



Bleats and Blats

Official Newsletter of the
Desert Bighorn Council

NOVEMBER 2006



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Hello DBC members and friends!

Check out this newsletter for important information on the 2007 DBC meeting. April 2007 may seem a long way away, but before you know it, it'll be here! So make your plans now to attend our next meeting, and possibly to present some of your work in a talk or poster. This will be the 50th anniversary of the DBC, and Ross Haley and others have already been hard at work to make it a fantastic meeting, so we hope to see you all there! Information on the meeting will also be posted on the Desert Bighorn Council website: <http://www.desertbighornCouncil.org>

Please note also that I have moved. The email address below will remain the same, but my office phone number is now 760-767-3576, and the new mailing address for any DBC correspondence is: P.O. Box 369, Borrego Springs, CA 92004.

I hope you're all doing well, and that your desert bighorn sheep research and management activities are all going well!

*Esther Rubin
DBC Secretary (esrubin@consbio.org)*

2007 DESERT BIGHORN COUNCIL MEETING INFORMATION
AND FIRST CALL FOR PAPERS

Submitted by Ross Haley, Program Chair

The 50th anniversary meeting of the Desert Bighorn Council will be held in Las Vegas where it all began! This is not a coincidence. Those of you that attended the meeting in St. George may recall that the decision was made to adjust the regular rotation of meeting locations so that the 50th would be in Nevada, and more specifically, in Las Vegas. However, a lot has changed since 1957 (or even 1985 when the Council last met here). Las Vegas has consistently been the fastest growing city in the U.S. with a growth rate of 5-6 thousand new residents a month for at least the last 15 years. Concurrent with this rapid growth, Las Vegas' stature as a destination resort and convention venue has grown. Consequently, although there are plenty of facilities, none of them are inexpensive. Las Vegas simply isn't the cheap place to meet that it once was.

With that rather grim introduction, I'm pleased to announce that we have locked in a meeting place right on the Las Vegas Strip at a very reasonable rate. The meeting will be held April 3-6 at the Tropicana Hotel. April third is essentially a travel day, with a welcoming reception to be held at the hotel that evening. Friday, April 6, will be a field trip day with no special deals for rooms at the hotel as I would expect most people would be checking out, and all weekend prices exceed government approved per diem rates. There is a block of 50 rooms reserved for Tuesday through Thursday (April 3-5) for \$75.00, well below the government rate of \$99.00.

As mentioned above, the Tropicana Hotel is located right on the Las Vegas Strip, but what I didn't say is that it is at one of the prime locations on the strip. The Tropicana itself is a Las Vegas icon built during the construction boom of the 1950's that also produced the Sands, the Desert Inn, the Riviera, and the Stardust. It has been remodeled several times and has a particularly nice pool area in the central courtyard, but it still retains a bit of its early 50's funkiness which resulted in us being able to afford it.

The Tropicana sits on the corner of Tropicana Avenue and Las Vegas Boulevard (the Strip) about a mile from the Airport and shares the corner with the MGM Grand, the New York/New York, and the Excaliber Casino. Next door to the Excaliber is the Luxor, and next to that, the Mandalay Bay. Any of these hotel casinos would be within easy walking distance of the meeting should you wish to stay elsewhere. In the other direction, (i.e. next door to the Tropicana on Tropicana Ave.) is the new Hooters Hotel and Casino which would also be within easy walking distance for those so inclined. A monorail station is located just across the strip in the Luxor so it isn't even necessary to limit your choices to those listed above even if you don't have a car.

Although we negotiated a good room rate, many of the amenities for putting on a meeting are quite pricey so we are still working out the details for the banquet, reception, coffee breaks, etc., which will influence the necessary registration fee. We are trying to hold the cost down and are seeking donations and sponsorships for breaks, etc., to help us do that. Consequently, it is too soon to advertise a registration fee, but not too soon to solicit donations or ideas of organizations that might

like to help support the cause. If you have any questions, suggestions, or ideas please feel free to contact Ross Haley at Ross.Haley@nps.gov (702-293-8950), Pat Cummings at pcummings@ndow.org (702-486-5127 ext. 3212), or Kathy Longshore at longshore@usgs.gov (702-564-4505).

See you in Las Vegas!

First Call For Papers

If you would like to present a paper or poster at the upcoming meeting, please send an abstract and contact information (electronic version - MS Word format preferred) to Darren Divine darren_divine@ccsn.edu or to the address listed below. A submission deadline (late February or early March) will be established and sent out in a future notice.

