



# Bleats and Blats

Official Newsletter of the  
Desert Bighorn Council  
June 2013



## Inside:

- **Re-cap of the 2013 DBC meeting**
- **Note from the incoming Council Chair**
- **DBC Officers and Tech Staff members**
- **DBC Transactions update**
- **DBC Awards**
- **Hansen-Welles Scholarship**
- **Recent literature related to bighorn sheep**

---

*Hello DBC members and friends,*

*People are on the move in the DBC. Esther Rubin has passed the secretary's pen to me. For those I have not met, my name is Amber Munig and I am the Big Game Management Program Supervisor for the Arizona Game and Fish Department. I have been with Arizona for nearly 21 years with most of my career in game management. I have 2 wonderful (most of the time) teenage daughters. And, although I truly enjoy game management, I work to spend time 100' under exploring the California kelp beds and coral reefs. It's nice to have a job you love that feeds your hobby that you love even more.*

*Hopefully your summer is going well and you are able to stay cool; we are definitely not here in Arizona. Although I am a little slow in getting the newsletter out, it is finally here. Thank you to all who attended and supported the 2013 Desert Bighorn Council meeting. There were some great presentations and lively conversations.*

*The next newsletter is planned for mid October so if you have updates or announcements to share, please send them to me by September 15<sup>th</sup>. I hope to hear from you! For more information about the Desert Bighorn Council, or to download a membership form, please visit our website at [www.desertbighorncouncil.com](http://www.desertbighorncouncil.com) (NEW website address).*

*All the best to you,*

*Amber Munig (DBC Secretary)*

*Game Branch  
Arizona Game and Fish Department  
5000 W. Carefree Highway  
Phoenix, AZ 85086  
Office phone: 623-236-7355  
[amunig@azgfd.gov](mailto:amunig@azgfd.gov)*

---

---

## **Desert Bighorn Council Meeting – Las Cruces, NM**

**Submitted by Eric Rominger, 2013 Council Chair**

The 52<sup>nd</sup> meeting of the Desert Bighorn Council on April 17-20, 2013 was attended by 91 desert bighorn sheep biologists and aficionados from the United States and Mexico. Eric Rominger (New Mexico Department of Game and Fish) and Patrick Morrow (U.S. Army, White Sands Missile Range) co-chaired the meeting. The gift, provided by the New Mexico Chapter of the Wild Sheep Foundation, was an etched Buck Knife. The key focus of the meeting was predator management in desert bighorn sheep habitat. The meeting included a panel discussion on mountain lion predation and desert bighorn sheep, 19 technical papers, and status reports from 7 jurisdictions. This year the Council funded 2 projects for a total of \$8,060. A field trip to the White Sand Missile Range included a visit to the Trinity site and a great fajita lunch cooked by the White Sand Missile Range staff.

The next Council meeting will be held in April 2015 and will be hosted by the California Department of Fish and Wildlife tentatively planned to be held at the Anza Borrego State Park. The 2015 meeting Chairman will be Ben Gonzales ([BGonzale@dfg.ca.gov](mailto:BGonzale@dfg.ca.gov)) with Steve Torres as vice-chair.

---

### **A Note from the Incoming Council Chair**

Ben Gonzales

Looking forward from a very successful Desert Bighorn Council meeting in Las Cruces in 2013, vice-chair Steve Torres, local events coordinator Mark Jorgensen, and I are looking forward to hosting the 2015 meeting in California. Regina Abella, coordinator for the desert sheep program in California will be program co-chair with Steve Torres. Lora Konde, Environmental Scientist with California Department of Fish and Wildlife, has agreed to provide administrative support and to help keep tasks on track. Stay tuned for details as we make progress on developing an informative and fun meeting in the beautiful California desert.

