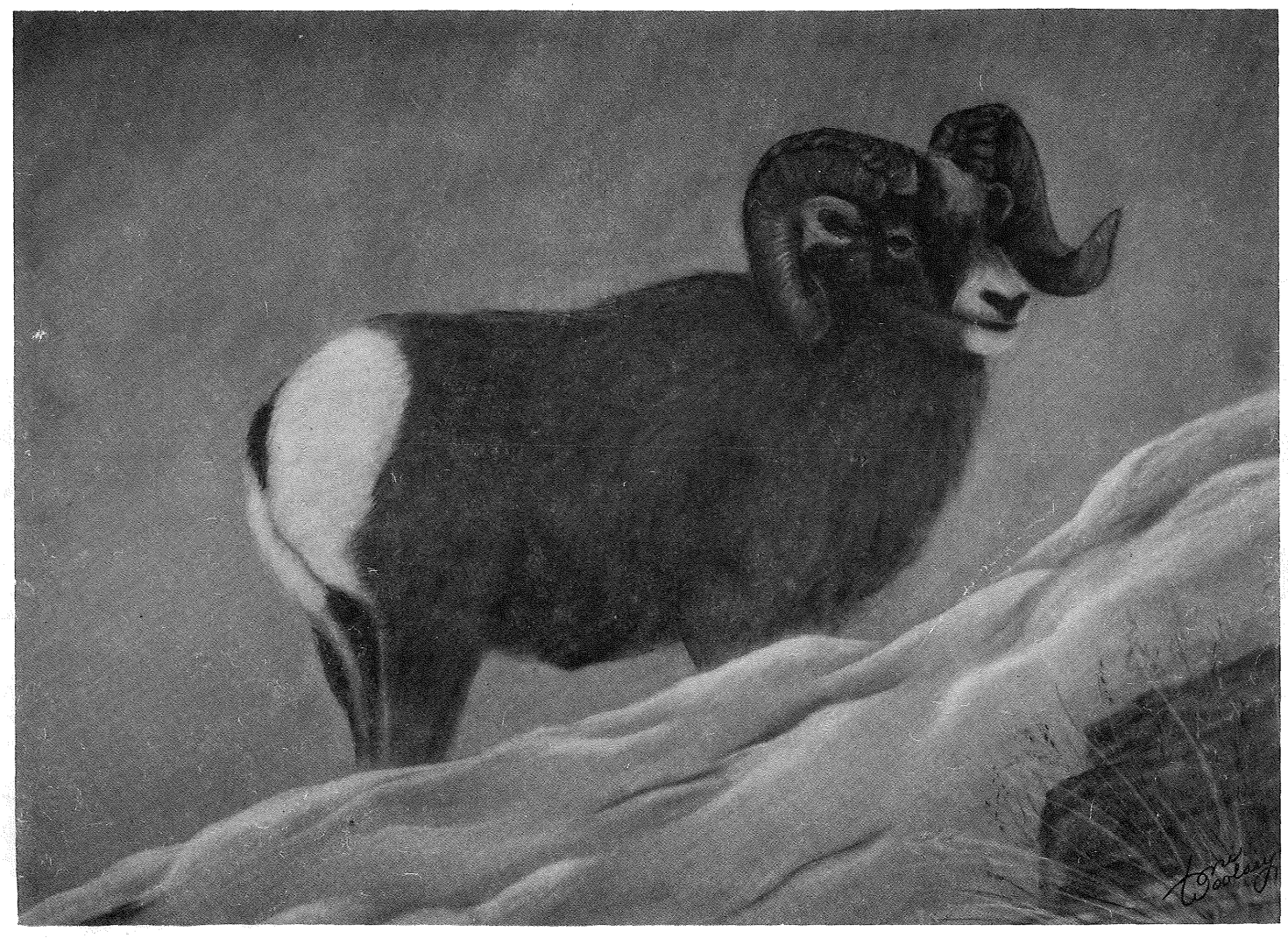
APRIL 1990

THE SOCIETY FOR
THE CONSERVATION OF BIGHORN SHEEP

THE SHEEPHERDER



SOCIETY FOR THE CONSERVATION OF BIGHORN SHEEP

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On The Cover

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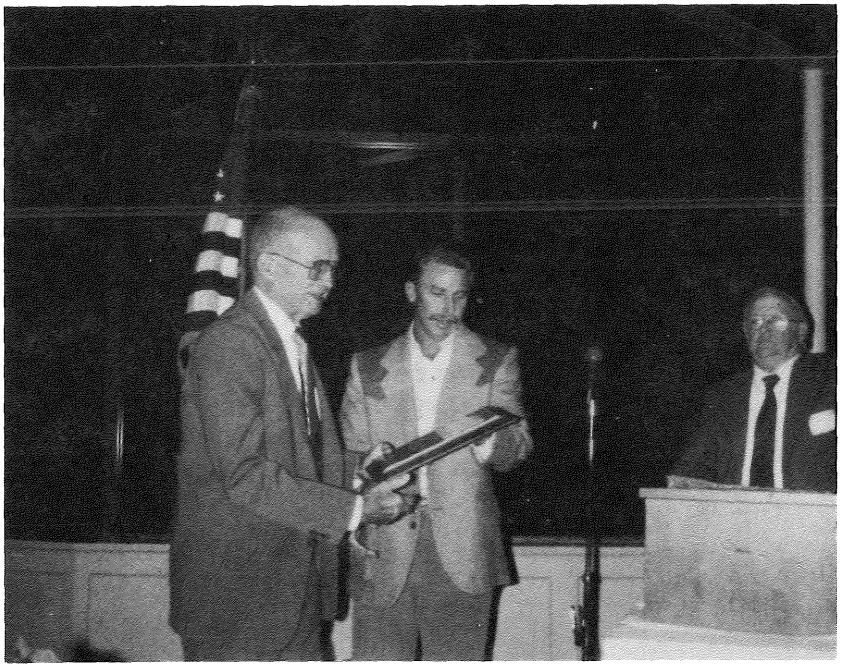

John Larronde receiving an award from George Kerr

JOHN LARRONDE NIGHT

By Loren Lutz

The annual Water for Wildlife dinner held November 4, 1989 was named John Larronde Night in honor of one of the founders of the Society for the Conservation of Bighorn Sheep.

John has been its secretary since the inception of the organization. He has been one of the longest termed members of Angeles Sportsmen's Club and one of its leaders. Serving in many capacities, he has been a leader in the conservation circles all his adult life.

His activities include water surveys, sheep censusing, guzzler building and implementation of the goals of the Society as a director.

An avid skier, hunter, fisherman, photographer, river rafter and general outdoorsman, Larronde has traveled extensively particularly throughout Europe and North America.

As president of the Coast at Malibu, he has been vitally concerned about ocean resources and the historical heritage of the area.

The Society honored him with a plaque recognizing his many accomplishments and long term leadership in the organization.

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THE RAFFLE IS COMING YOUR WAY

By John Doll

It's that time of the year when we all can do our "bit" to help provide water for the bighorn sheep.

If you haven't been able to go out and be a part of the "Sheep Census" in the 100 plus degree heat in July, or freeze your "tail" off at the projects in the early months of the year, or been able to be part of that "bucket brigade", or take part in laying the cement, welding that fence, carrying those rocks, **NOW IS YOUR CHANCE** to give us a hand! Help us reach that goal of **"10,000 by the year 2000"** by taking those books of raffle tickets and **SELLING THEM.**

Each ticket **YOU** sell helps. These tickets aren't hard to sell. Most people are interested in the conservation of wildlife.