Status reports are also requested for all states and from Mexico, and those individuals presenting status reports should also notify Darren for their inclusion into the program. Please forward this call for papers to others who may be interested in presenting or attending the workshop. If you have any further questions, please call Darren at (702) 651-7515.

Call For Special Sessions

If you would like to suggest a Special Session (Special Session set aside for papers on a specific topic, Round-Table Discussions, or any other Special Session) please send a brief proposal (electronic version – MS Word format preferred) to Darren Divine at darren_divine@ccsn.edu or to the address listed below.

Dr. Darren Divine, Chair
CCSN Department of Biological Sciences
6375 West Charleston Blvd, Sort Code W3E
Las Vegas NV, 89146-1164.

SEEKING DBC AWARDS NOMINATIONS

Submitted by Rick Brigham, Technical Staff Member

Awards Chair Dick Weaver is seeking nominations for awards for the upcoming (50th anniversary!!) meeting at Las Vegas. PLEASE! Think about individuals who have contributed significantly to the betterment of desert bighorn sheep and who might be awarded the Ram Award, a plaque, or a certificate of appreciation. It would be great to make several awards at the Las Vegas meeting. Contact Dick at 505-539-2378, or regular mail at P.O. Box 100, Glenwood NM 88039. Do it soon! Thanks! Or, if you function best via email, contact Rick Brigham at rick-ceil@syringa.net with your nomination.

AWARDS AND PROMOTIONS

DBC member, Vernon C. Bleich, was recently recognized by the Foundation for North American Wild Sheep for his long-term contributions to the management of bighorn sheep. In presenting the Foundation's "State Statesman" award, Foundation President Ray Lee said, "The Foundation recognizes your outstanding contribution to the wild sheep of California. We applaud your career-long commitment to the conservation and study of wild sheep."

Congratulations, Vern!!

RECENT LITERATURE RELATED TO DESERT BIGHORN SHEEP

Epps, C. W., J. D. Wehausen, P. J. Palsboll, and D. R. McCullough. 2005. Using genetic analyses to describe and infer recent colonizations by desert bighorn sheep. Page 51-62 in J. Goerrissen and J. M. Andre, eds. Sweeney Granite Mountains Desert Research Center 1978-2003: A Quarter Century of Research and Teaching. University of California Natural Reserve Program, Riverside.

Abstract: Species occurring in small fragmented populations are often dependent on colonization or recolonization of empty habitat patches to persist, especially if local extinction is common. However, detecting natural colonizations is often difficult. Here we use genetic data, obtained primarily from fecal samples, to characterize recent colonizations of desert bighorn sheep (*Ovis canadensis nelsoni*) in southeastern California. We use inferences gained from known colonizations to determine the probable source population for another recent colonization. In another population we diagnose a probable cryptic extinction event, followed by recolonization from at least two source populations. We base these inferences on analyses of 14 microsatellite loci and 515 base-pairs of mitochondrial DNA control-region sequences, as well as the sex-identifying molecular marker SE47/SE48, obtained from 397 desert bighorn in 27 populations. We analyze colonization from the microsatellite data using conventional F-statistics, Bayesian population-level assignment tests, and individual-level assignment tests. We also map the distribution of mitochondrial DNA haplotypes to make inferences about the direction of gene flow between populations and to infer the movement of ewes between populations. All these types of data contained information that helped identify recent colonizations and source populations, particularly when used in combination. These genetic techniques provide powerful tools for monitoring systems of small, fragmented populations where direct census techniques are difficult or expensive to apply. We also present data describing the current genetic structure of desert bighorn sheep in southeastern California, to establish a base-line for future studies of population turnover.

Espinoza-T., A., A. V. Sandoval, A. J. Contreras-B. 2006. Historical distribution of desert bighorn sheep (*Ovis canadensis mexicana*) in Coahuila, Mexico. Southwestern Naturalist 51:282-288.

