Four Species on the Brink And the Wall that Would Push Them Toward Extinction

Sonoran Pronghorn • Jaguar • Black Bear • Mexican Wolf





NOVEMBER 2017

Juan Carlos Bravo · Katie Davis

Wildlands Network is a non-profit group of experts on science, policy, and conservation working to stem the mass extinction of wildlife across the planet—a crisis driven by human activity. We reconnect wildlife habitats in North America so that animals can live in and move safely through the landscape. We collaborate with partner groups to create wildlife corridors at a large enough scale to meet the needs of wolves, cougars, and other native carnivores. And we engage with policymakers to ensure that our laws and public policies are doing everything possible to protect wild places and animals—because nature sustains us all.



November 2017

1402 Third Ave, Suite 1019 98101 Seattle WA USA

info@wildlandsnetwork.org Phone: 1 (877) 554 5234

FOREWORD

The border policies of the current administration seek to undermine decades of work by federal and state agencies, supported by a broad base of private stakeholders, that have established the borderlands as one of the most secure and economically and biologically diverse regions of the country. The Sonoran Desert and Sky Islands regions, which are treasured by communities in both the United States and Mexico, contain critically important habitat for many iconic North American species, including jaguar and black bear. They are internationally recognized areas of biodiversity that sustain numerous wide-ranging animals requiring sustained binational conservation efforts to ensure their survival.

The border is already walled in many of the places where fencing is feasible, as a result of the policies set forth during the Bush administration (2001-2009). Vehicle fencing, designed to deter motorized crossings, does allow for some wildlife connectivity, although certain species avoid it altogether while others are incapable of crossing it when mixed with barbed wire or other structures. Pedestrian fences are the most common feature along urban stretches of the border and extend into wild areas, these are all but impenetrable by wildlife, although people manage to breach them on a regular basis. The remaining gaps are thoroughly monitored by the Border Patrol with the use of remote sensing techniques, and the number of unauthorized migrants from Mexico has been steadily declining since 2007. Under current circumstances, it is evident that any increase in militarized operations will only worsen the environmental, wildlife and human rights problems the borderlands already face.

Wildlands Network is proud of its partnerships with organizations and leaders in the social justice, immigrant rights and civil rights movements to oppose the border wall and associated border-security infrastructure. We believe in an interconnected, vibrant future for the borderlands region that is based in self-determination, the rule of law, local community-driven solutions and respect for humans and wildlife.

To prevent directing much needed resources towards self-destructive and ineffective measures, a nuanced understanding of the borderlands region, and the many species that inhabit it, is necessary. With this document, Wildlands Network aims to contribute to such an understanding.

INTRODUCTION

This report summarizes the most relevant and up-to-date information on four charismatic species affected by the fragmentation of habitat and disruption of movement corridors resulting from the existing and proposed border infrastructure and associated militarization. It focuses on the Arizona-Sonora border and covers a small portion of western New Mexico's border with Chihuahua, but its framework and broad themes are relevant to any evaluation of impacts to wildlife across the entire U.S.-Mexico border.

The report presents evidence for decision-makers to consider as they determine the future of infrastructure and policy in the borderlands region. Management of public lands and government operations should take into account the best available information. It is important to understand impacts that infrastructure development has on the landscape and the many species that constitute the natural heritage of two countries.

We compiled information from available research and policy documents of both the United States and Mexico, presenting a digest of how both countries have, over the last few years, advanced specific conservation actions in support of wide-ranging species. Many of these actions are the result of years of international collaboration, a practice that is indispensable if these species are to recover and thrive in their native habitat in both nations.

The species selected serve as both umbrella and flagship species for long-standing conservation strategies in the region. The public of both the United States and Mexico have invested, and continue to invest, significant financial resources in the protection of their habitat, the mitigation of actions that threaten them, and in activities that may secure the long-term recovery and persistence of genetically viable populations of each of them. These collective efforts are now threatened by a project that is plagued by a failure to understand the biological and cultural richness of one of North America's most diverse landscapes.

SONORAN PRONGHORN

Expected effects of border wall:

- Isolation of populations leading to decrease in genetic diversity necessary for long-term survival.
- Blocking access to water and forage in times of drought could lead to large die-offs.

What you need to know:

Pronghorns (Antilocapra americana) are a native ungulate of the Americas and the fastest land mammal on the continent. Historically, pronghorn populations stretched across the grasslands of



Steve Hillebrand/USFWS

the Sonoran Desert. The Sonoran subspecies (A. americana sonoriensis) is recognized as endangered by the Endangered Species Act (ESA) and its Mexican equivalent, the Norma Oficial Mexicana-059 (NOM-059). Before European settlement, millions of pronghorn ranged across North America. Today, the best estimates indicate there are only about 980 Sonoran pronghorn in Mexico and around 320 in the United States.

In winter, Sonoran pronghorn prefer sparselyvegetated, flat, open spaces that are ideal for swift running and visual detection of predators. However, in summer they require denser vegetation that offers thermal cover and moister forage. A mix of these vegetation types is essential to enable Sonoran pronghorn to use the most suitable vegetation type for the season. Sonoran pronghorn move nomadically in response to changing forage conditions and water availability as a result of sporadic rainfall. They require large expanses of contiguous habitat to make these movements and to persist in the harsh desert environment.

> USFWS - Recovery Plan for the Sonoran Pronghorn

Remnant populations of this subspecies exist in southwestern Arizona and northwestern Sonora. Its current range covers significant portions of the Cabeza Prieta National Wildlife Refuge, the Organ Pipe National Monument, and the Barry M. Goldwater Air Force Range, and extends south across the international border into the Pinacate y Gran Desierto de Altar Biosphere Reserve and the lands southeast of it. It is threatened in its native habitat primarily by human development and roads.

