

## Borderlands Conservation Hotspot

### 2. Sonoran Desert



GEORGE BENTLEY/FWS

The Sonoran Desert has 2,000 endemic plant species—more than anywhere else in North America.

**T**hink deserts are wastelands? A visit to one of the national monuments or national wildlife refuges in the Sonoran Desert could change your mind. These borderlands are teeming with plants and animals impressively adapted to extreme conditions. During your visit you might encounter a biologist, a volunteer or a local activist in awe of the place and dedicated to protecting it. The Sonoran Desert is so important to the natural heritage of the United States and Mexico that both countries are vested in conservation lands and programs and on a joint mission to preserve it. “A border wall,” says one conservation coalition leader, “harms our mission” (Campbell 2017).

The Sonoran Desert is one of the largest intact wild areas in the country, 100,387 square miles stretching across the southwestern United States and northwestern Mexico. This desert is renowned for columnar cactuses like saguaro, organ pipe and cardón. Lesser known is the fact that the Sonoran Desert has more endemic plant species—2,000—than anywhere else in North America (Nabhan 2017).

The desert and its forested mountains support a surprising variety of wildlife: 60 species of mammals, 350 birds, 20 amphibians, 100 reptiles and 30 native fish, many of them imperiled (National Park Service [NPS] 2016b). Endangered cactus ferruginous pygmy-owls occupy lush streamside habitats and bajadas—gentle slopes at the foot of desert

mountains, where they find nesting cavities and swoop between cactuses and trees to hunt lizards and other prey. Rare desert bighorn sheep stick to the steep, rocky slopes of isolated desert mountain ranges where they keep a watchful eye for predators. One of the most endangered mammals in North America, Sonoran pronghorn still occasionally cross the border in search of food and water in the dry Sonoran Desert (Wildlands Network 2017).

The biological diversity of the fragile Sonoran landscape derives from a confluence of conditions that allow temperate and tropical species to intermingle: a warm subtropical climate, two yearly pulses of precipitation, dramatic elevation gradients and varied geology. The Colorado River—the

