Teacher’s Guide to the San Mateo County Parks

With Activities for Grades 2-6

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for

San Mateo County Parks and Recreation Foundation
and
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Introduction

San Mateo County has an outstanding parks system that rivals some of the best state parks in the country. With more than a dozen separate sites, the San Mateo County Parks and Recreation Division offers school groups a vast range of unique educational experiences. Students can investigate a dramatic marine reserve that has one of the greatest concentrations of tide pool life in the world. They can walk through ancient coast redwood groves with trees over a thousand years old. They can watch migrating steelhead trout returning to their spawning grounds. They can see history come alive at an old adobe home built in the California rancho days.

This guide was developed to help you, as a teacher, take advantage of the park resources within an easy distance from your school. No matter what grade level you teach, you will find useful information about each of the San Mateo County parks, suggestions for using the parks as part of your teaching program, correlations to California State Content Standards, and tie-ins with state-adopted science textbooks. For grades 2-6, the guide also outlines park-based activities that use the parks to enhance classroom learning in many disciplines.

Our county park system offers marvelous educational opportunities just waiting to be tapped. May this guide inspire you to take advantage of this great resource!

Why Take Your Students to the Park?

The realities of today's classroom means that you don't have time for any fluff. With state content standards to meet and limited time for hands-on science instruction, you may be asking yourself, “How can I possibly justify taking my students to the park?”

In fact, a study trip to the park may be one of the best ways you can help your students meet learning standards. The San Mateo County parks can provide wonderful opportunities for illustrating concepts in real-life settings. During a unit on life cycles, students are unlikely to forget looking into the eye of a migrating trout or seeing the flight of monarch butterflies. When studying California history, an authentic general store outfitted from the 1800s can clarify for students a wealth of concepts.

Research on how the brain works is backing up what good teachers have known all along: students learn better in a stimulating environment. Scientists are finding that on both the chemical level and the cellular level, the learning environment shapes the brain. When it is provided with lots of different sources of stimulation involving all the senses, the brain forms more connections between its cells. Environmental stimulation, including physical activity, leads to dendritic growth. It appears that newness and challenge are important for the human brain's development.

There is no question that a study trip to the park is stimulating to students. New sights, sounds, smells, and sensations abound. Physical activity is integral to the experience. And, when this newness is combined with the challenge of directed learning activities, students are not only more likely to retain what they've learned, but may also increase their intellectual ability by helping the brain to grow.

In addition to helping students intellectually, there may well be deeper reasons to take children to the park. Edward O. Wilson, a biologist, hypothesizes that human beings have a genetically based
need to connect with the natural world. He says that meeting this need may be as important to human health as forming close relationships. Scientist Rachel Carson drew similar conclusions in an article she published in 1956 entitled, “Help Your Child to Wonder”:

“What is the value of preserving and strengthening this sense of awe and wonder, this recognition of something beyond the boundaries of human existence? Is the exploration of the natural world just a pleasant way to pass the golden hours of childhood, or is there something deeper?

“I am sure that there is something much deeper, something lasting and significant. Those who dwell, as scientists or laymen, among the beauties and mysteries of the earth are never alone or weary of life....Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts.” (See next page, Gardner’s Naturalist Intelligence, to learn more about people who are particularly drawn to nature.)

A trip to one of the San Mateo County parks can inspire students to continue learning, to see connections between subjects, and to identify their particular place in the world. It extends their learning beyond the four walls of the classroom and can help them make sense of their learning in the big picture. Given all this, you might ask yourself, “How can I possibly justify not taking my students to the park?”

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Gardner’s Naturalist Intelligence

Some people are naturally drawn to nature. According to Howard Gardner, professor of education at Harvard Graduate School of Education and multiple intelligences theorist, certain people have a high degree of what he calls “naturalist intelligence.” He defines a naturalist as a person who recognizes plants, animals, and other consequential distinctions in the natural world and uses this ability productively.

People with a high level of naturalist intelligence usually prefer to be outdoors and they feel strongly connected to nature. They may also enjoy collecting natural objects (rocks, shells, etc.); learning the names of flowers, trees, animals, or cloud types; and using binoculars, telescopes, magnifiers or other equipment to observe nature. Well-known people with high levels of naturalist intelligence include Galileo, Rachael Carson, Charles Darwin, Jane Goodall, and John Muir.

According to Gardner, developing the naturalist intelligence is no different than teaching math or reading skills: teachers must provide the opportunity for this intelligence to grow. Teachers should provide learning experiences that encourage students to:

- Observe natural phenomena using all the senses
- Gather data from observation
- Group or classify natural objects
- Observe animal behavior
- Grow plants or care for pets
- Learn the names of natural objects or phenomena
- Conduct outdoor field studies
- Use equipment such as microscopes, telescopes, binoculars, magnifiers to enhance observations
- Draw, sketch, photograph, or videotape nature

Offering outdoor learning experiences may give the needed motivation to students who are otherwise struggling. A trip to the park can give students who are drawn to nature a new perspective on their classroom learning. By incorporating activities that encourage the naturalist intelligence, teachers can help all of their students grow.

Sources:

San Mateo County’s Unique Environment

San Mateo County is without a doubt one of the best places in the world to live and work. We’ve got an unbeatable climate and a gorgeous setting. But, have you ever wondered what makes the natural landscape of San Mateo County so distinctive? How it can be that ancient coast redwoods in lush fern-filled gullies are just a hop and a jump from brushy, dry chaparral slopes? Or that gray fog will hang along the coast at the same time that the sun burns the grassy ridges a bit inland?

As the old real estate adage goes, it’s all about location. In other words, San Mateo County is like nowhere else because of its unique location, sitting between the Pacific Ocean and the San Francisco Bay and straddling the Sierra Morena mountain range. These three elements – ocean, bay, and mountains – work together with the local weather to create a variety of microclimates in a very small area.

The Pacific Ocean is the driving force behind much of the area’s climate and San Mateo County has about 55 miles of Pacific coastline. Throughout the central coast of California, the amount of yearly rainfall is determined by air pressure patterns that form over the ocean. Sea surface temperatures also influence whether rainfall is lower or higher than normal and determine the specific weather patterns known as “El Niño” and “La Niña.”

In addition to determining rainfall, the Pacific Ocean also creates the coastal fog that is so typical of summer here. In the summer, northwesterly winds tend to blow along the coast, pushing surface water away from the coastline. As a result, cooler subsurface water flows up to the top. As moist, heavy air flows from the ocean toward land, it passes over this cold offshore water causing condensation and that familiar fog.

The mountains that form a spine along the Peninsula also greatly affect the county’s climate. These Sierra Morena Mountains are actually the northern-most portion of the Santa Cruz Mountains and average 1500 feet in elevation, with the peaks close to 3000 feet. During the rainy season, the slopes of the mountains create a small “rainshadow.” As rain clouds move over the mountains, they tend to drop more rain on the western slopes so that the eastern ones receive less of the precipitation. This accounts for some of the variation in plant cover in the different areas.

Another way in which the mountains contribute to the variety of habitats is in the fact that they have deep narrow canyons. These ravines create areas that are sheltered from wind and intense sunshine and provide year-round creeks and streams. Coast redwood trees tend to prefer these sheltered canyon bottoms, while grass grows on the wind-swept balds at the ridges. Southward-facing slopes get the direct light of the sun, while the north-facing slopes receive less sun and so remain cooler and moister, further adding to the diversity of habitats.

This region is also known for its earthquake faults. The San Andreas fault, for example, separates the Sierra Morena Mountains on the western edge of San Mateo County from the hills and flatlands along the eastern San Francisco Peninsula. In addition to being seismically active (resulting in the possibility of landslides and liquefaction), this fault and others often occur in association with serpentine rock. Serpentine rock, in turn, dramatically influences the landscape, supporting native flora species that can tolerate high levels of iron, nickel, and chromium and dry, rocky conditions.

Finally, the San Francisco Bay also contributes to the county’s ecological picture. With 34 miles of bay front, the county sits firmly on this large estuary. The bay’s mud flats and salt marshes are
among the world’s most biologically productive habitats and add to the mosaic of habitats found in the county.

**Natural Communities Within San Mateo County Parks**

San Mateo County is only 440 square miles, and narrow enough that you can cross the entire county by car in just a matter of minutes. Even though it is a very small area, ocean, mountain, bay, and weather work together to create a patchwork of microclimates. These enable a great diversity of natural communities to thrive.

**Intertidal**
The intertidal community occupies the shoreline between the highest and lowest tide levels. The plants and animals living in the intertidal are specially adapted to the harsh conditions found here. As the tide moves the water in and out, these organisms are exposed to an environment that can change dramatically several times a day. Depending on the level of the tide, they may be exposed to sun, wind, and storms, or covered with salt water and subjected to strong ocean waves and currents. You can see some incredible members of this community at Fitzgerald Marine Reserve.

**Coastal Scrub**
This plant community lives in a habitat along the coast that often has strong winds and salt spray. California sagebrush and coyote brush are typical here as are other low-growing plants adapted to these extreme conditions. A number of the plants of this community have leaves with aromatic oils and resins, so that coastal scrub often has a delightful fragrance. You can experience this community at San Bruno Mountain and San Pedro Valley Parks.

**Chaparral**
This plant community is common throughout the county, and is the typical brushy growth you see in much of wild California. It consists mostly of shrubs like chamise, ceanothus, manzanita, and scrub oak that are adapted to summer drought and winter rain. Growing in thick masses on hot, dry southwest-facing slopes, these shrubs are impossible for large mammals like deer and people to enter. Smaller animals – wood rats, mice, rabbits, ground squirrels, chipmunks, lizards, and shrub-loving birds like California quail, wrentits, towhees, and California thrashers – do find good homes here. San Bruno Mountain, Huddart, Edgewood, Junipero Serra, San Pedro Valley, and the Memorial-Pescadero Creek Park Complex contain good examples of the chaparral community.

**Grassland**
Grassland communities are found in areas with lots of sun and relative dryness. They are often found on the tops of hills. Nearly all the original native bunchgrass community is now gone. With the arrival of European settlers it was quickly converted from a perennial cover of native species to an annual grassland of introduced species. The annual grasses sprout after the first winter rains, grow rapidly through the spring, produce their seed, and by summer dry up and die, leaving the hills golden-brown. In grasslands, rodents like voles and mice tunnel under the fields, while predators like snakes, hawks, and coyotes look and listen for movement and rustling in the grass. You can see examples of this community at San Bruno Mountain, Edgewood, San Pedro Valley, Junipero Serra and other parks.
Coastal Redwood Forest
Coast redwood trees need quite a bit of moisture. They prefer protected areas near streams or creeks, and depend on coastal fog for summer moisture. The coast redwoods are the tallest tree species in the world, with some individuals over 300 feet tall. They can also live for over a thousand years. Plants that grow beneath them must be adapted to the dense shade created by the trees themselves. Heritage Grove is an outstanding example of an old coast redwood community, and Memorial, Huddart and Sam McDonald Parks also contain some coast redwood forest.

Oak Woodland
While the most noticeable feature of oak woodlands is the oak trees themselves, this habitat also supports a diversity of plants and animals. According to one report, over 300 vertebrate animals, 1100 native plants, 370 fungal species and 5000 arthropod species are associated with California oak woodlands. In San Mateo County, oaks tend to grow on the valleys and slopes of rolling hills and need more water than grasslands. You can find oak woodlands at Edgewood, Junipero Serra, and San Pedro Valley Parks.

Mixed Evergreen Forest
Mixed evergreen forests grow in San Mateo County all along the Sierra Morena Mountains, the northern portion of the Santa Cruz Mountains. These forests don’t need as much moisture as coast redwoods, but they need more moisture than oak woodlands. The particular trees that grow in a specific site are related to the soil, elevation, and moisture level of the site. In our parks, the evergreen California laurel, madrone, and Douglas-fir trees are common, as are deciduous buckeye, big-leaf maples, and willows. You can see mixed evergreen forests at Huddart, Wunderlich, and Sam McDonald Parks.

Baylands
The San Francisco Bay is a large estuary that is affected by the ocean tides as well as the rivers and streams that flow into it. There is a huge amount of sediment on the bay floor, which is exposed when low tide drains the water off the gently sloping shores. The resulting mudflats and salt marshes of San Mateo County are home to pickleweed, cord grass, clams, shrimps, mussels, and other creatures. You can see an example of a baylands community at Coyote Point.

History of the San Mateo County Parks

For thousands of years, native people inhabited the region that is now San Mateo County, supported by the rich abundance of resources found here. It is estimated that when the Spaniards arrived, there were 10,000 people living along the coast between Point Sur and San Francisco, and 1,500 people populating the Peninsula. These people lived in small tribes, each with its own name and language. Several San Mateo County parks contain anthropological and archeological evidence of these native Californians and their lives, including San Pedro Valley, Sanchez Adobe, Junipero Serra Park, and San Bruno Mountain.

When Spanish explorers under Gaspar de Portola first came to what is now San Mateo County in 1769, they encountered the huge virgin forest of the Sierra Morena mountain range, the northern portion of the Santa Cruz Mountains. Because of the denseness of the forest and the lush vegetation, these explorers often found it difficult to see 100 feet in any direction. In the fall of that year from the summit of Sweeney Ridge, Portola’s men became the first Europeans to set eyes on the magnificent San Francisco Bay.

Now, nearly 250 years later, most of the Peninsula has been deeply affected by logging and intense development. Still, there are a few carefully preserved areas where we can catch a glimpse of what the native people and early explorers might have experienced. Thanks to the committed effort of many individuals and the county as a whole, we can enjoy the unique natural and historic sites of San Mateo County.

In the 1920s, Roy W. Cloud was San Mateo County’s superintendent of schools. Every year he made annual visits to many of the county’s schools. It was on one of these visits that the idea was born for the first park in our county’s park system.

When visiting a one-room school located among the majestic old-growth coast redwoods of Harrison Canyon between La Honda and Pescadero, Cloud learned that the forest had been acquired by a lumber company and was slated to be logged. Cloud was appalled to think of losing these ancient trees and so he went to the county supervisor for help. He asked the supervisor to save this magnificent area by purchasing about 314 acres of coast redwood forest and turning it into a park.

After an amazingly short discussion, the county decided to buy the land and to levy a special tax to pay for it. This new park was dedicated in 1924 as Memorial Park in honor of county residents who had died in World War I. Its acquisition launched a park system that was dedicated both to recreation and to habitat and species preservation.

The next park in the system was Flood Park, which was added in the 1930s. Under the direction of San Mateo Counter Planner Ronald Campbell, WPA (Works Progress Administration) workers transformed a windswept grainfield into a beautiful urban park. Campbell designed Flood Park in the style of early California ranch buildings, using adobe brick to create the caretaker’s cottage, restrooms, and administrative office building. This park soon became a popular place for locals to picnic and play.

The 1930s through the 1950s brought a number of new parks to the county system. In the late 1930s, land previously owned by James Huddart was donated to San Mateo County. Huddart Park was developed for hiking, picnicking, and camping and opened in 1948. In the 1950s, as the county’s population doubled, it acquired two historical properties to help fill the increased...
need for recreation. The Sanchez Adobe is one of the oldest standing structures in the county and Woodside Store was the only store on the Peninsula between San Francisco and Santa Clara during the logging boom of the late 1800s. The county purchased the land that is now Junipero Serra County Park in 1956, and acquired the land that is now Sam McDonald Park in 1958.

The 1960s through the 1980s brought other new properties into the system, including several comprised of critical habitat. In 1963, the county acquired Coyote Point, which quickly became its most visited park. The county in 1968 bought the land to develop Pescadero Creek Park. In 1969, it acquired the coastal property that would become the Fitzgerald Marine Reserve. In the early 1970s, the county acquired San Pedro Valley Park, with its 1140 acres of meadows, hills, and streams. In 1974, the land for Wunderlich County Park was deeded to the county. This park has fifteen miles of trails and a steep evergreen forest. Also in 1974, the county purchased a grove of coast redwood trees near La Honda. This small Heritage Grove Redwood Preserve includes trees that are estimated to be 1500 years old. In 1980, the biologically rich Edgewood Park was purchased by the county and was to become its only natural preserve. In 1986, after long and protracted negotiations and through a number of land gifts and an operating agreement with the State of California, the 2400-acre San Bruno Mountain State and Regional Park was finally dedicated. At the time of printing, the County was about to purchase its next park, Mirada Surf. Please check with the San Mateo County Parks Foundation for more information about this site.

Today, this extensive system of parks is invaluable. It not only offers places to pursue a myriad of recreational activities, including hiking, birding, fishing, cycling, picnicking, and camping, but also enables residents to experience nature just beyond their backyards. In addition, it provides natural habitats for countless plants and animals, including a number of plant and animal species that are considered endangered or threatened.

The history of our parks is a rich and exciting one. Thanks to ongoing efforts by park staff, volunteers, county officials, and the San Mateo County Parks and Recreation Foundation, our parks continue to be a source of pride and joy.
Planning Your Park Visit

A field trip to one of the San Mateo County parks will likely be an exciting learning experience for students, but will require extra preparation on the part of the teacher. A little bit of advance planning will ensure a successful field trip and is worth every minute spent. Here are a few suggestions to help you plan your visit.

✓ Clarify the goal of your field trip. Whether it is to enhance your unit on life cycles or to experience a local native landscape, articulate the goal for yourself, administrators, parents, and students.

✓ Decide whether you want a docent-led tour or whether you will lead the exploration. Find out whether the park you are interested in offers tours or other enrichment opportunities (see the “Parks” section of this guide or visit www.sanmateocountyparks.org).

✓ Schedule the field trip day as soon as possible and make necessary reservations. Keep in mind that docent-led tours fill up quickly.

✓ Get necessary administrative approval for the field trip and arrange for transportation.

✓ Line up adult volunteers to help on the field trip. We recommend 1 adult chaperone per 5 students.

