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M E M O R A N D U M

The Resources Agency

Date: 18 July 2003

To: Ms. Jane McKeever
Deer Program Coordinator
Region 6

From: Department of Fish and Game - Region 6 (Dr. V. C. Bleich)

Subject: East Mojave Deer Plan

Enclosed herewith, please find 2 copies of subject plan, as requested; I apologize for the delay in getting this to you, but it took me quite awhile to locate it. I have also provided a copy directly to Andy, as he apparently did not have it in his files.

This is the draft that was sent to Wildlife Management Division, and to the Wildlife Management Supervisor in Region 5. It was sent on 18 January 1991 (copy of transmittal letter attached; ironically, that was exactly 12.5 years ago, today), with a request for review and comments to be returned to me. I never received a response from anyone.

I don't know what your intentions are for this plan. Now that we are dealing with deer assessment units, perhaps you, Andy, and Alisa would want to incorporate a greater area into it. Andy has been diligent in continuing to obtain information that is presented in the tables, so they can easily be updated. Additionally, I believe there is additional helicopter survey information, specific to deer, that can be added.

There is quite a lengthy data stream with respect to harvest, and we have detailed records of hunter effort. It would be fun (and, I think, worthwhile) to examine the information with respect to weather conditions, etc., and see what falls out of those analyses (similar to what we did in the Sonoran Desert, perhaps); I'd like to help with that. This data stream is even better and more exciting than the Sonoran Desert stuff, because we have antler class information!

In the meantime, this is the most recent thing I have. The few edits on it are mine and, I obviously didn't get very far into it.

Vernon C. Bleich, Ph.D.
Senior Environmental Scientist

cc: Mr. A. Pauli (with copy of draft plan)
Ms. A. Ellsworth
Mr. B. Kinney

State of California

The Resources Agency

M E M O R A N D U M

Date: 18 January 1991

To: Larry W. Sitton
Wildlife Management Supervisor
Region 5

From: **Department of Fish and Game**- Eastern Units Supervisor, R-5

Subject: Eastern Mojave Desert Deer Managment Plan

Attached is a draft copy of subject plan. Please review the plan, and return it to me with your comments by 31 January. I have forwarded a copy of this plan to WMD and, by copy of this memo, I am requesting their input by the same date.

When I receive comments, I will incorporate them and prepare a clean copy for BLM review and, hopefully, signature.

Thank you for expediting your review.

Vernon C. Bleich
Associate Wildlife Biologist

cc: A. Pauli
T. Mansfield, WMD

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EASTERN MOJAVE DESERT DEER MANAGEMENT PLAN

Andrew M. Pauli

and

Vernon C. Bleich

DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT

California Department of Fish and Game

Long Beach, CA

1991

Approved by:

_____ _____

Fred A. Worthley
Regional Manager
Region 5

Date

_____ _____

Gerald E. Hillier
District Manager
California Desert District
Bureau of Land Management

Date

INTRODUCTION

In response to a serious long term decline in many California deer herds in the late 1960's and early 1970's, the Department of Fish and Game (DFG), with public input, developed a statewide plan for California deer. Consistent with Assembly Bill 1521 (September 1977), the DFG established the policy that 1) planning for deer be on a herd-by-herd basis; 2) selected program elements be included in each herd plan; and 3) herd plan goals generally conform to the goals of the statewide plan.

This plan for the management of the Eastern Mojave deer herd will include: 1) description of the deer population and physical environment which constitutes its range and habitat; 2) management unit goals; 3) problems and potential solutions; 4) management programs, objectives, and recommended prescriptions; 5) alternatives; and 6) references. Since herd plans are dynamic, periodic review and updating are integral parts of the planning process. As additional information is obtained, the plan will be revised appropriately.

The general goals of the statewide plan are to restore and maintain healthy deer herds at a desirable level, and to provide for high quality and diversified use of the deer resource. This desirable level for the Eastern Mojave Herd is characterized by a population with a relatively high proportion of male deer, a consistent and reasonably high buck harvest, and deer numbers in balance with the carrying capacity of all deer habitat included within the plan boundaries.

DESCRIPTION OF DEER HERD MANAGEMENT UNIT

DEER HERD DEFINITION AND HISTORY

Distribution, Herd Range and Population Estimates

The Eastern Mojave deer herd range lies entirely within San Bernardino County and consists of the higher elevations of the Kingston Range, Clark Mountain, the Mescal Range, the Ivanpah and Castle mountains (including Teutonia Peak), the New York, Providence, and Granite Mountains, and the Midhills area (Figure 1).

Historically, deer were not known to occur in this portion of the Mojave Desert. Beginning in 1945 and continuing through 1948, an estimated ~~approximately~~ 68 deer, consisting of a mixture of Rocky Mountain mule deer, California mule deer, and southern mule deer, were translocated into the Providence Mountains area (Leja 1976). In an effort to allow the population to establish itself, the area was closed to hunting from 1950-1954. No population estimates are currently available for this herd; however, ~~results~~ of aerial surveys conducted from 1984-1990 suggest that relative densities of deer in the Clark and Kingston ranges and the Providence/New York/Midhills complex are similar.

