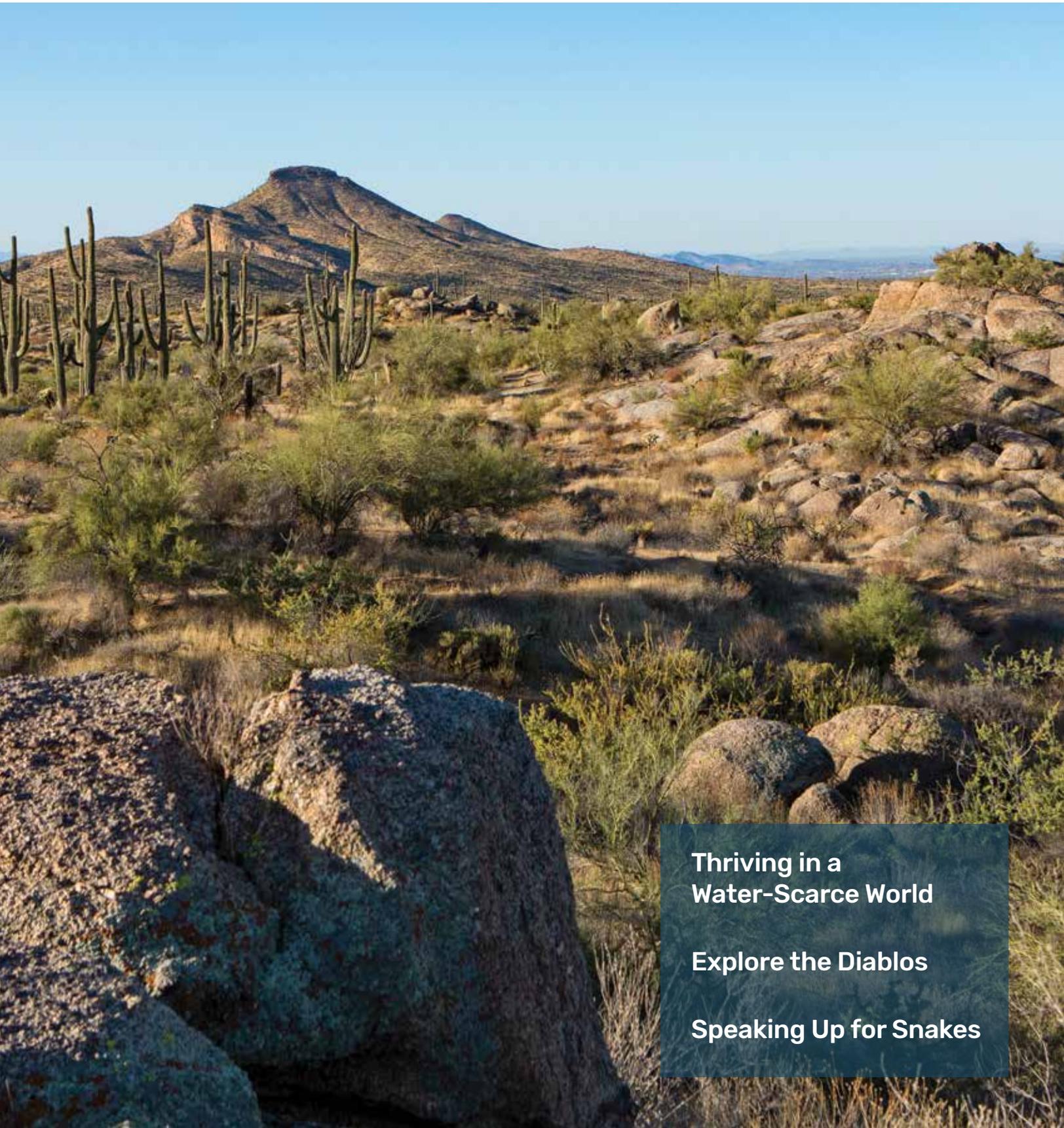




MCDOWELL
SONORAN
CONSERVANCY

Mountain Lines

MAGAZINE OF THE MCDOWELL SONORAN CONSERVANCY SPRING 2021



**Thriving in a
Water-Scarce World**

Explore the Diablos

Speaking Up for Snakes



Justin Owen, CNAP

Natural open space continues to provide a respite for so many people through the pandemic. There have been more visits than ever before into the McDowell Sonoran Preserve as people seek solace in nature. This brings a good number of new visitors into the Preserve, and our steward presence has never been more important to advise and help these visitors. Sharing the trails is key to ensuring we can all enjoy this amazing resource in a safe,

thoughtful, and respectful way. We cannot thank our heroes in blue shirts enough as they continue to be roving ambassadors on the trails. In addition to engaging with visitors, our stewards play a crucial role in identifying trail issues and raising them to our trail maintenance crews. These crews then mitigate those issues so the trails remain in the great condition we have all become used to. Although their work is not realized by many, we all appreciate the results from their amazing work—thank you!

Spring also sees a significant period of scientific fieldwork for us. As this magazine is released, we will be in the middle of our field work season. We have strong plans to ensure we can complete all of our projects, despite relying on smaller teams for social distancing and safety. Fieldwork is just one step in the process; subsequent analyses of the data allow us to better understand the Preserve and Sonoran Desert and work to protect them into the future.

