SOCIETY FOR THE CONSERVATION OF BIGHORN SHEEP

The Sheepherder

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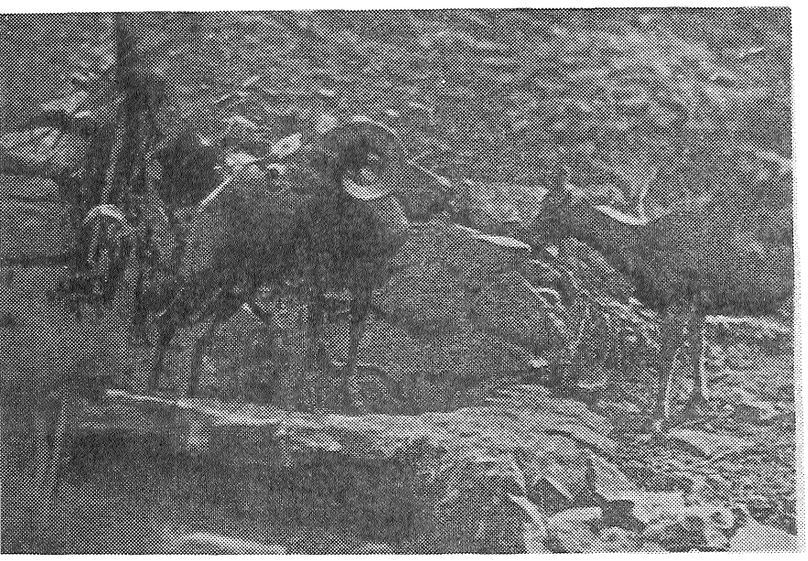
BIGHORN SHEEP CENSUS REPORT, 1975 - DEATH VALLEY NATIONAL MONUMENT

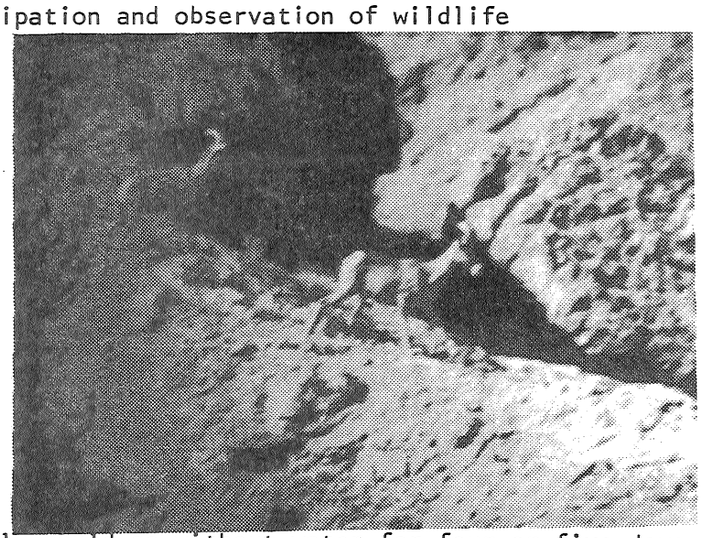
Peter G. Sanchez, Resources Management Specialist, D.V.N.M.
Banky E. Curtis, Wildlife Biologist, Calif. Dept. Fish and Game



The bighorn sheep water hole census was conducted in the Grapevine Mount ains of Death Valley National Monument from daylight on August 30 1975 through dusk on September 1st inclusive. Thirty-one observers monitored 17 springs from blinds. In addition, more than 33 springs were examined in the field prior to or during the census period. These were found to be dry, not recently used by wildlife, or with water unavailable to wildlife. A total of 18 - 19 bighorn were counted at three of the springs. Deer sign was noted at six springs.

The 1975 census is a continuation of the plan begun in 1974, ie., to cover all known water sources within a given area as opposed to spot counting throughout the Monument. The number of observers permitted coverage of the entire Grapevine Mountains in the northeastern portion of the Monument. The objectives of the census are to:

1. Determine bighorn population by direct count,
2. Determine age structure of the herd,
3. Determine deer range limits of the Grapevine herd,
4. Determine vigor (health) of animals observed,
5. Determine relative importance of water sources based on utilization by wildlife,
6. Inventory other animals utilization of springs (including exotics and trespass stock),
7. Update spring flow data,
8. Provide opportunity for public participation and observation of wildlife with minimal disturbance to wildlife.



The census was conducted during the summer dry period. Temperatures during the count period were cooler than normal and probably were responsible for small numbers of bighorn seen. Precipitation prior to the count was insufficient to affect observations. All days were clear. During the period of count the average maximum temperature at Furnace Creek was 109 degrees and the average low was 77. However, at the blinds the high temperatures reached the upper 80's (the mid-elevation springs) and lows were estimated in the upper 50's. Within these temperature ranges bighorns probably could go without water for four or five days.

Bighorn sheep observed during the count were all at five of the springs under observation; namely Monarch, Corkscrew, Klare, Owl, and Epipactis. The spring that had the greatest use during the count was Klare Spring with a total of 5 rams and 6 ewes being observed; Monarch Spring showed 1 ram 2 ewes and either 1 or 2 unident-

ified adults (the discrepancy arose with the possibility of one yearling or ewe being seen twice). Owl Spring and Epipactis showed recent signs of use although no sheep were observed.

