GLOSSARY

Abiotic: non-living factors of an ecosystem (rocks, temperature, humidity).

Adaptation: adjustment to environmental conditions: modification of an organism or its parts that makes it more fit for existence under the conditions of its environment.

Aspect: the direction a *slope* faces.

Biodiversity: biological diversity in an environment as indicated by numbers of different species of plants and animals.

Biome: a major ecological community type (such as tropical rain forest, grassland, or desert) Biomes are mainly distinguished from one another by climate, soil, and vegetation (plant life). These characteristics together support a collection of animal life.

Biotic: living organisms of an ecosystem (plants, animals, organisms).

Chaparral: a diverse, woody and evergreen shrub-dominated plant community shaped by a Mediterranean-type climate with summer drought, mild, wet winters, and naturally recurring fires every 30-150 years plus.

Chemical makeup: A plant's chemical composition that will determine how readily it will burn.

Climate: the average course or condition of the weather at a place usually over a period of years as exhibited by temperature, wind velocity, and precipitation.

Coastal Sage Scrub: a plant community sometimes called "soft chaparral" because the dominant plants have softer leaves and are not as woody as "hard chaparral." It is generally shorter and less dense than chaparral and found on drier slopes at lower elevations. Many species have hairy leaves and aromatic oils, which help retain water.

Community: Plant communities are groups of plants sharing a common environment that interact with each other, animal populations, and the physical environment.

Condition: an environmental requirement.

Density: the thickness or concentration of a plant or plant community.

Ecosystem: a geographic area where biotic (living) and abiotic (non-living) components work together to form a bubble of life.

Endemic: an organism that is restricted to a locality or region.

Facultative Seeders: plants that can resprout from their stumps or germinate from their seeds to replace their populations after a wildfire.

Fauna: animal life.

Features: The canyons, valleys, rivers, mountains, etc. of the *topography*.

Fire Interval: The period of time between fires within a given area in a specific period of time.

Fire Regime: The general patterns of fire behavior and effects within a particular vegetation type or ecosystem over multiple fire cycles (decades to centuries) determine the fire regime over a specific period for any given ecosystem.

Flora: plant, bacterial, or fungal life.

Fuel: all living and dead plant material that can be ignited by a fire.

Fuel Moisture: a measure of the amount of water in a fuel (vegetation) available to a fire and is expressed as a percent of the dry weight of that specific fuel.

Grassland: an ecological community in which the characteristic plants are grasses.

Habitat: the place or environment where a plant or animal naturally or normally lives and grows.

Humidity: Generally, a measure of the water vapor content of the air. Popularly, it is used synonymously with *relative humidity*.

Invasive species: a nonnative organism: growing and dispersing easily usually to the detriment of native species and ecosystems.

Microclimate: the climate of a very small or restricted area, especially when this differs from the climate of the surrounding area.

Native species (Indigenous): species that have historically occurred as part of an ecosystem in a specific location.

Non-native species: species that have been introduced into new areas that have not historically been part of their native range.

Oak Woodland: a plant community found throughout the California chaparral and woodlands ecoregions where the dominant trees are oaks, interspersed with other broadleaf and coniferous trees, with an understory of grasses, herbs, geophytes, and native plants.

Obligate Resprouters: plants with the ability to sprout from their stumps after a wildfire.

Obligate Seeders: plants that are killed by the flames and depend on seedlings to replace their populations. Some seeds require some fire cue (heat, or the chemicals found in charred wood or smoke) to germinate.

Relative Humidity: the ratio of the amount of water vapor actually present in the air to the greatest amount possible at the same temperature

Santa Ana Winds: In southern California, a weather condition in which strong, hot, dust-bearing winds descend to the Pacific Coast around Los Angeles from inland desert regions.

Springs Fire: A wildland fire that began on May 2, 2013 by accidental ignition from a passing car or truck. The fire burned 24,238 acres in a day and a half and was the 5th largest wildfire in the park burning 12% of the Santa Monica Mountains NRA.

