Mountain Lines

MAGAZINE OF THE MCDOWELL SONORAN CONSERVANCY

Winter 2018

Our New Field Institute Manager

A perfect fit for a big job

The Trail to Sunrise Peak

A hike with stunning views

A Gila Monster on a Mission

A rarely observed digging frenzy

McDowell Sonoran Conservancy

FROM THE PAST INTERIM EXECUTIVE DIRECTOR

Paul Staker,
Interim Executive Director

The McDowell Sonoran Conservancy welcomes Justin Owen as our new executive director beginning January 1, 2018. Owen brings nearly 20 years of experience in agency leadership, large-scale event management, public affairs advocacy and volunteer recruitment. Most recently, Owen spent five years as executive director of Phoenix Pride where he oversaw the organization's annual production of Arizona's two largest lesbian, gay, bisexual and transgender (LGBTQ) community events, fundraising, issue advocacy, and outreach efforts. He managed an in-house staff of five and over 750 community volunteers, as well as an annual budget of over $1.5 million. Under his leadership, Phoenix Pride saw record growth in revenue and attendance at its events, and strengthened its voice as a leading advocate for equality and rights for all people throughout the Greater Phoenix area and Arizona.

We are thrilled to welcome Owen as the Conservancy's fourth executive director. Working together, we will take the Conservancy's service to our community to the next level while we maintain the beauty and accessibility of Scottsdale's McDowell Preserve—a unique and indispensable national treasure.

As I reflect on my time as the interim director during the last seven months, I have come to appreciate even more the unique role that the Conservancy plays in helping to establish and sustain the Preserve. Our mutual commitment with the City of Scottsdale to manage the Preserve continues to evolve as we find new ways to support efforts in scientific research, public and youth education, and safe and enjoyable visitor experiences. I personally look forward to returning to a more active role in the steward programs that represent the many services that the Conservancy provides to our residents and visitors.

Table of Contents

On the cover: Sunrise Trail leads the hiker to the summit of Sunrise Peak, one of the few accessible summits in Scottsdale's McDowell Sonoran Preserve. Photo by Dennis Eckel.

About Us

The McDowell Sonoran Conservancy champions the sustainability of the McDowell Sonoran Preserve for the benefit of this and future generations. As stewards, we connect the community to the Preserve through education, research, advocacy, partnerships and safe, respectful access.

McDowell Sonoran Conservancy
7729 East Greenway Road, Suite 100
Scottsdale, AZ 85260
480-998-7971

www.mcdowellsonoran.org
info@mcdowellsonoran.org

Mountain Lines is published quarterly by the McDowell Sonoran Conservancy, a 501(c)3 nonprofit organization and sent to members and donors.

Peggy McNamara, editor
McDowell Sonoran Conservacy
master steward

Creative design donated by
McDowell Sonoran Conservancy
steward, Dennis Eckel,
Eckel Advertising & Photography

Nature Guides conduct guided tours along the nature trails in the Preserve. The hikes include stops to share information about desert flora, fauna and geology. Photo by Lynne Russell.

Connecting the Community with Nature

By Don Brockway,
McDowell Sonoran Conservancy lead steward

Imagine coming through the Gateway Trailhead on Halloween, and there to greet you is a collection of the scariest, creepiest critters of the desert—spiders, snakes, bats, scorpions and more. The Nature Guides have them all! Every fall, the Nature Guides program kicks off the season with the Halloween Spooktacular Trailside naturalist station.

The Nature Guides program began with a group of McDowell Sonoran Conservancy stewards who had a passion for learning about the flora and fauna of the Sonoran Desert. The program members learned from resources such as the Desert Botanical Garden, Arizona-Sonora Desert Museum, Southwest Wildlife Conservation Center, Arizona Game and Fish Department, Center for Native and Urban Wildlife at Scottsdale Community College, and Liberty Wildlife—to name a few. Those organizations provided information for our extensive Sonoran Desert knowledge base. Scottsdale's

McDowell Sonoran Preserve provided an abundance of undisturbed natural habitat and wildlife and the perfect setting for teaching. These stewards chose as their mission to provide educational and interactive opportunities for the community to learn about the value, significance and wonder of Scottsdale's McDowell Sonoran Preserve.

The Nature Guides connect the community with nature through multiple informal learning activities and use an interpretive presentation format to promote questions and learning opportunities. One of these activities includes guided tours that are theme-based hikes conducted on the Preserve nature trails. The hikes are led by Nature Guides who use show and tell items to engage and educate the audience. Hikes are directed toward elementary school students—ideally fourth and fifth graders—senior citizens and families. The hikes last about one hour and are typically less than one mile. Their format is to walk, talk and make use of the five senses. The guides keep the group moving with short stops that provide teachable moments along the nature trail. This format works especially well with elementary school students. In addition to the planned educational content of the hike, the guides will point out and expand upon unplanned sightings that happen along the nature trail, such as when a hawk floats by in the sky, a brilliant butterfly flits about, or a lizard darts across the trail.

A snake skeleton is one of many exhibits on display throughout the season at Family Sonoran Sunday. Photo by Lynne Russell.

Another activity designed to promote a casual learning experience along the trail is the use of trailside naturalist stations. Nature Guides set up educational tables at the Preserve trailheads, featuring hands-on items, pictures and fun interactive activities. This occurs on select Saturdays from October through March, usually at Gateway Trailhead. Check our website for the dates. The guides foster an informal atmosphere that encourages visitors to stop at the table, chat about the display and then resume hiking. The tables can be themed allowing for a seasonal flavor, such as the annual Halloween Spooktackular, or topical stations set up to educate people about plants, animals, geology or even scat. A large group of Nature Guides provide many opportunities for interactive fun for the visitors, as well as the guides.

Yummy flowers tempt this desert tortoise on display at Family Sonoran Sunday. The desert tortoise is not frequently seen because it spends as much as 90 percent of its time in an underground burrow. It could live to be 100 years old. Photo by Lynne Russell.

Nature Guides also work with Preserve partners to bring the Sonoran Desert to life for community family visitors. The scheduled outdoor presentations, called Family Sonoran Sundays, happen at Gateway Trailhead and Brown's Ranch Trailhead during select Sunday afternoons. Check our website given below for the dates. Our partner presenters at these events include experts from Arizona Game & Fish Department who usually feature live reptiles, Southwest Wildlife presenters who provide our mammal friends, and Liberty Wildlife and Wild at Heart who bring their magnificent birds of prey. The presentations usually begin at 3 p.m. and last for about one hour in the shade of the trailhead amphitheater or breezeway. This is a wonderful way to spend time with the family and learn about the Sonoran Desert and life in the Preserve using an up-close wildlife encounter with an expert presenter.

If you want to encounter a skunk without consequences, Family Sonoran Sunday is the place to do it. These animals are common in a wide variety of habitats, including the Sonoran Desert. Photo by Lynne Russell.

