

HIGHWAYS AND WILDLIFE CONSERVATION IN MEXICO: THE SONORAN PRONGHORN ANTELOPE AT THE EL PINACATE Y GRAN DESIERTO DE ALTAR BIOSPHERE RESERVE ALONG THE MEXICO - USA BORDER

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Abstract.

The Sonoran pronghorn antelope is considered an endangered species in Mexico. Since 1991 a binational effort between Federal and State Governments in Mexico as well as several Federal and State agencies in the US have been working together on the recovery program for this shared subspecies. Some unconfirmed reports of Sonoran pronghorn and other big large mammals crossbordering movements between Mexico and the US have been recorded. Mexico faces now a new challenge: Mexico Interstate highway 2 broadening project that will change it from a 2-lane highway to a 4-lane speedway. It will sweep across 88 miles of prime pronghorn habitat within the Pinacate Biosphere Reserve and over a stretch 125 miles along the Sonora - Arizona border. This is an important development project that will bring along social, economic and communication benefits to the region but that also has to be analyzed under a shared binational biodiversity conservation perspective. Negative environmental impact must be taken into account and be prevented or mitigated. Highway crossings along natural biological corridors between Organ Pipe National Monument and Cabeza Prieta National Wildlife Refuge on the US side, and El Pinacate Reserve on the Mexican side should be built.

Introduction

The Sonoran pronghorn antelope is one of the five subspecies of pronghorn in North America (Goldman, 1945). *Antilocapra americana sonoriensis* is the smallest form and also the lightest in color (Paradiso & Nowak, 1971). By the 40=s, its historic range in Sonora, Mexico included from the Desierto de Altar in Northwestern Sonora down to the Gulf of California Central Coast, in the proximity of Hermosillo city.

During the 50=s, the Caborca region - located in the core area of pronghorn historic range- went through an agricultural boom, thus splitting pronghorn populations into 2 separate areas. One area was North of Caborca and the other one South of the agricultural expanse. It is believed that the Southernmost population was wiped out by the early 80=s. The population located North and Northeast of Caborca is regarded as a big unit, perhaps divided into two separate sub-units by highway 8 that links Sonoyta and Puerto Peñasco cities (Castillo et al, 1996.)

In the United States, current Sonoran pronghorn antelope range covers only the Southwestern corner of the state of Arizona.

The sonoran pronghorn antelope, together with 2 others related subspecies that occur naturally in Mexico, is regarded as an endangered species by the Mexican government (DOF, 1994) and is listed on the Appendix I of Convention on International Trade of Endangered Species. In US, the sonoran pronghorn is included in the endangered species list of the USFSW since 1967 and in the list of Threatened Native Wildlife in Arizona since 1988. (Hervert et al. 1995).

Studies conducted on this subspecies between 1988 and 1993 were key factors that gave thrust to the declaration of a Biosphere Reserve in the area, the so called AEI Pinacate y Gran Desierto de Altar Biosphere Reserve@. This Reserve was created by a presidential mandate on June 10, 1993. It covers an area of 1.7 million acres.

El Pinacate Biosphere Reserve is located in the Northwestern tip of the state of Sonora. It borders with the Alto Golfo de California y Delta del Río Colorado Biosphere Reserve to the South. To the North is adjacent to Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge and the Goldwater Bombing Range. All these areas but the latter cover an extension of over 5 million acres of Sonoran Desert landscape in excellent conservation conditions (Castillo, 1993).

Nowadays, around 40% of the Sonoran pronghorn antelope range in Mexico is protected within the El Pinacate Biosphere Reserve. Since 1998, the remainder 60% of pronghorn habitat lies within a Unidad de Manejo y Aprovechamiento de Vida Silvestre or UMA (a special kind of legal Wildlife Private Ranch). Threats pose to pronghorn population have not been eliminated thoroughly yet, though.

Since 1996 a new threat has come into play over the Sonoran pronghorn antelope population as well as over other animal species. This threat casts a shadow over an important chunk of pronghorn range. Widening of Mexico Interstate highway 2 from a 2 to a 4 lane speedway will spread over a span of 125 miles along Mexico-US international border. Highway completion is due by the year 2002. It poses a high-risk potential that threatens the Sonoran pronghorn antelope population integrity as well as that of many other wildlife species that are shared between both countries.

