National Park Service
U.S. Department of the Interior

State of the Park Report

Organ Pipe Cactus National Monument

Arizona

April 2013

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Disclaimer. This State of the Park report summarizes the current condition of park resources, visitor experience, and park infrastructure as assessed by a combination of available factual information and the expert opinion and professional judgment of park staff and subject matter experts. The internet version of this report provides the associated workshop summary report and additional details and sources of information about the findings summarized in the report, including references, accounts on the origin and quality of the data, and the methods and analytic approaches used in data collection and assessments of condition. This report provides evaluations of status and trends based on interpretation by NPS scientists and managers of both quantitative and non-quantitative assessments and observations. Future condition ratings may differ from findings in this report as new data and knowledge become available. The park superintendent approved the publication of this report.

Executive Summary

The mission of the National Park Service is to preserve unimpaired the natural and cultural resources and values of national parks for the enjoyment, education, and inspiration of this and future generations. NPS Management Policies (2006) state that "The Service will also strive to ensure that park resources and values are passed on to future generations in a condition that is as good as, or better than, the conditions that exist today." As part of the stewardship of national parks for the American people, the NPS has begun to develop State of the Park reports to assess the overall status of each park's resources. The NPS will use this information to improve park priority setting and to synthesize and communicate complex park condition information to the public in a clear and simple way.

The purpose of this State of the Park report is to:

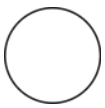
- Provide to visitors and the American public a snapshot of the status and trend in the condition of a park's priority resources and values;
- Summarize and communicate complex scientific, scholarly, and park operations factual information and expert opinion using non-technical language and a visual format;
- Highlight park stewardship activities and accomplishments to maintain or improve the State of the Park;
- Identify key issues and challenges facing the park to help inform park management planning.

The purposes of Organ Pipe Cactus National Monument are to:

- Perpetuate for future generations a representative sample of the natural and cultural resources of the Sonoran Desert and provide for public understanding, safe use, and enjoyment of the same.
- Serve as a natural laboratory for understanding and managing the Sonoran Desert ecosystem.
- Serve as a baseline indicator against which environmental changes can be identified.
- Preserve for future use and enjoyment the character and values of this designated wilderness.

Organ Pipe Cactus National Monument is significant because it is one of the most biologically diverse protected areas in the Sonoran Desert Region of North America, providing habitat for a wide variety of desert adapted plants and animals, including numerous threatened and endangered species. Visitors to Organ Pipe's Wilderness can experience primitive recreation, expansive vistas, natural night skies, remote solitude and spiritual replenishment in a Sonoran Desert setting. The monument has been recognized by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as a globally important biosphere reserve that is representative of the natural Sonoran Desert ecosystem. Accordingly, the monument has been studied since the early 1940s, serving an international role in research, conservation, and education. Organ Pipe's Sonoran Desert basin and range landscape includes dramatic mountains and valleys, eroding bajadas or slopes, alluvial fans, and magnificent specimens of columnar cacti. The monument is also significant because of the cultural resources that are found within its boundaries which reflect the long, widespread and varied presence of diverse human groups, including those of Native American, Mexican, and Anglo origin.

The summary table, below, and the supporting information that follows, provides an overall assessment of the condition of priority resources and values at Organ Pipe Cactus National Monument based on scientific and scholarly studies and expert opinion. The internet version of this report, available at http://www.nps.gov/stateoftheparks/orpi/, provides additional detail about the resources summarized in this report, including references, accounts on the origin and quality of the data, and the methods and analytical approaches used in the assessments. The Status and Trend symbols used in the summary table below and throughout this report are summarized in the following key. The background color represents the current condition status, the direction of the arrow summarizes the trend in condition, and the thickness of the outside line represents the degree of confidence in the assessment.

Condition Status		Trend in Condition		Confidence in Assessment	
	**Warrants Significant Concern**		**Condition is Improving**		**High**
	**Warrants Moderate Concern**		**Condition is Unchanging**		**Medium**
	**Resource is in Good Condition**		**Condition is Deteriorating**		**Low**

State of the Park Summary Table

Resource or Value	Condition Status/Trend	Rationale
Natural Resources		web ▸
Air Quality		Sulfate concentrations have decreased during the 30 years since copper mining and smelting were active near the park. However, no trends in nitrate, sulfate, or ammonium concentrations have been documented to date.
Water Quantity and Quality		Perennial springs provide the only reliable year-round water source in the park. Seasonally, tinajas, or naturally occurring water catchments, also provide water. Currently, both tinajas and perennial springs are frequently sought by human travelers and are consequently impacted by related trash and debris which in turn may compromise the availability of these important water features for wildlife. Groundwater is showing a slow, but steady decline. Increases in groundwater consumption by urbanization may be exacerbated by drought. There have been no large deviations from baseline water quality measures at Quitobaquito Pond.
Quitobaquito		In 2006, a severe water loss problem developed at Quitobaquito, a spring and pond system that provides critical habitat for pupfish and an endemic mud turtle. After years of effort by the NPS and other cooperators to address this problem, the pond has been re-established and the system stabilized. Some of the repairs however were temporary in nature and permanent stabilization of the system will require implementation of additional management actions in the near term. Pupfish and mud turtle populations have rebounded, following restoration of the pond. Cultural features of this important landscape are similarly threatened by the existing circumstances, although the NPS is doing what it can to maintain a number of heritage plants. Public access to this popular destination is currently limited.
Soils and Geology		Off-road vehicle activity is abundant, increasing, and causing long-term, widespread impacts to soils, vegetation, and associated ecosystem processes. Resulting impacts such as soil compaction, dust deposition, impacts to biological soil crusts, erosion, sedimentation, interruption of surface hydrology and reductions in plant growth, robustness and recruitment, among others are having localized and widespread ecosystem effects. The park and its partners are currently working to assess these impacts as well as develop and implement restoration projects where opportunities exist.
Threatened, Endangered, and Rare Species		While some species' numbers are increasing, concerns remain regarding vulnerability to stressors such as drought or border-related activities, which could act to reverse gains made to date. Sonoran pronghorn continue to recover from a crisis year in 2002; however, this is largely because animals from a semi-captive breeding population are being released to supplement the wild population. With its habitat temporarily stabilized, Quitobaquito pupfish numbers have returned to normal. Lesser long-nosed bat numbers continue a 15-year-long increase. Acuña cactus has experienced severe declines though the cause remains uncertain. Sonoyta mud turtle has been successfully bred in captivity following an emergency evacuation due to the aforementioned impacts to its habitat, and their numbers at Quitobaquito have rebounded. The number of Sonoran desert tortoise detected during surveys in 2005 was similar to data from 1995.

Resource or Value	Condition Status/Trend	Rationale
Invasive Species		Buffelgrass and fountain grass are well-established invasive plants that, if left unmanaged, would have long term and widespread impacts. In managed areas, buffelgrass and fountaingrass have been declining. However, in other vast area of the park, where management is more difficult due to border related access restrictions, buffelgrass has been increasing. Other invasive species of concern occur in the park and infestations are managed opportunistically.
Plants		Climate change predictions for the region implicate persistent drought, warming temperatures, and shortening winters. These drivers are likely to change the distribution of many species, including columnar cacti and high-elevation species. Loss of plant species in the drier, western part of the park could also occur. Some heritage plants have been lost and others are declining.
Terrestrial Vertebrate Animals		Most vertebrate animal species appear to have relatively stable populations and distributions, with fluctuations attributable mainly to weather variations. The potential effects of long-term climate change mentioned above are also of concern for various terrestrial vertebrate groups. For example, some large animals have declined from historical numbers (desert bighorn sheep, Coue's white-tailed deer, and Sonoran pronghorn).
Soundscapes		The monument recently began monitoring soundscapes at sites where human activity and noise may affect Sonoran pronghorn and other sensitive wildlife. Preliminary results indicate that the background ambient sound level was less than 15 dBA at night and less than 30 dBA during the day, but noise was audible between 17% and 25% of the day. Noise most often originated from vehicles, which were audible between 12% and 20% of the day. Noise from power generators, jets and low level rotary-winged aircraft was also present.
Ecosystem Structure and Function		In recent years, thousands of miles of off-road vehicular transport have occurred annually within the monument and consequently, unauthorized roads and trails are widespread today. Not surprisingly, the corresponding impacts to monument resources are similarly widespread. Soils, vegetation, and ecosystem processes like surface hydrology, are vulnerable to off-road vehicle use as are wildlife and wilderness character. During this same time, adjacent lands along the international boundary have continued to be developed resulting in further loss of ecosystem integrity.
Cultural Resources		web ▸
Prehistoric Archeological Sites		The current condition of prehistoric archeological sites varies. Impacts from border-related activities are known to be occurring; however, the extent and frequency of these impacts are currently poorly understood. The NPS is working closely with tribal representatives and other stakeholders to improve its understanding of these issues as well as its ability to manage these important sites.
Historic Sites (post Spanish contact)		The monument has recently conducted numerous condition assessments of historic sites. Many historic features are currently found in degraded condition. In response, the park has recently conducted numerous stabilization efforts.
Ethnographic Resources		Consultation occurs frequently with all culturally-affiliated tribes. The monument routinely engages tribal affiliates to address complex ethnographic issues.

Cultural Landscapes		Cultural Landscape Inventories (CLI) have been completed for Victoria Historic Mining District and Blankenship Ranch. A new Quitabaquito CLI and nomination to the National Register is in progress at this time. Other CLIs are pending.
Museum Collections		Work is continuing to transfer the park's collections to the Western Archeological Conservation Center where it will be maintained. Accession and catalog records need significant improvement. Work also continues to complete a comparative projectile point and ceramic collection for the monument.
Visitor Experience		web ▸
Visitor Numbers and Satisfaction		The number of visitors to the Kris Eggle Visitor Center in Fiscal Year (FY) 2011 was 21,582, which is lower than the 35,914 visitors in FY07 and 36,883 visitors in FY08. The five-year average for visitor satisfaction was 96.2% for 2007–2011.
Educational and Outreach Programs - Personal Services		Direct interaction between park staff and visitors through formal interpretive programs, community outreach events, and informal visitor contacts has remained stable.
Exhibits, Signs, Websites – Non-personal Services		New exhibits were installed in the Kris Eggle Visitor Center in August 2011. The park newspaper, park brochure, park website, and site bulletins have all been updated within the past two years.
Recreational Activities		Many areas of the monument remain closed. Despite these closures, staff continue to provide numerous and diverse visitor opportunities. Visitor satisfaction with their Twin Peaks campground experience in 2011 was 99% satisfied.
Visitor Amenities		Improvements have been made to visitor facilities in recent years, including new exhibits. Visitor comments remain consistently high, with 92%–99% satisfaction. Cell phone coverage is very limited in some areas of the park.
Visitor Safety and Protection		Overall safety for park visitors is good and on an even trend. Accidents and injuries involving park visitors are rare, the response to those incidents is quick and professional, and non-cross-border-violator crime is rare.
Park Community: Volunteers and Partnerships		Organ Pipe Cactus National Monument maintains a stable number of volunteer participants and partnerships.
Park Infrastructure		web ▸
Facility Condition Index (Overall FCI)		The 187 assets at OPCNM have an overall FCI of 0.061, which is Good based on industry and NPS standards. FCI is the cost of repairing an asset, such as a building, road, trail, or water system, divided by the cost of replacing it.
Energy Consumption		Energy usage (BTUs per gross square footage of buildings) in 2012 was 30.8% lower than the average for the previous four years (Source: NPS Annual Energy Report). The park has implemented a number of energy-saving features and practices in recent years, including replacing light fixtures and air conditioners with more energy-efficient ones.

Resource or Value	Condition Status/Trend	Rationale
Water Consumption		Average water consumption at ORPI during 2011–2012 increased by 13% over the three-year average for 2008–2010 (Source: NPS Annual Energy Report). This increase is partially attributable to construction and road maintenance projects that were carried out in the park during 2011 and 2012 in support of the Department of Homeland Security.
Wilderness Character		web ▸
Natural		Natural resources in wilderness are in a wide array of conditions, due to both natural and human influences.
Undeveloped		Wilderness is substantially degraded by human impacts, mostly due to border-related activities. Vehicle use is common; infrastructure exists within and adjacent to wilderness and is visible from deep within wilderness; low-level aircraft overflights are common; illegal camps and associated impacts are common.
Untrammeled		Commonly occurring activities manipulate the wilderness' biophysical environment. These include trespass by invasive livestock and feral animals, backcountry vehicle travel, and sometimes restoration actions, e.g., removal of abandoned vehicles.
Solitude or Primitive and Unconfined Recreation Opportunity		Sense of solitude is illusory or difficult to achieve. The presence of cross-border violators is common; surveillance equipment and associated interdiction efforts occur throughout wilderness. Evidence of human presence pervades wilderness (trash, footprints, vehicle tracks, aircraft, etc.) Closure of portions of the park to the public restricts wilderness experience.
Other Features and Values		Limited opportunities exist to experience various cultural resources that evidence the prehistoric and historic use of wilderness by man.

Summary of Stewardship Activities and Key Accomplishments to Maintain or Improve Resource Condition:

The list below provides examples of stewardship activities and accomplishments by park staff and partners to maintain or improve the condition of key park resources and values for this and future generations:

Visitor and Resource Protection

- Daily and sustained law enforcement in a complex border environment
- One-third of the park is now accessible to visitors, up from 5% previously
- Provided park-wide training opportunities: implemented operational leadership procedures
- Provided thousands of hours of protection details in support of diverse monument programs

Visitor Experience

- Developed new exhibits for the visitor center
- Expanded outreach programs in Ajo and Why
- Conducted limited public van tours to Quitobaquito, a unique perennial desert water resource
- Revised monument newspaper, site bulletins, website, Junior Ranger, and Desert Ranger booklets
- Management of a diverse and successful Volunteers in Parks program

- Resource briefs and factsheets posted on the Learning Center of the American Southwest website

Resource Management

- The spring and pond system at Quitobaquito was stabilized in 2011 for the first time since 2005, providing critical habitat for the endangered Quitobaquito pupfish and other species of conservation concern
- Endangered Sonoran pronghorn recovery project: captive breeding and release to the wild, and supportive recovery infrastructure
- Sustained abundant population of the endangered lesser long-nosed bat
- Cross border (Mexico/US) wildlife movement monitoring project
- Diverse partnerships with tribes, federal and state agencies, universities, Mexican counterparts, and NGOs
- Historic structure preservation field schools have been implemented each year since 2009 resulting in significant improvement in the condition of treated structures
- Mitigated damage to archeological site via removal of historical dam structure
- Surveyed approximately 1,000 acres for cultural resources between 2010 and 2012; documented 20 new archeological sites
- Moved many of the museum collections at the park to the Western Archeological and Conservation Center repository in 2012 resulting in significant preservation improvements
- Tri-national symposium addressing Sonoran Desert natural and cultural resource conservation issues
- Ecological monitoring program implementation—climate, rodent, reptile, vegetation, border impact monitoring, etc.
- Completed a comprehensive report on the Organ Pipe Cactus Ecological Monitoring Program—2006
- Completed the Organ Pipe Cactus Vital Signs Report—2010
- Abandoned mineral lands restoration and bat gate closures
- Invasive plant and animal monitoring and treatment programs
- Completed the legal description for the Organ Pipe Cactus wilderness—2010
- Development of multiple wilderness workshops designed to educate individuals working within wilderness areas
- Received regional and national wilderness stewardship awards
- Added two quads to surficial geology maps
- New NPS border policy and security protocol development
- Increased monument support of external research scientists—currently approximately 30 permittees

