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(Editors)

A Barrier to our Shared Environment

The Border Fence between
the United States and Mexico



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THE IMPACTS OF THE BORDER FENCE ON WILD MAMMALS

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INTRODUCTION

The composition of ecosystems in the border region between the United States and Mexico is the result of thousands of years of northward or southward movement of flora and fauna. For example, Neotropical elements have moved to northern regions along the coastal plains, while with the glaciations, Nearctic elements have since established and remained in the Sierra Madre Oriental and the Sierra Madre Occidental. This was possible because there were no barriers to obstruct their movement in both directions over extended periods of time.

Not since the Great Wall of China, has there been other project to build a physical barrier on a scale similar to that of the border fence proposed between the United States and Mexico. A project of such magnitude, which includes a solid metal wall, a parallel chain link fence, barbed wire and surveillance and access roads, will inevitably have effects on the regional biodiversity due to loss, degradation and fragmentation of habitat, increased human activity, disruption of the populations' social structure, reduced access to vital resources and habitats, population isolation and fragmentation as well as certain species' avoidance of roads, among other aspects (Jackson 2000).

THE IMPORTANCE OF THE FREE MOVEMENT OF SPECIES

The dispersal of the young as they abandon the grounds where they were born and conquer new territories, the search for a mate, the movement in search of food and shelter, to escape from predators or disturbances, latitudinal or altitudinal migratory movements, can all happen to the extent that there is freedom of movement for the species. These flows are necessary for mammal populations, and in particular for large carnivores which because of their size, maintenance of numerically low populations, low reproductive rates, and because they are at the top of the food chain, run a higher risk of extinction due to anthropogenic pressures or genetic isolation (Purvis *et al.* 2000). But if in small populations, individuals occasionally arrive bringing new genes and increasing the number of specimens, the viability of that population increases (Weaver *et al.* 1996, Hellgrena *et al.* 2005).

Individuals from many species have their areas of activity in the border region. In studies carried out 50 kilometers south of the border we have seen that, for example, for the kit fox (*Vulpes macrotis*) and the coyote (*Canis latrans*), barbed wire such as the one that currently divides the border in several regions, is no obstacle for their movements, and the area of activity for these two species can be found on both sides of one or more of this type of fence (List *et al.* 2003, List and Madconald 2003). Similarly, the mule deer (*Odocoileus hemionus*), white-tailed deer (*O. virginianus*) and pronghorn antelope (*Antilocapra americana*) will jump over livestock fences or pass under the bottom wire if it is more than 30 cm off the ground (Feldhamer *et al.* 1986, Scott 1992, Harrington and Conover 2006). The current configuration of the border fence, where there is no wall, allows the movement of these animals, but the new proposal would make the passage of non flying mammals impossible.

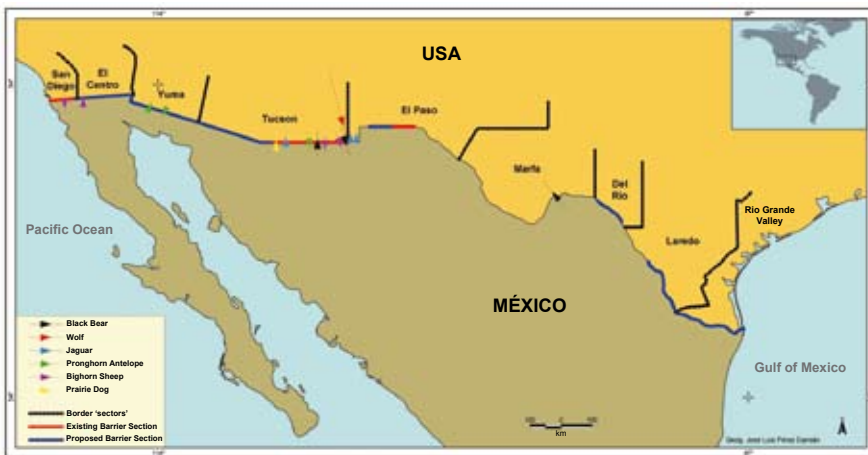
THE EFFECTS OF THE BORDER FENCE ON FAUNA THROUGHOUT THE REGION

Under the climate change scenario, the distribution of many species of flora and fauna is expected to change (Peterson *et al.* 2002) as they gradually move; but if there is a border wall over a sufficiently long time, it could turn into the fence of extinction by preventing species from changing their distribution by moving from sites where conditions are being altered, to those with favorable conditions (Brown *et al.* 1997, Gian-Reto *et al.* 2002).

