Desert Divide

Transboundary Conservation in the Southwest

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The desert southwest is home to some of the most diverse and fragile ecosystems in North America. Habitats in the region support rare and extraordinary species of plants and animals—including one of my favorites, the desert bighorn sheep. Because the desert is a tough place to live and work, the biology of many resident species is poorly understood. Add to that the complication of political boundaries that fragment species ranges, and conservation efforts can be a real challenge.

Such is the conservation landscape of the Chihuahuan Desert. This North America desert straddles the U.S.–Mexico border and occupies areas of Arizona, New Mexico, and Texas, and the Mexican states of Chihuahua, Coahuila, Nuevo León, Durango, and Zacatecas. The arid environment of the Chihuahuan Desert is a function of its geographic location between the Sierra Madre Occidentals and the Sierra Madre Orientals. Altitudes range from 1,000 to 10,000 feet, with much of the region located above 4,000 feet. Lower habitats are characterized by creosote bush, tarbush, sotol, lechuguilla, ocotillo, and various cacti. Scattered within the desert are peaks supporting "sky islands" that house plant communities representative of the Sierra Madre Occidental Mountains. Here, relic populations of oak-juniper-piñon forests and ponderosa pine-Douglas fir forests occur at various elevations. Scatterings of blue grama-dominated grasslands are found in the deeper soils of the basins, plateaus, and rolling hills.

Drawn to the Desert

The region called the Chihuahuan Desert Borderlands surrounds the Rio Grande near Big Bend National Park in Texas, Coahuila, and Chihuahua. The unique landscapes and species of this area sparked my early interest that developed into a career in biology and conservation.

My husband, B.C., and I had the fortune of living in this region during our college years in the 1970s, and the remoteness of the region made us feel like discoverers in an unexplored land. This was hardly the case. Anthropologists suggest that human habitation may have occurred as early as 40,000 years ago, but human populations were restricted by the harsh environment's sparse and scattered resources. Utilization of these resources by early peoples likely caused some minor ecological changes, particularly near water sources,

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but for the most part they lived sustainably. That changed following the westward advancement of settlement in the 19th and 20th centuries. Habitat disturbance and over-hunting led to the decline of many of the region's large mammal species, such as mule deer, pronghorn, black bear, desert bighorn, and elk.

As throughout North America, hunter-conservationists in the early 20th century helped reverse the declines in wildlife in the Chihuahuan Desert Borderlands. As in so many endeavors, there were winners and losers. Some of the little-known, rarer species benefited from habitat conservation. Regardless of the conservationists' efforts, many populations of big-game species continued to decline and were eventually extirpated from areas of their native ranges. So goes the story of the Mexican desert bighorn sheep (*Ovis canadensis mexicana*) in Texas, and it typifies the historical accounts of many of the region's wildlife species.

