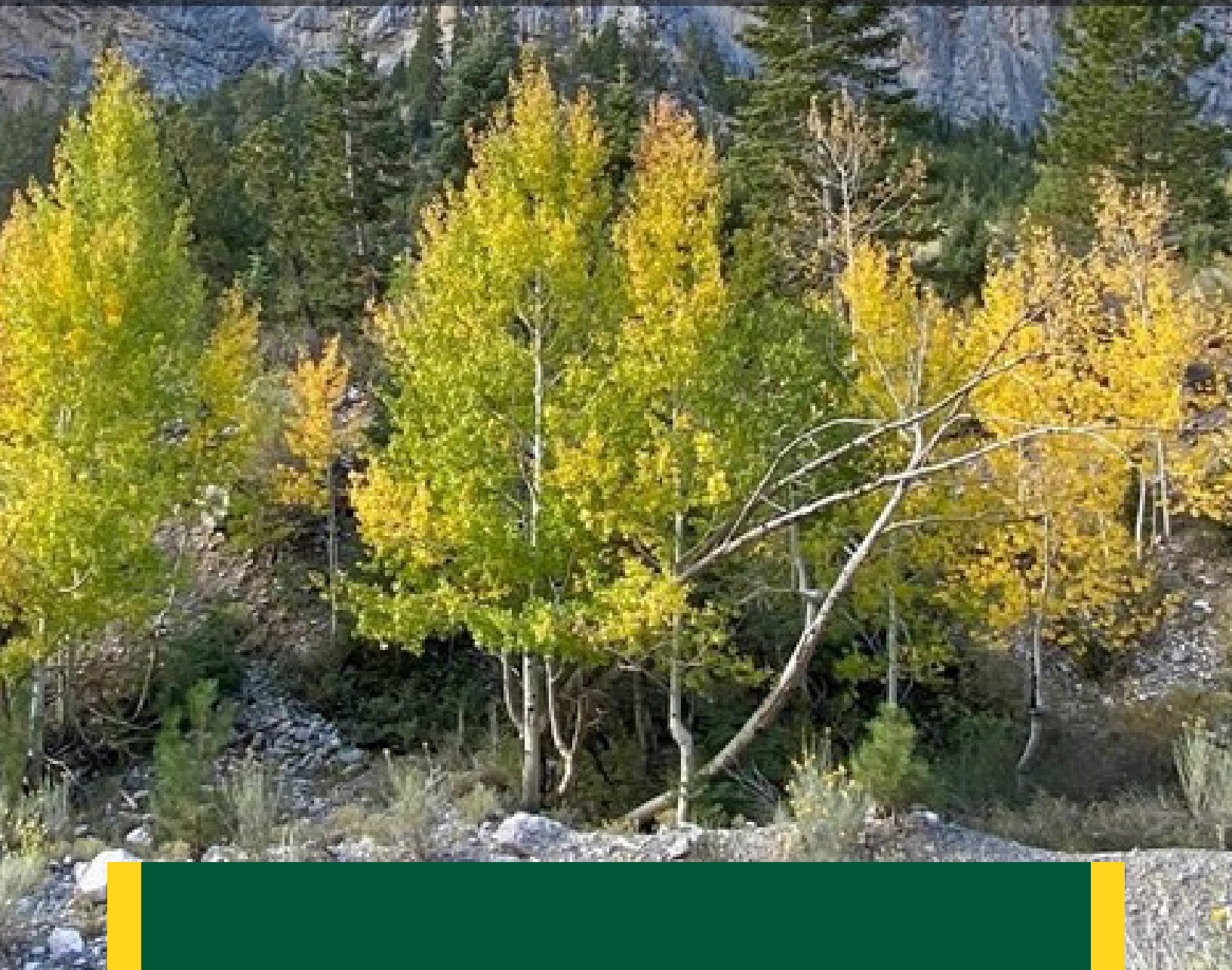




Our Places Tell Stories

An Educator's Field Trip Guide for the
Spring Mountains National Recreation Area
Nevada



Cover Image: Limestone cliffs of the Spring Mountains (Image by: Southern Nevada Conservancy).

Southern Nevada Agency Partnership (SNAP) Accessibility Statement

The U.S. Forest Service (USFS) is committed to creating accessible content. It is our policy to ensure that everyone, including persons with disabilities, has full and equal access to our digital offerings. This document conforms to the PDF/Universal Accessibility (PDF/UA) (ISO Standard 14289) accessibility standards as required for Section 508 compliance.

Purpose of the Guide

The purpose of this guide is to support teachers in conducting independent field trips onto public lands, specifically to the Spring Mountains Visitor Gateway at the Spring Mountains National Recreation Area. The field trip activity provides detailed information about what to bring, who to contact at the agency, and required forms to arrange a fieldtrip. It also provides maps and trail details to be able to safely and comfortably implement the lesson.

The Spring Mountains Visitor Gateway field trip content supports standards-based knowledge and skills related to making observations, ecosystems/environmental impacts on organisms, and biological structure and function targeting grades 3-5.

This guide provides detailed information about what to bring, who to contact at the agency. The classroom-based activities are encouraged but not required to successfully conduct the field trip and its accompanying lessons.

The developers of this guide would like to acknowledge that some of the activities have been adapted from the following sources: Project Wet Curriculum Guidebook 2.0; Discover a Watershed: The Colorado River; Windows on the Wild: Biodiversity Basics; and, Discovery Place Stay at Home Science.



Table of Contents

Section 1 – About this Guide	1
Welcome.....	1
How to Use This Guide.....	2
Activities at a Glance.....	2
Classroom Activities.....	3
Science Content Standards.....	4
Section 2 – Field Trip and Onsite Activities	6
Recreate Responsibly.....	6
Safety.....	7
Southern Nevada Federal Public Lands Fieldtrips.....	8
Conducting a Field Trip to the Spring Mountains Visitor Gateway.....	14
Activity 1 - Nature Detectives.....	17
Activity 2 - Nature Inspirations.....	21
Section 3 - Classroom Activities	26
Home Means Nevada - Life Zones of the Spring Mountains.....	26
Survivor.....	45
Creature Creations.....	54
Voice of the Mountains.....	58
Biomimicry.....	68
Section 4 - Additional Background Information and Resources	71
Land Acknowledgement.....	71
Public Lands.....	72
Spring Mountains National Recreation Area.....	75
Acknowledgements.....	103



Section 1 – About this Guide

Figure 1. Scouts learning about the animals found in the Spring Mountains. (Photo by: Rosa Prasser)

Welcome

Welcome to the “Our Places Tell Stories” field trip guide for the Spring Mountains Visitor Gateway!

This is one of four field trip guides developed for educators to independently conduct field trips on public lands in southern Nevada. The other guides are for the Desert National Wildlife Refuge, Lake Mead National Recreation Area, and Red Rock Canyon National Conservation Area.

These guides were funded through a grant from the Southern Nevada Public Lands Management Act (SNPLMA), which financially supports recreation, conservation, and education on public lands in southern Nevada.

Many people are not familiar with the various federal land management agencies (such as the U.S. Forest Service or the U.S. Fish and Wildlife), nor the different types of land designations (like Recreation Area, National Reserve, National Preserve, Wilderness Area, Wildlife Refuge, and so on). This guide provides more information for you to familiarize yourself with these differences prior to going on a field trip to one of the locations.

For this welcome, though, we want to briefly introduce you to the multi-agency team that is working together to develop this series of field trip educator guides – SNAP (Southern Nevada Area Partnership). SNAP was established in 1999 to address shared and common land management issues in southern Nevada, as well as work with outside partners and community members to support education, interpretation, and research to advance conservation.

The SNAP partnership includes the Bureau of Land Management (BLM), the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), the U.S. Forest Service (USFS - who manages the Spring Mountains National Recreation Area, the focus of this guide), and the Bureau of Reclamation (BOR). We thank you for your commitment to educating youth about our beautiful and unique natural areas in southern Nevada, and we hope you enjoy your time at Spring Mountains National Recreation Area!

Sincerely,

The SNAP Team



Figure 2. Southern Nevada Agency Partnership Logo



How to Use This Guide

This guide is intended for use in conjunction with an educator-led field trip to the Spring Mountains Visitor Gateway. The guide contains field trip specific activities targeting 3rd through 5th grade addressing the geology of the Spring Mountains, water cycle and availability, ecological communities, and people (past and present).

The guide has four sections: (1) About this Guide; (2) Background Information; (3) Field Trip and Onsite Activities; and (4) Classroom Activities.

The Background Information section provides content and context for the field trip experience and the classroom activities. The Field Trip and Onsite Activities section explains how to conduct a school field trip to the Spring Mountains Visitor Gateway and contains all educator instructions and student handouts for the Acastus Trail at the Spring Mountains Visitor Gateway fieldtrip. The Classroom Activities section contains classroom-based pre- and post-fieldtrip activities to prepare for, expand upon, and reinforce the fieldtrip experience and content. Although complementary to each other, all activities can be implemented independently, allowing teachers to pick and choose.

Activities at a Glance

Field Trip Activities

Onsite at Spring Mountains Visitor Gateway,
2525 Kyle Canyon Road, Las Vegas, NV

Nature Detectives

- **Overview:** Using a field guide check list, students will use their observation skills to investigate the landscape adjacent to the Spring Mountains Visitor Gateway. This process will help students slow down, engage with nature and gain independence and confidence in the outdoors.
- **Setting:** Trail system south of the Spring Mountain Visitor Gateway; includes portions of the Acastus Trail, Pack Rat Route, and the Escarpment Trail
- **Time:** 45 minutes

Nature Inspirations

- **Overview:** Students use creative writing and language to reflect on the natural world.
- **Setting:** Outside with landscape views, OR Amphitheater or picnic tables (NOTE: The amphitheater and picnic tables require reservations and fees. Check when you contact the agency/agency partner about the field trip)
- **Time:** 30 minutes (minimum)

In the order presented in the guide: Field trip activities are listed first, classroom (pre-field trip and post-field trip) follow.

Classroom Activities

Pre-Field Trip

Home Means Nevada - Life Zones of the Spring Mountains

- Overview: Students explore local life zones, and match plants and animals to life zones in the Spring Mountains.
- Setting: Classroom or outside
- Time: 1 class period or less

Survivor

- Overview: Explores predator and prey relationships and is played as a game in small groups
- Setting: Outside, amphitheater, or picnic tables (NOTE: The amphitheater and picnic tables require reservations and fees. Check when you contact the agency/agency partner about the field trip)
- Time: 30-45 minutes

Creature Creations

- Overview: After learning specific animal adaptations, students create individual art-science fusion creatures.
- Setting: Classroom
- Time: 1 class period or less

Post-Field Trip - Classroom

Voices of the Mountains

- Overview: Students step away from their own life experiences and explore someone else's perspective about the place they recently visited.
- Setting: Classroom
- Time: 1 class period or less

Biomimicry

- Overview: Students become inspired by one of mother nature's great architects, the spider, as they create spider webs and apply their new knowledge to find solutions to human problems.
- Setting: Classroom
- Time: 1 class period or less



Figure 3. A homeschool group visits the Spring Mountains Visitor Gateway. (Photo by Rosa Prasser)



Science Content Standards

This program is intended for students in third through fifth grade. It is integrated with content and activity connections to science, social studies, English language arts, physical education/health and art.

Students will gain experience using fundamental skills and concepts such as observing patterns in nature; cause and effect; using systems and system models; analyzing stability and change in systems and examining the structure and function of elements in the natural world.

Activities have been created for the cognitive, social, emotional, and academic development of the intended age group. The following are some connections to Nevada science content standards.

Disciplinary Core Ideas - Grade 3

3-LS2-1. Construct an argument that some animals form groups that help members survive.

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Disciplinary Core Ideas - Grade 4

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

4-ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

Disciplinary Core Ideas - Grade 5

5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.

5-ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

Engineering Practice & Design

3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.



Figure 4. A school group learns about animal tracks and scat. (Photo by Rosa Prasser)



Figure 5. A scout group visits the cool summer air at the Spring Mountains. (Photo by Rosa Prasser)



Recreate Responsibly

Whether exploring desert spaces or mountain places, remember to #RecreateResponsibly and follow Leave No Trace principles when you visit.

Know before you go

Check the status of the place you want to visit for closures, fire restrictions, and weather. Learn the rules and regulations for the site.

Plan and prepare

Reservations and permits may be required. Each location and agency has different fieldtrip and entrance requirements (see Section 3 – Field Trip and Onsite Activities for specific details for this location). Make sure you have the gear you need (such as student medications, plenty of water and snacks, sunscreen, and clothing layers). Be sure to have a back-up plan.

Build an inclusive outdoors

Be an active part of making the outdoors safe and welcoming for all identities and abilities.

Respect others

There is space for everyone and countless outdoor activities. Be kind to all who use the outdoors and nature differently. Teach students basic trail etiquette – like step aside and let people pass, stay on the trail, use quiet voices and play music only in headphones. Students should be informed that loud noises scare off wildlife and other people go outdoors to relax and find quiet.

Leave no trace

Respect the land, water, wildlife, historic sites, and Native American communities. Follow Leave No Trace principles: Stay on trails; Pack out all waste; Leave what you find (this includes rocks, plants, and historic remnants); Minimize campfire impacts/determine if there are fire restrictions; Never feed animals; Control and clean-up after pets; and, Keep a distance of at least 40-feet between yourself and wildlife.

Make it better

We all have a responsibility to sustain the places we love. Help clean up other's trash or volunteer.

Safety

Keep your distance from wildlife

Do not feed wildlife – it actually hurts them, either because human food can be toxic and/or animals become aggressive and have to be captured and moved or euthanized.

Be aware of your surrounding terrain

Stick to trails and stay on the safe side of barriers. Use extra caution on steep, loose, or rocky terrain. Stay away from ledges and drop-offs.

Wear hiking shoes or boots with sturdy soles

Bring water, food, medications, and clothing

A good rule of thumb is to bring one liter of water for every two hours (more when it's warmer). On a field trip, teachers and chaperones should carry a backpack with student medicines, extra food, extra water, and a first aid kit.

Be weather-aware

Avoid walking in washes when rain is nearby. (It can be raining in higher elevations miles away and water can flood the wash). Avoid hiking in high temperatures or exposed locations during lightning storms. The Spring Mountains have higher elevations where snow and ice can occur, even in spring and fall. Be sure to check for road closures and wear appropriate clothing.

Make sure people know where you are and when you will return

Make sure cell phone batteries are charged and GPS locaters are on (which can provide a location to 911 in case of an emergency.)



Southern Nevada Federal Public Lands Fieldtrips

Places And Teacher Guides

The Las Vegas Valley is surrounded by amazing public lands run by different federal agencies including the National Park Service (NPS), the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service (USFWS). Each of these agencies has developed specific field trip activities to help you plan and implement a field trip that highlights unique experiences at each location and meets specific educational standards and topics.

Taking students on field trips to the public lands around the Las Vegas Valley is a very rewarding experience for students and teachers alike, but it takes planning to help the field trip go smoothly. Each land agency has different contacts and processes to make field trip arrangements. For example, some locations have entrance fees, so you will need to apply for a fee waiver, other locations are free, but have limited space, so you will need to obtain permission to visit with a group and know where and how to park the bus.

This Teacher Guide provides checklists and information you can use for field trips to any location, while subsequent pages provide specific steps, contact information, and links to forms (if needed, e.g. fee waiver forms) for planning the field trip associated with this specific location.

The four federal agencies (BLM, USFWS, NPS, and USFS) developed detailed materials to help you conduct a fieldtrip to a specific location/trail. Below is a summary of each field trip location, activity, and topics covered as part of the fieldtrip.

Spring Mountains

Forest Service – free entrance, limited space, coordinate with the Agency ahead of time by calling the Visitor Gateway at 702-872-5486.

- **LOCATION:** Spring Mountains Visitor Gateway
- **Field Trip ACTIVITIES:** *Nature Detective* – Nature Detective is an activity that connects students to their surroundings and allows them to practice observational skills. Students begin their observations on the ride up Kyle Canyon Road, learning about different life zones as they move from desert to pine trees. Once at the Spring Mountain Visitor Gateway they explore the nearby trails and record observations of nature, including evidence of insect and animal life. Students then take their observations and craft them into a poem.
 - ◆ **TOPICS:** Life zones/evidence of plants and animals in nature/recording observations using their senses



Figure 6. A homeschool group searches for butterflies. (NOTE: Do not remove plants, animals, rocks, or cultural objects from federal lands. Butterflies play an important role in plant pollination and the mountain has several rare species.) (Photo by Rossa Prasser)

Lake Mead National Recreation Area

NPS – fee area, fee waiver needed, limited parking space, coordinate with the agency ahead of time via lake_education@nps.gov and lake_fee@nps.gov.

