

# The Farallon Islands Educator Guide

A resource for using QUEST video, audio and blogs in the classroom



## QUEST SUBJECTS

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| <p><b>Life Science</b></p> <p><b>Earth Science</b></p> <p><b>Physical Science</b></p> | <p><b>Biology</b><br/>Health<br/>Environment</p> <p><b>Geology</b><br/><b>Climate</b><br/>Weather<br/>Astronomy</p> <p><b>Physics</b><br/>Chemistry<br/>Engineering</p> |
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## CA SCIENCE STANDARDS

**Grade 6**  
*Ecology (Life Sciences)*  
5. (c, e) Populations of organisms can be categorized by the functions they serve in an ecosystem; number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors.

**Grades 9-12**  
*Ecology (Biology/Life Sciences)*  
6. (a, b, e) Biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats; changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species or changes in population size; a vital part of an ecosystem is the stability of its producers and decomposers.

## QUEST MEDIA FOR TEACHING ABOUT THE FARALLON ISLANDS

Read and comment on the blogs for these stories by clicking on the story link and clicking on the blog post link below the video/audio.

Watch “The Farallon Islands – ‘California’s Galapagos’”

<http://www.kqed.org/quest/television/the-farallon-islands--californias-galapagos>

- Today, the only humans allowed on the Farallon Islands are those working to better understand and protect this fragile, natural ecosystem. Join **QUEST** for a rare glimpse into this uniquely wild island habitat.

Listen to “Journey to the Farallones” <http://www.kqed.org/quest/radio/journey-to-the-farallones>

- The Farallon Islands aren’t just a unique habitat, they’re also a bellwether for climate change. Learn how unexpected recent climate change is affecting life on and around the Farallon Islands.

View Web Extra: “Visit to the Farallon Islands - Audio Slideshow”

<http://www.kqed.org/quest/slideshow/visit-to-the-farallon-islands--audio-slideshow>

- Get a behind-the-scenes look at **QUEST**’s journey to the Farallon Islands.

Examine Web Extra: “Farallon Islands History Timeline”

<http://www.kqed.org/quest/slideshow/web-extra-farallon-islands-history-timeline>

- View the history of the Farallon Islands, from Sir France Drake’s first landing in 1579 through to the present day.

Explore “Farallon Islands Interactive Map”

<http://www.kqed.org/quest/exploration/farallon-islands-interactive-map>

- See examples of human impact and animal populations on the Farallon Islands.

## TOPIC BACKGROUND

Officially part of the city and county of San Francisco, the Farallon Islands lie in the open ocean 28 miles outside of the San Francisco Bay. One of 552 designated National Wildlife Refuges, the islands are virtually uninhabited by humans but are home to the largest seabird breeding colony in the contiguous United States. The Farallon Islands also have a rich diversity of marine life—they are the spawning grounds for numerous fish and invertebrate species, and at least 36 species of marine mammals have been observed in surrounding waters. This unique and fragile ecosystem has informally earned these islands the name “the Galapagos of California.”

The earliest record of a European setting foot on the islands was Sir Francis Drake in 1579. From that point until 1909, when President Theodore Roosevelt signed a decree protecting part of the Farallon Islands, humans ravaged the fragile island environment. The islands were initially used as hunting grounds for seal pelts and seabird eggs. Later they became significant as the site of a lighthouse and radio station. In 1969, the entire chain was designated a National Wildlife Refuge.

### Additional background resources:

- PRBO Conservation Science: “Wildlife on Southeast Farallon Island” <http://www.prbo.org/cms/157>
- Farallones Marine Sanctuary Association: <http://www.farallones.org/>

## VOCABULARY

**Conservation** – the protection, management, preservation or restoration of wildlife and natural resources

**Ecology** – the pattern of relations between organisms and their environment

**Ecosystem** – a community of living organisms and their environment

**Habitat** – the type of environment in which an organism or group normally lives or occurs

**Refuge** – a place providing shelter, relief or protection

**Seabird** – a bird that frequents the open ocean

**Species** – a group of organisms that have common characteristics and can interbreed

**Terrain** – a geographic area

**Topography** – detailed description of the physical and surface features of an area

**Upwelling** – the upward flow of sub-surface water bringing cold, nutrient-rich water to an ocean's surface

## INTRODUCTORY QUESTIONS

- What do you know about the Farallon Islands?
- What do you think is significant about these islands?
- Why do you think the Farallon Islands are described as "the Galapagos of California"? What does this mean?

## FOCUS QUESTIONS

- Why does the position of the Farallon Islands make them such a magnet for marine life? How does the upwelling of the Gulf of the Farallones affect life in and around the islands?
- How have humans impacted animal populations on the islands throughout history?
- What alarming changes have researchers seen in and around the Farallon Islands in recent years? What positive changes do they see?

