STATUS OF BIGHORN SHEEP IN THE REPUBLIC OF MEXICO

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ABSTRACT

Due to limited finances and manpower, quantitative data are lacking regarding the numerical and geographical distribution of desert bighorn sheep (Ovis canadensis) in the Republic of Mexico. Based on incidental field observations conducted by personnel of the Direccion General de Flora y Fauna Silvestres (Federal Wildlife Agency), local ranchers and hunters, approximately 5,000-9,000 desert bighorn are presently found in Mexico.

Factors affecting population growth include competition with domestic livestock, particularly goats (Capra hircus), illegal hunting, detrimental land use activities, unpredictable precipitation and resultant forage, less than optimum water availability and predation.

Management programs include attempts to educate the people on the importance and aesthetics of bighorn sheep, establishment of sanctuaries specifically for the propagation and protection of bighorn sheep, implementing stiff penalties to discourage the illegal taking of sheep, the development of tinajas (potholes) to ensure year-long water supplies, providing hunting opportunities and transplant efforts to re-establish new populations on suitable habitat.

INTRODUCTION

Bighorn sheep, regarded as one of the most important mammals in North America, have been the subject of numerous qualitative and quantitative studies. However, due to their relatively low numbers, scattered distribution and inaccessible habitat the rate of data collection has been slow and in many cases, the data have been inconclusive. This is particularly true in the Republic of Mexico, where very little has been published with respect to desert bighorn sheep. Insufficient funding is available to proceed with comprehensive, long-term studies of population dynamics, food habits, nutrition, behavior and competition with other species, including man. This paper is a general synopsis

on the status and management of bighorn sheep in Mexico, and is based on the available literature and personal correspondence with biologists affiliated with the Direccion General de Flora y Fauna Silvestres.

PAST AND PRESENT DISTRIBUTION

Historically, desert bighorn sheep occurred over broad regions in six states of northern Mexico. Available evidence reveals that desert bighorn occupied most of the arid and rugged mountain ranges of Baja California Norte, Baja California Sur, Sonora, Chihuahua, Coahuila and Nuevo Leon (Cossio 1975, Monson 1980). Currently, desert bighorn are found only in Baja California Norte, Baja California Sur and Sonora (Alvarez 1976). Unconfirmed reports suggest that isolated populations leading a precarious existence may occur in Chihuahua and Coahuila.[1] (Figure 1).

Three of the four ecological races collectively known as desert bighorn (Cowan 1940) are found in Mexico:

O.c. mexicana Merrian, 1901. Merrian, 1901. Mexican bighorn. Type from Lago de Santa Maria, Chihuahua, Mexico. The Mexican bighorn is currently found in the northwestern part of Sonora, and Tiburon Island located in the Sea of Cortez (Gulf of California).

O.c. cremnobates Elliot, 1904. Peninsular bighorn. Type from Matomi, Sierra San Pedro Martir, Baja California Norte, Mexico. The Peninsular bighorn is found in the northen two-thirds of Baja California.

O.c. weemsi Goldman, 1937. Weems bighorn. Type from Canon de Tecomaja, Sierra de la Giganta, Baja California Sur, Mexico. The Weems bighorn occurs in the southern one-third of Baja California.

POPULATION TRENDS

Historically, desert bighon were widely distributed and occured in sizable numbers throughout much of northern Mexico. Bighorn sheep have been extirpated from Nuevo Leon, Coahuila and Chihuahua (Cossio 1975, Mendoza 1976). Isolated populations of questionable viability are found scattered in northeastern Sonora. Desert bighorn still persist in northwestern Sonora, although their numbers have declined precipitously since the advent of European man.[2] Baja California contains the largest concentration of desert bighorn in Mexico, and current numbers might be as high as those prior to the exploitation period (Alvarez 1976).

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[2]Jose C. Trevino, Jefe de Officina de Fauna Silvestre en Chihuahua, Aldana Numero 315, Chihuahua, Chihuahua, Mexico.

