Water We Doing Here?

5th Grade Field Trip to

Red Rock Canyon National Conservation Area

Las Vegas, Nevada

Water We Doing Here?

Overview:
Students extend their learning about Earth's systems by defining terminology, making place-based observations of the Earth's systems and the water cycle, and describing how the Earth's systems interact using the Red Springs 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: Fifth

Next Generation Science Standards:

5-ESS2-1 Earth's Systems

Students who demonstrate understanding can:

5-ESS2-1. **Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.** [Clarification Statement: Examples could include the influence of the ocean on ecosystems, landform shape, and climate; the influence of the atmosphere on landforms and ecosystems through weather and climate; and the influence of mountain ranges on winds and clouds in the atmosphere. The geosphere, hydrosphere, atmosphere, and biosphere are each a system.] [*Assessment Boundary: Assessment is limited to the interactions of two systems at a time.*]

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	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions. • Develop a model using an example to describe a scientific principle.	**ESS2.A: Earth Materials and Systems** • Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth's surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes landforms, and influences climate. Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.	**Systems and System Models** • A system can be described in terms of its components and their interactions.

Field Trip Theme:
Red Rock Canyon National Conservation Area's topography creates a specialized water cycle that is important to the interaction of Earth's systems.

Objectives:
Students will:

- Define and give examples of the major Earth's systems
- Name the phases of the water cycle
- Name two plants and two animals that live in or depend on Red Rock Canyon National Conservation Area water cycle to survive
- Describe how the water cycle at Red Rock Canyon National Conservation Area works
- Describe the importance of the water cycle to plants and animals
- Simulate the paths that water takes in the water cycle
- Investigate and explain that water can be a liquid or a solid and can go back and forth from one form to another
- Create a model of the Earth's systems for the Red Springs trail at Red Rock Canyon
- Describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact

Background Information:
The water cycle describes the constant movement and ever changing states of water (hydrosphere) on, in and above the Earth. Heat from the sun causes water to evaporate from the surface of various sources such as oceans, lakes, rivers (hydrosphere) and even the land (geosphere). Air masses (atmosphere) that pick up the moisture move from one area to another. As they cool, the water vapor (hydrosphere and atmosphere) condenses and returns to earth as precipitation (hydrosphere). Animals and plants (biosphere) immediately use some precipitation (hydrosphere). However, it also flows over the surface (geosphere) into streams, rivers and lakes while some of it seeps into the soil to replenish aquifers.

The water of Red Rock Canyon National Conservation Area (NCA) (hydrosphere) supports a complex, interdependent community. Water plants like algae and pondweed support animals such as insects, frogs and spring snails. These in turn support larger animals like toads, bobcats and birds of prey (biosphere).

The location and movement of water affects community structure (i.e. what species can live in an area and how well those organisms can thrive). The quality of water (hydrosphere) is also important since specialized forms of life (biosphere) in the riparian areas cannot tolerate even small changes in their habitats.

Since humans (biosphere) are also a part of the community that depends upon water (hydrosphere), its quality and availability are important to us too. Moreover, the changing uses of Red Rock Canyon NCA to suit human needs and the impacts on it have influenced the populations of native and non-native species that live in and around it.

Some members of this community are very specialized and easily impacted by changes to the

volume, temperature, pH and general availability of water. The springtail snail and several endemic plants present an excellent case study of native species, which have been impacted by human alterations to the natural system (i.e. development of trails and recreational sites and by competition from introduced species (i.e. goldfish, crayfish and pondweed)).

The students, their families (biosphere) and their community depend upon water removed from underground aquifers as well as from Lake Mead (hydrosphere). Much of this "ground water" comes from unseen sources and is recharged through areas such as Red Rock Canyon NCA where high mountains create barriers for wind, and therefore increased precipitation. This recharging can take up to 600 years and is a factor in providing clean drinking water. It is important to keep the "ground" clean and provide areas for water to seep back into the natural cycle so that we can have healthy, diverse ecosystems.

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.