Stay safe and well. ▲▲

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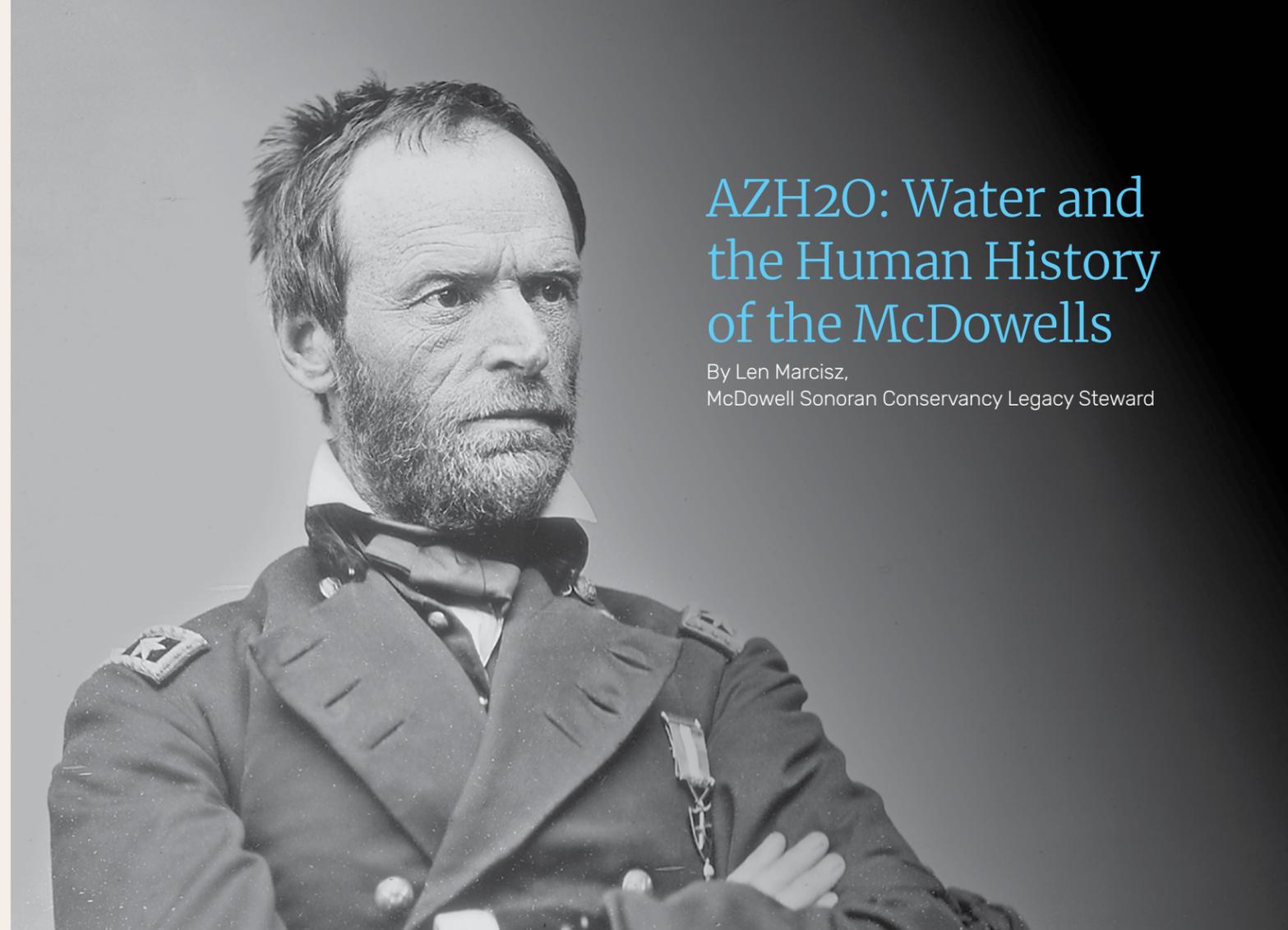
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General Sherman was an American Civil War general and a major architect of modern warfare. Photo courtesy of the U.S. National Archives

AZH2O: Water and the Human History of the McDowells

By Len Marcisz,
McDowell Sonoran Conservancy Legacy Steward

About Us

The McDowell Sonoran Conservancy preserves and advances natural open space through science, education, and stewardship. We create a culture that ensures, preserves, and values natural open spaces for all to enjoy.

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Cover photo: Looking west from the trail, you can see Brown's Mountain. Look at all those saguaros! Photo by Dennis Eckel

Part 1: Water, Wildlife and Archaic Culture

While traveling through the Arizona Territory in the 1880s, an unimpressed General William Tecumseh Sherman was told that, although the place was hot and desolate, all it needed was more water and a better class of people.

Sherman's response: "That's all hell needs."

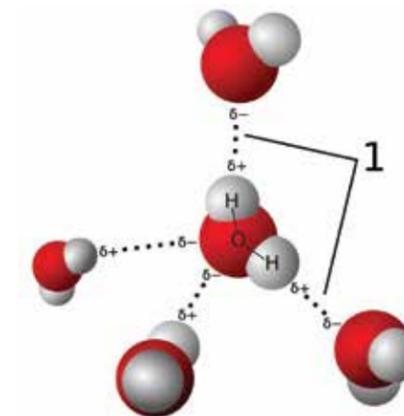
While the need for a better class of people might make for an interesting discussion, the need for more water

has been a constant refrain in Arizona since Sherman's visit.

What is water?

It is a molecule consisting of two parts hydrogen to one-part oxygen, hence the designation H₂O with which we are familiar. It exists in three states: liquid, solid (ice), and gas (vapor). Although most of the Earth's surface is covered with it, only 2.5% is fresh water, found in glaciers, groundwater, lakes, wetlands, and the atmosphere. Of that 2.5%, only 0.4% is surface or atmospheric water. Bottom line: fresh water is limited—accessible fresh water

is even more limited. Deserts represent regions where accessible surface water



Water is the main constituent of Earth's hydrosphere and the fluids of all known living organisms. It is vital for all known forms of life.

is not just limited, but scarce.

There is no generally agreed definition of a desert. Some deserts are cold; some are hot. Some deserts exist at low altitude; others at high elevations. Some deserts receive 10 or more inches of rain annually and are classified as arboreal because of the plant life they can sustain; others may go for nearly a year without rainfall and are defined by sandy dunes. But no matter the desert, there is one common denominator—"the availability of water is limiting to life most of the time."

That common denominator certainly describes our Sonoran Desert, where rainfall is not only uncommon but capricious. It may range from 3 to 15 inches annually depending on location and may not occur for months at a stretch. Its character can range

from prolonged gentle drizzles to abrupt, violent downpours. It generally arrives during two seasons: winter, when storms are usually gentle, and summer, when storms often feature blowing dust, electrical activity, and downpours.

The bi-modal seasonality of Sonoran rainfall is the result of its location in a "rain shadow." As warm, moist air rolls inland from the Pacific Ocean and rises as it encounters the mountains along California's coast, it begins to cool. Cold air cannot hold as much water as warm air, so condensation occurs and clouds release water in the form of rain on the western slopes of California's mountain ranges. Once the cool air passes over the mountain ridges, it descends and warms, becoming arid. As a result, California's mountain ranges receive more than 40

inches of precipitation annually while desert ranges such as the McDowell receive between 8 and 12 inches.

The water provided by desert rains is critical to plant, animal, and human life in the desert. It facilitates the carbon exchange that allows life to survive. Plants take in carbon dioxide (CO₂), combine it with water (H₂O) and photons (sunlight) to produce carbohydrates (building blocks for plant tissues), and release excess oxygen (O₂), which is inhaled by animals. The complementary process involves animals that consume plants, thus ingesting carbohydrates. The carbohydrates generate energy for survival when combined with the oxygen supplied by breathing. That process generates exhaled carbon dioxide, body heat, and water in various forms such as perspiration, urination, and salivation. These two complementary processes, while requiring solar energy, carbon, and oxygen, are mostly facilitated by...water.

Sonoran Desert plants and animals have adapted to the limited availability of water by employing various survival strategies. These adaptations maximize the efficiency of retaining and using water. The palo verde (*Parkinsonia sp.*) and ocotillo (*Fouquieria splendens*) shed leaves during times of drought and regenerate them during times of rain. Brittlebush (*Encelia farinosa*) and bursage (*Ambrosia sp.*) leaves shrivel during times of drought and expand or "green up" subsequent to rain. Our various cacti minimize evaporative loss by eschewing leaves for spines and supporting photosynthesis through



Hummingbirds are frequently seen in the Preserve and around our neighborhoods. The beaks of these inquisitive birds allow them to reach into the depths of tube-shaped blooms. Photo by Lynne Russell



Javelina are not often seen, but their presence is known! These peccary are found in the southwestern area of North America as well as Central and South America. Photo by Lynne Russell

a thin layer of chlorophyll under the epidermis of the plant body. Cacti also can store substantial amounts of water in their tissues. The saguaro (*Carnegiea gigantea*) can store up to 85 pounds of water per linear foot—and that includes its arms as well as the central stalk!

