

FALL 2017

My Public Lands

**JUNIOR
RANGER**

**Milkweed
for Monarchs**

Rock Art Stars

**Critters in
the Creek**

**A Disgusting
Discovery**

**Citizen Science
Adventures**



**Bureau of
Land Management**

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BLM manages
**245 MILLION
ACRES**

More than
99%
of BLM-managed
lands are open for
recreation

Become a BLM Junior Ranger!

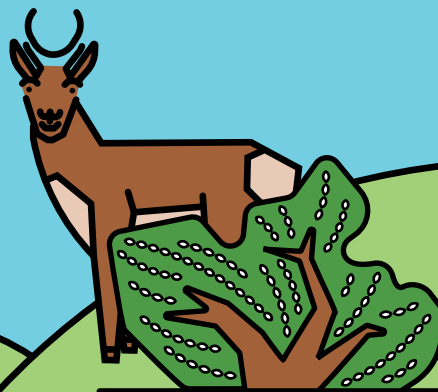
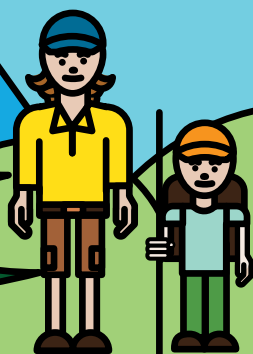
The Junior Ranger program
introduces young adventurers like
you to the lands and resources of the
Bureau of Land Management.
We invite you to join the adventure!
Learn more at blm.gov/education.



Belong to You!

More than **62 MILLION VISITS**

each year to BLM-managed lands



1

Find Junior Ranger activities at over **50 LOCATIONS**

The Bureau of Land Management (BLM) is a federal government agency that cares for public lands. These lands are managed for many different uses and belong to all Americans.

BLM lands provide energy resources, such as coal, oil, and natural gas. They provide habitat for wildlife, food for grazing animals, and timber for people. The lands contain evidence of the past, such as dinosaur bones and plant fossils. Archaeological sites on public lands help us learn about people who lived here long ago. Each year millions of people explore the big open spaces on these lands.



Energy



Forestry



Wild Horses & Burros



Grazing



Education



Conservation



Fire



Recreation



Cultural Resources

You Can Be a Citizen Scientist

Are you curious about nature? Do you enjoy outdoor adventures?
You can do citizen science while exploring the great outdoors!

2

Citizen scientists are people who volunteer to collect information, or data, for scientific research. Citizen scientists do not need a college degree, and they don't have to be adults. What they do need is a sense of curiosity about the natural world, and a little time to spend observing it.

Kids are natural citizen scientists. Like scientists, they are curious and ask a lot of questions. They notice things and enjoy investigating and exploring nature. Kids just like you can make real contributions as citizen scientists. In fact, many already are.

Citizen science:
scientific research that happens when ordinary people observe the world around them and share that information with scientists and land managers.

Millions of people around the world are doing citizen science. They are gathering more information, from more places, than scientists could ever do without their help. Thanks to citizen scientists, our understanding of the natural world is growing and growing.

Citizen Science on Public Lands

Out on public lands, people are collecting data while hiking, biking, fishing, and just having fun. They explore wildernesses, historic trails, wild and scenic rivers, national monuments, and other amazing places, and share their observations with land managers. Their work helps the BLM protect and preserve America's public lands for all of us to enjoy!



Are you interested in becoming a citizen scientist?

Fill out the application to see if you qualify.



3

Citizen Scientist Application

Name: _____

Age: _____

Check all that apply:

- ☐ I am a person.
- ☐ I have a brain.
- ☐ I am curious.
- ☐ I notice things in nature.
- ☐ I can share what I learn.
- ☐ I want to help scientists and public land managers.



I am interested in (circle):

Plants

Wildlife

Fish

Birds

Archaeology

Insects

Other: _____

Congratulations!

You have what it takes to be a citizen scientist!

