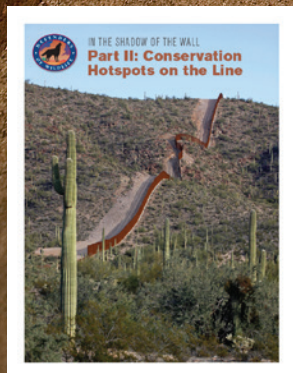


IN THE SHADOW OF THE WALL: PART I

Borderlands Wildlife, Habitat and Collaborative Conservation at Risk



For an analysis of the conservation lands and collaborations and threats the wall presents in five borderlands conservation hotspots, see part two of In the Shadow of the Wall.



Defenders of Wildlife is a national, nonprofit membership organization dedicated to the protection of all native wild animals and plants in their natural communities.

Jamie Rappaport Clark, *President and CEO*

This is part one of a two-part report on the conservation consequences of extending the wall along the U.S.-Mexico border. It provides an overview of how the wall affects wildlife, habitat, communities, conservation and binational collaboration. *In the Shadow of the Wall Part II: Borderlands Conservation Hotspots on the Line* (published separately), zeroes in on five hotspots along the border—areas with high biological diversity and significant investments in conservation lands and conservation projects—and gives voice to the people who live and work along the border.

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Introduction



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A bobcat snags a meal in the shadow of the wall. Border barriers block animals from hunting and mating opportunities on the other side.

The 2,000-mile U.S.-Mexico border—and the “big, beautiful wall” the Trump administration envisions along parts of it—pass through stunning and biologically diverse landscapes. Together the United States and Mexico have long labored to protect these lands. President Trump’s vision does not bode well for the future of collaborative cross-border conservation and the wildlife, habitat and local economies that benefit from it.

Border landscapes include deserts, mountains, rivers, streams, thorn scrub forests, tropical and subtropical broadleaf forests, freshwater wetlands, salt marshes and coastal mangrove swamps. Except for the coastal plain of the Gulf of Mexico in Texas, most of the border is desert or semi-arid.

The rivers and streams of the borderlands support particularly high levels of biological diversity, including birds, fish, amphibians, reptiles and butterflies found nowhere

else. The Quitobaquito pupfish, for example, lives only in a single spring at Organ Pipe Cactus National Monument. Tiny, three-square-mile Santa Ana National Wildlife Refuge on the lower Rio Grande is a haven for nearly half the butterfly species in North America (U.S. Fish and Wildlife Service [FWS] 2017a). Other major biologically rich rivers include the Tijuana, San Pedro and Colorado.

Mountains have high species diversity because they are topographically complex. Traveling up a mountain in the Sky Islands of Arizona, for example, the vegetation transitions from desert grasslands and cactuses to deciduous forest to conifers, and the wildlife varies with the habitat.

The overlap of temperate and subtropical zones in the borderlands also contributes to biodiversity—black bears share habitat with ocelots, bald eagles with military macaws, jaguars with bobcats.

A vulnerable region

Human activities already threaten much of the borderlands' biological diversity. Excessive water use has dried up streams and rivers. In Arizona, 20 of 35 surviving native fishes are federally threatened or endangered (Arizona Game and Fish Department [AGFD] 2017). When water levels are low in major rivers like the Colorado, delta forests that depend on seasonal flooding die, marshes that need freshwater become too saline, and estuaries silt up.

Throughout the Southwest, riparian forests are in trouble, cleared for agriculture and starved for water. More than 90 percent of the forests along the Rio Grande in Texas are now agricultural land and developments (Leslie 2016). Many once-common birds are now rare—the western yellow-billed cuckoo and southwestern willow flycatcher are endangered.

In coastal southern California and northern Baja California, Mexico, dense human development, more than 4 million people in the San Diego and Tijuana metropolitan areas alone, has severely reduced habitats like coastal scrub (Stallcup et al 2015) and imperiled a multitude of species. According to The Nature Conservancy, San Diego County alone has some 200 imperiled species, more than any other county in the nation (Nature 2018).