Hunting Harvest

Reported buck harvest from the eastern Mojave Desert

mountain ranges was unavailable from unit files for the first four years, but Leja (1976) indicates that 10-11 bucks were taken annually during that time. Harvest data from 1959 - 1990 are summarized in Tables 1 and 2. Annual reported kill for this ~~30~~ 32 year period has averaged 28, and has ranged from nine in 1965 to 48 in 1970. Of this average harvest, 40% were taken in the Mid Hills, 31% in the New York Mountains, 10% in the Providence Mountains, 7% in the Mescal Range, 3% in the Clark Mountains, and 1% in the Kingston Range (Table 1). In addition, a total of 19 antlerless deer were reported harvested during 1963 and 1964.

Hunter pressure data, in the form of opening-day car counts conducted at standard locations, are available for 10 of the past 20 years (Table 3). Prior to 1978, deer hunters in the eastern Mojave Desert were not subject to the zone management system, and hunter opportunity essentially was unlimited. For the period 1978-1984, the eastern Mojave Desert was split between zone D-11 and D-14, or contained entirely within zone D-11. During 1978, when the eastern Mojave Desert was split between D-11 and D-14, car count data were not affected, because all areas counted remained unchanged. (reword) Beginning in 1985, the eastern Mojave Desert was included in zone D-17, along with the Inyo Mountains, and a ceiling of 1,000 tags was placed on the zone.

When average car counts from the three periods described above are examined, a Kruskall-Wallis One Way Analysis of Variance indicated that no differences exist among those car count data ($\underline{X}^2 = 4.06$, $\underline{P} = 0.132$, 2 DF); however, a distinct downward trend is evident. This trend suggests that

implementation of zones may have had some affect on hunter pressure, assuming that the mean number of hunters/vehicle remained constant across years. It is probable that the finding of no differences in average car counts among the three periods is largely a function of the small sample size. When one compares average car counts from 1978-1984 (when, effectively, there was no ceiling on tags), and similar data from 1985-1990 when the eastern Mojave Desert was placed in D-17, along with the Inyo Mountains, and a ceiling of 1,000 tags was in place, the differences become more apparent (Mann Whitney U Test, $\underline{Z} = 1.595$, $\underline{P} = 0.0553$).

Overall, these data suggest that there has been a decline in opening day hunter pressure since 1978, when the eastern Mojave Desert was first placed in a "zone". The difference in pressure is particularly evident when one compares car count data from the period prior to the establishment of D-17 in 1985, with data collected from 1985 forward.

The average deer harvest from the period prior to 1985 and the implementation of a ceiling of 1,000 tags (27.96 ± 10.51, N=25) and the average deer kill from 1985 - 1990 (24.60 ± 5.16, N=5) do not differ (Mann Whitney U Test, $\underline{Z} = 0.556$, $\underline{P} = 0.289$). Thus, it does not appear as though lower hunter pressure, as evidenced by opening day car counts, has resulted in a significant decline in the harvest.

The ramifications of these observations warrant further consideration. For example, the data suggest that it may be entirely possible to provide a great deal of hunting opportunity

in the eastern Mojave Desert, without significantly increasing the deer harvest. Of course, a tradeoff exists; with more hunters and a static harvest, hunter success will be lower. However, in our experience most individuals hunting deer in the eastern Mojave Desert do so because of the aesthetic attributes of that area, including the vast stretches of public land, numerous areas in which to hunt, and the wide open country. When questioned, many of them have expressed their fondness for the area as an important reason for hunting deer in the eastern Mojave Desert.

Continued, careful record keeping will allow deer managers to evaluate the effects of placing the eastern Mojave Desert in a separate zone, with an initial recommended ceiling of 500 tags. After a period of time, changes in the opening day car count can be used to judge whether or not a change in hunter pressure has occurred. Given the long term data set available for this area, the ceiling can be adjusted up or down to achieve a variety of management objectives, and the effects of those adjustments can be evaluated.

Herd Sex Ratio and Composition

Demographic data for deer existing in widely dispersed populations are exceedingly difficult to obtain. All data gathered to date, however, indicate that a high proportion of the population is comprised of male deer. For example, aerial data

obtained from 1984-1990 in the Kingston and Clark ranges indicate males comprised 23.4% of the adult cohort (30.5 males:100 females). Similarly, samples obtained from hunter interviews and by ground observations of Department personnel indicate males comprised 29.4% of the total population in the Kingston and Clark ranges and the Providence/New York/Midhills complex (41.6 males:100 antlerless deer).

From 1984 through 1990, three mountain ranges and one mountain range complexes within the herd area were surveyed, using a helicopter, a total of 15 times (Table 4). The primary purpose of those flights was to obtain demographic data for mountain sheep popuations inhabiting those areas; however, mountain sheep and deer are sympatric throughout the survey areas. During those efforts, a toal of 72 deer were observed during 53.59 hours of rotor time, yielding an extraordinarily low observability rate of 1.34 deer/hour. Significant differences exist among observability rates when the four areas are considered as a group (Kruskall-Wallis 1-Way Analysis of Variance, $\underline{X}^2 = 9.285$, 3 DF, $\underline{P} = 0.0257$); however, when the Granite Mountains are eliminated from consideration, no difference exists among observability rates from the Providence, Clark, and Kingston ranges, suggesting that relative deer densities within those ranges do not differ (Kruskall-Wallis 1-Way Analysis of Variance, $\underline{X}^2 = 2.565$, 2 DF, $\underline{P} = 0.2273$).

