



MCDOWELL
SONORAN
CONSERVANCY

Mountain Lines

MAGAZINE OF THE MCDOWELL SONORAN CONSERVANCY SPRING 2022



Anatomy of the Landslide



The Breakaway scar, where the mass of rock that other masses detached from the mountainside, has a concave shape. The top of the scar reaches to the ridge line, 1,300 feet above this point. You can distinguish the Breakaway area from the undisturbed mountainside by looking for large boulders and rock faces all leaning in the same direction. These are part of the original talus. The smaller, jumbled boulders are in the Breakaway zone.



Although not visible from here, the bottom of the Breakaway area is not clear from the top. About halfway between this point and the ridge line, there's a horizontal ledge of large boulders marking the edge of a scarp. This ledge is referred to as the "pocket" that water flows from. The right side of the scarp can help you locate it. This area and the top of the "talus cone" are the area where the landslide rock finally fell down. This landslide rock finally fell down that steep 300 feet, even before flowing an additional 4,000 feet to the east over the desert floor, flooding on the mesa nearby.





Justin Owen, CNAP

As we move from Winter into Spring, we have enjoyed our winter rainfall which helps the desert spring to life. And as our temperatures begin to rise, we welcome the wildflowers that enhance the beauty of our wonderful desert. This year, how widely spread will the fiddle-necks be? Will we see lots of delicate lacepod? Will we see wide expanses of poppies?

This time of year, also sees us flooded with visitors from out of town. How many of us enjoy showing

off our widespread natural open spaces? As I enjoy sharing this amazing beauty with others, I always remember we each have a role to play in ensuring our natural open spaces remain protected for future generations. One of my favorite quotes is "We don't inherit the earth from our ancestors, we borrow it from our children." Native American proverb.

I hope you enjoy reading about some of our work and expanding partnerships in this edition. Our tortoise telemetry project and the article about urban wildlife help us appreciate the impact we have on this land. Our partnership with Intel and exploration of drones and AI to identify invasive non-native plants are great examples of our growing impact. We are also continuing to expand our K-12 hands-on experiential opportunities to encourage local students to appreciate their surroundings. There are so many exciting opportunities right now and we enjoy sharing just some of those with you.

Stay safe, and I look forward to seeing you out on the trails soon. ▲▲

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Wild About Wildflowers

By Lynne Janney Russell,
McDowell Sonoran Conservancy
Master Steward
Photos by Lynne Janney Russell



Purple-blue Coulter's Lupine (Lupinus sparsiflorus) flowers bloom on a fuzzy spiral with yellow and white portions of the flower changing to magenta pink as they are pollinated.

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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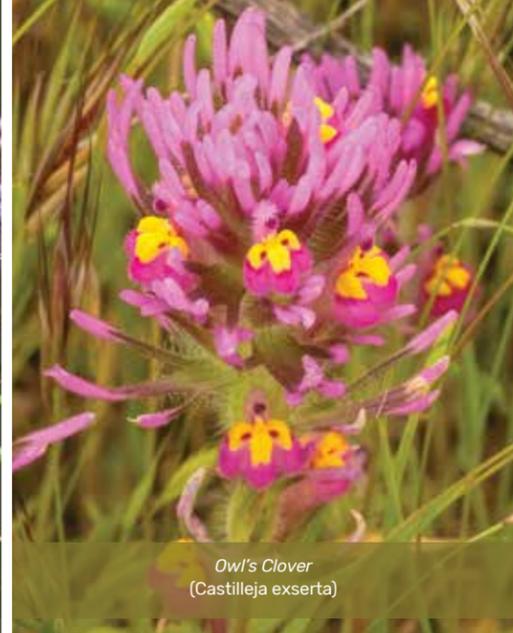
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Cover photo: Visitors better understand the geological events that took place at Marcus Landslide by reading the interpretive signs along the trail. Photo by Dennis Eckel



New Mexico Thistle
(*Cirsium neomexicanum*)



Owl's Clover
(*Castilleja exserta*)