Liberty Wildlife, a frequent presenter at Family Sonoran Sunday, displays a raptor and talks about how raptors live in the Sonoran Desert. Photo by Lynne Russell.

Nature Guides contact nearly 3,000 visitors per season beginning in October and ending in March. In February 2017, the Redfield Elementary School in Scottsdale bused their fourth-grade class members to the Gateway Trailhead to provide its students with a real-life science experience of the topics they were discussing in the classroom. The Nature Guides incorporate STEM (Science, Technology, Engineering and Mathematics) educational standards in many of the interactive presentation materials being used.

In November 2016, the Nature Guides hosted a group of students from Scottsdale's Sister City, Uasin Gishu County, Kenya. Guides entertained the visitors with contrasts and comparisons of Sonoran Desert flora and fauna with the flora and fauna of their desert, the Chalbi Desert. It proved to be quite a rewarding experience for both the Nature Guides and the visitors!

Future plans include an expanded menu of educational programs and interpretive tours. The idea is to encourage participants to want more knowledge, come back again and build an appreciation of the Preserve itself so it will be sustained for future

Visitors from Uasin Gishu County, Kenya pose with their host Nature Guides during a guided tour in the Preserve. Photo by Lynne Russell.

Hundreds of school children visited the Preserve during the Fall 2017 Junior Citizen Science Festival. Nature Guides and other volunteers were on hand to make their visit fun, and to host trailside nature stations to educate the students about the Preserve and the Sonoran Desert. Photo by Dennis Eckel.

generations. The Nature Guides program will continue partnering with the City of Scottsdale to provide Title 1 school field trips through their after-school program, allowing students to experience the Sonoran Desert and its flora and fauna firsthand. Expanded participation in the McDowell Sonoran Conservancy sponsored Junior Citizen Science Festival provides a fantastic platform to engage students and families with more than 15 hands-on interactive learning stations to further unlock the mysteries of the Sonoran Desert and the Preserve. At the festival, children and families learn how scientists study the environment and how they, as citizen scientists, can take an active part in increasing knowledge of our natural world. The Junior Citizen Science Festival is held in spring and fall with one day of each festival devoted to school field trips and the other to public. The next Junior Citizen Science Festival is scheduled for March 2 and 3, 2018. Youth receive a field notebook to keep track of their observations and experiments from the festival activities. The event is at the Lost Dog Trailhead on the Kovach Family Nature Trail.

At the Halloween Spooktacular station, creepy critters are on display. Nature Guides talk to visitors about the place of these critters in the Preserve ecosystem. Photo by Lynne Russell.

The Nature Guides will continue to develop methods and programs that create connections with the community. Visitors of all ages can experience the wonders of the Sonoran Desert through the McDowell Sonoran Preserve!

Learn more about these activities and check out the events schedule at the Conservancy Kids website at http://mcdowellsonoran.org/education/youth-education.

Meet the Newest Member of Our Conservancy Family

By Amina D'Ambrozio,
McDowell Sonoran Conservancy steward

The McDowell Sonoran Conservancy Field Institute has a new manager, Tiffany Sprague. I met Tiffany recently to talk to her about her work and her new job. I quickly learned that Tiffany's childhood experiences with family camping and hiking vacations are what nurtured her love of nature, which still endures. This Arizona native grew up close to the Superstition Mountains and feels very connected to the natural environment.

For the past decade, Tiffany worked with the Grand Canyon (Arizona) Chapter of Sierra Club, which seeks to educate the public and decision-makers about Arizona's environment. Prior to that, she served as education events coordinator at the Arizona Science Center, where she developed and organized numerous science-focused family events. Now, as manager of the Field Institute, she is eager to continue sharing her passion and love of nature with diverse audiences. As part of her new position, Tiffany oversees the Conservancy's Nature Guide Program. One of her top priorities is expanding the program to further engage youth in science and conservation. She wants people to have opportunities to learn through firsthand experiences, ensuring a better understanding of and a healthy respect for all life that encompasses our natural world.

As part of her work with Sierra Club, Tiffany participated in the Arizona Water Sentinels program in which citizen scientists monitor the quality and quantity of water in Arizona's rivers and streams. In this photo, she is measuring the flow of the Verde River near Clarkdale, Arizona. Photo by Scott Sprague.

Tiffany's background is as a wildlife biologist.

Tiffany's Conservancy profile picture is one of the few photos of her not taken in nature or holding a wild animal. Photo by Steve Dodd.

She has worked with a diversity of species across the state, including Sonoran desert tortoises, black-footed ferrets, and various bat species. Tiffany completed her Master of Science degree in Applied Biological Sciences at Arizona State University this past May. Her research focused on the microhabitat and movements of the northern Mexican gartersnake, which is listed as threatened by the United States Fish and Wildlife Service. Her research is being used by resource managers to help protect this species and its habitat. Not only does Tiffany want to help resource managers protect the northern Mexican gartersnake, but she also wants to help educate the public about all snakes and other misunderstood wildlife.

Tiffany's research for her master's degree focused on the habitat and movements of threatened northern Mexican gartersnakes at Bubbling Ponds Hatchery in Cornville, Arizona. In this photo, she is preparing to release a female gartersnake back into the wild. Photo courtesy of Tiffany Sprague.

Leading and working with volunteers is another area in which Tiffany has a wealth of experience. She spends much of her free time volunteering on various wildlife and conservation projects across the Southwest. Before joining the Conservancy, she assisted with its mule deer capture efforts and assisted in a training workshop in radio telemetry techniques used by that project. Now, in her new capacity, Tiffany oversees the Field Institute's Citizen Science Program, in which trained volunteers participate in research, fieldwork, and activities that focus on the Preserve's natural resources.

Much of Tiffany's wildlife work has used radio telemetry, a process that enables researchers to locate animals without having to see them. Photo by Scott Sprague.

As a wildlife biologist, Tiffany enjoys restoring habitat. Here, she is seen helping to remove nonnative buffelgrass from the Rio Salado Habitat Restoration Area in Phoenix. Tiffany is now leading Conservancy volunteers working on a similar project in Scottsdale's McDowell Sonoran Preserve. Photo by Scott Sprague.

At home, Tiffany and her husband, Scott, have three youngsters—Acacia Greggii (the cat), a Sonoran Desert tortoise they adopted through the Arizona Game and Fish Department, and a barred tiger salamander she inherited from a research project. In her free time, she loves to bake and is known for her Irish cupcakes. She's already looking forward to preparing cupcakes for their 14th annual St. Patrick's Day celebration. Knitting and crocheting are other hobbies she enjoys.

Tiffany and Scott are big fans of the outdoors and enjoy kayaking, rock climbing, camping, and hiking. Tiffany has a personal goal of hiking all of the trails in the Preserve and completed four trails in her first month with the Conservancy.