In an effort to accumulate an adequate sample for determining the sex structure of the population, observations over several years (1984, 1986, 1989, 1990) were combined for the

Kingston Range and the Clark Range, respectively, and a total of 50 of the 72 deer observed from the air (69.4%) were classified as males, females, or fawns (Table 4). The proportion of male deer comprising the total number of adults observed in the Kingston Range (N = 30) did not differ from the proportion of male deer comprising the total number of adults observed in the Clark Range (N = 17; Fisher's Exact Probability Test, P >0.50, 1 DF). Moreover, the proportion of male deer comprising the total observations in the Kingston Range (N = 32) did not differ from the proportion of male deer comprising the total observations in the Clark Range (N = 18; Fisher's Exact Probability Test, P > 0.05, 1 DF). Consequently, the aerial observations from the Kingston and Clark ranges were combined for further analyses.

Although deer observations were summed over years to generate an adequate sample for statistical comparisons, there is no a priori reason to suspect a change in the sex structure of those populations from 1984 - 1990. For example, the buck harvest in the Kingston Range averaged < 0.15/year, and in the Clark Range the buck harvest averaged 2.4/year during that period. Hence, it is unlikely that hunter harvest has resulted in major changes in the sex ratio of those populations since 1984.

In 1990, in an effort to generate a larger sample size for the purposes of calculating the sex structure of the deer population, hunters were interviewed during the D-17 deer season. Results of those interviews were combined with observations made by Department personnel (hereafter referred to as interview

sample). A total of 68 observations of deer were recorded from the Providence/New York/Midhills complex, the Kingston Range, and the Clark Range using the above described technique.

The technique employed closely approximates the assumptions of sampling with replacement, in that the observations were recorded from individual hunters (or groups of hunters) from widely dispersed parts of the hunt area over the entire deer season. By so doing, we attempted to randomize our sample, thereby decreasing the liklihood of a sample biased by repeat observations of the same groups of deer. Because of the potential for misidentifications of female, yearling female, and young of the year deer, we combined those groups into a single category, termed "antlerless" deer. All antlered deer were combined into another category, termed "males". Thus, the only additional assumptions that we made were that (1) hunters can distinguish "male" deer from "antlerless" deer [an assumption inherent in the hunting regulations], and (2) hunters can count the number of deer in each category; neither of these assumptions is unrealistic.

To further decrease any potential bias in responses to the interviews, hunters were not told ahead of time that they would be interviewed, nor were they told how the information would be used. When we compared the combined results of our aerial samples in the Kingston and Clark ranges with the interview sample (from the Kingston, Clark, and Providence/New York/Midhills complex), no difference existed between the proportion of male deer in either sample ($\underline{X}^2$ Test for Independent

Samples [corrected for continuity], $\underline{X}^2 = 0.479$, 1 DF, $\underline{P} >$

Based on aerial sampling from 1984-1990, and interv sampling during 1990, we conclude that the deer population in the Eastern Mojave Desert contains a high proportion of male deer. Further, we suggest that no difference exists between the proportion of male deer comprising the adult segment of the deer population in the Kingston and Clark ranges. Moreover, we believe that interview sampling may be the most economical way to obtain demographic information, but that further efforts should be made to obtain aerial data. Those efforts should be conducted specifically to sample the deer population, rather than ancillary to mountain sheep demography. Interview sampling should also continue, and further comparisons of data obtained using this technique, data obtained from aerial sampling, should be undertaken.

Mortality

The relative importance of various mortality factors in this herd is unknown. Mountain lions and coyotes are the most common predators inhabiting the eastern Mojave Desert deer management unit. Lions are "deer specialists" and no doubt take deer from this herd. In addition, it seems likely that the extended (now permanent) protection of mountain lions, combined with the translocation of deer into the eastern Mojave Desert, have

resulted in an increase in available lion habitat, and a concomittant increase of the mountain lion population. For example, Johnson et al. (1948) spent a considerable amount of time within the area now occupied by the Eastern Mojave Deer Herd, and reported evidence of neither deer nor mountain lions. No reliable estimate of the mountain lion population is available. Mountain lions do, however, prey heavily on mountain sheep in local mountain ranges, including the Granite Mountains (Wehausen 1990), a range with a resident population of mule deer. We speculate that they prey heavily on mule deer throughout the eastern Mojave Desert.

Coyotes are numerous on much of the range and probably are the major source of predation on Eastern Mojave deer, especially fawns, simply because of the large number of coyotes compared to other predators. However, the overall effect of predation on deer demographics is unknown. Although various species of parasites have been identified in these populations, no cases of extreme parasitism have been noted. With current information, infectious diseases and parasitism are not considered important mortality factors.

