



# Bleats and Blats

Official Newsletter of the Desert Bighorn  
Council



October 2004

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*Hello everyone,*

*Hope you had a good summer! This newsletter includes some important updates about our upcoming meeting. I know it seems like April 2005 is still far off in the future, but it’s not too early to make travel arrangements, start preparing a talk, register for the meeting, or submit your Hansen-Welles Scholarship application (\$\$\$!!). Please take a look at this newsletter for related updates and reminders about important dates.*

*You can also check our website (<http://www.desertbighornCouncil.org>) for the latest DBC information. And as always, the website and next newsletter could use some new material from you as well. You’re invited and encouraged to send in material such as announcements, research updates, photos, or stories about your work with bighorn sheep. The next newsletter will be out in mid December so please send me material by December 1<sup>st</sup>.*

*Hope to hear from you!*

*Esther Rubin  
DBC Secretary (erubin@sandiegozoo.org)*

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## **MEETING UPDATE**

**\*\*\*First Call for Papers\*\*\***

**48<sup>th</sup> Biennial Meeting of the Desert Bighorn Council  
April 6-9, 2005 in Alpine, Texas**

The state of Texas is pleased to be hosting the 2005 Desert Bighorn Council meeting in Alpine, Texas, April 6-9, 2005. The meeting will be held at Sul Ross State University (SRSU). We would like to thank the Texas Bighorn Society, the Texas Wildlife Association, and the Texas Parks and Wildlife Department Foundation for helping to fund this meeting.

**Preliminary Schedule:**

April 6 – Wed	Kokernot Lodge, SRSU	Arrive - Registration - Reception - Technical Staff Meeting
April 7 – Thur	University Center, SRSU Kokernot Lodge-SRSU	Registration - State Status Reports - Technical Papers Banquet (Evening – Chuckwagon Dinner)
April 8 – Fri	University Center, SRSU Elephant Mountain WMA	Tech. Papers - Business Meeting Evening Steak Dinner
April 9 – Sat	Elephant Mountain WMA	Field Trip

**Transportation:**

El Paso (218 miles): West on I-10 to Van Horn (115 miles), South on Hwy-90 to Alpine (103 miles)

Midland/Odessa (160 miles): West on I-20 to Monahans, south on State Hwy 18 to Ft. Stockton, west on I-10 (10 miles), south on Hwy-67 to Alpine (56 miles).

**Hotel:**

**MAKE RESERVATIONS EARLY!!!!!!!!!!!!!!!!!!!!!!**

BestWestern-Alpine Classic (**35 rooms blocked**) 800-528-1234 or (432) 837-1530

- All rooms- \$70 (**Mention “Desert Bighorn Council meeting” when making Reservations!**)

Ramada Inn (432) 837-1100 (First come-first serve - hotel would not block rooms)

- Single - \$72
- Double - \$68

**Registration:**

You are strongly encouraged to register early, as this will assist us in planning the conference. Registration forms will be available on our website. Please send completed form and payment to Esther Rubin, at the address indicated on the form, by **March 1, 2005**. If you have trouble downloading the form or need a paper copy please contact E. Rubin.

Cost: \$70 (\$90 if paid after March 1, 2005) - Does not include membership dues (\$20) or transactions (\$15).

A reduced registration fee of \$35 is being offered for students.

Fee includes:

- Reception (Wednesday evening)
- Breaks (Thursday and Friday during presentations)
- Lunches (Thursday and Friday),
- Banquet (Thursday evening)
- Evening Meal (Friday evening)

**Call For Papers:** Individuals involved in desert bighorn management and research are strongly encouraged to present a technical paper at the meeting. Alternatively, posters may also be presented at this meeting. If you would like to present a paper or poster, please send an abstract (electronic version – MS Word format preferred) and contact information to Billy Tarrant (Vice Chairman) at [btarrant@overland.net](mailto:btarrant@overland.net) or P.O. Box 2083 Fort Davis, Texas 79734 by **March 1, 2005**. Status reports are requested for all states and Mexico. Individuals presenting status reports should also notify Billy Tarrant by **March 1, 2005**. Please forward this call for papers to others who may be interested in presenting or attending the workshop

**Questions:** Please contact Clay Brewer at (432)426-3770 or [cbrewer@overland.net](mailto:cbrewer@overland.net) if you have questions or need additional information.