- accumulation: a gradual collection of water or other liquids
- aquifer: an underground water reservoir; found within permeable rocks, sand and gravel
- atmosphere: the layer of gases surrounding Earth
- biosphere: all life on Earth
- condensation: water moving from a gas or vapor to a solid state
- ecosystem: a natural unit that includes living and nonliving parts interacting to produce a stable system in which the exchange of materials between the living and nonliving parts follows closed paths
- evaporation: change from a liquid or solid into a vapor
- geosphere: the solid, rocky part of Earth's crust
- hydrosphere: all of the water on Earth in solid (ice), liquid (water), and gas (water vapor) phase
- precipitation: depositing moisture in the form of rain, snow, hail or dew
- rain shadow: an area on the leeward side of a mountain barrier that receives little rainfall
- transpiration: moisture moving from liquid to vapor through a barrier such as through leaves of a plant
- water cycle: the continuous circulation of water in systems throughout the planet, involving condensation, precipitation, runoff, evaporation and transpiration

Materials:

- Teacher resource pages (project these images from your computer or transfer them into a PowerPoint presentation to retain the colored graphics)
- Student Field Experience Journal copied for each student

Suggested Pre-Activity:

1. Introduce the field trip to Red Rock Canyon National Conservation Area by showing the Red Springs PowerPoint (Go to the Red Rock Website below, find "Teacher Resources" then "Trail PowerPoints" and "Red Springs Boardwalk")
    a. https://www.blm.gov/site-page/nevada-red-rock-canyon-national-conservation-area-teachers-and-parents-teacher-resources
2. Explain to students that the focus of the field trip will be on Earth's systems at Red Rock Canyon and the water cycle. Show students pages from the Teacher Resources section and stop after each Earth's system (geosphere, biosphere, hydrosphere, and atmosphere). Have students fill out graphic organizer in their Student Field Experience Journal.

Field Trip Summary:

Water plays an important role in the Red Rock Canyon ecosystem. During this field trip, students will:

- receive a brief introduction to the water cycle
- engage in an activity that demonstrates the path water takes in the water cycle
- perform a demonstration of the path water takes in the water cycle
- describe how Earth's systems (geosphere, biosphere, hydrosphere, and/or atmosphere) interact to create the water cycle
- take a tour of Red Springs to find evidence of the interaction of Earth's systems 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 the Earth's systems. 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 Earth's systems in each of the pictures or use the PowerPoint from the pre-activity.
2. Have students create a model (labeled diagram) of the Red Springs area labeling the parts of the Earth's systems that are evident.
3. Have students describe the interaction of two systems using the diagram.