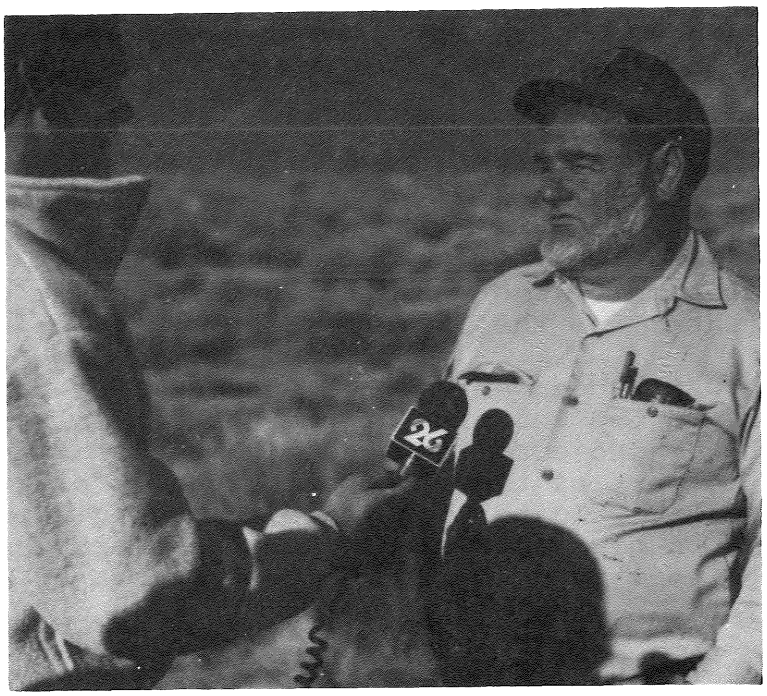
We have 8 great prizes this year. They are:

1st Prize:	One week Wyoming Vacation for two at Elk Track Ranch.
2nd Prize:	Ruger Model 77 Cal 7x57 mm with 4x40 Scope and Rifle Case
3rd Prize:	Trophy Wild Boar Hunt in Paso Robles
4th Prize:	Bushnell 10-30x50 mm Zoom Spotting Scope with Tripod
5th Prize:	Bushnell Binoculars 8x40 mm with Wide Angle Lens
6th Prize:	Coleman Butane Stove and Lantern
7th Prize:	$75.00 Gift Certificate for the Pony Express Gun Store
8th Prize:	$75.00 Gift Certificate for Archery or Taxidermy

The sale of these tickets gives us badly needed money to buy Helicopter time, materials, and pay for professional help, just to name a few items, which are all expensive and very badly needed to reach that goal by the year 2000.

The tickets sell for $1.00 each /$10.00 a book. The 11th ticket (the white one) is the FREE ticket. It goes to the person who buys the full book of 10. That free ticket is for a special separate drawing for a Lifetime Membership in the Sheep Society. They will also receive a **Limited Edition Numbered Print** of bighorn sheep and a book on bighorn sheep.

All checks should be made payable to the Society. Mail the money and the stubs to the Treasurer: John Nelson, 24925 Chicory Court, Newhall, CA 91381. Drop me a note or call for additional raffle tickets: John Doll, 1518 North Benton Way, Los Angeles, CA 90026. (213) 483-6426. The drawing will be held on July 4, 1990 and you do not need to be present for the drawing. All unsold tickets, stubs and money must be returned by **June 25, 1990 - no later.** Thanks for your help.



Dcik Weaver on the right being interviewed

DICK WEAVER RETIRES

By Loren Lutz

A biologist, Dick Weaver served for forty years with the Department of Fish and Game, State of California.

Among other assignments, he had investigated water resources in the deserts thus having at his disposal knowledge that would enable him to assess the potential for building artificial water sources for wildlife when that program was instituted in 1969.

Widely recognized as a premier sheep biologist, Dick has always vigorously supported efforts to promote the conservation of wild bighorn sheep.

Dick Weaver is a non-replaceable resource and person. His retirement leaves a great gap in our Government expertise.

The Society presented a fancy Bausch and Lomb spotting scope and stand for his continuing interest in sheep observations.

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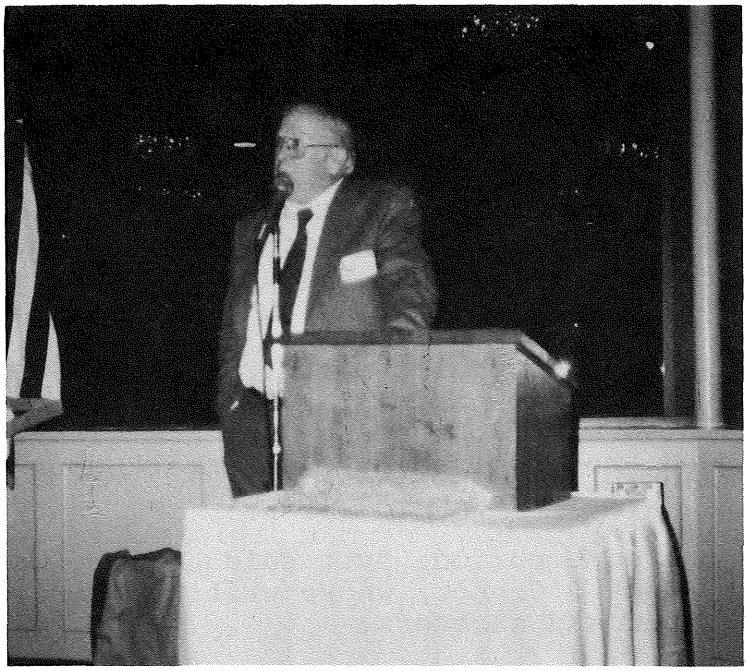

Dr. Loren Lutz

DR. LOREN LUTZ: A TRUE CONSERVATIONIST

By Western Outdoor News Staff Writer, Steve Comus

Events at the annual banquet of the Society for the Conservation of Bighorn Sheep and Southern Council of Conservation Clubs this coming Saturday will make a milestone in organized efforts to effectively manage wildlife.

Dr. Loren Lutz of Pasadena will be honored upon his retirement from the presidency of the Sheep Society. He remains active as the executive director of the society, but has passed the gavel to George Kerr of Simi Valley.

Kerr has been a most active conservationist for years, and is a logical successor to Lutz, who was one of the founding members of the society a quarter of a century ago.

"I brought this idea (for a sheep society) to four other people in the Angeles Sportsmens Club in 1963," Lutz, a retired dentist, told WON in a recent interview, noting that the society was actually incorporated the following year.

"At that time, when we asked the DFG (California Department of Fish and Game) how many (wild) sheep there were (in the state), they said there were a couple of thousand," Lutz recalled, adding that state officials also had said there were a couple of thousand when that species became protected way back in 1883.

Those efforts in the early 1960s resulted in the society becoming the first such group in the nation. "I was a sheep hunter to start with," Lutz continued, when asked how he became involved in the first place.

"I saw my first bighorn up there in Fish Canyon (above the Los Angeles suburb of Duarte and at the head waters of the San Gabriel River)," he noted. "I was intrigued by the fact that they lived so close to civilization."

Among his many accomplishments, Lutz in 1953 was on the first sheep hunt ever sanctioned in Arizona, and it was there that he became acquainted with John Russo, who was with the Fish and Game Department, and who inspired Lutz to embark upon his life-long quest.

During the same period, Lutz said he also was greatly influenced by Jack O'Connor, whose writings continue to be popular among many hunter and shooters.

"We decided that the bighorn in the United States were having a horrible problem, and nobody was paying any attention to them," Lutz explained as he recalled the times the initial efforts were set into motion to form the sheep society.

"We started a campaign to recognize officially that the bighorn had problems," Lutz continued. "We targeted California as the case (state) with the worst problems and the greatest potential for good."

Through the mid-60s, efforts continued, and the then newly formed society was working with the DFG. Next big break came in 1968 when the then-new state Senator H.L. "Bill" Richardson, R-Arcadia, introduced legislation giving authority to the DFG to manage wild sheep.

Lutz noted that there were many of the same kinds of problems then as exist now. He recalled that there were a number of protectionists interests which favored no change in anything -- which actually means continuing to do nothing.