There are many ways for you to get involved in citizen science. You can observe nature in your neighborhood, or sign up for a citizen science event. You can visit public lands with your family and collect data for land managers. Read on to learn about some exciting opportunities for citizen scientists like you.

Citizen Scientist ID Card

Just for fun, make your personal citizen scientist identification card. Feel free to add a photo or drawing of yourself.

Citizen Scientist ID Card



Name: _____

Areas of Interest: _____





Monitoring Monarchs

Every fall, monarch butterflies migrate hundreds, even thousands, of miles to southern California and central Mexico. Along the way, they stop to drink nectar from wildflowers and other flowering plants. Reaching their winter homes, they gather in the trees and form large clusters, or roosts, to stay warm. They remain in their roosts until spring, when warmer weather signals that it's time to breed. Soon, a new generation of monarchs will make the long trip back to their summer habitats.

4

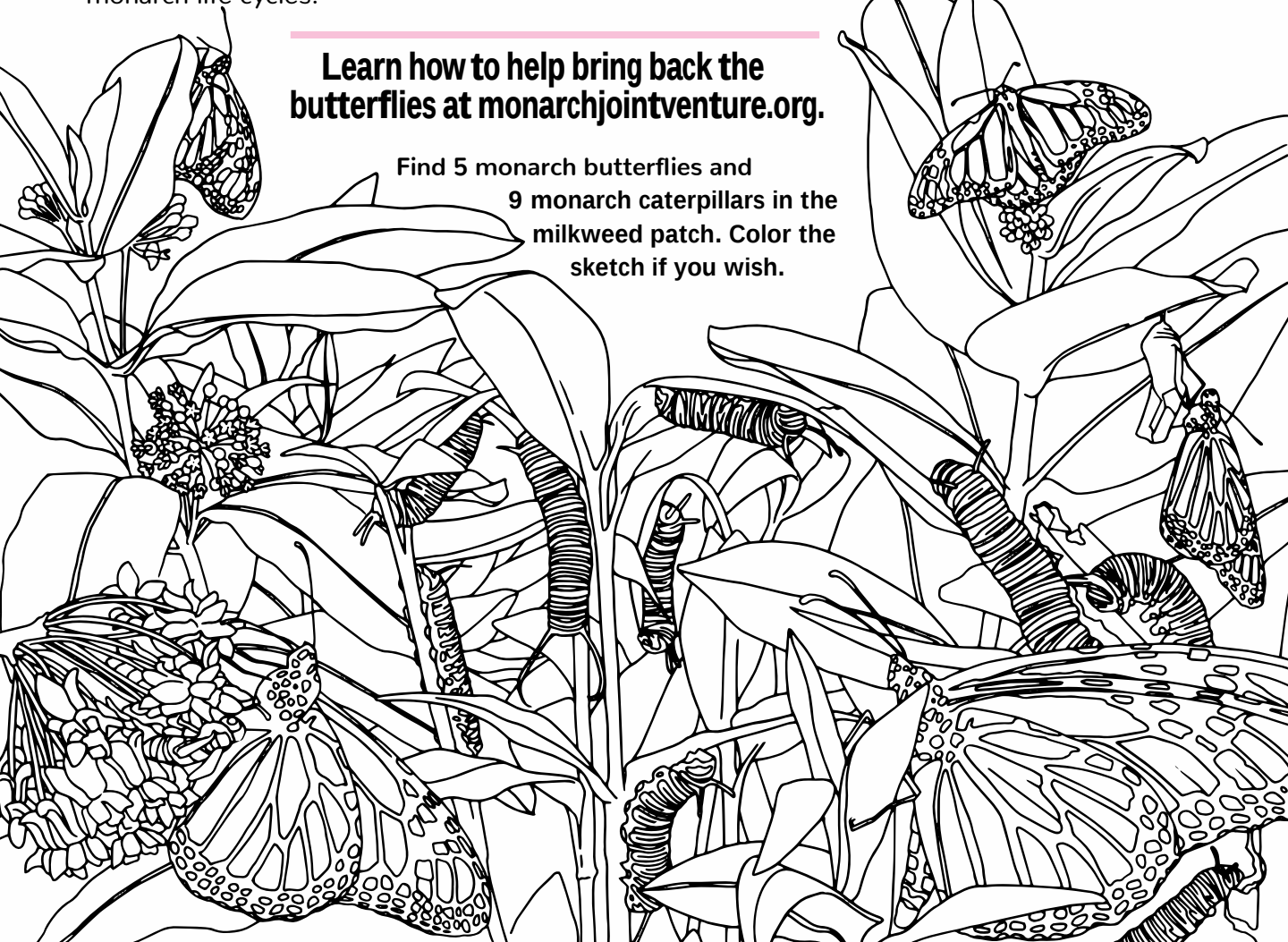
For female monarchs to reproduce successfully, they must lay their eggs on milkweed. The caterpillars that hatch will be hungry, and milkweed is the only plant they will eat. Without milkweed, monarchs cannot survive. But milkweed and sources of nectar have become scarce, and monarch populations are declining.