✓ If you will be leading the investigation, plan the specific learning activity(ies) you will conduct for the visit. Look through this guide for ideas and suggestions. Contact the San Mateo County Parks and Recreation Foundation to reserve a Park Pack.

✓ Decide what materials each student will need for the activity and plan how to get materials to the field trip site.

✓ Decide what students will need to bring from home and what the appropriate clothing should be. We recommend a backpack, sneakers or boots (no open toes), long pants, a hat, jacket or sweater (depending on the weather), water bottle, sack lunch, and sunscreen. In spring through fall, students should avoid wearing red or yellow, carrying candy in their pockets, or wearing perfume since these all attract yellow jackets and bees.

✓ Send home permission slips and a letter describing the field trip and what students need to wear and bring. See that all permission slips are signed and returned.

✓ If possible, visit the field trip site before the trip. Survey the area or ask a ranger for any safety issues to consider. Also think about what boundaries need to be established for each activity and how students will know and remember the boundaries.

✓ Conduct any preparatory learning activities. Each activity described in this guide contains a classroom component to do prior to the park visit.

✓ Teach students to be good stewards of the park. They should stay on roads or trails and should not pick or trample plants or collect animals. Everything is protected in the parks and should
be left in place for others to enjoy – so no picking flowers, collecting rocks, or taking home bugs. Do not bring any seeds, leaves, soil, or plant material into parks to prevent the spread of non-native, invasive plants. Plan to bring along a trash bag and gloves and to pick up any trash the class creates or finds on the field trip.

✓ Find out and follow the specific regulations of the park you plan to visit, either when you make the reservation or from the park web site at www.sanmateocountyparks.org.

✓ Be clear about what behavior you expect from students for the field trip. Some students may think that classroom rules apply only in the classroom unless you tell them otherwise.

✓ After the field trip, ask parents to launder students’ clothes in a separate load right away in case of contact with poison oak.

**Park Safety**

The San Mateo County parks are natural areas in which everyone needs to be aware of safety. Students should always stay on trails and not run on slippery rocks or climb on bluffs. At Fitzgerald Marine Reserve, students should watch the waves at all times, not wade in the water, and stay far enough away from the surf so that no more than the bottoms of their shoes get wet.

The parks are also home to a variety of wild plants and animals. For the safety of everyone involved, help your students understand the importance of being respectful toward these other living things. Be particularly aware of the following plants and animals, which can pose specific safety issues in some of the parks. Be prepared and have along a first aid kit. If possible, please alert a Park Ranger of any injury or safety concerns.

**Poison Oak**

Poison oak is common throughout the San Mateo County parks. This plant contains an oil that causes an irritating skin rash. People react differently to poison oak, with rashes ranging from very mild to very severe.

Poison oak has groupings of three leaves, which range in color from green, to yellow, to red. It can grow as a shrub or as a tree-climbing vine. The plant can cause a rash even when it is dormant in the winter, without leaves.

To avoid poison oak, have students avoid all foliage and twiggy branches when they are walking on a trail. If you aren’t sure you can recognize it, have someone knowledgeable point out poison oak to you in the field. Teach your students to recognize the leaves using the mnemonic, “Leaves of three, let it be.”

If someone in your group comes into contact with poison oak:

✓ Wash the affected skin area with soap and warm water as soon as possible (the oil typically penetrates the skin within ten minutes).
✓ Scrub under fingernails with a brush to avoid spreading oil to other parts of the body.
✓ Have parents launder in a separate load any clothing and shoes that may have been in contact with the plant.
**Stinging Nettle**

Stinging nettle grows in moist, shady places throughout San Mateo County parks. Its bright green leaves and stems are covered with hollow hairs that come off easily when the plant is brushed. These hairs are filled with formic acid, which instantly causes a painful stinging. As the skin reacts, a rash also begins to form and can last about a day.

If someone in your group comes in contact with stinging nettle:
✓ Neutralize the acid by immediately applying a paste of baking soda and water.
✓ If baking soda is not handy, human saliva rubbed into the itchy area may help.

**Ticks**

Ticks are parasites that feed on a host's blood by digging into the skin using the sharp pointy anchors below their mouths. Ticks climb plants and wait for a host (a human or other animal) to brush up against them. Ticks can carry many diseases, including Lyme disease, which is carried by the Western black-legged tick.

If someone in your group is bitten by a tick:
✓ Grasp the tick with a tissue or tweezers as close to the skin as possible. Never use bare hands as this can further transmit disease.
✓ Gently pull the tick from the skin. Do not twist or crush it.
✓ Apply an antiseptic to the bite area after removing the tick.
✓ If possible, save the tick for identification and have parents consult a doctor.

**Yellow Jackets**

Yellow jacket is the common name for several different species of wasps found in California. Some of these species are pests because they like picnic areas, garbage cans, and refreshment stands. They are attracted to sweet foods such as honey, candy, fruits, and soft drinks; some species are even attracted to red meat, chicken, and fish. To defend themselves, yellow jackets may deliver a painful sting, which can cause swelling and itching. For people allergic to yellow jackets, a single sting can require immediate medical attention. To avoid stings, teach children to stay still if a yellow jacket approaches and to not slap or brush off an insect of this kind.

If someone in your group is stung by a yellow jacket or a wasp:
✓ Remove the stinger (if present) by scraping it from the side with your fingernail.
✓ Apply cold water or ice in a wet cloth.
Keep the stung arm or leg as low as possible. Have the person lie down if feeling faint or dizzy.
Seek medical attention immediately if the person is known to be allergic to yellow jacket venom.

Rattlesnakes
Rattlesnakes are venomous snakes common throughout the parks. They are important members of the natural community, helping to keep the rodent population under control. Rattlesnakes feed on small rodents, rabbits, birds, and almost anything alive they can swallow. They will not attack, but will defend themselves if disturbed or cornered, shaking their rattle to let their presence be known. Rattlesnakes are found around rocks and are usually out when the weather is warm.

If your group encounters a rattlesnake:

✓ Instruct students not to corner, disturb, or pick up the snake.
✓ Have students move away, and usually the snake will flee.
✓ If someone is bitten, keep him or her from moving as that could spread the venom. A snakebite requires a doctor’s attention – send for help immediately.

Bobcats and Mountain Lions
These two wild cats occasionally visit some of the San Mateo County parks, but are rarely seen. They usually hunt alone at night and are important members of the natural community. Bobcats weigh up to 60 pounds and hunt small animals like squirrels and rabbits. Mountain lions weigh up to 150 pounds and hunt larger animals like deer.

Both of these cats avoid contact with people and it is highly unlikely that your boisterous group would see one of them. However, should you ever encounter one of these animals, particularly a mountain lion:

✓ Make yourself look as big and imposing as possible. Shout and wave your arms. Open your coat and flap it.
✓ Maintain eye contact with the wild cat, and do not crouch down.
✓ Do not run, as running triggers a wild cat’s instinct to chase.
✓ Pick up small children and keep them from panicking and running.
✓ If attacked, fight back! Try to remain standing and face the attacking animal.
Wild Pigs
Wild pigs are present in the parks, but are not usually seen during the daytime. They are not native to the area, but were introduced by people. Wild pigs can be dangerous and aggressive when cornered or when tempted by food.

If your group encounters a wild pig:
✓ Instruct students not to approach it, but to back away slowly giving the pig an opportunity to escape.
✓ Pigs have poor eyesight, so wave your arms side to side, make noise, and speak loudly in a non-threatening manner.

Coyotes
Coyotes live in and around the parks and are occasionally seen by park visitors. These members of the dog family play an important role in maintaining the health and balance of the natural ecosystem. They are most active from dusk through dawn, but may move around anytime during the day. Coyotes are very adaptable and will eat anything from insects to small prey (like birds and mice) to plant material. People dropping trail mix or leaving food along the trail can indirectly attract coyotes by concentrating prey in these areas.

Coyotes are usually very wary of humans and will avoid people whenever possible. However, when they associate people with food, they may become bold or aggressive toward people. This is not considered normal coyote behavior. For survival, coyotes need to maintain their natural fear of humans, so people should not attempt to “make friends” with them.

If your group encounters a coyote:
✓ Calmly leave the area.
✓ If the coyote approaches, yell and stamp your feet to scare it away. Do not turn your back or run.
✓ If attached, fight back.
Park Regulations

To preserve the natural environment of the San Mateo County parks, all plants, animals and natural features within the parks are protected. The following regulations are in force in all the parks.

- Picking or removing wildflowers or other natural material is prohibited.
- Feeding of wildlife is prohibited.
- Leaving designated trails is prohibited.
- Dogs and other pets are not allowed.
- Fires are permitted in park barbeque grills only - no ground fires.
- Cutting and gathering wood are prohibited.
- Motor vehicles and bicycles are permitted only on paved roadways and in established parking areas.
- Firearms and other weapons are prohibited.
- Loud radios and the playing of amplified musical instruments are not permitted.
- Smoking is permitted in the picnic areas only; no smoking is allowed on the trails.

Find out specific regulations for the park you are visiting by checking the park web site at www.sanmateocountyparks.org or by asking when you call for your reservation. Some fees, including entry, car parking and bus parking, may apply.
Activities
Correlation to Content Standards

The San Mateo County parks offer endless ways to support and supplement your teaching. The following charts list California State Content Standards and show the activities in this guide that address the standards. Where appropriate, the charts also suggest other park-based activities you may want to consider in helping your students master the standards.

**Science**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Strand and Concept</th>
<th>Activity⁴</th>
<th>Other Park-Based Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Life Sciences: 2. Different types of plants and animals inhabit the earth.</td>
<td></td>
<td>Observe insects and spiders (Flood Park). Explore salt marsh and Bay mud flat wildlife and shorebirds (Coyote Point).</td>
</tr>
<tr>
<td></td>
<td>Earth Sciences: 3. Earth is composed of land, air and water</td>
<td></td>
<td>See and explore where the water and land meet (Coyote Point, Sawyer Camp Trail).</td>
</tr>
<tr>
<td>1</td>
<td>Life Sciences: 2. Plants and animals meet their needs in different ways.</td>
<td></td>
<td>Investigate a rich diversity of different tree species (Flood Park or Coyote Point).</td>
</tr>
<tr>
<td></td>
<td>Earth Sciences: 3. Weather can be observed, measured and described.</td>
<td></td>
<td>Observe Bay Area weather on a given day and see the impact of weather over time on a physical landmark (San Bruno Mountain, Coyote Point).</td>
</tr>
<tr>
<td>2</td>
<td>Life Sciences: 2. Plants and animals have predictable life cycles. 1, 3</td>
<td></td>
<td>Watch steelhead trout spawning in San Pedro Creek (San Pedro Valley).</td>
</tr>
<tr>
<td></td>
<td>Earth Sciences: 3. Earth is made of materials that have distinct properties and provide resources for human activities.</td>
<td></td>
<td>Look for examples of different types of rocks (all parks). No collecting is allowed.</td>
</tr>
<tr>
<td>3</td>
<td>Life Sciences: 3. Adaptation in physical structure or behavior may improve an organism’s chance for survival. 1, 2, 3, 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Life Sciences: 2. All organisms need energy and matter to live and grow. 3, 5, 6</td>
<td></td>
<td>Explore a coast redwood grove with everything linked together in a web of interdependency (Heritage Grove or Memorial Park).</td>
</tr>
<tr>
<td></td>
<td>Life Sciences: 3. Living organisms depend on one another and on their environment for survival. 1, 3, 4, 5, 6</td>
<td></td>
<td>Explore a coast redwood grove with everything linked together in a web of interdependency (Heritage Grove or Memorial Park).</td>
</tr>
<tr>
<td></td>
<td>Earth Sciences: 5. Waves, wind, water, and ice shape and reshape Earth’s land surface.</td>
<td></td>
<td>See the impact of weather over time on a landform (San Bruno Mountain). See the impact of waves on a coastal reef (Fitzgerald Marine Reserve).</td>
</tr>
<tr>
<td>5</td>
<td>Life Sciences: 2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. 1, 3, 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Earth Sciences: 3. Water on Earth moves between the oceans and land through the process of evaporation and condensation.</td>
<td></td>
<td>Visit a local reservoir to see one aspect of the water cycle (Sawyer Camp Trail).</td>
</tr>
<tr>
<td></td>
<td>Earth Sciences: 4. Energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns.</td>
<td></td>
<td>Observe fog and cloud patterns from the peak (San Bruno Mountain).</td>
</tr>
</tbody>
</table>

⁴ Key to Activities: 1- Drawing Wildflowers, 2- Bird Sounds, 3- Butterflies, 4- Identifying Trees, 5- Tracking Wildlife, 6- Square-Foot Naturalists
<table>
<thead>
<tr>
<th></th>
<th>Focus on Earth Science: 1. Plate tectonics accounts for important features of Earth’s surface and major geologic events.</th>
<th>Take a walk on a trail that traverses the San Andreas Fault (Sawyer Camp Trail).</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Focus on Earth Science: 2. Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment.</td>
<td>See the impact of weather over time on a landform (San Bruno Mountain, Huddart, Junipero Serra, Memorial/Pescadero Creek, or San Pedro Valley).</td>
</tr>
</tbody>
</table>
|   | Ecology (Life Science): 5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment.  
1, 3, 5 | Watch pollinators like bees get nectar from wildflowers (Edgewood and others). |
|   | Resources: 6. Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. | See evidence of people using coast redwoods as a resource for building (Woodside Store, Huddart). |
| 7 | Focus on Life Science: 3. Biological evolution accounts for the diversity of species developed through gradual processes over many generations. | See a large diversity of intertidal species (Fitzgerald Marine Reserve).  
Walk through different ecosystems (Wunderlich, Edgewood). |
| 9-12 | Physics: 4. Waves have characteristic properties that do not depend on the type of wave. | Study wave action and tides (Fitzgerald Marine Reserve). |
|   | Biology/Life Sciences: 6. Stability in an ecosystem is a balance between competing effects. | Observe migrating species of shorebirds or threatened habitats (Coyote Point and others). |
|   | Biology/Life Sciences: 8. Evolution is the result of genetic changes that occur in constantly changing environments. | Look for examples of species adapted to specific environmental conditions (all parks). |
|   | Earth Sciences: 3. Plate tectonics operating over geologic time has changed the patterns of land, sea, and mountains on Earth’s surface. | Take a walk on a trail that traverses the San Andreas Fault (Sawyer Camp Trail and Edgewood Trail in Edgewood).  
See evidence of uplifted marine layers. (Junipero Serra) |
|   | Earth Sciences: 7. Each element on Earth moves among reservoirs, which exit in the solid earth, in oceans, in the atmosphere, and within and among organisms as part of biogeochemical cycles. | See a natural gas deposit near Hoffman Creek (Pescadero Creek). |
|   | Earth Sciences: 9. The geology of California underlies the state’s wealth of natural resources as well as its natural hazards. | Take a walk on a trail that traverses the San Andreas Fault (Sawyer Camp Trail, Edgewood Trail). |
### History-Social Science

<table>
<thead>
<tr>
<th>Grade</th>
<th>Theme</th>
<th>Knowledge and Skills</th>
<th>Park-Based Activities&lt;sup&gt;5&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Learning and Working Now and Long Ago</td>
<td>K.4 Students compare and contrast the locations of people, places, and environments and describe their characteristics.</td>
<td>Visit any of the parks and compare it to the places people live.</td>
</tr>
<tr>
<td>1</td>
<td>A Child’s Place in Time and Space</td>
<td>1.2 Students compare and contrast the absolute and relative locations of places and people and describe the physical and/or human characteristics of places.</td>
<td>Visit any of the parks and compare it to the places people live.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.4 Students compare and contrast everyday life in different times and places around the world and recognize that some aspects of places, people, and things change over time while others stay the same.</td>
<td>Visit the oldest wood frame construction in the county, restored to the ambiance of an 1880s country store (Woodside Store).</td>
</tr>
<tr>
<td>2</td>
<td>People Who Make a Difference</td>
<td>2.1 Students differentiate between things that happened long ago and things that happened today.</td>
<td>Visit the oldest wood frame construction in the county, restored to the ambiance of an 1880s country store (Woodside Store).</td>
</tr>
<tr>
<td>3</td>
<td>Community and Change</td>
<td>3.2 Students describe the American Indian nations in their local region long ago and in the recent past.</td>
<td>Examine native artifacts found on park property, including arrowheads and pestles (Junipero Serra).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.3 Students draw from historic and community resources to organize the sequence of local historical events and describe how each period of settlement left its mark on the land.</td>
<td>See first-hand examples of the logging history of the Santa Cruz Mountains– huge coast redwood stumps and skid roads (Huddart).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Visit the oldest wood frame construction in the county, restored to the ambiance of an 1880s country store (Woodside Store).</td>
</tr>
<tr>
<td>4</td>
<td>California: A Changing State</td>
<td>4.1 Students demonstrate an understanding of the physical and human geographic features that define places and regions in California.</td>
<td>Walk on a trail where you can see the State Mineral, the State Flower, and the State Bird (Edgewood Trail from Cañada Rd. entrance, Edgewood Park).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Visit an old adobe with lots of hands-on activities, literature, and films relating to native Californians and the early days of Californios (Sanchez Adobe).</td>
</tr>
<tr>
<td>8</td>
<td>United States History and Geography: Growth and Conflict</td>
<td>8.8 Students analyze the divergent paths of the American people in the west from 1800 to the mid-1800s and the challenges they faced.</td>
<td>Visit the oldest wood frame construction in the county, restored to the ambiance of an 1880s country store (Woodside Store).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.12 Students analyze the transformation of the American economy and the changing social and political conditions in the United States in response to the Industrial Revolution.</td>
<td></td>
</tr>
</tbody>
</table>

