Bleats and Blats

Official Newsletter of the
Desert Bighorn Council

APRIL 2008

Inside:

Hello DBC members!

I hope you're all enjoying a wonderful spring. This newsletter includes some important updates, such as the date of the next DBC meeting. We'll include updates in future newsletters and on our website at www.desertbighorncouncil.org.

As you'll see, the newsletter is a great way to share or request information. The next newsletter is scheduled for July, so if you have updates or announcements to share, please send them to me by July 6, 2008. We hope to hear from you!

All the best!

Esther Rubin
DBC Secretary (esrubin@consbio.org)

2009 DBC MEETING – SAVE THE DATE!

As many of you may know, the 2009 DBC meeting will be held in Colorado. Scott Wait, Senior Terrestrial Biologist with the Colorado Division of Wildlife, will be the Meeting Chair and has already begun plans for the meeting!

The meeting will be held in Grand Junction, Colorado, on April 8-10, 2009, with the following tentative schedule:

April 8:	Registration and Social in the evening
April 9:	Technical Session, State reports, Banquet
April 10:	Technical Session and Field Trip

There are tentative plans to include special sessions on disease and on human/recreation impacts, as well as a general session. If you have questions or suggestions regarding the meeting, please contact Scott directly at:

Scott Wait
Senior Terrestrial Biologist
Southwest Region
Colorado Division of Wildlife
970-375-6745
scott.wait@state.co.us

Check the DBC website and future newsletters for more details!

DBC TRANSACTIONS

2007 DBC Transactions Update

Submitted by Brian Wakeling, Arizona Game and Fish Department (DBC Transactions Editor)

Volume 49 of the *Desert Bighorn Council Transactions* is a bit behind the scheduled publication timeline. Several submissions were received well behind the scheduled due dates, and I chose to accept them for consideration because the content was well suited for publication in the *Transactions*. For those that submitted manuscripts, I have now received completed reviews on each paper, and the authors should be receiving compiled reviews by the end of May. Although I had hoped to have a published document by this time, I have had to revise the expected publication date. I still expect to be able to complete the *Transactions* by September 1.

For those planning to contribute to future volumes, I would encourage you to begin working on those manuscripts early and have a draft ready to submit by the time we hold the next Desert Bighorn Council meetings. Early submissions facilitate the editor's ability to complete the *Transactions* in a timely fashion. I am not suggesting that delays in publication are the sole responsibility of the authors, because I own much of that responsibility myself. Putting a quality document together requires time and effort from everyone involved. But it often seems that in today's busy, under-funded, and instantaneous-gratification world, the saying shared by the administrative assistant within my work unit is truer now than ever, "If it weren't for the last minute, nothing would ever get done." I'm trying to be a bit more proactive.

Past DBC Transactions Available on the Web!

Past issues of the Desert Bighorn Council *Transactions* are now available online, at no cost, at the DBC's website. Brian Wakeling (DBC Editor) and his staff have scanned all existing issues (going all the way back to the first issue from 1957!) and Karsten Kelm (DBC Webmaster) has posted these files on the web. Thanks to both of you for all your hard work!!

TREASURER'S REPORT

Submitted by Kathy Longshore, DBC Treasurer

Greetings DBC Members,
The DBC account balances as of March 31, 2008 are listed below. We received our final donation of $855.79 from the Robert S. Campbell Trust in March 2008.

Robert S. Campbell Donation	
Checking account (Citibank)	$ 70,329.45
Campbell Fund CD #618 6 mo. (4.88% interest rate, matures 8/08)	$ 52,648.27
Total R. Campbell Fund	**$122,977.72**
Hansen-Wells Memorial Fund Account Balance	
This balance includes:	
Hansen-Wells Fund CD#885 (3.92 % interest rate, matures 9/08)	$ 23,002.94
Hansen-Wells Fund CD#022 (3.87 % interest rate, matures 1/09)	$ 20,962.73
Hansen-Wells Fund CD#920 (3.92 % interest rate, matures 4/12)	$ 34,897.94
Checking acct. (interest from CD #885 plus net income from 2007 mtg.)	$ 878.58
Total Hanson Wells Fund	**$ 79,742.19**
General operating funds (in checking account)	**$ 206.52**
Total Assets	**$208,485.10**

TWO OF A KIND

Submitted by Aimee Byard, Bighorn Institute (DBC member)

On March 4, 2008, I checked on one of the many pregnant, radio-collared ewes in the northern Santa Rosa Mountains. February through April is the peak of lambing season, which extends from January through June for desert bighorn. We had not observed any lambs yet in this part of the range and were beginning to get a bit impatient.

