



# Sonoran Desert Heliograph



Quarterly Newsletter of the Sonoran Desert Network

## Natural Resource Condition Assessments Underway

Over the past year or so, the Intermountain Region Inventory & Monitoring (I&M) networks, including the Sonoran Desert Network, have taken on responsibility for a National Park Service (NPS) program that evolved separately from I&M but shares similar goals. The Natural Resource Condition Assessments (NRCA) program was initiated by the NPS to provide current information on the status of natural resources in park units across the nation. NRCAs utilize existing data, observations, and expert opinion to determine the ecological condition of

resources relative to established reference conditions. NRCAs are park-specific, and are intended to provide parks with information that will support management and planning for natural resources.

The NRCA program—originally the Watershed Condition Assessment (WCA) program—was created in response to Congress’s Appropriations Act for FY 2003, which instructed (and funded) the NPS to assess environmental conditions in watersheds. WCAs eventually became NRCAs and, in 2009, coordination of the NRCAs was assigned to the NPS regions. In the Intermountain Region, the NRCA program was assigned to the I&M networks.

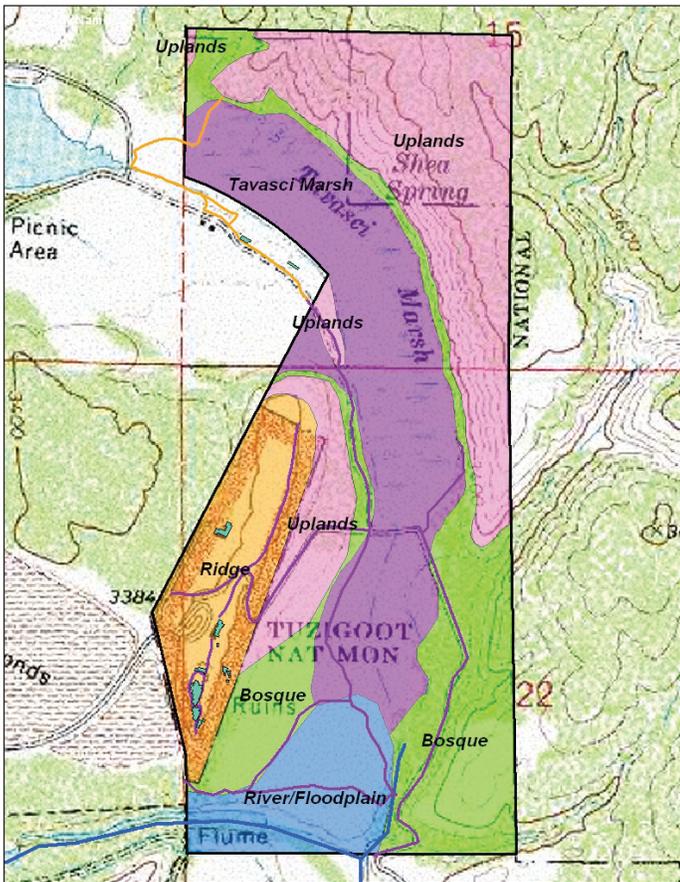
### What is the purpose of an NRCA?

NRCAs combine useful scientific documentation and new insights about current resource conditions and the threats and stressors that influence those conditions. NRCAs do not:

- define the desired resource conditions for a park;
- establish park resource management targets;
- recommend specific park management actions or strategies;
- give a single overall-condition score for park areas;
- evaluate alternative futures (e.g., climate change scenario planning);
- emphasize rigorous trend analysis; or
- report on conditions for lands and resources outside park boundaries.

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In the first stage of an NRCA, network staff meet with park managers and delineate “management reporting areas” on a park map. This is a finished example for Tuzigoot National Monument.



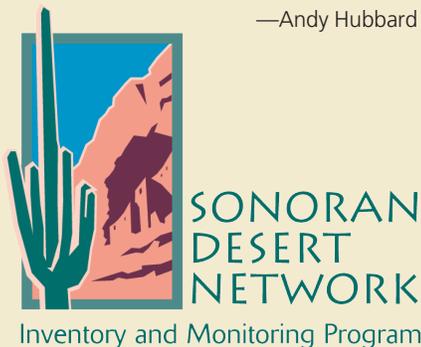
### Message from the Program Manager

As described in Deborah Angell's article in this issue of the *Heliograph*, Natural Resource Condition Assessments address three essential questions: "What are the current conditions of fundamental park natural resources?" "How do current conditions compare with similar resources off-park?" and "How have park resources changed over time?"

