

BLUE CANYON DEER HERD MANAGEMENT PLAN



U.S. Forest Service - California Department of Fish & Game

IN THE CIRCUIT COURT OF THE FIRST JUDICIAL DISTRICT
OF THE STATE OF FLORIDA

WILLIAM T. BARNETT, JR.



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W-51-R, Big Game Investigations.

THE BLUE CANYON DEER HERD
MANAGEMENT PLAN^{1/}

May 1982

by

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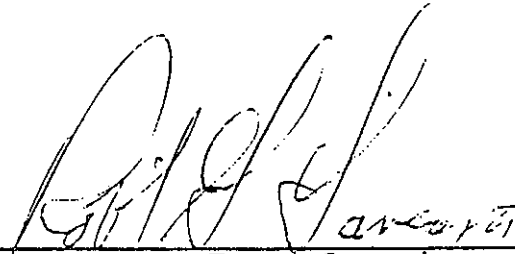
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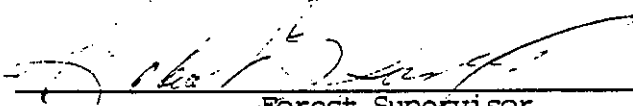
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May 17, 1982

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Date

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I. INTRODUCTION

The deer herds of California are a resource of great economic and esthetic value to the people of the state. California was among the pioneer states in recognizing these values and afforded deer some legal protection as early as 1852. The mandate to manage the resource has been the responsibility of the California Department of Fish and Game since the inception of the agency. At the turn of this century, deer populations were at extremely low levels on most ranges, primarily due to unrestricted market hunting and habitat alteration (Longhurst et al. 1952). The programs and regulations established at that time were highly successful in rebuilding the state's deer populations to a high point during the 1950's.

Beginning in the 1960's, most California deer herds began to exhibit serious long-term population declines (Longhurst et al. 1976). In 1976, Department personnel, with considerable public input, formulated a statewide strategic plan for deer management to address the problem. Emphasis was added to the program by legislative mandate (AB-1521, September 1977). The mandate was translated into a new policy by the Department and the Fish and Game Commission requiring that:

- 1) planning for deer management be on a herd basis, 2) specific program elements be included in each plan, and 3) herd plans generally conform to the statewide strategic plan.

This document conforms to the general legislative mandate and Department policy commitment as a management plan for the Blue Canyon deer herd. The plan includes: 1) a description of the deer herd and the physical environment which constitutes its range and habitat; 2) management unit goals; 3) specific management problems; 4) management programs, objectives, and prescriptions for those problems; 5) alternatives to proposed programs and prescriptions; 6) selected references; and 7) appendices containing supporting information. Since a herd management plan must

be dynamic to be successful, periodic review and updating are integral parts of the planning process. As additional information is obtained, the plan will be revised as is appropriate.

Comprehensive planning for the Blue Canyon deer herd is particularly important for several reasons. The magnitude of the population decline implicates serious deer habitat degradation. As will be discussed in subsequent sections of the plan, the Blue Canyon herd appears to have declined approximately 50-65% from the most reasonable peak population estimates. This is, of course, a decline of tremendous magnitude. The herd is located in close proximity to a metropolitan area (the greater Sacramento area) and thereby receives attention from a large public. Under appropriate conditions, the herd could provide at least a 100% increase in both consumptive and nonconsumptive resource use. By virtue of the proximity of the herd to large urban centers and the intensity of multiple resource use programs on both public and private lands, the Blue Canyon area is likely to be heavily impacted by development and habitat modification. A comprehensive management plan is needed to evaluate alternatives for deer herd restoration and corresponding habitat capacity increases as well as potentials for harvest under various strategies.

This plan is intended to provide guidance to land management agencies, local governments, and private landowners in making resource allocation decisions which will dictate the future condition of the Blue Canyon deer herd. Contact with land management agencies and interested publics, including the Placer County Board of Supervisors, Placer County Fish and Game Commission, and Foresthill Rod and Gun Club, identified a number of major issues and concerns related to deer management including the following:

1. Demand for increased deer harvest.
2. Increasing demand for multiple resource use on both public and private lands (timber, livestock, water development).

3. Influence of predators and illegal take on deer.
4. Long-term deer habitat deterioration.
5. Increasing pressures for residential and recreational development of deer range.
6. Lack of specific deer herd and habitat inventory data.
7. Opportunities for deer habitat enhancement in conjunction with other resource management programs.

Coupled with appropriate laws, regulations, and policies, these and other issues and concerns were the criteria used to evaluate goals for the Blue Canyon herd.

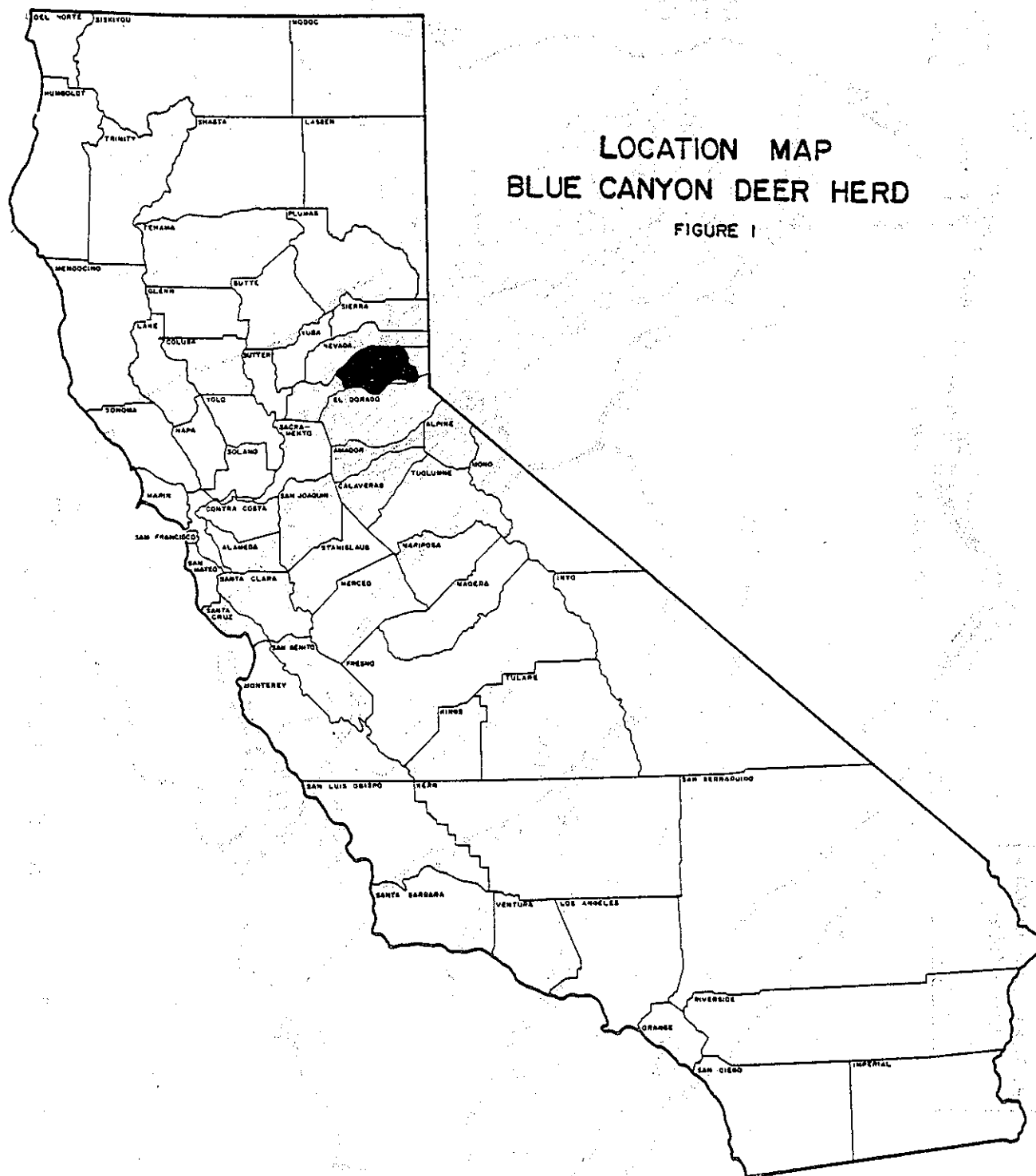
II. DESCRIPTION OF DEER HERD MANAGEMENT UNIT

A. Herd Definition and History

1. Herd Definition

The Blue Canyon deer herd is located in eastern Placer County, California (Figure 1). The herd seasonally occupies an area of approximately 454,800 acres (711 square miles). The boundaries of the herd unit were delineated by the use of radio telemetry and are defined as follows: 1) the eastern boundary follows the Sierra Crest from Ellis Peak north to Norden; 2) the north boundary follows Interstate 80 to Emigrant Gap and thence down the Bear River to Colfax; 3) the west boundary runs southeast from Colfax, through Foresthill, to the American River (Middle Fork) near its confluence with the Rubicon River; and 4) the south boundary follows the Rubicon North Fork east to Miller Creek and thence to the Ellis Peak area (Figure 2). The herd takes its name from a major canyon located near the center of the northern portion of the range. It should be noted that the Blue Canyon herd essentially covers the majority of hunt zone D-4. The actual D-4 zone extends into the Central Valley floor, but very few deer are harvested in that area. The vast majority of deer killed in zone D-4 are thus from the Blue Canyon herd.

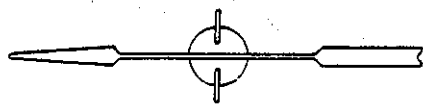
The Blue Canyon herd consists of a sub-unit of migratory deer (comprising the majority of the herd), and another sub-unit of resident deer in the western portion of the range (see Figure 2). Three subspecies of mule deer are found in the herd: 1) Columbian black-tailed deer (Odocoileus hemionus columbianus); 2) California mule deer (O. h. californicus); and 3) Rocky Mountain mule deer (O. h. hemionus). Columbian black-tailed and California mule deer winter together in the western portion of the range. Trapping and telemetry studies show that Rocky Mountain mule deer summering with the Blue



**BLUE CANYON
DEER HERD
PLACER AND NEVADA
COUNTIES**

1982

FIGURE 2

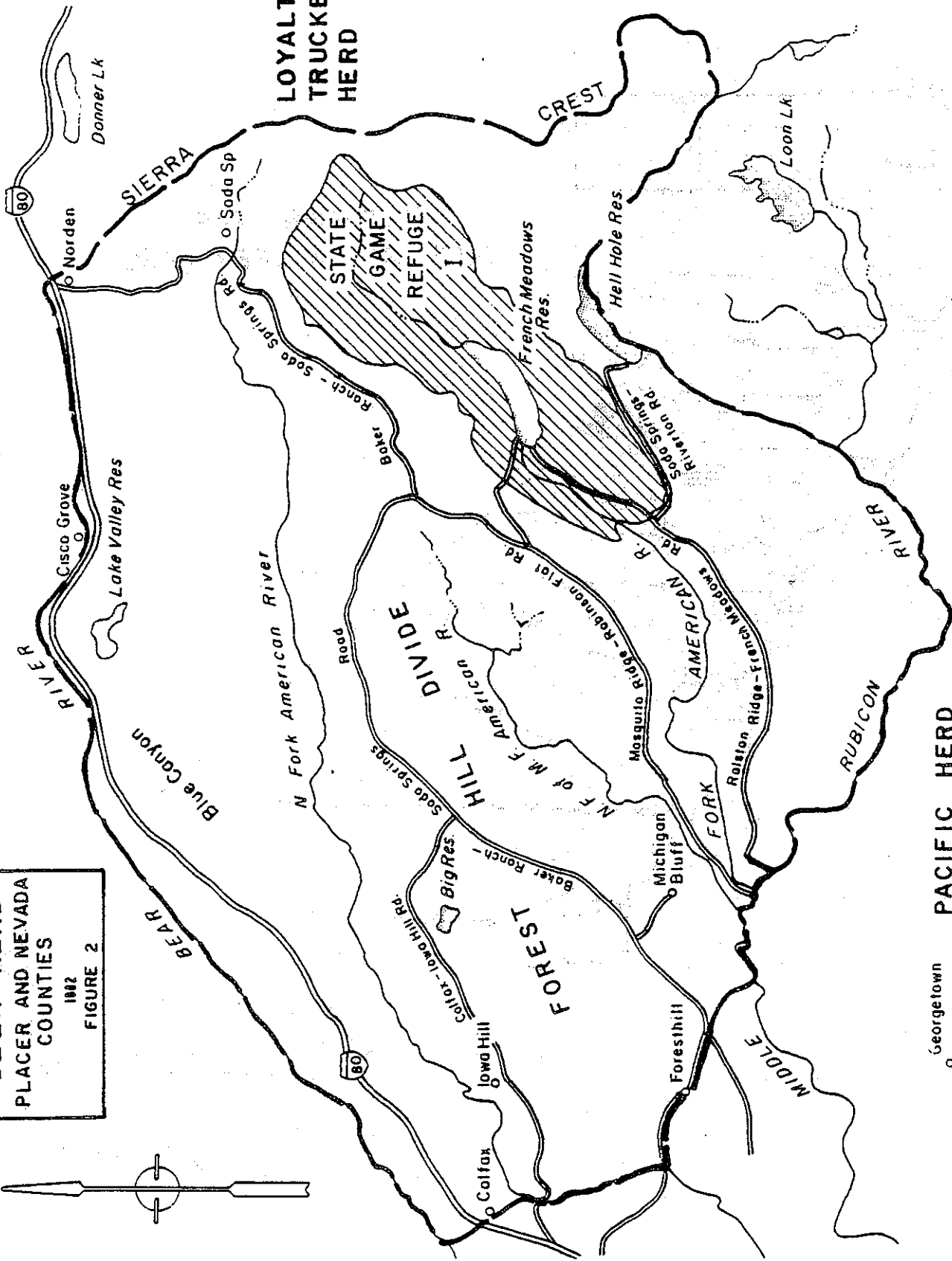


NEVADA CITY HERD

LOYALTON-
TRUCKEE
HERD

PACIFIC HERD

Georgetown



Blue Canyon herd spend the winter on the Loyaltown-Truckee herd winter ranges in the Verdi Basin area. There may be a basis for future delineation of two subunits of the migratory herd, based on wintering areas. Telemetry studies indicate two wintering areas, separated by the Foresthill Divide, with little or no cross-migration between the two.

