GENETIC VARIATION AMONG PRONGHORN (A*ntilocapra americana*) POPULATIONS.

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Abstract: Mexican pronghorn populations have been declining drastically in the last century as a result of habitat fragmentation and loss, predation and poaching. The latest census data indicates there are approximately 1000 individuals representing three subspecies. Of the three, the peninsular pronghorn subspecies is the most threatened, comprising only 10% of the total number of pronghorn present in Mexico. In order to ensure the survival of this species, conservation management of the remaining populations is necessary. One key element to contribute towards this management is the analysis of genetic variation found among pronghorn subspecies and populations. This will help to understand their recent demographic history, the effects of range reduction on gene flow and genetic variation. To accomplish this goal, we compared genetic variation between Mexican and USA populations using the mitochondrial d-loop control region as a molecular marker. The majority of DNA samples from México that were obtained for these studies were extracted from horns, bone marrow, old tissue, hair, and feces, all of which were collected by non-invasive methods. Oligonucleotide primers designed to amplify the d-loop control region were used in PCR reactions to produce a 500 base pair product. The sequence from 93 individuals from México and USA was obtained including representatives of all five subspecies. We found 29 haplotypes, which indicates a high level of variation, suggesting that reported severe population bottlenecks during the last Century did not strongly reduce the genetic variability within the species. We have found a low level of genetic differentiation between the populations. The data that we obtain in this study shows signs of a rapid population explosion of the pronghorns populations, as a result of the extinction of many of their predators and competitors during the megafauna extinction, and the prairie expansion during the Holocene. The results obtained from this study will help to understand the recent evolutionary history of the pronghorn populations, and will be valuable for making management decisions designed to reestablish populations of the endangered subspecies in Mexico.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:106

***Key words*:** Molecular genetics, subspecies, population biology, bottleneck, management, mitochondrial DNA.

HISTORY AND MANAGEMENT OF YELLOWSTONE NATIONAL PARK PRONGHORN

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Abstract: Unregulated commercial hunting outside the Yellowstone National Park (YNP) boundary was largely responsible for extirpating pronghorn from the area north of the park by the early 1920's and isolating the Yellowstone population at the upstream limit of its former distribution. Increased protection from poaching within the park, along with favorable climatic conditions and predator control actions allowed pronghorn and other ungulates to increase in number during the first half of the century. These increases resulted in an apparent reversal of National Park Service (NPS) management policy, which had stressed full preservation and protection of all ungulate species. Between the 1940's and the late 1960's, park managers, concerned about impacts of increasing ungulate numbers on habitat, attempted to maintain the pronghorn population between 125 and 150 animals by shooting and by trapping and transplantation. Pronghorn from Yellowstone were used to augment or re-establish decimated pronghorn populations in several western states. In 1968 the NPS again implemented a policy change, ceasing its program of aggressive population control, and allowing all wildlife populations to exist without human interference to the maximum extent possible. The Yellowstone pronghorn population at this time numbered less than 200 animals, and remained so until 1983 when it began to increase. After reaching a high of nearly 600 animals in 1991, the population has declined in recent years to around 200 pronghorn. Human activity, intraspecific competition, habitat changes, and predators have all been suggested as possible contributing factors to the recent decline. The NPS has recently initiated a cooperative research effort to examine the factors influencing pronghorn numbers. These studies are intended to form the beginning of a comprehensive evaluation of the factors influencing the Yellowstone pronghorn population and an estimation of the likelihood of persistence of the population. This information will also be used to review the potential effectiveness of various proposed management strategies.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:107

CAPTURE, HAND REARING AND CAPTIVE MANAGEMENT OF PENINSULAR PRONGHORN.

