



The Heliograph



Official Newsletter of the Sonoran Desert Network

Hola, Humans! CritterCams Come to SODN

Ask a dozen people what comes to mind when they think of national parks and you're likely to hear something about furry animals. Yet few I&M networks chose to include mammals in their long-term natural resource monitoring. Although the Sonoran Desert Network's original list of candidate vital signs did include a host of fuzzy, feathered, and scaly creatures, only bird and fish communities were selected for monitoring. What gives?

Among the several reasons for this decision was one simple fact: unlike plants, soils, and water bodies, animals move around—a lot. This may make them more interesting to watch than, say, a barrel cactus. But it also makes them difficult—and expensive—to monitor, especially because many Southwestern mammals don't tend to follow predictable migration patterns. So until recently, we haven't been keeping a close eye on our furry park residents.

To a degree, however, that is changing, due to improvements in technology and monitoring methodologies—and our participation in the [Southwest Network Collaboration](#) (SWNC). As part of its long-term monitoring program, the U.S. Fish and Wildlife Service (FWS; a SWNC partner), working in tandem with park staff, has developed a draft protocol for monitoring mammals using remote wildlife “camera traps.” The work is being piloted at Chiricahua NM, Fort Bowie NHS, and Saguaro NP (RMD and TMD). In return for their efforts in parks, NPS staff plans to help the FWS to pilot the protocol on a national wildlife refuge later this year.

The cameras are remote and motion-activated, and are positioned at a height designed to capture animals ranging in size from squirrels to bears. They will be placed during times of the year when mammal activity is expected to be highest, depending on season and loca-

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tion. Because they can simultaneously sample nearly all species of medium and large mammals in an area, camera traps are useful for identifying trends in low-profile species, such as small carnivores and rabbits.

These pilot efforts will help us to collect baseline data and refine a draft protocol. Once fully established, the overall goal of this monitoring will be to track biologically significant changes at the community and population levels over

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Grey fox.

Project Updates

Flora Project

With support from the U.S. Fish and Wildlife Service, National Park Service, and U.S. Forest Service, former SODN botanist Steve Buckley will continue to work on the Flora Project from his new office across the hall (see page 8). Field guides for Leslie Canyon and San Bernardino national wildlife refuges, as well as Ft. Bowie NHS and Tonto NM, are expected to be released this summer. A field guide to the flora of the Patagonia Mountains (in southern Arizona) is also in the works, along with a field guide to invasive plants in the 55 NPS units served by the Southwest Exotic Plant Management Team.

Landbirds

This season's monitoring is currently being completed at the last of 11 SODN parks. Plans are being established for next year's round of monitoring. This monitoring was made possible by the restoration of funding previously lost under federal budget sequestration.

Springs

With the help of new biotechnician Laura Palacios and a teaching crew from the Chihuahuan Desert Network, springs sampling has been completed for Montezuma Castle, Tuzigoot, and Gila Cliff Dwellings NMs and the Southeast Arizona Group (Chiricahua NM, Fort Bowie NHS, and Coronado NMem). With the help of park staff, all springs and tinajas at Organ Pipe Cactus NM will be sampled in spring 2016. Springs at Saguaro NP and Tonto NM will be similarly sampled by park and network staff, giving us a full first round of completed springs monitoring. This monitoring was also made possible by the restoration of funding previously lost under federal budget sequestration. To increase future efficiency, we will be combining our streams and springs sampling efforts at parks where both are monitored, so that when streams are monitored, springs will be monitored, as well.

Streams

Routine streams monitoring has been conducted in seven park parks (5 Sonoran Desert Network and 2 Southern Plains Network units). Springtime

macroinvertebrate sampling is complete.

Uplands

Reflecting substantial effort by our data managers and other staff, the SWNC uplands database has been revised to improve efficiencies. A spatial data collection application has been implemented, and master plant species lists revised and improved.