The Grapevine mountains are in the northeastern part of the Monument primarily in California but extending into Nevada. The towns of Beatty and Ryolite are outside the Monument. The road down Titus Canyon is open to one-way traffic only--from east to west and has its beginnings near Ryolite. This road is subject to very severe washing during rainstorms. Klare Spring is in the Titus Canyon. It is recommended that excess vegetation and the tamarix (an exotic plant specie from Africa) be removed to furnish more water for wildlife.

Trespass cattle and horses and or feral burros (or recent sign) were observed at all springs under observation in that part of the Monument which lies in Nevada. The count showed 37 cattle--a minimum, 30 burros and one horse. None of the burros were within Monument boundaries. Observers at Log Spring declared the area under observation a "disaster area" because of the severe browsing and trampling by cattle. It is recommended that this part of the Monument boundary be fenced in order to keep the trespass cattle and burros out of the Monument.

All observers on the eastern side of the Grapevine Mountains reported coveys of chukar and quail. Coveys of chukar ranged up to 100 in numbers. Chukar were also observed on the western side of the mountains but in smaller coveys.

A total of 25 deer were also observered. These were also all in the Nevada portion of the MOnument. All of the wildlife observed seemed to be healthy. Though there is past evidence of range overlaps, it is quite clear that bighorn and deer occupy discrete portions of the range.

All observers along the eastern portion of the range have recommended remedial action, preferably exclusion of non-native species. If boundary fencing cannot be accomplished then the Strozzi Ranch, Stone Basin, Black Spot Spring, Log Spring and Doe Spring should be fenced to exclude cattle and feral animals.
NOTE: Jack B. Helvie, Bureau of Sport Fisheries and Wildlife, Las Vegas, Nevada, reported in April to the Desert Bighorn Council (1971) of his experimentation concerning fencing which will exclude horses, cattle and burros, but which will be readily negotiable by the bighorns. The Spacing of the wire used is important in order to accomplich the desired objective. This experimentation and report have been previously reported in T.S. lew.

Curtis and Sanchez recommend a continuation of complete spring coverage method, as used in 1975. The 1976 area to be covered will be the Cottonwood Mountains. The time will be again the LABOR DAY WEEKEND. PUT THIS TIME ON YOUR CALENDAR -----NOW.

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THE DESERT BIGHORN COUNCIL WILL MEET APRIL 7 and 8, 1976

The meeting of the DBC this year is to be held at the Posada del Mar at Baja, Kino, Mexico. The Posada del Mar is located on the coast of the Gulf of California. Room rates begin at $15.00 per day for one or two people. It is estimated that meals will approximate $14. daily per person. There are other cafes in the area. There is a sanitary trailer park about one mile distant. If you contemplate driving be certain to have proof of Mexican insurance with you. Should you decide to travel by air you would deplane at Hermosillo, Mexico a distance of about 70 miles. In this case let Gerald Gates, Route 2, Box 317-E, Santa Fe, New Mexico, 87501 know the date and time that you will arrive in Hermosillo prior to March 26, 1976. He will arrange to have someone pick you up at the airport. You will need to have either a valid passport or a Tourist Card. This card may be obtained from the Mexican Counsulate or at the Immigration Office at the point of entry.

Session Chairman will be Mr. Edward Munoz, of the New Mexico Game Commission. The list of papers to be presented includes James DeForge a Director of the Society for the Conservation of Bighorn Sheep, his titled paper "IS STRESS LIMITING BIGHORN?" Jim has been conducting a research project in the San Gabriel Mountains about 70 miles northeast of Los Angles for the past four years. NOTE: an outline of his project appears elswhere in this issue of T.S.

Friday morning the 9th there is a field trip scheduled into bighorn habitat---a large island a few miles out of Kino Bay.

FURTHER NOTE: Information received by the editor is that Airwest #1 leaves Los Angeles at 9:25 a.m. arriving at Tuscon at 11:40 a.m.; Aeromexico #101 leaves Tuscon at 12:20 p.m. and arrives at Hermosillo at 1:05 p.m. My travel agent has informed me that all planes bound for the U.S. out of Hermosillo depart during the mornings only.

Council sessions are open to all interested people. Membership in the DBC is open to anyone having the welfare of the bighorns at heart.

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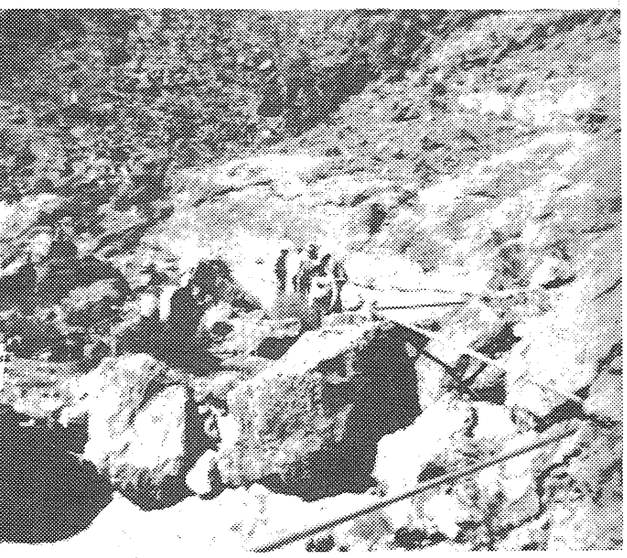
OLD DAD MOUNTAIN
VOLUNTEER WATER FOR WILDLIFE PROJECT