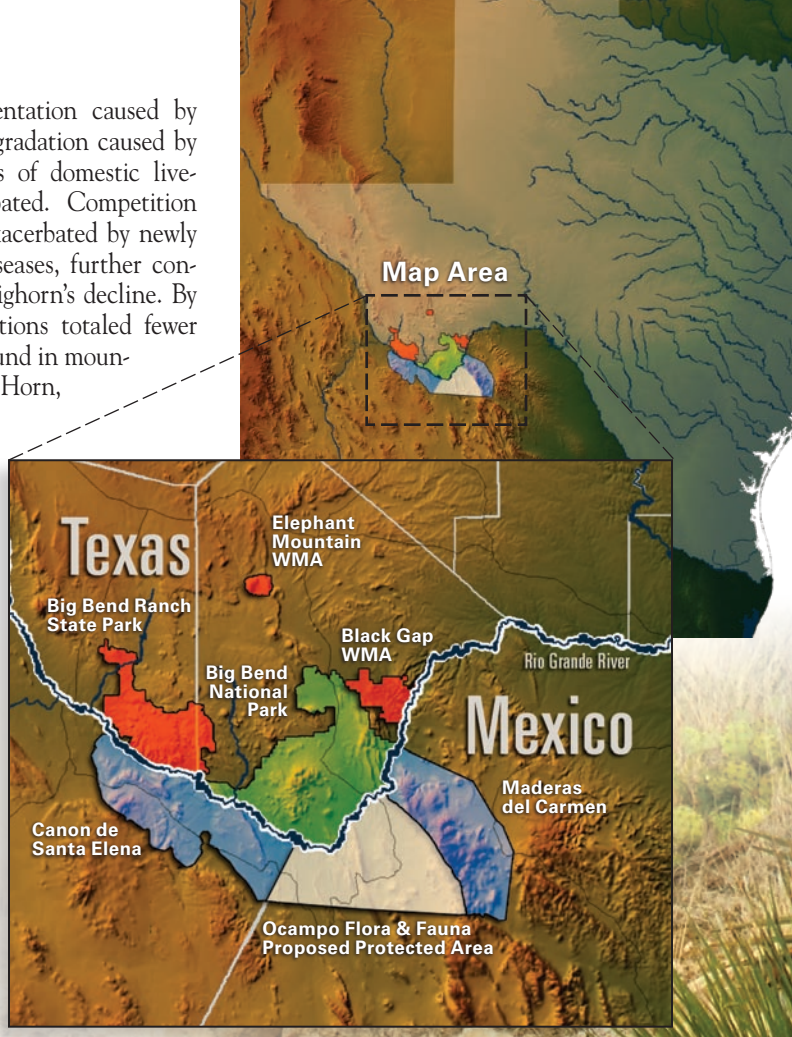
Saga of a Special Sheep

Desert bighorns once ranged from Coahuila to Nevada, including portions of western Texas, southern New Mexico, Arizona, California, and southern Utah and Colorado. Texas bighorns were uniquely adapted to their preferred habitat—arid regions with precipitous cliffs, rock outcroppings and rugged terrain void of tall vegetation. While never abundant in Texas, they declined rapidly from a maximum of about 1,500 animals as a result of over-hunting and the introduction of domestic livestock. Vernon Bailey, chief U.S. Bureau of Biological Survey field naturalist, spent 16 years (1889–1905) documenting flora and fauna in Texas. In his 1905 publication, Biological Survey of Texas, Bailey lamented the demise of the wild desert sheep:

> "It is with some hesitation that I make public these facts as to the abundance, distribution, and habitats of mountain sheep in western Texas, and only in the hope that a full knowledge of the conditions and importance of protective measures may result in the salvation instead of extermination of the species. It would not be difficult for a single persistent hunter to kill every mountain sheep in western Texas if unrestrained. Not only should the animals be protected by law, but the law should be made effective by an appreciation on the part of residents of the country of the importance of preserving for all time these splendid animals."

Hunting of desert bighorns in Texas was banned altogether around 1903. However, range fragmentation caused by fencing, and habitat degradation caused by ever-increasing numbers of domestic livestock, continued unabated. Competition for limited resources, exacerbated by newly introduced livestock diseases, further contributed to the desert bighorn's decline. By 1945 the Texas populations totaled fewer than 100 animals, all found in mountain ranges north of Van Horn, Texas. By 1961 the population had plummeted to about 25 animals. Eventually, Texas's native bighorn sheep, once thought to be a subspecies differentiated as *O. c. texiana*, went extinct. A desert sheep propagation and re-introduction program launched in the 1950s by the Texas Parks and Wildlife Department failed because of disease and predation, and the program was abandoned. Hunter-conservationists, unwilling to accept failure and determined to ensure restoration of the species in west Texas, eventually formed the Texas Bighorn Society. It was members of the Texas Bighorn Society who were responsible for the return of the bighorn to west Texas! These efforts were led by Boone and Crockett members such as Dr. James (Red) Duke, Daniel (Dan) Pedrotti, Gibson (Gib) Lewis, Clayton Williams, and Bob Cook. Amazingly, bighorn populations have grown to about 1,200 wild, free-roaming animals in Texas, but concerns still exist regarding habitat fragmentation and competition from introduced exotic ungulates such as aoudad sheep. And finally, predators, particularly cougar, are the biggest threat to newly-introduced bighorn populations.