Slope: the measure of steepness or the degree of inclination of a feature relative to the horizontal plane.

Temperature: degree of hotness or coldness measured on a definite scale.

Topography: the configuration of a surface including its relief and the position of its natural and man-made features.

Weather: the state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness.

Wildland-Urban Interface: the area where homes and wildlands meet and a significant area for wildfire impact and management.

Wildfire Walkabout
Student Journal

National Park Service
U.S. Department of the Interior

Santa Monica Mountains
National Recreation Area

Santa Monica Mountains National Recreation Area

Southern California Fire Ecology
Wildfire Walkabout

Name _____

Date _____

Class _____

WELCOME TO SANTA MONICA MOUNTAINS NATIONAL RECREATION AREA!

Why is this area protected?

Congress established the Santa Monica Mountains National Recreation Area (SMMNRA) in November 1978 to protect the largest expanse of mainland Mediterranean *ecosystem* in the national park system. This extraordinarily diverse *ecosystem* is home to 26 distinct natural *communities*, from freshwater aquatic *habitats* and coastal lagoons to *oak woodlands*, valley oak savanna and *chaparral*. Situated in densely populated southern California, the recreation area is a critical haven for more than 450 animal species, including mountain lions, bobcats and golden eagles. It is also home to more than ten threatened or endangered plants and animals.

Why am I here?

You are here to explore an area that burned in a wildfire. There are several plant communities that you can experience in the Santa Monica Mountains, including *chaparral, coastal sage scrub* (soft chaparral), *grasslands*, and *oak woodlands*.

Large *weather*-driven fires have always been a part of the Santa Monica Mountains due to the global circulation patterns that cause the Mediterranean climate and *Santa Ana wind* patterns. These patterns have existed for many millions of years. Fire is an important aspect of the natural cycle of the *chaparral ecosystem* as it plays a major role in maintaining *biodiversity*.

Chaparral plants are *adapted* to survive infrequent large fires and recover well on their own if the *fire interval* is not too frequent.

There are many facets of wildland fires and fire ecology, so throughout your visit today at the park, focus on this question:

Why do wildfires occur in Southern California and how do we preserve the chaparral ecosystems while keeping communities safe?

During your visit, you can :

Hike through several plant communities, some of which burned in a wildfire.

Explore the *biotic* and *abiotic* factors that shape these plant communities.

Identify chaparral plants and look for signs of *adaptations*, post-fire recovery, and their recovery strategies.

Analyze the *conditions* present that may affect wildfire behavior in the area.

Evaluate the *Wildland-Urban Interface*.

Most importantly, you will have an opportunity to experience, explore, and connect to nature in YOUR PARK!

Do you think that natural areas like these are important to preserve? Why?

What can you do to become more familiar with your local ecosystems?

What can you do to protect life, property, and natural resources that are important to you?

What was your favorite part of the visit to the park? Why?

What is one thing that you learned that you would like to explore in more depth?

FILL IN THE BLANK - WORD BANK

- Life
- Community
- Get Set
- Emergency Supply Kit
- Hardening
- Wildland-Urban Interface
- Property
- Go
- Natural Resources
- Suppression
- Wildfire
- Get Ready
- Defensible
- Early
- Backfire
- Evacuation
- Stakeholders

REFLECTION

As a physical and important ecological process, fire plays a complex role in Southern California's Mediterranean *biome* affecting the survival and preservation of the plants, animals, and humans within the ecosystem.

By broadening our awareness and familiarity with local ecosystems and understanding why and how fires occur in Southern California, stakeholders can develop procedures to protect life and property, allow for future growth, and continue to preserve a valuable natural resource.

What is my task at this stop?

Reflect on your visit to the Santa Monica Mountains National Recreation Area.

Think about the following questions.

Pick a couple questions and write your answers in the space provided or record a 30 second Public Service Announcement (PSA) on your phone.

Thank you for visiting Santa Monica Mountains National Recreation Area. Come and visit again!

HOW TO USE THIS FIELD JOURNAL:

You will use this journal at various stops along your hike today.

