Teacher Preparation Materials
Nature Hike

For their 2-hour hike at Filoli, your students will visit the many natural and human-made plant communities on the Estate, including the newt pond, redwood groves, oak woodlands, agricultural fields, formal garden, and even the compost. Your students will be challenged to hike briskly up hills, use all their senses to observe nature, take time to draw and reflect, and will be given opportunities to inquire and discover.

The curriculum and route are designed for 3rd, 4th, and 5th graders. All students will take the same 2-mile route, and the staff and volunteer Guides will focus on the same theme and talking points. Every student will receive a Nature Notebook that they will write and draw in throughout the hike. An answer key is included in this document should you choose to finish completing the notebook when you return to the classroom. Students enjoy sharing what they saw with their teachers and classmates.

Pre- and post- field trip materials are included in this document. We hope you will use them to prepare students before the field trip and to continue the lesson in the classroom afterwards. This follow-up will strengthen the student’s connection to what they learned on the hike.

Filoli’s staff and volunteers look forward to hosting your class. Please contact us with any questions prior to your field trip.

**Reservations:**
Taken online only at filoli.org/field-trips

**Reservation Changes & Field Trip Day Contact:**
Lisa Chai, Youth Programs Assistant
youthprograms@filoli.org, (650) 364-8300 x 252
Monday, Wednesdays, Fridays
Preparing For Your Hike

**Hike Day**
- Filoli is located at 86 Cañada Road in Woodside. You will be directed to bus parking by staff after the children unload.
- Meet staff at the picnic tables outside the Visitor Center.
- Arrive by 9:40 am to use bathrooms in the Visitor Center and have a snack.
- Hike starts promptly at 10:00 am.*
- Hike ends at 12:00 pm. Your class is welcome to use the picnic tables for lunch.
- Divide each class into three groups before you arrive.
- Our Guides appreciate when students and chaperones arrive wearing nametags.
- There is nowhere to store backpacks or lunches. **Please leave them in the car/bus.** Filoli will provide your chaperones with a tote bag to carry the children’s water bottles.
- Hikes are only canceled in heavy rain. Contact us the day prior to your hike if you are concerned about rain. Filoli’s cancellation policy is listed on filoli.org/field-trips.

*Filoli can accommodate late start schools or schools with a long drive. Contact us immediately after making your reservation to change your start time.

Note that your field trip includes a visit to the Garden and Nature Preserve but not the House.

**Preparing the Students**
Please review the following rules with students and chaperones before arriving:
- Stay on the trails and don't pick plants or flowers - protect the fragile plants.
- Protect yourself from poison oak. Don’t touch plants unless asked to by the Guide. They know what is safe to touch.
- Never pick up animals or insects. This is okay at some parks, but at Filoli, we choose not to disturb the creatures. Plus, some animals, like newts and banana slugs, have toxic skin!
- No eating on the hike.
Preventing For The Hike

Information For Parents
Please ask parents to prepare their children for their hiking adventure by doing the following:
- Dress children in long pants, even on hot days. Long pants better protect students from poison oak and ticks.
- Pack a water bottle and hat.
- Generously apply sunscreen at home.
- Trails can be muddy or dusty – send your children in closed-toed shoes and clothes that can get dirty.
- Hikes are held in light rain. If it is raining, send students with a raincoat and a change of shoes and socks for after the hike.

Chaperone Policy
- Is your class taking a bus? The maximum number of adults is 5, including the teacher.
- Is your class taking cars? You may bring 1 adult for every 3 students, including the teacher.
- These ratios will be strictly enforced. Classes that exceed the number of allowed adults will be asked to pay general admission prices for the additional adults. Payment for additional adults can only be made on the day of the hike. Additional adults may not accompany the hikers. They may explore the House and Garden on their own.

Preparing the Chaperones
Filoli values the contributions and involvement of chaperones and we thank them for being part of this experience. We’d like to share ways in which chaperones can enhance the students’ experience, and also ask them to avoid situations that detract from the experience.

Add to the experience!
- Set an example for the students by following the hike rules.
- Be responsible for the safety of the students by ensuring they follow hike rules.
- Keep the focus on the students’ learning experience by limiting your own questions and comments to the guide.
- Carry the students’ water bottles. Filoli will provide a tote bag.
- Help students find pages in their Nature Notebook when prompted by the guide.
These actions detract from the students’ experience:
- Talking on your cell phone, with the teacher, or with other chaperones in your group.
- Photography is distracting for the students and Guides. We encourage taking a few photos to capture and share the experience, but please limit photography.
- Asking students or Guides to stop and pose for photographs.
- Asking the Guides many questions. Please let the students ask and answer questions.

Siblings are not permitted on the field trip.
Curriculum Connections

School Hike Theme
All living things are interdependent. Plants, animals, and people interact in incredible and surprising ways.