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## **TREASURER'S REPORT**

### **Report submitted by Stacey Ostermann, DBC Treasurer:**

First of all, thank you to Rick Brigham and Marguerite Carpenter for their generous donations in memory of Buddy Wells. And a big thank you to the Texas Bighorn Society, the Texas Wildlife Association, and the Texas Parks and Wildlife Department Foundation for their donations toward the 2005 DBC meeting. We really appreciate all your assistance!

The DBC checking account was moved from El Dorado Savings Bank to US Bank in March 2004 in order to facilitate timely deposits and allow easier access to our accounts. At that time, \$6000 from the checking account was placed in a short term CD.

#### Income since April 1, 2004:

Transaction sales	\$648.71
Membership	25.00
Donations to Hansen-Wells	132.86
Donations toward the 2005 Meeting	4350.00

#### Expenses since April 1, 2004:

New checks	\$83.10
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#### Current account balances are as follows:

Checking account	\$4,382.88
CD at US Bank (1.01% matures 10/04)	6,000.00
Hansen-Wells Fund CD#1 (1.29% matures 9/05)	20,738.72
Hansen-Wells Fund CD#2 (2.13% matures 1/06)	8,248.37
Hansen-Wells Fund CD#3 (5.01% matures 4/07)	<u>33,474.67</u>
TOTAL	\$72,844.64

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## **CALLING ALL STUDENTS (and faculty)!!**

Are you a student doing your research on bighorn sheep? Do you need money??? Remember that the Hansen-Welles Scholarship may be able to help you cover some of those expenses. Applications are due by December 31, 2004 and grants will be awarded at the DBC meeting in April 2005. Visit our website ([www.desertbighornCouncil.org](http://www.desertbighornCouncil.org)) for more information and guidelines for submitting your application. Faculty, please pass this information on to your students.

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## **NEWS FROM THE FIELD**

### **Update from the San Andres National Wildlife Refuge**

*(Submitted by Mara Weisenberger)*

The population estimate for the San Andres desert bighorn sheep herd in southern New Mexico is approximately 70 animals (to include 20 rams, 21 ewes, 15 yearlings, and 14 lambs). The bighorn are using the southern half the San Andres National Wildlife Refuge and a portion of the White Sands Missile Range. There are still at least two rams in the Organ mountains, directly south of the San Andres mountains. These rams crossed Highway 70 during the 2002 rut and have remained in that area to date; the rest of the bighorn herd remains approximately five miles north (across Highway 70).

There has been only one documented bighorn mortality during calendar year 2004, an adult ewe (SAE-121) that had a lamb in late May or early June: much later than when the rest of the lambs were born. This ewe was observed in mid May with no lamb and appeared in relatively good health, however, when she was observed again in mid June, her health had deteriorated significantly. The latter observation revealed that she had produced a lamb and was extremely thin, with her hips and ribs visible. When searching for the ewe's carcass on 5 August 2004, her lamb from this year was observed by Refuge staff. They were able to get within 15 yards of the ram lamb and took some photos after noticing a crusty surface on his muzzle and above the hooves, with active lesions (likely clinical signs of Contagious Ecthyma). This could explain the extremely poor body condition of SAE-121 during her last observation. The ewe's carcass was discovered the next day and it appeared she died in her tracks on a relatively flat point above a dry wash. The ewe's carcass had not been scavenged on and was completely intact. The ewe did have a small amount of material in her rumen. She had been dead a few days and did not have the crusty lesions on her muzzle as did the lamb. Although there were no obvious lesions above her hooves, they were in poor condition (broken off at the back of the pad) and we collected samples for analysis. We did not observe the lamb again and there were no other bighorn in the immediate area.