Water availability also influences wildlife.

Vitamin A in green plants and seeds that are ingested by Gambel's quail (*Callipepla gambelii*) triggers the reproductive cycle and affects the strength of eggshells. Dry winters and springs result in fewer and smaller greens, which result in weaker eggshells and fewer surviving chicks.

Both javelina (*Tayassu tajacu*) and mule deer (*Odocoileus hemionus*) deliver their babies with an eye toward the rainy monsoon season. While javelina may breed year-round, their peak period occurs in January through March, resulting in a 145-day gestation period that produces young in June through August. Similarly, deer, which tend to have a peak breeding period in late October and November in other parts of the U.S., tend to experience peak breeding in December and January in the Sonoran Desert. This results in fawns born in July and August.

The adaptive champ among desert denizens is the kangaroo rat

(*Dipodomys sp.*). It eats high-carb seeds and can convert 1 gram of seed into ½ gram of water. It has no sweat glands, utilizes a nasal cooling system to recycle the moisture it exhales, and stores its seeds in a burrow where they absorb moisture from the air and soil.

At the other end of the adaptive scale is the hummingbird: 30% of its body weight is muscle, and its heart rate is 1,260 beats per minute in order to support a wingbeat of 4,800 per minute (or 80 beats per second). In order to fuel the demands of flight, it consumes 70% of its body weight in calories daily. But this pales in comparison to its need for water—four to eight times its body weight every day! Now

there's a good reason to keep those hummingbird feeders full or to plant chuparosa on your property.

Although they are neither kangaroo rats nor hummingbirds, McDowell Sonoran Conservancy stewards are well acquainted with the importance of proper hydration when hiking, biking, patrolling, and maintaining trails in Scottsdale's McDowell Sonoran Preserve. As with other animals, humans need water and typically will die within 48 to 72 hours without it.

Which brings us to the subject of the earliest humans to encounter the McDowells and their relationship to water.

There is no evidence of Paleo Indians—the earliest designated North American culture—in the McDowells. The earliest traces of humans in the mountain range are those of the Archaic Culture and are variously estimated as beginning circa 5000–3000 B.C.

The Archaics were hunter gatherers who travelled in small bands,

living off the animals and plants they could harvest. Natural travel corridors probably followed rivers and streams, offering access to riparian flora and fauna. On occasion, they penetrated mountain ranges to hunt large game and collect fruits and seeds not available in the foothills and open deserts. What did they do for water?

It is likely that they carried small amounts of water in canteens made of hollowed gourds, slung from their shoulders with twine made of natural fibers such as yucca. They also had



The Archaics used the trees and plants we see around the Sonoran Desert now as food, for shelter, and to create tools. Painting by Martin Pate, Newnan GA. Courtesy of Southeastern Archaeological Center, NPS.



Although dry for much of the year, washes carry life-giving water after rains. The small level dams the archaic people engineered to manage agriculture in these washes have been adapted to manage water through the US and world. Photo by Aireona Raschke

the ability to read the landscape and identify greener areas that indicated springs or pockets of standing water. In the McDowells, evidence of Archaic presence, however transitory, is found at Frazier Spring, Ochoa Spring, Brown's Ranch, Pinnacle Peak, and Adero Canyon. These experienced desert rovers also knew that pockets of standing water could be found in boulder depressions, especially in washes, after rain events. As hunters, they also knew that the local animals

would be drawn to these sources of water, which explains the proximity of their hunting venues to such locations.

Over time, the Archaics discovered that normally dry washes could be modified to support primitive agriculture. This took the form of building small, low check dams from available rocks, then planting seeds upwash from the structures in hopes that they would sprout when water trapped by the small dams moistened the wash soil. This process could be replicated in

a number of washes. Once completed, the Archaic bands could continue their travels, perhaps in a circuit, and eventually loop back after many months to see what had sprouted and was available for harvesting.

This primitive agriculture eventually evolved into more sophisticated, large scale irrigation projects.

But that's a subject for a future article. ▲▲

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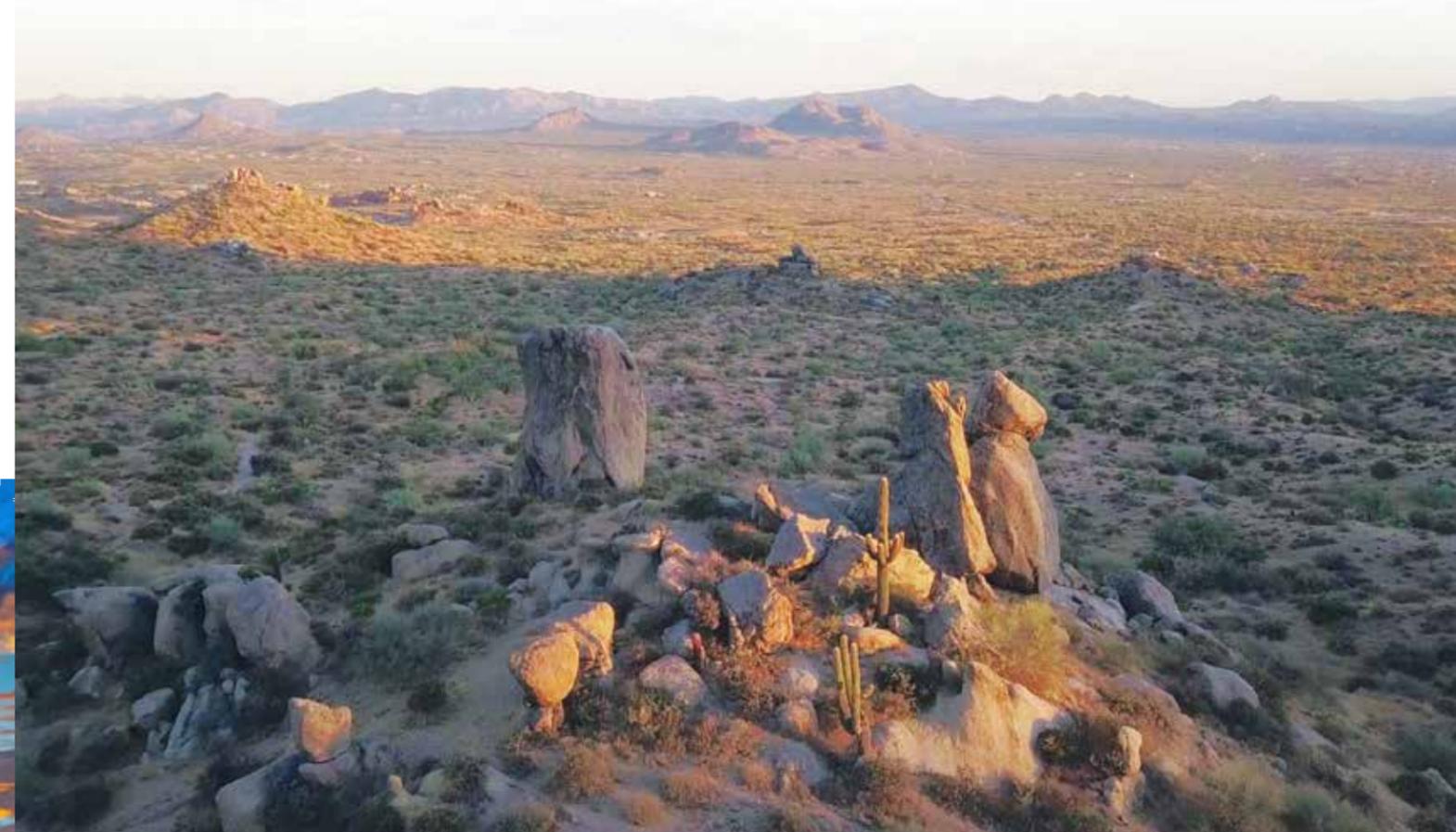
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Appreciating the McDowell Sonoran Preserve's Snakes