Another factor with unknown demographic consequences is nutritional deficiency. Bucks harvested throughout the eastern Mojave Desert generally have been in excellent condition, as evidenced by body fat, suggesting that forage quality and quantity are not limiting factors.

Most of the deer habitat, with the exception of the Kingston Range, is located within the Bureau of Land Management's East

Mojave National Scenic Area. Visitor use, as well as a renewed interest in mining activity, has increased substantially over the past five years. Many activities (traveling on the Mojave Trail, sightseeing, off-road vehicle use, and camping) occur in habitats occupied by deer; the intensity of such uses will increase in the future, and could have important demographic consequences for deer in the eastern Mojave Desert.

HERD RANGE AND HISTORY

Climate and Topography

Climatic conditions vary considerably within the numerous ranges occupied by deer and throughout the Mojave Desert. Arid conditions prevail in all ranges with precipitation ranging from 2.5 to 7.0 inches annually, including some snow in the higher elevations (Weaver et al. 1969, Weaver and Hall 1972). Summer high temperatures range from 80 F to well over 100 F, even at the higher elevations. Winter low temperatures are well below freezing throughout most of the management area. Deer use occurs through a wide elevational range between approximately 3000 feet and 7532 feet, at the highest point in the New York Mountains. In each mountain range, some of the terrain is extremely precipitous, and probably is not used by deer at all.

Locations of Highest Deer Use

Following the translocation of deer into the Providence Mountains, it was quite some time before they established themselves in nearby mountain ranges, and were located by the hunting public. A buck was first reported harvested in the Mescal Range in 1964, but that mountain range did not begin to provide much hunter harvest until well into the 1970's (Table 1). A similar situation exists in the Clark Range; potentially, because this range is further north, more time was needed for deer to become well established. The Kingston Range and the Granite Mountains have resident deer herds but, ostensibly, because of their limited population sizes and number and the poor vehicular access into those areas, neither of those ranges have produced many harvested deer.

Based on deer tag returns, the majority of the deer (81%) are harvested in the Providence/New York/Mid Hills complex (Table 1). Areas of high deer concentration within that complex include the Mid Hills and Hole in the Wall campground areas, Macedonia Canyon, Pinto Mountain, Table Mountain, Bathtub Spring and Keystone Spring.

Vegetation

Vegetation communities used in this plan come from "A Guide to Wildlife Habitats of California" (Mayer and Laudenslayer, 1988). Deer use occurs in all vegetation types described, but is not evenly distributed among the vegetation types.

Pinyon-Juniper Woodland Zone

This zone occurs at elevations of 4000 to 7532 feet in the Mojave Desert. Pinyon pine is the dominant tree, although juniper may be locally important. Shrubs that occur in this zone are big sagebrush, desert and antelope bitterbrush, cliffrose, Mormon tea, rabbitbrush, and nolina. Typical herbaceous species include buckwheat, wheatgrass, and Indian ricegrass. This zone is the most important habitat type for deer found in this herd management unit.

Joshua Tree Woodland Zone

The elevational distribution of Joshua Tree habitats varies from 2500 to 7500 feet, but maximum development occurs above 3300 feet, Joshua trees are the dominant tree and other yuccas, as well as scattered pinyons and junipers, occur. Scrub species include big sagebrush, blackbrush, Ephedra, buckwheat, creosotebush, wolfberry, Opuntia, bladdersage, and Spanish bayonet. Grasses and forbs that occur within the zone are big galleta, bush muhly, and desert needlegrass.

Desert Scrub Zone

This zone typically is found below 4000 feet typically, but

may occur 1000 feet higher on south-facing slopes. Creosote bush is considered the dominant plant of Desert Scrub habitats but its dominance is due to its height rather than density. Other plant species are catclaw, desert agave, brittlebush, burrobush, barrel cactus, hedgehog cactus, Krameria, cholla, rabbitbrush, wolfberry, and Mojave yucca. Forbs and grasses found within this vegetation type include big galleta and Spanish needle.

Desert Wash Zone

These habitats can be found in suitable locations at elevations between 2500 feet and 6500 feet. Canopy species typically found in washes include catclaw, smoketree, tamarisk, mesquite, paloverde, and desert willow. Other important plant species are desert broom, wolfberry, brittlebush, Opuntia, bursage, and desert lavender as well as a variety of forbs and grasses.

Water Distribution

Virtually all mountain ranges within the herd boundary contain numerous springs, tenajas, windmills, catchments, and cattle water developments. In areas that were considered water deficient, big game guzzlers (catchments) have been constructed to benefit both deer and mountain sheep. Two catchments in the Clark range and one in the Kingston Range have been developed, and an additional one is scheduled to be constructed in the

Kingston Range in 1991.

Land Ownership

Approximately 90% of the land comprising the deer habitat in these mountain ranges is owned by the federal government, and is administered by the Bureau of Land Management (BLM). Other landowners include the State of California, the Union Pacific Railroad, and private citizens.

Fire History

There is no evidence of substantial fire damage occurring over the past several decades, with the exception of two fires near Kingston Peak, one in 1982 and another in 1990. However, small lightning-caused fires occur in most of the mountain ranges on an annual basis.