The San Andres National Wildlife Refuge has continued with its prescribed burn program to improve desert bighorn sheep habitat. Another prescribed burn was conducted in summer 2004 with more than 10,600 acres treated, and a 2005 burn is in the planning process. To date, the Refuge has treated more than 40,000 acres to improve desert bighorn habitat.

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## **AWARD PRESENTED BY** **ARIZONA DESERT BIGHORN SHEEP SOCIETY**

**Report submitted by Rick Brigham (Technical Staff member):**

**George Welsh**, long-retired Arizona Game and Fish Department biologist, who worked (and still lives) in the Kingman area, was honored on September 25 by the Arizona Desert Bighorn Sheep Society. George was DBC Chair in 1972, served on the Technical Staff for many years, and received the DBC Ram Award in 1984 for his efforts relating to desert bighorns, including pioneering the use of helicopters for censusing bighorns. Members of The Arizona Desert Bighorn Sheep Society, at its annual Sheep Hunters Clinic and Ram Recognition Banquet, made the presentation:

*"The John Russo Award 2004 is presented to George Welsh in grateful appreciation for your work with desert bighorn sheep. Through your efforts, the legacy of pioneer desert bighorn sheep biologist John Russo continues in Arizona."*

The award consists of a plaque and bronze ram. John Russo was the first bighorn biologist in Arizona, and wrote the seminal work "The Desert Bighorn Sheep In Arizona" published originally in 1956. Following the plaque

presentation, George remained on the stage while Bernie Lawrence, his good friend and long time government trapper in the Kingman area, presented him with a binder full of documents and pictures spanning George's entire career in Arizona, dating back to the 1960's. Bernie capped his presentation when he invited all the members of the audience who had attended the banquet just to see George's award presented, to come up on the stage--and they filled it! The entire award effort was guided by Ed Shannahan, who helped establish the Sheep Society in the 1960s. The Sheep Society is a sportsman's group which has cooperatively developed hundreds of waters for wildlife in Arizona, and contributed funds and manpower to aid the Arizona Game and Fish Department with its bighorn reintroduction program throughout the state.

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## **RECENT LITERATURE** **RELATED TO BIGHORN SHEEP**

*(citations and abstracts)*

Holl, S. A., V. C. Bleich, and S. G. Torres. 2004. **Population dynamics of bighorn sheep in the San Gabriel Mountains, California, 1967-2002.** Wildlife Society Bulletin 32(2):412-426.

### *Abstract*

We analyzed long-term population data for bighorn sheep (*Ovis canadensis nelsoni*) occupying the San Gabriel Mountains in southern California. From 1967-1972 an estimated 500 bighorn sheep occupied that range. During 1968-1975 wildfires burned over half the occupied winter-spring ranges. Wildfires increased carrying capacity, and the population grew to 665 animals in 1976. During 1976-1982 adult mortality was low and recruitment was dependent on annual forage production and weather conditions during lambing. Rate of change indicated the population would double every 44 years, and it was considered to be stable. As vegetation matured and carrying capacity declined, mortality of adults and lambs increased and the population halved approximately every 8 years to 501 +/- 30 bighorn sheep in 1989. During 1989-1995 adult mortality increased and rate of change indicated the population would halve approximately every 2.8 years. From 1995-2002 the population was stable at 90 animals. Increased recruitment and an inverse relationship between number of adult ewes and recruitment rates between 1985 and 2001 suggested that neither habitat suitability nor disease was causing the dramatic population decline observed after 1989. We hypothesize that because of a declining mule deer (*Odocoileus hemionus californicus*) population, mountain lions (*Puma concolor cougar*) began to prey more frequently on bighorn sheep, which led to a dramatic decline in the sheep population after 1989.

Jacobson, A. R., A. Provenzale, A. Von Hardenberg, B. Bassano, and M. Festa-Bianchet. 2004. **Climate forcing and density dependence in a mountain ungulate population.** Ecology 85(6):1598-1610.