To increase monarch habitat, BLM scientists collect native milkweed seeds and use them to grow more milkweed. Seeds harvested from the new plants are shared with citizen scientists to plant in gardens, schoolyards, and parks. In addition, the BLM belongs to the Monarch Joint Venture, a partnership dedicated to monarch conservation. Citizen scientists can help by planting milkweed and other wildflowers, and by observing monarch life cycles.

**Learn how to help bring back the
butterflies at monarchjointventure.org.**

**Find 5 monarch butterflies and
9 monarch caterpillars in the
milkweed patch. Color the
sketch if you wish.**



Recording Ancient Rock Art

5



Long ago, people painted, chipped, and chiseled pictures on rock walls and boulders. Many ancient rock paintings (pictographs) and carvings (petroglyphs) are located on public lands. These rock art sites are evidence of the past and are considered cultural treasures. For Native Americans, rock art can have both historical and sacred value.



In New Mexico a group of citizen scientists, known as the Rock Art Team, is on a mission to create a permanent record of the ancient designs. They take photos, make measurements, and write down the locations of rock art sites. To avoid damaging the art, they



carefully follow historic preservation guidelines. Their work helps the BLM protect and preserve these cultural treasures. These citizen scientists really are rock art stars!

The BLM is required by law to protect cultural resources on public lands. Learn more at blm.gov/programs/cultural-resources.

Look at the pictures above. Which rock art designs are painted and which are carved? Write “1” for pictograph and “2” for petroglyph.

(Answers on page 12)





FIND YOUR CITIZEN

IN YOUR NEIGHBORHOOD, OR ON PUBLIC LANDS,



PARTY WITH THE STARS!

On the Grand Canyon's northern rim is a wild, rugged area of more than a million acres. By day, Grand Canyon-Parashant National Monument is a great place for exploring canyons, plateaus, and mountains. After the sun sets, it's one of the best places on Earth for exploring the night sky. Sparkling with the light of countless stars, our home galaxy looks like a milky river.

Most people live in places where they can't see the Milky Way. Because of light pollution, only the moon and the brightest planets and stars are visible. The Globe at Night website provides tools for measuring star brightness. Using the online app, citizen scientists have already shared more than 100,000 measurements. Scientists use this data to learn how light pollution affects birds, bugs, and other wildlife. Be part of this project by visiting globeatnight.org.



EXPLORE WILD PLACES!

With dramatic desert views, tall cliffs, and narrow slot canyons, Crack Canyon is a fun place for family adventure. There are hiking trails for all skill levels and rock art sites hidden in some of the canyons.

Crack Canyon is one of hundreds of Wilderness Study Areas, or WSAs, managed by the BLM. Managing WSAs is a huge job for the BLM, but specially trained citizen scientists are making it easier. Using an app called WildSNAP, they report on important wildlife habitat and historic sites. They take photos of native plants and damage to trails. These adventurous volunteers are helping the BLM keep the "wild" in "wilderness." Learn more at wildsnap.org.