Abstract: Historically, desert bighorn sheep occurred throughout Coahuila, Mexico, as far south as latitude 25° 43' 02"N. The subspecies *Ovis canadensis mexicana* probably was extirpated in Coahuila by 1970. We determined the historical range of desert bighorn sheep through a review of the available literature, interviews with long-term local residents, and a subjective habitat assessment. We found historical documentation of bighorn sheep in 14 mountain ranges (Sierra Alamos, Sierra Maderas del Carmen, Sierra la Encantada, Sierra Hechiceros, Sierra del Pino, Sierra Mojada, Sierra el Rey, Sierra San Marcos y del Pino, Sierra Gavia, and Sierra la Paila), including 4 previously not recorded (Sierra el Fuste, Sierra el Almagre, Sierra de la Madera, and Sierra la Fragua). In addition, one archaeological site with remains of bighorn sheep was identified (La Candelaria Cave). The introduction of domestic livestock, particularly sheep and goats, and unregulated hunting probably were the major factors contributing to the extirpation of the subspecies in Coahuila. These factors persist in 7 areas, and we learned of the presence of aoudad (*Ammotragus lervia*) in 3 mountain ranges (Sierra Mojada, Sierra Hechiceros, and Sierra la Fragua).

Festa-Bianchet, M., T. Coulson, J. Gaillard, J. T. Hogg, and F. Pelletier. 2006. Stochastic predation events and population persistence in bighorn sheep. *Proceedings of the Royal Society Biological Sciences Series B*, 273:1537-1543.

Abstract: Many studies have reported temporal changes in the relative importance of density-dependence and environmental stochasticity in affecting population growth rates, but they typically assume that the predominant factor limiting growth remains constant over long periods of time. Stochastic switches in limiting factors that persist for multiple time-steps have received little attention, but most wild populations may periodically experience such switches. Here, we consider the dynamics of three populations of individually marked bighorn sheep (*Ovis canadensis*) monitored for 24-28 years. Each population experienced one or two distinct cougar (*Puma concolor*) predation events leading to population declines. The onset and duration of predation events were stochastic and consistent with predation by specialist individuals. A realistic Markov chain model confirms that predation by specialist cougars can cause extinction of isolated populations. We suggest that such processes may be common. In such cases, predator-prey equilibria may only occur at large geographical and temporal scales, and are unlikely with increasing habitat fragmentation.

Forsyth, D. M., and P. Caley. 2006. Testing the irruptive paradigm of large-herbivore dynamics. *Ecology* 87:297-303.

Abstract: A dominant paradigm in understanding and managing large herbivores is that, after introduction to new range or release from harvesting, the herbivore population increases to peak abundance, crashes to a lower abundance, and then increases to a carrying capacity lower than peak abundance. However, support for the paradigm has been largely anecdotal. We first developed two mathematical models to better describe irruptive dynamics. The models differed in the form of the postcrash growth toward carrying capacity: the "Caughley model" included a time lag that generated dampening oscillations, and the "Leopold model" did not. We then evaluated which of four models (theta-logistic, delayed-logistic, Leopold, and Caughley) best described the dynamics of seven ungulate populations either introduced to new range (n = 5 populations) or released from harvesting (n = 2). The dynamics of six of the populations were best described by irruptive models (two by the Leopold, one by the Caughley, and three by the delayed-logistic), and one of the populations did not display irruptive dynamics (theta-logistic model). The limited data thus support the widespread existence of irruptive dynamics, and we encourage the consideration of irruptive models in studies of large-herbivore dynamics.

Hogg, J. T., S. H. Forbes, B. M. Steele, and G. Luikart. 2006. Genetic rescue of an insular population of large mammals. *Proceedings of the Royal Society Biological Sciences Series B*, 273:1491-1499.

Abstract: Natural populations worldwide are increasingly fragmented by habitat loss. Isolation at small population size is thought to reduce individual and population fitness via inbreeding depression. However, little is known about the time-scale over which adverse genetic effects may develop in natural populations or the number and types of traits likely to be affected. The benefits of restoring gene flow to isolates are therefore also largely unknown. In contrast, the potential costs of migration (e.g. disease spread) are readily apparent. Management for ecological connectivity has therefore been controversial and sometimes avoided. Using pedigree and life-history data collected during 25 years of study, we evaluated genetic decline and rescue in a population of bighorn sheep founded by 12 individuals in 1922 and isolated at an average size of 42 animals for 10-12 generations. Immigration was restored experimentally, beginning in 1985. We detected marked improvements in reproduction, survival and five fitness-related traits among descendants of the 15 recent migrants. Trait values were increased by 23-257% in maximally outbred individuals. This is the first demonstration, to our knowledge, of increased male and female fitness attributable to outbreeding realized in a fully competitive natural setting. Our findings suggest that genetic principles deserve broader recognition as practical management tools with near-term consequences for large-mammal conservation.