On September 24, 1975 the air lift by helicopter began moving the necessary equipment and material, such as 3 - 1500 gallon steel tanks, 2 cemet mixers and generators, gas for the generators, and electric pipe threader, re-bar for the dam, 5 - 55 gallon drums of water and 20 gallons of drinking water for the volunteers, picks, shovels, buckets, tool-box and an electric drill, 300 feet of 2" galvanized pipe, 63 feet of 3/4" pipe and fittings for both. A commercial plastic drinker, complete with float and valve. Due to no aggregate in the area, 9,500 pounds of readymix cement was air-lifted into the project site, along with the other equipment needed to complete the project.

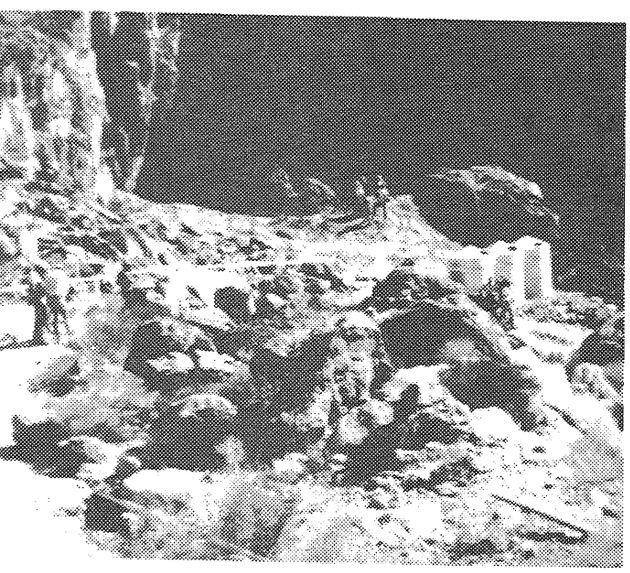
This particular project had been put off for some time, due to the steep and rugged terrain. John Massie, Wild-life Habitat Supervisor said that it would be just short of rope work to get any of the volunteers in to the project site. Les Coombes of the Department of Fish and Game located and marked another route in to the project site. This latter distance was perhaps one-and-a-half miles longer and would involve a lot of climbing but would be much safer.

During the night of September 26th all of the volunteers had found their way in to the camp site, located on the slope of Old Dad Mountain, to the south of Baker in San Bernardino County.

On Saturday morning the 27th, National Hunting and Fishing Day, the assault on Old Dad Mountain began. A one mile shuttle by truck took everyone to the base of the mountain. The climb to the project began at 7:00 a.m. One volunteer stayed behind to watch over the camp site. Two of the volunteers dropped out during the first 20 minutes of the climb. All the remainder had arrived at the project and ready for work by 9:15. While the first crew went towork clearing the dam site; the second crew were joining the 2" pipe to form the line from the dam to the 3 - 1500 gallon tanks about 250 feet down the canyon where the third crew were preparing a platform for the tanks. The dam when finished was 5 feet thick at the base and had a height of 5 feet above bedrock, and having a crest length of nine feet. The making of the platform itself was alarge undertaking. The steep cnyon made it necessary that the down-canyon end be built up about six feet although the upper end was on the slope. A four-inch cap of cement was put over this rock base before the three tanks were put in place and joined together. The platform had a 7foot by 19 feet dimensions. From the tanks a discharge pipe was joined to the drinker about 30 feet distant and on a rock ledge.



The entire project was completed in 5½ hours, and by 5:00 p.m. everyone was down and off the mountain. The temperature at the project site was a mere 80 degrees and only 90 at the camp site. A BEAUTIFUL DAY ON THE DESERT..



Those participating on the project from the Society for the Conservation of Bighorn Sheep's committee Chairman Glen Sudmeier and his guests Michael Schmidt and Linda Zickenfoos and Bud Weideman, Director of the Society; Southern Council of Conservation Clubs: Walt Powell and his daughter Jane Powell. Donald Douglas Sportsmen's Club Jerry David, Bob Smith, Wayne Frankfurter, Rex Foland, Cliff Lewis, Charles Jiglinski, and dale Johnson. Bud Weidemean is also a member of DDSC. Explorer Post 621X, John Lowery, Matt Lowery, Mario Sanchez, Bob Garcia, Eddie Avedician and Ernie Sanchez; Panorama Sportsmen's Club: Carry Hope, Merle Hebel, Gine Kissinger, Gene Griffith, Kirk D. Hanson, Eric C. Pond, S.M. Sanders, and Robert L. Jancid; Sylmar Hills Sportsmen's Club: Ron Vickery, John Rice, Russ Baker and Robert D. Baker; The Bureau of Land Management was represented by Allen Cooperider and Randy Legler; California DFG by Les Coombes and his guest Jeff Bush.