Under the Wilderness Act of 1964, the BLM protects more than 200 federally designated wilderness areas. These wild, unspoiled places are habitat for wildlife and sources of clean water and clean air.

SCIENCE ADVENTURE

HAVE FUN DOING CITIZEN SCIENCE WITH YOUR FAMILY.



FIND FEATHERED FRIENDS!

The place to see eagles, falcons, owls, and other raptors is Morley Nelson Snake River Birds of Prey National Conservation Area in Idaho. Every year, hundreds of pairs of these meat-eating birds nest on the canyon walls of the Snake River. Another great destination for birdwatching is Jupiter Inlet Lighthouse Outstanding Natural Area in Florida. As you hike the trails or paddle the lagoon, watch for pelicans, egrets, ibis, and other water birds.

Celebrate Urban Birds (CUBS) seeks kid citizen scientists, like you, to study birds that live in cities and towns. Your observations will help scientists understand how birds use city parks and other green spaces. If you see a nest in a weird place, enter a photo in the Funky Nests Contest. Sign up at celebrateurbanbirds.org.

People of all ages can participate in the Great Backyard Bird Count. Learn more at birds.cornell.edu.



CONNECT WITH NATURE!

California's King Range National Conservation Area is a favorite destination for families. Watch for signs of spring along the Bear Creek Nature Trail. Share your observations with the BLM to help the agency monitor seasonal changes. In autumn, head to the Bizz Johnson National Recreation Trail to enjoy the fall colors while hiking, biking, or horseback riding. Wander back in the winter with skis or snowshoes to look for animal footprints in the snow.

Nature's Notebook needs citizen scientists to observe how living things adapt to the seasons. Visit the website to select a plant or an animal to observe. The data you share will help scientists and land managers and could lead to scientific discovery! Learn more at naturesnotebook.org.

**Plan your next adventure at
blm.gov/visit!**

Life in the Stream



8

A watershed is the land that rain and melted snow flow across and through on the way to streams, rivers, wetlands, and lakes. The health of stream water depends on the quality of the watershed. Watersheds also affect the water people use at home, school, and work.

Much of the watershed in the West includes public lands. One of the BLM's many jobs is managing land and water resources to protect those watersheds. If a stream or river becomes contaminated, that can harm the fish, the wildlife, and the people who depend on the watershed.

Water Watch
Join citizen scientists from around the globe in a worldwide water watch. Find out more at monitorwater.org.



Stream Selfie
Help scientists learn more about the health of our streams. Take a picture of a stream in your neighborhood, answer a few questions, and share at streamselfie.org.



How healthy are America's streams? Citizen scientists are helping to find the answer. Healthy streams attract a wide variety, or diversity, of living things. One way to judge the health of a stream is by counting the different kinds, or species, of animals living in the stream.

Counting Creek Critters

Give your neighborhood stream a checkup by counting the number of insect- and worm-like critters (stream macroinvertebrates) that live in the water. Use the Creek Critters Data Sheet to identify and record the species you see.



Materials:

- Pan or shallow container for holding creek water
- Net or cup for scooping up water bugs
- Magnifier (optional)
- Pencil or pen
- Ruler (see side of page)
- Creek Critters Data Sheet

Find a free app for identifying stream macroinvertebrates at iwla.org/aquabugs.



Creek Critters Data Sheet

Location: _____ Date: _____ Time: _____

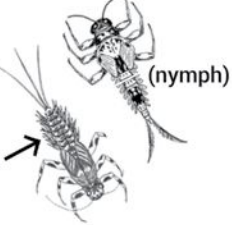
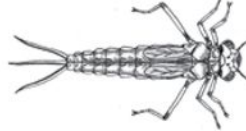
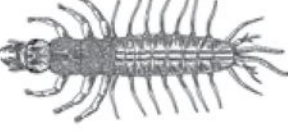
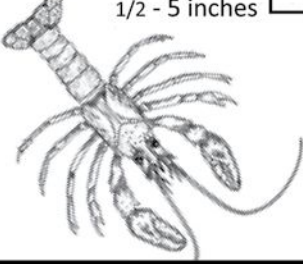
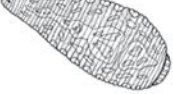
Weather (circle): sunny cloudy dry raining snowing hot cool cold other: _____