Vegetation Mapping

Network staff completed a formal accuracy assessment for both units of Montezuma Castle NM in April, and are now working on the final report. At Saguaro NP (TMD), we are finalizing a raster model to serve as the map basis. Substantial progress has been made in recent weeks. For Saguaro's RMD, we have initiated an interagency agreement with the U.S. Geological Survey that will allow remote sensing specialists to conduct the next phase of raster analysis and modeling this fall. We just completed a formal accuracy assessment for Gila Cliff Dwellings NM in early June. Three teams completed over 300 site evaluations in six days. Data are currently in review; reporting will begin in the coming months.



National Park Service
U.S. Department of the Interior

The Sonoran Desert Network is one of 32 National Park Service inventory and monitoring networks nationwide that are implementing vital signs monitoring in order to assess the condition of park ecosystems and develop a stronger scientific basis for stewardship and management of natural resources across the National Park System.

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The National Park Service cares for the special places saved by the American people so that all may experience our heritage.



NPS/C. CONNOR

Groundwater Monitoring at CCC-era Wildlife Watering Facilities

Like many other natural areas across the country, Saguaro National Park benefitted greatly from the work of the Civilian Conservation Corps (CCC) during the 1930s. Although we may typically think of the CCC as tree-planters and builders of visitor amenities, their final two projects at Saguaro were different. In 1937, the Corps constructed two facilities in the Tucson Mountain District (TMD) “to supply water to game animals and birds. . . . Each site included a windmill [to power a pump] and . . . water storage tank” (Clemensen 1987).

There are no naturally occurring perennial surface waters in the TMD, so wildlife in the area benefit from supplemental water when it is available. And although it might seem unusual for a national park to be providing wildlife watering facilities, both CCC catchments (called Red Hills and Dobe Robinson) were rehabilitated in 1989 “to provide year-round water supply for large mammals” as part of efforts to mitigate impacts from the Central Arizona Project (GMP; Kline et al. 1998). Today, the catchments are again in need of work to bring them back online and—in part due to the anticipated effects of climate change—park staff is interested in making that happen.

Before resources are committed to upgrading the Dobe Robinson and/or Red Hills watering facilities, park and SODN staff and volunteers have initiated water-level monitoring in shallow wells at both sites. Limited monitoring to date suggests that long-term drought is lowering the shallow groundwater levels in the TMD. Continued monitoring will provide a better long-term picture.

This effort is part of a host of other research geared toward helping park staff understand the park’s water dynamics in the face of climate change. In addition, an interagency (USGS/NPS) project that is mapping groundwater levels around the northeast corner of the district will provide an important snapshot of water levels in and around that part of the park, and will provide a baseline inventory for assessing climate change impacts as we move forward. Long-term water-level records are needed to understand the dynamic relationships between subsurface water reserves and springs, climate, vegetation, resource development (e.g., groundwater pumping), and changing land-surface conditions, such as soil loss or stream or road entrenchment.

*Colleen Filippone, Hydrologist
Alice Wondrak Biel, Writer-Editor*



From top:
Interior of the hand-dug Dobe Robinson well;
Volunteer Chuck Perger installing a water-level
sensor at Dobe Robinson well;
Approaching the Dobe Robinson windmill.

“Yes, and . . . ” (Finding Our Inner Amy Poehler)

You’ve heard the stories about football players taking ballet lessons to improve their performance on the field. But scientists taking acting lessons? Turns out, it’s not as strange as it may sound.

Last January, 30 Inventory & Monitoring Division staff gathered in Fort Collins, Colorado, for a workshop with the [Alan Alda Center for Communicating Science](#). The training, called “[Improvisation for Scientists](#),” was designed to help our ecologists, program managers, data managers—and yes, science communicators—improve their ability to explain their work and its importance. As explained by the [New York Times](#), the objective of the this training “is not to make [scientists] funny, but to help them talk about science to people who are not scientists. The exercises encourage them to pay attention to the audience’s reaction and adjust.”

