Welcome

Welcome to Santa Monica Mountains National Recreation Area
Southern California Fire Ecology: Wildfire Walkabout

The purpose of this guide is to prepare you and your students for your trip to the Santa Monica Mountains. This field trip is self-led. Please read this guide carefully and if you will be visiting, contact the Santa Monica Mountains National Recreation Area (SMMNRA) education team at samo_education@nps.gov.

Field Trip Location

The field trip can take place in any recent burn scar in your area or the Santa Monica Mountains. Suggested sites within the park include *Paramount Ranch, Rancho Sierra Vista/Satwiwa, Circle X Ranch, Rocky Oaks, Peter Strauss Ranch, or Solstice Canyon*. **However, you must contact the park to make sure these sites are accessible and available for a field trip by calling (805) 370-2301 or email samo_education@nps.gov.**

As this is a teacher-led field trip please feel free to visit any location that is convenient to you that has been affected by a recent wildfire. You may use or modify any of the activities suggested in this program to your needs.

Directions

For directions to the sites above, call (805) 370-2301 or visit https://www.nps.gov/samo/planyourvisit/placestogo.htm

Good to know

Parking – The parking areas in the national park site locations are free. Other sites in the recreation area may require a fee. National Park Service (NPS) parking lots are open from 8:00 AM to sunset.

Restrooms are not available at all locations, check the website above for details.

Water fountains are not available at all locations, check the website above for details.

Pets are allowed on leash and under control on NPS land. Please pick up after your pet. Pets must remain on the trail. Pets are not allowed in other sites of the recreation area such as state park properties. Check the website of your chosen site for details.

Accessibility: Please check the website of your chosen site for details or call (805) 370-2301.

Cell phone service is available in some areas but unreliable in the canyons and backcountry areas of the park.

Contact us

Phone: (805) 370-2301
Email: samo_education@nps.gov
Web: https://www.nps.gov/samo/planyourvisit/placestogo.htm

WILDFIRE WALKABOUT HIKE

Hike Goal

The goal of the Santa Monica Mountains National Recreation Area Fire Ecology program is to give students the opportunity to explore the subject of wildland fires and fire ecology including the relationship between wildland fire, the chaparral ecosystem, and human communities including how land managers are attempting to preserve the natural ecosystems while keeping communities safe.

The field trip is designed to complement the other units of the program. Although not necessary, the trip will provide the opportunity for students to expand on their classroom work and directly explore a burn scar while considering the impacts and recovery of the ecosystem and the people.

Essential Question

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

Objectives

- After this field trip, 20% of students will be inspired by the information they learned or the experience that they had and will seek additional information or initiate similar experiences.
- After this field trip, during a wildfire occurrence, 40% of students will take notice of wildfire behavior conditions (Santa Ana winds, temperature, humidity, etc.) and understand how they are affecting the wildfire.
- After this field trip and after a wildfire occurrence, 20% of students will recall the strategies that chaparral plants are using to recover and 5% of students will travel to a burn scar to witness the recovery.
- After this field trip, 20% of students will discuss with their family the ways that they can prepare for a wildfire and take actions to prepare.

Hike Options

There are many trails to hike in the Santa Monica Mountains. To plan your visit, please refer to this website:

https://www.nps.gov/samo/planyourvisit/placestogo.htm

Before hiking any trail in the park, call (805) 370-2301 to make sure the trails are open and safe.

Hiking maps are available on the above website or from the King Gillette Ranch visitor center. Call the number above for more information.

Suggested hikes:

Rancho Sierra Vista / Satwiwa:
- Satwiwa Loop trail (1.5 miles
- Burned in the 2013 Springs fire

Paramount Ranch:
- Coyote Canyon trail to Hacienda Trail Loop (1.0 mile)
- Burned in the 2018 Woolsey fire

Solstice Canyon:
- Solstice Canyon trail (2.1 miles round trip)
- Burned in 2018 Woolsey fire

Rocky Oaks:
- Rocky Oaks Loop trail (1.1 miles)
- Burned in the 2018 Woolsey fire

Materials

Digital documents supplied by the park:

- High School Student Journal_any location
- High School Field Trip Teacher Guide_any location
- Scavenger Hunt Teacher Key_High School
- Plant Community Key

Optional materials supplied by the teacher:

- Thermometer
- Sling psychrometer
- Anemometer
- Compass
- Magnifying glasses
- Binoculars

PREPARING FOR YOUR HIKE

Safety

Remember while you are hiking:

1. Stay together as a group.

2. Stay on the trail.

3. Carry a first-aid kit.

4. 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 students with allergies and try to avoid bothering hives .