Historical grazing practices often degraded grasslands and riparian zones in southeastern Arizona and northeastern Sonora, Mexico, stripping streams of vegetation and drying them up (FWS 2002). Grazing destroyed grasslands critical to Sonoran pronghorn, converting them to shrublands and landing this geographically and genetically distinct pronghorn subspecies on the endangered species list (AGFD 2013). In Mexico's Janos Biosphere Reserve, illegal conversion of grasslands for agriculture contributed to a 73 percent decrease in what was North America's largest expanse of prairie dog colonies between 1988 and 2005 (List et al 2010, Ceballos et al 2010).

Government programs extirpated large cross-border predators like the Mexican gray wolf and jaguar in the United States during the 20th century. Other borderlands species targeted by people include black-tailed prairie dogs, extirpated from Arizona by poisoning campaigns (Underwood and Van Pelt 2008), and the beaver, driven from U.S. and Mexican borderlands 100 years ago (Leskiw 2017).

In addition, more than 600 miles of barriers already bisect the border.



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The imperiled cactus ferruginous pygmy-owl typically flies no more than five feet above the ground.

Walls, Wildlife and Habitat

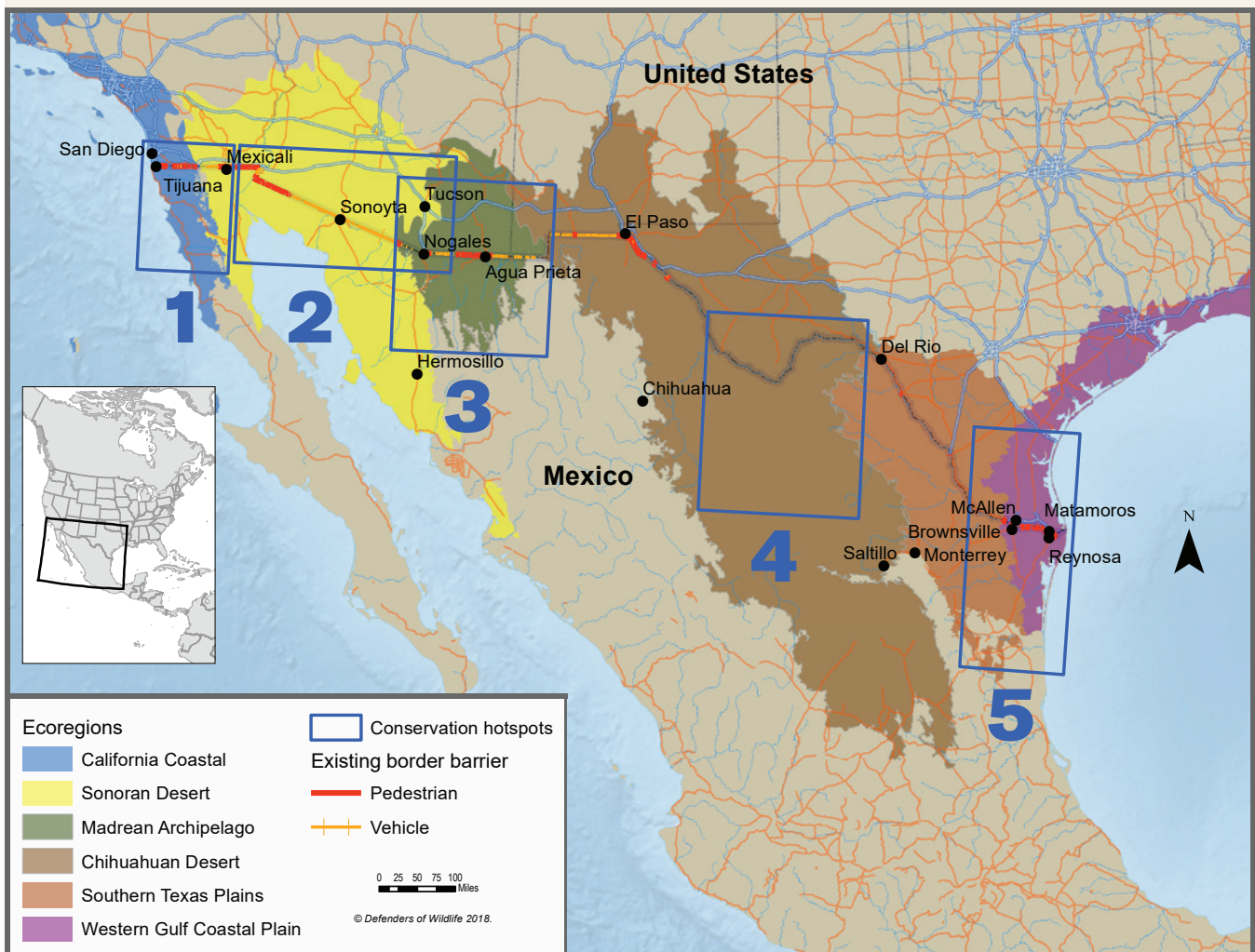
Border barriers elsewhere in the world have taken a toll on wildlife (Trouwborst, Fleurke, and Dubrulle 2016). Fences that closed off migration routes in Namibia are linked to the deaths of giraffes, elephants and antelope. A 124-mile fence along the Kazakhstan-Uzbekistan border almost completely blocked saiga antelope migration routes and is likely responsible for the loss of 69 percent of the antelope's population between 2013 and 2015 (Bykova, Esipov and Golovtso 2015). Fences along the Mongolian-Chinese border split herds of rare Mongolian ass into distinct subpopulations. Conflicts between people and Asiatic black bears and leopards increased in Kashmir, likely because the fence between India and Pakistan in Kashmir prevented them from finding natural prey (Pahalwan 2006). Researchers reported similar effects for fences in Europe and the Middle East (Trouwborst, Fleurke and Dubrulle 2016).