- **LOCATION:** Bluffs Trail, Las Vegas Bay Campground
- **Field Trip ACTIVITIES:** *Geology: Erosion, Weathering, and Deposition and Colors in Stone* – The Bluffs Trail provides an incredible view of the mountains that surround the Las Vegas Valley and a front-row look at geological processes like erosion, deposition, and fault lines. Also, nearly every major category of rock is represented on this trail – volcanic, metamorphic, sedimentary, and conglomerate – which tells an amazing story about the geology of the Las Vegas Valley. Students stop at points along the Bluffs Trail to learn about these land-forming processes, then finish with a watercolor activity “Colors in Stone.”
 - ◆ **TOPICS:** Geology/erosion/land formation

Red Rock Canyon National Conservation Area

BLM – Teachers are required to have attended a pre-approved training to conduct self-guided field trips, fee area, waiver needed, limited space, coordinate with the agency ahead of time at blm_nv_sndr_recreation@blm.gov.

- **LOCATION:** Fire Ecology Loop Trail (Pine Creek pull out in the loop)
- **Field Trip ACTIVITY:** *Bio Blitz Inventory* – Students identify desert plants at specific stops along the Pine Creek Canyon trail on their way to the Fire Ecology Trail. At points along the trail students work in pairs to conduct a “bio blitz inventory” to see how many different leaf arrangements and leaf shapes they can find in a square meter. Students

compare the areas and make decisions about biodiversity based upon the data they collected.

- **TOPICS:** Biodiversity/plant identification/data collection and analysis

Desert National Wildlife Refuge

U.S. Fish and Wildlife Service – free entrance, limited space, coordinate with the Agency ahead of time.

- **LOCATION:** Desert National Wildlife Refuge Visitor Center
- **Field Trip ACTIVITY: *Habitats: Refuge Residents*** – Students are assigned a desert animal that lives at the National Desert Wildlife Refuge. As the class follows the trails near the visitor center, there are specific stops that highlight different habitats. At each stop students consider the availability of food, water, and shelter and record whether their assigned animal would live in that habitat.
- **TOPICS:** Habitats/animal and plants found in different habitats along the trail

General Checklists and Planning

STEP 1: Field Trip DATES & PAPERWORK (minimum 1-2 months prior)

All of the agencies featured in this field trip guide require schools to schedule the field trip ahead of time.

- **Select a field trip date**, with at least 1 – 2 alternative dates. Some areas have limited space with schools vying for that space. The more optional dates you have the more likely you will easily be able to reserve your desired field trip spot. If your original field trip location is not available, consider going to one of the other three agency locations.
 - ◆ It is strongly recommended to plan at least 1 – 2 months out to allow time for the agency to process your paperwork. If your trip is less than one month away, be prepared that you may not be able to visit that location.
- Determine how the class will get to the location and reserve buses. Funds may be available to help pay for buses or even rent a charter bus. Get Outdoors Nevada is a non-profit organization that may be able to connect schools to mini-grants for buses. NOTE: There may be some restrictions for chartered buses at certain fieldtrip sites, either for size or certain agencies have contractual agreements with specific companies. If you use a charter bus that is not on approved agency list, you may have to pay additional fees. Agency details are included in the specific agency fieldtrip section in the specific Teacher Guide.
- **Complete all paperwork** needed for your school and/or school district (including obtaining permission slips, and ordering lunches and water ahead of time, etc.).

STEP 2: CONTACT THE AGENCY (minimum 1 month prior, preferably several months prior)

- Refer to specific fieldtrip activities for information about who to contact and the necessary forms required for the agency/location you are interested in visiting.
 - ◆ Read forms carefully and include all of the requested information. Missing information/documents will result in a delay. For example, in order to process fee waivers, some agencies require the teacher to complete and sign the form, provide proof of accreditation of the school, provide proof of non-profit status, and give a description of the educational activity and learning objectives for the activity. Just because you are using one of the lessons developed by the agency, do not expect the fees or front booth staff to know this information. Copy and paste descriptions and educational standards from the specific guide into specific paperwork or attachments as needed.

STEP 3: PLAN THE ITINERARY

- **Plan a detailed itinerary.** A sample general itinerary is provided below. More specific itineraries are provided with the specific field trip information.

Itineraries will vary depending on the following factors:

- Distance from the school to the site. Use Google maps to estimate the time needed to travel from your school to the fieldtrip location. Be sure to add in additional time for traffic, bathroom breaks, and getting through fee booths (where applicable).
- What time your school starts and ends.
- Whether you are using school buses or chartered buses. School buses often have to be back sooner.
- The number of students participating in the fieldtrip and where you are going. If the group is large, your itinerary may need to include rotations or break up the field trip into two days. Suggestions for student group size and rotation times are included with each specific agency/location fieldtrip.

Sample Itinerary:

- ◆ 9:00 – 9:15 a.m.: Depart school
- ◆ 10:00 a.m.: Arrive at field trip location
- ◆ 10:00 – 10:15 a.m.: Restrooms (we highly recommend all students go to the bathroom before heading onto the trail)
- ◆ 10:15 – 10:20 a.m.: Introduction
- ◆ 10:20 a.m. – 12:00 p.m.: Trails and activities
- ◆ 12:00 – 12:15 p.m.: Restrooms and load buses
- ◆ 12:15 – Depart
- ◆ 1:00 p.m.: Arrive back at school

STEP 4: DO A SITE VISIT (minimum of 1 week prior)

- **Visit the site ahead of time.** This will significantly increase your comfort level with conducting the fieldtrip. Scope out where the bus(es) will park, bathroom locations, as well as the most direct and/or safest way to get from the bus to the trail. Print out a copy of the fieldtrip activity and accompanying maps and bring them with you. Try a dry run by yourself or with friends or family, taking note of specific stopping points described in the activity.

STEP 5: GATHER SUPPLIES FOR YOUR FIELD TRIP (1 week – 2 days prior)

- **Bring permission slips as needed/required by school or agency** - Make sure you are aware of medical concerns with students.
- **Distribute Field Trip supplies lists for students** – Each student needs to wear comfortable clothes, wear close-toed tennis shoes, bring a backpack, clothing layers/ jacket per season, water bottle, snacks, pen/pencil, medicines.
- **Prepare copies of activity handouts and any supplies for the field trip activity** (e.g. photo print-outs, pens/pencils). Activity supplies are listed at the beginning of the specific fieldtrip.
- **Copy of approved Fee Waiver Form (if needed)** – Print out a copy of your *agency-approved* field trip fee waiver and bring it with you on the bus to show the entrance station. Field trips that will need fee waivers are: Lake Mead National Recreation Area and Red Rock Canyon.
- **Bring fully-charged cell phones** – All adult chaperones on the trip should bring fully charged cell phones in case of an emergency. Emergency phone numbers for each agency are provided on the agency-specific fieldtrip pages. These numbers will get you the fastest response. Not all locations will have a strong cell phone signal and reception is better for some carriers than others depending on the area (e.g. Verizon, AT&T, T-Mobile). Having a variety of phones and carriers will increase the likelihood of cell signal.
- **Consider getting an emergency GPS locator/alert device such as SPOT or a Garmin InReach** – Emergency GPS locators are excellent safety devices to have on hand in case of an emergency when cell phones do not work. There are basic alert devices that do not require a subscription (no fee) and just send an alert and location to 911. Other devices allow texting-style communication with those on a contact list or, in an emergency, with the dispatch to provide details about the emergency. The more sophisticated devices with texting require monthly or limited plans. Outdoor stores are a good place to learn more about these device options. If a school plans to do self-guided fieldtrips to public lands, the school might consider purchasing a device and allowing teachers to check it out.

- **Field trip teacher/chaperone backpack** – Assemble one or more fieldtrip backpacks for teacher(s), group leaders, or chaperones with the following supplies:
 - ◆ **Field trip activity materials for each group leader** (e.g. handouts, data sheets, background information, etc. per the specific field trip activity instructions)
 - ◆ **Large and small trash bags** – Help students practice Leave No Trace principles by bringing both large and small trash bags with you. Small trash bags are helpful to bring on the trail and large trash bags are helpful if you plan to eat lunch on site. Some students really enjoy picking up trash found along the trail. You can give small trash bags (and possibly gloves) to students who get excited about contributing.
 - ◆ **Gloves** - Consider having some gloves for the students who are excited about picking up trash.
 - ◆ **Hand sanitizer**
 - ◆ **Spare water and snacks**
 - ◆ **First aid kit**
 - ◆ **Sunscreen**
 - ◆ **Student emergency medicine** (e.g. epipens, asthma inhalers, insulin, etc.)
 - ◆ **2 Wag bags** - Wag bags are emergency bathroom kits in case someone needs “to go” while out on the trail and cannot make it to a standard bathroom facility. Most outdoor stores sell wag bag kits (they can also be ordered online). These kits include instructions, toilet paper, hand wipe, anti-odor and absorbent materials, and multiple opaque bags to prevent spills or seeing the waste. NOTE: Students should not urinate in the bags, this is for feces.

STEP 6: CONFIRMATIONS (the day before)

- Confirm bus(es), student lunches, permission slips, student checklists, and all above supplies, as needed.

STEP 7: HAVE FUN AND FOLLOW-UP WITH THE AGENCY!

- Celebrate the joy the students experience while being out in nature and on our public lands!
- Follow up with the agency and let them know how the field trip went for you and the students. If you have suggestions about the field trip activity or materials, let the agency know and they will take notes for future revisions.



Conducting a Field Trip to the Spring Mountains Visitor Gateway

All field trips, including self-guided, must be scheduled in advance by contacting the Visitor gateway at 702-872-5486 at least one month ahead of time to make sure the facilities can accommodate the date, time, and number of students. There are no entrance fees at the Visitor Gateway, however fees are associated with the use of picnic tables and the amphitheater (reservations are also required).

CONTACT: Spring Mountains Visitor Gateway at 702-872-5486.

School Field Trips – Using School Buses or Chartered Coaches

The parking lot at the Spring Mountains Visitor Gateway is large and can easily accommodate buses, including parking and turning around.

Campgrounds/Camping Fees Group Campsites

Campground fees are not usually waived as camping is usually considered to be recreation. However, there are circumstances where the camping fees can be waived for educational activities such as symposia or teaching camping skills. On multi-day volunteer events either park entrance or camping is waived but often not both. That is determined on a case-by-case basis.

Maps



Figure 7. Area map of the Spring Mountains National Recreation Area (Image by U.S. Forest Service)



Figure 8. Spring Mountains Visitor Gateway Site Map (Image by U.S. Forest Service).



Field Trip Activity 1 - Nature Detectives

Overview

Using a field guide check list, students will use their observation skills to investigate the landscape adjacent to the Spring Mountains Visitor Gateway and gain independence and confidence in the outdoors. The deliberate nature of the checklist will force students to slow down and see their surroundings in more detail.

Location

Spring Mountain Visitor Gateway

Materials

- Nature Detective Checklist - 1 per student
- Map of trails - 1 per group
- Clipboards/pencils - 1 per student (optional)

Procedure

1. Explain to students that they are going to have some time to investigate the landscape using their observation skills.

Ask students:

- ◆ What does it mean to observe?
- ◆ Is observing and looking different? Why or why not?

Explain that observing is looking for details. Observing can also mean listening or touching in order to better understand what you are observing. Scientists are always observing. They use their observations to learn more, solve a problem, collect data, or understand phenomena. Detectives also use observation when investigating a crime scene. They have to pay very close attention to clues, evidence and details they observe and take careful notes. Today we will work as nature detectives. We will use observation to look for clues, evidence and details in the environment that will help us better understand the landscape and better understand the ecological relationships in the Spring Mountains.

2. Orient students to the exploration area. The trail system adjacent to the Spring Mountains Visitor Gateway offers a good exploration area. Set some boundaries and time limits. Pair or group students with a chaperone. This activity is meant to be student driven. Students should feel confident to explore with some level of independence. Students should make choices about which direction to explore and the pace at which they explore. Chaperones and teachers should set deliberate guidelines for safety and logistics while leaving some decision making up to the students.

3. Distribute materials (checklists, pencils, clipboards, etc.) Remind students that this is not a race. The goal is not to finish the checklist.

On-site Activities – Nature Detectives (educator instructions)

The goal is observation. Students should work to make good observations while exploring this land. Afterwards you will use your observations to learn more about the landscape. Allow at least 20 minutes for exploration.


4. Once students have returned from their exploration. Allow time for them to talk about what they observed with each other freely. Ask an open-ended question: What did our observations teach us about this environment?

Some conversation starters:

- ◆ Would you consider this area's vegetation dense, meaning thick like a forest?
- ◆ Based on your observations, what can you conclude about rainfall?
- ◆ What does the scat tell you? I.e Coyotes mark their territory (area they hunt, sleep, mate) with their scat. Seeing coyote scat along a trail could indicate a coyote following the trail looking for food. You might also observe rabbit (prey for the coyote) scat along the same trail.
- ◆ You observed a lot of evidence of animal life but few animals. What conclusions can you draw about why we see evidence but no animals? Many desert animals are nocturnal, seeking sneaky areas to rest during the hot days and venturing out at night to forage and hunt. Many animals in this area may be bedded down in the day while you are exploring. What other reasons might animals only come out at night?
- ◆ Some of you noticed trees with no leaves alongside trees with lots of leaves. What can you conclude about the differences?
- ◆ Based on your observations of the rocks in the area, do you think these rocks are from this place or were brought here?
- ◆ How do you know? What evidence in the landscape led you to your conclusion?

Can You Find Me?

- Rock - What Color? _____
- Seed Pod - How long is it? _____
- Lizard _____
- Tree without Leaves - Is it dead? _____
- Butterfly - What color? _____
- Flower - Does it smell good? _____
- Grass - Does it have seeds? _____
- Shiny Leaf _____
- Juniper Berry - What Color is it? _____
- Beetle - How big? _____
- Bird - What color? _____
- Pine Needle - How long? _____
- Bee - Did you hear it? _____
- Lichen - What color? _____
- Red Bark _____
- Water _____
- Cave - Who lives there? _____



Nature Detective

Draw an Insect You See

What Animal Sign do you Find?

- Burrows
- Feathers
- Spider Webs
- Ant Hills
- Tracks

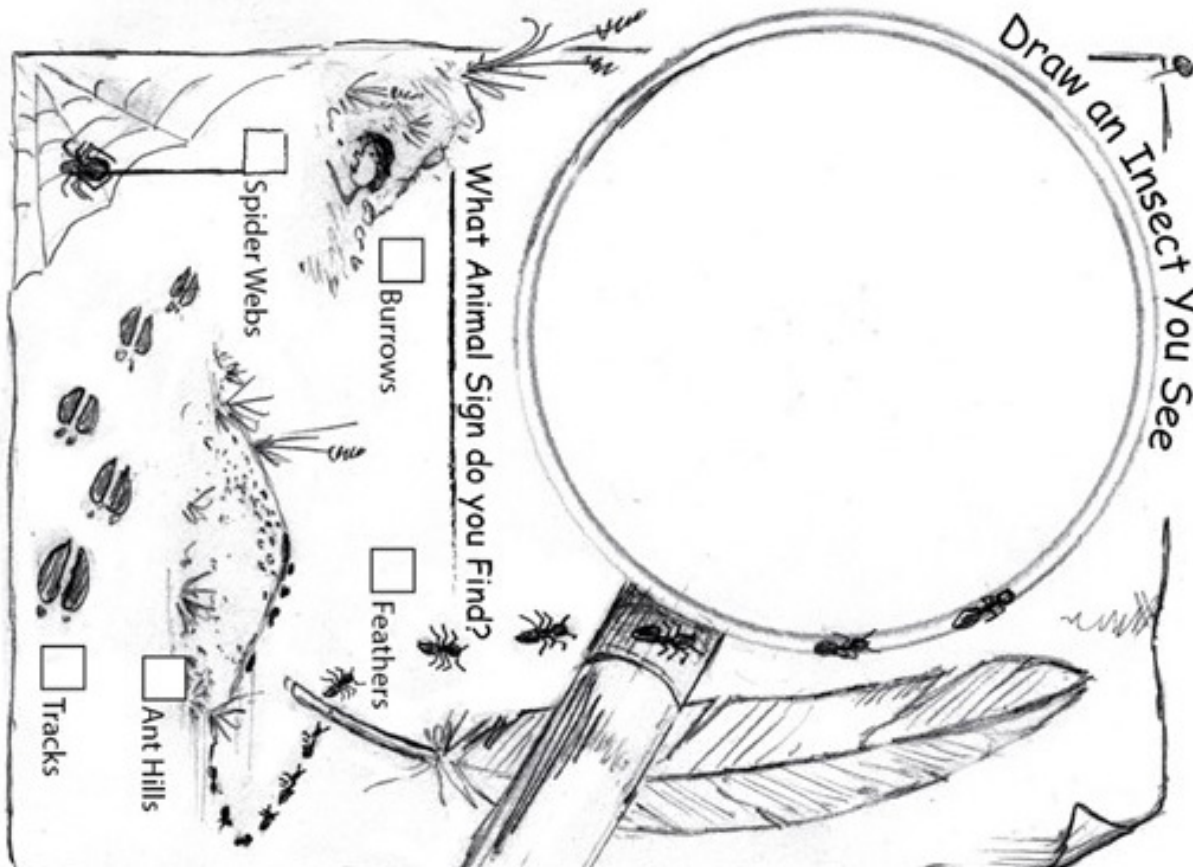


Figure 9. Nature Detective (illustrations by Sharon Schafer).