And so, over the course of three days, we tossed and caught imaginary balls with a partner, devised an infomercial for a product whose components we drew out of a hat just seconds before, threw angry tantrums on cue (and then put a positive spin on our partner’s tantrum), and described cherished photos that our audience couldn’t see. What we learned was that science communication isn’t much different than any other communication. It’s largely about storytelling and minding your audience.

The first rule of improvisation is “Yes, and . . .,” meaning that regardless of where your partner may take an idea, your job is to accept that route and build on it. Then your partner does the same as you create a story together. And with the ball exercise in particular, it quickly became clear that successful communication isn’t primarily about you, and the point you want to make—it’s about your audience, and how your point is being received.

For instance, my partner and I got to a point where I thought, “She’s not catching my ball anywhere near where I aimed it.



Why isn’t she doing what she should be doing?” Then it dawned on me that if my partner (audience) wasn’t



providing the response I wanted, then getting frustrated with her wasn’t going to help anything. Instead, I needed to figure out how to change my approach in a way that would recapture her attention, and be clearer about my intention.



In other exercises, we were instructed to make a persuasive argument in two minutes—then the same argument in one minute, and then in 30 seconds. (Spoiler alert: The 30-second arguments, which got straight to the point via the simplest possible route, were almost always the most effective). We also practiced Randy Olson’s famous “elevator pitch:” “the ability to explain your project . . . so succinctly that you get all the way through it in a single elevator ride.” And we sat for impromptu, five-minute interviews in which we played ourselves appearing on a morning talk or news show to talk about some aspect of our work.

After the training, I was asked to use those 150 minutes of talking-head footage to create a story about I&M. The result is a 3.5-minute video, “NPS Inventory & Monitoring: What We Do (and Why),” now posted on [YouTube](#). If you haven’t seen it yet, take a look—it’s fun to see all those familiar faces so excited about their science. More importantly, though, it provides a succinct, accessible explanation of our work and its importance—just what the training was designed to facilitate. Networks and parks have already found this video a useful addition to seasonal trainings and meetings where I&M is discussed, and it has been widely shared and viewed on social media.

Alice Wondrak Biel, Writer-Editor



BOLO: Bullfrogs!

Our tinaja project, designed in part to provide artificial habitat for native species, is already running into some real-world threats to those species. In late May, 49 [lowland leopard frog](#) (*Rana yavapaiensis*; see below) tadpoles were released into the tinaja. Lowland leopard frogs are a species of special concern at Saguaro National Park, as prolonged drought has caused pools that once held frogs to go dry. Their tadpoles take a year or more to reach adulthood, and in the meantime they are particularly susceptible to predation.

One of the fiercest predators around is the American bullfrog (*Lithobates catesbeianus*; see next page), a species native to the eastern U.S. but invasive in the Southwest, where it was introduced as a game species in the early 20th century. Bullfrogs will gobble up anything that fits in their mouths, including birds, small mammals, dragonflies, butterflies, lizards, frogs, turtles and fish ([AZGFD 2010](#)). They have been blamed for amphibian declines in much of western North America ([Rosen undated](#)).

Bullfrogs are also surprisingly mobile and adept at sensing pools of standing water while seeking out new habitats. They have been known to travel eight miles in a single season ([AZGFD 2010](#)). This spring, an overabundance of precipitation has made for an unusually active population of bullfrogs, and they have reportedly been spotted in the general area of the Desert Research Learning Center (DRLC).

Because any bullfrog that gained access to the SODN tinaja would make short work of our tadpoles, we are installing a fence around it. The fence (below) is designed to both prevent people from falling into the water and to keep bullfrogs from entering the area. At its top is a length of slick metal to prevent the frogs from climbing over. Below the fence, a thick layer of concrete extends several inches into the ground, to keep them from burrowing underneath.