I found my "target" ewe for that day isolated away from other bighorn, bedded high-slope in steep terrain. These were good signs that she may have given birth. The ewe stayed bedded throughout the observation so it was impossible to determine whether or not she had a lamb with her. After maneuvering to a higher location, I was able to see some of the area behind the ewe and, sure enough, there was a lamb bedded behind her! I was thrilled to document the first 2008 lamb in the northern Santa Rosa Mountains. Mother and young seemed content so I set off to look for other sheep.

After a few hours in the field it was time to head out. The hike back to the jeep required me going by

the area that the ewe and lamb were previously observed. Surprisingly, they were still bedded in the exact same spot as they were three hours prior. Typically, when a ewe has a newborn lamb she will remain around the area she gave birth until the lamb is capable of keeping up with her, which usually takes a few days or more. This ewe and lamb being in the same area indicated that the lamb was very young. However, as I approached the ewe, she remained bedded. This seemed quite unusual because often when a ewe has a very young lamb she will run off and leave her lamb "stashed," or hidden, in order to divert the attention of a predator. When the gap between us was a mere 150 meters, the ewe finally stood up and scampered up-slope a short distance followed immediately by, not one, but **two** lambs! While the ewe focused on me, the two lambs stood beneath their mother, then each of them nursed briefly.

It was incredible that we were able to record this incident since bighorn ewes rarely give birth to twins and even fewer cases are well documented. In the Institute's captive herd we have had two sets of twins born over the past 25 years. Bighorn ewes often "babysit" lambs other than their own, which can make it difficult to know if a ewe has actually given birth to twins. With the young age of these lambs, (only a day or two old), both of them suckling from the ewe, and no other bighorn sheep in the vicinity, there was no doubt that these two lambs were twins. Just when you think you know all about these amazing animals' behavior and abilities, they humble you with the marvel of twins. We look forward to keeping track of these special little ones as they continue to grow.

NEW MEXICO DEPARTMENT OF GAME AND FISH WEBSITE – FEEDBACK INVITED

Submitted by Elise Goldstein, New Mexico Department of Game and Fish (DBC member)

The New Mexico Dept. of Game and Fish has developed a large section of their website devoted to bighorn sheep management in New Mexico. There is information for the general public as well as wildlife managers about the history and current status of the bighorn sheep programs. Take a look at http://www.wildlife.state.nm.us/conservation/bighorn/index.htm, and let me know if there is additional information that would be useful to see there (Elise.Goldstein@state.nm.us).

UPDATES FROM THE NORTHERN WILD SHEEP AND GOAT COUNCIL

Past Proceedings of The Northern Wild Sheep and Goat Council are available, free of charge, at their website (www.nwsgc.org/proceedings.html). So between the DBC Transactions and the NWSGC Proceedings, both freely available, you have an amazing resource of information available at your fingertips! Also, check out the NWSGC website – it has recently been updated.

INFORMATION REQUEST

Submitted by Vern Bleich, California Department of Fish and Game (DBC member)

In the recent past, we have examined a number of mountain sheep carcasses ($\geq$6) and 1 steer that had mylar or rubber balloons in the rumens. Has anyone else observed similar situations? If so, how many times, where, and when? Please respond to me, Vern Bleich, at vbleich@ndsupernet.com. Thanks in advance for any help that is offered.

RECENT LITERATURE RELATED TO BIGHORN SHEEP

Coltman, D. W. 2008. Molecular ecological approaches to studying the evolutionary impact of selective harvesting in wildlife. Molecular Ecology 17:221-235.