Tiffany's favorite hike is the Mount Baldy Loop in the White Mountains of Arizona. The White Mountains span the Arizona and New Mexico border and contain the second highest peak in Arizona. It's a great place to hike if you want to see some incredible wildlife. On a three-day camping trip there, she and Scott saw bighorn sheep, a bobcat, some elk, and Mexican gray wolves!

When you combine Tiffany's solid experience in research and education, her experience leading volunteer efforts, and her incredible passion for nature, it's clear that the Field Institute is in great hands. Welcome, Tiffany!

Junior Citizen Science Festival

Explore, discover, learn

Grinding seed pods in a metate makes learning ethnobotany fun. At the Junior Citizen Science Festival, children experience how desert people use seeds from native plants for their food. Photo by Lynne Russell.

At the Junior Citizen Science Festival, children have close encounters with a number of live desert animals. Here, children meet a great horned owl brought by Liberty Wildlife. Photo by Lynne Russell.

Children learn about the importance of the saguaro and how slowly it grows in this fun exhibit. For example, this child learns that because she is four feet six inches tall, if she were a saguaro and received 7.5 inches of annual rainfall, she would weigh 382 pounds and be 59 years old! Photo by Dennis Eckel.

This exhibit at the Junior Citizen Science Festival displays the skeletons of several Sonoran Desert animals. Whose skull is this? Is it a predator or prey? The festival uses a hands-on approach to learning about desert animals. Photo by Lynne Russell.

The Junior Citizen Science Festival teaches children how to identify animals by examining the scat they leave behind, and matching it to a labeled photograph. This activity lets children experience a well-known technique used by researchers in the field. Photo by Dennis Eckel.

Children learn how archaeologists uncover clues to the lives of ancient people at this Junior Citizen Science Festival station. Using trowels, they dig through dirt filled boxes to find artifacts—Native American pottery sherds. They measure the depth where a sherd was buried, the dimensions of the fragment, and record their observations. A guide then helps them discover what it might be, and how it may have been used. Photo by Dennis Eckel.

The McDowell Sonoran Conservancy

Join us for this FREE family event!

McDowell Sonoran Preserve
Lost Dog Trailhead (NE Scottsdale)

12601 N. 124th St., Scottsdale, AZ 85259

March 2 & 3, 2018

9:00 a.m. – 2:00 p.m.

Round up your elementary school-age kids, grandkids, nieces and nephews, even your neighborhood kids and bring them to the McDowell Sonoran Conservancy's third annual Junior Citizen Science Festival, presented by Cox Communications, our friend in the digital age, and in cooperation with the City of Scottsdale. Children and families will enjoy more than a dozen interactive, fun-filled educational STEM* inspired activities about Sonoran Desert natural history and learn how junior and adult Citizen Scientists study the environment.

Pre-registered participants will get a special Junior Citizen Scientist tote bag loaded with fun, educational items. Children and youth must be accompanied by an adult. Space is limited so reserve your spot today!

For more information and to register, contact JCSFinfo@mcdowellsonoran.org or call (480) 998-7971

The McDowell Sonoran Conservancy is grateful to these important sponsors for their generous support!

COX CONNECT2 STEM

MAKING A DIFFERENCE THUNDERBIRDS CHARITIES

Bass Pro Shops

ARIZONA SCITECH SIGNATURE event

CITY OF SCOTTSDALE MCDOWELL SONORAN PRESERVE

*Science, Technology, Engineering and Mathematics

The Scottsdale Unified School District neither sponsors nor endorses the organization or activity represented in this material. The distribution or display of this material is provided as a community service.

Junior Citizen Science Festival

McDowell Sonoran Conservancy

Conservancy Kids

www.mcdowellsonoran.org

A Not So Cuddly Teddy Bear

By Steve Jones,
Botanist

Flowers on the teddy bear cholla are indistinct from the rest of the plant. Because the plant rarely produces seed, it puts little effort into attracting insects. Photo by Steve Jones.

Most people remember their first contact with a teddy bear cholla *(Cylindropuntia bigelovii)*. It generally leaves a lasting impression when the spines on the teddy bear cholla attach to the passer-by—penetrating clothes, shoes and flesh. The cactus joint readily breaks off, and the joint is carried away by the victim. The barbed spines make it very difficult to remove.

Teddy bear cholla is an erect cactus that grows to about five feet tall. It usually has a single trunk with many short branches made up of one to several joints. The joints are relatively thick and are densely covered in inch-long yellow spines. Each spine is covered by a thin, paper-like sheath protecting the tip and the numerous backward-pointing barbs that cover the spine. With age, the spines turn black and give the lower trunk a distinctive dark appearance.

The short teddy bear cholla plants are clones of the tall one. The old bird nest in the center was well-protected when it was active. The inset photo is a related species, the chain fruit cholla. Photos by Steve Jones.

The top yellow fruit on this teddy bear cholla is ripe, whereas the fruit below it is dried. Unlike the stems, the fruit is spineless, although it does have irritating bristles called glochids. Photo by Steve Jones.

The flowers of the teddy bear cholla appear in the spring. The color of the flower petals is very much like that of the spines, but the inner parts of the flower are green. On ripening, the light green, spineless fruit turns yellow before drying and dropping.

The teddy bear cholla is one of two cholla species that are often called jumping chollas. The other species is the chain fruit cholla *(Cylindropuntia fulgida)*. Both species share the characteristics of highly barbed spines and easily broken connections between the joints. Those two characteristics are the keys to their reproductive success. Neither the teddy bear nor the chain fruit chollas are very good at producing or distributing seeds, so they reproduce by cloning. Joints from each cactus can be carried some distance by animals and people unfortunate enough to encounter them. Wind, rain and sub-freezing temperatures also induce joints to drop. When a joint comes to rest, hormones settle on the lower side of the stem and induce root growth. If the roots reach the soil, a new plant will form. Given enough time and good conditions, both species can develop dense colonies.

Chain fruit chollas retain their fruit, so they rarely reproduce by seed. Indeed, it is more likely that a dropped fruit will root and produce a new plant.

However, teddy bear chollas have a different reproductive problem. Most individuals have three sets of chromosomes. When it is time to produce pollen or ovules (male and female gametes), two of the three sets of chromosomes go to opposite sides of the mother cell, while the third set wanders with some chromosomes going left and some going right. Those gametes are not viable and will not produce seed. Yet every now and then, all the chromosomes of the third set end up on one side of the cell. After division, these two gametes—one with one set of chromosomes, the other with two sets—are viable.

Roots are growing out of the lower right part of the stem. New stems are barely visible growing in the upper right. The subject plant is on the author's property and was subsequently replanted. Photo by Steve Jones.

The woody trunk of the cholla is attractive and is sometimes collected. However, it should be left in place because it provides habitat for small critters. Photo by Steve Jones.