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Abstract. Capture and hand rearing of peninsular pronghorn fawns was carried out early 1998 (2 males: 3 females), 1999 (3 males: 1 female), and 2000 (5 males: 2 females),. After these, captive management include since transfer of the first weaned youngsters, to care and to observe the animals, general complement feeding, coyote control, irrigation system, training some animals, and to capture wild adults. All these activities are developed in a large enclosure ranging 1,400x1,850m. There is a division with a double fence (wire netting and electric) and other single wire fences for pronghorn handling. The facilities includes a 405 m^3 water storage, an observation tower and cabins. Some of the activities are described with detail. Nowadays there are 33 captive peninsular pronghorns: 18 males and 15 females. First captive births of peninsular pronghorn were early 2000, including triplets.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:108

Key words: Capture, hand rearing, captive management, peninsular pronghorn.

ALTERNATIVE CAPTURE TECHNIQUE FOR THE PENINSULAR PRONGHORN.

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Abstract. Capture of wild peninsular pronghorn adults is described. The technique used was supported by a irrigation system, captive hand reared fawns and an observation tower. The main structure of the trap consists of a divided fence (1400x1850m) installed for capturing wild adults and captive reproduction. One side of this fence can be opened or closed as needed, in a mayor dimension than a door. A general diagram is included. There are two main “baits” used: a) Green vegetation yearlong promoted by the irrigation system, and b) the hand-reared captive animals. Other important element is the use of the tower to spot the entrance of wild pronghorn to the trap, and to coordinate the capture action. Obviously optic and radio equipment was unavoidable.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:109

Key words: Capture, fence, peninsular pronghorn, irrigation system.

REINTRODUCCIÓN Y MONITOREO DE BERRENDOS EN EL ESTADO DE COAHUILA.

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Abstract: Unidos para la Conservación A. C. (U.P.C.) inicia el Programa "El Retorno del Berrendo" en 1993, año en que inicia pláticas con el New México Department of Game & Fish para establecer un programa de colaboración internacional para reintroducir la especie al estado de Coahuila. Después de la evaluación de las áreas de captura y trasplante, se eligió el Valle Colombia, en el NW de Coahuila, que ocupa un área aproximada de 230,000 hectáreas y en el cual se estimó una superficie de pastizales para el manejo del Berrendo de 55,743 ha. En 1996 se realizó la primera traslocación de 65 Berrendos procedentes de Carrizoso, Nuevo México y se estableció un programa de monitoreo para observar su adaptación y distribución en el área de liberación. Debido al éxito de ésta, se realizó una segunda traslocación de 85 Berrendos. Actualmente se da seguimiento a los grupos de Berrendos establecidos dentro del Valle Colombia mediante monitoreos terrestres y aéreos para evaluar el éxito de las traslocaciones y el proceso de dispersión de algunos grupos fuera del Valle.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:110

"UNIDOS PARA LA CONSERVACIÓN" PRONGHORN RESCUE PROGRAM IN THE STATES OF CHIHUAHUA AND COAHUILA.

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Abstract: Unidos para la Conservaci6n, A.C. (UPC), is a Mexican non-profit private association founded in August 7, 1992, with the goal to preserve Mexican natural resources, to assist and develop programs that would allow their continuity by applying an efficient financial and scientific structure, as well as it's promotion."The Return of the Pronghorn", is the name of UPC's program for the conservation of the pronghorn in Mexico. This program started giving support to other projects already existing such as the one in the state of Baja California Sur with the Centro de Investigaciones Biologicas del Noroeste and the Reserve of El Vizcaino; and the other in Sonora, with the Centro Ecologico de Sonora. In February 1996 and January 1998, with the support of the New Mexico Department of Game and Fish, UPC reintroduced this species to Coahuila with herds from the south of New Mexico. Since then this herd has been monitored by air and land. In collaboration with the UNAM and some landowners, during 1997, 1998 and 1999 air and land monitoring has been carried out in Chihuahua obtaining information of the status of the pronghorn populations and its habitat. We are also collaborating with the UNAM in the genetic study of the introduced animals and the pronghorns surviving in Chihuahua, Sonora and El Vizcaino in Baja California Sur. This study will let us establish new alternatives for the management of this species. All these actions have been carried out with the support of different institutions and companies.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:111