Management Projects and Actions Addressing Border-related Activities

- Supported diverse border infrastructure proposals: vehicle barrier, pedestrian fence, fiberoptic project, high tech surveillance tower system, forward operating base, tactical infrastructure maintenance, and repair program, etc.
- Digitized thousands of miles of unauthorized vehicle routes using remote imagery
- USGS/NPS multi-year border impacts research project
- Consolidated multi-agency communications infrastructure on the top of Mt. Ajo
- Removed numerous abandoned vehicles from within wilderness
- Restored areas impacted by construction of vehicle barrier, pedestrian fence, and tower network
- Ongoing multi-year ecological restoration projects designed to mitigate border related impacts
- Built a new plant nursery to support restoration efforts
- Built two roads in support of a border security tower network project
- Frequent mending of fence-breaks associated with border activities and addressing related trespass livestock issues
- Developed a soundscape monitoring program; soundscape mitigation at tower sites
- Established horse-trailer pullout on highway in support of U.S. Border Patrol operations
- Implemented comprehensive interagency road signage and mapping program

Facilities Management

- Diverse remodeling projects which provided needed improvements to park dorms and housing units
- Replaced failing sewer system
- Multipurpose building/community center erected in park housing area
- Upgraded campground buildings with showers
- Fiber optic project implemented—upgrade of communications infrastructure
- Chip-sealed all paved roads in park
- Replaced water line for the campground
- Ongoing expansion of needed office space to meet new and growing needs

Key Issues for Consideration in Management Planning

The prolonged and ongoing US/Mexico border situation influences every aspect of management at Organ Pipe Cactus National Monument. While impacts on monument resources are common and sometimes severe, many areas are still relatively undisturbed and representative of the pristine Sonoran Desert wilderness that the monument is intended to conserve. Some examples of issues facing the monument include the creation of thousands of miles of unauthorized roads and trails, associated damage to soils and vegetation, interruption of natural ecological processes, expansion of exotic invasive species, disturbance to wildlife movements, recurring vandalism and theft at cultural-resource sites, and an abundance of trash. In response, monument managers are working to understand the extent and nature of these impacts, and are collecting baseline data on unaffected areas to facilitate ongoing and long-range restoration plans. The following is a list of key monument issues that require continued consideration:

- Ensuring visitor, employee, and resident safety
- Safety zone management; within the monument certain areas are managed differently as determined during periodic safety assessments
- Continued implementation of a full range of Visitor and Resource Protection action
- Addressing diverse and ongoing impacts from border-related issues
- Continuous engagement with Department of Homeland Security (DHS) on diverse border security initiatives
- Seeking reevaluation of the 2006 MOU between Departments of Homeland Security, Agriculture and Interior
- Finding ways to compensate for diversion of staff time and funding from other duties due to the influence of diverse border issues
- Preparing for possible plans to expand State Highway 85 to four lanes and 24-hour point-of-entry
- Monitoring the influence of climate change
- Continued management of Quitobaquito, and important perennial desert water sources
- Continued involvement with multiple partners regarding recovery of the critically-endangered Sonoran pronghorn
- Continued close collaboration with tribal and international counterparts regarding diverse Sonoran desert conservation issues
- Improving wilderness character by preventing and restoring border related impacts within designated wilderness
- Invasive species management
- Continued implementation of a robust long-term ecological monitoring program
- Land acquisition relating to a private land inholding near Lukeville, AZ, two state inholdings, and a park expansion to the north which would permit the development of needed NPS and homeland security infrastructure
- Addressing housing, administrative space, commuting, and quality of life issues, etc. in support of staff retention
- Addressing the deterioration of historic cultural resources, which is occurring faster than they can be maintained
- Implementing rehabilitation/stabilization of archeological sites impacted by border activities
- Improving our understanding of the effects and rates of natural processes, vandalism, looting, etc. on cultural sites

Chapter 1 – Introduction

The purpose of this State of the Park report for Organ Pipe Cactus National Monument is to assess the overall condition of the park's priority resources and values, communicate complex park condition information to visitors and the American public in a clear and simple way, and to inform visitors and other stakeholders about stewardship actions being taken by park staff to maintain or improve the condition of priority park resources for future generations. The State of the Park report uses a standardized approach to focus attention on the priority resources and values of the park based on the park's purpose and significance, as described in the park's Foundation Document or General Management Plan. The report:

- Provides to visitors and the American public a snapshot of the status and trend in the condition of a park's priority resources and values.
- Summarizes and communicates complex scientific, scholarly, and park operations factual information and expert opinion using non-technical language and a visual format.
- Highlights park stewardship activities and accomplishments to maintain or improve the state of the park.
- Identifies key issues and challenges facing the park to inform park management planning.

The process of identifying priority park resources by park staff and partners, tracking their condition, organizing and synthesizing data and information, and communicating the results will be closely coordinated with the park planning process, including natural and cultural resource condition assessments and Resource Stewardship Strategy development. The term "priority resources" is used to identify the fundamental and other important resources and values for the park, based on a park's purpose and significance within the National Park System, as documented in the park's foundation document and other planning documents. This report summarizes and communicates the overall condition of priority park resources and values based on the available scientific and scholarly information and expert opinion, irrespective of the ability of the park superintendent or the National Park Service to influence it.

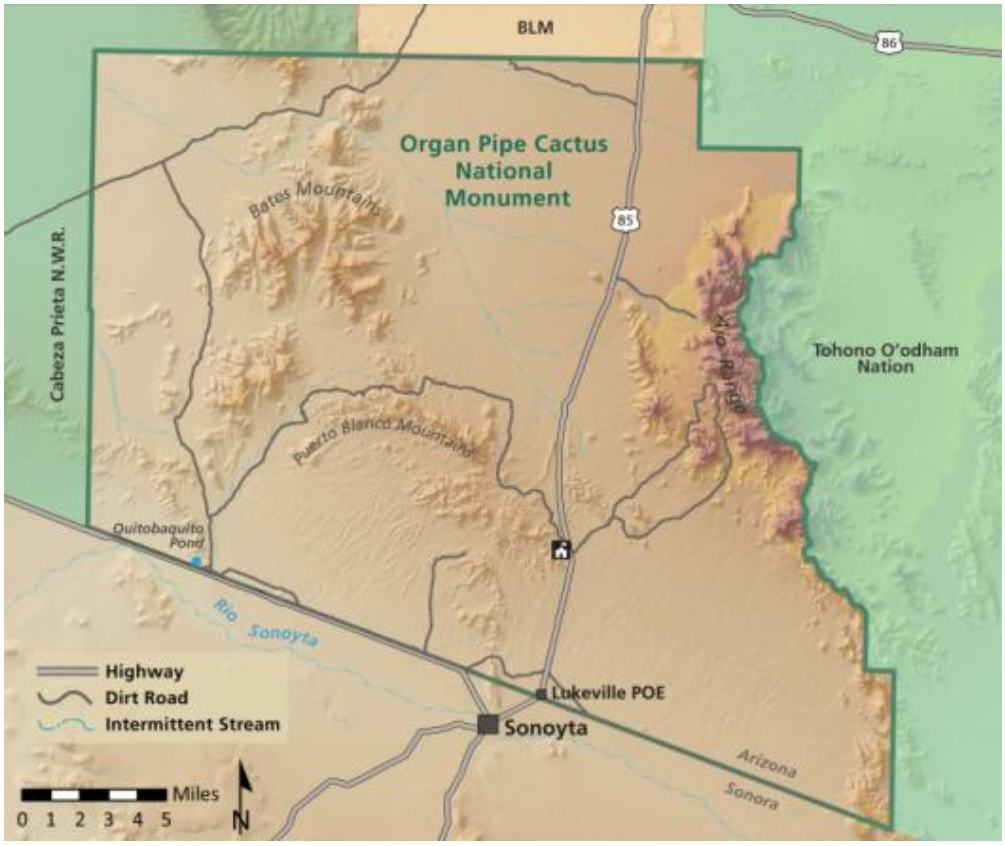
Organ Pipe Cactus National Monument is one of the most biologically diverse protected areas in the Sonoran Desert region of North America, conserving uniquely adapted flora and fauna, including numerous threatened and endangered species. Although readers of this report will see that the monument faces some considerable challenges, visitors to Organ Pipe Cactus National Monument can nonetheless, still experience a protected natural area with wilderness character that provides opportunities for solitude and primitive recreation, expansive vistas, enjoyment of the natural night sky, and spiritual replenishment in a Sonoran Desert setting.

The purposes of Organ Pipe Cactus National Monument are to:

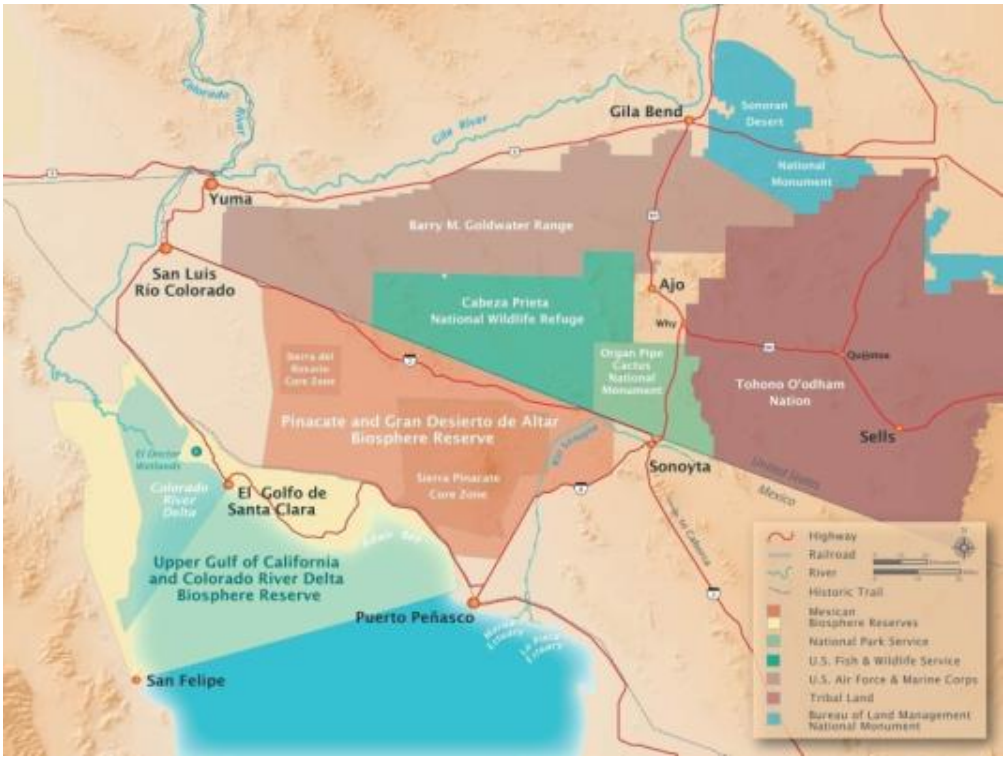
- Perpetuate for future generations a representative sample of the natural and cultural resources of the Sonoran Desert and provide for public understanding, safe use, and enjoyment of the same.
- Serve as a natural laboratory for understanding and managing the Sonoran Desert ecosystem.
- Serve as a baseline indicator against which environmental changes can be identified.
- Preserve for future use and enjoyment the character and values of this designated wilderness.

Organ Pipe Cactus National Monument has been studied since the early 1940s, serving an international role in research, conservation, and education. Accordingly, in 1976, the United Nations Educational, Scientific and Cultural Organization (UNESCO) recognized the monument as a globally important biosphere reserve that is representative of the natural Sonoran Desert ecosystem. Then in 1978, the U.S. Congress designated the Organ Pipe Cactus Wilderness, which comprises approximately 94% of the monument. The monument's Sonoran Desert basin and range landscape includes dramatic mountains and valleys, eroding bajadas or slopes, alluvial fans, and magnificent specimens of columnar cacti. It is also significant because of the cultural resources that are found within its boundaries which reflect the long, widespread and varied presence of diverse human groups, including those of Native American, Mexican, and Anglo origin.

Located in southwestern Arizona along the US/Mexican Border, Organ Pipe Cactus National Monument has experienced unprecedented levels of border related activities in recent years. Understanding and responding to the effects of such sustained levels of activity on trust resources is currently the focus of much of the monument's management efforts. In addition, the monument continues to implement a variety of long-term programs including among others: an ecological monitoring program; recovery of numerous threatened and endangered species; treatment of invasive species; and diverse cultural resource management actions. A summary of many of these programs is presented here.



Map of Organ Pipe Cactus National Monument.



Location of Organ Pipe Cactus National Monument in southwestern Arizona.

Chapter 2 – State of the Park

The State of the Park is summarized below for four categories—Natural Resources, Cultural Resources, Visitor Experience, and Park Infrastructure—based on a synthesis of the park's monitoring, evaluation, management, and information programs, and expert opinion. Brief resource summaries are provided below for a selection of the priority resources and values of the park. Clicking on the web ▸ symbol found in the tables and resource briefs below will take you to the internet site that contains content associated with specific topics in the report.

The scientific and scholarly reports, publications, datasets, methodologies, and other information that were used as the basis for the assessments of resource condition are referenced and linked throughout the report and through the internet version of this report that is linked to the NPS IRMA data system (Integrated Resource Management Applications). The internet version of each report, and the associated workshop summary report available from the internet site, provide additional detail and sources of information about the findings summarized in the report, including references, accounts on the origin and quality of the data, and the methods and analytical approaches used in data collection and the assessments of condition. Resource condition assessments reported in this State of the Park report involve expert opinion and the professional judgment of park staff and subject matter experts involved in developing the report. This expert opinion and professional judgment derive from the in-depth knowledge and expertise of park and regional staff gained from their being involved in the day-to-day practice of all aspects of park stewardship and from the professional experience of the participating subject matter experts. This expert opinion and professional judgment utilized available factual information for the analyses and conclusions presented in this report. This State of the Park report was developed in a park-convened workshop.

2.1. Natural Resources

Air Quality

web ▸

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Deposition	Sulfate		Since 1980, when copper mining and smelting were still active in Ajo, sulfate concentrations in wet deposition have decreased. More recent data (1999–2009) indicate no near-term change. According to the NPS Air Resources Division, sulfur conditions are good at OPCNM (National Park Service 2010; NPS ARD 2013).
	Nitrate and Ammonium		No trends have been seen in nitrate concentrations in precipitation from 1999–2009. However, the NPS Air Resources Division rates nitrogen conditions as being of significant concern due to off-park activities (National Park Service 2010; NPS ARD 2013).
Visibility	Haze		In 2008, ammonium sulfate (40.6%) and coarse mass (26%) were the major sources of haze-causing fine particulates at OPCNM. Ammonium sulfate comes mainly from coal-fired power plants and smelters; coarse mass consists of wind-blown dust. Other particles consisted of organic carbon (15%), fine soil (10%), sea salt (4.4%) and elemental carbon (4%). Organic carbon comes primarily from combustion of fossil fuels and vegetation. Since aerosol monitoring began at OPCNM in 2003, the highest concentrations of nitrate particles in the air occurred in winter 2008–2009. Peak concentrations of fine soil occurred in fall 2006 and spring 2007, coinciding with high PM2.5 (particulate matter <2.5 micrometers) levels (National Park Service 2010; NPS ARD 2013).

Resource Brief – Visibility

Both local and distant air pollution sources affect air quality in OPCNM. The monument's air quality related values (AQRVs; resources that are potentially sensitive to air pollution) include vegetation, surface waters, soils, fish and wildlife, and visibility. At present, visibility has been identified as the most sensitive AQRV in the park. Although visibility is still superior to that in many parts of the country, it is often impaired by light-scattering pollutants (haze).

