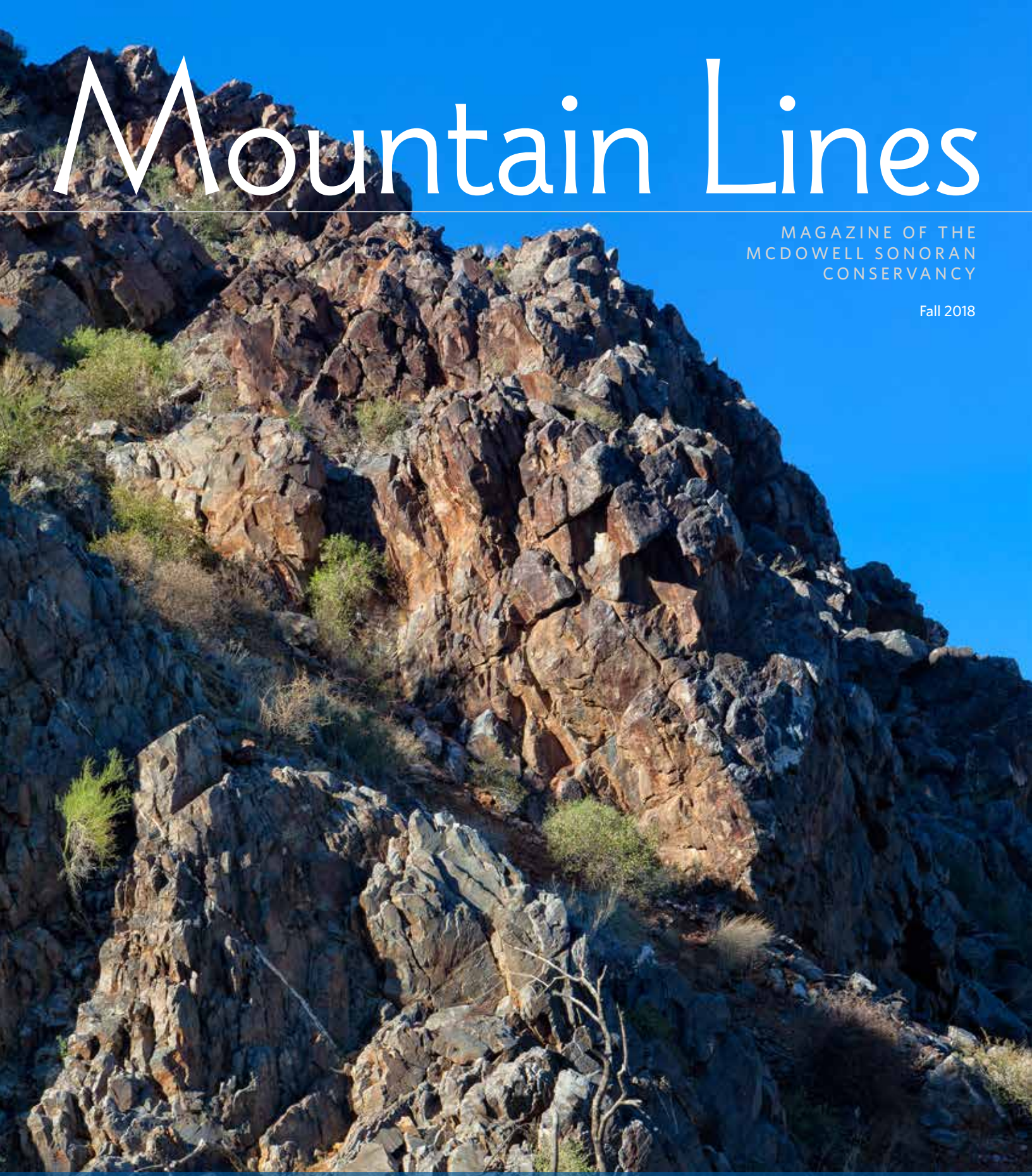
Mountain Lines

MAGAZINE OF THE
MCDOWELL SONORAN
CONSERVANCY

Fall 2018



A Preserve Survey Map

Enhance hikes with our map app

Windgate and Bell Passes

See striking vistas on this hike

Badgers in the Preserve

Badgers are in our midst

McDowell Sonoran Conservancy

FROM THE EXECUTIVE DIRECTOR

Justin Owen

Welcome to the Fall! As the monsoons leave and the temperatures lower, Scottsdale's McDowell Sonoran Preserve comes alive with people! This is our most exciting time of year as we launch our programs, New Steward Orientation, and a new fundraising plan. As we are evolving into a more science-based stewardship organization, *Mountain Lines* presents the beauty of our Preserve and the work of the McDowell Sonoran Conservancy in education and research.

Building on our long legacy of love and stewardship of the land, our vision now expands for the Conservancy to become an international leader in urban preserve management. Through scientific research conducted by the Parsons Field Institute of the Conservancy and our experiential STEM Education Program for youth, the Conservancy is expanding its reach and charting a course for building a new generation of conservation leaders.

More than 650 Conservancy stewards continue to effectively care for the Preserve through a comprehensive array of programs and services that add capacity by maintaining and patrolling trails, serving as safety experts, and providing guided hike and bike tours throughout the Preserve.

We want you to be a part of our future! Come explore the Preserve! Revel in its beauty! Understand its uniqueness as the largest urban preserve in North America. Join us in our journey to the future. Support our vision with a financial gift, a gift of your time, or a gift of your talent!

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.

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Cover photo: Tectonic collisions created the backbone of the McDowell Mountains about 1.7 billion years ago. The hard, metamorphic rock it formed is exposed throughout the McDowells. Photo by Dennis Eckel

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Mapping the McDowell Mountains