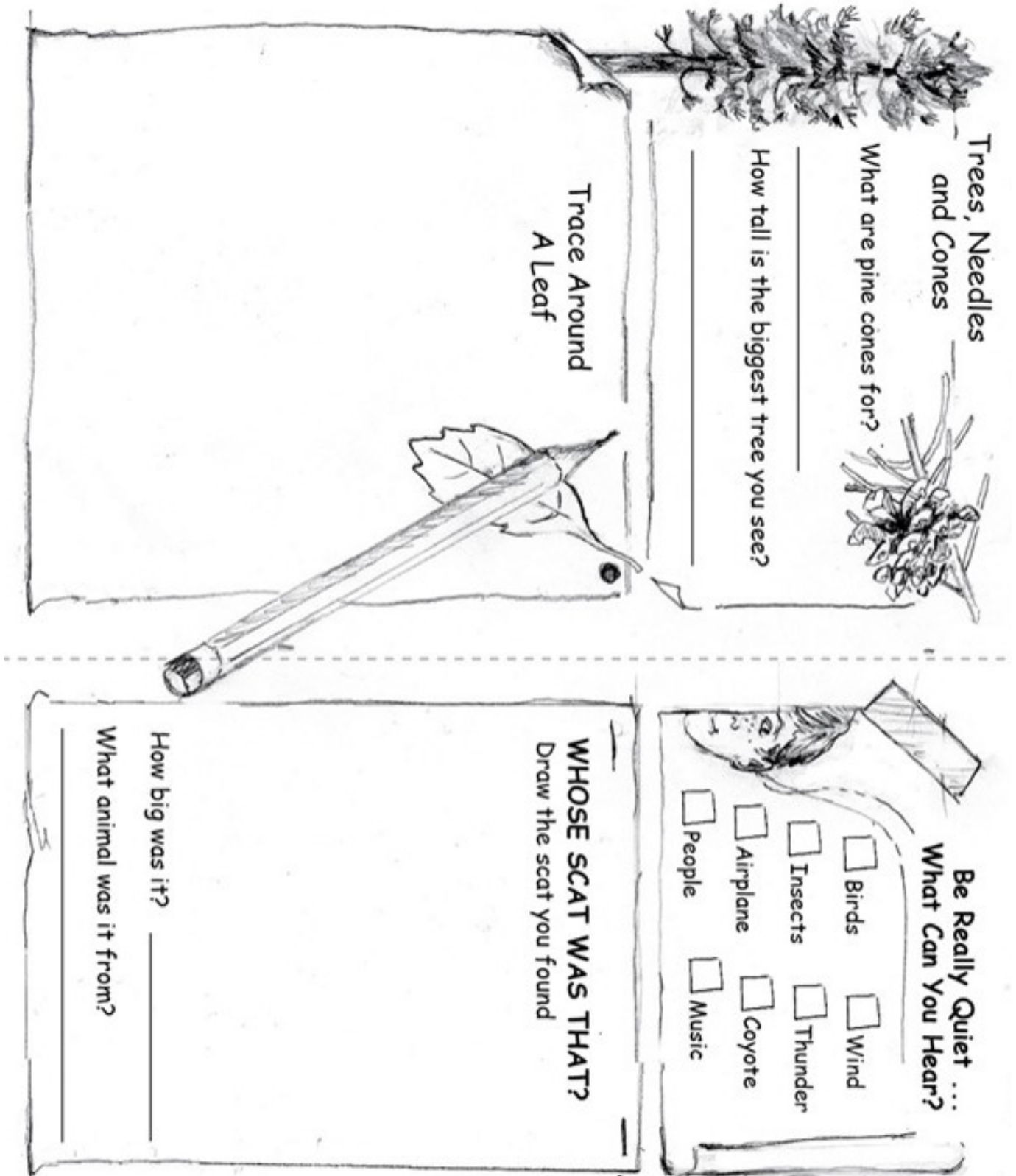
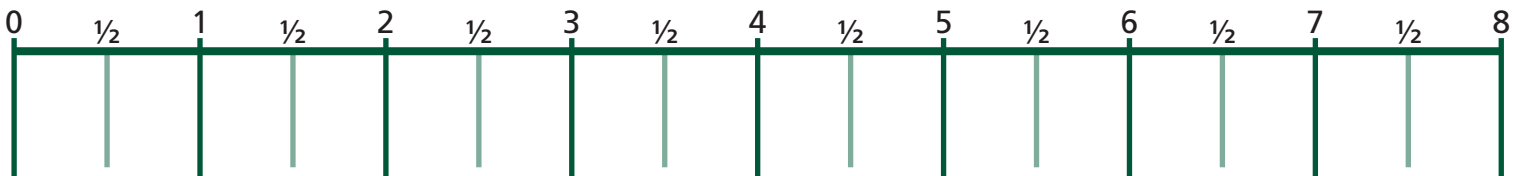


Figure 10. Nature Detective continued (illustrations by Sharon Schafer).





Field Trip Activity 2 - Nature Inspirations

Overview

In this activity, students will spend time using the natural world as a platform to engage with language and poetry. Students will observe the landscape and use guided writing exercises and descriptive language to create works of art.

(Adapted from Project Wet Water Inspirations Activity)

Materials

- Student poetry instructions for cinquain poem - 1 per student (not needed for acrostic poem)
- Paper/notebook - 1 per student
- Pencil - 1 per student
- Clipboard - 1 per student (optional)

Procedure

1. Direct the students to a quiet place near the Spring Mountains Visitor Gateway where they can sit quietly and observe the landscape and their surroundings for a few moments. The large amphitheater near the group use area might be a good location for this activity.
2. Ask students to describe what they observe in the landscape. Ask students to use nouns, adjectives, and verbs, to describe what they see. Choose individual elements of the landscape such as a flower, cave, a tree, etc. to focus on. Ask students to think about the element and describe any feelings, emotions, or thoughts they have when they observe the element. Instruct students to brainstorm a list of adjectives that describe the element.

By using adjectives and language to describe elements in nature, we often reveal emotions and feelings about that element. Ask students to observe if there are any interactions happening in the landscape such as between birds and trees; plants and animals; animals and weather; etc. Ask students to brainstorm verbs that describe the interactions.

3. Explain that you will be taking the students through a guiding writing exercise. Distribute clipboards with paper or notebooks and pencils. Explain that they will first write together and then they will be able to create their own creative writing on a subject of their choice.

Artists and writers have a unique capacity to capture the essence of nature and evoke powerful responses from audiences. These responses can inspire others to adopt behaviors and protect and preserve the natural world. Explain to students that today they will have an opportunity to create works of art that can inspire others.

There are two choices of guided writing: Acrostic Poems or Cinquain Poems. For younger students, Acrostic Poetry is a better choice. For older students who are familiar with language and phonics, the Cinquain Poem can be a good choice.

Student Handout

Acrostic Poem

An acrostic poem begins with a noun in which each letter of the noun is used to begin each line of the poem. Each line should be a word or group of words that reveal something about the noun. Here is an example:

Water

Wet drops fall quietly

Ample and full

Trickling down the edge of a leaf

Eemptying onto the ground

Running between my toes

Choose an element of the landscape in all of the student's line of sight. Begin with a noun with just a few letters, i.e. Sky, Cloud, Leaf.

After students practice with this element together as a class, allow time for them to choose a new subject they observe at the site to write a unique acrostic poem about. Allow plenty of time to share at the site or on the bus back to school.

Student Handout

Cinquain Poem

A cinquain poem is a five-line poem that follows a very deliberate form:

Line 1: A one-word line, a noun which is the subject of your poem

Line 2: Two adjectives that describe the noun above

Line 3: Three action verbs that describe the noun in

Line 4: A phrase that indicates a feeling about Line 1

Line 5: A synonym for Line 1

Choose an element in the landscape to write a cinquain poem about. Begin with a noun which will serve as the subject of the poem. Example: Cave

Using the format above, students can use basic language phonics to create a beautiful poem about a stream.

After students practice with this element together as a class, allow time for them to choose a new subject they observe at the site to write a unique cinquain poem about. Allow plenty of time to share at the site or on the bus back to school.

Sample cinquain poem:

Cave

Dark, quiet

Providing, protecting, holding

Giving shelter

Home

A cinquain poem is a five-line poem that follows a very deliberate form:

Line 1: A one-word line, a noun which is the subject of your poem

Line 2: Two adjectives that describe the noun above

Line 3: Three action verbs that describe the noun in

Line 4: A phrase that indicates a feeling about Line 1

Line 5: A synonym for Line 1

*Take a moment to observe the beauty around you.

Table 1. Cinquain Poem

Line 1	
Line 2	
Line 3	
Line 4	
Line 5	



Section 3 - Classroom Activities

Pre-fieldtrip Classroom Activity

Figure 11. Children learning about bugs (Photo by: Southern Nevada Conservancy).

Home Means Nevada - Life Zones of the Spring Mountains

Overview

The wide range of elevations in Nevada creates an array of habitats and a diverse plant and animal community. This activity prepares students for the dramatic changes in elevation and plant communities at Spring Mountain National Recreation Area.

Soil type, moisture, temperature, and elevation are factors that define the area's life zones. Students will explore the characteristics of the distinct life zones of the Spring Mountains and the species that inhabit them and then work together to put pictures of the life zones in the correct order by elevation with the correct species in each.

Materials

- Map Spring Mountains - teacher master
- Topographic map of Spring Mountains - teacher master
- Life Zone Community Picture Cards - 1 set
- Elevation Labels - 1 set
- Life Zone Animal Cards - 1 set per team

Procedure

1. Students are shown a map of Nevada with the Spring Mountains National Recreation Area boundary marked. They are also shown a topographic map. Explain to the students that the topographic map shows changes in elevation. Elevation is how high the land is above sea level.

Have a conversation with students about elevation:

- ◆ How do you think a place's elevation is related to the plants and animals that live there?
 - ◆ Do you think Las Vegas is at a high elevation or a low elevation? Do you see any evidence outside of a change in elevation?
 - ◆ As you go higher in elevation, what changes would you expect to see in plant and animal life? Why?
 - ◆ Do you think the climate would change in higher elevations?
2. Divide the class into seven teams/groups. Each group will represent one life zone. Distribute one Life Zone Community Picture Card to each team.
 3. Have teams work together to create a description of their life zone. Have them speculate if their life zone is at a high or low elevation.
 - ◆ What do they think the climate is like?
 - ◆ Describe the types of plants in their life zone.
 - ◆ Speculate about what kinds of animals would live in their life zone.
 - ◆ Have each team share their life zone with the class.
 4. Without yet revealing mistakes in their descriptions, have the teams try to put the life zone pictures in elevation order from lowest elevation life zone to the life zone at the highest elevation. Spread the life zones out on a tabletop or on the floor so all the teams can see the order. Have teams examine their results and make any changes to the order that they might now observe.

Discuss:

- ◆ What do you notice about the changes in plant life in each life zone?
- ◆ Help the class with any mistakes until the picture cards are in the correct order. Add Elevation Range Labels to the cards.



Figure 12. Elevation and the Life Zones of Mt. Charleston (Image - Southern Nevada Conservancy)

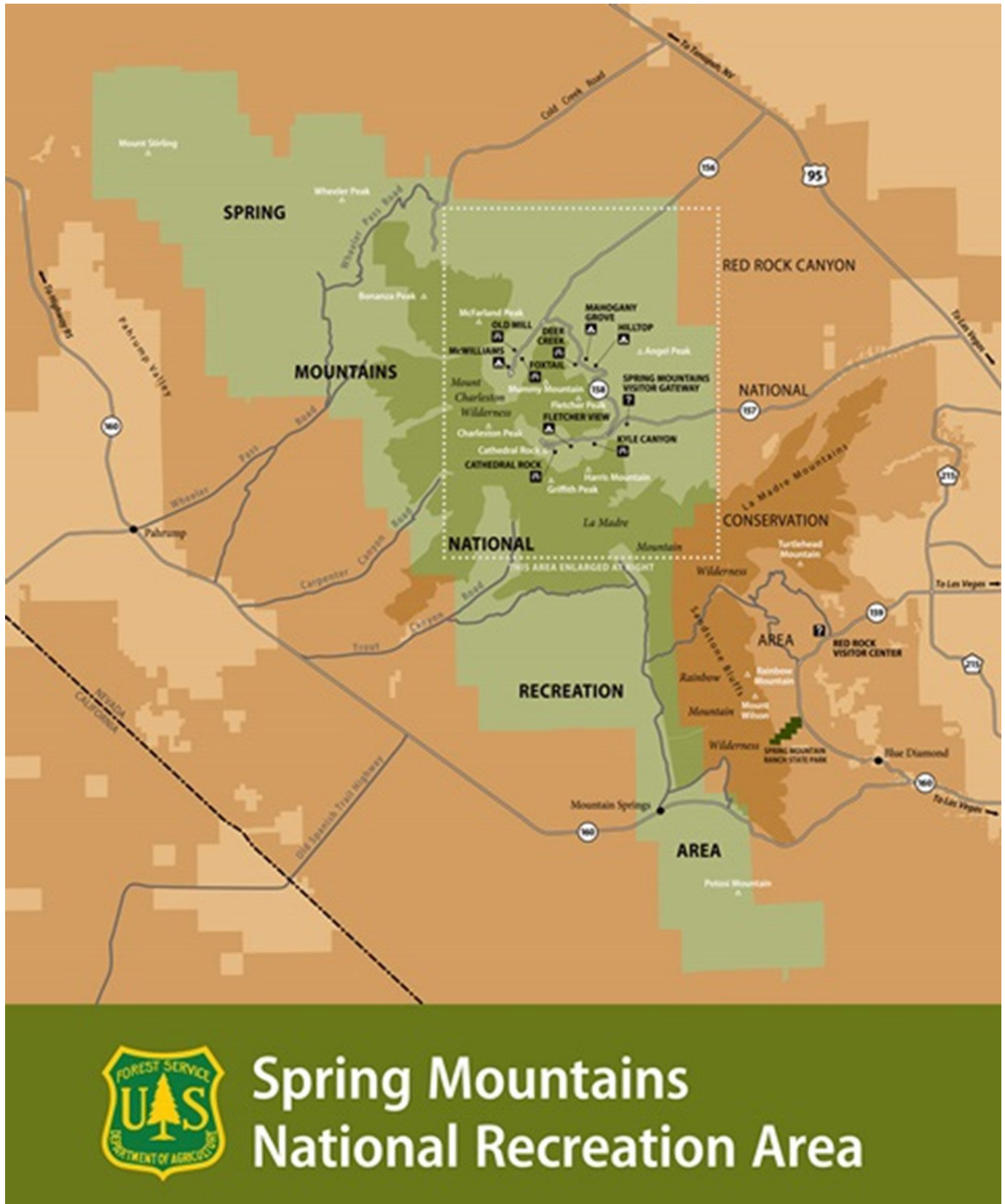


Figure 13. Map of the Spring Mountains Recreation Area (U.S. Forest Service)



Cut Here

Saltbush Community

The hottest, driest of the life zones. Dominated by short desert shrubs that can tolerate very salty soil.



Figure 14. Image - Southern Nevada Conservancy

 Cut Here

Creosote-Bursage Community

Low desert shrubs persist in this life zone where animal life thrives mostly underground in burrows where plant roots and nutrient-rich soil hold the key to their survival.



Figure 15. Image - Southern Nevada Conservancy



Blackbrush-Joshua Tree Community

Although vegetation can seem dried up in this zone, the blackbrush and yucca plants are thriving with life. The landscape is dotted with the iconic Joshua Tree. This zone also creates perfect habitat for invasive grasses.



Figure 16. Image - Southern Nevada Conservancy

 Cut Here

Pinyon-Juniper Community

Dominated by the Pinyon Pine, rich in an essential food source for animals and humans alike, the pine nut. Also present in high populations are the fragrant sage and juniper.



Figure 17. Image - Southern Nevada Conservancy



Mixed Conifer Community

This zone is characterized as a dense, thick forest of pine, fir and aspen trees. It is the most diverse life zone in the Spring Mountains with the widest variety of species. It's cool, moist and shady habitat is also inviting to humans so hosts campgrounds, picnic areas and even homes and businesses.



Figure 18. Image - Southern Nevada Conservancy

 Cut Here

Alpine Community

This zone is characterized as a dense, thick forest of pine, fir and aspen trees. It is the most diverse life zone in the Spring Mountains with the widest variety of species. It's cool, moist and shady habitat is also inviting to humans so hosts campgrounds, picnic areas and even homes and businesses.