Abstract: Harvesting of wildlife populations by humans is usually targeted by sex, age or phenotypic criteria, and is therefore selective. Selective harvesting has the potential to elicit a genetic response from the target populations in several ways. First, selective harvesting may affect population demographic structure (age structure, sex ratio), which in turn may have consequences for effective population size and hence genetic diversity. Second, wildlife-harvesting regimes that use selective criteria based on phenotypic characteristics (e.g. minimum body size, horn length or antler size) have the potential to impose artificial selection on harvested populations. If there is heritable genetic variation for the target characteristic and harvesting occurs before the age of maturity, then an evolutionary response over time may ensue. Molecular ecological techniques offer ways to predict and detect genetic change in harvested populations, and therefore have great utility for effective wildlife management. Molecular markers can be

used to assess the genetic structure of wildlife populations, and thereby assist in the prediction of genetic impacts by delineating evolutionarily meaningful management units. Genetic markers can be used for monitoring genetic diversity and changes in effective population size and breeding systems. Tracking evolutionary change at the phenotypic level in the wild through quantitative genetic analysis can be made possible by genetically determined pedigrees. Finally, advances in genome sequencing and bioinformatics offer the opportunity to study the molecular basis of phenotypic variation through trait mapping and candidate gene approaches. With this understanding, it could be possible to monitor the selective impacts of harvesting at a molecular level in the future. Effective wildlife management practice needs to consider more than the direct impact of harvesting on population dynamics. Programs that utilize molecular genetic tools will be better positioned to assess the long-term evolutionary impact of artificial selection on the evolutionary trajectory and viability of harvested populations.

Lawrence, P. K. and S. Srikumaran. 2007. CD11b of *Ovis canadensis* and *Ovis aries*: Molecular cloning and characterization. Veterinary Immunology and Immunopathology 119:287-298.

Abstract: Leukotoxin (Lkt) is the primary virulence factor secreted by *Mannheimia haemolytica* which causes pneumonia in ruminants. Previously, we have shown that CD18, the β subunit of β_2 integrins, mediates Lkt-induced cytolysis of ruminant leukocytes. CD18 associates with four distinct α subunits giving rise to four β_2 integrins, CD11a/CD18 (LFA-1), CD11b/CD18 (Mac-1), CD11c/ CD18 (CR4), and CD11d/CD18. It is not known whether all the β_2 integrins serve as a receptor for Lkt. Since PMNs are the leukocyte subset that is most susceptible to Lkt, and Mac-1 expression on PMNs exceeds that of other β_2 integrins, it is of interest to determine whether Mac-1 serves as a receptor for Lkt which necessitates the cloning of CD11b and CD18. In this study, we cloned and sequenced the cDNA encoding CD11b of *Ovis canadensis* (bighorn sheep) and *Ovis aries* (domestic sheep). CD11b cDNA is 3455 nucleotides long encoding a polypeptide of 1152 amino acids. CD11b polypeptides from these two species exhibit 99% identity with each other, and 92% with that of cattle, and 70-80% with that of the non-ruminants analyzed.

Keller, B. J. and L. C. Bender. 2007. Bighorn sheep response to road-related disturbances in Rocky Mountain National Park, Colorado. Journal of Wildlife Management 71:2329-2337.

Abstract: Bighorn sheep (*Ovis canadensis*) use of Sheep Lakes mineral site, Rocky Mountain National Park, Colorado, USA, has decreased since 1996. Officials were concerned that human disturbance may have been contributing to this decline in use. We evaluated effects of vehicular traffic and other road-related disturbance on bighorn use of Sheep Lakes in the summers of 2002 and 2003. We found that the time and number of attempts required by bighorn to reach Sheep Lakes was positively related to the number of vehicles and people present at Sheep Lakes. Further, the number of bighorn individuals and groups attempting to visit Sheep Lakes were negatively affected by disturbance associated with the site. The number of vehicles recorded the hour before bighorn tried to access Sheep Lakes best predicted an animal's failure to cross Fall River Road and reach Sheep Lakes. We conclude that human and road-related disturbance at Sheep Lakes negatively affected bighorn use of the mineral site. Because Sheep Lakes may be important for bighorn sheep, especially for lamb production and survival, the negative influence of disturbance may compromise health and productivity of the Mummy Range bighorn sheep.

Rominger, E. M., E. J. Goldstein, and M. A. Evans. 2008. Biological and statistical errors make inferences circumspect: response to Bender and Weisenberger. Journal of Wildlife Management 72:580-582.