To monitor atmospheric deposition at OPCNM, SODN acquires, analyzes, and reports on air quality data from the web-based program archives of the Interagency Monitoring of Protected Visual Environments (IMPROVE) program. The objective of visibility monitoring at OPCNM is to determine the seasonal and annual status and trends in concentrations of visibility-reducing pollutants.

Visibility includes not only how far we can see, but how well we can see, and is often expressed with an index of visual range and light extinction. Visibility impairment results largely from small particles in the atmosphere; small pollutant particles in the air scatter and absorb light, causing haze and reducing visibility. As light extinction increases, visibility decreases. For visibility trends, light extinction on the 20% clearest and haziest days is analyzed. From 1998 to 2008, no trend was detected for the 20% clearest days at OPCNM. Haziest days showed a non-statistically significant improving trend.

In 2008, ammonium sulfate (40.6%) and coarse mass (26%) were the major sources of haze-causing fine particulates at OPCNM. Ammonium sulfate comes mainly from coal-fired power plants and smelters; coarse mass consists of wind-blown dust. Other particles consisted of organic carbon (15%), fine soil (10%), sea salt (4.4%) and elemental carbon (4%). Organic carbon comes primarily from combustion of fossil fuels and vegetation. Since aerosol monitoring began at OPCNM in 2003, the highest concentrations of nitrate particles in the air occurred in winter 2008–2009. Peak concentrations of fine soil occurred in fall 2006 and spring 2007, coinciding with high PM2.5 (particulate matter <2.5 micrometers) levels.

Left: Representative visibility conditions from automatic visibility camera operated at OPCNM, 1997–2004

Water Quantity and Quality

web

Tinajas ("large earthen jars" in Spanish) occur naturally and are generally ephemeral being primarily fed by surface runoff following rainfall events. Tinajas represent most of the key surface water features of Organ Pipe Cactus National Monument. In addition, three spring complexes—Quitobaquito, Bull Pasture, and Dripping Springs—are perennial, groundwater-driven systems. Collectively, these scattered water bodies represent important and isolated aquatic habitats within the park, providing important ecosystem services for the larger terrestrial landscape. Water quality, quantity, and ecological characteristics of these sites have been sampled periodically, although their remote, rugged locations combined with recent border-related activity have restricted monitoring efforts. In 2010 and 2011, the Sonoran Desert Network collected baseline data as part of the enhanced Climate Change Monitoring Program for parks of the American Southwest. By contrast, groundwater data has been collected by park staff and cooperators since 1977, providing an excellent record on trends in this important resource.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Surface Water Quality	*E. coli*		A recent inventory of known springs and tinajas provides baseline water quality for tinajas and springs at OPCNM. *E. coli* concentrations at 33 springs and tinajas were 1.55±0.56 MPN (most probable number)/100ml of water. The highest observed value was 13.5MPN/100ml—well-below the state standard of 235MPN/100ml for partial body contact.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
	- Specific conductance - Dissolved oxygen - pH - Temperature		The 2010–2011 inventory documented core water quality parameters for 41 springs and tinajas. Dissolved oxygen observations ranged from hypoxic, or levels of dissolved oxygen less than what typical organisms need to thrive (e.g., 0.53 mg/L at Dripping Spring), to hyper-saturated in more productive systems (e.g., several of tinajas in the Ajo Mountains). pH was similarly variable and generally basic, with a mean value of 9.06, probably due to geologic factors. Specific conductance and water temperature were all within normal ranges for desert aquatic systems.
Surface Water Quantity	Discharge/water level		Water quantity is by far the most important ecohydrologic feature of tinajas and springs. The 2010–2011 inventory documented local evidence (water stains on rocks, vegetation) suggesting that water quantity was within recent natural variability. Historic data is generally lacking, although relatively low water levels were documented in 2001–2003, possibly due to drought.
Human Use	4-level rapid assessment tool		The 2010–2011 tinaja inventory collected impact data at 47 sites: 43% (20 sites) had some level of migrant or smuggler impact. Of these sites 55% was slight impact, 35% moderate impact and 10% heavy impact. The Spring Monitoring protocol currently under development will incorporate metrics to quantitatively assess such impacts. Human use of tinajas and springs likely affects utilization of these resources by wildlife.
Groundwater	Depth to groundwater near U.S. / Mexico border		Depth to groundwater for wells near the U.S./Mexico border has increased steadily from 1987–present, with increases generally exceeding 20 feet. Withdrawals for agricultural and municipal development in the Sonoyta (Mexico) area are a likely cause of water table decline. The four wells nearest the Lukeville, AZ port of entry have shown the greatest decline when compared to their long-term averages declining at a rate of approximately one foot per year.
	Depth to groundwater away from U.S. / Mexico border		Depth to groundwater has generally been shallower for wells remote from the Lukeville/Sonoyta areas and any recorded declines have not been as consistent or dramatic. These wells have, however, exhibited temporal and spatial variation from 1987–present which could be due to natural causes.

Quitobaquito

***see note below**

web ▸

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Water Quantity and Quality	- Spring discharge - Pond depth - Basic water quality parameters		Spring discharge is currently steady but has declined over the past 40 years. Pond depth had been restored after a 4-year crisis period, but remains a significant concern because of the temporary nature of some of the repairs. Large-scale water losses resumed in 2012 and can be expected again in summer 2013. A more long-term repair is required and should be completed soon. Water quality is stable.

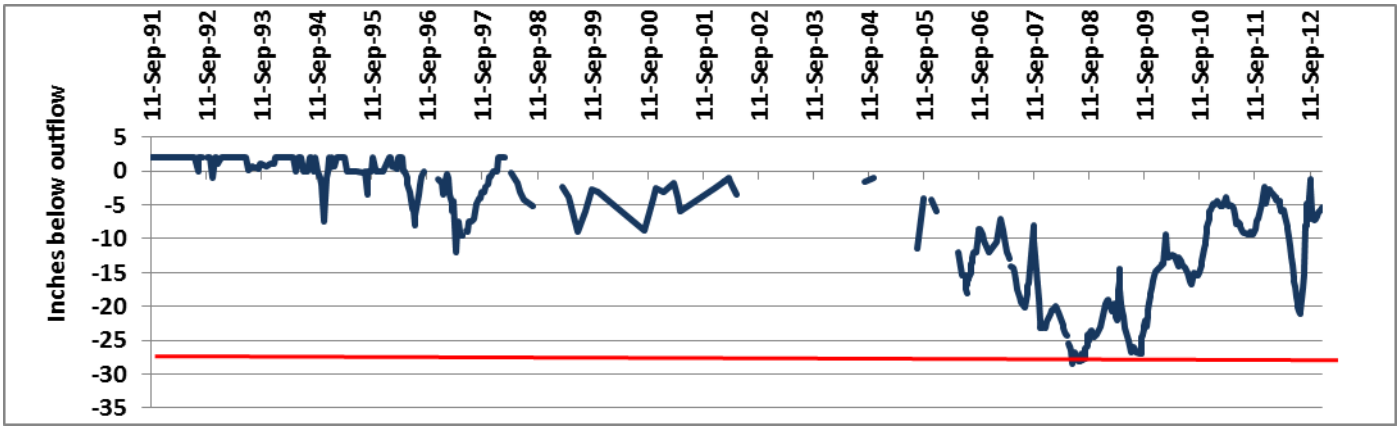
Vegetation	Overall health of plant community		Today, Quitobaquito is at risk of a catastrophic fire due to heavy fuel loads. Fuels have not been managed in the area for about 40 years. As a result, minor seeps are buried by accumulated dead material and many woody perennials such as mesquite are dead or dying. Bulrush, a native plant that grows around the pond perimeter, colonized new areas during the low-water period of 2005–2010. Continuous bulrush management is required to keep open and shallow water in the pond. Bermuda grass occurs throughout the wetland and competes with natives.
Quitobaquito Pupfish	Abundance Habitat stability		Number of pupfish has returned to previous levels (>9,000) after a period of extended low water. Approximately 2,500 Quitobaquito pupfish are held in off-site refugia, at monument headquarters, the Arizona-Sonora Desert Museum, and Cabeza Prieta National Wildlife Refuge.
Sonoyta Mud Turtle	Abundance		The number of Sonoyta mud turtles at Quitobaquito (excluding young of the year) has varied from 39 to 156 (average 97.2 based on 15 years of census data). Census efforts in 2007 and 2011 yielded estimates of 119 and 156 turtles, respectively.
Cultural Resources	Condition of Cultural Landscape, Prehistoric, and Historic features		A cultural landscape inventory has recently been completed for Quitobaquito. Like the natural landscape of this system the cultural landscape remains vulnerable to change as monitoring, protection, and management are complicated by border related activities.

* Despite yellow ratings for four of the five indicators of condition, we nonetheless have rated Quitobaquito's overall condition as red because the system's underlying instability remains. Known sources of water loss are currently only partially sealed with a temporary patch and this patch began to fail in 2012. Total loss of the pond is an imminent threat in the absence of a long-term repair of this known problem. Such an occurrence would turn several more of indicators red with deteriorating trends.

Resource Brief: Quitobaquito Pond

Quitobaquito Pond is the centerpiece of the natural and cultural landscape of Quitobaquito. It is designated "critical habitat" for the Quitobaquito pupfish, and also provides habitat and water for the Sonoyta mud turtle and a wide array of other plant and animal species.

From the mid-1990s to 2006, moderate fluctuations in the pond level were noted and attributed to drought. In 2006–2007, drastic fluctuations raised concern for the pond's stability and existence, and indicated drought was not the only force at work. By late 2007, it became clear that large fluctuations were the result of large-scale leakage from the pond—although no physical evidence of such leakage was seen, other than large volumes of water disappearing. A series of actions was undertaken to analyze, localize, and correct the water deficit issue. On-site corrective actions included: renovating the northeast spring (April 2007), installing a diaphragm wall inside the retaining berm (May 2008), renovating the southeast corner (August 2009), placing a temporary seal around the leaning cottonwood (October 2010), and manually removing rapid bulrush encroachment (2006–2012). Quitobaquito pupfish and Sonoyta mud turtles were evacuated as the pond diminished in size, and held off-site in captivity up to two years. The pond was essentially lost in midsummer 2008 and 2009. However, the water level began increasing immediately following the August 2009 renovation of the southeast corner. Conditions improved through 2010 and 2011, with minor, expected midsummer reductions in pond level. Through 2011, the pond maintained its highest and most stable water level since 2005 or earlier, despite severe drought conditions. By late 2011, almost all evacuated pupfish and mud turtles had been returned, with some of each held back in holding facilities to provide off-site "assurance" populations into the future. In summer 2012, large-scale water loss again took place, again threatening imminent loss of the pond. This situation was resolved largely by early and abundant summer rains, and making temporary repairs on a previous temporary patch over a leakage area. This underscored the urgent need for long-term repairs to the system, in the immediate future, to avoid significant impacts on all resources.



Trend in surface elevation of Quitobaquito Pond, 1991–2012. Horizontal red line at approximately minus 27.5 inches indicates the near-total loss of the pond.

Quitobaquito Pond during, and following, acute water loss problems. Above: July 2008, pond level is minus 28 inches. Below: December 2010, pond level minus 5 inches.

Resource Brief: Sonoyta Mud Turtle

The range of the Sonoyta mud turtle (*Kinosternon sonoriense longifemorale*) is restricted to the Quitobaquito springs of OPCNM and a sewage lagoon and few remaining pools of perennial water in the Rio Sonoyta drainage of northwestern Sonora, Mexico. It was recently discovered at Quitovac, Sonora, about 24 miles south of Sonoyta. Populations were once connected by more frequent and extensive flows in the Rio Sonoyta. The U.S. Fish and Wildlife Service (USFWS) has identified the Sonoyta mud turtle as a candidate for listing under the Endangered Species Act. Only a few hundred individuals remain of this subspecies. Primary threats include loss and fragmentation of aquatic habitat from groundwater pumping and drought. Other concerns include potential wildfire, habitat contamination, and introduction of exotic species.

Researchers have studied the Quitobaquito population of the Sonoyta mud turtle since the 1950s. The NPS began regular annual monitoring in 2001, with assistance from the Arizona Game and Fish Department (AGFD) and USFWS. The Sonoyta mud turtle at Quitobaquito matures in seven years, and numbers of individuals (excluding young of the year) vary from 39 to 156. The last census prior to removal at Quitobaquito, completed in 2007, yielded an estimate of 119 turtles. A rapid decline in the water level at Quitobaquito Pond began in late summer 2007. Between fall 2007 and summer 2009, 81 mud turtles were evacuated from the pond to provide an assurance population in case of further water loss and to permit managers to repair a leak. Turtles were moved to the Arizona-Sonora Desert Museum and Phoenix Zoo. The AGFD assisted with arrangements, turtle capture, and transportation. Interestingly, efforts to capture turtles by hand revealed many turtles that had not been recaptured in years and were apparently trap-shy. This is good news, because it suggests that the population size may have been underestimated.

The multi-party Quitobaquito/Rio Sonoyta Working Group has drafted a Candidate Conservation Agreement to guide conservation of the aquatic ecosystem and sensitive species. Goals of the strategy include the protection of remaining wild populations and establishment of captive assurance populations of the Sonoyta mud turtle. To provide guidance on numbers of individuals needed to ensure survival, a population viability analysis was performed. Results indicated that a minimum assurance population of 8 small juveniles, 8 large juveniles, and 8 adult females (and a smaller number of males) is needed to maintain an extinction probability of zero for the captive population.

A turtle census, completed in 2011, yielded an estimate of 156. This is the highest estimate ever obtained at Quitobaquito. Given the apparent stability of conditions at Quitobaquito, 24 captive turtles were released into the pond in 2011 and another 12 will be released in 2012.

Soils and Geology

web

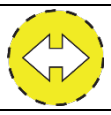
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Deposition and Erosion of Sediments	- Airborne dust - Visual observations		Traffic counts (vehicles per day) have more than doubled on some un-paved park roads. High traffic volume has significantly increased airborne dust (see Air Quality section). Such increases in airborne dust are known to cause declines in biological soil crust and plant productivity, resulting from being coated in dust. (See Ecosystem Structure and Function section.)
	Water erosion & deposition rates		Throughout the monument, vehicle routes and trails created during the past decade have captured, blocked, or channelized sheet flow, triggering accelerated erosion and causing localized loss of soils. Backcountry park roads have degraded significantly due to sustained increases in high traffic volumes; many roads are now below grade and capturing runoff. Some road segments are now deep drainages with gullies forming on either side. During the 20th century, livestock grazing triggered accelerated erosion that resulted in the loss of millions of tons of soil from the monument. Accelerated soil erosion continues at some of these sites but has slowed in others. The Armenta Ranch area gully system has been recently studied by the Arizona Geological Survey; a report is in progress that will discuss erosion triggers and rates of soil loss.
	Soil aggregate stability class (1–6)		Surface soil aggregate stability provides an indicator of site disturbance and site resistance to soil erosion. Preliminary monitoring data indicate soils aggregate stability under vegetation (360 sample points) and soils without vegetation cover (543) were 4.1±0.1 and 3.4±0.8, respectively, with high between-site variance. A score of 6 is the most stable, whereas 1 represents the most unstable.
Valley Bottom Soils	- Compaction - Aggregate stability - Off-road vehicle use and trail densities		More off-road vehicle use has occurred on these soil types than any other soil group in the park. These soils tend to be fine-grained and young (less than 10,000 years old), and degraded sites can often be recovered if accelerated erosion has not occurred. Preliminary data from a two-year study indicate that off-road vehicles and foot travel cause soil compaction, which can slow rainfall absorption and capture, block, or channelize sheet flow or change drainage patterns.
Bajada Soils	- Compaction - Aggregate stability - Off-road vehicle use and trail densities		Due to the more rugged terrain, bajadas have experienced less off-road vehicle use than flatter valley bottom areas. The terrain does not appear to discourage high-volume foot traffic. Soils of bajadas contain a lot of rocks so they may be more resistant to physical damage. Data from a three-year study to examine these impacts is currently being analyzed.