Drawing from I&M results, legacy datasets, and the research literature, condition assessments provide context by evaluating park natural resources from multiple perspectives and at varied scales. Originally developed in response to Department of the Interior land-health goals, natural resource condition assessments have evolved to bridge planning, science, and park management by incorporating both formal (i.e., established in planning or enabling legislation) and informal (park standard practices) management themes and emphasizing spatial products like maps, remote-sensing imagery, and other GIS-related tools.

I encourage you to check out the early products for other parks at [http://www.nature.nps.gov/water/NRCondition\\_Assessment\\_Program/NRCA\\_Reports.cfm](http://www.nature.nps.gov/water/NRCondition_Assessment_Program/NRCA_Reports.cfm); the document for Rocky Mountain National Park is a good example. Please feel free to contact me for more information on Natural Resource Condition Assessments in Sonoran Desert Network parks.

—Andy Hubbard



# Arrivals and Departures



Congratulations to former Assistant Data Manager **KRISTEN BEAUPRÉ**, who is now the SODN Data Manager. Learn more about Kristen at [http://science.nature.nps.gov/im/units/sodn/bio\\_kristen.cfm](http://science.nature.nps.gov/im/units/sodn/bio_kristen.cfm).

Former Data Manager **DEBBIE ANGELL** is the new NRCA Information Manager for Southern IMR Parks (see cover story).

New in the SODN offices is **LACRECIA JOHNSON**, the new I&M program manager for the U.S. Fish and Wildlife Service. Lacrechia and her future staff will be co-located with SODN. Welcome, Lacrechia!

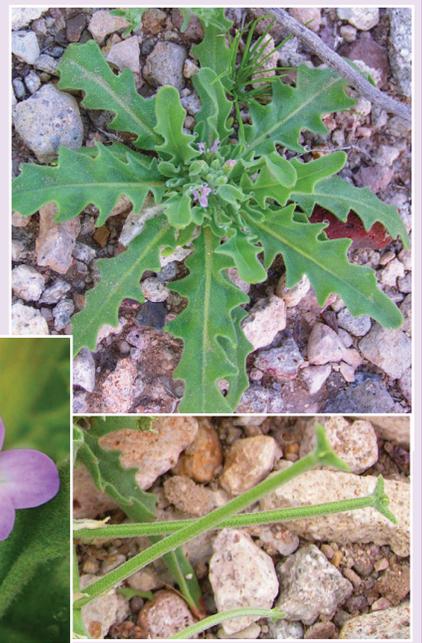
### Have you seen this plant?

*Matthiola parviflora* (Shousb.) (Brassicaceae)

The University of Arizona is trying to catalog the current distribution of *Matthiola parviflora*, an exotic annual crucifer, around Tucson (and anywhere else!). It will flower and fruit in March and April. If you see this plant, please e-mail detailed location information and any comments about extent or density to Jonathan Horst, [jhorst@email.arizona.edu](mailto:jhorst@email.arizona.edu).

*M. parviflora* is similar to the more showy *M. longipetala*, a naturalized horticultural plant, but has much smaller (<1 cm diameter) and paler (lavender) flowers, without wavy margins on the petals (visit [www.eebweb.arizona.edu/faculty/venable/matthiola.htm](http://www.eebweb.arizona.edu/faculty/venable/matthiola.htm) for photos of both species). Both have characteristic long, narrow, horned siliques.

Petals: 0.6–0.8 cm, lavender, obovate.  
Raceme: Usually <20 cm, often overtopped by leaves



**National Park Service Inventory & Monitoring Program**

National Park Service U.S. Department of the Interior

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**Sonoran Desert Inventory & Monitoring Network**

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## New on the Web!