What's being done:

The US Fish & Wildlife Service (USFWS) has collaborated, since the preparation of the species' first recovery plan issued in 1982, with the Arizona Game and Fish Department (AGFD), the Department of Defense, local stakeholders, and Mexican agencies and conservation groups in the protection of this subspecies. Key activities undertaken by stakeholders include regular surveys to monitor fluctuations in population sizes, establishing a *Reintroduction Management Unit* (i.e. an area for the reintroduction of the species) in Arizona and proposing one in California, establishment of water "developments" to ensure pronghorns have access to water during prolonged drought periods, supplemental feeding, and enhancement of forage plots to prevent starvation. More recently, two experimental populations have been reintroduced in Arizona.

Border Crosser

In 2008, a male pronghorn identified simply as **#851**, born in a breeding pen at Cabeza Prieta National Wildlife Refuge, was released with a satellite-tracking collar and traveled more than 190 miles to join a herd in Mexico, successfully crossing Federal Highway 2 multiple times. **#851** provided tangible proof that remaining corridors still allow genetic interchanges between populations of both countries.

MEXICO has initiated the removal or retrofitting of cattle fences in private and communal properties to allow pronghorn to move freely in search of resources. The Pinacate Biosphere Reserve personnel conduct environmental education activities to inform the local communities of the status of the species, and the Secretariat for Communications and Transport has retrofitted existing bridges along Highway 2 within the Biosphere Reserve to potentially serve as wildlife crossings for the species.

What's at stake:

Habitat fragmentation is already identified as one of the major threats to the species, with land use change and infrastructure having a detrimental effect on the connectivity of the remaining populations. Highways, fences and

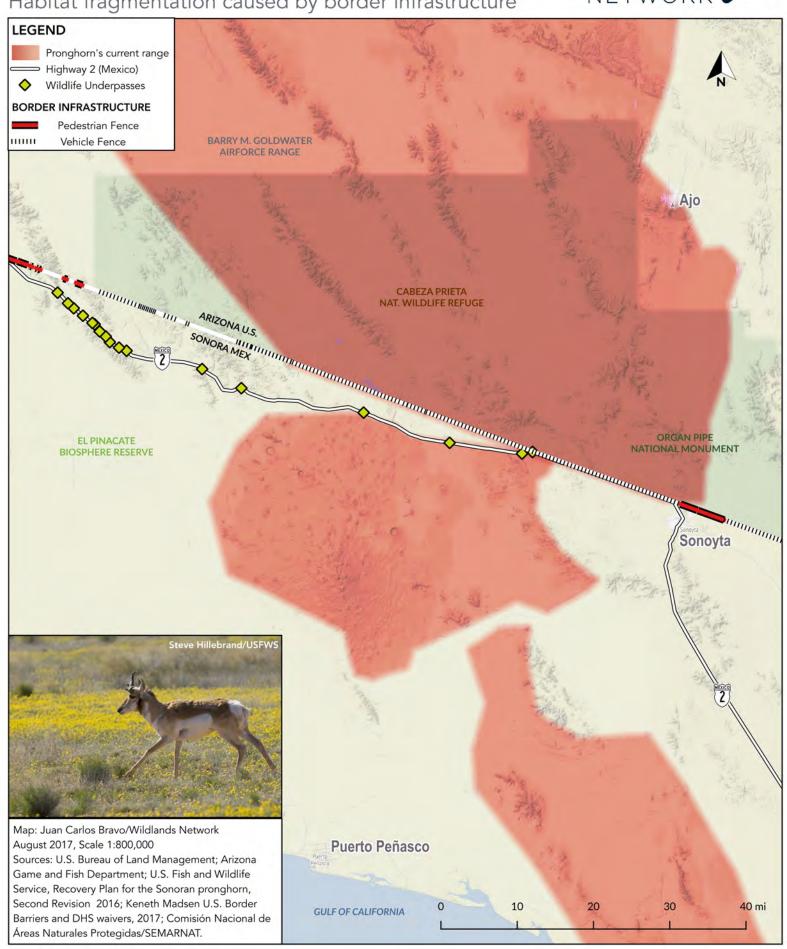
canals all affect pronghorns either by directly blocking their movement or by redirecting human traffic to regions away from urban areas, altering the species behavior in such places.

Historically there was interchange of individuals between both countries, but barriers have split populations and continue to pose an obstacle to full recovery of the subspecies. The border fence in the region is still primarily a vehicle barrier, and individuals manage to cross the border occasionally, maintaining a flow of genes necessary to keep the diversity and health of populations in Arizona and Sonora.

Increased border infrastructure could completely sever connectivity between the herds of the U.S. and Mexico, undermining progress toward recovery.

SONORAN PRONGHORN Wildlands NETWORK





JAGUAR

Expected effects of border wall:

- Blocking of dispersal corridors preventing future recolonization of native habitat in the United States.
- Isolation and resulting failure to reproduce for any individuals remaining in the U.S.

What you need to know:

Jaguars (*Panthera onca*) are the continent's largest cat and, though generally associated with tropical climates, they were present historically as far north as the Grand



Northern Jaguar Project / Naturalia A.C.

Canyon. Widespread carnivore eradication practices resulted in their extirpation from the United States in the second half of the 20th century.

Since 1996, jaguars have been sporadically recorded in southeastern Arizona, and three different individuals were photographed in 2016: in the **Santa Rita**, the **Huachuca** and the **Dos Cabezas mountain ranges**, illustrating both the species' capacity for long-distance dispersal and the existence of vast tracts of suitable habitat throughout the southwest. Most recently, one of these jaguars, dubbed "Sombra" (Spanish for shadow) by local school children, was captured on a <u>remote camera</u> in the **Chiricahua mountains** in Arizona.