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

5. 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.

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

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

7. Know the name of the site you are visiting and call 911 on a cell phone in an emergency.

Student Field Journal

- The field journal is used by the students at the stopping points on the hike.
- Terms in the journal that are italicized are defined in the glossary.

Hike Stopping Points

- Stopping points will be at the discretion of the teacher.
- All hike stopping points are optional. Feel free to add your own activities into the hike or simply walk along and experience the Mediterranean ecosystems.
- All activities are designed in a manner which allows teachers to take students on the hike without having to provide any additional materials. However, we have suggested optional materials that you can provide yourself to enhance the activities. Some materials would be helpful if you would like to have your students measure and record data or learn to use scientific instruments.

Lunch

- You can have your lunch anywhere.
- Many sites do have picnic tables and restrooms available. Check the website https://www.nps.gov/samo/planyourvisit/placestogo.htm for specific information.

WILDFIRE BEHAVIOR OBSERVATION STATION

Summary	This 10-20 minute activity is designed for students to observe the plant communities around them, determine what communities they are looking at, and use their senses to observe (or instruments to measure) variables in these communities that may affect wildfire behavior.
Where should I stop?	It is recommended that if time allows, you hike the trail ahead of your field trip to determine the best places for your activities. Pick a location where you can see at least two plant communities such as chaparral, coastal sage scrub, grassland, oak woodland, etc...
Focus Question	What affects wildfire behavior?
Objectives	• During this activity, 90% of students will use their senses or instruments to measure wildfire behavior variables that are a part of these ecosystems. • After this activity, 90% of students will be able to identify 2 plant communities in the Santa Monica Mountains. • After this field trip, during a wildfire occurrence, 40% of students will take notice of wildfire behavior variables (Santa Ana winds, temperature, humidity, etc.) and understand how they are affecting the wildfire.
NGSS Standards	Grade 7-MS-ESS3-2 Grade 8-MS-ESS3-4 HS-PS1-5 HS-LS2-2 HS-ETS1-1 HS-ESS3-5

WILDFIRE BEHAVIOR OBSERVATION STATION

Guidelines

1. Have the students observe the plant communities around them.
2. Use the plant community key or have a discussion to identify as many communities as possible.
3. Have the students use their senses to observe or scientific instruments, if available, to answer the questions in their field journals.

Materials

SUPPLIED BY THE PARK:

- High School Student Journal_ any location
- Plant Community Key (print enough copies for students to share)

OPTIONAL MATERIALS SUPPLIED BY THE TEACHER:

- Thermometer
- Sling psychrometer
- Anemometer
- Compass
- Magnifying glasses

Background

- You can see many grasslands in the park that are mostly annual non-native grasses such as bromes. Many of these grasses were planted by ranchers in the 1800-1900s as food for their livestock. However, if you search you can find native grasses such as purple needle grass.
- Coastal Sage Scrub communities are found at lower elevations, are more sparse than chaparral, and have softer plants with aromatic oils that smell good such as black sage and California sagebrush. Have the students look higher on the mountains to see the dense chaparral communities full of manzanita, ceanothus, and scrub oak. These plants are harder and woody with a dense canopy.
- Plant communities that you could see include: Chaparral, Coastal Sage Scrub, Grassland, Oak Woodland, Riparian, Valley Oak Savanna.
- Wildland fire behavior is affected by conditions including:

