experience.

» **Connected Experience:** Ocean Life Opposites

<http://www.calacademy.org/teachers/resources/lessons/ocean-life-opposites/>

In this lesson, students will compare and contrast the behavior and appearance of marine animals along the California coast, practicing their observational skills in the classroom and the Steinhart Aquarium. The Connected Experience includes

» **Pre-Visit Activity:** Fish Forms

<http://www.calacademy.org/teachers/resources/lessons/fish-forms/>

In this lesson, students will learn the characteristics of a fish and create a three-dimensional sculpture.

## CA Science Content Standards

### Kindergarten

#### Life Science

- 2a. Comparing
- 2c. Major structures

### Grade One

#### Life Science

- 2a. Different environment
- 2b. Needs
- 2c. Need each other

### Grade Two

#### Earth Science

- 3c. Natural resources





## Bibliography

### Want to find out more?

Here is a selection of additional resources to explore in the Academy’s Naturalist Center or at your public library. Naturalist Center staff can also answer any questions you have about this exhibit via email or phone. The Naturalist Center is located on the third floor of the Academy and is open Monday–Friday from 11AM to 4PM and Saturday–Sunday from 10AM to 5PM. 415.379.5494 / naturalist@calacademy.org

#### Books

- » **An Octopus is Amazing** by Patricia Lauber. New York: Harper & Row, 1990. (Let’s-Read-and-Find-Out series). Nat. Ctr. Juv. QL430.3 .O2 L38 1990  
Learn all about the life of an octopus including what it eats, how it protects itself, and how it cares for its young.
- » **One Small Place by the Sea** by Barbara Brenner; illustrated by Tom Leonard. New York: HarperCollins, 2004. Nat. Ctr. Juv. QH541.5 .S35 B74 2004  
Come explore all of the plants and animals you might find in a tidepool in this book with lush and detailed illustrations.
- » **Is This a House for Hermit Crab?** by Megan McDonald; illustrated by S. D. Schindler. New York: Franklin Watts, 1990. Nat. Ctr. Juv. QL444 .M33 M31 1990  
Hermit crab has become too large for his current shell so he explores the beach to find a new one. This book works well as an interactive read-aloud.
- » **Sea Anemones** by Lola M. Schaefer. Mankato, MN: Capstone Press, 1999. Nat. Ctr. Juv. QL377 .C7 S25 1999  
Brilliant photos and very simple text introduce young readers to these unusual creatures. Includes a bibliography for further reading.
- » **Sea Urchins** by Lola M. Schaefer. Mankato, MN: Capstone Press, 1999. Nat. Ctr. Juv. QL384 .E2 S32 1999  
Beginning readers can practice their skills while learning about these spiky animals. Includes a list of books and websites for the young marine biologist to learn more.
- » **The Seaside Switch** by Kathleen V. Kudlinski; illustrated by Lindy Burnett. Minnetonka, MN: NorthWord, 2007. Nat. Ctr. Juv. QH541.5 .S35 K82 2007  
From low tide to high tide, the seashore is an ever-changing place. You never know what you might find as you explore from morning to evening.

#### Curricula/Activity Books

- » **Squirts and Snails and Skinny Green Tails: Seashore Nature Activities for Kids** by Diane Swanson. Vancouver: Whitecap Books, 1993. Nat. Ctr. Juv. QH95.7 .S93 1993  
There’s a lot to discover and examine at the seashore, and this book gives you everything you need to know to respectfully do just that.
- » **Tidepools & Coral Reefs** by Jeanne King; edited by Patricia Miriani Sima; illustrated by Cheryl Buhler. Huntington Beach, CA: Teacher Created Materials, Inc., 1993. Nat. Ctr. QH541.5 .S35 K56 1993  
Activities and reproducible worksheets about the world of tide pools and coral reefs for the primary classroom.

#### DVD

- » **Where the Sea Meets the Shore**  
Boca Raton, FL: Allegro Productions, 2005.  
In this film designed for classroom use, students learn about the marine life found in a tidepool and how it has adapted to living in this harsh environment.



## Online Resources

### Websites

- » **Friends of Fitzgerald Marine Reserve**  
[www.fitzgeraldreserve.org](http://www.fitzgeraldreserve.org)  
A plethora of information about the Reserve, including links to the Friends' newsletter, a recommended reading list and logistics for visiting.
  
- » **A Guide to the Side of the Sea: A Teacher's Guide for Field Trips to Rocky Intertidal Areas**  
[www.parks.ca.gov/?page\\_id=24075](http://www.parks.ca.gov/?page_id=24075)  
Lessons plans and field trip tips for a visit to a tidepool.
  
- » **Marine Science: Tidepools in California**  
[www.marinebio.net/marinescience/03ecology/tpindex.htm](http://www.marinebio.net/marinescience/03ecology/tpindex.htm)  
Extensive information and amazing photos of wildlife found along the California coast.
  
- » **Tidepool Treasures: Tidepool Field Trip Advice and Tidepool Field Guide**  
<http://tlc.ousd.k12.ca.us/~acody/tidepool.html>  
Recommendations for taking a school group to a tidepool, as well as a simple tidepool field guide.
  
- » **Tidepooling, Farallones Marine Sanctuary Association**  
[www.farallones.org/explore/tidepooling.php](http://www.farallones.org/explore/tidepooling.php)  
Logistical and background information about tidepooling at different sites in the Farallones Marine Sanctuary.
  
- » **Watchable Wildlife: Tidepools**  
[www.dfg.ca.gov/viewing/tidepools.html](http://www.dfg.ca.gov/viewing/tidepools.html)  
This section of the California Department of Fish and Game's website includes tips for tidepool viewing and locations of tidepools you can visit along the entire California coast.