As of 2016, there is no evidence suggesting the presence of a jaguar breeding population in Arizona; thus, for Arizona, it is important to protect jaguars in Sonora and in all key breeding and connective areas in Mexico. For Arizona and Sonora combined, it is important to maintain connectivity to all other potential jaguar populations in Mexico (Northern population), thus maintaining the pattern of gene flow among populations

Culver & Ochoa Hein, 2016 – "Jaguar Taxonomy and Genetic Diversity for Southern Arizona, United States, and Sonora, Mexico: U.S. Geological Survey Open-File Report"

The breeding population closest to these isolated records lies in central Sonora, Mexico.

Jaguars are adaptable to many different ecosystems, terrains and altitudes yet require large undisturbed territories and sufficient prey. Attempts to prevent them from becoming extinct must focus on habitat protection and connectivity while also addressing the root causes of illegal hunting and poisoning.

What's being done: The USFWS has designated approximately 764,207 acres of "Critical

Habitat" in Arizona and New Mexico for the protection of this species; the same agency recently released a Draft Recovery Plan, currently under review after receiving comments from experts and advocates suggesting important changes. Recommendations include Wildlands Network's advice to expand the area being considered for recovery to integrate areas north of Interstate 10 and farther into New Mexico, following the creation, by researchers at Conservation Science Partners, of a habitat model that is more accurate, more robust and more detailed than the one used in the Draft Recovery Plan.

Border Crosser

On August 31st 1996 a cougar hunter in southern Arizona met face to face with an adult male jaquar who would later become known as "Macho B" (male B). Over the next 13 years, Macho B was photographed repeatedly, using an area in both countries of approximately 840 square miles. On October 4-5, 2005, he was recorded crossing the border from the south along the Atascosa mountain range. The nearest breeding population, from where Macho B most likely came, lies 190 miles south in central Sonora. Macho B's untimely death spurred public awareness of the plight of jaguars in the borderlands, his life taught us how the landscape of both countries is simply "home" for such an individual.

The Department of Homeland Security funded a monitoring project, run by the University of Arizona, which successfully monitored the Santa Ritas jaguar (also known to the public as *El Jefe*) for three years. The project included scat collection for DNA samples and resulted in analyses to better understand the origin and diversity of jaguars in the U.S.

Numerous local conservation groups have included jaguars in their conservation planning and are working on promising strategies to decrease human-jaguar conflict across the region.

MEXICO has made increasing efforts to protect the northernmost breeding population of the species. A partnership of the groups Naturalia and Northern Jaguar Project protects over 50,000 acres of jaguar habitat in the species' northernmost breeding area. Other conservation groups, along with researchers from the National Autonomous University of Mexico (UNAM), have promoted jaguar conservation in ranches covering an additional area of similar size, and successfully collared two jaguars to obtain better information on their behavior patterns in arid ecosystems. The Secretariat of Agriculture, along

with the Confederation of Cattle-growers (a nationwide umbrella organization that connects all regional cattle-growers groups), run a compensation program for livestock losses, which was started at the behest of jaguar conservation specialists and CONANP (Mexico's parks agency).

Between 2000 and 2011, three private protected areas along the jaguar corridors were certified by CONANP as Areas Destined Voluntarily for Conservation (ADVC): **Los Ojos**, **El Aribabi** and **Los Fresnos**. Local conservation groups and specialists of both Mexico and the U.S. are collaborating with the Secretariat for Communications and Transport in the construction of wildlife crossings for jaguars and other species along Highway 2; this effort is financially supported by the Wildlife Without Borders Program of the USFWS.

What's at stake:

The U.S.'s vast public and undeveloped lands, along with strict law-enforcement can provide necessary protections for jaguars that make it across the border though. However, as far as we know, only males have crossed northward since their extirpation in the last century. Females are not only known to travel much shorter distances away from their places of birth, they also seem to avoid highways and other man-made obstacles more frequently than males.

Jaguar recovery in the U.S might become impossible if more fencing is erected in the regions that may still serve as corridors for the dispersal of females from central Sonora. Existing border infrastructure in known jaguar corridors remains mostly permeable to them.