"We found the population of sheep was declining," Lutz explained. Following a long legislative offensive, the effort succeeded, and the DFG was officially in the wild sheep management business.

"Dick Weaver, who took a cut in salary to become involved, and Jerry Mensch, both biologists with the DFG, took it up, and they covered all the historic sheep country in the state," Lutz continued, noting that in the process, Weaver and Mensch picked up all kinds of volunteers, including Lutz himself.

In 1969, "we had the most massive sheep count ever undertaken," Lutz said. The count revealed a population of about 2,600 sheep in the state, and the question became one of direction: should they merely try to protect what was there, or attempt to expand the base?

And, it was more complicated than looking at a static situation.

"People were invading sheep territory at that time, and doing things detrimental to their welfare," Lutz stressed.

He said that primarily through the efforts of Weaver, it was established that one of the major deficiencies of bighorn management was the supply of water - or lack thereof.

That was 1970, and the sheep society and the Southern Council launched a joint program to enhance the water supply for bighorns. The place was Anza Borrego State Park, and Lutz said it was with the aid of state park officials and the state military forces that the first guzzler was established.

Before it was over, a helicopter was brought into service to help put the guzzler into place. And, to this day, the sheep society and the Southern Council continue to perform guzzler projects throughout the state.

And, these same volunteers conduct sheep counts. There is an annual count the second Sunday in March, and also a count in July for sheep in the desert areas.

To date, the number of bighorns in California has continually expanded, Lutz said. There are now about 5,000, and there is a program ongoing which is expected to double that number by the year 2000.

In fact, the efforts have been successful enough that bighorns are again hunted in California. Next month the third annual sheep hunt will be held. Each year, the state issues nine permits - one at auction and the other eight by draw.

This is enabled only by the successes of genuine conservation programs like those of the sheep society. For example, in the Old Dad Mountains alone, there were between 12 and 25 bighorns in the late 1960s when the society first became involved.

Since then, the number has grown, and there have been several transplant programs which have relocated sheep from the Old Dads to other locations in the state. Additionally, there are still more than 300 sheep in those mountains today.

Including all the support groups, like Safari Club International and Quail Unlimited, there are more than 25,000 hunter/conservationists involved directly or indirectly in the conservation efforts now.

And, as executive director of the sheep society, Lutz is keeping very busy.

"We are presently engaged in saving some sheep in Nevada and along the California/Nevada border," Lutz said. "We are still involved in purchasing property in the Santa Rosa Mountains."

And, the society continues to try to consolidate landholdings in the Sierra, and establish sheep in the Chimney Peaks area.

Lutz said he feels that the three biggest threats to wildlife in California in general, and to bighorn sheep in particular are:

1. The acquisition of the East Mojave by the National Parks Service.

2. Mountain lion initiative.

3. The listing of the desert tortoise as endangered and closing off all the lands the species inhabits to any other usage. (He said he feels this would also be the biggest threat to the tortoise itself.)

During his long tenure with the sheep society, Lutz has been no stranger to controversy.

He has encountered the wrath of legislators and bureaucrats, as well as of anti-hunters.

But there is a difference between those adversaries and Lutz. He has been successful. And that's what counts.

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FACELIFT FOR JACKASS SPRING

By Scott Yoo

The weekend of January 13 and 14, 1990 saw 20 volunteers at Jackass Spring, just east of Kelbaker Road, 23 miles south of the town of Baker.

Background: The Marl Mountains are under heavy pressure by loose range cattle and especially wild burros, and are displacing bighorn sheep in the area. This region is attractive to these unwanted species partly because of the gently rolling hilly terrain and the availability of water from Jackass Spring. Additionally, cattle and burros trample and foul water sources rendering them nearly useless.

The purpose of this project was to clear the spring of debris, cement in a catch basin, and exclude cattle and burros from the spring by erecting a pipe fence around the area, thus ensuring future usability by bighorn sheep.

Les Coombes of California DFG supervised the project that required hardy souls to shoulder 20 foot sections of 2" black pipe, shovels, picks, cement, and the COBRA rock drill for the 1/2 mile trek into the spring. Luckily, the hike in was an "honest" 1/2 mile and was on a gentle downhill slope that followed the shallow draws right to the site.

The spring itself drips out from the bottom of a 6-foot boulder at the side of the narrow wash and momentarily pools up in the silt, where it then soaks in to be lost for any use except to irrigate the copious stand of chest-high rabbit brush that chokes the draw.

The work party split into two groups: one unit made several round trips to bring the pipe to the spring; the other unit clipped, rolled and removed sections of dilapidated barbed wire fencing that had, in years past, enclosed the spring. Once the old fence was removed, a swath of rabbit brush and creosote was cleared in a rectangle around the area to make room for the exclosure to be erected from the pipe. Holes were drilled into the rock and soil for pipe posts, and enough pipe was laid out to make a fence three rails high. The exclosure was planned such that 3-1/2 sides of the rectangle were to be fenced. A 15-foot section of steep, rocky canyon wall on the East slope was left open for easy sheep access. The steepness and broken rocks will preclude access at that point by burros and cattle but will allow the sheep an easy entry.

Due to the time required to shuttle materials to the site, our available manpower was unable to actually raise the fence this weekend, but another work party will be returning on February 10-11, 1990 to burn holes in the pipe with a torch and bolt the rails in place to complete the project. (The Panorama Sportsmens Club will be providing mules to carry in the materials needed to finish up.)

Mud, rocks and brush were cleared away from the immediate area around the dripping spring to give a good, clear line of sight to drinking Bighorns, and to provide room for the construction of a cement catch basin of 50-odd gallon capacity.

Except for the necessary brush clearing for the exclosure itself, the riparian habitat created by the presence of the spring was left intact, thus imposing minimal impact to the wildlife using the area.

At the end of the day we all congratulated each other on a good, productive work day and trekked back to the vehicles. That evening we huddled around the community campfire and enjoyed the fellowship of others with the common desire to replenish our deserts with bighorn sheep and felt the warmth of satisfaction that comes with having a purpose and making a positive contribution toward it.

Overnight a gentle rain cleansed the desert and thereby silently promised the continuity of life, much as our spring development will for the sheep.

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BIGHORN SHEEP RELOCATION PROVING SUCCESSFUL

The bighorn sheep population established on San Rafael Peak, Ventura County, just over 4 years ago is growing by leaps and bounds according to the Department of Fish and Game.

Back in December 1985, 21 Nelson bighorn sheep were relocated from the Angeles National Forest, Los Angeles County, to the Los Padres National Forest mountain range by Fish and Game. All 5 rams and 16 ewes were marked with ear tags and a radio telemetry collar or a color coded collar.

Also in January 1987, an additional 15 animals (4 rams and 11 ewes) were transported to San Rafael Peak, with similar tags and tracking collars.

Since the initial release of animals into the historical Bighorn range by Fish and Game, in cooperation with the U.S. Forest Service, 4 lambing or breeding seasons have been completed. Until the final survey late last year only a moderate increase in the population was noted by Fish and Game biologists.

The November 1989 survey, however, showed an almost two-fold increase of new animals incorporated into the adult population of the sheep herd.

"We look for the total number of marked animals, animals we introduced to the area, to go down as a result of natural mortality. The number of unmarked sheep should correspondingly go up indicating the addition of new animals to the population," said Tom Paulek, wildlife biologist in charge of the November survey of Bighorns.

"For example," Paulek explained, "in November 1986, 11 marked adult sheep were counted in San Rafael Peak and no unmarked animals were observed. Two years later, 13 marked and 2 unmarked adults were located, and the final survey last year recorded 9 unmarked adults and 7 unmarked adults."

The increasing population trend is very encouraging to note relative to the Department's overall effort to return bighorn sheep to their former range," Paulek summed up.

The initial relocation efforts as well as the continuing study of the San Rafael Peak bighorns by Fish and Game is funded through the sale of hunting licenses and other related fees, and is part of an overall management plan to return bighorn sheep to their historic ranges.

