



Cooperative Conservation Along La Frontera



Southwest Border Resource Protection Program

*Promoting conservation and improving
international cooperation along La Frontera*

Table of Contents

Introduction	1-2
Monarch Butterfly Program	3-4
Sea Turtles Protected & Tracked	5-6
Archeological Survey Identifies Coronado Encampment	7-8
Re-Opened Border Crossing at Big Bend	9-10
Park Flight Program Tracks Migrating Species	11-12
Beetles Cross International Border	13
Teacher Workshops in Juarez/El Paso	14-15
New Arthropod Species Discovered	16
Chamizal Treaty	17
Rock Art Documented in 3 Border Parks	18-19
Study of 17 th -Century Indian Rebellions in Chihuahua	20
Native Vegetation Restored Along Lower Colorado River	21
Historic Ore Tramway in Big Bend	22-23
Camera Traps at Organ Pipe & El Pinacate Capture Elusive Species	24-25



The Southwest Border Resource Protection Program — Intermountain Region

Introduction

Nature knows no borders. Many birds, butterflies, sea turtles and other species that breed on U.S. and Canadian soil spend winters in Mexico, Central America and South America. Historically important landmarks of human culture, including the many colonial missions established by Spanish explorers and settlers, reach north from Mexico across the American Southwest.

Managers of the 411 units of the National Park Service know that no park or monument can operate in isolation, as an island apart. All must work with and learn from the managers, neighbors and resources on other lands around them to fulfill their parks' missions to the fullest.

Nowhere in the National Park System is that reality more profound than along La Frontera—the 2,000-mile U.S. border with Mexico. More than a dozen U.S. national parks, monuments, recreation areas, memorials and seashores lie on or within walking distance of this shared boundary, across from which Mexico manages nine of its own protected areas.

La Frontera has come to symbolize the promise and the challenge of international conservation.

Introduced exotic and invasive species such as tamarisk (salt cedar), hydrilla and giant cane have displaced native species and seriously disrupted ecosystems within Texas border park lands. At the same time, human actions have seriously damaged desert resources. In other boundary parks in Arizona and New Mexico, illegal cross-border traffic of undocumented immigrants, drugs and other illicit contraband have marred the landscape and disrupted major wildlife migration patterns and ecological processes. Important historic sites have been vandalized, and archeological sites have been looted.



To address these challenges, the SWBRPP provides financial assistance to U.S. national parks and nonprofit partner organizations to support research, inventory and monitoring, and other projects that preserve and restore threatened natural and cultural resources. Because education is key to every initiative, the SWBRPP also provides coordination and funding for conferences that bring resource managers together to focus on critical issues that the United States and Mexico share.

Lastly, the program supports the informal system of “sister parks” established by several U.S. national parks with federally protected areas in Mexico. Sister parks

foster sharing of information and regular, direct park-to-park contact to address mutual interests and concerns. SWBRPP helps facilitate new sister park agreements and provides funds for international travel. This report pulls together a diverse collection of projects funded by the Southwest Border Resource Protection Program. The projects highlight the serious issues confronting our border parks and some of the steps we have taken to address these ongoing resource challenges.

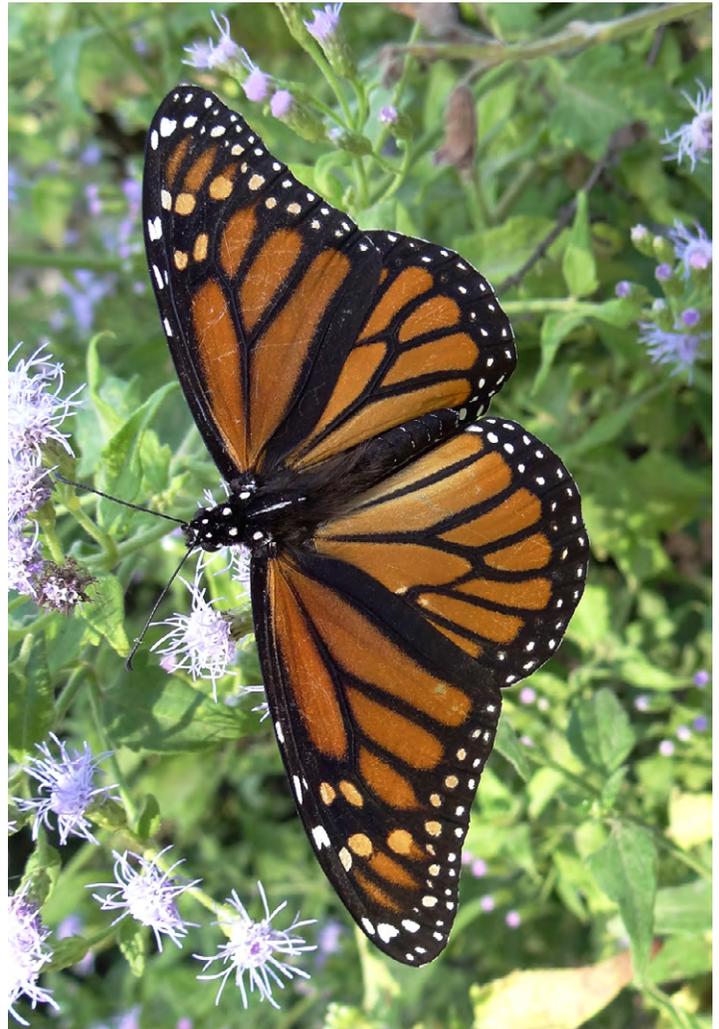
Monarch Butterfly Program Centers on Importance of Milkweed

If a popularity poll were taken for insects, the Monarch Butterfly would win, hands down. With their orange and black wings, Monarchs are easily recognizable, and they're found throughout much of the United States. They're also in trouble.

From a population of perhaps one billion in 1996, their numbers have plummeted by as much as 90 percent in recent years. The butterflies face numerous threats, but the biggest is loss of habitat, especially in regards to the milkweed plant, where Monarchs lay their eggs. Milkweed is the only food source for the caterpillar that hatches four days later, and it's on a milkweed leaf that the caterpillar becomes a pupa and morphs into a butterfly. Milkweed also provides nectar for adult Monarchs, who undertake one of the world's most remarkable migrations every year. They travel thousands of miles, funneling down from the north and through Texas to their overwintering sites in Mexico, then back again in the spring, though the journey north takes three to four generations to complete.

While milkweed grows in many places, plants in and around agricultural fields are a Monarch favorite—and that is the problem. As native prairie gives way to development and farms grow ever larger and more industrialized, habitat vanishes, especially with the introduction of genetically modified seeds for corn and soybeans. They often are referred to as “Roundup® Ready” crops because they are resistant to the herbicide Roundup. The milkweed, however, is not, and it dies off permanently when the herbicide is sprayed. Because corn and soybeans are the major crop in the nation's mid-section, sprayings occur in the exact path of the yearly Monarch migration.