McKinney, T., T. W. Smith, and J. C. deVos. 2006. Evaluation of factors potentially influencing a desert bighorn sheep population. *Wildlife Monographs* 164: 1–36

Abstract: We studied a desert bighorn sheep (*Ovis canadensis*) population in the Mazatzal Mountains (primary study area) in central Arizona and population indices on reference areas between 1989 and 2003. We evaluated disease exposure and nutritional status of desert bighorn sheep, vegetation parameters, predator diets, and mountain lion (*Puma concolor*) harvest and abundance (1999–2003) and mountain lion predation (1995–2003) as factors potentially affecting desert bighorn sheep and population parameters. We measured rainfall monthly, monitored demography and relative abundance of desert bighorn sheep using aerial surveys, captured and placed radio collars on desert bighorn sheep, and collected samples of blood, parasites, and other pathogenic agents from captured animals. We measured mineral content, relative use, and structural composition of vegetation and determined diets of desert bighorn sheep adults and lambs, dietary intakes of nitrogen (FN), 2,6-diaminopimelic acid (FDAPA), neutral detergent fiber, and minerals using fecal analyses. We incorporated mountain lion reductions as an experimental element, monitored harvest, and used track surveys as an index of relative abundance of the predator and monitored radiocollared desert bighorn sheep to determine mortalities and causes of death. We determined diets of bobcats (*Lynx rufus*), coyotes (*Canis latrans*), and mountain lions using fecal analyses. Drought conditions occurred during summer (July–September) and winter (November–April) during 4 and 3 years, respectively, between 1999 and 2003. Annual surveys indicated that the Mazatzal Mountains population declined during drought between 1994 and 1997, experienced low growth and lamb production coincident with above-normal rainfall in 1998 and drought in 1999, and exhibited higher growth, production, and productivity during 2000–2003 despite persistent drought conditions during this period. We observed no clinical symptoms of disease in radio-collared desert bighorn sheep, and hematological and other evidence of exposure to disease agents was unremarkable. Population indices on the primary study and reference areas were positively correlated with winter (November–April) rainfall. We found no evidence of forage overutilization on the primary study area. Rainfall on Mazatzal Mountains was associated with differences in primary production, particularly of forbs, forage mineral concentrations, and diets, nutritional status, and demographic attributes of desert bighorn sheep between 1999 and 2003. Higher winter rainfall was associated with higher forb growth, and

higher rainfall was associated with higher concentrations of P and Se but lower levels of Fe in browse; higher concentrations of Ca, P, and Zn in forbs; and higher levels of P, Se, and Zn in grasses. Narrower mean Ca:P ratios of browse and forbs were associated with higher rainfall. Diets of desert bighorn sheep adults and lambs generally were similar, particularly near summer, and forbs tended to predominate in diets during wetter and drier years. Higher winter rainfall was associated in adult feces with more prolonged winter-to-spring increases in FN and FDAPA concentrations, higher fecal phosphorus, lower fecal Ca levels, and narrower fecal Ca:P and Na:K ratios, but levels of fecal Na increased during the driest year. Higher winter rainfall corresponded in lamb feces with higher levels of FN, FDAPA, and fecal P; lower concentrations of fecal Ca; and narrower fecal Ca:P ratios. Thus, we hypothesized that diets and nutritional status of desert bighorn sheep adults and lambs tended to correspond with rainfall patterns and associated differences in relative abundance and mineral content of forages. We found no evidence that bobcats or coyotes preyed on or scavenged desert bighorn sheep. Decline of desert bighorn sheep abundance during 1994–1997 was greater than declines on reference areas lacking mountain lions despite continually higher, and a lesser decline in, winter rainfall on the primary study area. In comparison, population indices on a reference area and on Mazatzal Mountains increased between 1999 and 2003 in association with predator reductions and lower abundance of mountain lions and predation of radio-collared animals despite continued occurrences of drought during this period. We thus identified 2 proximate factors that likely acted to influence demographic trends of the Mazatzal Mountains desert bighorn sheep population: nutritional status (higher rainfall [ultimate factor] was associated with higher availability and differences in mineral content of forages and improved indices of desert bighorn sheep nutritional status) and predation by mountain lions. We hypothesize that nutritional status and mountain lion predation during a period of drought influenced desert bighorn sheep population parameters in Mazatzal Mountains and that short-term removal of mountain lions by lethal harvest contributed to higher growth and productivity of the small, isolated population, even during periods of drought.