By Dan Gruber, McDowell Sonoran Conservancy legacy steward

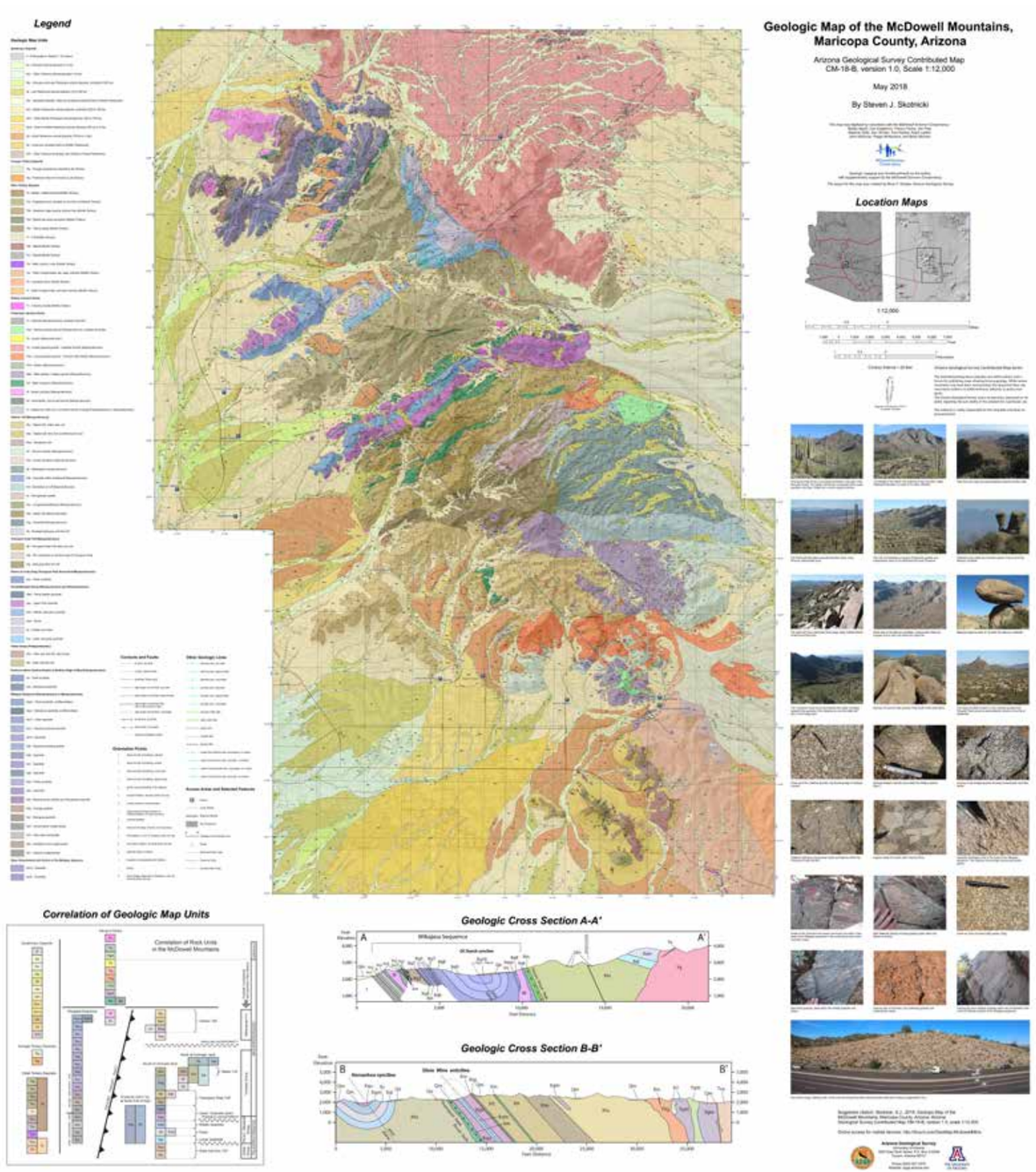
Dr. Steven Skotnicki is a senior geologist known for his extensive geologic mapping work. His survey of the McDowell Mountains resulted in a geologic map of them. Photo by Steve Skotnicki

The digital version of the Preserve's geologic map can be displayed on mobile devices. Touching the screen brings up all the information associated with the selected feature. The digital map shows Preserve trails and, depending on the device, may indicate the user's position on the map. Photo by Dan Gruber

A prominent feature visible throughout the northeast Valley, the McDowell Mountains form the backbone of the southern portion of Scottsdale's McDowell Sonoran Preserve. Anyone who's travelled in these mountains has noticed their geologic complexity. There are angular metamorphic rocks of varying colors abutting rounded granite boulders and occasional veins of milky quartz snaking through the rocks.

Yet in spite of its complexity, no comprehensive geologic survey had been done of the McDowell Mountains before 2006. That was the year Dr. Steve Skotnicki, geologist, began his epic investigation of the mountains. Based on his personal interest, Skotnicki spent more than nine years and 2,000 hours of his own time, including 1,200 hours in the field[1], to produce a detailed hand-drawn geologic map of the range and its vicinity.

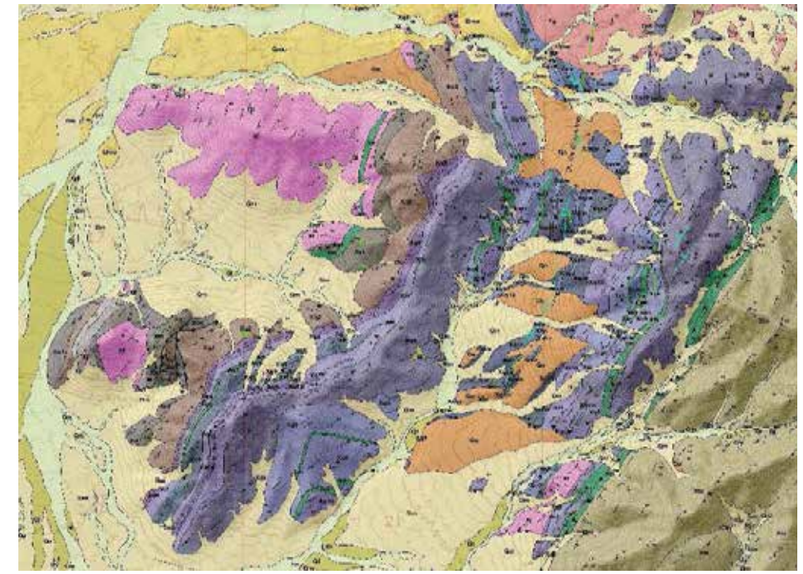
The map identifies all the types of rocks in the mountains and where they are located, superimposed on a topographic map showing the contours of the land. Producing a geologic map requires an experienced geologist to directly observe the rocks in the field in order to identify accurately what they are and to observe their relationships to each other. The pattern of different types of rocks over extended distances reveals



The Arizona Geological Survey published this map of the Preserve along with its related information. Steve Skotnicki, Brian Gootee of AZGS, and Conservancy volunteers did the work to produce the map. Photo courtesy of the Arizona Geological Survey

when and how they were formed and what happened afterwards. These observations are a record of the geologic history of this area extending over more than a billion years!

However, the map required conversion into digital form for research and conservation purposes. Skotnicki hand-drew the original map in very large size to show all the details of the complex local geology. But this size made copies of the paper map unwieldy to use in the field. Also, a paper map can't be zoomed or panned, nor can it show all the background information associated with each mapped rock unit or data point. A digital map can, and it can be carried on a small device like a phone or tablet. It can be easily zoomed and panned, and simply clicking on it brings up all the relevant geologic information for any feature.



This is a close-up of a complex portion of the map showing the northwest corner of the McDowell Mountains. Some of the features shown in this portion are only about 10 meters (33 feet) wide on the ground. Photo by Dan Gruber

The McDowell Sonoran Conservancy supported the costs required to digitize Skotnicki's field map and sample collection. The Conservancy also performed the work of digitizing the map using citizen scientists, aided by Brian Gootee, research geologist with the Arizona Geological Survey (AZGS), and Conservancy staff.