Numerous initiatives are under way to protect and restore Monarch habitat, with the planting of milkweed a key component. In 2011 the Southwest Border Resource Protection Program, in collaboration with Palo Alto Battlefield National Historic Site (PAAL) and Amistad National Recreation Area, awarded \$19,900 to the North American Butterfly Association to develop a



A monarch migrating south on October 23, 2011 in Hidalgo County, TX. Photo courtesy: North American Butterfly Association.

Monarch Butterfly Program Centers on Importance of Milkweed (continued)

multi-faceted program to further conservation of Monarch Butterflies in South Texas, which lies in the heart of the Monarch migration path. Called the “Rio Grande Monarch Monitoring Partnership,” the program succeeded on many levels, including demonstrations on the Monarch lifecycle and importance of milkweed to thousands of visitors at festivals and botanic gardens, gardening clubs and service organizations, as well as schools, Head Start centers, and Scouting events.

Norman Winter of the National Butterfly Center in Mission, Texas, initiated a weekly newspaper column and radio program, and Center staff reached out to five big ranchers, one of whom planted a three-acre butterfly garden, including extensive milkweed. The Center, which is operated by the National Butterfly Association, made progress in cultivating four species of native milkweed and also located three species of milkweed at PAAL, findings that it turned over to the park.



Navarro kindergarteners inspecting milkweed. Photo courtesy: National Butterfly Center.

Sources:

1. "U.S. Fish and Wildlife, Conservation Partners Launch Campaign to Save Monarch Butterfly," *The Sand Paper*, <http://thesandpaper.villagesoup.com/p/u-s-fish-and-wildlife-conservation-partners-launch-campaign-to-save-monarch-butterfly/1305181>.
2. "Monarch Butterfly," National Wildlife Federation, <https://www.nwf.org/Wildlife/Wildlife-Library/Invertebrates/Monarch-Butterfly.aspx>.
3. "Finding, Collecting, and Growing Milkweed," University of Minnesota, <http://monarchlab.org/biology-and-research/monarch-rearing/finding-collecting-and-growing-milkweed/>.
4. "Flight of the Butterflies in 3D," SK Films, <http://www.flightofthebutterflies.com/home/>.

Sea Turtles Protected, Tracked at Padre Island National Seashore

The Kemp's ridley turtle, found primarily in the Gulf of Mexico, is the world's most endangered sea turtle. As early as 1966 the Mexican government initiated a recovery and conservation program near the village of Rancho Nuevo, where a 16-mile stretch of beach is the turtle's primary nesting ground. So important is Rancho Nuevo to the species that one day in 1947 an amateur filmmaker recorded an estimated 40,000 female Kemp's ridleys nesting on the beach there. Over the next few decades, however, the population declined so precipitously (primarily due to egg poachers and accidental capture by commercial shrimp trawlers) that as few as 1,000 Kemp ridleys remained in the world.

With the turtles on the edge of extinction, Mexico and the U.S. launched a bi-national recovery plan that linked Rancho Nuevo, in the state of Tamaulipas, and the protected beach at Padre Island National Seashore (PAIS) in Texas. From 1978 to 1988, more than 22,000 Kemp's ridley eggs were collected at Rancho Nuevo, packed in Padre Island sand and transported to the National Seashore, the goal being to imprint the hatchlings to Padre Island so they would return there to nest.



Green sea turtle on PAIS. Photo courtesy: National Park Service.

From that start, recovery efforts at Padre Island have expanded to include daily beach patrols to locate and protect nesting Kemp's ridleys, as well as the use of satellite transmitters (79 deployed from 1997 to 2013) to track the turtle's habitat and migration patterns. During nesting season, which runs from April through July, adult female turtles lug their bodies from the water and lay their eggs in the sand, a process that might take 45 minutes. The nests are hard to find because the tracks are faint and disappear on windy days, which the Kemp's ridleys prefer. Once a nest is found, most of the eggs are brought to the incubation facility at Padre Island, though eggs from some of the nests found at the less accessible southern end of the National Seashore are placed into a large screen enclosure called a corral and allowed to incubate there. All hatchlings are released and allowed to go free.

The Southwest Border Resource Protection Program has provided project funding for a number of years, including a three-year, \$195,000 allocation for 2013 through 2015, which has enabled Padre Island to add seasonal staff to help in the recovery efforts.



Young Kemp's ridleys make their way to the sea for the first time on PAIS. Photo courtesy: National Park Service.

Sea Turtles Protected, Tracked at Padre Island National Seashore (continued)

“The funding and collaboration with Mexico is very important,” said Dr. Donna Shaver, Chief of the Division of Sea Turtle Science and Recovery at Padre Island National Seashore, and “the species is migratory so recovery needs to be a bi-national collaboration.” Shaver, who has been at Padre Island since 1980 and started the turtle recovery program there, said bi-national tracking allows scientists to understand “the breadth of nesting ranges for an entire area instead of focusing on just one place.” Most recently, the National Seashore partnered with an aquarium in Veracruz, Mexico (*Acuario de Veracruz*) to apply 10 satellite transmitters to track Kemp’s ridleys found nesting on beaches at Tecolutla, the southern-most edge of the turtles’ historical range. Padre Island is at the northern edge, and Rancho Nuevo at the center of the historical range.



GPS trackers have given us a clearer understanding of Kemp's ridleys' year-round behavior. Photo courtesy: National Park Service.

Satellite tracking has shown, for example, that adult males found near Rancho Nuevo remained close to the nesting beach year-round. On the other hand, many female Kemp’s ridleys, after nesting at Padre Island, travel north in a line parallel to the Gulf Coast to forage. The turtles prefer shallow coastal areas, bays and lagoons where they dive to the bottom to feed on crabs, other shellfish, and jellyfish.

Recovery efforts have shown progress over the years, but a steep decline of nesting turtles was registered immediately following the 2010 Gulf oil spill, which coincided with nesting season. (The coast of Louisiana is a major foraging area.) In 2014, wildlife biologists recorded 119 nesting sites along the Texas coast, down significantly from a high of nearly 200 before the spill.

Sources:

1. “Kemp’s Ridley Sea Turtle,” National Park Service, <https://www.nps.gov/pais/learn/nature/kridley.htm>.
2. Donna J. Shaver and Cynthia Rubio, “Post-nesting movement of wild and head-started Kemp’s ridley sea turtles *Lepidochelys kempii* in the Gulf of Mexico,” <http://www.int-res.com/articles/esr2007/3/n003pp10.pdf>.
3. W.N. Witzell, et al., “Nesting Success of Kemp’s Ridley Sea Turtles, *Lepidochelys kempi*, at Rancho Nuevo, Tamaulipas, Mexico, 1982-2004,” <http://aquaticcommons.org/9706/>.
4. “Fears confirmed: Texas turtle in trouble,” *Houston Chronicle*, November 18, 2014.
5. Donna Shaver, telephone interview, February 20, 2015.

Although the nesting population at Padre is far below population sustainability, a record 209 Kemp’s ridley nests (with 20,067 eggs) were found in Texas during 2012. Of those nests, 106 were found at Padre Island National Seashore.