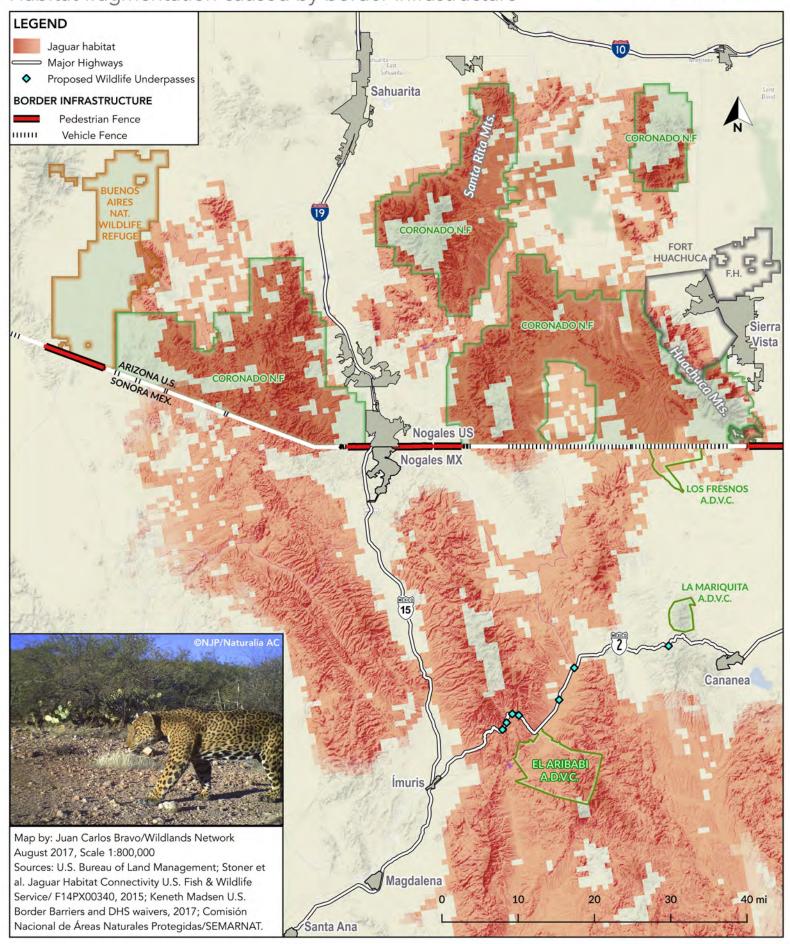


A coalition of wildlife advocates from both countries are collaborating with the Mexican government to promote new wildlife crossings for jaguars along known corridors on Highway 2, similar to the one in this artist's rendition. Such infrastructure would enhance connectivity for the species in the borderlands and facilitate recovery in the United States.

JAGUAR

Nogales region

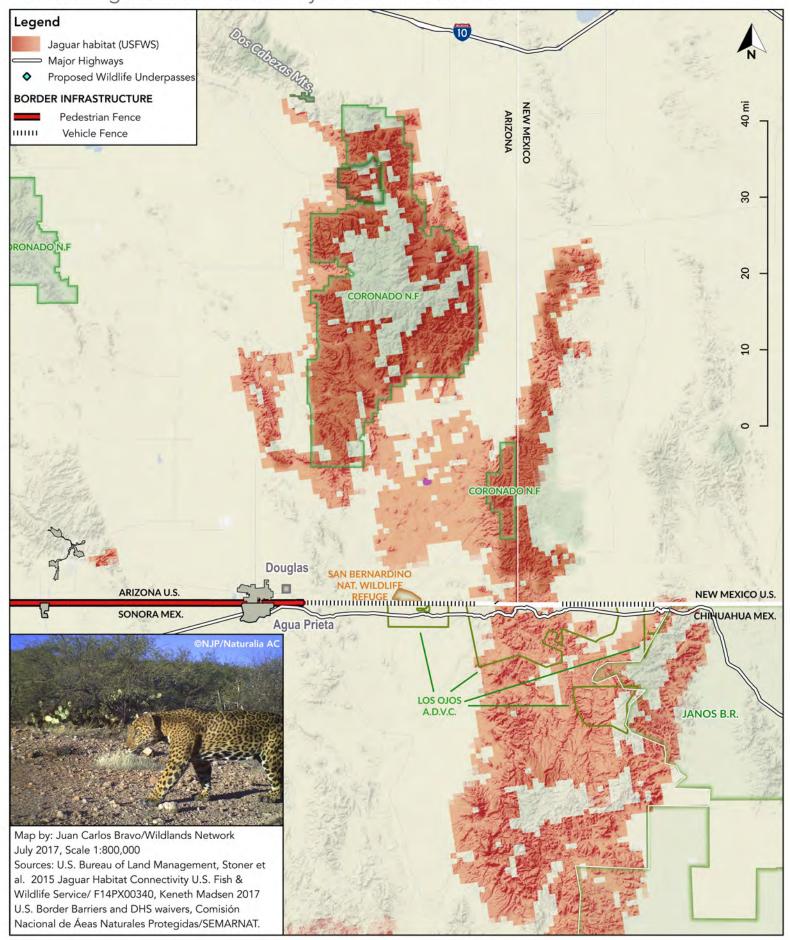




JAGUAR

Douglas region





BLACK BEAR

Expected effects of border wall:

- Isolation of populations leading to decrease in genetic diversity necessary for long-term survival.
- Blocking access to water and forage in times of drought could lead to seasonal die-offs and increased conflict with cattle.

What you need to know:

Black bears (*Ursus americanus*) are still abundant in the United States. However, a small subpopulation of them in southern Arizona is already



Sky Island Alliance/ El Aribabi Conservation Ranch

facing genetic isolation and could disappear altogether. Bears in this region are closely related genetically to those in Mexico's Sky Islands and Northern Sierra Madre Occidental, but they are almost cut off from –and less genetically related to– black bears elsewhere in Arizona due to habitat fragmentation, caused in part by major highways.

Black bears are found in temperate forests throughout North America and require large undeveloped areas to maintain viable populations. Because of this, they are highly vulnerable to habitat fragmentation and loss of connectivity.

Black bear persistence in the US-Mexico border Sky Islands may be particularly vulnerable to further loss of habitat due to urbanization and border security activities.

Black bear populations in Arizona exhibit a north–south [distribution] in which the border sub-population is isolated from, and less genetically diverse than, the main population segment in east central Arizona.

Atwood et al. 2011 – "Modeling connectivity of black bears in a desert sky island archipelago"

Black bears in southern Arizona and in Sonora appear to have lower population densities than in similar habitats elsewhere, which already increases their chances of becoming extirpated from this region in the near future. Research suggests that black bears prey more often on domestic cattle when wild food is scarce, suggesting that access to native foraging grounds is important for long-term conservation efforts.

