Changing Landscapes

4th Grade Field Trip

Red Rock Canyon National Conservation Area

Las Vegas, Nevada

Changing Landscapes

Overview:
Students extend their learning about processes that shape the Earth by analyzing and interpreting maps, making place-based observations of landscapes using a map and observations of the area, and observing evidence of erosion using the Sandstone Quarry trail at Red Rock Canyon National Conservation Area.

Duration:
45-minute session for pre-activity
1 day for field trip and reflection
45-minute session for post-activity

Grade: Fourth

Next Generation Science Standards:

4-ESS2-1 Earth's Systems

Students who demonstrate understanding can:

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.** [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [*Assessment Boundary: Assessment is limited to a single form of weathering or erosion.*]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.

Disciplinary Core Ideas

ESS2.A: Earth Materials and Systems

- Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around.

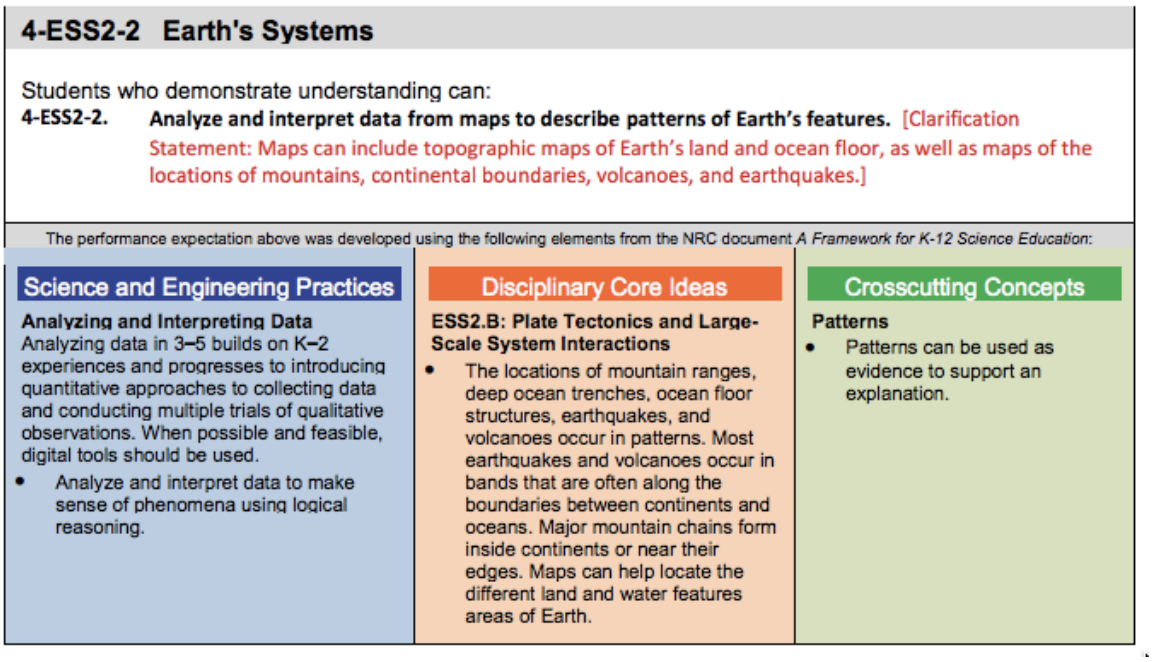
ESS2.E: Biogeology

- Living things affect the physical characteristics of their regions.

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified, tested, and used to explain change.



4-ESS2-2 Earth's Systems

Students who demonstrate understanding can:

4-ESS2-2. **Analyze and interpret data from maps to describe patterns of Earth's features.** [Clarification Statement: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena using logical reasoning.

Disciplinary Core Ideas

ESS2.B: Plate Tectonics and Large-Scale System Interactions

- The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth.

Crosscutting Concepts

Patterns

- Patterns can be used as evidence to support an explanation.

Geography Standards:
G5.4.1 Identify and use intermediate directions on a compass rose to locate places on a map of Nevada.

G5.4.2 Identify spatial patterns on a map of Nevada; i.e., deserts, mountains, population.

G8.4.2 Describe how technologies altered the physical environment in Nevada, and the effects of those changes on its people.