Narrative
Animals and plants have evolved remarkable adaptations to help them survive and thrive in Bay Area ecosystems. Filoli’s Nature Preserve is a unique setting to explore these interactions because of the great variety of natural and human-made plant communities. These include agricultural fields, a formal garden, grasslands, oak woodlands, redwood forests, chaparral, and riparian zones.

Students will also trace the many ways people have used the land over thousands of years. Filoli was the location of an Ohlone village, a working estate for the Bourn and Roth families in the 1900’s, and now, as a historic House, Garden, and Nature Preserve, the land is used for enjoyment, scientific research, and education.

Nature Journaling
By drawing and writing in the field, students hone their skills of observation and documentation. Both are essential processes to begin learning as young scientists. Some students' drawings might be wonderfully creative representations of their subject; other students who do not enjoy creating artwork might still document important and accurate details though drawing.

If you wish to further explore nature journaling with your students, the California Native Plant Society offers a free nature journaling curriculum.
Curriculum Connections

Though the hike is built around one main theme, additional connections can be made to multiple Disciplinary Core Ideas in the Next Generation Science Standards and to California’s History–Social Science Content Standards.

Next Generation Science Standards Connections (NGSS)

LS1.A: Structure and Function
All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water, and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

LS1.D: Information Processing
Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Different sense receptors are specialized for particular kinds of information, which then may be processed by the animal’s brain. Animals are able to use their perceptions and memories to guide their actions. Plants also respond to some external inputs.

LS2.A: Interdependent Relationships in Ecosystems
Animals depend on their surroundings to get what they need, including food, water, shelter, and favorable temperature. Animals can move around but plants cannot, and often they depend on animals to move their seeds around. Some organisms break down dead organisms. Decomposition restores some materials back into the soil for plants to use.

LS2.C Ecosystem Dynamics, Functioning, and Resilience
When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die.
LS2.D: Social Interactions and Group Behavior
Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size.

LS4.C: Adaptation
For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

LS4.D: Biodiversity and Humans
Populations live in a variety of habitats, and change in those habitats affects the organisms living there.

History-Social Science Content Standards Connections (HSSC)

3.1.1: Using maps, identify geographical features in their local region.

3.1.2: Trace the ways in which people have used the resources of the local region and modified the physical environment.

3.2.2: Discuss the ways in which physical geography, including climate, influenced how the local Indian nations adapted to their natural environment (e.g., how they obtained food, clothing, tools).

4.1.5: Use maps, charts, and pictures to describe how communities in California vary in land use, vegetation, wildlife.

4.2.1: Discuss the major nations of California Indians and describe how they depended on, adapted to, and modified the physical environment by cultivation of land.

5.1.1: Describe how geography and climate influenced the way various nations lived and adjusted to the natural environment, including locations of villages, the distinct structures that they built, and how they obtained food, clothing, tools, and utensils.

California’s Education and the Environment Initiative
California’s Education and the Environment Initiative Principals and Concepts, can also be connected to Filoli’s hike, specifically to units on Environmental Principals I and II.
## Curriculum Connections

<table>
<thead>
<tr>
<th>Students will learn:</th>
<th>Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>All living things are interdependent</td>
<td>NGSS LS2.A: Interdependent Relationships in Ecosystems</td>
</tr>
<tr>
<td>How to identify evidence of an animal despite the animal not being visible</td>
<td>NGSS Science and Engineering Practices: Analyzing and Interpreting Data, Obtaining, Evaluating, and Communicating Information</td>
</tr>
<tr>
<td>To use scientific and artistic methods of observation to identify, document, and draw structures of plants and animals and discuss the purpose</td>
<td>NGSS LS1.A: Structure and Function [ \text{NGSS Science and Engineering Practices: Analyzing and Interpreting Data, Obtaining, Evaluating, and Communicating Information} ]</td>
</tr>
<tr>
<td>Which plants at Filoli provide food and shelter for animals and people</td>
<td>NGSS LS2.A: Interdependent Relationships in Ecosystems [ \text{NGSS LS4.D: Biodiversity and Humans} ] HSSC: 3.1.2, 4.2.1, 5.1.1</td>
</tr>
<tr>
<td>Plants depend on animals for pollination or to move their seeds around</td>
<td>NGSS LS2.A: Interdependent Relationships in Ecosystems</td>
</tr>
<tr>
<td>How prey animals adapt and use body parts to gain information needed to avoid being eaten by their predators</td>
<td>NGSS LS1.D: Information Processing [ \text{NGSS LS4.C: Adaptation} ]</td>
</tr>
<tr>
<td>That parasites take from their hosts, while decomposers give back nutrients into the soil</td>
<td>NGSS LS2.A: Interdependent Relationships in Ecosystems</td>
</tr>
<tr>
<td>To identify geological features through the use of a map</td>
<td>HSSC: 3.1.1, 4.1.5</td>
</tr>
<tr>
<td>Why plant identification is important to people using plants for building materials, food, and medicine</td>
<td>NGSS LS4.D: Biodiversity and Humans [ \text{HSSC: 3.1.2, 3.2.2, 4.2.1, 5.1.1} ]</td>
</tr>
<tr>
<td>Trace the way people have used the resources of a local region and modified the physical environment</td>
<td>NGSS LS2.C: Ecosystem Dynamics, Functioning, and Resilience [ \text{NGSS LS2.D: Social Interactions and Group Behavior} ] HSSC: 3.1.2, 3.2.2, 4.2.1, 5.1.1</td>
</tr>
</tbody>
</table>
Examples from the Nature Notebook