What's being done: The hunting season for the species, managed by the Arizona Game and Fish Department, has been adapted to take into

account conservation needs. Transportation authorities are collaborating with local conservation groups and wildlife agencies to determine the possibility of establishing wildlife crossings along Interstate 10, which could increase connectivity between the Sky Islands bears and other populations.

MEXICO has designated its western (Sky Islands & Sierra Madre Occidental) black bear population as Endangered. In May 2017, the Secretariat for the Environment and Natural Resources published the re-categorization of the Bavispe Area for Fauna and Flora Protection, updating its management status and providing it with legal certainty. Black bear is protected as the mascot of the Bavispe, and its habitat is also under protection in the Janos Biosphere Reserve, the Los Ojos private reserve and the Campo Grande Area for the Protection of Fauna and Flora, where recent reports suggest the regional population may include as many as 122 individuals. Wildlife crossings being considered by Mexican transportation authorities in the area of Los Ojos would benefit

Border Crosser

On April 22, 2009, as part of a black bear survey conducted for Mexico's National Ecology and Climate Change Institute, a camera trap in Sierra de Ajos, Sonora, took a picture of a black bear, sitting calmly in a forest. The bear showed the typical brown coat of the Sky Islands population and a distinctive red tag on its right ear. Protected within the limits of the Bavispe reserve, the Arizona-Ajos Black Bear had clearly traveled all the way from Arizona, where the Game and Fish Department uses such tags for its research. While the picture did not display details on the tag that might allow individual identification, it provided concrete evidence, supporting findings by geneticists, that there remains a flow of bears and their genes across the border.

this species and prevent deaths caused by vehicle collisions, such as the one recorded near Cananea on June 17, 2012.

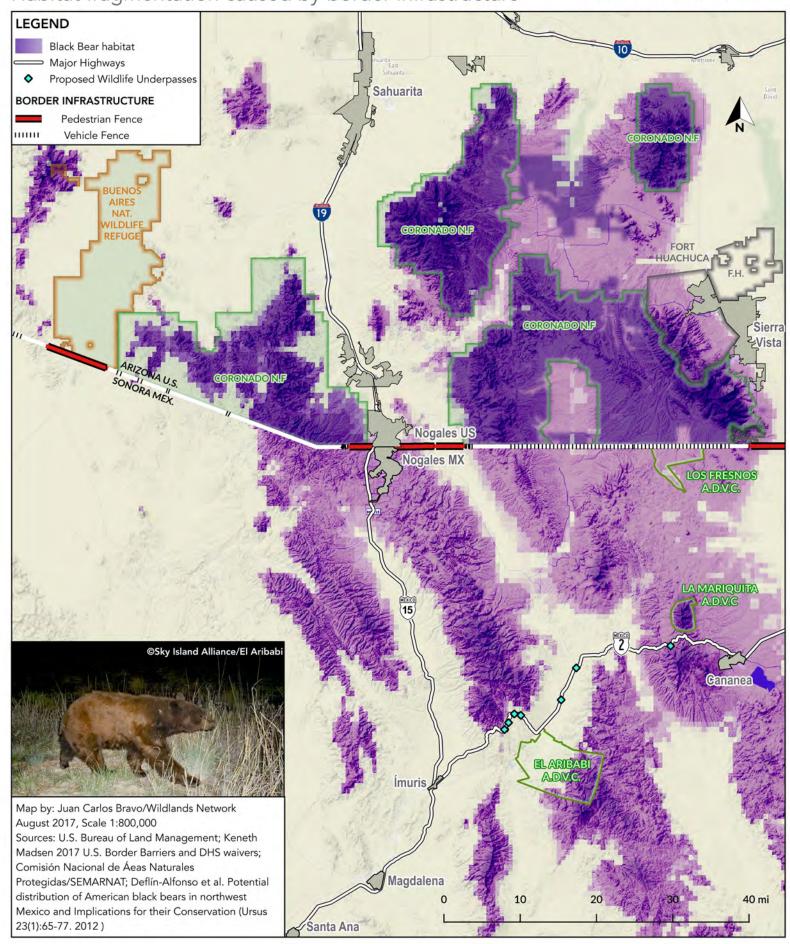
What's at stake:

Researchers identify such threats as habitat and connectivity loss and overhunting due to the potential overestimation of the size of the Sky Islands population. Maintaining connectivity between Mexico and the United States is crucial to preserving genetic diversity within this population and preventing it from becoming vulnerable to disease and to problems associated with inbreeding. The region has already lost most of its top carnivores, including the grizzly bear (*Ursus arctos*). Increased border infrastructure could result in further isolation of this population making Black bears the next in line for local extinction.