In one known case, a teddy bear cholla produced a viable gamete that crossed with a buckhorn cholla *(Cylindropuntia acanthocarpa)* in the Pinnacle Peak area of Scottsdale, Arizona. This hybrid plant also reproduces by dropping joints, and clones surround the original plant. After discovery, joints were propagated and the plants found their way into the nursery trade as red cholla.

When a teddy bear cholla dies, it leaves behind a tubular woody skeleton that reveals some interesting engineering features. The hollow center makes for a lighter structure and allows space for water-storing cells both inside and outside the skeleton. Its netlike walls with perforations also reduce weight. Yet the structure can hold a substantial amount of weight on cantilevered branches. The chain fruit cholla has a similar though somewhat sturdier skeleton which allows the trunks to branch and the plant to reach more than twice the height of the teddy bear cholla.

Experienced desert hikers carry combs with them for the inevitable encounter with an unseen joint. The comb can be used to flick the joint off the shoe, or if your luck is running low, the skin. The joint can fly some distance after the barbs release, so make sure no companions are downrange.

All cholla species have thin sheaths to protect the spines. All species have barbed spines, as well, but the jumping cholla's barbs are especially well-developed. Photo by Steve Jones.

The view of the Superstition Mountains in the background is just one of the many beautiful panoramas visible from the Sunrise Trail. Photo by Dennis Eckel.

Great Hikes in the Preserve: Sunrise Trail

By Barbara Pringle,
McDowell Sonoran Conservancy master steward

Sunrise Trailhead was the first official access area built by the City of Scottsdale to support public use of Scottsdale's McDowell Sonoran Preserve. After breaking ground for the trailhead in April 2004, McDowell Sonoran Conservancy stewards and volunteers worked with a professional trail construction firm through the hot summer months and beyond to complete the trail. The hardy volunteers acquired basic trail building techniques, and learned how to safely relocate thorny teddy bear and buckhorn cholla, as well as large barrel and saguaro cactus specimens. The skills gained by these early stewards would be put to good use on the many Preserve trail construction and maintenance projects that followed.

Since its grand opening in early 2005, Sunrise Trail has become a favorite of Preserve visitors. The trail's popularity is due to its convenient location, its relatively short two-mile, one-way climb that provides a solid workout, and access to the 3,069-foot Sunrise Peak via the Peak Spur Trail. Sunrise Peak is one of the Preserve's few accessible peak summits. Here, hikers can catch their breath and enjoy commanding 360-degree views of the McDowell Mountains, the Superstition Range, the Four Peaks Wilderness area, and the surrounding urban valley. In addition, Sunrise Trail offers connections to other trail areas, providing users with a first-rate local site for longer distance hikes.

Let's Go Hiking!

Start at Sunrise Trailhead, tucked into the southeastern-most point of the McDowell Sonoran Preserve at 145th Way and Via Linda. There are two parking lots with limited capacity, water fountains for people and dogs, directional signage, and limited horse-trailer parking with hitching rails and a trough. There is no restroom. As always, use sunscreen, wear a hat, and bring plenty of water. This trail is quite rocky in places, and other spots are slippery with decomposed granite. So, wear good hiking shoes, and use hiking poles if they help your stability.

The trailhead is located at an elevation of 1,923 feet. From there, you immediately start a moderate climb for roughly 1.2 miles to a marked viewpoint (SR7) at 2,474 feet. From this point, the trail narrows, steepens, and intensifies for the next six-tenths of a mile to a level ridge just below the summit. Here you have the option of climbing the Peak Spur Trail, a very steep climb of 230 feet in just one-quarter mile, to Sunrise Peak. Happily, the panoramic summit views are worth the workout!

As you climb, the residential neighborhoods of Scottsdale and Fountain Hills disappear, replaced by beautiful McDowell Mountain canyon views replete with lush Sonoran Desert flora. You'll likely see ocotillo, saguaro, palo verde, buckhorn and teddy bear cholla, brittlebush, and chuparosa. If you're lucky you might spot mule deer and javelina. Listen for the calls of cactus wrens, phainopepla, and other native birds, and look for soaring hawks overhead.

From the Sunrise Peak, you can opt to hike down the west side of Sunrise Trail to the Lost Dog Trail network. This adds about three miles to your one-way route if you go all the way to the Lost Dog Trailhead. Obviously, you'll need a ride to return to the Sunrise Trailhead (unless you're a very strong hiker and can go back up and over Sunrise). Another option for hikers seeking a longer trek is to connect to the adjacent Fountain Hills Preserve via the Andrews-Kinsey Trail. It branches off the eastern side of the Sunrise Trail about a half-mile northeast of Sunrise Peak. Stay on this trail for two miles to the entrance to the Fountain Hills Preserve. (No horses are permitted in the Fountain Hills Preserve.)

Sunrise Trail is one of the many special places in the exceptional McDowell Sonoran Preserve. Grab your map, water and go enjoy!

Sunrise Trail passes through boulder outcroppings where mature saguaro, ocotillo, and a variety of desert trees and bushes grow. Photo by Dennis Eckel.

Along the Sunrise Trail, hikers will pass these beautifully varnished and lichen covered metamorphic rocks. Photo by Dennis Eckel.

The short Peak Spur Trail, seen at the left, ends at the top of Sunrise Peak where the hiker can enjoy a a panoramic view at 3,069 feet. In the distance, the Andrews-Kinsey Trail, leading to the Fountain Hills Preserve, intersects with Sunrise Trail. Photo by Dennis Eckel.

Citizen Science Changes Everything

By Dan Gruber,
McDowell Sonoran Conservancy master steward

Citizen scientists from the Field Institute installed pitfall traps in the Preserve and have been periodically collecting the insects from the traps for many years. This photo shows citizen scientists emptying a trap into a sample jar that goes to Arizona State University for analysis. Over time, data from the samples provide information on the ongoing health of the Preserve because short-lived insects quickly reveal changes to the Preserve ecosystem. Photo by Debbie Langenfeld.

The Field Institute phenology project studies the phases of plants throughout the year. Trained citizen scientists observe and record activity on tagged plants several times a week. Over a period of years, data analysis shows if the seasonal dates change for new leaves, blossoms, fruit and seeds. This is important information because animals that depend on these plants may get out of sync with their food sources. Photo by Debbie Langenfeld.

A good definition of citizen science is "scientific work undertaken by members of the general public, often in collaboration with or under the direction of professional scientists and scientific institutions." * This definition accounts for two important aspects of citizen science. First, it involves scientific work that includes all aspects of science and is not limited to collecting data or reporting observations. Second, it involves people who may not be specifically trained in science or who are not initially subject matter experts. People have met this definition for thousands of years. After all, science emerged from the thinking and observations of ancient astronomers, mathematicians, physicians, and observers of nature. When these creators lived, there were no university degrees in science.