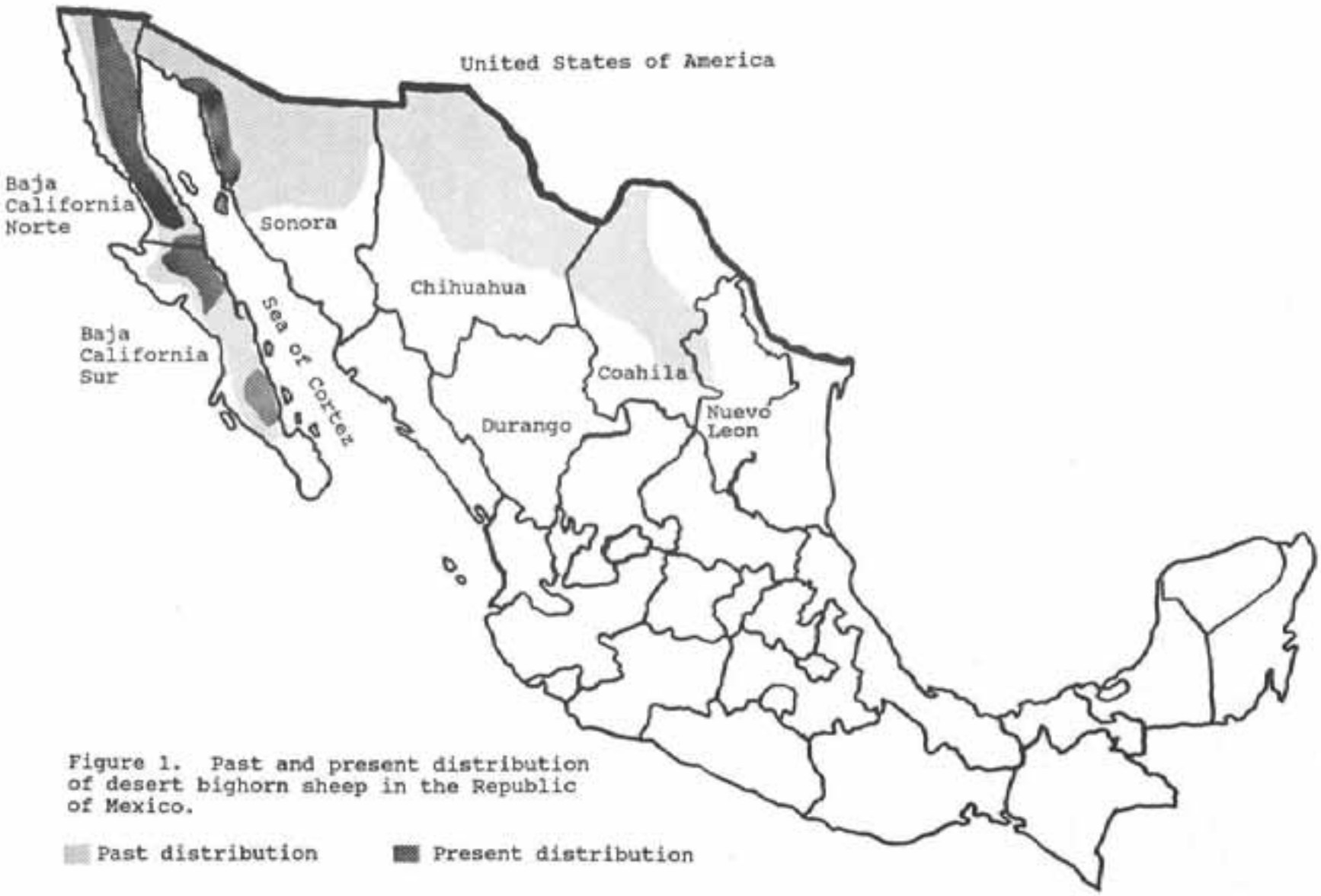

Figure 1. Past and present distribution of desert bighorn sheep in the Republic of Mexico.

Past distribution Present distribution

SURVEYS

Baja California

Numbers. Since the distribution of desert bighorn in Mexico is not completely known, population estimates are difficult and imprecise. Organized efforts to census bighorn sheep in Baja California were initiated in 1974. Biologists were assigned to accompany every hunter for 10 days, during four different hunting periods. The size of the areas surveyed was determined planimetrically from maps, to aid in calculating the relative density of sheep. Approximately 1,764 km^2 were surveyed during 279 man-days. Based on these results, Alvarez (1976) calculated a maximum of 0.63 sheep/km^2, and a minimum of 0.38 sheep/km^2 (Table 1). Based on mean densities of sheep and size of suitable habitat, Alvarez (1976) obtained a rough estimate of 4,500 to 7,800 desert bighorn in Baja California. This estimate should be considered an approximation, subject to a considerable margin of error due to a lack of knowledge concerning the exact distribution of bighorn sheep.

Table 1. Summary of bighorn sheep surveys conducted in Baja California, Mexico during February and March 1974. Data from Alvarez (1976).

