



The Heliograph



Official Newsletter of the Sonoran Desert Network

The Desert Research Learning Center

Our New Home Away from Home

While all 11 Sonoran Desert Network (SODN) parks are home to our staff, Tucson is our central base of operations. In August 2012, we moved our offices from a leased space in east-central Tucson to a building and grounds vacated several months earlier by the Bureau of Land Management (BLM). As the BLM is currently in the process of transferring the building and land to the National Park Service, we have eliminated our leasing costs.

The news gets even better: our new location, designed and built as a classic 1970s Tucson ranch house, sits on 40 acres adjacent to Saguaro National Park (NP). This new location, and the resources it provides, supports our efforts to engage in continued collaboration, obtain proper data analysis facilities, and promote science- and park-based service learning.

Since our move to the new location, we have been busy making the space feel like home. On top of normal fieldwork duties and meetings, renovations are underway—and so are discussions about the vision for use of the new facilities.

Building Updates

To meet federal building codes and update the facility for SODN operational needs, several assessments have been conducted with the aim of improving the building's efficiency and making environmentally friendly modifications. Projects already underway include converting lighting to energy-efficient LEDs, improving energy efficiency with R12+ insulation, establishing a dry lab for soil analysis, painting walls, and installing solar-tube lighting and a solar water heater. Cabinetry in the front en-

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try of the great room has been demolished to make space for a future visitor and education center. Exciting plans are in motion to install student-designed native landscaping in the courtyard, and install directional signage to and around the building. In addition, our collateral-duty safety officer has been working to ensure that the building is up to code for fire hazards and other safety concerns, and a bathroom and the front door will be modified to meet the requirements of the Americans with Disabilities Act.

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Project Updates

Groundwater

Spring quarterly water-level monitoring was completed and processed for Chiricahua NM, Coronado NMEM, Fort Bowie NHS, and Saguaro NP (West). Groundwater-level monitoring at Saguaro NP by volunteer par excellence Chuck Perger continues on a biweekly schedule. With Chuck's able assistance, a well discovered at Hope Camp a couple of years ago was characterized, instrumented, and added to the monitoring program in March.

Updating of the groundwater database has been ongoing since last fall. The database has undergone extensive revision, especially the metadata portion, which is being brought into conformance with federal interagency data-sharing standards. A draft of the groundwater protocol was sent for peer review. Comments were received and addressed; this protocol is currently being prepared for publication in the NPS Natural Resource Report series.

Invasive Exotic Plants

Exotic plant surveys were completed at Casa Grande Ruins NM and Tumacácori NHP in March, and at Coronado National Memorial in April.

Landbirds

The 2013 field season of landbirds monitoring has been completed, with the same transects sampled at each park as were in previous years. The annual report for the 2012 field season is now available at <http://go.nps.gov/sodnbirds>.

Natural Resource Condition Assessments

Our NRCA effort took an unfortunate step backward when our key cooperator (the Sonoran Institute) withdrew from the project. We are currently working with the new Intermountain Region NRCA coordinator to get the effort back on track.

Springs

Planned activities under this protocol were cancelled due to the federal budget sequestration.

Streams

In March, April, and May, vegetation-density plots were read and part of the riparian vegetation module of the Streams Protocol was implemented at Tumacácori NHP. Implementation of the rest of the module is scheduled for September, when vegetative cover is highest. A permanent mount for water-quality logging instruments was installed at Pecos NHP, and instruments were deployed at that park as well as Bent's Old Fort NHS and Gila Cliff Dwellings NM. Water-quality samples were also collected at those three parks, and aquatic macroinvertebrates were collected at Bent's Old Fort NHS.

In June, July, and August, a permanent mount for water-quality instruments and stream-gaging equipment will be installed on Wet Beaver Creek at the Well unit of Montezuma Castle NM. Water-quality logging instruments will be deployed and retrieved at Tumacácori NHP, Montezuma Castle NM, and Tuzigoot NM. Aquatic macroinvertebrates and quarterly water-quality samples will be collected at Montezuma Castle NM, Tuzigoot NM, and Tumacácori NHP.

The aquatic ecologist presented results from streams monitoring at Tumacácori NHP at the 2013 Santa Cruz River Research Days at the Sonoran Desert Museum. Copies of all the presentations are available at <http://www.sonoran-institute.org/where-we-work/south-west/santa-cruz-river/672-research-days-2013.html>.

Uplands

Annual reporting is underway. The data from all parks have been evaluated to assess the adequacy of the sampling design (number of plots), allowing us to schedule this year's field work more efficiently and determine whether additional or fewer plots may be necessary at certain parks.