Despite these difficulties, and perhaps because of them, the desert bighorn may well be the flagship species for the Chihuahuan Desert Borderlands. Conservation efforts are making a visible difference. When my husband and I lived there in the 1970s, bighorn sheep were not to be seen. Looking southeast from our back porch we could see Elephant Mountain, a privately-owned, isolated mountain located about 20 miles south of Alpine, Texas. Today Elephant Mountain is part of the state-owned Elephant Mountain Wildlife Management Area, and it supports a population of about 150 desert bighorn sheep. The reappearance of sheep in West



Texas is one of many success stories achieved by regional conservation efforts.

Shared Borders and Conservation Goals

Although 97 percent of Texas is privately owned, three large public-land areas in the western part of the state figure large in the conservation picture. Big Bend National Park, Big Bend Ranch State Park, and Black Gap Wildlife Management Area comprise more than 800,000 acres with a management objective to maintain habitats for wildlife such as desert bighorn, black bear, mule deer, and Carmen Mountain whitetail deer. Directly south runs a 196-mile stretch of the Rio Grande designated as a Wild and Scenic River. The river also serves as the U.S.–Mexico border; however, hundreds of species of mammals, birds, bats, and insects don't recognize this political border as an obstacle to movement. Their diurnal and seasonal migrations continue across this river-border, creating conservation challenges for both countries. While both the U.S. and Mexico have deep commitments to conservation of the Chihuahuan Desert eco-region, complications arise when two countries with different social, political, land-use, and wildlife-management systems attempt to manage the same species.

Charles Chester describes such challenges in his recent book, *Conservation Across Borders: Biodiversity in an Interdependent World*. He relates how an array of indigenous peoples, citizens, activists, and governments from private, federal, state, and tribal lands attempted to coordinate conservation efforts along the border between Arizona and Sonora, Mexico. A central goal was the formation of an International Sonoran Desert Biosphere Reserve around a 37,770-square-mile area southwest of Phoenix. The involvement of three nations—the U.S., Mexico, and the Tohono O'odham—complicated the endeavor. The initial organization coalesced around the formation of the International Sonoran Desert Alliance (ISDA). However, tensions within the ISDA, symptomatic of different and sometimes conflicting cultural, economic, and political perspectives, upended the efforts to form the biosphere reserve. This situation demonstrates how social and political factors, always of chief importance in conservation efforts, figure much greater in cross-border conservation. It also provides valuable lessons for the El Carmen-Big Bend Conservation Corridor, a new conservation initiative within the Chihuahuan Desert Borderlands.

Bridging the Political Divide

The El Carmen-Big Bend Conservation Corridor is a concept aimed at securing the future of wildlife, habitats, and ecological processes in a large, cross-border region. North of the border the corridor includes Big Bend National Park, Big Bend Ranch State Park, and the Black Gap Wildlife Management Area. South of the border it includes several protected or managed areas in the Mexican states of Chihuahua and Coahuila.

Conservation in Mexico has its own set of challenges, deriving in part from history and traditional patterns of land

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ownership. Land tenure systems in Mexico are categorized as federal, private, or communal. Following the Mexican Revolution (1917), lands were confiscated from large private landowners and redistributed to landless peasants in two forms of communal lands, *ejidos* and *comunidades*. *Ejidos*, owned and managed by groups of individual peasants, comprise about 50 percent of rural lands in Mexico. *Comunidades* are recognized as communal landholdings that belonged to indigenous communities prior to the Mexican Revolution. The redistributed lands remained the property of the federal government; however, in 1991 the law was changed to allow the sale of *ejidos* to private owners.

The scarcity of public lands makes it difficult to establish protected areas in Mexico. Progress has occurred through the development of national Natural Protected Areas (NPAs) composed of public, private, and communal lands. NPAs offer great opportunities, but also great challenges for conservation, because of the different management strategies employed within each of these land tenure types. Two NPAs established in 1994 illustrate these challenges.

Cañon de Santa Elena and Maderas del Carmen were established for the protection of flora and fauna. These NPAs, when added to the adjacent Big Bend National Park and Big Bend Ranch State Park, provide nearly 1.2 million acres of protected habitat. This is roughly equivalent in size to the Glacier-Waterton International Peace Park on the U.S.–Canada border. Maderas del Carmen contains most of the Sierra del Carmen mountain range, a 40-mile-long sky island situated within the Chihuahuan Desert. It also includes Latin America's first designated wilderness, El Carmen Wilderness Area, an area of more than 175,000 acres adjacent to Big Bend National Park.