By Barbara Montgomery-Ratcliff,
McDowell Sonoran Conservancy Lead Steward



Coral snake: The colorful, venomous Sonoran coral snake has red, cream to yellow, and black bands encircling its slim, 2-foot body. Red and black bands never touch. Photo by Randall D. Babb



Western threadsnake: The Western threadsnake, who lives underground, has "eyes" covered by scales that are no longer functional for sight but are vestiges of its ancestors' functional eyes. Photo by Scott Sprague



Gophersnake: Often mistaken for a rattlesnake, the Sonoran gophersnake is a non-venomous, muscular constrictor that sometimes hisses loudly, vibrates its tail, and strikes when threatened. Photo by Scott Sprague

Snakes are long, legless, carnivorous reptiles covered in scales. Some people might add words like "scary," "creepy," and "slimy" (although their skin is actually dry), which reflect the fear many humans have of snakes. Understanding that snakes help maintain the ecological order of open spaces and have no interest in harming us can reduce that fear.

Seventeen snake species are known to reside in the McDowell Sonoran Preserve. The smallest is the 16-inch-long, skinny, pink Western threadsnake that looks like a shiny earthworm, is blind, and spends most of its time underground. The largest is the 7-foot-long, husky, intricately patterned Sonoran gophersnake that is a powerful constrictor. Each of these 17 species contributes to the ecological health of the Preserve.

First, snakes help maintain balance in the food web by being both predator and prey. To illustrate, a few years ago a worker at a Florida dog kennel noticed dozens of snakes in the rafters and set about, successfully, to kill them. Soon after, the kennel had a "plague of rats." It

took two years and thousands of dollars to gain control of the rats and repair the building. The snakes in the Preserve and around our desert homes also provide pest control by keeping in check populations of rabbits, mice, rats, centipedes, scorpions, and many more.

As prey, snakes help sustain birds, mammals, and other snakes. For instance, California kingsnakes, who are immune to rattlesnake venom, and greater roadrunners, who demonstrate a brave resolve to hit a snake's head against the ground, are predators for many snakes, including venomous ones. Others that eat snakes are hawks, falcons, coyote, and bobcats.

Snakes also help us appreciate the natural environment and better understand how to co-exist with wild creatures. As with most wildlife, snakes prefer flight over fight. In their world, attacking is used to procure food and in self-defense. Humans are too big to serve as food; instead, we may appear as very large threats. When encountered, snakes will typically try to hide or escape. If we appear to pose a threat (e.g., cornering them, throwing rocks, poking

at them) and flight is not possible, they try to warn us off. Rattlesnakes may raise their head in a striking pose and shake their tails. A coral snake may hide its head under its body and emit gas through its cloaca, a process known as "cloacal popping." The meaning of these behaviors is "stay away." Predators, including humans, who don't comply risk attack. According to the Arizona Game and Fish Department, 50-70% of reptile bites are provoked by the person who was bitten.

Once we understand that snakes simply want to be left alone, we can appreciate them from afar for their beauty and adaptations to the desert environment. For instance, because snakes do not internally regulate their body temperature, very cold and very hot days are potentially fatal. Thus, most of the Preserve's snakes seek deep shade in summer and shelter in burrows or rock crevices in winter. Winter is a time to brumate, a lethargic state in which snakes are awake but not moving much, which is different from deep hibernation. Thus, we might see a snake out on a mild winter day sunning itself on a rock,

even though it spends most of the cold months in a burrow in brumation.

It is rare to see any snakes when we are in the Preserve. If you do see a snake, give it space so that it doesn't feel threatened. Show them respect because they aren't in our territory, we are in theirs.

For more information about Sonoran Desert snakes, see www.reptilesfaz.org and <https://www.desertmuseum.org>. ▲▲



Kingsnake: The California kingsnake, a powerful constrictor, reaches a maximum length of 4.5 feet and lays up to 24 eggs that hatch in late summer. Photo by Scott Sprague



Western Diamondback: The Western diamondback has a heat-sensing "pit" on each side of its head between the eye and nostril to identify warm-blooded predators and prey. Photo by Scott Sprague

SNAKES IN THE PRESERVE

Venomous:

- Western Diamondback Rattlesnake* (*Crotalus atrox*)
- Mojave Rattlesnake* (*Crotalus scutulatus*)
- Northern Black-Tailed Rattlesnake* (*Crotalus molossus molossus*)
- Tiger rattlesnake* (*Crotalus tigris*)
- Sonoran coral snake* (*Micruroides euryxanthus*)
- Desert nightsnake** (*Hypsiglena chlorophaea*)
- Smith's black-headed snake** (*Tantilla hobartsmithi*)
- Sonoran lyresnake** (*Trimorphodon lambda*)

*Considered dangerous to humans

**Not considered dangerous to humans

Non-venomous:

- Coachwhip (*Coluber flagellum*)
- Sonoran whipsnake (*Coluber bilineatus*)
- Variable sandsnake (*Chilomeniscus stamineus*)
- California kingsnake (*Lampropeltis getula californiae*)
- Western threadsnake (*Leptotyphlops humilis*)
- Sonoran gophersnake (*Pituophis catenifer affinis*)
- Long-nosed snake (*Rinocheilus lecontei*)
- Desert patch-nosed snake (*Salvadora hexalepis hexalepis*)
- Western groundsnake (*Sonora semiannulata*)

¿El Diablo o La Santa?