Desert Pavements	- Compaction - Aggregate stability - Wind erosion		Desert pavements are hundreds of thousands of years old and older. They are characterized by a surface layer of tightly packed dark stones and a subsoil laden with salts and clay. The surface pavement protects the soil from wind erosion. Once disturbed, the pavement can take decades to centuries to re-assemble, while the distinctive dark coloration may require several thousand years. Off-road vehicle activity sometimes exposes or disturbs the fine particles in the subsoil, which become prone to wind and water erosion that is very difficult to halt. Recovery from these types of disturbance is difficult and exposure to such disturbances should be avoided. Data from a two-year study to examine these impacts is currently being analyzed.

An unauthorized vehicle route on valley bottom soils in the San Cristobal Valley, OPCNM, 2011.

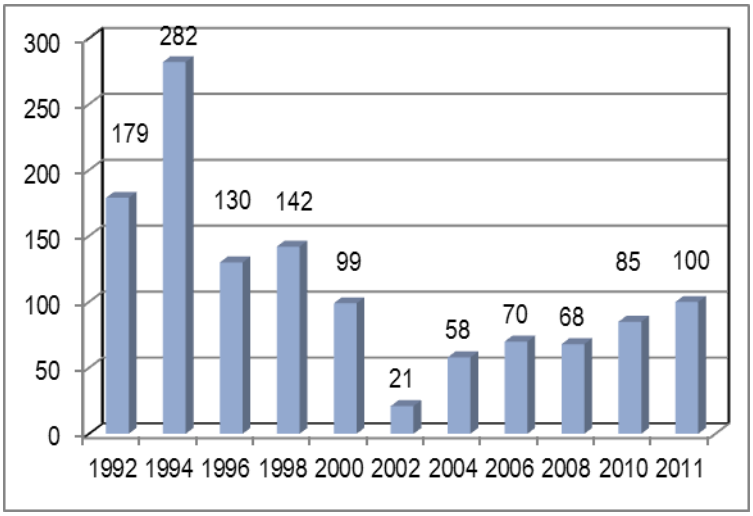
Threatened, Endangered, and Rare Species

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Acuña Cactus	- Survival - Reproduction		During the past 22 years, the number of plants greater than 25 mm (1 inch) tall in six plots declined from 194 plants in 1992 to 37 plants in 2010. With few larger plants left to reproduce, the total number of plants in these plots is likely to remain low for many years.
Cactus Ferruginous Pygmy-Owl	Abundance		Monument staff monitored the pygmy-owl from 1995 through 2005, at 8–10 territories annually. Since 2005, monitoring has been largely curtailed due to the combined influences of delisting, large increases in illegal border-related activities, and associated changing work priorities for NPS staff. However, visits to territories in the higher-quality habitat continue to indicate that they are still occupied annually.
Quitobaquito Pupfish	- Abundance - Habitat stability		Number of pupfish has returned to previous levels (>9,000) after a period of extended low water. Habitat is restored and stable, but actions to secure long-term habitat stability are yet to be implemented. Approximately 2,500 Quitobaquito pupfish are held in off-site refugia, at monument headquarters, the Arizona-Sonora Desert Museum, and Cabeza Prieta National Wildlife Refuge.
Sonoran Desert Tortoise	Abundance		For the 25 repeated transects, 1995 and 2005 survey periods had very similar numbers of tortoise detections.
Sonoyta Mud Turtle	Abundance		The Sonoyta mud turtle at Quitobaquito matures in seven years, and numbers of individuals (excluding young of the year) vary from 39 to 156. The most recent population estimates were 119 in 2007, and 156 in 2011. Habitat is restored and stable, but actions to secure long-term habitat stability are yet to be implemented.
Sonoran Pronghorn	- Abundance - Distribution		In 2012, Sonoran pronghorn continued to recover from the crisis year of 2002. Animals from semi-captive population are being released to supplement the wild population. The current estimate for the wild population is 159 animals, distributed across ORCNM, Cabeza Prieta National Wildlife Refuge, and Barry M. Goldwater Range lands.
Lesser Long-nosed Bat	- Abundance - Roost security		The main OPCNM colony has tripled over the last 15 years, but is vulnerable to disturbance, and border-related activity takes place in the area. The nearby large colony in Mexico has decreased by a comparable number; there may be no net change in regional population if they moved here.

Resource Brief: Sonoran Pronghorn

In OPCNM, the endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*) chiefly occurs west of Highway 85. The current range of this species in the United States occurs in OPCNM, Cabeza Prieta National Wildlife Refuge, and on lands managed by the Bureau of Land Management and Barry M. Goldwater Range. The Sonoran pronghorn also occurs in northwestern Sonora, Mexico. The Mexican and U.S. populations are physically separated by international boundary fences and Mexican Highway 2, which parallels the border through this region. Radio-telemetry data indicate that Sonoran pronghorn in the U.S. move upslope during the summer months. By midsummer, a substantial portion of the population may be in the monument or near its border, making OPCNM important habitat for the U.S. Sonoran pronghorn population during this critical time of the year. The monument also provides winter habitat for the pronghorn.



Estimated U.S. population of Sonoran pronghorn. All estimates are derived from Arizona Game and Fish Department aerial surveys.

In 2011, Sonoran pronghorn continued to recover from the crisis year of 2002. In that year, the U.S. population was reduced to 21–25 animals due to the combined stresses of extreme drought and persistent human disturbance in the form of illegal immigration, smuggling, and associated interdiction activities. Rainfall in the area improved somewhat from 2003 through 2011, although it remained below long-term average values, and 2009 was another extreme drought year. This, combined with continuing border-related human activity, may have had adverse effects on pronghorn survival, inhibiting recovery from the 2002 low point.

Invasive Species

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Buffelgrass and Fountaingrass, Ajo & Diablo Mountains	Number of sites in management zone		Of 243 sites in the management zone that were visited at least three years in a row, over two-thirds have remained free of buffelgrass for two years. Nearly all treated sites showed a decline in the number of plants.
Buffelgrass in the rest of OPCNM	Abundance		The buffelgrass management program at OPCNM began in 1994 and was focused on the south boundary area of the park. Management actions were successful but had to be discontinued when illegal border activities caused increasing concern over staff safety. Buffelgrass has begun to increase in number at known sites in unmanaged areas. In addition, new locations of buffelgrass are discovered but not managed in locations outside of the current management area.
Other Non-Native Invasive Plants	Number of species		Nine species of invasive or potentially invasive plants arrived in OPCNM during the past 10 years. Several species arrived more than once. Most newly-arrived species were found in construction areas along State Route 85.

Trespass Livestock	- Number of intrusions - Number of fence breaks		There has been a considerable increase in the number of fence breaks associated with border activities in recent years. This in turn has caused an increase in the frequency of cattle, horses, and feral burros entering the park, resulting in resource damage, possible disease transmission, and public safety hazards (livestock on roads).
Feral Dogs	Number of intrusions		Feral dogs have been a persistent problem along the international border, in proximity to Sonoyta, Mexico. The 5-mile pedestrian fence may be reducing this impact, but it does continue. Feral dogs have multiple adverse impacts on wildlife.
Africanized Honey Bees	Number of colonies reported and treated		A limited number of colonies of Africanized honey bees are present in the monument, and are treated each year only if presenting a hazard due to their proximity to other project areas.

Plants

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Columnar Cacti	Aerial extent		The persistent drought, warming temperatures, and shortening winters (Weiss & Overpeck 2005, IPCC 2007 Synthesis Report) are drivers that are likely to change the geographic range and local distribution of many species, including columnar cacti in OPCNM—organ pipe, saguaro, and senita. These freeze-intolerant species are limited by cold temperatures. As climate change progresses, we expect these species in areas previously too cold to inhabit.
	Timing of flowering		The timing and amplitude of flower and fruit production in columnar cacti is important for the cacti as well as many wildlife species, including the endangered lesser long-nosed bat. Three years of phenology monitoring revealed remarkable consistency in timing with variation of two weeks or less in the annual cycle. Peaks in average numbers of flowers and fruit varied up to three-fold between lowest and highest years in both species. All adult organ pipes produced fruit each year, compared to a 95% average for fruiting adult saguaros.
Native Plants	Mortality of drought-adapted plants		During the past ten years, there has been a sharp increase in the death or die-back of drought-adapted, long-lived perennial plants such as creosote bush, ironwood, linear-leaf saltbush, triangle-leaf bursage, big galleta grass, mesquite, and others. Death of creosote bush, one of the most drought-tolerant plants in the world, signals an important increase in environmental stress. A persistent drought, higher than average temperatures and shortening winters (Weiss & Overpeck 2005) could be contributing factors. Major changes in ecosystem structure and function and shifts in species geographical ranges are predicted for this century (IPCC 2007 Synthesis Report).

High-elevation Plants	- Aerial extent - Number of plants		Some plant species occur only in the upper elevations of Sonoran Desert Mountains. These areas provide the cooler, moister habitats these plants require. As climate change progresses, these rare habitats may be lost as temperatures warm, annual rainfall declines and winters shorten. Species such as *Juniperus arizonicus*, *Quercus turbinella*, *Vauquelinia pauciflora ssp sonorensis*, and *Perityle ajoensis* could be extirpated from OPCNM. These extirpations would be consistent with predictions that range contractions will occur in the next century (IPCC 2005).
Heritage Plants	Number of individuals		Several cottonwood trees were planted at Quitobaquito springs during the late 1800s and early 1900s. Four of the original six iconic trees remain and are important to the visiting public and neighboring tribes. Mission figs and pomegranates are traditional Spanish mission plants and were grown by O'odham farmers at Quitobaquito Springs during the past century. As such, they are an important part of this culturally significant area. During the past five years, all mission figs and all but five pomegranates have died due to lack of care and drought conditions. The remaining plants are in poor condition. Management access to the area has been difficult due to border-related safety concerns.
Plant Species Inventory	Completeness		An inventory of plant species in the Ajo Mountains is 95% or more complete, but checklists for the central and western mountains as well as large basins are incomplete. The summer annual flora is poorly documented. This knowledge will become important as climate change affects the vegetation of the Sonoran Desert.

Terrestrial Vertebrate Animals

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Diurnal Lizards	- Species richness - Abundance		Species richness appears to vary with the El Niño climate cycle, as some species recolonize individual study sites in response to abundant winter rains and disappear during dry periods. Species richness rebounded sharply in 2004 from a drought whose severity peaked in 2002. The abundance of small-bodied species such as the side-blotched lizard has been increasing, whereas abundance of large-bodied species such as the western whiptail has been declining.
Snakes	- Species richness - Abundance		Species richness and abundance vary over time with no significant trends at the single monitoring area. Fluctuations generally track lizard and rodent abundance.
Birds	Species richness		10 years of bird monitoring data for OPCNM are currently being analyzed for a status and trend report. Preliminary results indicate that bird species richness may have slightly increased over that period, suggesting that new species (perhaps favored by the warmer recent temperatures) are colonizing park habitats.
Bats	- Species richness - Abundance		Species richness has not fluctuated significantly since the mid-1990s. Captures of some species, such as Townsend's big-eared bat, have increased, while others, such as cave myotis, have decreased. Bat monitoring has been reduced to three mist-netting sites in recent years due to border security issues.

Nocturnal Rodents	- Species richness - Abundance		The number of nocturnal rodent species in the park has remained the same since regular monitoring began in 1991. No species have been lost, nor have new species appeared. Relative abundance of kangaroo rats has been below average for the past five years, whereas the smaller-bodied pocket mice are at their highest population level since 1992. Murids, including pack rats, are near average and last peaked in 2010.
Large Mammals	Visual count		Aerial surveys conducted in 1994 and 2006 revealed declines in white-tailed deer, mule deer, desert bighorn sheep, and javelina. A similar survey is being planned for late 2012. Remote detection cameras have been used to document the continued presence of ungulates, carnivores, and other large animals.

Soundscapes

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Sound Levels	Percent time above threshold level		The monument recently began monitoring soundscapes at selected sites where human activity or technology may affect Sonoran pronghorn and other sensitive wildlife, such as movement corridors and foraging areas. Preliminary results indicate noise levels exceeding 35bBA from 18 to 100% of the time at 3 sites in 2009. (Warner, 2012). Soundscape monitoring data also show an increase in motor vehicle traffic in the Growler Valley between 2009 and 2011.

Ecosystem Processes

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Surface Hydrology	Channel morphology		Changes in channel depth and width indicate channel instability when compared to control sites and changes in channel capacity. In 2008, the monument began monitoring six washes bisected by a new pedestrian fence built along the international boundary. The pedestrian fence has caused an accumulation of sediment in adjacent upstream areas, reducing water capacity, and leading to increased flooding and damage to surrounding landscapes.
	Natural patterns		Water and its movement through the Sonoran Desert determine plant species composition, density, and cover. Monument roads and off-road vehicle traffic have locally degraded infiltration rates (due to increased compaction), increased runoff, blocked, dammed or channelized sheet flow, and diverted natural drainages. These alterations are affecting plant community composition and require mitigation to re-establish natural processes.
Fire	Number and size		The role of fire in the Sonoran Desert is poorly understood and many plants, such as cacti, are not fire-adapted. The number of fires has risen steadily since 1980 and most are human-caused. Fires have generally been less than one acre, though some recent fires have destroyed historic structures and saguaro cacti. There is a risk of fire at Quitobaquito due to the buildup of dead wood and the monument hopes to be able to conduct fuel load reductions there soon.

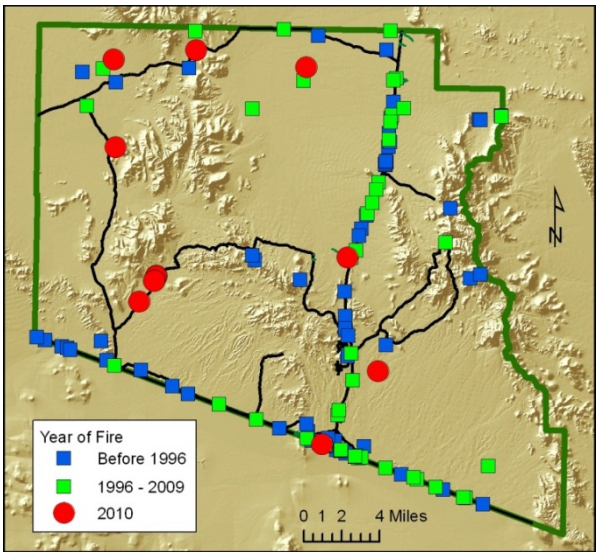
Adjacent Land Use	Land-use classification		Land use is determined from aerial imagery and field work. The conversion of natural lands to agricultural, commercial, and residential use along the international boundary has continued. Adverse impacts include non-native plants and animals, air pollution, fire, groundwater drawdown, illegal entry, and loss of migratory dispersal corridors and native species habitats.
Off-road Motor Vehicle Use	Number of vehicle tracks per kilometer of transect sampled		Impacts from off-road vehicles have increased dramatically in recent years. A decade ago, monitoring revealed approximately 0.5 vehicle impacts per kilometer while in 2011 there were approximately 7.5 vehicle impacts per kilometer. The NPS is currently conducting an assessment of off-road vehicle impacts using a combination of aerial photography and field work. The construction of a vehicle barrier and pedestrian fence in 2006 and 2008 respectively, had the intended effect of nearly eliminating illegal cross-boundary traffic originating from Mexico. Off-road vehicle use has negative impacts on soils, surface hydrology, plant communities, wildlife, cultural resources and wilderness.
Biological Soil Crusts	Percent biocrust cover of soil substrate		Biological soil crusts provide critical ecosystem services in the Sonoran Desert, influencing soil nitrogen availability, soil water holding capacity, and resistance to soil erosion. Preliminary monitoring data indicate that crusts cover 19% of soil surfaces at OPCNM, with very high between site variability. Light cyanobacteria species (inconspicuous crusts that are easily disturbed) comprised 74% of the crust cover.
Vegetation	Percent cover		Perennial vegetative cover increased from the 1970s, when livestock grazing ended, to the 1980s and again from the 1980s to 1990s. It declined from the 1990s to 2000s. These changes appear to track rainfall with the four sampling efforts following dry, average, wet, and dry periods, respectively. White bursage, an important forage species for Sonoran pronghorn, declined from 6.61 to 0.72% cover between 1994 and 2011 at one site.
	Species richness		Perennial species richness is up since 1970s and down since 1990s in a pattern similar to that for cover. Drought conditions have prevailed since 1996 and some species may be present but undetected due to the dry conditions during sampling. The Sonoran Desert Network is implementing a new protocol that will resample 60 upland vegetation plots every five years with 12 plots sampled every year.