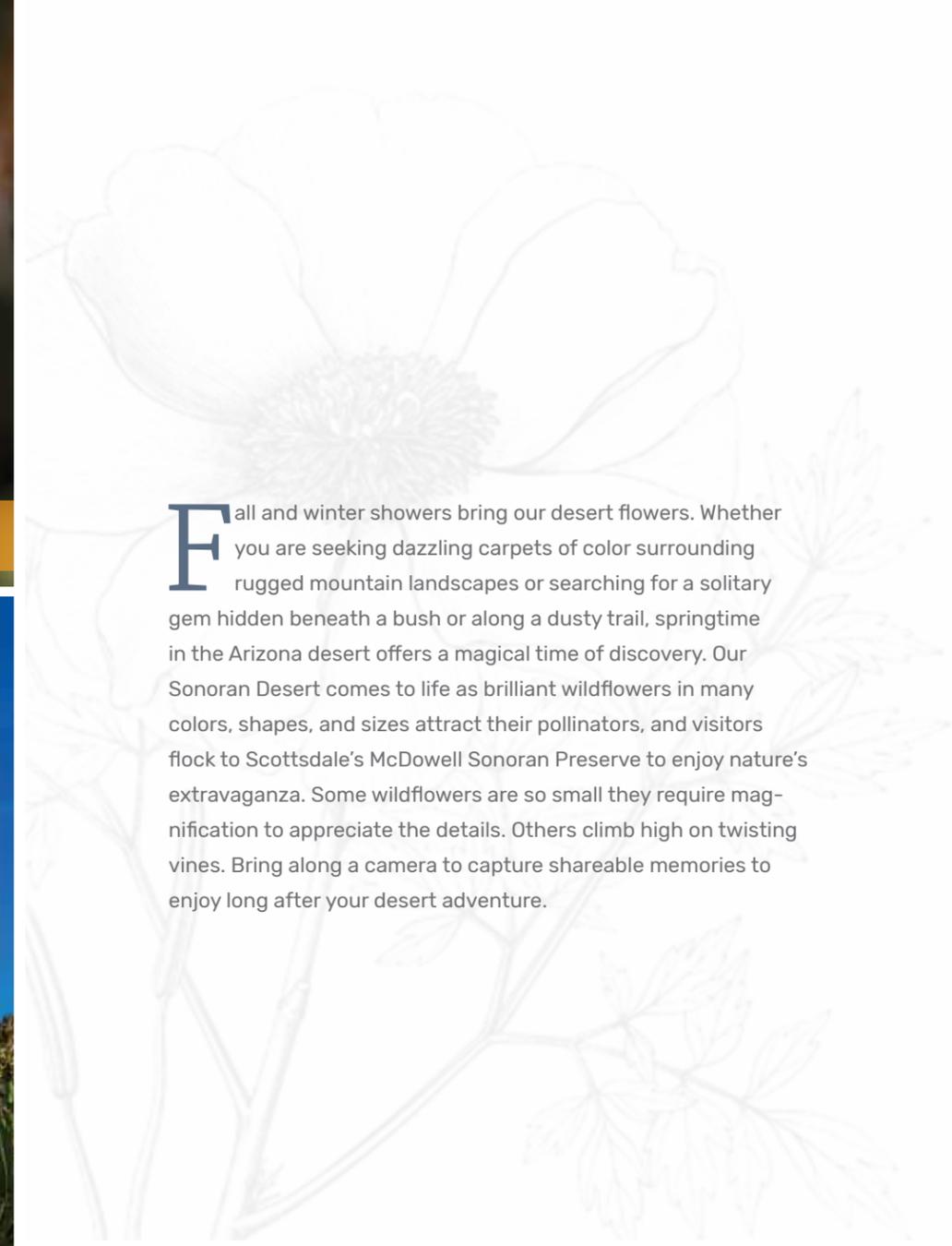


Desert Hyacinth
(*Dichelostemma capitatum*)



Desert Marigold
(*Baileya multiradiata*)

To help identify the wildflowers you see, note the color and shape of the flowers, the characteristics of the leaves, and the arrangement of the blooms.



Fall and winter showers bring our desert flowers. Whether you are seeking dazzling carpets of color surrounding rugged mountain landscapes or searching for a solitary gem hidden beneath a bush or along a dusty trail, springtime in the Arizona desert offers a magical time of discovery. Our Sonoran Desert comes to life as brilliant wildflowers in many colors, shapes, and sizes attract their pollinators, and visitors flock to Scottsdale's McDowell Sonoran Preserve to enjoy nature's extravaganza. Some wildflowers are so small they require magnification to appreciate the details. Others climb high on twisting vines. Bring along a camera to capture shareable memories to enjoy long after your desert adventure.



Desert Senna (*Senna covesii*)



Desert Chicory (*Rafinesquia neomexicana*)



Common Fiddleneck (*Amsinckia menziesii*)

When will wildflower season begin? What wildflowers may I expect to see? Will we have a super bloom? The best answer to your questions: "It depends." It depends on location, temperatures, micro-climates, soaking rains in

September and October, and additional rain in December and January. A super wildflower season happens about every ten years, but even in not-so-super years, there will be wildflowers to enjoy.

To help identify the wildflowers you see, note the color and shape of the flowers, the characteristics of the leaves, and the arrangement of the blooms. Because we leave Preserve flowers where they are, be sure to bring along a camera, a 6-inch ruler, a magnifying glass, and Marianne Skov Jensen's flora photo identification guide, "*Wildflowers, Butterflies and more*," to assist with your identification and documentation of our local wildflowers and butterflies. Enjoy the

wildflower season and being wild about wildflowers!

The guide "*Wildflowers, Butterflies and more*" is available for \$20 at Preserve trailheads and in the McDowell Sonoran Conservancy's online store (<https://conservancymerchandise.org/shop>). All proceeds benefit the McDowell Sonoran Conservancy. ▲▲



Clusters of Mexican Poppy (*Eschscholzia californica*), Lupine (*Lupinus sparsiflorus*), and Phacelia (*Phacelia crenulata*) cover open desert areas beside Granite Mountain trails.



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.

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Over 30,500 acres of Sonoran Desert waiting to be explored.

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Protecting the Desert Tortoise

By Robert Hallagan,
McDowell Sonoran Conservancy Steward and Tortoise Project Steward Lead



Telemetry, which uses radio signals, allows researchers to locate animals in the field, helping us understand habitat use, movements, behaviors, and more. Photo by Tiffany Sprague

Spotting a Sonoran desert tortoise (*Gopherus morafkai*) in the wild is exciting to visitors and stewards alike. The encounter always seems to generate a social media post and shared photos.

As a long-lived species with few young surviving to adulthood, tortoises are vulnerable to human and environmental pressures. Chief threats include habitat loss and fragmentation, removal from the wild, disease, and more. In Arizona, tortoises are designated a Species of Greatest Conservation Need. Understanding how human activities influence this

species will help determine appropriate management protocols to protect the tortoise and Scottsdale's McDowell Sonoran Preserve ecosystem.

The Conservancy's Work

Through generous support from the Arizona Game and Fish Department's Heritage Fund and with appropriate permits, the McDowell Sonoran Conservancy is studying the Preserve's tortoise population. Fieldwork, which began in April 2021 and will continue through Fall 2023,



has been very successful. Last year our 12 field leads and 32 additional stewards contributed more than 2,200 hours to the project, traversing some of the most difficult off-trail terrains in the Preserve every week. We've also engaged a diverse group of external partners, students, and the public.

Last year we conducted 17 surveys to locate tortoises. We attached radio transmitters to 19 tortoises and observed more than 25 additional ones. The animals we tag are measured, marked, and given a health

assessment. So far, the tortoises have appeared healthy and well-nourished.

The small transmitters allow us to re-locate the tortoises. Our plans to attach GPS trackers in 2021, which would have provided hourly locations for each tortoise, were thwarted by the worldwide chip shortage. Our stewards stepped up to manually locate transmittered tortoises in seven locations across the Preserve every week from April to November and continued periodically over the winter. We will attach GPS trackers this year and swap them out monthly. The small receivers and transmitters do not affect tortoise behaviors or movements and will be removed at the end of the study.

What We've Found

Working off-trail, we have had the opportunity to regularly observe other seldom-seen species such as

Gila monsters (*Heloderma suspectum*) and black-tailed rattlesnakes (*Crotalus molossus*). We've witnessed some rarely observed tortoise behaviors like courtship and mineral mining (eating dirt to obtain minerals lacking in its plant-based diet). We have also found artifacts from the Hohokam and modern era ranching, which we left undisturbed and reported to the City of Scottsdale for further study.

We have found tortoises in the flatlands and upon the mountain tops, near trails and well off-trail. Most individuals regularly moved 100–200 meters in one week but stayed within about 5-acre areas. Some made longer-distance forays. Two juveniles made journeys of 2–5 kilometers off the Preserve where they were picked up by well-intentioned members of the public, turned over to the Arizona Game and Fish Department, and safely



Desert tortoises spend the majority of their lives hidden from view in rock or soil shelters. Seeing one basking in the sun is a real treat! Photo by Won Fogel

returned to the Preserve. Two other adults made long-distance loops of more than 3 kilometers in a week, one skirting around an active construction zone before returning to his home area. Tortoises were less active during the dry seasons and made larger movements during the monsoon season. As temperatures began to drop and the days shortened, they moved into over-winter shelters for brumation, where their metabolism slows and they rest until springtime. We continue to monitor tortoises through the winter and are looking forward to the spring!