<sup>5</sup> Key to Activities: 1- Drawing Wildflowers, 2- Bird Sounds, 3- Butterflies, 4- Identifying Trees, 5- Tracking Wildlife, 6- Square-Foot Detectives
**Mathematics**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Strand</th>
<th>Knowledge and Skills</th>
<th>Activity(^6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Measurement and Geometry</td>
<td>2.0 Students identify common objects in their environment and describe the geometric features.</td>
<td>1 (simplified)</td>
</tr>
<tr>
<td>1</td>
<td>Measurement and Geometry</td>
<td>2.0 Students identify common geometric features, classifying them by common attributes.</td>
<td>1 (simplified)</td>
</tr>
<tr>
<td></td>
<td>Statistics, Data Analysis &amp; Probability</td>
<td>2.0 Students sort objects and create and describe patterns by numbers, shapes, sizes, rhythms, and colors</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Measurement and Geometry</td>
<td>1.0 Students understand that measurement is accomplished by identifying a unit of measure, iterating (repeating) that unit, and comparing it to the item to be measured.</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Statistics, Data Analysis &amp; Probability</td>
<td>2.0 Students identify and describe the common figures in the plane and of common objects in space.</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Measurement and Geometry</td>
<td>1.0 Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations.</td>
<td>1, 2, 6</td>
</tr>
<tr>
<td>4</td>
<td>Measurement and Geometry</td>
<td>1.0 Students choose and use appropriate units and measurement tool to quantify the properties of objects.</td>
<td>5, 6</td>
</tr>
<tr>
<td></td>
<td>Statistics, Data Analysis &amp; Probability</td>
<td>2.0 Students use two-dimensional coordinate grids to represent points and graph lines and simple figures.</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Statistics, Data Analysis &amp; Probability</td>
<td>1.0 Students organize, represent, and interpret numerical and categorical data and clearly communicate their findings.</td>
<td>1, 2, 6</td>
</tr>
<tr>
<td>6</td>
<td>Statistics, Data Analysis &amp; Probability</td>
<td>2.0 Students use data samples of a population and describe the characteristics and limitations of the samples.</td>
<td>6</td>
</tr>
</tbody>
</table>

\(^6\) Key to Activities: 1- Drawing Wildflowers, 2- Bird Sounds, 3- Butterflies, 4- Identifying Trees, 5- Tracking Wildlife, 6- Square-Foot Detectives
### Visual and Performing Arts

<table>
<thead>
<tr>
<th>Grade</th>
<th>Discipline</th>
<th>Standard</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>K-12</td>
<td>Visual Arts</td>
<td>1.0 Artistic Perception: Students perceive and respond to works of art, objects in nature, events, and the environment. They also use the vocabulary of the visual arts to express their observations.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0 Creative Expression: Students apply artistic processes and skills, using a variety of media to communicate meaning and intent in original works of art.</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0 Connections, Relationships, Applications: Students apply what they learned in the visual arts across subject areas.</td>
<td>1</td>
</tr>
<tr>
<td>K-12</td>
<td>Music</td>
<td>1.0 Artistic Perception: Students read, notate, listen to, analyze, and describe music and other aural information, using the terminology of music.</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.0 Connections, Relationships, Applications: Students apply what they learn in music across subject areas.</td>
<td>2</td>
</tr>
</tbody>
</table>

7 Key to Activities: 1- Drawing Wildflowers, 2- Bird Sounds, 3- Butterflies, 4- Identifying Trees, 5- Tracking Wildlife, 6- Square-Foot Detectives
### Correlation to Textbooks

The activities in this guide are designed to provide hands-on science experiences for students in a real-life setting. To help you in your planning, this chart lists the science textbooks adopted in 2000/2001 by the California Department of Education for elementary students, and shows where the activities can be used to support and supplement the texts.

<table>
<thead>
<tr>
<th>Textbook Series</th>
<th>Grade</th>
<th>Unit</th>
<th>Activity&lt;sup&gt;8&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Discovery Works</em>, Houghton Mifflin</td>
<td>K</td>
<td>Unit A: Characteristics of Living Things</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Exploring with the Senses</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit C: Earth’s Land and Water</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Unit A: Kinds of Living Things</td>
<td>1, 2, 3, 4, 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit D: Earth’s Land and Water</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Unit A: Interactions of Living Things</td>
<td>2, 5, 6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Unit A: Life Cycles</td>
<td>1, 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit D: Earth’s Resources</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit E: Roles of Living Things</td>
<td>1, 2, 5</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Unit C: Classifying Living Things</td>
<td>2, 4, 5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Unit A: Systems in Living Things</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit D: Populations and Ecosystems</td>
<td>5, 6</td>
</tr>
<tr>
<td><em>McGraw-Hill Science</em></td>
<td>1</td>
<td>Unit A: Plants Are Living Things</td>
<td>1, 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Animals are Living Things</td>
<td>2, 3, 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit D: Caring for Earth</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Unit A: Plants and Animals</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Homes for Plants and Animals</td>
<td>2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Unit A: Looking at Plants and Animals</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Where Plants and Animals Live</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Unit A: The World of Living Things</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Animals as Living Things</td>
<td>2, 3, 5, 6</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Unit A: Structures of Plants and Animals</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Interactions of Living Things</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td><em>Harcourt Science</em></td>
<td>K</td>
<td>Unit A: Animals</td>
<td>1, 3, 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Plants</td>
<td>1, 4</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Unit A: Plants and Animals All Around Us</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Living Together</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Unit A: Living Things Grow and Change</td>
<td>1, 3, 4, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Homes for Living Things</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Unit A: Plants and Animals</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Plants and Animals Interact</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Unit A: A World of Living Things</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Looking at Ecosystems</td>
<td>4, 6</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Unit A: Processes of Living Things</td>
<td>1, 3, 4, 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Systems and Interactions in Nature</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Unit A: Understanding Living Things</td>
<td>1, 4, 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unit B: Living Things Grow and Respond</td>
<td>1, 2, 3, 4, 5</td>
</tr>
</tbody>
</table>

<sup>8</sup> Key to Activities: 1- Drawing Wildflowers, 2- Bird Sounds, 3- Butterflies, 4- Identifying Trees, 5- Tracking Wildlife, 6- Square-Foot Detectives
Park Pack

The San Mateo County Parks District has put together a Park Pack to help you conduct the activities described in this guide. Designed for use with 30 students, the Park Pack includes field guides and instruments that will enhance students’ learning experience in the park. We recommend that, before you head out to the park, you plan how to manage the materials and provide opportunities for students to practice using them. You may want to sort students into pairs or groups for sharing the materials. Depending on your class, you may also want to supplement with additional materials, including student journals and borrowed binoculars or thermometers, for example.

Reserve your Park Pack as far in advance of your planned trip as possible. You may do so by contacting the San Mateo County Parks and Recreation Foundation at (650) 321-5812 or at www.SupportParks.org.

Park Pack Contents

- 15 copies, *National Audubon Society Pocket Guide to Western Flowers*
- 1 *Identiflyer* with *Yardbirds Series* 1 and 2 song cards
- 1 *Western Yardbirds* song card
- 1 moisture meter
- 5 pocket thermometers
- 15 dual hand-held magnifiers, 3X 6X
- 15 copies, *Nature Finder Guides: Pacific Coast Trees*
- 15 copies, *Animal Tracks of Northern California*
- 15 copies, *Peterson Flash Guide to Western Trailside Birds*
- 5 student binoculars
- 1 *National Audubon Society Regional Guide to California*
Lesson 1

Subjects
Science, Mathematics, Visual and Performing Arts

State Content Standards:

Science
Grade 2, Life Sciences, 2. Plants and animals have predictable life cycles.
Grade 3, Life Sciences, 3. Adaptation in physical structure or behavior may improve an organism’s chance for survival.
Grade 4, Life Sciences, 3. Living organisms depend on one another and on their environment for survival.
Grade 5, Life Sciences, 2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.
Grade 6, Ecology (Life Science), 5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment.

Mathematics
Grade K, Measurement and Geometry 2.0 Students identify common objects in their environment and describe the geometric features.
Grade 1, Measurement and Geometry 2.0 Students identify common geometric features, classifying them by common attributes.
Grade 2, Measurement and Geometry 2.0 Students identify and describe the common figures in the plane and of common objects in space.
Grade 2, Statistics, Data Analysis and Probability 1.0 Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations.
Grade 4, Statistics, Data Analysis and Probability 1.0 Students organize, represent, and interpret numerical and categorical data and clearly communicate their findings.

Visual and Performing Arts
Grade K – 12, Visual Arts 1.0 Artistic Perception: Students perceive and respond to works of art, objects in nature, events, and the environment. They also use the vocabulary of the visual arts to express their observations.

Activity 1: Drawing Wildflowers

Students sketch wildflowers in one of the San Mateo County parks as a way to enhance observational and recording skills. While the best time to see wildflowers is in the spring, you can adjust this activity for other times of the year by having students sketch any small plants you see.

Background for the Teacher
Several of our San Mateo County parks offer jaw-dropping wildflower displays in the spring. For this activity, students first learn some nature drawing techniques that help them focus on the form and structure of flowers. Then on a field trip to one of these parks, they practice drawing close-ups of flowers. By looking carefully at the flowers, students will learn about the different parts of the flower and will come to appreciate how wildflowers help the plant reproduce.

To preserve the natural environment of the San Mateo County parks, all plants, animals and natural features within the parks are protected. For this activity, students will draw the wildflowers in place, as picking or removing wildflowers or other natural material is prohibited.

The best wildflower displays are usually found in grassland areas. Edgewood, San Bruno Mountain, Junipero Serra, Huddart, San Pedro Valley, and Sam McDonald (in the Memorial-Pescadero Creek Park Complex) have the most abundant displays. You can also see plenty of flowers at Coyote Point, Sawyer Camp Trail, and Wunderlich. The best time to see the wildflowers is in the spring from February to June. Keep in mind that what you see will depend on where you hike and when you go. Some wildflowers have a brief flowering period, while others persist for longer spells.

A wildflower is any flowering plant that lives in the wild without the help of people. Many, but not all, wildflowers are native plants that thrived here prior to European contact. These plants evolved over a long period of time and are well suited to the specific climate and habitat conditions found here. Some wildflowers are not native, but were brought to California from other places by people.
Wildflowers, like all flowers, have one main job: to create seed. Many flowering plants depend on insects, hummingbirds, or bats for this process and attract them through their nectar, scent, or color. As these pollinators go from flower to flower gathering nectar or pollen or eating the petals, they brush against the stamens, causing pollen to cling to their legs or other parts of their body. When the pollinator moves from plant to plant, this pollen will then stick to the pistil of another flower and work its way to the ovary, where it can fertilize an ovule. After fertilization, the ovule begins to develop into a seed, which will allow the plant to reproduce.

When students examine a flower, they will see at least some of the basic flower parts shown in the diagram. As they look at several flowers, they will begin to notice great deviations from this basic structure. Some plants are bisexual, with each flower having both male and female parts, while others are unisexual. Some plants, like sunflowers, have complex flowers, where what we see as one flower head is in fact a collection of many flowers.

When drawing the flowers, the biggest challenge for students is to draw what they actually see and not what they think they should see. Even with an iris in front of them, many students will want to draw a circle with a ring of petals around it. It may take some encouragement for them to see that this symbol for “flower” is very different from how most flowers look.
Basic Flower Anatomy

Petal – The petals attract insects into the flower. They may be colorful, scented, or have guidelines.

Pistil – The female part of the flower is called the pistil. This includes the ovary (where the seed develops) and the style (the long tube into the ovary).

Stamen – The stamen is the male part of the flower. It is usually a long stalk with pollen sacs at the end.

Flower stalk – This gives support to the flower and elevates the flower for the insects.

Wildflowers Commonly Seen in San Mateo County Parks

These are the most common wildflowers in the parks, but you may well come across others.

<table>
<thead>
<tr>
<th>Bluedick</th>
<th>Fiddleneck</th>
<th>Owl’s clover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blue-eyed grass</td>
<td>Fremont’s camas</td>
<td>Paintbrush</td>
</tr>
<tr>
<td>Brodiaea</td>
<td>Fremont’s star lily</td>
<td>Popcorn flower</td>
</tr>
<tr>
<td>California buttercup</td>
<td>(or Zygadene lily)</td>
<td>Shooting star</td>
</tr>
<tr>
<td>California poppy</td>
<td>Goldenfield</td>
<td>Sticky monkey flower</td>
</tr>
<tr>
<td>Checker-bloom</td>
<td>Indian warrior</td>
<td>Sun cup</td>
</tr>
<tr>
<td>Chinese houses</td>
<td>Johnny jump-up</td>
<td>Tarweed</td>
</tr>
<tr>
<td>Clarkia</td>
<td>Lupine</td>
<td>Tidytips</td>
</tr>
<tr>
<td>Coast trillium</td>
<td>Mariposa lily</td>
<td>Western hound’s tongue</td>
</tr>
<tr>
<td>Cow parsnip</td>
<td>Milkmaid</td>
<td>Wild mustard’</td>
</tr>
<tr>
<td>Creamcups</td>
<td>Mission bells</td>
<td>Wild radish’</td>
</tr>
<tr>
<td>Douglas iris</td>
<td>Mule ear sunflower</td>
<td>Wood rose</td>
</tr>
<tr>
<td>Fairy lantern</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Non-Native
In the Classroom

What to Do:

1. Give students a piece of drawing paper and have them draw a flower from memory. After they have drawn, show them one of the flowers and ask them to describe how it differs from the flower they drew. Explain to them that they will learn how to be careful observers of flowers as they sketch a real flower.

2. On the board, draw a basic flower as shown in the Background for the Teacher. Introduce or review the basic flower parts and their functions, explaining to students that this will help them in their observations.

3. Give each student a flower. Explain to students that before they draw the flower, they need to spend a good amount of time just looking at it. Ask them to notice the following as they examine their flower very carefully:

   ✓ What is the general shape of the flower?
   ✓ How does it differ from the basic flower on the board?
   ✓ What are the shapes of the petals?
   ✓ What color patterns do the petals have?
   ✓ How are the petals attached to the stem?
   ✓ How many stamens does the flower have?
   ✓ What is the shape of its pistil?
   ✓ What shape are the leaves?
   ✓ How are they attached to the plant?
   ✓ What pattern do the leaf veins follow?
   ✓ What is the texture of the leaves?
   ✓ What shape is the stem: straight or branched?
   ✓ How are the flowers attached to the stem?

4. Have the students turn the flower around until it is in a position they like. Point out that from this position, the petals do not all look the same shape even if they are identical, and that the student will not be able to see the entire flower.

5. Explain to students that they will now make a rough sketch of what they see. Make sure they understand that the sketching is to help them observe the flower more carefully, not to create an artistic masterpiece.

6. Give each student a piece of drawing paper and a pencil. Suggest that they begin by drawing the basic geometric shapes they see. For example, one petal may look like a circle, another a triangle, and another a rectangle.

7. After roughing out the basic geometric shapes, have students develop the drawing more fully by drawing over the previous lines with new lines that are truer representations of what they see.
Students can continue with this process until they are finished drawing in the shapes. Remind them to be sure to include in the drawing all the parts they see such as the stamen, stigma, and stem, and to label each part. Students who finish early can sketch the same flower in a different position, or can trade flowers with another student to draw.

**Extension**

Give each student the name of a wildflower they might see in the parks (see the list in the Background for the Teacher) and a copy of the Wildflower student page. Using field guides or web pages, have students research their wildflower to learn: what the wildflower looks like, its color(s), where it is likely to be found, and other interesting information. See the References and Resources section for suggestions of where to start. Students should record their information on the student page. Collect the pages and bind them together to make a class wildflower field guide. Make copies for each student.

**At the Park**

What to Do:
1. At the park, find a location that has a number of wildflowers near the trail. Students will need to stay on the trail even as they work.

2. Have students choose a flower to sketch. Students should not pick the wildflowers, but will sketch them in place. Depending on the location, several students may sketch the same flower.

3. Before handing out the materials, have students spend a few minutes making careful observations of their flowers. You may want to guide them with specific questions as for the classroom activity. If you like, have students use the field guide to try to identify their flower.

4. Give students time to sketch their flowers. Have them share their sketches and something they learned about the flower.

**Questions**

The following questions may be used for a wrap-up discussion, for assessment, or for reflective writing in journals.

- What is something you learned about flowers by drawing them?
- Looking at the flowers that you and your classmates drew, what are some ways that all the flowers are the same? In what ways do they differ?
- How do wildflowers help other living things (plants or animals)? In what ways do they depend on other living things?
- What is the reason for a flower? What does a flower do for the plant?
- Why is it important to have places like the San Mateo County parks where wildflowers are protected?
**Student Page**

**Wildflower**

Common Name(s):

Scientific Name:

Sketch of Wildflower:

Color:

Where it is usually found (shady area, sunny area, or other):

Other interesting information:
Activity 2: Bird Sounds

Lesson 2

Subjects
Science, Mathematics, Visual and Performing Arts

State Content Standards:

Science
Grade 3, Life Sciences: 3. Adaptation in physical structure or behavior may improve an organism’s chance for survival.

Mathematics
Grade 2, Statistics, Data Analysis and Probability 1.0
Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations.
Grade 4, Statistics, Data Analysis and Probability 1.0
Students organize, represent, and interpret numerical and categorical data and clearly communicate their findings.

Visual and Performing Arts
Grade K – 12, 1.0 Artistic Perception: Students read, notate, listen to, analyze, and describe music and other aural information, using the terminology of music.
Grade K – 12 2.0 Connections, Relationships, Applications: Students apply what they learn in music across subject areas.

History-Social Science—see Correlation matrix for field trip relevance, page 19-20.

Students learn to identify the sounds made by common birds, and then visit one of the San Mateo County parks to listen for these birds.

Background for the Teacher
Birds seem to hold a special attraction for most people. According to a national survey, approximately one in four Americans watches birds. With over 70 million bird enthusiasts, birding is one of the most popular hobbies in the country.  

Birds are a wonderful way to introduce young people to the joys and challenges of wildlife watching. No matter where you live or work, you can find a variety of birds to observe. And birds are relatively easy to spot because they are fairly mobile and noticeably vocal.

