## III. INTRODUCTION

California's mule and black-tailed deer are among our most visible and widespread wildlife species, inhabiting much of the wildlands in the state (Figure 2). Consequently, their value as representatives of California's wildlife resources is high. Deer are enjoyed for viewing, as in the mountain meadows of Yosemite National Park, along 17-mile drive on the Monterey Peninsula, or concentrated on winter range on the east side of the Sierra Nevada and Cascade ranges. Deer are an integral component in the food chain, from their role as grazers/browsers of wildland plants to their role as prey species to California's top carnivores, particularly the mountain lion, black bear, coyote, and golden eagle.

Deer are also California's most popular game mammal, attracting between 165,000-200,000 hunters to the field annually. The opportunity to go deer hunting provides for thousands of Californians and their families the chance to get out of the office, away from the cities and suburbs, to enjoy the wildlands of the state. The economic value that the deer resource contributes to California through recreational activities was estimated in a detailed study in 1987 (Loomis et al. 1989) at over $450 million annually (at 1987 dollars and conditions).

**FIGURE 2. Approximate distribution of deer range in California. Areas not shaded are considered to be where deer are rare or absent.**

Because of their role in nature, their widespread occurrence, and their long-standing popularity with hunting as well as non-hunting Californians, the conservation of deer and the habitats they occupy continues to be one of the fundamentally important aspects of wildlife conservation in California.

**Using Deer as an "Umbrella" or Flagship Species for Habitat Conditions in California**

Deer are among the most studied wildlife species in California thanks to decades of interest in them as a principal game animal. For some herds, data exist as far back as the early 1900s. From this long history of study, we have learned that deer often respond predictably to California's changing wildland environment, particularly to changes in forestland habitats that are dominated by a mix of herbaceous and shrub vegetation; and to changes in Great Basin shrub/grass ranges.

Because of the existence of long-term data on deer abundance and seasonal ranges and their well established popularity and economic value, deer are an important flagship species in the DFG's environmental review process. They are often the focus of attention in the DFG's review of proposed projects that are subject to the California Environmental Quality Act (CEQA) and in similar federal environmental review processes conducted by the USFS and BLM. Long-term trends in deer populations reflect the conditions of their habitat. Early successional habitat quantity/quality on forested lands, and quantity/quality of important habitat types on Great Basin and desert ranges influence these trends.

**Role of the Department of Fish and Game in Managing Deer and Wildlife Habitat**

The Department collects, compiles, and analyzes deer population data throughout the state and develops proposed hunting regulations for deer. DFG has monitored deer habitat conditions on public lands at varying levels of intensity over the years. Intensive efforts in the past were often collaborative ones, with all three agencies involved at some level. Currently, DFG is renewing an investigative effort in habitat assessment and mapping, particularly in northern California.

The Department is California's lead agency for fish, wildlife, and native plants- collectively called "wildlife." Fish and Game has trustee responsibility for the conservation and management of deer and other wildlife for the benefit and enjoyment of the public. As DFG administers a small amount of the state's wildland, it relies on collaborative efforts, cooperation, and mutual goals/objectives of public land managers (e.g., National Park Service, Fish & Wildlife Service, Bureau of Land Management, U.S. Forest Service); other state agencies (e.g, Parks & Recreation, Forestry & Fire Protection, Water Resources); city/county governments; private landowners; and environmental organizations to achieve consideration for wildlife values. DFG represents the interests of wildlife to these and other entities proposing to implement management strategies, land use plans, specific projects, and other resource use activities on California's wildlands.

The Department is guided by State policies and laws relating to deer and other wildlife. The Fish and Game Code (Section 450) states: "It is hereby declared to be the policy of the Legislature to encourage the conservation, restoration, maintenance, and utilization of California's wild deer populations. Such conservation shall be in accordance with the principles of conservation of wildlife resources set forth in Section 1801 and in accordance with the objectives and elements stated in "A Plan for California Deer, 1976."

Section 1801 of the Code establishes the overall Wildlife Conservation Policy for the Department: "It is hereby declared to be the policy of the state to encourage the preservation, conservation, and maintenance of wildlife resources under the jurisdiction and influence of the state. This policy shall include the following objectives:

(a) To maintain sufficient populations of all species of wildlife and the habitat necessary to achieve the objectives stated in subdivisions (b), (c), and (d).