Determining how existing sections of the border wall have affected wildlife and ecosystems is difficult because the Department of Homeland Security (DHS) waived environmental laws prior to construction (Sierra Club 2017, Neeley 2011), including the Endangered Species Act (ESA) and National Environmental Policy Act (NEPA). (For more about waivers, see "Walls and Waivers," page 4). With these laws set aside, wall projects proceeded without the necessary depth of environmental impact analysis, identification

BORDERLANDS CONSERVATION HOTSPOTS

In researching the conservation consequences of walling off our southern border, Defenders of Wildlife identified five borderlands conservation hotspots. These are areas extending roughly 100 miles from each side of the border that have high biological diversity and significant investments in conservation lands and collaborative conservation efforts. Moving along the border from the Pacific Ocean to the Gulf of Mexico, these hotspots are 1) The Californias (western Southern California and northern Baja California); 2) Sonoran Desert (Arizona and northern

Sonora Mexico); 3) Sky Islands (northern Sonora, Mexico and southern Arizona and New Mexico); 4) Big Bend (conservation lands in the Rio Grande's Big Bend in Texas and Coahuila, Mexico); and 5) Lower Rio Grande (including the Laguna Madre region on the Gulf of Mexico in Texas and adjoining Tamaulipas, Mexico). For profiles of each hotspot that highlight the conservation lands, collaborative efforts to protect wildlife and habitat and the threats the wall poses, see *In the Shadow of the Wall Part II: Borderlands Conservation Hotspots on the Line*.



The five borderlands conservation hotspots identified by Defenders of Wildlife lie within six important cross-border ecoregions.

MAP DATA SOURCES: COMMISSION FOR ENVIRONMENTAL COOPERATION; REVEAL FROM THE CENTER FOR INVESTIGATIVE REPORTING AND OPENSTREETMAP CONTRIBUTORS; THE ATLAS OF CANADA, INSTITUTO NACIONAL DE ESTADÍSTICA Y GEOGRAFÍA, AND U.S. GEOLOGICAL SURVEY

of less-damaging alternative strategies, input from the public, pursuit of legal remedies and requirement for post-construction monitoring necessary to determine ecological effects. For example, wall prototypes built in late 2017 in California lacked any environmental assessments, despite likely harm to endangered species (Center for Biological Diversity 2017). Scientists may be reluctant to start or continue field research near wall segments because heightened security makes it more difficult to reach study sites.

In addition to the direct effects of construction, the wall has secondary effects caused by lights, noise, erosion, flooding, road building and off-road vehicle travel. The extent of these secondary effects can be significant. For example, a 2014 National Park Service study of off-road vehicle use near the U.S. Border Patrol's Ajo-1 project, an installation of 10 observation towers, mapped approximately 9,327 miles of undesignated vehicle routes in or near the Cabeza Prieta National Wildlife Refuge and Organ Pipe Cactus National Monument (Howard, Rutman and Stum 2014).