Primarily nocturnal, the bullfrogs of Tucson are likely to approach our tinaja stealthily, under cover of darkness, like a congress of killer zombies that will leave nothing alive in their wake. Our goal: prevent a tadpole apocalypse. So if you see an American bullfrog in the vicinity of the DRLC, please contact us at the number provided on the next page.

Alice Wondrak Biel, Writer-Editor



Native adult lowland leopard frog.

Bullfrog-resistant fence.



UNDESIRABLE

№ 1



AMERICAN BULLFROG

**CONTACT THE MINISTRY OF MONITORING IMMEDIATELY IF YOU
HAVE ANY INFORMATION CONCERNING HIS WHEREABOUTS
NEAR THE DESERT RESEARCH LEARNING CENTER: (520) 751-6860**

**👉 REWARD 👈
OUR EVERLASTING GRATITUDE**

The DRLC: Our Living Laboratory

If you follow our [Facebook page](#), you already know that we've been working hard to transform the grounds of the Desert Research Learning Center (DRLC; see [previous Heliograph](#)). But this isn't just any landscaping project. The DRLC is already being used as a living laboratory and testing ground for a number of field projects.

The DRLC's location adjacent to but outside a national park unit makes it a little easier for us to do things like build our own tinaja, plant native gardens, and install and test field equipment—all while promoting youth engagement in park-based science. Through our partnership with local schools and environmental education organizations, students from grades 9 to 12 have already designed and conducted research projects and benefited from hands-on learning experiences at the center.

Over the last two and half years, high-school students from the Arizona College Preparatory Academy (ACPA) have helped shape the design and use of the DRLC. Their first project was to visit and then design spaces that would appeal to high schoolers conducting research at the center. Some of their ideas have guided the landscaping seen today and will continue to inspire future landscaping and interior improvements.

Last summer, when a small number of ACPA students took a class on research design and field implementation, the DRLC supplied technology, equipment, and locations for their research projects. In one notable project, students designed research questions related to packrats and their middens, found throughout the DRLC's 40 acres. Students developed questions about the characteristics of middens entrances, predators, and packrat activity level. While developing skills to design and implement research projects, the students worked with wildlife cameras ([see related article](#)), using the opportunity to develop technical questions and test different camera setups.

Student ideas also inspired the design of the DRLC's tinaja, whose construc-



Students and teachers from the Arizona College Preparatory Academy plant trees and shrubs at the DRLC.



Rock artist Ron White uses the SODN kayak to apply rock stain and seal.



DENNIS CALDWELL

In late May, 49 lowland leopard frog tadpoles were introduced to the tinaja.

tion has been well documented on the SODN Facebook page. As a follow-up project, students are designing year-long research projects, subject to review by a panel of scientists from the National Park Service, the University of Arizona, and other organizations. One of those projects will compare a natural tinaja system in Saguaro National Park to the development of the DRLC's artificial tinaja as plants and animals are introduced to this new habitat.

Our own staff is using the grounds for environmental monitoring and testing, as well. We installed a Davis weather station shortly after taking over the DRLC grounds (see [The Heliograph, 3\(2\):5](#)), learned ways to transplant soil microbes to disturbed areas during our ground-moving projects, and, more recently, have been testing the use of infrared wildlife cameras to monitor herpetofauna.

The herp monitoring project is the brainchild of Saguaro NP biologist Don Swann, who learned about the idea at a conference and wondered if it could be applied in a desert environment. Together, Don, SODN's Anna Iwaki Mateljak, and part-time Student Conservation Association intern Elise Dillingham have been testing different camera arrangements. Elise, also an employee of the non-profit [Ironwood Tree Experience](#) (ITE), is developing a herpetology curriculum for ITE's Field Science for Schools Program, where school teachers and administrators can select from a number of programs to provide place-based and experiential learning for their students. In addition, a protocol is being developed to initiate a youth-based citizen science monitoring group that will be responsible for setting up the cameras at the start of the monsoon season, and later download and process the data.