Like other NPAs, land ownership in Maderas del Carmen includes a mix of private entities, non-government organizations, and government. For example CEMEX, a global cement corporation, purchased the El Carmen Wilderness Area. Taking the initiative to restore the ecosystem, CEMEX has entered into agreements with private landowners, the Museo Maderas del Carmen and the Rancho Santo Domingo, all of which own adjacent areas outside the Madera del Carmen protected area. CEMEX also joined with conservation groups, the state of Coahuila, and other government agencies to create a desert bighorn sheep restoration program in Mexico, south of Big Bend National Park. Thanks to those cooperative efforts, desert bighorn sheep have now been reintroduced on both sides of the border.

Additional proposals are in the works, including the proposed 680,000-acre Ocampo Flora and Fauna Protected Area. If established, it will form a contiguous unit between Maderas del Carmen and Cañon de Santa Elena along the southernmost boundary of Big Bend National Park.

The Road Ahead

The cooperative efforts of private landowners, non-government organizations, and federal and state agencies on both sides of the border have resulted in the protection of about 2.5 million acres of contiguous lands for conservation purposes. These lands support wildlife species that have been extirpated elsewhere, but may be a source for recolonization into former ranges. Black bears, extirpated from Texas by the 1960s, ventured across the border in the 1980s and established breeding populations in several mountain ranges in western Texas. In 1996 the black bear was upgraded from endangered to threatened status in Texas—a real conservation milestone. Social factors may wield an influence, however. A recent study of private landowners in the state's Trans-Pecos Region revealed polarized opinions regarding the recolonization of black bears. Many private ranchers have legitimate concerns about the return of a species that may kill or compete with livestock—yet another challenge for conservation.

Research and education figure prominently in assisting private landowners on both sides of the border with conserving and managing desert wildlife. Unfortunately, Mexico has no undergraduate wildlife management programs and graduate-level wildlife programs have only been established within the last 15 years. Consequently, Texas universities are leading many research efforts, but distance to study areas can be a real problem.

In 2007, Sul Ross State University in Alpine, Texas, established the Borderlands Research Institute for Natural Resource Management. Its mission is to conduct research and provide local land managers with current, science-based information on wildlife and natural resource management. Its proximity to the Chihuahuan Desert Borderlands provides excellent opportunity for regional research and extension. The institute aspires to be the region's flagship organization for conservation, stewardship, and management. For those of us enamored with the region and its spectacular wildlife, this is exceptionally good news! ■

BORDERLANDS RESEARCH INSTITUTE

The Borderlands Research Institute's (BRI) mission is to assist land managers in the region by providing them with the most current scientific information on natural resources management. The BRI plans and conducts scientific investigations of the natural world with the goal of providing landowners and managers with science-based management alternatives to enhance their roles as land stewards.

BRI's central focus is large-mammal research. The Chihuahuan Desert Borderlands' rich variety of large mammals includes desert mule deer, desert bighorn sheep, pronghorn, del Carmen whitetail deer, and elk. Despite the recreational and economic importance of these species, relatively little information is available regarding antler development, forage quality, movements, or habitat-management strategies. Therefore, such topics are a priority for BRI researchers.

Other research subjects include gamebird management, carnivore ecology, and non-consumptive uses of wildlife. Scaled and Gambel's quail and whitewing doves are abundant throughout much of the region. The Borderlands region also boasts a wealth of prized avifauna such as Montezuma quail and Aplomado falcons. Carnivore diversity, including black bear, mountain lion, bobcat, coyote, ringtail, coati, and many smaller mammals, is one of the least-studied aspects of desert ecosystems.

Rangeland restoration is another BRI focus. Often, existing vegetation in desert communities may not meet management needs for livestock, wildlife, and water. Large-scale research projects on private lands will encourage the development of economically feasible ways to increase desirable plant species while decreasing bare ground and undesirable species. Such restoration is critically important in the riparian areas and associated uplands within the Borderlands. These areas are oases in the desert, and they are threatened by watershed degradation and invasive species. Restoration of these native riparian communities must support the hydrology and the health of the wildlife community.

For more information on the Borderlands Research Institute or to be placed on the BRI's mailing list, please contact:

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