2. Early History

J. C. Fremont (1853) reported that deer were abundant in the foothills of the Sierra Nevada during his explorations. Most of these deer inhabited chaparral and oak woodland habitats. Detailed accounts concerning deer are lacking for the mature coniferous forest on the eastern portion of the range. It is unlikely, however, that deer were numerous in this area until after the commencement of early logging operations. Conditions had probably been more or less stable in recent centuries.

With the gold rush, the status of the deer herds changed significantly. The Blue Canyon area was then a portion of the heart of the Mother Lode district and quickly became inhabited by miners who utilized deer as a food source (Hittell, 1911). Market hunting operations were also begun at this time, and large numbers of deer were killed for commercial profit during the next half century (Longhurst et al. 1952). Although market hunting remained profitable until approximately 1903, the effect of such unrelenting hunting pressure was to devastate deer herds in many areas.

3. Estimated Herd Size

a. Historical Herd Size

Early historical population size estimates are lacking for the Blue Canyon herd. Estimates made by Longhurst et al. (1952) indicate an average summer population density of 9 deer per square mile; winter density was estimated to be 33 deer per square mile. They estimated an average population of approximately 8,000 deer during the period 1947-49. This

estimate was based on general assessments of the carrying capacity and status of the range as well as harvest records for the area. The estimate must therefore be regarded as somewhat crude. The range was characterized as overstocked at that time, and range quality was thought to be declining.

b. Estimated Current Herd Size

Data currently available for the Blue Canyon herd are insufficient to allow sophisticated estimates of the current population size using harvest data, age class structure, and change in sex ratios. Population size was estimated using primarily kill data. The method described by Dasmann (1952) results in a ratio of deer remaining in the population per legal buck harvested, by estimating herd productivity. The herd productivity estimate is based on fawn recruitment (fawn survival over winter), and the method assumes a reasonably constant harvest rate. In the Blue Canyon herd, the resulting ratio is 10.5 deer remaining per legal buck removed. The estimated population sizes for the years 1957-80, using this method, are presented in Table 1. In the estimate calculation, reported kill is corrected for unreported kill (32% based on locker checks by Department personnel) and assumed crippling loss (20%). It should be noted that the correction factor for unreported kill is thought to be inaccurate for the years 1967-69, since self-validation of deer tags was allowed. A substantial increase (of unknown magnitude for the Blue Canyon herd specifically) in unreported kill was suspected (Craig and Ashcraft 1976). The mean population estimate for the period 1976-80 is 5,372 deer using this method. The estimates obtained in this manner probably represent minima for the years indicated.

Another method, described by Anderson et al. (1974), yields a population size estimate using the actual buck kill and two proportions; the proportion of the total population consisting of legal bucks, and the proportion of all legal bucks removed by hunting. Both these proportions

TABLE I

ESTIMATED ANNUAL POPULATION SIZE 1957-80*

BLUE CANYON DEER HERD

<u>Year</u>	<u>Reported Kill</u>	<u>Population Estimate**</u>
1957	277	4,607
1958	326	5,422
1959	403	7,035
1960	615	10,228
1961	572	9,514
1962	576	9,580
1963	524	8,715
1964	884	14,703
1965	605	10,062
1966	740	12,307
1967***	284	4,723
1968***	363	6,037
1969***	447	7,434
1970	481	8,000
1971	455	7,568
1972	424	7,052
1973	292	4,856
1974	228	3,792
1975	190	2,633
1976	252	4,191
1977	458	7,617
1978	277	4,607
1979	369	6,137
1980	259	4,308

*Using method from Dasmann (1952) [Pop. Est. = 10.5 (Buck Kill)].

**Estimates are based on reported kill, corrected for non-reported kill (32%) and crippling loss (20%).

***Correction factors used, but do not accurately apply due to self-validation of tags and subsequent increase in non-reported kill.

are subjective estimates made by the biologists most familiar with the herd. The proportions estimated for the Blue Canyon herd are that legal bucks comprise 16% of the total population, and 54% of all legal bucks are harvested annually. Using estimated actual buck kill for the years 1964 and 1980 (the peak and current harvest levels), population estimates are 15,683 and 4,595 deer, respectively. The mean population estimate for the years 1976-1980 is 5,730. These figures are somewhat higher than, but roughly comparable to, the estimates generated by the Dasmann method.

The peak estimate (15,683 in 1964) is considerably higher than the estimate made by Longhurst et al. (1952), who felt that the range was overstocked at that time. The reason for this is probably related to the fire history of the region, which will be discussed in the section concerning range history.

c. Population Size Trends

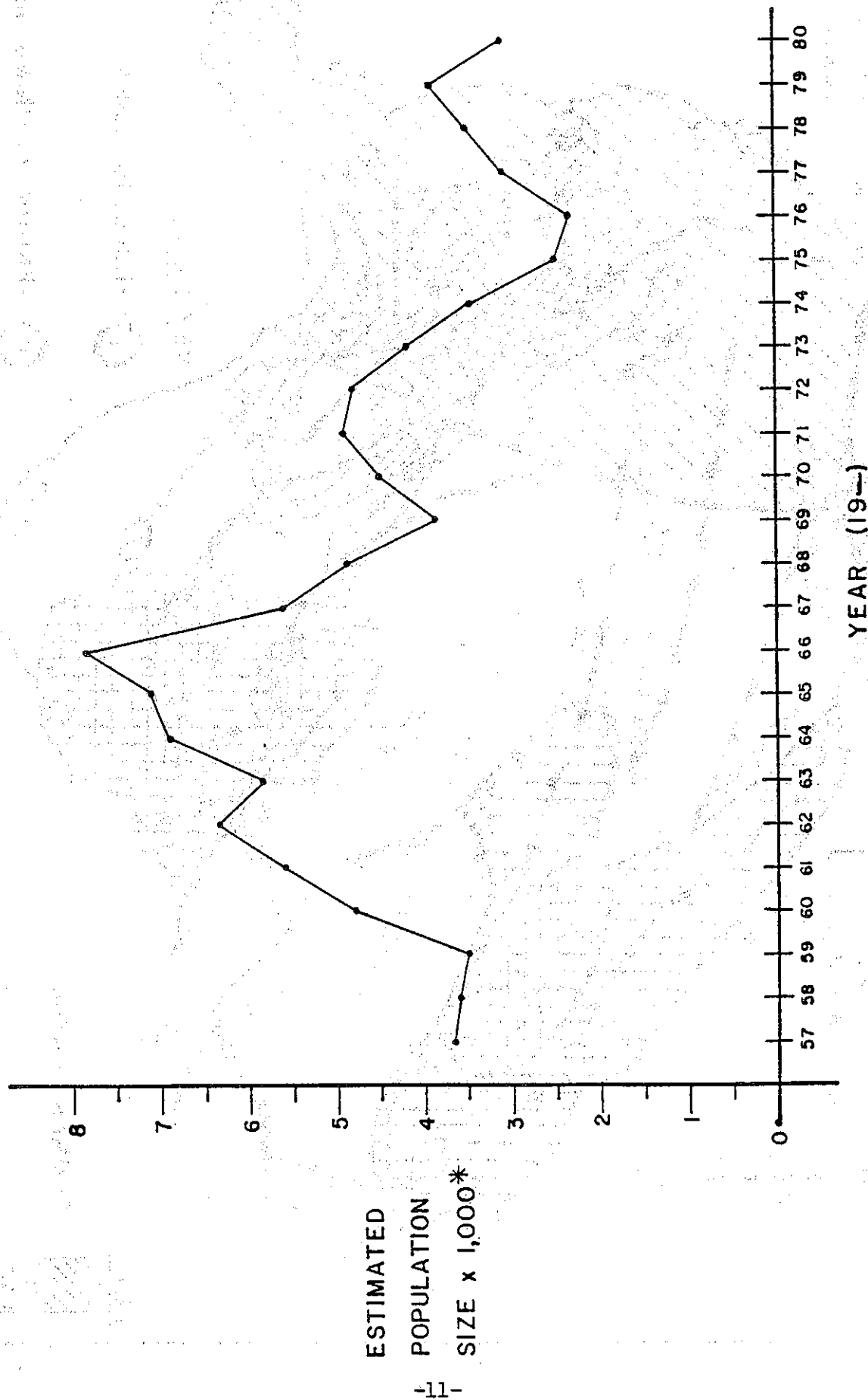
The determination of population trends does not require the absolute population sizes for the years considered, but merely a consistent index of size. The Dasmann (1952) method of population size estimation will serve as this index. A certain amount of variability, independent of deer abundance, is to be expected in annual harvest data. To reduce this variability, a 3-year period average of buck kill was used as the kill for a given year. This average was used in estimating the population size for the given year. The estimates calculated for the years 1957-80 are illustrated in Figure 3. The trend indicated is one of general decline since the mid-1960's.

4. Herd Migration and Seasonal Ranges

Seasonal ranges, holding and fawning areas, along with migration corridors, are generally depicted in Figure 4. Two entirely separate winter ranges are indi-

POPULATION SIZE TREND BLUE CANYON DEER HERD

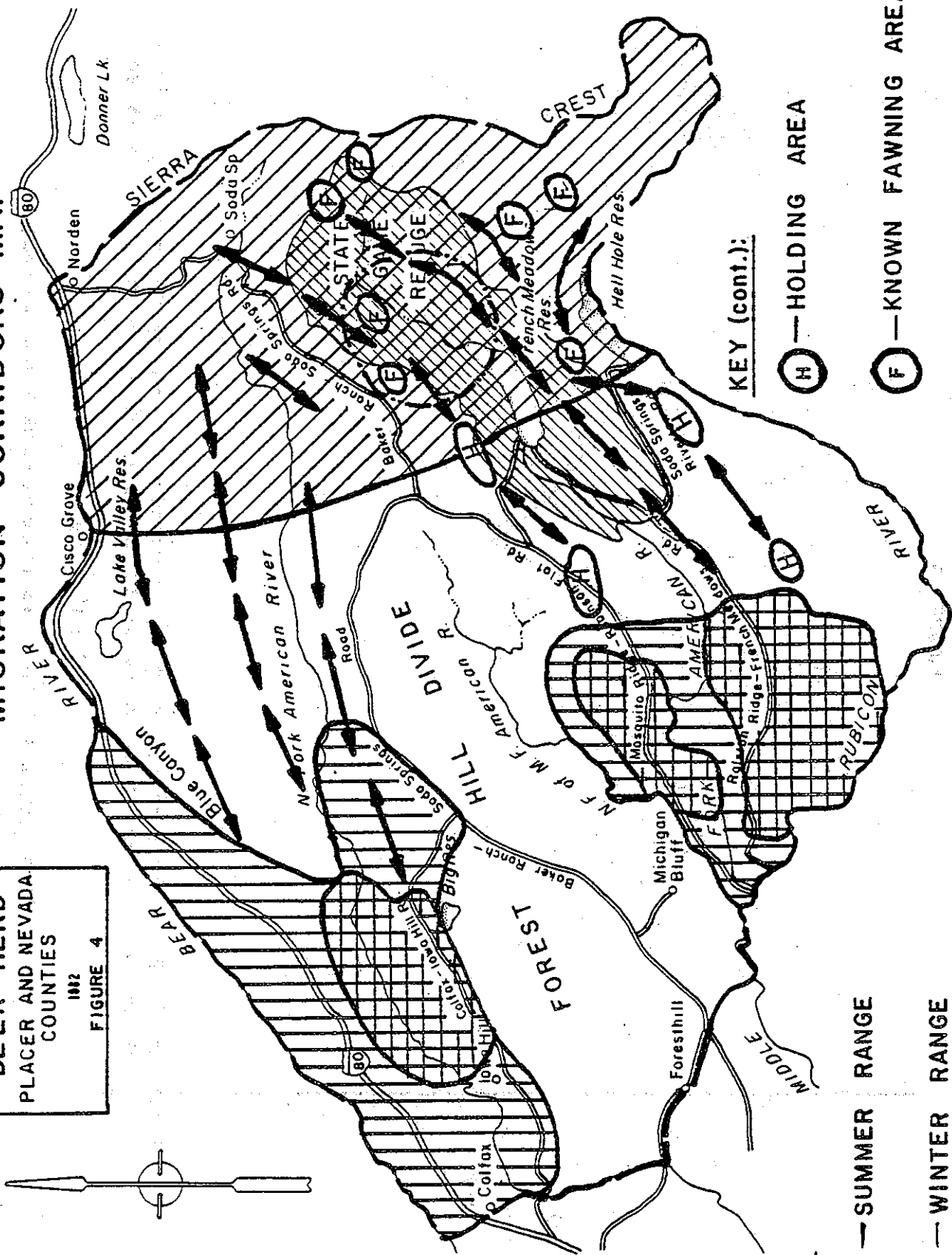
FIGURE 3



* POPULATION SIZE ESTIMATES BASED ON PRIOR 3 YEAR AVERAGE
OF REPORTED BUCK KILL (UNCORRECTED FOR NON-REPORTED KILL
OR CRIPPLING LOSS) AND METHODS FROM DASMANN (1952).

**BLUE CANYON
DEER HERD
PLACER AND NEVADA
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FIGURE 4



KEY (cont.):

KEY:

—SUMMER RANGE

— WINTER RANGE

—KEY WINTER RANGE

—HOLDING AREA

F—KNOWN FAWNING AREA

SUSPECTED MAJOR
FAWNING AREA
BOUNDARY

cated. The Foresthill Divide appears to be used by resident deer which are the source of hunter kill in that area. The term intermediate range is used here to describe those portions of the range located between summer and winter ranges which are used during migration. Because of topographical and climatic factors, the extent of the intermediate range varies annually as deer react to current climatic conditions.

The summer range is generally defined as having lower limits roughly extending from Cisco Grove on Interstate 80 to the area just west of French Meadows and Hell Hole reservoirs. Known and suspected fawning areas are distributed within the summer range between 6,000-9,000 feet in elevation. Four distinct holding areas have been documented; all are located in the southern half of the unit. Three of the four holding areas are on ridge tops, the fourth in a canyon bottom.

