



Middle School Life in a Biodiversity Hotspot

Pre- Field Trip Lesson Plan



At a Glance

This Pre-field trip Lesson Plan will help students gain knowledge of relevant vocabulary and practices that will make them more prepared for their Exploring Conservation Science (ECS) Field Trip to the San Diego Zoo Safari Park.

Objectives:

- ☐ Students will understand and identify ancestral homelands.
- ☐ Students will become familiar with vocabulary utilized during the field trip.

Time:

Approximately 1.5 hours

Activity One: *Identify Ancestral Homelands (~30 mins)*

California has a unique diversity with several habitat types, supporting many plants and animals, including humans. California has one of the highest plant diversities in the world and the highest Indigenous cultural diversity in the United States, once with up to 500 different cultures speaking up to 100 languages. These cultures and languages have a special connection to the biodiversity and geology they developed alongside, creating a unique and irreplaceable connection to place, each with their techniques in caring for the environment, which provides food, medicine, and materials.

Students will explore three California maps during the *Life in a Biodiversity Hotspot* module that unravels California's diversity. Before attending the ECS Field Trip, we recommend identifying ancestral homelands by exploring a map created by [Native-Lands.ca](https://www.native-lands.ca/). Before exploring the map, please read the introduction at the beginning of the provided [Teacher Guide](#). We recommend following Exercises One and Three in the Teacher Guide. Exercise One introduces ancestral homelands and familiarizes students with their local landscape and favorite places on earth. Exercise Three builds upon Exercise One by digging deeper into the geographic features of the land and provides critical thinking into how indigenous people rely on specific geographic regions, plants, and animals. We recommend using the questions at the end of each exercise to inspire student discussions.

Activity Two: *Watch Prickly Pear Harvest at The Safari Park (~ 6 mins)*

Watch the short video of the [annual prickly pear gathering](#) at the Safari Park on Kumeyaay land. This video will help narrow the focus from ancestral homelands around the globe to one ancestral homeland located in the San Pasqual Valley. The video discusses conservation efforts on the

Biodiversity Reserve, a 900-acre coastal sage scrub habitat adjacent to the Safari Park. Participants of the gathering engaged in food sovereignty by harvesting prickly pears.

Activity Three: *Define Vocabulary (~ 30 mins)*

Assign different groups of students to define one section (all sections will be defined through the different groups) of the vocabulary words listed on the following pages. Have students write the definition in their notebooks so it's accessible to the class during share-out time. Ensure students understand that these words all relate to the environment/conservation/science in some way, so for words with multiple meanings, they should be looking for definitions surrounding these topics. After 10-15 minutes, have each group share the definitions of their vocabulary words with the class. Feel free to provide feedback and add to their definition. **Optional: Once all groups have shared, distribute the printout of our definitions to each student.*

Activity Four: *Nature Story (~ 30 mins)*

Now that students understand the vocabulary words, they will create a five-seven sentence nature story using the highlighted species in their vocabulary section as the subject. Take your students outside and tell them to find an area to sit and observe their surroundings. Once they feel ready, they can start writing their nature story.

Vocabulary List

Section 1:

1. **Conservation**¹ - a careful preservation and protection of something, especially planned management of a natural resource to prevent exploitation, destruction, or neglect.
2. **Biodiversity hotspot**² - a region with a high number of native species and a high level of human threat.
3. **Field biologist**³ - A field biologist is a professional who studies plants, animals, and other organisms within their natural environments, focusing on tasks like recording observations, collecting samples for analysis, and consulting on environmental laws.
4. **Scientific name**⁴ - The scientific name of an animal consists of two levels of its taxonomic classification, the genus and species. Scientific names are in Latin. They are usually printed in italics, with the genus capitalized.

Species Highlight:

California Gnatcatcher⁵ - *Polioptila californica* is a small 10.8 cm (4.3 in) long insectivorous bird. A tiny gray bird with a tiny range, the California Gnatcatcher flits through coastal sage scrub and desert scrub from southern California to southern Baja California, Mexico. This petite bird flicks its long, narrow black tail as it hops through the dry waist-high scrub. The male is distinguished by his black cap and the female by her gray head, thin white eye ring, and brown-washed sides. Much of their California coastal scrub habitat has been developed into suburbs, placing the California subspecies on the Endangered Species List.

Section 2:

1. **Species**⁶ - a group of similar living things that ranks below the genus in scientific classification and is made up of individuals able to produce offspring with one another
2. **Invasive species**⁷ - a species that is not native to an ecosystem and outcompetes native species.
3. **Endemic species**⁸ - restricted to a specific location or region
4. **Habitat restoration**⁹ - Habitat restoration is the purposeful rehabilitation of an area to recreate a functioning ecosystem. Successful habitat restoration requires understanding species life cycles and interactions, and the food, water, nutrients, space, and shelter that are necessary to sustain species populations.

Species Highlight:

Black mustard¹⁰ - *Brassica nigra* is a winter annual herb/forb. Black mustard grows profusely and produces allelopathic chemicals that prevent the germination of native plants and is considered an invasive species. The spread of black mustard can increase the frequency of fires in chaparral and coastal sage scrub, changing these habitats to annual grassland. It is native to regions of North Africa, temperate regions of Europe, and parts of Asia.