(b) To provide for the beneficial use and enjoyment of wildlife by all citizens of the state.

(c) To perpetuate all species of wildlife for their intrinsic and ecological values, as well as for their direct benefits to all persons.

(d) To provide for aesthetic, educational, and nonappropriative uses of the various wildlife species.

(e) To maintain diversified recreational uses of wildlife, including the sport of hunting, as proper uses of certain designated species of wildlife, subject to regulations consistent with the maintenance of healthy, viable wildlife resources, the public safety, and a quality outdoor experience.

(f) To provide for economic contributions to the citizens of the state, through the recognition that wildlife is a renewable resource of the land by which economic return can accrue to the citizens of the state, individually and collectively, through regulated management. Such management shall be consistent with the maintenance of healthy and thriving wildlife resources and the public ownership status of the wildlife resources."

Section 1802 of the Code further establishes the department's role as it relates to lead agencies such as the USFS and BLM: "The department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. The department, as trustee for fish and wildlife resources, shall consult with lead and responsible agencies and shall provide, as available, the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities, as those terms are used in the California Environmental Protection Act."

Appendix 2 provides additional Fish and Game Code sections specifically related to the management of deer herds in the state.

**Role of the United States Forest Service in Managing Deer and Wildlife Habitat**

The USFS is authorized by Acts of Congress and by regulations issued by the Secretary of Agriculture to administer, manage, and protect National Forest System (NFS) lands for multiple uses, including the fish, wildlife, and plant resources. Therefore, the USFS is responsible for managing habitats (eg, food, water, and cover) for species, and coordinates with the Department, who is responsible for managing the animal populations.

Each National Forest is required to developed a Land and Resource Management Plan (LRMP), which sets the framework for multiple use management of the Forest. As directed by the Code of Federal Regulations (CFR) 36, Part 219.19, National Forests must identify management indicator species (MIS) in their LRMP. In developing LRMPs, National Forests are required to: (1) establish objectives for the maintenance and improvement of the habitat for MIS species, (2) evaluate the quantity and quality of habitat and of animal population trends of MIS species within planning alternatives, (3) consult biologists from State fish and wildlife agencies and other Federal

agencies to coordinate planning for fish and wildlife, and (4) monitor the trends of MIS species and determine the relationships to habitat changes determined. Most National Forests (16 of 18) in California have identified deer as a MIS species.

In addition, 36 CFR 219.19 directs the Forest Service to manage fish and wildlife habitat to maintain viable populations of existing native and desired non-native vertebrate species. Habitat within each planning area must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area. This regulation defines a "viable population" as "one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area." 37 CFR 219.27 further requires that habitat for MIS species is "maintained and improved to the degree consistent with multiple-use objectives established in the plan."

**Role of the Bureau of Land Management in Managing Deer and Wildlife Habitat**

The Taylor Grazing Act of 1934 stipulated that forage for wildlife would be taken into account when allocating forage in Grazing Districts established by The Grazing Service. On July 16, 1946 The Grazing Service and The Land Office were merged to form the Bureau of Land Management. The Taylor Grazing Act and its stipulations for wildlife forage stayed in effect until 1976. With passage of the Federal Land Policy and Management Act (FLPMA) on October 21, 1976 (Public Law 94-579), Congress expanded the Bureau of Land Management's (BLM) role in managing wildlife and wildlife habitat from strictly discussing forage to all habitat components found on Public Lands. Two paragraphs within Section 102. (a) of FLPMA, Declaration of Policy, have the most direct bearing on wildlife and wildlife habitat management on Public Lands. Paragraph 7 states: "it is the policy of the United States...that management be on the basis of multiple use and sustained yield...." Paragraph 8 states: "the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use...." The BLM, therefore, is charged with maintaining the health of the land while providing for several appropriate uses. The major uses for public lands defined in FLPMA "includes and is limited to, domestic livestock grazing, fish and wildlife development and utilization, mineral exploration and production, rights-of-way, outdoor recreation and timber production."