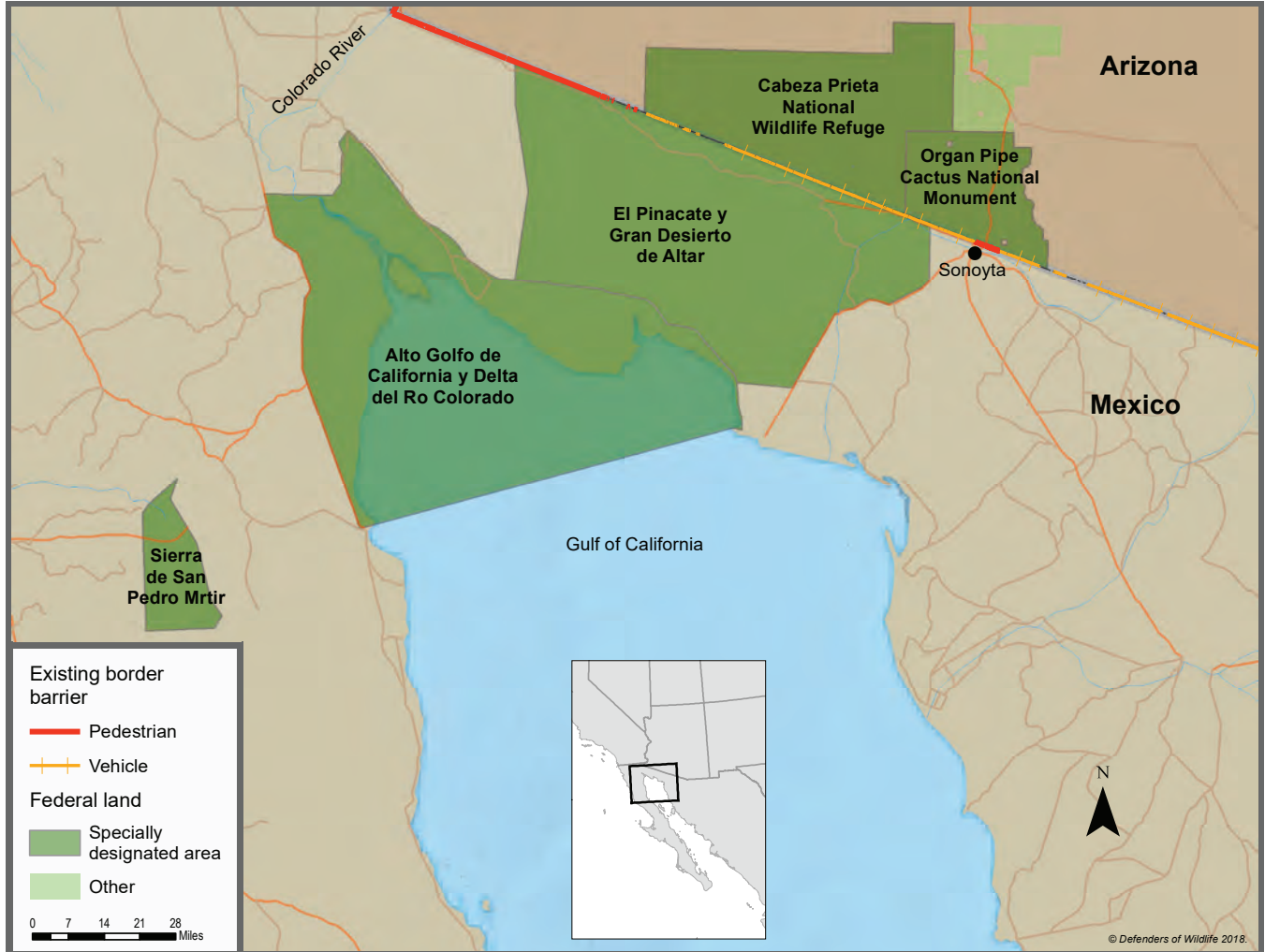


Figure 4. Protected areas in the Sonoran Desert

most important source of renewable freshwater in the arid Southwest—and the Santa Cruz and San Pedro rivers and their tributaries further enhance the desert’s diversity. These waters provide aquatic and riparian habitats that sustain an abundance of wildlife, including many now imperiled species like the southwest willow flycatcher and Gila topminnow.

### Conservation lands

Protected areas on both sides of the border safeguard the diverse and delicate Sonoran Desert (Figure 4).

In Mexico, the 2,500-square-mile El Pinacate y Gran Desierto Biosphere protects a diverse mosaic of intact desert habitats, including large maternity caves crucial for the endangered lesser long-nosed bat. The landscape includes granite massifs, circular volcanic craters and the largest dune system in North America. The subtropical desert ecosystem hosts more than 44 mammals, 200 birds, and 40 reptiles (United Nations Educational, Scientific and

Cultural Organization [UNESCO] 2017). The adjacent Alto Golfo de California Biosphere Reserve, 6,378 square miles, has extremely varied habitats, including desert and coastal beaches and dunes. The reserve extends into the Gulf of California where it provides some protection for the tiny vaquita, the smallest and possibly rarest cetacean.

On the U.S. side is a dense patchwork of lands protected for biodiversity that includes Organ Pipe Cactus National Monument, more than 517 square miles set aside in 1937 to preserve a prime example of Sonoran Desert ecosystem; 1,343-square-mile Cabeza Prieta National Wildlife Refuge, home of a Sonoran pronghorn captive breeding program; and Buenos Aires National Wildlife Refuge, 183 square miles in the Altar Valley protected in 1985 to recover the endangered masked bobwhite quail, a species still struggling in the United States and Mexico because of overgrazing, invasive species and drought (U.S. Fish and Wildlife Service [FWS] 2014a). Also important are Kofa National Wildlife Refuge,

Sonoran Desert and Ironwood Forest national monuments and Saguaro National Park, plus many multi-use national forest lands, conservation easements on private ranchlands and some 200,000 acres protected by Pima County (Coalition for Sonoran Desert Protection [CSDP] 2017a).