### *Abstract*

Population models in ecology are rarely validated by comparing their predictions to long-term observations of changes in population size. We have used a variety of analytical tools to examine a 45-year time series of annual censuses of Alpine ibex (*Capra ibex*) in the Gran Paradiso National Park in northwestern Italy. This ibex population grew from about 3300 to almost 5000 individuals in the 1980s during a decade of anomalously mild winters, and then began to decline in the 1990s. By 1997, the population size had returned to previous levels. Adult survival apparently increased and adult sex ratio may have changed to slightly favor males during the increase in population density. Yearly changes in total population were correlated with seasonal average snow depth and population density over the 39 years for which climate data were available. Our results show that the ibex population size was limited by both density dependence and deep snow. A model based on these factors fit to the first 19 years of data was used to forecast subsequent changes in total population based on initial population size and yearly snow depth. The model was able to predict the increase and subsequent decline in total population size over the final 20 years of the study but failed to reproduce population levels after the eruption. Our results suggest that the 1980s episode of population growth was primarily driven by increased adult survival, rather than increased recruitment.

Kreeger, T. J., W. E. Cook, W. H. Edwards, and T. Cornish. 2004. **Brucellosis in captive rocky mountain bighorn sheep (*Ovis canadensis*) caused by *Brucella abortus* biovar 4**. *Journal of Wildlife Diseases* 40(2):311-315.

*Abstract*

Nine (four female, five male) captive adult Rocky Mountain bighorn sheep (*Ovis canadensis*) contracted brucellosis caused by *Brucella abortus* biovar 4 as a result of natural exposure to an aborted elk (*Cervus elaphus*) fetus. Clinical signs of infection were orchitis and epididymitis in males and lymphadenitis and placentitis with abortion in females. Gross pathologic findings included enlargement of the testes or epididymides, or both, and yellow caseous abscesses and pyogranulomas of the same. *Brucella abortus* biovar 4 was cultured in all bighorn sheep from a variety of tissues, including testes/epididymides, mammary gland, and lymph nodes. All bighorn sheep tested were positive on a variety of standard *Brucella* serologic tests. This is the first report of brucellosis caused by *B. abortus* in Rocky Mountain bighorn sheep. It also provides evidence that bighorn sheep develop many of the manifestations ascribed to this disease and that infection can occur from natural exposure to an aborted fetus from another species. Wildlife managers responsible for bighorn sheep populations sympatric with *Brucella*-infected elk or bison (*Bison bison*) should be cognizant of the possibility of this disease in bighorn sheep.

Mooring, M. S. and E. M. Rominger. 2004. **Is the activity budget hypothesis the holy grail of sexual segregation? (Reply)**. *Behaviour* 141(5):521-530.  
(no abstract)

Mooring, M. S., T. A. Fitzpatrick, T. T. Nishihira, and D. D. Reising. 2004. **Vigilance, predation risk, and the allee effect in desert bighorn sheep**. *Journal of Wildlife Management* 68(3):519-532.

*Abstract*

Knowledge of how predation risk affects population survivorship is important for understanding predator-prey relationships and designing effective conservation strategies. The Allee effect (inverse density dependence) can be generated when antipredator strategies become inefficient in small groups of prey, thus making the population more susceptible to catastrophic population collapse and extinction. Many populations of desert bighorn sheep (*Ovis canadensis*) are declining, and predation is, in many cases, a major mortality factor. We studied desert bighorns at the Red Rock Wildlife Area, New Mexico, USA, to assess predation risk in different group types (ram, ewe, mixed) and age-sex classes. Multiple regression analysis revealed that predation risk (as estimated by individual vigilance) increased with smaller group size and greater inter-individual distance for all bighorns, with groups of <5 individuals subject to the greatest risk. Although rugged terrain is thought to provide refuge from predators, habitat ruggedness did not influence vigilance. The biggest males in ram groups experienced the greatest predation risk in that they were in the smallest groups, were most likely to be solitary, and were spaced farther apart from conspecifics. Although big rams spent twice as much time vigilant as other age-sex classes, collective alertness was lowest for ram groups. The conclusion that big rams were most at risk from predation was partially supported by the recent predation history of the population and previous studies in which mountain lion (*Felis concolor*) kills were biased toward rams. We discuss the management implications of these results for small populations subject to Allee effects, including reintroduction and/or translocation practices and selective removal of problem predators. We suggest that the use of multivariate techniques to simultaneously explore the influence of multiple factors and the use of vigilance as a correlate of predation risk would be useful management tools for assessing seasonal and class-specific vulnerability to predation.