What do I need to know?

Follow your teachers instructions for each activity.

The words that are *italicized* in this journal can be found in the glossary on the back page.

Remember while you are hiking:

1. Stay together as a group.

2. Stay on the trail.

3. Be aware of flora & fauna. Remember TRIP.

Ticks are often found on tall grasses. Thoroughly check yourselves after your visit and stay on trails to try to avoid these little suckers!

Rattlesnakes live in this area. If you see a snake, step back to a safe distance and try to identify the snake. If it has a triangle shaped head and a rattle, it is a rattlesnake. These are the only venomous snakes in the mountains.

Insects that sting are present in the mountains. Be aware of your surroundings and try to avoid bothering hives .

Poison oak grows along the trails. Remember, leaves of three, let it be!

4. Everything is protected!

Do not pick any flowers or collect any souvenirs. **Leave no trace** that you were here and take only pictures and memories.

5. Do not have your electronic devices out while you are walking.

Only use them for pictures or assignments while you are stopped.

WILDFIRE BEHAVIOR OBSERVATION STATION

WILDLAND FIRE BEHAVIOR IS AFFECTED BY:

Weather: *temperature* and *climate*, winds, and *humidity*

Topography: *slope, aspect, features*

Fuels: *fuel moisture, chemical makeup, density*

WHAT IS MY TASK AT THIS STOP?

1. **Observe the various plant *communities* around you and identify as many as you can.**

2. **In these plant communities, observe the *conditions* that could affect how a fire may behave in this area.**

   Use your senses:
   Can you feel the wind?
   What direction is it blowing from?
   Do you think these are *Santa Ana Winds*?
   What do you think the *temperature* is?
   How dry do the plants look and feel?
   Are the plants thin and wispy or thick and woody?
   How dense is the foliage canopy?
   What does the *topography* look like?
   Is it steep and rocky or level and full of foliage?
   Are the plants different on north versus south *slopes*?

3. **Choose two plant communities. Write your observations or if you have scientific instruments, record your data.**

   Then compare how you think a wildfire may behave in each *community* based on what you learned about how *weather*, *topography*, and *fuels* affect wildfire behavior.

Step two is to _ _ _ _ _ _ and step three is to _ _!

Follow step one by _ _ _ _ _ _ _ _ _ your home and creating _ _ _ _ _ _ _ _ _ space. Follow step two by preparing for an _ _ _ _ _ _ _ _ _ _ _.

This includes preparing an _ for each member of your family.

Follow step three by evacuating _ _ _ _ _ _, as soon as is recommended by fire officials.

Land and fire managers use various strategies to protect the wildland-urban interface such as fire _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ immediately after a wildfire starts. During the Springs Fire, fire managers used a strategy that fights fire with fire, called a _ _ _ _ _ _ _ _. This strategy stopped the oncoming wildfire from burning further towards the nearby _ _ _ _ _ _ _ _ _.

In order, write the circled letters for the first word and write the letters in squares for the second words to discover the number one goal during all fire management activities in the Santa Monica Mountains National Recreation Area.

_ _ _ _ _ _ _ _ _ _ _ _ _ _ & _ _ _ _ _ _ _ _ _ _ _ _ _ _

WILDLAND-URBAN INTERFACE FILL IN THE BLANKS

The Wildland-Urban Interface, also known as WUI, is the area where homes and wildlands meet. This is a significant area for wildfire impact and management.

What is my task at this stop?

Can you see a *Wildland-Urban Interface* (WUI)?
Fill in the blanks to learn about the WUI.
Tip: Turn the page for a word bank to help you with this activity.

An area where homes and wildlands meet is called the _ _ _ _ _ _ _ _ _ - _. This is a significant area for wildfire impact and management.

People that have a direct or indirect interest in this area are called _ _ _ _ _ _ _ _ _ _ _ _ _ _ _.

These people must work together to develop procedures to protect _ _ _ _ _ and _ _ _ _ _ _ _ _ _ _ _ _ _. It is also important for them to consider future growth as well as preserve the valuable _ of the area.