WHERE, OH WHERE, HAS THE DEPARTMENT OF FISH AND GAME GONE???

By George Taylorson

(The following article is an editorial by George Taylorson and does not necessarily express the views of any other individuals or the Sheep Society. Ed.)

Did you ever have something that you enjoyed playing with or working with, or just enjoyed it's company and then one day wake up to find it was gone? If so, then maybe you can relate to some of the following ideas that I have jotted down.

Way back when (at least 8 to 10 years ago) the Volunteers who went out on water hole projects used to enjoy working with a government agency that was called the Department of Fish and Game for the State of California. In fact, we called it a combined effort of labor for the Bighorn Sheep because the DFG would send out anywhere from six to ten of their members for these water hole projects. In those days, and even as recent as a few months ago, the DFG would send one or more of their representatives to the Bighorn Sheep Society's board meetings as it was thought that this type of communication was very important for the sheep herds in the State of California.

Well, if you've been on any of the recent water hole repairs or work projects you will notice that if one DFG representative shows up it is a surprise (on most projects you will find that no one from the DFG shows up). **Where have they gone?**

If you have attended a Board Meeting for the Sheep Society over the last several months you will have noticed that no representative from the DFG was there. What about all the communication they keep insisting they want between the public and their agency? **Where, oh where, have they gone??**

The Region 5 area of DFG was very supportive of the bighorn sheep program in this area which was easily determined by the fact that their representatives were involved with the volunteers. One of the problems is that, over the past few years, the DFG has continuously cut back on their support personnel to the point that there is now only one person working in this area. In fact that really does not seem to be an accurate statement as a large amount of his time is spent on paperwork and the remainder as a custodian of Camp Cady.

What happened to the seasonal aid that used to assist the DFG representative? It is this writer's understanding that there has been a position open for over a year, yet DFG refuses to fill it. It can't be because there are no qualified applicants. Several qualified applicants have applied for the position but because they have not been of the correct ethnic background they have been denied the job. **Where have they gone??**

As most everyone knows, there are funds that have accumulated from license plates in the State of California designated for the DFG. In the past, the director of the DFG has delegated a portion of this money to the bighorn sheep program in the state. Is there any truth to the wild rumor that this year all the monies have been assigned to another program that is falling flat on it's face and the director is embarrassed and is trying to save it? **Where, oh where, have they gone??**

In this writer's view things are changing and changing fast. Most recently Dick Weaver held a state position which allowed him to make more contributions to the Bighorn Sheep Society program than any other DFG person. He has now retired and the DFG has known that this was going to happen for quite some time. In spite of this knowledge, nothing has been done to fill the vacancy his retirement creates. There is no one to effect a smooth transition. **I really wonder what has happened.**

I'm sure the DFG will say "money". However, the DFG has more money now than at any other time since its inception. Perhaps it has something to do with the people at the administrative level who seem to have forgotten who they work <u>for</u>, that's right, they work <u>for</u> the people.

Yes, I guess I'll have to go on singing my little song, **"Where, oh where, has the DFG gone"**. But don't give up folks for the sheep are not being forgotten or neglected because the volunteers are out there doing the job. If **YOU** have not become an official volunteer then now is the time to get with it. Just write or call the headquarters of the Bighorn Sheep Society and they will gladly point you in the right direction. Wouldn't it be nice if the title of my next editorial was entitled "Sleeping Beauty"?

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DONATION OF COMPUTERS

About three years ago we printed a list of items which we needed and hoped our members could help by donating these to the Society. Well, fortunately my wife didn't forget our great need.

Recently, when some computers became availale through Sears Savings Bank, my wife was able to do just that -- obtain 2 computers, a printer, typing table, paper holder, paper, assorted software and office supplies.

I want to take this opportunity to formally thank the people at Sears Savings Bank who were instrumental in obtaining the authorization for this general gift.

A special thank you to John Hampton, Sandy Skal-Gerlock, Anne Pederson and, of course, my wife, Evelyn.

VOLUNTEERS NEEDED FOR DESERT WILDLIFE PROJECTS

Water and shade are, arguably, the least likely provisions to be found in the desert during the long hot weather months. Both are scarce and come and go quickly and each are precious assets in an otherwise inhospitable environment. Nights bring some relief from the blistering sun, but little except rain quenches the parched plain or a ravaging thirst.

But thanks to a dedicated core of volunteers, banded together nearly 30 years ago by the Bighorn Sheep Society, desert wildlife has some relief, realized through many years of hard work--manmade caches of water called guzzlers.

In addition to building, and in some cases rebuilding guzzlers, the volunteer group also constructs fences, puts up gabions and participates in censusing surveys as needed.

DFG wildlife biologist Les Coombes, advisor to the group, Dick Conti, volunteer project coordinator, and a representative from the Society for the Conversation of Bighorn Sheep, developed a list of seven projects to be accomplished for 1990.

Coombes noted that this program is the "most successful, on-going volunteer project" of its type in the nation. It's so successful, Coombes said, because the tremendous output of energy and dedication by people who care about wildlife in Southern California--and who are willing to help.

"The volunteer efforts are directly responsible for a substantial increase in wildlife in various areas of the state, including such species as bighorn sheep, tule elk, quail, chukas, various waterfoul species and, of course, an enormous number of non game species," Coombes added.

The following is a list of the remaining conservation projects throughout Southern California this year:

March 10/11 (alternate 17/18)	San Gabriel Sheep Census
March 24/25	Granite Mts., San Bernardino Co. three spring developments
April 7/8	Whipple Mts., repair and replace tanks on three BGG
May 5/6	Hyten Spring, Bristol Mts., finish adit
July 13	Sheep census (location to be announced)

Perspective volunteers can obtain additional information from Dick Conti, (213) 256-0463.

The volunteer program was developed in 1969 by the Society for the Conservation of Bighorn Sheep and the department to supply volunteer assistance for mountain sheep habitat improvement projects sought by DFG biologists in the 1960s.

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OFFICIALS TRY TO AVERT BIGHORN SHEEP PARASITE THREAT

By Sam Atwood
(Reprinted from the Sub, January 14, 1990)

Wildlife officials netted the bighorn sheep from a helicopter Saturday to check the spread of a potentially fatal parasite in the San Gorgonio Wilderness herd.

Bighorn sheep populations in New Mexico, southern Washington and northeast Oregon have been ravaged by a microscopic, parasite mite. A similar mite has been found in sheep in the San Gorgonio Wilderness.

But so far, the mite hasn't killed sheep in the San Gorgonio herd, now about 200 strong and considered one of the healthiest in the state, said Rick Clark, a Monterey County veterinarian who is checking up on the health of the herd.

Nelson's bighorn sheep are native to the San Gorgonio Wilderness in the San Bernardino Mountains; statewide, there are about 3,800 animals in about 50 herds.

The ram captured Saturday, just east of Morongo Valley, was captured last July and fitted with a radio collar, said Susan Sferra of the U.S. Forest Service.

The ram had mites but appeared to be responding well to an injection of antibiotics administered last year, Sferra said. The animal was implanted Saturday with a time-release antibiotic beneath the skin of its neck, she said.

Psoroptes mites typically take up residence in a sheep's ears, then spread to other areas of the animal. The mites can itch and irritate the skin so much, sheep lose their winter coats and freeze to death, Clark said.

Wind and icy conditions forced Wildlife officials to turn back Saturday afternoon, but they hoped to capture and test a total of four sheep this weekend.

The animals are herded with a helicopter to a sand wash or flat area, then captured with a net gun fired from the aircraft. Once on the ground, veterinarians hobble the animals and take blood, nasal, ear, skin and fecal samples to check for mites and disease.

In addition to the danger posed by mites, wildlife officials are concerned that the San Gorgonio herd may contract diseases spread by sheep and cattle.

Other herds across the state, including those in the San Jacinto Mountains and the Little San Gorgonio Range, have been infected with livestock diseases, including bluetongue, bacterial pneumonia and shipping fever, Forest Service officials said.