If successful, this project may be suitable for implementation by park managers seeking to monitor herpetofauna, possibly as a citizen science project.

*Anna Iwaki Mateljak,
Communications Biotech and
Alice Wondrak Biel, Writer-Editor*

Arrivals and Departures



Botanist **STEVE BUCKLEY** has left SODN . . . for an office across the hall. As botanist for the Southwest Exotic Plant Management Team (SWEPMPT), Steve consults on restoration efforts across the 55 parks in the SWEPMPT service area. He is also working with other

federal agencies and a range of non-profit and private groups to develop a plant materials program to support seed collection, plant propagation, and restoration efforts across the Southwest.

Biological science technician **SHANNON HENKE** is now leading a vegetation crew for the U.S. Forest Service in Oregon.

In a double-whammy for the network, communications biotech **ANNA IWAKI MATELJAK** and Southeast Arizona Group resources chief **JASON MATELJAK** are headed to Lassen Volcanic National Park, where Jason will be the new chief of resources.

SODN's first data manager, **DEBBIE ANGELL**, has also moved on—to retirement! Congratulations, Debbie, and thank you for your service.

LAURA PALACIOS (see <http://go.nps.gov/helio4-1>) has gone from volunteer extraordinaire to biological science technician extraordinaire. Laura is now leading our streams and springs crews. Since January, she has enjoyed the assistance of Student Conservation Association volunteer **MARK HILER**. Mark will leave SODN in July to study hydrology in a graduate program at Texas State University.

JEPPE ALBREKTSSEN, who came to us from the University of Copenhagen to volunteer and write a capstone project in fulfillment of his degree requirements, will leave SODN this month.

CritterCams

Continued from Page 1

time. Through a relatively new technique known as occupancy analysis, we can answer questions about the composition of mammal communities, such as, are we seeing as many medium-sized carnivores as we did 10 years ago? Are they the same species, or are some becoming more or less dominant than in the past? Is there as much variety? Such questions are important because changes at one trophic level (mid-sized mammals) may have cascading effects at other levels. Knowing about these kinds of changes will help land managers and researchers to study the underlying causes of these trends, which will in turn lead to more effective management and conservation strategies.

After the monitoring protocol is complete, we hope to install these cameras in all 11 SODN parks. The results will be used in combination with results from our climate, uplands, and landbird protocols, but also as a standalone monitoring component that can provide early warning of the kinds of changes described above.

The photographs taken by camera traps can also be used for interpreting wildlife and wildlife monitoring to visitors—a frequent theme at parks and refuges. In fact, at least four SODN parks (Coronado NMem, Ft. Bowie NHS, Organ Pipe Cactus NM, and Saguaro NP) already use wildlife cameras, in part for interpretive purposes. The Friends of Saguaro National Park maintain a [website](#) where people can learn about the Saguaro NP wildlife camera program (separate from the program discussed here) and view some images from it. We are excited to have this new tool to assist with both our science and our science communication.

Alice Wondrak Biel, Writer-Editor



Bobcat.

Coatiundi.

“Let Me Ask You Something . . .”



. . . with
Jeff Galvin
(SODN)

What do you like best about working in several NPS sites as compared to one?

Getting the opportunity to explore southern Arizona and New Mexico, and the different elevations and vegetation biomes found throughout the region.

What would be something that could really help SODN to accomplish its mission?

An assistant data manager. Data management is greatly underestimated and underappreciated.

What's the most rewarding part of your job?

Getting to work on the final products of the vegetation mapping project, and being a part of the process to have that data in useful forms for the parks and general public.

Which part of your job is something you geek out about that most other people don't?

I tend to be nitpicky, and do absurd overplanning. I like having every possible resource in case something happens.

What's your biggest work-related challenge right now?

Writing vegetation community descriptions for the Coronado National Memorial vegetation map based on classification plots and polygons completed before and after the monument fire in 2011 that burned through the entire project area.

What's the best advice you've received in your career?