In general, snowfall is the controlling factor in migration for the Blue Canyon herd. The first heavy snows trigger fall migration, and during years of extremely light precipitation, some deer do not enter the winter range at all. Migration corridors tend to run along ridge tops, although some do follow canyons to a certain extent.

During the years 1977 and 1978, a total of 32 deer were trapped and tagged on the Blue Canyon winter range. The trapping sample consisted of: 8 adult does, 13 adult bucks, 1 yearling female, 2 yearling males, 6 female fawns, and 2 male fawns. All deer were marked with white plastic numbered T-lok tags and a metal numbered cattle tag. Radio collars were placed on all adult does which were captured. All radio collars were monitored weekly from Department aircraft. Numerous additional checks were made on the ground from vehicles and by horseback. Migration corridors were delineated for both spring and fall migration. In addition, holding areas and fawning areas were determined. It was

established that deer from the Blue Canyon unit do not cross the Sierra Crest and summer in the Tahoe Basin. Five of the 14 tagged bucks were reported hunter kills; 1 collared doe was illegally killed.

5. Herd Composition and Harvest Information

a. Herd Composition

Composition data for the Blue Canyon deer herd are presently inadequate. Sample sizes are generally small (due mostly to the presence of heavy cover in sampled areas and manpower limitations). There are also several gaps in the data. From 1963-1968, Department personnel were not available to conduct the surveys. During the winters 1968-70, 1973-74, 1974-75, and 1975-76, there was insufficient snowfall to drive the deer down to the winter range, where the surveys are made. Herd composition data from 1957 to present are summarized in Appendix 1. These data were compared with composition data from the Pacific deer herd (which adjoins the Blue Canyon herd on the south boundary) to give a more complete picture of herd composition. Significant differences ($p < .01$) were found only in the mean number of fall fawns per 100 does between herds; the Pacific herd having more fall fawns.

Buck-doe ratios ranged from 16:100 to 47:100 with the mean for all years surveyed in the Blue Canyon herd being 31:100 does. Fall fawn ratios ranged from 40:100 to 86:100, the mean being 58:100. Spring fawn counts are too few and far between to be meaningful.

The age class structure of hunter-killed bucks is presented in Appendix 2. Sample sizes are too small to be meaningful in some instances, but in general, 2-year old bucks comprise the largest proportion of the kill.

b. Hunting Harvest

1. Buck Harvest

The reported buck kill data for the years 1955-1980 are presented in

Table 2. Harvest ranged from 884 in 1964 to a low of 190 in 1975. Mean annual buck kill for the period 1955-1980 is 426. Figure 3 illustrates buck harvest trends, as the population size curve depicted is directly related to the prior 3-year average of buck kill. The trend indicated is one of decline since the middle 1960's.

2. Antlerless Harvest

Antlerless hunts were held in the Blue Canyon herd during the years 1956 and 1960-1972. Harvest levels during those years are presented in Table 2. With the exception of 1956, none of the hunts resulted in a kill of more than 80 animals. Mean annual antlerless harvest for the years indicated was 60 deer. No further antlerless hunts have been held since 1972, due to a declining deer herd and local public opposition. Figure 5 is a graphical summary of the combined buck and antlerless kill for the years 1955-1980. The mean annual combined harvest for the period shown was 462 (approximately 6-10% of minimum population).

3. Topographical Kill Distribution

Areas of highest buck kill density in the Blue Canyon range are depicted in Figure 6. The map was prepared from Department spot kill maps. Kill density is probably more an indicator of hunter density and access availability than deer density. The area adjacent to State Game Refuge 1-I shows the highest buck kill, followed by the areas near Big and Hell Hole reservoirs. The harvest from the Big Reservoir area is probably composed of resident deer, since that area is not part of the Blue Canyon herd summer range. As indicated, a relatively small proportion of the total range accounts for the majority of the harvest, assuming deer tag information reflects actual kill location.

TABLE 2

REPORTED DEER KILL BLUE CANYON HERD

A. Reported Kill 1955-1980

<u>Year</u>	<u>Bucks</u>	<u>Antlerless</u>	<u>Total</u>
1955	343	---	343
1956	436	228	664
1957	277	---	277
1958	326	---	326
1959	403	---	403
1960	615	3	618
1961	572	10	582
1962	576	34	610
1963	524	39	563
1964	884	45	929
1965	605	51	656
1966	740	74	814
1967	284	79	363
1968	363	36	399
1969	447	47	494
1970	481	36	517
1971	455	79	534
1972	424	76	500
1973	292	---	292
1974	228	---	228
1975	190	---	190
1976	252	---	252
1977	458	---	458
1978	277	---	277
1979	369	---	369
1980	259	---	259

Totals

(1955-1980) 11,080

837

12,014

Mean annual

reported kill 426.2

60*

462.1

*Includes only years when antlerless deer were hunted.

B. Reported Kill in Zone D4** and Hunter Success

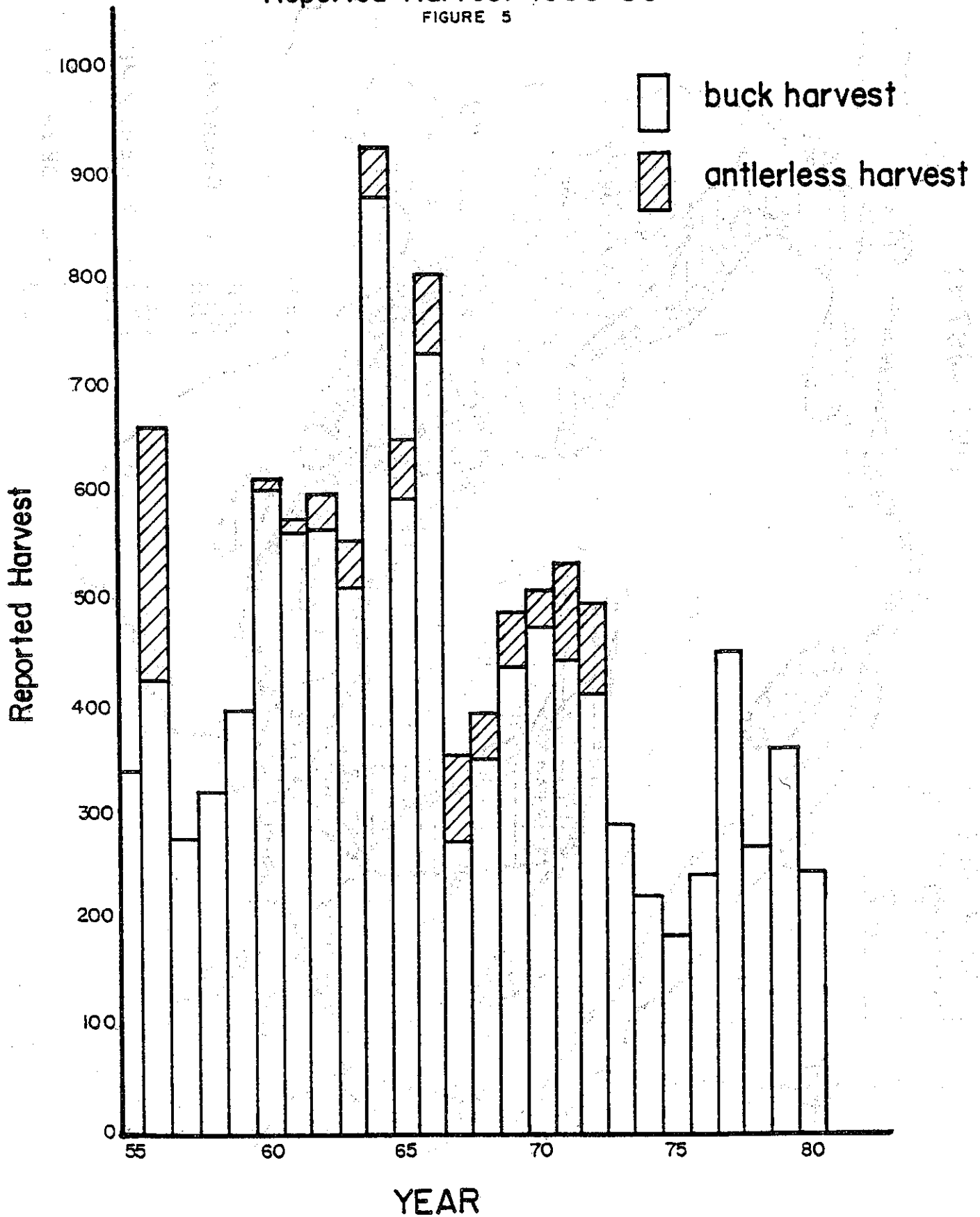
<u>Year</u>	<u>Zone D-4 Tag Sales</u>	<u>Buck Kill</u>	<u>% Hunter Success***</u>
1978	5,729	277	4.8
1979	5,516	369	6.7
1980	5,666	259	4.5

**Current hunt zones established 1978.

***Not corrected for non-reported kill or crippling loss.

Blue Canyon Deer Herd Reported Harvest 1955-80

FIGURE 5

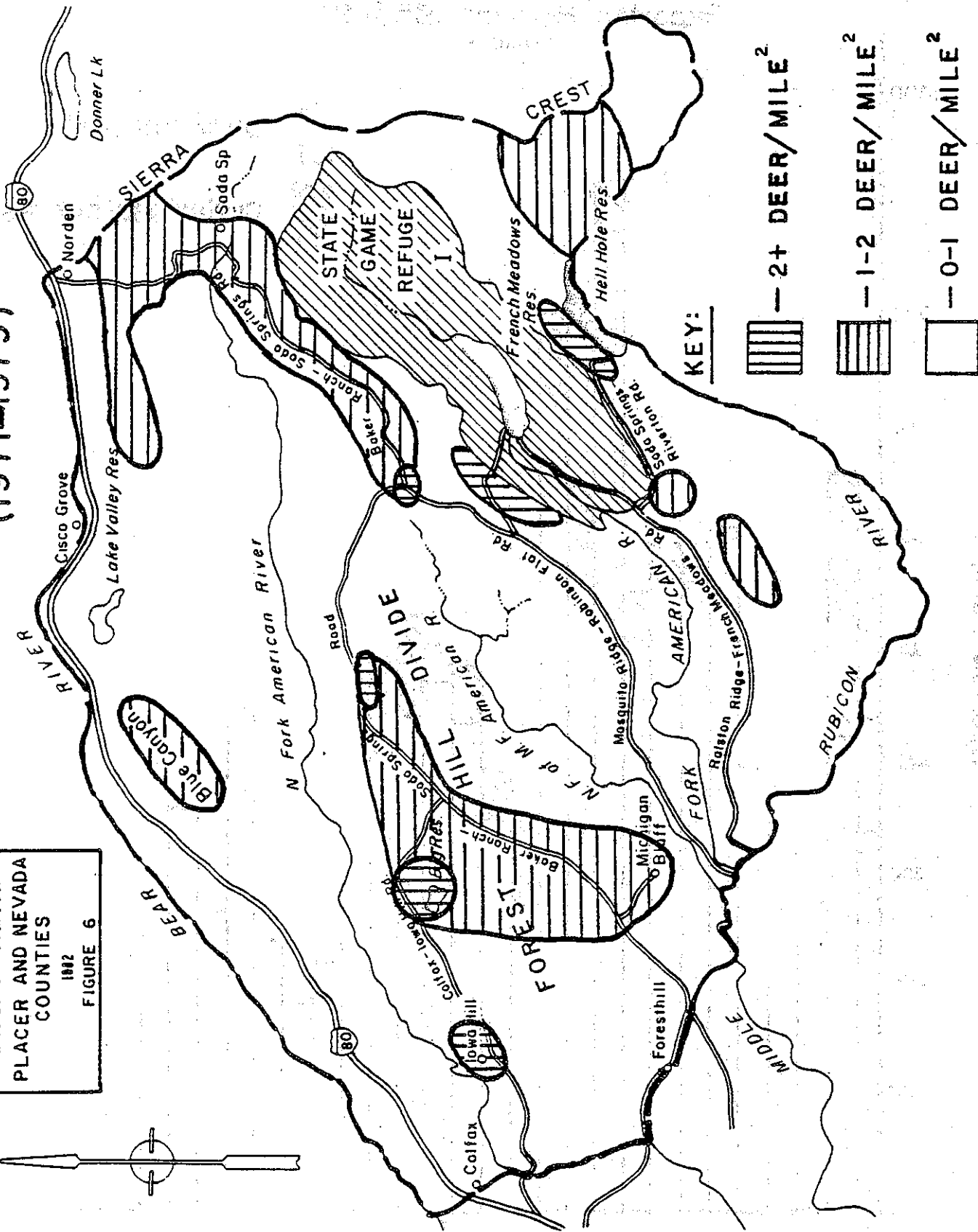
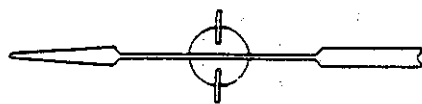


**BLUE CANYON
DEER HERD
PLACER AND NEVADA
COUNTIES**

1982

FIGURE 6

**REPORTED KILL CONCENTRATION MAP
(1971-1979)**



6. Mortality Factors

a. Illegal Kill

By its nature, the impact of the illegal harvest of deer is extremely difficult to evaluate and quantify. Nearly all estimates must be more or less educated guesses on the part of Wildlife Protection officers. Personnel closely involved with the Blue Canyon deer herd believe that the illegal kill is at least equal to, and perhaps greater than, the reported legal harvest. It is further believed by enforcement personnel that there may be some market hunting occurring in the herd, particularly in the Foresthill area. The sex and age distribution of the illegal kill is not known, but is thought to be representative of the population as a whole.

b. Road Kill

Exact data are not available for road kill in the Blue Canyon deer herd range, but it is not thought to represent a significant proportion of total mortality for the herd. The only major highway in the area is Interstate 80, which is located in the extreme northern portion of the range, away from primary wintering areas and migration corridors. Most of the road kill is believed to take place on the intermediate ranges, during migration.

c. Predation

The magnitude of predation as a mortality factor is not known for the Blue Canyon deer herd. The principal predators on deer are (in order of their probable importance): 1) the coyote (Canis latrans); 2) the mountain lion (Felis concolor); and 3) the bobcat (Felis rufus). The mountain lion takes the most deer per individual, but there are relatively few mountain lions. There are also relatively few bobcats and bobcats tend to take smaller prey, although they are known to prey on live deer (Dill, 1947). The coyote is the main predator which may possibly have a major impact on the

Blue Canyon deer herd. There is at present, some local public concern that coyote predation may be a major source of fawn mortality. Hawthorne (1972) analyzed coyote scats in the Truckee area (northeast of the Blue Canyon range) and found that deer tissue occurred in 35% of the scats, comprising 25% of the total volume. He stated that the majority of this was probably derived from carrion. He also found that late spring-early summer (when does are fawning) was the period of lowest frequency of deer remains in coyote scats.

d. Diseases and Parasites

Direct studies of disease incidence and parasitism are lacking for the Blue Canyon deer herd. Management personnel in the area do not feel that disease is a major source of mortality. Browning et al. (1973) found a heavy incidence of lungworms in the Rail Road Flat herd (approximately 80 miles south of Blue Canyon range). They found that the infection lowered the overall condition of individuals, particularly during late winter-early spring (during gestation). Management personnel for the Blue Canyon herd believe that lungworms may be a factor in lowering fawn survival by lowering the condition of does prior to parturition, and by direct infection of fawns thereby increasing stress and energy demands.