The Field Institute restoration project uses trained citizen scientists to seed test plots throughout the Preserve. A different restoration methodology was applied to each plot to test the effectiveness of each method. Volunteers make periodic visits to the plots to record plant restoration success. The experiment will reveal the best method to use for restoring damaged areas in the Preserve. Photo by Debbie Langenfeld.

Most people credit the creation of modern citizen science to the National Audubon Society. In 1900, Audubon initiated its Christmas Bird Count using nonprofessional birders in multiple locations to record bird species observed on one day. This created a template for citizen science that continues today—bringing large groups of unrelated people together for a specific science purpose. Sometimes these activities are planned, such as when the National Aeronautics and Space Administration (NASA) recruits thousands of people to look for patterns in millions of photographs. Sometimes they involve crowdsourcing with apps to collect and aggregate real time information about a phenomenon, such as temperature change during the recent solar eclipse. The McDowell Sonoran Conservancy participates in such events and uses crowdsourcing to help fulfill some of its resource management obligations.

But the Conservancy also created its own citizen science model focused on one geographic area—Scottsdale's McDowell Sonoran Preserve. In order to best manage and protect the Preserve, managers need to understand the resources it contains and suitable management practices. These management questions are best addressed through continuing research, scientific analysis and monitoring. To support these needs, the Conservancy created the McDowell Sonoran Conservancy Field Institute as its research center. The Field Institute, in turn, developed a citizen science volunteer program modeled on the overall steward organization. It has a defined structure, steward leaders and steward teams. The key to the success of this citizen science program is that it is permanent and its participants work on multiple projects over time. Citizen scientists in the program receive ongoing training in basic scientific and ecological concepts and focused project related training in the classroom and in the field. They gain cumulative knowledge and experience, becoming more proficient with each project. Over time, citizen scientists will participate in the full range of scientific work from reviewing available literature; helping to plan experiments; collecting, analyzing and mapping data; and coauthoring papers and presentations. Each project is led by Field Institute staff or a scientific partner. The scientific partner can be an academic faculty member, a governmental or private sector scientist or a subject matter expert. Field Institute citizen scientists work with and learn from multiple scientific partners over time, and the scientific partners become familiar with and confident in the ability of the volunteer project leaders and teams.

Citizen science is a boon to researchers and preserve management. Mobilizing groups to collect information allows more data to be collected faster and less expensively than would be possible for a researcher working alone or with a few others. Similarly, science based management of the Preserve would be impractical without the Field Institute and its citizen science program.

The citizen science model developed by the Field Institute offers substantial additional benefits. Because Field Institute citizen scientists usually have more field experience and training than public groups assembled for a single activity, they can collect more detailed and complex information with high accuracy. They often develop a significant measure of subject matter expertise from their project experience and can deal with ambiguous situations without constant assistance from a scientific partner or staff member. With permanent citizen scientists experienced in structuring and performing project work, researchers need to do less project planning, scheduling and management. They can, instead, focus on the science.

Some Field Institute citizen scientists develop skills that contribute

Citizen scientists assist with the Field Institute's periodic bat surveys in the Preserve. Researchers and volunteers periodically trap and count bats at their roosts. In this photograph, a researcher examines a bat's wing to estimate the age of the animal. Photo by Debbie Langenfeld.

to more than data collection. Initial projects conducted by the Field Institute—flora and fauna surveys, geology research and other investigations—were designed with the help of citizen scientists working with subject matter experts. Most of the Field Institute's experiments and results are photographed, catalogued and mapped by citizen scientists using standard formats that can be widely shared. Every new capability developed by Conservancy citizen scientists increases the leverage that can be offered to researchers and the amount of work that can be accomplished.

The Field Institute corridor viability projects study the presence of large mammals in the Gooseneck Corridor, a narrow strip of land connecting the north and south portions of the Preserve. Citizen scientists installed multiple motion activated cameras to count the number and kinds of animals using the corridor. The data from the study will inform managers how to provide a viable movement corridor once the private areas around the Preserve are developed. Photo by Debbie Langenfeld.

Perhaps the greatest benefit of the citizen science program at the Conservancy is that it provides a model that could enable small conservation organizations to bring science based management to the land they own or maintain. Our experience demonstrates that volunteers are capable of managing themselves with minimal staff oversight once they have an organizational structure with defined roles and responsibilities. This means that even a small conservancy can create and sustain a citizen science program. When evaluating grant proposals, funders view the availability of volunteer resources to leverage professional staff very positively.

Since its founding in 2010, the Field Institute has studied many management questions in the Preserve. Most of this work required extensive and continued field observation, generated large amounts of information and required detailed summarization and reporting. None of it would have been possible without the involvement of scores of trained citizen scientists, often over a period of years. Sometimes stewards originated the work and then recruited scientific supervision. The Conservancy's first citizen science project grew out of steward curiosity about some odd rock formations in the Preserve. Citizen scientists were the first to recognize significant geological findings in the Preserve, bringing them to the attention of professional geologists and recruiting them for the study. These efforts led to the first geology paper ever accepted, peer reviewed and published by the Arizona Geological Survey with amateurs as the primary authors.

The foundation of the Field Institute's work was a flora and fauna survey conducted under the supervision of a half-dozen principal investigators working continuously with scores of citizen scientists over a three-year period. This survey documented many of the plants and animals found in the Preserve and serves as the backbone for many additional projects. The results were published by the Conservancy, samples were provided to herbaria and results were recorded in online databases for public reference with many attributions to the citizen scientists who collected the data.

Other work has been equally pioneering. Field Institute staff led the development of the first Ecological Resource Plan (ERP) for the Preserve—a comprehensive scientific management plan for the Preserve prepared for the City of Scottsdale, the land owner. Large portions of the ERP were drafted by citizen scientists.

Several times each year, trained citizen scientists record the number of bird species and their individual numbers at designated locations in the Preserve. This is only one of many ongoing monitoring projects performed by the Field Institute to catalogue the animals and plants living in the Preserve. Photo by Debbie Langenfeld.

Currently, ongoing Field Institute work, staffed almost entirely by citizen scientists, will establish best practices for the restoration of degraded areas in the Preserve, and for mitigation and removal of the most problematic invasive species. This work is already establishing the Field Institute as a regional center of expertise in these areas, capable of providing regional leadership and assistance to other organizations facing these common issues.

The Field Institute model for a permanent, continuously trained and largely self-managed citizen science program makes this kind of work possible. The model is as important and as pioneering as the work it enables. It supports ongoing investigations of a scope and depth that otherwise would be prohibitively expensive and time consuming. Not only has the rise of citizen science changed the way field science is done, but the Conservancy model also demonstrates a way for smaller conservation organizations to provide and support science based management.