Archeological Survey Identifies Coronado Encampment

For more than a decade, archeologists have been trying to identify the precise route that 16th-century Spanish explorer Francisco Vasquez de Coronado took from the Sonora River Valley of Mexico, through the American Southwest and into what today is Kansas. Many believed the Coronado expedition had visited the Pecos Pueblo, which is located between the towering Sangre de Cristo Mountains and the Pecos River Valley in northern New Mexico. Using \$73,000 of Southwest Border Resource Protection Program funding, the National Park Service assembled a team of prominent archaeologists to confirm these suspicions. The team included cultural anthropologists Professor Douglas Scott (Colorado Mesa University), Peter Bleed (University of Nebraska), Professor Angelica Maria Madrono Enriquez (Autonomous University, Zacatecas), National Park Service archaeologist Charles Haecker, and students from the University of Nebraska at Lincoln.



These photographs show the remains of the Pecos Pueblo. George C. Bennett and W. Henry Brown photographed several historical sites in northern New Mexico in the 1870s and 1880s. Photo courtesy: Amigos de Cerillo Hills State Park.

The survey, which employed techniques from metal detection to ground penetrating radar, uncovered a number of artifacts linked to Coronado and his 1,200-man expedition.

The National Park Service administers Pecos National Historical Park and preserves and interprets the ruins of a large pueblo village that once served as a trade center between villagers who grew maize, cotton, beans, and squash and nomadic Apache and Comanche hunters from the Plains. Pecos Pueblo was an important village where different cultures met and exchanged goods at trade fairs. Encounters were not always peaceful, including a raid by elements of Coronado's party in 1541.

When the archeological team arrived at Pecos National Historical Park in the summer of 2011, members focused on the twelve-acre trade fair site and surrounding uplands, where they discovered significant new evidence and artifacts. Among discoveries were artifacts from members of Coronado's 1541 expedition, who camped nearby and laid siege to the pueblo. Fired lead shot and metal arrow points, for instance, were found over a broad area to the east and northeast of the pueblo.



Metal detectors helped researchers find everything from bullets to buttons. Photo courtesy: National Park Service.

Archeological Survey Identifies Coronado Encampment (continued)

Evidence of a Coronado Expedition-related encampment also was found on high ground to the northeast of the pueblo. Uncovered at the encampment site was a cluster of horseshoe nails characteristic of the Coronado Expedition, as well as bridle parts, a copper coin dated from the sixteenth century and metal fittings characteristic of sixteenth-century men's clothing. To date the project team has identified eleven Coronado-related sites and made hundreds of 1540s-era Spanish artifacts available for research.

Each bit of information has offered Pecos National Historical Park a more comprehensive understanding of the nature and route of the Coronado Expedition, information that will be invaluable in park management, planning, and interpretation.



Team members flagged each artifact upon discovery. Photo courtesy: National Park Service.

Re-opened Border Crossing Makes for Good Neighbors, Improved Conservation

Just a mile across the Rio Grande from Big Bend National Park is Boquillas del Carmen, a sleepy little border town in the state of Coahuila, Mexico. For years no visit to Big Bend was considered complete without crossing the Rio Grande into Mexico – without a passport – and spending a few hours having lunch, talking to villagers, and exploring the town’s artisan wares. Boquillas welcomed tourists as the key to its economy. After the September 11, 2001, terrorist attacks, however, new border restrictions halted the tourist flow to Boquillas. The town fell on hard times, and many residents moved away.

But, on April 10, 2013, happier times returned to Boquillas—and to Big Bend National Park—with the opening of the new Boquillas Crossing Port of Entry station. Situated in a new, modern pueblo revival-style building within Big Bend National Park, the Port of Entry operates as a partnership between the National Park Service (NPS) and U.S. Customs and Border Protection (CBP). NPS personnel staff the building, where arriving visitors use two kiosks to transmit their travel documents (including a passport) to a CBP officer in El Paso.

When *New York Times* reporter Whitney Joiner made the trip from Big Bend to Boquillas on a sweltering afternoon in May 2014, she told of following the path “under the mesquite and willows” from the Port of Entry building to the Rio Grande. “A cluster of men sat on folding chairs under a tarp on the Mexican side, waiting for American tourists to appear,” she wrote. “Soon, we were in a rowboat steered by one of them, heading briskly over to Mexico, a seven-minute trip.” Once across the river, she had her pick of transportation to Boquillas—truck, burro, or foot. “I requested the burros,” she recalled, “the obvious tourist option . . . We passed trucks with children and dogs piled in the back as we meandered into town.” Once there, she had her passport stamped at an immigration trailer and then was free to wander the dusty village. The day Joiner visited, she counted two restaurants, a bar, and a few souvenir shops. She bought a small rock painted with an ocotillo cactus and then headed back across the border.

While the border crossing offers Big Bend visitors a rich cultural experience – and the opportunity to be a good neighbor – it also has a positive impact on



Photo courtesy: National Park Service.

Re-opened Border Crossing Makes for Good Neighbors, Improved Conservation (continued)

park management on both sides of the border. Thus, the Southwest Border Resource Protection Program awarded close to \$500,000 to help construct the facility and to host workshops for National Park staff and their counterparts in four sister parks just across the Rio Grande in Mexico: Maderas del Carmen, Cañon de Santa Elena, Ocampo, and Rio Bravo del Norte Natural Monument. The meetings have fueled efforts to address bi-national conservation of the two nation's shared desert ecosystem. The challenges are many, aptly illustrated by the simple difficulty – prior to the re-opening of the Boquillas border crossing – of having a face-to-face meeting between American and Mexican counterparts. Scientists and resource managers were forced to travel hundreds of miles to the nearest legal crossing, at Del Rio, Texas-Ciudad Acuña, Coahuila, even though the sister parks are nearly a stone's throw across the Rio Grande. The new Port of Entry has streamlined communication and enhanced collaborative resource management.

The Port of Entry is about a mile and a half east of the Rio Grande Village Campground at Big Bend National Park and operates from 9 a.m. to 6 p.m. Wednesday through Sunday (hours change with the time of year). Individuals crossing into Mexico must have a Western Hemisphere Travel Initiative approved document, which includes a U.S. passport or passport card.

Information about documentation and Boquillas is available from the staff at the Boquillas Crossing Port of Entry or the U.S. Customs website.

Sources:

1. Whitney Joiner, "With Border Reopened, Crossing the Rio Grande to Mexico," *The New York Times*, May 22, 2014.
2. Travis Bubenik, "With Border Crossing Open for a Year, Hopes are High in Boquillas del Carmen," Marfa Public Radio/West Texas Public Radio, April 23, 2014.
3. "Opening of Boquillas Border Crossing and Update to the Class B Port of Entry Description," *Federal Register*, December 28, 2012.
4. "Boquillas Border Crossing Marks First Anniversary April 10," U.S. Customs and Border Protection, April 8, 2014.