Area	Size-Km^2 y/	Rams		Ewes		Lambs			Density/km^2
		Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Matomi	59	25	15	100	68	8	6		1.50
La Assamblea	412	144	78	183	115	43	32		0.54
San Juan	1,179	59	30	138	61	28	15		0.09
Las Virgenes	114	25	10	48	25	26	10		0.39
Total	1,764	253	133	469	269	105	63	$\overline{X}$	0.63

y/ Size of areas actually surveyed.

Population Structure. After subtracting all possible duplicate sightings, the minimum number of sheep observed is 465 (Table 1). These data yield a ram/ewe/lamb ratio of 49:100:23, and a population structure composed of 58 percent ewes, 29 percent rams and 13 percent lambs.

The lamb/ewe ratio suggests poor lamb production and/or survival. Nevertheless, these data should be interpreted cautiously since the survey was conducted prior to the end of the lambing season, and no apparent differentiation was made between ewes of non-reproductive and productive age. These factors would erroneously suggest poor lamb production.

Ewes observed during the spring months may include: (1) ewes with lambs, (2) gravid ewes, (3) ewes that were never gravid, or that had resorbed or aborted their off-spring, and (4) ewes that lambed but lost their off-spring prior to the time they were observed.

Sonora

Numbers. Quantitative population data for Sonora are not available. Mendoza (1976) obtained population estimates based on field observations, interviews with local ranchers and accounts from hunters. Approximately 1,000 desert bighorn sheep are currently found in 10 separate ranges in Sonora (Table 2).

Table 2. Desert bighorn sheep population estimates, Sonora, Mexico. Data from Mendoza (1976).

Area	Estimated Population
Sierra del Viejo	350
Posada-Pico Johnson	300
Isla Tiburon	125
Sierra del Chino	85
Los Mochos	75
El Plomito	30
El Pinacate	30
La Tordilla	25
El Marmol	20
Punto Cirios y Las Cuevitas	20
Total	1,060

MANAGEMENT

Wildlife management in Mexico is still in its infancy. Major emphasis has been placed on people management -- educating the people on the importance and aesthetics of wildlife. Species and habitat management oriented programs also have been implemented on a limited scale.

Management programs for bighorn sheep and other species as well, are severely hampered by very limited finances, and the legal and political structure concerning jurisdiction over wildlife. The Direccion General de Flora y Fauna Silvestres under the Subsecretaria de Ecologia (Under-Secretary of Ecology) exercises authority over all wildlife throughout the Republic. This arrangement has resulted in resentment, and a lack of communication and cooperation between the federal and state wildlife agencies.[1]

[3]Raul Valdez, Professor of Wildlife Science, New Mexico State University, Las Cruces, New Mexico.

Considering the obstacles, Mexico has made progress in the management of bighorn sheep, particularly during the past ten years. Management programs include protective measures by providing monetary incentives to the natives to discourage the killing of sheep for meat, establishment of wildlife preserves, increased surveillance in sheep habitat and implementation of stiff penalties to discourage the illegal taking of sheep. Transplant efforts to re-establish new populations on suitable habitat also have been undertaken. Habitat oriented schemes include the development of tinajas (potholes) to ensure year-long water supplies, and eradication of feral burros (Equus asinus) and goats from bighorn habitat.

PROTECTION

Although wildlife resources are federal property and are managed by the Federal Government, almost all the land us under private ownership. To induce landowners to protect wildlife on their lands, a portion of license fees goes to the landowners. The objective is to provide a monetary incentive, beyond what could be derived from killing bighorn sheep for meat. Licenses income also is set aside for local community improvements, i.e., road maintenance and public services (Cossio 1975).

Mexico is attempting to discourage the illegal taking of bighorn sheep by establishing stiff penalties, and through increased surveillance in sheep areas. Surveillance is carried out through a coordinated system of air and ground reconnaissance. Additional vigilantes (game wardens) have been employed, and outfitted with modern equipment, i.e. 4-wheel drive vehicles, 2-way radios and spotting scopes. Vigilantes on horseback patrol areas inaccessible to vehicles (Araujo 1976).

Certain areas, namely San Pedro Martir National Park, Baja California Norte, have been set aside as wildlife preserves, specifically for the protection of bighorn sheep and their habitat (Cossio 1975). However, without a public education program, sufficient funding, authoritative support and control in the form of law enforcement, refuge designation has little or no meaning.