Check out the network's web site for new reports and briefs on uplands monitoring at Fort Bowie NHS, Gila Cliff Dwellings NM, and Saguaro NP (RMD); reports and briefs on network-wide landbird monitoring in 2009 and 2010; uplands trip summaries; and a plan for enhanced monitoring of climate-sensitive indicators in southwest desert parks.

<http://science.nature.nps.gov/im/units/sodn/>

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# Project Updates

## Exotic Plants

The relatively new exotic plants—early detection protocol will be implemented at a few SODN parks in 2011. Currently, Casa Grande Ruins NM is scheduled to be sampled during March/April, in order to capture winter annual growth. This sampling effort will provide useful information on implementation effectiveness and usefulness of the data to park staff, and provide estimates of time needed to conduct the surveys. Other exotic plant surveys will be conducted throughout the year in conjunction with other scheduled vegetation work at Gila Cliff Dwellings and Montezuma Castle national monuments.

## Groundwater

SODN groundwater monitoring is conducted through a combination of SODN staff site visits and collaboration with park staff and other agencies. Over the next three months, SODN staff will make quarterly site visits to Saguaro NP, Coronado NMem, and Fort Bowie

NHS. The twenty-fourth year of groundwater data collection will begin at Organ Pipe Cactus NM, where park staff collects quarterly data from nine sites. The Arizona Department of Water Resources will continue to collect data at Tumacácori NHP. For that monitoring, a manual, as well as continuous data, are available at <https://gisweb.azwater.gov/gwsi/SearchGWSI.aspx>. Search for the registration numbers of the two wells, 551438 and 551439. The U.S. Geological Survey monitors one well at Coronado NMem; the data for this well can be found at [http://waterdata.usgs.gov/nwis/dv/?site\\_no=312044110141901&referred\\_module=gw](http://waterdata.usgs.gov/nwis/dv/?site_no=312044110141901&referred_module=gw). Chiricahua NM staff will continue to collect monthly data from three sites at the monument. For more, see “Groundwater In-Depth,” page 5.

## Landbirds

Landbirds were surveyed at all 11 SODN parks in 2010. Species richness and community composition varied widely among parks. White-winged doves were the most commonly detected species (n = 785). New species were recorded for three parks, with five new species recorded for Chiricahua National Monu-

ment. The Rocky Mountain Bird Observatory, our primary cooperator for this project, manages the bird monitoring data. The 2010 annual landbirds monitoring report is nearing completion.

## Natural Resource Condition Assessments

NRCAs for Chiricahua NM, Coronado NMem, and Fort Bowie NHS are nearing completion. NRCAs are currently underway for SODN’s five small cultural parks with important riparian resources: Montezuma Castle and Tuzigoot national monuments, Tumacácori NHP, Gila Cliff Dwellings NM, and Tonto NM. Servicewide, all NRCAs are scheduled for completion by 2014.

## Springs

Springs inventories have been completed for Saguaro NP, Chiricahua NM, Fort Bowie NHS, Coronado NMem, and Gila Cliff Dwellings NM. SODN staff will meet with staff from the Chihuahuan Desert Network and Mojave Desert Network to support springs protocol development related to the NPS climate-change initiative (<http://www.nature.nps.gov/climatechange/about.cfm>). Springs inventories will soon be completed at Organ Pipe Cactus and Tonto national monuments.

## Streams

Stream channel-morphology sampling has been initiated at Gila Cliff Dwellings NM. The focus of this effort was to resurvey existing stream-channel cross-sections and establish five new cross-sections, bringing the total to 11. Quarterly streams sampling was implemented at Gila Cliff Dwellings NM, Montezuma Castle NM (both units), Tumacácori NHP, Tuzigoot NM, and Pecos NHP (Southern Plains Network; SOPN). Multiparameter probes have been deployed at Gila Cliff Dwellings NM and Tumacácori NHP. In addition, SODN and

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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.

### Sonoran Desert Network

7660 East Broadway Blvd.  
Tucson, Arizona 85710

### Phone

520-546-1607

### Website

<http://science.nature.nps.gov/im/units/sodn>

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

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The first observation of a black phoebe (*Sayornis nigricans*) at Chiricahua NM was recorded in 2010.

