

## Drive-by Extinction – Bay Checkerspot Butterfly

Listen to it online <http://www.kqed.org/quest/radio/view/221>

Radio length 5:45 minutes

### QUEST SUBJECTS

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

#### Grade 2

*Life Sciences*

2. Plants and animals have predictable cycles. (b,e)

#### Grade 3

*Life Sciences*

3. Adaptations in physical structure or behavior may improve an organism's chance for survival. (c,d,e)

#### Grade 4

*Life Science*

2. All organisms need energy and matter to live and grow. (a)

3. Living organisms depend on one another and on their environment for survival. (b,c)

#### Grade 6

*Ecology*

5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. (d,e)

#### Grade 9-12

*Ecology*

6. Stability in an ecosystem is a balance between competing effects. (b,e)

### PROGRAM NOTES

Edgewood County Park and Natural Preserve was once home to a vibrant population of bay checkerspot butterflies, but now it's difficult to see even one. The butterfly is now categorized as a federally threatened species whose decline has been called "drive-by extinction." Exhaust fumes from nearby I-280 have contributed to destroying the butterfly's food source, a serpentine grass. Learn what biologists are doing to prevent the bay checkerspot from going extinct.

In this segment you'll find...

- ⦿ what the bay checkerspot butterfly eats and where it lives.
- ⦿ how cars play a role in the decline of the bay checkerspot butterfly.
- ⦿ what the San Mateo County Department of Parks is doing to increase the butterfly population.



### TOPIC BACKGROUND

The bay checkerspot butterfly (*Euphydryas editha bayensis*) is a member of the brush-footed butterfly family (Nymphalidae). Historically, the butterfly was found all around the San Francisco Bay Area, from San Francisco to Contra Costa County and south to Hollister. In September 1987, the bay checkerspot was designated as a federally threatened species under the Endangered Species Act. It is one of 13 federally listed butterflies found in California. Currently the bay checkerspot occurs only in San Francisco, San Mateo and Santa Clara County.

The bay checkerspot life cycle starts when the larvae hatch from the eggs about 10 days after they are laid. The larvae shed their skin three times as they grow during the next two or more weeks. Larvae will then enter a period of dormancy for the summer months, hidden under rocks or in cracks in the soil. During the next rainy season, the dwarf plantain (*Plantago erecta*) starts to grow. It is the primary food source for the bay checkerspot's larval (caterpillar) stage. The larvae resume their development and continue eating. Once the larvae are fully grown, they enter the pupa stage and form a chrysalis. Adults emerge as butterflies in early spring. During the next four to six weeks they feed on nectar, mate, and lay eggs, typically in March and April. Females lay up to five egg masses of up to 250 eggs each, which they deposit near the base of the plantain, and the cycle starts over.

The habitat for the bay checkerspot butterfly consists exclusively of shallow, serpentine-derived soils. Serpentine soils are high in magnesium and heavy metals and low in basic nutrients (nitrogen, phosphorus and calcium), because they're formed from rocks from the ocean floor. Soils that lack basic minerals make life challenging for the plants that grow on them, and these plants have to use special techniques to adapt to their difficult life. Plants that have adapted to these soils, such as the dwarf plantain, are often specialized to live only on these soils. This makes them vulnerable to an invasion by another plant. Often these plants will not grow anywhere else if they get pushed out of their habitat.

## Media Enhance Education

Video and audio can be powerful tools for meaningful learning. It all depends on you, the educator. The key to using media effectively is preparation. Make the most of learning opportunities by encouraging students to become active viewers and listeners. Pick and choose from the suggested questions and activities to offer an engaging media experience.

## Questioning

Oftentimes, teachers and students become frustrated during a media segment when students can't find the answers to a long list of questions. Provide a limited number of questions or topics for students. This focuses their attention during a media segment, helps to keep them engaged and generally results in higher quality answers. QUEST Ed. has provided a number of options for focus questions, ranging from fact based to opinions to "big picture" ideas.

## PRE-LISTENING

- What is the life cycle of a butterfly?
- What do butterflies and caterpillars eat?
- Where is the bay checkerspot butterfly found?
- What is an invasive species? What is a native species?
- How do invasive species affect native species?
- What role do butterflies play in their community/habitat?

## LISTENING FOCUS

NOTE: You may choose to watch the television segment twice with your students: once to elicit emotional responses and get an overview of the topic and again to focus on facts and draw out opinions.

- Record any facts you find interesting while you watch.
- What is the invasive weed that is choking out the butterfly's native host plant?
- What is the native host plant of the bay checkerspot?
- How did car pollution cause the decline of the bay checkerspot?
- What is Dr. Stuart Weiss doing to increase the number of bay checkerspots at Edgewood Park?
- What is the park doing to control the spread of Italian ryegrass?
- What can be done to prevent the continued decline of the butterfly?

## POST-LISTENING – Links to activities mentioned can be found on the following page.

- **Review** students' answers to the Viewing Focus Questions.
- **Grow** butterflies in your classroom and study their life stages. Draw the life cycle of the butterfly that you observe.
- **Explore** the role of butterflies as pollinators. Follow the procedures in the **Butterfly Activity Guide** and discover the relationship between butterflies and plants.
- **Write** letters to help support the recovery work of the bay checkerspot. Letters can be written to decision makers to make sure recovery programs continue to be funded and receive all needed resources.
- **Help** eliminate invasive species in your community. Volunteer with organizations that pull invasive weeds and conduct restoration projects.

“When we try to pick out anything by itself, we find it hitched to everything else in the universe.” - John Muir

## LESSON PLANS / ACTIVITIES

### Butterfly and Nature Gift Store

<http://www.butterfly-gifts.com/live-butterfly-kits.html>

- Find resources for buying butterfly kits for your classroom and raising butterflies.