Resource Brief: Fire

Wildland fires are rare in the Sonoran Desert, even though lightning strikes are very common during summer thunderstorms. Lightning-caused fires in OPCNM are usually small (less than one acre), and rarely detected or recorded. In 2010, no lightning-caused fires were discovered in the park.

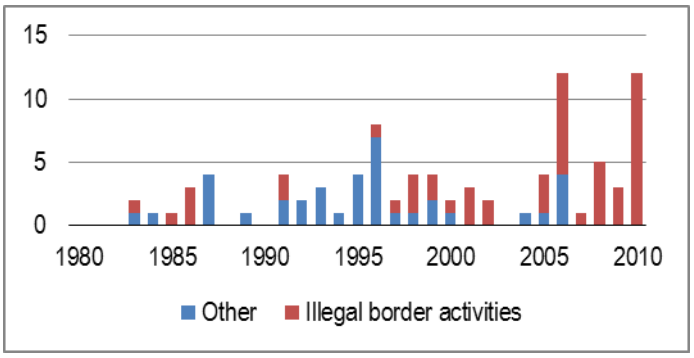
Fires ignited by people are much more common. Before the late 1990s, most fires in OPCNM occurred along roadsides or the U.S./Mexico border, especially near agricultural fields. Most fires were unintentionally caused by motor vehicle accidents, tossed cigarettes, campfires, or fires that escaped from farm fields and ditches in Mexico. By comparison, the twelve fires that occurred in the park during the first nine months of 2010 were intentionally started by drug smugglers and migrants. All fires were less than one acre.

The number of backcountry ignitions has also risen since the late 1990s. Remote from observation and suppression, these fires raise the risk of large



Locations of reported fires.

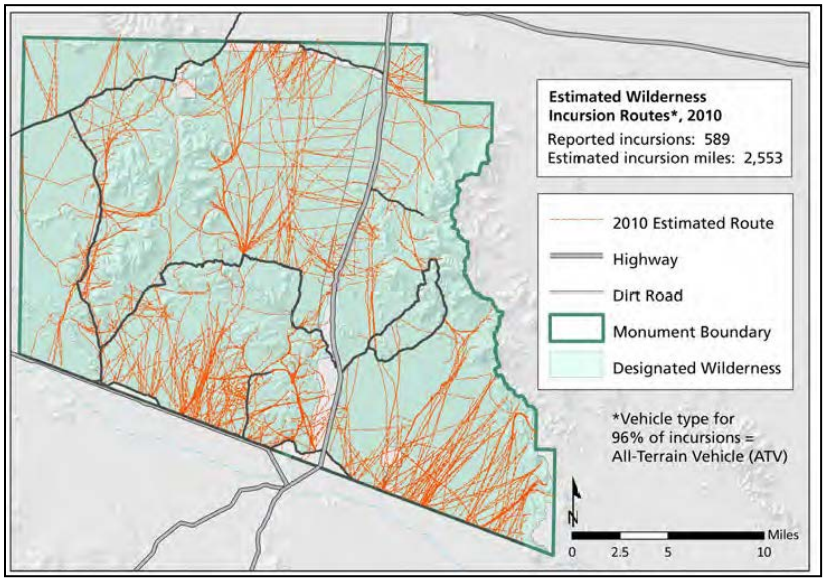
fires occurring in OPCNM, similar to the large fires (several hundred thousand acres) on Cabeza Prieta National Wildlife Refuge and the Barry M. Goldwater Gunnery Range that occurred in the mid-2000s.



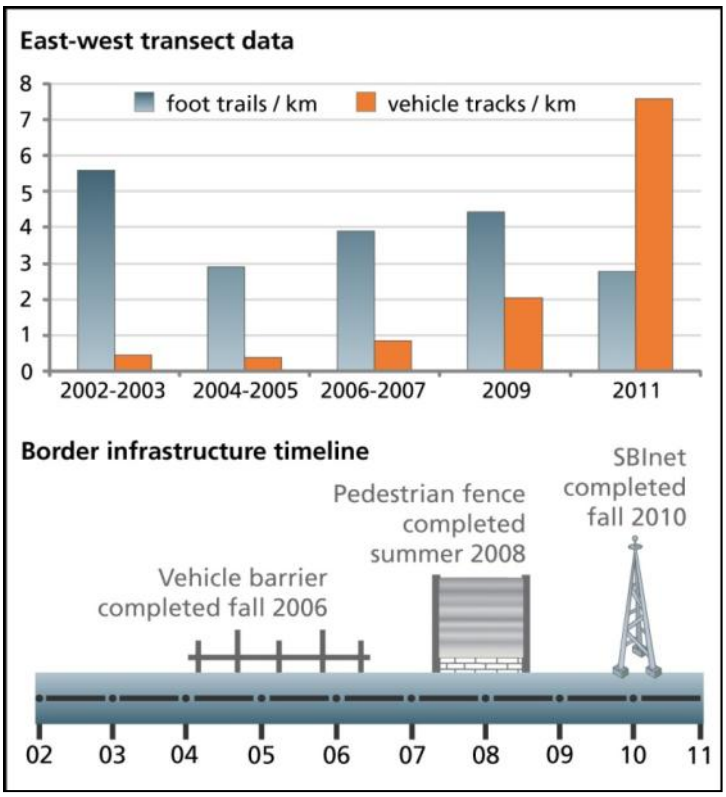
Number of fires and associated causes, per year, since 1980

Resource Brief: Off-road vehicle use

Monitoring results reveal that off-road vehicle use has greatly expanded throughout the monument in recent years. The resulting impacts to diverse and sensitive trust resources are of obvious concern. Such impacts are ubiquitous and indiscriminate, affecting both cultural and natural resources, often in profound ways. The NPS is working to limit the continued expansion of such impacts and to further restore impacted areas when possible. This work involves multiple, interrelated efforts to investigate, understand and interpret the consequences of such activities on soils, vegetation, endangered species, cultural resources, ecological processes, and wilderness. Monument staff is also working to assess the expansion of such impacts as well as understand the restoration potential of different impacted areas. Finally, today monument staff are further using this information, and working with diverse counterparts, to develop restoration projects where opportunities exist.



Estimated vehicular incursion routes conducted during 2010 in response to illegal border related activities and reported under a 2006 Memorandum of Understanding between the Departments of Homeland Security, Agriculture and Interior.



Results of a cross-park transect monitoring effort that documents foot trail and vehicle track densities in relation to the timeline for the development of different border security infrastructure within Organ Pipe Cactus National Monument.

2.2. Cultural Resources

Prehistoric Archeological Sites

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Inventoried Sites	Damage from: Natural Forces Vandalism/Theft Vehicular Incursions		At this time, less than 5% of monument lands have been surveyed for archeological resources and fewer than 350 prehistoric sites have been recorded in the park. The monument is working towards increasing the number of site condition assessments performed each year. Ten to twelve inventoried sites are assessed each year for site condition status, threats, and disturbances. This monitoring program allows us to quantify the nature and extent of damage to sites. Impacts from natural forces vary from year to year. In 2010 and 2011 several severe and localized rain events occurred within the monument resulting in as yet unknown levels of damage to sites. Currently, the levels of vandalism and theft at prehistoric sites are believed to be low. Monitoring data indicate that damage due to vehicular incursions is increasing. Such incursion events are known to occur within site boundaries. Prevention and restoration programs addressing incursion issues are currently being developed.

Non-inventoried Sites: Archeological Surveys and New Sites Inventories	Damage from: Natural Forces Vandalism/Theft Vehicular Incursions		Work to increase the documentation of new archeological sites is ongoing and the number of newly-surveyed acres is increasing yearly. Between 2010 and 2012, approximately 1000 acres were surveyed for cultural resources, resulting in the discovery and recording of 21 new archeological sites. Continuation of this work is a high priority for the park. As each new site is recorded it is typically given baseline site condition and National Register eligibility assessments. Monitoring data indicate that damage due to vehicular incursions may be increasing which is concerning.
Prehistoric Trails	Damage from: Natural Forces Vehicular Incursions		The nationally-significant Salt Trail passes through the monument. It was a major trade route from the Sea of Cortez to the core areas of the Hohokam culture and other areas to the north. Salt and seashells from the Sea of Cortez and the Pacific as well as obsidian and additional items from Mesoamerica were transported over this trail and throughout a broad region of the Southwest. The trail is not well documented on the ground, but evidence of its presence can be found throughout the monument.
Pictographs/ Petroglyphs	Damage from: Natural Forces Vandalism Illegal traffic		There are many pictograph and petroglyph sites throughout the park. At one of the monument's most important sites, a project to assess and correct long-term damage to pictographs due to water seepage and resulting mineralization was initiated in 2011. There has been no evidence of vandalism noted at any rock art site in the park, most likely due to their remote locations even though some are used by illegal aliens as lay-up sites. Virtual tours are under consideration for display at the Visitor Center in the future.

Historic Sites (Post Spanish Contact)

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Historic Ranching and Farming	Damage from: Natural Forces Vandalism/Theft Illegal Border Traffic Vehicular Incursions		Monitoring of the monument's historic ranching and farming sites has revealed substantial damage from natural forces, vandalism, and vehicle incursions. Erosion, heavy rains and flooding, high winds, sun and high heat exposure act constantly upon the vernacular Sonoran Desert architecture typically found at historic ranching and farming sites within the monument. Work to assess and prioritize treatments is ongoing. Unfortunately, vandalism has been on the rise and vehicle incursions continue to impact these resources. In response, a number of stabilization projects have been developed. Each year between 2009 and 2012 ruins preservation field schools, held in collaboration with the University of Arizona and heritage preservation partnerships, have addressed the degraded condition of structures at Bates Well Ranch, Armenta Ranch, and Gachado Line Camp.

Historic Mining Sites	Damage from: Natural Forces Vandalism/Theft Illegal Border Traffic Vehicular incursions		Historic mining sites have suffered degradation as a result of natural forces, vandalism, lay-ups by illegal aliens, and vehicular incursions. In 2012 the monument conducted a field school at Victoria Mine to stabilize its primary vernacular masonry structure, the historic Levy's Store. Cultural resource surveys in 2010 resulted in the identification of previously unrecorded mining assets in the San Cristobal Valley and other locations in the monument. In 2011, numerous hazardous mine features were permanently closed for safety reasons. Many additional mining assets require similar stabilization and management actions
Historic Roads and Trails	Damage from: Natural Forces Vehicular incursions		Historic routes include El Camino del Diablo; the Yuma mule train route; Bates Well Road; Armenta Ranch Road; the Gunsight to Sonoyta Road; and numerous other wagon trails. Some of these historic routes are being degraded by the high levels of vehicular activity occurring throughout the monument and by the related effects of natural forces.

Ethnographic Resources

web ▸

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Relationship with Associated Tribes	- Level and frequency of engagement - Status of the relationship		Tribal consultation occurs frequently with culturally-affiliated tribes. Such dialog is important to maintaining good tribal relations. Towards this end, during 2010, and again in 2012, we worked with tribal counterparts to coordinate a successful tri-national symposium with representatives of the Tohono O'odham Nation, Mexico, and the U.S. Tribal representatives have also recently participated in a number of cultural resource management projects at both prehistoric and historic sites. During 2011, the monument also completed a NAGPRA consultation process which involved the four southern O'odham Tribes of Arizona, the Zuni Pueblo, and the Hopi Nation.

Cultural Landscapes

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Documentation of Significant Cultural Landscapes	Number of Cultural Landscape Inventories (CLI) completed		CLIs have been completed for Victoria Historic Mining District (NPS 2002b) and Blankenship Ranch. A new Quitabaquito Cultural Landscape Inventory is complete and has been nominated to the National Register (NPS 2002a). Documentation of additional landscapes, possibly including an early Ak-Chin agricultural and irrigation system associated with Hohokam culture is a priority for the monument in the near future.

Museum Collections

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Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Inventoried Objects, Specimens and Archives	Number of items and documentation; meets museum standards		Accessioned museum objects, specimens, and archives are 71% cataloged (FY2012); funding is obligated to catalog the remaining archives and a portion of the herbarium specimens. Considerable work remains to bring park accession and catalog records up to minimal standards.
Preservation and Protection	Meets museum preservation standards		In the park collection items are maintained in two recorded facilities which meet 47.61% of the preservation and protection standards (FY2012). Most of the museum collection is curated at the NPS Western Archeological Conservation Center (WACC) in Tucson, AZ, a state-of-the-art curation facility. Efforts to catalog and move a backlog of objects, specimens, and archives to WACC are ongoing.
Documentation	Current and appropriate core museum documents		The park lacks 8 of 9 core museum documents including a current Scope of Collections Statement, Collection Management Plan, collection condition survey, fire and security surveys, Housekeeping Plan, and inclusion of museum collections in the Emergency Operations Plan and Structural Fire Plan.
Comparative Collections	Completeness of projectile points and ceramics collections		Projectile point and ceramic collections are less than 10% complete, and work is progressing in these areas. The typing and dating of projectile points and ceramics will be applied to a local Organ Pipe typology within the overall framework of regional southwestern Arizona typologies and the park's cultural chronology.

Numerous prehistoric site types in OPCNM include year-round villages, seasonal open campsites, roasting pits, sleeping circles, trade routes and trails, rock shelters, and rock art sites. Many of these sites are associated with the Hohokam culture, which dates from approximately A.D. 150 to A.D. 1450. Evidence for year-round prehistoric village sites on park lands is increasing, challenging the previous notion that aboriginal peoples practiced only a dual-residence system; practicing Ak-Chin floodwater-farming in the desert lowlands during the summer and moving to the mountains during the winters.

Crossing the park, running north-south, is the Salt Trail. Known as the primary salt and shell trading route used by the Hohokam (and probably by earlier cultures as well), and ethnographically by the O'odham tribes, this trail is nationally significant. In the future, the park hopes to document its alignment more extensively and nominate it to the National Register of Historic Places.

Important historic sites also occur throughout OPCNM, dating from the Spanish contact era (ca. A.D. 1540) and after. These sites are primarily related to mining and cattle ranching, with mining beginning in earnest in the mid-1800s. Cattle ranches followed, in part to satisfy the miner's demand for beef. These historic resources, in combination with prehistoric sites, are important in interpreting the many lifeways that are associated with the access to, and control of, water in the Sonoran Desert without which life here would never have been possible.