Study Area

The Sonoran pronghorn antelope lives in different types of habitat in the Sonoran Desert, including semistabilized dunes or Amédanos@ in Northwestern Sonora.

Médanos lie mostly within the Lower Colorado Valley Subdivision of the Sonoran Desert. This is the most arid and hottest area within the desert. Annual precipitation may vary from under 2 to 6 inches a year. Highest summer day temperatures may go over 133 F and under 181 F during winter nights.

Semistabilized dunes systems have been recognized as prime and preferred Sonoran pronghorn antelope habitat in Sonora. Although it is also common to watch them on the extensive sand flats and lapilli mesas (or volcanic cinder flats), as well as on the loose soil patches interspersed within lava fields in the Pinacate Volcanic Field (Castillo, 1993).

Plant communities within Sonoran pronghorn antelope habitat include (from bigger to smaller extension): *Larrea - Ambrosia* (creosote bush - white bursage), *Larrea - Opuntia* (creosote bush - cholla), *Cercidium - Carnegiea* (paloverde - sahuaro), and *Larrea - Encelia* (creosote bush - brittle bush). It has been observed that the highest diversity of annual plants, staple pronghorn food, is found on semistabilized sand dunes and sand flats (Castillo et al, 1996.)

Most of the broadening works of 4-lane Mexico Interstate highway 2 lie within the Lower Colorado Valley Subdivision right at and along Mexico - US international border.

It is worth mentioning that besides the current barrier that Interstate 2 represents to pronghorn movements as is today, wire fence throughout the border is also an effective barrier in between Mexico and the US. This barrier is made of metal fence poles of approximately 4 feet tall with 4 to 7 barbwire lines.

Analysis of the information.

In 1989, a joint study called AStrategies for the Sonoran Pronghorn Antelope Recovery@ was set in by the Centro Ecológico de Sonora and the Arizona Game and Fish Department. The first activities conducted were a series of aerial and land surveys to identify habitat and potential range of the Sonoran pronghorn in Sonora. In the US, Arizona Game and Fish Department has been researching the Sonoran pronghorn for at least 10 years.

Between 1990 and 1996 a series of captures were made in the state of Sonora to radiocollar Sonoran pronghorns with transmitters. During this period 31 animals were marked. Nine out these were marked within the El Pinacate Biosphere Reserve.

Since 1991, The Sonoran Pronghorn Core Working Group was formed. This was a International and Inter-Agency group that included various agencies of the USFWS, NPS, AG&FD, BLM, USAF, Tohono O=odham Nation and Centro Ecológico de Sonora.

For more than 8 years land monitoring has been conducted, as well as aerial surveys and a broad range pronghorn census in the state of Sonora. In March 1993, Sonoran pronghorn Mexican population was estimated in 313 animals using the line-transect method. The total number of observed animals was 220. (Snow, 1994).

These kind of studies have also been conducted in the Arizona Sonoran pronghorn population.

Between 1990 and 1997, telemetry monitoring on the 31 Sonoran pronghorn radiocollared animals had a main goal: to determine their home ranges as well as use of habitat. It was important to do this on a several year basis and on groups located in different sections of their current range.

Key information for this study was to find out about possible Sonoran pronghorn movements between the médanos East of highway 8 and their current range within the El Pinacate Biosphere Reserve, West of highway 8. It was likewise relevant to find out about the same type of movements between El Pinacate and contiguous protected areas on the US side of the border.

Unfortunately, only 5 out of the 31 collared animals during this 6 year period were caught and marked in the Pinacate. Uninterrupted telemetry tracking of these animals was done for only 2 years in a row.

Cabeza Prieta Wildlife Refuge Staff and Organ Pipe Cactus National Monument staff were able to make more captures and a longer tracking of animals, as well as a longer follow-up of the study in their areas. They also did systematic overflights, so they obtained more accurate data.

In regards with Sonoran pronghorn border crossing the only reliable account was registered by the Arizona Game and Fish staff in 1989. By means of telemetry they could radio track one collared animal on the Mexican side. This same animal re-entered the US a few hours later (Thompson-Olais, 1998,1998).