  Weather: temperature and climate, winds, and humidity

  Topography: slope, aspect, features

  Fuels: fuel moisture, chemical makeup, density

CHAPARRAL & COASTAL SAGE SCRUB SCAVENGER HUNT

Summary	This 20 minute activity is designed to encourage students to discover the biodiversity of chaparral and coastal sage scrub plant communities while closely exploring the biotic and abiotic factors surrounding them looking for flora and fauna as well as plant adaptations and wildfire recovery strategies.
Where should I start this?	Pick a place along the trail to start and stop the scavenger hunt. Ideally a place where there are a variety of plants recovering in a burned area or a place where you can see a variety of plants. End the scavenger hunt at your discretion.
Focus Question	Why are chaparral plant communities important? How have they adapted to survive in this Mediterranean biome and how do they recover from wildfires?
Objectives	• During this activity, 100% of students will identify at least three Chaparral or Coastal Sage Scrub biotic factors. • After this activity, 75% of students will be able to discuss how chaparral plants have adapted to survive in this biome. • After this field trip and after a wildfire occurrence, 20% of students will recall the strategies that chaparral plants are using to recover and 5% of students will travel to a burn scar to witness the recovery.
NGSS Standards	Grade 7-MS-LS2-4 Grade 8-MS-ESS3-4 HS-LS2-1 HS-LS2-2 HS-LS2-6 HS-LS2-7 HS-LS4-5 HS-ESS3-3

CHAPARRAL & COASTAL SAGE SCRUB SCAVENGER HUNT

Guidelines

1. After a short rest, tell the students that they will be participating in a scavenger hunt.

2. Have them read the background information and instructions and answer any questions they may have.

3. With each find, the students are to write the name of the flora or fauna and answer the question, share the provided information with your group, or complete the task associated with it.

4. Students can use the Scavenger Hunt Word Bank for identification purposes.

5. Continue the scavenger hunt along the trail until your next stop.

Optional Biodiversity Bonus!

- iNaturalist is a citizen science project and online social network of naturalists, citizen scientists, and biologists built on the concept of mapping and sharing observations of biodiversity across the globe.

- Find it in your app store or visit inaturalist.org. You can have the students create their own account if they are 13 or older or create a classroom account. It is free!

- During their visit, have the students take pictures of at least three plants or animals in the chaparral and upload them to a class inaturalist account for identification.

- Before the field trip, visit:
https://www.inaturalist.org/pages/getting+started
or watch the video at: https://vimeo.com/162581545
for more information about how to use iNaturalist and have the students download the app.

- When you return you can analyze the data collected to help determine how healthy the ecosystems in the park are based on the biodiversity data collected.

Materials

Supplied by the park:

- High School Student Journal_ any location
- Scavenger Hunt Teacher Key_ High School

Optional materials supplied by the teacher:

- Magnifying glasses

Chaparral and the Role of Fire

Due to its broad distribution and the high diversity of plant species and sub-vegetation types, chaparral experiences a variety of fire regimes and post-fire conditions. Most chaparral species are able to survive and/or soon recolonize an area following wildfire, if the fires are not too frequent, ideally 40 to 100 years or more. Many distinct plant strategies exist to accomplish this.

Plants that are classified as obligate seeders (e.g. some Ceanothus and Arctostaphylos species, Helianthemum scoparium, Dendromecon rigida) are not found in areas with high fire frequency (e.g. 2–10 years) since consecutive fires limit plants from growing to a mature age when they will set new seed. Or, low-intensity fires (due to the sparse vegetation conditions and lack of fuels) do not trigger seed germination. In the latter situation, just one intense fire will stimulate a flush of germination.

Obligate sprouters (e.g. Prunus ilicifolia, Rhamnus spp., Cercocarpus betuloides, Heteromeles arbutifolia) cannot survive frequent fires either because fires destroy the shoots and canopy every few years, and no viable seed crops are developed for at least 7–10 years. If winter rainfall is adequate or plentiful, obligate sprouters may withstand two or three wildfires occurring at intervals of 3–5 years before sustaining severe declines. However, frequent wildfires and post-fire browsing result in loss of leaf canopies and new sprouts, which normally shade and supply nutrients to the plants during dry seasons. Then the plants' roots cannot supply their year-round needs in the locally nutrient-poor soils and summer-drought conditions. Without new stems and leaves or sufficient nutrients to produce new leaf canopy and feeder roots, obligate sprouters also disappear.