The digitizing team consisted of citizen scientists, some of whom were experienced in previous geology projects sponsored by the McDowell Sonoran Conservancy Parsons Field Institute. Gootee and I developed the necessary digital infrastructure. We made high-resolution images of the hand-drawn maps and georeferenced[2] the images to a topographical map in the software package the Conservancy uses for mapping. Gootee provided software tools for geological mapping, which allowed the team to insert specialized geologic symbols into the digital map.

The digitization process reproduced all the features of the hand-drawn maps in digital form. The lines drawn by Skotnicki that represented the location, extent, and boundaries of different rock types were traced digitally. The points where he recorded observations were replicated as digital points with suitable symbols. His indications of other features like faults—lines across which rock had been displaced by geologic forces—were reproduced in digital form. His observations were transcribed into electronic form and associated with the correct digital features.

The work was divided into phases prefaced with detailed instructions and training. The first phase was to trace all the polygons that outlined each occurrence of a particular type of rock. Next, we created digital points corresponding to locations where Skotnicki recorded observations. Finally, we labeled all the polygons and other features. After completing each phase, quality assurance was done by having team members review each other's work, after which a final review occurred.

A team of 10 citizen scientists produced the digital map in 900 hours over a period of six months. The time spent included education, training, and quality assurance. Project support and supervision from Skotnicki, Gootee, and Melanie Tluczek, former Parsons Field Institute assistant director, totaled more than an additional 100 hours.

The completed map is an amazing achievement, a testament to both Skotnicki's perseverance and the complexity of the mountains. It contains the following:

- 87 sections (square miles) are covered entirely or in part on the map.
- 86 map units (different types of rocks) are described

individually with associated data and colored based on a standard geologic color palette modified by discussions with Skotnicki.

- Approximately 3,200 polygons distinguish the occurrences of the 86 types of rocks in the map area.
- Approximately 3,000 points display data about rock characteristics.

A map legend was produced using map unit descriptions and associated data from Skotnicki. The map shows all the features surveyed by Skotnicki superimposed on a topographic map. To help use the map conveniently in the field, other features or layers, such as existing Preserve trails, trailheads, and points of interest, are included.[3]

After the digitizing work was completed, Gootee uploaded the map to an AZGS site from which AZGS staff could review the work. Mike Conway, chief of the AZGS Geological Extension Service, reviewed map content, clarity, and function. The volunteers incorporated his feedback into the map, and Phil Pearthree, AZGS director, performed a final review. The map was then released online for interactive digital and mobile access on the AZGS website[4] and in published form.[5]

Through this project, the Parsons Field Institute produced a significant document accessible to researchers, educators, and other interested parties. It added important information about the McDowell Mountains and raised opportunities for further research. Rocks in the McDowells are exposed horizontally in a sequence spanning hundreds of millions of years, an expanse not seen elsewhere in the region. Some of the rocks are complexly layered in a manner not seen nearby. Skotnicki currently is working with Arizona State University faculty to date rock samples collected in the mountains. This could provide the most comprehensive timeline yet for the geohistory of this entire area.

The availability of the digital map will enrich users' experiences and researchers' work in the Preserve by:

- Allowing users to understand the geology of what is seen on or from the trails in the McDowell Sonoran Preserve and vicinity
- Supporting interpretive hikes and field education about geology
- Aiding in site selection and providing background information for future ecological research
- Allowing area geology to be related to other features that reflect or depend on it, such as soil types and biotic communities

To our knowledge, this is the largest such project ever done by a small conservancy. The scale of the effort and quality of the result demonstrate the ability of volunteers to perform professional-level work and to handle large, technically complex projects.

1. The field work required to produce the original map was conducted under permit from the City of Scottsdale.
2. Georeferencing is the process of relating a point on an image to the equivalent point on a map, so that the image can be accurately superimposed onto the underlying map.
3. Some of the data layers shown on the digital map were provided by the City of Scottsdale GIS staff.
4. Access the interactive map for mobile access on the AZGS website at: http://tinyurl.com/GeoMap-McdowellMtns or http://repository.azgs.az.gov/uri_gin/azgs/dlio/1692.
5. Access the published map form: http://repository.azgs.az.gov/uri_gin/azgs/dlio/1890

Veins of white milky quartz running through rocks are a common feature in the McDowell Mountains. Research work sponsored by the Conservancy and staffed by citizen scientists indicates that these quartz deposits were created by repeated episodes of hydrothermal activity spanning hundreds of millions of years. Photo by Dan Gruber

The fifteenth annual Tour de Scottsdale rides again! The event takes place on Sunday, October 7, 2018, and features 30- and 70-mile bicycle rides through beautiful Scottsdale. For more information about the tour, registration, and sign in, visit the Tour de Scottsdale website at www.tourdescottsdale.net.

Volunteer in Scottsdale's McDowell Sonoran Preserve

By Janice Holden, McDowell Sonoran Conservancy lead steward and
Susan Mitchell, McDowell Sonoran Conservancy steward

Sometimes the hardest thing about volunteering is getting started. But it doesn't have to be.

If you have ever spent time enjoying the peaceful beauty of Scottsdale's McDowell Sonoran Preserve, you may wonder what you can do to help protect this urban gem. If so, you are like the hundreds of people who have chosen to become stewards with the McDowell Sonoran Conservancy. The Conservancy is a nonprofit organization whose mission is to champion the sustainability of the 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.

Conservancy stewards are the volunteers who carry out this mission through 11 programs that offer a wide range of volunteer opportunities. Whether you want to be outdoors leading guided hikes, hosting trailheads, patrolling or maintaining trails; or you want to help with scientific research, special events, or other nonfield opportunities, such as working in our office, the Conservancy needs your skills. You can learn more about these activities and programs on our Conservancy website at: www.mcdowellsonoran.org

How do you get started? To become a steward, you need to complete and submit two applications on the Conservancy website and pay an orientation fee of $60. Once accepted, two things will happen to ease your introduction to stewardship. First, you will be invited to attend a New Steward Orientation (NSO) class given on the second Saturday of each month from September through March. Second, you will be assigned a mentor who will guide you and help you on your pathway to stewardship.

NSO is the first step in learning what you need to know to become a steward. The NSO class is an introduction to the Preserve, the Conservancy, what it means to be a steward, and the meaningful ways in which stewards can get involved. You'll learn about expectations, requirements, and tools you can use to understand and serve.

The one day orientation is fun. It includes a fast-paced introduction, similar to "speed dating," to all 11 programs. You will meet the program leaders during this activity.

"I thought I'd find NSO long, drawn out and dry; but I was pleasantly surprised and totally engaged the whole time. It was an amazing day and 'speed dating' was a great way to learn more about the programs," one recent steward-in-training told us.

The stewards who prepare and present the material make learning it fun. This group of very talented teachers excel at keeping the class fresh and entertaining every month.