*For all media see:*

- Segment Summary Student Sheet  
[http://www.kqed.org/quest/downloads/QUEST\\_SegSum\\_StudentSheet.pdf](http://www.kqed.org/quest/downloads/QUEST_SegSum_StudentSheet.pdf)
- Personal Response Student Sheet  
[http://www.kqed.org/quest/downloads/QUEST\\_PersResp\\_StudentSheet.pdf](http://www.kqed.org/quest/downloads/QUEST_PersResp_StudentSheet.pdf)

## LESSON PLANS and RESOURCES from PBS, NPR and MORE

NOTE: Resources from the Teachers' Domain collection require a fast and free registration.

**Shifting Winds Disrupt Island Birds' Feeding Habits** NPR  
<http://www.npr.org/templates/story/story.php?storyId=11253445>

This June 24, 2007, **Weekend Edition** radio story discusses changes in the Farallon Islands' Cassin's Auklet population.

**Farallones Cam** California Academy of Sciences  
<http://www.calacademy.org/webcams/farallones/>

This overview of the Farallon Islands from the California Academy of Sciences includes a live streaming Web camera and a field guide to the many seabirds that live here.

**Exploring the "Systems" in Ecosystems** Teachers' Domain  
<http://www.teachersdomain.org/resource/lsp07.sci.life.eco.lpexpecosystems/>  
This lesson explores basic information about the systems within any ecosystem and allows students to analyze a local ecosystem of their choosing.

**Gulf of the Farallones National Marine Sanctuary** PBS  
<http://www.pbs.org/kqed/oceanadventures/episodes/treasures/guide/farallones.html>  
This guide from **Jean-Michel Cousteau Ocean Adventures** offers a complete overview of the Gulf of the Farallones National Marine Sanctuary, including a map of the area and information about research projects and challenges facing this protected region.

**Seabirds and Shorebirds of the Gulf of the Farallones** Farallones Marine Sanctuary Association  
<http://www.farallones.org/documents/education/SeabirdsShorebirds.pdf>  
This unit from the Farallones Marine Sanctuary Association includes fact sheets about the breeding birds of the islands, information about human impact in this region and classroom activities for students.

## VISIT OUR PARTNERS

The Bay Institute  
[www.bay.org](http://www.bay.org)

California Academy of Sciences  
[www.calacademy.org](http://www.calacademy.org)

Chabot Space and Science Center  
[www.chabotspace.org](http://www.chabotspace.org)

East Bay Regional Park District  
[www.ebparks.org](http://www.ebparks.org)

Exploratorium  
[www.exploratorium.edu](http://www.exploratorium.edu)

Girl Scouts of Northern California  
[www.girlscoutsnorcal.org](http://www.girlscoutsnorcal.org)

Golden Gate National Parks Conservancy  
[www.parksconservancy.org](http://www.parksconservancy.org)

The J. David Gladstone Institutes  
[www.gladstone.ucsf.edu](http://www.gladstone.ucsf.edu)

Lawrence Berkeley National Laboratory  
[www.lbl.gov](http://www.lbl.gov)

Lawrence Hall of Science  
[www.lawrencehallofscience.org](http://www.lawrencehallofscience.org)

Monterey Bay Aquarium  
[www.mbayaq.org](http://www.mbayaq.org)

Monterey Bay Aquarium Research Institute  
[www.mbari.org](http://www.mbari.org)

Oakland Zoo  
[www.oaklandzoo.org](http://www.oaklandzoo.org)

The Tech Museum of Innovation  
[www.thetech.org](http://www.thetech.org)

UC Berkeley Natural History Museums  
<http://bnhm.berkeley.edu/>

U.S. Geological Survey  
[www.usgs.gov](http://www.usgs.gov)

## MORE EDUCATIONAL RESOURCES FOR USING QUEST MULTIMEDIA TO ENHANCE 21<sup>st</sup> CENTURY SKILLS IN TEACHING AND LEARNING

### Why Use Multimedia in Science Education?

<http://www.kqed.org/quest/downloads/QUESTWhyMedia.pdf>

- Read about the importance of using multimedia in the 21st century science classroom.

### How to Use Science Media for Teaching and Learning

<http://www.kqed.org/quest/downloads/QUESTMediaTips.pdf>

- A collection of tips, activities and handouts to actively engage students with multimedia.

### Science Multimedia Analysis

<http://www.kqed.org/quest/downloads/QUESTMediaAnalysis.pdf>

- Give your students the tools to recognize the purposes and messages of science multimedia.

### Create Online Science Hikes with Google Maps

[http://www.kqed.org/quest/files/download/52/QUEST\\_ExplorationCreation.pdf](http://www.kqed.org/quest/files/download/52/QUEST_ExplorationCreation.pdf)

- Do you like the science hike Explorations on the QUEST site? Use this place-based educational guide to create similar science-based maps with youth.