Livestock Grazing

Currently, virtually all areas that might be considered suitable for livestock grazing support cattle allotments. Figure 2 shows the locations of allotments, and Table 2 summarizes the use levels of each. Presently, the nine allotments within the deer herd management area total approximately 35,000 animal use months (AUMs), and encompass over 2000 square miles (Table 5). The effects of livestock grazing on deer habitat will be

discussed under the section on competition.

Mining

Much prospecting has occurred and continues throughout most of the desert mountain ranges, but there is no evidence that these small ventures have had any significant impact on deer habitat. This seems to also be the case at the numerous talc mines in the Kingston Range, which are found primarily at lower elevations and near existing roads. The main threat of mining comes from the loss of large amounts of habitat to the recently developed heap leach mining process. At the present time, the Colosseum Mine is in operation in the Clark Mountains, and the Castle Mine in the New York Mountains is slated to begin operation soon. Deer very likely will be displaced from these areas of extreme activity.

MAJOR FACTORS REGULATING THE POPULATION

Weather

The relationship between precipitation and certain wildlife populations throughout the desert has been well documented. Upland game populations have plummeted to extemely low levels during the drought of the last four years. Conversely, during years of adequate spring rainfall, and the resultant good forage quality production, populations increase dramatically. Such is

probably the case with deer numbers as well. Abundant, high quality forage, resulting from increased precipitation, will improve the condition of does, and very likely will be followed by substantial increases in fawn survival and recruitment, assuming that the population has remained below carrying capacity. Adequate precipitation also recharges springs, which benefit wildlife by allowing increased habitat utilization via dispersal from existing point water sources. Deep snows and winter kill are not a problem within this management unit.

Competition

As stated above, no area utilized by deer in the eastern Mojave Desert is not within a cattle allotment. Cattle and feral burros normally normally are concentrated near water sources, and other sites supporting succulent vegetation (grasses and forbs) that have been shown to be preferred by deer in numerous other localities (Wallmo and Regelin 1981, Short 1981) during certain times of the year.

Competition from cattle and burros can be expected to be of greatest importance during spring and early summer, when nutritional needs of deer (particularly pregnant or lactating does) are high. Poorly nourished deer have very low fawn survival, compared to those on high quality diets (Short, 1981).

In addition to competing for the best forage, cattle and burros may be detrimental to fawn survival in other ways. Riparian areas are important fawning sites (Ashcraft 1977,

Leopold et al. 1951). At such sites, water, suitable hiding cover, and high quality forage normally are in close proximity, and fawn rearing has the greatest chance of being successful. On the west slope of the Sierra Nevada, cattle have displaced does from riparian areas by their presence alone (Ashcraft 1977). Further, once cattle have been in such locations for a period of time, depletion of forage and hiding cover make it less likely that a fawn will escape predation (Mackie 1981).

It is not known to what extent burro numbers and cattle grazing may limit the deer population in the eastern Mojave Desert. However, McCulloch (1955), Gallizioli (1977), and McMahan and Ramsey (1965) found deer production to be substantially lower in grazed, than in ungrazed, areas. It is unrealistic to project that an allotment reduction to increase deer populations will occur, unless it could be shown conclusively that cattle grazing in specific locations substantially reduces deer survival. Under the current administration, federal land management agencies have been encouraged to increase, rather than decrease, grazing opportunities on public lands.

Approximately 400 mountain sheep also occupy the mountain ranges utilized by deer in the Eastern Mojave, but at current population levels and because of different microhabitat preferences (Bleich and Holl 1982), competition with mountain sheep may not be important. However, Weaver et al. (1969) suggested that competition between these species occurs in water deficient areas. Further, they noted a severe decline in deer

and mountain sheep populations in the New York Mountains and Castle Peaks in the early 1960's but, as of 1969, deer numbers had increased and mountain sheep numbers had not. Moreover, Weaver et al. (1969) speculated that, because the population declines occurred simultaneously, "possible conflicts in range use" might occur. That both popoulations declined simultaneously, however, suggests that some factor, perhaps extended drought, may have been more important than "competition" per se. The more rapid recovery of the deer population might be explained by the high biotic potential of mule deer relative to mountain sheep.

Predation

No studies of the impacts of predators on deer populations have been conducted in the eastern Mojave Desert. However, it is reasonable to assume that predation may play a role in regulating the population. Although limited deer demograhpic data are available for the eastern Mojave Desert, it is probable that mountain lions and coyotes take a substantial number of deer each year, particularly fawns.

Numerous studies, in California and elsewhere, have shown that predators take many apparently healthy fawns. A study of fawn mortality in the North King's deer herd found that, of 14 fawns monitored, eight did not survive the summer period, and four of those were killed by mountain lions (Neal 1981). J. Siperek (pers. comm.) found that mountain lions killed six of 52

radio-collared deer in Tehama County, and T. Taylor (pers. comm.) found that mountain lions were an extremely important source of mortality for the Casa Diable deer herd in Mono County. Data collected from the west slope of the Sierra Nevada in the 1940s indicated that the highest predation on deer by coyotes occurred during spring and summer (when fawns were available as prey), when deer made up 19% of coyote diets (Ferrel et al. 1953).