After NSO, you are required to participate in five activities in at least four different programs of your choice, and complete a simple, open book, online exercise to become familiar with our website content before achieving stewardship. Mentors will help you meet those requirements. On average, most stewards-in-training become stewards within six to eight weeks.

To make sure the experience is not overwhelming, mentors and program representatives provide a support system as does the website that includes resources for stewards-in-training such as, a calendar identifying specific activities that count to attaining stewardship, and a list of volunteer opportunities open in each program.

The process of becoming a full-fledged steward is upbeat and uplifting. You will leave NSO motivated, inspired, and ready to earn your steward badge. You will feel that you've joined a great organization serving a great cause, and you will be on your way toward volunteering with others like you.

Upon completing NSO, you will understand how to contribute, do good, have fun, make new friends, and help ensure an ecological treasure will prevail for generations to come.

More than 70 steward training classes have prepared volunteers over the past 20 years to work in the Preserve and at the Conservancy. Classes are kept small to enhance the learning experience. Photo by Lynne Russell

The class for training new stewards takes place in the Preserve among beautiful surroundings at the Gateway Trailhead meeting room. Photo by Lynne Russell

Students and instructors get to know each other over lunch at New Student Orientation. Photo by Lynne Russell

Students learn about the important role of the Conservancy's website and gain knowledge about the programs, activities, volunteer opportunities, and other valuable resources. Photo by Lynne Russell

This mule deer buck lives in the Preserve where he finds enough vegetation to hide in and eat. Deer are most active in the early morning and evening during the warmer months. Photo courtesy of McDowell Sonoran Conservancy

Say Cheese! Using Camera Traps to Assess Wildlife in the McDowell Sonoran Preserve

By Katherine Weiss,
Arizona State University School of Life Sciences PhD candidate

Scottsdale's McDowell Sonoran Preserve houses a great diversity of native Sonoran Desert wildlife. On any given day, coyotes travel in groups or alone in search of elusive cottontail rabbits; bobcat mothers cajole their kittens, often in vain, to stay together as they bounce around rocky outcroppings; and roadrunners stop to eat the small, flighty lizards that passersby only see as flashes in their peripheries. These scenes unfold in the distance as we hike the many trails of the Preserve. Sometimes, we come across a mule deer or jackrabbit, each of us equally frozen in surprise at seeing one another in the otherwise quiet, picturesque landscape. And then, just as suddenly, the deer or jackrabbit bolts away into the brush. Left with nothing but a memory and a smile, we, too, eventually continue on our way, enjoying the space we share.

But how do we take inventory of a shared space, especially when trying to understand how to manage landscapes used by both people and wildlife? For some herpetologists, the answer often lies in overturning rocks to assess which reptiles are found where in a designated area. For some ornithologists, the answer may lie in walking transects while listening intently for birdsong. However, for mammologists, the answer is not so simple. Mammals can be surprisingly difficult to pin down, and many present dangers when directly confronted. Further, live trapping can be a difficult process, especially for larger animals, and may present high and undue stress.

For many wildlife biologists, the answer for how to study mammals, especially in changing landscapes, is found in camera traps. Camera traps were originally created for game hunters in the form of game trail cameras. Many biologists have repurposed game trail cameras for research, using them to passively detect wildlife in their natural habitat. Camera traps function by detecting both movement passing by the camera as well as differences in temperature between what is moving in the foreground and background. By placing cameras in a grid or transect across the Preserve, wildlife biologists can understand how species differentially use and occupy the landscape.

This young coyote has traits that will help him live a long coyote life. Coyotes are very adaptable, eat a wide variety of animals, and live in diverse urban and natural landscapes. They appear in many stories (and cartoons) as being the clever and resourceful animals they are. Photo courtesy of McDowell Sonoran Conservancy

A bobcat and her kitten roam their territory in the Preserve. Bobcats hunt mostly rabbits and hares, which are plentiful in the Preserve. Photo courtesy of McDowell Sonoran Conservancy

Like many other landscapes of the world, the Preserve faces threats from urban expansion. Specifically, housing development around the Gooseneck Corridor (the narrow connection between the southern and northern parts of the Preserve) and the projected expansion of Rio Verde Drive into a four-lane highway present unique challenges for wildlife. To better understand the impacts of urbanization on Sonoran Desert wildlife, we are investigating mammalian biodiversity throughout the Preserve with camera traps. Our results will be used to help inform management and mitigation efforts throughout the Preserve as well as to understand how corridors function in urbanized landscapes.

The Camera Trapping Process

Camera trapping is an interactive process. It first requires surveying maps of the study region and then identifying ideal locations for camera traps based on the statistical needs of the analysis. However, landscapes

Mountain lions are shy and tend to avoid encounters with people. They are more interested in deer and maintain a sustainable deer population through hunting them. Photo courtesy of McDowell Sonoran Conservancy

are often not so forgiving as to allow ideal placement. Moreover, animals do not see their habitat in terms of where we as researchers would like to place our cameras; they, instead, experience the land as we do our own homes, finding places to sleep and eat based on a combination of needs, preferences, availability, origin, and mere chance. The ideal does not always map with reality. We therefore first identify preferred locations to fulfill our statistical requirements and then survey these places in person for signs of wildlife—scouring the ground with heads down for fresh scat, looking for the well-traveled game trails coyotes and mountain lions traverse, or finding animal tracks. With the Conservancy's very experienced and knowledgeable stewards leading the way and Dr. Jan Schipper, field conservation research director at the Phoenix Zoo - Arizona Center for Nature Conservation, providing key methodological insight, we were able to identify 18 sites to place cameras over the first year of our study. The cameras were evenly distributed in the north, the Gooseneck Corridor, and the south parts of the Preserve to best represent each region. All cameras were placed on trees or posts along washes and captured animals living their day-to-day lives—a series of snapshots that represent the heartbeat of mammalian desert life. Each camera was left for two to three months before a crew of stewards and researchers hiked back to each camera to swap out the SD cards that stored the photographs and to change the batteries. Conservancy stewards then sorted each picture by species on the computer and into a series of file folders—a process that takes dedication, patience, and a keen eye. These pictures then go through a statistical analysis program that provides a long array of information, revealing which species are found where and to what degree. Researchers at Arizona State University then use these data to conduct greater statistical analyses and to understand how and in what ways species occupy McDowell Sonoran Preserve.

The large ears on the jackrabbit are used primarily for dissipating heat. Despite the name, the jackrabbit is really a hare. It is larger than a rabbit and prefers to eat bark and twigs instead of the softer plants preferred by rabbits. Photo courtesy of McDowell Sonoran Conservancy

Which Species are Found in McDowell Sonoran Preserve?