View from the U.S. side of the Boquillas Border Crossing. Photo courtesy: <https://discoverboquillas.wordpress.com>

Park Flight Program Tracks Migratory Birds on Both Sides of Border

National borders mean nothing to migratory birds such as the Western Tanager and Violet-Green Swallow.

They spend the summer at Bandelier National Monument or Mesa Verde National Park and then fly south to winter in Mexico, or Central or South America. Protecting bird habitat is an international affair that requires countries to work together through efforts such as the Park Flight program, now in its eleventh year at Bandelier.

Since 2009, the Southwest Border Resource Protection Program has helped fund a total of seven interns from south of the border who have come to Bandelier National Monument to work and learn. During that time, nearly 10,000 birds of 118 subspecies have been captured, banded, and released in Bandelier and nearby Mesa Verde National Park. In addition to identifying movement patterns and life-cycle problems for the migratory birds, the Bandelier project aims to develop leaders who will return to their home countries to promote conservation efforts there.

In 2014 and 2015, the SWBRPP awarded a total of \$67,779 to the program. Funding allows the park to hire and house two interns to study migratory birds at Bandelier and Mesa Verde. In 2013, for example, Vanessa Sandoval of Bolivia and Jaime Garizábal of Colombia arrived at Bandelier to study the park's migratory birds. They spent hundreds of hours banding as many as 56 subspecies of neotropical birds, as well as teaching fifth- and sixth-graders about bird ecology.

The program teaches interns to implement a protocol known as Monitoring Avian Productivity and Survivorship (MAPS), which involves using mist nets to capture and band birds at six MAP stations over the summer. Three stations are in mix-conifer forests at Bandelier, and three are in piñon-juniper woodlands at Mesa Verde.



Western Tanager



Violet-green Swallow

Park Flight Program Tracks Migratory Birds (continued)

The Nature Conservancy and the Desert Southwest Cooperative Ecosystem Study Unit (CESU) contributed to project costs, while the Pajarito Environmental Education Center (PEEC) in Los Alamos, New Mexico, helped the interns develop and deliver classroom presentations and take students on field trips.

The population decline of migratory birds is alarming. Between 1967 and 2007, numbers in the U.S. fell 70 percent, from an estimated 17.6 million to 5.35 million.¹ Data from monitoring stations across North America indicate that the decline is geographically extensive, involving more than 25 percent of bird species for which scientists have reliable data. Monitoring life-history rates and population changes of migratory birds is the first step in a scientific process to better understand and to help prevent this serious decline.

Sources:

1. G.S. Butcher and D.K. Niven, *Combining Data from the Christmas Bird Count and the Breeding Bird Survey to Determine the Continental Status and Trends of North American Birds* (Ivyland, PA: National Audubon Society), 2007.

Since 2009, the Southwest Border Resource Protection Program has helped fund a total of seven interns from outside the U.S. and Mexico who have come to Bandelier National Monument to work and learn.



Intern Pilar Gonzalez (2012, from Mexico) holds a hatch-year (immature) sharp-shinned hawk just before releasing it. Note the brown streak on the breast of this bird, versus the white and orange pattern in the photograph below; these are the same species, but different ages. Photo courtesy: U.S. Fish and Wildlife Service.



Pilar holds an adult male Sharp-shinned Hawk (Spanish: Gavilán Pajarero) just before releasing it. This hawk breeds across Canada, the U.S., and Mexico, and winters across the U.S. and Mexico south to Panama. Photo courtesy: U.S. Fish and Wildlife Service.

Beetles Cross International Border in Fight Against Invasive Saltcedar

If water is the lifeblood of the American West, then saltcedar (genus *Tamarix*), that most thirsty of shrubby trees, is Plant Enemy No. 1. It has spread its long roots and laterals all across the Southwest and into northern Mexico, pushing out native species as it monopolizes the limited water sources.

So invasive has the saltcedar, also known as tamarisk, become along the Rio Grande that it now is the dominant plant species in the watershed. It has replaced many native trees, shrubs and grasses, degraded wildlife habitat, and eroded the river bed.

As early as 2003, the Maderas del Carmen Flora and Fauna Protected Area in the Mexican state of Coahuila took action by hiring workers to physically remove saltcedar from Boquillas Canyon. Big Bend National Park followed suit in 2005 and then, in 2009, took a new, “pest management” approach by releasing the saltcedar leaf beetle (*Diorhabda sublineata*) at two sites along the Rio Grande. The beetle larvae, especially, feed on the saltcedar’s soft bark and foliage, causing the leaves to turn brown and drop to the ground. So successful was the beetle introduction at Big Bend that by the end of the 2010 growing season, saltcedar (also known as tamarisk) was showing signs of stress all along the Big Bend reach of the Rio Grande.

By 2012 the beetles were well-established and chewing saltcedar as far west on the Rio Grande as New Mexico and as far south as Ciudad Delicias on the Rio Conchos in the Mexican state of Chihuahua.

Mexican scientists and agencies are working with staff at Big Bend to monitor the beetle spread and its effects, including efforts to protect a popular shade tree in Mexico, the athel, which the beetles, unexpectedly, have damaged. In 2014, the Southwest Border Resource Protection Program provided \$28,600 to monitor the beetle impact and find ways to protect the athel tree. Program partners in the United States and Mexico are sharing information and expertise as they also work to understand how the continued reduction of saltcedar cover will influence river flows and sediment movement within the larger Rio Grande/Rio Bravo region.



Saltcedar (brownish in color), native to Eurasia, has spread throughout much of the southwestern U.S. and northern Mexico. Photo courtesy: National Park Service.



Saltcedar leaf beetles, just under a centimeter long, feed exclusively on tamarisk leaves for the first 4-5 weeks of their lives. Photo courtesy: National Park Service.

Teacher Workshops Introduce City Dwellers to the Natural World

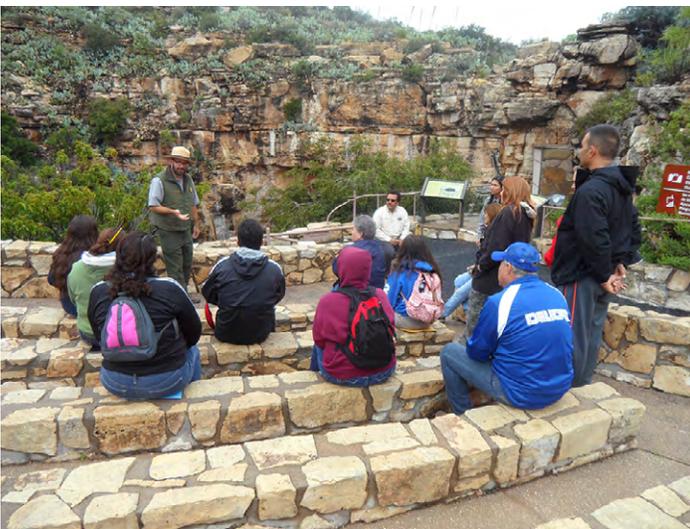
With a population of about 1.5 million, Ciudad Juárez is the largest city in the Mexican state of Chihuahua. If combined with the population of El Paso, Texas, which sits just across the Rio Grande, the binational metropolitan area counts an estimated 2.5 million residents, ranking it as the second largest metro area on the U.S.-Mexican border (behind only Tijuana-San Diego). Urban though they are, Juárez and El Paso lie in the Chihuahua Desert, with its fragile habitat and proximity to natural areas as fascinating as Carlsbad Caverns and as diverse as the Lincoln National Forest, where vegetation ranges from rare cacti at low elevations to Engelmann spruce in sub-alpine forests.