There are cases where coyote control has greatly increased fawn survival. In a study at Fort Sill, Oklahoma, Stout (1982) showed that removal of coyotes from three study sites increased fawn survival an average of 154%. Although it seems likely that a sufficiently wide-spread predator control program would increase fawn survival, such a program presently is not being considered. Predator control, to increase deer numbers, has not been practiced by CDFG for many years. Although current Fish and Game Commission policy provides for predator control, public opinion may be strongly opposed to such a practice, particularly on public land. The CDFG and BLM also recognize the value of all wildlife species, including predators; BLM likely would not allow extensive predator control on public lands without proof of the necessity, and only with substantial public support. An additional objection to a predator control program would be the enormous expense, particularly with the present budgetary problems.

Habitat

Habitat limitations (quantity and quality of forage, water, and cover) are doubtless important factors influencing the deer populations in the eastern Mojave Desert; this is true for most deer herds throughout California (Longhurst et al. 1976). In a sense, such is the case even though predators may be the proximate cause of deer mortalities. For example, it has been shown on the west slope of the Sierra Nevada that only in certain habitat types will fawns normally escape predation (Ashcraft 1977). Since does about to fawn, or with young fawns, are somewhat territorial, a lack of sufficient fawning sites containing food, water, and cover in close proximity may limit the number of fawns that can be expected to survive in a given area. Other habitat limitations may include a lack of sufficient high-quality forage.

Although it is known that some deer populations may occur where no permanent water exists, in most instances water is necessary, at least during the summer months (Wallmo 1981). More information is needed on where deer use occurs and on those habitats that appear suitable, but are not used, before water deficient areas can be defined. Because virtually all deer habitat in the eastern Mojave Desert is managed by BLM, and because of the extreme distances from major population centers, residential and commercial development probably is not an immediate threat.

Hunting and Illegal Take

At the present levels, neither hunting nor illegal take is likely to be a factor controlling the population of this deer herd. The level of illegal take is unknown, but probably is quite low due to low deer densities and, more importantly, the low number of people living in the area.

MANAGEMENT UNIT GOALS

The statewide plan for the management of deer in California has as general goals, maintaining healthy deer herds and providing high-quality, diversified use of deer. Goals for the Eastern Mojave Deer Management Area conform to these general goals, but will be more specific based on the characteristics of this herd and its range.

No counts of deer in eastern Mojave Desert mountain ranges have been made, other than sightings made during mountain sheep helicopter surveys. Because of the expanse of these ranges, a substantial amount of helicopter time will be necessary to obtain a significant demographic sample; such information would then be incorporated into deer management decisions. A total count will never be possible and, consequently, demographic objectives will be expressed as sex ratios. Pending further information on this herd, a ratio of 20 males per 100 females is desirable. Information on current sex ratios will be enhanced, once planned helicopter surveys are completed.

Since virtually all of the range of the Eastern Mojave deer

herd is within public ownership, the goals for the herd range are to: (1) maintain the current land ownership status; (2) maintain or expand, wherever applicable, existing hunter opportunity; (3) improve habitat conditions wherever possible; and (4) prevent deleterious impacts to deer that could result from future land uses.

PROBLEMS AND CONSTRAINTS IN HERD MANAGEMENT

This section identifies major problems and limitations relating to management of deer in the eastern Mojave Desert and their habitat.

1. Estimates of fawn survival will not be available until helicopter surveys are conducted, and adequate samples are obtained. However, based on information from other herds, fawn loss probably is extensive; causes of fawn loss have not been determined.
2. Even if predation is determined to be a a major cause of fawn loss, control of predators does not appear to be a viable option for a number of reasons.
3. Current grazing management may reduce fawn survival; however, changing current grazing practices is politically difficult.

MANAGEMENT PROGRAMS, OBJECTIVES, AND RECOMMENDED PRESCRIPTIONS

Population Management

Objectives:

Collect information that allows for effective management of the Eastern Mojave deer herd. This will include information on numbers and composition, and locations of important concentration areas.

Recommended Prescriptions:

1. Determine the demographics of the most imporant populations of deer in the eastern Mojave Desert, and the location of key concentration and fawning areas. Existing data suggest that relative deer densities are similar in the Kingston and Clark ranges and the Providence/New York/Midhills complex. In an effort to determine if an adequate sample can be obtained, it will be necessary to expend approximately 30 hours of helicopter time in those ranges; because of the increasing harvest, the Mescal Range should be included in this survey effort. If an adequate sample can be obtained, this effort should be continued at least every other year, and preferably annually, as the budget allows.

2. In conjunction with the aforementioned helicopter surveys, a concerted annual effort should be made to obtain demographic data through the interview process. Thus, helicopter surveys should occur immediately prior to, or following, the deer season, so that the interview sample will be comparable. If no differences are found to exist between aerial data and interview data, interview data may be an adequate source of information upon which decisions will be based.