Although the study is ongoing and results may change as data collection continues, some interesting results have been found thus far. Nineteen different taxa were found during the first year of data collection, including cottontail rabbit, quail, jackrabbit, coyote, mule deer, bobcat, gray fox, javelina, roadrunner, Harris's antelope squirrel, American badger, three species of skunk, rock squirrel, mountain lion, raccoon, and desert tortoise. The northern, Gooseneck Corridor, and southern extents of the Preserve all held a similar number of species, and all mammal species, except skunk and raccoon, were found in each region. However, the abundance of species found in each region of the Preserve was very different, indicating that perhaps certain aspects of the environment in the north, Gooseneck Corridor, and south facilitate or limit certain species to occupy and coexist. Our cameras also identified some interesting behavior, such as coyotes collecting in groups of up to five individuals, javelina rolling around in the dirt to cool off, and bobcats showing off their predatory abilities. These and future data will help us to understand how aspects of the urban environment, especially surrounding the Gooseneck Corridor, might impact species diversity, gene flow, and the lives of wildlife in the Preserve.

The badger is a carnivorous, solitary mammal. And, yes, badgers live in the desert! Read the Mountain Lines *article about them on page 20 of this issue. Photo courtesy of McDowell Sonoran Conservancy*

Next Steps

After collecting preliminary data, we now have the opportunity to ask more complex questions about which characteristics of urban landscapes and city life impact how species occupy the Preserve. These data, too, will help inform management decisions as housing and road developments around the Preserve increase, as well as how we may improve the utility of the Gooseneck Corridor for wildlife. With the help of the Conservancy's many stewards and researchers, we recently moved six cameras in the south of the Preserve to the northern region, and we added two additional cameras in the north plus two cameras on a neighboring golf course near abundant water. By improving the number of cameras and the length of time cameras are present on the landscape, we can increase the rate of detection for and better identify how wildlife use the land we share.

For any questions regarding the Corridor Viability Project at the Preserve, please feel free to contact Ralph Lipfert at corridor@mcdowellsonoran.org or Kate Weiss at kcweiss@asu.edu.

Hiking the Windgate and Bell Passes Loop

By Doug Jabour,
McDowell Sonoran Conservancy master steward

Photo by Dennis Eckel

Mature stands of saguaro cactus along with a variety of desert flora populate the hillsides. Depending on seasonal rainfall, these hills often show a variety of colorful blooms. Photo by Dennis Eckel

The most popular hike in the southern portion of Scottsdale's McDowell Sonoran Preserve is the 4.5-mile Gateway Loop Trail. However, if you are looking for a longer and more difficult hike with great scenery, then you should consider hiking the Windgate and Bell Pass loop. This hike is 9.6 miles, has an elevation gain of nearly 2,000 feet, and can take four to five hours for the experienced hiker.

The area between Windgate Pass and Bell Pass feels very remote, and it contains more varied vegetation than most other Preserve locations. In the higher elevations around Windgate Pass, you will see shrubs and grassland. Wolfberry shrubs bloom in the early spring and produce fruit that look and taste like tiny tomatoes. Yes, the berries are edible, but leave them for the Preserve's fauna! If there has been sufficient rain during the fall and winter seasons, the hillsides will be yellow from wildflowers, such as poppies, and shrubs, such as brittlebush. In late spring, you may see the desert Mariposa lily, which looks like a dark orange poppy and only grows in these higher elevations.

There are also areas of fountain grass, an ornamental grass that has spread from urban landscapes to the desert. It is a nonnative grass and can be found in many of the washes in the Preserve crowding out native plants. The Parsons Field Institute of the McDowell Sonoran Conservancy is studying fountain grass and removal techniques to determine the best eradication method.

The beautiful desert Mariposa lily grows in the area of Windgate and Bell Passes in the Preserve. Its brilliant three-petalled flower is one to two inches wide. Photo by Marianne S. Jensen

Let's Go Hiking!

The Gateway Trailhead, which opened in 2009, is the starting point for this hike. After leaving the trailhead, take the Saguaro Trail over the bridge to arrive at the junction of the Bajada Nature Trail. Continue past the nature trail for 0.3 miles until you arrive at the Gateway Loop Trail. Turn left at this junction and take the Gateway Loop Trail until you reach the Windgate Pass Trail.

The trail now becomes steeper as you climb up to Inspiration Viewpoint, which offers great views towards the northwest. Inspiration Viewpoint is a great spot to stop for a drink and perhaps a snack on a bench shaded by a palo verde.

Continue another mile past Inspiration Viewpoint to Windgate Pass. This will be one of the steepest climbs on this hike. If you look at more than just the trail underfoot, you may see deer that frequent this area. When you reach the saddle, you will have climbed around 1,500 feet and will have great views of the Superstition Mountains and Four Peaks. After enjoying the view, you can return via the same route or continue on to the junction where Windgate Pass Trail meets Bell Pass Trail. The hike to this junction includes a gradual drop of about 500 feet.

After turning onto Bell Pass Trail, you have a little more than one mile and a climb of 600 feet until you reach Bell Pass at 3,204 feet, the highest point on this hike. The descent from Bell Pass is very steep and slippery in spots, especially at the beginning. Hiking poles are recommended. The Bell Pass Trail flattens out after about two more miles when you rejoin the Gateway Loop Trail. Take this trail back to the Gateway ramada.

A group of hikers enjoy a vigorous workout and extraordinary views on one of the Conservancy's wellness hikes along Bell Pass Trail. Photo by Dennis Eckel

The Care Behind Trailhead Construction at Fraesfield and Granite Mountain

By Scott Hamilton,
City of Scottsdale Preserve planner

The City of Scottsdale continues to progress on the construction of the Fraesfield and Granite Mountain Trailheads in the northern region of Scottsdale's McDowell Sonoran Preserve. Construction began over the summer and is anticipated to be complete in 2019. The new trailheads will be similar in size and amenities to the Lost Dog Wash and Tom's Thumb Trailheads.

During the planning process, special attention was given to locating the permanent trailhead improvements on top of areas that previously had been disturbed. Both the Fraesfield and Granite Mountain sites experienced a lengthy history of motor vehicle use, leaving scars on the land prior to the City purchasing it for inclusion in the Preserve. Focusing the new improvements on top of these disturbed areas minimizes the amount of new disturbance, reduces overall project costs, and preserves as much native vegetation and habitat as possible.

Prior to the start of construction, the native trees were salvaged in accordance with the requirements of the City of Scottsdale's *Guide to Native Plant Ordinance*[1]. Professional salvage crews first "side boxed" the trees. This entails digging trenches around each tree and fitting them with wood panels banded together to form a box. This process can be a bit of a shock to the tree, so to maximize survivability, they are left in the ground with the bottom tap root still intact and allowed to rest and recover for three weeks. Once recovered, the trees are then "bottom boxed," which involves cutting the tap root, banding a wood panel to the bottom of the box, and lifting them out of the ground. The trees are then stored in a temporary on-site tree nursery, where they are monitored and watered regularly. The trees will be replanted in the landscaping as the trailheads near completion in the spring.