BLACK BEAR

Nogales region

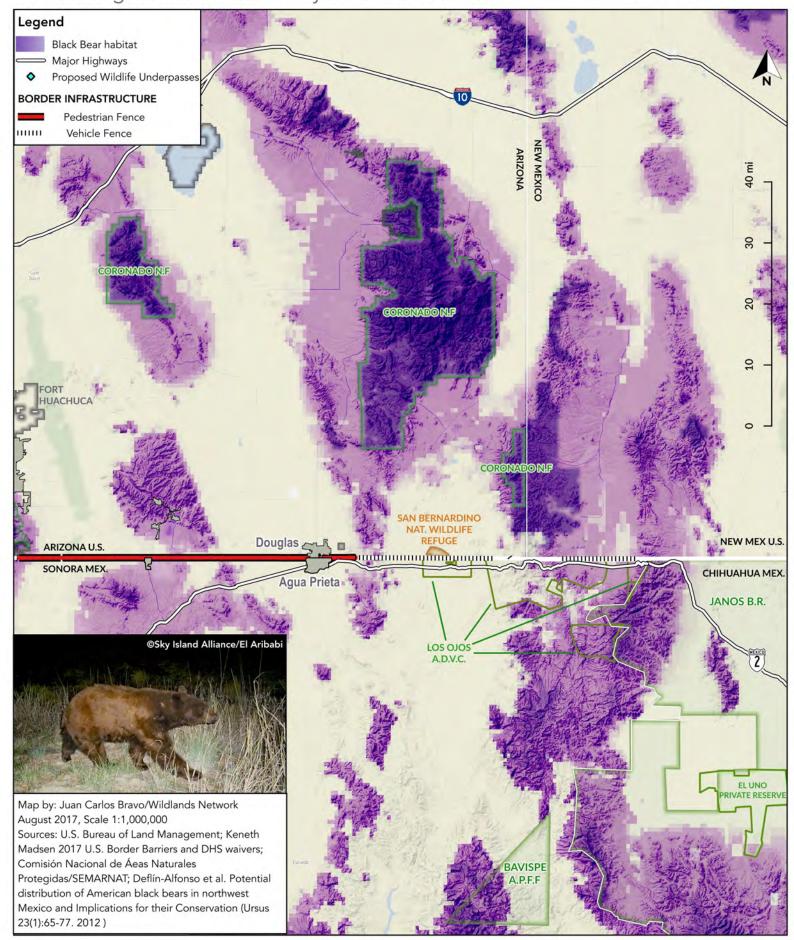
Wildlands NETWORK



BLACK BEAR

Douglas region





MEXICAN WOLF

Expected effects of border wall:

 Blocking of dispersal corridors preventing genetic interchange between recovering populations in Mexico and the U.S., leading to populations at greater risk from local extinction.

What you need to know: Mexican wolves are the most threatened subspecies of gray wolf in the world. Extirpated in the U.S. as a result of aggressive extermination campaigns during the last two centuries, wolves are only recovering now thanks to a



Juan Carlos Bravo

binational reintroduction program. There are currently two semi-isolated populations, one in the region designated as **Mexican Wolf Experimental Population Area** (MWEPA) in southern Arizona and New Mexico and one in the **Sierra Madre Occidental** in Chihuahua and Sonora, Mexico.

"... movements between the existing US wild population and [the population in the] Northern Sierra Madre Occidental are very possible due to the high mobility of wolves as evidenced by exploratory travels of US wolves and the released wolves in Mexico."

 Mexican Wolf Habitat Suitability Analysis in Historical Range in the Southwestern US and Mexico, 2017 Report to USFWS Mexican wolves, despite their smaller stature when compared to other subspecies, can still travel huge distances and are constantly seeking new territories to establish good hunting grounds and safe dens, away from human disturbance.

What's being done:

The Mexican wolf recovery program is a binational program involving several federal and state agencies of the United States and Mexico as well as breeding centers, veterinaries and field

experts. It is cemented in nearly 30 years of international collaboration and keeps a captive population as genetically diverse as possible while advancing releases into areas deemed suitable in both countries. Animals released in any given site might have been born in either country and are selected based upon to how their genetic traits contribute to the overall goals of the program. Releases in New Mexico, Arizona, Sonora and Chihuahua and the reproduction of the individuals released have resulted in an

overall wild population of at least 141 individuals. The USFWS recently issued a revised Recovery Plan, which focuses on the need to establish two populations of the species – one of them in Mexico – potentially connected by habitat good enough to facilitate gene-flow between them. Comments from experts on this draft plan, including those submitted by Wildlands Network, call for an increase in the target number of populations and the connectivity between them.

MEXICO collaborates in the captive breeding program and in 2011 started its own reintroductions. To date it has released 41 wolves in Sonora and Chihuahua and has managed to establish a population of approximately 28 wild wolves. In 2014 a pair of released wolves in Chihuahua had a litter of five pups, marking the first wild births of the species in Mexico in more than 30 years. The pair went on to produce two more litters in subsequent years.

Border Crosser

In 2016, a female was born in a breeding facility near Cananea in the state of Sonora, Mexico. She was fitted with a collar and, in October of the same year, released in the neighboring state of Chihuahua, 90 miles from the international border. Known by wolf managers as f1530, and named Sonora by wolf advocates, she then traveled north. Her collar last located her 21 miles south of the border on Valentine's Day, 2017. On March 19, she was sighted in Arizona, and a week later she was captured by an Interagency Field Team in charge of the species' on-the-ground management, to be taken to a breeding facility, pending a decision on her future. Sonora showed a wild courage in traveling through the rugged terrain of the borderlands, undeterred by highways and other obstacles in her search for a family.