The Secretary of the Interior within the regulatory authority granted by 43 United States Code 1201 further establishes the BLM's role in wildlife and wildlife habitat management in Part 24 of the 43 Code of Federal Regulations (CFR) entitled: *Department of the Interior Fish and Wildlife Policy; State-Federal Relationships.* While the several states are recognized to "possess primary authority and responsibility for management of fish and resident wildlife on BLM lands, the Secretary, through the Bureau of Land Management, has custody of the land itself and the habitat upon fish and resident wildlife are dependent (Subpart 24.4 Resource management and public activities on Federal Lands, Paragraph (d))." While management of the habitat is a responsibility of the Federal Government, the Secretary of the Interior is directed to cooperate with the states in developing programs for the conservation and rehabilitation of fish and wildlife including specific habitat improvement projects. Federal agencies of the Department of the Interior are directed to

prepare fish and wildlife management plans in cooperation with state fish and wildlife agencies, and institute fish and wildlife habitat management practices within their statutory authority and subject to agency management priorities and strategies. Agency management priorities and strategies include the Rangeland Health Initiative. The Rangeland Health Initiative sets standards for rangeland health and establishes guidelines for grazing administration based on meeting rangeland health standards. One standard which guides management of wildlife habitat is that healthy, productive, and diverse populations of native species exist and are maintained.

The BLM in California manages approximately 4,886,000 acres of deer habitat which provide an estimated 2,795,000 hunter days for deer hunters with an estimated net economic value of more than $170 million. California BLM's policy is to: "maintain close cooperation and coordination with the California Department of Fish and Game (CDFG) on matters of wildlife, wildlife habitat, and other areas of common interest on BLM administered lands (BLM Manual Supplement, Rel. 6-18, Dated 5/10/84, entitled; *BLM-State Memorandum of Understanding)*." In developing and implementing the Master Memorandum of Understanding and its 5 Addenda the BLM and CDFG have agreed, within the context of their respective statutory authority, policies, and management strategies, to work cooperatively in the management of the State's wildlife and their habitats.

### Who Owns and Administers Wildlife Habitat In California?

Deer inhabit about 64 million acres of California's approximately 85 million acres of forest, rangeland, and desert. About 50 percent of the deer range is public land administered by the federal government, primarily the USFS and the BLM (Figure 3). About 45 percent of the state's deer range is privately owned by individuals or businesses; among these, timber companies own a substantial amount of land that is deer range, particularly in the northern part of the state. A limited amount of deer range is owned and administered by the state as state parks, forests, and wildlife areas. The DFG has responsibility for the management of less than one percent of the state's deer habitat; about nine percent is managed largely to preserve natural conditions (e.g., national and state parks); and about 90 percent of the habitat is managed for specific single uses (e.g., private lands) or multiple uses (e.g., USFS and BLM lands) that may or may not be beneficial to deer or other wildlife. The majority of deer hunting by the public occurs on lands administered by the USFS and BLM.

## IV. DEER POPULATION TRENDS

The DFG estimated deer populations by DAU, but also provided a general representation of deer population trends in California since 1800 (Figure 4). Figure 4 illustrates that deer populations in California peaked in the late 1950s to 1960s (see also Figure 5) and are now at a lower level of statewide population. The deer decline appears due largely to long-term declines in habitat quality throughout the state, brought about by various factors.

Deer population estimates were made for the period 1990-1996. Annual variation in specific deer population estimates may be quite high due to localized changes in environmental conditions, so it is more appropriate to have at least a several-year period upon which to evaluate trend (stable, upward, or downward). The DAU system fits reasonably well with the late 1940s assessment conducted by Longhurst et al. (1952), and their estimate of population is included for each of the