All of these impacts add up to serious consequences for borderlands wildlife and habitat.

Blocked wildlife movement

The ability of animals to cross a wall depends on the nature of its construction. Normandy-style vehicle barriers—crisscrossed steel railroad ties connected by flat rails—may allow large mammals to cross, while bollard walls (a series of vertical posts) may prevent large mammals from crossing but allow smaller ones through. Where the wall is completely solid, even small animals like rabbits, toads and Gila monsters cannot cross. The wall may even prevent some bird species from crossing the border. The ferruginous pygmy owl, under consideration for listing as an endangered species, typically flies no more than five feet above the ground; a 30-foot wall could impede it. (Ogden 2017).

Even animals that could physically cross the wall may be deterred by associated infrastructure and human activity, including roads, watch towers, lights, noise and patrols. Many species are known to avoid human structures and disturbance (Willig and McGinley 1999). The southernmost extent of the lesser prairie chicken's range is in Texas near the border, and studies show these birds are disturbance-sensitive, avoiding otherwise suitable habitat within roughly 1,600 feet of power

WALLS AND WAIVERS

All other departments and agencies, including the military services, have to comply with a suite of federal environmental laws, but not the agency in charge of building walls. In 2005, Congress passed a provision that allows the DHS secretary to waive all laws that he or she deems necessary for the expeditious construction of border barriers. Using this authority, unprecedented in American history (Viña & Todd Tatelman), DHS Secretary Michael Chertoff waived dozens of laws on five separate occasions to construct border walls, roads and associated infrastructure in all four border states. Cumulatively these waivers exempted DHS from all federal environmental laws—including the ESA and NEPA—and related state, local and other laws, along with laws like the Religious Freedom Restoration Act.

Chertoff's waivers in 2007 and 2008 included public and private land in all four border states, including the Barry M. Goldwater Range, San Pedro Riparian National Conservation Area, Organ Pipe Cactus National Monument and San Bernardino, Cabeza Prieta and

Lower Rio Grande Valley national wildlife refuges.

The Trump administration, taking steps to fulfill the president's wish to build a "great wall on the southern border," issued three waivers in its first year, covering the site of the prototype construction in southern California, replacement wall in another area of southern California, and conversion of vehicle barrier to pedestrian wall on a 20-mile stretch near the Santa Teresa Port of Entry in New Mexico.

But those who want proper environmental analysis are fighting back. Defenders of Wildlife, along with the Sierra Club and the Animal Legal Defense Fund, filed a lawsuit in 2017 challenging the Trump administration's proposal to replace existing walls in the San Diego area, claiming the waiver violates the U.S. Constitution and the doctrine of separation of powers. The Center for Biological Diversity and the state of California filed similar suits. As California Attorney General Xavier Becerra said at a news conference, "No one gets to ignore the laws. Not even the president of the United States."



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In this 2007 photo, bulldozers remove a vehicle barrier in Buenos Aires National Wildlife Refuge to make way for the 15-foot wall that soon replaced it.

line, for example (Hagen et al 2011). FWS identified cross-border traffic and law-enforcement interdiction efforts by the Border Patrol, the mobile, uniformed law enforcement arm of U.S. Customs and Border Protection, as the most significant current source of disturbance to the U.S. population of the Sonoran pronghorn antelope (FWS 2016a).

As DHS continues extending the wall, populations of cross-border endangered species like the Mexican gray wolf, ocelot, jaguar and Sonoran pronghorn antelope will be increasingly divided in two, a U.S. population and a Mexican population. Such a division can cause several problems:

- **Fragmented populations.** Splitting larger populations into smaller ones increases the chance of local extirpation and extinction. Small, separated populations are more likely to disappear than larger, connected ones. Inbreeding within these small populations causes genetic problems that result in poor survival and reproduction. Small

populations may also have unbalanced sex ratios, again decreasing reproduction (Simberloff 1998).