The Old Dad Mountain project was funded by monies derived 75% from the 26-D Federal Aid in Wildlife Restoration Funds and 25% from the Fish and Wildlife Preservation Funds of

San Bernardino County. These latter funds are those reverting to the Counties from fines assessed those people found guilty of fish and game law violations.

The Society for the Conservation of Bighorn Sheep extends its sincere thank you to all of those people who participated in this project, and to those organizations which were so ably represented. This group of sportsmen and women are all hunters and fishermen and they did give of their time and money to work on a project for the benefit of wildlife on National Hunting and Fishing Day, instead of going out and enjoying a sport that they had already paid for. Again, THANK YOU.

Report and pictures by Bud Wiedeman.

SECOND NORTH AMERICAN WILD SHEEP CONFERENCE SET

Colorado State University and the Colorado Division of Wildlife are sponsoring the second North American Wild Sheep Conference on April 22-23, 1976, the Wildlife Management Institute reports. T he meetings will be held in the conference facilities of the Airport Holiday Inn, Denver, Colorado.

The Conference's purpose is to bring together wildlife ecologists, managers, and administrators concerned with wild sheep in North America and discuss programs, problems, and needs in bighorn management and research. These conferences are held at five-year intervals.

Requests for information concerning advance registration and lodging should be sent to Professor Eugene Decker, Department of Fishery and Wildlife Biology, Colorado State University, Fort Collins, Colorado 80523.

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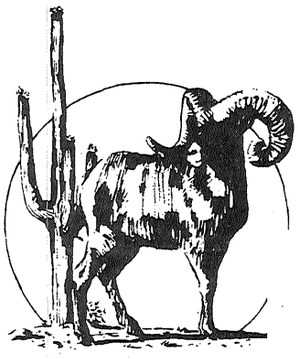
SHEEP SOCIETY SETS NEW RECORD

A newsletter from the Arizona Game and Fish Department states that:



The Arizona Desert Bighorn Sheep Society Inc.

A new record was set by the Arizona Desert Bighorn Sheep Society at the first of its annual projects on January 16 and 17 in the Tank Mountains northwest of Dateland.

Undertaken in conjunction with the Arizona Game and Fish Department, the waterhole improvement project attracted 85 participants, an all-time record according to the club's president Ned Smith

Don Belknap, the Department's habitat development suprevisor, explained the project consisted of two concrete-masonry water storage dams, and two rock-filled wire basket dams to trap silt carried along the watercourse.

Smith credited much of this project's success to the record turnout, and Belknap felt it was a job well-done and would last indefinitely. The society's next project is slated for the Trigo Mountains in late February.

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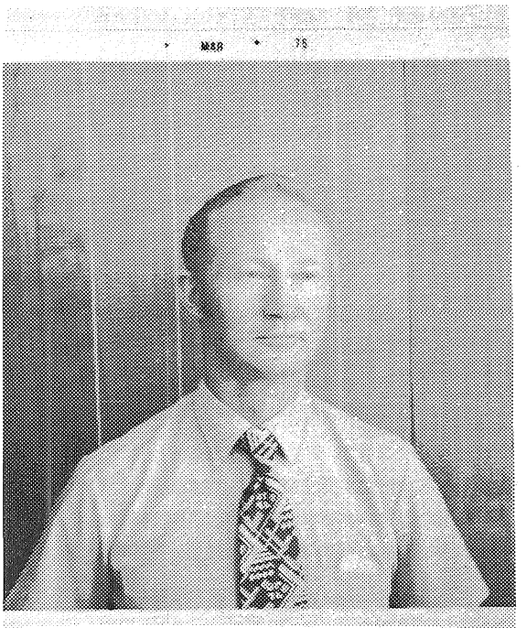
A FEW ODDS AND BITS



John Massie, Wildlife Habitat Supervisor, Calif. Department of Fish and Game. Photo courtesy of Bob Montgomery, Regional Manager, Region 5.

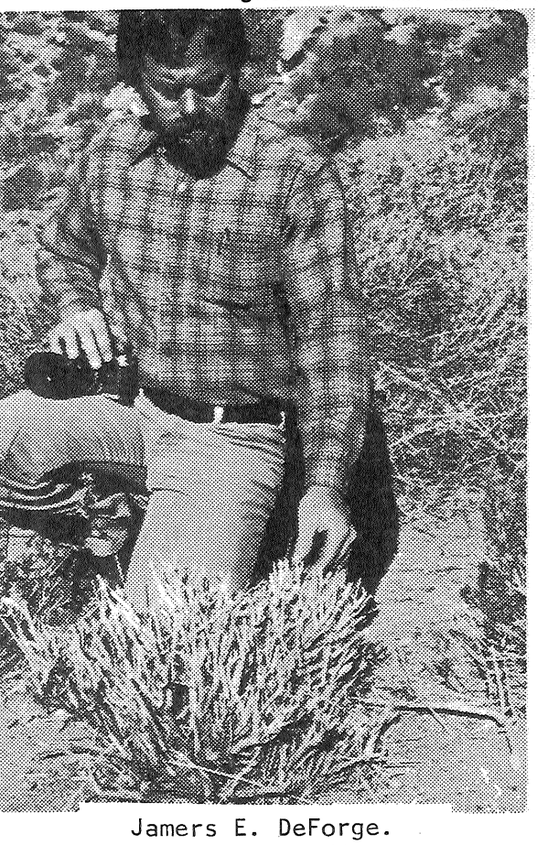
During a recent phone conversation with John Massie, Wildlife Habitat Supervisor, Department of Fish and Game, he told of several things of interest to the Society:

Work projects originally scheduled for March 6th and April 3 have had to be cancelled. Funds are not presently available for materials and expenses related to these water storage projects.....Prospects for funding of projects beginning this coming fall for the fiscal year 1976-77 looks to be in good shape financially.