By Art Ranz,
McDowell Sonoran Conservancy Master Steward



The gently climbing trail allows you to appreciate the geology of the area. Photo by Dennis Eckel

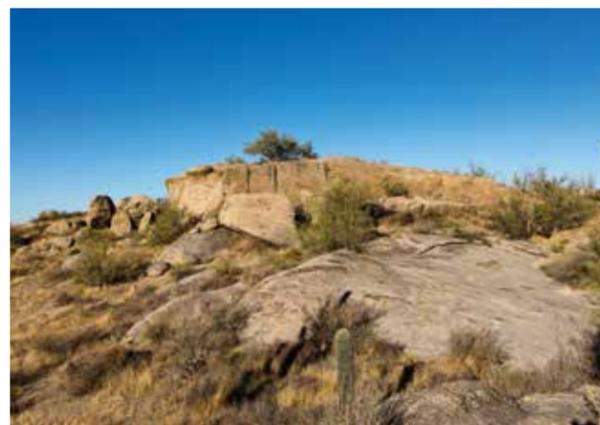


The trail continues through rock formations. Think about the erosion that happened to leave these two standing sentries. Photo by Dennis Eckel

We started our hike to a trail named Diablo with some trepidation. After a few miles from the Brown's Ranch Trailhead, there was a sign warning us of terrain with challenging expert technical features such as steep rock slabs and vertical drops. We wondered, "Is this really a devil trail?" Anxiously heading out on the southern trail, we found it to be uneventful. Smooth, flowing, single-track trails invited us to continue on. Soon we climbed onto beautiful granite rock formations as the trail meandered to the east. Suddenly we found ourselves standing on huge

rounded mounds of solid granite with unobstructed views of Brown's, Cholla, and Granite mountains to the south, the White Tank Mountains to the west, Four Peaks to the east, and Mount

Humboldt with its white radar tower in the Tonto National Forest to the north. Few other trails in the McDowell Sonoran Preserve lead to such an expansive view with so little effort.



The amazing trails allow you to traverse rocks and get up close with the plant life of this area. Photo by Dennis Eckel

We followed the trail back down to a smooth and level path only to find fascinating granite mushroom rocks and fields of saguaros (*Carnegiea gigantea*) that were unrivaled for their height, health, and numbers. The southern trail ended at The Divide Trail, and we headed north, where we encountered more scary signs for the northern section of the Diablo. As we headed west on the northern section of Diablo,

there were signs at forks in the trails indicating "Most Difficult" with the black diamond emblem common to expert ski runs. Would this be where we would encounter the cliffs and steep slabs? We took a black diamond turn. With an easy climb, this took us on to an even more impressive granite boulder formation with rising rock faces filled with linear inclusion bodies in the granite. There were saguaros and palo verde (*Parkinsonia sp.*) trees growing right out of small cracks in the boulders. And, of course, another impressive 360-degree view. This pattern of up and down the boulders continued for another mile until we started home on the Stagecoach Trail.

Well, where was El Diablo?

The following day, we hopped on our bikes to look for him on the same trails. We quickly found him! Taking the first black diamond trail, those boulders we had scrambled up the day before became formidable paths to ride. Now we get it! Those warning signs were directed at the bikers. Our attention now turned from admiring views to total concentration in navigating the technical challenges of riding the trails we had walked the day before. It was a whole new set of challenges with straight ahead drop offs, narrow turns with rock walls on both sides, and short steep climbs that made our legs burn. Not to mention leaving an occasional

bit of flesh on the rocks close to the trail. But what could be more fun? So, after resting, we headed for the south trail, where we decided to bypass the black diamond sections. That became a rather smooth ride with many of the great views and much less intensity. We agreed that an intermediate rider could easily manage both Diablos by avoiding the black diamond sections, with the south being easier.

So, in two days, we discovered the hidden beauties of the Diablos that all hikers should not miss. We also found challenging technical sections built for the seasoned bike rider as well as a path for the recreational rider. So, ¿El Diablo o La Santa? It's both! ▲▲

The trail traverses over the rocks to make for a stunning hike through boulder fields. Photo by Dennis Eckel





The mixture of online learning and self-driven experiments provides youth with a novel way to explore and learn. Photo by Lynne Russell

Reimagining Education for Our Students

By Nicole Kallman,
McDowell Sonoran Conservancy Education Manager

The past year has highlighted aspects of our educational system that need improvement along with opportunities for innovation to better support our teachers and students. Since the onset of the pandemic, educators and communities have had to engage in creative problem solving. While teaching during COVID-19 was—and is—no easy task, the modifications that have already been made within learning spaces encourage us to reimagine what Arizona education can look like in the future.

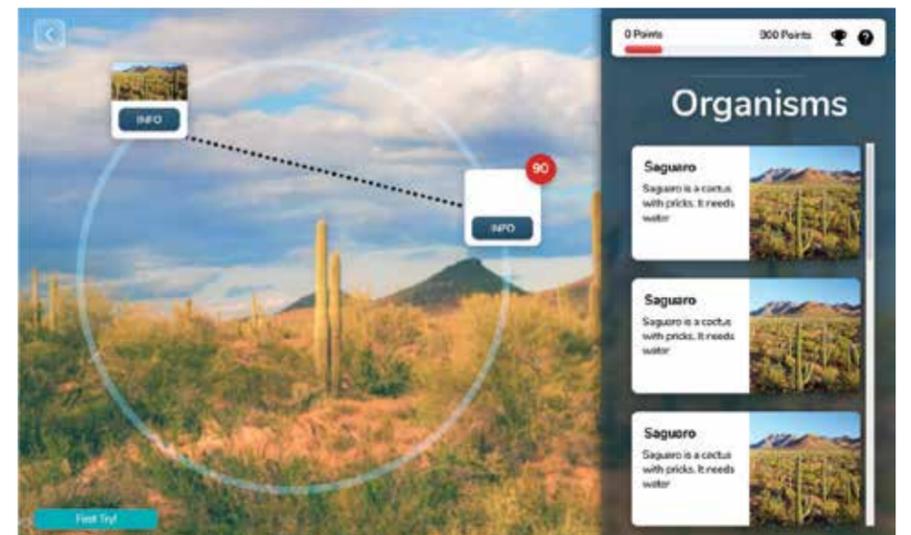
Online instruction offers entirely new challenges beyond the classroom management teachers normally deal with. Many standard teaching tools, such as worksheets and group work, are difficult to implement in the new online format. However, online teaching provides the opportunity for students to engage in self-directed forms of exploration and inquiry. Although students may not pay attention to an online presentation about photosynthesis, they can be inspired by an independent, at-home experiment in which they

design an experiment around the effect of sunlight on plant growth.

The focus on students directing their own learning experience is inherent in the Arizona State Science Standards. One of the Phoenix Valley school districts points out that “students making sense of the world and their surroundings is at the heart of the Arizona Science Standards.” What better time to take advantage of students exploring the world around them than when they are already outside a classroom?