As many as 100,000 bighorn sheep may have inhabited the California desert in prehistoric times before hunting and livestock-borne diseases reduced their numbers to a few thousand.

A ban on hunting, the creation of artificial watering holes and transplantation of sheep into new ranges bolstered their numbers somewhat, and in 1987, state wildlife officials permitted the first bighorn hunt in 114 years.

The San Gorgonio herd is growing and so far appears to have escaped the ravages of mites and disease, Clark said.

"It's a very healthy population," he said. "The reason we're testing is to stay on top of it."

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AN OFFBEAT TALE--BIGHORN SHEEP NUMBER 440

As fate would have it, bighorn sheep number 330 probably met its match with a mountain lion, as did sheep Number 320. But sheep Number 440 had a fatal accident with a sharp object three months later. Is this some fictional accounting of bighorn sheep after the year 2000?

As it turns out, these numbers reflect one of the more offbeat and interesting journals kept by wildlife biologists.

The Department of Fish and Game, working in cooperation with the U.S. Forest Service, initiated a relation of Nelson bighorn sheep from the Angeles National Forest to the Los Padres National Forest in December 1985. The animals were radio collared and marked with tags, and were monitored for up to 3 years or until their death. Each animal was located by biologists upon its death, and a determination as to its cause of death pronounced.

These extraordinary biographies and obituaries not only complete a chapter in a bighorn sheep relocation, but are also one of the very significant components in the overall relocation efforts by Fish and Game. This is because biologists have their own "bottom line" when it comes to numbers of sheep being recruited into a population versus the mortality rates, and these numbers would reflect further management decisions regarding the bighorn population in Ventura County.

If the herd, as first thought, was suffering too much loss from mountain lion predations and other mortality causes, then biologists may have wanted to supplement the population with more sheep or, if the loss too great, abandon the project. Neither of the above proved to be necessary for the new San Rafael Peak sheep herd, but the mortality figures will continue to be watched closely by Fish and Game biologists.

But the San Rafael Peak study in Los Padres National Forest has begun showing greater recruitment of animals into the herd than sheep being lost from the population. In other words, the Ventura sheep are at least sustaining their population, and may be increasing their overall numbers.

No one is exactly sure how half of the radio monitored bighorn died, although conclusions have been drawn from the remains of the animals located through the radio telemetry devices attached to the sheep. But Fish and Game biologists have clearly determined the cause of death for 8 animals--5 sheep were thought killed by mountain lion and 3 died due to a variety of accidents.

Fish and Game biologists determine the fate of the sheep through various pieces of evidence found at the kill site. Drag marks, if the carcass is covered over, what type of other animal droppings are in an area or other identifying characteristics.

For instance, sheep number 280 was a 7 year-old ewe, released in 1985 and died on or about March 26, 1986. The animal was found about 10 miles away from the release site under some bushes in the Gold Hill area, Ventura County. Almost the entire animal had been consumed with only the hind quarters remaining, and the animal was covered with dirt and brush. Biologists say a mountain lion probably killed the bighorn and stashed the remains for another meal.

Sheep number 230 met a similar demise, however the sheep was apparently taken from the lion's cache by bears and finally consumed.

Sheep number 440 met the most unusual end, however. Biologists surmised that the animal somehow punctured itself on a sharp object and bled to death. The 8 year-old ewe had been released in January, 1987 and was located little more than half-mile away from the release area.

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BORN LOOKING FOR A PLACE TO DIE

By Dr. Tom Thorne

To big game hunters and wildlife managers, bighorn sheep are an enigma. They survived the Ice Age while more than half of their contemporaries succumbed. And today, they inhabit the harshest of environments. Yet, bighorn sheep are fragile. More so than any other North American big game species, their numbers and distribution are controlled by disease and parasites. When the first trappers and explorers reached the Rockies, they found about two million bighorn sheep in the badlands and mountains. Because these animals were not plains dwellers, they endured the settling of the West better than the bison, elk, and pronghorn. Market hunters found the plains critters easier prey than bighorns; consequently, wild sheep were never in great demand in the eastern game markets... More importantly, however, livestock encroached on their habitat. By the late 1880s, great numbers of domestic sheep had arrived in Wyoming. Better adapted to the high country than cattle, the domestic "woolies" reduced the range of the wild bighorns, and in all likelihood, exposed them to disease.

Most historians agree that a die-off involving bighorns throughout Wyoming and the rest of the Rocky Mountain region began during the early 1880s and was probably due to the disease scabies. There is disagreement, however, regarding the source of the mite which spread the disease; some believe it came from domestic sheep; others think not. In any case, a die-off or series of die-offs during the late 1800s decimated bighorn sheep herds. Continued uncontrolled hunting further reduced remaining small populations, although it had had little or no impact on the large herds present up to 1880. Since the early 1900s, bighorns have existed at much reduced numbers and, generally, in the high mountains. In a 1942 survey, Wyoming's bighorn population was estimated to be about 2,500.

In a recent survey published by the northern Wild Sheep and Goat Council, 30,700 Rocky Mountain bighorn sheep were estimated to exist in the United States and Canada, with about 6,300 occurring in Wyoming... Habitat loss, especially in badlands and lower elevations, is responsible for the failing bighorn recovery. Some former habitat has been irrevocably altered and other formerly occupied lands now host livestock, deer, or elk to the exclusion of bighorns. Unfortunately, bighorn sheep are not as adaptable to changing habitat as are other species, such as deer and moose. In addition, fire suppression has been detrimental to bighorns...

Wyoming's Rocky Mountain bighorn sheep herds are the envy of most other western states, and resident bighorns have responded favorably to protection from unlimited hunting, and to intensive and innovative management. The herds that winter on or near Whiskey Mountain southeast of Dubois are an example. Although they now make Wyoming one of North America's largest and most

visible concentrations of wintering Rocky Mountain bighorns, that was not always the case. The 1942 survey failed to reveal the number of bighorns inhabiting the Whiskey Mountain area, but it was estimated that only 500 sheep lived in the Wind River Mountains at that time. By the mid 1950s, a study by the department revealed 300 to 400 sheep were using limited winter ranges and that lamb survival to maturity was very low. Subsequently, cooperative efforts of landowners, grazing permits, the U.S. Forest Service, the Bureau of Land Management, and the Wyoming Game & Fish Department resulted in acquisition and reservation of winter range for bighorn sheep in the vicinity of Whiskey Mountain. Bighorns responded to the management of important winter range with improved lamb survival and increased numbers. Between about 1969 and 1972, sheep numbers and resultant forage use on the winter range became too high and lamb survival once again declined. In the late 1970s, lamb survival improved. This was apparently in response to the development of highly effective trapping techniques that allowed the capture of large numbers of sheep for transplant. These transplants were used to control the size of the population. In addition to keeping herd size below carrying capacity of the winter ranges by trapping, other range enhancement procedures were implemented. These included baiting bighorns into previously unused areas to increase the effective winter range size, improved fencing to keep out trespassing livestock, a controlled burn, rangeland fertilization, meadow rehabilitation, and reduction of existing livestock grazing allotments.

Few of Wyoming's bighorn herds use winter ranges as accessible as those of the Whiskey Mountain bighorns or that are largely dedicated to bighorn use. However, other resident bighorn populations seem to be thriving, even though they probably do not produce surplus animals to the extent the Whiskey Mountain herds do. Given that opportunities to increase or enhance bighorn sheep habitats in Wyoming are few, we must consider how secure the state's bighorns are on stable or declining habitats. History has demonstrated that diseases and parasites pose serious threats to bighorns even where habitat losses are not important and that their effects are magnified when bighorns are forced to use deteriorating and inadequate habitats.