How You Can Help

1. Tortoises are protected in Arizona. If you see one, please do not touch, handle, or move it unless it is in imminent danger (e.g., on a busy road).
2. Please report any sightings of tortoises while adventuring in nature! You can document them in iNaturalist and email your sighting to Tortoise@mcdowellsonoran.org. ▲▲



To help identify individual tortoises, we use a temporary non-toxic "license plate" with a unique number. Sometimes you get lucky and find two tortoises in the same location! Photo by Won Fogel

A Unique Partnership to Control Non-native Plants

By Paul Staker,
McDowell Sonoran Conservancy Legacy Steward



Buffelgrass, a highly flammable non-native plant, is prevalent in the Brown's Mountain area. Once located by the drone, Conservancy stewards can follow up with mitigation efforts for non-native plants. Photo by Magdiel Galan-Oliveras

The McDowell Sonoran Conservancy has worked for many years to control non-native, invasive plants in Scottsdale's McDowell Sonoran Preserve. These plants, including both non-native grasses and annual flowering plants, can alter the ecological balance of the Sonoran Desert environment and increase the frequency and intensity of wildfires. The Conservancy has conducted long-term experiments to determine optimal methods to remove these plants, and Conservancy staff and stewards have begun to implement best practices learned from these studies to survey,

remove, and conduct follow-up monitoring in the Preserve.

One of the biggest challenges in this effort is the initial step of surveying the area to locate and record data about these invasive plants. The Preserve, at over 30,500 acres, includes steep slopes and rough terrain that is difficult to navigate on foot. As a result, the Conservancy has undertaken an ambitious project in partnership with the Intel Corporation to determine whether drone and artificial intelligence (AI) technologies can be used to help identify the location of invasive plants. The Intel team is led by

Magdiel Galan-Oliveras, Supply Chain Technical Analyst, who has recruited a team of volunteers at Intel across many disciplines, including drone pilots, AI programmers, and many more.

The identification process starts by using a drone to fly over the Preserve to take photos of areas where we suspect there may be non-native plants. A drone is ideal for this task because it can scout greater coverage in optimal time with less risk to volunteers.

Next, a team of volunteers reviews the photos and attempts to identify and label the non-native and other plants observed in the images using



The drone's eye view of the project team members and vegetation on Brown's Mountain. Project volunteers will identify non-native plants in drone photos by looking at such characteristics as their color, size, and shape. Photo by Jacob Krakauer

specialized software. Labeling can be a tedious, time-consuming task. Conservancy stewards have done much of the initial work to learn how to identify each plant from a drone photo, but Intel has volunteers with all types of skills and backgrounds throughout

the world helping with labeling.

The critical final step of the process is to develop an AI algorithm using the labeled images. According to Magdiel, this is akin to face recognition technology but for plants. A computer model must be developed and



The project team includes representatives from Intel, the Conservancy, and the City of Scottsdale, which oversees Preserve management and strongly supports this initiative to reduce the fire threats posed by non-native plants. Photo by Magdiel Galan-Oliveras

trained. Thousands of images help identify unique features, such as color distribution, shape, and density, to build enough of a pattern or profile to distinguish the non-natives within a certain level of accuracy.

At this time, Intel experts have begun to develop the AI software. We plan to improve the process with a more sophisticated drone to capture higher-resolution photos, which should make plant identification simpler. More also needs to be done to refine the model to take into account seasonal variations in plant appearance through the year and differences in terrain and sunlight.

This project has the potential to yield dramatic benefits in using sophisticated technology to greatly improve the ability to control the spread of non-native plants, not just in the Preserve but, ultimately, on a global basis. Control starts with locating and mapping the problem. The Conservancy's partnership with Intel on this project aims to identify how this can be done as effectively, efficiently, and safely as possible.

The most impressive feat is that this work is being completed largely by volunteers. Conservancy stewards have volunteered more than 100 hours to date on this work, with many more to come. The entire Intel team is volunteering their time and expertise to this initiative. We look forward to more collaborations like this that demonstrate our ability to leverage the unique skills of the Conservancy with world-class organizations like Intel. ▲▲

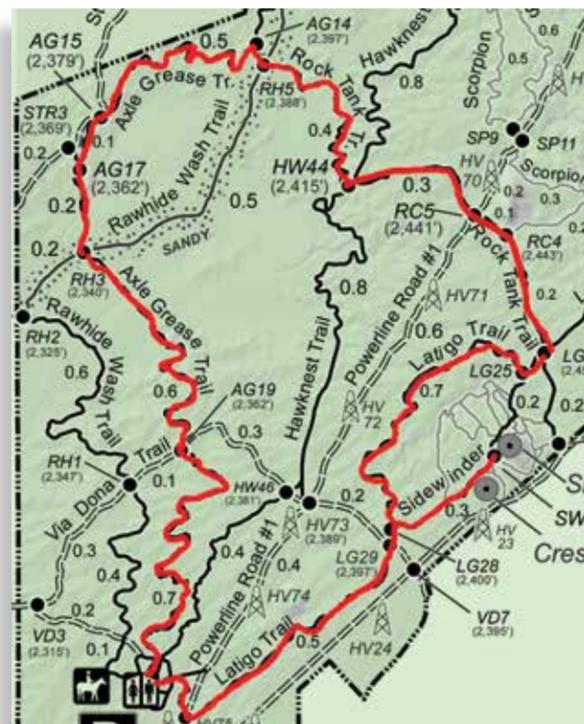


Getting Started in Mountain Biking

By Toni Vallee, McDowell Sonoran Conservancy Master Steward and Co-Assistant Chair of the Guided Hike and Bike Program and Wendy Wilson, McDowell Sonoran Conservancy Lead Steward and Bike Lead

The Conservancy's Mountain Biking Skills Clinics are a great way to learn, whether you are new to mountain biking or want to refresh your skills. For more information, go to: [mcdowellsonoran.org/event/mountain-bike-skills-clinic](https://www.mcdowellsonoran.org/event/mountain-bike-skills-clinic). Photo by Dennis Eckel