Figure 19. Image - Southern Nevada Conservancy



Coyote



Figure 20. Image courtesy of birdandhike.com

- Mammal, omnivore
- Prefers brush-covered hillsides and flatlands but are found from low desert valleys to the alpine ridge
- Typically grazes berries, especially manzanita, and hunts small mammals
- As an unprotected species in Nevada, humans are their biggest threat

Red-Tailed Hawk



Figure 21. Image courtesy of birdandhike.com

- Bird, carnivore
- Prefers open desert and sagebrush grasslands or riparian areas. Also found in pinyon-juniper woodlands with plenty of perching opportunities for hunting
- Hunts small mammals, reptiles and occasionally birds

 Cut Here

Western Tanager



Figure 22. Image courtesy of birdandhike.com

- Bird, omnivore
- Prefers in open conifer or mixed forests of spruce, fir, pine and aspen trees
- Forages in the treetops for insects or eats berries, especially mulberries and elderberries and flower nectar

Mojave Green Rattlesnake



Figure 23. Image courtesy of birdandhike.com

- Reptile, carnivore, venomous
- Prefers desert flatland with sparse vegetation including creosote bush, cacti, mesquite, and Joshua tree woodlands.
- Hunts primarily small mammals and reptiles.
- Threats include birds, snakes and large carnivores such as coyotes



Cut Here

Kangaroo Rat



Figure 24. Image courtesy of birdandhike.com

- Mammal, herbivore
- Adapted to the desert, drinks little to no water and stays underground during hot days
- Eats seeds from grasses and mesquite beans
- Hunted by most desert predators

Gopher Snake



Figure 25. Image courtesy of birdandhike.com

- Reptile, carnivore
- Eats mostly small rodents but also hunts rabbits, lizards, and birds. Forages in mammal burrows and in ground shrubs Lives in nears all Mojave habitat up to 7,000 feet but typically avoids dense forest
- Predated by foxes, hawks, coyote, and other snakes

 Cut Here

Pinyon Jay



Figure 26. Image courtesy of birdandhike.com

- Bird
- Prefers pinyon-juniper, pine, and pine-oak forests
- Primary diet is pinyon pine nuts. They eat, store, and spread pine seeds throughout the forest
- Biggest threat is the loss of Pinyon Pine trees

Mule Deer



Figure 27. Image courtesy of birdandhike.com

- Large mammal, herbivore
- Prefers arid, rocky environments with diverse and expensive plants and shrubs
- Browses for trees buds, flowers, fruits, leaves, coniferous boughs, and lichens on trees.
- Hunted by mountain lions, and coyote



Western Fence Lizard



Figure 28. Image courtesy of birdandhike.com

- Reptile, carnivore
- prefers high elevations.
Avoids low desert
- Feeds on mostly insects and spiders
- Predators include snakes, coyote, bobcats and hawks

Western Skink



Figure 29. Image courtesy of birdandhike.com

- Reptile, carnivore
- Prefers higher elevations, alpine meadows and grasslands, woodlands and riparian areas
- Feeds in leaf litter and dense vegetation on insects and worms
- Predators include snakes, foxes and birds of prey



Mountain Lion



Figure 30. Image courtesy of birdandhike.com

- Mammal, carnivorous but eats a fair amount of grass likely to aid in digestion
- Occurs from low desert to high mountain elevations. Prefers dense cover or rocky, rugged terrain usually associated with pinyon, juniper, and mahogany trees
- Hunts small mammals and deer and sheep when plentiful. Also will eat house cats in lower elevations
- In the Spring mountains, predators in other lions and humans

Scott's Oriole



Figure 31. Image courtesy of birdandhike.com

- Bird
- Inhabit arid foothills and mountains down to deserts, preferring slopes with abundant yucca, agave, pinyon pine, juniper, and live oak.
- Eat mostly insects, fruit, and nectar from plants such as the yucca



Cut Here

Palmer's Chipmunk



Figure 32. Image courtesy of P. Garrett

- Mammal, omnivore
- Found only in the Spring Mountains in coniferous forests that contain juniper-piñon pine, fir-pine, and bristlecone pine.
- Eat seeds, fruits, various plants, fungus, and invertebrates such as worms, snails and insect larvae

Townsend Big-eared Bat



Figure 33. Image courtesy of birdandhike.com

- Mammal, Omnivore
- Habitat is almost always near caves or other roosting areas. Prefer pine forests and arid desert scrub habitats.
- Diet includes moths and other insects such as beetles, flies and wasps

 Cut Here

Mount Charleston Blue Butterfly



Figure 34. Image courtesy of Dr. Thompson, UNLV

- Insect
- Requires open habitat that supports its larval host plants, which grow between 8,200 to 11,500 feet in the Spring Mountains.
- Threats include habitat loss due to fire management

Grey Fox



Figure 35. Image courtesy of birdandhike.com

- Mammal, omnivore
- Deciduous forests interspersed with brushy, woodland areas near water.
- Eats rabbits, mice, rats, nuts, and grains, fruit, grasshoppers, beetles, butterflies, and moths
- Coyotes, bobcats, eagles, and owls are among its predators



Cut Here

Spring Snail



Figure 36. Image courtesy of birdandhike.com

- Mollusk, considered an endemic species of concern
- Exists in springs and creeks
- Eats algae and detritus (waste or debris)
- Biggest threat is drying springs

Nevada Admiral



Figure 37. Image courtesy of birdandhike.com

- Insect, butterfly (endemic)
- Prefers riparian areas, bristlecone pine stands, mixed-conifer forests, and pinyon-juniper communities between 4,900 and 9,200 feet

Pre-Field Trip Classroom Activity



Survivor

Overview

The natural world is filled with plants and animals, many of which have unique interactions and relationships in their environments. Some relationships involve shelter, food, self-preservation, and other interactions. One consistent interaction in every life zone is that of a predator and its prey.

In this activity, students explore the relationship of predator and prey as they make choices about the best adaptations which will give them the outcome they desire: Survival! This activity is a simulation game played in teams. The goal is to choose adaptations you think will outlast or outwit your opponent.

Materials

- Fox and Chipmunk story - teacher master
- Playing Cards - 1 deck per group
- Scoring card - 1 per group

Procedure

1. Share story of Chipmunk and Grey Fox.
2. Discuss the story. Speculate about why Chipmunk survived. What adaptations did each animal use?
3. For this activity, students should be in teams of three. Explain that they are going to play a game called Survivor. As the name suggests, the object of this game is to survive. While playing the game, players will assume the ecological roles of predators and prey. One player will be a predator. One player will be prey. Each team will also have a score keeper/referee. Teams can play several rounds, switching roles in each round so every player has an opportunity to play each role.
4. Remind students that animals have particular adaptations to help them survive. Survival may mean finding and catching your food, but it also may mean staying safe from a hungry carnivore. Have teams decide who will play which role in the first round. Explain that the predator and the prey will soon battle to see who the survivor is.
5. Distribute playing cards. Explain that each set of cards contains prey adaptation cards and predator adaptation cards. Students should distribute the correct cards to the players. Players should privately look through their deck and select up to three cards they believe to be the best combination of adaptations for their role. These cards should be kept out. The remaining cards can be set aside.

6. Explain that the scorekeeper will receive a scoring card which indicates which adaptations beat which adaptations. The goal is for all of the prey animal's adaptations to beat all of the predator's adaptations. If this occurs, the prey animal survives. If even one predator adaptation beats a prey animal selection(s), the predator defeats the prey and earns a point. The scorekeeper must keep the scoring card hidden from the players, so they do not see what beats what.

Repeat the game, switching roles.



Figure 38. Grey Fox (illustration by Sharon Schafer).

Survivor (educator instructions)

Chipmunk and Grey Fox

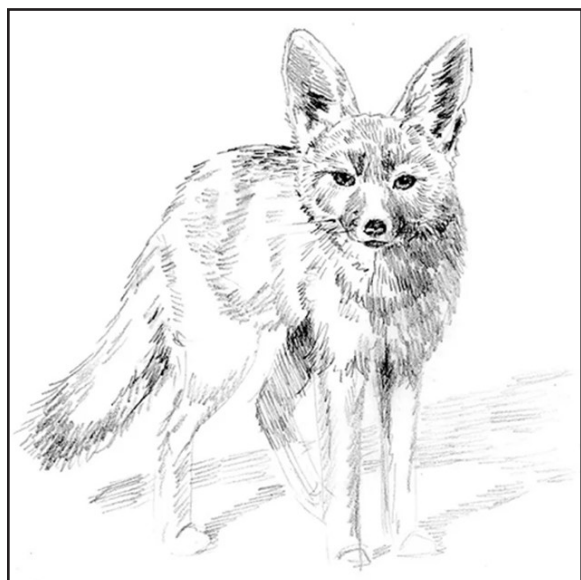


Figure 39. Grey Fox illustration (illustration by Sharon Schafer)

earth and pungent evergreen is overwhelming but a hint of something else is also present.

Nearby, a small critter is preparing to bed down in a shallow burrow having busied herself all day munching on the seeds of the looming ponderosa above her and collecting berries. The Palmer's Chipmunk is petite, measuring only nine inches long with its long bushy tail. Two kits await their mother's return in the burrow nearby. As she makes her final preparations for the night, Chipmunk senses something just above her on the low branch of a mahogany.

Grey Fox has spotted the undeniable scent of Palmer's Chipmunk. It's tawny fur with distinct black and white stripes on its back make it easy to spot with Fox's amazing crepuscular eyesight. As the only small dog with semi-retractable claws, he is cat-like in his ascent up the tree just above Chipmunk. He is salivating knowing the

Somewhere is the conifer woodland forest of the Spring Mountains the faint call of a Mountain Bluebird can be heard in the distance. It is dusk, late Spring. The bluebird hunts for insects to bring back to the fledgling young nesting high in a Ponderosa Pine. But lower on the forest floor another resident is emerging from a long daytime nap. Grey Fox slinks out of a shallow den dug in the soft dirt near a small outcropping of shrubs and rocks, hungry for a snack. Grey Fox wanders the forest floor spreading his scent and trying to pick up the trail of a critter to devour. As the vegetation around Grey Fox thickens, his sense of hearing and smell are heightened.

He is a small dog, only the size and weight of a newborn baby, but his senses are keen with large eyes and long ears and nose. The smell of moist



Figure 40. Chipmunk illustration (illustration by Sharon Schafer)

few insects eaten earlier in the morning would not sustain Fox through this cold night. He readies himself to pounce.

Sensing danger, Chipmunk quickly darts into a miniscule hole in a rocky crevice. Tunneling as far as the rock wall will allow, Chipmunk waits as Fox sniffs the hole. A stand-off ensues.

Soon Grey Fox tires of waiting and turns to leave the tasty critter. Grey Fox slinks away, hungry and defeated, in search of his next pursuit.

Meanwhile, Chipmunk continues to bed down in the rocky tunnels. She grows tired and begins to sleep hoping her kits are safe in their earthy burrow only a few feet away. In the morning she will journey to the lowlands to forage pinyon seeds and juniper berries for her kits.

Scorekeeper: Use this table to award a winner in the card match up. For example: If your prey shows the Can Dig card and the predator also shows the Can Dig card, the Predator wins but if the predator does not have a defense that will beat can dig, the prey survives.

Print or copy this page and the next page as two-sided so the words "Predator Adaptations" are on the back of the cards on page 50 when cut out.



Cut Here

Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations
Predator Adaptations	Predator Adaptations





Cut Here

Hunts in Groups	Can Run
Can Trip Prey	Can Surprise at Close Range
Can Climb	Can Dig
Can Trip Prey	Can Jump
Uses Quiet Locomotion	Can Camouflage
Has Sharp Claws	Hunts Alone
Bites Neck to Kill	Can Smash a Shell
Keen Sense of Smell	Keen Eyesight
Lacks Sense of Taste	Keen Hearing
Can Resist Chemical Spray	Uses Traps or Webs

Print or copy this page and the next page as two-sided so the words "Prey Defenses" are on the back of the cards on page 52 when cut out.



Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses
Prey Defenses	Prey Defenses





Can Dig	Can Run
Can Jump	Can Climb
Keen Sense of Smell	Keen Sight
Has Slippery Skin	Keen Hearing
Builds Shelters (Holes)	Has a Smell
Has Sharp Teeth	Has Antlers or Horns
Lives in Groups	Has Claws
Tastes Bad	Can Camouflage
Has Chemical Spray	Has Scary Visual Display
Uses Group Defense	Can Sting

Table 2. Predator Prey Adaptations

Prey Defense	Predator Adaptations that Beat Prey Defenses
Can Run	Can run Hunts in groups Can surprise at close range Can trip prey
Can Dig	Can dig
Can Climb	Can climb
Can Jump	Can jump Can trip prey Can surprise at close range
Keen Sight	Can camouflage Keen sight Can surprise at close range
Keen Sense of Smell	Uses traps or webs
Keen Hearing	Uses traps or webs Uses quiet locomotion Hunts alone Can surprise at close range
Has Slippery Skin	Has sharp claws
Has a Shell	Can smash a shell
Builds Shelters (holes)	Can surprise at close range Can dig
Has Antlers or Horns	Bites neck to kill Hunts in groups Can trip prey
Has Sharp Teeth	Bites neck to kill Has sharp claws
Has Claws	Bites neck to kill Hunts in groups Can trip prey
Lives in Groups	Can surprise at close range Hunts in groups
Can Camouflage	Keen sight Keen sense of smell Keen hearing
Tastes Bad	Lacks sense of taste
Has Frightening Visual Displays	Uses traps or webs
Has Chemical Spray	Can resist chemical spray
Can Sting	Can remove stinger
Uses Group Defense	Can surprise at close range Hunts in groups

Pre-Field Trip Classroom Activity



Creature Creations

Overview

This activity allows students to be creative as they investigate how an animal's features, traits and behavior directly relates to their habitat. These characteristics of an animal are called adaptations and they help an animal survive and thrive.

In this activity, students are given descriptions of fictitious animals and are challenged to draw pictures or create models of the animal and its habitat based on a description of its adaptations and habitat preferences. While the animals will be fictitious, the habitat conditions will match a life zone or micro-habitat of the Spring Mountains. This activity allows students to further investigate life zones while also creating empathy for how animals survive in wild places.

Materials

- Creature Creation Cards (1 card per student)
- Paper
- Arts and craft supplies

Procedure

1. Review the Spring Mountain life zones. Remind students that the life zones are determined by things like climate and vegetation. Animals are adapted to live in different life zones based on their ability to meet basic needs. Additionally, animals have both physiological and physical characteristics called adaptations which help them survive in the place they inhabit. Consider the story of the elusive and endangered Mount Charleston blue butterfly whose short life is lived only in the Spring Mountains at elevations higher than 8,200 feet. It's extreme habitat sensitivity anchors it to this area. Like most butterfly species, the blue butterfly is dependent on specific host plants during its larva stage and distinct nectar plants as an adult butterfly. As a sky island, Mount Charleston has encumbered both the vegetation and animals from easily migrating to other areas where populations might have success.
2. Explain that biologists and ecologists understand that animals and the habitats in which they live can be fragile systems. Small disturbances in ecosystems can have big effects on the plants and animals, but also the people that value those places.

The introduction of non-native grasses such as, Russian Thistle and Cheatgrass are having a devastating effect on endemic species like the Mount Charleston Blue Butterfly. These invasive grasses take up limited soil space and crowd out the butterflies' host plants and nectar producing species. Invasive grasses are transplanted

in the Spring Mountains and around the Valley in shoe tread, in pet droppings or even with the wind. Understanding relationships between animals and their habitats can help scientists safeguard habitat conditions to ensure plants and animals can continue to thrive.

This can be very important to people living near natural environments. Many of our needs are also met in these wild places. Things like fresh clean water and air come from the natural world and are connected to larger life systems that include animals and their habitats. Healthy plants and animals can be an indication of healthy water systems and clean air.

3. Explain that understanding the traits and adaptations of animals can tell you a lot about where they live. If you are told that an animal has gills, you would suppose the animals lived in water at least some of the time. If I told you an animal was green, you might imagine the animal lived in a habitat with a lot of green vegetation. If you know an animal burrows underground for safety, you would suppose the animal has sharp claws for digging.
4. Introduce the activity: You have a mission: Suppose there is a scientist, working in a remote location, away from civilization, who discovered a sky island habitat, like the Spring Mountains, in which the animals were endemic and had never been seen by humans. This scientist needs your help introducing these animals to the world. The scientist can get a description to you, but due to the remote location, cannot send images or video. It will be your job to use the scientist's limited description to illustrate both the animal and its habitat.
5. Distribute Creature Cards. Reiterate that the animals have never been seen by humans. It is your job to illustrate the animal based on it's description. Have students discuss their animal descriptions with their classmates before starting to sketch/draw. They should team up with students who do not have the same animal as them to discuss their ideas. Have them consider what each quality might mean for the animal's physical appearance, as well as habitat characteristics.
6. Allow plenty of time for sketching and drawing. Teachers may choose to have students create their animal using found materials, playdough, or other arts and crafts materials. You also may choose multimedia and graphic programs to create animals and habitats depending on the amount of time and resources you have available.

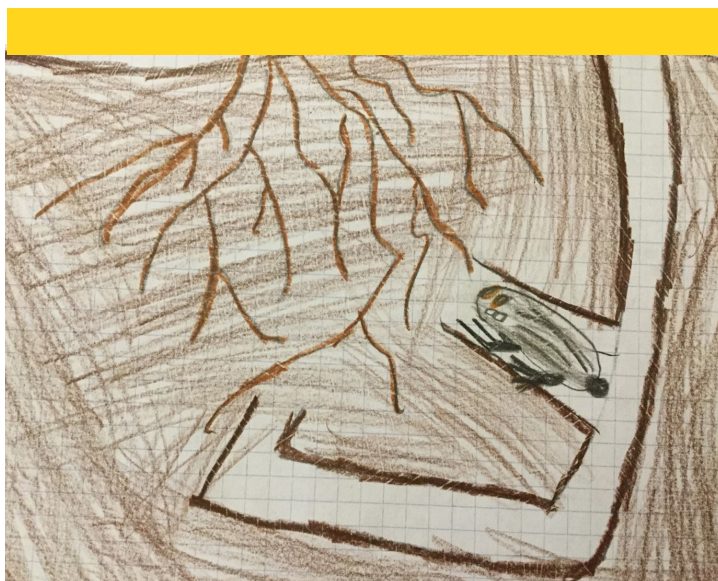


Figure 41. Creature Creation Example (Photo by: Southern Nevada Conservancy).