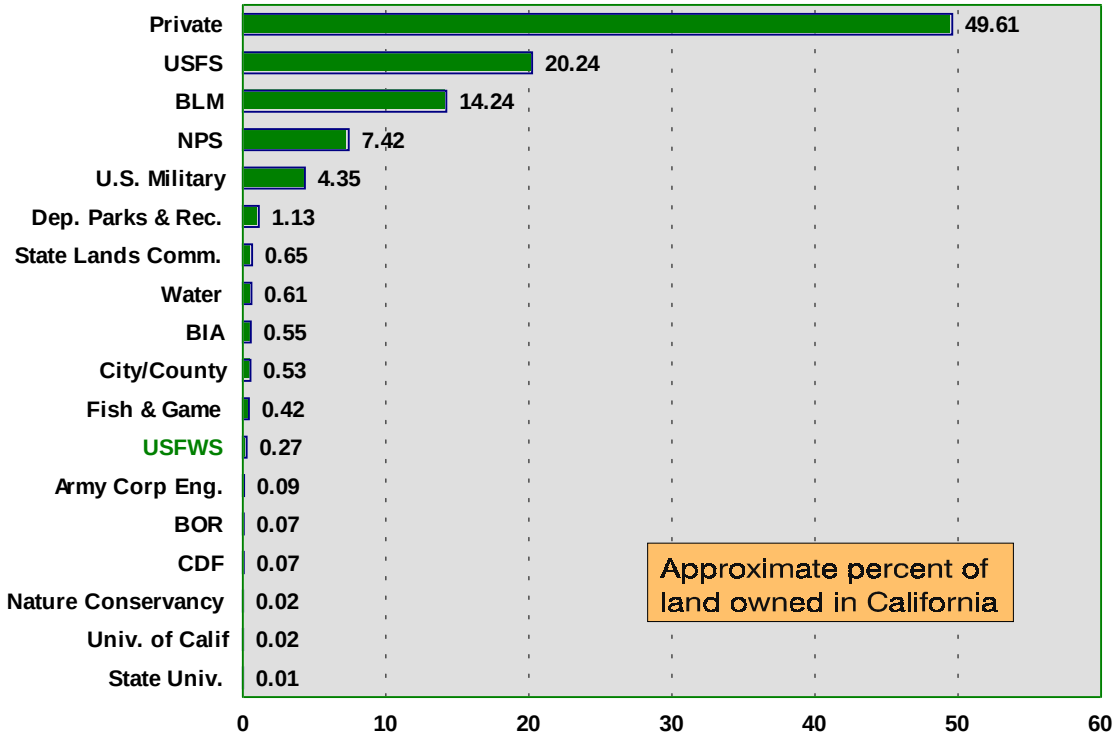


**FIGURE 3. Major ownership and administration of deer habitat occurs on private lands and on USFS and BLM lands.**

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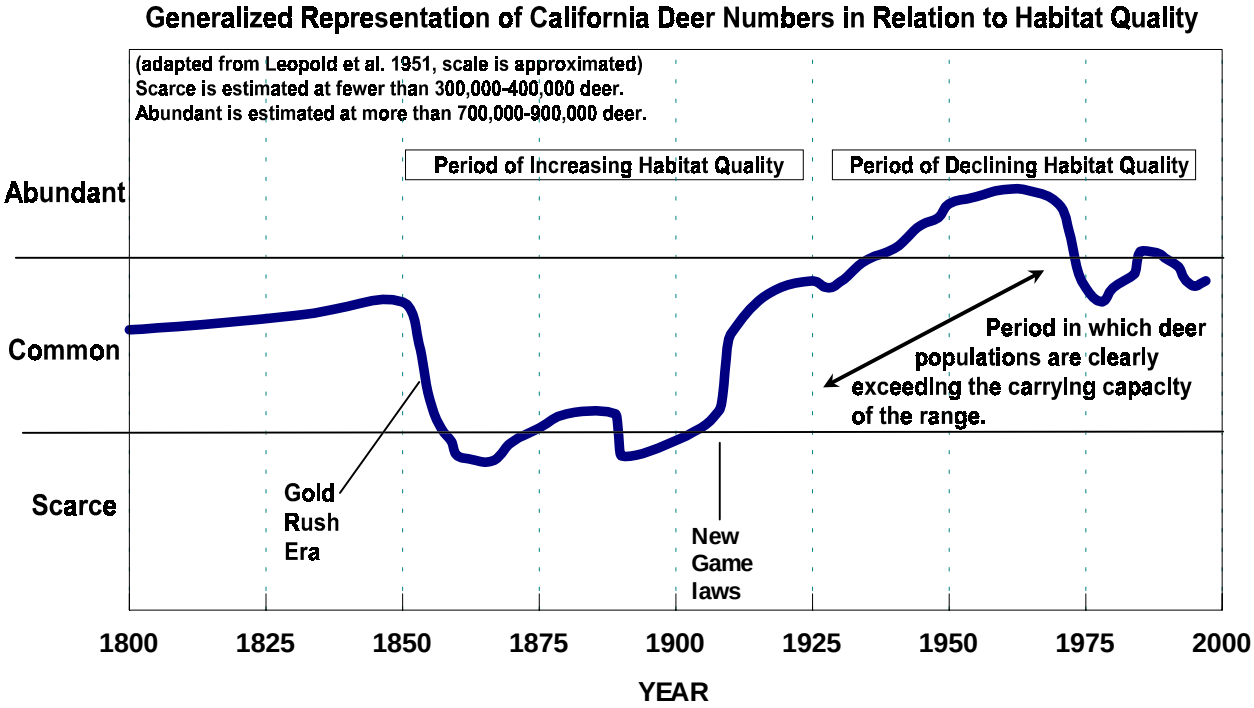
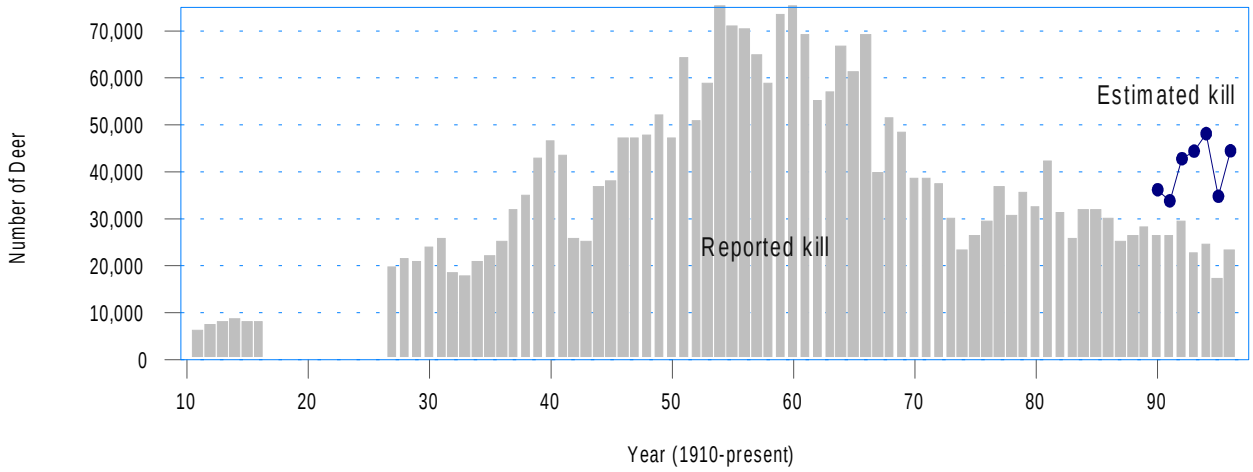



**FIGURE 4. Generalized deer population trends as they relate to key periods of increasing habitat quality due to disturbances (e.g., fire and logging) and decreasing habitat quality due to declining disturbance (fewer fires and more regulated logging). Opening of forests as a result of post World War II logging activities likely contributed to the final peak in deer numbers in the 1960s, but also signaled the start of the decline as those forests began to "close" again.**




(Reported kill numbers are based on tag returns only and represent the minimum # harvested. Estimated kill reporting began in 1990 and accounts for those tags not returned by successful hunters).

**FIGURE 5. Deer harvest in California reflects the general changes in deer populations, and is affected by long-term changes in habitat quality. (Beginning in 1967, a change to self-validation of deer tags was imposed on hunters and there was a marked drop in the deer tag return. Self-validation was dropped in 1970, however the tag return rate remained low, with a 30-40 percent estimated non-return rate.)**

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specific DAU sections (Longhurst's numbers do not reflect the ultimate high point in deer numbers that continued to increase into the 1960s, then began trending downward to present levels).

Deer population trend is considered increasing in DAU 9, the south central Coast (Figure 6). Populations were considered fairly stable in DAUs 1, 7, 8, and 10 (Figure 6) and populations were declining in DAUs 2, 3, 4, 5, 6, and 11 (Figure 7). Northeastern California has experienced the sharpest percentage decline in deer, followed by the northeastern Sierra. Deer populations on the eastside have also declined substantially.