Concerned that urban dwellers are becoming disconnected from such natural areas, staff at Carlsbad Caverns National Park (CAVE) instituted International Teacher Workshops, where schoolteachers from both sides of the border come to CAVE for four days of immersion into the natural resources that lie just outside the cities in which they live. The idea is for educators to carry the insights they gain back to their classrooms, where they can introduce their students to the natural world and inspire them to become future environmental



Teachers from Juárez, Mexico and Carlsbad, New Mexico come together to learn about the Chihuahuan Desert ecosystem while attending a teacher workshop at CAVE. Photo courtesy: National Park Service.

stewards. The workshops, one in the spring and one in the fall, were funded in 2014 with a \$5,720 award from the Southwest Border Resource Protection Program. The funding covered the costs of transportation, lodging, and teaching supplies for 35 to 40 teachers—from elementary through high school—to come to CAVE for the workshops. Teachers arrived from El Paso and Las Cruces, New Mexico; and from Juárez and Delicias, Chihuahua.



CAVE Ranger Glenn Reynolds explains the importance of the cave habitat to teachers from Mexico. Photo courtesy: National Park Service.

Park guide Georgina Jacquez recalls how the teachers went on field trips not only within CAVE, but also to nearby Guadalupe Mountains National Park, the Lincoln National Forest, and to the Living Desert Zoo and Gardens State Park in the town of Carlsbad, where staff from each site assisted in the workshops. “We went on hikes and discussed what we observed and the wildlife; how different animals adapt,” Jacquez said. Back in the classroom, teachers were given a curriculum guide and

Teacher Workshops Introduce City Dwellers to the Natural World (continued)

introduced to activities they might consider using in their own classrooms. A popular activity was using feathers, twist wire and other craft materials to design and build their own animals. “It was based on how the animal would adapt,” Jacquez explained. Many desert animals go out at night to avoid the heat, for example, “so it would have big eyes,” she said.

The workshops not only create a personal connection to the environment for educators, but also introduce them to the National Park Service mission of protecting and preserving cultural and natural landscapes. The workshops also open cross-border lines of communication that foster awareness about binational issues such as water conservation and vandalism of cave formations or plant life. “Education is one of the most powerful tools we can use to instill a sense of stewardship in urban populations,” CAVE said. “If we educate others about resource protection issues and establish a personal connection to those resources, they are more likely to help protect those resources.”



Teachers from all over Mexico embark on the journey 750 feet underground into Carlsbad Caverns. Photo courtesy: National Park Service.



Teachers from Mexico learn the importance of fire to a desert ecosystem. Forest service Ranger Michael Salmon, far right, led the activity. Photo courtesy: National Park Service.

Researchers Document 22 New Arthropod Species at Two Desert Parks -

Arthropods comprise the largest animal population on earth, with more than 800,000 named species. With such huge numbers, no comprehensive survey had ever been conducted at Cuatrociénegas Natural Protected Area in Coahuila, Mexico, and only one survey at White Sands National Monument, and that was nearly 70 years ago.

With \$126,000 in funding from the Southwest Border Resource Protection Program, researchers from the University of New Mexico's Museum of Southwestern Biology set out in 2010 and 2011 to develop an inventory of potentially undescribed and endemic arthropods at the two parks, which share the extreme habitat of the Chihuahuan Desert, as well as rare gypsum sand dunes. After collecting 6,372 specimens in total, researchers identified five new species of arthropods from White Sands and seventeen from Cuatrociénegas. Arthropods are invertebrate animals and include insects (such as grasshoppers, beetles and ants), arachnids (such as spiders, scorpions, ticks and mites), crustaceans (such as crabs, shrimps, and barnacles), chilopods (centipedes) and diplopods (millipedes). Arthropods have similar bodies (divided into distinct parts), skeletons (on the outside of their body), jointed legs and appendages, and bilateral symmetry.

The discoveries at White Sands and Cuatrociénegas (translated four swamps) include new species of beetles, crickets, katydids, moths, cockroaches, robber flies, and grasshoppers, including one species of grasshopper found at both parks. A number of collection techniques were used, from aerial netting, beating sheets, and pitfall traps, to UV light traps to collect scorpions. Samples were transported to the laboratory at the Museum of Southwestern Biology, where they were further curated and labeled, and the information entered into a database. Because the sampling was limited to



A grasshopper in the genus *Anconia* is among the new species identified in White Dunes of White Sands National Park and Cuatrociénegas National Protected Area. Photo courtesy: National Park Service.

target taxa (depending on whether taxonomic experts were available to identify the samples), investigators David C. Lightfoot, Karen Wright, and Kelly B. Miller, would like to see further inventories.

Their final report, “Joint Research on the Endemism of White Sands National Monument, USA, and Cuatrociénegas Protected Area, Mexico: Arthropods,” also advises that the new species be included in both parks' natural resource management plans, with special attention given at White Sands to the specific habitat of a new grasshopper species found in the damp saline soils supporting the inland salt grass. At Cuatrociénegas, the report calls for protecting riparian and wetland habitats where some new species were found. Water diversions for agriculture outside of the Cuatrociénegas Basin pose the greatest threat to these species, the report states; also of concern is that heavy livestock use has trampled and compacted the soil.

Sources:

1. "Arthropod Information," Center for Insect Science Education Outreach, University of Arizona.
2. Dr. Bruce E. Fleury, “Introduction to Arthropods,” Tulane University lab guide.

Documents Shed Light on Chamizal Treaty of 1963 -

According to poet Robert Frost, "good fences make good neighbors," but what of a river when the river changes course?

For the U.S. and Mexico, the Rio Grande caused a neighborhood dispute so turbulent that Texas Rangers were once called in to calm the waters. The dispute began in 1864 when a flood shifted the course of the Rio Grande, leaving a patch of Mexican land known as the Chamizal within the boundary of the U.S. The middle of the Rio Grande had long been established as the international boundary, but what now? Did the U.S. own the 437-acre Chamizal, or did Mexico?

For nearly 100 years the question was a thorn in relations. In 1909, when Presidents William Howard Taft and Porfirio Diaz met to try to settle the dispute, tensions ran so high that the Texas Rangers, as well as 4,000 U.S. and Mexican troops, were called in to provide security. When nothing was resolved, the two nations set up an arbitration committee in 1911. The committee recommended that the land be returned to Mexico, but the U.S. refused to do so.