Neuhaus P. and K. E. Ruckstuhl. 2004. **Can the activity budget hypothesis explain sexual segregation in desert bighorn sheep? (A Critique)**. *Behaviour* 141(5):513-520.  
(no abstract)

Schoenecker, K. A., R. O. Lyda, and J. Kirkpatrick. 2004. **Comparison of three fecal steroid metabolites for pregnancy detection used with single sampling in bighorn sheep (*Ovis canadensis*)**. *Journal of Wildlife Diseases* 40(2):273-281.

*Abstract*

We compared three fecal steroid metabolite assays for their usefulness in detecting pregnancy among free-ranging Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) from Bighorn Canyon National Recreation Area, Wyoming and Montana (USA) and captive bighorn ewes at Zoo Montana in Billings, Montana. Fecal samples were collected from 11 free-ranging, radio-collared bighorn ewes in late January-May 2001 and from 20 free-ranging, radio-collared ewes in late March to mid-May 2002. Free-ranging ewes were monitored the following spring to determine whether or not they lambed. In addition, two captive ewes were studied at Zoo Montana. With three exceptions, free-ranging bighorn ewes that produced lambs had nonspecific progesterone metabolite (iPdG) levels of >1,800 ng/g feces and iPdG levels >7,000 ng/gm feces when samples were collected between early March and mid-May. Samples collected earlier in the year were inconclusive. One false negative was suspected to be the result of sample collection error. Of the captive ewes, nonspecific pregnanediol-3alpha-glucuronide (PdG) and iPdG followed a predictable curve over the course of the 180-day pregnancies. We conclude that estrone conjugates are not useful in diagnosing pregnancy; however, fecal steroid analysis of PdG and iPdG can be used to accurately determine pregnancy and reproductive function in bighorn sheep. This holds great potential as a noninvasive technique for understanding the role of reproductive disease in wild bighorn sheep.

Tserenbataa, T., R.R. Ramey, O. A. Ryder, T. W. Quinn, and R. P. Reading. 2004. **A population genetic comparison of argali sheep (*Ovis ammon*) in Mongolia using the ND5 gene of mitochondrial DNA; implications for conservation**. *Molecular Ecology* 13(5):1333-1339.

*Abstract*

We sequenced 556 bp of the mitochondrial ND5 gene to infer aspects of population structure and to test subspecific designations of argali sheep (*Ovis ammon*) in Mongolia. Analysis of molecular variance (AMOVA) revealed greater variation within than among putative subspecies and populations, suggesting high levels female-mediated gene flow. Compared with bighorn sheep (*O. canadensis*) in North America, substantially less differentiation in mitochondrial DNA was found among argali populations over 1200 km than was found among bighorn populations over 250 km. This result is consistent with differences in argali and bighorn life history traits. Argali run for long distances across open terrain in the presence of a threat rather than running up into steep escape terrain like bighorn sheep do. Our results suggest recognizing only one Evolutionary Significant Unit (subspecies) of argali in Mongolia, but they may support recognizing two Management Units, because two regions do exhibit slightly different haplotype frequencies at the ND5 gene of mtDNA.

Turner, J. C., C. L. Douglas, C. R. Hallum, P. R. Krausman, and R. R. Ramey. 2004. **Determination of critical habitat for the endangered Nelson's bighorn sheep in southern California**. *Wildlife Society Bulletin* 2(2):427-448.