## OTHER WAYS TO PARTICIPATE IN QUEST



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[www.kqed.org/quest](http://www.kqed.org/quest)



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**KQED 88.5 FM San Francisco &  
89.3 FM Sacramento  
Mondays at 6:30am and 8:30am**



WATCH

**KQED Channel 9  
Tuesdays at 7:30pm**

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They've been called "California's Galapagos." Nearly thirty miles west of the Golden Gate Bridge lie the Farallon Islands. This year marks their 100<sup>th</sup> anniversary as a national wildlife refuge. While the islands are off limits to tourists, reporter Lauren Sommer caught a rare, and rough, ride with marine researchers to learn about how unpredictable changes in our climate are affecting life there.

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It's been a stomach-churning, three-hour boat ride, but we've finally spotted the Farallon Islands, a craggy group of rocks jutting out from the Pacific.

PITKIN: One of the first things that hit me are both the smell and the sound. And the smell is the guano from the large seabird colonies.

Bird poop, that is. Melissa Pitkin is with PRBO Conservation Science, a non-profit that has worked with the U.S. Fish and Wildlife Service to study these seabirds for the past 40 years. Lately, they're seeing these islands as more than a unique habitat. They're a bellwether for climate change. Waters here are so rough, there's no dock on the island.

AMBI: Can you bring it down just a touch? Coming down!

We're transferred into a small, orange dingy that is lifted out of the water and carried onto land by a huge, overhead crane.

Once on solid ground, I can see that nearly every foot is claimed by a nesting bird.

Biologist Russell Bradley leads us up a rocky path to the highest point on the main 70-acre island where a historic lighthouse sits.

BRADLEY: You can see all the common murrens down there. The black and white birds down there. There's well in excess of 40,000 birds right there.

But this is nothing, Bradley says, compared to historic populations, before the Pacific Egg Company moved in.

BRADLEY: So during the Gold Rush times, folks wanted eggs, and there really weren't the chicken farms to provide them. So there were large efforts to collect sea bird eggs from the Farallons.

Murrens lay only one egg a year. And in a matter of decades, the population dropped from the millions to the thousands. Wildlife only began to come back after 1909, when President Theodore Roosevelt declared the islands a national wildlife refuge. Over the past century, several species have rebounded, but new threats have emerged.

BRADLEY: We're in the middle of one of the richest currents in the world. We have this huge upwelling center. So it's a very, very unique location.



Each spring, winds from the northwest blow across the California coast and draw nutrient-rich water up from the deep. Those nutrients create massive blooms of plankton and krill - which feed everything from fish to birds to whales.

BRADLEY: Timing is very important for all these animals, because they've evolved to try to breed successfully when food is available. So sometimes you have these mismatches.

Those mismatches occur when the timing is off. If upwelling is delayed, birds aren't able to feed themselves and their chicks. That can be due to natural causes, but lately, researchers are seeing patterns they don't recognize. In 2005 and 2006, Cassin's Auklets, a small, black seabird that nests on the islands, failed to produce chicks. Ocean conditions weren't right for their favorite food, krill. And this year, another bird isn't doing so well.

SCHMIDT: Birds eye view of the birds.

We climb into a small wooden hut perched on a hillside. Researcher Annie Schmidt normally spends hours in here each day, studying the love lives of Cormorants.

SCHMIDT: Yeah you get caught up in the drama of the sea bird colony and what's going on at site 172 and who stole whose chick.

But where Schmidt would normally see 20,000 nesting Cormorants, this year there are only a handful.

SCHMIDT: We're definitely a little bit puzzled by the lack of Cormorants because conditions seem to be good for productivity. It's a very complex ecosystem, new patterns are emerging that we've never seen before.

So far this summer, the researchers haven't seen any Cormorant chicks fledge, which sounds the alarm that the ecosystem is off balance. Bradley says the health of these birds can reveal widespread impacts.

BRADLEY: They're telling us what's out there, not only from birds, but also for the rest of the ecosystem. Salmon eat the same things as a lot of these sea birds do. Whales eat krill just like Cassin's auklets.

Scientists are forecasting that climate change will mean more unusual upwelling patterns, which could mean more disruptions in the food chain. In a system as complex as the ocean, Bradley says it's not always easy to say which shifts are from climate change and which aren't, but they believe climate change may already be having an effect.

BRADLEY: We are able to observe the direct impacts of some dramatic changes that are happening right now. And some are benefiting some species and others are to the heavy detriment of other species



The birds of the Farallones will be facing more pressures next season. Scientists recently confirmed that the El Niño weather pattern will return this winter, meaning more disruptions in coastal upwelling and in the food web the birds depend on.

For Quest, I'm Lauren Sommer, KQED Radio News.