Because the ore from the mines could not easily be processed without water, some high-grade ore was sent by mule train to Yuma where it was shipped around Cape Horn to Wales for processing. A primitive grinding mill often powered by burros, called an arrastra, was used to pulverize ore, where it was not so rich. Pulverized gold ore could be amalgamated with mercury in the bottom of the arrastra and refined in a distillation retort. Because arrastras used much less water than other refining processes, the miners built them where access to water was limited. In the park, the remains of arrastras can be found at Bates Well Ranch and the Lost Cabin Mine.

Although historic resources can date back further, the period of significance for most of the park's historic structures begins with the start of mining in the 1850s, and runs to the early 1900s when most of the small mines played-out and ranches began to fade away. However, because some ranchers stuck it out, some resources have periods of significance running up through the 1930s and 1940s.

Table 1. General Culture History of Organ Pipe Cactus National Monument Lands

PERIOD	APPROXIMATE DATES
Malpais Tradition	Associated with the Malpais Pluvial ~30,000–18,000 B.C. (?)
Pre-Paleoindian Period (Western Stemmed Projectile Point Technology Overlapping with Clovis Technology)	~16,000(?)–10,000 B.C. (?)
Paleoindian Period – Clovis Technology	~13,000 B.C. to 7500 B.C.
Archaic Period-Early, Middle, and Late	7500 B.C. to A.D. 200
PRE-AGRICULTURAL and PRE-CERAMIC	Time Prior to ~2000 B.C.
AGRICULTURAL	2000 B.C. to A.D. 200
Invention & Spread of the Bow & Arrow	~A.D. 500 to 700
Late Prehistoric Period	A.D. 200 to 1400
CERAMIC	A.D. 150 to 1900
Hohokam	A.D. 150 to 1450
Patayan	A.D. 700 to 1850
Trincheras	A.D. 700 to 1900
Protohistoric Period	A.D. 1400 to 1540
Early Historic Period	A.D. 1540 to 1848
Mid Historic Period	A.D. 1848 to 1940
Arizona Territorial Period	A.D. Feb 24, 1863 to Feb 14, 1912
World War II and Cold War Period	A.D. 1940 to 1989
Modern Period	A.D. 1989 to Present

Adapted 2012 by Connie Thompson Gibson from Ahlstrom (2000, 2001); Huckell (1984); Mabry (1998); Foster et al. (2002); Beck and Jones (1990, 2009, 2010); Rogers (1929, 1939, 1945, 1958), Hayden (1966, 1967, 1969, 1970, 1976); Rankin (1995); Hartmann and Thurtle (2000); Rogers (1929, 1939, 1945, 1958); Altschul and Rankin (2008); and Jenkins et al. (2012). See internet version of report for full references.

Levy's Store, as it appeared in the mid-1900s, in the Victoria Historic Mining District

The monument contains numerous abandoned gold, silver, and copper mines, including examples of early deep-shaft silver mines such as the Victoria Mine, which is nearly 400 feet deep. Other mine features in the park include glory holes, tunnels, adits, ore-cart runouts, leaching vats, and thousands of prospect pits. Ruins include the infrastructure associated with mining camps such as supply stores; blacksmith shops; miner's outdoor kitchens and quarters that are constructed of ocotillo and cactus ribs plastered with mud; cisterns; and dynamite storage bunkers. Stone buildings are located in the Victoria Historic Mining District and at Lost Cabin Mine. In early 2012 a ruins preservation field school, conducted in collaboration with the University of Arizona, was held at Levy's Store (right), a mud-mortar-and-stone masonry structure at Victoria Mine.

Numerous structures and features remain from early cattle ranches in the park including ranch houses, cowboy line camps, tack barns, bunkhouses, chicken coops, hay barns, windmills, charcos, represos, water pipelines, canals, terraced fields, berms, wells, fences, cattle chutes, corrals, stock troughs, and historic wagon roads and horse trails. Vernacular Sonoran Desert architecture is frequently represented by scavenged building materials including railroad ties, whole buildings that were moved from nearby mines, and by sandwich-style corral fences made from mesquite branches.

The remains of an arrastra, an early ore milling appliance at Bates Well Ranch. Its location adjacent to the bunk house suggests that it was no longer in use when the bunk house was built since the building would have interfered with its operation.

Historic and prehistoric archeological sites within the monument have valuable research potential. Historical sites can augment the 500-year historical record of the region by confirming, disproving, or adding to the written record and thus support or enhance the interpretive story of OPCNM. Prehistoric sites contain important diagnostic artifacts and features from time periods ranging from the Paleoindian through the Early, Middle, and Late Archaic and Late Prehistoric periods. Diagnostic projectile dart points have been recovered that date back

thousands of years, and ceramic shards from three major cultures—the Hohokam, Trincheras, and Patayan—have been recovered. Research on these sites can add to the archeological record of southwestern Arizona and, as above, enhance the interpretive story of the monument.

Research is ongoing at several sites in the park where there was access to water year-round, and many desert water-control devices such as wells, represos, irrigation canals, and charcos have been identified. While not on the scale of the extensive Hohokam canal works in the Tucson and Phoenix basins, the water control devices on ORPI were actually a part of the Hohokam irrigation and agricultural complex—they are outliers of the Hohokam system, and representative of the akchin floodwater farming that went on at nearly every wash on the monument during the monsoons (Rankin 1995, Altschul and Rankin 2008).

Above Left: Distribution of artifacts (indicated by the pink flags) at an OPCNM rock shelter site.

Above Right: Early Ak-Chin agricultural motifs depicted on petroglyphs at OPCNM.

2.3. Visitor Experience

Visitor Numbers and Visitor Satisfaction

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Number of Visitors	Number of visitors per year entering the Visitor Center		The number of visitors to the Kris Eggle Visitor Center in Fiscal Year (FY) 2011 was 21,582, which is lower than the 35,914 visitors in FY07 and 36,883 visitors in FY08.
	Vehicle counts along roads		Counts of vehicles along roads through the park do not accurately reflect the visitor traffic as the formulas used in the past do not account for the increases in federal enforcement agents using monument roads. The number of such agents has increased more than ten-fold over the past decade. Traffic counters are installed and maintained, new visitor-use estimation formulas are envisioned.
Visitor Satisfaction	Percent of visitors who were satisfied with their visit		The five-year average for visitor satisfaction was 96.2% for 2007–2011. Surveys are only distributed during the month of March, when the interpretation and fee divisions are fully staffed. Survey methodology has varied depending on staff and in response the monument continues to work towards improving by implementing specific survey guidelines.

Educational and Outreach Programs - Personal Services

web

Visitors enjoy interacting with monument staff. During these encounters information is exchanged to help the visitor understand the significances of the monument. Dialogue is in both direction to and from the monument staff and visitor. The status and trends in personal services in which the two-way dialogue takes place are summarized in the following table.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Education programs	Number of programs		The number of education programs with fourth, fifth, and sixth grade classes at Ajo School increased from 3 in FY09 and 5 in FY10, to 25 in FY11. New programs are tied to National Wildlife Community Habitat establishing a certified wildlife habitat at the school for education.
	Number of participants		The number of participants in education programs each year between FY07 and FY11 was 195, 187, 50, 119, and 508.
Formal Interpretive Programs	Number of programs provided		The number of formal interpretive programs presented each year was between 258 and 580 during FY07–FY11.
	Number of visitors		The number of visitors who attended the formal interpretive programs each year during FY07 to FY11 was 8,311, 9,752, 8,773, 6,121, and 4,331.
Community Outreach	Number of programs/events		The number of community outreach programs and events each year during FY07 to FY11 was 11, 11, 6, 9, and 45.
	Number of participants		The number of participants in community outreach programs each year during FY07 to FY11 was 423, 732, 536, 280, and 1,871.
Informal Visitor Contacts	Number of visitor contacts		There were 3,011 informal visitor contacts recorded in FY11, compared to 6,121 in FY10 and 4,246 in FY09. Counts made prior to FY09 used a different methodology.

Exhibits, Signs, Websites – Non-personal Services

web

Visitors may receive information about the monument without interacting with monument staff. There are a number of venues to get information without personal interactions. The following are the non-personal services that a visitor can use to receive information.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Video Program	Number of visitors viewing		The annual number of visitors who viewed the video program in the park Visitor Center between FY07 and FY11 was 7,169; 7,257; 5,633; 7,801; and 5,000.
Junior Ranger Programs	Number of participants		In FY12, the Desert Ranger program for older visitors will be introduced. The number of Junior Rangers that participated between FY07 and FY11 was 252, 139, 104, 168, and 127.

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Wayside signs	Condition and accuracy		Funding requests have been submitted for a complete update of all wayside signs.
Kris Eggle Visitor Center Exhibits	Condition and accuracy		All new exhibits were installed in the Visitor Center in August of 2011.
Printed Media	Site bulletins		In FY10, the Ajo Mountain Auto Tour book was revised to meet NPS Interpretive standards. All site bulletins were revised and reformatted in FY11 to meet NPS standards.
	Park brochure		The park brochure was recently updated.
	Newspaper		The park established a new format for its newspaper in FY10, and visitors received 7,500 newspapers last year.
Website (Virtual Visitors)	Number of updates		The park's website has been updated, but there is no trained staff to keep current information on the website.
	Number of visitors		Information is only available for FY11 when there were 77,083 visits to the website.

Recreational Activities

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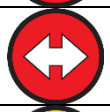
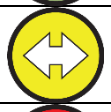
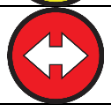
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Campground Camping	Percent of visitors satisfied with campground experience		Surveys distributed each year during the month of March at the Twin Peaks campground found that 99% of respondents were satisfied with their campground experience in FY11, compared to 92%, 92%, 90%, and 96% satisfied during FY07–FY10. Survey methodology has varied depending on staff and in response the monument continues to work towards improving by implementing specific survey guidelines.
Public Access	Percent of park open to the public		NPS Organic Act requires NPS to provide for public enjoyment. Two-thirds of park is not open to the public. This has not changed in more than four years.
Backcountry Camping	Number of permits		No backcountry camping has been allowed in the park since 2003 because of security concerns.
Hiking	Miles of accessible hiking trails		The number and length of trails is appropriate for the size of the park; however, many trails are closed due to security concerns.
	Trail condition		Trail improvements are being made using skilled maintenance reclamation crews.

	Variety of difficulty and lengths		The park maintains trails with a variety of difficulty levels to meet visitor interest and needs.
Scenic Drives	Miles of accessible roads		Many park roads are closed due to security issues.
	Accessibility of roads to different types of vehicles		Not all scenic drives within the monument are accessible to RVs over 21 feet in length. A large portion of our visitors are unable to use the scenic drives.

Visitor Amenities

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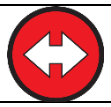
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Restrooms	Percent of visitors satisfied		In FY10, 50% of the campground restrooms were upgraded with solar showers, and visitor surveys during the past five years regarding restroom facilities have been positive.
Accessibility	Number of restrooms that are accessible		Twin Peaks Campground has four sites. Restrooms at the Visitor Center, Twin Peaks campground, and Estes Canyon are accessible. However, the doors are not equipped with push pad access.
Cell Phone Coverage	Area covered		Very limited coverage. Cell phone coverage is adequate only in the Twin Peaks Campground area.

Visitor Safety and Protection

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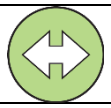
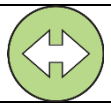
Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Law Enforcement Incidents	Cross-border violator (CBV) data from Customs and Border Protection		Raw data on apprehensions and pounds of contraband seized as compared to this time last year are statistically consistent. This condition status does not include long term (>1 year) data from any source.
	Number of law enforcement incidents – non-CBV		Motor vehicle accidents and petty vandalism cases comprise the majority of non-CBV law enforcement cases. During 2011, there were seven cases of damage to government property, five motor vehicle accidents and one resource theft case. This condition status is based off of comparing last year statistics.
Traffic Safety	Number of accidents		Park roads are in good repair and motor vehicle accidents are rare. During FY11, there were two motor vehicle accidents which required EMS response.
	Number of high speed pursuits		Construction of the vehicle barrier fence and the pedestrian fence has nearly eliminated high speed pursuits within the monument. Within the last five years statistics have been consistent.
	Number of incidents		Accidents and injuries involving visitors are at a low frequency. During FY 2011, rangers responded to 11 requests for emergency medical service. There were no visitor fatalities.
Safety Incidents & Injuries	Number of staff trained in First Aid and CPR; AEDs on site		VRP staff is current in their EMS qualifications and continuing education training is held regularly. Rescue One, a dedicated all risk response vehicle, entered into service in 2012.

	EMT access & response		Response times for EMTs are consistent with other rural areas of Arizona.
	Mutual response (fire, LE)		MOUs with Pima County Sheriff's Department and Ajo Ambulance Service are in effect and working to mutual benefit over the last several years.

Park Community: Volunteers and Partnerships

web

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Volunteers	Number of volunteers and volunteer hours		FY11 98 volunteers for 10,757 hours FY10 52 volunteers for 16,660 hours FY09 41 volunteers for 14,216 hours FY08 148 volunteers for 12,280 hours FY07 103 volunteers for 16,712 hours
Partnerships	Number of official and unofficial partnerships		OPCNM has dozens of partners who collectively assist the monument with nearly every aspect of management. The monument's current partners include: tribes, diverse international counterparts from Mexico, academia, numerous federal partners from other agencies within the Departments of Defense (DOD), Homeland Security (DHS), Agriculture, (USDA) and Interior (DOI), local, regional and national nongovernmental organizations (NGOs), etc.
	Value of partnerships		The value of partnerships to ORPI is inestimable. Our partners help us with law enforcement, resource management, interpretation and park maintenance. The supportive law enforcement operations conducted by our partner's on a daily basis alone are of immense value to the monument. In addition, our partners help us conduct research or implement monitoring and management programs. Examples include a multi-year, robust and collaborative border impacts research project or the implementation of diverse monitoring and management actions related to the recovery of the endangered Sonoran pronghorn. Our partners also help us develop content and opportunities for public outreach. For example, the monument recently worked with numerous partners to successfully develop a second tri-national symposium in 2012 that was dedicated to addressing cultural and natural resource conservation issues in the Sonoran Desert. In short, the monument's numerous successes, especially over the past several years, have all resulted, in one way or another, from a high level of collaboration and involvement by a diverse network of partners who share similar issues and concerns. OPCNM remain very grateful for their collective time, energies and support.

2.4. Park Infrastructure

Overall Facility Condition Index

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The National Park Service uses a facility condition index (FCI) to indicate the condition of its facilities and infrastructure. The total cost of deferred repairs divided by the total cost to replace the structure results in the FCI, with values between 0 and 1 (the lower the decimal number, the better the condition). The condition of the buildings and other infrastructure assets at each park is determined by regular facility inspections, or "condition assessments." Deficiencies identified from these assessments are documented in the NPS Facility Management Software System and the cost for each repair determined. Repairs that cannot be completed within the year count against the condition of a structure. The FCI is assigned a condition category of Good, Fair, Poor, or Serious based on industry and NPS standards. Deferred maintenance projects that require additional funding are identified based on FCI. Planned preventive maintenance on critical components occurs during the year, using a park's base budget. For additional information about how park managers use information about the condition of facilities and infrastructure to make decisions about the efficient use of funding for maintenance and restoration activities at the park, Click Here.

The overall FCI for 187 assets at Organ Pipe Cactus National Monument for 2012 was 0.061, which is considered Good based on industry and NPS standards. The NPS produces scorecards that reflect on the accuracy of the data used to determine the FCI values reported here. The table below summarizes the number of assets at ORPI within each industry-standard asset category and the mean FCI on October 1, 2012, compared to October 1, 2008, to determine trends in condition. Please note that park infrastructure dating from the historic era have been assessed separately and are not included in this section; for more information regarding the condition of historic era resources please refer to the cultural resource section of this report.