Citizen scientists assisted Arizona Game and Fish Department in deploying radio telemetry collars on 32 mule deer in the Preserve. These collars provide regular information about the locations of the deer, enabling researchers to understand movements within and adjacent to the Preserve. The collars will fall off in February 2018 and will be retrieved by citizen scientists. In this photo, citizen scientists use radio telemetry equipment to practice their collar recovery skills. Photo by Debbie Langenfeld.

Citizen science changes everything for science, for the Conservancy and for similar organizations everywhere.

**Oxford English Dictionary*, 2014.

Photographing a tiger whiptail can prove to be almost impossible. A whiptail is highly mobile and always seems to be on the move, constantly looking for its next prey or for cover from predators. Photo by Sidney Riddle.

A Land of Lizards

By Sidney Riddle,
Arizona State University graduate student

The American Southwest is undeniably a land of lizards. This is hardly surprising if you consider the life history of these fascinating creatures. Lizards are ectothermic, meaning that their body temperature varies with the environment they inhabit. Climate plays a major role in provisioning these needs, which is why lizard diversity is greatest near tropical areas.

There are several ways to define the term, biodiversity, but my favorite is the original coined by scientist and author E.O. Wilson. He states, "Biodiversity is the totality of all inherited variation in the life forms of Earth, of which we are one species. We study and save it to our great benefit. We ignore and degrade it to our great peril." Arizona harbors a diverse array of reptile species. This considerable diversity primarily takes two forms—snakes and lizards. Of the 49 species of lizards in Arizona, at least 14 are found within the boundary of Scottsdale's McDowell Sonoran Preserve.

Lizards exhibit many different adaptations for coping with their environment. Tail autotomy, or the ability to self-amputate the tail, which eventually grows back, is a common way to avoid predation. Parthenogenesis, a reproductive condition wherein a species is composed entirely of females, each lizard being a clone of its mother, is present in at least a few Arizona residents. So, let's explore some of the unique and interesting variations of lizards found in the Preserve.

We will begin with the Gila monster, the largest and only venomous lizard native to the United States. This incredible desert dweller spends most of its time in hiding, with annual surface activity of only a few weeks. During the small window of active foraging, a Gila monster may travel large distances, sometimes more than one kilometer per day, in search of its favorite foods—mostly eggs and carrion. Like other toxin-producing species, the Gila monster provides potentially important compounds to the field of human medicine. Drugs synthesized from its venom are currently being used for treatment of type 2 diabetes. This lizard is hard to mistake with its beaded scales and intricate network of bands and reticulations. In fact, the patterning of a Gila monster is so unique that herpetologists (folks who study amphibians and reptiles) can identify an individual by the patterning alone.

Second only to the Gila monster in size is the common chuckwalla. This species of lizard is one of only a handful of herbivorous native lizards. Interestingly, it may never drink a drop of water, instead relying solely on water obtained from eating a variety of plants. This lizard is intimately tied to its preferred habitat of rocky outcroppings and boulder fields. If harassed, a chuckwalla is likely to find a nearby rocky crevice, where it inflates its body with air, deterring any would-be predator. Another primarily herbivorous lizard found within the Preserve is the desert iguana. It is commonly associated with flat, sandy areas, and seems to be particularly fond of habitat where creosote bush *(Larrea tridentata)* is present. Desert iguanas remain active on even the most extreme summer days. In fact, some of the highest recorded internal temperatures of any lizard species come from the desert iguana.

The eastern collared lizard may very well be most photogenic lizard in the Preserve. This medium-sized lizard sports two distinct black collars below its large head, as well as brilliant turquoise and yellow spotting on the body. Don't be fooled by the attractive appearance, though; this lizard possesses strong jaws and an equally ferocious bite which it uses to immobilize smaller lizards, invertebrates and even mammals. You might see an individual perched on a rock, actively scanning for prey or defending breeding and foraging territory. A close cousin of the eastern collared lizard, the long-nosed leopard lizard, inhabits sandy open areas where it waits to ambush smaller prey. The long-nosed leopard lizard can be identified by heavy dorsal spotting and a very long, spotted tail.

Human development surrounds at least half of the Preserve, and the desert spiny lizard is a common fixture in many exurban and suburban environments. If you have ever noticed a bulky, medium-sized lizard around your neighborhood in the Phoenix metropolitan area, there is a good chance it was a desert spiny lizard. Equally at home in your neighborhood as in a pristine riparian area is the tiger whiptail. Scientists often label ubiquitously occurring species like this as habitat generalists. Yet another common fixture of developed areas is the aptly named common side-blotched lizard. This small lizard is relatively widespread and found throughout much of the Preserve. Distinct dark blotches behind the forelimbs help separate it from species of similar size and appearance, such as Schott's tree lizard and the western

Many lizards display some degree of sexual dimorphism. This scientific term refers to a difference in appearance between males and females. We might assume that this desert spiny lizard is a male because of its bright coloration. Photo by Sidney Riddle.

Researchers have demonstrated that throat coloration in the western side-blotched lizard, which can vary a great deal in both males and females, may determine its respective roles within the population. Photo by Sidney Riddle.

long-tailed brush lizard. The Schott's tree lizard is distinguished from the western long-tailed brush lizard by tail length—the latter has a much longer tail, more than twice its body length.

Life as a small-bodied lizard can be a perilous one. As the target of large invertebrates, birds, snakes, larger lizards and mammals, small lizards must employ techniques to survive long enough to reach maturity and reproduce. Several life strategies, such as crypsis (camouflage) and nocturnal behavior have evolved many times over, but possibly the most primal strategy to avoid getting eaten is speed. No other lizard displays this trait quite like the zebra-tailed lizard and the greater earless lizard. Both species tend to be found in open habitat and can be differentiated by a lack of external ear openings in the greater earless lizard. A much less mobile species, which relies heavily on the strategy of crypsis, is the regal horned lizard. A horned lizard is often spectacularly adorned with modified scales that serve as a thorny defense against airborne and terrestrial predators. This species has an even more impressive defense. When confronted by certain predators, it can squirt blood from its eyes! Keep a watchful eye for the regal horned lizard around the perimeter of harvester ant mounds. The final and only nocturnal lizard in the Preserve is the western banded gecko. This lizard is most readily observed after dusk on roadways.

This greater earless lizard is putting himself on full display. This behavior is typical of a territorial male, who will often perch on an object and perform a series of push-up motions intended to intimidate and alert would-be trespassers to his territory claims. Photo by Sidney Riddle.

Like its name suggests, the Schott's tree lizard is most often found on upright structures like trees. This species has one of the largest distributions of any species in Arizona and can be found in almost every type of habitat. Photo by Cheyenne Herzog.

Horned lizards, such as this regal horned lizard, can be readily keyed out (determined to species level) by the orientation of the horns at the base of the head. Photo by Sidney Riddle.