Cut Here

Wooble

- Spends days underwater and nights on land
- Wormlike body with sharp horns
- Eats insects
- Able to change color to blend in

Meek-Meek

- Lives underground, prefers soil moist most of the time
- Eats roots of conifers
- Has long claws for digging
- Has soft fur

Green-Eared Tootle

- Good at climbing
- Eats twigs and foliage from evergreens
- Absorbs water through its skin with highly specialized gills
- Has extra-large eyes for night-vision

Prancing Devil Bug

- Prefers shady vegetation for habitat
- Collects water using adapted head armor
- Eats exclusively dragon and damselflies
- 6 legs, 4 antennae, specialized tongue



Wink

- Inhabitants underground beneath desert shrubs
- Munches on berries from desert bushes
- Sucks water from dew on leaves using specialize mouthpiece
- Has been seen drinking its urine

Shiverbote

- Small furry mammal; with scaly head armor
- Prefers cold temperatures
- Eats foliage of bristlecone pine trees
- Burrows for safety and warmth

Cowella

- Prefers treetops high above the ground
- Eats mice and squirrels
- Is as big as a housecat
- Scaly skin, winged

Post-fieldtrip Classroom Activity



Voice of the Mountains

Overview

Hearing other people’s points of view or perspectives about the natural world can be a powerful way for students to practice empathy.

This activity will require students to step away from their own life experiences and explore someone else’s perspective about the place they recently visited.

Students will read excerpts written by residents, visitors, and users of the Spring Mountains, each with a different, distinct viewpoint. This activity reveals the difficult and complicated role of land managers when creating a place that keeps the stakeholder’s perspectives in balance.

Materials

- Voices of the Mountain Student Pages - 1 Voice per student.
- Voices of the Mountain Reflections Student Page - 1 per student

Procedure

1. Begin a brainstorm with a prompt:

- ◆ What do you think is the most fun thing to do in the Spring Mountains?

Allow student answers to begin a list of ways people use the Spring Mountains National Recreation Area. Students will likely think of things such as: hiking, camping, wildlife viewing, skiing, playing in the snow. They will be less likely to think of ways people use the Mountains like: people live in the Spring Mountains; people work there as rangers, firefighters, and ecologists; people use the mountains as their research laboratory; teachers take students to the Mountains to learn about the natural world; for some people, the mountains are a sacred place and they use the mountains for ceremonial purposes, etc.

2. Explain that in this activity, students will receive a short story from a real person who spends time in the Spring Mountains. The stories communicate the person’s point of view about the Mountains. These are the “Voices” of the Spring Mountains. After reading their story, students will reflect about the person’s perspective about the Mountains.
3. Distribute “Voices of the Mountains” student pages, one per student. Allow time for the students to read through both the biographical information about their user and also their user’s story.
4. Distribute Voices of the Mountain Reflection Pages, one per student. Allow time for them to complete the Reflection Page.

Questions will include:

- ◆ Who was the author of your story?
 - ◆ What is their relationship with the Spring Mountains? (How do they use the Mountains? What are their experiences in the Mountains?)
 - ◆ Why do you think your user loves the Spring Mountains or thinks they are an important place?
 - ◆ How do you know? (What are some of the clues in their story that led you to this conclusion?)
 - ◆ Do you agree?
5. Pair students with different user stories. Allow time for them to share their user's story in their own words with their partner. Students should use what they wrote on their reflection page to help them describe their user's point of view or perspective.
 6. If time permits, ask if anyone would like to share their user's perspective with the class.

EXTENSIONS

Have students write their own story about their relationship with the Spring Mountains. Their story should not be a recap of their field trip, but rather how they felt while they were there, what emotions they had, why they liked being there, why they think it is an important place? Sharing these stories may reveal a number of different points of view just in your classroom.

Have a discussion about points of view. Explain that land managers have a difficult task. They must manage the land to protect and preserve the resource (the plants and animals that inhabit the place) but they also have to manage the land for all the different kinds of users. For some people, the recreation opportunities are very important, but for other people, keeping the land pristine is important.

Decisions land managers make might be in direct conflict with one user group's feelings about the place.

For example: One user wants to open a Ski Resort in the Spring Mountains. They think the Resort will be a great retreat for people living in the hot Las Vegas city. The Resort project would create jobs and revenue. The Resort would be a good incentive for both residents and tourists to visit the Spring Mountains.

Another user group is very against the Resort. They live in the Spring Mountains and think the Resort would cause a lot of traffic, pollution, crowded trails and trash. Encouraging people to come to the mountains in the Winter might also cause a lot of accidents on snowy roads. They propose that the Ski Resort idea is turned down.

Still another group is concerned that the Resort would take up critical habitat for the endemic Palmer's Chipmunk that lives only in the Spring Mountains. The Chipmunk depends on the plants and animals in the altitude needed for a Ski Resort to be successful.

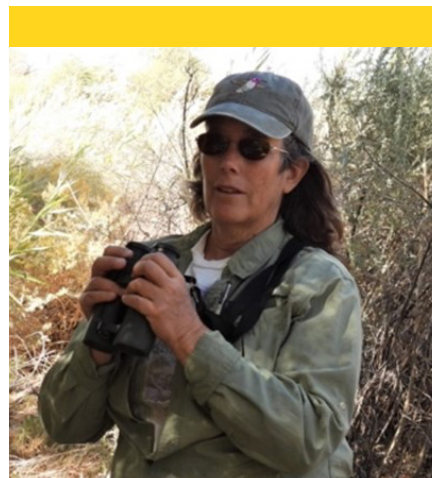
They propose that the Ski Resort Project be cut in half so less land is compromised and more habitat is preserved.

Ask students to discuss what management decisions they would make if they were land managers in the Spring Mountains. How can they make each group feel satisfied? What are the benefits and consequences to each user group's proposal? What compromises can be made? Which group is more important?

Voices of the Mountain (user card #1)

Jeanne Tinsman

Jeanne works for a Las Vegas nonprofit called, Get Outdoors Nevada. The mission of this organization is to connect people to the out-of-doors. Jeanne believes respect and knowledge are the keys to protecting our natural world.



The lure of the Spring Mountains is ever-present. They are always visible as we go about our daily lives in the Las Vegas area, providing a serene backdrop to the busy world below. As I make my way up, it is fascinating to see the different life zones; the vegetation changes, the types of birds living in these habitats is diverse. The goal is the Ponderosa forests, filled with tall pines and all the life within.

One of my favorite places to visit on a quiet summer morning is Deer Creek. There is water there, not a common thing. Catching the ethereal sound of a distant Hermit Thrush calms the soul, and watching Chipping Sparrows feeding their chicks and know this protected place will be home to sparrows and vireos and tanagers forever sets the world right in my brain. July brings migrant Rufous Hummingbirds to join the local breeders, Broad-tailed Hummingbirds, at a high-elevation patch of thistles in bloom. I delight in the buzz of wings, and seeing these tiny bits of life. All of them, the trees, the wildflowers, the butterflies, the birds ~ they are my neighbors.

Voices of the Mountain (user card #2)

Daniel Thompson

Daniel is a professor at the University of Nevada Las Vegas. He enjoys helping students learn about the natural world and conducts research on a variety of species endemic to southern Nevada.



Standing in a sea of desert, towering more than 12,000 feet above Death Valley, the Spring Mountains provide a portal into deep time and the forces that shape the earth and life itself—ancient seabeds, containing fossils of early marine life, now the roof of the world, that support thick and twisted 1,000 year old bristlecone pine trees.

In studying the life cycle and habitat of the Mount Charleston blue butterfly, it has become evident that the cool temperatures produced by shade from encroaching bristlecone pine trees prevent female butterflies and their caterpillars from using the alpine plants that grow on mountain ridges. The bristlecone pine trees themselves emerge from seeds stored by Clark's Nutcrackers, seed-eating birds that hide tens of thousands of pine seeds at locations along open ridges, continually returning to their hiding places.

Thus, the shade from a tree that currently limits habitat of the Mount Charleston blue butterfly, is the result of a bird's inaction centuries or millennia in the past when it did not return to dig up a pine seed cache. The pine that grew from the bird's cache will indirectly limit butterflies until, perhaps, wildfire returns the area to open butterfly habitat. Seeing evidence of natural world interconnections such as these, that reveal events and time scales is challenging to fathom, but I am continually inspired to explore and study the Spring Mountains, in all seasons.

Voices of the Mountain (user card #3)

Ryan Hewitt

Ryan is an avid mountain biker and outdoor enthusiast.

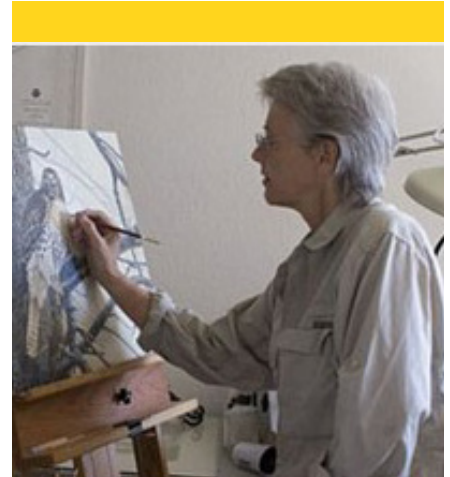


What makes the Spring Mountains special to me as a mountain biker, is the close proximity to where I live. In under an hour from my house I can have my mountain bike unloaded and be riding. Some of the most fun trails anywhere in the Las Vegas area are in the Spring Mountains. The area makes me feel free from all the hustle and bustle of the city. When I'm riding there it's just me, my bike, and the mountains. My second mountain bike race in the Las Vegas area was in the Spring Mountains. There are other trails / areas to ride around Las Vegas, but the Spring Mountains are unique in that it's so very different with the views, smells, and sounds.

Voices of the Mountain (user card #4)

Sharon Schafer

Sharon is a biologist, artist, and photographer whose skills have taken her around the world. She spends as much time as she can exploring and recording the beauty and diversity of the life and landscapes of the remarkable desert Southwest.



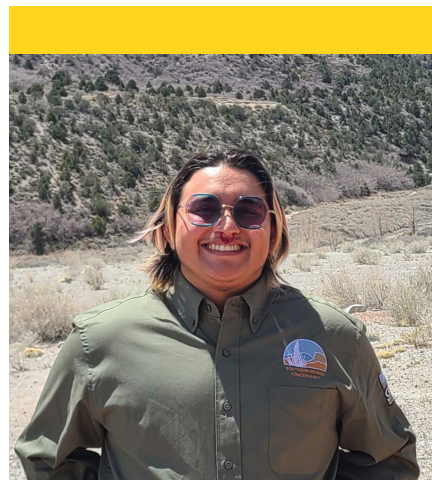
While hiking in a steep canyon at midday, I was startled as to hear a sudden loud clattering of hard hooves pounding against red stone and dry earth. I had surprised a small group of young bighorn rams resting in the deep shade of the overhanging rocks. The frightened rams vaulted effortlessly up the rocky cliffs. They jumped seven feet across a gap in the boulders only to land on tiny inch-wide small ledges of rock and bound upward again continuing their swift escape.

Now at ridge top, feeling safe at last, they paused and turned to look back at me. Their dark eyes met mine and within this wild animal I saw an intelligent life, a member of a different civilization that was smart enough to know the secrets of the dry rocky desert and find home there. The ram's survival is dependent upon knowing where to go to find shelter, water, food and family and safety. I too have the very same needs; shelter, water, food and family, but I am not skilled or smart enough to live in the desert for long without a house, grocery store and running water. The rams and I are not so different in our needs and wants. We both want to live our lives safely and comfortably, without interference or fear.

Voices of the Mountain (user card #5)

Ashton Melendez

Ashton is the Volunteer Coordinator for the Southern Nevada Conservancy.



The Spring Mountains are super unique. They allow me to sit and enjoy the cool, fresh air. I can't hear the business of traffic or music, sirens, or other city sounds. Instead, I hear the wind, the birds, the lizards running over rocks, and horses whipping their tails. There aren't a lot of other places that I've been to that give me the chance to enjoy it in that way so close to home.

More often, I feel calm and happy. Especially when I'm watching the clouds move around in the sky, even if I'm hiking and feeling tired physically, I can stop and look at the sky and let myself enjoy the happiness of being able to move around and see the clouds change throughout the day. It also excites me that there is so much I haven't even been able to explore yet on the Spring Mountains, so every day, I get to learn or see something new!

My son loves rocks. An experience I enjoyed was watching my young son play with rocks and twigs while we were in Lee Meadows. He even picked up a flower and smelled it! Although I had to stop him from eating the flower, I think he also enjoyed it. Whenever we are on the mountain together, he loves to be outside and touch all the rocks he sees.

My relationship with the mountain is still new, as well. I haven't worked on the mountain for very long, so I still feel like there's something new or some surprise to enjoy when I take the time to ask questions or just explore! I've missed the forested areas where I grew up and the ability to escape the city without driving far. I was surprised to find how much public land is accessible from Las Vegas. Plus, it snows! I can't deny that being in a desert with a place to go skiing and sledding is awesome!

I think my experience, as well as anyone else's, is unique to each of us. I know I have my own life and worries, and the mountain allows me to think clearly. It can also represent something different for others who visit. It's great learning about the experiences of locals and visitors on the mountain, including their love for the place, because it adds to my unique enjoyment of discovering these stories and connecting with others.

Voices of the Mountain (user card #6)

Katy Gulley

Katy is the Supervisory Program Specialist
Natural Resources.



The Spring Mountains hosts rare plant and animal species that are found nowhere else in the world. They evolved here slowly over time from their relatives in other mountain ranges and are completely unique to the mountains here. This place is also a refuge for birds traveling south for the winter and a mating ground for them to produce their young. The diversity and rarity of some of the species here in the mountain, just outside of a vast desert, is really impressive and found in few other locations in the US.

It is truly a breath of fresh air to be on Mount Charleston, the juxtaposition for the bustling city and the peaceful mountain always leaves my heart full. It's not only a truly special place scientifically but physically feels like a peaceful and inviting place to decompress and take in all of the beauty and variety mother nature has to offer.

Getting to teach and share with others about the species of the Spring Mountains is one of my favorite things. Teaching others how to ID rare butterflies and find endangered species and their habitat so they can facilitate recovery is so rewarding. Every year I have new employees and get to show them all the beauty and rarity of the mountains, and it's the most rewarding part of my job.

Understanding the ecology of the mountain allows me to read the landscape and see things that other visitors might not be able to see at first glance. Knowing what plants you will find in a burn scar, at the base of a juniper, or where to find the plants the butterflies love.

As a biologist I get to go to a lot of special places and see unique plants and animals. I get to see all of the unique features the mountain has to offer!

Voices of the Mountain - Student Reflection Page

Who was the author of your story?

What is their relationship with the Spring Mountains? (How do they use the Mountains?
What are their experiences in the Mountains?)

Why do you think your user loves the Spring Mountains or thinks they are an important place?

How do you know? (What are some of the clues in their story that led you to this conclusion?)

Do you agree? Why or why not?

Post-fieldtrip Classroom Activity



Biomimicry

Overview

In this activity, students will learn about the nature-inspired design process, Biomimicry.

Students become inspired by one of mother nature's great architects, the spider, as they create spider webs and apply their new knowledge to find solutions to human problems.

Materials

- Paper plate (at least 1 per student)
- Yarn or string (approximately 4 feet per student)
- Scissors
- Tape
- Pennies or other small materials to be used as prey

Procedure

1. Introduce Biomimicry:

When we observe nature, we often see phenomena which are imitated in our human environment. This is no coincidence. Take the airplane for example. Early dreamers of creating a machine that could fly no doubt were inspired by birds' ability to soar and presumably began with imitation. Airplanes have wings, arranged just like birds. Like their feathered counterparts, they also have a light skeleton (or frame) to decrease their weight, and they have a streamlined shape to decrease drag.

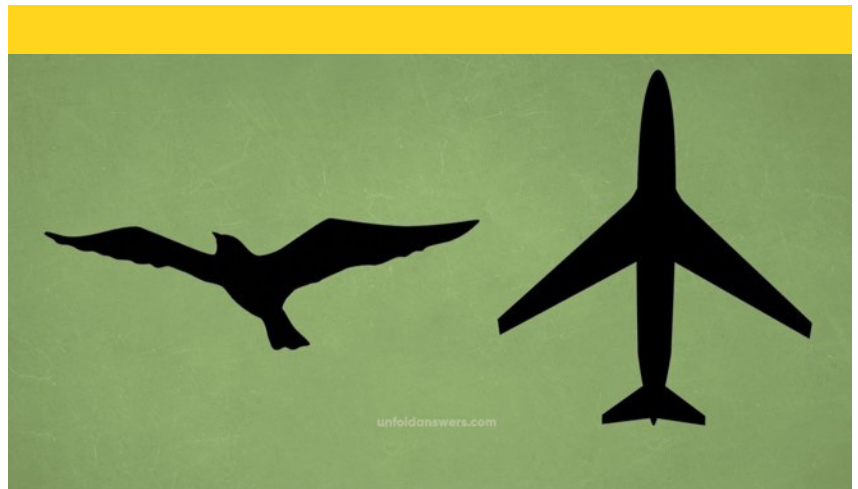


Figure 42. Silhouette of a bird in flight and a plane (Image by unfoldanswers.com).