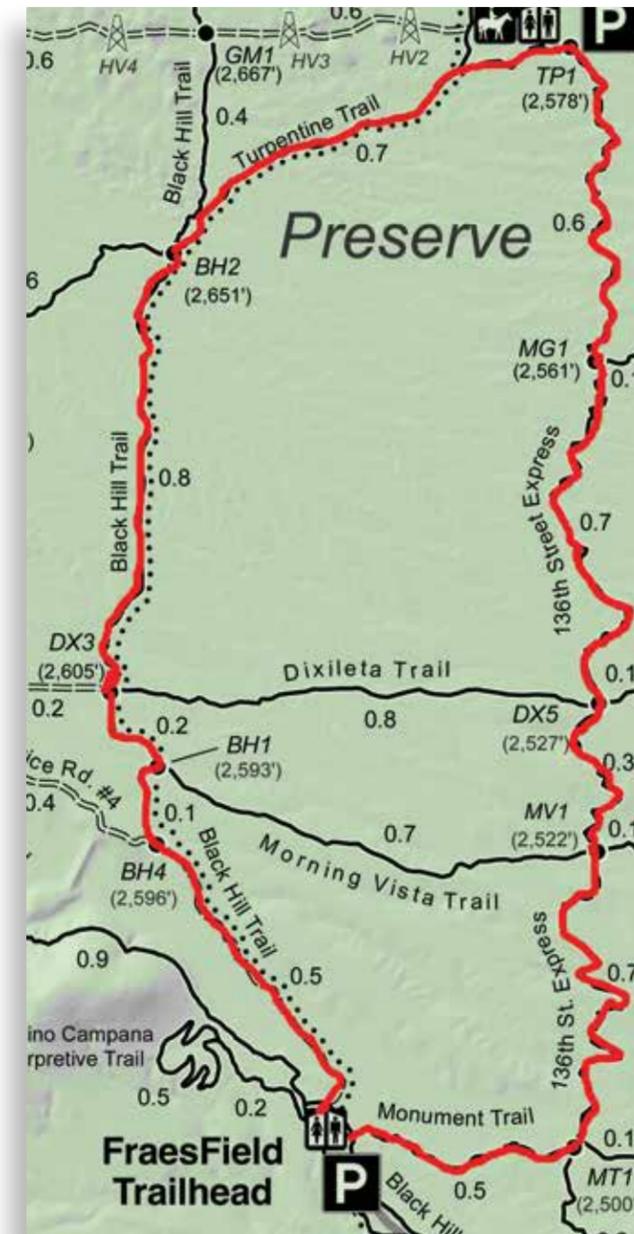
Longing to experience the northern region reaches of Scottsdale's McDowell Sonoran Preserve without needing to hike 10-15 miles? Mountain biking is the perfect solution to this dilemma. It is easy to get started in mountain biking by taking advantage of the many free events offered by the McDowell Sonoran Conservancy's Guided Hike and Bike (GHB) program. GHB offers beginning mountain bike clinics every month between October and April. Also offered is a range of events from beginner to advanced rides during this same time period. Many rides include themes such as Preserve flora/fauna, human history, and geology.



Starting at the Pima Dynamite Trailhead, this route is especially good for the skill level of beginning mountain bikers and it offers interesting views along the way.

You can learn while you ride – one of the best ways to enjoy all the Preserve has to offer.

Beginner clinics teach the skills needed to safely and confidently ride in the Preserve. After learning the skills, experienced stewards take the group on a short trail ride to reinforce the lessons learned in the drills. Trail etiquette and tips are discussed along the way to ensure a safe and excellent experience for all trail users. Because of the unique way GHB prepares the trail ride, clinic attendees usually have an experienced rider in front, to show what should be done, and one behind, to provide coaching on the skills to be used at a given time.



Starting at Fraesfield Trailhead, this loop route is a good one for practicing basic biking skills and exploring relatively uncrowded Preserve trails.

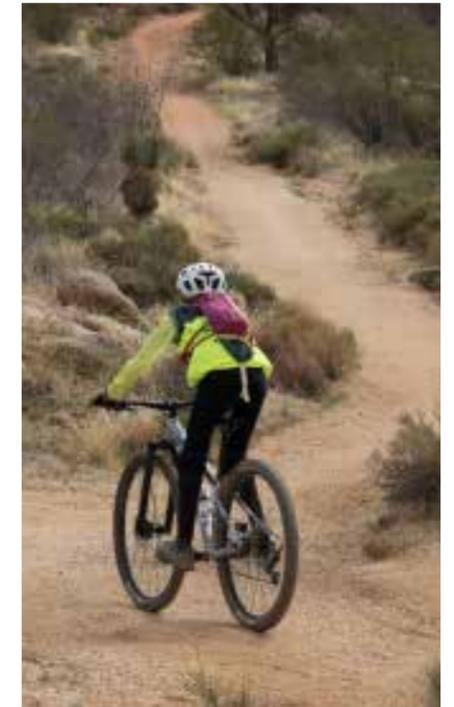
After attending a clinic, you will be ready to try some of the beautiful trails in the Preserve's northern region. A fun and lovely five-mile route from the new Pima Dynamite Trailhead starts on Latigo Trail, where a short detour on Sidewinder Trail will take you to a spectacular crested saguaro. Doubling back to Latigo, turn west on Rock Tank Trail, which will take you to Axel Grease Trail. At this point you will have

through granite rock formations and the typical flora of the Sonoran Desert. If you are lucky enough to be riding with a knowledgeable steward, you might spot the elusive Queen of the Night cactus (*Epiphyllum oxypeaslum*). You can take Black Hill Trail back to Fraesfield Trailhead or use Morning Vista or Monument Trails to bring you back to the trailhead.

a downhill, flowing ride back to the trailhead. "Woohoos" are frequently heard in this section of the route.

Routes starting from Fraesfield Trailhead provide many options new bikers can use to hone skills. Taking 136th St. Express Trail to Granite Mountain Trailhead is a common route riders use to practice the basic skills all mountain bikers use, such as looking to where you want to go, riding in sand, and standing and steering. If practicing skills is the objective, turn around and head back the way you came.

This is an easy way to build skills and fitness. Other options include taking Turpentine Trail south to Black Hill Trail. This route will take you



136 Street Express Trail between Fraesfield and Granite Mountain trailheads is a good place to practice basic mountain biking skills, such as standing and steering while on a trail with a slight incline. Photo by Dennis Eckel