---

### **DBC Officers and Technical Staff Members**

The Council officers and Technical Staff members are as follows:

Council Chair:	Ben Gonzales
Vice-chair:	Steve Torres
Secretary:	Amber Munig
Treasurer:	Kathy Longshore
Transactions Editor:	Brian Wakeling
Tech Staff Chair:	Clay Brewer
Tech Staff:	Ray Lee, Elise Goldstein, Mark Jorgensen, Mara Weisenberger, Brian Wakeling, and Patrick Cummings (newly appointed)

---

## 2013 DBC Transactions

We invite and encourage you to publish your work in the DBC Transactions. Submissions for the 2013 Transactions will be accepted through September 1, 2013. If you would like to submit a paper or if you are working on a 2013 state report, this is the time to get materials prepared and sent to Brian Wakeling, DBC Editor. So far, Brian has only received 2 state reports (Texas and New Mexico) so we hope the rest of the states complete their reports soon! The 2013 DBC Transactions will be printed, distributed to members, and posted on the Council's website prior to the 2015 meeting.

Please remember that any manuscript addressing the ecology, biology, management, and conservation of desert bighorn sheep, even if not presented at a Desert Bighorn Council meeting, may be submitted for publication in the Transactions. For more information, please email Brian Wakeling at [BWakeling@azgfd.gov](mailto:BWakeling@azgfd.gov).

---

## Desert Bighorn Council Awards

Submitted by Dick Weaver, Awards Committee Chair

Recipients of the Ram Award were:

- Dr. Eric Rominger for his long term involvement as New Mexico Department of Game and Fish contract and full-time bighorn biologist, including preparation and implementation of recovery and delisting plans for endangered desert bighorns in New Mexico, and gathering support from many stakeholders for pre-emptive mountain lion control on seven mountain ranges, and desert bighorn population reintroduction and enhancement efforts, resulted in the delisting of desert bighorns in 2011.
- Elise J. Goldstein for her long-term involvement as New Mexico Department of Game and Fish desert bighorn program coordinator and biologist, particularly including the preparation and implementation of recovery and delisting plans for endangered desert bighorns in New Mexico, and soliciting essential public support from a wide variety of stakeholders for pre-emptive mountain lion control and desert bighorn population reintroduction efforts, which resulted in the delisting of desert bighorns in 2011.

Recipients of the Honor Plaque were:

- The New Mexico Game and Fish Commission for its strong support of an aggressive restoration and management program for endangered desert bighorns in New Mexico, resulting in the delisting of this iconic species.
- Mara Weisenberger for her long term sustained efforts to re-establish a viable bighorn population in the San Andres National Wildlife Refuge through control of mountain lions, controlled burning, hunting of exotic oryx, and interagency cooperation.
- Bill Montoya for his long involvement with desert bighorns: working with the Mexican government to obtain bighorns for the Red Rock Facility, establishing them on Tiburon Island, and his role as biologist and director of the New Mexico Department of Game and Fish and his service on the New Mexico Game and Fish Commission.
- The New Mexico Department of Game and Fish for its long term successful efforts to

significantly increase desert bighorn populations statewide, resulting in their delisting from endangered to threatened to harvestable.

---

## Hansen-Welles Scholarships

Two Hansen-Welles Scholarships were awarded to:

- Ms. Rebekah Karsch at New Mexico State University for a study entitled “Survival and cause-specific mortality of neonatal desert bighorn sheep in the Peloncillo Mountains, New Mexico” was awarded \$4,200.
  - Mr. Kyle Garrison at New Mexico State University for a study entitled “Influence of livestock grazing on forage biomass, activity budgets and foraging efficiency of desert bighorn sheep in southern New Mexico” was awarded \$3,860.
- 

## Recent Literature Related To Bighorn Sheep

**Besser, T. E., E. F. Cassirer, M. A. Highland, P. Wolff, A. Justice-Allen, K. Mansfield, M.A. Davis, and W. W. J. Foreyt. 2013. Bighorn sheep pneumonia: sorting out the cause of polymicrobial disease. Preventive Veterinary Medicine 108(2-3):85-93.**