It is the vocal nature of birds that is the focus of this activity. Listening to sound recordings, students will learn to identify some common birds of the Bay Area by ear. This is a skill that students can build on throughout their lives. Even expert birders use bird songs and calls as a way to identify the birds in a particular area – often before they can see the birds.

Birds make a variety of different sounds to communicate different things. Calls tend to be short and simple. They may be used to keep the group together, to keep chicks close by, to warn of danger, or to confuse a predator. Certain birds, like sparrows and thrushes, produce songs that are used to establish territory or attract mates. These songs usually consist of a complicated arrangement of notes, trills, or phrases. Whether calls or songs, the sounds a particular bird makes are distinctive to that species and can be used to help identify the bird.

If students are quiet and watchful, any of the San Mateo County parks will reward them.

with a variety of birds. Advise students to look, listen, and move carefully. Expert birders walk fairly slowly – less than a mile per hour – and watch and listen for birds singing, calling, or moving. In general, songbirds are easiest to spot in the early morning or just before sunset, whereas midday is the best time for birds like hawks, eagles and vultures. On wet days, look for ducks and waterfowl on or near water, such as at Coyote Point or on the Sawyer Camp Trail.

Don’t worry if you cannot identify a particular bird you see or hear. A surprising number of birds are small, brown, and fairly nondescript. In fact, birders sometimes call these birds “LBBs” for Little Brown Birds and thus avoid identifying them individually. The important thing is to encourage students to learn what they can about the bird, even if not its name.

While you don’t really need any equipment to look for birds, two things will be extremely helpful. A good field guide will help you identify the birds you see and some binoculars will help students get a closer look at the birds you do find.

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**Equipment:**

**In the Classroom**

**Materials (for each student)**

- Copies of Bird Sounds student page (one for each bird), stapled together

**Materials (for the entire class)**

- Bird Identifier* and Western Yardbirds Song Card* (from Acorn Naturalists at www.acornnaturalists.com); or a tape player and a bird sounds tape such as “Familiar Bird Songs of the Northwest” (good for beginners, from the Audubon Society of Portland at (503) 292-9453) or one from the Cornell Laboratory of Ornithology at www.birds.cornell.edu
- Bird book or field guide* with pages marked for the mourning dove and American robin

*provided in the park pack

**At the Park**

**Materials (for each student or pair of students)**

- Binoculars (borrowed)*
- Completed Bird Sounds student pages

**Materials (for the entire class)**

- Bird book or field guide*
- Bird Identifier with song card*

*provided in the park pack


**In the Classroom**

What to Do:

1. Play the mourning dove sound and ask students what they think is making the sound (students often think it is an owl).

2. If they didn’t know, tell students that the sound is made by a mourning dove. Explain that this sound is special and that once they learn this sound, they will always be able to tell when they hear a morning dove. Show students a picture of the mourning dove either on the Bird Identifier or from the field guide, and play the mourning dove sound again. Have students try to imitate it as best they can.

3. Ask students to name other birds they know that make special sounds. Explain that each type of bird makes a special sound and that birds use sounds for a number of different reasons. Help them understand the difference between a song and a call (see Background for the Teacher).

4. Point out that birds are sometimes named for the sounds they make. For example, someone a long time ago thought that one bird’s call sounded like “kill-deee” and so named the bird killdeer. Sometimes birders use interesting ways to describe a bird’s sound. For example, the red-winged blackbird’s call is sometimes described as a squeaky door. Ask students what words they would use to describe the sound the mourning dove makes. Give students a copy of the Bird Sounds student page and have them write down their description.

5. Explain that bird scientists (ornithologists) also make sound pictures or graphs of a bird’s sound to help them tell it from other bird sounds. Invite students to draw a picture of the mourning dove’s sound on the student page using shapes, musical notes, or color bands to represent the sound.

6. Show students a picture of the American robin. Play the American robin’s song. Ask students how this song is different from the mourning dove’s. As with the mourning dove, have students first imitate the song, find words to describe the sound, and then draw a picture of the sound.

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**Birds Commonly Heard in San Mateo County Parks**

<table>
<thead>
<tr>
<th>Woodland</th>
<th>Chaparral</th>
<th>Grassland</th>
<th>Marshes, Streams, Ponds</th>
</tr>
</thead>
<tbody>
<tr>
<td>American robin</td>
<td>Bewick’s wren</td>
<td>American crow</td>
<td>American coot</td>
</tr>
<tr>
<td>Bewick’s wren</td>
<td>California quail</td>
<td>Red-winged blackbird</td>
<td>Canada goose</td>
</tr>
<tr>
<td>California quail</td>
<td>California thrasher</td>
<td>Red-tailed hawk</td>
<td>Mallard</td>
</tr>
<tr>
<td>Dark-eyed junco</td>
<td>Orange-crowned warbler</td>
<td>Western meadowlark</td>
<td>Marsh wren</td>
</tr>
<tr>
<td>House finch</td>
<td>Spotted towhee</td>
<td>Wrentit</td>
<td></td>
</tr>
<tr>
<td>Mourning dove</td>
<td>Western scrub-jay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northern flicker</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stellar’s jay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Western bluebird</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Chaparral**

- Bewick’s wren
- California quail
- California thrasher
- Orange-crowned warbler
- Spotted towhee
- Western scrub-jay
- Wrentit

**Grassland**

- American crow
- Red-winged blackbird
- Red-tailed hawk
- Western meadowlark

**Marshes, Streams, Ponds**

- American coot
- Canada goose
- Mallard
- Marsh wren
7. Repeat with one or two more birds.

8. Sometime later in the day, play these sounds again to reinforce students’ learning.

9. Over the next week or two, continue to introduce other birds on the song card. Two or three new birds a day is plenty. Reinforce by playing the sounds at quiet times for a couple of minutes. You might also have students quiz each other by imitating a bird sound (or using a word description) and having others guess what it is, or by naming a particular bird and having others imitate the sound.

10. After students have learned most of the bird sounds on the song card, take them for a walk around the school to listen for birds. Remind students that they will need to be very quiet to hear the birds. Bring along your field guide and binoculars.

11. Anyone who hears a bird should raise a hand or use another agreed-on signal. After everyone has had a chance to hear the bird, see if students can identify the sound. Have students look around for the bird. Ask students if they can determine the reason for the call or sound (such as establishing territory or to warn of danger).

**Extension**
Set up a feeding station at the school to attract different birds. Ideally it should be located so that students can see birds through a classroom window and so that there is cover for the birds. There are many reference books with information about setting up feeders, or you can check the Internet by searching for “bird feeding station.”

**At the Park**

What to Do:
1. Take students for a hike in the park. Remind students that they will need to walk quietly to hear any birds and to not scare them away. As you did on your school walk, have students use a hand signal when they hear a bird. Have the class stop to listen, see if they can find the bird visually, and then identify the bird.

2. Teach students to look for specific clues that can help identify the birds:

   ✓ The shape of the bird’s body, wings, and tail
   ✓ The bird’s colors and color patterns
   ✓ The habitat where it is seen or heard (forest, marsh, grasslands, etc.)
   ✓ What the bird is doing (walking, flying, etc.)
   ✓ The bird’s songs and calls

3. Divide the class into groups and challenge them to see how many different birds they can hear, and how many they can identify.
Questions
The following questions may be used for a wrap-up discussion, for assessment, or for reflective writing in journals.

• How many different birds can you identify by sound? What are they?
• How do birds’ sounds help them survive? What are some different reasons they make sounds?
• What did you learn about birds through this activity?
• Why are birds and other wild animals important?
• Describe what life would be like in San Mateo County if there were no birds.
Student Page

Bird Sounds

Name of Bird:

Describe this bird's sound:

Draw a picture that will help you remember this bird's sound:

Name of Bird:

Describe this bird's sound:

Draw a picture that will help you remember this bird's sound:

Name of Bird:

Describe this bird's sound:

Draw a picture that will help you remember this bird's sound:
Activity 3: Butterflies

Lesson 3

Subjects
Science

State Content Standards:

Science
Grade 2, Life Sciences: 2. Plants and animals have predictable life cycles.
Grade 3, Life Sciences: 3. Adaptation in physical structure or behavior may improve an organism’s chance for survival.
Grade 4, Life Sciences: 2. All organisms need energy and matter to live and grow.
Grade 4, Life Sciences: 3. Living organisms depend on one another and on their environment for survival.
Grade 5, Life Sciences: 2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.
Grade 6, Ecology (Life Science): 5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment.

History-Social Science – see Correlation matrix for field trip relevance, page 19-20.

Equipment:

In the Classroom

Materials (for the entire class)
- Butterfly raising kit, available from Carolina Biological Supply Company (www.carolina.com), Insect Lore products (www.insectlore.com) or Acorn Naturalists (www.acornnaturalists.com)

At the Park

Materials (for each student or pair of students)
- Binoculars (borrowed)

Materials (for the entire class)
- Butterfly field guide
- Field guide made by class (optional, see Extension)

*provided in the park pack

Students raise butterflies in the classroom, and then visit one of the San Mateo County parks to look for native butterflies.

Background for the Teacher
What is a butterfly? A butterfly is an insect, and it is also one of the most fascinating creatures on Earth. Its antennae can sense wind speed and direction. Its feet can “taste” leaves and flowers. Its eyes can detect light waves that humans cannot, enabling it to see more colors than any other creature on the planet. The butterfly also changes dramatically from the earliest stage of life to adulthood.

Watching butterflies is a simple joy. Their relatively large and colorful wings and their graceful flight are entrancing. Add to this the amazing change the butterfly makes from larva to pupae to adult, and you have a sure winner for a hands-on classroom experience.

It is easy to raise butterflies in your classroom. Many commercial companies sell live butterfly kits just for this purpose. All you have to do is set up the habitat (usually provided), place in it some easily obtained plant food, and let the butterflies do the rest. Most kits also come with butterfly information and activities you can try with your students.

After raising butterflies in the classroom, follow up with a visit to one of the San Mateo County parks to see butterflies in nature. Observing butterflies in the field is the kind of experience that can launch a young naturalist’s lifelong quest for knowledge. You do not need to be a butterfly expert to help students find butterflies; you just need a spirit of adventure and a basic understanding of butterfly needs.

Adult butterflies need wildflowers for food, sipping the nectar that is found in them. They need shallow puddles for water and places to bask in the sun, which warms up their muscles so they can fly. Butterflies also need the right larval plant food on which to lay their eggs as
the caterpillars often will feed only on certain types of plants.

Edgewood County Park and Natural Preserve and San Bruno Mountain are two very popular butterfly-watching spots because they offer good butterfly habitat and support several rare butterflies. You will also find plenty of butterflies at some of the other county parks. Junipero Serra, Huddart, San Pedro Valley, Sam McDonald (in the Memorial-Pescadero Creek Park Complex), and Wunderlich are probably your best bets.

Although butterfly watchers can find butterflies in all kinds of weather, you will have the best luck if you choose a warm, sunny day in the peak butterfly season (March or April to October). Butterflies do best in “T-shirt weather” and need temperatures of 55°-60° F or higher to be active. For your class field trip, you may want to have alternate dates in case of heavy clouds or rain, which will definitely dampen your ability to find butterflies.

Once you are at the park, look for areas with lots of flowers blooming. Keep an eye out for bees, because they will indicate nectar-filled flowers, which both bees and butterflies like. Follow a trail that meanders through a variety of habitats for your best chance of finding the good spots.

**Bay Area Butterflies Commonly Seen in the Parks**

<table>
<thead>
<tr>
<th>Acmon blue butterfly</th>
<th>Orange sulfur butterfly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buckeye butterfly</td>
<td>Painted lady butterfly</td>
</tr>
<tr>
<td>California ringlet butterfly</td>
<td>Pale swallowtail butterfly</td>
</tr>
<tr>
<td>California sister butterfly</td>
<td>Red admiral butterfly</td>
</tr>
<tr>
<td>Cabbage butterfly</td>
<td>Sara orange tip butterfly</td>
</tr>
<tr>
<td>Chalcedon checkerspot butterfly</td>
<td>Satyr angelwing butterfly</td>
</tr>
<tr>
<td>Echo blue butterfly</td>
<td>Umber skipper butterfly</td>
</tr>
<tr>
<td>Lorquin’s admiral butterfly</td>
<td>West coast lady butterfly</td>
</tr>
<tr>
<td>Monarch butterfly</td>
<td>Western pygmy blue butterfly</td>
</tr>
<tr>
<td>Mourning cloak butterfly</td>
<td>Western tiger swallowtail butterfly</td>
</tr>
</tbody>
</table>
In the Classroom

What to Do:

1. Following the directions that come with your kit, set up the butterfly habitat and place the caterpillars in it. Schedule a daily time for students to observe the caterpillars and note any changes from the previous day.

2. Use the materials that come with your kit to teach students about the different stages of the butterfly life cycle.

3. Help students make a list of the things butterflies need to live.

Extensions

✓ Make a class field guide to Bay Area butterflies. Assign students a butterfly and have them use books or web sites to find a picture of their butterfly. The USGS Northern Prairie Wildlife Research Center has a California Butterflies page with color photos and information about many different butterflies. It is at www.npsc.nbs.gov/resource/distr/lepid/bflyusa/ca/toc.htm. Have each student write one or two sentences with interesting facts about their butterfly. Bind the book together and take it on your visit to the park.

✓ Create a butterfly garden to attract butterflies to the school. A shallow dish with flat stones can provide a good butterfly puddle, while rocks, a grassy bank, or a windowsill can provide basking spots. For information about what plants to include in your garden, check your library for books about butterflies or butterfly gardens, search the Internet for “butterfly garden” or get ideas from The Smithsonian Institution’s Butterfly Garden web site at www.si.edu/gardens/butterfly/smith.htm
At the Park

What to Do:

1. If possible, visit the park in advance to scope out where you will go with your students. Find spots with good nectar sources by looking for lots of annual flowers. Bees can help you find these spots because bees and butterflies are attracted to many of the same flowers.

2. Help students practice using their binoculars. If the binoculars have independent focusing (which means you can focus the two eyes separately), help students get their binoculars in sync. They must first close their left eye and focus the right eyepiece, then close the right eye and focus the left eyepiece.

3. After getting the binoculars synchronized, the best way for beginners to find objects through the lenses is to first look at the object without the binoculars, and then to bring the binoculars up to their eyes. They can use the central focusing mechanism once they see the object in the lenses.

4. Explain to students that when looking for butterflies, it is best to walk slowly and be on the watch for butterflies that flush when you pass them. If someone spots a butterfly, they shouldn’t point at it because that may scare it away (butterflies have compound eyes that easily detect movement). Instead use words to describe where it is. For example, “There’s a butterfly. Do you see those three rocks in a row? It is sitting right in front of the furthest one. See it?” If most of the group still cannot see it, the student should try a different set of landmarks to help them locate it.

5. Point out to students that they must follow the butterfly watching rules (see the box). Go over these rules as a class, and make sure everyone understands them.

6. Depending on the number of parent helpers you have, divide the class into groups. Send groups in different directions of the trail or at five-minute intervals. Have students record the butterflies they find on their walk.

Butterfly Watching Rules:

- Stay on trails.
- Do not use nets or specimen boxes.
- Walk slowly and quietly and be on the lookout for butterflies.
- Everyone must stop when a butterfly has been spotted.
- Make sure everyone sees the butterfly before moving any closer.  
- Only after everyone has seen the butterfly (even from a distance), begin to move in slowly for a closer look.
- Be careful that you do not pass your shadow over the butterfly.
- Do not deliberately startle the butterfly.
Questions
The following questions may be used for a wrap-up discussion, for assessment, or for reflective writing in journals.

- How many different kinds of butterflies did your group find? Which were you able to identify?
- What do butterflies need to live? What evidence did you find to back up your answer?
- What are good places to look for butterflies?
- Describe the butterfly’s life cycle. How does a butterfly get the energy it needs at each stage of its life cycle?
- How do San Mateo County’s parks help protect biological diversity – the varied plants and animals that call the parks home?
Sketch a picture of the butterfly.

Where did you see it?

What was it doing?

What else can you say about the butterfly?
Activity 4: Identifying Trees

Lesson 4

Subjects
Science, Mathematics

State Content Standards:

Science
Grade 4, Life Sciences: 3. Living organisms depend on one another and on their environment for survival.

Mathematics
Grade 1, Statistics, Data Analysis & Probability 2.0
Students sort objects and create and describe patterns by numbers, shapes, sizes, rhythms, and colors.

History-Social Science – see Correlation matrix for field trip relevance, page 19-20.

Equipment:

In the Classroom

Materials (for each student)
- Copy of Tree Key or Dichotomous Tree Key student page

Materials (for the entire class)
- One shoe from about 6-10 different students

At the Park

Materials (for each student)
- Copy of Tree Key student page or Dichotomous Tree Key student page
- Cardboard, notebook, clipboard, or other hard writing surface
- Pencils, crayons and drawing paper

Students learn about dichotomous keys in the classroom and practice using a tree key, and then take a trip to one of the San Mateo County parks to identify trees growing there.

Background for the Teacher

Studying trees can be richly rewarding. Trees don’t move like birds or butterflies, so you are always sure to find them. And since they are the defining features of many habitats, you will usually find many interesting plants and animals living in and around them. Trees provide shelter, shade, oxygen, and food to a whole host of creatures.

Learning what trees grow naturally in an area can tell you a lot about the place. Each tree species has specific requirements for sunlight (full sun, part shade, or shade) and soil (moist, dry, alkaline, or acidic). Some trees grow best on warm sunny ridges, while others grow best along streambanks or in soggy soil. With each specific type of tree, you will also find specific types of plants associated with it. By identifying the trees they see, students will begin to hone their observation skills to notice small differences not only among habitats, but also among leaf shapes, branching patterns, and bark. In doing so they will become more connected to the world around them.