Vegetation Mapping

Field work was initiated at Saguaro NP-Rincon Mountain District in March, and is ongoing. Data from Gila Cliff Dwellings NM have been analyzed in preparation for map finalization.

Washes

Planned activities under this protocol were cancelled due to the federal budget sequestration.



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.

DRLC

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Desert Research Learning Center

Our new building and grounds also serve as the physical location of the interagency Desert Research Learning Center. Research Learning Centers (RLCs) were established in 19 areas of the country as part of the National Park Service (NPS)'s Natural Resource Challenge in 2001 to increase the effectiveness and communication of scientific research in national parks. They communicate and host scientific research in parks, integrate current scientific research into service learning programs, and promote science knowledge and resource stewardship.

While the initial creation of RLCs was NPS-specific, the Desert Research Learning Center (DRLC) will collaborate with the U.S. Fish and Wildlife Service, other federal agencies, college institutions, local K-12 schools, and non-profit organizations to promote and

conduct cultural- and natural-resource research, communication, and protection across the Southwest. The DRLC will provide office and lab space for research, housing for volunteers and researchers, and an outdoor classroom for students and working professionals (see [story on page 4](#)).

Share and Share Alike

Only about two-thirds of our office's occupants actually work for SODN. Our new building also hosts employees of the Sonoran and Chihuahuan Deserts Zone of the U.S. Fish and Wildlife Service's natural resource inventory and monitoring program. Our common space helps strengthen efforts to de-

velop interagency monitoring protocols and share expertise. Two Intermountain Region Office NPS employees—a hydrologist and the Southwest Exotic Plant Management Team Coordinator—also work in the building.

Many projects, initiatives, and big ideas are materializing at the Desert Research Learning Center, so keep an eye out for new developments. If you are interested in learning more about our efforts or have a great idea yourself, we would love to work with you.

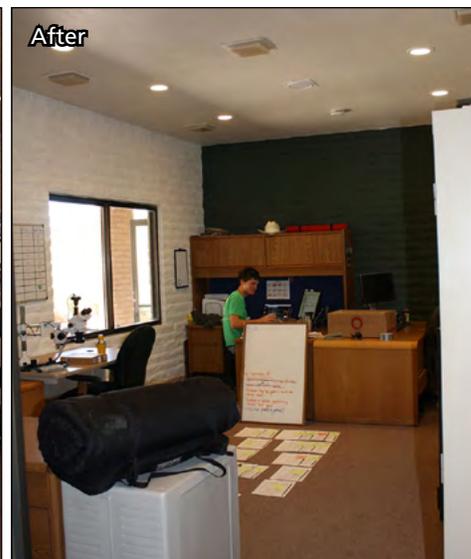
—Anna Iwaki,
Biological Science Technician

—Alice Wondrak Biel,
Science Writer-Editor

Top: Before and during the process of installing R12+ insulation in the program manager's exterior wall.



Bottom: Replacing the original monochromatic pink color scheme with contrasting paints has effectively improved the lighting for vegetation staff assigned to this room.



The New Wave of Student Scientists

Science communication and education have always been priorities for SODN, and the Desert Research Learning Center (DRLC) grounds are providing us with opportunities we could only have dreamed of before. A variety of service-learning projects involving local students have already begun and more are in the planning stages. Saguaro National Park Biologist Don Swann has been instrumental in obtaining a National Park Foundation grant allowing high-school students from the Arizona College Prep Academy to complete student-designed research projects at the DRLC, help install remote wildlife cameras, develop ideas to reduce anthropogenic impacts on the desert, and help us make the DRLC activities relevant and fun to students. Efforts are also underway to have students from the University of Arizona design and install native-plant landscaping on the DRLC grounds. In response to the call for International Volunteers in Parks, the DRLC is also working on obtaining foreign-exchange honors-thesis students from abroad to work with SODN field crews and develop Sonoran Desert-based senior projects.