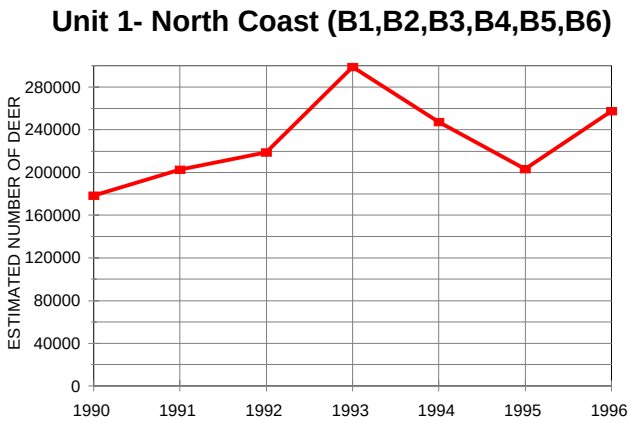
**California Deer Populations in Relation to Habitat Quality (How Did we Get Here?)**

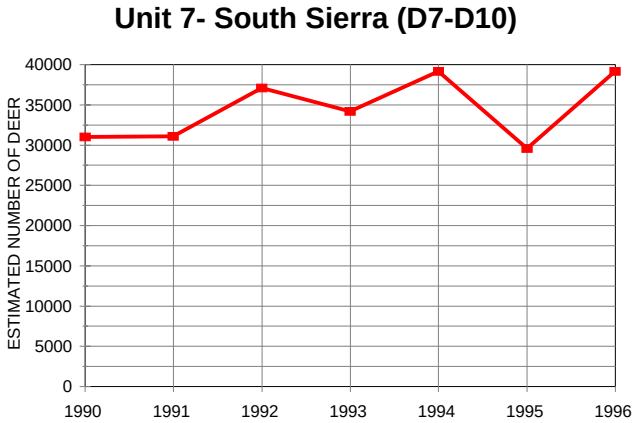
The most notable fact about deer populations in California is they have decreased from the record highs of the 1950s-60s, and it is of concern to hunters (and others interested in deer) from one end of the state to the other because of the declining hunting opportunity (Figure 5). This benchmark period is important because it is the basis upon which the DFG deer management program's success is, and has been, compared.

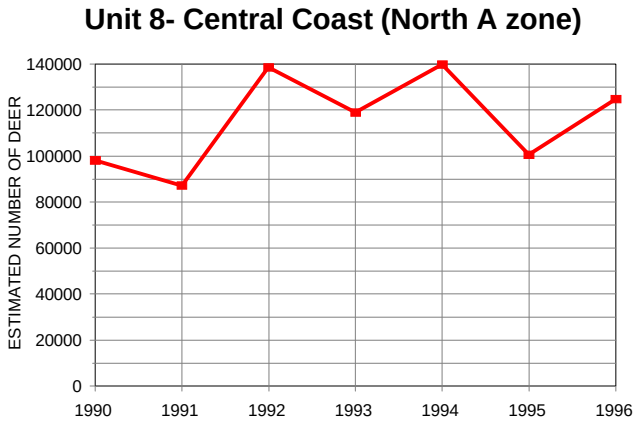
Not coincidentally, much of the poor public relations that deer management in California has experienced for the past 40-50 years was specifically a result of the active programs begun in 1946 to address the growing "deer problem... that occurs when deer populations become out of balance with their habitats" (Dasmann et al. 1958). Generally, there were two possible approaches to address the deer problem:

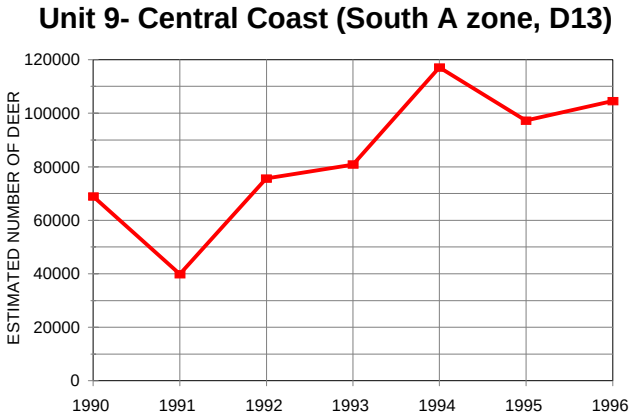
a) increase the quality (carrying capacity) of deer habitats; and/or
b) reduce the deer populations by instituting doe harvests, thereby maintaining or increasing buck numbers and potential harvest while keeping the deer population in balance with existing habitat conditions.