## Guiding Questions and Answers

Use these questions to get students thinking about the California Coast.

- » **Choose an animal in the Northern California Coast exhibit. Where does this animal live? How is its home different from your home?**

Unless you happen to live underwater, your home is likely very different from most of the animals in the California Coast exhibit. Some animals live in the kelp, which is similar to the plants that may surround your home, but is actually a type of algae. These animals may use the kelp as food or as shelter. Others live in the rocky intertidal and have to survive strong waves crashing on them without getting knocked around! Others live on the sandy bottom and may blend in really well so that predators can't find them and eat them.

- » **Take a look at some kelp in one of the exhibits. How is this similar to a plant you might find in your backyard? How might it be different?**

First of all, the plants in your backyard don't live underwater! While kelp may look like it has a stem and roots, these parts that you see are very different from the stem and roots of a plant. The "roots" of kelp are actually called a holdfast. The holdfast helps the kelp stay in one spot, but it doesn't bring water and nutrients to the kelp like roots do for a plant. The parts of the kelp that look like leaves are called blades. Similar to leaves on a plant, the blades collect energy from sunlight to make food. Both plants and kelp provide food and shelter to many animals.

- » **Animals that live on the rocky shore have ways to keep from being swept away by strong waves. If you lived on the rocky shore, how would you do this?**

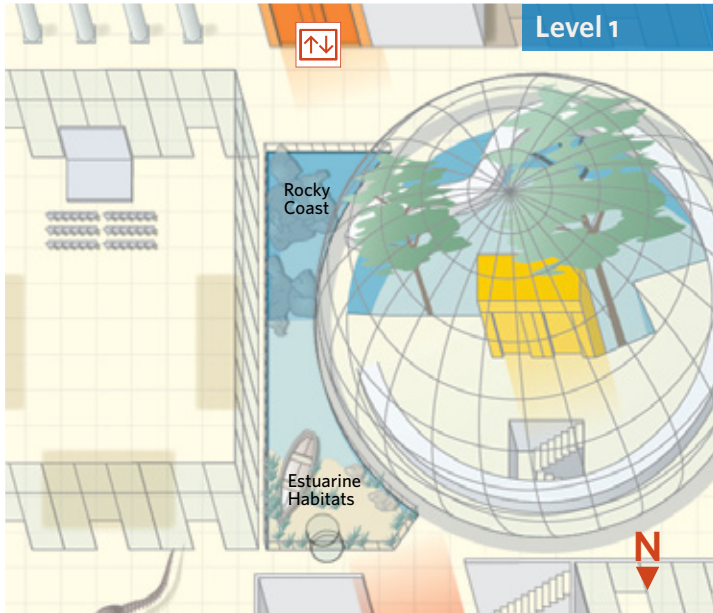
There are many ways that you could do this. For example, many of the animals that live on the rocky shore have special body parts or behaviors that help them stay put. Many have hard shells and shapes that protect them from strong waves. Others hunker down in crevices or hide under boulders, and some hang on with suction, a special sticky substance, or anchoring threads!

- » **Pick an animal in the Northern California Coast exhibit. How is its body like your body? How is it different?**

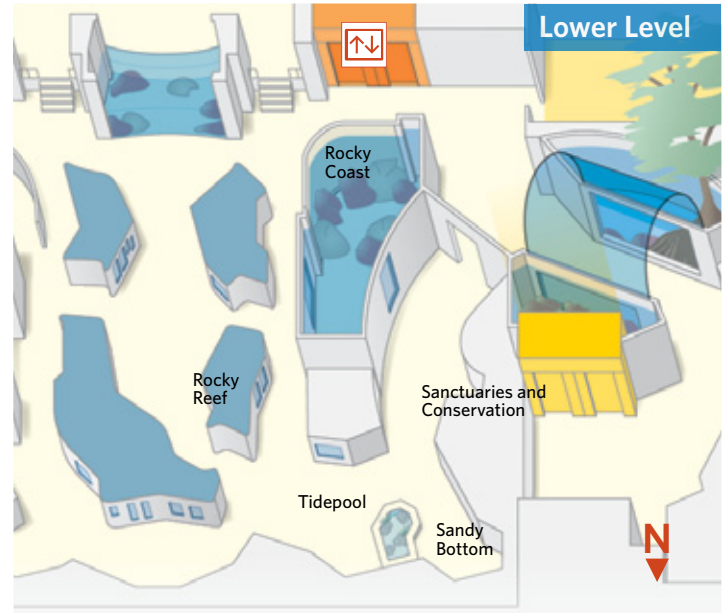
There are many different kinds of animals that live on the California coast. Some animals, like fishes and sea lions, have backbones like we do. They have specialized body parts that help them live in the water, like fins or flippers instead of hands and feet like us. There are other marine animals that do not have backbones. These animals come in many different shapes and forms. Many of them are smaller than we are, but a few can get quite large, like the Giant Pacific Octopus. Some of these animals have shells, like mussels and limpets, and others may have spines, like sea urchins. Many have tentacles, such as sea anemones and jellies.



## Aquarium Map



▲  
**Northern  
California  
Coast**



▲  
**Northern  
California  
Coast**

### **Welcome to the Northern California Coast, home to some of the world's richest temperate marine ecosystems.**

The Northern California Coast exhibit focuses on two main themes: California coastal habitats and conservation, and is found on Level 1 and the Lower Level. Your students will encounter an abundance of organisms, as well as interactive stations, video presentations and information panels. Before you visit the exhibit, spend some time viewing the guiding questions and answers.