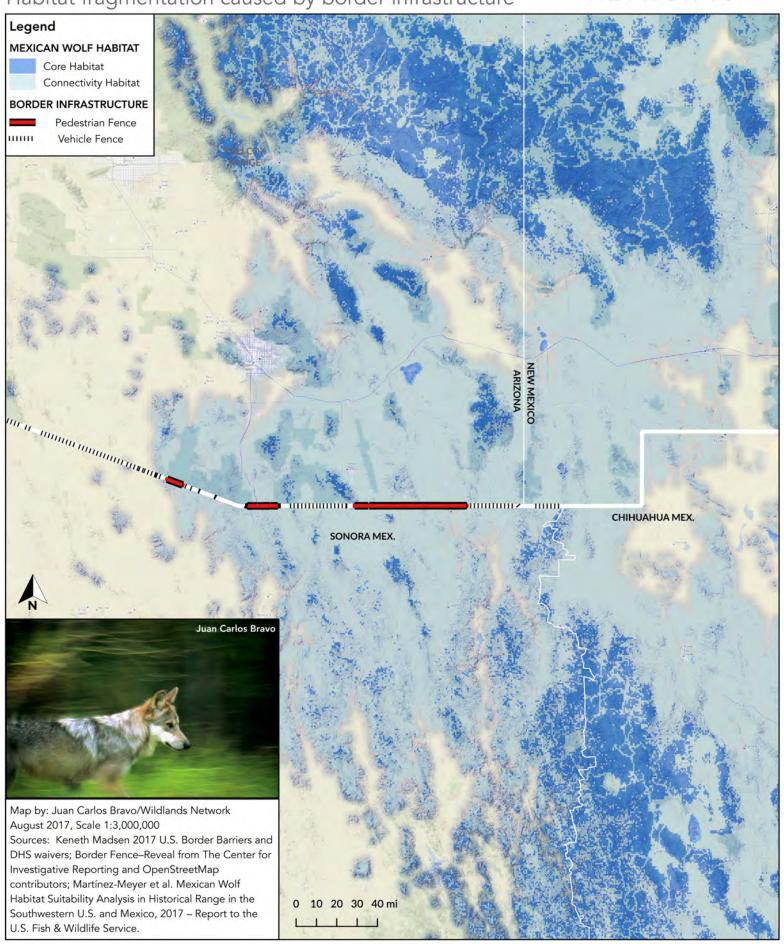
Mexican scientists are currently evaluating the potential for additional reintroductions in the southern Sierra Madre Occidental. The same program that compensates for cattle losses due to jaguar predation covers losses from proven wolf predations, and landowners collaborating in wolf reintroductions receive financial incentives for managing their lands for conservation.

What's at stake:

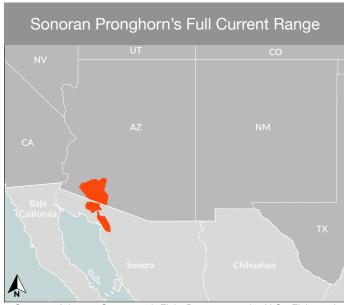
Recovery of such a wide-ranging species necessarily requires trans-jurisdictional collaboration as well as a foundation of goodwill and trust between partners. A recovery, decades in the making, could be more threatened than ever if limited by an impenetrable border wall resulting from a lack of long-term planning for sustainable, cross-border populations. Despite veterinarians' best efforts, the best strategy to prevent genetic issues detrimental to a species' survival remains establishing several wild and connected populations. With Mexican wolves already facing problems associated with their shallow gene pool, it is imperative that populations in the wild be allowed to continue the dynamics of natural selection unimpeded by infrastructure that could preclude gene flow between packs.

MEXICAN WOLF

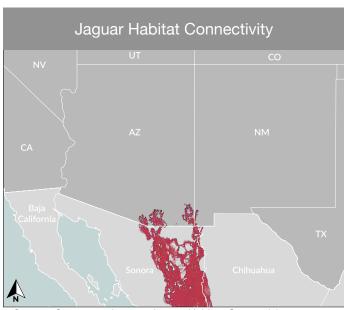
Wildlands NETWORK



SPECIES' BINATIONAL HABITATS



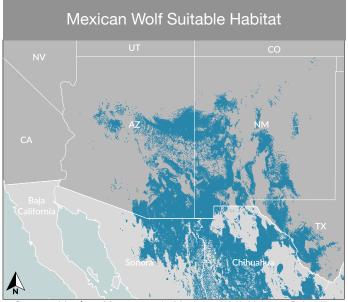
Source: Arizona Game and Fish Department in U.S. Fish and Wildlife Service, Recovery Plan for the Sonoran pronghorn, Second Revision 2016.



Source: Stoner et al. 2015 Jaguar Habitat Connectivity report to U.S. Fish & Wildlife Service/ F14PX00340



Source: Deflín-Alfonso et al. Potential distribution of American black bears in northwest Mexico and Implications for their Conservation (Ursus 23(1):65-77. 2012)



Source: Martínez-Meyer et al. Mexican Wolf Habitat Suitability Analysis in Historical Range in the Southwestern U.S. and Mexico, 2017 – Report to the U.S. Fish & Wildlife Service.

RECOMMENDATIONS

In order to preserve the species highlighted here and create an umbrella effect that maintains diversity and resiliency in the borderlands, Wildlands Network strongly recommends the following actions:

- Do not fund or build a border wall.
- Continue international coordination in conservation issues through the Commission on Environmental Cooperation and other bi-lateral mechanisms to support and enhance habitat connectivity across borders.
- Preserve existing gaps between the current segments of border wall.
- Do not replace vehicle barriers with pedestrian fencing. Also, do not replace semi-permeable bollard fencing with impermeable concrete or mesh walls.
- Repeal authorization, provided for under the REAL ID Act of 2005, for waivers by the Department of Homeland Security of laws and regulations, such as the Endangered Species Act and National Environmental Policy Act.
- Direct the Department of Homeland Security to consult with the U.S. Fish and Wildlife Service, local communities and species experts, and integrate their recommendations on all projects, to ensure border operations do not undermine or negatively impact species recovery efforts.

ACKNOWLEDGEMENTS

This report was made possible thanks to the generous support of the Wilburforce Foundation, the Schaffner Family Foundation, David Welborn and Ann Hunter-Welborn, and anonymous donors.

The authors also wish to thank the following individuals for their help in obtaining the information presented here: Horacio Ortega, Christian Alejandro Delfín Alfonso, Carlos Alberto López González, Erin Fernandez, Sherry Barrett, Enrique Martínez-Meyer, Alejandro González Bernal.