The very cold weather this winter in the Dry Mountains did freeeze and break one pipe of the water storage project. This break has been repaired.....John reported seeing a large ram on Pyramid Peak on the eastern side of the Death Valley National Monument.....The horizontal well drilling of the Magnesia Spring did not develope any water.....Riverside County Board of Superviosors have allocated $2,500. of the Preservation funds to the Martinez Canyon area. Massie to fly the horizontal drilling equipment into a well drilling site.....other wells to be drilled in the Anza-Borrego State Park.....John has been able to hire two people to bring his well drilling crew up to proper man-power.....Seven water storage projects are now under discussion for next fiscal year. The Pennzoil Company gave the Society 18 - 1200 gallon steel tanks during November 1971. Eight of these tanks resisted all efforts of cleaning by use of detergents and steam cleaning, and have been abandoned as unusable. Petroleum products are not good for health of wildlife, even in small quantities, and also the odor of such residue discourages use of water stored in the tanks. However, the other 10 tanks had been placed in service by end of 1973.

STUDY OF BIGHORN SHEEP IN THE SAN GABRIEL MOUNTAINS

James R. DeForge a Graduate student at the California State Polytechnic University at Pomona, California is now in his second year of study of the bighorn sheep (Ovis canadensis nelsoni) which inhabit the San Gabriel Mountains of Southern California. These mountains are no more than 70 miles from downtown Los Angeles and an area where some 9 million people live. Consequently these mountains receive a great deal of pressure from recreationists desiring to get away from the congested city existence. Thus, recreational opportunities are being increasingly demanded. It is therefore imperative that the extent of the movements of sheep in these mountains be documented and the human impacts be evaluated. DeForge quotes the late Dr. Charles Hansen who stated, "Continued competition between bighorn and man makes extensive research essential to the welfare of the sheep."



Jamers E. DeForge.
photo---editor

DeForge hopes that his study will not only benefit the bighorns in the San Gabriel Mts. but will also supply information which can aid in developing management programs in bighorn areas throughout the state, and also increase their chances for survival.

The objectives of this study are: to further the knowledge of the bighorn sheep in the San Garbriel Mountains; to determine yearly movements and habitat requirements. He plans to use radio collars on captured sheep for this part of the study; to determine the key areas of bighorn use; to record bighorn behaviour as influenced by human presence in and near their habitat; the influences of changes in weather; to determine bighorn movements which result from human disturbances; and to correlate the sheep movements with the extent of man's encroachment.

The Mt. Baldy area appears to be afocal point for most ram movements to and from breeding areas. This movement will be studied by tracking bighorn from the Lytle Creek and East Fork herds.

Jim plans to capture a total of 6 or 8 bighorns for the attachment of radio collars in order to monitor movements of these sheep. Every effort will be made to minimize stresses which do occur during capture. He plans to immobilize these animals by using darts. He has hopes that he can get close enough on foot to use this method, believing that induced stresses would be diminished. If this proves unsuccessful then it will be necessary to use a helicopter in order to get close enough to the animals to affect their capture. Qualified veterinarians will be present during all attemps of capture. After capture all animals will be examined for gross pathology and external parasites. Blood and fecal samples will be taken along with a nose and throat culture. All sheep will be carefully watched and observed until they are fully recovered from drug effects. In the event that an animal does die at any time during the study, the animal will be rushed to the laboratory of Dr. Charles Jenner, D.V.M. at Los Alamitos, where a complete postmortem will be performed

DeForge has as his advisor Dr. Glenn R. Stewart, Ph.D, of the C. S. P. University at Pomona. There are a number of prominent Veterinarians who are participating with DeForge in this study. The Society is furnishing support personnel through Dr. Loren L. Lutz, DDS resident and W illiam "Bill" D. Phifer, a Society Director is keeping a photgraphic record of the Study.

It has been previously reported in THE SHEEPHERDER that the Society is underwriting partial cost of the study. The Society budgeted $7,000. for this study during 1975

The past history of mountain sheep indicates that they were one of the most successful ice age mammals. They survived and spread to most major mountain ranges in the Northern hemisphere. Early distribution thus implies that they were successful dispersers and colonizers. Today, however, sheep have revealed some limitations which all but contradict their past. Since their protection at the turn of teh century, some populations of sheep have increased in number, only to crash and rise again (and again crash) without colonizing uninhabited mountain ranges next door. NOTE: Article concerning New Mexico's bighorns in the Jan.- Feb. issue T.S.