Abstract: Pneumonia of bighorn sheep (*Ovis canadensis*) is a dramatic disease of high morbidity and mortality first described more than 80 years ago. The etiology of the disease has been debated since its initial discovery, and at various times lungworms, *Mannheimia haemolytica* and other Pasteurellaceae, and *Mycoplasma ovipneumoniae* have been proposed as primary causal agents. A multi-factorial "respiratory disease complex" has also been proposed as confirmation of causation has eluded investigators. In this paper we review the evidence for each of the candidate primary agents with regard to causal criteria including strength of association, temporality, plausibility, experimental evidence, and analogy. While we find some degree of biological plausibility for all agents and strong experimental evidence for *M. haemolytica*, we demonstrate that of the alternatives considered, *M. ovipneumoniae* is the best supported by all criteria and is therefore the most parsimonious explanation for the disease. The strong but somewhat controversial experimental evidence implicating disease transmission from domestic sheep is consistent with this finding. Based on epidemiologic and microbiologic data, we propose that healthy bighorn sheep populations are naive to *M. ovipneumoniae*, and that its introduction to susceptible bighorn sheep populations results in epizootic polymicrobial bacterial pneumonia often followed by chronic infection in recovered adults. If this hypothesized model is correct, efforts to control this disease by development or application of vectored vaccines to Pasteurellaceae are unlikely to provide significant benefits, whereas efforts to ensure segregation of healthy bighorn sheep populations from *M. ovipneumoniae*-infected reservoir hosts are crucial to prevention of new disease epizootics. It may also be possible to develop *M. ovipneumoniae* vaccines or other management strategies that could reduce the impact of this devastating disease in bighorn sheep. (c) 2012 Elsevier B.V. All rights reserved.

**Cassirer, E. F., R. K. Plowright, K. R. Manlove, P. C. Cross, A. P. Dobson, K. A. Potter, and P. J. Hudson. 2013. Spatio-temporal dynamics of pneumonia in bighorn sheep. *Journal of Animal Ecology* 82(3): 518-528.**

Abstract: Bighorn sheep mortality related to pneumonia is a primary factor limiting population recovery across western North America, but management has been constrained by an incomplete understanding of the disease. We analyzed patterns of pneumonia-caused mortality over 14 years in 16 interconnected bighorn sheep populations to gain insights into underlying disease processes. We observed four age-structured classes of annual pneumonia mortality patterns: all-age, lamb-only, secondary all-age and adult-only. Although there was considerable variability within classes, overall they differed in persistence within and impact on populations. Years with pneumonia-induced mortality occurring simultaneously across age classes (i.e. all-age) appeared to be a consequence of pathogen invasion into a naive population and resulted in immediate population declines. Subsequently, low recruitment due to frequent high mortality outbreaks in lambs, probably due to association with chronically infected ewes, posed a significant obstacle to population recovery. Secondary all-age events occurred in previously exposed populations when outbreaks in lambs were followed by lower rates of pneumonia-induced mortality in adults. Infrequent pneumonia events restricted to adults were usually of short duration with low mortality. Acute pneumonia-induced mortality in adults was concentrated in fall and early winter around the breeding season when rams are more mobile and the sexes commingle. In contrast, mortality restricted to lambs peaked in summer when ewes and lambs were concentrated in nursery groups. We detected weak synchrony in adult pneumonia between adjacent populations, but found no evidence for landscape-scale extrinsic variables as drivers of disease. We demonstrate that there was a >60% probability of a disease event each year following pneumonia invasion into bighorn sheep populations. Healthy years also occurred periodically, and understanding the factors driving these apparent fade-out events may be the key to managing this disease. Our data and modeling indicate that pneumonia can have greater impacts on bighorn sheep populations than previously reported, and we present hypotheses about processes involved for testing in future investigations and management.

**Plowright, R. K., K. Manlove, E. F. Cassirer, P. C. Cross, T. E. Besser, and P. J. Hudson. 2013. Use of exposure history to identify patterns of immunity to pneumonia in bighorn sheep (*Ovis canadensis*). *PLoS One* 8(4): Article No. e61919.**

Abstract: Individual host immune responses to infectious agents drive epidemic behavior and are therefore central to understanding and controlling infectious diseases. However, important features of individual immune responses, such as the strength and longevity of immunity, can be challenging to characterize, particularly if they cannot be replicated or controlled in captive environments. Our research on bighorn sheep pneumonia elucidates how individual bighorn sheep respond to infection with pneumonia pathogens by examining the relationship between exposure history and survival in situ. Pneumonia is a poorly understood disease that has impeded the recovery of bighorn sheep (*Ovis canadensis*) following their widespread extirpation in the 1900s. We analyzed the effects of pneumonia-exposure history on survival of 388 radio-collared adults and 753 ewe-lamb pairs. Results from Cox proportional hazards models suggested that surviving ewes develop protective immunity after exposure, but previous exposure in ewes does not protect their lambs during pneumonia outbreaks. Paradoxically, multiple exposures of ewes to pneumonia were associated with diminished survival of their offspring during pneumonia outbreaks. Although there was support for waning and boosting immunity in ewes, models with consistent immunizing exposure were similarly supported.