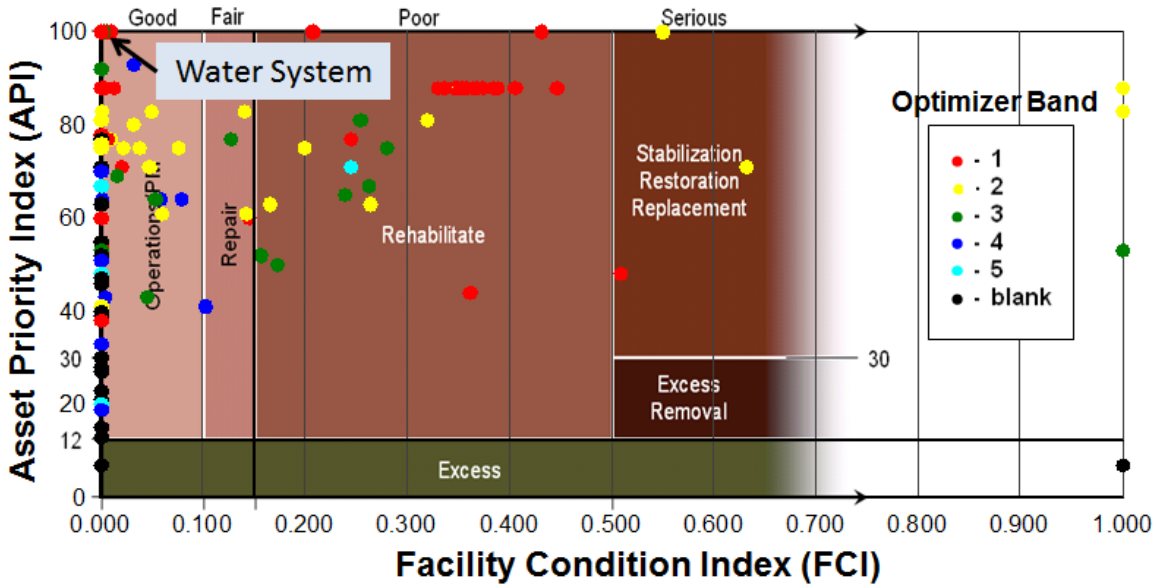
Asset Category	Number of Assets 2008 / 2012	FCI 2008 / 2012	Condition Status/Trend	Rationale
Buildings	34 / 43	0.168 / 0.064		Air conditioning units were replaced in all buildings and housing units this year to reduce energy and maintenance costs. All buildings were painted in the past year. Four new buildings have been added for staff offices and required occupancy for rangers, etc. Smith Building was converted to office space for RM staff.
Housing	11 / 11	0.107 / 0.072		Electrical systems for housing units were recently upgraded. Interiors of all park housing except for one have been remodeled. Stucco fences were constructed around two of the units, and front patios were built for four houses. Installed a security gate on road into housing area. Three housing units are currently utilized as office space. The monument is currently preparing to convert them back to housing units which will require considerable renovations.
Campgrounds	3 / 3	0.018 / 0.011		Replaced eroded asphalt RV pads from sites 162–174 with concrete pads. Chip seal was applied to campground lanes and perimeter road. Rebuilt campground dump station. Replaced pit toilet at Alamo Canyon. Remodeled seven restrooms and added showers to four. Replaced trash cans with varmint-proof cans.

Trails	15 / 15	0.184 / 0.090		Workcrews from Saguaro NP helped to make improvements to trails over the past four years. Despite these improvements, recent storm damage to monument trails during the summer of 2012 has once again left them in considerable need of repair. The FCI reported for 2012 (0.090) does not include post-monsoon trail assessments.
Waste Water Systems	4 / 6	0.182 / 0.005		A new sewer system has been built for the housing area, and was designed so that new office buildings can use the same leach field.
Water Systems	1 / 1	0.490 / 0.010		Replaced water line from the 100,000 gallon tank to campground. Painted interior and exterior of water tanks. Rebuilt south water well.
Unpaved Roads	15 / 15	--- / ---		The FCI statistics for ORPI's unpaved roads are not reported due to data deficiencies that the park is working hard to address. 105 miles of dirt roads occur in the park of which approximately 50 miles are open to the public. The park recently built four new concrete water crossings on Ajo Mountain Drive. Many of the monument's unpaved roads are maintained, however numerous other road segments present considerable repair and maintenance challenges given recent increases in use combined with the influence of several recent heavy rain events.
Paved Roads, Parking Areas, Bridges, Tunnels	42 / 48	--- / 0.193		The FCI statistic for 2008 is not reported due to data deficiencies. Recent efforts by the park to address these issues have resulted in a more reliable FCI statistic for 2012 which is reported. Recently, the monument replaced housing driveways and parking lots with concrete. New chip seal and oil seal was applied on paved roads and parking areas. Built two waysides (pullouts) for visitor use on Hwy 85. Horse pullout constructed for DHS. Despite these improvements considerable maintenance challenges remain particularly around low water crossings, which have experienced considerable road damage during recent flood events.
All Others	23 / 41	0.010 / 0.004		Consolidated radio repeaters operated by multiple agencies. Constructed new nursery for RM for raising native plants for restoration work. Built a pond at the Visitor Center so the public can see the endangered pup fish without going to Quitobaquito Spring.

Structures with historic designation on the List of Classified Structures (LCS) are also formally assessed every five years to determine their LCS Condition, which determines whether the structures and their significant features are intact, structurally sound, and performing their intended purpose.

Another important facilities management planning tool used at a park is the Asset Priority Index (API). It identifies the importance of the various infrastructure components at a park. The API is determined using five criteria, and is calculated out of 100 possible points. The criteria are weighted based on their importance to NPS core priorities. They are distinct to ensure that each aspect of the asset is measured independently. As a result, most assets will not rate high in every category.

The scatterplot (below) for 2012 shows the FCI for each of the infrastructure asset types at ORPI. It plots buildings, trails, roads, parking areas, and other infrastructure assets against its Asset Priority Index (API). Park managers and maintenance staff use the FCI and API data for each park asset to focus on preventive maintenance and repairs to facilities that are most critical to their parks.



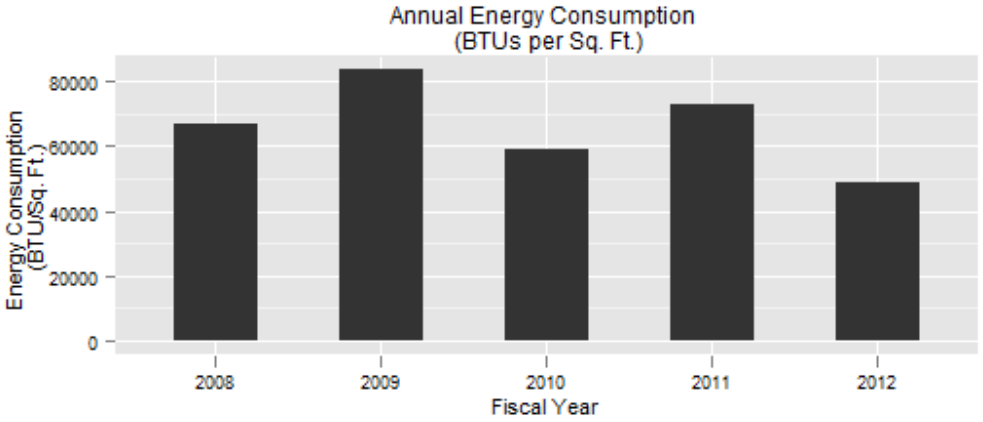
Optimizer bands—the color of the dots in the scatterplot—are assigned to each facility or asset as a tool to prioritize use of limited funding to maintain park infrastructure. Optimizer Band 1 includes those assets with the highest maintenance priorities. These assets are most important to the park—often linked to the park's enabling legislation or have high visitor use—and usually are in the best condition. Band 1 assets receive the highest percentage of base funding for routine operations, preventive maintenance, and recurring maintenance to keep them in good condition with proactive, planned maintenance. These assets are important to park operations, but because fewer park base dollars are available after maintaining Band 1 assets, Band 2 assets receive a lesser percentage of remaining funds. Assets in the lower priority bands may only receive preventive maintenance for the most critical components or may require special projects or partner funding to maintain them. For additional information about optimizer bands and how park managers use them to make decisions about the efficient use of funding for maintenance and restoration activities at the park, click here.

Energy Consumption

web

The production of energy to heat, cool, and illuminate buildings and to operate water utility systems is one of the largest contributors to greenhouse gas emissions in the United States. The National Park Service is committed to improving facility energy performance and increasing its reliance on renewable energy sources. The National Park Service has a goal to reduce Servicewide building energy consumption per square foot of building space by 35% by 2016 from the baseline set in 2003 (NPS Green Parks Plan 2012).

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Energy Consumption	BTUs per gross square footage of buildings		Energy usage (BTUs per gross square footage of buildings) in 2012 was 30.8% lower than the average for the previous four years (Source: NPS Annual Energy Report). The park has implemented a number of energy-saving features and practices in recent years, including replacing light fixtures and air conditioners with more energy-efficient ones, installing motion sensor lighting systems, and installing bug lighting bulbs to prevent insects from setting off lights.

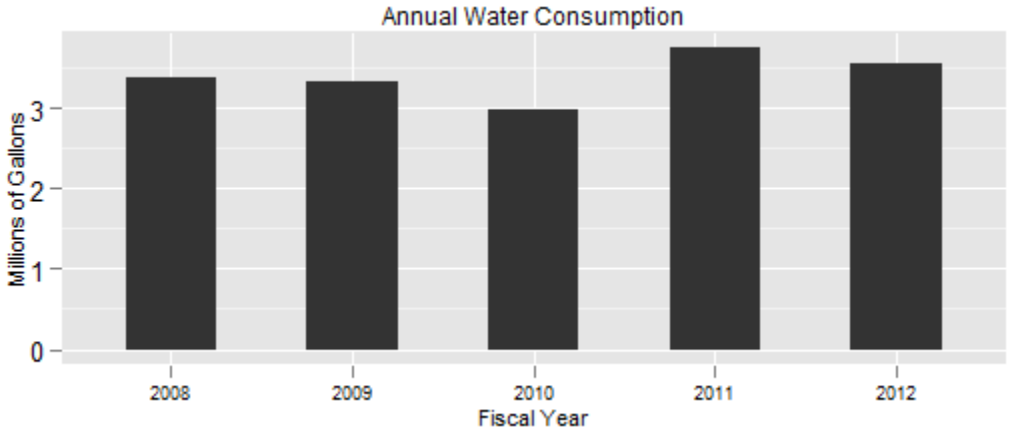


Water Consumption

web

The national and global supply of fresh water has diminished in recent decades, and this trend is likely to continue due to drought and other climatic changes. To contribute to the responsible use of freshwater supplies, encourage groundwater recharge, and protect water quality, the National Park Service is improving its efforts to conserve water, reuse gray water, and capture rainwater, and has set a goal to reduce non-irrigation potable water use intensity by 30% by 2020 from the baseline set in 2007 (NPS Green Parks Plan 2012).

Indicators of Condition	Specific Measures	Condition Status/Trend	Rationale
Water Consumption	Avg. 2008 to 2010—3.23 million gallons/yr Avg. 2011 to 2012—3.65 million gallons/yr		Average water consumption at ORPI during 2011–2012 increased by 13% over the 3-year average for 2008–2010 (Source: NPS Annual Energy Report). This increase is partially attributable to construction and road maintenance projects that were carried out in the park during 2011 and 2012 in support of the Department of Homeland Security.



The monument participated in four separate environmental audits during 2010 and 2011 as part of the NPS' Environmental Management Program. These audits identified opportunities to improve efficiencies relating to energy and water consumption, recycling, gas emissions, or environmental stewardship. In response to the results from these audits the monument has already implemented a number of actions that have resulted in measureable improvements in these areas, some of which are mentioned above. In addition, the park has developed a number of projects that in time will continue to address identified deficiencies. Some examples include: construct a vehicle wash rack and disposal system; remediate lead contamination and close a firing range, remove a non-compliant fueling system, and remove debris from an old dump station and rehabilitate the site.

2.5. Wilderness Character

The Wilderness Act of 1964 requires the NPS to maintain Wilderness character, including the qualities of being "…untrammeled by man…undeveloped…natural," and allowing for "…solitude or primitive and unconfined recreation." An article summarizing the current condition of the Organ Pipe Cactus Wilderness is pending publication in the winter of 2012 and will soon be available on the monument's public website at: http://www.nps.gov/orpi/index.htm

Wilderness Character  web

Wilderness Quality	Condition Status/Trend	Rationale
Natural		Natural resources in wilderness are in a wide array of conditions, due to both natural and human influences.
Undeveloped		Wilderness is substantially degraded by human impacts, mostly due to border-related activities. Vehicle use is common; infrastructure exists within and adjacent to wilderness and is visible from deep within wilderness; low-level aircraft overflights are common; illegal camps are common.
Untrammeled		Commonly occurring activities manipulate the wilderness's biophysical environment. These include trespass by invasive livestock and feral animals, backcountry vehicle travel, and sometimes even restoration actions (e.g., removal of abandoned vehicles).
Solitude or Primitive and Unconfined Recreation Opportunity		Sense of solitude is illusory or difficult to achieve. The presence of cross-border violators is common; surveillance equipment and associated interdiction efforts occur throughout wilderness. Evidence of human presence pervades wilderness (trash, footprints, vehicle tracks, aircraft, etc.) Closure of portions of the park to public restricts wilderness experience.
Other Features and Values		Limited opportunities exist to experience various cultural resources that evidence the prehistoric and historic use of wilderness by man.