Field Trip Theme:
Red Rock Canyon National Conservation Area offers a great opportunity to see geology in action. Powerful forces and dynamic processes have been working to shape and sculpt this unique landscape. During this field trip, students will explore an area where both man and nature have helped to change the landscape.

Objectives:
Students will:

- Compare and contrast different types of maps
- Derive geographic information from maps
- Identify and locate major geographic features of Red Rock Canyon National Conservation Area using maps and map elements

Background Information:
An ability to read topographic maps will help students understand land use, as well as flooding problems and identify geological features such as mountains and stream systems.

In Earth Science topographical maps are especially valuable in identifying hills, washes, plateaus, glacial features and plains because of their ability to depict three-dimensional features.

The natural forces at work on Earth; wind, water, and earthquakes change the Earth's surface-erosion, deposition, creation of new land, faulting, etc. These forces create landforms such as hills, cliffs, stream, valleys, mountains, washes, basins, etc.

Vocabulary:
It is not necessary for students to know these definitions. This serves as a resource to support student understanding as it comes up in discussion or activities.

- Canyon: a deep, steep-sided rocky valley carved by a river through layers of rock or cut by rejuvenation in resistant rock or along a fault.
- Chemical weathering: changes that take place in minerals and rocks at or near the surface of the earth in response to the atmosphere, to water, and plant activity where rocks are decomposed, dissolved, or loosened by natural elements.
- Contour line: a line on a topographical map, which connects points of equal elevation.
- Crossbedding: inclined beds laid down at an angle to the horizontal bed
- Earthquake: movement of the ground when part of the earth's crust suddenly shifts along a fault line.
- Erosion: the movement of rocks or soil particles from one place to another by the force of wind, ice or water.
- Fault: a deep crack in the earth's crust where earthquakes occur.
- Gravity: the force that pulls objects on or near the earth's surface toward earth.
- Landform: a natural geographic feature such as mountains, valleys or streams.
- Layering: numerous layers of sediment deposited over time.
- Ledge: a narrow shelf projecting from a cliff wall
- Map: a visual representation of a featured area on a flat surface.
- Oxidation: when a substance combines with oxygen
- Physical weathering: the breakdown of rock into smaller pieces that retain the properties of the original rock.
- Sand dune: a hill or ridge of sand formed by the force of blowing wind
- Sedimentary rock: a rock that is formed by or from layers of sediment deposited on the earth's surface. (on land or under water)
- Rock slide: the sudden movement of rock down a hill or cliff

- Valley: a low area of land between hills or mountains, typically with a river or stream flowing through it.
- Wind erosion: the movement of rock or soil particles from one place to another by the force of wind.

Materials:

- Teacher resource pages (project from computer to show pictures in color and to zoom into smaller areas of the map)
- Student Field Experience Journal copied for each student

Suggested Pre-Activity:

1. Show the map from the Teacher Resources section and discuss the importance of the compass rose and legend. Pose questions that require students use the key or the legend (i.e. Where is Red Rock Canyon compared to Las Vegas? Is camping allowed in the Red Rock Canyon National Conservation Area?). Then have students answer the questions or complete the statements about the map.

Field Trip Summary:

Geology plays an important role at Red Rock Canyon. During this field trip, students will:

- receive a brief introduction to different types of maps
- analyze and interpret maps of Red Rock Canyon
- discuss the history of Sandstone Quarry
- observe and describe how humans have altered the landscape in the area
- observe and discuss how water, wind, ice, and snow erosion have also altered the landscape
- take a tour of Sandstone Quarry to find evidence of the effects of erosion and interpreting maps at Red Rock Canyon