Appearance of water (circle): clear muddy brown green oily foamy milky other: _____

Streambed color (circle): orange or reddish yellow brown black other: _____

Odor of water (circle): musky rotten egg (sulphur) metallic chemical (e.g., chlorine) other: _____

9

Sensitive: Needs clean, unpolluted water	Somewhat sensitive: Can tolerate some pollution	Not sensitive: Tolerant of pollution
☐ Caddisfly (except net-spinning) 1/2 - 1 1/2 inches  Often covered in stones, sticks, or leaves  ☐ Mayfly 1/4 - 1 inch  Look for gills fluttering in the water ☐ Stonefly 1/2 - 1 1/2 inches  ☐ Riffle beetle 1/16 - 1/8 inch  ☐ Water penny 1/4 - 1/2 inch  ☐ Gilled snail 1/16 - 3/4 inch 	☐ Net-spinning Caddisfly 1/2 - 1 inch  ☐ Dobsonfly 3/4 - 4 inches  ☐ Crane fly 1/3 - 2 1/2 inches  ☐ Damselfly 1/2 - 2 inches  ☐ Sowbug 1/4 - 3/4 inch  ☐ Dragonfly 1/2 - 2 inches  ☐ Alderfly 1/2 - 1 1/2 inches  ☐ Fishfly 3/4 - 4 inches  ☐ Scud 1/8 - 1/4 inch  ☐ Crayfish 1/2 - 5 inches 	☐ Aquatic worm 1/4 - 2 inches  ☐ Black fly 1/8 - 1/4 inch  ☐ Midge 1/8 - 1/4 inch  ☐ Leech 1/4 - 2 inches  ☐ Lunged snail 1/8 - 1 inch 
Total sensitive to pollution:	Total somewhat sensitive:	Total not sensitive:

Based on your observations, how do you rate the stream's health?

Talk with family and friends about things you can do if you think your stream is unhealthy.

INVASIVE SPECIES DISCOVERED

Sitka, Alaska
June 2010

Bioblitz:
a special event
for scientists and
volunteers to record
all the living species
they see in an
area.

Participants in a citizen science bioblitz in Whiting Harbor made a disgusting discovery. Below the water's surface, massive numbers of a small sea animal seemed to cover everything. Sea squirts were clinging to docks, moorings, boat ramps, and rocks. The appearance of the slimy mass earned sea squirts a nickname—rock vomit.

10

In the waters of North America, sea squirts are a non-native, or invasive, species, and so they have no natural enemies. Sea squirts reproduce quickly, even by cloning. Without predators or disease to control them, they can quickly take over. This was the case in Whiting Harbor, where native shellfish and fish habitat had disappeared under a carpet of slime.



Sea squirts clinging to an oyster net

The BLM is responsible for managing and protecting fish habitat in Whiting Harbor. The discovery of sea squirts meant BLM scientists had a big problem. So they teamed up with scientists from other agencies to think of possible solutions, like treating areas with salt, chlorine, and cement dust. By comparing treated areas to untreated “control” areas, they are finding the most effective way to get rid of sea squirts and prevent them from spreading.

Backyard Bioblitz

You can do a bioblitz almost anywhere—in the city, in a park, at your school, or in your yard. Any green space, however small, will do. Invite family members and friends to join in the fun and become bioblitz team members.

Draw a simple map of the site. Label the main features, such as trees, logs, stumps, leaf piles, and paths. Spend some time looking around for wildlife. On the map, mark where you find them. A field guide can help you identify the species by name. Take pictures or sketch what you see. When you are done, complete the bioblitz log.