Free movement has allowed, and must continue allowing the continuity of ecological and evolutionary processes for all the species that inhabit the border region. Map 1 shows approximate areas where there is information available on the movement of some species from one side of the border to the other; but it obviously also happens with many other mammals, as well as birds, reptiles and amphibians, which could be affected accordingly. For example, birds that seldom fly, such as the wild turkey (*Meleagris gallopavo*), are affected by roads (MacDougal *et al.* 1991), and quails are limited in their possibilities of going from one place to another by the loss of ground-cover vegetation (Stromberg 1990). Populations of rodents and many bird species in grassland and shrub areas may be affected by increased hunting from predatory birds due to the advantage that artificial structures, such as the border fence, represent as perching and nesting sites (Burger *et al.*, 1994, Suhonen 1994).

Among the threatened species in this region are the jaguar (*Pantera onca*), ocelot (*Leopardos pardalis*), Mexican gray wolf (*Canis lupus baileyi*), American black bear (*Urdus americanus*), kit fox (*Vulpes velox*), American badger (*Taxidea taxus*), and others that are not carnivores but which are also threatened; such as the black-tailed prairie dog (*Cynomys ludoviciana*), pronghorn antelope (*Antilocapra Americana*), bighorn sheep (*Ovis canadensis*) and North American porcupine (*Erethizon dorsatum*, Pacheco

Map 1. Approximate areas for which there is information available on the movement of some species from one side of the border to the other and which would be affected by the construction of a border fence



et al. 2000). One of the species that is currently drawing more attention is the jaguar, since the presence of individuals has been recorded for over ten years in Arizona and New Mexico, where they were considered extinct (Brown and López González 2000). They are moving from a reproductive population in the central-north region of Sonora, through the sierras and across into the United States (Friederici 2006), but since jaguars pass through areas where the border fence is planned, its construction would prevent their recovery in the U.S.

Bighorn sheep was widely distributed in northern Mexico and in the southwestern United States; but it disappeared for various reasons and has been reintroduced in several sites. Because of the limited size of the sierras where it lives, the species must extend to both sides of the border in order to maintain viable populations. There are at least three recorded crossings of bighorn sheep from reintroduced populations in Arizona and New Mexico into Chihuahua and Sonora (Pelz Serrano *et al.* 2006). Should this new barrier come true, the natural recovery of the bighorn sheep in northern Mexico and the viability of its populations in the border region would suffer the same fate as the jaguar.

Similarly, the pronghorn antelope has very small populations in Mexico. It is estimated that there are 1,500 individuals remaining (Sánchez Cordero *et al.* 2007), and both the Sonora subspecies and the Baja California subspecies depend on a porous fence. Figure 1 shows a group of pronghorn antelopes in the foothills of the San Luis Sierra, on the border, at one of the sites where construction of the fence is planned. Should this barrier be built in this area, the population of pronghorn antelopes on the Mexican side would be significantly reduced.

Every year, at various locations in northern Mexico, black bears are captured and killed because they come near human population centers. This happens more frequently in the western part of Chihuahua and northern Sonora. For example, in July 2006 a bear was captured in the Mennonite colony of Las Virginias, and thanks to a tag from the Arizona Game and Fish Department, it was possible to know that it had been caught ten days before in the Peloncillos mountains (E. Ponce Guevera, personal communication). There is a distance of 135 kilometers between the two sites, which the bear did not travel in a straight line; rather, it had to move along mountains and go across an area where construction of the fence is projected (see Figure 2).

Bear routes run through the north as well as the south during dispersion, droughts when they wander in search of food, or when they are searching for

Figure 1. A group of pronghorn antelopes in the foothills of the San Luis Sierra, right on the border, at one of the sites where construction of the fence is planned. (Photograph: Karla Pelz Serrano)