Community members in the Wildland-Urban Interface must take actions in order to be prepared for the next _ _ _ _ _ _ _ _ _. They can do this by following three steps.

Step one is to _ _ _ _ _ _ _ _ _ _ _ _.

Community 1

Conditions that you observe (or measure) that may affect wildfire behavior:

How do you think wildfire would behave in this plant community? Why?

Community 2

Conditions that you observe (or measure) that may affect wildfire behavior:

How do you think wildfire would behave in this plant community? Why?

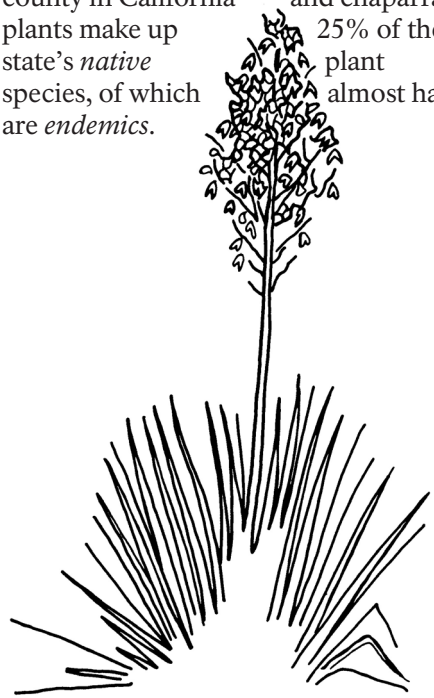
CHAPARRAL & COASTAL SAGE SCRUB SCAVENGER HUNT

What is Chaparral?

Chaparral is a diverse, woody and evergreen shrub-dominated plant *community* shaped by a Mediterranean-type *climate* with summer drought, mild, wet winters, and naturally recurring fires every 30-150+ years.

Chaparral shrubs are tough, able to survive long periods of drought and recover from fire as long as the flames do not occur too often.

Chaparral is significant for *biodiversity* in the state. It exists in every single county in California and chaparral plants make up 25% of the state's *native* plant species, of which almost half are *endemics*.



How does Chaparral survive in California?

Chaparral plants have *adapted* to survive in a hot dry environment. *Adaptations* include:

- Leaves can be small, leathery, thick, fuzzy, and/or waxy—all *adaptations* to resist water loss.
- Fewer stomata (pores in the leaves for gas exchange) to cut down on evaporation.
- Leaves may be oriented to reduce their exposure to sunlight.
- *Microclimate*: plants that grow on hotter, drier south-facing *slopes* tend to have smaller leaves than plants on cooler, wetter north-facing *slopes*.

What is Coastal Sage Scrub?

Coastal Sage Scrub (also called soft chaparral) occurs on drier sites and lower elevations than chaparral, especially on coastal south-facing *slopes*. Many species in this *community*, particularly the sages, are summer or drought deciduous, dropping their malacophyllous (soft) larger leaves during mid-summer to conserve moisture. Their roots are relatively shallow and help to hold the low nutrient soil they typically grow in.

This plant only blooms once, then dies. Look for its tall stalk with white flowers but don't get too close to the leaves of this plant with their needle-sharp ends!

___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___

You may see this common non-venomous snake cross the trail. Although they resemble rattlesnakes, you can tell the difference by their narrow rather than triangle shaped head.

___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___

This *native* herb that follows fire is nature's own "band-aid" erosion control measure. It is also California's state flower.

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___

It's not hard to spot this opportunistic, *non-native*, and *invasive* plant that has seeds which can be used to make a popular condiment for hot dogs.

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___ ___ ___ ___ ___ ___ ___

The berries of this plant are an important food source for birds as well as a popular ingredient in jams and pies. Have you ever eaten these berries before?

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

Look for the glimpse of a red-brown tail on this large bird of prey soaring high in the sky. They may be hunting the small mammals, reptiles, or smaller birds in the chaparral and grasslands around you.