Jim brings up an unanswered question: What has kept sheep, which colonized continents in the past, from reoccupying some of their former ranges? Sheep are obviously creatures capable of migrating great distances, yet they now live in only a small portion of their ancestral range.. Why is it that the sheep today seem apparently incapable of extending their range from those areas they now inhabit? (*See a related article this issue.*)

Dr. Valerius Geist, Ph.D. of the University of Calgary believes this may well be due to at least two things: Encroachment of humans into bighorn living space and the very nature of the sheep themselves. As sheep are crowded into a smaller space not only do stresses build-up through to close an association with too many others, but also the habitat is degraded and now in modern times disease can be epidemic (see previous reference) an entire herd may be lost and that part of sheep habitat then has no sheep population. Geist has spoken and written much about the 'home-range' principle of the sheep, and their

unwillingness to expand their ranges. Roads and highways through sheep habitat block their migration routes in many instances.

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NOTE: During the construction of the new highway 40 through the eastern Mojave Desert, Dick Weaver of the California Department of Fish and Game did prevail upon the Highway Department to build passageways under the highway so that it would be possible for the sheep to continue their migration from one part of their traditional range to another part. To date, however, there has been no confirmation of these culverts under the highway being used by the sheep. ALSO--- this past spring the editor did check these passageways and did find that someone---probably a livestock permittee -- had built a barbed wire fence across the opening to the culvert---probably to prevent straying of cattle. Upon notification of this happening the Department of Highways removed the fencing the next day.
NOTE: This past September the editor hiked into many basins in the mountains of Western Alberta's First Range of the Rockies and saw these basins devoid of any bighorns and also showing no evidence of having had any sheep in them for many years. Yet, my guide told me that ten to twelve years before these basins did have sheep populations. I suspect an epidemic of lungworm may have caused the loss of the sheep from these areas. I am trying to get information from the Canadian Department of Wildlife---without success.

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DATES TO PUT ON YOUR CALENDAR---AND TO REMEMBER

March 20th--- Annual dinner meeting to be held at Freddie's Town House--700 Truxton Avenue, Bakersfield, California---always an excellent dinner---Marvin Wood making arrangements. SPEAKER: Dr. Robert Ohmart, Ph.D. Arizona State University will speak on the topic: *"EQUUS ASINUS"* . Dr. Ohmart and his associates have been conducting an extensive study of the feral burro and the problems associated with it, along the Colorado River and the Bill Williams Mountains of Arizona.
There is still time to get reservations in to Doctor Lutz--Address---see first page.
March 28th ------ A sheep count will be conducted all over the Mt. Baldy area--- some 200 people are to be involved in this project. MORE ARE NEEDED. It is to be a ONE DAY project. THERE WILL BE CONSIDERABLE WALKING INVOLVED. The San Bernardino National Forest is furnishing the use of one helicopter to take people to the top of the Mountain so that they can then walk down. Two fixed wing aircraft will be used also in the survey. One of these will be furnished and piloted by Don Carper and the other by Ron Peters. Bill Phifer has been doing a lot of watching of sheep on the east side of Mt. Baldy. Some of the meeting places will be the Lytle Creek Ranger Station---and Rincon area. For further details and to get an assignment telephone Dr. Lutz at 213-284-5113 or 213-797-1287; or call Jim DeForge at 714-983-3272 or call Glenn Sudmeier at 714-735-4387.
THE ABOVE IS ONE PHASE OF JIM DEFORGE'S *SAN GABRIEL MOUNTAIN SHEEP STUDY PROJECT---see an article elswhere in this bulletin.*
Dr. Lutz recently had an opportunity to appear on Los Angles television and to talk about the Society's involvement in projects for the welfare of the bighorn sheep of California. During this interview he was also able to speak concerning the sportsmen-conservationists who are the backbone of the Society and are also deeply involved in conservation projects of the various sportsmen's organizations in California.
A recent issue of the Los Angeles Times carried an almost full page story concerning the aims and objectives of the Society for the Conservation of Bighorn Sheep and what it is doing for the wildlife of the deserts. *Lupe Saldana was the writer of that article.*

APRIL 24th--a waterstorage project in the Chemehuevi Mountains of eastern San Bernardino County. Call John Massie ph.213 - 435 - 7741 or Doctor Lutz; Glenn Sudmeier at above numbers.

REMOTE MONITORING OF DESERT BIGHORN SHEEP

During November of 1975 Dr. Don Hunsaker II, Ph.D. of the San Diego State University applied to the San Diego County Fish and Wildlife Committee for an $875. grant to conduct a study of the utilization of desert waterholes by remote census techniques. Currently the animals atthese sites are observed by researchers for two or three day periods; however, this tends to disturb the animals. Since water and supplies have to be carried in, longer observational periods are difficult to perform.

The total cost of the project is estimated to be $1,100. The funds requested come to the Counties of California as a portion of monies paid to the Courts as a result of convictions obtained for violations of California's Fish and Game Code, and do not come in any part from the tax-base of the several Counties or State.

In a previous study, the total population of desert bighorn sheep in San Diego County has been estimated at 440 animals by Mark Jorgensen, Dick Weaver and Jack Turner (these have been previously reported in the SHEEPHERDER). Others involved in this study are the employees of the Anza Borrego State Park and Graduate students of the S.D.S.U.