It wasn't until 1963 that the Chamizal Treaty resolved the dispute. A number of things happened under its provisions: the Chamizal tract was returned to Mexico and the 5,600 U.S. residents living there were told to relocate; the Rio Grande was rechanneled in a cement bed as it flowed between El Paso and Ciudad Juárez; and part of a nearby peninsula known as Cordova Island was ceded to the U.S.

"An old argument has ended," President Lyndon Johnson said a few years later when he crossed the border into Juárez to visit a monument erected by Mexico to commemorate the settlement. On the American side, a "peace park" was created in El Paso—today's Chamizal National Memorial, on the portion of Cordova Island given to the United States under the treaty. Today, Chamizal National Memorial acts as a cultural center, celebrating the culture, history, and heritage of the U.S.-Mexico Borderland.

To better understand the long and complex history of the Chamizal Treaty of 1963, the Southwest Border Resource Protection Program provided \$33,696 in 2014 funding to the Spanish Colonial



AMBASSADOR MANN, left center, with glasses, speaks to Chamizal residents.



This newspaper article serves as a reminder of the impact that the Chamizal Treaty had on thousands of ordinary people. Source: Marshall Hail, "Chamizal 'Little People' Ask for 'Just Treatment,'" *Herald-Post* (El Paso), February 21, 1963, The University of Texas at El Paso, Special Collections, MS143, James Papers (1900s-1960s), Binder 1, Newspaper clippings.

Research Center to update and digitize historical information. The project also focused on the relationship of Chamizal National Memorial to its sister park, Parque de Chamizal in Ciudad Juárez. The Spanish Colonial Research Center is based at the University of New Mexico in Albuquerque.

From repositories in Texas, Arizona, New Mexico, California, and Washington, D.C., researchers collected nearly 21,000 pages of primary and secondary documents concerning the international boundary dispute and the establishment of the memorial. Documents were digitized, inventoried, and presented to Chamizal National Memorial staff; materials will aid in interpretation and the development of programs to enhance understanding and appreciation of the border's shared cultural heritage. The Chamizal tract and the national memorial get their name from the *chamiza* plant, a hearty shrub with prickly leaves that thrives in salty soils and is common to the area surrounding El Paso.

Indian Rock Art Documented at Three Borderland Parks

At Big Bend National Park, hikers along the Indian Head Trail are sure to encounter pictographs (drawings or paintings) and petroglyphs (carvings) left on cliffs and cave walls by Indian people who lived in or passed through the area for thousands of years. The hike is short and the access so easy that park archeologists worry about vandalism, which already has occurred. The story is similar at other borderland parks, including Carlsbad Caverns and Guadalupe Mountains, where Indian rock art faces threats not only from people but from the weather and other natural processes such as mineralization and spalling (chipping or flaking).

To address concerns, the Southwest Border Resource Protection Program provided \$53,144 in 2014 funding to three parks to identify and document significant rock art sites. Park personnel, with assistance from two students from Mexico and Rupestrian CyberServices, a company based in Flagstaff, Arizona, then spent three weeks in the field documenting petroglyphs and pictographs at nine endangered sites. The team took high-resolution photographs, assessed the panel conditions and made field sketches. Back in the lab, they enhanced images and created panoramas and 3D models.

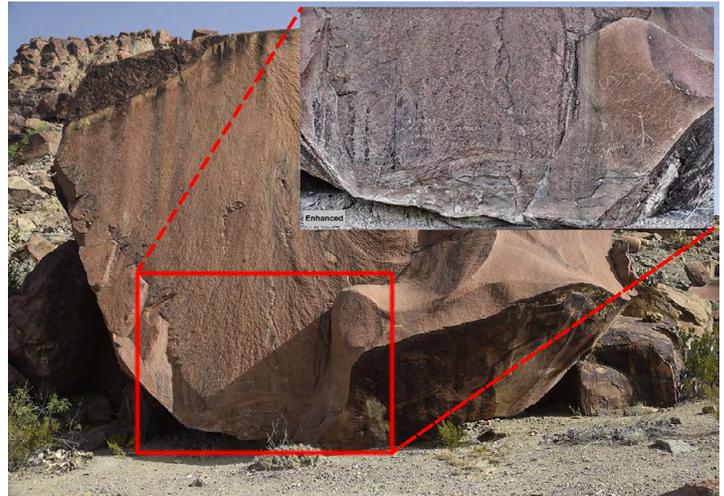


Figure 1: The enhanced image (top right) from Big Bend National Park shows details from the area enclosed in red (bottom). Photo courtesy: National Park Service.

An interactive Acrobat file, created for land managers, links a location map to the panel images. The documentation of current site conditions is useful in assessing future impacts to sites. The inventory and 3D images are important not only to interpreting cultural lifeways along the border, but to educating the public about the need to protect fragile rock art sites.



Figure 2: A total of 444 overlapping images were stitched together to create this image from Big Bend National Park. Photo courtesy: National Park Service.

Indian Rock Art Documented at Three Borderland Parks (continued)

At Big Bend National Park, the team documented 41 panels of petroglyphs and pictographs that span multiple time periods, from the Archaic (8,000 C.E. to 1,000 B.C.E.) to the more recent Historic Era when Chisos Indians and Mescalero Apaches inhabited the Big Bend region, as late as the 19th century.

At Guadalupe Mountains National Park, the team documented sites in McKittrick Canyon, DeMoss Meadow and Devil's Hall. Some of the rock art has faded and one petroglyph boulder is threatened by its proximity to a major highway.

At Carlsbad Caverns National Park, the team backpacked to three rock shelters in the Upper and Lower Slaughter Canyons, including Hunter's Shelter, where Adriana Medina, a student from Mexico, discovered several small paintings that were overlooked in past documentation. The team also recorded Painted Grotto and another site, where a large ceiling is decorated with shades of red, black, and yellow geometric paintings, recently damaged by spalling. The team stitched together 444 overlapping images to create the example in Figure 2.



Figure 3: A daddy-longlegs (center right) provides scale for images on this rock art at Carlsbad Caverns National Park. Photo courtesy: National Park Service.



Figure 4: This is the view out from a rock shelter in Guadalupe Mountains National Park. Photo courtesy: National Park Service.