___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___

Most of these shrubs with smooth, crooked, burgundy colored branches are obligate resprouters with some that are facultative seeders. Its name means “little apple” in Spanish referring to its little berries.

___ ___ ___ ___ ___ ___ ___ ___ ___

The pads and fruit (tunas) of this plant are edible, but don’t pick these off, they are covered in spines! Have you ever eaten nopales or tunas?

___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___

How is fire related to these plant communities?

Fire is important to shrublands and *chaparral* plants are adapted to a particular *fire regime* and can recover well if the *fire interval* is not too frequent.

Toyon resprouting after a fire.

How does Chaparral recover from fire?

Chaparral plants have three strategies for recovery from wildfire:

Obligate Resprouters have the ability to resprout from their stumps.

Obligate Seeders: their seeds require some fire cue to germinate, like heat or the chemicals found in charred wood or smoke.

Facultative Seeders can do both! They can resprout from their stumps and germinate from their seeds after a fire.

What is my task at this stop?

Along your hike, you may be walking through various plant communities including Chaparral and/or Coastal Sage Scrub. These *ecosystems* are shaped by *biotic* and *abiotic* factors, their *adaptations* for survival, and their unique survival strategies after a fire.

You are tasked with a **scavenger hunt** to find and identify Chaparral and Coastal Sage Scrub plants, their *adaptations*, and their recovery strategies from the fire.

Search as you walk to your next stop. When you find a plant or animal:
Write the name of the *flora* or *fauna* (use the dashes to help you figure it out) AND

- **Answer the question, or**
- **Share the provided information with your group, or**
- **Complete the task associated with your find**

Biodiversity Bonus: Take photos of the plants and animals you find and upload them to iNaturalist online or in the iNaturalist app.

Word Bank

Rattlesnake
Coyote Brush
Coast Live Oak
Elderberry
Black Mustard
Bush Mallow
Deer Weed
Scrub Oak
Poison Oak
Chamise
Coyote
Red Tailed Hawk
California Poppy
Monkey Flower
Type-conversion
Western Fence Lizard
Scrub Jay
Acorn Woodpecker
Wrentit
Gopher Snake
Prickly Pear
Ceanothus
Toyon
Laurel Sumac
Roadrunner
California Quail
Spotted Towhee
Manzanita
California Sagebrush
Chaparral Yucca

Find a plant that has re-sprouted from its roots after the fire.
Can you identify this plant?
Do you think it is an:

- obgligate resprouter
- obligate seeder
- facultative seeder

This is the only reptile in the Santa Monica Mountains that gives birth to live young. Their babies can grow their own “rattles.”

___ ___ ___ ___ ___ ___ -

___ ___ ___ ___ ___

Look for these birds running after a lizard or rodent in the chaparral. These track stars can run 15 miles an hour with faster spurts when needed. They only fly when necessary but can leap straight up in the air fast enough to catch a hummingbird!

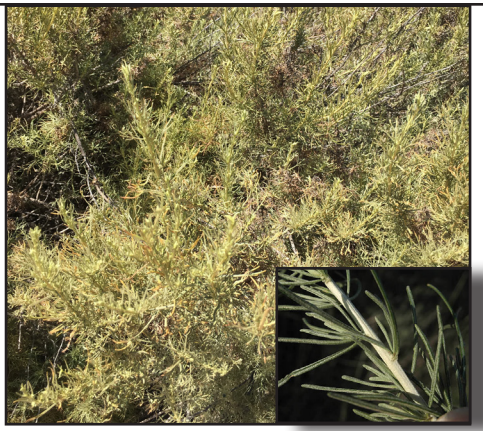
___ ___ ___ ___ ___ ___ ___ ___ ___ ___

This facultative seeder can resprout as fast as 15 days after burning in a wildfire. The genus name Malosma translates to “apple smell”, referring to the aroma of the plant.
Smell this plant, what do you smell?