Dr. Hunsaker hopes to get answers tosome of the following questions: What is the success of lambing? How many sheep are actually in the area?; are other animals or people interferring with the sheep while watering? The application of a remote camera monitoring system will shed some light on these factors, it is hoped.

The types of equipment used for this study has been reported on at the annual meetings of the Desert Bighorn Council and has then been reported in previous issues of THE SHEEPHERDER. However, a brief outline of procedure is appropriate. Three camera units will be assembled in self-contained, portable, water-proof units which will automatically take one picture each minute----eleven hours a day---over a five day period. The cameras with zoom lenses will facilitate maximum image size from even the most distant camera placement.

The above information was sent in to the editor by Walt Foster of Mt. Laguna. The editor did talk with r. Hunsaker, in mid-November about the project and was able tofurnish literature concerning previous experimentation by others in the field. We had hoped to get some report of progress from Dr. Hunsaker to incorporate in this issue. There will be a follow-up. Thank you Walt. lew.

ON THE RELATIONSHIP OF SOCIAL EVOLUTION AND ECOLOGY IN UNGULATES

Dr. Valerius Geist, Ph.D of the Faculty of Environmental Design, The University of Calgary, Calgary, Alberta, Canada, has written the above titled paper which has appeared in AMERICAN ZOOLOGY, 14: 205-220 during 1974. Dr. Geist sent a copy of the paper to me, the editor. I find the paper to be very thought provoking and do hope that in trying to give, what I must consider, to be the gist of the paper that I will not have lost the main thrust of Dr. Geist's theory.

The stated purpose of the paper is to present the beginnings of a comprehensive theory os social evolution as it relates to ecological variables. The paper deals primarily withthe ungulates, that is the species of the orders *Artiodactyla, Perissodactyla and Proboscida*. There is urgency tothis task since behavioral and ecological studies of freeliving ungulates have only begun to blossom in the last decade, while thelast vestiges of wilderness are coming under m an's control; the day is in sight when the last natural population of ungulates will become a managed one. This applies also to sactuaries and national parks. We need more and better theoretical guidance in studying ungulate populations to maximize our research efficiency and to secure information we are unlikely to get a few decades hence. Such guidance is most important when studying relict and endangered species inorder to minimize interference with the animals. We need better theory in order to guide management of ungulates in a rational manner.

In constructing his theory Dr. Geist did not follow trdition and use behavioral and habitat correlates but instead used principles derived from several disciplines and deduced their ecological and/or behavioral consequences. He finds that this method is economical in reducing diverse habitat types to a few ecological variables andsecondly that our knowledge of the ecology and behavior of ungulates is at present sketchy, and is biased in its sampling, beset with difficulties in concept, methodology, and terminology, and open to some reasonable doubts. Few studies on the wild sheep have been made until the past decade. The more observable species have had much more research----those which are gregarious and live in open landscapes. Very few studies have been conducted over the whole yearly cycle of the study animals and fewer still have been repeated over successive years.. Even where reasonably natural conditions appear to exist, we may still lack native predators or competitors found but a century ago, as well as all the megafauna that vanished after the last ice age. These questions can never be answered.

In Dr. Geist's theory he has linked ecological variables to social man ifestations using individual selection and reproduction fitness as criteria. In this theory Dr. Geist proposes a total of 16 hypotheses and relates the one to another. These are:

1. *The body size and population biomass of ungulate species is a function of the fiber content(digestibility) and density of the forage they exploit.* Body size effects many forms of behavior in ungulates . It permits migration,biases communication toward the visual and olfactory channels; effects the anti-predator strategy and social behavior directly and indirectly. Small bodied ungulates require a forage of relatively low fiber content but high protein. A ruminant can eat only as much as it digests; hence, the more it digests the more it can eat; also the more energy it requires, the more digestible the forage must be. The sheep being a ruminant must therefore lose a great deal of time during a day to the necessity of chewing its cud rather than the gathering of food. the *perissodactyls*, such as the horse(or burro), can vary the rate of gut clearance and compensate for poor forage of low digestibility by eating more and passing out the undigested portions relatively quickly. This mechanism permits the exploitation of very coarse forage, and thus permits these animals to reach larger body size than a ruminant on identcal forage.

2. *The anti-predator strategy of an ungulate species is a function of its body size.* The larger the body size of the specie the fewer predators that it has and the better it is to defend itself against them.

3. *The anti-predator behavior of an ungulate species is a function of the cover of its habitat. (Ecological parameter: three dimensional structure of habitat).* In thisck cover an animal may be heard beforeit is seen, and so adopts protective coloration and tends to remain quiet to avoid detection; Ungulates inhabiting open plains are detected by predators on the basis of sight rather than sound, may use visual predator warnings such as flashing of rump patches or by excited jumping. From this comes the prediction that for specie of equal body size, those from the ecotones of high and low structured habitats will have a greater number of social signals since they will use sensory modalities applicable, for instance, to forest and open landscapes.