# Staff profile: Kate Connor

When SODN biotechnician Kate Connor was growing up in Erie, Pennsylvania, no one was really talking about Erie's particular "sense of place," or about which species of trees lining the streets had been growing there for millennia or were new exotic transplants. The understanding that everything around us is part of a functioning system—or, at least, should be—came later, and it's a lesson that's stuck.

Kate, who has an environmental-studies background and is currently serving a term appointment as SODN's field crew leader for vegetation monitoring, worked as a seasonal park guide and biotech at several National Park Service units, including Saguaro NP, before returning to Tucson in 2007. Although she was simultaneously offered a term position in Moab, Utah, Kate's love of the desert southwest compelled her to opt for what was then a seasonal position with SODN, instead. The Sonoran Desert lowlands, she says, are her favorite ecosystem, and she understands why Arizona was author Edward Abbey's favorite state of all.

Being part of a program that examines earth-based systems from an holistic perspective is a good fit for Kate, whose passion outside work is permaculture, "an ecological design system for sustainability in all aspects of human endeavor" ([www.permaculture.org](http://www.permaculture.org)). On the ground, that means approaching your living space and environs as a system in and of itself; not only using natural building materials, for example, but also xeriscaping, gardening, composting, and harvesting rainwater.

Individually, those actions might be part of any personal "greening" program; what separates permaculture is its integration of those actions into part of a multi-faceted system in which each component serves at least three household purposes. Harvested rainwater, for instance, is not just fed back into plants, but also used to cook food and wash clothing. The passion flower (*Passiflora arizonica*, a native vine) Kate has planted on her north-side deck lattice shades a large window from

the hot summer sun, cooling the house and reducing her cooling bill. The vines also bear fruit, have medicinal uses, and provide privacy. Of course, they are also aesthetically pleasing (see photo!).



PHOTOS COURTESY KATE CONNOR



One obvious goal of all this is true sustainability—of the sort to which the National Park Service aspires and is developing through its Climate-Friendly Parks program (<http://www.nps.gov/climatefriendlyparks/>) and the Intermountain Region Sustainability Initiative ([http://www.cfc.umt.edu/cesu/NEWCE-SU/Assets/Partner%20Activities/FY10%20Activities/10RMCluster\\_Meeting/RM\\_Cluster10.html](http://www.cfc.umt.edu/cesu/NEWCE-SU/Assets/Partner%20Activities/FY10%20Activities/10RMCluster_Meeting/RM_Cluster10.html)). As one of her future professional objectives, Kate would like to contribute to shaping that effort, including investigating options for broad-scale implementation of solar energy, composting toilets, and alternative fuels.

Kate is also an amateur herbalist with a strong interest in traditional medicinal uses of local plants. She shares her home with her husband, Pete, who works on the trail crew for Saguaro NP, and their dog, Star. She is already looking forward to the April paloverde bloom.

—Alice Wondrak Biel  
SODN Writer-Editor



Left, passionflower. Above, paloverde in bloom.

Learn more about Kate at  
[http://science.nature.nps.gov/im/units/sodn/bio\\_kate.cfm](http://science.nature.nps.gov/im/units/sodn/bio_kate.cfm)

# Project Updates

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SOPN staff met with natural and cultural resource staff at Pecos NHP to discuss installation of stream-discharge and water-quality instruments at the park.

Upcoming work will include quarterly sampling at Gila Cliff Dwellings NM, Montezuma Castle NM (both units), Tumacácori NHP, Tuzigoot NM, and SOPN parks Pecos NHP, Lyndon B. Johnson NHP, and Chickasaw NRA, as well as channel-morphology monitoring at Gila Cliff Dwellings NM and Pecos NHP. SODN staff will meet with staff from Lyndon B. Johnson NHP and Chickasaw NRA for training and implementation of quarterly sampling at those parks, and

with Pecos NHP staff regarding the installation of monitoring equipment.

## Uplands

Vegetation and soils monitoring crews will primarily be focused on data management during the upcoming winter months. Soil samples collected at each plot will be processed during this time and plant specimens will be identified, vouchered, and accessed into the University of Arizona herbarium. Field work will resume at full force in June, with the intervening months spent planning and training new interns.