- **Barrier to cross-border colonization.** For Arizona populations of the endangered jaguar and ocelot that depend on animals dispersing from Mexico into the United States, the wall would end hope of natural recovery. For the endangered Mexican gray wolf and Sonoran pronghorn antelope, a wall would prevent the U.S. populations from expanding into Mexico and vice-versa. For U.S. ocelots, the wall would eliminate the possibility of connecting the tiny Texas population with ocelots in Mexico. Black-tailed prairie dogs from Mexico would be unable to continue recolonizing southwest New Mexico (List 2007).
- **Death from thirst, starvation or increased predation.** Rainfall is patchy in the desert. In any given year, for

example, only some areas within the range of a species dependent on grass and forbs may receive enough rain to grow them. Many desert animals cope with this unpredictability by traveling in search of food and water, not always successfully. A drought in 2002 dropped Sonoran pronghorn numbers from roughly 140 to 19, the brink of extinction (FWS 2013). The border wall could prevent these pronghorn and other animals from reaching needed resources.

In areas without trees, the border wall and associated towers and electric or light poles can increase predation on young desert tortoises, prairie chickens, and other prey species by providing perches that would otherwise be lacking for corvids and raptors (Prather and Messmer 2010, Sandercock and Martin 2011). Wolves and coyotes have learned to hunt by chasing prey into fences (Trouwborst, Fleurke and Dubrulee 2016).

- **Obstacle to range shifting in response to climate change.** As the Southwest heats and dries, some species may only survive by shifting their ranges northward or by periodically migrating north to track water and food. Many species are already showing northerly shifts in their ranges (Union of Concerned Scientists 2017). An impenetrable wall would make shifting impossible for large mammals and other species that cannot climb or fly over the wall.

Habitat loss and degradation

Permanent Border Patrol operating bases, outposts and new road networks built to accommodate enforcement operations and wall construction compromise habitat. Patrol vehicles also regularly go off-road, crushing plants and animals and creating undesignated roads—even in wildlife refuges and wilderness areas. As of February 2017, DHS had constructed 654 miles of “primary” border barriers and approximately 5,000 miles of roads along the U.S.-Mexico border (Government Accountability Office 2017). As documented on Cabeza Prieta National Wildlife Refuge and Organ Pipe Cactus National Monument, off-road traffic can quickly carve out thousands of miles of undesignated routes (Howard et al 2014). Road construction may require felling trees, like the endangered Tecate cypress in the Otay Wilderness, and clearing vegetation near the wall for better visibility as planned for Santa Ana National Wildlife Refuge.

Flooding

Walls built in water channels can block free flow, causing flooding upstream that can drown animals and plants. Even openings left for water can become blocked with debris, creating unintended dams. The wall built in Arizona’s Organ Pipe National Monument trapped debris that caused serious flooding in 2008 and 2011 (Moran 2017). In 2011, the doors DHS installed in the wall after the 2008 flood to accommodate flow proved inadequate, and flood waters tore down a 40-foot section of wall (Nicol 2012). The administration has plans in place to build 30-foot high concrete walls along the northern edge of Santa Ana National Wildlife Refuge and elsewhere along the Lower Rio Grande. Set back a mile or two from the river, these segments would be death traps for animals fleeing rising water when the river floods. In 2011, flood waters trapped by an earthen levee on the north side of the Santa Ana refuge killed trees and wildlife (Findell 2011, Nicol 2018).

Crushing and removal of vegetation

Construction equipment and off-road patrol vehicles can crush plants and animals, significantly threatening rare plants like the endangered Pima pineapple cactus (FWS 2017b) and Otay Mesa mint (FWS 2010). The FWS recovery plan for the endangered Quino checkerspot butterfly, a species with limited remaining habitat in the borderlands of California and Mexico, identifies off-road traffic as a major threat because it compacts soil, destroys host plants, increases erosion and fire frequency, and creates trails that are conduits for non-native plant invasion (FWS 2003).

In addition to service roads paralleling each mile of wall, there is an ever-expanding web of intentional secondary access roads and undesignated routes. Thousands of miles of undesignated vehicle routes associated with the Border Patrol’s Ajo-1 project caused widespread impacts to wilderness characteristics, soils, plant and sensitive wildlife (Howard et al 2014).