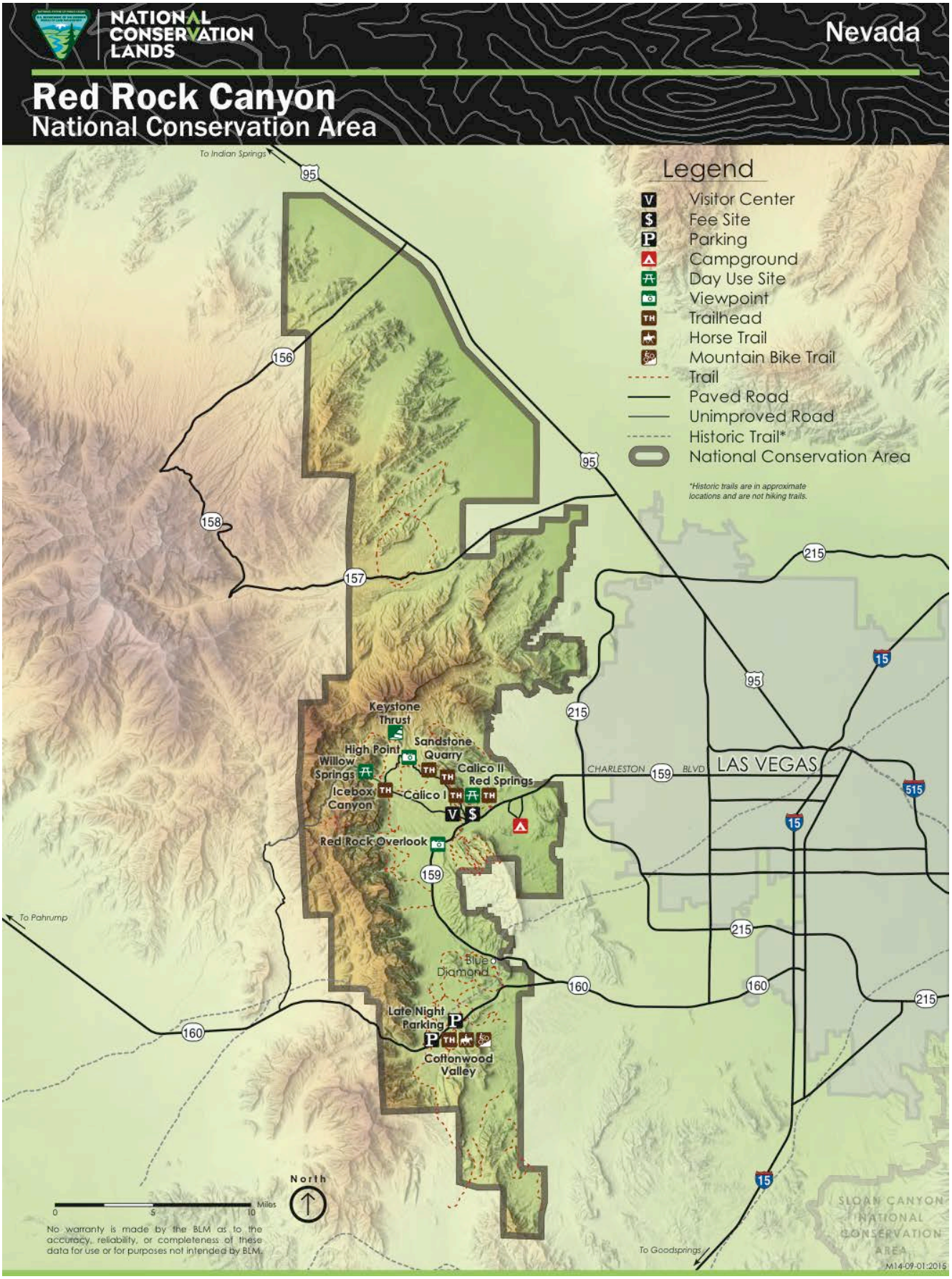
Encourage your students to take pictures while on the field trip. Students will have an opportunity to share their pictures and discuss evidence of erosion.

After coming back from the field trip, have students fill out the reflection sheet from the Student Field Experience Journal.

Suggested Post-Activity:

1. Share pictures from the field trip and discuss evidence of erosion in each of the pictures.
2. Have students analyze a physical and topographical map to find a pattern on where springs are located.
3. Have students make a claim and support it with evidence as to what caused the type of erosion in the pictures.