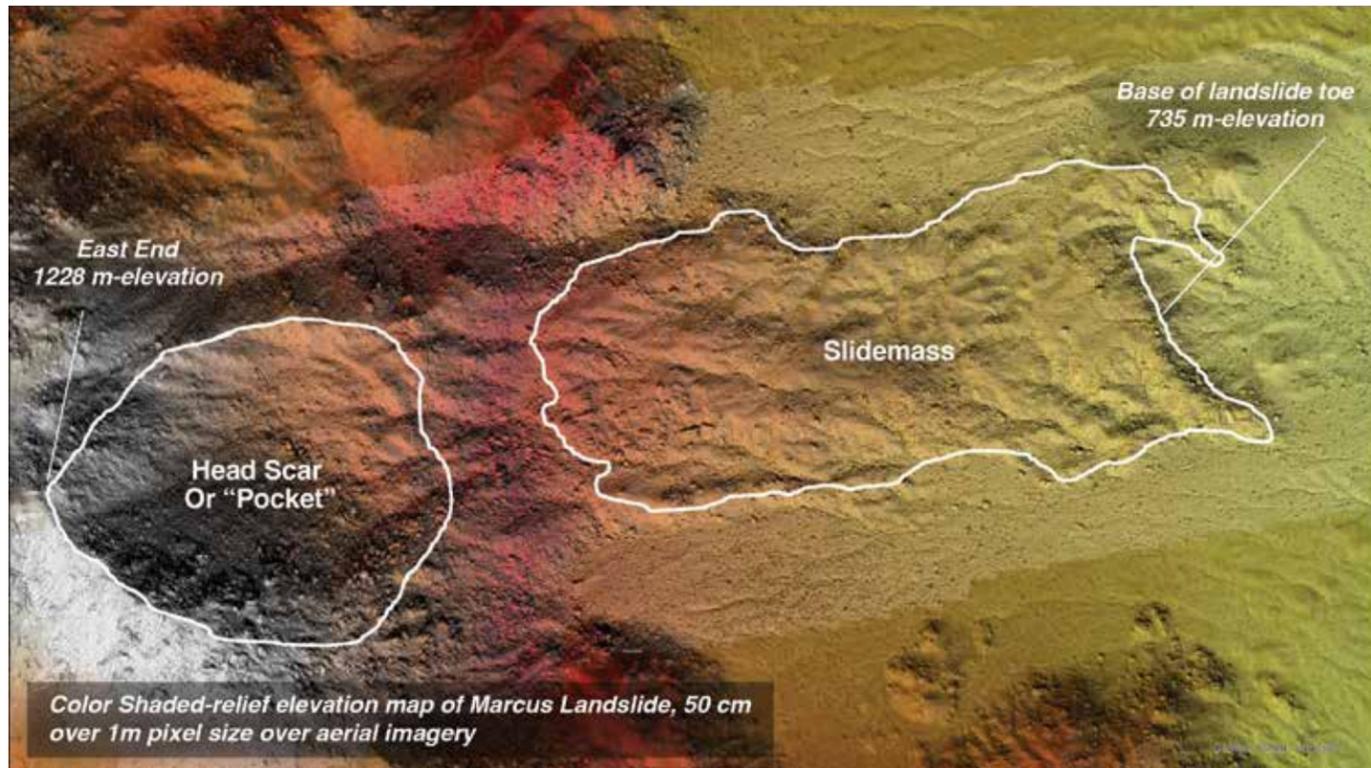
After gaining more experience and confidence, riding in the northernmost areas of the Preserve will take you to unique rock formations, magnificent crested saguaros, and spectacular long-range views. During the spring season, riding through Ocotillo (*Fouquieria splendens*) forests and wildflower carpets are experiences not easily gained by hiking because of the distances involved.

Guided Hike and Bike events can be found on the Conservancy website under the calendar of events (<https://www.mcdowellsonoran.org/event>), on the Guided Hike and Bike Facebook page, as well as in Meetup. See you on the trails! ▲▲

The Billion-Year Landslide

By Dan Gruber,
McDowell Sonoran Conservancy Legacy Steward





A relief map of Marcus Landslide shows the source of landslide material (head-scar) and where that material ended up (slidemass). Image by Brian Gootee

The Marcus Landslide on the northeastern slope of the McDowell Mountains in Scottsdale is thought to have happened 300,000–500,000 years ago. But this landslide was at least a billion years in the making.

The landslide occurred in granite rock. This formed when molten rock intruded from the Earth’s interior about 1.4 billion years ago, got trapped beneath the existing native rock, and slowly cooled into granite deep underground. The slow cooling allowed large crystals to grow, as we see today in the granite in the northern region of Scottsdale’s McDowell Sonoran Preserve.

The main mineral components of this granite are quartz, small clear crystals; feldspar, larger crystals that range from cream to yellow to pink;

and biotite mica, which looks like black specks or tiny mirrors. These minerals dictate what happens over time when granite is exposed at or near the surface.

Over millions of years, geologic forces pushed the underground granite mass toward the surface. At the same time, rocks already at the surface eroded away. Thus, the granite was moving toward the surface as, simultaneously, the surface itself was being worn down. Eventually, the surface and the granite met.

When the granite formed deep underground, it was under enormous pressure from the weight above it. As uplift and surface erosion brought the granite closer to the surface, the external pressure decreased. The granite mass actually expanded because of the decompression and

cracked, forming parallel fractures called joints. In addition, over the last billion years, the granite experienced episodes of contraction and expansion related to tectonic activity in the region, which also produced fractures.

As the fractured granite approached the surface, weathering—mostly via water entering cracks—began to chemically break down the rock. Weathering through physical effects like freezing and thawing and wedging of roots also mechanically broke the rock into smaller pieces.

The biotite component of granite consists of thin microscopic layers stacked together. With exposure to water and oxygen over time, these layers separate. This is like having tiny expanding wedges embedded in the rock, which break it apart into



Heavily fractured granite, one of the conditions for a landslide in this area, is visible on the mountainside all along the Marcus Landslide Trail. Photo by Dennis Eckel



Mushroom-shaped rocks, sculpted by water weathering at ground level, are visible along the trail and throughout the northern Preserve. Photo by Dennis Eckel

grus—fragments the size of sand or fine gravel that can act like ball bearings on a slope. The feldspar minerals in the rock react with water over time to form clay. Clay expands when wet and contracts when dry, further weathering the granite, and it also gets slippery when wet.

Weathering and erosion of granite often occur fastest at ground level due to water accumulating there and remaining longer. This may produce boulder shapes that are narrowest at or near the ground, like the striking “mushroom” shapes that are so noticeable on the Marcus Landslide Trail and elsewhere in the northern Preserve.

When the McDowell Mountains were created by tectonic events between 5 and 15 million years ago, fractured granite was exposed at a steep angle. You can see this clearly along the Marcus Landslide Trail. The slope of the northeastern face of the mountains around East End reflects the angle of the joints in the rock because these are weak places where rock may detach from the slope.

More than a billion years after the granite was created, the ingredients for a landslide finally were in place. The granite was fractured into parallel joints and exposed at a steep angle as the mountains formed. The granite at and just below the surface had been decomposing for a very long time and had broken into boulders, ball-bearing grus, and slippery clay. Thus, there was a huge mass of rock that could slide off the mountainside.

But what triggered the slide? The



Along the Marcus Landslide Trail, you can see the exposed granite mass broken into parallel joints, a contributing factor to the Marcus Landslide. Photo by Dan Gruber.

estimated age of the landslide puts it during the Ice Age. The climate here was very different then. Although glaciers never reached this part of Arizona, it was much cooler and wetter during that period than today. There would have been more rain and more substantial soils where water could accumulate.

There's no way to know exactly what triggered the landslide. It could have been unusually heavy rain, a lightning strike, or a small earthquake.