EVIDENCE OF ANIMALS

Many animals are hiding from us or from predators. How do you know these animals are hiding or have been there? Check off what you observe on your hike:

- Acorn granary
- Animal tracks
- Bird calling
- Bird droppings
- Bird nest
- Bones
- Feathers
- Frog croaking
- Gopher hole
- Hole in a tree
- Mole mound
- Spider web
- Scat
- Tunnel in a decaying log
- Woodpecker pecking
- Woodrat nest

Did you find scat? What do you think this animal eats?

________________________

Sketch the track.

Measure the size of the track you found.

Width: _______ inches  Height: _______ inches

What animal made this track?

________________________

Is it a carnivore or herbivore?

________________________

PLANTS PROVIDE FOOD AND SHELTER

Acorn Woodpecker

Acorn woodpeckers live in holes in trees. They also make small holes in trees to store acorns. This is called a granary.

The Ohlone also stored acorns in granaries. List three of the steps the Ohlone took to make acorn flour:

1) ________________________
2) ________________________
3) ________________________

Did you spot a tunnel spider burrow on your hike? Sketch it here.

________________________
Pre-Hike Activities

Pre Hike Checklist:
- Review vocabulary words
- Watch acorn woodpecker video
- Do plant identification activity
- Email parents how to prepare their children for the hike
- Email chaperones expectations
- Review hike rules with students and chaperones

Acorn Woodpecker Video
Acorn woodpeckers live throughout Filoli’s Nature Preserve. Students may not see the birds on their hike, but they will find evidence of them. They will hear their “wakawaka” calls and will come across granary trees with acorns stored in them.

This video from the Cornell Lab of Ornithology offers a close-up look at the birds and allows students to hear their calls in advance so they can listen for them while hiking. Acorn woodpecker video. The video can also be located by searching “Through the Lens: Acorn Woodpecker”.

Mystery Science
Plant and Animal Needs
This unit helps students develop the concept that animals and plants need things in order to survive, and their lives are all about meeting those needs. While these are K level lessons, they directly align to Filoli’s program. https://mysteryscience.com/secrets/plant-animal-needs

Ecosystems & The Food Web
This unit on ecology helps students develop the idea that plants, animals, and fungi form a system of interdependent parts, with each part dependent on the other parts for its material nourishment. https://mysteryscience.com/ecosystems/ecosystems-the-food-web

Plant Heroes
Moths, Beetles, and Fungi
These fun activities help students to see how fungi, moths, and beetles can be both beneficial and detrimental to the balance of the ecosystem. https://plantheroes.org/
Videos
This KQED video offers an up-close look at the banana slug, explains the benefits of their slime (mucus), and explains how natural and artificial mucus is used by people: https://www.kqed.org/science/27260/banana-slugs-secret-of-the-slime

This video is of turret spiders hunting from their burrows. Students will see and draw the burrow on their hike: https://www.kqed.org/science/1936465/turret-spiders-launch-sneak-attacks-from-tiny-towers

Plant Identification Activity
This activity serves two purposes:
1) It is an opportunity to reinforce the need to stay on trails and avoid poison oak.
2) It is helpful for students to experience nature journaling before the field trip, which is an activity they will do in their Nature Notebook while on the trail.

Classroom Discussion
Using the photographs and worksheet, discuss the differences and similarities in the leaf shape, texture, leaf pattern, and color of the poison oak leaf and the wild blackberry leaf. Then ask the students to draw each one in color.

Notice that the blackberry is a single leaf with three points and has spines on the stems. The poison oak is arranged in groups of three leaves and has smooth stems.

Print the following two pages for this activity.
Poison Oak Leaves in Fall

Poison Oak Leaves in Spring

Wild Blackberry Leaves
Why does plant identification matter? People have always needed to know which plants are safe to eat and use for medicines and which make the best building materials. Some edible mushrooms look identical to mushrooms that are poisonous. The leaves of a wild blackberry look like poison oak leaves. Poison oak contains an oil that gives most people a red, itchy rash, but many animals can eat the leaves and berries.

