

Chihuahuan Desert Network

Park Monitoring Brief

National Park Service
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Intermountain Region
Inventory & Monitoring Program



Natural Resource Monitoring at Big Bend National Park and Rio Grande Wild & Scenic River

2010

Chihuahuan Desert Network

The Chihuahuan Desert Network (CHDN) covers the geologically and biologically diverse Chihuahuan Desert and Tamaulipan Thornscrub ecoregions of west Texas and southeastern New Mexico. The network comprises seven national parks containing biomes ranging from low-elevation desert grasslands to mixed conifer forests, as well as critical riparian systems associated with perennial rivers, seeps, springs, and tinajas. The CHDN is designing and implementing a long-term monitoring program to measure key indicators of ecological integrity, or “vital signs.” This coordinated, multi-perspective ecosystem monitoring effort will help inform managers and the public as to the condition of key park resources and provide an early warning system for potential problems. This brief describes CHDN activities at Big Bend National Park (NP) and Rio Grande Wild and Scenic River (WSR), which is administered by Big Bend NP.



Big Bend National Park

NPS/MISSY POWELL

Air Quality



Big Bend NP

NPS/MISSY POWELL

Air quality can affect many park resources, including scenery and vistas, vegetation, water, and wildlife. Big Bend NP is a designated Class I air quality area, reflecting the wilderness character and high-quality atmospheric conditions at the park. Ozone, wet and dry atmospheric deposition, and visibility are monitored at Big Bend NP, with funding and coordination by the NPS Air Resources

Division and local operation by park staff. To ensure that park-specific results are communicated in a timely and effective manner, the CHDN will compile, summarize, and interpret air quality data in annual resource briefs and, as data become available, in comprehensive status-and trends reports. The first air quality resource brief for Big Bend NP will be completed in 2011.

Climate



View from Sotol Vista

NPS

Climate is a primary driver of ecosystem structure and function in the Chihuahuan Desert ecoregion. Spatial and temporal variability in precipitation and temperature extremes set the limits for community composition and productivity in these semi-arid environments. Additional parameters, including wind velocity, relative humidity, photosynthetically active radiation, and

total radiation, provide insights into environmental conditions. For Big Bend NP, the CHDN will compile and analyze climate information from long-term cooperative stations beginning in 2011. Data will be interpreted in annual climate monitoring reports and resource briefs, and referenced in reports for other vital signs.

Exotic Plants



Rio Grande, *Arundo donax*

NPS

Invasive exotic plants represent one of the most significant threats to natural resources in national parks because of their ability to reproduce prolifically, rapidly colonize new areas, displace native species, alter ecosystem processes, and detract from the value of park resources. The CHDN will pilot test an exotic plant early detection protocol in fall 2010 and implement monitoring in 2011 to determine the status

and trend of exotic plant species and determine changes in species composition in Big Bend NP and Rio Grande WSR. Status reports and resource briefs will be produced annually; a detailed synthesis and trend report will be produced in 2016, based on five years of monitoring information. Data will also be reported to exotic plant management teams on an annual basis.

Groundwater



La Loma well, NW of Rosillos Mtns

NPS

Water is the most limiting factor for ecosystem productivity in the Chihuahuan Desert, and groundwater is a critical component of the hydrologic cycle. Because humans, vegetation, and wildlife all require access to water for survival, understanding groundwater dynamics is essential to understanding ecosystem function and integrity. Monitoring groundwater availability also provides key insights into surface waters, as these

are tightly coupled in semi-arid systems. In conjunction with park staff, the CHDN will compile and analyze depth-to-groundwater information at Big Bend NP at monitoring wells operated by park staff beginning in 2011. Data will be interpreted in annual groundwater monitoring reports and referenced in other monitoring efforts, such as climate, vegetation, and dynamic soil function monitoring.

Landbirds



Hermit Thrush

NPS/Dan Leavitt

Birds are a conspicuous component of many ecosystems. They have high body temperatures, rapid metabolisms, and occupy high trophic levels. Because they can respond quickly to changes in resource conditions, birds are considered effective indicators of ecosystem condition. Therefore, changes in bird populations and community structure may indicate key

changes in the biotic and abiotic components of the environments upon which they depend. The CHDN will begin annual bird monitoring at Big Bend NP in 2010 to provide insights into human perturbations and natural events. Status reports and resource briefs will be produced annually; a detailed synthesis and trend report will be produced in 2015, based on five years of monitoring information.

Vegetation and Soils



Desert landscape

NPS/Missy Powell

Vegetation comprises or interacts with all primary components of terrestrial ecosystems. Vegetation dynamics can indicate the integrity of ecological processes, productivity trends, and ecosystem interactions that can otherwise be difficult to monitor. Soils and landform characteristics mediate available water in semi-arid systems, influencing vegetation composition, distribution, and production. By monitoring soils and vegetation (including established exotic plants) in an

integrated fashion, we can gain key insights into the condition and trends of Chihuahuan Desert ecosystems. The CHDN will pilot test a vegetation and soils sampling protocol in Big Bend NP in fall 2010 and begin monitoring terrestrial vegetation and dynamic soils vital signs in 2011. The first status report and resource brief will be completed in 2012. These detailed measurements will be repeated every five years to ascertain any trends in the condition of these important resources.

Seeps and Springs



Sampling, Lower Madison Spring

NPS

Seeps and springs represent the perennial surface water locations across the mountainous landscape of Big Bend NP. Seeps and springs vary greatly in size, permanence, and landscape position. These surface waters provide critical access to water for animals, plants, and humans. Working with park staff, the CHDN will initiate monitoring of these ecosystems in

2011, with focus on water quantity, basic water quality, sedimentation, vegetation (including exotic plants) and qualitative monitoring of aquatic biota. Results from this effort will be presented in annual status reports and resource briefs, with more comprehensive synthesis and trends reports being generated at five-year intervals.

Streams



Rio Grande

NPS

In addition to the largest protected area representative of the Chihuahuan Desert, Big Bend NP also protects and manages about 300 miles of the Rio Grande (including the wild and scenic river). Perennial streams and the ecosystems they support are biological “hotspots” within the expansive and semi-arid landscapes of the Chihuahuan Desert. The CHDN supports Big Bend NP in monitoring water quantity, water quality, aquatic biota, channel

morphology, and riparian vegetation in an integrated fashion to provide managers, scientists, and the public with key information on the condition of these critical park resources. Status reports, field summaries, and resource briefs will be produced annually, with a detailed synthesis and trend report to be produced in 2015, based on five years of monitoring information.

For more information

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