Native cacti also were salvaged from the site. Conservancy stewards, working under direction of City of Scottsdale Preserve staff, dug up and temporarily relocated a considerable number of cacti, including fishhook barrels, cholla, hedgehogs, pincushions, and small saguaros. These cacti were moved to a sand planting bed, where they will reside until they are permanently planted in the finished landscaping at the end of the project. Also salvaged were several large chain fruit cholla. Although not rare, they are an interesting and unique plant. Their large size and prickly personalities make them difficult to salvage by hand, so the City's professional salvage contractor boxed them as they would a desert tree. These plants will make an excellent aesthetic addition to the finished landscape and will provide habitat for a variety of local fauna.

Salvaging native trees at a construction site is required by the City of Scottsdale. Prior to construction, an expert marks native plants and trees that will be boxed and moved to a nearby location, watered during construction, then replanted on the site after construction is completed. Photo by Scott Hamilton

Many cacti, due to their shallow root systems and their water storing capabilities, tolerate removal and replanting well. Photo by Scott Hamilton

Professional salvage contractors handle cacti that are too big for volunteers. Photo by Scott Hamilton

Prior to the sites being graded, Conservancy stewards, City staff, and researchers from the U.S. Geological Survey and Northern Arizona University salvaged a significant amount of biological soil crust from the sites. According to Dr. Helen Rowe, McDowell Sonoran Conservancy Parsons Field Institute director, biological soil crusts are consortia of bacteria, cyanobacteria, fungi, lichens, and mosses that provide critical ecosystem functions such as stabilizing soils, increasing fertility, and storing carbon. The salvaged biocrust will be used in restoration experiments here in the Preserve, as well as at the Mayberry Native Plant Propagation Center in southeastern Utah.

The general contractor also salvaged dead trees, branches, cacti skeletons, and surface rocks for placement in the finished landscaping around the edges of the parking lots and trailhead buildings. This material gives the site a more natural appearance and creates microhabitats that support native plants and animals. The contractor also salvaged the top two inches of the soil surface for reuse as top dressing at the end of the project. This top layer of soil has a higher organic content and contains the seeds of native plants. When added as top dressing around the edges of the completed parking lots and trailhead buildings, it will help native plants to repopulate the disturbed areas.

When you come out and enjoy the completed trailheads in the spring or summer of 2019, please take a moment to observe and appreciate the sensitivity and care given to the sites by Conservancy staff and volunteers, City of Scottsdale staff, and the City's design and construction contractors.

For up-to-date information on the status of construction of the Fraesfield and Granite Mountain trailheads, please visit the City of Scottsdale website at www.scottsdaleaz.gov. You also can contact me directly at 480-312-7722 or email me at Shamilton@scottsdaleAZ.gov. I hope to see you out on the trail!

1. *The Guide to Native Plant Ordinance* document can be found on the City of Scottsdale, Arizona website at http://www.scottsdaleaz.gov/.

McDowell Sonoran Conservancy volunteers, supervised by City of Scottsdale staff, frequently salvage and replant smaller native plants during construction and renovation projects. Photo by Linda Kalbach

Badgers are in our Midst

By Jack McEnroe,
McDowell Sonoran Conservancy master steward

What was that? While hiking on September 25, 2013, I saw something moving out of the corner of my eye. Distracting. I was standing on Brown's Ranch Road in Scottsdale's McDowell Sonoran Preserve, just south of Vaquero Trail, watching two Harris's hawks soar above me. I turned to look. I had no idea what I was looking at. Fumbling, I pulled my camera out to get a photograph. The animal was on the move in the brush. I snapped off a few photos, recorded the time, date, place, elevation, and GPS coordinates, and then completed my hike.

At Brown's Ranch Trailhead, I spoke to Preserve staff member Claire Miller and described what I saw. Claire said she occasionally heard hikers mention a badger, but no one had actually documented its existence. Surprise! Claire mentioned that a couple of years prior several badgers were released in McDowell Mountain Regional Park. I later confirmed this with the park manager, who also informed me that badgers like the type of soil found in the Brown's Ranch area. It is great for digging. Having lived in the Midwest, I was familiar with references to badgers (and wolverines, but that's another story—a football story).

At home, I looked at the photographs. Grainy. Pitiful camera. Note to self: Get a better camera. I did make out the animal. It looked like a badger. I did a search, and the images looked like the animal in my photograph. I emailed the photographs and related information—day and date, time, location—to Melanie Tluczek, (former) manager of the Parsons Field Institute at the McDowell Sonoran Conservancy. She confirmed the find. History was made (in a very, very small way). A few months later, I was on a guided hike coming back from Brown's Ranch when the hike leader yelled to the group, "There's a badger!" We were nearly at the same spot where I first saw the badger. I turned to look, as did 20 plus other guests and stewards. There was the badger! Discovery reconfirmed.

Badgers are usually nocturnal. They have been documented throughout the Preserve, preferring open flats with loose soil and lots of prey. Solitary, badgers roam frequently, excavating holes looking for prey and to create cover. Badger burrows are relatively large and are generally wider than they are tall—similar to the shape of the animals themselves. Fresh piles of dirt may indicate recent hunting. Badgers sometimes cooperate with coyotes in hunting, using the different hunting styles (above ground for coyotes and below ground for badgers) to increase success.

So how do you document the existence of a plant or animal in the Preserve? Be aware of your surroundings. I did not seek out the badger; the badger found me. Pay attention to what you are seeing. In most cases, I did not realize what I had found; rather, I knew that I did not know. Take a photograph. No camera? Use your cell phone camera. Record the date, time, and place of your sighting. Cameras may automatically record the date and time. More advanced cameras may record GPS coordinates. While it is nice to have the GPS coordinates, if you aren't able to get those, record the trail, nearby trail intersections, or the closest emergency marker. Also mention weather (in the Preserve, very warm or hot and clear usually work). Ask someone for assistance in identifying your find. Stewards, Conservancy staff, and Scottsdale Preserve staff are very helpful. Upload your find into iNaturalist[1]. Do your own research. It's a great way to learn. Use the internet. Assemble a few reference books. Attend Conservancy educational programs. Build your knowledge over time. Within a short while, you will be impressing your family and friends with your new-found expertise.

1. iNaturalist is a popular nature app where members record field observations at http://www.inaturalist.org/.

The distinct markings on the badger's face make it easy to identify. It is a squat animal that can grow to nearly three feet in length and weigh up to 25 pounds. Photo by Cindy Howland-Hodson

Although peaceful looking in this photo, badgers can be ferocious and might attack other animals, even ones larger than themselves, when threatened. Photo by Scott Sprague, Arizona Game and Fish Department

Badgers live in open areas and at the edges of woods. They find the loose soil in parts of the Sonoran Desert to be good places to build dens. Photo by Kerry Baldwin, Arizona Game and Fish Department

The badger digs a den to live in, but also digs when hunting underground prey. It hunts mostly at night and preys on small rodents, insects, and snakes. The American badger ranges from Canada to Northern Mexico. A female's territory is about one-square mile, and the male's is slightly larger. Photo by Robert Coonrod

Using long claws, a female badger may dig a den that goes as deep as 10 feet below the surface. The den will contain many tunnels and several exits. Her brood is born sightless and lightly furred. The mother will nurse the young for several months. The young remain with the mother until they are four to six months old. Photo by Robert Coonrod

Which Agaves Are in the Preserve?