The landslide is so large that often visitors get right beside the slidemass (left-center in photo) without realizing that they're next to the landslide. Photo by Dan Gruber

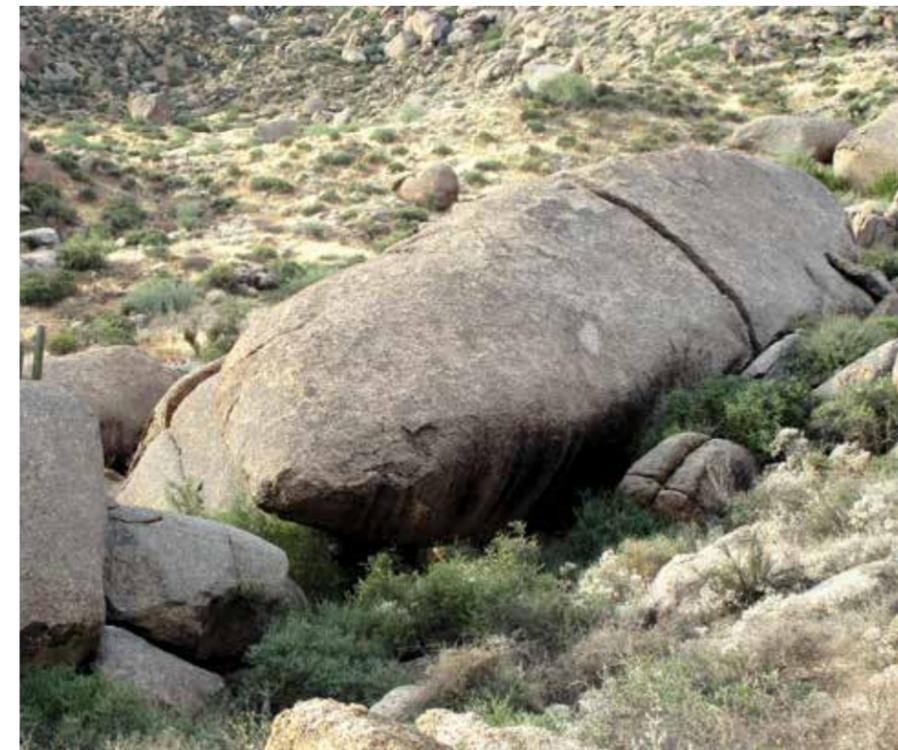
It might only have taken a single large boulder near the top of the mountain-side dislodging and tumbling down the steep slope, hitting other loose rocks, and starting a rock cascade—a landslide.

Whatever triggered it, once the landslide started, it happened with astonishing speed. Geologists believe the entire event took no more than a minute, with the flowing rock reaching speeds as high as 44 mph. During that short time, an enormous amount of rock, grus, soil, and vegetation—200 million cubic feet of material weighing roughly 26 billion pounds—slid down and off the mountain, generating the energy of a small nuclear bomb.

The end or toe of the landslide is about 1,600 feet lower than the

existing ridgeline, and the rocks and debris were carried as much as one mile. The slidemass itself—the rock and debris that came off the mountainside—is about 3,300 feet long and averages 1,650 feet wide and 100 feet high. It's so big that many people walk right up to the edge of it and don't realize they're at the landslide!

Some of the boulders carried down by the landslide were enormous. Submarine Rock, which can be seen and accessed from the Marcus Landslide Trail, is about 100 feet long and is estimated to weigh more than 2.2 million pounds. The largest single boulder associated with the landslide, called Clubhouse Rock, is in McDowell Mountain Regional Park. It's a roundish giant more than 80 feet in diameter



Visible from the trail, Submarine Rock, one of the larger landslide boulders, was pushed into alignment with the overall direction of the slidemass and possibly smoothed by friction with other rock. Photo by Dan Gruber

and estimated to weigh more than 3 million pounds.

In most rock landslides, the rock falls down from a slope and accumulates at the bottom. In this landslide, the debris flowed out almost a mile from the base of the mountain. This kind of flow is quite rare and is called a rock avalanche. The rock traveled so far because the grus and wet clay that surrounded the rock acted as a lubricant beneath the sliding debris and allowed it to travel much farther than is typical. Remnants of this lubricating layer, called the matrix, are still visible along the trail at the base of some boulders as a hardened clay-rich grus.

As huge as this landslide is, it wasn't recognized until 2002 when two Arizona State University graduate students, John Douglass, now a member of the geology faculty at Paradise Valley Community College, and Brian Gootee, now a research geologist with the Arizona Geological Survey, were doing fieldwork in the area. Today, it's instantly visible on Google Earth, but that software wasn't available when Gootee and Douglass surmised that what they were viewing near East End was an enormous landslide.

Enjoy seeing this amazing geologic feature on the Marcus Landslide Trail from Tom's Thumb Trailhead in the Preserve. While exploring, you can learn from the interpretive signs at the trailhead and along the trail. It's a moderate four-mile hike to reach and climb onto the landslide, with signs explaining interesting features. ▲▲

Getting Along with Our Wild Neighbors

By Natalie Case,
Education Programs Developer, Center for Native and Urban Wildlife, Scottsdale Community College

“You know what I don’t see anymore?” It’s a question I get occasionally from adults who visit our nature center. I know it’s a rhetorical question, but having heard it a few times I just jump in and answer, “Horned lizards?” “Yeah!”

So, what changed in the last few decades to cause a noticeable decline of regal horned lizards (*Phrynosoma solare*) in the Phoenix Metro area? The answer is people. Maricopa is one of the fastest-growing U.S. counties.

With more people comes more roads, concrete, and buildings, but we also have more personal involvement with our choices, like the decision to use pesticides. The regal horned lizard is a specialist that feeds almost exclusively on large seed-harvester ants (*Pogonomyrmex spp.*). Given their painful sting and swarming tendencies, people tend to poison and eliminate these ants.

Even with fewer ants to feed on, horned lizards have other things to worry about in cities—road mortality,

lack of loose soil for burrowing, abundant predators including cats and dogs, and being collected as pets. With urbanization, the horned lizard has been pushed almost entirely to the city outskirts. Fortunately, the regal horned lizard still thrives in the desert and in outlying parks and preserves. We’ve only lost the joy of having them as neighbors.

Urbanization can pose major challenges, yet our cities are not devoid of wildlife. The great-tailed



A regal horned lizard blends in perfectly with desert surroundings. Urban areas rarely provide the habitat and food this species needs to survive. Photo by Juan Loza



Once a migratory species just passing through, Anna's hummingbirds (*Calypte anna*) now have enough urban resources to stay in the Valley year-round. Photo by John Weser

grackle (*Quiscalus mexicanus*), a slender-legged blackbird, for example, hardly balks at urban stressors. Unlike the specialist diet of the horned lizard, grackles are omnivores and are always investigating their environment for food sources. They like water, so without urbanization and agriculture, this bird would be rare in the Sonoran Desert. The grackle has capitalized on our growing urban landscape and, as a result, is one of the fastest-expanding species in the U.S. This is a neighbor we are stuck with, including their cacophonies at dusk and a penchant for rummaging through the trash. At least they are interesting to watch.