In contrast to these two groups, some plant species are found primarily within recent burn areas where they rapidly produce a lot of seed, replenishing their seed banks, or there are new shrubs taking advantage of open canopy, lack of competition, and perhaps extra nutrients to establish themselves before the obligate seeders and obligate sprouters shade them out. There are a few post-fire plant species, such as wild cucumber (Marah macrocarpus) and wild morning glory (Calystegia macrostegia), that sprout immediately after fire and cover burned areas like blankets, acting as effective erosion protection during the first few years following fire.

As a result of these complex interactions, fire—especially its frequency and intensity—strongly influences the shaping of chaparral vegetation and the creation of diverse species associations across the landscape. Areas affected by multiple fires in short succession are likely to have fewer obligate seeders and sprouters, and instead to have a greater proportion of species that are able to recolonize from outside seed sources. It follows that the size of a fire is an important influence on the stand's future species composition. Fire extent can affect the ability of chaparral to properly recover as the large perimeter-to-area ratio of small burns can make areas more vulnerable to invasion by non-natives than with larger fires.

Chaparral Plant Recovery Strategies

Chaparral plant communities have important strategies for fire survival and regrowth, such as sprouting from the underground rootstock and the stimulation of seed germination by fire (heat). Some shrub species that usually reproduce by seeds are able to resprout from rootstock after fire; these plants are called facultative sprouters. Other shrub species either reproduce exclusively from seeds (obligate seeders) or from rootstock (obligate sprouters), as described above.

Herbaceous plants in chaparral, which are often "fire followers," are usually conspicuous only during initial post-fire years. Many herbaceous plant seeds remain dormant in the soil until germination is triggered directly or indirectly by fire. Thus, soil seed banks are a significant source of plant diversity in chaparral systems. Examples of fire-related stimuli include heating of seeds for a particular amount of time or to a certain temperature in order to scar the seed coat and thereby allow germination and sunlight.

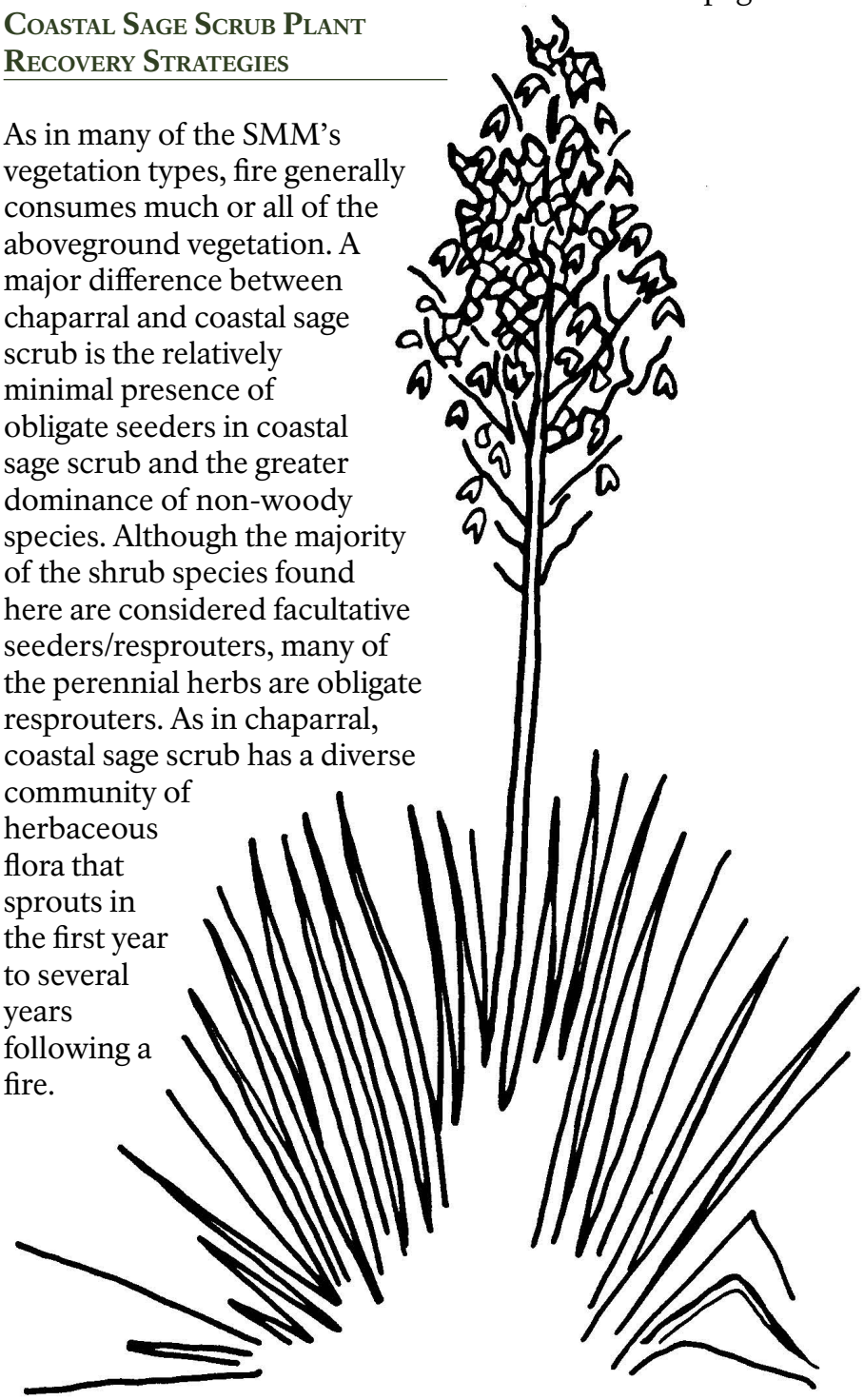
However, when fires burn too frequently and consume too much aboveground vegetation, a later fire may not have sufficient fuel to reach the temperatures necessary for seed stimulation, creating a delay in the recovery of native species with this requirement. Chemicals derived from smoke and charred wood can cause seed germination in many species, whereas it can be lethal to other species.