*Abstract*

The United States Fish and Wildlife Service's (USFWS) designation of critical habitat for the endangered Nelson's bighorn sheep (*Ovis canadensis nelsoni*) in the Peninsular Ranges of southern California has been controversial because of an absence of a quantitative, repeatable scientific approach to the designation of critical habitat. We used 12,411 locations of Nelson's bighorn sheep collected from 1984-1998 to evaluate habitat use within 398 km<sup>2</sup> of the USFWS-designated critical habitat in the northern Santa Rosa Mountains, Riverside County, California. We developed a multiple logistic regression model to evaluate and predict the probability of bighorn use versus non-use of native landscapes. Habitat predictor variables included elevation, slope, ruggedness, slope aspect, proximity to water, and distance from minimum expanses of escape habitat. We used Earth Resources Data Analysis System

Geographic Information System (FRDAS-GIS) software to view, retrieve, and format predictor values for input to the Statistical Analysis Systems (SAS) software. To adequately account for habitat landscape diversity, we carried out an unsupervised classification at the outset of data inquiry using a maximum-likelihood clustering scheme implemented in ERDAS. We used the strata resulting from the unsupervised classification in a stratified random sampling scheme to minimize data loads required for model development. Based on 5 predictor variables, the habitat model correctly classified >96% of observed bighorn sheep locations. Proximity to perennial water was the best predictor variable. Ninety-seven percent of the observations were within 3 km of perennial water. Exercising the model over the northern Santa Rosa Mountain study area provided probabilities of bighorn use at a 30 x 30-m<sup>2</sup> pixel level. Within the 398 km<sup>2</sup> of USFWS-designated critical habitat, only 34% had a graded probability of bighorn use to non-use ranging from greater than or equal to 1:1 to 6,044:1. The remaining 66% of the study area had odds of having bighorn use <1:1 or it was more likely not to be used by bighorn sheep. The USFWS designation of critical habitat included areas (45 km<sup>2</sup>) of importance (2.5 to greater than or equal to 40 observations per km<sup>2</sup> per year) to Nelson's bighorn sheep and large landscapes (353 km<sup>2</sup>) that do not appear to be used (<1 observation per km<sup>2</sup> per year).

Worley K., C. Strobeck, S. Arthur, J. Carey, H. Schwantje, A. Veitch, D. W. Coltman. 2004. **Population genetic structure of North American thinhorn sheep (*Ovis dalli*)**. *Molecular Ecology* 13(9):2545-2556.

#### *Abstract*

The thinhorn sheep (*Ovis dalli* ssp.) provides a rare example of a North American large mammal that occupies most of its native range and maintains close to ancestral population size. There are currently two recognized subspecies, Dall's sheep (*O. d. dalli*) and Stone's sheep (*O. d. stonei*), the validity of which remains uncertain. We investigated the spatial genetic structure of thinhorn sheep populations representing both subspecies by genotyping individuals (n = 919) from across the species range at 12 variable microsatellite loci. We found high levels of genetic diversity within (H-E = 0.722) and significant genetic structure among the 24 sampled areas (F-ST = 0.160). Genetic distance measures and Bayesian clustering analyses revealed the presence of at least eight subpopulations that are delineated by mountain range topology. A strong overall pattern of isolation-by-distance is evident across the sampling range (r = 0.75, P < 0.001) suggesting limited dispersal and extensive philopatry. Partial Mantel tests of this relationship showed mountain range distinctions represent significant barriers to gene flow (P = 0.0001), supporting the Bayesian analyses. Genetic structure was more strongly pronounced in southern Yukon and Alaska than elsewhere. We also show evidence for genetic differences between the two currently recognized thinhorn subspecies.

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## **FNAWS MEETING UPDATE**

The 28<sup>th</sup> FNAWS Annual Convention will be held in Texas in 2005. It will be held at the Gonzales Center in San Antonio, Texas, March 2-5. For more information, visit their website at [www.fnaws.org](http://www.fnaws.org)

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