B. Herd Range Description and History

1. Topography

The Blue Canyon range has a great deal of variation in elevation, ranging from 1,100 feet in the western foothill portion to approximately 9,000 feet on the crest of the Sierra Nevada. The topography is generally steep and rugged. There are few major roads in the area, and these generally course along ridge tops. The major river canyons are largely lacking in improved roads. The combination of rugged terrain and few roads make access difficult into substantial portions of the range.

2. Climate

The gradient in elevation in the Blue Canyon herd range is responsible for a similar gradient in precipitation and temperature from the foothills to the Sierra crest. Precipitation ranges from 15-40 inches annually in the western portion to an average of 65 inches at higher elevations along the eastern margin. Winter daytime peak temperature ranges are approximately 29°-42°F and 16°-26°F in the western and Sierra crest areas, respectively. Summer daytime peak temperature ranges are 75°-96°F in the foothills and 73°-85°F at peak elevations. The Blue Canyon weather monitoring station is approximately in the middle of the precipitation/elevation gradient, and thus represents an approximate mean between the 2 extremes. Climatic data from this monitoring station for the years 1958-79 are presented in Appendix 3. Precipitation range for this station is 23-90 inches, with a mean of approximately 50 inches. Temperature extremes and seasonal ranges for this station are presented in Table 3. The growing season in the Blue Canyon range varies from 3 months near the Sierra crest to 10 months in the foothill areas. Native plant species diversity corresponds with the wide range of temperature and precipitation.

3. Soils

The soils of the Sierra Nevada are described as being shallow to moderately deep (10-40 inches) and generally have a sandy-loam texture. Rock content ranges from 0-35%, often varying in proportion to the degree of hillside slope. The soils are often low in water retention capacity. Soils in the Blue Canyon unit follow this pattern but are deeper on the average in many areas and tend to be quite good soils in general. Good quality soils exist in sufficient quantity to preclude soil capability from limiting management options.

4. History

Prior to about 1840, the eastern portion of the Blue Canyon range (i.e., the west slope of the Sierra) was timbered with coniferous forests and probably

TABLE 3

TEMPERATURE EXTREMES AND RANGES*
 BLUE CANYON WEATHER STATION
 (°F)

Extremes		Normal Range**			
		January		July	
<u>Hi</u>	<u>Lo</u>	<u>Hi</u>	<u>Lo</u>	<u>Hi</u>	<u>Lo</u>
97	3	43	30	78	49

*Information from USWS annual summary of climatological reports.

**1941-1970

PRECIPITATION EXTREMES
 BLUE CANYON WEATHER STATION

(1958-79) (inches)

<u>Precipitation</u>	<u>Year</u>
Hi 90.80	1973
Lo 23.48	1976

supported few deer (Fremont 1853). California Indians inhabited the foothill portions of the range and may have played a role in keeping vegetation on some of this area from reaching climax stages by frequent burning. Indians also inhabited the wooded high country on a seasonal basis (Hittell, 1911). According to some authors, burning was used to drive game to hunters, but was also for the express purpose of providing nutritious new forage (Sampson, 1944). Lightning no doubt also played a major role in the fire ecology of the region, causing random burns throughout the range. Regardless of the ultimate origin, fire played an extremely important role in the ecology of the pristine Sierra Nevada. The condition of the range probably remained in a dynamic equilibrium with natural and man-caused fires until the influx of large numbers of white men during the Gold Rush (Longhurst et al. 1952).

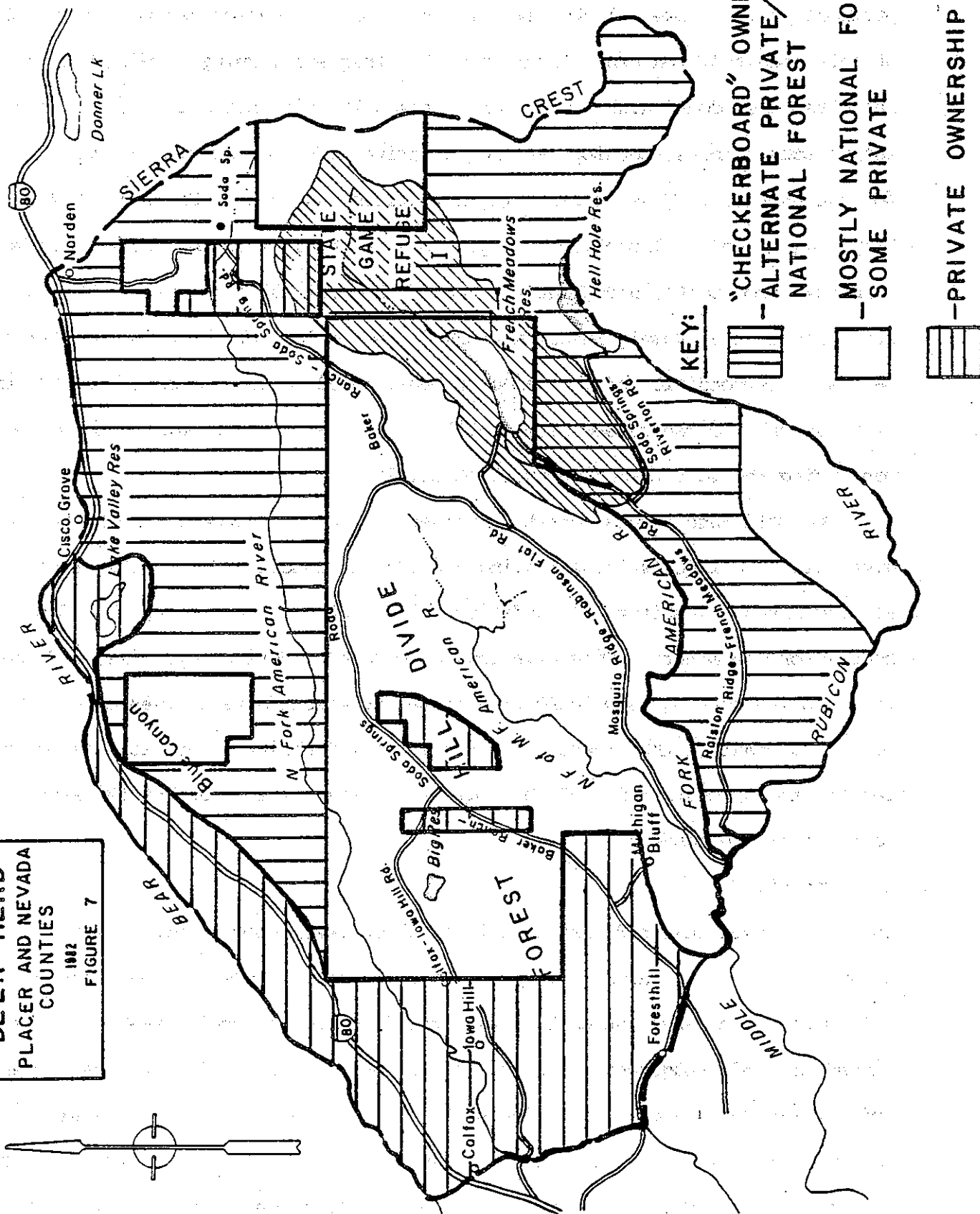
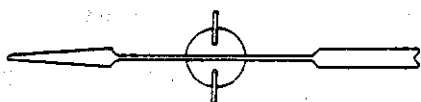
The Gold Rush brought drastic changes to the deer range in the Mother Lode district. Small scale local logging and burning associated with the mines altered areas of habitat. In addition, livestock were introduced as a food source for the miners. Extensive logging commenced during this time, and the uncontrolled burning associated with these operations altered even more forest cover than that of the miners. Ultimately, this habitat alteration was of great benefit to the deer herd, but the short-term effect was to devastate large portions of the range.

5. Landownership

The Blue Canyon deer herd range exhibits a complex landownership pattern (Figure 7). Public lands within the range are administered by the State of California, the Tahoe National Forest, the Eldorado National Forest, and the Bureau of Land Management. Publicly owned lands comprise 53.5% of the summer and intermediate ranges and 58.5% of the winter range. A total of 54.5% of the range is held in public trust. A more complete breakdown of ownership is presented in Appendix 4. Summer and intermediate ranges comprise 79.3% of

**BLUE CANYON
DEER HERD
PLACER AND NEVADA
COUNTIES**

1982
FIGURE 7



the herd range, and are of special interest since a "checkerboard" pattern of public/private ownership prevails over much of the range. Alternating sections in this area are in public and private ownership. This pattern resulted as alternating sections were granted to the Central Pacific Railroad Company by Congress as an inducement to build the Transcontinental Railroad during the previous century. The Southern Pacific Land Company was the successor in ownership of these lands at a later date.

6. Grazing History and Current Utilization

Domestic stock were first introduced into the Sierra in large numbers following the Gold Rush. By the 1870's, literally millions of sheep were making circular migrations through the entire Sierra, with devastating effects on range quality (Longhurst et al. 1952). The process of gaining control over livestock grazing on public lands did not begin until establishment of the National Forest System in 1891. By 1920, livestock usage of public lands was being drastically curtailed to an amount more consistent with range carrying capacity.

There are currently 9 grazing allotments on the Blue Canyon herd range.

Three cattle and 4 sheep allotments are located within the Tahoe National Forest, and 2 cattle allotments are within the Eldorado National Forest. A summary of grazing allotments and livestock numbers is presented in Appendix 5.

7. Recent Fire History

Since 1940, there have been 10 fires of 40 acres or more within the Blue Canyon unit. Eight of these fires each altered 500 acres or less. Only 4 fires, comprising a total of 800-1,000 acres, have been within the summer range. The Foresthill-Volcano fire burned a total of 44,386 acres (9.8% of the total range area) in August of 1960. Of the total acreage burned, 43% (19,040 acres) was within the winter range and 57% in the intermediate range. This fire burned over the area altered by 3 of the previous, smaller fires. A fire

history map and table of yearly acreages burned are presented in Appendix 6.

There have been no major wildfires in the Blue Canyon herd unit since 1960. Current fire suppression policy and the highly efficient fire suppression techniques now employed contribute to the maintenance of mature brush stands which are rather poor habitat for deer.

8. Seasonal Ranges

The 711 square mile range of the Blue Canyon deer herd can be divided into 3 seasonal ranges, each occupied by and providing the necessary habitat for deer at different times in the annual cycle. The 3 seasonal ranges are the summer, intermediate, and winter. Because of the considerable overlap between intermediate and summer ranges and annual climatic variation, habitat that serves as intermediate range for 1 deer may be the summer range for another. For this reason, the summer and intermediate ranges will be treated together. The vegetative communities listed here follow the usage of CALVEG (Matyas and Parker 1979).

a. Winter Range

The Blue Canyon winter range is approximately 94,080 acres (147 square miles) or 19% of the total herd range. Of this, 17,920 acres (3.5% of total range) are considered to be key winter range. Elevations in this seasonal range extend from approximately 1,000 to 4,000 feet. Plant communities found on this range include: black oak-canyon live oak, montane mixed shrub, and mixed conifer-pine at the higher elevations. A list of dominant plant species is presented in Appendix 7.

b. Intermediate and Summer Ranges

The intermediate and summer ranges consist of approximately 360,720 acres (563 square miles) or 81% of the total range. Of this, approximately 120,000 acres (188 square miles) are considered to be exclusively summer

range. There is considerable variation in elevation on this portion of the herd unit. Elevations extend from 3,000 to 9,000 (6,000-9,000 feet exclusively summer range). There is also considerable variation in the plant communities found. The major plant communities are: montane mixed shrub, mixed conifer-fir, red fir, and some mixed conifer-pine. Common plant species for the intermediate and summer ranges are listed separately in Appendices 8 and 9, respectively.

9. Food Habits

There have been no direct studies of food habits made on the Blue Canyon herd. Recent studies are available, however, for other Sierra west slope herds, in particular the Rail Road Flat herd (Browning et al. 1973). The bulk of the diet in the winter ranges in that study was composed of browse (81.2%), followed by grasses (13.2%), and forbs (5.6%). Diet patterns varied through the winter. Browse constituted 90+% of the diet in early winter, but dropped to 60% by early spring when utilization of grasses rose to approximately 25%. The Rail Road Flat herd is located approximately 80 miles south of the Blue Canyon range, and the food habits described for that herd should be roughly representative of those in the Blue Canyon herd. Principal browse species for the Blue Canyon winter range include: black oak (Quercus kelloggii), buckbrush (Ceanothus cuneatus), lemmon ceanothus (C. lemonii), and deer brush (C. integerrimus).

Summer food habits for the Rail Road Flat deer herd on granitic soils were similar to winter food habits, but different species of plants were involved in each forage class. Browse constituted 93.4% of the diet, followed by grasses (4.8%) and forbs (1.8%). A single species, mountain whitethorn (Ceanothus cordulatus) comprised 37% of the total summer food intake. Principal browse species in the Blue Canyon herd summer range include: mountain whitethorn, bitter cherry (Prunus emarginata), mountain misery (Chamaebatia foliolosa), and currants (Ribes sp.).