### Conservation collaborations

Conservation in the Sonoran Desert brings together state, federal and tribal land protection and wildlife agencies, local governments, nongovernmental organizations and citizens. From broad-based binational programs to more targeted efforts, they strive to protect species and to restore, acquire and connect habitat.

### Citizens in action

Citizens have banded together in local conservation groups to protect their beloved desert and its flora and fauna. These include the Altar Valley Conservation Alliance, Coalition for Sonoran Desert Protection and Friends of the Sonoran Desert.

Conservation-minded landowners in south-central Pima County formed the Altar Valley Conservation Alliance to protect and restore the valley's semi-desert grasslands (Altar Valley Conservation Alliance 2017), complementing Pima County's projects to enhance habitat on county lands in the valley, as well as the county's mitigation bank that protects habitat for the endangered Pima pineapple cactus (Pima

## SONORAN SPRAWL

Amid the relatively pristine expanses that remain in the Sonoran Desert stretches the Arizona Sun Corridor, an exploding area of growth that encompasses Phoenix, Tucson and Agua Prieta, Mexico. The corridor's 2010 population of 5.6 million is expected to reach 12 million by 2050 (America 2050 2017), putting intense pressure on fragile land and water resources. Suburban sprawl in Tucson contributed to the plight of the cactus ferruginous pygmy-owl (Johnson et al 2004), and demand for water dried up the U.S. side of the once-navigable Santa Cruz River. All that remains is a short stretch of riparian vegetation sustained by treated sewer water from the two Nogales, neighboring cities of the same name on either side of the border (Sprouse 2005).

“Tourism is a major element of our local economy. The militarization and environmental damage that come with the border wall do not enhance tourism.”

—Richard Elias, Pima County Supervisor

County 2017a). To date, the alliance has directed some \$4 million to improving grazing lands while benefiting the watershed and native species (Pima County 2015).

With 30 member groups, including Defenders of Wildlife, the Coalition for Sonoran Desert Protection (CSDP) uses citizen volunteers to watchdog development and help agencies plan projects. The coalition recently worked on the installation of a wildlife overpass on Oracle Road north of Tucson with the Arizona Department of Transportation, Arizona Game and Fish Department and Pima County.

### Binational ventures and projects

The Sonoran Joint Venture protects birds and their habitats by coordinating conservation work on both sides of the border. The joint venture offers a competitive grant program, which currently supports 19 U.S. and Mexican organizations working on projects like bird surveys, habitat monitoring and public education and outreach.

The Mexico Program of FWS works with Mexico's Secretariat of Environment and Natural Resources and other partners on both sides of the border to monitor, protect and recover at-risk species like the Chiricahua leopard frog, flat-tailed horned lizard, Sonoyta mud turtle, lesser long-nosed bat, cactus ferruginous pygmy-owl and Sonoran pronghorn (Fernandez et al 2009).

FWS's Wildlife Without Borders Program recently awarded a grant to the Wildlands Network, an international conservation organization that promotes wildlife corridors and wide-ranging species from Canada to Mexico. The grant supports the group's work with Mexican transportation authorities to determine where to put wildlife passages across Mexico's Highway 2 (Bravo 2017a), a dangerous east-west barrier for jaguars, Sonoran pronghorn and other wildlife. Mexican biologists are inventorying culverts and other wildlife-crossing structures on Highway 2 and monitoring how animals use them. The Sky Island Alliance and Cuenca



## CONSERVATION COALESCES IN PIMA COUNTY

**P**ima County, 9,189 square miles in southeastern Arizona, which shares 100 miles of border with Sonora, Mexico, has a county-wide commitment to protecting sensitive borderlands.

