

Inventory of Carlsbad Caverns National Park

National Park Service managers are confronted with increasingly complex and challenging issues that require a broad-based understanding of the status and trends of each park's natural resources as a basis for making decisions, working with other agencies, and communicating with the public to protect park natural systems and native species. The Inventory and Monitoring (I&M) Program is part of the National Park Service's effort to emphasize reliance on science to improve management decisions and safeguard our natural heritage. An essential component of this strategy is a comprehensive inventory of the natural resources found in national parks. Inventories are extensive point-in-time surveys designed to contribute to our knowledge of the condition of park resources and establish baseline information for subsequent monitoring activities. The I&M Program provides guidance, funding, and technical assistance to complete a set of 12 baseline natural resource inventories for parks, including the presence of plants, animals, and other resources such as water, air quality, and climate.

The Chihuahuan Desert I&M Network (CHDN) comprises seven national parks in New Mexico and Texas. Six of the seven CHDN parks are located in the Northern Chihuahuan Subregion of the Chihuahuan Desert Ecoregion. Carlsbad Caverns National Park is located in the Chihuahuan Desert but contains several elements of Sierra Madrean, Rocky Mountain, and Great Plains affinity, and is characterized by its steep limestone canyons. The park supports a highly diverse ecosystem—including many plants and animals that are at the edges of their geographic ranges. This brief summarizes inventories coordinated by the network at Carlsbad Caverns, located in southeastern New Mexico. Reports from inventories supported by the CHDN are available

PARK BRIEF



Carlsbad Caverns National Park.

on the CHDN website, <http://science.nature.nps.gov/im/units/chdn/index.cfm> and on the Learning Center of the American Southwest website, www.southwestlearning.org. A database of inventories coordinated at the national level in cooperation with CHDN—climate, geology, air quality, and soil—are available on the I&M Program's Inventory home page: <http://science.nature.nps.gov/im/tracking/InventorySearch.aspx>.

Birds



Gray vireo in Carlsbad Caverns National Park/Steve West

The CHDN supported an inventory of high-elevation breeding birds in Carlsbad Caverns in 2003. Prior to this survey, little was known about the distribution, or relative abundance of the high-elevation breeding birds in the park. A total of 1,524 individuals from 50 species were observed during the survey and an additional 6 species were recorded between survey points or outside of the survey. A new species for the park, elf owl (*Micrathene whitneyi*), was documented during the survey. The CHDN also supported a separate inventory of birds in low elevation riparian habitats

(Rattlesnake Springs, Walnut Canyon, and seeps and springs) during the migration and breeding seasons between 2004 and 2006, which documented 151 species. This comprises about 45% of the species known to occur in the park, compared to the park's checklist. Four new species were added to the checklist that were not previously documented—all at Rattlesnake Springs, which was the most diverse survey site with the highest number of documented obligate and dependent riparian species.

Reptiles and Amphibians



Eastern collared lizard/
Chris Newsom

In 2003 and 2004, the CHDN supported an inventory of reptiles and amphibians in Carlsbad Caverns. Researchers documented 46 species: eight frogs and toad, 15 lizard, 20 snake, and three turtle species, including one state-listed endangered species, the gray-banded kingsnake (*Lampropeltis alterna*), and two state threatened species, the mottled rock rattlesnake (*Crotalus lepidus lepidus*) and Rio Grande cooter (*Pseudemys gorzugi*). One nonnative species was found during this inventory, the American bullfrog (*Rana catesbeiana*), which was only found at Rattlesnake Springs. The data

from this inventory could be used to detect changes within the reptile and amphibian communities that may occur as a result of climate change, urbanization near the park boundary, drought, invasion by nonnative species, wildland fire, or other factors. Reptile and amphibian populations exhibit natural fluctuations in range extensions and contractions. The researchers provided suggestions and evaluations of potential monitoring strategies, such as monitoring species composition, species richness, species distribution, and relative abundance, for determining unexpected population changes.

Vegetation



Carlsbad Caverns National Park/
NPS

The CHDN supported preparation of a herbarium and literature review of plants for Carlsbad Caverns in 2002. Carlsbad Caverns supported a mapping project of the park and researchers classified vegetation and created a high-resolution vegetation map that can be used by managers, particularly for fire management and analysis of habitat for rare species. Through the mapping effort, 85 plant associations were identified in the park, ranging from desert shrublands and semi-grasslands of the lowland basins, foothills, and montane grasslands, shrublands and woodlands at the highest elevations. Of these, 28 are unique in the world. The map was assessed for accuracy in 2008 with

support from the CHDN. Researchers created 328 validation plots and evaluated the map for errors in different categories: classification, alliances, plant associations, and phases. Overall accuracy was 91.1% for the classification and 80.5% for alliances, plant associations, and phases. These areas of the map meet accuracy requirements and are sufficient for most resource management and planning activities. For areas of the map with low sample numbers, the overall accuracy was 74.4% when shrub phases of grassland units were considered. Higher resolution maps of these areas may be needed for resource management and planning activities.

Water



Rattlesnake Springs/NPS

The CHDN supported a 2009 study of records of surface water and surface and groundwater hydrology, water quality conditions and trends, and the condition of macroinvertebrate communities in Carlsbad Caverns, with a focus on Rattlesnake Springs. This area was added to the park for a supply of potable water. A well at Rattlesnake Springs taps water from the same coarse alluvial aquifer that sustains the spring. Water from this aquifer is also pumped outside of the park for irrigation. Springflow and groundwater levels in the Rattlesnake Springs area vary seasonally and fluctuate with annual precipitation and levels of irrigation.

Results from the treated water supply indicate excellent water quality, though the researchers were unable to obtain long-term water quality data for Rattlesnake Spring. Water quality and ecological conditions in an unnamed, small stream supplied by the Rattlesnake Spring springflow are unknown. Growths of aquatic plants have been reported in Rattlesnake Spring, particularly during the spring; moderate growths of bottom-dwelling (benthic) algae and large, aquatic vascular plants (macrophytes) were observed in 2008. State-listed fish species occur in the Rattlesnake Springs system.

For more information

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