3. As other work commitments allow, investigation of fawning sites, once determined, will be made and these habitats will be compared relative to cattle grazing and other land uses. If it appears that grazing policies might be changed to benefit deer, an experimental research project could be planned to determine the effects of cattle use on fawning habitat.

4. Potential sites for water development to benefit wildlife in the Mojave Desert mountain ranges will be explored. A concerted attempt will be made to discover any water deficient areas within otherwise suitable habitat.

Habitat Element

Objective: Preserve existing habitat against development and improve habitat as methods become available.

Recommended Prescriptions:

The values of habitat for deer will be given full consideration in all land management decisions having potentially adverse impacts on deer populations. The following specific recommendations should be implemented: (1) increases in grazing should not occur where such increases are shown to be detrimental to deer habitat, and reductions in grazing levels should be examined by land management agencies if conflicts with deer are identified; (2) new roads or trails into important deer areas

should not be constructed, where such roads are shown to be detrimental to deer use; (3) development should not be permitted where it might substantially affect areas used by deer; (4) mining activities will be coordinated to reflect concern for deer habitat; (5) water sources for deer and other wildlife should be developed in suitable areas, using appropriate techonology, once those areas have been determined.

Utilization Element

Objective:

Maintain the sex ratio at a minimum of 20 males per 100 females. Allow as much hunting as possible within this constraint, while maintaining a high quality hunting experience and a high percentage, as yet to be determined, of deer $\geq$ 3 points in the bag.

Recommended Prescription:

Zone boundaries will be changed as needed. Presently, a proposal is being considered to create a new zone of the Inyo Mountains and White Mountains and to eliminate the Inyo Mountains from Zone D-17. This will allow the DFG to better determine hunter pressure and distribution within each of the new zones. If the above proposal is implemented, it is likely that no adjustments in zone boundaries will occur in the immediate

future; however, annual adjustments of the ceiling of 500 tags for this zone likely will occur as data accumulate. The overall objective will be to provide a high quality hunting experience consistent with a reasonably high ratio of large males in the deer population.

Law Enforcement Element

The level of illegal kill in the eastern Mojave Desert is not thought to be high. Currently, a substantial amount of patrol effort is expended in locations of known hunter concentrations during the hunting season, and additional effort is expended during the months of November through February to monitor the activities of fur trappers and to prevent the illegal take of deer.

Objectives:

Prevent poaching to the extent possible; provide protection from disturbance of water sources critical to the well-being of deer and other desert wildlife.

Recommended Prescriptions:

1. Patrol efforts will be continued to assure as little poaching as possible. When routine patrols ,or citizen reports, indicate that illegal kill is occurring, patrol will be increased in that

location.

2. The CalTip toll free phone number (1/800/952-5400) in the secret witness program will be publicized.

3. Actively enforce Section 730, Title 14, with respect to camping near water sources.

Informational Element

Objective:

Increase the amount of information distributed to the public regarding deer in the eastern Mojave Desert as it becomes available, so the public can better understand options available for the management of deer populations and habitat.

Recommended Prescriptions:

1. Presentations on the deer management program for the eastern Mojave Desert will be provided to local groups, in response to public interest.

2. Public seminars on management alternatives and habitat requirements of deer in the eastern Mojave Desert should be held on an occasional basis.

Review and Update

Objective:

The Eastern Mojave Deer Management Plan will be reviewed, and updated, as necessary.

Recommended Prescription:

Input from CDFG, BLM, and members of the public will be sought and may be incorporated into the plan as additional data accumulate.

ALTERNATIVE MANAGEMENT ACTIONS CONSIDERED

In any aspect of natural resource management, different values and opinions inevitably lead to different ideas about goals and programs. This section discusses three basic management alternatives to the recommended objectives presented here, and the reasons for not choosing these alternatives.

1. No Hunting

Under this alternative, deer hunting would be discontinued in all portions of the eastern Mojave Desert, except those portions found in zones X-9c and D-12. The total deer population would remain essentially the same, although the proportion of male deer in the population would increase. This alternative would cause the loss of an important, highly valued,

recreational opportunity. The local economy would suffer a loss of money that is now brought in from outside of the imediate area. A "no hunting" alternative would not conform to current CDFG policy, and would generate a considerable amount of local and statewide reaction.

2. Elimination of consideration of deer in agency management practices.

Under this alternative, value of deer habitat would be given no consideration by BLM. Other land uses would be given priority over the maintenance of productive wildlife habitat; grazing levels might increase. This alternative would be most detrimental to deer in the eastern Mojave Desert. Population levels would decline, perhaps dramatically, depending on the level of conflicting land uses that occurred. This alternative would be contrary to existing CDFG policy and to the multiple use policy of BLM.

3. Manage habitat for maximum deer numbers.

Under an alternative of managing for maximum deer numbers, BLM policy would have to be changed. Deer habitat would receive a higher priority than other land uses; no grazing would be permitted, and predator numbers would be severely lowered. Obviously, this alternative would be contrary to BLM multiple use management policy.

Table 1. Reported harvest of male deer from eastern Mojave Desert mountain ranges, 1959 - 1989.