By Steve Jones,
botanist

Agaves are a genus of succulent-leaved monocots[1] usually found in hot and arid regions of southwestern North America, although some tropical species occur in Central and South America. They have been used by humans since humans first arrived in the area, providing food, fiber, and even liquor to successive civilizations.

Agaves can be divided into two main groups based on their flower stalks (inflorescences). Some have unbranching, spike-like (spicate) inflorescences while others have branched inflorescences called panicles.

Toumey's agave *(Agave toumeyana)* is a small, spicate species usually occurring in clumps of several to many plants. It's found in two areas of Scottsdale's McDowell Sonoran Preserve. There are scattered populations in the upper reaches of the McDowell Mountain range along Tom's Thumb and Lookout Trails, and on Brown's Mountain Trail, there is a single large colony at the saddle east of the peak.

Desert agave *(Agave deserti ssp. simplex)* is found in southwestern Arizona, but within the Preserve is only found in the McDowell Mountains widely scattered on both the eastern and western aspects of the range. Its tall panicles are distinctive and reveal its presence.

Agaves are semelparous—an individual plant that flowers once, then dies. Most reproduce by seed, but some also reproduce by clones in one of two forms. Around the base of some plants, you can find pups—offshoots from the mother plant arising from underground stems. Others will produce clones on old inflorescences—fruits drop off unfertilized and, in their place on the stalk, small plantlets called bulbils develop. Bulbil-producing plants are otherwise sterile and can be propagated only by clone.

Toumey's agave usually grow in tight clusters. All agave leaves end in sharp spines to protect them from herbivores. Photo by Steve Jones

A large population of Toumey's agave grow where Brown's Mountain Trail crosses the saddle below the peak. Their inflorescences are visible in the distance. Photo by Steve Jones

Desert agaves can be located by their remnant panicle inflorescences, which can remain standing for years after shedding their seed. Photo by Steve Jones

In 1994, on a group hike to the top of Thompson Peak, we stumbled on a cluster of odd agaves, a species I recognized immediately due to the bulbils on its panicled inflorescence. It's a Murphey's agave *(Agave murpheyi),* a species usually found in association with Hohokam sites. Another common name for it is Hohokam agave. The cluster was much reduced but still alive in 2013, when I last visited it.

I recognized it because it's also a popular landscape plant around the Phoenix Valley. Its prolific bulbil production makes it very easy to propagate—just pop off a bulbil and plant it. If you see an agave with bulbils on a branched inflorescence around town, chances are it's a "murph."

There are several other agave species found only in association with archaeological sites in the Verde Valley, Gila County, and Grand Canyon. None of them, including murph, are known in nature; they are only known as cultivars. They are all of hybrid origin (agaves hybridize freely) and do not reproduce by seed, only by pups or bulbils.

Note the pack rat nest (midden) at the center of the photo. The agave in the foreground is a Murphey's agave growing in the Preserve. Photo by Steve Jones

Cultivated agaves are prepared for eating by cutting the leaves off the plant just before it sends up its inflorescence. The remaining stem is swollen with polysaccharides in preparation to feed the fast-growing inflorescence. Baking the stem breaks down the polysaccharides to monosaccharides—simple sugars. The baked stem is eaten fresh or beaten into cakes and dried for storage. This is chewed and, being full of tough fibers, the remaining quid is spat out. An oft-inhabited cave found in Cave Creek is chock-full of these archeological quids.

A similar procedure—cutting off leaves and baking—is used to begin the process of converting agaves into tequila and its cousin mescal. The baked stems are crushed, and the liquid thus extracted is fermented and then distilled.

One other agave found in the Preserve was planted in the past. Near the cistern at the old Ochoa Ranch site along a climbers' trail is a single American agave *(Agave americana)*. Its ancestor was likely planted there when the ranch was active.

The fruits of the Murphey's agave drop unfertilized soon after flowering and are replaced by bulbils—clones of the parent plant. Photo by Steve Jones

1. A monocotyledon, often called monocot, has one embryonic leaf (a cotyledon) in its seed. During germination, the cotyledon grows into a plant leaf.

This solitary American agave in Ochoa Canyon may be a holdover from ranching days. Photo by Steve Jones

During wildflower season, the Conservancy offers guided discovery hikes with a wildflower expert. Photo by Lynne Russell

A Classroom with a View

By Art Ranz,
McDowell Sonoran Conservancy lead steward

Guided discovery hikes to the ruins at Brown's Ranch are quite popular. The guide, an expert in the history of the area, talks about ranching and what life was like at Brown's Ranch. Photo by Lynne Russell

My wife and I had just moved to Scottsdale a few years back. We were sitting on a rock along the Gateway Loop Trail in Scottsdale's McDowell Sonoran Preserve when a man in a blue shirt came up and introduced himself as Don, a steward. I mentioned to Don that I knew nothing about all these rocks and plants around us. That's when he gave me a card and said, "I have just the program for you!"

Following up on his suggestion, I was in a McDowell Conservancy Steward Orientation Class the next Saturday and attended my first of dozens of discovery hikes.

What are discovery hikes? The Conservancy offers almost 50 educational hikes and walks per season, covering a wide array of topics. Learn how the Ancestral Pueblo people lived here, how the rocks formed, and how the incredibly diverse array of plants, birds, bugs, reptiles, and other animals thrive in the Preserve. Discover the history of early Europeans coming to the area as well as recent ranching and the development of Scottsdale and all of its interactions with the elements of nature in our area. Spend time in the desert doing yoga or Tai Chi, hearing poetry from Scottsdale's poet laureate, or learning about the second largest landslide in Arizona. There are fantastic family hikes that are geared toward kids, offering topics like "Tails on the Trails" or "What Bird is That?" It's all right here in our spectacular Preserve for you and your family to discover for free.

The guided discovery hikes involve discovering the desert using all the senses. Hikers stop by a creosote bush to smell the pungent odor imparted by its leaves. Photo by Lynne Russell

Some Conservancy guided discovery hikes emphasize Sonoran Desert flora and fauna. This expert holds a cholla ball and explains the life cycle of cholla cactus found throughout the Preserve. Photo by Lynne Russell

The Conservancy has a varied group of local experts who present these topics in the classroom of the outdoors where one can touch, see, hear, smell, and experience the wonders that have been preserved by the citizens of Scottsdale. The walks and hikes vary from one to five miles in length with numerous educational stops using all the senses to learn about the Preserve. The pace is leisurely, and the outings last from one to three hours, depending on the topic and topography covered. Binoculars are needed for bird walks but, otherwise, just show up with good shoes, sun protection, water, and a thirst for learning. The outings begin from the various Preserve trailheads from September through April and are posted on the calendar on the Conservancy's website and in Conservancy publications. The hikes are also listed below.