Mooring, M. S., B. L. Hart, T. A. Fitzpatrick, D. D. Reisig, T. T. Nishihira, I. C. Fraser, and J. E. Benjamin. 2006. Grooming in desert bighorn sheep (*Ovis canadensis mexicana*) and the ghost of parasites past. *Behavioral Ecology* 17:364-371.

Abstract: Ectoparasites such as ticks have a negative effect on host fitness, whereas parasite-defense grooming is effective in removing ticks. The central control (programmed grooming) model proposes that animals engage in preventive tick-defense grooming in response to an internal timing mechanism, even in the absence of peripheral stimulation from parasites. This model predicts that smaller animals will groom more frequently than larger ones because of the higher cost of parasitism for a small animal (body size principle). The peripheral stimulation (stimulus driven) model predicts no size-related differences in grooming rate in the absence of tick bite irritation. We observed grooming behavior in a Chihuahuan desert population of bighorn sheep (*Ovis canadensis mexicana*), where ticks have been absent for perhaps thousands of years. Although not exposed to ticks, bighorns self groomed by means of oral and scratch grooming, albeit at very low rates compared to size-matched ungulates in both tick-infested and tick-free environments. Logistic regression and general linear models revealed both the probability that grooming was performed during a 10-min focal sample and the rate of grooming when it occurred was greater for younger, smaller age/sex categories of less body mass. Oral and scratch grooming were negatively associated with body mass during both years, with juveniles (X = 15 kg) grooming the most frequently and the oldest males (X = 70-85 kg) grooming the least. Assuming that programmed grooming evolved in a tick-infested environment, the current grooming behavior of this population is a relict of their ancestral environment, an adaptation to the "ghost of parasites past."

Richomme, C., D. Gauthier, and E. Fromont. 2006. Contact rates and exposure to inter-species disease transmission in mountain ungulates. *Epidemiology and Infection* 134:21-30.

Abstract: The risk for a pathogen to cross the species barrier depends on the rate of efficient contacts between the species. However, contact rates between species have rarely been estimated from observations. Here we estimate contact rates and exposure of chamois *Rupicapra rupicapra* and Alpine ibex *Capra ibex* exposed to domestic pasteurellosis and brucellosis carried by sheep or cattle herds summering in mountain pastures. We use field observation data on animal positions treated in a geographic information system (GIS). Comparing 10 pastures, we show that the management of domestic herds influences the risk of inter-species transmission. Exposure to direct transmission of pasteurellosis is high when herds are not guarded nor enclosed, whereas exposure to indirect transmission of brucellosis is increased on epidemiological dangerous points such as salt deposits. Our preliminary results need further investigation, but they underline the importance of both herd management and pathogen transmission mode when the aim is to reduce the risk of contamination of wild populations by a pathogen associated with domestic pathogens.

Sacco, R. E., W. R. Waters, K. M. Rudolph, and M. L. Drew. 2006. Comparative nitric oxide production by LPS-stimulated monocyte-derived macrophages from *Ovis canadensis* and *Ovis aries*. *Comparative Immunology Microbiology and Infectious Diseases* 29:1-11.

Abstract: Bighorn sheep are more susceptible to respiratory infection by *Mannheimia haemolytica* than are domestic sheep. In response to bacterial challenge, macrophages produce a number of molecules that play key roles in the inflammatory response, including highly reactive nitrogen intermediates such as nitric oxide (NO). Supernatants from monocyte-derived macrophages cultured with *M. haemolytica* LPS were assayed for nitric oxide activity via measurement of the NO metabolite, nitrite. In response to LPS stimulation, bighorn sheep macrophages secreted significantly higher levels of NO compared to levels for non-stimulated macrophages. In contrast, levels of NO produced by domestic sheep macrophages in response to *M. haemolytica* LPS did not differ from levels detected in non-stimulated cell cultures. Nitrite levels detected in supernatants of LPS-stimulated bighorn macrophage cultures treated with an inducible nitric oxide synthase (iNOS) inhibitor, N-G-monomethyl-L-arginine, were similar to that observed in non-stimulated cultures indicating a role for the iNOS pathway.

Wehausen, J. D. 2005. Nutrient predictability, birthing seasons, and lamb recruitment for desert bighorn sheep. Pages 37-50 in J. Goerrissen and J. M. Andre, eds. *Sweeney Granite Mountains Desert Research Center 1978-2003: A Quarter Century of Research and Teaching*. Univ. of Calif. Natural Reserve Program, Riverside, CA.