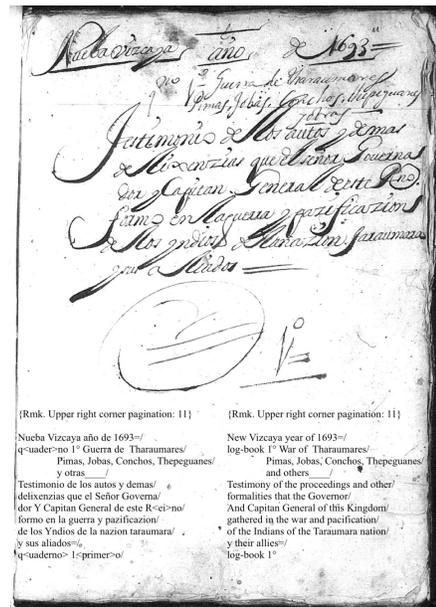
Study Compares 17th-Century Indian Rebellions in New Mexico, Chihuahua

In the 1600s, when Franciscan friars and Jesuits built missions to convert indigenous people to Catholicism, no border divided Mexican Chihuahua and present-day New Mexico. Spanish missions dotted both sides of today's border, and people came and went on the Camino Real de Tierra Adentro, the Spanish "Royal Road," a trade route that stretched from Mexico City to Santa Fe. The route passed right through the Tarahumara region of Chihuahua, where the native Tarahumara people had lived for at least two thousand years before the arrival of the Spanish in the mid-1500s. As the Camino Real stretched north, it connected Tarahumara and the Indian pueblos in New Mexico.

Documenting the historical connection between the 17th century Spanish missions in Chihuahua and those in New Mexico is a goal of historians at the Spanish Colonial Research Center at the University of New Mexico. In 2012 and 2013, the Southwest Border Resource Protection Program awarded a total of \$50,000 to the center to pursue this goal. Work ensued on a comparative study of Spanish missions that focused on the Tarahumara Rebellion of 1690 in Chihuahua and the Pueblo Revolt of 1680 in New Mexico. The two Indian rebellions were among many that occurred in the region as the Spanish exploited Indian labor and Catholic missionaries suppressed native religions.

In the first year of funding, staff at the Spanish Colonial Research Center transcribed, inventoried and catalogued three rolls of microfilmed documents from the Archivo General de las Indias in Seville, Spain. They also compiled a bibliography of primary and secondary sources related to the Tarahumara Rebellion, as well as an inventory of mission sites in the Tarahumara region. Included was a detailed map and description of the Tarahumara pueblos visited by Captain Juan Fernández de Retena, whose militia laid siege to Tarahumara lands during the 1690 revolt.

In the second year of funding, researchers compiled a selected bibliography related to the Pueblo Revolt of 1680 and created a narrative history, *The Tarahumara and Pueblo Revolts: A Shared History*



Transcription and translation of first page of "Expediente concerning the uprising of the Tarahumara Indians and their allies in Nueva Vizcaya, 1693-1695," Archivo General de Indias, Sevilla, document housed at the Spanish Colonial Research Center, University of New Mexico.

between Mexico and the United States. Written by Joseph P. Sánchez, Ph.D., the history compares the 1680 revolt in New Mexico to that in Tarahumara a decade later. Sánchez concludes that the Pueblo Revolt of 1680—which drove settlers and missionaries out of New Mexico for twelve years—resonated among the Tarahumara people and their cohorts, among whom were the Conchos, Tephuanes, and Pimas. The rebellion, Sánchez writes, "shook Spanish colonials into recognizing that colonial policies and missionary activities needed to be reconsidered" in Chihuahua, just as they had in New Mexico.

The study, which includes an inventory of mission sites in the Tarahumara region of Chihuahua, will aid Mexico's *Instituto Nacional de Antropología e Historia* (INAH) and the National Park Service, which oversees seven mission sites in New Mexico, in interpretation and management. Many of the archival sources used in the study are housed at the Spanish Colonial Research Center and Zimmerman Library at the University of New Mexico in Albuquerque.

Native Vegetation Grows Again on Banks of Colorado River at Yuma, Arizona

The city of Yuma, Arizona, located just north of the border with Mexico, would not exist if it weren't for the Colorado River. Yet, historically the city so neglected and abused the Colorado that a 110-acre stretch of riverfront was used as a dumping ground. Invasive species including phragmites (the common reed) and salt cedar, which looks like a ratty pine tree, took over the city's entire riverfront—east to west—pushing out native vegetation and destroying what once was a diverse habitat for wildlife.

All that has changed over the past 30 years thanks in part to the Yuma Crossing National Heritage Area, which has worked with the city, private landowners, federal agencies, a Mexican environmental organization, and the Quechan people to restore Yuma's riverfront. Today, that 110-acre dumping ground is the city's West Wetlands, a public park with a two-mile paved trail for walking, biking and bird watching. The trail connects to the city's 1,418-acre East Wetlands, which also have been restored.

To keep invasive species at bay and to enhance native habitat, the Yuma Crossing National Heritage Area received \$50,000 in 2014 from the Southwest Border Resource Protection Program. With funding in hand, the NHA partnered with Pronatura Mexico, a Mexican conservation group, to revegetate one thousand feet of bank line on the lower bench of the West Wetlands. The shoreline was cleared of salt cedar and reeds and replanted with native sandbar willows, inland saltgrass, and three-square bulrush. The cleared brush was mulched and spread on birding trails. An education area also was created for schools and the community to teach about the environment.

Improvements along the Colorado River bank line not only have increased visibility and safety, but also have enhanced the habitat for the southwest willow flycatcher, the California black rail, and the Yuma clapper rail, one of the most endangered birds in the Southwest. The international partnership with Pronatura will allow the wetlands restoration project to continue downstream on the Mexican side of the border.



Workers plant sandbar willows along the North Bank of the Colorado River in 2014. Photo courtesy: City of Yuma.



The completed bankline of the West Wetlands in April 2015. Photo courtesy: City of Yuma.



A natural fence marks the education grove. Photo courtesy: City of Yuma.

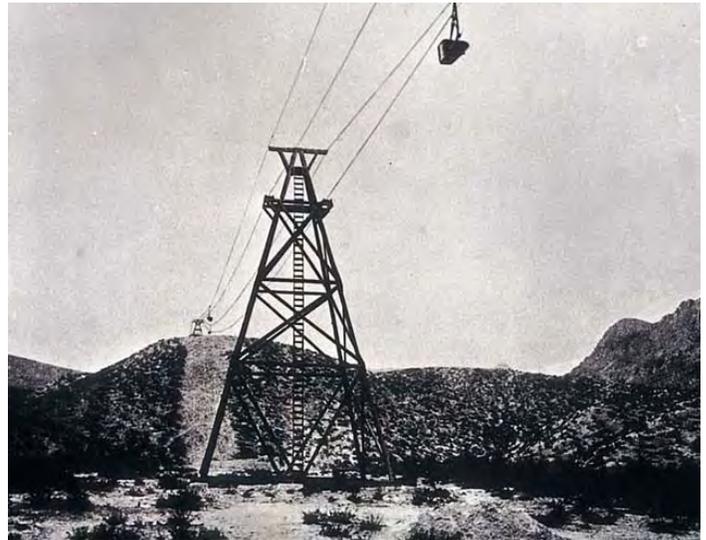
Historic Ore Tramway Documented in Big Bend National Park

In Big Bend National Park, the Ore Terminal Trail winds nearly four miles into the hills, leaving the Rio Grande far below. Along the trail, hikers pass the collapsed towers of a historic aerial tramway, which once carried ore mined in Mexico across the river to a terminal in Texas; hence the trail's name.