## Vegetation Mapping

During December, we completed the accuracy assessment phase of mapping

work at Tonto NM. The first few months of 2011 will be spent reviewing the data and finalizing the map. In addition, field work will continue Saguaro NP (TMD), with the aim of interpolating field data collected during the fall to unmapped areas. A scoping meeting will be conducted for Montezuma Castle NM (both units) in January, with mapping work planned for early summer.

## Washes

Testing of wash-monitoring techniques has continued at Organ Pipe Cactus NM, including the channel-morphology and riparian vegetation modules.

## Groundwater In-Depth

Following are two examples of applications of water-level data, one short-term and one long-term.

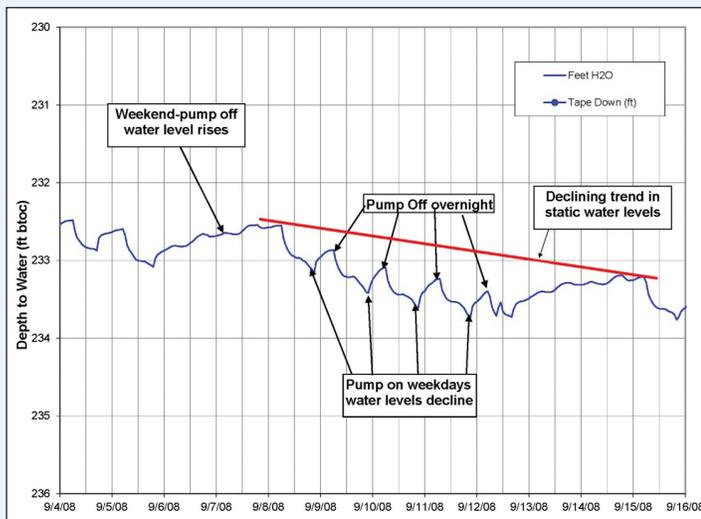
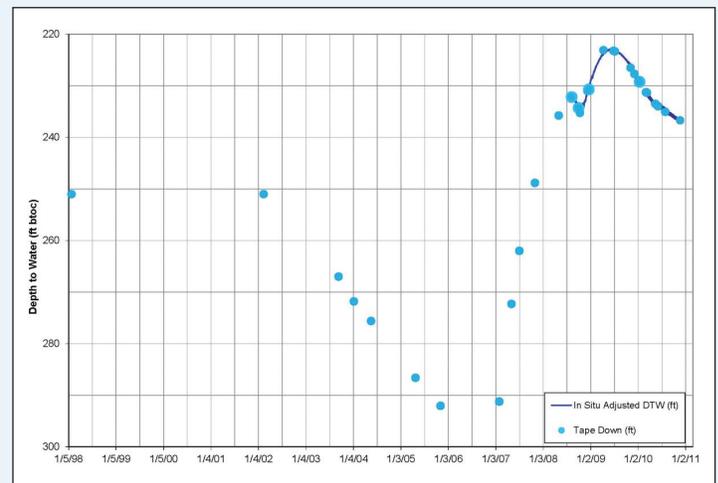


Figure 1 (left) illustrates a record of water levels as depth-to-water at a well in a SODN park. In this case, the park had agreed with a contractor that groundwater pumping would occur only for a certain number of hours per day, and only during certain hours. Park managers were concerned about water levels declining due to the pumping, causing possible impacts to surface resources. The data shown in Figure 1 were measured at a 30-minute interval, using a recording water-level sensor installed in a well near the pumping well. As the figure shows, water levels draw down during pumping and recover after the pump is turned off. The changes in measured water levels indicate when the pump was turned on and off. The maximum change in water level over the duration shown on the plot was about two feet. This is not a substantial decline over the short term, but the downward trend in static water levels indicates that if the project had continued for several more months, there might have been reason for concern. The contractor was revealed to be pumping for many more hours than were agreed upon, and these data were used to convince the com-



pany to obtain additional water from another source.