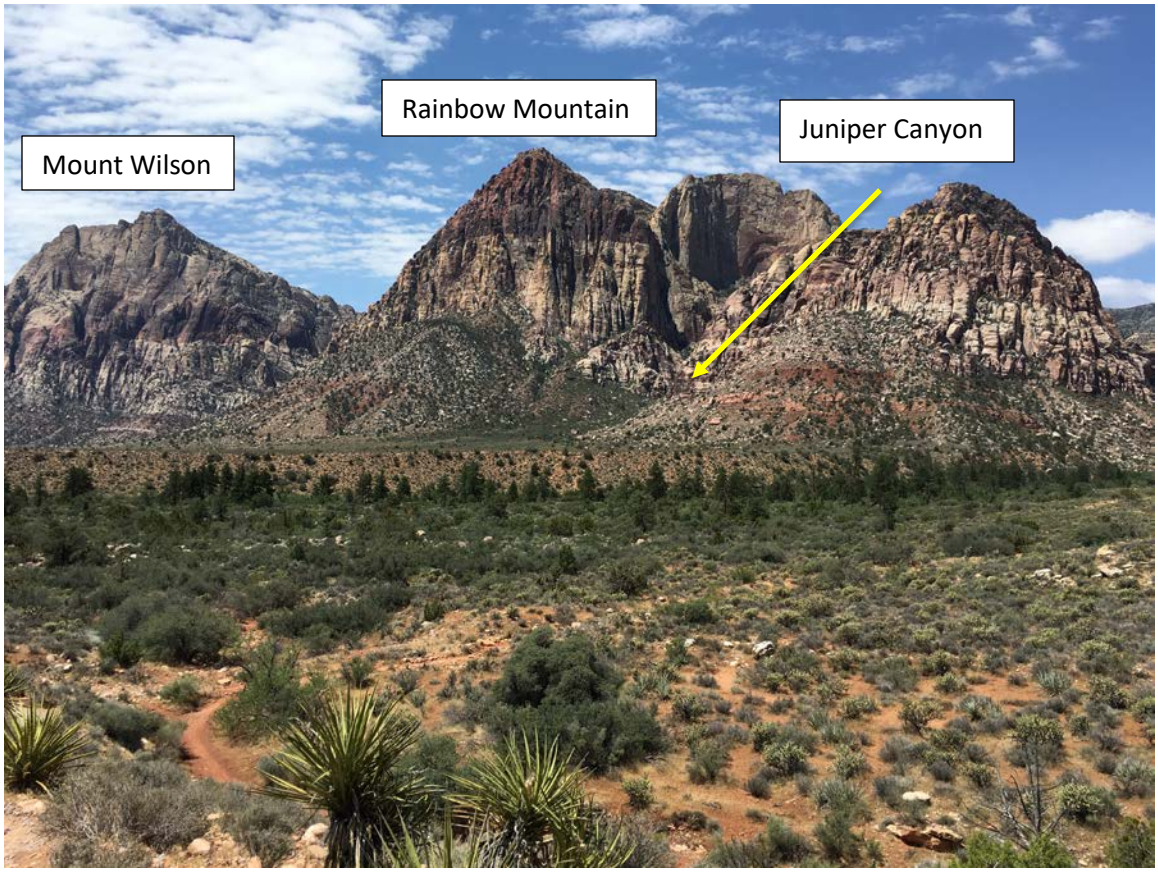
Teacher Resources

Geosphere

Definition: Earth's rocks, minerals, and landforms

Greek root and meaning: geo=ground/earth

Example: Mount Wilson, Rainbow Mountain, Juniper Canyon

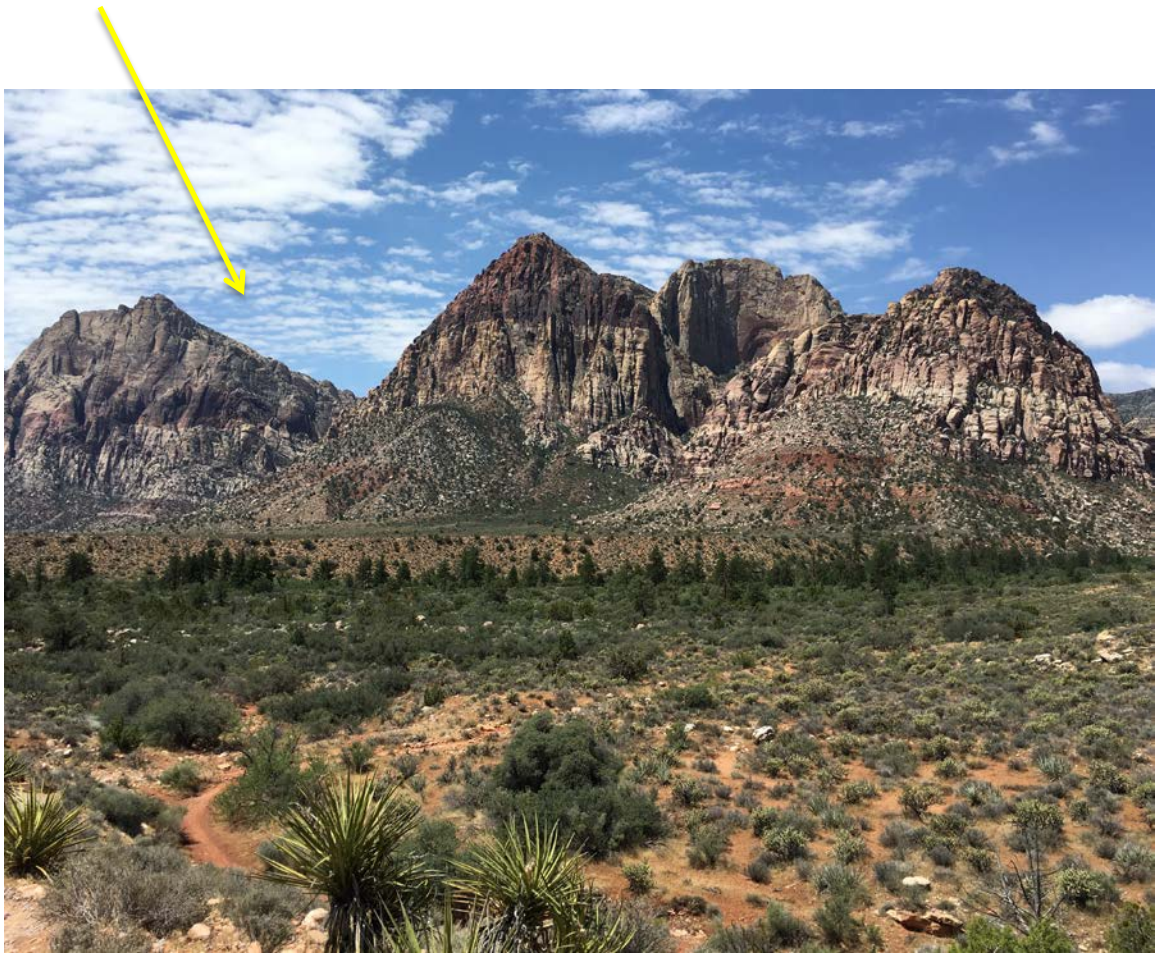


Atmosphere

Definition: the gases surrounding Earth

Greek root and meaning: atmo=air

Example: Air (cold and warm)



Hydrosphere

Definition: the water on Earth in the rivers, lakes, seas, groundwater, ocean, and atmosphere

Greek root and meaning: hydro=water

Example: Stream at Pine Creek at Red Rock Canyon

Biosphere

Definition: All the plants, animals and other living things in the water, on the land and in the air.

Greek root and meaning: bio=life

Example: snails and plants

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Student Field Experience Journal