A zoological park and interpretive area containing desert bighorn sheep was established in 1984, in Hermosillo, Sonora. This project was undertaken by the state government, with the assistance of the Bighorn Sheep Research Institute.[4]

RESTORATION

Mexico has undertaken two bighorn sheep transplants. Both transplants were from Sonora to two different islands located in the Sea of Cortez. In 1975 New Mexico Department of Game and Fish personnel assisted Mexican officials in the capture of 20 bighorn sheep (16 ewes and 4 rams), and subsequent release on Isla Tiburon (Montoya and Gates 1975). This transplant was successful, and the

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current population is estimated at 125 animals.[3] In 1979, Direccion General de Flora y Fauna Silvestres biologists attempted a transplant on Isla Angel de la Guardia. Five sheep (three ewes and two rams) were captured, but only three (two ewes and one ram) survived to be released. This transplant was not successful.[1,2]

HUNTING

The first protective legislation intended specifically for the conservation of wildlife in Mexico was passed in 1894. In 1921, a complete closed season for a period of ten years was proclaimed on bighorn sheep throughout the country (Leopold 1959). Bighorn sheep hunting was again prohibited in 1944. No provision was made for enforcement, and the law was little heeded. In 1963, an open season was held. Fifty permits were issued by random drawing (Cossio 1975). Annual hunts have been conducted in Baja California and Sonora through the present, with intermittent closures in Sonora.

Fifteen of the 25 record-class trophy desert rams belong to the subspecies cremnobates, and all have been taken in Baja California (Valdez 1982). Seasons have averaged ten days in length, and hunter success has averaged between 40-50 percent (Subsecretaria Forestal y de Fauna 1976). Sheep permits cost approximately $15,000.00[1], and also cover the expenses for a professional guide, two spotters, two porters and a cook (Araujo 1976).

Mexico has experimented with a point system, and horn curl criteria in the definition of a legal ram. A point system was enacted in 1974. Under this system a ram in Baja California Norte had to measure a minimum of 180 Boone and Crockett points, and in Baja California Sur, the minimum was set at 170 points to be legal. A fine of 5,000 pesos for each point below the established minimum was implemented. During the 1974 hunt, only 1 of 19 rams harvested exceeded 180 points (Subsecretaria Forestal y de la Fauna 1976). Numerous hunters felt that 180 points was unrealistic. Few people are capable of determining the minimum points established. Most hunters will take a smaller sheep, pay the fine and leave. Few sheep over 180 points were observed.

PROBLEMS AFFECTING BIGHORN SHEEP MANAGEMENT

FINANCES

The most obvious and immediate shortcoming of bighorn sheep management in Mexico is the absence of an effective plan of protection and law enforcement. The inadequacy of present bighorn sheep programs stems directly from lack of financial support by the federal government. Funds for operation of wildlife programs are drawn from the general appropriation, but the actual allocation of support from this source is pitifully low. The wildlife program does not even receive for its own use the equivalent funding generated from hunting license fees.

HABITAT MANAGEMENT

The entire legal structure of bighorn sheep conservation is based on the premise that regulation of hunting is the number 1 problem. Granted that the most immediate problem is the enforcement of regulations, the law should not

be limited to that objective but should be broadened to provide for phases of bighorn sheep management that include environmental conservation. The patterns of agriculture grazing and forest use have profound effects upon local game populations, but they are dictated by economic needs and are not easily changed to favor wildlife.

PUBLIC EDUCATION

Bighorn sheep conservation in Mexico must have its beginnings in the minds of the rural population. In general, the rural Mexican lives according to the traditions established by his ancestors, and seldom does he accept innovations. He believes what he was taught at home and what he sees with his own eyes.

A bighorn sheep conservation program will not be effective until the public education phase catches up with the limited technical and legal advances. Therefore, an aggressive educational effort concurrent with existing conservation programs is needed, since few people understand the critical situation of Mexico's wildlife resources.

TECHNICAL TRAINING

Technical knowledge and trained personnel will be essential to promote bighorn sheep conservation efforts. At the present time, no wildlife management curriculum exists in any of the educational facilities in Mexico.[5] Therefore, a source of personnel trained in wildlife does not exist. Most of the employees of the Direccion General de Flora y Fauna Silvestres are trained in zoology or related fields. A few biologists have completed advanced wildlife training in the United States.

EXOTIC UNGULATES

At least two introductions of aoudad (Ammotragus lervia) have taken place on historic desert bighorn range in Coahuila and Nuevo Leon. These exotics have increased and dispersed over a relatively large area (Rangel and Simpson 1979). The release of aoudads in Mexico was not designed to supplement the endemic fauna for sport hunting purposes, rather to fulfill the interests of individuals for a private collection of exotics.

The existence of aoudada on historic bighorn sheep habitat will render these areas unsuitable for the restoration of bighorn, and the unchecked dispersal of aoudad into occupied bighorn habitat could have a deleterious impact on the remnant bighorn populations found in northeastern Sonora.

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