The challenges of online instruction are by no means fully solved simply by encouraging students to engage in self-directed exploration at home. The novel teaching situation of the past year has shown that community support is critical. The McDowell Sonoran Conservancy designed Expedition Days Online, a robust online curriculum, as an immediate response to the challenges created by online learning. The unit is customizable based on classroom needs and can be done in the classroom, completely online, or through a hybrid teaching model. The lessons and activities were created so students can progress through the lessons with little to no adult facilitation, recognizing the varying at-home situations. Most importantly, the curriculum helps teachers meet multiple 3rd and 4th grade science standards while engaging students in interactive learning and investigating the world like a scientist. This type of educational program meets the immediate need created by the pandemic; however, the structure and teaching practices used have impacts far beyond. As we continue to navigate the new educational landscape, the Conservancy will work to best support our teachers and students by building the following into current and future K-12 programs:

- Customization of material, both in delivery format and time commitment. Each teacher knows his or her class best. Designing flexibility into a program allows more classes to easily access and successfully use the material.
- Build educational programs directly



A video game will be embedded into our 2021 Expedition Days Online event, which will allow students to explore the ecosystem numerous times, leveraging inquiry-based learning techniques.

supporting Arizona State Science Standards. Informal education opportunities are incredible and can be made more accessible if they align with what teachers already need to teach in the classroom.

- Design opportunities with students in mind. There are a range of student learning levels at each grade level. Creating curricula that engage these different levels creates the most rewarding learning experience for each child.
- Make learning fun! Ask students to investigate the world around them,

solve problems, and generate new ideas. Not only will students enjoy learning more, but they will also develop a deeper and more holistic understanding of the material.

- There are many challenges still to be faced when it comes to the repercussions of the pandemic on public education. However, as we continue to move forward, we can use the lessons we’ve learned to create informal educational programs that support our teachers and get our students excited about learning. ▲▲

Plants Important for Pollinators

By Steve Jones,
Botanist



Digger bee (*Centris pallida*) adults emerge in conjunction with palo verde's flowering period. They collect nectar and pollen and store it underground along with the eggs of next spring's generation. Photo by Steve Jones

Vascular plants are, for the most part, sexual beings and generally reproduce by producing and swapping gametes. There are exceptions—cloning, self-pollination, and other methods not available to mammals like us. Gamete swapping in vascular plants requires pollination and, being stationary beings, requires assistance to complete the exchange. Some plants (gymnosperms, many monocots such as grasses, and some dicots like jojoba, bursage, and oak) partner up with the wind. Male flowers produce prodigious amounts of pollen and count on wind and luck to carry a pollen grain to the stigma, the receptive part of the female flower. The wind is indiscriminate; the pollen grain finds a stigma or not.

Most other plants require the assistance of a more active and

discriminate agent. Flying insects are by far the most common partners assisting in plant pollination. To encourage that assistance, a plant supplies its partners with a reward for the service, usually in the form of food—nectar or pollen or both. Cues are often important in attracting insects, so plants produce colorful flowers or aromatic nectar (or both) to signal the presence of a food reward. Pollination is generally a mutualistic relationship in that both species—the plant and the insect—benefit from the interaction.

In the Sonoran Desert, with its bimodal rain pattern, there are separate guilds of flowering plants in the spring and in the summer. By far, the larger number of species are spring-flowering herbs, shrubs, and trees. However, some species flower in both seasons,

for example desert marigold (*Baileya multiradiata*), goldeneye (*Bahiopsis parishii*), and desert lavender (*Condea emoryi*). The latter will flower just about year-round.

Some plant species are particularly important to pollinators due to their tendency to flower in profusion and in coordination with the adult phase of their principle pollinators. In the spring, the bean trees partner with native bees to help each other propagate. Blue palo verde (*Parkinsonia florida*) flower first, followed a couple of weeks later by its cousin foothill palo verde (*P. microphylla*). Another bean tree, ironwood (*Olneya tesota*), blooms about the same time as the latter.

Catkin-producing bean trees, velvet mesquite (*Prosopis velutina*) and catclaw acacia (*Senegalia greggii*), are



Desert lavender can flower in any season and provide food to insects, such as this non-native honeybee. Photo by Steve Jones



Fall-flowering shrubs like this turpentine bush attract butterflies, including this Mormon metalmark (*Apodemia mormo*). Photo by Steve Jones



Myriad kinds of insects visit the flowers of desert broom in the fall, including bees, flies, beetles, moths, and butterflies like this great purple hairstreak (*Atlides halesus*). Photo by Steve Jones

also important to the native bees and other species. Catclaw acacia blooms in late spring and is well-known for its wonderfully aromatic flowers, which attract many pollinators including bees, flies, bee flies, butterflies, and moths.

Spring annual wildflowers such as lupines (*Lupinus sparsiflorus*, another bean family member), Mexican poppies (*Eschscholzia californica* var. *mexicana*), and chia (*Salvia columbariae*) rely on, and reward, flying insects.

Summer rains bring the second guild of plants into flower. Turpentine bush (*Ericameria laricifolia*) and its

cousin broom snakeweed (*Gutierrezia sarothrae*) often cover large areas with their characteristic yellow flowers. They provide sustenance to local and migratory insects, especially butterflies. In years when they fail to flower (recently, 2018 and 2020), fall butterfly numbers are substantially lower than in normal years.

Desert broom (*Baccharis sarothroides*) flowers in the fall and, while its flowers are not showy, is highly popular among local and migratory insects. As it is dioecious, with male and female flowers on separate plants,

insects are very important for their gamete exchange.

There is one local plant that tricks an insect into pollinating its flowers. Dutchman's pipe (*Aristolochia watsonii*) forms a flower that both looks and smells like the ear of a mouse. Biting midge flies searching for a blood meal enter and are trapped overnight in the flower. The fly is released the next morning covered in pollen and, with luck for the plant, will again fall for the trick and pollinate another flower. ▲▲



Late spring brings catclaw acacia flowers with their very aromatic scent. The flowers are popular with numerous insect species, such as this bee fly. Photo by Steve Jones



Lupine flowers with white central spots advertise fresh, unpollinated flowers. After an insect visits, a chemical change induces the white spot to turn red indicating to pollinators that the flower has little to offer. Photo by Steve Jones



The unusual flower of the Dutchman's pipe resembles a mouse's ear in shape and scent, attracting biting midge flies that enter to be covered in pollen. Photo by Steve Jones



Views from our Legacy Stewards as We Celebrate 30 Years

By Gina Clark,
McDowell Sonoran Conservancy steward

As the McDowell Sonoran Conservancy reaches its 30th anniversary, we share stories from some of our most committed volunteers, Legacy Stewards. With more than 650 stewards supporting the Conservancy, 14 stewards make up the ranks of Legacy Stewards.

The Conservancy takes a unique approach to volunteerism, making stewards active partners with staff

in developing and implementing the strategy, planning, and programs. To become a Legacy Steward, you need to devote significant service but also to have made a significant contribution to the Conservancy.

Like many stewards today, Legacy Steward Len Marcisz was recruited to the Conservancy right off the trail. After retiring from corporate life, Len found time on his hands. He had read about

the McDowell Sonoran Land Trust (MSLT), as the Conservancy was named at the time, and was intrigued by its advocacy and stewardship initiatives.