Draw a poison oak leaf:

Draw a blackberry leaf:
**Vocabulary**

**Adaptation** - a unique feature of a plant that allows it to survive in its environment

**Decomposer** - an animal or fungus that breaks down dead plants or animals and returns them into the soil as nutrients

**Evidence** - a sign proving that something exists or that an idea is true

**Habitat** - the place where an animal lives or a plant or fungus grows

**Natural Community** - a group of plants and animals living together and depend on each other for food and shelter

**Nature Preserve** - an area where animals, plants, and special features of the land are protected

**Nutrients** - chemicals that provide food for plants

**Ohlone** – the Indigenous People who had villages throughout the Bay Area, including what is now Filoli’s Nature Preserve

**Organism** - any living thing including plants, animals, and fungi

**Parasite** - an organism that benefits from a host organism by taking nutrients or water from its host, or by using it for shelter

**Plant Community** - a group of different types of plants, usually named after the plant that is most abundant

**Predator** - an animal that captures and feeds on another animal

**Prey** - an animal that is hunted for food

**Tannin** - a chemical in oaks, redwoods, and some other plants that prevents decay from fungus, insects, and fire

**SWAN** - all living things need Sun, Water, Air and Nutrients
Post-Hike Activities

**Complete Nature Notebook**
Have students sit in groups with other students that were not in their group on the hike. They can compare answers, drawings, observations, and share what they experienced as they fill out the uncompleted pages of the Nature Notebook.

PAGE 6
Q: Did you find scat? What do you think this animal eats? Is it a carnivore or herbivore?  
A: Look for animal hair, berries, or seeds. Some animals are omnivores and eat both. *We’re not asking students to identify the animal, only what it eats, but you can explore this also.*

PAGE 9
Q: Compare the bark of both trees. Which is wavy? Which is straight up and down?  
A: Douglas fir bark is wavy and often has an elongated diamond shape. Coast redwood bark is straight up and down.

PAGE 10
Q: List three of the steps the Ohlone took to make acorn flour.  
A: Any of these steps are acceptable answers: harvest from tree, dry in sun, crack between stones to remove shell, remove husks with a basket or by hand, pound into a coarse flour with a mortar and pestle, leach with water to remove bitter tannic acid.

PAGE 12
Q: Nocturnal Pollinators  
A: Moth, Bat, Beetle

Q: Diurnal Pollinators  
A: Butterfly, Bee, Hummingbird

PAGE 16
Q: How does slime help banana slugs thrive in the redwood forest?  
A: 1) Slime contains chemicals that numb the tongue of the animal that attempts to eat it.  
2) Slime is a great lubricant and protective layer that helps them glide over leaves and sticks and protects them from sharp edges.  
3) Slime gathers moisture out of the air like a sponge to keep the slug’s skin moist.
PAGE 17
Q: List adaptations that help the newt avoid or survive attacks from predators:
A: 1) Camouflage. From above, they are brown, allowing them to blend in with the soil and leaf litter.
2) They show their orange bellies as a warning to predators that they are toxic.
3) The toxins on their skin harm or kill other animals.
4) They have the ability to hide in the water or on land from predators.

PAGE 18
Q: What did the Ohlone use these deer parts for:
A: Brain = preserve hides and keep them soft
Scapula = cutting tool
Leg Bone = awl for making holes in hard materials like hides or wood when weaving baskets
Hide = clothing, bags, balls

PAGE 19
Q: What animals use branches to build homes?
A: woodrats, birds, squirrels, beavers (there are no beavers at Filoli, but students might offer this as an answer)

Animal Videos
This video is a short compilation of the animals that live at Filoli that your students may not have seen on your visit: https://youtu.be/kDLn__mbR1M

Story
Choose a mammal you saw on your field trip and research:
1) What does the animal eat?
2) What animals eats it?
3) Is it nocturnal or diurnal?
4) What is its habitat?

Then write a story featuring the animal as the main character, its predator and prey as additional characters, and the habitat as the setting for the story.
**Word Search**

People have depended on the natural resources from the Filoli Estate and Nature Preserve for over 1,000 years.

1) The Bourns enjoyed nature in the GARDEN, just as visitors do today.

2) Water that flows from underground streams into WELLS is used to water the garden.

3) Students on field trips hike the trails to learn about how INTERCONNECTED we are with plants and animals.

4) Forests are PRESERVED so the trees can clean our air.

5) Filoli gardeners make COMPOST to fertilize the garden.

6) Scientists RESEARCH plants, animals, and geology.

7) VOLUNTEERS pick fruit from the orchard to donate to food banks.

8) FARMERS grow and bale hay in the fields that were once pastures for the Bourn’s sheep and Roth’s horses.

9) The Ohlone carefully burned fields to make grazing land for DEER, which they then hunted for food.