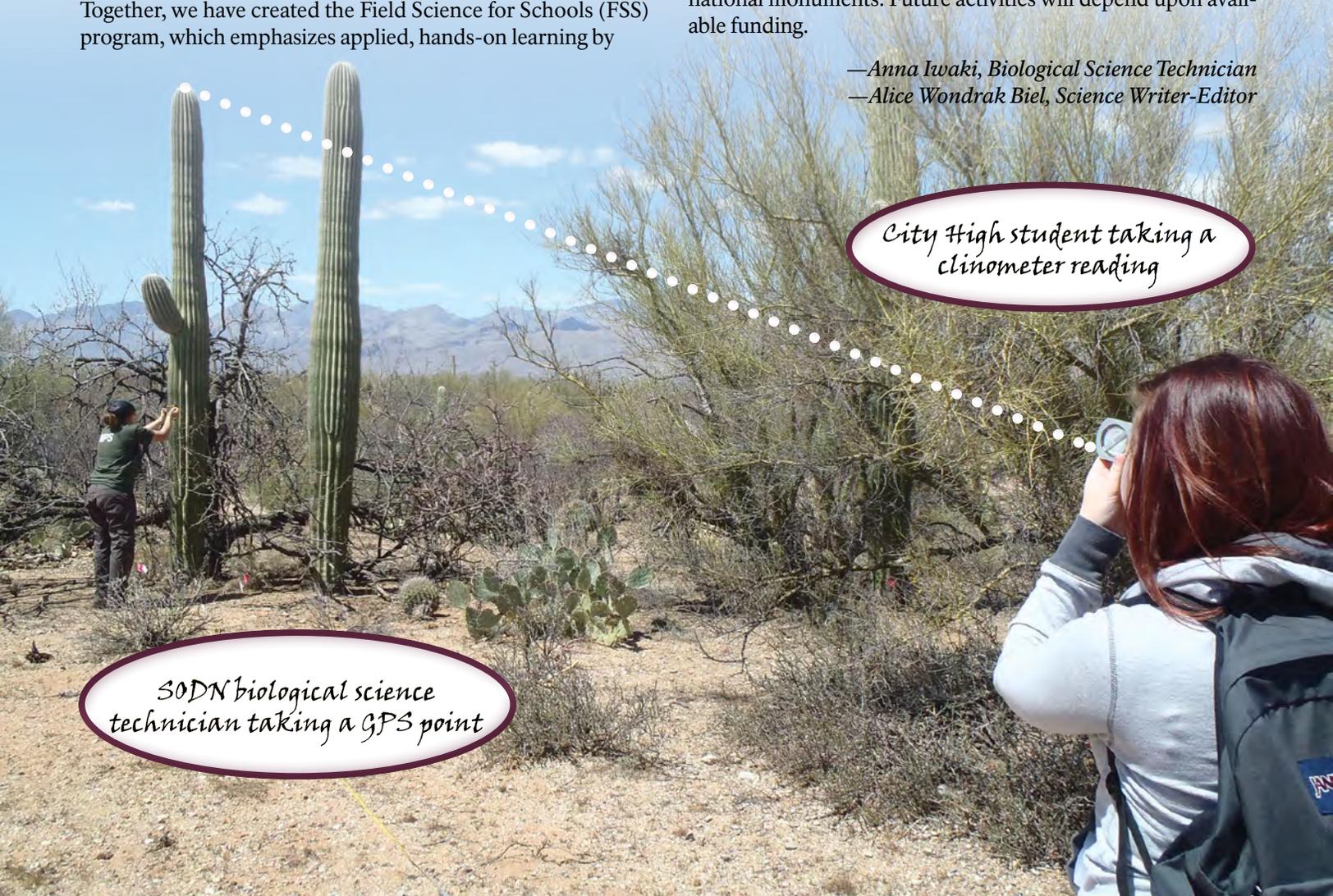
One of our most rewarding collaborations has been with the Tucson-based non-profit, Ironwood Tree Experience (ITE). Together, we have created the Field Science for Schools (FSS) program, which emphasizes applied, hands-on learning by

connecting scientists and local experts with high-school students to enhance science learning, skills, and literacy. As part of the FSS, the SODN streams team visited City High School's field-ecology course several times last fall. Staff presented information on desert aquatic ecology and technical equipment before taking the students to Saguaro NP's Madrona Pools. At the pools, students implemented classroom instruction and real-world protocols to assess springs ecology in the field.

In early April 2013, students from the same class conducted the first plots of a census of all saguaros on DRLC grounds. This project not only provides data integral to understanding the population of saguaros on the property, but also teaches students about desert safety, navigation, applied geometry, biology, and advanced application of Global Positioning Systems devices (GPS) at the instruction of biologists and ecologists in the field. With the help of ITE staff, SODN staff and interns, volunteers, and Don Swann, about 60 students participated.

The FSS has also supported field-science education and service-learning projects at Saguaro NP, Buenos Aires National Wildlife Refuge, and Montezuma Castle, Tuzigoot, and Tonto national monuments. Future activities will depend upon available funding.

—Anna Iwaki, Biological Science Technician
—Alice Wondrak Biel, Science Writer-Editor



City High student taking a clinometer reading

SODN biological science technician taking a GPS point

The SODN Weather Station *Revolution*

the Automatic Packet Reporting System to transmit weather data over amateur radio. Remote receiving stations upload the data to the Internet, resulting in near real-time data. Based on their experience, NWS staff believes the stations are durable enough to withstand long-term deployments.