The near compulsion by humans to imitate nature surely reveals in some instances, like in all science and engineering, we are all just copy-cats, looking at successes and trying constantly to improve upon them. As the old adage says, why fix what isn't broken.

Consider the mighty live oak tree. From its roots to its trunk, branches and leaves, these trees were custom engineered by nature to survive hurricanes. In one part of New Orleans only 4 of 700 trees were destroyed by Hurricane Katrina while nearly every building in that area was destroyed. Architects are now looking at the design of the live oak when considering buildings and houses in hurricane prone cities.

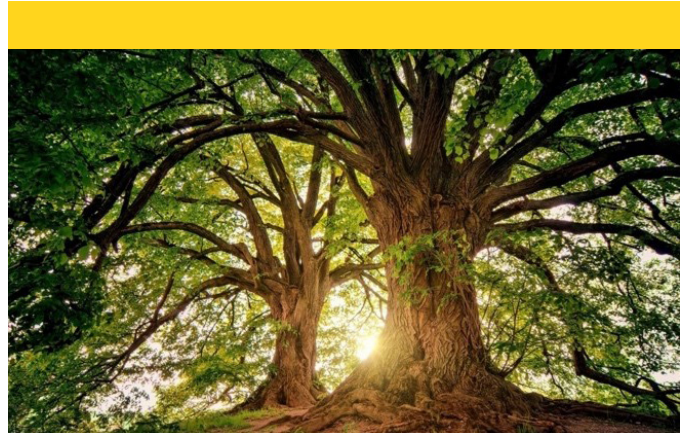


Figure 43. Giant Oak Tree (Image by pxhere.com).

In this project you will first investigate one of nature's engineering phenomena and then imitate it. Finally, you will apply the phenomenon to the human world.

2. Introduce students to the natural engineer they will be investigating: the Spider. Ask students to brainstorm things that make spiders unique in the animal kingdom and what makes them successful predators. If time and resources permit, have students research spiders online. If students have not identified spinning webs as a unique and advantageous adaptation, point this spider ability out and discuss. Show pictures of a variety of spider webs.
3. Explain that students will follow some simple instructions and imitate the spider's web to see how successful they can be at catching prey.

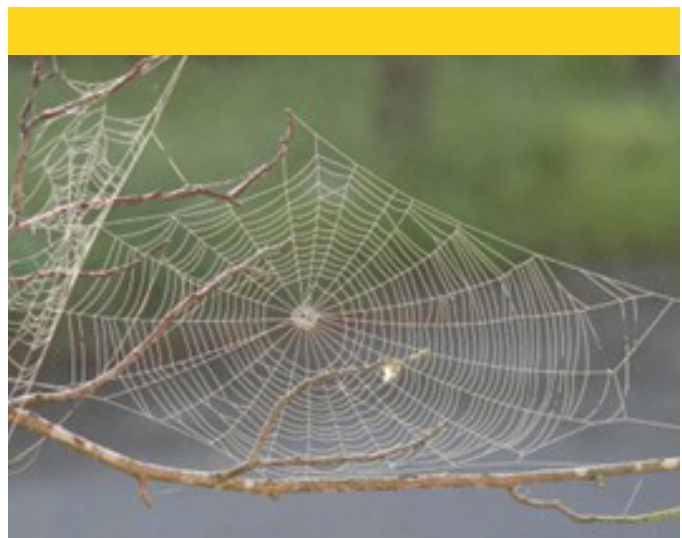


Figure 44. Spider web (Image by Pixabay.com).

Each student will need:

- ◆ A paper plate
- ◆ Approximately 4 feet of yarn or string
- ◆ Scissors
- ◆ Tape
- ◆ A handful of pennies (or some other small item to be used as prey)

Have students cut out the middle of their paper plate. Students then will cut up the string into smaller pieces and attach the string to the plate to make a web. They may use whatever pattern they think will make the most successful web for catching prey.

4. Once webs are constructed, pair up the students and have them take turns holding each other's webs while their partner tosses pennies onto it. For each penny that sticks in the web, the web designer receives a point.
5. Allow time for re-design. During redesign, encourage students to combine their ideas with their partners.
6. Finally, have students brainstorm a list of human products, practices, or policies in which a spider's web may be a useful design to imitate. i.e., a Mosquito repelling material in malaria prone areas.

Activities Key Words

Habitat - A place where an organism makes its home. A habitat meets all the environmental conditions an organism needs to survive.

Native species - An organism living in its natural environment or place where it normally lives and grows

Non-native species - An organism that has been introduced to an environment that it does not normally live in.

Invasive species - A non-native species that causes harm to the environment they are introduced to.

Endemic species - Species that naturally occur in only one area or region.

Nocturnal - An animal that is active at night

Diurnal - An animal that is active during the day

Crepuscular - An animal that is active at dawn and dusk

Ecosystem - Community and interactions of living and nonliving things in an area.

Biodiversity - All the different kinds of living organisms within a given area.

Adaptation - The adjustment of organisms to their environment in order to improve their chances at survival in that environment.

Ecology - A branch of biology that studies the relationship between living organisms and their environment.

Predator - Animal that hunts other animals for food.

Prey - Animals that are hunted and eaten by other animals.

Elevation - The distance above sea level. Elevations are usually measured in meters or feet and shown on maps with contour lines.

Climate - All weather conditions for a given location over a period of time.



Section 4 - Additional Background Information and Resources

Figure 45. Children learning about the Spring Mountains ecosystems (Photo by: Southern Nevada Conservancy).

Land Acknowledgement

“A land acknowledgement is a formal statement that seeks to recognize the unique and enduring relationship that exists between Indigenous Peoples and place. Although they have recently become more commonplace, land acknowledgements have been conducted for centuries by many Indigenous communities.”

Public Lands in the United States: Examining the past to build a more equitable future. Curriculum by The Wilderness Society and the Avarna Group

We acknowledge that the area discussed in this text is the ancestral land of the Nuwu/ Nuwuvi, also known as the Southern Paiute People. We respect their communities, past, present, and future, and recognize them as the original people of this land. We honor and respect their unique connection to and knowledge of the Spring Mountains.

In 2009, the Nuwuvi Working Group in collaboration with Jeremy Spoon and the U.S. Forest Service wrote the following welcome message to the visitors of the Spring Mountains National Recreation Area. Share this message with your students:

“Welcome to our sacred land, Nuvagantu. It is a place that is alive and has power. The land has feelings to greet you, eyes to see you, and ears to hear you. It talks from every place in your sight. All of the plants, animals, rocks, water, snow, and air in this landscape are living and need to be in balance to remain healthy. To sustain this balance, we treat all beings with the utmost respect, as we have since the beginning of time. We are inseparable from these mountains, which are powerful, yet delicate. Our language and songs resonate through the springs, trees, rocks, and animals. We harvest resources here and renew our cultural and familial ties. The Southern Paiute/Chemehuevi people continue to care for this land as we have for thousands of years, long before it became a National Recreation Area. We along with the U.S. Forest Service actively strive to keep the land in balance in culturally appropriate ways. Although you may not see us, you will surely hear our voices and feel

our presence. Take a moment to get acquainted with this special place and allow it to know you. Use your senses and open your heart. This is a landscape where your spirit can be replenished and you can learn valuable lessons. Please Walk softly on these grounds as we do and it will continue to thrive for generations.”

Public Lands

“Public lands” is a broad term used to describe the lands and waters that are owned collectively by the citizens of the United States. These areas are managed by either federal, state, or local governments. There are also other lands beyond “public lands” that are available for public use, such as private lands that are accessible by special conservation easements or hunting/fishing permits.

The majority of public lands are managed by four federal agencies: National Park Service (NPS), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), or Bureau of Land Management (BLM). The focus and mission of each of these agencies differ and subsequently affect the way they manage the lands. The Bureau of Reclamation manages land primarily along waterways for which it is responsible.



Bureau of Land Management – To sustain the health, diversity, and productivity of America’s public lands for the use and enjoyment of present and future generations.



National Park Service – To preserve unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations.



U.S. Fish & Wildlife Service – To work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.



U.S. Forest Service – To sustain the health, diversity, and productivity of the nation’s forests and grasslands to meet the needs of present and future generations.



Bureau of Reclamation – To manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

How lands are managed is dependent on the agency managing those lands, the mandates set for that land, and the type of land designation defining the scope and breadth of the use and protection. For example, some lands are preserved for wildlife (e.g. refuge or wilderness), while others may allow commercial activities such as mining or grazing.

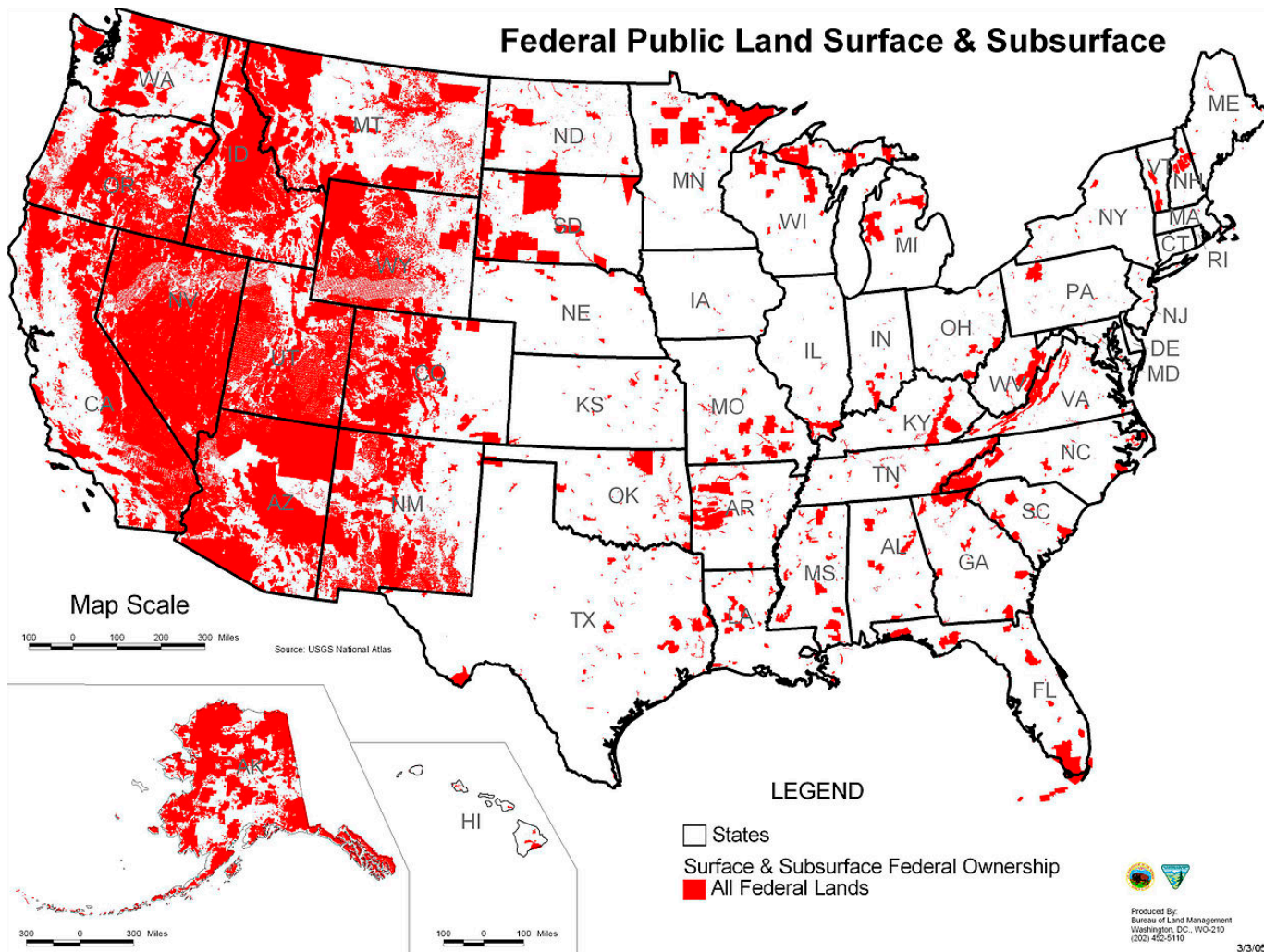


Figure 46. Map of the Federal Public Lands in the United States. (Image Courtesy of Bureau of Land Management)

The percentage of federal lands in each state varies, with the western states having higher percentages than eastern and midwestern states. Nevada has the highest percentage of federal land in all fifty states. Of Nevada's 70 million acres of land, 56 million acres or 80.1% of Nevada is federal lands.

For more information about our nation's public lands visit <https://www.doi.gov/blog/americas-public-lands-explained>.

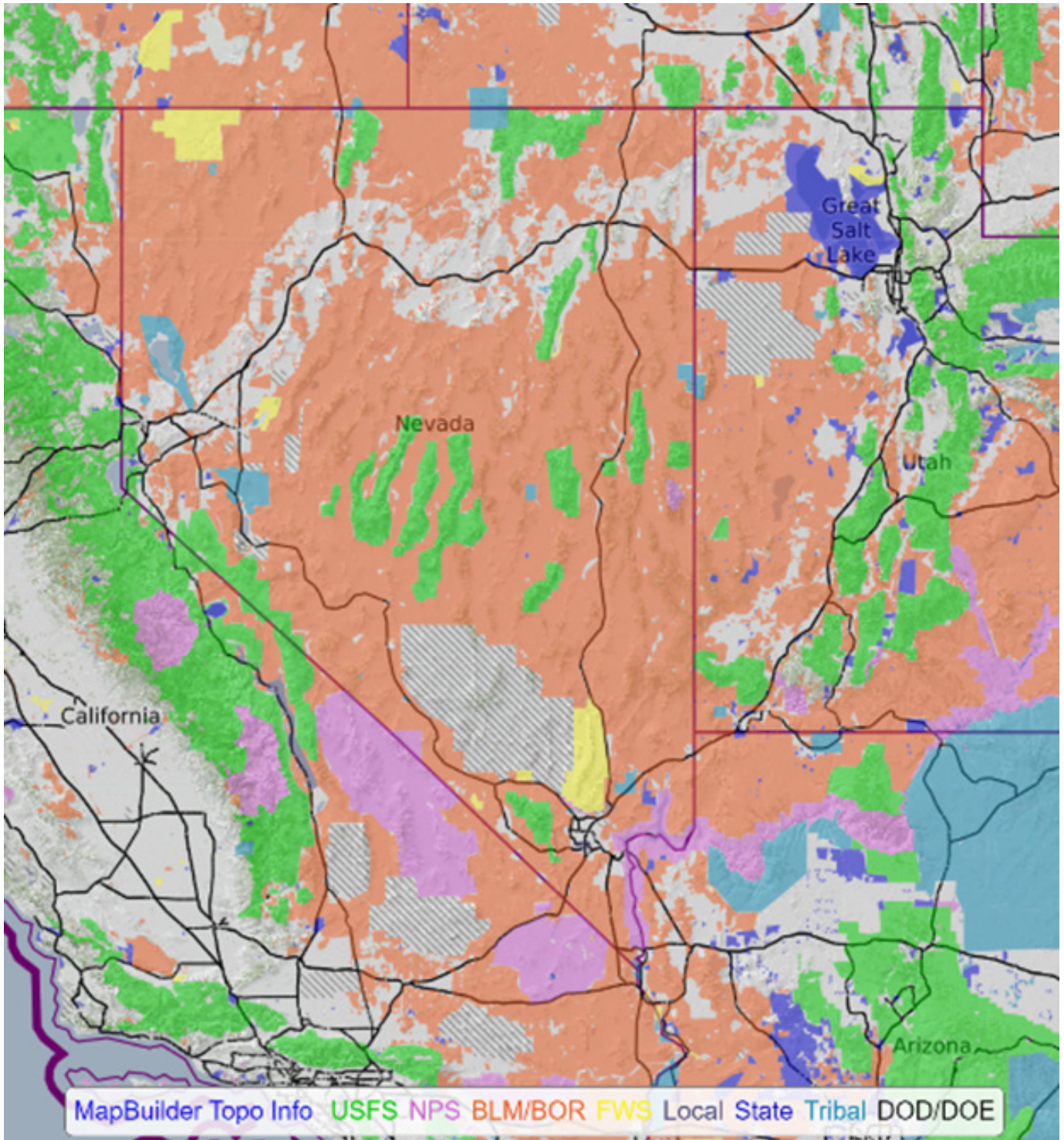


Figure 47. Map of the Federal Public Lands in Nevada (Image by CalTopo)



Figure 48. Child receiving their Junior Snow Ranger Badge (Photo by: Southern Nevada Conservancy).