In Figure 2 (right), data from the same well illustrate the importance of long-term groundwater data and the impact of sampling frequency on interpretation. The light-blue dots show water levels measured manually, with a water-level sounding tape. The dark-blue line shows water levels measured more frequently, with the recording water-level sensor that was installed for the data collection effort discussed above. The figure shows that water levels in this well varied over a range of more than 60 feet during the period shown. This puts the two-foot change in water level observed for the data set shown in Figure 1 into perspective; sampling frequency between 1998 and 2008, which took place approximately quarterly, was adequate to identify long-term changes in water levels at this location, but clearly would not have provided the resolution needed to answer management questions such as the one discussed above.

—Colleen Filippone, Regional Hydrologist

# Volunteers Pull Ton of Trash from Santa Cruz



Members of Southwest Conservation Corps Crew #130 pose with some of the trash they pulled out of the Santa Cruz River in September.

For 10 sweltering days in September, Southwest Conservation Corps (SCC) Crew #130 worked to remove more than one ton of garbage from the Santa Cruz River's flow through Tumacácori National Historical Park (NHP).

Why so much trash in the river? During the summer and winter monsoons, intense rainstorms carry debris and garbage into the park, creating dams and redirecting water across the floodplain within Tumacácori NHP. These fast-moving flows also deposit large woody debris on fences. To prevent a fence collapse and the arrival of trespass cattle into the park, that debris must be removed before the next big storm.

In addition to removing more than a ton of trash from the park's stream channel and riparian areas, the hard-working SCC crew, made up of six members and two co-leaders, also removed debris

from the boundary fence and performed trail maintenance in the park—all the while dealing safely with daily temperatures of more than 100 degrees.

The Santa Cruz River has its headwaters in the San Rafael basin in southern Arizona. From there, it flows south into Mexico, then makes a northerly U-turn and returns to the U.S. via the Nogales International Wastewater Treatment Plant. The river has sustained human populations for over 3,500 years, and with its current, effluent-generated flow, it continues to replenish groundwater aquifers and support a riparian area of cottonwood-willow forests.

Lowland riparian forests are among the rarest ecosystems in the Western U.S., with an estimated 90% of presettlement forest having been degraded by water extraction or converted to agriculture. The one-mile stretch of this stream and associated forest within the park sup-

ports native fish populations and provides habitat for numerous mammals, reptiles, amphibians, and more than 200 bird species. Wildlife viewing opportunities attract naturalists from all over the world, including thousands of birders hoping to catch a glimpse of migrant species, such as the endangered southwestern willow flycatcher, colorful elegant trogon, or reclusive yellow-billed cuckoo.

The park's riparian area is a sensitive resource, and garbage removal is an ongoing park activity in support of ecological health. This marks the fourth year that Tumacácori NHP has partnered with SCC to complete conservation projects, and park managers look forward to continuing this valuable partnership.

—Jason Welborn  
*Biotechnician, Tumacácori NHP*

# NRCAs Underway

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Rather, they are intended to help park managers to:

- develop near-term strategies and priorities by identifying park areas and resources that warrant the most immediate attention so limited staff and funding can be better utilized;
- participate in watershed- or landscape-scale resource partnerships and education efforts;
- conduct formal planning to describe and quantify desired conditions for their most important resources and develop comprehensive strategies for how to best protect/restore those same resources; and
- report to “resource condition status” performance/accountability measures as instructed by the Department of Interior and the Office of Management and Budget.

## How is an NRCA created?

The primary phases in developing an NRCA are:

**Planning and information gathering** – SODN staff conduct a preliminary planning meeting with park staff, at which “management reporting areas” are delineated on a park map (see figure). For each area, a primary management or interpretive theme, important resources, and character-defining features are identified. This spatial context guides the information search and provides a reporting framework for the assessment. The search for various types of information (e.g., reports, plans, data sets, spatial data layers, species lists, photographs) from multiple sources (e.g., Western Archeological and Conservation Center archives and library, e-TIC online, park library and files) is conducted and relevant materials are scanned and their locations recorded in a database.

**Data synthesis** – The information is analyzed, interpreted, and synthesized by network staff and partners. Local subject matter experts may also be consulted.

**Product development** – The assessment is written, following a standard outline, and spatial data layers are developed.