I am constantly impressed by the fervor and attention given to lizard's close feathery relatives. Bird data collected by citizen scientists is unrivaled by any other taxa and provides science with useful tools for furthering the research and management of avifauna. Why don't lizards get the same treatment? The answer may lie in their physiology. As discussed earlier, lizards are ectothermic, so you are unlikely to see them out and about during the coolest parts of the year. The best time to view lizards in the Preserve is during daylight hours on warm spring days, most of the summer (though few lizards can tolerate heat higher than 120 degrees Fahrenheit), and early fall. Years with high levels of winter rain generally translate to high numbers of active lizards in the spring and summer. Remember that hand-capturing lizards on public lands requires a permit, so plan to bring a pair of binoculars for best results.

A juvenile western banded gecko is rarely seen on the surface during daylight hours. Photo by Sidney Riddle.

If I have piqued your interest, then I encourage you to seek additional information from the experts. An excellent guide entitled *A Field Guide to Amphibians and Reptiles of Arizona* is available in print. A similar, free resource is available online at **http://www.reptilesofaz.org/lizards.html.** A masterfully done, lizard-specific atlas, *Lizards of the American Southwest: A Photographic Field Guide*, is also available in print.

A Gila Monster on a Mission

By Lynne Russell,
McDowell Sonoran Conservancy lead steward

Over the course of 15 minutes, this Gila monster industriously dug a large hole. This behavior, not usually observed, was probably foraging. Photos by Lynne Russell.

Early on a sizzling morning in June, I was enjoying a peaceful hike on a familiar Sonoran Desert trail. Suddenly, flying dirt swirled ahead of me. I paused, and lifted my camera to use as binoculars. Zooming out the lens as far as it would go, I saw a Gila monster industriously digging in the trail ahead. My lens brought me in close to the scene. Although I would have kept a respectful distance for any wildlife I encountered, I was also aware that I was in close proximity to one of the two species of venomous lizards in North America.

I spent my next 15 minutes videotaping and photographing a hectic scene as the Gila monster dug wider and deeper. Turning from side to side, it occasionally lifted its head toward me. I was thrilled to look into the eyes of this magnificent animal. The longer it dug, the more I realized that I was recording a unique event. This Gila monster was on a mission this scorching summer morning.

I never did reach my planned destination that day. I had the Gila monster blocking the trail, and I was increasingly aware of the heat. As I turned to head home, I glanced back over my shoulder. The Gila monster was disappearing under a brittlebush by the side of the trail, but questions were emerging in my mind.

Why was this Gila monster using so much energy under the sweltering sun? What was it trying to accomplish?

I reached out to social media for answers, hoping to find an expert. The photos and video quickly reached more than 7,000 views. Speculation included nesting, digging for cooler soil, building a new home, or foraging for food. There were advocates and critics for each of these opinions.

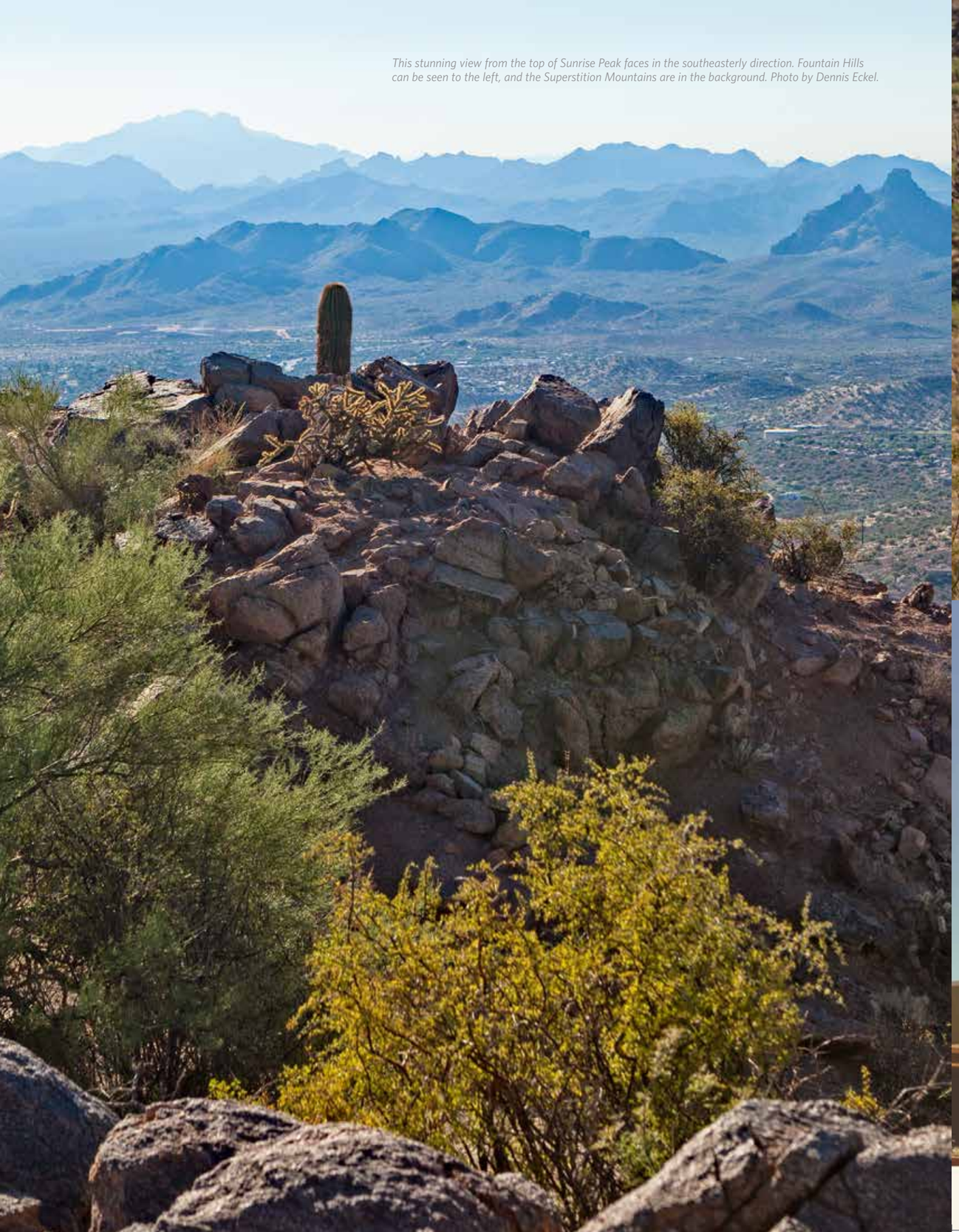
A few days later, I read that a Tucson construction crew had unearthed the first observed hatching Gila monster nest. News coverage of this groundbreaking discovery led me to Dr. Dale DeNardo, Gila monster researcher at Arizona State University. He found my videos extremely interesting. He had never before seen a Gila monster digging over such a wide area. DeNardo considered this odd behavior, at least in terms of being observed, and worth noting. It made little sense for the animal to be digging for cooler ground, as it would not do so in the middle of the trail where there was no shade. The disturbed dirt in the photos was unusual in that it was not directly adjacent to a burrow. DeNardo highly suspected the animal was foraging.