In this activity, students use a dichotomous key to identify trees they see on their visit to a San Mateo County park. A dichotomous key is made up of a series of couplets, each with two statements describing characteristics of a group of organisms. To use the key, you must choose the statement in each couplet that best fits the organism in question, and continue doing so until you have identified the organism.

For this tree key, students look at a typical leaf of the tree they want to identify and choose statements that best describe the leaf. If you will be visiting the park in winter, some of the trees you see will have lost their leaves. Even so, you will still find plenty of trees to identify.
that keep their leaves all year. These evergreen trees include California bay laurel, canyon live oak, coast redwood, coast live oak, Douglas-fir, eucalyptus, knobcone pine, Monterey cypress, Monterey pine, Pacific bayberry wax myrtle, Pacific madrone, and tanoak.

Tree leaves vary tremendously in their shape and form, and these differences are the basis for identifying the tree. Some leaves are needle-shaped and others are broad and flat. Leaves may be long and slender, oval-shaped, or triangular. The tips may be notched, pointed, rounded, or tapered, and the bases may be round, square, or heart-shaped. The edges or margins of the leaves can also provide clues. Some leaves are serrated with teeth, some smooth, and some are lobed, with undulations in and out.

Keep in mind that the keys provided here are designed specifically for common trees in the San Mateo County parks. They will not help you identify trees you may find in your neighborhood, or even less common trees in the parks. You may well see a tree in the park that is not included in the key. If so, you will need to use a more comprehensive key or guide to identify it.

Sudden Oak Death is a deadly fungus that is killing tanoak, coast live oak, and black oak trees in California coastal communities. To prevent the spread of this fungus, be sure to park your vehicles only in designated areas at the parks, stay on trails, avoid muddy areas, and do not collect any wood, plants, or soil.

**In the Classroom**

**What To Do:**

1. Before the activity, look over the two tree keys and choose the one most appropriate for your students. Of the tree species listed on that key, find one or two trees within walking distance of your class. Look on the school grounds, or at a nearby park or neighbor’s house.

2. Ask about 6-10 students to take off one of their shoes and put it in a pile in the center of the room.

3. Looking at the pile of shoes, ask students to think of a way that they could divide the shoes into two piles so that all the ones in a given pile have a characteristic in common.

4. Draw two lines a distance apart on the board and write one characteristic on each line.

   
   __________   __________

5. Looking at one of the piles, have students think of a way to divide the shoes into two new piles so that all the ones in a given pile have a common characteristic. Record these characteristics on the board by writing them on two lines below the appropriate line.

   __________   __________
   \     /
   _____ /  \_____

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45
6. Continue dividing the piles into two distinct piles and adding the information to the diagram until there is only one shoe in each pile. You can write the owner’s name on the diagram to identify the shoe.

Sample Dichotomous Key for Shoes

```
Is athletic shoe
    /
Has shoe laces  Does not have shoe laces
    /
    /
Is blue  Is not blue
  (Jan’s)   (Taylor’s)

Has stripes
    /
Does not have stripes
    /
Is sandal  Is not sandal
    /
    /
Is black  Is not black
  (Shawn’s)   (Kelly’s)

Is slip-on  Is not slip-on
    /
(Toby’s)   (Terry’s)

(Sammy’s)
```

7. Explain to students that they have just made a key for finding out who owns each shoe. Explain that this kind of key is called a dichotomous key. Help students say the word (dye-COT-a-mus) and point out that it comes from Greek words: dich (two) and tomos (to cut), meaning to cut in two. A dichotomous key works by separating things into two groups, which are then separated into two more groups and so on. Tell students that scientists use dichotomous keys to find out the names of plants and other living things and that these keys often use numbers instead of lines or arrows to organize the clues.

8. Put all the shoes back into one pile. Ask volunteers to choose a shoe and then place it on the correct branches of the key to find out its owner.

9. Tell students that they will be using a dichotomous key to find out the names of trees in the neighborhood and at one of the San Mateo County parks. Introduce or review any vocabulary on the key you think will be challenging for your students.

10. Give students the tree key and show them that it uses the same process as for the shoes. For the Dichotomous Tree Key, show students how the numbered statements move you through the key just as the branching lines did in the diagram.

11. Take students to the trees you have chosen for the activity, and have them practice using the key to see if they can identify the trees.

**Extension**

Begin a class bulletin board of trees. Have students collect, mount and label leaf and seed samples they collect from their home or school yard. Students should only collect samples if they have permission from the tree’s owner. To prevent the spread of Sudden Oak Death (see Background for the Teacher), tell students not to collect oak leaves or acorns.
At the Park

What to Do:

1. Have students look at two or more different trees in the park. Have them use the tree key to identify each of the trees in question.

2. After identifying each tree, have students sit in one spot and sketch a picture of the tree. They can also use the edge of a crayon to make leaf and bark rubbings of the tree.

3. Give students a few minutes to sit quietly and watch the tree. They should record any visitors that come to the tree or other observations about the tree.

Questions
The following questions may be used for a wrap-up discussion, for assessment, or for reflective writing in journals.

• How many different kinds of trees did you find? Which ones were you able to name?

• What visitors did you observe at each of the trees?

• For trees you couldn’t name, describe the leaf and tree as best you can so that you might be able to name it later.

• What is a dichotomous key? How does this kind of key work?

• Why do you suppose different trees have different types of leaves?

• Describe three reasons why San Mateo County’s parks are important to trees and people.
START HERE

Is the leaf.....

Shaped like a needle?

Is the needle....

Pointed at the end?  Round at the end?

It is a Coast Redwood  It is a Douglas-Fir

A regular leaf?

Does the leaf have....

Five fingers like a hand?  A long bump down the middle?

It's a California Buckeye

Do the leaf...

Smell when you rub it?  Have a shape like a dish with spines on the outside?

It's a California Laurel  It's a Coast Live Oak
Dichotomous Tree Key for San Mateo County Parks

A dichotomous key is a special tool that botanists use to identify and name plants. It helps them pinpoint the traits of a plant that make it different from all others.

This dichotomous key will help you identify a tree you may find in the San Mateo County parks. To use it, find some typical leaves or needles to look at. Start with number 1, and choose the statement that best fits your tree’s leaves. Depending on your choice, go to the number the key directs you to. After making a few more choices like this, you will find the name of your tree.

1. If the tree leaves look like ordinary leaves, go to 2.
   If the tree leaves look like needles, go to 16.

2. If each leaf is made up of three or more smaller leaflets, go to 3.
   If each leaf is only one piece, not made of leaflets, go to 4.

3. If the leaf has five leaflets fanning from the same point, it is a CALIFORNIA BUCKEYE.
   If it has a different number of leaflets or a branching pattern, see a detailed tree guide to identify.

4. If the leaf has three or more main veins coming from the leaf base, go to 5.
   If the leaf has one large vein running down the center of the leaf with veins branching off it, go to 6.

5. If leaves grow out of the twig in pairs that are opposite each other, it is a maple. In San Mateo County parks, it is probably a BIG LEAF MAPLE.
   If the leaves do not grow opposite each other in pairs, go to 6.

6. If the edge of the leaf has lobes, looking sort of like a jigsaw puzzle piece, it is an oak. The VALLEY OAK has leaves that are a bit hairy on top, with 7 to 11 deeply cut lobes. See a detailed tree guide to identify other oaks.
   If the leaf is not lobed, go to 7.

7. If the edge of the leaf has small notches or teeth like a saw, go to 8.
   If the edge of the leaf has no notches or teeth, but is smooth, go to 13.

8. If the main veins on the underside of the leaf go all the way to the edge of the leaf, go to 9.
   If the main veins on the underside of the leaf branch into small veins without reaching the edge of the leaf, go to 10.

9. If the leaf stem is hairy and there’s a stubby spine at the end of each main vein, it is a TANOAK.
   If the leaf stem is hairy and there are many small soft teeth on the edge of the leaf, it is a CALIFORNIA HAZEL.

10. If the leaf is narrow and shaped like a paddle that is wider toward the tip, go to 11.
    If the leaf is not shaped like this, go to 12.
11. If the leaf has teeth along the edges that are easy to see, it is a PACIFIC BAYBERRY WAX MYRTLE.
If the leaf does not have easy-to-see teeth, but has a pointy end, and rolled-under edges, it is an ARROYO WILLOW.

12. If the leaf curves under, and has tufts of hair on the underside where the veins join together, it is a COAST LIVE OAK.
If the leaf is shiny green on top and whitish below, it is a CANYON LIVE OAK.

13. If the leaf has a strong smell when you rub it, go to 14.
If the leaf does not have a strong smell, go to 15.

14. If the leaf is dark green with a slightly rounded tip, it is a CALIFORNIA BAY LAUREL.
If the leaf is pale green with a sharp tip, it is a EUCALYPTUS. This tree is native to Australia and is considered a pest here in California.

15. If the tree has a smooth, red-brown bark, it is a PACIFIC MADRONE.
If it doesn’t have that kind of bark, check a detailed tree guide to identify.

16. If the needles are smooth, go to 17.
If the needles are not smooth, but covered with scales, go to 22.

17. If the needles are bundled together (two are more coming from the same spot), it is a pine tree. Go to 18.
If the needles are not bundled together, go to 20.

18. If there are three needles on each bundle, go to 19.
If there are more or less than three in each bundle, see a detailed tree guide to identify.

19. If the needles are dark green and the tree has blackish bark, it is a MONTEREY PINE tree.
If the needles are twisted and light green, it is a KNOBCONE PINE tree.

20. If the needle tips are pointed with a groove along the top, it is a COAST REDWOOD tree.
If they’re not pointed, go to 21.

21. If the needles are about an inch long and the cones about 2-4 inches long, it is a DOUGLAS-FIR.
If not, check a detailed tree guide to identify.

22. If there are round, woody fruits that look like cones, it’s a cypress. MONTEREY CYPRESS can be found in San Mateo County parks.
If not, check a more detailed tree guide for identification.

Source
Activity 5: Tracking Wildlife

Lesson 5

Subjects
Science, Mathematics

State Content Standards:

Science
Grade 3, Life Sciences: 3. Adaptation in physical structure or behavior may improve an organism’s chance for survival.
Grade 4, Life Sciences: 2. All organisms need energy and matter to live and grow.
Grade 4, Life Sciences: 3. Living organisms depend on one another and on their environment for survival.
Grade 5, Life Sciences: 2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials.
Grade 6, Ecology (Life Science): 5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment.

Mathematics
Grade 3, Measurement and Geometry 1.0 Students choose and use appropriate units and measurement tool to quantify the properties of objects.

History-Social Sciences—see Correlation matrix for field trip relevance, page 19-20.

Equipment:

In the Classroom

Materials (for each pair of students)
- Set of animal tracks (Tracks student page copied and cut apart)
- Tracks Key student page
- Ruler
- Tracking Wild Animals student page

At the Park

Materials (for each pair of students)
- Tracking Wild Animals student page
- Cardboard, notebook, clipboard, or other hard writing surface
- Magnifier*
- Tracking guide* (a published book or from Extension activity) or Tracks Key student page
- Ruler

*provided in park pack

Students practice identifying tracks of wildlife commonly found in the area and learn about other animal signs, then take a trip to a San Mateo County park to track wild animals.

Background for the Teacher
All of the San Mateo County parks are crawling with wild animals. But when you take your class for a walk in a park, you may only see a few different ones. That is because most animals are very good at hiding from any perceived threats, including people.
Lucky for us, animals do leave a lot of clues about what they are up to. They chew leaves, dig underground tunnels, leave scat in the trails, make footprints in the mud, build nests, scratch bark, leave eggs, lose feathers, or shed bits of fur or skin. From these signs, we can learn who the animals are, where they are going, what they are eating, and what they are doing. As one tracker put it, there is “never a square yard in the forest that does not tell us something about the wildlife in it.”

Tracking is basically looking for animal clues. It means not only looking for tracks or footprints, but also keeping an eye out for all the other signs that animals leave. Tracking involves trying to tell a story about an animal and to learn more about it.

You do not need to be an expert tracker to lead students in this activity. The student pages will give beginners plenty to go on without any special training. Keep in mind that tracking often brings up more questions than answers and that even skilled trackers puzzle over things they see in the field. Relax and remember that mystery is part of the fun.

The best places to look for animal signs are in and around trees, near streams, ponds, or other water sources, and in areas where two different habitats meet such as at the edge of a grassy meadow. In these areas, students may

find bird nests, chewed leaves, scat, and possibly even animal tracks. You may need to remind students that they must stay on trails. This is especially important in areas where there are sensitive habitats, including Edgewood and San Bruno Mountain. You may also need to tell them that they may not do any activities in the water, including splashing, stepping, skipping rocks, swimming or wading. This is to protect the habitats of red legged frogs and steelhead trout.

**In the Classroom**

What to Do:

1. Ask students to imagine that they are walking along a trail at one of the San Mateo County parks and come across a pile of feathers. Tell them that they look around, but don’t see any other clues about what happened. Ask them what they think might have happened and who they think might have been there.

2. Tell students that they will be taking a field trip to the park and that they will be doing some tracking there. Explain that tracking is looking for clues left by animals and trying to figure out who was where and why. Ask students to name some clues that animals might leave besides feathers. List these on the board.

3. Give pairs of students a set of the animal tracks. Have them sort the tracks into piles so that each pile is alike in some way. Have a few groups share how they sorted their tracks.

4. Give pairs a copy of the Tracks Key. Have them use the key to identify each of the tracks.

5. After students have identified the tracks, point out to them that tracks in the wild are not usually so easy to see. Unless the animal walked on smooth mud or freshly fallen snow, they are often unclear, stepped on, or jumbled up. Explain that when students go to the park, they will be looking for all kinds of clues to help them “track” the animals. Give students the Tracking Wild Animals student page, and point out some of the ideas there.

**Extension**

Use the Tracks student pages to make tracking guides. Give students 5½-inch by 8½-inch sheets of paper and have them cut out and glue individual tracks on separate pages. Have students look in reference books at the library or at reference web sites to add other tracking information about the animals like scat (poop) or other telltale sign. Staple the pages together to make a book to bring to the park.

**At the Park**

What to Do:

1. If possible, scope out an area of the park to study before taking your students. See the Background for the Teacher for ideas about where to look for animal tracks and sign. Depending on the area you have chosen, decide on which part of the Tracking Wild Animals student page students should focus.

2. At the park, remind students that looking for tracks is only one part of tracking. Give pairs of students a copy of the Tracking Wild Animals student page, and a copy of the Tracks Key student page or tracking guide.
3. Point out the area that students will be studying. Be sure that students know the boundaries for the activity and the behavior expectations. Also be sure that students understand they should not touch scat or get close to it with their faces.

4. Have student pairs use the Tracking Wild Animals student page to look for animal sign. Students should record what they find on the student page. If students happen to find animal tracks, they can use the materials to try to identify the tracks.

5. Have students write a story about one or two of the animals they tracked, using the tracks and sign as clues to what happened.

6. Ask pairs to share their tracking stories.

**Questions**
The following questions may be used for a wrap-up discussion, for assessment, or for reflective writing in journals.

- What signs did you see that animals had visited this area?
- What animals do you think were here and what do you think they were doing?
- What evidence did you find involving eating? Walking or moving?
- What evidence did you find for how animals depend on each other or on plants to survive? Based on the park you visited with your class, create a food web showing the relationships between the plants and animals you learned about.
Student Page

Tracks
Student Page

Tracks
Western Fence Lizard

Coyote

Mule Deer

Raccoon

Stripped Skunk

Western Gray Squirrel

Wild Pig

Mallard

Deer Mouse

California Quail
Western Fence Lizard
Front feet have four long toes and hind feet have five long toes. The lizard’s belly and tail leave a groove down the middle of the track.

Mule Deer
Tracks are heart-shaped.

Wild Pig
Tracks show two large, widely spaced toe marks, and sometimes smaller pointed dewclaw marks to the sides.

Coyote
Tracks have four toe marks and are pretty oval. Coyotes are like dogs and cannot retract their claws, but usually you can only see claw marks on the middle two toe marks. The print is usually 2-1/2 to 3 inches long.

Raccoon
Tracks look like human hands with five well-formed toes. The front paw is smaller than the back paw.

Striped Skunk
Tracks for both the front and back paws have five toes. You can often see marks from the long claws of the front paws.

California Quail
Tracks have three toes facing forward, and you can sometimes see the small toe that faces to the rear.

Mallard
Tracks look like a duck’s foot and show three long toes pointing forward. You can also usually see webbing between the toes.

House Cat
Tracks have four toes with no claw marks.

Bobcat
Tracks have four toes with no claw marks because, like housecats, they can retract their claws. The pads of the paws have two lobes or bumps toward the front and three toward the back. They are usually about 2 to 2-1/2 inches long.

Western Gray Squirrel
Front paws show four toes with sharp claw marks, four fused together palm pads and two heel pads. The rear paw shows five toes and four palm pads.

Deer Mouse
The front paw tracks show four toes, and the hind paws show five toes.
Remember to stay on trails at all times.