10. Range Surveys

Range surveys within the Foresthill Ranger District (Tahoe National Forest) are currently being conducted only through monitoring of the grazing permit system. This consists of range readiness checks which rely on utilization measurement, using ocular and toe-point methods.

11. Timber Harvest and Reforestation

The current 10-year Tahoe Timber Management Plan (10-16-78) calls for the annual removal of 29.7 million board feet from the Foresthill Ranger District.

Concurrent with the removal is the scheduled reforestation of 1,240 acres

annually. Timber harvest plans for the Eldorado National Forest call for the annual removal of 15 million board feet within the herd boundary. Timber harvest strategies vary on a site-by-site basis on the Eldorado National Forest, including sanitation cutting, overstory removal, and clearcutting. In general, select cutting is practiced on private lands and public lands at higher elevations within the Tahoe National Forest. Clearcutting is more commonly practiced on public lands at lower elevations in the winter and intermediate ranges within the Tahoe National Forest. There are however exceptions to both the above generalities.

12. Game Refuge 1-I

Game Refuge 1-I was established in 1917 with a total acreage of 83,680 (131 square miles, 18% of unit) in the area of what was then French Meadows (currently French Meadows Reservoir). It has since been legislatively reduced in size and altered several times to its current size of approximately 43,000 acres (67 square miles, 9% of unit). The refuge is located within the intermediate and summer ranges of the Blue Canyon deer herd (Figure 4). The refuge contains prime fawning and spring holding areas. In addition, the refuge becomes a fall holding area for bucks concurrent with the opening of deer hunt-

ing season. Enforcement personnel report that bucks tend to congregate in the refuge until the first snows drive them down onto winter ranges (K. Nilsson, personal communication). This usually occurs during the last week of the open season. The refuge also currently contains a number of recreational facilities (campgrounds, etc.) associated with the French Meadows Reservoir and is subject to a great deal of human use from late spring until the first snowfalls. Because of the firearm exclosure and recreational facilities, the refuge is an excellent area for non-consumptive use of the herd. The refuge is not thought to be either a major constraint on deer management, nor of positive benefit to the herd; its maintenance is largely a political, rather than biological issue.

C. Major Factors Regulating the Deer Population

The complex set of factors which tend to regulate the size and condition of the Blue Canyon deer herd fall into 2 general categories, human influences and environmental influences. Unquestionably, the most profound influences on deer productivity fall into the first category.

1. Human Influences

a. Habitat Conversion and Alteration

Water Impoundments - A summary of reservoir projects completed or planned within the Blue Canyon herd unit is presented in Appendix 10. Only a small portion of the total range area has been removed due to the reservoirs but the negative effects appear to be quite disproportionate to the area involved. Water impoundments affect the deer herd in several ways. First, some interfere with migration corridors, particularly the French Meadows Reservoir. Second, and regardless of placement, they remove vegetation used as cover and food including important holding areas. Deer can and do swim and migrate around water impoundments, but the placement of the impoundments has been in areas that were highly productive habitats. Thus deer

are forced to migrate through areas where forage supply and quality is less than optimum, causing nutritional stress. Third, and probably most important from the standpoint of deer productivity, water impoundments tend to be placed in areas that were formerly important fawning habitat. This forces does into marginal habitats to give birth, and increases the susceptibility of fawns to environmental influences, including predation.

Road Access - Often associated with the construction and recreational use of water impoundments is road access. Construction of all-weather roads has increased human use of much of the herd range. The road following Ralston Ridge to Hell Hole Reservoir in particular transects an important winter range, allowing increased harassment of deer at a critical time of year, and probably also allowing increased illegal deer kill. The same is probably true of the Robinson Flats road along Mosquito Ridge. Additional logging roads planned for the southern portion of the summer range will tend to attract more human activity into previously roadless areas, allowing additional potential for harassment and illegal kill.

Residential Development - Currently, this is not thought to be a major factor in deer population regulation in the Blue Canyon unit, but is included here because of its great potential for becoming such a factor. The most desirable sites for human habitation are at the lower elevations, in areas which tend to be more level and free of forest overstory than the surroundings. The same description applies to the most important wintering areas within the herd unit. Development in and around these areas will remove critical habitat from production for deer, and will also increase harassment pressure from human activities, dogs, etc. Residential development may well become the most serious land use issue related to deer winter range in the near future.

Logging - Logging is generally regarded as being potentially beneficial to deer populations. However, replanting of conifers, when accompanied by extensive brush control to eliminate competition with seedlings, can remove substantial acreages of habitat from the lower intermediate and winter ranges. Timber harvest prescriptions which include maintenance of islands of escape and thermal cover, and limited brush control to maintain availability of forage are highly beneficial to deer. Timber harvest can be of even greater benefit when KV funded habitat improvement projects are incorporated into timber sale plans.

b. Fire

In the past, fire played a major role in regulating the Blue Canyon herd. Currently, the lack of fire may be a regulatory factor. Estimates of herd size peaked in 1964, four years after the Volcano-Foresthill fire, which burned 9% of the total range and 20% of the winter range. Estimated herd size remained high for several years thereafter. Since that time, the lack of controlled burning and/or wildfires has contributed to the maintenance of mature, relatively unproductive brush stands, substantially lowering range carrying capacity. Fire is a natural part of the Sierra west slope ecosystem and should be returned. Prescribed burning is a very powerful habitat management tool.

c. Grazing

The effects of grazing as a factor in deer population regulation are not known for the Blue Canyon herd. However, the presence of other large herbivores on the range is assumed to have some effect on the deer population. Grazing usage by livestock may increase in the future; if grazing pressure does go up, it is important to recognize its potential impact. An increase in the number of sheep grazed on the range will result in some loss of deer forage, since sheep and deer tend to select the same species

of plants. Sheep also tend to graze in concentrated flocks and can completely remove preferred species from an area. Cattle tend to select plant species not preferred by deer and tend to be more dispersed than sheep, although they may concentrate in meadows. Limited grazing by either species has the potential to maintain forage areas in seral stages favorable to deer. Thus, the future effects of livestock grazing on the deer population will depend largely both on the species involved and the grazing pattern allowed by land management agencies.

d. Hunting

It has been shown, using computer modeling (Anderson et al. 1974), that controlled hunting is not a regulatory factor in herds where only bucks are removed. This is the current hunting strategy within the Blue Canyon unit, and hunting is thus not currently a factor in regulating total herd size. The same study shows that when antlerless deer are also removed, hunting can be a tool to regulate deer numbers. Most of the antlerless hunts conducted in the past in the Blue Canyon herd unit resulted in an insufficient take (less than 5%) to affect herd productivity (Table 2). In 1956, 228 antlerless deer were removed. This was followed, after a 2-year lag period, by a general increase in buck harvest for 3 years. The influence of illegal take of deer in this herd is unknown. Illegal kill is likely a substantial problem however and, when the capacity of seasonal habitats are improved, may limit potential herd response.

2. Environmental Influences

a. Climate

The principal climatic factor influencing the Blue Canyon deer herd appears to be the lack of precipitation during drought years. The topography of the Blue Canyon unit is such that excessively harsh winters can be avoided

by deer through further downslope migration, although harsh winters undoubtedly affect the herd adversely. The drought years of 1976-77 were followed by a decrease in reported buck harvest in 1979 and 1980.

Longhurst, et al. (1976) measured the effects of climatic factors on buck harvest for the Sierra west slope and found that buck kill is directly related to mean monthly temperature in the late fall and early winter, 1 to 3 years prior. Combined climatic variables showed a moderately high correlation with buck kill (r^2 averages 0.52). The Blue Canyon herd is presumed to respond in a similar fashion.

b. Predation

In general, predation is not thought to limit the productivity of deer herds (Hornocker 1970; Swank 1958), but certain age classes are more heavily impacted than others, particularly fawns and deer of advanced ages. The most significant impacts occur on fawns, shortly after parturition (Robinette et al. 1977). In combination with other factors, most notably the loss of prime fawning habitat and subsequent shift by pregnant does to marginal areas, predation may be having unusually severe impacts on fawn recruitment. If this is true, then predation is the secondary (proximate) cause of death, with poor habitat being the ultimate cause. However, recent investigations (Connolly and Longhurst 1975) indicate that extremely high levels of coyote control (>75% removed annually) are necessary to significantly reduce the level of predation on deer. In summary, it appears that predation may be a problem of some significance; more information is needed on the subject.

III. MANAGEMENT UNIT GOALS AND POTENTIALS FOR RESTORATION

The statewide goal for California deer herds is to restore and maintain healthy deer populations and to provide for high quality, diversified use of deer resources. However, before one can begin to state specific objectives and programs to implement those

objectives, several fundamental determinations must be made including: possible mechanisms for restoration; potential level of restoration associated with each mechanism; the factors which would tend to inhibit or conflict with deer herd restoration; potential levels of restoration; potential harvest strategies and intensities of utilization; and, considering the mix of all major issues and concerns, the preferred level of restoration and utilization. The final statement of this last determination will necessarily imply specific levels of action, mechanisms for restoration, and trade offs with other land uses. The following analysis evaluates criteria established to define goals for the Blue Canyon deer herd.

A. Potentials for Deer Restoration

The factors involved in deer restoration can be divided into 2 categories, those which affect habitat carrying capacity, and those which directly affect herd mortality. These factors are presented, along with their estimated potentials, in Tables 4 and 5. The potentials are subjective estimates, made by the Department of Fish and Game and U. S. Forest Service biologists most familiar with the Blue Canyon unit. Some discussion of the mechanics of these factors is necessary.

1. Summer Range Capacity

It is believed that in the "worst case", summer range condition will remain static, since the minimum benefits of clearcutting will balance capacity loss due to potential sheep grazing. Sheep tend to compete directly with deer for preferred forage plants and can entirely remove those species from an area, reducing deer use of that portion of the range.

Prescribed cattle grazing may enhance summer range since cattle do not tend to compete with deer for forage as directly as do sheep and can be used to maintain clearcut forage areas at a seral stage favorable to deer. These factors, in combination with other habitat improvement, yield the "best case" potential for deer habitat capacity increases.

Control over areas used and season of use by domestic stock can also yield forage benefits to deer.

2.. Winter Range Capacity

Table 4 indicates a potential for a 10% decrease in winter habitat capacity, principally in response to the loss of oaks. Some of this loss would doubtless be replaced by additional browse production, but mast loss remains a serious problem. Due to the "checkerboard" pattern of landownership, oak removal is not likely to be consistent throughout the range. On private lands, it is possible that the majority of oak woodlands will be harvested and possibly replaced with conifers. On public lands, hardwood sales, fuel wood programs and reforestation will lead to some oak loss. Thus, the potential exists for the loss of substantial portions of currently standing oaks on both private and public lands. Since there is little possibility of controlling oak loss on private lands, management of oaks on public lands becomes extremely important.

The effects of winter range clearcutting are presented in 2 time frames. The short-term horizon is approximately 10 years (the effective planning horizon for this document). The long-term horizon is 20-30 years. Both horizons depend on the assumption of 15-20% clearcuts on public lands during the period indicated. This cut pattern directly implies a 50-60 year rotation pattern, which is not a sustained yield pattern under current 80-year standards. The result of this cut pattern would be to place much of the range in closed canopy conifer stands in 30-40 years, which would be both too young to cut again for several decades and non-productive in terms of deer forage and cover. To derive maximum benefit for deer in areas clearcut and reforested, extensive, non-selective brush control would be precluded.

3. Unit Wide Factors

Factors in this category tend to act directly on herd mortality rather than

TABLE 4

PROBLEMS AND POTENTIALITIES IN DEER RESTORATION
BLUE CANYON UNIT^{1/}

SEASONAL HABITAT CAPACITY FACTORS

<u>Summer and Intermediate Range</u>		<u>Winter Range</u>	
<u>Factor</u>	<u>Potential*</u>	<u>Factor</u>	<u>Potential</u>
Clearcuts	+10 to 20%	Hardwood Conversion	-10%
Increase in Livestock Use (Sheep)	-10%	Clearcutting (Short Term)	+5 to 10%
Increase in Livestock Use (cattle)	+5%	Clearcutting (Long Term)	(-20 to 30%)
Alteration of Decadent Brush	+5%	Alteration of Decadent Brush	+10%
Meadow Improvement	<u>+1 to 2%</u>	Livestock Use	<u>**</u>
Worst Case Total	0%	Worst Case Total (Short Term)	-10%
Best Case Total	+30%	Best Case Total	+20%

*Potential influence on range carrying capacity in response to indicated factor.

**No direct potential, acts to prolong benefits to clearcuts.

^{1/} See text for rationale and assumptions.

habitat capacity. It is estimated that, using methods to be described later, a reduction in herd mortality of 2-5% is possible by reducing illegal harvest levels. This projection is based on an assumed poaching loss of 10% annually. If poaching losses can be reduced by 20%, by whatever means, it follows that a 2% reduction in overall mortality will result. In order to quantify a potential mortality reduction resulting from predation control, a number of assumptions were made. Herd composition data indicate a loss of approximately 75% of fawns between parturition and arrival on the winter range (fawns 5-6 months of age). The magnitude of coyote predation is unknown for the Blue Canyon herd, but if we assume a rough estimate of 50% of all fawn mortality, a total of 37% of fawns dropped would be lost to coyotes. Coyotes are known to take substantial numbers of deer (Connolly 1981), and this figure seems at least reasonable. If it were possible to make a 50% reduction in coyote predation, an increase in fawn survival and recruitment of approximately 20% would ensue. To attain this reduction in predation, it is estimated that 75% of all coyotes would have to be removed annually (Connolly and Longhurst 1975), and the desired reduction would not be achieved for 5-10 years. It should be recognized that under current harvest strategy (2 pt. plus, bucks only), a 20% increase in recruitment would result in a maximum increase in hunter harvest of approximately 2%. This analysis depends on the assumption that the habitat will support the increase in deer which would survive.