Spring Mountains National Recreation Area

Geology

The geologic formations of the Spring Mountains give the area its unique, one-of-a-kind environment that today allows species to survive that life nowhere else in the world. This environment took lots of time and many changes to create what we see today.

It all started with a shallow sea – in fact, very similar in appearance to what the Caribbean looks like today. Hundreds of millions of years ago this area was flat; essentially a continental shelf covered by warm sea water. Sandstone was deposited, followed by shale. The area was home to a plethora of marine creatures. Today, the shale contains the trilobite fossils that can be seen in various locations across southern Nevada.

That ended abruptly when a large meteor hit about 100 miles north of Las Vegas at a whopping 20,000 miles per hour. The impact resulted in a series of tsunamis rushing across Nevada causing the ocean floor to be broken up. After the impact, the seafloor was compressed causing portions to push upwards during a time called “the big squeeze”. This action pushed limestone and sandstone upwards from the sea floor, creating the Spring Mountains.

Today the Spring Mountains are characterized by steep slopes, limestone cliffs, vast canyons, alluvial fans and floodplains. The grey rock we see on the Spring Mountains is an older rock called limestone and the white to red colored rock is a younger rock called sandstone. Most of the more prominent canyons were formed along fault zones.

Mining activities on the Spring Mountains have included prospecting for lead, zinc, and gold. Today there is still evidence of past mining activities with several mineshafts and mine pits.

Shark's Teeth on the top of the Mountain

Paleontologist Dr. Steve Rowland has a unique job; he has been studying shark's teeth from the top of a mountain in the Spring Mountains. The teeth are roughly 320 million years old, from a time when the area was a shallow sea – even before the mountains were formed. The teeth are from a specialized type of shark-like species called a cochlodont. It's not a true shark but somewhere between a shark and a ray in its characteristics.



Figure 49. Shark teeth fossils found on Spring Mountain (Image courtesy of Dr. Steve Rowland).

There are many cochlodont teeth found throughout the nation, but this find was a unique one. It was the first time the teeth were found intact in a jaw. Shark skeletons are made of cartilage, not bone which typically degrades and doesn't form into a fossil. Prior to this find, they didn't know how many teeth this type of cochlodont had or how they were arranged in the jaw. Modern sharks lose their teeth during their lifetime and become replaced with new, bigger teeth. This Cochlodont is different because they didn't lose their teeth. They also had what is called "pavement teeth" meaning they are arranged on the floor of the mouth and in the upper jaw. It is thought that they scooped up invertebrates and crushed their shells with their teeth.



Climate

Southern Nevada has seen a wide variety of topography and climates over the millennia – from once being completely covered in water to the desert ecosystem we see today

Looking back 15,000 years ago, this area along with the whole Las Vegas valley was much cooler with more precipitation resulting in marsh areas with abundant streams. Large animals such as mammoths, giant sloths, small horses and even a type of camel. These large Pleistocene animals became extinct approximately 11,000 years ago, about the time humans became established in North America.

Today the climate is much drier in southern Nevada with average high temperatures in the 50s during the winter to high temperatures in the summer over 100°F. Depending on your location on the mountain, temperatures are typically 20-30 degrees cooler.

While the Las Vegas valley averages around 4 inches of rain per year, the Spring Mountains rainfall varies from 10-24 inches per year.



Figure 50. Snow on the Spring Mountains (Image by: Southern Nevada Conservancy).

Snow Telemetry (Snowtel) Stations

How do you keep track of rain, snow and sunshine on the most remote parts of the nation? You set up automated weather stations! The Natural Resources Conservation Service installs, operates and maintains weather stations in remote areas where it is difficult for people to travel. Information from the climate stations help provide accurate information for water supply forecasts and to gather data to monitor climate trends. The Spring Mountains has three of these stations. Through the links below, you can access current, real-time data as well as past temperatures and precipitation.

<https://wcc.sc.egov.usda.gov/nwcc/site?sitenum=1111>

Bristle Cone Trail (8890 feet)

<https://wcc.sc.egov.usda.gov/nwcc/site?sitenum=1112>

Lee Cayon (8626 feet)

<https://wcc.sc.egov.usda.gov/nwcc/site?sitenum=1110>

Rainbow Canyon (7860 feet)



Figure 51. Spring Mountains SNOTEL Stations: Bristlecone Trail (8890 feet). (Image by: USDA.gov).



Figure 52. Students learning about snow (Image by: Southern Nevada Conservancy).



Water

The name Spring Mountains gives us some insight into water sources on the mountain. Named for its many springs and seeps – the area has over 220 water sources. The structure of the mountain captures clouds as they move from the west and from the south resulting in precipitation on the mountain. Precipitation comes from the Pacific Ocean and from the Gulf of California in Mexico depending on the season.

The elevation gradient on the mountain effects the climate with higher elevations getting more rain and snow and having cooler temperatures than low lying areas. Precipitation levels on the mountain vary from 10-24 inches per year which is significantly more than the Las Vegas annual rain of 4 inches. Temperatures are typically 20-30 degrees cooler than the Vegas valley depending on where you are on the mountain. Much of the precipitation on the Spring Mountains soaks into the ground, recharging the aquifer for both the Las Vegas and Pahrump basins.

Life in the desert is a harsh one and water is one of the key components to sustaining a species survival. Many species live near a water source so that they have daily access to water. Studies have shown that a higher percentage of species live close to a water source in a desert environment.

Streamflow is often seasonal with surface water flows often happening after a larger precipitation event. Perennial streams on the Spring Mountains are evident in Carpenter Canyon, Clark Canyon and with perennial creeks such as Cold Creek, Deer Creek, and Willow Creek.



Ecology

The Spring Mountains have a rich diverse ecological community

all due to the drastic elevation changes and the gradual climate change that has occurred over the past several thousand years. During the Pleistocene, the region was cooler and experienced more precipitation. Species could move freely from mountain range to mountain range. As climate changed, higher temperatures and less precipitation resulted in mountains like the Spring Mountains becoming isolated, essentially trapping and isolating species.

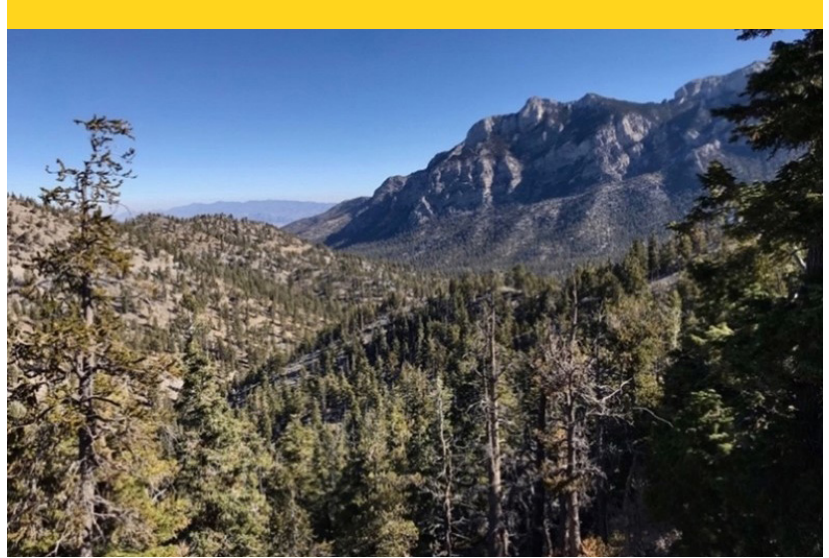


Figure 53. View of the Spring Mountain Range (Image by: Southern Nevada Conservancy).

The Spring Mountains are known as “Sky Islands” because they are mountains isolated by surrounding deserts. This isolation results in an “island” type environment where species on the mountain can’t easily move to other areas or interact with other species.

Over time this isolation has resulted in species being so isolated that they evolved to become different than others like them – in fact they became new species. These new species live no place else in the world and are termed endemic.

Today, the mountains are a rich diverse ecological community. The variability in elevation and climate allows for the Spring Mountains to have many of the life zones found in North America and subsequently a plethora of species. In fact, the Spring Mountains are one of the few places in North America that you can visually see so many life zones in one place in such a short distance.

Tree Ring Studies & Nuclear Testing

Las Vegas in the 1950's was as popular as it is today. Back then you could gamble, catch a show, and perhaps watch the testing of a nuclear bomb. Above ground nuclear testing occurring in the state from 1951 to 1963 and was often watched as a form of entertainment.

Scientists have noticed something different about trees that were around and in the vicinity of nuclear testing – they have an extra amount of carbon-14 atoms in the tree rings for that time period. Seems a little blast of neutrons in the atmosphere is strong enough to turn nitrogen into carbon-14. Trees leave a 'carbon footprint' - so to speak - in their tree ring data that shows exactly the year the testing took place.

Many of the trees on the Spring Mountains were close enough to the blasts to have this unique nuclear carbon footprint.



Figure 54. Nuclear testing in southern Nevada (Image by: Wikimedia Commons).

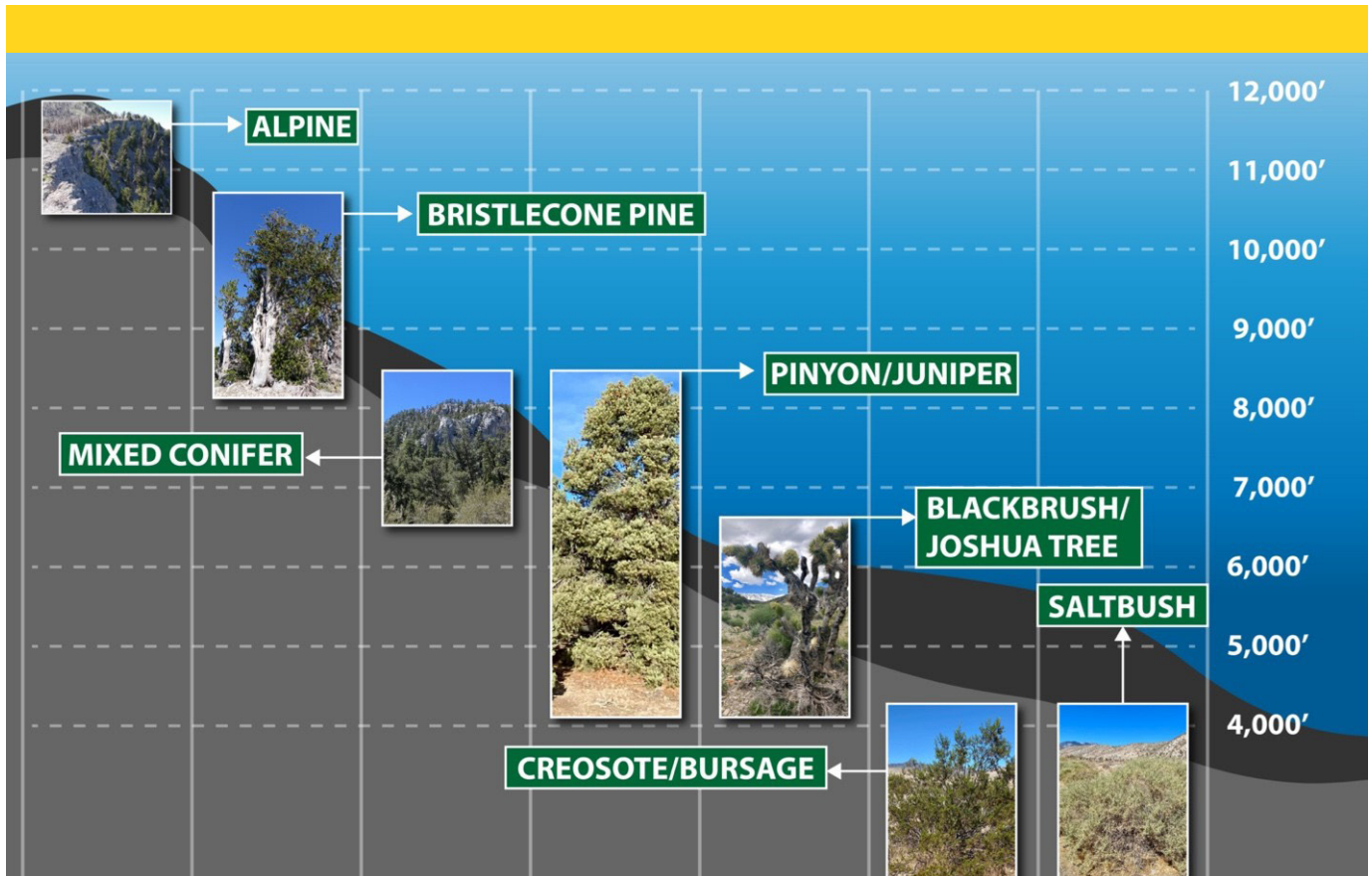


Figure 55. Life Zones of the Spring Mountains (Image by: Southern Nevada Conservancy).

Life Zones

Early ecologists were looking for ways to compare and contrast similar ecosystems within an area and between areas. To better understand and define regions, the concept of life zones was established by C. Hart Merriam in the late 1800's. The overall concept was to group plants and animals into distinct areas or zones based on their similarity and particular temperature and precipitation.

This allows scientists to compare different life zones to each other and to compare similar life zones on different mountain ranges. These life zones not only define the plant species that are typically found in an area, but subsequently helps define the other species such as birds, mammals, reptiles, amphibians, and invertebrates in an area.

On the Spring Mountains there are seven distinct life zones:

Saltbrush Community
(2,400 feet and below)

This area is the lowest part of the Spring Mountains Range and is characterized by high soil salinity. Dominated by creosote, bursage and blackbrush, these plant species are tolerant of high salt concentrations.



Figure 56. Saltbush community (Image by: Southern Nevada Conservancy).

Creosote Bush /Bursage Community

(2,400-3,600 feet)

In this area, the creosote bush is most common but other plants such as Mojave yucca and bursage also occur here. This desert area is very dry, receiving less than 5" of rain per year.



Figure 57. Creosote community (Image by: Southern Nevada Conservancy).

Blackbrush / Joshua Tree Woodland

(3,000-5,000 feet)

This area is characterized by the presence of the iconic Joshua Tree. While its presence indicates this zone, it may not be the dominant plant. There are many types of shrubs that call this zone home. This area has steep hills with shallow soils and is dominated by the blackbrush plant. Cholla cactus, the Mormon tea plant and various yucca plants are interspersed throughout the blackbrush.



Figure 58. Blackbrush - Joshua Tree Woodland community (Image by: Southern Nevada Conservancy).

Pinyon-Juniper
(6,000-7,500 feet)

This higher elevation receives more precipitation; approximately 10-15 inches per year. This life zone is characterized by single-leaf pinyon, Utah juniper and mountain mahogany. This area is very susceptible to fire.



Figure 59. Pinyon - Juniper (Image by: Southern Nevada Conservancy).

Mixed Conifer Pine-Fir Forest
(7,500-9,000 feet)

This area is a denser 'pine forest', this area hosts primarily ponderosa pine and white fir. With the higher elevation in this zone, there is more snow and rain which provides the perfect environment for healthy, dense forests.



Figure 60. Mixed Conifer Pine-Fir Forest (Image by: Southern Nevada Conservancy).

Bristlecone Pine Forests

(around 10,000 feet)

The very top of the peaks in the Spring Mountains Range host the Bristlecone Pines. These trees grow in extreme conditions with a short growing season and extreme temperatures. The Great Basin Bristlecone can be single or multi-trunked and in harsh environments much of the tree may be dead wood. Growth forms are variable, dependent on elevation. The higher elevation trees tend to be shorter with the twisted and contorted morphology. The lower elevation trees are tall and upright.



Figure 61. Bristlecone Pine Forest (Image by: Southern Nevada Conservancy).

Alpine
(over 11,500 feet)

This zone is found at the highest elevations where the climate is harsh and for a large part of the year, the area is under snow. Above tree line, this area has sparse, low growing vegetation.