Teacher Resources



Changing Landscapes

4th Grade Field Trip

Student Field Experience Journal

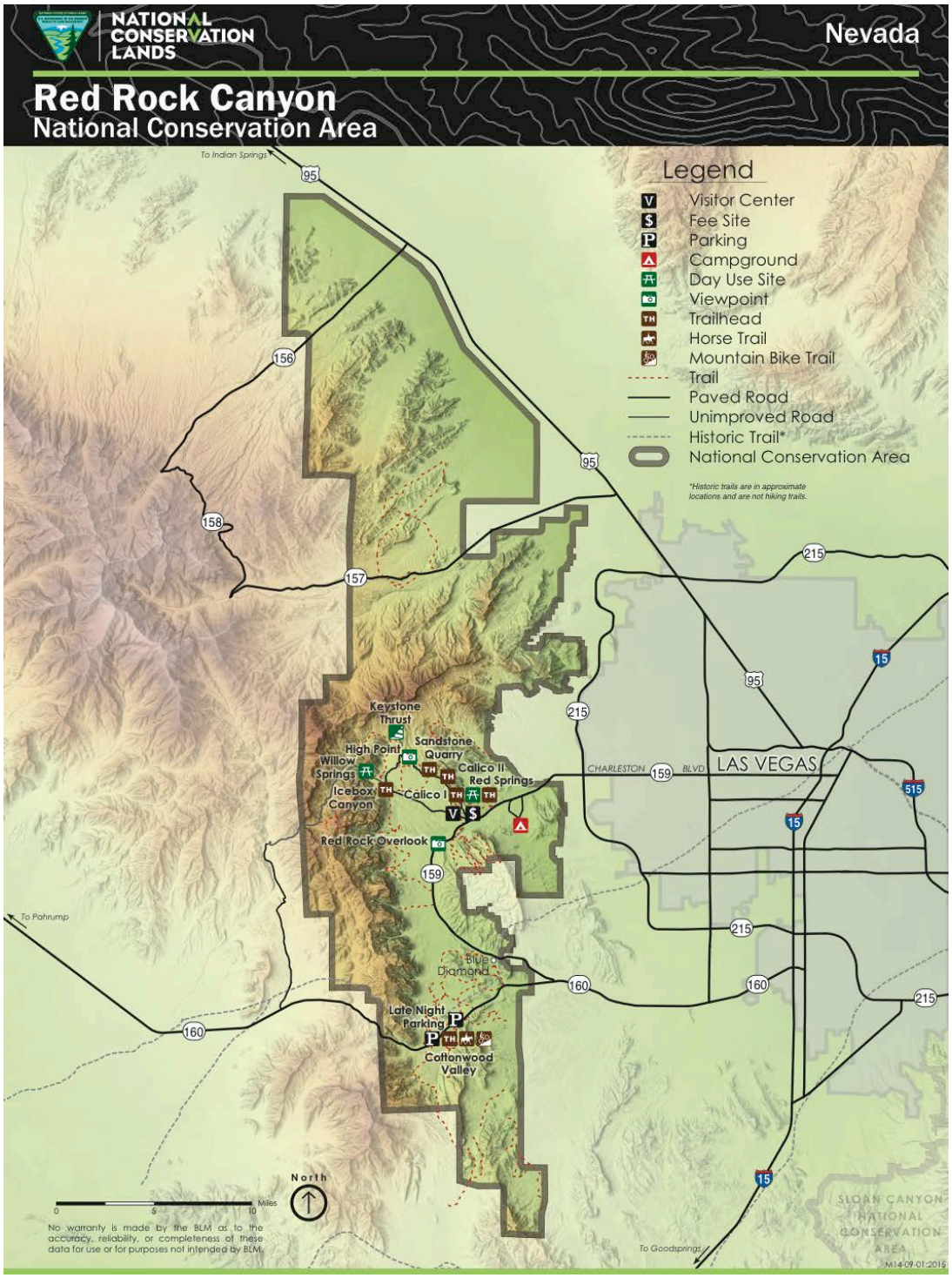
Red Rock Canyon National Conservation Area

Las Vegas, Nevada

Name: _____

Understanding Maps

Before going on the field trip to Red Rock Canyon National Conservation Area, you will need to know how to read a map. After your teacher gives you a brief overview of maps, use the map to answer the questions or complete the statements.