Introduction of noxious weeds

Border roads are corridors for invasion by noxious weeds like buffelgrass and Sahara mustard that degrade western landscapes. The disturbed soils along roads favor weeds that sprout from seeds carried by tires and undercarriages and dispersed as vehicles travel. The roads are conduits for weeds to invade new areas. Sahara mustard has completely replaced



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Pronghorn and other borderlands animals must travel widely to find enough food; barriers impede this vital movement.

native vegetation over wide expanses of the Southwest, turning meadows of native wildflowers into mustard monocultures (Desert Museum 2018) and challenging agencies and conservation groups to slow its spread.

Interference with seed distribution and fertilization

Many plants, including mesquite trees that form highly productive bosques (forests), have seeds that germinate best if first passed through the guts of javelinas, coyotes and other mammals (Stromberg 1993). If seed-dispersing animals become rarer or excluded from either side of the border by the wall and associated activity, plant establishment may be diminished. Border fences can also hinder pollination and dispersal of wind-dispersed seeds (Trouwborst, Fleurke and Dubrulle 2016). The Great Wall of China appears to have reduced cross-wall fertilization or seed dispersal, causing genetic differences between plant populations on either side (Trouwborst, Fleurke and Dubrulle 2016).

Threats to Collaborative Conservation and Communities

The United States and Mexico have each designated vast protected areas at or near the international border. In some places, sister areas like Cabeza Prieta National Wildlife Refuge in the United States and El Pinacate Biosphere Reserve in Mexico sandwich the border, creating a wide swath of binational habitat. Both governments, as well as nongovernmental organizations, have spent many millions of dollars over decades to create and manage these protected areas (Todd and Ogren 2016). Agencies, nonprofits and individuals with a love of nature on both sides of the border are also working to recover cross-border species like the endangered Mexican wolf, Sonoran pronghorn, black-footed ferret, California condor and monarch butterfly; and to restore stream flows, riparian vegetation and other habitats (Basin and Bay Expert Science Team 2012; FWS 1997, Barry 2014). Extending the wall raises concerns for the wildlife, habitat, local economies and the future of conservation in the borderlands.

Undermining binational conservation

Conservationists working on binational collaboration projects point to the chilling effect the increased focus on border security has on collaboration. “As a Hispanic field biologist working the borderlands, I’ve been profiled and intimidated by Border Patrol agents and militias and harassed by helicopters, ATV and vehicle patrols while conducting jaguar research in remote border areas,” says Sergio Avila, who has spent many years studying the region (Avila 2017). Researcher Gary Nabhan was surveying birds at the desert oasis of Quitobaquito in Organ Pipe Cactus National Monument at dawn one day when he was stopped. “I had my National Park Service permits, I’d notified NPS law enforcement, and a rookie Border Patrol employee held us at gunpoint on our stomachs for one-and-a-half hours, threatening to shoot us if we moved,” says Nabhan. “He was unaware that there is significant research being conducted at this National Park site along the border” (Nabhan 2017).

Others report a lack of money and attention by the U.S. government as priorities shifted to border security. “We used to visit or work frequently with colleagues and landowners from the other side of the fence,” says Rurik List, professor of ecology at Universidad Autonoma de Mexico. “The crossing was easy and the border agents friendly, but now the interaction has stopped; it’s harder to gain access, dangerous to move around and there is a feeling of not being welcome. Because of the insecurity, our American friends also stopped coming” (List 2017). But conservationists are still determined to protect cross-border species.

Starving the conservation budget

Winning the race to protect and restore habitat and to recover endangered species requires adequate funding. However, President Trump’s proposed 2018 budget would provide only \$19.3 million for the Cooperative Endangered Species Conservation Fund, which provides money to states and territories for species and habitat conservation actions on nonfederal lands (FWS 2016b). This is less than the current estimated cost of \$25 million for building a single mile of wall. The cost of a single mile could also cover the annual costs of implementing the management actions and other measures specified in the FWS recovery plans for the jaguar, ocelot, Mexican gray wolf and Sonoran pronghorn (FWS 2016c, 2016d, 2017c, 2016a).



ANDREW FISHER/FWS

The endangered Quino checkerspot butterfly has limited remaining habitat in the California-Mexico borderlands.