SONORAN PRONGHORN HOME RANGES AND HABITAT USE

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Abstract: The current range of Sonoran pronghorn (Antilocapra americana sonoriensis) in the United States is limited to southwestern Arizona. Vegetation is described as either the Lower Colorado River Valley or Arizona Upland subdivisions of the Lower Sonoran Desert Life Zone (Brown 1982). We studied home ranges and habitat use of radio-collared Sonoran pronghorn from 1994 - 1999. Habitat was classified primarily by topographic features into 5 categories: flats, bajadas, hills, washes and other. Habitat associations of pronghorn were recorded on weekly aerial telemetry flights. We used estimates of the expected proportions of habitat types from Wright and DeVos's (1986) study in the same area, which were derived by plotting random points. Seasons were based on local temperature and precipitation patterns. Observed use was compared to expected use by seasons using chi-square tests. We also mapped the distribution of chain-fruit cholla (Opuntia fulgida) and compared use of these areas to areas lacking this species. The results of these analyses will be presented.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:112

***Key words*:** Sonoran pronghorn, habitat, bajada, chain-fruit cholla, home range.

BIOTIC AND ABIOTIC FACTORS AFFECTING THE QUALITY AND QUANTITY OF HABITAT OF THE PENINSULAR PRONGHORN (*Antilocapra americana peninsularis*) IN THE BIOSPHERE RESERVE "EL VIZCAINO', BAJA CALIFORNIA SUR, MEXICO.

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Abstract: Some biotic and abiotic factors were evaluated. Canfield line and quadrants were used to record the vegetation data. The information obtained is in the following tables. The main anthropogenic activities include: agriculture, cattle raising, infrastructure developments (aqueduct and roads), and poaching. Human population and habitat fragmentation also are important factors.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:113-114

Table 1. Number of quadrants per vegetation type.

Dune shrub	Halophilous vegetation	Microphila vegetation	Microphila - halophilous vegetation
12	8	9	9

Table 2. Vegetal composition per vegetation type.

Vegetation Type.	Shrubs (%)	Forbs (%)	Grasses (%).
Dune shrub	**63**	35	2
Halophilous vegetation	37	**45**	18
Microphila vegetation	**60**	20	20
Microphila - halophilous vegetation	**55**	27	18

Table 3. Number of species per vegetation type.

Vegetation Type.	Shrubs	Forbs	Grasses	Total
Dune shrub	**8**	6	1	15
Halophilous vegetation	7	**9**	3	19
Microphila vegetation	**10**	3	2	15
Microphila – halophilous vegetation	**11**	4	2	17

Table 4. Biomass estimated per vegetation type.

Vegetation Type.	Maximum production (Kg/ha)	Minimum production (Kg/ha)	Medium production (Kg/ha)
Dune shrub	256.08	140.23	192.56
Halophilous vegetation	534.5	196.0	333.9
Microphila vegetation	276.5	217.5	247.0
Microphila – halophilous vegetation	593.9	315.7	454.8

EFFECT OF BIRTH DATE ON PREDATION OF NEONATAL PRONGHORN IN THE NORTHERN GREAT BASIN.

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Abstract: The northern Great Basin represents an important area of the pronghorn (*Antilocapra americana*) range. However, limited information exists about factors influencing fawn survival. Birth date can affect fawn survival of other ungulates, but it has not been examined in pronghorn. We investigated causes and timing of fawn mortality and the effect of birth date on survival at Hart Mountain National Antelope Refuge in southeastern Oregon during 1996-99. One hundred forty-nine fawns (<1 to 7 days old at capture) were marked and monitored from mid-May to mid-July during the 4-year study. We estimated survival of marked fawns with the Kaplan-Meier estimator modified for staggered entry and used the Weibull survival model to identify factors related to fawn mortality. Eighty-six percent (128/149) of the marked fawns died during the monitoring period. Average age at death was 7.3 days and 124 (97%) of the fawns that died were <21 days old. Predation accounted for 82% (105/128) of the fawn deaths. Coyote (*Canis latrans*) predation was the greatest single cause of mortality each year. Disease and starvation were minor factors and accounted for only 6 deaths. No mortalities attributed to exposure were diagnosed during the 4-year study. Female fawns lived longer than male fawns (P = 0.048). Birth date affected fawn survival where fawns born during the peak parturition period lived longer than those born during the non-peak period (P = 0.0001). Of 21 surviving fawns, 17 (81%) had birth dates during peak parturition. Results suggest that birth synchrony in pronghorn may be an important factor in fawn survivability.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:115

Key words: birth date, birth synchrony, coyote, fawn, Great Basin, mortality, predation, pronghorn, sex, survival.