In 2001, Pima County approved the Sonoran Desert Conservation Plan, which identifies high-priority conservation lands where development is discouraged (Pima County 2017b). The county was also part of a years-long planning process involving ranchers, developers, conservationists, scientists, the Tohono O'odham Nation and FWS that resulted in the landmark Pima County Multi-Species Conservation Plan. Released in 2016, that plan spells out steps for protecting endangered species.

To meet its conservation goals, the county spent \$202 million in voter-approved bonds to purchase over 71,000 acres, including large intact ranches (CSDP 2017b). The county also leased more than 130,000 acres of state trust land for conservation, many of which remain open to grazing.

A driving force behind Pima County's desert and species conservation plans was agreement by stakeholders that protected open space attracts tourism and business. A study commissioned by the Tucson Audubon Society estimated spending on watchable wildlife recreation alone in Pima County at \$179,459,718 in 2011 (Tucson Audubon Society 2013). This spending stimulated a broader economic impact of \$304,338,133, generating \$19,866,395 in state and local taxes.

"Tourism is a major element of our local economy," says Pima County supervisor Richard Elias. "The militarization and environmental damage that come with the border wall do not enhance tourism." (Elias 2017).

Carolyn Campbell, executive director of the Coalition for Sonoran Desert Protection, worked with Elias on both conservation plans and a new wildlife overpass north of Tucson. "Here in Pima County," she says, "we are investing in open space and wildlife crossings to overcome highways and other man-made barriers" (Campbell 2017). The border wall is the ultimate barrier.

Los Ojos, a foundation that works on both sides of the border, are monitoring roadkill.

### *Saving Sonoran pronghorn*

For the moment, populations of the endangered Sonoran pronghorn in the United States and Mexico are small but rebounding from a low of 19 individuals in 2002 (Springer 2009), thanks to close cooperation among the Arizona Game and Fish Department, FWS, Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge and Mexico's Gran Desierto de Altar Biosphere Reserve (El Pinacate). Mexican and U.S. agencies coordinate a biannual aerial census that in 2015 counted 1,050 wild Sonoran pronghorn in the United States and Mexico (Mazon 2017).

U.S. efforts include a captive-breeding program on Cabeza Prieta and Kofa national wildlife refuges (Springer 2009). In Mexico, staff at El Pinacate reserve, which was designated in part to protect pronghorn habitat, educate visitors and landowners and contend with challenges like off-road vehicles, over-use of water and pressures to open the reserve to



STEVE HILLEBRAND/FWS

Connectivity between the U.S. and Mexican populations of Sonoran pronghorn is vital to the survival of this highly endangered species.

incompatible uses like agriculture (Grageda 2017).

El Pinacate's coordinator of natural resources, Miguel Angel Grageda, works closely with U.S. counterparts. "We share ideas and experiences and help each other solve problems," he says (Grageda 2017). As an example he cites genetic work underway at the University of

Arizona that will help identify the most important areas for connecting pronghorn populations—information needed to maintain corridors between the larger, genetically richer El Pinacate population and the isolated U.S. population (Krausman et al 2005).

### *Restoring the Colorado River Delta*

The Colorado River is dammed and tapped along its course to meet the agricultural and household water needs of nearly 40 million people. At the delta, where the river now rarely meets the sea in the Gulf of California, water withdrawal and a prolonged drought have killed delta forests and dried up what was once a vast, braided network of river channels, marshes, lagoons and estuaries that were nurseries for fish.

To bring more water to the delta, the U.S. and Mexico signed Minute 319, a five-year water agreement, in 2012. The agreement arranged for a “pulse flow” of 105,000 acre-feet to be delivered to the delta over an eight-week period in 2014 (Congressional Research Service 2017). The natural flooding conditions simulated by the pulse regenerated stands of cottonwood and willows, increasing the diversity and abundance of birds (Flessa, Kendy and Schlatter 2016).