### Butterfly Activity Guide – The Butterfly Conservation Initiative

[http://www.butterflyrecovery.org/education/docs/BFCI\\_ActivityGuide.pdf](http://www.butterflyrecovery.org/education/docs/BFCI_ActivityGuide.pdf)

- Discover the life cycle of a butterfly, explore butterflies as pollinators or learn about butterfly migration. This guide gives you three butterfly activities to conduct with your students.



### The Bay Institute

<http://www.bay.org/main.htm>

- The mission of this nonprofit organization is to restore the ecosystem of the San Francisco Bay Area and its surrounding watershed. It conducts restoration projects and inspires students to be stewards of their communities.

## ARTICLES / READING

### Bay Checkerspot Butterfly Natural History U.S. Fish & Wildlife Service

[http://www.fws.gov/sacramento/es/animal\\_spp\\_acct/bay\\_check.htm](http://www.fws.gov/sacramento/es/animal_spp_acct/bay_check.htm)

- This Web site provides natural history information, federal status, distribution information as well as other references.

### Friends of Edgewood Natural Preserve

<http://www.friendsofedgeswood.org/>

- This nonprofit organization seeks to preserve and protect the Edgewood Natural Preserve. This Web site contains photos, stories and newsletter articles about the preserve.

### Bay Checkerspot Butterfly – The Butterfly Conservation Initiative

[http://www.butterflyrecovery.org/species\\_profiles/bay\\_checkerspot/](http://www.butterflyrecovery.org/species_profiles/bay_checkerspot/)

- Here you'll find natural history information on the bay checkerspot, including conservation needs.

### Serpentine Splendor: The Native Colors of Edgewood Park Bay Nature

[http://www.baynature.com/2004apriljune/ott\\_edgewood.html](http://www.baynature.com/2004apriljune/ott_edgewood.html)

- This article about the serpentine soils in Edgewood Park has photos and information on the bay checkerspot butterfly.

Look for the



indicating resources from QUEST partner organizations

# QUEST QUAD

<b>FIELD NOTES</b> 	<b>FIELD TRIP</b> 
<p><b>Go outside and ...</b></p> <ul style="list-style-type: none"> <li>📍 Discover the wonders of serpentine soils           <ul style="list-style-type: none"> <li>• Observe the differences between serpentine soils and other types of soils.</li> <li>• What do the plants look like? What does the environment as a whole look like?</li> </ul> </li>   <li>📍 Observe butterflies in the wild           <ul style="list-style-type: none"> <li>• Go to an area where there are many flowers in bloom and watch the butterflies.</li> <li>• Keep a journal of what the butterflies do, how many flowers they visit and how the butterflies benefit the plants.</li> </ul> </li> </ul>	<p><b>Visit ...</b></p> <ul style="list-style-type: none"> <li>📍 Edgewood Park and Natural Preserve           <ul style="list-style-type: none"> <li>• Take a trip here and try to find bay checkerspot butterflies. Conduct a teacher-led tour or arrange a tour through the park. <a href="http://www.sanmateocountyparks.org">http://www.sanmateocountyparks.org</a></li> </ul> </li>   <li>📍 Redwood Regional Park           <ul style="list-style-type: none"> <li>• Check out serpentine grasslands at the Skyline Serpentine Prairie </li> </ul> <a href="http://www.cnga.org/action/visiting.php?place=06_serpentine">http://www.cnga.org/action/visiting.php?place=06_serpentine</a> </li> </ul>
<b>FIELD RESEARCH</b> 	<b>FIELD TEST</b> 
<p><b>Find out more about...</b></p> <ul style="list-style-type: none"> <li>📍 Another federally threatened butterfly           <ul style="list-style-type: none"> <li>• Are there other threatened or endangered butterflies in California? If so, pick one and find out more information about its natural history, distribution and status. <a href="http://ecos.fws.gov/tess_public/SpeciesReport.do?groups=l&amp;listingType=L&amp;mapstatus=1">http://ecos.fws.gov/tess_public/SpeciesReport.do?groups=l&amp;listingType=L&amp;mapstatus=1</a></li> </ul> </li>   <li>📍 California invasive plants           <ul style="list-style-type: none"> <li>• Why should we be concerned with invasive plants? Which ones are abundant in the San Francisco Bay Area and what effects do they have on their habitats?</li> </ul> </li> </ul>	<p><b>Experiment with...</b></p> <ul style="list-style-type: none"> <li>📍 Creating a butterfly and native plant garden           <ul style="list-style-type: none"> <li>• Follow the guidelines below on planting a garden especially to attract butterflies. <a href="http://www.monarchwatch.org/garden/creating.htm">http://www.monarchwatch.org/garden/creating.htm</a></li> </ul> </li>   <li>📍 Reducing car pollution at home and at school           <ul style="list-style-type: none"> <li>• Carpool to school with friends.</li> <li>• Ride your bike whenever possible.</li> <li>• Share the story of the bay checkerspot with others to educate them about the effects of car exhaust on native plants and animals.</li> </ul> </li> </ul>

## 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 San Francisco Bay Area  
[www.girlscoutsbayarea.org](http://www.girlscoutsbayarea.org)

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

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

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

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

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

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

## OTHER WAYS TO PARTICIPATE IN QUEST



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### LISTEN

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



### WATCH

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

Major funding is provided by the National Science Foundation, the Gordon and Betty Moore Foundation, the Richard and Rhoda Goldman Foundation, and The Amgen Foundation. Additional support is provided by the William K. Bowes, Jr. Foundation, Ann S. Bowers -The Robert Noyce Trust, the Dirk and Charlene Kabcenell Foundation, and the Vadasz Family Foundation.

QUEST is a production of KQED Public Broadcasting