**WOODED AREA**

Choose a tree and look for:

<table>
<thead>
<tr>
<th>Sign</th>
<th>What It Might Tell You</th>
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</thead>
<tbody>
<tr>
<td>Holes drilled in the trunk</td>
<td>A woodpecker may have poked in the bark in search of insects to eat.</td>
</tr>
<tr>
<td>Nests in the branches</td>
<td>Many birds make their nests in the branches of trees.</td>
</tr>
<tr>
<td>Chewed leaves</td>
<td>Caterpillars, grasshoppers, slugs, or even deer may have had the leaves for lunch.</td>
</tr>
<tr>
<td>Tiny eggs on the undersides of leaves</td>
<td>Butterflies, moths, and bugs lay eggs on the bottom side of leaves to hide them from enemies.</td>
</tr>
<tr>
<td>Meal leftovers on the ground</td>
<td>A pile of nutshells or cone pieces may have been left by a squirrel.</td>
</tr>
<tr>
<td>Scat (poop) on the ground</td>
<td>You might see what the animal was eating. Do not touch the scat or get your face close to it.</td>
</tr>
<tr>
<td>Owl pellet on the ground</td>
<td>It contains bones, teeth, fur and other parts of a prey that the owl regurgitates after eating. Do not touch it with your hands or get your face close to it, but ask an adult to use a long stick to poke it to see what the owl was eating.</td>
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</tbody>
</table>
GRASSY FIELD
Look for:

<table>
<thead>
<tr>
<th>Sign</th>
<th>What It Might Tell You</th>
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<tbody>
<tr>
<td>Places where the grass seems to part</td>
<td>These could point out animal paths.</td>
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<tr>
<td>Little piles of dirt</td>
<td>These may be the “front door” of a mole’s home.</td>
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<tr>
<td>Spider webs in the plants</td>
<td>You might see the spider still sitting on or near the web.</td>
</tr>
<tr>
<td>Piles of grass pieces</td>
<td>These may be the leftovers of a mouse’s meal.</td>
</tr>
<tr>
<td>Scat (poop) on the ground</td>
<td>You might see what the animal was eating. Do not touch the scat or get your face close to it.</td>
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POND OR STREAM
Look for:

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<th>Sign</th>
<th>What It Might Tell You</th>
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<tr>
<td>Tracks in the mud along the shore</td>
<td>Animals often come to water to drink and may leave their footprints in the mud or sand.</td>
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<tr>
<td>Nibbled plants along the shore</td>
<td>Animals or insects may have eaten the leaves.</td>
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<tr>
<td>Small round eggs in the shallow water</td>
<td>Frogs or fish may be have laid these eggs.</td>
</tr>
<tr>
<td>Meal leftovers on the ground</td>
<td>Fish or crayfish carcasses may be a raccoon’s leftovers.</td>
</tr>
<tr>
<td>Scat (poop) on the ground</td>
<td>You might see what the animal was eating. Do not touch the scat or get your face close to it.</td>
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</table>
Describe or draw each sign you see, and then write what it tells you about the animal or what happened.

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Activity 6: Square-Foot Detectives

Lesson 6

Subjects
Science, Mathematics

State Content Standards:

Science
Grade 4, Life Sciences: 2. All organisms need energy and matter to live and grow.
Grade 4, Life Sciences: 3. Living organisms depend on one another and on their environment for survival.

Mathematics
Grade 2, Measurement and Geometry 1.0 Students understand that measurement is accomplished by identifying a unit of measure, iterating (repeating) that unit, and comparing it to the item to be measured.
Grade 2, Statistics, Data Analysis & Probability 1.0 Students collect numerical data and record, organize, display, and interpret the data on bar graphs and other representations.
Grade 3, Measurement and Geometry 1.0 Students choose and use appropriate units and measurement tool to quantify the properties of objects.
Grade 4, Measurement and Geometry 2.0 Students use two-dimensional coordinate grids to represent points and graph lines and simple figures.
Grade 4, Statistics, Data Analysis & Probability 1.0 Students organize, represent, and interpret numerical and categorical data and clearly communicate their findings.

History-Social Science – see Correlation matrix for field trip relevance, page 19-20.

Students practice using thermometers, magnifiers, and a moisture meter. They then visit a San Mateo County park and examine and compare a square foot area in two different natural communities.

Background for the Teacher
When you walk through any of the San Mateo County parks, you are likely to traverse two or more different plant communities like grasslands, chaparral, or evergreen forests. Each of these communities includes not only the dominant plant species, but also other plants and animals.

A community is a group of species that live in an area and interact with each other. The plants and animals that live in a community depend on each other for survival. Plants may depend on animals to pollinate their flowers, to disperse their seeds, and to fertilize the soil they live in. Animals depend on plants for food and shelter. They may also depend on other animals for food and protection.

There are many different kinds of natural communities. Scientists usually name a community for the largest or most abundant plants found there. Physical factors such as the amount of sunlight, moisture, wind, and type of soil affect the types of plant that will live in a place. That is because different plants have particular requirements for sunlight, moisture, and so on. While the physical factors determine the dominant plants, the plants themselves also influence these physical factors. For example, coast redwood trees create a deep shade where they live, which affects the types of plants that can live underneath them.

In this activity, students will examine two different natural communities by comparing the soil moisture, air temperature, and types of plants and animals found in each. They will make close observations to look for subtle and not-so-subtle differences between them.
Understanding some of these differences will help students become lifelong observers of nature’s diversity. If you want to know more about the plant communities found in the parks, see the section titled Natural Communities Within San Mateo County’s Parks.

### In the Classroom

**What to Do:**

1. Give students practice using thermometers, magnifiers and a moisture meter (if you have one). One way is to take them to three different places around the school grounds and have pairs of students measure air and soil temperatures in each place, check for moisture, and see what they can find with their magnifiers.

2. For measuring the temperatures, demonstrate how to measure the air temperature, keeping the hands away from the bulb. Also demonstrate how to take soil temperatures by carefully inserting the bulb end of the thermometer into the soil. Students should always shield the thermometer from direct sunlight so that the reading is more accurate.

3. Also show students how to use the magnifier by holding it close to the object and moving until the object is in focus. Challenge students to find things with their magnifier that they cannot see with just their eyes.

4. Have students record on a piece of scratch paper the temperatures for each place as well as what they see in their magnifiers.

5. While pairs are measuring temperatures and practicing using their magnifiers, circulate among them with the moisture meter. Help students use the meter to measure the moisture level in the soil. If you do not have a moisture meter, have...
students feel the soil an inch or so beneath the surface and describe how moist it is (soggy, damp, or dry). Have them record the moisture reading for each place.

6. Back in the classroom, have students compare the temperatures, moisture level, and other observations. Readings will vary, but should all fall within a reasonable range. If not, you may want to give students more practice using the equipment before your trip to the park.

At the Park

What to Do:

1. If at all possible, visit the park before your field trip so that you can scope out two different natural communities along the trail such as a sunny grassy slope and a shady grove, or in a forested area and in chaparral. Keep in mind that students will need to stay on trails at all times and that they may not do any activities in water, including splashing, stepping, skipping rocks, swimming or wading. This is to protect the natural habitats of the park’s plants and animals.

2. Take students on a walk to the two places you have identified. After you have shown them both places, ask them to name ways that the two places differ. For example, they might say that one place has lots of trees, while the other is grassy or that one is very sunny, while the other is shady.

3. Explain to students that they are going to be detectives. Using magnifying glasses, thermometers and their senses, they will be looking for clues to solve a mystery: What makes these two places different from each other? Ask them for their ideas about what makes the two places different.

4. Starting at one of the two places, have each group lay a square-foot marker in that area and conduct the investigations described on the Square-Foot Detectives student page. When describing plants, students can record the most common plants in each location. They do not need to know the names, but can draw a picture or make up a name that seems to fit (red leaf bush). When describing animals, they should record any animals they see, as well as evidence of animals like webs, feathers, or tracks. Again, they do not need to know the names, but can make up one or draw a picture.

5. When students are finished, take them to the other place and have them conduct the investigations for that place as well.
**Questions**
The following questions may be used for a wrap-up discussion, for assessment, or for reflective writing in journals.

- How are these square-foot areas the same and how do they differ? Use a Venn diagram to show your answers.

- Did different temperature and moisture conditions seem to affect which plants and animals could live there? Use evidence from your observations to support your answer.

- If you were to examine the temperature, moisture, and types of animals and plants in a square-foot area in Alaska or Hawaii (or other place), how do you think they would compare to what you found here?

- Describe three reasons why San Mateo County’s parks are important for people. Describe three reasons why they are important for other living things.
Square-Foot Detectives

Square # ____________

Date and Time: ________________

Place your square marker on the ground and keep it in one place. Describe this square’s location: ________________________________

Air Temperature: ______ Degrees

Soil Moisture: ______ Reading from moisture meter

Sunlight:
___ Very sunny
___ A little shady
___ Very shady

-or-
___ Soggy
___ Damp
___ Dry

Soil Temperature: ______ Degrees

Ground Covered By:
___ Grass
___ Other plants
___ Leaves
___ Rocks
___ Nothing
___ Other: ____________

Plants:
Describe or draw any plants within your square. Count (or estimate) the number of each kind.

Animals:
Describe or draw any animals within your square. Count (or estimate) the number of each kind.
The San Mateo County Parks
Coyote Point Recreation Area  
Coyote Point Drive, San Mateo, CA 94401

**Highlights**
- Coyote Point Museum for Environmental Education with exhibits about the natural history of the Bay Area
- Wildlife Habitats Center housing live animals native to the area
- Saltwater marsh along the bay shore

Coyote Point can provide your students a variety of exciting science and environmental education activities. They may visit the spectacular natural history exhibits at the Coyote Point Museum, observe and listen to live animals at the Wildlife Habitats Center, or explore the saltwater marsh and study a number of organisms living there.

Coyote Point was originally an island surrounded by salt marsh. Covered with a thin layer of salty soil, it was only able to support scrubby brush. Small shell mounds indicate that California Indians may have used the island for feasts or special ceremonies.

In the late 1800s, the landowners filled in the marsh between the main land and the island, turning it into a point. They also planted the large stand of eucalyptus trees that are the most prominent feature of the park today. You can see these trees from many points along the peninsula, and they provide protection from the almost constant winds.

Today Coyote Point is a regional recreation area for picnicking, swimming, bicycling, jogging, fishing, boating, and more. Remnants of the salt marsh still exist at the southeastern corner of the park near the Marina.

**Teacher-Led Visit**
For school groups interested in visiting the Recreation Area, walking, bird-watching, weather watching, and picnicking are particularly well-suited activities. Park pathways wind their way past the marina, the remnant salt marsh, and large stands of eucalyptus trees.

To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

**Coyote Point Museum and Wildlife Habitats Center**
The Coyote Point Museum for Environmental Education features exhibits on the six major ecosystems found in the Bay Area as well as changing exhibitions and themed gardens. The Wildlife Habitats Center, adjacent to the museum, houses live reptiles, amphibians, mammals, and birds native to the Bay Area. Contact the Museum for more information about the following programs. (Please note that in addition to Museum’s fees, some Park fees, including entry, car parking and bus parking, may apply.)

**Self-Guided Museum Visit**
School groups may visit the Museum on their own, using interpretive information provided by the Education Department, and relying on teachers and chaperones to guide the students’ museum experience. There is an entry fee to the museum, and admission to the Wildlife Habitat Center is included. You can get a discount for your group if you reserve in advance.
Docent-Led Museum Tour
For grades 3-6, you can arrange a docent-led tour of the Museum’s Environmental Hall. Students have an opportunity to explore the Bay Area’s unique environment and share discoveries with each other. There is a fee for this program.

Museum Classes
You may arrange to have your group participate in a class at the museum led by a museum instructor. Classes focus on topics such as Creatures of the Night, Animal Appetites, Tidepools, Reptile Rap, Birds of Prey, California Indians, Redwood Forests, Threatened Species, and Marsh Muck (a tour of the marsh at Coyote Point). There is a fee for these programs.

Docent-Led Wildlife Habitats Center Tour
For grades K-6, you can arrange a docent-led tour of the Wildlife Habitats Center, with an introduction to native animals and their habitats. There is a fee for this program.

Service Learning: Volunteer Program
Many volunteer activities take place all year long at Coyote Point Recreation Area as part of the San Mateo County Parks and Recreation Division’s Volunteer Program. School groups or individual students can help in constructing trails, removing exotic plants, restoring habitat, and other rewarding projects. Special activities are held each year for Earth Day, Coastside Cleanup Day, and Trails Day. For more information, please contact the Museum or the San Mateo County Parks Volunteer Program Coordinator.

Facilities
Restrooms are located in the Museum. Restrooms, drop-in picnic areas, and group picnic areas are located throughout the central portion of the recreation area. To make reservations for the group picnic area, please call the Reservations Desk. No rainy weather lunch facilities are available.

Information and Reservations
Coyote Point Recreation Area: 650-573-2592
Coyote Point Museum: 650-340-7598 or www.coyoteptmuseum.org/education
Volunteer Program: San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Facilities: Reservation Desk, 650-363-4021
Teacher-Led Visit: Reservations Desk, 650-363-4021
Edgewood County Park and Natural Preserve
10 Stage Coach Road, Redwood City, CA 94062

**Highlights**
- Stunning spring wildflower display
- Abundance of native California plants
- Diversity of native habitats: wetland, grassland, oak woodland, and chaparral

Edgewood County Park and Natural Preserve is an excellent place to show your students nature in its full glory. This special park has an abundant spring wildflower display and a rich diversity of native habitats. It is home to the state rock (serpentine), the state flower (California poppy), the state tree (the coast redwood), the state bird (the California quail), and the state grass (purple needlegrass).

Edgewood's biological diversity is partly due to the fact that it is situated right along the San Andreas fault. Faults are often associated with serpentine soil, which has high levels of iron, nickel, and chromium. Native flora species thrive in this special soil, while many non-native species cannot tolerate it. The serpentine soil at Edgewood supports a magnificent variety of spring wildflowers, including clarkia, shooting star, buttercup, California poppy, giant trillium, leopard lily, brodiaea, tidy-tips, and owl's clover. Approximately 480 different plant species have been identified in Edgewood, including at least ten rare or endangered species. One of them, the San Mateo thornmint, was thought to be extinct until recently.

In addition to plants, there is an abundance of wildlife in Edgewood. Various plant communities, including wetland, grassland, oak woodland, and chaparral, offer a diversity of habitats for animals living in the park. Visitors frequently see coyote, bobcat, raccoon, rattlesnakes, skunks, and other small animals. The Bay checkerspot butterfly is a threatened species with colonies only in Edgewood and at one other site in Santa Clara County.

Edgewood was designated a natural preserve in 1993, thanks in large part to the tireless efforts of one local citizen. In 1969, Susán Sommers visited the property for the first time and was intrigued by the wonderful display of wildflowers she saw there. On subsequent visits she began identifying and cataloguing the immense variety of plants. She soon discovered that several of the plants in the park are endangered and subsequently formed a Save Edgewood Park Coalition of more than fifty organizations. She helped rid Edgewood of off-road vehicles, and spoke out against building an 18-hole golf course on a portion of the land. Thanks to her efforts and the work of many others, Edgewood is now protected from future development.

Restoration of native habitats is a key focus within the park at present. Removal of invasive exotic plants, more commonly know as weeding, is one of the most important activities of the Friends of Edgewood. These volunteers devote more time and attention to weeding than to any other activity because weeds pose a serious threat to Edgewood's fragile native habitats. Yellow starthistle (Centaurea solstitialis), Italian thistle (Carduus pycnocephalus), bristly ox-tongue (Picris echioideae), and fuller's teasel (Dipsacus sativus) are among the most obvious weeds crowding out the native plants and threatening the animals that rely upon them.
**Teacher-Led Visit**
You can take students on a hike in the park to observe wildflowers, compare native habitats, identify trees, or be on the lookout for different bird species. To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

There are five trails of various lengths throughout Edgewood: Edgewood Trail (1.93 miles), Serpentine Loop (1.94 miles), Ridgeview Loop (1.38 miles), Clarkia Trail (0.74 mile), and the Sylvan Loop (2.5 miles). See the Activities section for other hands-on activities appropriate for this park.

**Friends of Edgewood Tour**
For grades 1-6, you can arrange a tour of the park led by a Friends of Edgewood volunteer, subject to availability. This not-for-profit organization seeks to preserve Edgewood County Park and Natural Preserve for the human, plant, and animal generations to come. The school tours aim to inspire in children attitudes of stewardship and caring for the environment. This program is free of charge, but must be arranged in advance.

**Docent-Led Foothill Tour**
For grades 3 and up, you can arrange a docent-led tour at any one of several San Mateo County Parks by calling the Coyote Point Museum. The tour is an hour-and-a-half-long exploratory hike through foothill habitats, where students learn about the plants and animals living there. Choose from Edgewood, Huddart, Junipero Serra, San Bruno Mountain or San Pedro Valley Parks for this tour. There is a fee for this program.

**Service Learning: Volunteer Program**
Many volunteer activities take place all year long at Edgewood as part of the San Mateo County Parks and Recreation Division’s Volunteer Program. School groups or individual students can help in constructing trails, removing exotic plants, restoring habitat, and other rewarding projects. For more information, please contact Edgewood Park or the San Mateo County Parks Volunteer Program Coordinator.

**Facilities**
An interpretive center is being planned for Edgewood. Restrooms, water fountains, drop-in picnic areas, and group picnic areas can be found in the Old Stage Day Camp area. To make reservations for a group picnic area, please call the Reservations Desk.

**Information and Reservations**
General Information: Edgewood Park, 650-368-6283, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Friends of Edgewood Tour: 866-GO-EDGEWOOD or www.friendsofedgewood.org
Docent-Led Foothill Tour: Coyote Point Museum, 650-340-7598
Volunteer Program: Friends of Edgewood, 866-GO-EDGEWOOD, or San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Facilities: Reservations Desk, 650-363-4021
Fitzgerald Marine Reserve
California and North Lake Streets, Moss Beach, CA 94038

Highlights
• One of the most diverse concentrations of intertidal life anywhere
• Close-up views of intriguing animals and plants specially adapted to tidepool life

For an unforgettable field trip, take your students to the Fitzgerald Marine Reserve to explore the wonderful and weird organisms of the intertidal zone. This rocky seashore hosts a living community of marine life that includes a variety of seaweeds, crabs, sponges, sea anemones, mollusks, sea stars, and fish. At low tide, pools of water form in the exposed rock and offer a fascinating glimpse into underwater life.

The Fitzgerald Marine Reserve is renowned for its richness and for the diversity of its intertidal species. This diversity is due, in part, to the cooler deep water off the San Mateo County coast that rises to the surface in spring and summer, carrying with it nutrients from the ocean bottom. This “upwelling” of nutrient-rich water, combined with a generally mild climate and special geologic formations of sea level reefs and pocket beaches, creates the perfect environment for an abundant and diverse marine life.