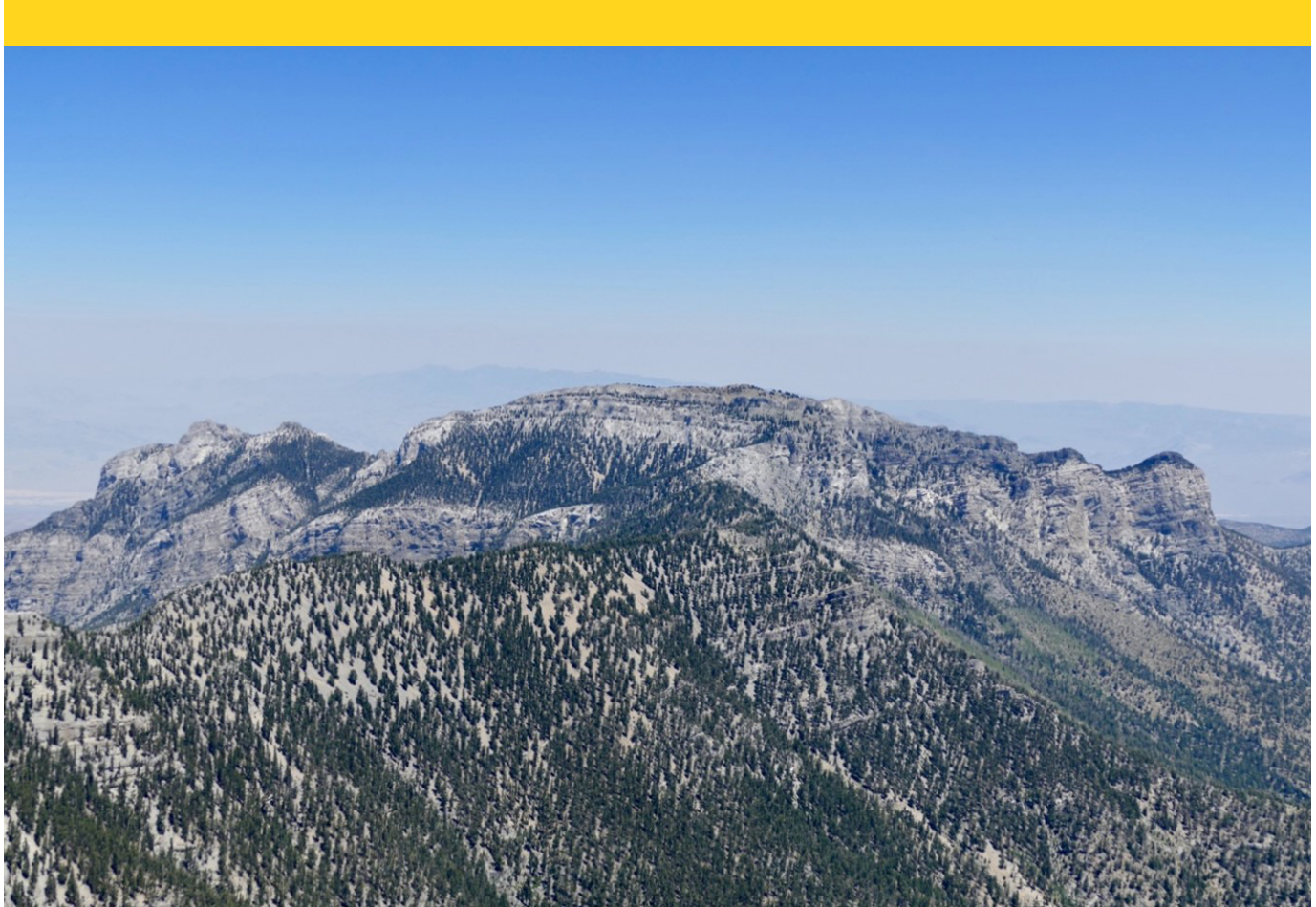


Figure 62. Alpine Community (Image by: Southern Nevada Conservancy).



Plants

The Spring Mountains host over 1,000 species of plants and has the highest diversity of trees of any other mountain range in the state. The vast elevation range and subsequent climate changes allow for a host of species to live in the area from dry, desert adapted plants in the lower elevations to large trees in the higher elevations and even lush riparian plants along streams and springs.

The area has several of the Nevada’s biggest trees including the world record largest Great Basin Bristlecone Pine. Across the nation, each state records its largest trees to see who has the biggest trees of each species. The Spring Mountains are home to three of the largest trees in the state; in fact, one species is a world record holder – the Great Basin Bristlecone Pine.



Figure 63. Spring Mountain (Image by: Southern Nevada Conservancy).

Have Seeds Will Travel: How the Fate of the Joshua Tree Lies with Rodents

The iconic Joshua tree is an important tree to the Mojave Desert. They are truly ancient, dating back two million years and living, on average, 150 years with heights upwards of 30 feet. Larger trees have been recorded up to 60 feet high with ages estimated up to 1,000 years old. The Joshua tree was named by Mormon settlers who believed the tree resembled the prophet Joshua with arms raised to the heavens in prayer.

Joshua tree growth is very slow – about ½ inch per year. In the spring, the tree produces large white, fragrant flowers that are

pollinated by the yucca moth. Seeds are carried in a large seedpod, roughly the size of a walnut. These pods can hold up to fifty seeds. Prehistorically, the seeds were dispersed by a giant, now-extinct ground sloth. At that time, the climate was colder and moister. Giant ground sloths dispersed the seeds in their dung after eating them. This plant/animal relationship provided food for the sloth and a mechanism of seed dispersal over large areas for the Joshua tree.

Today, the Joshua tree relies on a much smaller dispersal mechanism – rodents. The small antelope ground squirrel climbs the tree collecting seeds while other rodents such as the kangaroo rat will collect fallen seeds from the ground. These species 'cache' or hide food in the area, thereby planting the seeds. The problem is that dispersal by rodent has a much more limited range than dispersal by ground sloth.



Figure 64. Sloth (Image by: Wikimedia Commons).



Mammals

The wide variety of life zones in the Spring Mountains means wide variety in of species are found there. There are a host of mammal species that call the Spring Mountains home from large herbivores such as mule deer and elk, to carnivores such as the mountain lion, bobcat, coyote and the fox. There are over twelve different types of rodents live on the mountain including the endemic Palmer’s chipmunk. The area sees about half the state’s recorded bat species with some residing in the area year-round and some migrating in seasonally.

Some of the species that are on the Spring Mountains are native to the area, others are non-native. In fact, some species were purposefully brought into the Spring Mountains such as elk. In 1935, fifteen elk were brought into the area from Yellowstone Park, WY. In 1984, another eighty elk were brought in from Utah to supplement the herd.



Figure 65. Game camera photograph of a mule deer (Image by: U.S. Forest Service).

Finding Treasure in a Pack Rat Nest

The wood rat or pack rat as it is sometimes called, has an unusual role in history. Not only does it play a role in its own natural history, but it is also a keeper of time of other species; trees, flowers, reptiles, birds, you name it – even humans. The pack rats build their homes (known as middens) in between rocks or logs or at the base of shrubs. The rats have several homes; typically, three times as many as they can occupy. These homes are big with several entrances. In each house there is a bathroom of sorts - an area for defecation and urination to occur.



Figure 66. Wood Rat (Image by: birdandhike.com).

Over time these sections of the middens become compacted and encased in a urine residue which in effect preserves the contents underneath. Any material that was in the nest and happened to be under the stream of urine are preserved. The pack rat gets its name from its hoarding activity - bringing into its den whatever it finds in its home range (typically 100 yards or so). They bring in objects such as animal bones, plant seeds, Native American arrow heads, settlers' buttons etc.

Those middens that are constructed in secure areas such as caves or rock shelters and are protected from weather and elements may survive for thousands of years. Archaeologists study the contents of these middens for historical and archaeological data, further understanding the human impacts in the area over time.



Birds

There have been over 200 species of birds recorded in the Spring Mountains. Some are year-round residents; others are seasonal and still others just migrate through on their way to someplace else. The cooler temperatures in the summer and year-round water provide habitat for species not adapted to the severe climate of a Mojave Desert lowland summer. Colder winter temperatures typically drive species to lower elevations for more a hospitable climate.

The Audubon Society considers this area an Important Bird Area or IBA. Part of a global program started by BirdLife International, this program aims to conserve areas vital to birds and thus other species. In the United States, Audubon along with other partners, work to identify, monitor, and protect those areas across the nation that are important places for birds. To date, Nevada has 40 Important Bird Areas.



Figure 67. Woodhouse Scrub Jay (Image by: Southern Nevada Conservancy).

What a memory! Caching behavior by Corvids

Corvids are a specialized group of birds that hide or cache their food for later use. When food like nuts are available, they will hide those nuts to eat maybe a week or year later depending on the species. Three species; specifically, the Clark's nutcracker, the pinyon jay and the Western scrub-jay take part in this behavior. The Clark's nutcracker is the king of this activity and has been shown to 'cache' or hide up to 33,000 seeds in thousands of ground sites and return over a year later and find virtually all of them.



Figure 68. Corvid (Image by: birdandhike.com).

These birds are thought to have the best spatial memory of all animals, even superior to humans. What's amazing is the birds can hide these seeds then find them again even when the surface of the ground is covered in snow.



Reptiles & Amphibians

Since these species are ectothermic (cold-blooded), maintaining sustaining temperatures is more manageable at the lower elevations of the recreation area's life zones.

Researchers studying these species are typically looking at populations at lower elevations in the valley and throughout Nevada and the region. Although research has not been significant in the SMNRA, we do know that reptiles and amphibians live in the area starting at the lower elevations and do occur at higher levels dependent on the species and the time of year.

One of the most commonly seen reptiles on the Spring Mountains is the gopher snake. These snakes can get up to five feet long, they have a small head with a dark line - almost looking like a mask across their eyes. They have dark mottled patches of dark brown along their body. They have a wide range and can eat a variety of types of food from small mammals to lizards and will even eat the occasional egg. They are typically seen at elevations below 7,000 feet. The cooler, more drastic temperatures at the higher elevations are not prime habitat for this mountain resident.

Insects/Invertebrates

This is probably the most poorly understood section of organisms on the Spring Mountains. Little research has been conducted, if any, on the organisms and their life cycles.

To date, the best understood group is the butterflies. There are eight endemic butterflies, several of which are under severe decline. Their complete life cycle and relationship to their host plants are still not clearly understood.

Other species are less understood such as the very small springsnails that are merely a few millimeters in size. They are dependent on unpolluted waters of the many springs in the area. Ongoing studies are working to better understand their populations and lifecycle.

Even more elusive is the Charleston ant that hasn't been seen since 1956. It is an endemic to the area, meaning it lives nowhere else in the world, but it has been hard to find. It is a yellow-brown color and lives primarily underground at elevations around 7,500 feet.



Figure 69. Butterfly (Image by: Souther Nevada Conservatory).

Mount Charleston Blue Butterfly

First identified in the late 1920's, it is believed that the Mt. Charleston Blue Butterfly has existed for thousands of years. Once at more viable numbers, now the butterfly has been reduced to several small areas on the mountain. At one time the butterfly was thought to be extinct, but volunteers brought back pictures of one lone butterfly that confirmed its existence which sparked further investigation and the discovery of more individuals.

The Mt. Charleston Blue Butterfly is an extremely small butterfly with a wingspan about the size of

a dime that prefers elevations above 8,000 feet. They have a harsh life-cycle where they go through two winters before becoming a butterfly, then as a butterfly they live three to six days if they are a male and slightly longer as a female.

Colonies on the Spring Mountains occupied 15 locations at one time but over the years these numbers have decreased. University of Nevada, Las Vegas researcher Dr. Daniel Thompson has been studying the blue butterfly to determine its range and to estimate how many are left.



Figure 70. Mount Charleston Blue Butterfly (Image by: Dr. Daniel Thompson, UNLV).



People

Most scholars believe that people have lived in the area for the past 12,000-13,000 years. At that time this area was lush with cooler temperatures and more precipitation. There were many more springs, streams and marsh areas throughout southern Nevada.

During this period there were a variety of large animals that roamed the area, such as mammoths, giant sloths, small horses and even a type of camel. These large Pleistocene animals became extinct approximately 11,000 years ago, about the time humans became established in North America.

Around 10,000 years ago the area began to become drier with less precipitation and warmer temperatures. Subsequently, the plants and animals changed with some areas, such as the valley floors becoming more desert-like. Species that preferred cooler temperatures and more precipitation became isolated on mountain ranges such as the Spring Mountains.

The traditional Native American groups of the area are Southern Paiute (Nuwu/Nuwuvi) and Chemehuevi but other groups such as the Colorado River Yuman and the Western Shoshone also have a history in the area.

Changing climate conditions meant that people living in the area needed to adapt as well to the changing environment. Groups were very mobile at this time, moving from place to place to find resources. Southern Paiute settlements have been recounted in the foothills of the Spring Mountains and along large springs and washes in southern Nevada. As the climate changed, so did the areas they hunted and gathered but the Spring Mountains continued, and to this day continues to be an important aspect of their lives.

Sacred Mountains & Nuvagantu

An excerpt from Nuvu Kanee, Nuwu Tooveenup (Our Home, Our story): Nuvuvi (Southern Paiute and the Spring Mountains):

Mountains are sacred places to us. They provide everything that we need to survive as a people and a culture. Mountains are our spiritual places, where we harvest resources and conduct ceremonies that are central to our lives. Every mountain in Nuwuvi (Southern Paiute) territory has a name and was the place of significant events that helped to shape our history and relation to our land. We visit mountains to renew our spirits.

Nuvagantu (literally 'where snow sits' or the Spring Mountains landscape) is our holy land, and considered a true cultural landmark. It is important to us because it is the site of our creation, which defines who we are as a people. Nuvagantu is also a crucial reserve of resources that we use and a place to visit with family. Our connection to this landscape reinforces our ties to the Creator, the land, and our people.

"Mt. Charleston is a creation place. This mountain made and shaped the Southern Paiute nation's world. It permeates all life—revolving through, over, under, around everything. It's a grand and royal place."

-Native Elder, Colorado River Indian Tribes

"...this is our everything, our existence. We're always told to do our prayers in the morning to the east, and to the west in the evening. Especially when you have bad dreams, you blow it before sunrise [in the direction of]."

-Native Elder, Moapa Band of Paiute Indians

Euro-American Settlers – the Lure of the Mountains

For thousands of years people have been drawn to the Spring Mountains but the first Europeans did not arrive until sometime around the turn of the 19th century when explorers were in search of a route that would link New Mexico with Los Angeles. This route would eventually become known as the Spanish Trail and was critical for trade between the United States and Mexico.

In 1844, renowned explorer, John C. Fremont traveled the trail east from California mapping available water sources. Later, these maps would be used by the Mormons during the Mormon Battalion in which hundreds of Mormons fleeing persecution in Illinois would use the trail on their way to refuge in San Diego. Other expeditions followed such as those led by Jedediah Smith and Kit Carson and by the 1850's the route was used as a mail route and soon after, a military road.

With increased travel on this new route through the Spring Mountains, came settlement. Soon sawmills and lumber yards were established. Kyle and Lee Canyons became important timber suppliers for nearby Las Vegas, Pahrump, Amargosa Valley and Mesquite Valley. Lumber resources were also being supplied to important mining camps such as Tonopah, Beatty, Rhyolite and Potosi.

The human presence in the Spring Mountains continued into the 21st century. In the early 1900's the area came under the management of the federal government beginning with the creation of the Charleston Forest Reserve in 1906. Land transfers, eliminations,



Figure 71. Logging trucks in this early 20th century photo (Image by: UNLV Special Collections).

presidential proclamations, and acts of congress persisted through the 20th century for the area until finally in 1993, the district was designated as the Spring Mountains National Recreation Area.

Government management was not the only human story in the Spring Mountains during the last century. Numerous human endeavors occurred on the sky islands including Civilian Conservation Corp (CCC) and Works Progress Administration (WPA) projects during the great depression, residential and semi-residential community development, recreation and lodging opportunities, a military retreat, both a boy and girl scout camp, private special interest camps and a county managed camp.

The Spring Mountains have a long history of human exploration, resource use and exploitation, settlement and recreation.

Silent Heroes of the Cold War

It was November 15th, 1955. The residents of Mt. Charleston were beginning their day, making coffee, eating breakfast, and otherwise beginning their typical Tuesday morning. A large crash was heard, and a fire was visible just below the Mt. Charleston peak. While residents questioned what was happening, military personnel set up a roadblock to stop access to the upper reaches of the mountain. What happened that morning would remain classified for over 40 years.

Occurring in the height of the Cold War, a top-secret mission was quickly ended when a C-54 plane crashed into the mountain. On board were engineers, aircraft designers and CIA agents all headed to Area 51's Groom Lake to work on the secret U-2 plane program. High wind speeds pushed the aircraft off course causing the pilot to clip a ridge a mere fifty feet below the top of Mt. Charleston. From there it skipped and slid across the landscape, eventually stopping, and becoming partially burned.

Local resident and Boy Scout leader, Steve Ririe fought for years to get sealed documents released and to share the story of these silent heroes. The family members of the deceased had never known the details of their loved ones passing, just that they had died in a



Figure 72. Four men (Image by: UNLV Special Collections).



Figure 73. Military C-54 plane (Image by: Wikimedia Commons)



Figure 74. Cold War Memorial located outside the Spring Mountains Visitor Gateway (Image by Southern Nevada Conservancy).

workplace accident. The releasing of documents allowed the families to know more about the accident. Mr. Ririe was also instrumental in creating the Cold War Memorial located at the Spring Mountains Visitor Gateway, outside of the visitor center building.

Acknowledgements

Developers

Paula M. Jacoby-Garrett

Amy Page

Reviewers

Martha McMahon, USDA, Forest Service

Rosa Prasser, Southern Nevada Conservancy

Leonie Mowat, Southern Nevada Conservancy

Stefani Dawn, National Park Service, Lake Mead National Recreation Area

Production

Stefani Dawn, National Park Service, Lake Mead National Recreation Area

Jennifer Heroux, U.S. Fish and Wildlife Service, Desert National Wildlife Refuge

Aaron Leifheit, Get Outdoors Nevada

Formattting and 508 Compliance

Digital Echo

Funding

SNAP contract number 11020A, SNPLMA Round 17