EVALUATION OF AERIAL LINE TRANSECT FOR ESTIMATING PRONGHORN POPULATIONS IN OREGON.

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ABSTRACT: We evaluated the use of Aerial Line Transect, Wyoming method, for estimating pronghorn antelope abundance in Oregon. Surveys were conducted in 2 Oregon big game units during May 1998 and 1 unit during May 1999. Data were collected according to protocols developed by Wyoming Game and Fish (Guenzel 1997) and analyzed using DISTANCE (Buckland et al. 1993). We found this technique provided reasonable estimates of population size for the density range found in Oregon, which is much lower than found in other states already utilizing the technique. However, confidence intervals around estimates were larger than desired. In addition, application in lower density areas was more expensive compared to traditional survey methods because additional effort was required to obtain adequate sample size for desired precision estimates. Comparison with historic trend counts and management implications will be discussed.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:116

***Key words*:** aerial transect, *Antilocapra americana*, low density, Oregon, pronghorn, survey

MONITORING A PRONGHORN *(Antilocapra americana mexicana)* POPULATION REINTRODUCED TO THE NORTHEASTERN OF MEXICO

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Abstract: The pronghorn (*Antilocarpra americana mexicana*), an endemic ruminant species of North America is classified as an endangered species. This study covering three years (1995-1998) was conducted to evaluate the factors determining the success of reintroduction of pronghorn in the Mexican State of Coahuila. Vegetation characteristics, botanical composition of the pronghorn diet and birth and mortality rates were monitored. One hundred and seventeen vegetation species belonging to 32 different species were identified. Greatest diversity was obtained in the natural grass community (0.77), followed by halophyte grass community (0.74) and rosetophyll shrubs (0.53). Fifty-nine vegetation species were identified in the pronghorn diet and the poisonous plants: *Solanum rostratum* and *Solanum eleagnifolium* were determined in the pronghorn diet all-year round, though percentages consumed varied with season (0.96 % in wet season versus 11.2 % in dry season). Of the total diet consumed by the pronghorns, forbs ranked highest (75 %) while grasses and shrubs were eaten in almost similar quantities (12.5 % of each). Births averaged 0.17 ± 0.075 and 4 and 3 deaths were recorded in 1996 and 1998, respectively. Competition with cattle for grazing would occur under drought conditions. It is concluded that the pronghorn will continue to be endangered despite these translocation programmes. Further studies to evaluate supplementation strategies during critical times, to promote forb development and the dynamics of interaction with other ruminant animal species in the same rangeland, are necessary

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:117

***Key words*:** Diet composition, habitat condition, pronghorn, translocation

NUTRITIONAL VALUES OF SOME PLANTS INGESTED BY PENINSULAR PRONGHORN.

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Abstract: Nutritional values from proximal analyses were obtainded for several items ingested by peninsular pronghorn. Direct and indirect observation was the base to select the samples collected. This observation was done with wild and captive (hand reared) animals. . Mourning dove (*Zenaida macroura*) feces sample was analyzed more detailed for some mineral content. Table 1). Vegetal samples include 13 species (or part). Vegetal samples were analyzed for: humidity, ash, protein, ether extract, crude fiber, and nitrogen-free extract (Table 2). The species key is Eule(g) *Euphorbia leucophyla* (green); Spam *Sphaeralcea ambigua*; Enfa *Encelia farinosa*; Eule(d) *Euphorbia leucophyla* (dry); Fodi(l) *Fouquieria diguetti* (leaves); Fodi(f) *Fouquieria diguetti* (flower); Lyca *Lycium californicum*; Erbe *Errazurizia benthamii*; Atca *Atriplex canescens*; Phfi *Phaseolus filiformis*; Enca(f) *Encelia californica* (flower); Padi(l) *Pachycormus discolor*; Eumi *Euphorbia misera*; Atju *Atriplex juneata*; Stli *Stillingia linearifolia*; Atba *Atriplex barclayana*

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:118-119

Key words: Nutritional value, minerals, ingest, peninsular pronghorn.