Len shares, "It was late spring 2003 that the local newspaper announced the MSLT was conducting its final hike of the season at the Lost Dog Wash. On a whim, I decided to participate in the hike, which was led by a founding member of the MSLT and

the Conservancy's first steward, Chet Andrews, and another early steward, Bernie Finkel. As the hike progressed, I pointed out to Bernie some prehistoric artifacts along the route and suggested that the hike leaders might incorporate this information in their commentary. At the time, I had no intention of joining the MSLT."

Spotting talent, Chet and Bernie invited Len to become a steward as they were heading back to the parking lot. According to Len, "They mentioned that the next steward class would not be offered until the fall but were effusive in describing the course material and the value of stewardship to the community. Both were genial and obviously totally committed to the stewardship program and experience. What impressed me was the intensity of their commitment. Inviting someone to a class to be offered months into the future bespeaks a faith in the value of an enterprise. And so, I showed up that fall for Class 6 and have cherished the decision every day since."

Hiking trails have played an important role in attracting stewards to the Conservancy for a variety of reasons. Legacy Steward BJ Tatro began her steward journey on the trails as she pondered important life decisions after the sudden death of her husband. "Back in 2004, I used to hike in the Lost Dog area quite a lot. I would frequently cross paths with a blue-shirted logoed hiker or two, and they would invariably greet me with a smile and friendly salutation," explains



Legacy steward, BJ Tatro was the driving force behind the Pathfinder program. This trailhead ambassador program helps visitors with safety tips in addition to route suggestions. Photo by Frank Romaglia

BJ. "Often, if they could not see my flask, they would ask if I had water. Always helpful, never scolding. One of the important decisions I was making related to what I could do to avoid spending even more time working than I already did. The answer became clear...check out volunteering with the Conservancy."

BJ applied to become a steward and was accepted into the steward program. Her steward training was under the expert guidance of Chet Andrews. According to BJ, shortly after that, Bernie Finkel talked her into taking on the job of helping to create the Pathfinders Program. Today the Pathfinders Program includes more than 175 stewards who host trailheads and assist visitors with safety, directions, and tips.

BJ continues to have great enthusiasm for the Conservancy. "I was hooked! I was able to use my organi-

zational skills to help the Conservancy achieve its mission of protecting Scottsdale's McDowell Sonoran Preserve, while enjoying the outdoors that I love. And here I am still, finding new ways to help the Conservancy realize its vision of creating a culture that ensures, preserves, and values open spaces for all to enjoy."

Legacy Steward Bernie Finkel, who talked BJ into creating the Pathfinders Program, recalls what the Conservancy and the Preserve have meant to him. "After taking several hikes into the McDowell Mountains, I realized that I had in my backyard a special place, a place of rugged beauty and historical presence and a great place to hike. In March 2001, I graduated as a steward with Class 3 and began focusing on protecting and conserving our Preserve."

During his 20 years as a steward, there have been many things that



Each year, Legacy Steward Len Marcisz (front) leads a Veterans Day hike from Lost Dog Wash Trailhead. Len encourages veterans from all backgrounds to share their stories. Photo by Jakki Casey



Legacy Steward Bernie Finkel enjoys teaching students about ethnobotany to help them understand how people who lived here long ago used the native plants in many ways. Photo by Dennis Eckel

stand out for Bernie. He believes several things keep stewards connected with the Conservancy, including making a difference and opportunities for self-growth. Bernie says he stays connected because of “the privilege to work with a group of talented and committed individuals who leave their egos in their desk drawers at home.”

Retirement is another theme that has led stewards to the Conservancy, where they can continue to contribute their talents to an organization that engages stewards in important and multi-faceted volunteer work. When Legacy Steward Dan Gruber considered retiring from his work as a management consultant, his wife brought an article about the MSLT to his attention.

Dan’s interest in conservation and long involvement in leading hiking trips for



In 2019, Legacy Steward Dan Gruber led a field trip for visiting geologists from around the world.

friends motivated him to get involved with the MSLT in 2003 and become a steward the following year. Since then, Dan has been involved in many of the major transitions and programs of the Conservancy.

In 2009, he worked with Len Marcisz and BJ Tatro to help create the program-oriented, self-managed steward organization that continues today. As a result of his personal interest in science and especially geology, he helped found the Field Institute (now the Parsons Field Institute) in 2010 and, several years later, the Citizen Science Program, with which he remains very active. With Preserve staff, he led the planning and development of the Marcus Landslide interpretive trail, one of the



Legacy Steward Bobby Alpert led the Conservancy’s first formal hike along Marcus Landslide Trail. This was Bobby’s 100th hike as lead. Photo by Dave Lorenz

most comprehensive geologic interpretive trails in Arizona. “I believe the Conservancy will continue to expand its activities in support of science- and education-based conservation in the Preserve and beyond, and I hope to continue my involvement with that mission for years to come,” says Dan.

Legacy Steward Bobby Alpert, graduate of Class 8, was inspired by other stewards who demonstrated a deep passion for preserving the McDowells. In 2006, a year after Bobby became a steward, Chet Andrews asked him to take over the steward education classes. “I retooled the classes from four weeks of classes to two classes over a weekend, graduating about 170 stewards during my tenure,” explains Bobby.

In 2008, with new Executive Director Mike Nolan, Bobby developed the Patrol Program and became the first Patrol Chair. “Within the first two years, we had more than 135 stewards patrolling all trails, and then we added bike and equestrian patrol as well,”

explains Bobby. Today, the Patrol Program has more than 470 qualified stewards. In early days, Bobby led more than 100 hikes in the Preserve, including the first hike to Marcus Landslide.

With a multitude of contributions over the years, Legacy Stewards continue to play an important role in the Conservancy today. Their enthusiasm in supporting the success and

evolution of the Conservancy to meet the growing needs of the Preserve and larger region is an inspiration to all stewards. Legacy Stewards demonstrate what is possible with volunteers when an organization embraces their ideas, skills, and work ethic to achieve goals. This represents just some of their tales; we thank and appreciate them all. ▲▲



The unique steward organization relies on stewards teaching stewards. Our incoming stewards are taught and mentored by existing stewards to ensure everyone finds their individual pathway to stewardship. Photo by Lynne Russell



The Sonoran Desert is not adapted to wildfires. The increasing frequency and intensity of wildfires has profound impacts on this landscape. Photo by Aireona Raschke

Working Together to Manage Invasive Plants and Wildfire

By Aireona B. Raschke, Ph.D., Central Arizona Conservation Alliance Program Director, and Annia Quiroz, Central Arizona Conservation Alliance Engagement Coordinator

Like much of the western United States, Arizona struggled with both drought and wildfires in 2020. We saw many fires throughout the state during an intense wildfire season, including several fires that were very close to home in the Phoenix-metro area. Parts of Cave Creek were evacuated twice, White Tank Mountains Regional Park suffered a fire, and many watched the massive Bush Fire, which was active

for nearly a month, burn 193,455 acres, much of which was valuable habitat.