Abstract: Bender and Weisenberger (2005) reported that desert bighorn sheep (*Ovis canadensis*) on San Andres National Wildlife Refuge (SANWR), New Mexico, USA, were primarily limited by rainfall. However, they failed to mention, or were unaware, that persistent long-term predator control was used to enhance population growth at SANWR. Additionally, lamb:female ratios were collected throughout the

year, rather than dates typically associated with assessing recruitment, and therefore influence of precipitation on lamb recruitment was unknown. Finally, model predictions forwarded by Bender and Weisenberger (2005), that carrying capacity of SANWR is zero when annual rainfall is <28.2 cm, were not supported by data, nor were their model results properly interpreted. The coefficient of determination value of 88.9% for the relationship between population size and current year's precipitation was primarily a function of serial correlation between successive years in population data, with current year's precipitation accounting for only 3.8% of this value. This suggests that precipitation was a weak predictor of population increase. These errors in concert make biological inferences reported in Bender and Weisenberger (2005) of limited value.

Rudolph, K. M., D. L. Hunter, R. B. Rimler, E. F. Cassirer, W. J. Foreyt, W. J. DeLong, G. C. Weiser, and A. C. S. Ward. 2007. Microorganisms associated with a pneumonic epizootic in Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*). Journal of Zoo and Wildlife Medicine 38:548-558.

Abstract: A comprehensive study of a pneumonic epizootic was initiated when the first signs of disease were noted in a metapopulation of bighorn sheep inhabiting Hells Canyon, bordering Idaho, Oregon, and Washington. A total of 92 bighorn sheep were tested for etiologic agents during the following 6-mo study period. The study population included bighorn sheep believed to be the subpopulation in which disease was first noted, and these sheep were translocated to a holding facility in an effort to contain the disease (group A_1, n = 72); bighorn sheep in other subpopulations (group A_2) with evidence of clinical disease were captured, sampled, given antibiotics, and released (n = 8) and those that were found dead were necropsied (n = 12). Samples, including oropharyngeal and nasal swabs, and lung, and liver tissue were collected from the bighorn sheep identified above. Tissue was collected at necropsy from 60 group A_1 bighorn sheep that died following translocation, and samples were cultured for bacteria and viruses. Blood samples were tested for antibodies against known respiratory viruses, and histopathology was conducted on tissue samples. The major cause of death in both group A_1 and group A_2 bighorn sheep was a rapidly developing fibrinous bronchopneumonia. Multiple biovariants of *Pasteurella* were isolated from oropharyngeal and nasal samples from both groups, and *Mycoplasma ovipneumonia* was isolated from five group A_1 oropharyngeal samples. Organisms isolated from lung tissue included *Pasteurella multocida multocida a* and *Pasteurella trehalosi*, both of which differentiated into multiple strains by restriction enzyme analysis, and parainfluenza-3 virus (PI-3). Paired serum samples revealed > fourfold increases in titers against PI-3 and bovine respiratory syncytial viruses. It was concluded that this epizootic resulted from a complex of factors including multiple potential respiratory pathogens, none of which were identified as a primary pathogen. and possible stress factors.

Whiting, J. C., R. T. Bowyer, and J. T. Flinders. 2008. Young bighorn (*Ovis canadensis*) males: can they successfully woo females? Ethology 114:32-41.

Abstract: Mating by young males or low male-to-female ratios can decrease pregnancy rates and postpone birthdates in ungulates, thereby hindering population growth. Young (2.5–3.5 yr old) male bighorn (*Ovis canadensis*) behave differently than older males, and age, horn size, mating behavior, and social rank help determine reproductive success. We estimated birthdates in two populations of bighorn sheep in Utah, USA, to determine if mating by young males or low male-to-female ratios resulted in fewer young born per female, a shift in mean timing of births, or asynchronous births. When reintroduced, the Rock Canyon population consisted of four males (two each of 2.5 yr old and 1.5 yr old) and a 1 to 7.5 ratio of males (>2 yr old) to adult females (≥3.5 yr old); the Mount Nebo population consisted of four males ≤1.5 yr old and a 0 to 12 ratio of males to adult females. For both populations, the number of young born per female did not differ between the first parturition period after reintroduction (where females were impregnated by males from their source populations) and the second period of parturition (where females were impregnated by young, reintroduced males). Mean birthdates and synchrony (SD) of births did not differ for Rock Canyon (May 12, 2001 ± 4.5 d, May 14, 2002 ± 3.2 d) or Mount Nebo (May 23,

2005 ± 8.1 d, May 22, 2006 ± 10.2 d) between the first and second years following reintroduction. Mating by young males or low male-to-female ratios had no demonstrable effect on the number of young born per female or timing and synchrony of births in these populations.