Researchers are just beginning to understand the ways that wildlife adapt to urban environments, and the list of animals that are undergoing fascinating adjustments to their behavior and genes is growing. Peregrine falcons (*Falco peregrinus*) in New

York are learning to hunt at night using artificial light. Anole (*Anolis spp.*) lizards in Puerto Rico have developed longer, stickier toes to better navigate urban surfaces. Atlantic killifish (*Fundulus heteroclitus*) in industrially polluted estuaries now tolerate levels of toxins that would kill other fish. These are the urban exploiters, the few species that have figured out how to thrive under urban adversities. So what can we do about the rest of the species?

The idea that cities can have a role in preserving biodiversity is catching on. Surprisingly, 20 percent of the world's bird species can be found in urban areas, but for plants, that number is only five percent. Perhaps the easiest and most effective way to help urban wildlife is to grow a variety of native plants. These plants come

pre-adapted to local climate and diseases and are recognized as food by native species.

The remaining steps we can take are even easier! They are to just stand back and let nature be. Instead of continuously pruning our plants and raking our yards, we can allow plants to grow in more natural shapes so that birds, lizards, and insects have a sheltered understory and abundant flowers and seeds to feed on. Instead of using poisons that have a myriad of unintended effects, we can stand by and admire how nature regulates populations with predators and parasites. If we can make urban living a little easier for native wildlife, who knows, maybe the horned lizard will come back. ▲▲



Burrowing owls need open, grassy habitat. They can persist in urban areas with agriculture and will readily use artificial burrows while helping control pest species. Photo by John Weser



The Construction and Maintenance Program— Keeping the Trails Safe for Us

By Jerry Holden,
McDowell Sonoran Conservancy Lead Steward

While in Scottsdale's McDowell Sonoran Preserve, you may see a column of McDowell Sonoran Conservancy stewards carrying tools and trudging up a trail. Stop and listen and you may hear strange words uttered like "McCleod," "outslope," and "San Angelo pick." Say "hello" to the Conservancy's Construction & Maintenance Program (C&M) crew. C&M's mission is to maintain the 225 miles of trail in the Preserve for the safe use of hikers, bikers, and equestrians while providing stewards with an enjoyable and rewarding volunteer experience.

A trail or trail corridor includes a trail tread and the area on the sides and above the tread (see illustration). The tread is the width of the traveled portion and is usually 2 to 4 feet wide. The travel way is the width of the tread plus 2 to 4 feet on either side of the tread. The corridor height is 8 to 12 feet above the trail to accommodate bikers and equestrians. The exact dimensions of the corridor at a specific location are determined by the trail usage, land manager's standards, and the surrounding topography. When feasible, trails are outsloped or insloped to allow water to sheet across the trail naturally.

C&M deals with numerous issues both on and off the trails. Ruts are the biggest issue on the trail. Initially, a rut forms because users tend to

Drainage corridors are used to divert water across the trail. This Construction & Maintenance (C&M) crew will armor this drainage corridor on Marcus Landslide Trail with the rocks shown in the photograph. Photo by Lynne Janney Russell

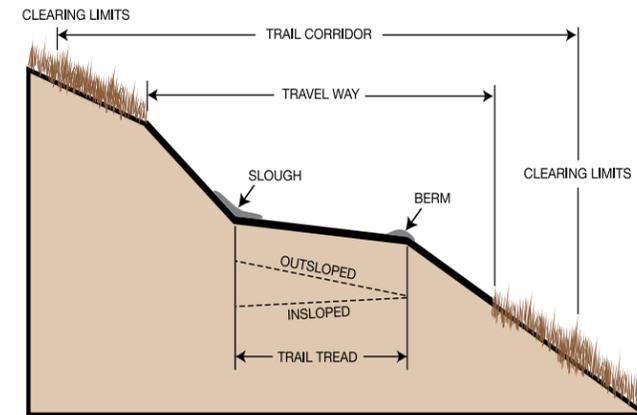


Illustration of a Trail Corridor.

continually pass over the center of the tread. Rainwater flowing down the trail deepens the rut, creating a berm—a soil barrier that prevents water from sheeting off on the outer edge of a trail—and slough—soil and rock buildup on the inside of the trail, narrowing it. To remediate, both berm and slough need to be removed from the trail and the rut filled in. Sometimes a drain needs to be added. Also, monsoons cause saguaros and other plants to fall onto the trail blocking passage and necessitating an immediate response by C&M to clear the trail. Additionally, with rain, plants grow rapidly, requiring extensive trimming by C&M to maintain corridor width and height.

For unbeknownst reasons, users often wander off-trail, destroying soil crust and creating an unauthorized path trampled free of any vegetation. At this point, it is categorized as a "social trail," and C&M employs a variety of methods, such as planting cacti, placing deadfall, and posting signs, to curtail further use of the social trail.

The Preserve serves many purposes. For some, it's a place to recreate, for others it's a place to commune with nature, and for others, it is a place to study the flora and fauna of the Sonoran Desert. Safe use of the Preserve for these and other purposes, however, would

not be possible without C&M's diligent maintenance of the trails.

Finally, working on a C&M project is not hard labor, and all training is done in the field under the supervision of a C&M crew lead. C&M crews have fun being outdoors in the Preserve with fellow stewards and enjoy interacting with visitors who are always very inquisitive of and thankful for the work C&M does. For more information about our work, please contact the C&M Chair at c-m@mcdowellsonoran.org. ▲▲



If saguaros fall across the trail, C&M stewards chop them into small sections to more easily remove them from the trail. Saguaros fall for many reasons, including disease, extreme or prolonged heat and cold, lightning, and very strong winds, especially when coupled with heavy rains. Photo by Leona Weinstein



Education and Partnering for the Future

By Melanie Tluczek,
McDowell Sonoran Conservancy's Director of Science and Education

Expedition Days participants can experience a remote area of the Preserve in virtual reality. EcoListen creates these experiences for people unable to visit the Preserve. Photo by Lynne Janney Russell

For more than 30 years, the McDowell Sonoran Conservancy has focused on building a community in which our natural open spaces are valued and protected well into the future. Two important tools in this endeavor are partnerships and education, through which we reach beyond municipal, socioeconomic, and cultural boundaries to inspire people of all ages to appreciate nature around us and, therefore, to protect it into perpetuity.

Over the past few years, the Conservancy has placed even greater emphasis on building its

K-12 educational offerings to reach underserved students and spark their curiosity about STEM fields (Science, Technology, Engineering, Math), the natural sciences, and the Sonoran Desert. We have connected with the Arizona Game and Fish Department, Arizona State University Ecology Explorers, and Project WET to expand Expedition Days Live and Expedition Days Online. These events engage more than 5,000 students per year in entertaining STEM activities related to Scottsdale's McDowell Sonoran Preserve and the Sonoran Desert and are linked with Arizona's science

education standards. Teachers can engage with the programs as part of their school day.