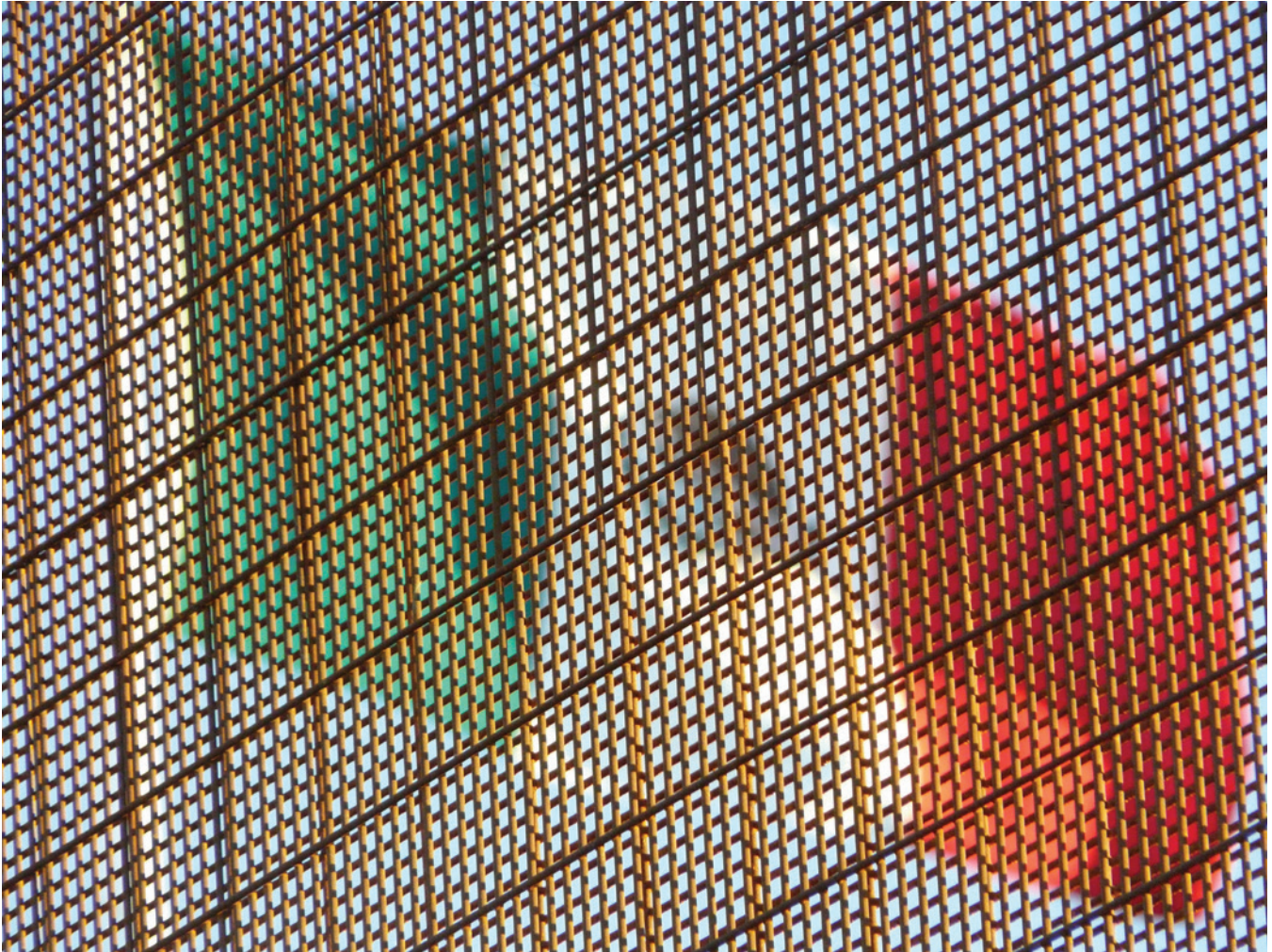
Devaluing past conservation investments

Not only is the current administration squeezing conservation budgets, by building the border wall it is also devaluing past investments, including the \$8 million spent last year to install ocelot road crossings and the \$150 million spent on refuge acquisition and restoration in the Lower Rio Grande region of Texas since the 1940s (Kelley 2017, Todd and Ogren 2016). Other investments the wall would undercut include decades of funding by FWS and many private conservation organizations for Mexican wolves, Sonoran pronghorn antelope, masked bobwhite and other rare species.