Bioblitz Log:

Bioblitz Site _____ Date/Season _____

Weather _____ Temperature _____



Count or tally the number of species of animals you see for each of the categories listed. If you saw sparrows, cardinals, and robins, the count for “Birds” would be 3, because you saw three different species.

Species Categories:

Amphibians _____ Fish _____ Mammals _____

Birds _____ Insects _____ Reptiles _____

Other _____ Total number of species observed _____

You can contribute your observations to the citizen science databank at [iNaturalist.org](https://www.inaturalist.org).



BLM Junior Ranger Certificate

**As a Bureau of Land Management Junior Ranger,
I promise to:**

- **Do all I can to help preserve and protect the natural and cultural resources on our public lands.**
- **Be aware of how my actions can affect other living things and the evidence of our past.**
- **Keep learning about our important heritage.**
- **Share what I have learned with others.**

Junior Ranger Signature

Date

Answers

Recording Ancient Rock Art

pictographs = 1

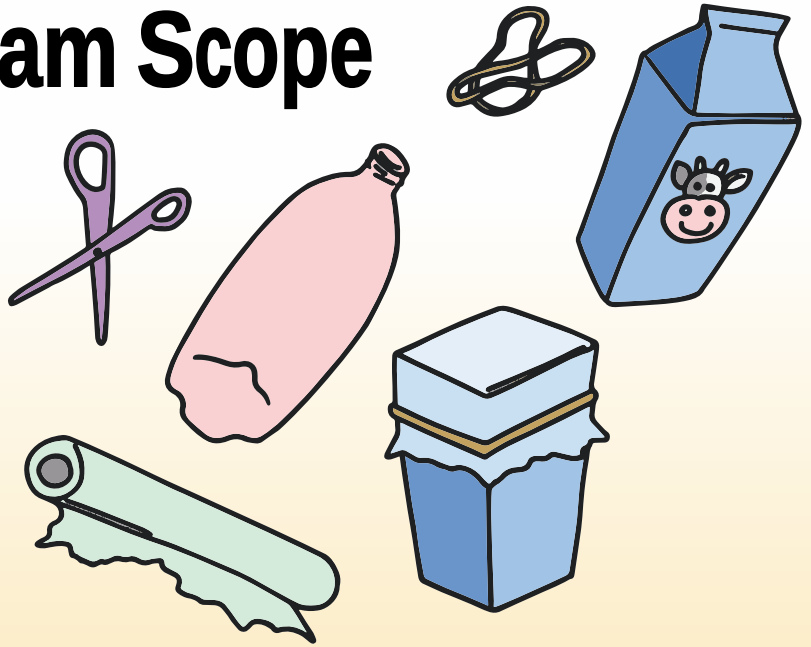
petroglyphs = 2

2	1	1
1	2	2
2	2	1

Make a Stream Scope

Materials:

- Tall container, such as a large beverage bottle, milk carton or jug, or wipes container
- Plastic wrap
- Rubber bands
- Duct tape or packing tape
- Scissors



Activity instructions:

1. Cut the bottom off of the container. If you are using a bottle or jug, cut the neck off too. Ask an adult for help if the plastic is difficult to cut.
2. Cut a piece of plastic wrap large enough to cover the top of the container and as much of the sides as possible.
3. Place the plastic wrap over the top of the container. Use rubber bands to keep it in place.
4. Tape the edges of the plastic wrap securely to the sides of the container to prevent water from entering.

Note: The plastic should be a little loose, so it will curve inward and act like a lens.

Test your stream scope by dipping it in a sink or bowl of water to make sure it doesn't leak. Place a penny or other small item in the bowl to see how well the scope works. (If it leaks, you will not be able to see clearly.) Adjust as necessary.

When you are satisfied with your design, head down to the stream. Place your stream scope gently into the water and peer inside. Do you see any critters in the creek?





Gold Butte National Monument, Nevada

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This publication was produced by the BLM Division of Education, Interpretation, and Partnerships.

Production services were provided by the BLM National Operations Center, Information and Publishing Services Section.