Besides this observation there is not any other confirmed record of Sonoran pronghorn antelope border crossing between Mexico and the US. In 1994, 22 Sonoran pronghorns were marked in the US. Monitoring of these same animals did not show any evidence of border crossing from the United States towards Mexico. Although, during weekly monitoring Sonoran pronghorn antelopes were often registered very close to the border wire fence in Southern Cabeza Prieta Wildlife Refuge territory. Nevertheless, there is some indirect evidence that proves to the contrary. Cabeza Prieta staff as well as Border Patrol officers reported Sonoran pronghorn tracks on sandy soil under border wire fence at several washes. It is believed that pronghorns use dry washes to cross back and forth the US. (Thompson-Olais, 1998.)

In regards with Sonoran pronghorn crossing on the highways that sweep across the El Pinacate Biosphere Reserve the evidence is scarce. During a 6 year monitoring period in Sonora there was no direct visual evidence nor telemetry radiotracking information of pronghorn highway crossing on Mexico Interstate 2. But between 1989 and 1996 some unconfirmed records of dead pronghorns ran over by motor vehicles were registered. These were verbal accounts by local ranchers and ejido landowners who claimed to have seen various dead antelopes during those years.

The only one confirmed record of Sonoran pronghorn highway crossing on Mexico Interstate 2 was on August 3rd of this year by the El Pinacate Biosphere Reserve staff when a group of 5 animals (3 juveniles and 2 adults) was seen crossing Interstate 2 Southward at ca. Km 25.

In regards with Mexico highway 8, confirmed Sonoran pronghorn crossing evidence is scarce. In January 1991 a pregnant Sonoran pronghorn female was found dead just a few hours after it had been killed by a mountain lion at the base of a small hill in the San Francisco Sierra foothills. This same animal had been radio collared in the El Pinacate Biosphere Reserve and the corpse was found East of Mexico highway 8.

In July 1996 another adult male Sonoran pronghorn antelope was found dead by the El Pinacate Biosphere Reserve staff. It had been run over by a motor vehicle at ca. Km 29 on Mexico highway 8. In addition to these, there are only 2 other reliable records. Some Arizona visitors claim to have seen Sonoran pronghorn crossing on Mexico highway 8.

There are reliable data that confirm Sonoran pronghorn antelope crossings on the highways that cross El Pinacate Biosphere Reserve. Mexico Interstate highway 2 is an important commercial route with constant traffic, especially freight trailers, and with a speed limit of 55 miles/hour. Modernization works (broadening to change it from a 2-lane highway to a 4-lane speedway) will increase the risk o death of wildlife crossing, including Sonoran pronghorn antelope.

There is a study on big horn sheep habitat use on the Northern mountain ranges within the El Pinacate Biosphere Reserve conducted by IMADES. A 10% of habitat impoverishment and deterioration was estimated for this Sonoran Desert dweller due to Mexico Interstate highway 2 construction. It has been found that the less habitat availability the more intensive use of habitat by big horns. Accordingly, there has been an increase in activity and movements back and forth mountain ranges across Mexico Interstate 2. (Eduardo Lopez, pers. comm.)

Some of these mountain ranges are literally dissected by Mexico Interstate 2. In some areas the steep side of the mountain ends right at the highway. This has caused that big horns tend to browse constantly beside both sides of the highway. Crossings are common even during the same day. Animals seem to have gotten used to and are not afraid of noise and constant traffic. But with people they behave otherwise. Re-modeling and broadening works of Mexico Interstate highway 2, as it has already been mentioned, will increase noise, traffic and risk of death for wildlife crossings. Current highway is 24 feet wide. The new speedway may be over 90 feet in width. Only in 1996, motor vehicles accounted for 6 Bighorn sheep that got ran over.

As managers of a protected area in Mexico it is our duty to integrate in a balanced and harmonious way development and conservation. Mexican Biosphere Reserve concept as well as Mexico=s environmental legislation reckon human populations and development of productive activities as mandatory policies for natural resources conservation. A Biosphere Reserve in Mexico cannot be conceived without human beings and their productive endeavors. Therefore, it is both very important and challenging to find a good balance between conservation and the much needed country=s development.

It is true that road broadening, re-modeling and construction are priorities for a country=s development. But it is also true that current acts and government mandates that ban, regulate and control activities that cause environmental impact have allowed us to step forth for conservation of natural resources, thus deterring ecosystem deterioration.

Unfortunately there is a common lack of technical information to serve as guidelines for development processes such as highway construction or re-modeling.