_____

Plant name: ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___



This plant is sometimes called "Cowboy Cologne." Without ripping pieces of this facultative seeder off, rub your hand over this plant gently and smell your hand. What does it smell like? _____

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___

This is the most common bird in the chaparral. Listen closely for its song that sounds like the bouncing of a ping-pong ball.

___ ___ ___ ___ ___ ___ ___

Don't "monkey around" with this fire following facultative seeding flower or you may get a sticky surprise!

___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___

This pretty facultative seeder is in the same family as *Althaea officinalis* or marsh-mallow plant. One use for this European *native* plant was to make the sugary confection marshmallows.

___ ___ ___ ___

___ ___ ___ ___ ___ ___

These trees resprout from the trunk and upper limbs within three months following a fire. This is referred to as epicormic sprouting. Look for these *native* trees along the trail that burned in the fire but are now showing epicormic sprouting.

__ __ __ __ __ __ __ __ __ __

__ __ __

This nocturnal predator exists in wild and urban places and can run up to 65 km/hr and jump up to 4 meters when hunting small mammals. Have you ever seen one of these animals in the city?

__ __ __ __ __ __

Look for this common chaparral bird foraging on the ground in leaf litter or in the shrubs for insects. They have distinguishing white spots on their upperparts.

__ __ __ __ __ __ __

__ __ __ __ __ __

Also called California Lilac, some of these common shrubs of the chaparral are obligate seeders while others are facultative seeders.

__ __ __ __ __ __ __ __ __

This obligate resprouter could give you an itchy rash if you touch it!
Leaves of three, let it be! Expect this plant in shaded and sheltered areas. It is often under trees and along the banks of streams. In the winter it loses its leaves (deciduous) but the bare stems are potent irritants as well.

___ ___ ___ ___ ___ ___ ___ ___ ___

Look for the blue flash and harsh call of this intelligent bird. Unlike blue jays, these birds do not have a crest on top of their heads. Watch for them to pick acorns from the oaks and bury them for later feeding.

___ ___ ___ ___ ___

___ ___ ___

These lizards hide during a fire and then invade the burn site for food and sun. Watch for them to do "pushups" to flash their blue bellies and defend their territory from other males and show off for the ladies!

___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___

A version of this obligate resprouter is the namesake for the word Chaparral. It is derived from the Spanish word, *Chaparro* (dwarf oak).

___ ___ ___ ___ ___

___ ___ ___

This obligate resprouter is not found in mature chaparral but is found in burned areas where sunlight is more prevalent.

___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___

This top predator depends on the ecosystem it lives in. What are three ways this animal depends on its physical environment?

_____

_____

_____

This is California's state bird that is found in many *habitats*. It likes to eat seeds, invertebrates, and berries such as the poison oak berry. Listen for their call which sounds like "ChiCago ChiCago!"

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

___ ___ ___ ___ ___

This obligate resprouter is also referred to as Christmas Berry because of its red berries in the winter season.

___ ___ ___ ___ ___

This facultative seeder is susceptible to catching & spreading fire because of its dry branches and resinous wood which is why it is also called “greasewood.”

___ ___ ___ ___ ___ ___ ___

Listen for the pecking and drilling of these birds and look for their “granaries” in dead trees. These birds hoard acorns in holes in trees and will use the same “granary” tree for generations.

___ ___ ___ ___ ___

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

These annual *non-native* grasses are called “flashy fuels” because they are highly combustible and burn faster than chaparral. Many are considered *invasive* and take over an area if it burns too frequently. What is the term used to describe this change?

___ ___ ___ ___-

___ ___ ___ ___ ___ ___ ___ ___ ___ ___

The flowers on this chaparral plant start out yellow and turn red as the summer arrives. It plays an important role in ecosystem recovery after a fire. Its seeds have a thick coating that sometimes only a hot fire can crack. These plants help the recovery by transferring much needed nitrogen, lost through the fire, from the air back into the soil. Larger plants in the next stage of recovery after a fire need this nutrient to thrive.

___ ___ ___ ___ ___ ___ ___ ___