The remains of 43 tramway towers and associated structures were documented in 2014 with the assistance of \$32,240 in funding from the Southwest Border Resource Protection Program. The project involved field documentation of the tramway using photography and GPS mapping. Measured drawings of wooden towers also were created and historical information synthesized. All will be used to generate interpretative materials, as well as bilingual teaching aids for local schools in Texas and Coahuila. With its cross-border history, the six mile long tramway is an ideal resource for fostering relations between Big Bend National Park and its sister park, Maderas del Carmen Protected Area in Coahuila.

The tramway story begins in Coahuila, where Boquillas – just across the Rio Grande from Big Bend – was a mining boomtown in the 1890s. The Puerto Rico mine, in the nearby Del Carmen Mountains, was renowned for its rich ores of lead and silver, and later of zinc carbonate. But getting the ore to the nearest railhead—90 miles away in Marathon, Texas—was quite a challenge. Enter the aerial tramway, manufactured by A. Leschen & Sons Rope Company of St. Louis. It had its first trial run on February 8, 1910.

As Joel Greenberg writes in “A Line Across the Rio Grande: The History of the Aerial Tramway in Big Bend National Park,” the tramway’s steel buckets moved along a wire cable, 1 inch in diameter, which was attached to the top of the towers. At one end of the tramway was the Mexican terminal, which housed a 45-horsepower gas engine that drove the mechanism. At the other end was the Texas terminal in today’s Big Bend National Park.



“Puerto Rico Mine” - 60’ tower along tramway in 1919. Photo courtesy: National Park Service.



Mine-Loaded bucket on tramway, 1919. Photo courtesy: National Park Service.

Historic Ore Tramway Documented in Big Bend National Park (continued)

On April 3, 1918, the El Paso Morning Times reported that mule teams were hauling 1,000 tons of ore from the Texas Terminal to Marathon. Sometime after World War I, when zinc prices fell, the tramway fell into disuse.

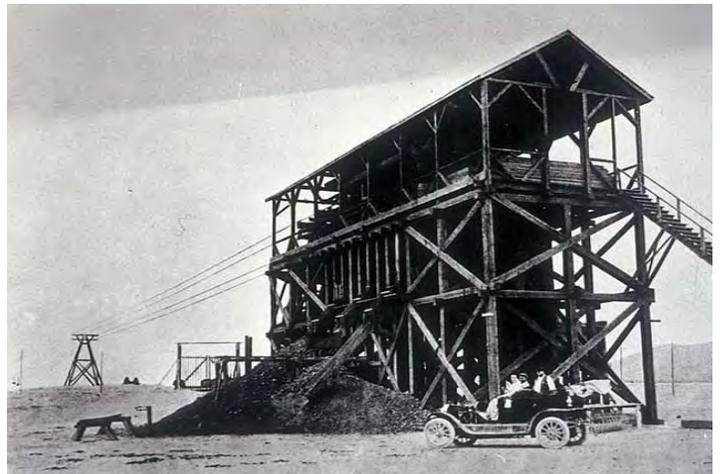
By 1943 – in the midst of World War II and a year before Big Bend National Park was formally established – some tramway cables were piled in a scrap heap on the Texas side of the border. During a discussion of whether the cables should be salvaged for the war effort, Ross A. Maxwell, first superintendent of Big Bend, wrote that he saw no reason why not. “This was most likely the demise of much of the tramway on the Texas side of the river,” Greenberg writes, “yet a number of artifacts survived to this day and can be seen along the Ore Terminal Trail in Big Bend National Park.”



Collapsed wooden tower along the ore tramway line, near the start of the trail. Photo courtesy: National Park Service.



One of the still-standing towers on the Mexican side of the Rio Grande. Photo courtesy: National Park Service.



From 1915-1919, an aerial tramway spanned the desert landscape. Carrying zinc, silver, and lead ore, the tramway started at the old Puerto Rico Mine above Boquillas, Mexico and terminated in the Ernst Valley, a six-mile-long journey. Photo courtesy: National Park Service.

Camera Traps Capture Elusive Animals, Monitor Illegal Human Activity

Desert ecosystems are fragile, a fact well-known at Organ Pipe Cactus National Monument (ORPI) in Arizona and sister park El Pincate Biosphere Reserve in Sonora, Mexico. The parks not only sit in the heart of the Sonoran Desert, but also along the U.S.–Mexican border, where illegal human traffic through wildlife corridors has only added to concerns.

To monitor the impact to wildlife and sensitive natural and cultural areas, in 2011 the Southwest Border Resource Protection Program began providing support to ORPI to deploy wildlife camera traps and to share the equipment with sister parks in Mexico. Day and night these cameras provide a glimpse into a previously unseen world of some of the most endangered species on Earth.

The cameras use infrared beams to trip the lens, and in turn trigger a DVR, which records images on a memory card. An infrared illuminator also allows the capturing of images at night. The data allows park managers to answer a number of questions, including the type, timing, and frequency of threat, as well as the type of damage or impact incurred. Not only does the data help determine the appropriate response to the threat, but it also reduces the need for routine patrols of sensitive and sometimes dangerous areas. The cameras have detected 116 wildlife species and documented that illegal human traffic is most common at water resource sites.

In 2015, the SWBRPP awarded an additional \$59,288 in funding for Phase Two of the camera trap program, which aims to produce specific management recommendations not only for Organ Pipe and Pincate, but also for six other park units in the Southwest border region that share similar species, habitats, and conservation issues: Saguaro National Park, Chiricahua National Monument and Coronado National Memorial in the United States, and Parque Nacional Sierra San Pedro Mártir, Parque Nacional Constitución de 1857, and Ajos-Bavispe National Forest Reserve & Wildlife Preserve in Mexico.



Bobcat at Dripping Springs. Photo courtesy: National Park Service.



Javelinas at Wild Horse Tank. Photo courtesy: National Park Service.

Camera Traps Capture Elusive Animals (continued)

The project will include two partners active in conservation issues on the U.S.–Mexican border: The Sky Island Alliance (skyislandalliance.org) and the Sonoran Joint Venture (sonoranjv.org). Wildlife cameras are already being used in each of the six parks, where not only have they documented new species (jaguar and ocelot in Ajos-Bavispe, for example), but also been a valuable outreach and interpretive tool for park visitors. Given the large number of animals at risk of local extinction, the cameras also are an important tool in helping park managers set wildlife conservation priorities.

The Sonoran Desert, which covers much of Baja California; Sonora, Mexico; and southern Arizona, contains the greatest species diversity of any desert in North America. The Sonoran Desert is home to at least 60 species of mammals, more than 350 bird species, 20 amphibians, some 100 reptiles, and about 30 species of native fish. These cameras are making many of the rarely seen, nocturnal animals visible to the general public for the first time.



Coyotes at Dripping Springs. Photo courtesy: National Park Service.



Mountain lion at Wild Horse Tank. Photo courtesy: National Park Service.



Southwest Border Resource Protection Program

Cooperative Conservation Along La Frontera

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