B. Possible Levels of Herd Restoration

In order to evaluate possible levels of restoration, reasonable estimates of current and historical population levels are needed. From Table 1, we can see that the current population is approximately 4,500 deer. This figure implies densities of 31 deer per square mile on winter ranges and 8 deer per square mile on the summer range. The estimated population peak occurred in 1964, approximately 14,500 deer,

or 99 deer per square mile on winter range and 26 deer per square mile on summer range. With this information, the potential for habitat improvement and reduction in mortality can be used to evaluate a set of feasible levels of herd restoration.

Estimated potential population size changes are presented in Figure 8. Levels of percent change are from Tables 4 and 5. The combined range of possible population levels is shown in Figure 8. Any population size between 4,500 and 7,500 deer is thus a possible level of restoration. Strictly speaking, the 4,500 level is, of course, a maintenance rather than restoration level.

Balanced habitat capacities are a necessity in attaining a prescribed population goal. However, the maximum capacities of winter and summer ranges shown in Figure 8 are not in balance. Since hunting is a prescribed use of this herd, and some level of removal will take place during fall, the winter population will be somewhat smaller than the pre-hunt summer population. The difference between these seasonal range capacities could be considered a harvestable surplus. The "feasible" range of restoration levels is somewhat smaller than the potential levels discussed, the rationale for which will be discussed subsequently.

C. Utilization Levels and Alternative Strategies

Three potential harvest levels and the strategies required to obtain them are graphically presented in Figure 9 as a function of possible herd restoration levels. Strategy #1 is the current harvest practice in the Blue Canyon herd. The most extreme population enhancement measures will result in a much less than maximum increase in hunting harvest. Strategies 2 and 3 are both possible strategies that theoretically could be attained in the Blue Canyon herd. Each is estimated to yield a far greater return in hunting harvest from population increases, as compared to alternative #1. A liberal harvest strategy would be required to maintain population levels above 6,000 deer, since the habitat could not support excess production of a large deer herd for an extended period. Choice of a preferred harvest strategy is largely dependent on social acceptability.

TABLE 5

PROBLEMS AND POTENTIALITIES IN DEER RESTORATION
UNIT WIDE FACTORS

<u>Factor</u>	<u>Potential*</u>
Illegal Harvest	+2 to 5%
Predation	+20%**
Disease and Parasites	***
Best Case Total	+25%

*Potential reduction in mortality in response to reductions in factors.

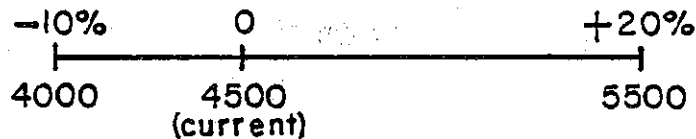
**See text for assumptions and rationale.

***Potential not quantifiable, acts in conjunction with other factors such as predation and habitat loss or degradation.

BLUE CANYON DEER HERD POTENTIAL LEVELS OF RESTORATION

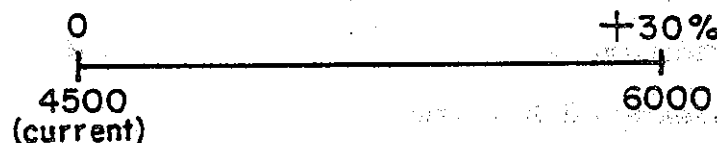
FIGURE 8

WINTER RANGE HABITAT CAPACITY



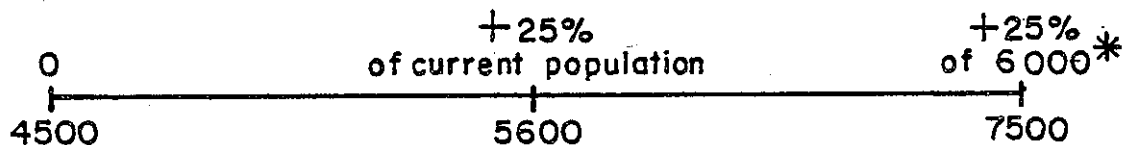
POPULATION SIZE

SUMMER/INTERMEDIATE RANGE HABITAT CAPACITY



POPULATION SIZE

UNIT WIDE MORTALITY FACTORS

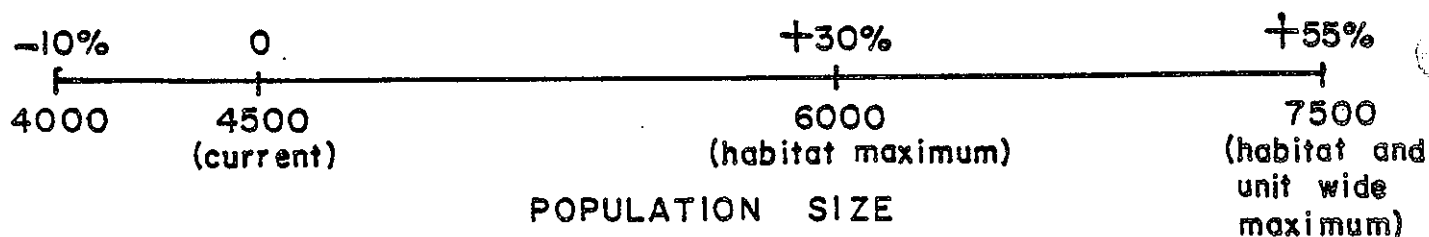


POPULATION SIZE

☆ REDUCTION OF MORTALITY FACTORS WILL RESULT IN INDICATED PERCENTAGE INCREASE IN POPULATION SIZE.

* 6000 IS MAXIMUM POPULATION SIZE IN RESPONSE TO HABITAT CAPACITY ENHANCEMENT ALONE.

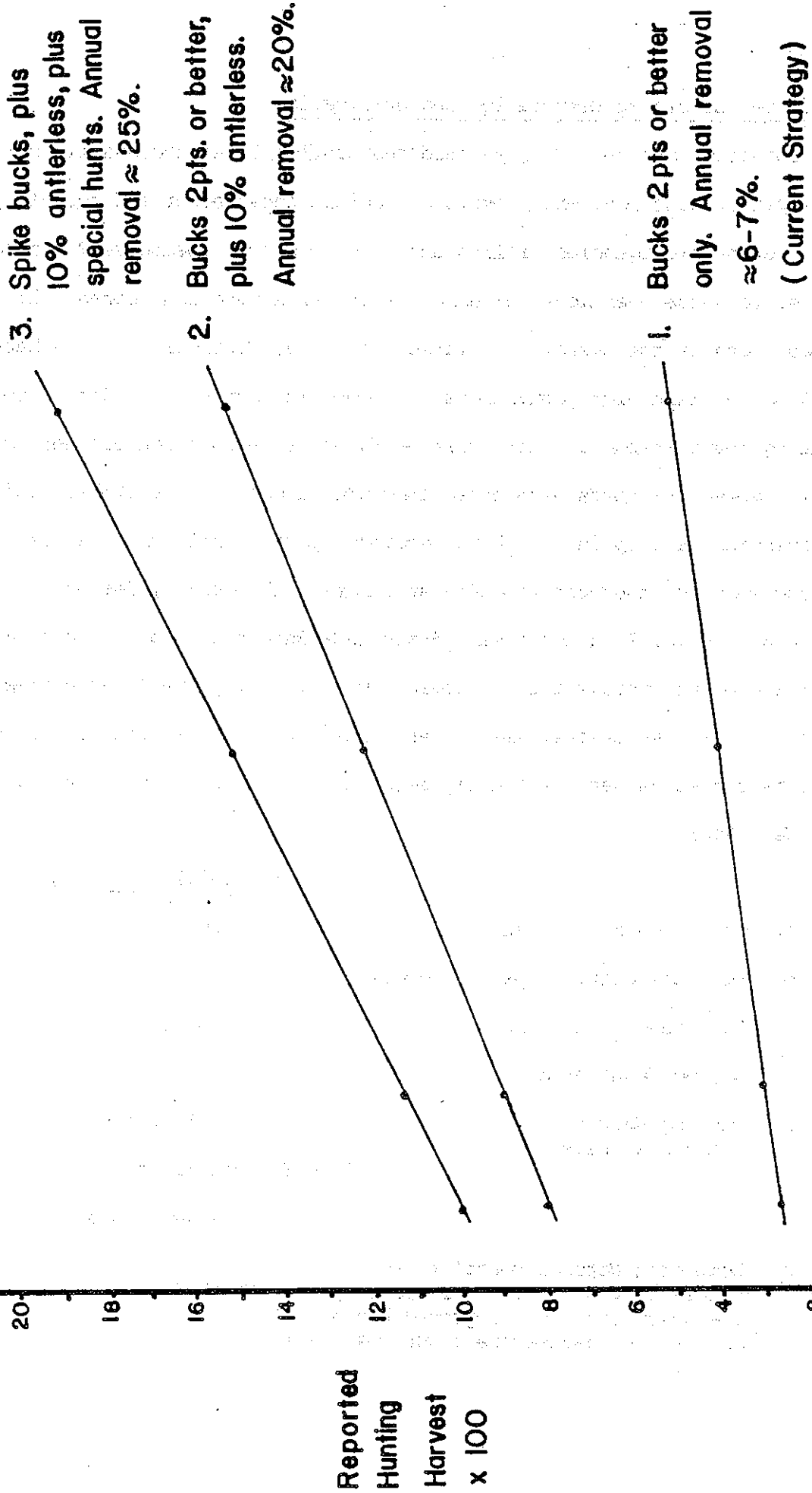
COMBINED TOTAL



BLUE CANYON DEER HERD

Potential Levels of Restoration & Harvest Strategies

FIGURE 9



D. Preferred Levels of Restoration and Utilization

Determination of the preferred herd restoration level necessarily carries with it an implicit question; what levels of habitat enhancement and mortality reduction are the responsible agencies willing and able to commit themselves? In formulating an answer to these questions, a number of criteria were considered: 1) social acceptance, both of the overall population size and, particularly, the harvest strategy used to maintain high populations; 2) economic factors, the direct cost of implementing restoration; 3) opportunities foregone, restoration of deer to high numbers will involve tradeoffs with other land use values such as timber production and residential development; 4) herd recovery, particularly the lag time between habitat enhancement and the need for harvest strategy changes; 5) demand for diverse uses of deer; 6) special land use areas (State Game Refuge 1-I, parks, etc.); and 7) alternative habitat improvement strategies such as to improve a large area to a small extent or improve several small areas intensively. Specific habitat objectives will be stated as part of the implementation process of this strategic plan.

1. Herd Goals

	<u>1990 Target</u>	<u>Current Level</u>
a. Fall Population Size	5,000-5,500	4,500
b. Herd Composition (per 100 does)		
Post-hunt buck ratio	30-35	25
Spring fawn ratio	50-60	Unknown
c. Hunting Harvest (annual average)	500-550 bucks	300 bucks
	400-450 antlerless animals	None
	20% harvest rate	7%
d. Estimated Natural Mortality to Hunter Harvest Ratio (calculated by use of current and projected hunter harvest and assumed herd turnover rate of 35%)	NM:HH 1:1.3	NM:HH 4:1

2. Range and Habitat Goals

	<u>1990 Target</u>	<u>Current Level</u>
a. Summer Range		
Area	563 square miles	563 square miles
Average deer density	10/square mile	8/square mile
Habitat capacity increase	20%	—
b. Winter Range		
Area	147 square miles	147 square miles
Average deer density	37/square mile	30/square mile
Habitat capacity increase	20%	—

Combined seasonal range habitat capacities must be increased by 18-20% in order to support 5,500 deer, assuming maintenance of current summer/intermediate and winter range size (563 and 147 square miles, respectively). Following this assumption, densities of 10 deer/square mile and 37 deer/square mile are necessary on summer/intermediate and winter ranges, respectively. Obviously, if seasonal range habitats are lost or degraded, corresponding habitat capacity increases must be achieved through more intensive efforts on other portions of the herd unit.

IV. MANAGEMENT PROBLEMS

1. Recruitment of fawns into the yearling age class appears very low and may be limiting herd size.
2. Detailed information concerning herd composition and productivity is lacking.
3. The magnitude of predation and illegal kill and their effects on herd performance are not known, but may limit herd recovery.
4. Conflicts exist between high yield, intensive timber management practices and deer habitat productivity but are poorly understood. Management of oaks and brush stands in conjunction with conifer plantations is a major concern.

5. Year-round access to winter ranges makes deer vulnerable to illegal harvest and harassment pressures when deer are concentrated and under severe nutritional and climatic stress.
6. Winter ranges are generally in poor condition due to lack of nutritional forage.
7. Large water impoundment projects have inundated migration routes and fawning habitat.
8. The "checkerboard" pattern of land ownership over much of the range makes consistent habitat management difficult.
9. Funds are lacking for deer habitat improvement projects.
10. Public attitudes toward the hunting of antlerless deer restrict flexibility in managing the herd.
11. Public attitudes regarding State Game Refuge 1-I (French Meadows Refuge) are not biologically valid. The refuge is perceived as being necessary to preserve the herd.
12. Increasing environmental workload and other manpower priorities limit the ability of management personnel to investigate and manage the herd.

V. MANAGEMENT PROGRAMS, OBJECTIVES, AND RECOMMENDED PRESCRIPTIONS

Among the issues and concerns involved in developing this plan are the legislative mandate and policy commitment to address specific elements in deer herd management planning. It is recognized that more detailed and specific objectives and prescriptions will be formulated in action plans to implement this strategic plan. The recommendations contained in the following program elements are intended to provide general direction and identify levels and intensities for herd restoration, habitat capacities, and utilization potentials to achieve strategic herd plan goals.

A. Inventory and Investigative Element

Objective: To collect and maintain a body of data on which effective management decisions can be based. It is desirable that sufficient data be gathered to allow

computer simulation modeling as a means of predicting herd performance and evaluating harvest strategies and population responses to changes in range carrying capacity.

1. Herd Status Information

The following herd performance indicators are currently being monitored and should be continued:

- a. Herd composition counts are being made in the fall. Current sample sizes tend to be small. For this reason, it is recommended that more intensive effort be expended to increase sample size. Spring composition counts are currently being made on an irregular basis. It is recommended that these counts be made annually, with a sample size of at least 250 deer. This will allow reasonably accurate estimates of fawn recruitment.
- b. A hunter check station is operated annually during opening weekend of the deer season. Sample sizes tend to be inconsistent and are sometimes rather small. It is therefore recommended that more effort be expended to obtain consistent sample sizes to accurately estimate the age class composition of harvested animals.
- c. Reported kill is recorded, and a spot kill map is prepared annually.