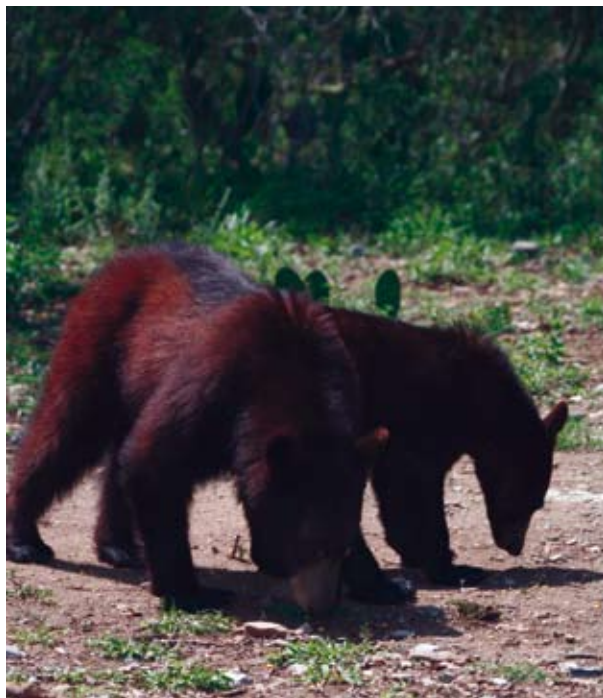


a mate. The border fence would impede this movement. We must remember that the black bear population in Big Bend National Park exists because of individuals that moved from Mexico to the north, across the Rio Grande (Hellgrena *et al.* 2005). Once again, the viability of these populations could be diminished by the border fence.

The black-tailed prairie dog is the only example we will mention of a small species with limited mobility; during dispersion, its movements can reach up to 7 km, although normally they don't move further than 200 meters from their burrow. At one time, their distribution ranged from southern Canada to northern Mexico. They are very relevant, since they are considered a keystone species because they are prey for many other animals, their burrows represent refuge for other species and they modify the landscape creating a particular ecosystem, which allows for great diversity in the grasslands they inhabit (Miller *et al.* 2000).

The greatest prairie dog colony remaining in all of North America is found in Mexico (Ceballos *et al.* 1993). In the early 20th century, prairie dogs were

Figure 2. The black bear population in Big Bend National Park recovered because of individuals that moved from Coahuila, Mexico. The population in the northern part of the Sierra Madre Occidental would be separated by the border fence into at least two populations (Photograph: Rurik List)



exterminated by poisoning in practically the entire territory of Arizona and New Mexico; but four years ago, they started establishing populations in southwest New Mexico, from the populations that inhabit the Mexican side of the border region (B. Brown, personal communication). In northern Sonora there are a couple of small colonies of this species which, if allowed, they could repopulate the southern end of Arizona, where they are currently absent. The border fence would stop not only the possibility of restoring the prairie dog, but also the particular ecosystem that these rodents generate that makes the North American grasslands so biologically rich.

Another case worth mentioning is the Mexican gray wolf, which disappeared from northern Mexico during the early 1980s, but has been reintroduced since 1998 in the United States, in the southern, central and northern mountains of Arizona. We know of at least two Mexican gray wolves that

recently reached the border: one was captured very close to the area, in U.S. territory (M. Philips, personal communication); the other was killed in a ranch on the Mexican side. Apparently, this last one had a micro-implant. The natural recovery of this species through the migration of wolves from the United States into Mexico would be interrupted if a wall were to be placed at the border between both nations.

There are many species that could be adversely affected by the construction of the fence, such as the otter-cat (*Herpailurus jaguarondi*), porcupines, mountain lions (*Puma concolor*) and deers. There are also others that –even though their populations would not disappear and would probably not be significantly affected– they would suffer an interruption in their gene flow between populations to the north and south of the proposed fence. It is worthwhile to point out that the impact goes beyond the structure of the border fence itself; we must also consider the negative influence, particularly on nocturnal carnivores, of bright stadium lighting, as well as the harmful effect that constant patrols may have on these species. Finally, another aspect to consider is that if the wall is built by sections, as it is currently proposed, people will continue to cross, except their movement and the impact of this traffic will be displaced toward areas with no fence; areas that are more remote but very important from the biological standpoint, such as the San Luis Sierra or Maderas del Carmen.

CONCLUSIONS

There are currently many threats to wildlife on both sides of the border. In April of 2007, while doing an evaluation of the only American bison (*Bison bison*) population in the wild in Mexico and the southwestern United States (List *et al.* in press), photographs were taken of a huge agricultural development (Figure 3) that started illegally in 2007 and which will affect the movements not only of bison, but of pronghorn antelopes which also live in that area and move north and south across the border.

Under this scenario, we must consider the flow of fauna as a matter for another binational treaty, such as the ones that exist to control the water flow in the Rio Grande and Colorado River. In Mexico as well as in the United States, we must ensure that the fauna is maintained on both sides of the border. And this will be achieved not by a wall, but by building agreements on how to solve the great problems that we currently face on both sides of this shared border.

Figure 3. Aerial photograph of an agricultural development site on the Mexican side of the border in Janos, Chihuahua, showing current environmental problems of binational interest that must be addressed by both countries (Photograph: Rurik List)



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