	Mountain Range[1]								
YR	NY	MH	PV	MS	KGN	GRA	CLK	UNK	TOT
59	9	9	1						19
60	21	19	5					2	47
61	13	17	2					7	39
62	13	20	2						35
63	9	11	2					6	28
64	8	5	2					2	18
65	2	4	3						9
66								24	24
67	11	9	3		1			4	28
68	18	10	2	2					32
69	19	23	3			1			46
70	23	17	5					3	48
71	15	13	2					5	35
72	6	7	1				1		15
73	6	4	1		1		1	1	14
74	10	13						2	25
75	7	16	1	5	2			2	33
76	3	10	3	1					17
77	2	11	5	3					21
78	10	12	2	12			1		37
79	6	8		5			1	1	21
80	7	14	3	5			6		35
81	3	12	5			1	4		25
82	5	11	2				2	1	21
83	6	1	7					3	17
84	6	13	3	5			4		31
85	8	13	4	3	1		3	2	34
86	5	7	8	2			4		26
87	2	6	2	2			1	2	15
88	6	13	3	4				3	29
89	5	13	4	6			1		29
90	6	9	3	2			4		24
TOT	270	350	89	58	5	2	33	70	853
AVG	9.3	12.1	3.1	2.0	0.2	<0.1	1.1	2.5	28.4

[1] NY=New York Mtns.; MH=Midhills; PRV=Providence Mtns.; MS=Mescal Range; KGN=Kingston Range; GRA=Granite Mtns.; CLK=Clark Range; UNK=Unknown

Table 2. Antler classes of male deer harvested from the eastern Mojave Desert, 1968 - 1989. Numbers in parentheses are percentages.

Year	Antler Class			Total
	2 pt.	3 pt.	4 pt.	
1968	8(25)	14(44)	10(31)	32
1969	21(46)	16(35)	9(19)	46
1970	27(56)	13(27)	8(17)	48
1971	9(26)	21(60)	5(14)	35
1972	7(33)	10(48)	4(19)	21
1973	2(14)	7(50)	5(36)	14
1974	17(68)	6(24)	2(8)	25
1975	12(37)	11(33)	10(30)	33
1976	8(47)	6(35)	3(18)	17
1977	10(48)	7(33)	4(19)	21
1978	10(27)	15(41)	12(32)	37
1979	4(19)	8(38)	9(43)	21
1980	12(34)	13(37)	10(29)	35
1981	14(56)	9(36)	2(8)	25
1982	10(48)	6(28)	5(24)	21
1983	10(59)	3(18)	4(23)	17
1984	16(53)	8(27)	6(20)	30
1985	18(53)	11(32)	5(15)	34
1986	10(36)	13(46)	5(18)	28
1987	4(27)	6(40)	5(33)	15
1988	13(45)	11(38)	5(17)	29
1989	9(31)	17(59)	3(10)	29
1990	7(29)	13(54)	4(17)	24
Total	258(41)	244(38)	135(21)	637(100)
Mean	11.2	10.6	5.9	27.7

Table 3. Number of vehicles observed on opening day of deer season at standard locations in the Providence/New York/Midhills complex.

Year	Aerial Observations	Ground Observations
1971	150	
1974	163	
1978	102	
1979	173	
1981	131	
1982		70
1984	99	
1985		91
1987		110
1990	97	

Table 4. Observations of mule deer made during mountain sheep aerial surveys in four areas of the eastern Mojave Desert. The number of males, females, and young of the year are presented parenthetically following the total number seen. Total survey time is presented, parenthetically, below the demographic data.

	Mountain Range			
Date	Providence[1]	Kingston	Clark	Granite
6/84		5 (2B:3D) (4.50 hrs)		
9/84			7 (1B:6D:1F) (6.80 hrs)	
4/85				0 (1.10 hrs)
11/86		15(4B:8D:3F) (5.40 hrs)	10 (2B:8D) (7.20 hrs)	
8/88				0 (5.0 hrs)
10/88				0 (2.0 hrs)
9/89	16 (9.16 hrs)	2 (5.75 hrs)	4 (3.60 hrs)	0 (2.0 hrs)[2]
2/90		3 (3D) (0.78 hrs)		
6/90				0 (2.0 hrs)[2]
9/90		10 (2B:8D) (5.47 hrs)	0 (4.93 hrs)	
Total deer	16	35	21	0
Total time	9.16	21.90	22.53	12.20
deer/hour	1.75	1.60	0.93	0.0

[1] Includes the Providence, New York, Midhills, and Woods ranges.
[2] Flight time estimated from field notes.

Table 5. Livestock allotments within the range of mule deer in the eastern Mojave Desert.

Allotment Name	Type	Acres	AUMs
1. Clark Mountain	Cattle	88,312	1892
2. Colton Hills	"	147,827	2880
3. Crescent Peak	"	31,780	1560
4. Granite Mountain	"	276,125	4716
5. Gold Valley	"	16,190	1200
6. Horse Thief Spgs.	"	137,418	2424
7. Kessler Spgs.	"	252,172	8016
8. Lanfair Valley	"	339,553	12168
9. Round Valley	"	653	27
Total		1,290,030	34,863