People have long been interested in this reef. Four sites along the shoreline indicate that California Indians visited and settled here as long ago as 5,800 years. More recently, in 1908, the Ocean Shore Railroad was extended into the area, allowing people easy access for gathering food from the reef. Continuing into the mid-1900s, a large number of people – from marine biologists to collectors – flocked to the reef in search of tidepool plants and animals.

Because of its immense popularity, the reef was in danger of being depleted. In the 1960s, San Mateo County proposed that the state of California acquire the area as a state reserve. In 1969, the State designated it as a “marine life refuge.” As such, it is jointly managed by the county and the California Department of Fish and Game for multiple purposes, including education, research and scientific study, and recreation.

A recent study has shown that large numbers of visitors to the reef has caused a progressive decline in the marine plants and animals. In order to protect and preserve the marine resources for the future and enhance the educational experience, the County Parks recently changed the rules for classroom visits to the reserve. Field trips are limited to grades 3 and above and the total capacity of Fitzgerald Marine Reserve is limited to 500 people per day and 300 at any one time. During the weekdays, all field trips on the reef will be escorted by a docent. To keep to these numbers, advance reservations are required for all groups of 10 people or more. These reservations are vital in helping to protect and preserve this fragile environment.
Docent-led Visit
Docent-led tours are offered for grades 3-12. Groups of 10 or more pre-register to regulate the number of people who visit this fragile ecosystem. Some fees may apply, and days and times vary with the tides. Additional information regarding field trips can be found at www.fitzgeraldreserve.org. Review of this information is advised prior to making a reservation. Reservations can be made at 650-363-4021.

Service Learning: Volunteer Program
Fitzgerald Marine Reserve conducts a volunteer program organized and led by The Friends of Fitzgerald Marine Life Refuge. Volunteers participate in a variety of activities to preserve and protect this beautiful natural site, promote educational and research programs there, and support educational services for schools and the general public. For more information, please contact Fitzgerald Marine Reserve or the San Mateo County Parks Volunteer Program Coordinator.

Facilities
The reserve has a parking lot, restrooms. A picnic area is located at the Moss Beach entrance and includes five picnic tables.

Information and Reservations:
General Information: Fitzgerald Marine Reserve, 650-728-3584, or www.sanmateocountyparks.org or www.fitzgeraldreserve.org
Reservations for Docent-led field trips for grades 3 and above: 650-363-4021
Volunteer Program: Fitzgerald Marine Reserve, 650-728-3584, or San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Flood Park
215 Bay Road, Menlo Park, CA 94025

Highlights
• Pretty retreat in the midst of urban development
• WPA-built adobe building using native soils and redwood timbers from Memorial Park
• Fine examples of heritage oaks and California laurels

Take your students to Flood Park for an easy-to-get-to encounter with nature. This park is a relatively flat, 21-acre oasis located in the heart of the urbanized area of the San Francisco Peninsula. Famous for its large native trees, the park has a number of heritage oaks (valley oak and coast live oak) and California laurels, which are outstanding examples of these species. Squirrels are the most noticeable wildlife in the park. Also present are a number of spiders as well as various species of birds such as mockingbirds, woodpeckers, scrub jays, red-tailed hawks, red-shouldered hawks, and American kestrels.

Teacher-Led Visit
Take your students on a tour of the heritage oak and California laurel trees or have them look for wildlife in the park. There are also a variety of non-native trees that can be used for a comparison to the native species, including the three different types of redwoods: coast redwood, sequoia, and dawn redwood. See the Activities section for other hands-on activities appropriate for this park.

To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

Service Learning: Volunteer Program
Many volunteer activities take place all year long at Flood Park as part of the San Mateo County Parks and Recreation Division’s Volunteer Program. School groups or individual students can help in constructing trails, removing exotic plants, restoring habitat, and other rewarding projects. Classes can also participate in a tree survey. For more information, please contact Flood Park or the San Mateo County Parks Volunteer Program Coordinator.

Facilities
The park has restrooms, drinking fountains, softball fields, tennis and volleyball courts, and horseshoe pits. There are 27 drop-in family picnic sites and seven group picnic areas. To make reservations for a group picnic area, please call the Reservations Desk.

Information and Reservations
General Information: Flood Park, 650-363-4022, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Volunteer Program: San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Facilities: Reservations Desk, 650-363-4021
Huddart Park
1100 Kings Mountain Road, Woodside, CA 94062

Highlights
- A variety of plant communities: coast redwood forest, chaparral, and mixed evergreen forest
- Steep slopes and striking groves of trees
- Evidence of early logging days: huge coast redwood stumps and skid roads

Huddart Park is a great field trip destination. It has a variety of plant communities to explore, including coast redwood forest, chaparral, and mixed evergreen forest. In the spring, students can enjoy a colorful display of wildflowers, including wild iris. The park’s steep slopes not only offer lovely views of the surrounding countryside, but also form contrasting conditions for plants and animals. Cool canyons are filled with ferns and other shade loving plants, and sunny slopes support meadowlands and chaparral brush. West Union Creek is a steelhead trout spawning stream.

Much of the park is heavily wooded with coast redwood, Douglas firs, and ancient oaks. During the 1850s, much of the Bay Area, including this area, was severely logged and five different sawmills once operated within the boundaries of or immediately nearby what is now Huddart. You can still see “skid roads” made from logs being dragged to the mills. You can also see the enormous redwood stumps left behind from this early logging. Some of the stumps are sprouting new trees, forming “fairy rings” around the original stump.

Teacher-Led Visit
To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

Ask for a trail guide for the Chickadee Nature Trail and lead your group for a walk on this fully accessible trail. The trail crosses three plant communities: coastal redwood forest, mixed evergreen forest, and chaparral. The guide gives information about plants and habitats that you will see along the way. Students can see the re-establishment of the mature forest that existed all around the Peninsula before logging and grazing changed the landscape so dramatically.

The Redwood Trail is ideal for school groups because many trees and bushes are labeled with signposts. On this one-and-a-half hour walk you’ll encounter grassland, coastal redwood forest, and mixed evergreen forest communities. You’ll also find a rich diversity of ferns and fungi, which are fun for students. At the sign that reads “poison oak,” recite the rhymes of “Leaves of three, let it be” and “When in doubt, go about.”

There are many other trails in the park. While some follow gulches and creeks and others climb to breathtaking views, all are worth exploring. See the Activities section for other hands-on activities appropriate for this park.

Huddart Park Nature Walks
A volunteer from The Friends of Huddart & Wunderlich Parks can lead your students on a nature walk in the park. This not-for-profit organization supports Huddart and Wunderlich Parks by conducting educational programs and coordinating a variety of volunteer efforts. The hour-long nature walk is geared for students in grades Pre-K–5 and is free of charge.
**Docent-Led Foothill Tour**
For grades 3 and up, you can arrange a docent-led tour at any one of several San Mateo County Parks by calling the Coyote Point Museum. The tour is an hour-and-a-half-long exploratory hike through foothill habitats, where students learn about the plants and animals living there. Choose from Edgewood, Huddart, Junipero Serra, San Bruno Mountain or San Pedro Valley Parks for this tour. There is a fee for this program.

**Environmental Volunteers Program**
Environmental Volunteers, a local non-profit organization offers a program for grades K-8 in Huddart Park on foothills ecology for grades K-8. The program includes a classroom presentation and a two-hour field trip to the park. Contact Environmental Volunteers for information about this and the other programs it offers.

**Service Learning: Volunteer Program**
Many volunteer activities take place all year long at Huddart Park as part of the San Mateo County Parks and Recreation Division’s Volunteer Program. School groups or individual students can help in constructing trails, removing exotic plants, restoring habitat, and other rewarding projects. For more information, please contact The Friends of Huddart & Wunderlich Parks or the San Mateo County Parks Volunteer Program Coordinator.

**Facilities**
In addition to restrooms and family picnic tables, Huddart Park has five group picnic areas, three shelter buildings, three youth campgrounds, and a day camp. Call the Reservations Desk to reserve these group facilities.

**Information and Reservations**
General Information: Huddart Park, 650-851-1210, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Docent-Led Foothill Tour: Coyote Point Museum, 650-340-7598
Teacher-Led Visit: Reservations Desk, 650-363-4021
Environmental Volunteers Program: Environmental Volunteers, 650-961-0545
Volunteer Program: The Friends of Huddart & Wunderlich Parks, 650-851-2660, or San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Facilities: Reservations Desk, 650-363-4021
Junipero Serra Park
1801 Crystal Springs Road, San Bruno, CA 94066

Highlights
• Awesome view of the Bay Area
• Stunning array of wildflowers
• Native artifacts on display

Junipero Serra Park is a delightful place to take your students. Its creek, woods, and open grasslands can give them a glimpse of how the foothills of the Peninsula might have appeared prior to the arrival of Europeans. It also offers spectacular views of the Bay Area and a spring wildflower display.

Costanoan Indians once lived in and around the land that is now the park. Shell mounds have been found in the lower elevations. A variety of native artifacts that were found on park property, including arrowheads and pestles, are on display at the ranger’s station. In the 1800s, the park was part of the 15,000 acre Buri-Buri Rancho, which over time was slowly sold off and subdivided. In 1956, San Mateo County purchased 108 acres of the former rancho for a park. It was named after the Spanish missionary, Father Serra, who founded many of the Spanish missions in California.

Junipero Serra Park contains valuable remnants of the foothill plant communities that existed in the Bay Area before European explorers and settlers came here. Trees in the park include native ones like the coast live oak, arroyo willow, California laurel, madrone, and California buckeye, as well as Monterey pine, which is native to other parts of California but not here. There are also lots of eucalyptus trees, which were introduced from Australia. Because of the wide variety of trees, lots of different mushrooms and fungi can be found here, as well as stunning slime molds. Animals that are commonly seen include scrub jays, towhees, banana slugs, raccoons, red-tailed hawks and turkey vultures.

Teacher-Led Visit
To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

There are two trails that are especially well suited to school groups. The self-guided Live Oak Nature Trail is a short 0.3-mile loop offering interpretive information about plants and animals living in the park. You can get a pamphlet for this trail by calling Junipero Serra’s general information number. The Quail Look trail (1.5 miles) enables students to experience the different habitats of the park – creek, woods, and open grasslands. See the Activities section for other hands-on activities appropriate for this park.

Docent-Led Foothill Tour
For grades 3 and up, you can arrange a docent-led tour at any one of several San Mateo County Parks by calling the Coyote Point Museum. The tour is an hour-and-a-half-long exploratory hike through foothill habitats, where students learn about the plants and animals living there. Choose from Edgewood, Huddart, Junipero Serra, San Bruno Mountain or San Pedro Valley Parks for this tour. There is a fee for this program.
Facilities
Junipero Serra has drop-in family picnic areas, with tables, restrooms and drinking water, as well as group picnic areas, group shelter buildings, and a youth group day camp facility. To reserve the group facilities, please call the Reservation Desk.

Information and Reservations
General Information: Junipero Serra, 650-589-5708, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Docent-Led Foothill Tour: Coyote Point Museum, 650-340-7598
Volunteer Program: San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Facilities: Reservations Desk, 650-363-4021
Memorial-Pescadero Creek Park Complex
9500 Pescadero Creek Road, Loma Mar, CA 94021

Highlights
- Ancient coast redwood groves
- Steelhead trout spawning stream
- A contrast of natural environments: lush redwood forest and dry grassy ridge tops.

This immense parkland can give your students countless opportunities to explore nature’s diversity. Its 8,800 acres is made up of Sam McDonald Park, Heritage Grove, Memorial Park, and Pescadero Creek Park. The complex contains ancient coastal redwood forest, as well as a stream where steelhead trout spawn.

Sam McDonald Park
Sam McDonald Park is a unique and interesting 850-acre park comprised of two distinct natural environments. The northwesterly half is primarily a lush redwood forest. Here, coast redwoods, Douglas fir, and California laurel abound. In the moist ravines, shade-loving plants flourish, including ferns, trillium, redwood violet, and wild strawberry. In contrast, the southeasterly half is primarily open ridge, with grass areas, patches of brush, and splendid vistas. From Towne Ridge you can see the Pacific Ocean as well as Butano and Skyline Ridges. This is a “hiker’s park,” with miles of difficult trails and steep terrain.

Heritage Grove Redwood Preserve
Heritage Grove is a 37-acre preserve of magnificent ancient coast redwoods. A network of trails winds through these towering trees, where a sense of awe and tranquility permeates. Heritage Grove is considered to have the largest redwood trees in the entire Santa Cruz Mountains. This splendid grove is one of the few survivors of logging operations that downed most large ancient redwoods in San Mateo County by 1900.

Memorial Park
This lovely park is filled with redwoods, providing a tranquil reprieve from the business of modern living. Its 499 acres include old-growth redwoods, as well as riparian habitats along the various creeks that join within the park boundaries. Steelhead trout winter in Pescadero Creek. The park was acquired by the county in 1924 and was memorialized for the men of San Mateo County who served in the First World War. It is the only park in the San Mateo County Parks system with overnight family camping.

Pescadero Creek Park
Pescadero Creek, which flows continuously throughout the year, has carved a steeply sloped canyon in the center of this rugged 7400-acre park. Steelhead trout spawn both in this creek and in Alpine Creek. This sea-running rainbow trout is listed as endangered by state and federal agencies. Pescadero Creek Park is also home to another endangered species with a fairly large grove of Santa Cruz cypress. Another interesting feature of Pescadero Creek Park is that it sits atop a deposit of natural gas and oil. Natural gas occasionally bubbles up through seams near Hoffman Creek, producing a strong gas odor. This undeveloped park has no paved roads and is only accessible by foot or horse.
Teacher-Led Visit
To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

Heritage Grove and Memorial Park offer the easiest access for hiking and nature exploration. In both areas, coast redwoods are the most striking features. Heritage Grove has a mile-long trail that meanders among the grove’s giant trees. Call the park’s general information number to get a pamphlet for self-guided walks on the Mt. Ellen Nature Trail in Memorial Park’s north area and the Tan Oak Whole Access Nature Trail, a fully accessible interpretive trail in Memorial Park. See the Activities section for other hands-on activities appropriate for these parks.

Facilities
Memorial Park has family picnic and family camping sites, as well as group picnic and camping areas. It also has an interpretive center (with displays and information) that is open during summer months and summer campfire and naturalist programs. Sam McDonald has youth campgrounds for organized youth groups. To reserve group facilities, please call the Reservation Desk.

Information and Reservations
General Information: Memorial-Pescadero Creek Park Complex, 650-879-0212, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Facilities: Reservations Desk, 650-363-4021
San Bruno Mountain State and County Park  
555 Guadalupe Canyon Parkway, Brisbane, CA. 94005

**Highlights:**
- More biological diversity than the Costa Rican rainforest
- Magnificent spring wildflower display
- 360° views of the Bay Area

Give your students a peak experience and take them to San Bruno Mountain. This 1,314-foot high mountain is a landmark that can be seen for many miles around and provides excellent views of San Francisco and the central Bay Area. It is also a unique island of open space in the midst of Bay Area urbanization, offering 2,326 acres of rugged landscape for excellent hiking and nature exploration. There is more biological diversity here than in the Costa Rican rainforest.

One hundred thirty million years ago, what is now the entire Bay Area was under the ocean and covered with a thick layer of sedimentation. Due to movement of the large plates of Earth’s crust, the crust buckled in this region, causing the land to rise up and form San Bruno Mountain. The majority of the mountain is bedrock, composed of a shale and sandstone mixture that is known as greywacke.

San Bruno Mountain’s height, location, and relative isolation result in rather unique biotic conditions, especially for plants. The mountain contains many different microenvironments, with coastal scrub and grassland communities being the most common. Magnificent wildflower displays are found on the mountain in the spring.

The park is host to 14 species of rare or endangered plants, including coast rock cress, Montara manzanita, Pacifica manzanita, San Bruno Mountain manzanita, Franciscan wallflower, San Francisco owl’s clover, and San Francisco campion. San Bruno Mountain is also home to endangered or threatened butterflies, the San Bruno elfin, mission blue, and Callippe silverspot. These butterflies are found in only a few other places in the world.

When visiting San Bruno Mountain, keep in mind that the weather can be very changeable here. Wind speeds of 30 miles per hour are common and it can be foggy any time of the year. Temperatures can range from the upper 40’s to the 80’s (degrees F). Have students wear layered clothing for sudden weather changes. Also, make sure that students bring water, as there is none along the trails.

**Teacher-Led Visit**
To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

Take your students on a hike to see a variety of habitats within the park, to identify different native plants, or to gain a new perspective on the San Francisco Bay area. The main starting points are from the park’s entrance, from the trailhead parking area, and from the mountain’s summit. See the Activities section for other hands-on activities appropriate for this park.
There are twelve miles of hiking trails throughout the park, and each trail has vista points along the way. The Summit Loop Trail (3.13 miles) is one of the most scenic, offering spectacular views of San Francisco and the entire central Bay Area. A fully accessible trail, the Bog Trail, is located near the park entrance.

You can also drive up to the summit on Radio Road, leading up from the main entrance, and enjoy breathtaking views north to Mt. Tamalpais, east to Mt. Diablo and west to the Farallon Islands. The summit is privately owned and, due to its ideal location, you will also see a number of radio and microwave transmitters at the top.

**Friends of San Bruno Mountain Programs**
The Friends of San Bruno Mountain, a not-for-profit organization dedicated to building appreciation for the unique San Bruno Mountain ecosystem, offers several programs for school groups. The programs focus on the San Bruno Mountain Greenhouse, the San Bruno Mountain Botanical Garden, or on Seeds, Soils, and Containers. These are suitable for grades K-12 and are free of charge, with donations accepted. Contact the Friends to learn more about these programs.