Coastal Sage Scrub and the Role of Fire

Compared to chaparral, coastal sage scrub vegetation contains large amounts of fine fuel. Coastal sage scrub also tends to be partially or wholly drought-deciduous, so late in the dry season fuel moisture can be very low. For these reasons, coastal sage scrub can exhibit spectacularly intense fire behavior in the fall. Few obligate seeders are found in this vegetation type, with most of the species being facultative seeders/resprouters. This means species that are able to regenerate via seed production or existing seeds in the soil seed bank, or by resprouting from surviving rootstock after a fire destroys the upper plant. This characteristic may contribute to coastal sage scrub's resiliency to repeated fires. Plants surviving a fire or germinating from seed in the first year often produce large amounts of seed that contribute to the speedy reestablishment of native shrub cover in subsequent years.

Coastal Sage Scrub Plant Recovery Strategies

As in many of the SMM's vegetation types, fire generally consumes much or all of the aboveground vegetation. A major difference between chaparral and coastal sage scrub is the relatively minimal presence of obligate seeders in coastal sage scrub and the greater dominance of non-woody species. Although the majority of the shrub species found here are considered facultative seeders/resprouters, many of the perennial herbs are obligate resprouters. As in chaparral, coastal sage scrub has a diverse community of herbaceous flora that sprouts in the first year to several years following a fire.



Citation

Katelman, Tracy, et al. 2010. Santa Monica Mountains Community Wildfire Protection Plan. www.forevergreenforestry.com/SantaMonicaMountainsCWPP.html. 576 pages.

WILDLAND URBAN INTERFACE FILL IN THE BLANKS

Summary

This 10-15 minute activity is designed for students to see first-hand a Wildland Urban Interface (WUI).

Students will recognize the threats that wildfires pose to these communities, understand the delicate balance of management that land and fire managers face every day to protect the public while also protecting valuable natural resources, and think about actions that they can take to protect themselves and their families from a wildfire.

Where should I stop?

If available, choose a location where students can see a WUI. If not, have them complete the activity and if you drive through a WUI on your way home, you can have a discussion at a later time.

Focus Question

Why are wildland urban interface areas significant in relation to wildfire impact and management and what can you do to prepare for the next wildfire?