Underpromise and overdeliver.

What cheers you up?

Swimming, especially in the ocean or alpine lakes. It doesn't make much sense why I live in the desert.

What is your guilty pleasure?

Cooking reality shows with absurd challenges or an angry Brit.

Biological science technician Jeff Galvin oversees our field crews for vegetation mapping and monitoring.



. . . with
Laura Fawcett
(Coronado
NMem)

What recent accomplishment are you most excited about?

I've been thrilled with the success of our NPF/Disney nature Impact Grant, which we finished up last week. We planted hundreds of agaves in the park with local students from grades K-8. In addition, those students germinated thousands of agaves that are now growing in their school garden.

[Watch the video!](#)

What is the most rewarding part of your job?

The most rewarding part of my job has been seeing the progress of our agave and grassland restoration area over the past few years. I was an intern here in 2009, and at the time, the 7.6-acre area was a bare patch of dirt dominated by non-native stinkgrass and Lehmann lovegrass. Now, it's a wonderful mix of native grasses and shrubs. Restoring agaves has been challenging, but it has been rewarding to see the progress and changes over time.

Which part of your job is something you geek out about that most other people don't?

I get really excited about phenology. We monitor it for the National Phenology Network and I also record my own observations. I love seeing the differences year-to-year when certain species bloom or arrive in the park. Sometimes the differences are striking, but I've also seen certain species bloom within the exact same period—or on the same day—year after year.

What's the best advice you've received in your career?

The best advice I've received is that if you really want to make something happen, you can. Even if funding and support are lacking, a little time and effort will go a long way. There are many ways to reach a goal, and sometimes you just have to be creative to get there!

What is your guilty pleasure?

Sometimes, when I get sent a link to a cute animal video on YouTube, I will spend the next few hours clicking on other animal videos. I can't stop once I've watched just one.

Laura Fawcett, a lead biological science technician at Coronado National Memorial, helps oversee the completion of field projects and programs.

Where Are We?

| Park | July | August | September |
|-------------------|--|---|--|
| GICL | Streams: sonde deployment (7/14–7/16) | Streams: quarterly sampling (8/3–8/6) | |
| MOCA | | Uplands: sampling | Streams: quarterly sampling (8/31–9/6) Uplands: sampling |
| SAGU | | | Uplands: sampling (RMD) Veg Mapping: field validation (TMD) |
| TUMA | Streams: water stress test (7/23) | Streams: quarterly sampling, water stress test (8/18–8/19) | Streams: sonde retrieval (9/16) |
| TUZI | | | Streams: quarterly sampling (8/31–9/6) |
| BEOL ¹ | | Streams: quarterly sampling (8/3–8/6) | |
| CAVO ¹ | | Streams: quarterly sampling (8/3–8/6) | |
| PECO ¹ | Streams: sonde deployment (7/14–7/16) | Streams: quarterly sampling (8/3–8/6) | |

¹ Southern Plains Network park. BEOL: Bent's Old Fort NHS, CAVO: Capulin Volcano NM, PECO: Pecos NHP
Acronyms for SODN parks are shown in the box below.



The Heliograph is a publication of the Sonoran Desert Inventory & Monitoring Network.

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Sonoran Desert Network Park Units

Casa Grande Ruins NM (CAGR)
Chiricahua NM (CHIR)
Coronado NMem (CORO)
Fort Bowie NHS (FOBO)
Gila Cliff Dwellings NM (GICL)
Montezuma Castle NM (MOCA)
Castle unit (MOCC)
Well unit (MOWE)
Organ Pipe Cactus NM (ORPI)
Saguaro NP (SAGU)
Rincon Mtn District (RMD)
Tucson Mtn District (TMD)
Tonto NM (TONT)
Tumacácori NHP (TUMA)
Tuzigoot NM (TUZI)

NM = National Monument
NMem = National Memorial
NHS = National Historic Site
NHP = National Historical Park