We are very grateful to the following institutions and individuals who have made their research publicly accessible, allowing for a broader understanding of our landscape. Any misinterpretation of their work is, of course, our fault alone: U.S. Fish and Wildlife Service Arizona Ecological Services, Instituto Nacional de Ecología y Cambio Climático, Arizona Game and Fish Department, Comisión Nacional de Áreas Naturales Protegidas, US Geological Survey, Secretaría de Comunicaciones y Transportes, Center for Investigative Reporting, Reserva de la Biósfera Pinacate y Gran Desierto de Altar, Área de Protección de Flora y Fauna Bavispe, Michael Corey & OpenStreet Map contributors.

Thanks also to Northern Jaguar Project/Naturalia, Fish and Wildlife Service, Sky Islands Alliance/El Aribabi for permission to use their pictures.

We finally want to thank Matt Clark for his help in finding data, providing an excellent cover picture, and constantly cheering us.

SOURCES

Abarca F., Meléndez C., Soria C., Molina R., Corrales R. 2017, *Colaboración binacional para la conservación del berrendo sonorense*. La Jornada Ecológica, no. 213, pp.12-14.

Atwood T.C., Young J.K., Beckmann J.P., Breck S.W., Fike J., Rhodes O.E. Jr., Bristow K.D., 2011, *Modeling connectivity of black bears in a desert sky island archipelago*. Biological Conservation 144 pp. 2851-2862.

Caroll C., Fredrickson R.J., Lacy R.C. 2013, **Developing metapopulation connectivity criteria from genetic and habitat data to recover the endangered Mexican wolf.** Conservation Biology, vol. 28, no.1, pp. 76-86.

Christianson, D., Fernandez E, and Grageda García M.A., 2017 **The Endangered Sonoran Pronghorn, Population Status of a Borderland Desert Ungulate.** The Wildlife Professional, Sept/Oct 2017.

Culver M. and Hein A.O. 2016, *Jaguar taxonomy and genetic diversity for southern Arizona, United States, and Sonora, Mexico*: U.S. Geological Survey Open-File Report 2016-1109.

Deflín-Alfonso C.A., López-González C.A., Equihua M. 2012, **Potential distribution of American black** bears in northwest Mexico and Implications for their Conservation. Ursus, vol. 23 no. 1, pp. 65-77.

List R., Valdés M. and Zarza H. Amenazas a las poblaciones del berrendo en el norte de México. Investigación ambiental, vol. 5 no.1, pp. 94-100. 2013.

López González C. A., Lara Díaz N.E., Espinosa Flores E. 2010, **Diagnóstico poblacional del oso negro** (Ursus americanus) en las serranías de los estados de Sonora y Chihuahua y sus posibles afectaciones por el muro fronterizo. Informe parcial para el Instituto Nacional de Ecología. September 2010.

Martínez-Meyer E., González-Bernal A., Velasco, J. A., Swetnam, T.L., González-Saucedo, Z.Y., Servín, J. López González, C.A., Lara Díaz, N.E., Aguilar Miguel, C. Chávez García, C. & Oakleaf J.K. 2017, *Mexican wolf habitat suitability analysis in historical range in the southwestern U.S. and Mexico*. Report to the U.S. Fish & Wildlife Service. April 2017.

McCain E.B., Childs, J.L. 2008, Evidence of resident jaguars (Panthera onca) in the southwestern United States and the implications for conservation. Journal of Mammalogy, vol. 89, no. 1 pp. 1-10

Passel J. S. and Cohn D. 2016, *Overall Number of U.S. Unauthorized Immigrants Holds Steady Since* **2009**. Pew Research Center, September, 2016.

Povilitis T. 2015, Recovering jaguar Panthera onca in peripheral range: a challenge to conservation policy. Oryx vol. 49, no. 4 pp. 626-632.

Stephen C. L., Devos J. C. Jr., Lee, T.E., Bickham, J. W., Heffelfinger, J. R., Rhodes O.E. Jr. 2005, *Population genetic analysis of Sonoran pronghorn* (*Antilocapra americana sonoriensis*). Journal of Mammalogy, vol. 86 no.4, pp. 782–792.

Stoner K. J., Hardy A. R., Fisher K., and Sanderson E. W. 2015, *Jaguar habitat connectivity and identification of potential road mitigation locations in the Northwestern Recovery Unit for the Jaguar.* Wildlife Conservation Society final draft report to the U.S. Fish and Wildlife Service in response to Solicitation F14PX00340. March 2015.

Theobald D. M., Landau V., McClure M., Dickson B. G. 2017, *Potential jaguar habitat and structural connectivity in and surrounding the Northwestern Recovery Unit.* Report submitted to Wilburforce Foundation. March 2017.

- U. S. Fish and Wildlife Service. 2016, *Recovery Plan for the Sonoran pronghorn (Antilocapra americana sonoriensis), Second Revision.* U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico, USA. November 2016.
- U. S. Fish and Wildlife Service. 2016, *Jaguar Draft Recovery Plan (Panthera onca)*. Prepared by: The Technical Subgroup of the Jaguar Recovery Team in conjunction with the Implementation Subgroup of the Jaguar Recovery Team and the U.S. Fish and Wildlife Service for the U.S. Fish and Wildlife Service, Southwest Region, Albuquerque, New Mexico, USA. December 2016.
- U.S. Fish and Wildlife Service. 2017, *Mexican Wolf Captured in Chiricahua Area of Arizona*. Press release. April 6 2017.
- U.S. Fish and Wildlife Service. 2017, **Draft Mexican Wolf Biological Report: Version 2.** Region 2, Albuquerque, New Mexico, USA. June 2017.