The materials for each weather station, including Davis Vantage Pro2™ instrumentation, cost roughly \$1,500, which should allow us to deploy many stations throughout SODN parks. Additional and replacement materials are easily procured locally and through Internet vendors.

As is true of most pilot programs, we began with a relatively steep learning curve; the pilot station was worked on intermittently over a period of three months while kinks were worked out with the assistance of Eric Aselin at NWS–Flagstaff. In the future, stations will take roughly one day to set up and test at the office. Breaking down a station for transport to a park location will take an additional hour and set-up at the location will take 1–2 hours.

The real-time capabilities of these weather stations will make the data accessible to park staff, the public, and many organizations. Each station will be registered with the NWS Citizen's Weather Observing Program, giving over 800 organizations access to the data, including the National Oceanic and Atmospheric Association, Weather Underground, and the University of Arizona.

Station data will also be incorporated into ClimateAnalyzer.org, a website created by Mike Tercek, owner of Walking Shadow Ecology and a SODN partner. ClimateAnalyzer.org compiles data from the NWS Cooperative Observer Network, Remote Automated Water Stations, U.S. Geological Survey stream gages, U.S. Department of Agriculture rain gages, and now SODN weather stations. The website, which is automatically updated every 24 hours, performs quality control/quality assurance and summarizes the data in custom graphs and tables. Park staff can also work with Mike Tercek to create programs (i.e., write code) that fulfill specific needs, such as flash-flood warnings, that can be used for park operations and public awareness.

As the climate-monitoring program progresses, SODN will work directly with park staff to best meet the needs of each park and share maintenance operations of the stations. We will engage the active amateur radio community, keeping them abreast of our plans and receiving their assistance. Interns with the Desert Research Learning Center will also have a hand in the set-up and deployment of the stations, giving students practical experience in resource monitoring.

—Kara Raymond, Hydrological Technician



The author shows off SODN's new on-site weather station. The Desert Research Learning Center is visible in the background.

Standing tall on a hill 100 meters west of the SODN office is a new weather station. Neighbored by mighty saguaros, the station represents our pilot model for a revitalized climate monitoring program (described in the [previous issue](#) of the Heliograph). Coming to a park near you—SODN plans to deploy 20 stations throughout the parks over the next few years. These weather stations will be invaluable, providing easily accessible real-time data through inexpensive, easily maintained units.

The station, whose elegant design was created by Eric Aselin, Steve Duiame, and Nick Petro of the National Weather Service's Flagstaff office, was devised to be portable, self-sustaining, and suitable for rapid deployment during the monsoon season. It was originally used to monitor rainfall in recently burned areas at Grand Canyon National Park. The station uses

Where Are We?

Here's what we have planned for June, July, and August.

Park	June	July	August
CAGR			Uplands: Aug 28–31
CHIR	Climate: Weather station installation, June 4–6, 24–26 (tentative)		
GICL		Exotic Plants: July 3–10 (tentative) Streams: Sonde deployment, July 22–25 Vegetation Mapping: July 3–10, 17–24	Exotic Plants: July 31–Aug 7 (tentative) Streams: Sonde retrieval, Aug 12–15
MOCC			Streams: Quarterly sampling and QA/QC, Aug 26–29
MOWE	Streams: Sonde retrieval, June 13	Climate: Weather station installation, July 1–3 (tentative)	Streams: Quarterly sampling and QA/QC, Aug 26–29
SAGU	Vegetation Mapping: June 5–12, 19–26 (Rincon Mountain District)		
TUMA	Streams: Sonde deployment, June 6		Streams: Quarterly sampling and QA/QC, Aug 8; Riparian vegetation, Aug 14–21; Sonde retrieval, Aug 23 Uplands: Aug 28–31
TUZI			Streams: Quarterly sampling and QA/QC, Aug 26–29
BEOL		Streams: Sonde deployment, July 22–25	Streams: Sonde retrieval, Aug 12–15
PECO		Streams: Sonde deployment, July 22–25	Streams: Sonde retrieval, Aug 12–15

*Southern Plains Network parks. PECO=Pecos National Historical Park, BEOL=Bent's Old Fort National Historic Site. Acronyms for SODN parks are shown in the box below.



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of the National Park Service.

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Sonoran Desert Network Parks

Casa Grande Ruins NM (CAGR)
Chiricahua NM (CHIR)
Coronado NMEM (CORO)
Fort Bowie NHS (FOBO)
Gila Cliff Dwellings NM (GICL)
Montezuma Castle NM (MOCA)
Organ Pipe Cactus NM (ORPI)
Saguaro NP (SAGU)
Tonto NM (TONT)
Tumacácori NHP (TUMA)
Tuzigoot NM (TUZI)

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