Abstract: (none available)

DBC LOSES A LONG-TIME FRIEND

Many DBC members will miss Marion "Clair" Aldous, who passed away on August 28. DBC member, Warren Kelly, shares his memories below, and Clair's obituary follows:

“Clair Aldous and I were stationed in the Las Vegas area in late 1955. Clair worked for the U S Fish and Wildlife Service and I worked for the Nevada Fish and Game Commission (as it was known at that time). Clair was a Wildlife Biologist. We made many field trips together on the Desert Game Range and other bighorn habitats in southern Nevada. In the spring of 1957, a group of Federal and State people met at the Las Vegas office of the Nevada Fish and Game Commission. There were two people from the National Park Service, one from Lake Mead, and the other from the Washington office. The others were from the Desert Game Range and the Nevada Fish and Game Commission. The discussions centered around what we knew about the Desert Bighorn. At that time a study by Fred Jones from the California Fish and Game, and a study by John Russo of the Arizona Game and Fish, were the only publications on record. Some time during the meeting Gordon Fredine commented that a lot of the information on the bighorn sheep was the incidental sightings of the people present and other field personal in other states and Mexico. He suggested a meeting of field biologists from those State and Federal Agencies and Mexico to interchange what little information we had and get it into a publication that could be available to all. Everyone thought that was a great idea. I believe that Clair went away from the meeting with a will to do just that. In September of 1957 about twenty-five, mainly field, biologists met in Las Vegas to determine if we had enough information to continue having meetings. I remember Clair as a dedicated field biologist, a recipient of the DBC Ram award, a fellow graduate of the US Marine Corps, and a great story teller. He never hesitated to voice his opinion if he thought he was right. After his retirement he moved to Sequim, Washington. In later years we visited him in Sequim and he visited here in Florence. Clair spent the last several years in a nursing home. He passed away August 28.”

Obituary

A memorial Service for Sequim resident Marion "Clair" Aldous will be held from 2-4 p.m., Sept. 7, at 243 Brazil Road, Sequim. Mr. Aldous died Aug. 28, 2006 at the age of 86. He was born April 26, 1920, in Salt Lake City, Utah, to Clarence M. and Sarah Eunice (Robinson) Aldous. He married Alice Toston on Oct. 5, 1947, in Pocatello, Idaho. She preceded him in death on Sept. 11, 1986. He married Erma Perry on Dec. 14, 1987, in Colville. He served in the United States Marine Corps from 1942-46. He was part of many South Pacific invasions and the occupation of Tsing Tao, China, after the war. Mr. Aldous earned a Bachelor of Science degree from Utah State College. He worked for the U.S. Fish and Wildlife Service as a biologist and refuge manager in California, Oregon, Nevada, Utah, Illinois, Washington, and Montana. He purchased a fruit orchard in Kettle Falls before retiring to Sequim. He continued to be interested in the care and management of wildlife worldwide and enjoyed reading. Mr. Aldous was a member of Kiwanis for 16 years and also The Audubon Society. He is survived by his wife, Erma Aldous of Sequim; sons and daughters-in-law Duane and Eleanor Aldous of Gifford, Dan and Cindy Aldous of Kettle Falls, and Will Aldous of Spokane; daughter and son-in-law Alice and Don Worley of Kettle Falls, stepchildren Tim and his wife Mia Griffin of Seattle, Gayle and Lin Longdon of Arlington, and Connie and Gene Stein of Las Vegas, Nev.; brothers and sisters-in-law Duane and Barbara Aldous of Orem, Utah, Alan and Denise Aldous of Salt Lake City, Utah, sister Lorraine MacKenzie of Lincoln, Calif.; seven grand-children; and two great-grand-children.

Memorial contributions may be made to Northwest Kiwanis Camp for People with Special Needs, P.O. Box 1227, Port Hadlock, WA 8339.

IMPORTANT HANSEN-WELLES SCHOLARSHIP
FUND REMINDER

Students!! *Do you need money??* Is your graduate research related to bighorn sheep? Here is an excellent opportunity to apply for some of that much-needed money! The Hansen-Welles Scholarship Fund provides funding for projects that benefit desert bighorn sheep or desert bighorn sheep habitat. You can find more information about the application process at:

<http://www.desertbighornCouncil.org/scholarship.html>

Applications must be submitted by February 15, 2007 and funds will be awarded at the 2007 DBC meeting in Las Vegas.