Inflicting economic hardship on communities

Environmental damage caused by the wall and related border security hurts communities near the border financially. A 2012 study found that a border checkpoint on Interstate 19 significantly depressed real estate values in the tourism-dependent communities of Rio Rico and Tubac, Arizona, located just south of the checkpoint, compared with communities north of the checkpoint. Although more difficult to quantify, the study reported that “business representatives to the south of the checkpoint were unequivocal in their views that there has been, in fact, a decline in tourism in the region as a result of the checkpoint” (Gans 2012).

A wall segment planned for the Santa Ana National Wildlife Refuge on the lower Rio Grande would block public access to trails used for programs for school children and popular with the more than 100,000 people who visit the refuge each year (Schwartz 2017). Compromising access to the refuge could cost the local economy nearly \$35 million a year (Mathis and Matisoff 2004). The town of Patagonia in the Sky Islands also stands to lose. Once dependent on mining, the economy of Patagonia is now heavily based on



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The Mexican flag flies on the other side of the border wall in Organ Pipe Cactus National Monument. Walling off the border threatens the binational cooperation crucial to borderlands conservation.

ecotourism and restoration—sales tax revenues have risen 364 percent (corrected for inflation) in the decades-long shift (Shafer 2014). The wall and its attendant roads and other infrastructure could detract from the natural experience and depress ecotourism.

Few economic studies of such local impacts on protected areas or species exist, making it difficult to estimate cumulative effects along the wall. However, FWS does document total annual spending on wildlife-associated activities, including watching wildlife, hunting and fishing. In the four border states, wildlife-watching alone contributed nearly \$13 billion per year to local economies in 2011, with hunting and fishing adding another \$13 billion (FWS 2014). Spending related to watching wildlife in Arizona's four border counties alone contributed \$364,202,189 to local economies in 2011 (Tucson Audubon Society 2013). A 2012 study of visitors coming to the Lower Rio Grande Valley for ecotourism found they contributed \$463 million per year (Woosnam et al 2012).

Conclusion

Every day communities along the border experience the impacts from sections of the wall already built. Adding more barriers could worsen these damaging effects and introduce them in new areas, devaluing our investment in public lands, wildlife conservation and habitat restoration, harming local economies dependent on ecotourism and outdoor recreation, and wasting billions of dollars that could otherwise be spent on conservation or other worthwhile efforts. Moreover, the physical constraints of the wall and the antagonistic message it sends to Mexican citizens, agencies, scientists and conservationists threaten the programs, projects, partnerships and binational cooperation necessary to protect our borderlands just when they need it most.

DEFENDERS AGAINST THE WALL

Defenders of Wildlife has long fought to restore imperiled species and to protect national wildlife refuges and other sensitive federal lands along the U.S.-Mexico border. We have worked for decades to support the reintroduction and recovery of the Mexican gray wolf and to protect the habitat of the jaguar, ocelot, Sonoran pronghorn and cactus ferruginous pygmy-owl and other wildlife on the edge.

We advocate for science-based management of our federal public lands and collaborate with the U.S. Forest Service, FWS, other federal agencies and the states to protect and restore habitat and to find the food, water and mates necessary to sustain healthy populations. Walls thwart cross-border connectivity and our conservation goals.

Defenders has stood against the border wall since Congress mandated its construction with the passage of the Secure Fence Act of 2006. We have taken legal

action to halt construction of wall segments and to challenge the constitutionality of the provision in the Real ID Act of 2005 that allows DHS to waive laws—including the Endangered Species Act and other environmental safeguards—to construct border barriers and roads.

On Capitol Hill, Defenders is a strong voice against the wall, providing information about the biological diversity, conservation investments and communities at stake. We also work closely with a diverse broad coalition of environmental, Latino, immigration rights, religious rights and civil rights groups to oppose funding for the wasteful, damaging walling off of our southern borderlands.

“The Trump administration’s border wall would divide families and communities along the border and jeopardize wildlife, habitat and years of conservation progress and collaboration between the United States and Mexico,” says Jamie Rappaport Clark, Defenders of Wildlife’s president and CEO. “We cannot allow that to happen.”

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