As a result of studies conducted in Sonoran pronghorn antelope populations in both countries, it has been observed that there is not a seemingly important flow of animals between both countries along the two sides of the border. But ongoing and further studies may prove otherwise. Highway crossing shows a different perspective. We have a good deal of reliable reports that prove, at least on the Mexican side, that pronghorns do cross both Interstate 2 and highway 8.

Two matters are a major concern in regards with pronghorn conservation. Firstly, highway crossings pose a potential threat of death to animals run over by cars, trucks and the very many big trailers that haul necessities to and from important cities on the border. Secondly, assumed no border or scarce crossings may put in jeopardy the Sonoran pronghorn natural gene flow upon splitting the westernmost population into a Mexican population and an American population. @

A good way to deal with isolation of Sonoran pronghorn populations would be changing the borderline from a barrier into a filter and allowing free pronghorn crossing along the border by means of modifying the international border wire. It would require minor changes of wire lines height from the ground and the gap between wires. Even though that in recent times there has been a well documented increase of illegal aliens crossing from Mexico to the US within current Sonoran pronghorn range in adjacent protected areas, the wire has not ever been, let alone not meant to be, a true physical barrier but a visual landmark that states keep out from here; no trespassing. Therefore wire modifications would ease wildlife crossing and still would deter illegal aliens to cross the border. So, they would represent a hit in conservation of shared biodiversity.

Closely tied together with wire modifications more stringent restrictions and regulations would have to be in place for current broadening works of Mexico interstate highway 2. The new 4-lane highway should consider wildlife passes that will serve as corridors for highway crossing. This is the reason that brought us here to this forum. Expertise knowledge from other areas with similar problems may be very fruitful and helpful for the Mexican government agencies involved. Technical recommendations for reducing environmental impact and improving environmental mitigation should be taken into account. EIA has already been done and the works authorized but field work has not begun yet. So there is still time for international action.

References Cited.

- Castillo-Sánchez, Carlos. 1993. Informe Técnico y Programa de Manejo para el Berrendo Sonorense (*Antilocapra americana sonoriensis*) en Sonora, México. Centro Ecológico de Sonora. Gobierno del Estado de Sonora (Inf. Técnico no publicado).
- Castillo-Sánchez, C., James C. de Vos Jr. & John Hervert. 1996. The Status of Sonoran Pronghorn in Mexico. 17th Biennial Pronghorn Antelope Workshop. Brockway, California, 1996.
- Diario Oficial de la Federación. 1993. Decreto por el que se declara área natural protegida con el carácter de reserva de la biosfera, la región conocida como El Pinacate y Gran Desierto de Altar, ubicada en los municipios de Plutarco Elías Calles, Puerto Peñasco y San Luis Río Colorado, Son. Secretaría de Desarrollo Social, 10 de junio de 1994. Gobierno de la República Mexicana.
- Diario Oficial de la Federación. 1994. Norma Oficial Mexicana NOM-059-ECOL-1994, que determina las especies y subespecies de flora y fauna silvestres terrestres y acuáticas, en peligro de extinción, amenazadas, raras y las sujetas a protección especial, y que establece especificaciones para su protección. Secretaría de Desarrollo Social, 16 de mayo de 1994. Gobierno de la República Mexicana.
- Goldman, E.A. 1945. A new pronghorn antelope from Sonora. Proc. Biol. Soc. Washington, 58:3-4, 21 march.
- Hervert, J. J.; R.S. Henry; M.T. Brown; D.W. Belitsky; M.E. Kreighbaum. 1995. Sonoran Pronghorn Population Monitoring, Progress Report. Arizona Game & Fish Department. Technical report No. 98.
- Paradiso, J.L. and R.M. Nowak. 1971. Taxonomic Status of the Sonoran Pronghorn. J. Mammal. 52:855-858.
- Snow, T. 1994. Sonoran pronghorn aerial survey summary 1992-1994. Nongame and Endangered Wildlife Program Technical Report. Arizona Game and Fish Department, Phoenix, Arizona.
- Thompson-Olais, L. 1998. Final revised Sonoran Pronghorn Recovery Plan. U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico.

Aknowledgements.

I would like to thank Guillermo Lara for his help on translating this document into english and for his valuable suggestions to the manuscript. To Ruben Soto for the several transcriptions and Eduardo Gómez for his beautiful sonoran pronghorn and El Pinacate images.

I would also like to thank National Park Services and the US Fish and Wildlife Service for their kind support for our attendance to the ICOWET 99 meeting.