The more one understands the outdoors, the more one enjoys and treasures it. Join us for an adventure and your next hike will be all that more invigorating with newfound understanding of the world surrounding you. And it's just a great way to get some exercise and be with energetic, fun people.

Description	Date 2018-2019	Time	Trailhead	Hours	Miles	Rating
Return to Azatlan	11/8/2018	8:00 AM	Rio Verde	4.0	4.0	Moderate
How to Think Like a Citizen Scientist (Family)	11/11/2018	2:00 PM	Gateway	2.0	1.5	Easy
Yoga	11/12/2018	8:00 AM	Lost Dog Wash	2.5	2.5	Moderate
Bird Walk	11/18/2018	8:00 AM	Granite Mountain	2.0	3.0	Easy
Hike with Natural Resources Coordinator	11/19/2018	8:00 AM	Brown's Ranch	2.0	4.0	Easy
Biomimicry - Inspired by Nature	12/1/2018	9:00 AM	Lost Dog Wash	2.5	2.5	Easy
Fire in the Desert	12/4/2018	9:00 AM	Tom's Thumb	3.0	4.0	Moderate
Mammoth Hunters to Canal Builders	12/6/2018	9:00 AM	Brown's Ranch	2.5	2.5	Easy
Lifecycle of the Saguaro	12/9/2018	9:00 AM	Granite Mountain	3.0	4.0	Easy
Tails on the Trails: Taking Your Dog on the Trail (Family)	12/9/2018	2:00 PM	Lost Dog Wash	2.0	1.5	Easy
Hike with Natural Resources Coordinator	12/10/2018	9:00 AM	Brown's Ranch	2.0	4.0	Easy
Geomorphology Bike Ride	12/16/2018	9:00 AM	Brown's Ranch	2.5	12.0	Moderate
Mistletoe & Holly	12/19/2018	9:00 AM	Brown's Ranch	2.5	3.0	Easy
Botany Hike	1/13/2019	9:00 AM	Brown's Ranch	4.0	5.0	Moderate
How the Prehistoric Hohokam People Thrived in the Desert (Family)	1/13/2019	2:00 PM	Gateway	1.5	1.5	Easy
Stoneman Road	1/19/2019	9:00 AM	Brown's Ranch	3.5	4.6	Easy
Bird Walk	1/20/2019	9:00 AM	Tom's Thumb	2.0	3.0	Easy

Mountain Lines magazine presents the diverse natural beauty of Scottsdale's McDowell Sonoran Preserve. It showcases the Conservancy's work in research, education and stewardship of the land. Join the Conservancy Coalition! Your support ensures our legacy and secures our future.

Please make checks payable to: **McDowell Sonoran Conservancy.**

- ☐ Leader $5,000+
- ☐ Advocate $2,500-$4,499
- ☐ Guardian $1,000-$2,499
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You can also make your gift online at www.mcdowellsonoran.org. Thank you!

The Circle of Friends has a new name! The "Conservancy Coalition" is our individual giving program.

McDowell Sonoran Conservancy is a non-profit 501 C3: TAX ID# 86-0674350

7729 E Greenway Road, Suite 100 • Scottsdale Arizona 85260
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McDowell Sonoran Conservancy

Your Gifts in Action

Scottsdale's McDowell Sonoran Preserve is the largest urban preserve in North America and the fourth largest urban preserve in the world. Building on the legacy of our stewards and their success, we press forward to establish ourselves as global leaders in conservation, STEM education for youth, and ecological research.

We hope you are inspired by our history and our vision for the future.

Joining the Conservancy Coalition directly impacts the following programs:

1. Stewardship and best practices in volunteer leadership and management:
   - Conservation and trail maintenance
   - Adult education
   - User safety with daily patrols and guides
   - Guided hike and bike tours with experts
   - Donor recognition
2. STEM education for youth and experiential learning:
   - Classroom curriculum
   - Field trips to the Preserve
   - Junior Citizens Science Festival
3. Parsons Field Institute research projects:
   - Assessing the impact of urban stressors and climate change on:
     - Animals
     - Birds
     - Bats
     - Plants
     - Water
   - Improving best management practices in ecological restoration including:
     - Native plants planning and development
     - Trail restoration
     - Invasive plant management
   - Assessing viability of the Gooseneck Corridor:
     - Wildlife connectivity (camera traps)
     - Acoustic monitoring
     - Neighborhood mapping

The environment is where we all meet; where all have a mutual interest; it is the one thing we all share.

— Lady Bird Johnson

Three Easy Ways to Support the Conservancy

amazonsmile

Shop from the comfort of your home and earn rewards for the McDowell Sonoran Conservancy using AmazonSmile. To link your Amazon purchases to the Conservancy, visit smile.amazon.com and select "MCDOWELL SONORAN LAND CONSERVANCY" from their list of approved charities.

Fry's Food & Drug Stores

Community Rewards Program

Now you can support the Conservancy when you shop at Fry's by joining their Community Rewards Program. Join the program by visiting frysfood.com and selecting "Fry's Community Rewards" under "COMMUNITY" at the bottom of the page. Select "McDowell Sonoran Conservancy" from their list of eligible organizations.

Facebook Fundraising

You can create a Facebook fundraiser in support of the Conservancy. Just log into Facebook and click "Fund-raiser" under "Create" in the left column. Click "Get Started" then choose" McDowell Sonoran Land Conservancy" from the dropdown list under "Nonprofit". Share your fundraiser with friends and family and let them know why you support our mission.

Thank you for your support!

McDowell Sonoran Conservancy

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Scottsdale, AZ 85260

Connect with us:

Stay Cool and Follow These Safety Tips

Photo by Dennis Eckel

- Know your limitations. Scottsdale's McDowell Sonoran Preserve contains 215 miles of trails. Learn trail distances and difficulty, major trail intersections, and Preserve access points. It's a great idea to grab a free map, which are available at our trailheads.
- Begin hydrating the day prior to your hike/exercise, an hour before your hike, and during and after. Bring plenty of water. The desert environment is very dry and hot. Don't let yourself become dehydrated.
- Wear proper clothing that is lightweight and light color. Protect your head with a hat. Wear appropriate shoes. Many of the mountain area trails are uneven and rocky.
- Wear sunblock. The sun is intense.
- Take a working cell phone with a fully charged battery. Cell phone access is available in most of the Preserve, though you may have to walk to a higher elevation to get a signal.
- Hike with a buddy.
- Always tell someone where you are hiking and when you to plan to return.
- While in the Preserve, you will see numbered trail markers that can help rescuers find you in an emergency. Pay attention to them as you hike or bike by.