Rocky Mountain bighorn sheep are susceptible to many diseases and parasites; some of these are unique to bighorns and others are shared with and occasionally acquired from domestic livestock. Some diseases and parasites only sicken or weaken an occasional individual sheep others cause the death of almost all members of the herd. Historical accounts suggest scabies is one of the parasitic diseases that might extirpate entire herds; it is caused by a tine mite of the genus Psoroptes. The disease has been eradicated in domestic sheep in this country, and cross-transmission trials have shown the scabies mite found on modern bighorns will not infest domestic sheep or other animals. Since the die-offs in the 1880s, scabies has only rarely been diagnosed in bighorns and it generally has involved the ears of

affected animals, where it causes deafness. After an apparent long absence from Wyoming's bighorns, scabies was diagnosed as the cause of death of a mature ewe in 1982. Since then, scabies has been detected in four or five of the state's bighorn herds. Although it may be that scabies has been present without being recognized in these herds since the late 1800s, it seems the infection rate and severity of scabies is gradually increasing. Scabies is also being recognized more frequently in other states and the question arises: Are Rocky Mountain bighorns facing another catastrophic die-off like that of the 1800s. At this time, no one knows. The Wyoming Game and Fish Department is conducting a pilot study to determine if affected sheep can be treated with an antiparasitic drug and if there is an effective way to administer the drug to free-ranging bighorns. It is likely that the most effective control of scabies is to maintain bighorn herds within the carrying capacity of healthy habitats; vigorous, well-nourished bighorns may have sufficient resistance to the scabies mite to avoid developing debilitating or fatal infestations.

Lungworms of the genus Protostrongylus have long been thought of as a major cause of bighorn mortalities. The effect of lungworms on adult sheep is questionable, except lungworms undoubtedly damage lung tissue and predispose heavily infected animals to pneumonia. Clearly, lungworms acquired by a fetus from its mother before birth can cause fatal pneumonia during a lamb's first summer; what is not known is how often this occurs. All Wyoming bighorn herds do have lungworms, but we have no evidence that any herds are so extensively infected with lungworms that they cause any more than sporadic illness and death. Drugs can be used to control lungworms in bighorns, but they are difficult, and in many cases, impossible to administer. Maintaining migratory herds is probably the best way to protect bighorns against severe lungworm-induced losses because sedentary bighorns are more likely to acquire extensive infections.

Pneumonia caused by bacteria, generally of the genus Pasteurella, is probably the greatest modern threat to Rocky Mountain bighorns. Stress seems to play such an important role in predisposing bighorns to pneumonia that is frequently called "stress pneumonia." Stress may occur in the form of adverse weather, overcrowding, malnutrition, excessive harassment by man, and a variety of other causes that haven't been identified. Recent research sponsored by the Foundation for North American Wild Sheep, the University of Wyoming, and the Game and Fish Department showed that stress can cause physiological changes that may make bighorns more likely to develop pneumonia. Certain viruses and parasites such as lungworms may also predispose bighorns to pneumonia. Predisposing viruses and the causative bacteria also occur in domestic sheep and cattle. It is known that pneumonia may be very contagious and is frequently fatal among bighorns. Although Wyoming has experienced a few minor outbreaks of pneumonia, a major pneumonia-induced bighorn die-off had not been recorded here. The most recent and dramatic example

of the potential effect pneumonia may have on Rocky Mountain bighorns began in southeastern British Columbia, Canada, in December 1981. A pneumonia outbreak caused by Pasteurella bacteria spread in several directions and soon began killing bighorns in southwest Alberta. It then spread south through Waterton Lakes National Park in Canada into Montana's Glacier National Park. Hundreds, perhaps thousands of bighorn sheep died before this pneumonia die-off ran its course. Although the initial predisposing factor was not definitely identified, it obviously was not the same among all herds affected. In fact, it appears that once a pneumonia outbreak starts, a predisposing factor may not be required as the disease moves form animal to animal and herd to herd. Sick animals pass such large doses of bacteria to susceptible bighorns by simple contact that the second bighorn's defense against infection are overwhelmed without stress being necessary.

Once started, little can be done to change the course of a pneumonia die-off in bighorns. Antibiotics are not effective in free-ranging animals because there is no way to administer them, and there is no effective vaccine. In parts of Alberta during the recent Canadian die-off, sick sheep were shot in order to reduce the opportunity for animal-to-animal transmission. During the winter of 1985-1986, five sheep were found on Whiskey Mountain that had died of pneumonia. These deaths followed an early period of severe weather. Because a pneumonia die-off was feared, a planned transplant was canceled so the disease would not be inadvertently transferred to another bighorn sheep range. Fortunately, the severe weather abated and a die-off did not materialize. The most effective way to prevent the occurrence of pneumonia in a herd of bighorns is to prevent stress and limit exposure to livestock, both of which are difficult, if not impossible. Some man-induced stressors can be reduced, but it is not possible or desirable to completely eliminate human access to and use of bighorn habitat. Mother Nature's stresses cannot be controlled, although wildlife and range managers can reduce overcrowding and undernutrition. Even well-nourished bighorns enjoying the best of habitats are susceptible to pneumonia if inadvertently or unavoidably subjected to the proper combination of stress and predisposing agents. Concerned wildlife managers can be left feeling pretty helpless.

The vulnerability of bighorns to a highly contagious disease such as pneumonia was vividly demonstrated by another less fatal disease last October. Contagious ecthyma was diagnosed among the bighorns of Whiskey Mountain. Also known as sore mouth, this is a highly contagious, virus-caused disease of domestic sheep. Fortunately, it is not highly fatal. On Whiskey Mountain, the disease was occurring in early arrivals to rutting and winter ranges. By the time it was recognized, about half the bighorns present had sore mouth, and by the end of the rutting season it had affected most of the Whiskey Mountain bighorns.

Thus the enigma of Rocky Mountain bighorns. Despite extensive work to improve their winter range and keep the populations within the carrying capacity of their habitat by trapping, a disease which wildlife mangers have no control over quickly spread through the Whiskey Mountain bighorn herds. Nonfatal sore mouth showed what might be expected if a contagious, fatal disease such as stress-induced pneumonia ever occurs among the Whiskey Mountain sheep, or for that matter, any other large herd. The likely source was domestic sheep, but there is no contact between domestic and bighorn sheep anywhere near the Whiskey Mountain winter ranges. We can only surmise that a few individuals from this highly migratory herd contacted a sore-mouth-infected herd of domestic sheep somewhere on the west side of the Continental Divide during the summer. As they returned to Whiskey Mountain in the fall, they brought the infection with them and it quickly spread throughout the herd. Although no bighorns were known to have died during this sore mouth outbreak, the consequences would have been very different if the disease had been pneumonia. In that case, it is likely most of the Whiskey Mountain bighorns would have died by now.

The unique vulnerability of bighorns to a variety of diseases will never be changed and we can expect occasional disease outbreaks and their consequences to continue to occur. We can only hope that future research will find ways to prevent some diseases or negate their effects. Careful population and habitat management can reduce the occurrence of some diseases. In the long run, however, luck may be one of the most important factors determining the occurrence and consequences of disease in bighorn sheep.

Tom Thorne serves as Game & Fish veterinarian at the department research lab in Laramie. This article reprinted by permission from March 1987 Wyoming Wildlife.

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PREDATORS AND PREY - A CASE OF IMBALANCE

By Anne Harrison
Pacific Southwest Station

Predators are usually considered to be beneficial to ungulate populations by keeping animal numbers in balance with the habitat and removing the weak and old individuals. It is also often said that: 1) predators cannot control a healthy deer population, and 2) predator numbers are controlled by the prey population size.

According to Don Neal, a research scientist with the Pacific Southwest Station's (PSW) lab in Fresno, California, a recent cooperative study by PSW and the California Department of Fish and Game had shed light on a situation where these theories appear to

break down. In the study area on the west slope of the Sierra Nevada, apparently mountain lion numbers have increased while deer numbers declined to about one-eighth their peak numbers in the 1950s. Neal, along with George Steger (also with PSW), studied the California mule deer in the Sierra Nevada from 1970 to 1985 as part of an interagency effort to reverse the decline. This effort showed that the decline was primarily due to loss of fawns during the first 6-8 months of life.