DeNardo put forward several reasons for thinking the animal was not digging a nest: 1) A Gila monster typically digs a nest for laying eggs within the burrow system of another animal, such as a kangaroo rat, or a packrat. She enters the existing burrow, digs a hole in which to lay her eggs, and then covers them up. She doesn't start digging from the surface. 2) The Gila monster in the video did not have the girth of a female about to lay eggs. 3) A Gila monster typically lays her eggs in July, so my observation was too early for nesting. DeNardo and his fellow Gila monster researchers have followed many gravid (pregnant) females in the wild. Those females all laid their eggs in mid to late July. My observation was of a very atypical behavior for a Gila monster, but Dr. DeNardo is confident that it was related to foraging.

This was quite a thrilling experience for me, and also demonstrated an important lesson—when something does not seem quite right, stop and observe. You might be about to witness a truly remarkable event!

Watch my Gila monster encounter using the video link below.
https://www.youtube.com/watch?v=h0E0YdvkgTs

Read about the Gila monster nest discovered by a construction crew in *Tucson News Now*. The full link is below.
http://www.tucsonnewsnow.com/story/35705008/fw-gila-monster-story



This stunning view from the top of Sunrise Peak faces in the southeasterly direction. Fountain Hills can be seen to the left, and the Superstition Mountains are in the background. Photo by Dennis Eckel.

Photo opportunities exist from every direction near the intersection of Sunrise Trail and Peak Spur Trail. Photo by Dennis Eckel.

A hiker heads down Sunrise Trial toward Lost Dog Trailhead. Photo by Dennis Eckel.

We Continue to Have a Positive Impact but We Need Your Financial Support

With 3,000 youth and 4,000 adults served through school visits, events, hikes and continuing education this past year alone, the Conservancy continues to connect the community to the Sonoran Desert and McDowell Mountains. As the demand for the Preserve and Conservancy continue to grow, we count on the support of individuals like you to help us educate our community on the wonders and benefits of the McDowell Sonoran Preserve. This shared appreciation of the Preserve is why we invite you to join us as a member by returning the completed membership form below. You can also join or make a gift online at www.mcdowellsonoran.org. Just click on "Donate."

- ☐ Founder's Club $10,000+
- ☐ Ambassador $5,000 - $9,999
- ☐ Trailblazer $1,000 – $1,499
- ☐ Pioneer $500 – $999
- ☐ Explorer $250 – $499
- ☐ Guide $100 – $249
- ☐ Friend $50 – $99
- ☐ Other $ _____

You can now give to the Conservancy with a monthly recurring donation. No need to mail or call in your gift. A monthly gift creates a reliable source of funding year-round to help us better plan as we continue to protect the Preserve. Visit www.mcdowellsonoran.org, click on "Donate" and choose the monthly donation option

Credit Card No._____Expiration Date_____CVC_____

Name as it appears on the card_____

Name(s) by which you would like to be acknowledged _____

Address _____

Email_____ Phone(s) _____

☐ I have included the McDowell Sonoran Land Conservancy in my estate planning and/or I would like information about planned giving.

Please make checks payable to: McDowell Sonoran Conservancy.
To make a gift online, please visit us at www.mcdowellsonoran.org and click on "Donate."
Or call 480-998-7971 to learn more about giving level benefits and discuss your gift by phone.

Mail form to: McDowell Sonoran Conservancy • 7729 E Greenway Road, Suite 100 • Scottsdale Arizona 85260
Thank you for supporting the McDowell Sonoran Conservancy!

Did You Know? Your Personal Investments May Benefit the Conservancy Too!

By Blythe Sweeney
McDowell Sonoran Conservancy chief development officer

As you plan your charitable giving in the coming year, consider appreciated stocks as a viable option to benefit both you and the Conservancy. In fact, giving appreciated stocks is often better for your taxes than giving cash.

If you donate stock that has increased in value, and you bought it more than 12 months ago, you can take a charitable tax deduction for the stock's fair market value on the day you give it away. You'll also avoid capital gains taxes on the increase in value over time; taxes which you would have had to pay if you sold the stock, then gave the cash proceeds to charity. If you've held the stock for less than a year, your deduction is limited to your cost basis—what you paid for the stock—not the current value. More customized strategies such as donor advised funds and charitable trusts can be employed for large stock gifts in order to maximize tax benefits.

Your IRA may hold some extra benefits too. If you are over age 70½ and have an IRA, you are required to take minimum distributions based on your age and the value of the IRA. This means that you may have taxable income, even when you don't need the income. Congress passed a law last year that allows people to make a tax-free donation of up to $100,000 directly from their IRA to a charity, such as the McDowell Sonoran Conservancy! This donation can count as your required minimum distribution and doesn't increase your adjusted gross income. This is particularly helpful if you don't itemize, or can't deduct charitable contributions.

As always, review charitable gifts in detail with your tax adviser. The Conservancy does not represent stocks or funds, but can refer you to subject matter experts for questions. Thank you for considering the McDowell Sonoran Conservancy in your financial planning!

Photo by Rebeca Rodriguez.

amazonsmile

Share Your Love, Valentine's Day Shoppers!

Consider making your Valentine's Day purchases through AmazonSmile, and share the love with the McDowell Sonoran Conservancy. AmazonSmile is a website operated by Amazon.com, Inc. with the same products, prices, and shopping features as Amazon.com. The difference is that when you shop at AmazonSmile, the AmazonSmile Foundation will donate 0.5 percent of the purchase price of eligible products to the charitable organization of your choice.

On your first visit to AmazonSmile (smile.amazon.com), you will be prompted to select a charitable organization from its extensive list of eligible organizations. Select MCDOWELL SONORAN LAND CONSERVANCY on your first visit, and you're all set for your first and future purchases! Amazon will even do a "bill to—ship to" option to make sending gifts even easier. Gift wrap and enclosure cards are available, and your gift recipient will not see the price.

Thank you for supporting the McDowell Sonoran Conservancy during the Valentine's Day season!

McDowell Sonoran Conservancy

7729 East Greenway Road
Suite 100
Scottsdale, AZ 85260

Connect with us:

NON-PROFIT
ORGANIZATION
U.S. POSTAGE PAID
SCOTTSDALE, AZ
PERMIT NO. 807

A recently hatched Gila monster, seven inches long, walks along Chuck Wagon Trail in Scottsdale's McDowell Sonoran Preserve. A Gila monster, an average of six inches long at birth, can grow to be around 20 inches in length, and weigh up to five pounds. Its life expectancy is 20 to 30 years. The black and orange pattern seen on each animal is unique to that individual. Photo by Marianne S. Jensen.