Chapter 3. Summary of Key Stewardship Activities and Accomplishments

The list below provides examples of stewardship activities and accomplishments by park staff and partners to maintain or improve the condition of key park resources and values for this and future generations:

Visitor and Resource Protection

- Daily and sustained law enforcement within a complex border environment
- One-third of the park is now accessible to visitors, up from 5% previously
- Provided park wide training opportunities: implemented operational leadership procedures
- Provided thousands of hours of protection details in support of diverse monument programs

Visitor Experience

- Developed new exhibits for the visitor center
- Expanded outreach programs in Ajo and Why
- Conducted limited public van tours to Quitobaquito, a unique perennial desert water resource

- Revised monument newspaper, site bulletins, website, Junior ranger, and Desert ranger booklets
- Management of a diverse and successful Volunteers in Parks program
- Resource briefs and factsheets on the LCAS learning center website

Resource Management

- Quitobaquito's spring and pond system maintained a year-round water column in both 2011 1nd 2012 due to numerous temporary restoration measures providing critical habitat for the endangered Quitobaquito pupfish and other species of conservation concern
- Endangered Sonoran pronghorn recovery project: captive breeding and release to the wild, supportive recovery infrastructure
- Sustained abundant population of the endangered lesser long-nosed bat
- Cross border (Mexico/US) wildlife movement monitoring project
- Diverse partnerships with tribes, Federal and State agencies, Universities, Mexican counterparts, and NGOs
- Historic structure preservation field schools have been implemented each year since 2009
- Mitigated damage to archeological site via removal of historical dam structure
- Surveyed an estimated 1,000 acres of lands for cultural resources between 2010 and 2011; discovered 12 new sites
- Tri-national symposium addressing Sonoran Desert natural and cultural resource conservation issues
- Ecological monitoring program implementation —climate, rodent, reptile, vegetation, border impact monitoring, etc.
- Completed a comprehensive report on the Organ Pipe Cactus Ecological Monitoring Program—2006
- Completed the Organ Pipe Cactus Vital Signs Report—2010
- Abandoned mineral lands restoration and bat gate closures
- Invasive plant and animal monitoring and treatment programs
- Completed the legal description for the Organ Pipe Cactus wilderness—2010
- Development of multiple wilderness workshops designed to educate individuals working within wilderness areas
- Received regional and national wilderness stewardship award
- Added two quads to Surficial geology maps
- New NPS border policy and security protocol development
- Increased monument support of external research scientist—currently about 30 permittees

Management projects and actions addressing border related activities

- Supported diverse border infrastructure proposals: vehicle barrier, pedestrian fence, fiberoptic project, high tech surveillance tower system, forward operating base, tactical infrastructure maintenance and repair program, etc.
- Digitized thousands of miles of unauthorized vehicle routes using remote imagery
- USGS/NPS multi-year border impacts research project
- Consolidated multi-agency communications infrastructure on the top of Mt. Ajo
- Removed numerous abandoned vehicles from within wilderness
- Restored areas impacted by construction of vehicle barrier, pedestrian fence, and tower network
- Ongoing multi-year ecological restoration projects designed to mitigate border related impacts
- Built a new plant nursery to support restoration efforts
- Built two roads in support of a border security tower network project
- Frequent mending of fence breaks associated with border activities and addressing related trespass livestock issues
- Developed a soundscape monitoring program, soundscape mitigation at tower sites
- Established Horse trailer pullout on highway in support of US Border Patrol operations
- Implemented comprehensive interagency road signage and mapping program

Facilities Management

- Diverse remodeling projects which provided needed improvements to park dorms and housing units
- Replaced failing sewer system
- Multipurpose building/community center erected in park housing area
- Upgraded campground buildings with showers
- Fiber optic project implemented—upgrade of communications infrastructure
- Chip-sealed all paved roads in park
- Replaced water line for the campground
- Ongoing expansion of needed office space to meet new and growing needs

One of the greatest achievements at Organ Pipe Cactus National Monument in recent years is reopening approximately 52% of the monument to visitors; previously, almost 95% of the monument had been closed to the public. In addition, VRP has provided protection details to allow Maintenance, Interpretive and Resource Management Staff to work in areas of the Park closed to visitor and administrative use the Visitor and Resource Protection Division provides an average of two protection details per pay period. During

2011, VRP staff provided 49 protective details which totaled 768 VRP staff hours. The VRP Division contributed time, money and effort toward the purchase, construction, and outfitting of a new community center in the monument. This center currently houses physical fitness equipment and will have a kitchenette, a lounge, and a ramada for outdoor events in the future.

Installation of all new exhibits in the Visitor Center is another major achievement. The monument expanded outreach programs in the neighboring communities of Ajo and Why, and implemented public van tours to Quitobaquito on a limited basis. The monument developed new visitor bulletins and revised old bulletins, revised the junior ranger program, added information to the website, and produced a newspaper. The volunteer program brings in approximately 100 volunteers each year and has been highly successful in assisting interpretation, facilities and resources staff.

Another noteworthy accomplishment was the construction of a vehicle barrier along the international boundary, which was completed in 2006. Prior to construction, there were long stretches along the international boundary where vehicles crossed freely and continued off-road into wilderness. Today, although there are occasional breaches, the vehicle barrier has stopped the vast majority of illegal cross-boundary vehicle traffic and the project is considered a great success.

In addition, a multi-year research project was designed and implemented to assess the ecological effects of unauthorized vehicular and foot traffic related to illegal border activity. More than 250 plots were established throughout the monument to evaluate soil compaction and plant health as well as to survey for trash and invasive species near trails and vehicle tracks. Data were collected from both impacted and relatively undisturbed areas. With the cooperation of NPS law enforcement and private security, plots were set up throughout OPCNM in a stratified random design, which will allow for a robust analysis of impacts as well as identifying particularly vulnerable soil and vegetation communities. In addition, soil samples taken from OPCNM for lab analyses are being used to characterize soils and provide baseline information on the undisturbed structure of native soils for comparison with field conditions. Analysis with USGS partners is now underway and a final report will be produced in the winter of 2012.

The stabilization of the spring and pond system at Quitobaquito was also an important accomplishment. 2011 was the first time in many years that the pond maintained a deep water column throughout the year. This in turn helped assure the continued survival of a number of species of conservation concern including the Quitobaquito pupfish, and the Sonoyta mud turtle. 2011 also marked the first full year of a multi-year restoration program that is intended to address the diverse and abundant impacts associated with border related activities. This project is documenting impacts and using this information to develop plans for diverse and targeted restoration, education and prevention actions.

The monument's facilities have also been continually upgraded and improved in recent years. Visitor services have been improved by upgrading the campground buildings and showers, replacing the water line to the campground, and chip sealing all paved roads in the park. Park housing units have been improved with upgrades of appliances and furniture in three dorm units. The aforementioned multipurpose/community building was erected. Three new office units are being installed and modified to partially address a critical shortage of administrative and housing space within the park. A failing septic system has been replaced and expanded to accommodate increased use. Communication infrastructure upgrades were also accomplished via the implementation of a large scale fiber optic project. Monument staff have also provided assistance to US Border Patrol by building roads to border security infrastructure, constructing a horse-trailer pullout on Highway 85, consolidating interagency radio equipment on Mount Ajo, and coordinating road maintenance and repair activities. Interagency road signs are also being installed and maintained throughout the monument.

Chapter 4. Key Issues for Consideration in Management Planning

Organ Pipe Cactus National Monument remains an important conservation area within the Sonoran Desert Region of North America. The monument preserves a rich mosaic of cultural and natural resources that collectively represent the area's vibrant history. In collaboration with its many partners, the NPS continues to strive to understand, monitor and preserve these important resources for their continued enjoyment by present and future generations.

The monument conserves the geo-physical processes and biological communities that together form the natural, undeveloped, and untrammeled Organ Pipe Cactus wilderness. Monument monitoring results reveal that diverse taxonomic groups, indicative of the Sonoran Desert, such as columnar cacti, rodents, birds, lizards, and snakes remain stable. There are causes for concern, however. The effects of climate change, for example, though still undetermined, may dramatically alter the Sonoran Desert as we know it. A number of exotic, invasive plants and animals already have a foothold in the monument and the NPS needs to remain diligent in its efforts to limit their continued expansion. The status of endangered species occurring in the monument varies. The endangered lesser long-nosed bat is currently doing well, able to forage among the monument's abundant stands of Saguaro and Organ Pipe cacti. The endangered Quitobaquito pupfish is similarly doing well, although the Quitobaquito spring and pond system it depends upon has revealed a level of vulnerability that we only partially understand. The management actions that the NPS has implemented at Quitobaquito in recent years are temporary in nature. Ultimately, it will be necessary to develop more permanent measures, in consultation with our diverse partners and stakeholders, in order to stabilize the system and assure the continued survival of the

Quitobaquito pupfish and other species of conservation concern. The critically endangered Sonoran pronghorn still occurs in the monument; its numbers remain extremely low however, and its future is far from certain. Numerous and diverse Sonoran pronghorn recovery actions are being developed and their implementation is ongoing.

All monument resources are affected, in one way or another, by the current high levels of border-related activity. It is within this context that the monument continues to provide visitors with opportunities to experience the history and natural beauty of the Sonoran Desert. Issues related to the international border have obviously affected the park in profound ways, and direct and indirect impacts associated with border-related activities are found throughout the monument. The complex circumstances that currently exist at Organ Pipe Cactus National Monument present numerous and diverse management challenges. Responding to the resulting issues requires considerable time and effort. Law enforcement efforts have understandably been expanded. Overcoming obstacles like limited access to certain regions within the monument adds an additional layer of complexity to field work. Today, monument staff dedicates an enormous amount of time towards addressing border-related issues. This re-dedication of effort has made the continued implementation of long-established monitoring and management programs more challenging. By now, however, the monument has revisited each of its programs and adjusted them in consideration of current circumstances. The continued success of many of these programs is dependent upon finding ways to maintain data continuity and the robustness of each monitoring program's design in light of the monument's current reality. The following is a list of key monument issues that require continued consideration:

- Ensuring visitor, employee, and resident safety
- Safety zone management; within the monument certain areas are managed differently as determined during periodic safety assessments
- Continued implementation of a full range of Visitor and Resource Protection action
- Addressing diverse and ongoing impacts from border-related issues
- Continuous engagement with Department of Homeland Security (DHS) on diverse border-security initiatives
- Seeking reevaluation of the 2006 MOU between Departments of Homeland Security, Agriculture and Interior
- Finding ways to compensate for diversion of staff time and funding from other duties due to the influence of diverse border issues
- Preparing for possible plans to expand AZ State Hwy 85 to 4-lanes and 24-hr point of entry
- Monitoring the influence of climate change
- Continued management of Quitobaquito, and important perennial desert water source
- Continued involvement with multiple partners regarding recovery of the critically endangered Sonoran pronghorn
- Continued close collaboration with tribal and international counterparts regarding diverse Sonoran desert conservation issues
- Improving wilderness character by preventing and restoring border-related impacts within designated wilderness
- Invasive species management
- Continued implementation of a robust long-term ecological monitoring program
- Land acquisition relating to a private land inholding near Lukeville, AZ, two state inholdings, and a park expansion to the north which would permit the development of needed NPS and homeland security support infrastructure
- Addressing housing, administrative space, commuting, and quality of life issues, etc. in support of staff retention
- Addressing the deterioration of historic cultural resources, which is occurring faster than they can be maintained
- Improving our understanding of the effects and rates of natural processes, vandalism, looting, etc. on cultural sites

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See Also:

Collection of General References

Collection of Natural Resource-Related References

Collection of Cultural Resource-Related References

Collection of Visitor Experience-Related References

Other Park Infrastructure-Related References

Glossary

See the State of the Parks home page for links to a complete glossary of terms used in State of the Park reports. Definitions of key terms used in this report are as follows:

Baseline Documentation	Baseline documentation records the physical condition of a structure, object, or landscape at a specific point in time. A baseline provides a starting point against which future changes can be measured.
Border Patrol	The U.S. Border Patrol is an agency of the U.S. Customs and Border Protection. Border Patrol agents enforce the laws and regulations for the admission of foreign-born persons to the United States.
Carbon Footprint	Carbon footprint is generally defined as the total set of greenhouse gas emissions caused by an organization, event, product or person.
Climate Friendly Park	The NPS Climate Friendly Park designation requires meeting three milestones: completing an application; completing a comprehensive greenhouse gas (GHG) inventory; and completing a Climate Action Plan, which is the actions, policies, programs, and measures a park will put into place to reduce its GHG emissions.
Cultural Landscape Inventory (CLI)	A Cultural Landscapes Inventory describes historically significant landscapes within a park. The inventory identifies and documents each landscape's location, size, physical development, condition, characteristics, and features, as well as other information useful to park management.

Curation	National parks are the stewards of numerous types of objects, field notes, publications, maps, artifacts, photographs, and more. The assemblage of these materials comprises a museum collection. Curation is the process of managing, preserving, and safeguarding a collection according to professional museum and archival practices.
Department of Homeland Security (DHS)	A federal agency that, among other responsibilities, prevents and investigates illegal movements across U.S. borders, including the smuggling of people, drugs, cash, and weapons.
Exotic Plant Management Team (EPMT)	One of the ways the NPS is combating invasive plants is through the Exotic Plant Management Program. The program supports 16 Exotic Plant Management Teams working in over 225 park units. EPMTs are led by individuals with specialized knowledge and experience in invasive plant management and control. Each field-based team operates over a wide geographic area and serves multiple parks.
Facility Condition Index (FCI)	FCI is the cost of repairing an asset (e.g., a building, road, bridge, or trail) divided by the cost of replacing it. The lower the FCI number, the better the condition of the resource.
Foundation Document	A park Foundation Document summarizes a park's purpose, significance, resources and values, primary interpretive themes, and special mandates. The document identifies a park's unique characteristics and what is most important about a park. The Foundation Document is fundamental to guiding park management and is an important component of a park's General Management Plan.
Fundamental and Other Important Resources and Values	Fundamental resources and values are the particular systems, processes, experiences, scenery, sounds, and other features that are key to achieving the park's purposes and maintaining its significance. Other important resources and values are those attributes that are determined to be particularly important to park management and planning, although they are not central to the park's purpose and significance. These priority resources are identified in the Park Foundation Document and/or General Management Plan. The short-cut name that will be used for this will be Priority Resources.
Historic Integrity	Historic Integrity is the assemblage of physical values of a site, building, structure or object and is a key element in assessing historical value and significance. The assessment of integrity is required to determine the eligibility of a property for listing in the National Register.
Indicator of Condition	A selected subset of components or elements of a Priority Resource that are particularly "information rich" and that represent or "indicate" the overall condition of the Priority Resource. There may be one or several Indicators of Condition for a particular Priority Resource.
Interpretation	Interpretation is the explanation of the major features and significance of a park to visitors. Interpretation can include field trips, presentations, exhibits, and publications, as well as informal conversations with park visitors. A key feature of successful interpretation is allowing a person to form his or her own personal connection with the meaning and significance inherent in a resource.
Invasive Species	Invasive species are non-indigenous (or non-native) plants or animals that can spread widely and cause harm to an area, habitat or bioregion. Invasive species can dominate a region or habitat, out-compete native or beneficial species, and threaten biological diversity.
List of Classified Structures (LCS)	LCS is an inventory system that records and tracks the condition of the approximately 27,000 historic structures listed in the National Register of Historic Places that are the responsibility of NPS.
Museum Collection	NPS is the steward of the largest network of museums in the United States. NPS museum collections document American, tribal, and ethnic histories; park cultural and natural resources; park histories; and other aspects of human experience. Collections are managed by professionally-trained NPS staff, who ensure long-term maintenance of collections in specialized facilities.
Native American Graves Protection and Repatriation Act (NAGPRA)	A federal law passed in 1990. NAGPRA provides a process for museums and federal agencies to return certain Native American cultural items (e.g., human remains, funerary objects, sacred objects, objects of cultural patrimony) to lineal descendants and culturally-affiliated Indian tribes and Native Hawaiian organizations.

Natural Resource Condition Assessment (NRCA)	A synthesis of existing scientific data and knowledge, from multiple sources, that helps answer the question: what are current conditions of important park natural resources? NRCAs provide a mix of new insights and useful scientific data about current park resource conditions and factors influencing those conditions. NRCAs have practical value to park managers and help them conduct formal planning and develop strategies on how to best protect or restore park resources.
Priority Resource or Value	This term refers to the Fundamental and Other Important Resources and Values of a park. These can include natural, cultural, and historic resources as well as opportunities for learning, discovery and enjoyment. Priority resources or Values include features that have been identified in park Foundation Documents, as well as other park assets or values that have been developed or recognized over the course of park operations. Priority Resources or Values warrant primary consideration during park planning and management because they are critical to a park's purpose and significance.
Resource Management	The term "resources" in NPS encompasses the many natural, cultural, historical, or sociological features and assets associated with parks. Resource management includes the knowledge, understanding, and long-term stewardship and preservation of these resources.
Sonoran Desert Network (SODN)	One of 32 I&M networks established as part of the NPS Inventory and Monitoring Program. The Sonoran Desert Network comprises 10 parks in central and southern Arizona, and one park in southwestern New Mexico.
Specific Measures of Condition	One or more specific measurements used to quantify or qualitatively evaluate the condition of an Indicator at a particular place and time. There may be one or more Specific Measures of Condition for each Indicator of Condition.
Visitor and Resource Protection (VRP)	VRP includes, among other responsibilities, protecting and preserving park natural and cultural resources, enforcing laws that protect people and the parks, fire management, search and rescue, managing large-scale incidents, and on-the-ground customer service.
Wilderness	A designation applied to certain federal lands set aside for preservation and protection in their natural condition, in accordance with the Wilderness Act of 1964.