4. *Populations of large-bodied ungulates have a lower turnover rate than do populations of small-bodied ungulates; in consequence, there will be greater selection for non-damaging intraspecific fighting, ie. within their own specie, in large bodied species than in small bodied ones.* As the number of seasons in which a male breeds becomes reduced, a greater risk of death from intraspecific combat becomes acceptable. Hence, in species with long-lived males, the male maximizes his chances of reproduction by reducing damaging intraspecific fights and increasing alternative mechanisms for establishing dominance. Granted the acceptability in small and large-bodied forms of some absolute number of wounds per lifetime, such wounds would have to be inflicted at lower rates in large-bodied forms

than in small-bodied forms. (NOTE: information tends to show that the number of deaths among the wild sheep due to combat are few in number.)
5. *In habitats with little or no cover, ungulates use each other as orientation points and for cover.* In open spaces these species tend to gather together in groups with many more pairs of eyes to be on watch for danger.
6. *The exploitation of stable, self-regenerating, climax-plant communities selects ungulates for juvenile-retention(which manisfests itself in cohesion between individuals, leadership, gradual disassociation of mother and young, and home range traditions); exploitation of seral plant communities(a succession of plants) which appear due to catastrophic events (fires, floods, avalanches) and which cannot be predicted in space and time, selects for juvenile dispersal.* (Ecological parameter: climax versus seral plant community, habitat stable or subject to sudden contraction and slow expansion versus habitat subject to rapid expansion but slow contraction). This hypothesis proved useful in explaining the differences in the behavioral biology between mountain sheep and moose. Also why colonizing juveniles cannot be expected, and why refined, complex mechanisms of social submission should exist in some species.
7. *Territoriality is permitted to evolve in forms living in habitats where the diversity and productivity of plant matter is relatively great and continuous such as to fulfill the living requirements of the species on a small area; breeding territories may be permitted in species where the mobility of females is low during rutting seasons.* (Ecological parameters: amount of primary productivity, fluctuation in primary productivity, species diversity in plants). The hypothesis does not state why territoriality evolves, but states where it will not occur, namely in ungulate species which must be continuously prepared to move, be it that snow falls, frost and wind close some forage areas and expose others, or the forage is unpredictable in the time of an annual cycle for whatever reasons.
8. *The behavior of females compared to males will be such as to maximize energy and nutrients available towards fetal growth and lactation.* There are several manifestations of this hypothesis. In the strongly sexual dimorphic mountain sheep, females reduce to a minimum the cost of harassment by males, the cost of work, and communication as well as communication as well as competition for forage with males. We can expect that all ungulates will strive to reduce the high caloric costs of excitement and physical work since this detracts from the resources available for reproduction. The efforts of the rut among the males of species is in excess of their bodily intake of food even on good habitat. and when on marginal or poor habitat this loss of energy balance becomes critical. Hence many of the male ungulants enter the winter season, a season of stress in poor physical condidtion. The food requirements of the gestating and lactating females is greater than that of the males. It has then become adaptive for the males to remove other males from this territory and for the males to adopt different food habits than those of the females.
9. *Dispersed and difussed food of low density per unit area will lead to a selection against food competition by overt aggression, as will highly localized food resources found at high density; overt aggression will be selected for as a means of intraspecific competition where it will result in a significant return in food in short supply, compared to the cost of defending it.* (Ecological parameters: food density and concentration.) It is evident that where forage is diffuse and widespread, a female attacking another one only causes the latter to jump aside and continue feeding on a site a few paces away. The aggressor has incurred the cost of aggresion without gaining any resources in return. Here the best strategy is to compete by feeding more intensely and reducing aggression to save energy for reproduction and growth. This is the situation we find apparatly in most ruminants and explains the relatively tolerant behavior of females grazing together in groups of females into clans, or home range groups.

TO BE CONTINUED IN MAY-JUNE ISSUE

I must apologize to Doctor Geist for doing this. However, space will not permit me to complete this review in the present issue. lew.

PRESENT STATUS OF LEGISLATION CONCERNING THE FERAL BURRO

A recent letter from the Honorable B.F. "Bernie" Sisk Congressman from the San Joaquin Valley has informed me, the editor, that the House Subcommittee on Public Lands of the House Interior and Insular Affairs Committee has held one day of hearings on the H.R. 2935 that was introduced by Honorable G.William Whitehurst of Virginia 13 months ago. Chairman Congressman John Melcher had told me that he would keep us informed concerning progress on this legislation and on the proposed so called BLM Organic Act. No information has been received telling whether Congressman Melcher's Committee has made any decision.

My latest word concerning the invalidation of the PL 92-195--so called Wild Free Roaming Horse and Burro Act of 1971 is that the Supreme Court had postponed discussion concerning whether or not the Act is Constitutional. Apparantly no date has been set at this time for such discussion

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LATEST REPORT CONCERNING THE SAN GABRIEL MOUNTAIN PROJEST is that James DeForge together with members of the California Department of Fish and Game and with members of Wildlife Management class of the California State Polytechnic University of Pomona are at present building a trap for the capturing of bighorn sheep in the project written about on page five of this issue. Efforts to capture sheep by darting had not proven satisfactory.

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WE HAVE FOUND THAT THERE ARE MANY MEMBERS WHO ARE DELINQUENT IN SENDING THEIR DUES. NO CONSERVATION ORGANIZATION CAN LONG EXIST WITHOUT MONEY TO OPERATE ON. ALL FUNDS GENERATED GO INTO PROJECTS FOR THE BIGHORNS, EXCEPT FOR THE COSTS OF THIS NEWSLETTER.