This year, we are continuing to develop our K-12 programs in innovative ways to reach more students. A new program called Expedition Days on the Road takes individual lessons from Expedition Days Live to schools, providing one-hour lessons for classrooms that may be too far away for feasible travel to a live event at the Preserve.

We are also combining efforts with several other organizations whose missions intersect with ours.



Partner organizations are vital to bringing unique experiences to Expedition Days, like touching a live gopher snake (Pituophis catenifer) from the Center for Native and Urban Wildlife. Photo by Lynne Janney Russell

EcoListen is one such organization, which is located in an acoustics ecology lab at Arizona State University. The founders, Dr. Garth Paine and Dr. Sabine Feisst, study the diversity of fauna through sound and pair their ultra-sensitive recordings with 360-degree virtual reality (VR) videos to create an experience that brings natural areas to people who

cannot easily get to them. These VR experiences can be brought to schools and used in conjunction with lessons that we provide, so students can learn about the ecology of the Preserve and experience some of the peace and tranquility of it as well.

Another new partnership is with Trees Matter, a local non-profit that plants trees in areas where urban heat



Expedition Days On the Road takes our lessons, such as this Conservation table, to schools. This, paired with a virtual reality experience or a tree planting event, leaves a powerful impression on young minds. Photo by Lynne Janney Russell

and carbon monoxide intersect with some of the most extreme poverty in the Phoenix area. We are working with them to add hands-on tree planting events to our Expedition Days On the Road, giving students an opportunity to learn and then take direct action at their schools. Our hope is that these experiences will spark a love for the desert and a desire to protect it.

An additional exciting partnership is with the Scottsdale Unified School District. Last summer, the Conservancy began working with a group of 7th-grade teachers to introduce them to the Conservancy's Parsons Field Institute studies. The goal is for the teachers to design a curriculum that engages students directly and introduces them to field ecology. Although the students are in 7th grade, the curriculum is designed to bridge the 6th grade gap year, during which many of the students were learning remotely due to COVID-19. This spring, the teachers will be piloting the study and bringing students to the Preserve's Bajada Nature Trail to learn about the Sonoran Desert and collect data from the Parsons Field Institute's phenology project.

We look forward to continuing our long-standing partnerships while exploring new ones to enhance and expand the work that we do. After all, the more people who learn to love the Preserve and the Sonoran Desert, the more future champions and stewards we will have to protect it in perpetuity.



Enjoy Our Raptors—Part II

By Rick Pearce, McDowell Sonoran Conservancy Master Steward



The zone-tailed hawk is black with white bands on the tail that are very noticeable from below. Photo by Jeff Cooper/Macauley Library at the Cornell Lab of Ornithology (ML319511331)

In the Summer 2021 issue of *Mountain Lines*, we looked at four well-known raptors—Harris’s hawk (*Parabuteo unicinctus*), red-tailed hawk (*Buteo jamaicensis*), great horned owl (*Bubo virginianus*), and American kestrel (*Falco sparverius*). These are not the only raptors that can be seen in our area. Let’s consider some others that you may see.

The Cooper’s hawk (*Accipiter cooperii*) is a medium-sized hawk that has a distinctive flight pattern of several rapid wing beats followed by occasional glides. Soaring is sometimes seen as well. The Cooper’s hawk has a long, barred tail. This bird is widespread across North America

and common year-round in the desert. Short wings combined with a long tail enable the Cooper’s hawk to maneuver through thick branches, feeding primarily on smaller birds captured in flight.

The Cooper’s hawk grabs its prey with its feet, extending its legs away from the body to protect its head and eyes, and then it repeatedly punctures the prey with its long, penetrating claws. Its bill is used for plucking and tearing when feeding. The Cooper’s hawk may use nests built by other raptors.

The zone-tailed hawk (*Buteo albonotatus*) is a large, soaring hawk. Unlike most hawks, where

the juveniles appear quite different from the adults in coloration, the zone-tailed young are very similar to the adults, with only finely barred tails and a few white spots on the breast distinguishing them.

Holding its wings in a dihedral or shallow V, the zone-tailed hawk rocks back and forth, similar to the flight of a turkey vulture. It may employ a hunting strategy of mixing in with vultures, causing prey accustomed to harmless vultures to ignore it. It will continue to soar in this vulture-like manner, circling out of view of its target, then emerging from cover and diving like a falcon to capture its prey. The zone-tailed hawk may make



Young Cooper’s hawks are brown with streaked underparts. The adult Cooper’s hawk is blue/gray above with brown or orange-colored markings on a pale breast. Photos by Gerald Frechette and Ann Stockert/Macauley Library at the Cornell Lab of Ornithology (ML402703721 and ML402545001)

repeated dives at intruders.

The prairie falcon (*Falco mexicanus*) does not build stick nests but nests in ledges on high, rocky cliffs. It is brown with brown speckles on a light-colored breast and has dark facial markings. As with all falcons, it has long, pointed wings. After searching from above, it flies low to



The prairie falcon’s range is generally restricted to the prairies and deserts of North America. Photo by Chris Petrizzo/Macauley Library at the Cornell Lab of Ornithology (ML396467681)

the ground to take its prey of rodents such as ground squirrels, birds, lizards, or large insects. Prey is taken on open ground by surprising its victim with a fast approach.

The McDowell Sonoran Conservancy recently conducted a multi-year study of prairie falcons, monitoring their nesting, incubating, and fledging success. In the four-year study, a pair successfully fledged between three and five young each year.

The peregrine falcon (*Falco peregrinus*) is similar in size and overall appearance to the prairie falcon; however, the peregrine falcon is darker in color, generally gray above, and has distinctive facial markings that are nearly black. It preys on birds in flight, “stooping” or diving on them at speeds approaching 200 mph, knocking them out of the air and catching them as they fall. Its long fingers and sharply curved talons are formidable weapons. Prey is typically dove or pigeon-sized birds.

The peregrine is a cliff nester. It may winter at estuaries, where an abundance of waterbirds provide a reliable food source. Starting in the

1940s, population declines began due to organochlorine pesticides (*dieldrin*, *DDT*), leading to nesting failures caused by eggshell thinning. Once the use of DDT and similar pesticides was discontinued, private conservation efforts resulted in a turnaround in populations over several decades.

The next time you head out for a hike or ride, pack your binoculars and keep a lookout for these keen-eyed, hook-beaked, dramatic birds as they rest in a tree, on a rock ledge, or soar above. ▲▲



The word “peregrine” is synonymous with wandering or travel. This falcon can be found on every continent except Antarctica. Photo by Anthony Scott/Macauley Library at the Cornell Lab of Ornithology (ML3813268301)



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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.

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