Objectives

- During this activity, 80% of students will participate in a discussion about the significance of the WUI.
- After this field trip, 20% of students will discuss with their family the ways that they can pre-pare for a wildfire and take actions to prepare.

NGSS Standards

Grade 7-MS-ESS3-2

Grade 7-MS-LS2-5

Grade 7-MS-LS2-4

Grade 8-MS-ESS3-4

Grade 8-MS-ETS1-1

HS-ETS1-1

HS-ETS1-2

HS-ETS1-3

HS-ETS1-4

HS-LS2-7

HS-ESS3-1
HS-ESS3-3

HS-ESS3-4

HS-ESS3-6

WILDLAND URBAN INTERFACE FILL IN THE BLANKS

Guidelines

1. If available, have the students observe the wildland urban interface. Discuss the risks and impacts involved in living in the WUI and the actions that stakeholders can take to reduce these risks.

2. Have the students fill in the blanks of the WUI activity using the key.

Materials

Supplied by the park:

- High School Student Journal_ any location

Optional materials supplied by the teacher:

- Binoculars

Background

What is the Wildland Urban Interface (WUI)?

The Wildland Urban Interface is the area where homes and wildlands meet.

Preparing for the next wildfire

GET READY for the next wildfire by hardening your homes and creating defensible (survivable) space.

Hardening your home from wildfire means fortifying or retrofitting your home to be impervious to heat and embers. This can be your best defense against ember intrusion.

Defensible space is the area around a structure free of flammable plants and objects that will create a buffer zone to slow or halt wildfire spread to a structure. Defensible space also creates a zone that is essential for fire fighters to operate safely, while working to protect a home during a wildfire

GET SET by preparing for an evacuation.

Create a Wildfire Action Plan that includes evacuation planning for your home, family and pets.

Assemble an Emergency Supply Kit for each person in your household.

Fill-out a Family Communication Plan that includes important evacuation and contact information.

GO! By following your evacuation plan & checklist to evacuate quickly and early.

Leave as soon as evacuation is recommended by fire officials!

Listen to your radio/TV for announcements from law enforcement and emergency personnel.

Know when to evacuate and what to do if you become trapped.

Review and follow your evacuation plan checklist if time allows.

Ensure your Emergency Supply kits are in your vehicle.

To protect against flying embers: dress in long pants, long sleeve shirt, heavy shoes, hat, and a bandanna and glasses for face cover.

Take your pets with you!

Wildfire Suppression

Wildfire suppression is defined as a response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the direct and indirect effects of the fire and/or management actions.

Backfire

A fire set along the inner edge of a fireline to consume the fuel in the path of a wildfire and/or change the direction of force of the fire's convection column.

WILDLAND-URBAN INTERFACE FILL IN THE BLANKS TEACHER KEY

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?

Observe the *Wildland-Urban Interface* (WUI).
Fill in the blanks using what you have learned about the WUI.

An area where homes and wildlands meet is called the Wildland-Urban Interface. This is a significant area for wildfire impact and management. People that have a direct or indirect interest in this area are called Stakeholders.

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

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

Step one is to Get Ready.

Step two is to Get Set and step three is to Go!

Follow step one by Hardening your home and creating Defensible space. Follow step two by preparing for an Evacuation.

This includes preparing an Emergency Supply Kit for each member of your family.

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

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

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.

Firefighter & Public Safety

REFLECTION

Summary

This activity is designed as a quiet reflection that can happen any time after the hike.

Focus Question

What have you learned or experienced on your visit to the Santa Monica Mountains or a burned area?

Objectives

- During this activity, 75% of the students will recall an interesting fact they learned or an experience they had.

Guidelines

1. After lunch, in class, or at home have the students reflect on their hike and/or visit.

2. Have the students write in their reflection page of their field journal. They can use the questions as a guide, share what they learned, or just share what was special to them about the visit.

3. **Optional**: Have the students use their phones to record a 30 second Public Service An-nouncement (PSA). They can use the questions as a guide, share what they learned, or just share what was special to them about the visit.

MATERIALS

SUPPLIED BY THE PARK:

- High School Student Journal_ any location