“If one partner chooses to wall-off its landscape and isolate itself, we all lose. Though our personal friendships will last, the institutional ties and the physical corridors on the land will suffer.”

—*Juan Carlos Bravo, Mexico Program Director  
Wildlands Network*

In 2017, the partners negotiated a second agreement, Minute 323, which extends many of the previous agreement’s provisions for another nine years (James 2017). Like the 2012 agreement, Minute 323 commits freshwater to the delta and pledges restoration of estuaries and riverside habitats—1,076 acres in the 2012 agreement, an additional 3,224 in 2017 (International Boundary and Water Commission 2017).

Karen Schlatter, manager of the Sonoran Institute’s Restoration and Monitoring Program, started working in the Colorado River Delta in 2010 as “part of a tiny team implementing small-scale demonstration projects.” Today the institute leads projects in the delta



To restore water flows and habitat in the Colorado River Delta, government agencies, conservation groups and local citizens in the United States and Mexico are working closely together.



BOTH PHOTOS © WALT CLARK

Vehicle barriers (top) completed on the border in Buenos Aires National Wildlife Refuge in 2007 effectively curtailed entries by vehicle and left the border permeable to most wildlife movement. Less than six months later, a U.S. Customs and Border Protection plan to replace the barriers with a 15-foot, bollard-style steel wall moved forward after a hasty environmental assessment claiming “no significant impact” and an equally rushed Section 7 consultation (for impacts to endangered species). By September 2007, the refuge had severely damaged habitat and an impenetrable 7.6-mile-long section of border wall (bottom).

with help from local communities. The “scaled-up” delta program now has “more than 20 people, and we’re collaborating with diverse organizations across the border,” she says (Schlatter 2017).

Locals hired when the program first started have become experts in restoration and ecosystem monitoring and risen in the ranks. Mexican national and former hunting guide Guadalupe Fonseca is now the institute’s field chief, overseeing the restoration crew on the ground. “I was here for the 2014 pulse flow,” he says. “It was wonderful to witness the river meet the sea for the first time in many years. There was so much joy... people celebrating and playing in the water.

Now everyone wants to know when the next pulse will be (Fonseca 2017).”

Some of Fonseca’s staff used to commute an hour and a half each way to work in Mexicali’s factories. Today they work outside at restoration sites only 10 minutes from their homes. People who used to sell fence posts cut from the forests now work with pride to restore and study the forests they used to exploit (Fonseca 2017) and they are seeing the results of their efforts. “Not only are we seeing birds and other wildlife return to restored native habitat, but the positive impacts of restoration for local small communities in Mexico is incredible to witness,” says the Sonoran Institute’s Schlatter (Schlatter 2017).

### The looming threat of the wall

Conservationists and scientists are not the only ones who recognize the impact an expanding border wall and its security operations footprint would have on wildlife and habitat in the Sonoran Desert—and on long-standing collaborations among nongovernmental organizations and government agencies in the United States and Mexico. Local governments that depend on tourism and other benefits that flow from a healthy environment are worried, too.

In 2011, Pima County unanimously passed a resolution opposing the waiver of environmental laws on public lands for Border Patrol operations within 100 miles of the U.S.-Mexico (Pima County 2011). In 2017, the county passed a resolution denouncing President Trump’s executive order mandating border wall construction, stating, “the existing border structures have caused substantial environmental damage, including catastrophic floods, erosion, degradation of public lands and facilities, blockage of normal wildlife migration corridors, and destruction of critical wildlife habitat, all of which has contributed to harm of hundreds of border-region species...” (Pima County 2017).

“We are working to protect 44 unique local species, nine endangered or threatened, with the Sonoran Desert Conservation Plan,” says Pima County Supervisor Richard Elias, a fifth-generation Tucsonan and wildlife advocate. “A border wall degrades their habitat and cuts off corridors they need to get from one place to another” (Elias 2017).