Red Rock Canyon National Conservation Area

Las Vegas, Nevada

Name: _____

Earth's Systems

Before going on the field trip to Red Rock Canyon National Conservation Area, you will need to know Earth's major systems. As your teacher gives you information on Earth's systems, write the information on these graphic organizers.

Geosphere

Definition:	Greek root and meaning:
Examples from the teacher:	My examples:

Biosphere

Definition:	Greek root and meaning:
Examples from the teacher:	My examples:

Hydrosphere

Definition:	Greek root and meaning:
Examples from the teacher:	My examples:

Atmosphere

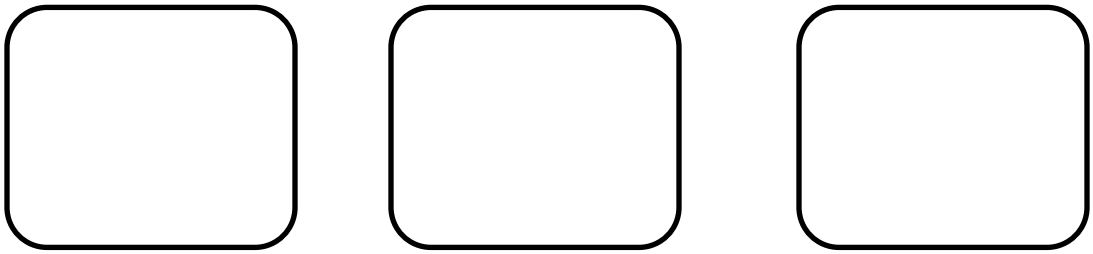
Definition:	Greek root and meaning:
Examples from the teacher:	My examples:

Field Trip Reflection

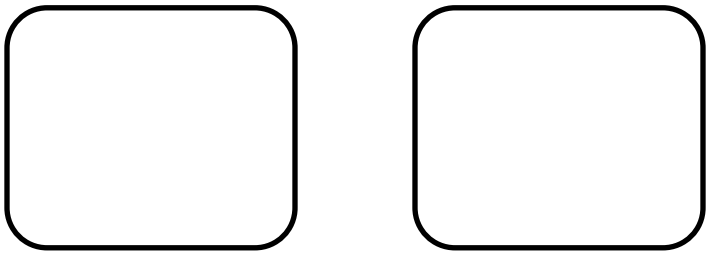
I took a field trip to _____

on_____

Here are three things I saw:

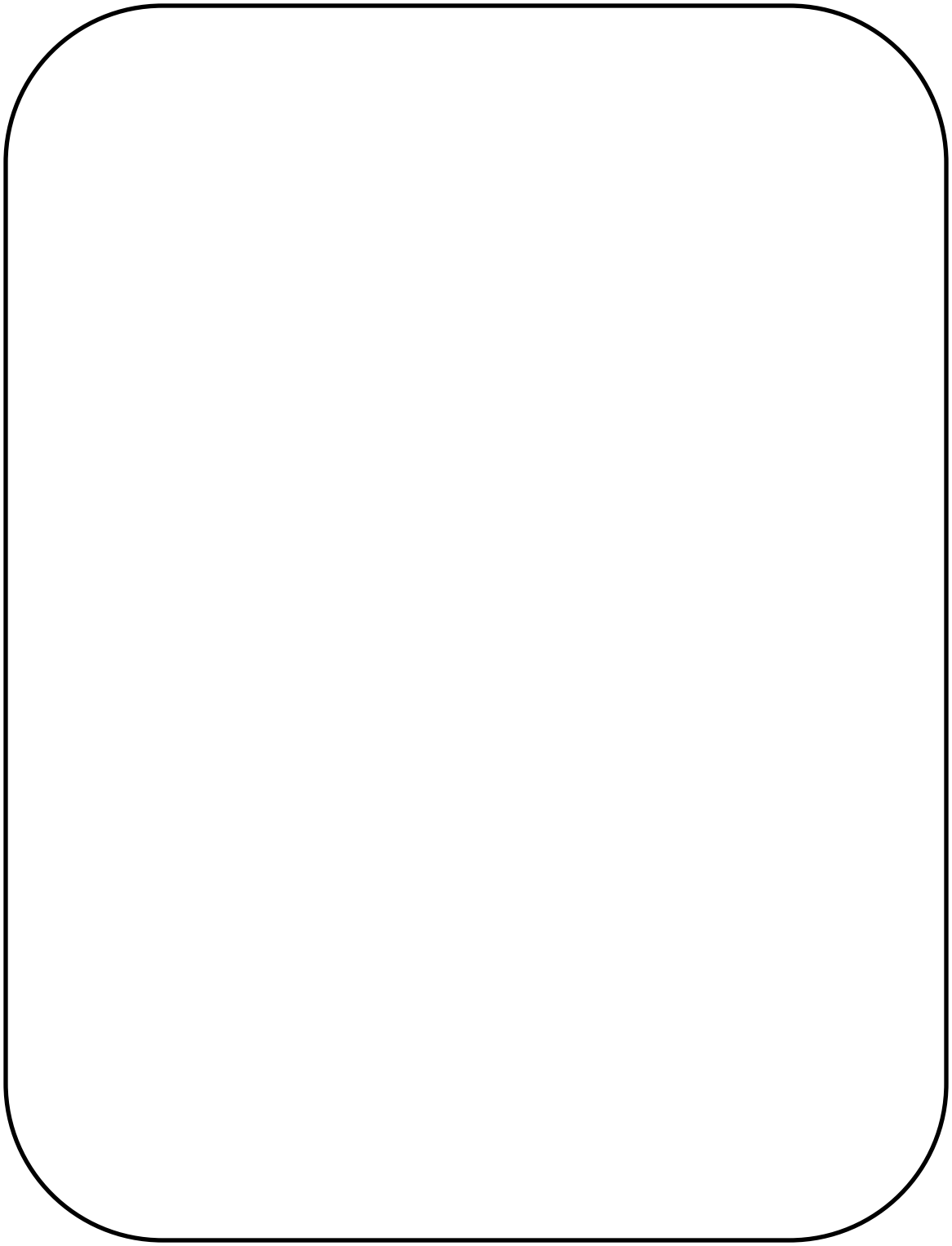


Here are two things I learned:



The best part of the day was:

Think about the field trip you have taken to the Red Rock Canyon National Conservation Area. Draw a diagram of the Red Spring Boardwalk area. Include labels of the Earth's systems (geosphere, biosphere, hydrosphere, and atmosphere) in your diagram.



Choose two Earth's systems from your diagram. Describe the relationship or interactions between the two systems using examples from the field trip.