Translocated animals that had not previously been exposed were more likely to die of pneumonia than residents. These results suggest that pneumonia in bighorn sheep can lead to aging populations of immune adults with limited recruitment. Recovery is unlikely to be enhanced by translocating naive healthy animals into or near populations infected with pneumonia pathogens.

**Poissant, J., D. Reale, J. G. A. Martin, M. Festa-Bianchet, and D. W. Coltman. 2013. A quantitative trait locus analysis of personality in wild bighorn sheep. *Ecology and Evolution* 3(3): 474-481.**

Abstract: Personality, the presence of persistent behavioral differences among individuals over time or contexts, potentially has important ecological and evolutionary consequences. However, a lack of knowledge about its genetic architecture limits our ability to understand its origin, evolution, and maintenance. Here, we report on a genome-wide quantitative trait locus (QTL) analysis for two personality traits, docility and boldness, in free-living female bighorn sheep from Ram Mountain, Alberta, Canada. Our variance component linkage analysis based on 238 microsatellite loci genotyped in 310 pedigreed individuals identified suggestive docility and boldness QTL on sheep chromosome 2 and 6, respectively. A lack of QTL overlap indicated that genetic covariance between traits was not modulated by pleiotropic effects at a major locus and may instead result from linkage disequilibrium or pleiotropic effects at QTL of small effects. To our knowledge, this study represents the first attempt to dissect the genetic architecture of personality in a free-living wildlife population, an important step toward understanding the link between molecular genetic variation in personality and fitness and the evolutionary processes maintaining this variation.

**Elbroch, L. M. and H. U. Wittmer. 2013. The effects of puma prey selection and specialization on less abundant prey in Patagonia. *Journal of Mammalogy* 94(2):259-268.**

Abstract: Populations of generalist foragers may in fact be composed of individuals that select different prey. We monitored 9 pumas (*Puma concolor*) in Chilean Patagonia using Argos–global positioning system (Argos-GPS) technology for a mean of 9.33 months  $\pm$  5.66 SD. We investigated 694 areas where puma location data were spatially aggregated, called GPS clusters, at which we identified 433 kill sites and 6 acts of scavenging. Pumas as a population specialized upon guanacos (*Lama guanicoe*), whereas only 7 of 9 individual pumas specialized upon guanacos. One puma specialized upon domestic sheep (*Ovis aries*) and 1 upon European hares (*Lepus europaeus*) in terms of numbers of prey killed. Male and female pumas selected different distributions of prey and pumas exhibited prey selection at both the individual and population level. Three of 9 pumas exhibited selection when we compared individual prey use to prey availability within individual pumas' home ranges. One puma selected endangered huemul (*Hippocamelus bisulcus*) and 2 selected sheep. When we compared individual prey use to prey use at the population level, 5 of 9 pumas differed from the population norm. Whereas pumas did not select huemul at the population level, 2 individuals did select huemul. Two individuals also selected domestic sheep, and the influence of these 2 pumas was substantial enough to result in a population-level effect. Our research highlights the need to determine whether pumas exhibit individual foraging variation throughout their range, the extrinsic factors associated with (and possibly influencing) such variation, and how pumas that select rare and less abundant species in multiprey systems impact recovering prey populations.





Interested in the Desert Bighorn Council?  
Questions about our organization or any of our projects?  
Please contact us – we'll be happy to answer your questions.

Desert Bighorn Council  
28 County Road 458  
Rochelle, TX 76872

Phone: 325-463-5001  
Fax: 575-382-5454  
E-mail: [clay.brewer@tpwd.state.tx.us](mailto:clay.brewer@tpwd.state.tx.us)