## What’s in an NRCA?

To show by example, a recent NRCA for Rocky Mountain National Park contained sections addressing the following topics:

- Air and climate: Condition of Alpine Lakes and Atmospheric Deposition
- Water: Extent and Connectivity of Wetland and Riparian Areas
- Biotic Integrity (3 topics): Exotic Terrestrial Plant Species, Extent and Connectivity of Fish Distributions, Extent of Suitable Beaver Habitat

- Landscapes (2 topics): Extent and Pattern of Major Ecological Systems, Connectivity of Natural Landscapes

Each section listed above included a description of its topic and a justification for its choice, an explanation of the approach and methods the authors used to address the topic, a description of the reference condition, an accounting and discussion of findings, an explanation of uses and limitations for those findings, and an overall topic summary.

That report, and examples of other completed reports, can be found at [http://www.nature.nps.gov/water/NRCondition\\_Assessment\\_Program/NRCA\\_Reports.cfm](http://www.nature.nps.gov/water/NRCondition_Assessment_Program/NRCA_Reports.cfm).

## How has this program affected SODN?

Integrating the completion of 11 NRCAs into the network’s extant workload required some internal juggling. To help meet this challenge, SODN Program Manager Andy Hubbard re-assigned SODN Data Manager Debbie Angell to the position of NRCA Information Manager for Southern IMR Parks. Debbie is coordinating the search for and assembling the information resources for these reports, not only for the SODN parks but also for parks in other southern IMR networks. In addition, a SODN NRCA Team was created to oversee the project. This group, which includes Andy, Debbie, aquatic ecologist Evan Gwilliam, vegetation ecologist Sarah Studd, IMR regional hydrologist Colleen Filippone, and Sonoran Institute ecologist Cheryl McIntyre, meets periodically to assess progress, assign priorities, and guide the search efforts.

NRCAs for Chiricahua National Monument, Coronado National Memorial, and Fort Bowie National Historic Site are nearing completion. NRCAs are currently underway for Montezuma Castle and Tuzigoot national monuments, Tumacácori National Historical Park, Gila Cliff Dwellings National Monument, and Tonto National Monument. Servicewide, all NRCAs are scheduled for completion by 2014.

For more information, contact the NRCA Information Manager for Southern IMR Parks, Debbie Angell, at 520-403-2716 or [Deborah\\_Angell@nps.gov](mailto:Deborah_Angell@nps.gov).

—Debbie Angell

*NRCA Information Manager for Southern IMR Parks*

### For more information:

[http://www.nature.nps.gov/water/NRCondition\\_Assessment\\_Program/Index.cfm](http://www.nature.nps.gov/water/NRCondition_Assessment_Program/Index.cfm)



National Park Service  
U.S. Department of the Interior

Sonoran Desert Network  
7660 East Broadway Boulevard, Suite 303  
Tucson, Arizona 85710

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**Program Manager**  
Andy Hubbard

**Editing and Design**  
Alice Wondrak Biel

**Contributors**  
Leslie Aills  
Debbie Angell  
Colleen Filippone  
Evan Gwilliam  
Andy Hubbard  
Sarah Studd  
Jason Welborn  
Alice Wondrak Biel

All photos in this document are courtesy of the National Park Service.

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<http://science.nature.nps.gov/im/units/sodn>

## Where Are We?

Monitoring currently scheduled during the next quarter includes:

Month	Project and Park
February	<b>Streams:</b> Tumacácori NHP, Gila Cliff Dwellings NM, Montezuma Castle/Tuzigoot NMs <b>Vegetation Mapping:</b> Saguaro NP (TMD) <b>Uplands:</b> All parks, data management and reporting
March	<b>Springs:</b> Gila Cliff Dwellings NM, Tonto NM* <b>Streams:</b> Pecos NHP (SOPN)* <b>Vegetation Mapping:</b> Saguaro NP (TMD) <b>Uplands:</b> All parks, data management and reporting
April	<b>Springs:</b> Organ Pipe Cactus NM <b>Vegetation Mapping:</b> Saguaro NP (TMD), data management and map development; Gila Cliff Dwellings NM, preparation for field work <b>Uplands:</b> Organ Pipe NM (field); all parks, data management and reporting <b>Washes:</b> Organ Pipe Cactus NM

\*tentatively scheduled

CHDN = Chihuahuan Desert Network; SOPN = Southern Plains Network