The following indicators are recommended for monitoring to allow simulation modeling:

- d. Reproductive information should be gathered in the form of young per female at birth (preferably segregated by age class of females). This could be done by necropsy of road killed does and/or by special collection if necessary to obtain sufficient sample size. Such necropsies could also be used to estimate breeding and fawning dates by fetal aging. The magnitude of the road kill mortality factor could be quantified simultaneously as reproductive data are gathered.

The following mortality factors should be quantified (may be evaluated in conjunction with similar herds):

- e. Document the effects of disease and/or parasites on the herd. This information could be gathered from road killed deer, simultaneously with reproductive information, and also by special collection.
- f. Document the effects of predation on this herd. This would require a special intensive study that could be broad enough to evaluate conditions for Sierra west-slope herds with comparable habitats.
- g. Document the magnitude and specific causes of fawn mortality. This would also require special study that could be comprehensive for Sierra west-slope herds.
- h. Improve estimates of illegal deer kill. This would no doubt require a special study and great effort. However, the development of more precise information would be of great benefit to all California deer herds and to legitimate users of the resource.

2. Habitat Status Information

Little information is currently being gathered concerning range condition. Such information is limited to range utilization by domestic stock. More information is needed concerning range condition as it relates to deer forage and cover conditions.

- a. Habitat inventories of key winter ranges, holding areas, and fawning habitats must be conducted. These inventories should be compared with the deer habitat capability models for the Sierra west slope to determine areas where habitat improvement is needed and will be most cost effective. This should be done in cooperation with the Tahoe and Eldorado National Forests.
- b. Develop cooperative programs to document deer responses to timber man-

agement practices. The Department and the Tahoe and Eldorado National Forests should be included.

- c. Evaluate opportunities to effectively use livestock grazing to maintain productive forage areas following timber clearcuts.

B. Herd Management and Mortality Control Element

Objective: Reduce current levels of natural mortality. Reduction of natural mortality (and the concomitant increase in recruitment and survivorship) is necessary for herd restoration and providing more deer for public utilization.

Some elements of mortality control/recruitment enhancement will be found in the following section on utilization. Also, in the absence of specific information on the role of parasites/diseases, predators, and road kill in regulating the Blue Canyon deer herd, most recommendations for reducing mortality are directly related to habitat improvement. Therefore other mortality control recommendations not included in the Utilization Element will be discussed in the Habitat Element.

C. Habitat Element

Objective: Protect critical winter range from further encroachment and degradation due to human activities. Improve remainder of winter and other seasonal ranges to balance habitat capacity with desired herd size goal.

Recommended Prescriptions:

1. Develop and use a deer habitat inventory system including all seasonal ranges in a systematic program to maintain necessary cover and forage conditions to achieve herd goals.
2. Work cooperatively with the USFS and private landowners to fund and perform habitat alterations at selected sites, concentrating initially on key winter ranges and fawning habitats. Holding areas and migration corridors should receive second priority.
3. Explore possibilities for and support Legislation to grant tax incentives to private landowners for habitat alterations which would benefit deer.

4. Work cooperatively with the Placer County Planning Commission and Board of Supervisors to ensure that critical deer habitat is protected from residential and other development which is not compatible with forage and cover requirements for deer.
5. Utilize deer habitat capability models for the Western Sierra (Hurley et al. 1981) as guidelines to achieve optimum feasible habitat conditions on all seasonal ranges, through use of the Forest Service land management planning process to coordinate habitat alterations.
6. Encourage use of brush control systems that do not entirely remove brush species from young timber stands in reforested areas. Incorporate deer forage needs into reforestation projects.
7. Document mast production of oaks within winter ranges to coordinate oak management for maximum multiple use benefits. Graves (1980) provides guidelines for mast surveys. An oak management plan, such as that currently being prepared by the Eldorado National Forest, should be prepared for all portions of the range, specifically including deer forage needs.
8. Allocate funds when available for habitat improvement projects. Encourage use of county fine monies for this purpose.
9. Consider all reasonable alternatives to construction of new roads into previously roadless areas unless a clear need exists. Plan any new roads to include access control and routing so as to minimize deer habitat losses, highway kill, and harassment.
10. When specific habitat inventory capabilities are available, develop long-term rotational treatment schedules to coordinate timber management and livestock grazing with deer habitat requirements.
11. Work actively with the Placer County Planning Department to resolve potential problems regarding development of private lands within winter ranges.

D. Utilization Element

Objective: Provide for an increase in current utilization of the herd, both consumptive and non-consumptive. Initially provide for an increase in hunting harvest from the current level of 250-350 to 450-550 bucks annually. As population size increases to 5,000, initiate more liberal harvest alternatives to increase harvest rate to approximately 20%.

Recommended Prescriptions:

1. Increase the total number of deer available to the public by increasing fawn survival through improved forage and cover conditions.
2. Increase the number of bucks available for harvest by increasing survivorship of male fawns. This would require habitat improvement on summer range. Habitat improvement near fawning areas would also tend to decrease neonatal mortality. Antlerless hunts can also be used to increase relative survivorship of male fawns (McCullough 1979), but are not immediately recommended.
3. Encourage hunters looking for a quality hunt to hunt after the opening weekend of the season when hunter density has decreased.
4. Encourage use of French Meadows Refuge I by non-consumptive users. Increase public awareness of these opportunities by methods discussed later in the Communication of Information Element.

E. Law Enforcement Element

Objective: Reduce the level of illegal deer take within the Blue Canyon herd unit. It is believed that a reduction of 5% of current levels of illegal harvest is feasible.

Recommended Prescriptions:

1. Provide more aerial patrol, in combination with ground patrol, to detect deer spotlighting at night.
2. Reduce road access during the critical winter period into areas where there

is little legitimate recreational activity, by road closure, where harassment and poaching problems exist.

3. Encourage local citizen involvement in detecting and reporting deer violations. Sportsmens groups and citizens should be encouraged to watch for suspicious strangers and activities, and to report such events to enforcement personnel, either directly or through the CAL-TIP program.
4. Provide more time for local wardens to spend on deer violations. This would require either additional manpower or an increase in warden overtime limitations. Another approach to increasing warden patrol effort would be to lessen workload in non-enforcement areas (such as permit approval, etc.).

F. Communication of Information Element

Objective: Increase public awareness of the status of the Blue Canyon herd, and convey as much specific information as possible concerning the herd to interested publics.

Recommended Prescriptions:

1. Publish and provide a summary of this plan to all interested publics.
2. Seek additional publicity through local public media (radio, television, newspapers, etc.) to provide pertinent information to a wider interest group. In particular, seek such additional publicity when new management procedures are initiated.
3. Provide information to private landowners concerning land management practices which would be of benefit to deer.
4. Provide information, including technical data such as herd composition, necropsy information, etc., to governmental agencies, educational institutions, and private groups interested in the deer resource.

5. An effort should be made to improve public relations regarding the potential for more liberal harvests, and the role (or lack thereof) of game refuges. This effort should be generalized for the state and need not be specific to the Blue Canyon herd.

G. Review and Update

Objective: Maintain this plan such that the information and recommendations are current and meet specific immediate and long-term needs in the herd unit.

Recommended Prescriptions:

1. Annually review the plan and update as is appropriate. Input into the review will be obtained from Department personnel including unit and regional personnel, the Tahoe and Eldorado National Forests, and interested publics. Harvest, herd composition, and range status information will be maintained and added to the plan, in addition to new information derived from special studies.
2. As a vehicle of public input into the plan, a questionnaire should be formulated and distributed to hunters at the opening weekend check station, to local sportsmens groups, and to other interested publics.

VI. ALTERNATIVES

Explicitly stated in the legislative mandate and policy commitment for deer herd planning is the need to address alternatives to preferred goals. A range of potential restoration levels, harvest strategies, and utilization levels is depicted in Figures 8 and 9, from which feasible alternatives to the preferred goals described previously can be drawn. The following alternatives are derived from Figures 8 and 9, and thus could in fact be achieved (or allowed, as the case may be) by the 1990 target date for this plan. These alternatives were not selected for reasons discussed previously under Management Unit and Restoration Potentials, and, in case of Section A below,

because it does not meet the legislative mandate and policy commitment on which this plan is based.

A. Current Trends Continue (Status Quo Management)

1. Population size: Down 10% to approximately 4,000 deer.

2. Harvest Strategy: Bucks only, 2 points or better.

Estimated average annual harvest, 250 bucks.

Annual harvest rate = approximately 6%.

3. Habitat factors responsible for 10% capacity reduction:

Principally loss of oaks and other forage plants associated with intensive timber management, reforestation, and other development.

4. Unit-wide factors continue at present rates (specifically including illegal take and predation); no new information gathered regarding herd performance.

B. Increase Habitat Capacity by 30%

1. Population size: Up 30% to approximately 6,000 deer.

2. Potential Harvest Strategies:

a. Bucks only, 2 points or better.

Estimated average annual harvest = 400-500 bucks.

Annual harvest rate = approximately 6%.

b. Bucks 2 points or better plus 10% antlerless harvest.

Estimated average annual harvest = 400-500 bucks

and 450-550 antlerless deer.

Annual harvest rate = 15-20%.

3. Habitat enhancement mechanisms used to achieve 30% capacity increase:

a. Use habitat capability models to coordinate deer habitat requirements with other resource management programs (timber, livestock, fuel control, etc.).

b. Obtain full compensation for habitat losses resulting from incompatible developments.

- c. Develop and utilize detailed deer habitat inventory system to set up rotational treatment to maintain beneficial habitats.

4. Unit Wide Factors, especially illegal take, reduced 2-5%; slight reduction in predation losses due to improved forage and cover in fawning habitats.

C. Increase Habitat Capacity to Feasible Maximum and Reduce Unit Wide Mortality to Feasible Minimum

1. Population size: Up 55% to approximately 7,500 deer.
2. Potential harvest strategies (liberal harvest strategies required to control deer numbers and prevent damage to habitat):
 - a. Bucks, 2 points or better, special quota 3 points or better buck hunt on Game Refuge 1-I and 10% antlerless harvest.
Estimated average annual harvest = 600-650 bucks
and 700-800 antlerless deer.
Annual harvest rate = approximately 20%.
 - b. Bucks (including spikes), special either sex quota hunt in Game Refuge 1-I and 15% antlerless harvest.
Estimated average annual harvest = 900-1,000 bucks
and 900-1,000 antlerless deer.
Annual harvest rate = approximately 25-30%.
3. Habitat enhancement mechanisms used to achieve 55% capacity increase:
 - a. Direct all other resource management programs to produce maximum benefits for deer habitat (timber, livestock, etc.).
 - b. Develop additional funding sources to plan and conduct single purpose deer habitat improvement projects.
 - c. Preclude any incompatible developments on important seasonal deer ranges (subdivision, highway construction, water development, etc.).

4. Unit wide factors, especially illegal take and predation reduced to minimum feasible level. Illegal take down 5% by increasing forage and cover quality. Appropriate predator control programs where problems are documented.

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APPENDIX I

HERD COMPOSITION COUNTY COMPARISON 1957-PRESENT BLUE CANYON AND PACIFIC DEER HERDS

Year	FALL						SPRING			
	Bucks:100		Fawns:100		Sample Size		Fawns:100		Sample Size	
	Female		Female				Female			
	BCDH*	PDH*	BCDH	PDH	BCDH	PDH	BCDH	PDH	BCDH	PDH
1957-58	47	33	63	77	130	144	—***	108	—***	183
1958-59	46	36	86	92	156	483	60	148	338	159
1959-60	47	36	56	97	87	286	—	56	—	266
1960-61	45	48	62	56	139	314	—	43	—	369
1961-62	42	28	59	53	234	190	47	45	304	344
1962-63	23	41	42	35	185	167	55	49	200	251
1963-64	—	27	—	76	—	134	—	94	—	300
1964-65	—	9**	—	47**	—	332**	—	57	—	186
1965-66	—	43	—	59	—	154	—	64	—	165
1966-67	—	25	—	50	—	347	—	59	—	125
1967-68	—	46	—	87	—	179	—	38	—	115
1968-69	18	28	76	78	178	124	65	48	271	370
1969-70	—	24	—	90	—	90	—	66	—	244
1970-71	30	35	53	67	104	111	86	66	272	238
1971-72	16	33	41	59	119	185	—	43	—	150
1972-73	21	31	40	43	117	191	—	48	—	438
1973-74	—	26	—	55	—	174	—	50	—	188
1974-75	—	30	—	61	—	252	—	60	—	186
1975-76	—	37	—	85	—	133	—	70	—	183
1976-77	20	****	56	****	104	****	—	****	—	****
1977-78	21	****	58	****	227	****	—	****	—	****
1978-79	28	****	58	****	149	****	32	****	168	****
1979-80	—	****	—	****	—	****	—	****	—	****

*BCDH = Blue Canyon Deer Herd; Pacific Deer Herd

**Count taken late, considered unreliable.

***Count not taken.

****Data not available at time of writing.

APPENDIX II AGE COMPOSITION OF BUCK HARVEST

Blue Canyon Deer Herd - Opening Weekend

	AGE	1958	1959	1960	1961	1962	1963	1964	1965
%	(1	6	25	4	0	14	33	14	8
	(2	12	25	48	8	43	33	52	62
	(3	34	17	20	42	14	16	20	21
	(4+	48	55	28	50	29	18	14	19
	Sample Size	17	12	44	12	7	61	29	62

	AGE	1966	1967	1968	1969	1970	1971	1972	1973
%	(1	11	11	15	21	18	11	15	0
	(2	46	22	53	21	54	42	45	41
	(3	25	11	5	14	14	31	35	24
	(4+	18	56	26	44	14	16	5	35
	Sample Size	28	9	19	19	50	19	20	17

	AGE	1974	1975	1976	1977	1978	1979	1980
%	(1	*	0	22	23	6	9	
	(2	*	29	21	29.5	59	22	
	(3	*	0	36	18	16	25	
	(4+	*	71	21	29.5	19	44	
	Sample Size	*	7	14	17	37	32	