One sensitive area on the border, Buenos Aires National Wildlife Refuge, already has a section of wall—seven miles constructed in 2007. Defenders of Wildlife helped convince the refuge manager to veto construction of the segment,

but the wall was ultimately built when FWS gave up a strip of refuge land along the border in exchange for land elsewhere to be provided by U.S. Customs and Border Protection.

Building more wall in the Sonoran Desert would exacerbate existing threats and pose new ones.

**Blocked wildlife movement.**

According to a 2009 study, bighorn sheep in Sonora, Mexico, are linked by dispersal with bighorns in neighboring Arizona. Impermeable walls would prevent genetic exchange and stop sheep from reaching resources they need on the other side of the border (Flesch et al 2010).

Cactus ferruginous pygmy-owls typically fly an average of 4.5 feet above ground and avoid large clearings and developed areas. An insurmountable border wall and adjacent roads could fragment populations, hindering dispersal into the United States from northern Sonora and handicapping recovery of the owl (Flesch et al 2010).

The endangered Sonoran pronghorn must travel across the desert to find the nutritious forbs required for successful reproduction. Any physical barriers impeding pronghorn movements in the areas where they are active (Figure 5) can be deadly, especially during times of drought (FWS 2013a). “If a solid border barrier is built,” says Miguel Angel Grageda of El Pinacate, “genetic links would be severed. It would then be up to humans to capture and move pronghorn to maintain genetic flow, which would be expensive and risky for the animals.”