While wildfires are not new to the Phoenix-metro area, in the last couple decades the extent, regularity, and severity of these fires have increased. Although these changes stem from a variety of conditions in the Sonoran Desert, including drought and climate change, invasive plant species such as buffelgrass (*Pennisetum ciliare*),

red brome (*Bromus madritensis*), and stinknet (*Oncosiphon pilulifer*) likely played a role in fueling these fires. We have seen these impacts in the past, with particularly rigorous science in Tucson illustrating the connection between invasive plants and wildfire extent and intensity (Source: McDonald, C.J., McPherson, G.R. 2013. <https://doi.org/10.4996/fireecology.0902026>).

With this in mind, the Central

Arizona Conservation Alliance (CAZCA), the McDowell Sonoran Conservancy, and several other partners including Maricopa County Parks and Recreation, White Tank Mountains Conservancy, City of Phoenix, and the Arizona Sustainability Alliance started a collaborative regional project called Desert Defenders in an effort to address invasive plant species management through mapping, removals, and raising public awareness.

Desert Defenders relies on community scientists and volunteers who share a concern about the role invasive plants play in increasing wildfires and decreasing our local biodiversity. These community members go through our Desert Defenders training and learn to identify the nine focal invasive plant species, identified by the partnership as being of prime concern in central Arizona. The trained Defenders go out and map where invasive plants are located along trails throughout Maricopa County, collecting valuable data. Others volunteers involved assist in removal efforts of these various plant species across the region, which require true dedication. Removal events can be strenuous and, most often, a single pull day is not enough to keep invasives from resprouting. The invasive plants must be pulled several times as plants re-emerge through the seasons. This is a continuous effort and why our trained Defenders are key members and valuable partners in this project.

Little by little, we have seen this program grow in numbers and impact and even attract the attention of other organizations and the media. To date, we have trained more than 130 volunteers, conducted removals in areas totaling 50 acres, and gathered



Anyone can become a Desert Defender! Participants are trained to identify target invasive plant species and to use a mobile application. Note: this training occurred prior to COVID-19. Photo by Annia Quiroz

well more than 6,000 data points. CAZCA is now working closely with City of Phoenix Parks and Recreation to tackle key areas within their parks and preserve, as well as with the City of Tempe.

Together, the Desert Defenders partners, community scientists, and volunteers are making a difference. We are raising awareness in our communities about the extent and impacts of invasive plant species and also showing our communities the true value and diversity that can exist in

the Sonoran Desert. Together, we are mapping, removing, and determining the best strategies for how to address this issue across our region to protect our biodiversity and the health of our communities.

You can explore the data collected by the Desert Defenders through this public map: https://bit.ly/NNP_map. If you are interested in learning more about this collaborative effort and/or becoming involved, please visit cazca.org/project/desert-defenders. ▲▲



Removing invasive plants helps restore the natural ecosystem while reducing the risk of catastrophic wildfires. Photo by Annia Quiroz



Dog owners should always carry poop bags with them. The poop flags along the side of the trails are a stark reminder for all visitors of how many dog owners do not adhere to the rules. Photo by Jim Tillinghast

Ever Wondered What Those Flags Alongside Preserve Trails Mean?

Gina Clark,
McDowell Sonoran Conservancy Steward

It's not surprising that dog owners enjoy hiking the McDowell Sonoran Preserve trails with their four-legged friends. Scottsdale ranks 6th nationally for outdoor pet friendliness according to Wallethub, the personal finance website that annually ranks dog-friendly cities. Although dogs are warmly welcomed, visitors must follow the rules, including cleaning up after their dogs.

You may have noticed flags along Preserve trails marking the locations of abandoned dog poop. Each fall and spring, the Dog Committee, led by Kelly Hayes, City of Scottsdale Natural

Resources Coordinator, and comprised of McDowell Sonoran Conservancy stewards and Scottsdale representatives, hosts Canine Safety Education Day and the Dog Waste Flagging Campaign to raise awareness of these issues. Last November, Conservancy stewards and Scottsdale personnel flagged 171 "dog presents" not picked up by dog owners during a two-week period. This number represented a 100% increase at Brown's Ranch, Gateway, and Toms Thumb trailhead areas compared to the previous year. The Lost Dog Wash area saw a decline, but the cumulative increase in dog waste left in all areas was 63%.



Responsible owners bag their dog's poop and bring it back to the trailhead to dispose of in the trash. Dog poop left in the Preserve can cause a myriad of issues for wildlife and humans. Photo by Jim Tillinghast

Four Easy Ways to Support the Conservancy



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 Conservancy" from its list of approved charities.



Now you can support the Conservancy when you shop at Fry's by joining its 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 the list of eligible organizations.



You can create a Facebook fundraiser in support of the Conservancy. Just log into Facebook and click "Fundraiser" under "Create" in the left column. Click on "Nonprofit" and then search for "McDowell Sonoran Conservancy." from the dropdown list under "Nonprofit." Share your fundraiser with friends and family and let them know why you support our mission.



The McDowell Sonoran Conservancy is proud to announce that it's now a part of the Target Community Giving Program known as Target Circle. List the Conservancy as your non-profit partner and Target will direct a charitable donation each time you shop and use the Target Circle app.

These increases could be a result of additional visitations to the Preserve as a respite from sheltering at home. However, there are no good excuses for leaving dog poop in nature. Common excuses from dog owners include forgetting a waste bag, expecting the poop fairy to clean up, thinking it's okay because coyotes poop on the trails, and being unaware of the health issues tied to dog waste.

Not all animal waste is created equal. Dog waste does not biodegrade like wild animal or horse waste because dogs eat processed food. It takes a long time for dog poop to biodegrade, so it quickly accumulates on trails. We all know it's not fun to step in poop. Leaving bagged poop on the trail isn't a solution; it just adds plastic litter to the equation.

Dog waste can also contain harmful bacteria and parasites such as *E. coli*,

Giardia, *Salmonella*, roundworms, hookworms, and *Cryptosporidium*, which can be spread to other animals and humans and cause significant health issues. Bacteria in dog waste can also pollute water sources, creating additional health issues for animals and humans. With sudden, hard monsoon rains, this contaminated water can flow to other water sources.

To protect people and dogs, Maricopa County and the City of Scottsdale have strict dog ordinances, including leash requirements, clean up and disposal of dog waste, animal cruelty, and liability for dog bites. These are meant to protect people, dogs, and the environment. Be aware that violating ordinances can mean penalties, fines, and possibly having a dog impounded. Enjoy the great outdoors with your four-legged friend but follow

the safety rules designed to protect both of you. ▲▲



There are many ways you can carry your dog poop bag. Think about a bull dog clip, which can be attached to your dog's leash for easy transportation on your hike. Photo by Jim Tillinghast



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Connect with us:



The Scottsdale McDowell Sonoran Preserve is owned by the City of Scottsdale and is managed through a unique partnership between the City of Scottsdale and the McDowell Sonoran Conservancy. Our shared goal for the Preserve is to maintain it in a natural state while providing appropriate recreational and educational opportunities for this and future generations.

Jacket Required.

Vests, fleece jackets, and gaiter masks to gear up for winter.

Visit conservancymerchandise.org to purchase your swag today!



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