Table 1. Chemical composition of feces of mourning dove (*Zenaida macroura*) consumed by peninsular pronghorn.

CONSTITUENT	CONTENT
Ca	4642.9 µg/g
P	5629.3 µg/g
Zn	24.43 µg/g
Fe	1833 µg/g
Cu	11.72 µg/g
Mn	77.54 µg/g

Table 2. Nutritional values for items consumed by peninsular pronghorn.

SPECIES	HUMIDITY	MINERALS	PROTEIN	ETHER EXTRACT	CRUDE FIBER	N.F.E. (*)
Eule(g)	69.34	2.89	12.70	5.58	2.92	75.92
Spam	69.24	4.01	19.66	4.36	4.41	67.56
Enfa	72.06	0.20	12.76	3.83	1.76	81.45
Eule(d)	6.20	0.12	10.20	4.77	8.52	76.39
Fodi(l)	72.63	2.07	17.32	3.62	0.87	76.13
Fodi(f)	71.79	1.33	9.87	3.34	3.89	81.57
Lyca	97.37	4.49	15.19	3.65	0.69	75.99
Erbe	60.95	2.86	16.06	6.00	6.54	68.54
Atca	43.71	12.71	14.04	2.59	2.95	67.71
Phfi	74.71	2.89	18.16	3.89	3.01	72.06
Enca(f)	74.47	2.31	12.91	9.22	1.97	73.58
Padi(l)	68.20	0.11	13.55	4.42	2.25	79.66
Eumi	77.87	2.34	17.03	6.74	1.23	72.65
Atju	60.21	0.23	5.78	3.24	7.43	83.32
Stli	80.46	2.01	23.41	6.41	1.67	66.50
Atba	70.89	10.48	8.61	3.53	2.19	75.19

PROGRAMA DE CONSERVACIÓN Y APROVECHAMIENTO DEL BERRENDO EN MÉXICO.

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This project contains goals, objectives and actions focused to resolve the pronghorn situation in Mexico, using protection, reproduction, recovery strategies, and reintroduction in potential areas. Each action or strategy will depend on the local and regional characterísts and problems, and should consider the social and economic development, the subspecies biological and ecological characteristics, and the factibility of national and international agreements which should involve the several social sectors (e.g. academic, private initiative, users and non guvernamental organitations), to search viable conservation alternatives, and in its opportunity, the sustainable use.

Este proyecto plantea una serie de metas, objetivos y acciones encaminadas a resolver la problemática del berrendo en México, a través de una estrategia de protección, reproducción, recuperación y reintroducción en áreas potenciales. Las acciones para el desarrollo de esta estrategia dependerán de las características y problemática local y regional, y deberán considerar el desarrollo socioeconómico, las características biológicas y ecológicas de cada subespecie, y la creación de convenios nacionales e internacionales con la participación de diferentes sectores de la sociedad (e.g. académico, particulares, usuarios e instituciones no gubernamentales), para la búsqueda de alternativas viables de conservación y, en su momento, aprovechamiento sustentable.

PROCEEDINGS PRONGHORN ANTELOPE WORKSHOP 19:120

Notes:

- Other participants are: Africam Safari, Bioparque Estrella, Environmental Flying Services, Espacios Naturales y Desarrollos Sustentables, Fish and Wildlife Services, Fondo Mexicano para la Conservación de la Naturaleza, Los Angeles Zoo, and Wyoming Fish and Game Department.
- Current web page is: www.berrendo.org.mx