* Insufficient sample

APPENDIX 3

PRECIPITATION AND TEMPERATURE RANGE BLUE CANYON WEATHER STATION 1958-1979

<u>Year</u>	<u>Total Precipitation (Inches)</u>	<u>Temperature Range</u>	
		<u>High (°F)</u>	<u>Low (°F)</u>
1958	73.37	87	15
1959	47.26	91	16
1960	66.90	91	9
1961	45.05	90	16
1962	77.16	86	7
1963	75.03	85	15
1964	88.85	85	12
1965	55.59	85	11
1966	49.41	87	14
1967	72.77	87	9
1968	64.57	87	13
1969	88.74	87	10
1970	89.56	87	17
1971	54.57	94	11
1972	58.00	95	3
1973	90.80	89	14
1974	65.28	89	13
1975	70.61	91	14
1976	23.48	88	16
1977	47.22	94	14
1978	73.81	97	11
1979	72.60	88	10

APPENDIX 4

LAND OWNERSHIP BLUE CANYON HERD UNIT

A. National Forest (All Ranges)

<u>Landowner</u>	<u>Summer/Intermediate Range</u>		<u>Winter Range</u>		<u>Total</u>	
	<u>Acres</u>	<u>%</u>	<u>Acres</u>	<u>%</u>	<u>Acres</u>	<u>%</u>
Eldorado N. F.	9,969	2.8	21,950	23	31,919	7.0
Tahoe N. F.	182,937	50.7	33,082	35	216,601	47.5
Other	167,769	46.5	39,082	42	206,851	45.5
TOTALS	360,675	100	94,114	100	454,789	100

B. Winter Range Ownership

<u>Landowner</u>	<u>Acres</u>	<u>%</u>
Public Domain	5,048	5.4
Private Title	45,888	48.8
State	1,199	1.3
Reclamation and Water Projects W/D*	76	—
Powersite W/D*	2,211	2.3
Bureau of Land Management W/D*	506	0.5
National Forest	39,147	41.7
Town of Foresthill	39	—
TOTALS	94,114	100

*W/D=Water Development

APPENDIX 5

GRAZING ALLOTMENTS AND CURRENT UTILIZATION BLUE CANYON HERD UNIT

A. Tahoe National Forest

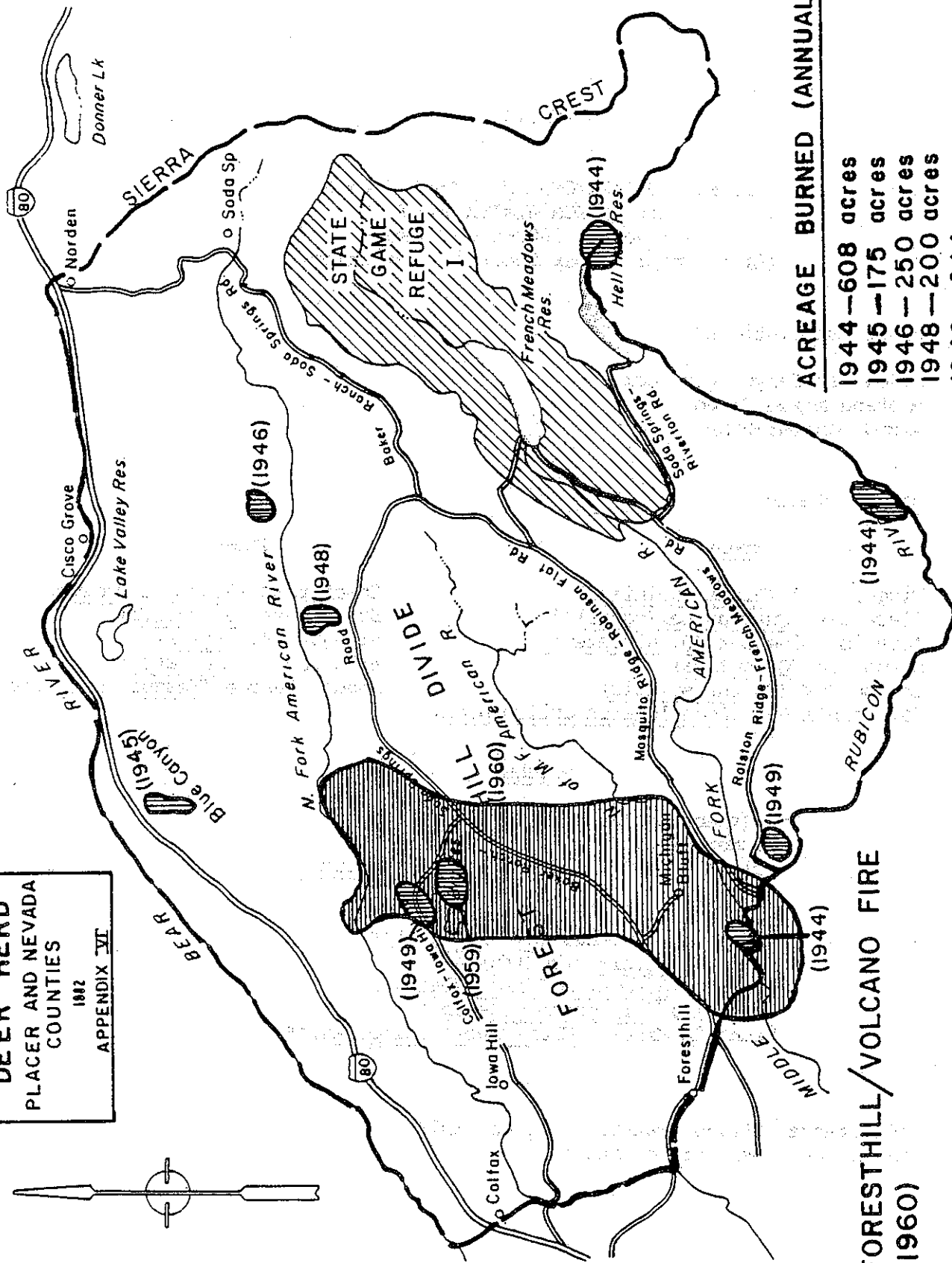
<u>Allotment</u>	<u>Class</u>	<u>No. F. S. Land</u>	<u>No. Pvt. Land</u>	<u>F. S. AUM</u>	<u>Pvt. AUM</u>
French Meadows	Cattle	142	68	469	172
Mosquito	Cattle	197	3	1,040	16
Sugar Pine	Cattle	200	15	924	69
Sugar Pine	Sheep	644	156	219	53
Deadwood	Sheep	1,000	0	300	0
Volcano	Sheep	1,000	0	300	0
Duncan Sailor	Sheep	<u>1,000</u>	<u>0</u>	<u>340</u>	<u>0</u>
TOTALS		4,183	242	4,232	310

B. Eldorado National Forest

<u>Allotment</u>	<u>Class</u>	<u>No. F. S. Land</u>	<u>No. Pvt. Land</u>	<u>F. S. AUM</u>	<u>Pvt. AUM</u>
Long Canyon	Cattle	109	162	351	380
Nevada Point	Cattle	<u>96</u>	<u>64</u>	<u>336</u>	<u>224</u>
TOTALS		205	226	687	604

BLUE CANYON
DEER HERD
PLACER AND NEVADA
COUNTIES
1882
APPENDIX VI

FIRE HISTORY MAP



KEY:

— FORESTHILL/VOLCANO FIRE
(1960)

— OTHER FIRES (YEAR BURNED)

ACREAGE BURNED (ANNUAL)

1944—608 acres
1945—175 acres
1946—250 acres
1948—200 acres
1949—244 acres
1959—183 acres
1960—44,386 acres

APPENDIX 7

PLANT ASSOCIATIONS AND COMMON PLANTS BLUE CANYON WINTER RANGE (Elevation 1000-4000 Feet) (Life Zones: Upper Sonoran, Transition)

A. Plant Associations*

Black Oak-Canyon Live Oak
Montane Mixed Shrub
Mixed Conifer-Pine

B. Common Plants

Trees

Digger Pine (Pinus sabiniana)
Black Oak (Quercus kelloggii)**
Interior Live Oak (Q. wislizenii)
Scrub Oak (Q. dumosa)
Canyon Oak (Q. chrysolepis)
California Bay (Umbellularia californica)

Grass

Cheatgrass (Bromus tectorum)
Soft Chess (B. mollis)
Rip-gut (B. rigidus)
Wild Oat (Avena fatua)
Annual Fescue (Festuca megalura)

Shrubs

Coffeeberry (Rhamnus californicus)
Redberry (R. crocea)
Poison Oak (Toxicodendron diversilobum)
Buckbrush (Ceanothus cuneatus)**
Deerbrush (C. integerrimus)**
Lemmon's Ceanothus (C. lemmonii)**
Toyon (Photinia arbutifolia)
Chamise (Adenostoma fasciculatum)
Manzanita (Arctostaphylos sp.)
Mountain Misery (Chamaebatia foliolosa)**

*Reference, CALVEG (Matyas & Parker, 1979)

**Principal deer forage species

APPENDIX 8

PLANT ASSOCIATIONS AND COMMON PLANTS BLUE CANYON INTERMEDIATE RANGE (Elevation 3000-6000 Feet) (Transition Life Zone)

A. Plant Associations*

Montane Mixed Shrub
Mixed Conifer-Pine

B. Common Plants

Trees

Ponderosa Pine (Pinus ponderosa)
Sugar Pine (P. lambertiana)
Black Oak (Quercus kelloggii)**
Incense Cedar (Libocedrus decurrens)
White Fir (Abies concolor)
Douglas Fir (Pseudotsuga menziessi)

Grasses and Forbs

Bearded Wheatgrass (Agropyron trichophoran)
Cheatgrass (Bromus tectorum)
Soft Chess (B. mollis)
Annual Hairgrass (Deschampsia danthoides)
Slender Hairgrass (D. elongata)
Western Needlegrass (Stipa occidentalis)
June Grass (Koeleria cristata)
Lupines (Lupinus spp.)
Clover (Trifolium spp.)
Buckwheats (Eriogonum spp.)

Brush

Buckbrush (Ceanothus cuneatus)**
Deerbrush (C. integerrimus)**
Squaw Carpet (C. prostratus)**
Snowbush (C. cordulatus)**
Bitter Cherry (Prunus emarginata)
Redberry (Rhamnus crocea)
Mtn. Misery (Chamaebatia foliolosa)
Manzanita (Arctostaphylos spp.)
Currants (Ribes spp.)
Poison Oak (Toxicodendron diversilobum)

*Reference, CALVEG (Matyas and Parker, 1979)

**Principal deer forage species

APPENDIX 9

PLANT ASSOCIATIONS AND COMMON PLANTS BLUE CANYON SUMMER RANGE (Elevation 5000-9000 Feet) (Life Zone: Canadian)

A. Plant Association

Mixed Conifer-Fir
Red Fir
Montane Mixed Shrub

B. Common Plants

Trees

Red Fir (Abies magnifica)
White Pine (Pinus monticola)
Jeffrey Pine (P. jeffreyi)
Quaking Aspen (Populus tremulaoides)
Alder (Alnus sp.)

Grasses and Forbs

Subalpine Needlegrass (Stipa columbiana)
Squirreltail (Sitanion hystrix)
Redtop (Agrostis alba)
Idaho Fescue (Festuca idahoensis)
Alpine Timothy (Phleum alpinum)
Mat Muhly (Muhlenbergia squarrosa)
Gilia (Ipomopsis sp.)

Brush

Sierra Chinquapin (Castanopsis sempervirens)
Mountain Whitethorn (Ceanothus cordulatus)**
Bitter Cherry (Prunus emarginata)**
Huckleberry Oak (Quercus vaccinifolia)**
Manzanita (Arctostaphylos sp.)
Currants (Ribes spp.)**

*Reference, CALVEG (Matyas and Parker, 1979)

**Principal deer forage species

APPENDIX 10

WATER IMPOUNDMENTS BLUE CANYON HERD UNIT

<u>IMPOUNDMENT</u>	<u>SURFACE ACRES</u>
Lake Van Norden	382
Kidd Lake	89
Lower Cascade Lake	33
Upper Cascade Lake	85
Lake Valley Reservoir	312
Putt Lake	34
Crystal Lake	14
Kelly Lake	24
Lake Mary	18
Big Reservoir	63
Dulzura Reservoir	43
Camel Lake	7
Hell Hole Reservoir	1,050
French Meadows Reservoir	1,277
Duncan Reservoir	2
Ralston Interbay	5
Ralston Afterbay	57
Sugar Pine	<u>350</u>
Subtotal	3,845
Auburn Reservoir	<u>12,000*</u>
TOTAL	15,845

*Not entirely within unit and not completed.

APPENDIX 11

THE PLACER COUNTY GENERAL PLAN AS IT RELATES TO DEER

The Placer County General Plan (GP) exists as a combination of a GP (1967) for the entire County and a series of Area Plans which, when approved, supersede the GP's Land Use Designations.

Of the GP and Plans for areas within migratory deer ranges, only the Forest Hill Area Plan mentions deer habitat (winter range); however, no minimum parcel size is designated to protect deer.

The Community Development Element of the Foresthill General Plan shows the following types of designations that may protect deer range; a Forest Residential designation with a variable 4.6-20 acre minimum and a Forestry designation with a variable 20-160 acre minimum. Timber Protection Zone (TPZ) lands and those zoned Forestry, prevent residential growth. The GP also encourages clustered development in the Forestry and Forest Residential designation.

While no specific minimum parcel designations are in the GP or Area Plans for deer ranges, other designations and public lands (U.S. Forest Service, Bureau of Land Management, and Bureau of Reclamation) do provide some protection for deer.

Approximately 85 percent of migratory deer ranges are designated by the GP and Area Plans as Forestry (25 percent) and TPZ (60 percent) which either do not allow residential dwellings or establishes a minimum parcel size of 20 acre/dwelling. Approximately 60+ percent of migratory deer ranges are on public lands and 126,028 acres of the remaining private lands are in the TPZ.

The County should be formally requested to develop a General Plan Amendment (GPA) that includes the maintenance, protection, and enhancement of migratory deer ranges as a goal and policy of the Foresthill GP, the County General Plan, and other Area Plans where migratory deer range is involved.