**Docent-Led Foothill Tour**
For grades 3 and up, you can arrange a docent-led tour at any one of several San Mateo County Parks by calling the Coyote Point Museum. The tour is an hour-and-a-half-long exploratory hike through foothill habitats, where students learn about the plants and animals living there. Choose from Edgewood, Huddart, Junipero Serra, San Bruno Mountain or San Pedro Valley Parks for this tour. There is a fee for this program.

**Service Learning: Volunteer Program**
Many volunteer activities take place all year long at San Bruno Mountain. School groups or individual students can help in constructing trails, removing exotic plants, restoring habitat (including butterfly habitat), and other rewarding projects. Special activities are also held each year for Earth Day, Habitat Restoration Day, and California Trails Day. For more information, please contact The Friends of San Bruno Mountain or the San Mateo County Parks Volunteer Program Coordinator.

**Facilities**
San Bruno Mountain has restrooms near the park entrance, family picnic sites with drinking water, and a day camp for group use. To reserve the group camp, please call the Reservation Desk.

**Information and Reservations**
General Information: San Bruno Mountain State and County Park, 650-992-6770, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Docent-Led Foothill Tour: Coyote Point Museum, 650-340-7598
The Friends of San Bruno Mountain Programs: 415-334-4711
Volunteer Program: The Friends of San Bruno Mountain, 415-584-7320 or San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Facilities: Reservation Desk, 650-363-4021
San Pedro Valley Park
600 Oddstad Boulevard, Pacifica, CA 94044

**Highlights:**
- Spawning area for migratory steelhead trout
- Seasonal waterfall
- Creekside, meadow, and coastal scrub habitats

This beautiful park is nestled between the Sierra Morena mountain range (the northern portion of the Santa Cruz Mountains) and the foothills of Pacifica. Here, your students can see eye-to-eye with migratory steelhead trout, savor the sight of a seasonal waterfall, or observe a number of native habitats.

San Pedro Valley Park’s 1,150 acres encompass Brooks Creek and the middle and south forks of San Pedro Creek. These three fresh-water creeks flow year-round and provide some of the few remaining spawning areas in the county for migratory steelhead trout. A lovely seasonal waterfall along Brooks Creek can be seen during the winter and spring months.

Along the creeks thrive a variety of plants such as coast trillium, giant trillium, creek dogwood, arroyo willow, watercress, and several species of ferns. In the springtime, the meadows of the middle valley display a wealth of wildflowers. In other areas of the park, some rare plants – giant golden chinaquapin, Montara manzanita, fetid adders-tongue, and California hazelnut – can be found among the thick coastal scrub.

In addition to the migrating steelhead trout, other wildlife is abundant at San Pedro Valley. Red-tailed hawk, turkey vulture, quail, scrub jay, garter snakes, rabbit, and chipmunk are common sights, while deer, bobcat, gray fox, raccoon, and gopher snakes are seen less frequently.

**Teacher-Led Visit**

Take your students to the park to see migrating steelhead trout, to explore native plants and animals of the region, or to learn about the local watershed. The steelhead trout spawning season is normally from December to February, and you can sometimes see these migrating fish from the bridge behind the visitor’s center or from the bridge out on Wilder Ranch Road. At the visitor’s center you will find trail guides, trail maps, park bird lists, and plant lists, as well as a wealth of information about park animals and all aspects of the park’s ecosystem.

If you are a bit more adventuresome, take your students for a hike on the Brooks Creek Trail (2.0 miles roundtrip) during the rainy months of winter and spring. They’ll enjoy an exhilarating view of Brooks Falls, a seasonal waterfall that drops 175 feet in three tiers, and gain a better understanding of the concept of watershed. See the Activities section for other hands-on activities appropriate for this park.

To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.
San Pedro Valley Park Tours
For grades K-6, you can arrange a free tour of the park and visitor center with the San Pedro Valley Park Volunteers. This not-for-profit organization supports the park by staffing the San Pedro Valley Park visitor center, interacting with visitors, and assisting park rangers in maintaining park trails.

Docent-Led Foothill Tour
For grades 3 and up, you can arrange a docent-led tour at any one of several San Mateo County Parks by calling the Coyote Point Museum. The tour is an hour-and-a-half-long exploratory hike through foothill habitats, where students learn about the plants and animals living there. Choose from Edgewood, Huddart, Junipero Serra, San Bruno Mountain or San Pedro Valley Parks for this tour. There is a fee for this program.

Service Learning: Volunteer Program
Many volunteer activities take place all year long at San Pedro Valley Park as part of the San Mateo County Parks and Recreation Division's Volunteer Program. Volunteers help in maintaining trails, removing exotic plants, restoring habitat, and other rewarding projects. For more information, please contact San Pedro Valley or the San Mateo County Parks Volunteer Program Coordinator.

Facilities
San Pedro Valley has a Visitor Center that is open on weekends and holidays only. The center offers exhibits about San Pedro Valley’s ecosystem, a small library, and a bookstore. The park also has drop-in family picnic areas, two group picnic areas and a youth overnight area. To reserve the group facilities, please call the Reservation Desk.

Information and Reservations
General Information: San Pedro Valley Park, 650-355-8289, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
San Pedro Valley Park Tours: San Pedro Valley Volunteers, 650-355-5454
Docent-Led Foothill Tour: Coyote Point Museum, 650-340-7598
Teacher-Led Visit (for groups of 50 or more): Reservation Desk, 650-363-4021
Volunteer Program: San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Facilities: Reservation Desk, 650-363-4021
Sanchez Adobe
1000 Linda Mar Boulevard, Pacifica, CA 94044

Highlights
• One of the oldest historical structures in San Mateo County
• Docent-led interpretive programs

Sanchez Adobe is one of the oldest and most exciting historical structures in San Mateo County. Take your students on a field trip to this former California rancho, and they will see evidence from every period in San Mateo County history.

This quiet site in the San Pedro Creek valley was once a campsite for coastal California Indians. Various artifacts and skeletal remains have been found on the grounds. On the same land in 1785, Franciscan padres from Mission Dolores in San Francisco, built a farm using Indians for labor. For a time, the irrigated fields and grazing lands provided much of the food for the San Francisco mission, but an epidemic spread through the native population and in 1793 the padres abandoned church activities at the farm. Archaeological remains from the farm are found on the site.

In 1839, the Mexican governor granted this property to Don Francisco Sanchez as part of the 8,926 acre Rancho San Pedro. Sanchez was a former Commandante of the San Francisco Presidio and had served as Alcalde (mayor) of San Francisco. He began construction of the current adobe residence in 1842, which was located near the center of his rancho and near San Pedro Creek. The products of his rancho were hides and tallow.

Over the years, the adobe served as a residence, a hotel, a speakeasy, lodging for farm workers, and an artichoke packing shed. It was in a sad state of disrepair before being sold to the county in 1947, and the county undertook the painstaking process of restoration.

Now the adobe can be seen complete with nineteenth century furniture pieces. It is included on the National Register of Historic Places and is listed as a California Historical Landmark. It offers a rare glimpse into the county’s history.

Docent-Led Programs
The San Mateo County Historical Association offers a docent-led interpretive program at the adobe for fourth grade classes studying early California history. This hands-on program involves students in making candles and adobe bricks, grinding corn, roping a mock-up steer and other activities. Reservations are required and should be made as far in advance as possible, beginning April 15 for San Mateo County schools and May 15 for other schools for the following school year. Other programs are offered by special request. There is a fee for all school programs.

Facilities
The Sanchez Adobe has a drinking fountain and restroom.

Information and Reservations
San Mateo County Historical Association, 650-359-1426
Sawyer Camp Trail -- Part of the Crystal Springs Regional Trail System
1801 Crystal Springs Road, San Bruno, CA  94066

Highlights
• Views of shimmering Crystal Springs Lake and San Andreas Lake
• Jepson Laurel, the oldest and largest known California laurel in the state
• Excellent birding

The Sawyer Camp Trail is one of the most popular trails in the county parks system – and for good reason. It parallels two picturesque lakes, offering great water views and closeups of birds and other wildlife. Sawyer Camp Trail is paved 6 mile segment of the larger Crystal Springs Regional Trail system running from San Bruno in the north to Highway 92 in the South. This popular, multi use trail was once a portion of the stagecoach route between San Francisco and Half Moon Bay.

Today, a walk along the trail can still conjure up images of an earlier California, with grassy meadows dotted by large oaks, and a dense forest of trees on the north end. As a further reminder of its special location, the trail winds back and forth over the San Andreas Fault.

Over 180 different species of birds have been identified along the trail, including ducks, hawks, and numerous small birds that can be seen overhead or in the surrounding oak and madrone trees. The pristine watershed area surrounding the trail is recognized by the California Department of Fish and Game as a Fish Wildlife Refuge and is considered a Biosphere Reserve.

The Jepson Laurel is an important landmark along Sawyer Camp Trail. At over 600 years old, it is the oldest and largest known living California laurel in California. California laurel, also known as bay tree, pepperwood, or Oregon myrtle, has wood that is heavy, hard, fine-grained, and exceptionally strong. In 1923, this particular tree was named in honor of Willis Linn Jepson, one of California’s most noted botanists.

Teacher-Led Visit
A visit to Sawyer Camp Trail can focus on exploring and measuring the oldest known California laurel tree or on gaining first-hand knowledge and understanding of the local watershed. You might also use the park to show students first-hand examples of the concepts of watershed and water cycle, or to explore the importance of a wildlife refuge in an urban area, or to help students visualize how the California landscape might have looked in an earlier time. See the Activities section for other hands-on activities appropriate for this park.

Trail maps of the 6.2-mile trail are available online at www.SanMateoCountyParks.org or by calling the general information number for Sawyer Camp Trail.

To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.
Facilities
Sawyer Camp Trail has restrooms and benches along the trail. Drinking fountains are located only at the north end (Millbrae Entrance) and at the Jepson Laurel Area. Be sure to bring your own water. Picnic tables are located approximately halfway along the trail.

Information and Reservations
General Information: Crystal Springs Regional Trail and Sawyer Camp Trail, 650-589-4294, or www.SanMateoCountyParks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Woodside Store
Kings Mountain Rd at Tripp Rd, Woodside, CA 94062

Highlights:
• Fully restored country store from the 1800s
• Docent program for school groups

Take your students on a trip to the late 1800s with a visit to the Woodside Store. This fully restored country store is actually a museum containing artifacts from this fascinating period in history, displayed as they might have been then. It offers an exciting peek into the area’s past when it was a bustling logging region.

The store was built in 1853 by Matthias Alfred Parkhurst and Dr. Robert Orville Tripp. These two men had been partners in a building materials business that boomed with the rapid development that followed the California Gold Rush. Their store was stocked with a variety of goods they sold to lumbermen, teamsters, blacksmiths, storekeepers, and saloon owners. When Parkhurst died in 1863, Dr. Tripp took over the business. Over the years, the structure served as a general store, post office, and dental office.

Dr. Tripp was apparently quite a character and the stuff of legends. During his lifetime, he was a San Francisco County supervisor, U.S. postmaster, San Mateo County deputy sheriff, public administrator, deputy assessor, and custodian of the library. He operated the store until he died in 1909. In 1940, the San Mateo County Historical Association recommended that the store be preserved, and San Mateo County purchased it for that purpose. The store has since been restored to its original condition and is stocked with period items.

Docent-Led Programs
The store is a popular school field trip destination. The San Mateo County Historical Association offers docent programs to educate students about the Store’s colorful past. Volunteers also give horseshoeing and blacksmithing demonstrations for visitors on occasion. School groups need to make reservations for field trips.

Facilities
The Woodside Store has water fountains and restroom facilities.

Information and Reservations
San Mateo County Historical Association, 650-851-7615
Wunderlich Park
4040 Woodside Road, Woodside, CA 94062

Highlights
• Undeveloped hillside park with opportunities for great hiking and nature observation
• A variety of plant communities: coast redwoods forest, chaparral, and mixed evergreen

Let your students experience the wild by taking them to this large undeveloped park. This beautiful hillside park was once the ranch of the Folger family (of coffee fame) and was donated to the county by Martin Wunderlich. Filled with redwoods, open meadows, and beautiful oaks and madrones, this 942-acre park is largely open space with a system of scenic trails for hiking or horseback riding.

Wunderlich consists of four general areas. The lowest area near the parking lot, was the Folger Ranch complex and now has private horse boarding facilities. Further up the hillside lies an open meadow with nice views. Further up still is an area with beautiful canyons and gullies, filled with second growth coast redwoods, a running stream, and numerous springs. At the highest point of the park is an upper meadow area.

Several different plant communities offer a varied habitat for the animals found in the park. Along the streams and in gullies, the coast redwoods provide a cool and shady environment for sword ferns, redwood sorrel, and banana slugs. By contrast, the open, chaparral areas are hot and dry. Shrubs like coyote brush and non-native Scotch broom form a thick cover for brush rabbits, chipmunks, and lizards scurrying through the underbrush.

Bordering the chaparral and the redwood forest is the mixed evergreen forest, which covers most of the park. Here dominate tanbark oak, madrone, California laurel, coast live oak, and Douglas fir trees. Beneath the trees are many shrubs, including sticky monkey flower, wild lilac, toyon, wood rose, and poison oak. Black-tailed deer, raccoons, black squirrels and, less commonly, bobcats, coyotes, and gray foxes may be seen in this forest, as well as acorn woodpeckers, chickadees, towhees, and Stellar’s jays.

Teacher-Led Visit
To bring your class, you must make a reservation through the Reservation Desk. Some fees, including entry, car parking and bus parking, may apply.

Wunderlich Park’s 900 acres of coastal mountain environment can serve as a wonderful outdoor laboratory for your class. Here, you might look for bugs or birds, practice tracking, identify differences among various plant communities, or inspire an appreciation for the native California landscape. Students should bring drinking water and stay on the trails.

The Redwood Trail (0.5 mile) passes through a superb, dense redwood forest. The Loop Trail (0.8 miles) is another fine option. If you can arrange for older students to be dropped off at one end, and then picked up at the other, the Alambique Trail offers a 5.1-mile one-way hike from Skyline Boulevard down to the parking area. It passes through many different environments including the Alambique Flat meadow area midway.

See the Activities section for other hands-on activities appropriate for this park.
**Service Learning: Volunteer Program**
Volunteer activities occasionally take place at Wunderlich as part of the San Mateo County Parks and Recreation Division’s Volunteer Program. School groups or individual students can help in constructing trails, removing exotic plants, restoring habitat, or other rewarding projects. For more information, please contact The Friends of Huddart & Wunderlich Parks or the San Mateo County Parks Volunteer Program Coordinator.

**Facilities**
Wunderlich is a very rural and undeveloped park with minimal facilities. There is a restroom and drinking water at the parking lot only.

**Information and Reservations**
General Information: Wunderlich Park, 650-851-1210, or www.sanmateocountyparks.org
Teacher-Led Visit: Reservations Desk, 650-363-4021
Volunteer Program: The Friends of Huddart & Wunderlich Park, 650-851-2660, or San Mateo County Parks Volunteer Program Coordinator, 650-599-1306
Resources and References

The following resources contain information on the topics covered in this guide and were helpful in the development of the guide. This list in not all-inclusive, and other excellent ones are available on the Internet or in your library or local bookstore.

Environmental Educational Programs in San Mateo County
Directory of Environmental Education Programs and Resources Serving San Mateo County Teachers and Students. San Mateo County Parks and Recreation Foundation, Fall 2002.
This directory summarizes the many organizations providing environmental education services to teachers and students within San Mateo County and is available at sanmateocountyparks.org.

General Ecology and History of San Mateo County Parks
This in-depth reference describes the natural communities of California, and explains the why behind California’s ecological diversity.

Digital Library for Earth System Education Web Site, www.dlese.org
This site is a rich resource of links to help you teach – and students learn – about nature and ecology.

Plants of the Coast Redwood Region. By Kathleen Lyons and Mary Beth Cooney-Lazaneo. Looking Press.
Wonderful color photographs accompany information about the plants in our area.

Filled with photos, this fun read chronicles the history of the county’s unique park system.

Wildflowers
CalfFlora Web Site, www.calflora.org
This site provides an extensive electronic library of photos and other information on thousands of California native plants.

This book focuses on the most common spring wildflowers throughout the state, with entries arranged by flower color.

California Wildflowers Web Site, www.calacademy.org
You can look up on this site photos and descriptions of over 125 California wildflowers by color, common name, Latin name, or plant family.

This comprehensive book includes almost 1500 wildflower species from British Columbia to Baja California arranged by flower color.

Wildflowers of the San Francisco Bay Area: An Interactive Guide for PC and Mac, Dianne Fristrom, John Game, and Glenn Keator, 1998. This user-friendly CD-ROM guide includes photos and descriptions of more than 380 wildflowers in the nine Bay Area counties. It is available from the California Native Plant Society (www.cnps.org or 916-447-2677) and in some bookstores.

**Birds**

*Bird Sounds: How and why birds sing, call, chatter, and screech.* By Barry Kent MacKay. Mechanicsburg, PA: Stackpole Books, 2001. If you want to know more about the science behind the variety of sounds that birds make, this is a clearly written, but detailed, resource.

Cornell Laboratory of Ornithology Web Site, www.birds.cornell.edu
You can listen to a variety of bird songs on this site, or find information about where to buy bird song tapes and recordings.


*Familiar Bird Songs of the Northwest,* Portland Audubon Society, 503-292-9453
This tape of bird songs is ideal for beginners, including American Crow, American Robin, and other urban and suburban birds that students will recognize.

This site contains some recordings of birds.


**Butterflies**

*The Butterfly Book: A kid’s guide to attracting, raising, and keeping butterflies.* By Kersten Hamilton. Santa Fe: John Muir publications, 1997. Written for children, this great little book has basic information and a field guide to the most common butterflies in the U.S.

This page has photos and information about many California butterflies.


**Trees**


**Tracking**