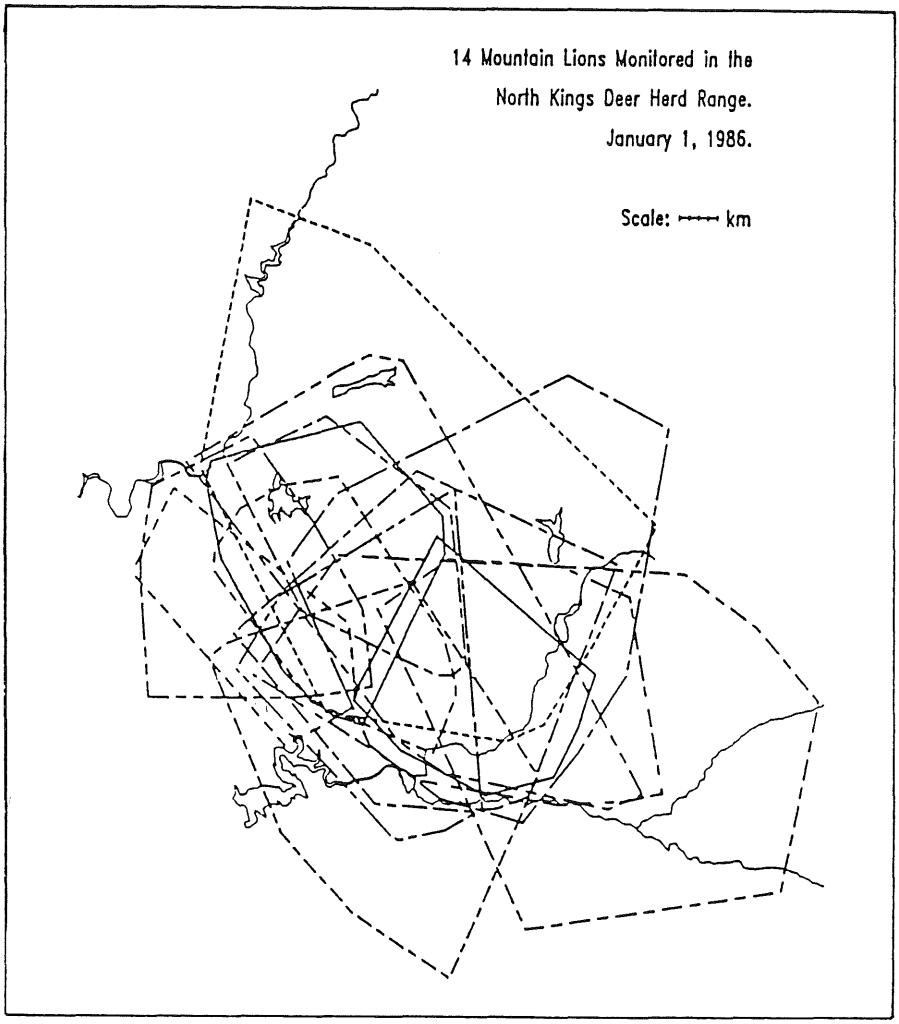
The focus of the study was the North Kings deer herd, a population of California mule deer. This herd declined from an estimated 17,000 animals in 1950 to about 2,000 animals in 1988. While the initiation of the decline was probably a result of overpopulation in the 1940s and 1950s, the lack of recovery seems to be related to heavy predation.

Fawn Survival a Problem

The research team captured 96 newborn fawns and equipped them with radio collars over a 7 year period from 1979 to 1985. These radio transmitters not only allowed the researchers to determine the locations of the fawns, but they also sent out a special signal when the fawns died. This allowed researchers to locate the fawns soon after they died and determine the cause of death. They were able to monitor and determine the fate of 90 of these fawns through their first year of life.

All the fawns were healthy at time of capture, and their size and weight were comparable to those of fawns from other mule deer herds. During the 7 years of the study, fawn survival ranged from 13 percent to 42 percent and averaged 38 percent. Two percent were killed in accidents, 9 percent died from disease or birth defects, and predators were responsible for the deaths of 51 percent of the fawns. Of those taken by predators 3 percent were killed by bobcats, 22 percent by bears, 27 percent by coyotes, and 49 percent by mountain lions.

Neal and his team were at first surprised by these results, because the general perception was that mountain lions were in very low numbers in California--the State Legislature had placed them under protection in 1971. It was obvious that it would require a healthy mountain lion population to be responsible for the death of an average of 25 percent of all the fawns born each year, as was the case in the North Kings deer herd.

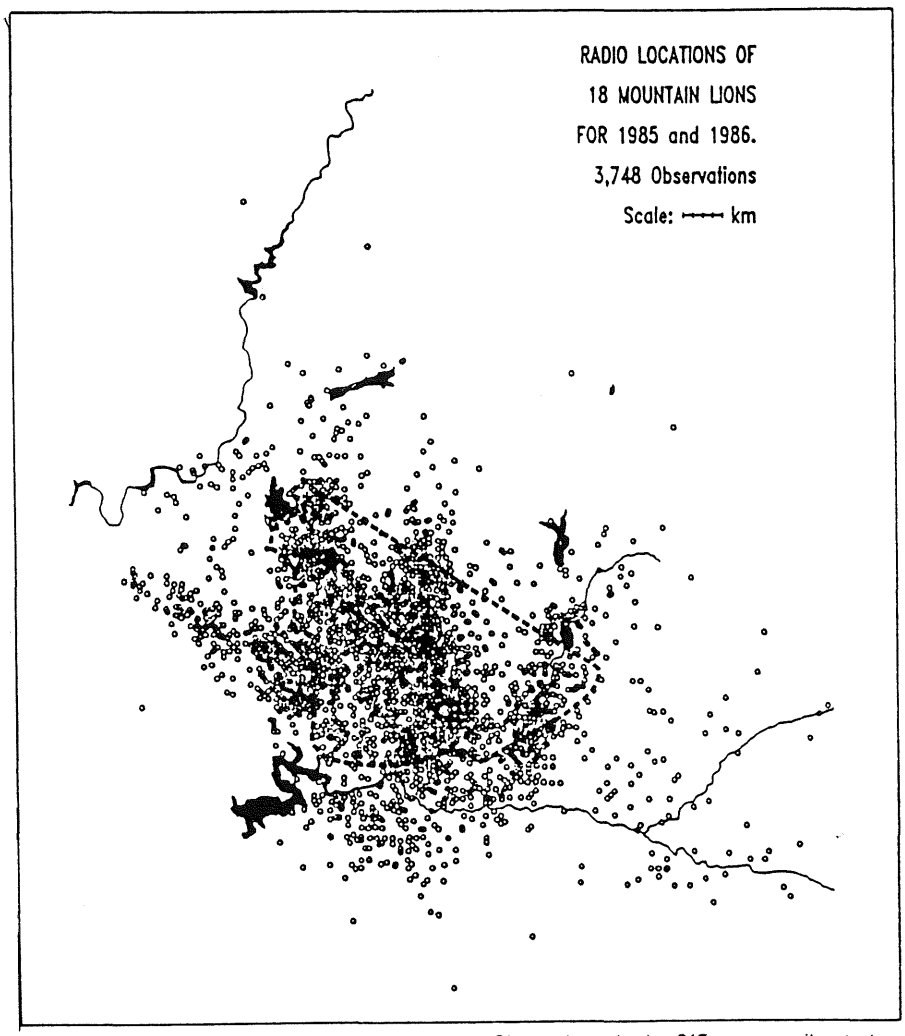


Map indicates the home ranges of the 14 mountain lions used to estimate density within the study area.

A Look At The Mountain Lions

The next step was to look at the mountain lion population and gain some understanding of movements and density. They knew this would not be an easy task. So Neal and Steger asked for the cooperation of Ron Bertram of the California Department of Fish and Game. This team uncovered some surprising results that run contrary to accepted understanding of mountain lion biology and behavior.