**Loss of habitat.** Animals may go out of their way to avoid the impact zone—the areas extending far beyond the

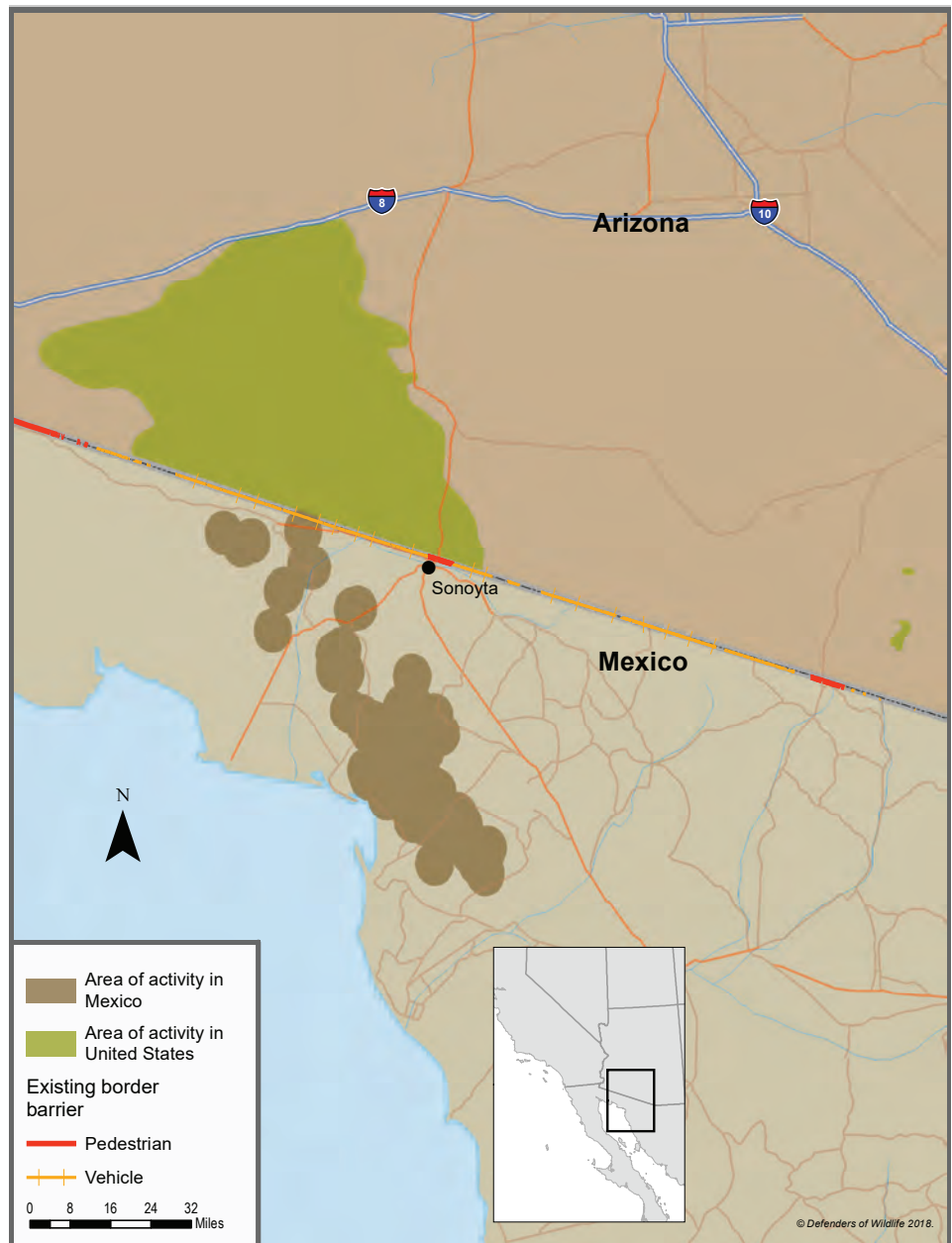


Figure 5. Areas of Sonoran pronghorn activity

physical border wall, where traffic, lights, noise and human activity disturb sensitive wildlife and habitat. A growing network of patrol roads, operating bases, surveillance towers and maintenance facilities results in significant cumulative impacts. A 2014 NPS study mapped approximately 9,327 miles of undesignated vehicle routes in the vicinity of the Border Patrol’s Ajo-1—a 10-tower surveillance project. The study revealed a maze of tracks harming soils, plants and sensitive wildlife on and near Cabeza Prieta National Wildlife Refuge and Organ Pipe Cactus National Monument (Howard, Rutman and Stum 2014).



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Organ Pipe Cactus National Monument shows the erosion caused by torrents of water redirected when heavy rains trap debris against a border wall.

**Flooding.** Sections of the border wall already built exacerbate flash flooding caused by rainy-season downpours. Even when openings are provided to let water through, the wall acts like a clogged sieve, trapping debris that dams and redirects floodwaters. Such events damaged habitat in Organ Pipe Cactus National Monument, caused millions of dollars in property damage in Nogales, Mexico, and even toppled a section of the border wall (McCombs 2008, NPS 2008).

**Hurdle to binational cooperation.** Juan Carlos Bravo, who works for the Wildlands Network in Hermosillo, Mexico, warns that border militarization and walls counter decades of binational investment in conserving the large landscapes required to sustain wide-ranging species. “For decades, Mexican and U.S. agencies, nonprofits and individuals have worked together to conserve shared species and habitats, bringing down cultural and language barriers in the pursuit of a higher ideal—that the land we all love and the species

we all care for may still be here for generations to come. If one partner chooses to wall-off its landscape and isolate itself, we all lose. Though our personal friendships will last, the institutional ties and the physical corridors on the land will suffer” (Bravo 2017b).

The Tohono O’odham Nation, a Native American tribe, governs 2.7 million acres spanning the border in Arizona and Sonora, Mexico. Jose Martin Garcia Lewis, governor general of the tribe in Mexico, says the proposed border wall would destroy his tribe’s way of life, despoil their land and violate their tribal sovereignty, “It will deny our shared cultural and religious practice in the Pinacate: our Salt Ceremony and Pilgrimage, our collection of medicinal plants, visitation to burial sites and sacred cave sites, and plant life. It will, under international law, illegally sever our communications with and access to the Tohono O’odham Nation in Arizona” (Náñez 2017).