Section 3:

1. **Independent variable**¹¹ - The independent variable, also known as the experimental treatment, is the difference or change in the experimental conditions chosen by the scientist (the cause). To ensure a fair test, a good experimental inquiry only has one independent variable, and that variable should be something that can be measured quantitatively. For example, experimental inquiries about plants may include such independent variables as:
 - Volume of water given to plants
 - Nitrogen or phosphorus concentration in soil
 - Duration, intensity, or wavelength of light that plants are exposed to
 - Concentration or type of fertilizer
2. **Dependent variable**¹² - When a scientist chooses an independent variable (the cause), that person anticipates a certain response (the effect). This response is known as the dependent variable. The dependent variable should be observable and measurable. Like the independent variable, an experimental inquiry should only have one dependent variable. For example, experimental inquiries about plants may include such dependent variables as:
 - Days to germination
 - Surface area of leaves
 - Days to flowering or fruiting
 - Dry mass (amount of plant material after all water has been removed)
3. **Seedlings**¹³ - a young plant grown from seed
4. **Pollination**¹⁴ - The act of transferring pollen grains from the male anther of a flower to the female stigma. The goal of every living organism, including plants, is to create offspring for the next generation. One of the ways that plants can produce offspring is by making seeds. Seeds contain the genetic information to produce a new plant.

Species Highlight:

Narrow-leaf milkweed¹⁵ - Narrowleaf Milkweed (*Asclepias fascicularis*) is a flowering perennial best known for the Monarch butterflies it will attract into the garden. It blooms from summer to fall, with clusters of lavender or pinkish white flowers, each one an interesting button shape. The fruits are smooth pods, which split open to spill seeds along with plentiful silky hairs that may carry the seeds through the air. This plant grows fast to 3 feet tall and is dormant in winter, often dying back to the ground. It will take full sun but is adaptable to most conditions, being easy to grow in soils with good drainage, even with no summer water. It can self-seed if the seed pods are not removed. This species is the most important host plant for Monarch Butterflies in California, attracting them and hosting their caterpillars.

Section 4:

1. **Seed bank**¹⁶ - A seed bank is a place where seeds are stored to preserve genetic diversity for the future.
2. **Ecosystem**¹⁷ - An ecosystem is a geographic area where plants, animals, and other organisms, as well as weather and landscapes, work together to form a bubble of life.
3. **Inquiry**¹⁸
 - The work scientists do when they study the natural world, proposing explanations that include evidence gathered from the world around them.
 - A systematic investigation, often of a matter of public interest.
4. **Invertebrate**¹⁹ - any animal that lacks a vertebral column, or backbone, in contrast to the cartilaginous or bony vertebrates. More than 90 percent of all living animal species are invertebrates.

Species Highlight:

Quino checkerspot²⁰ - The Quino checkerspot is a medium-sized butterfly with a wingspan of approximately 1 inch (3 cm). The Quino checkerspot is a black, white, and orange butterfly. The historical range of the Quino checkerspot butterfly included much of non-montane Southern California, including southwestern Ventura, southwestern San Bernardino, Los Angeles, Western Riverside, and San Diego counties. At the time of its listing as endangered in 1997, more than 75 percent of its historical range was lost due to habitat loss and fragmentation. This reduction in the historical range was also due to the invasion of non-native plant species, and catastrophic natural events like increased frequency of drought and wildfire. It is currently known to occur in western Riverside and San Diego counties, California, and northern Baja California, Mexico. Its habitat is characterized by patchy shrub or small tree

landscapes with openings of several meters between large plants or a landscape of open swales alternating with dense patches of shrubs.

Sources

- ¹<https://tinyurl.com/yc8nd543>, ²<https://tinyurl.com/bdffmth5>, ³<https://tinyurl.com/32nfj7n3>.
⁴<https://www.dictionary.com/browse/scientific-name>, ⁵<https://tinyurl.com/v47xy4s7>,
⁶<https://tinyurl.com/mr4x2jxz>, ⁷<https://tinyurl.com/2v7fa8mj> ⁸<https://tinyurl.com/2jy98e23>,
⁹<https://tinyurl.com/mrxyeu5n>, ¹⁰<https://tinyurl.com/bdewxjes>, ¹¹<https://tinyurl.com/wp5prcwn>,
¹²<https://tinyurl.com/wp5prcwn>, ¹³<https://tinyurl.com/5ctcws3m>, ¹⁴<https://tinyurl.com/yc8zvpx4>,
¹⁵<https://tinyurl.com/4r83wja6>, ¹⁶<https://tinyurl.com/mr2e8pmc>, ¹⁷<https://tinyurl.com/yybex4rt>,
¹⁸"Defining Inquiry" by Lisa Martin-Hansen, ¹⁸<https://tinyurl.com/yaj5yjm4>,
¹⁹<https://tinyurl.com/427wrc4t>, ²⁰<https://tinyurl.com/4cpx5cwj>