First, they selected a 215-square mile area within the 800-square mile range of the North Kings deer herd and set out to capture as many lions as time and funding allowed. Over a period of 3 years, they captured, radio equipped, and tracked 22 mountain lions. During the study they discovered 15 adult mountain lions that were using the area but were not radio-equipped, yet were known to be different individuals.



Shown here is the 215-square-mile study area within the range of the North Kings deer herd, and 3,748 mountain lion radio locations obtained during two years of the study.

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The lion locations determined by radio triangulation werecomputer plotted onto large-scale maps and aerial photos. This gave a good picture of daily and seasonal movements of mountain lions in the study area.

Home-Range Size

By plotting the locations of each cat on a map, the scientists were able to determine the size of the animals home range and the relationships between individual lions. Home ranges of 14 adult lions tracked over 12 months averaged 285 square miles. Those of females averaged 244 and those of males averaged 340 square miles.

Seasonal Movements

Each time a mountain lion was located by radio triangulation and plotted on a map or aerial photograph, the elevation was also recorded. This combination of location and elevation showed that most of the mountain lions migrated to high elevations in the summer and to lower elevations in the winter, following the patterns of the deer--their traditional prey.

However, detailed examination of the data revealed that several of the lions remained at low elevations in the foothills and valley edges throughout the year. They were found on ranches and among the rural communities. These lions occupied territories below most of the migrating deer in the winter, and these areas had no deer in the summer. This leaves only small mammals, livestock, and pets for a diet--a good way for a mountain lion to get into trouble.

Density

With the data on the radio-equipped cats, plus information on the known individuals without radios, the team had the data they needed to estimate mountain lion density.

Of the 22 lions captured and radio-equipped within the 25-square mile study area, not all were alive with operating radios during the entire study period. Therefore, one date was selected, January 1, 1987, and only the 14 lions alive and being monitored on that date were used to estimate density. This of course, underestimates the lion density because it does not include lions without radios that have quit transmitting.

The team recognized that the number of lions using an area, and lion density are not the same thing. Every radio-equipped lion used some area outside of the 215-square mile study area. They calculated the proportion of each animal's home range that was within the study area and used that to estimate density. In other words, if a lion's home range was 50 percent within the study area, it was counted as 0.5 cat. Therefore, the 14 adult cats using the area on January 1, 1987, adjusted to a total of 6.3

lions, or 2.9 per 100 square miles. When the scientists added in the known cats that were not radio-equipped, making a similar adjustment to allow for only partial use of the study area, they calculated the density of adult mountain lions in the study area at 6.1 per 100 square miles.

Home-Range Overlap

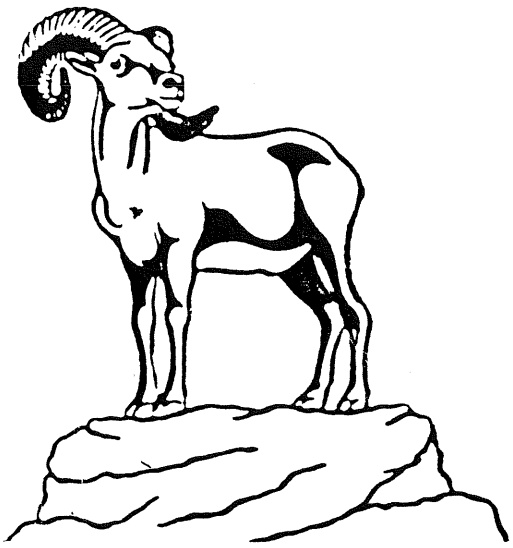
Mountain lions are generally thought to be solitary animals that defend their home ranges for their exclusive use. But, when you look at the density of mountain lions and the size of the home ranges, it's easy to see that if all the female lions maintained exclusive home ranges, there would be 7.2 times as many acres of home ranges as there are available within the study area.

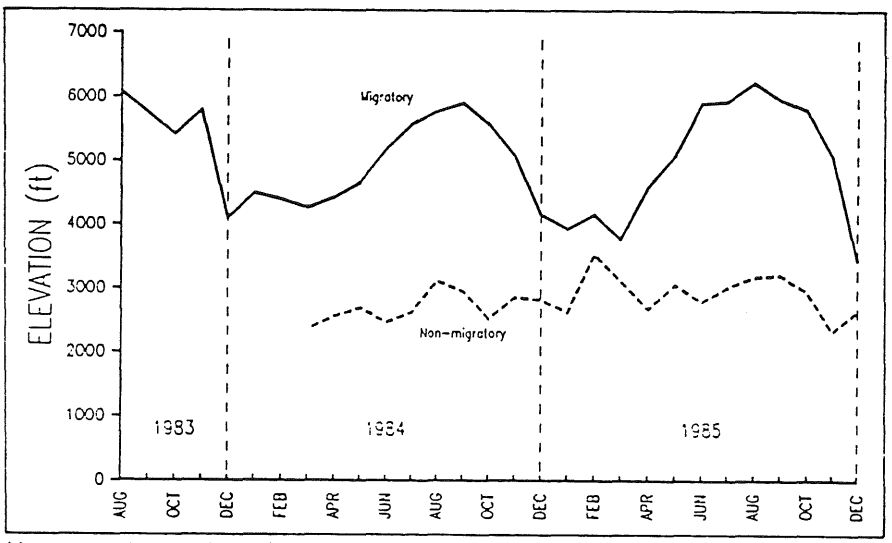
This can only mean overlap and home-range sharing.

Extensive home-range overlap was found between females, between males, and between females and males. One female shared parts of her home range with five other radio-equipped females and an unknown number of males and unradioed lions.

Reproduction

Other workers have stated that when the density of mountain lions reaches the point that home ranges overlap, breeding stops. However, in this study reproduction continued at what appeared to be a normal rate; and litter size averaged about 2.5 kittens. When the known kittens are added, the density of all mountain lions using the area becomes 10.6 per 100 square mile.





Mean monthly elevations of the migratory and nonmigratory mountain lions in the North Kings deer herd range.

Adult Deer Are Being Killed Also

To estimate the effect of mountain lions on adult deer, Ron Bertram and his coworkers with the California Department of Fish and Game radio equipped 25 adult does. Their work revealed that a sizable number of does were being killed by mountain lions in the central Sierra Nevada. Of 25 does radio equipped over a period of 3 years, 12 have died. One was killed by a coyote and 11 by mountain lions.

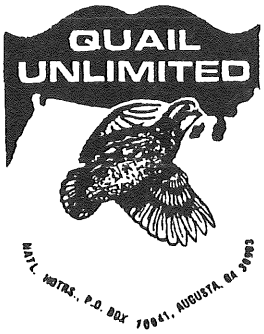
The Bottom Line

The bottom line is that in the study area, mountain lions appear to be controlling an already depressed deer herd, and they are apparently not benefiting the population by taking only the weak and old. The density of the lion population is not limited by the need for exclusive territories, and reproduction is continuing within this high-density population.

The magnitude of the problem can be understood when we consider that the ratio of deer to mountain lions has apparently declined from an estimated 750:1 in 1950 to about 30:1 in 1988. Deer populations cannot meet the needs of the mountain lions and maintain their numbers with the heavy predation that these ratios bring. This is especially true when you consider the additional predation from coyotes, bears, and bobcats.

Livestock losses to mountain lions have become a serious concern of this team. The number of permits to take mountain lions that are killing livestock reached an all-time high in 1988, with 145 issued and 62 lions taken. Neal, Steger, and Bertram expect livestock predation to continue at a high level or even increase, and deer to continue to decline in all but the most favorable years.

To learn more about this subject, contact the Pacific Southwest Station and request Research Note PSW-392, titled Mountain Lions: Preliminary Findings on Home Range Use and Density in the Central Sierra Nevada. Several other manuscripts are in process.



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