1. What highway or paved road takes you to Red Rock Canyon National Conservation Area?

   _____

2. What area has a horse trail?

   _____

3. What area has a picnic area?

   _____

4. Where are some great areas to take a picture with a viewpoint?

   _____

5. If you were headed north on Highway 159 from Blue Diamond, what area would I see first?

   _____

6. What area has a mountain bike trail?

   _____

7. What type of trail goes through Las Vegas and Blue Diamond?

   _____

8. What is:
   a. The National Conservation Area is about _____acres.
   b. The National Conservation Area is about _____square miles.
   c. The length of the National Conservation Area is about _____acres.
   d. The largest width of the National Conservation Area is about _____acres.

Field Trip Reflection

I took a field trip to _____
on _____.

Here are three things I saw:

Here are two things I learned:

The best part of the day was:

Look at the following pictures and maps; write down your observations.

_____

_____

_____

_____

_____

_____

_____

What caused this erosion? Support your answer with evidence from your observation.

_____

_____

_____

_____

_____

_____

_____

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

LA MADRE MOUNTAIN QUADRANGLE
NEVADA - CLARK COUNTY
7.5-MINUTE SERIES

Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 11S
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery	NAIP, May 2015 - September 2015
Roads	U.S. Census Bureau, 2016
Names	GNIS, 1980 - 2011
Hydrography	National Hydrography Dataset, 2004 - 2015
Contours	National Elevation Dataset, 2001 - 2016
Boundaries	Multiple sources; see metadata file 2016
Public Land Survey System	BLM, 2010
Wetlands	FWS National Wetlands Inventory 1980 - 1986

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.18

ROAD CLASSIFICATION
Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

1 Angel Peak
2 Grapevine Spring
3 Tule Springs Lake
4 La Madre Spring
5 Blue Diamond NE
6 Mountain Springs
7 Blue Diamond
8 Blue Diamond SE

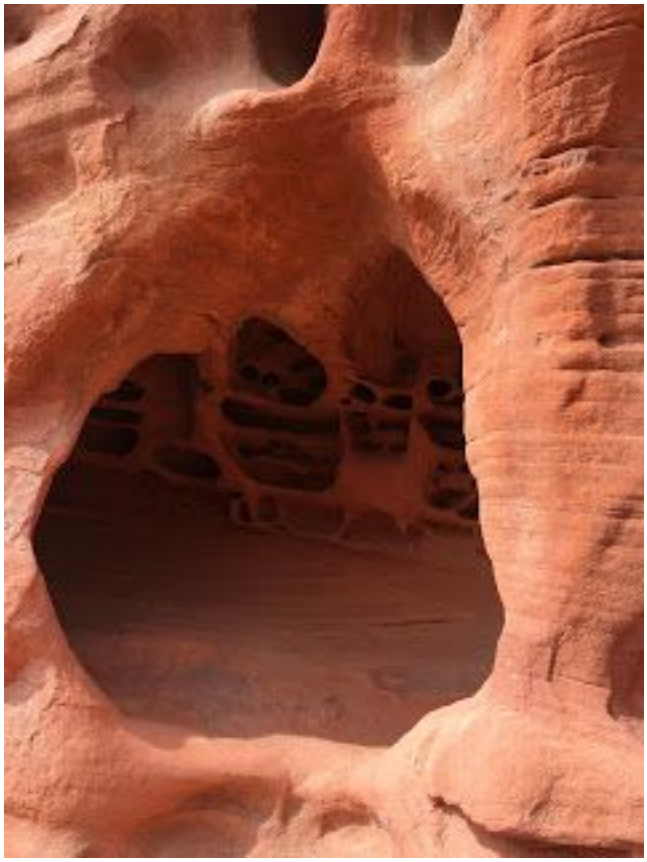
ADJOINING QUADRANGLES

LA MADRE MOUNTAIN, NV
2018


Red Spring Area
Picnic Area and Boardwalk Trail
Legend
Bus Drop Off
Bus Drop Off
Google Earth
N
100 ft


Aerial View of Red Spring
Legend
Bus Drop Off
What type of landform is this?
What type of landform is this?
What type of landform is this?
What type of landform is this?
What type of landform is this?
Bus Drop Off
What type of landform is this?
Google Earth
© 2020 Google
800 ft
N

What type of erosion caused the rolling round hills of Red Rock Canyon? _____



What type of erosion caused the holes in the Sandstone rock at Red Rock Canyon? _____

What type of event is happening in these pictures? _____