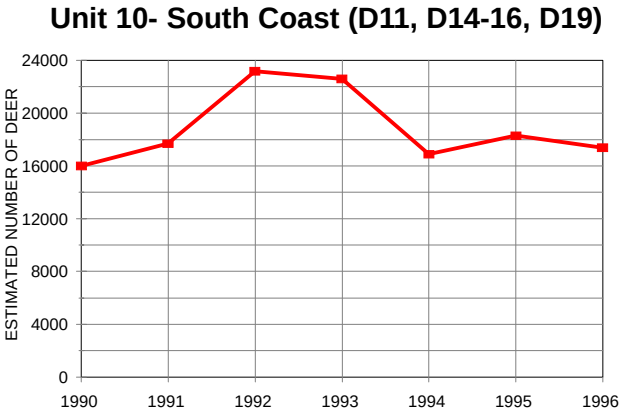
**FIGURE 6. Stable or upward-trending DAUs. Note scales vary among DAUs.**

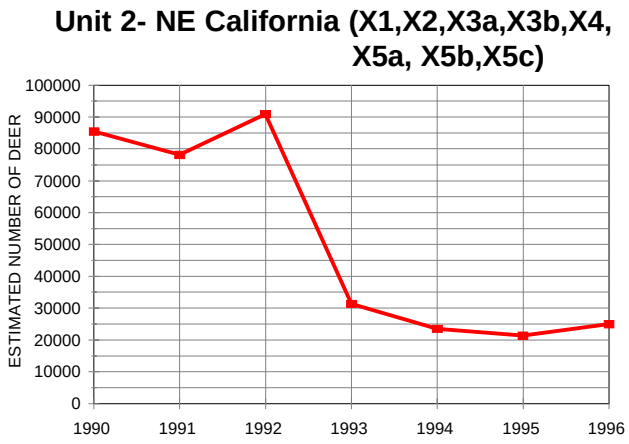


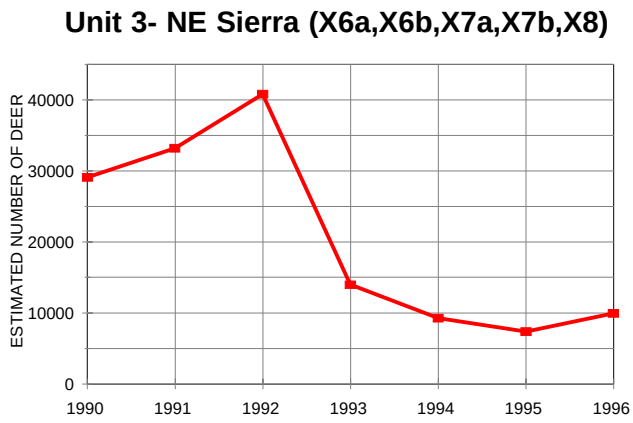



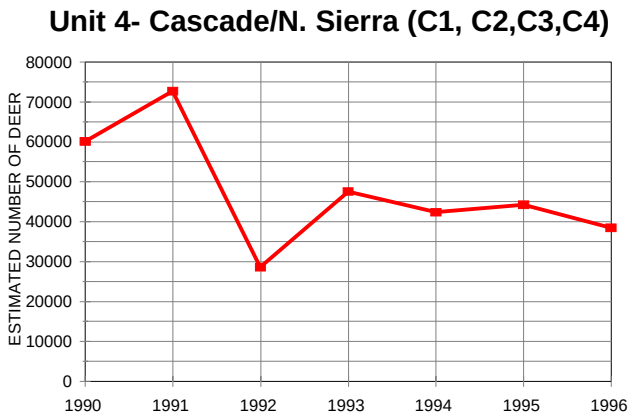



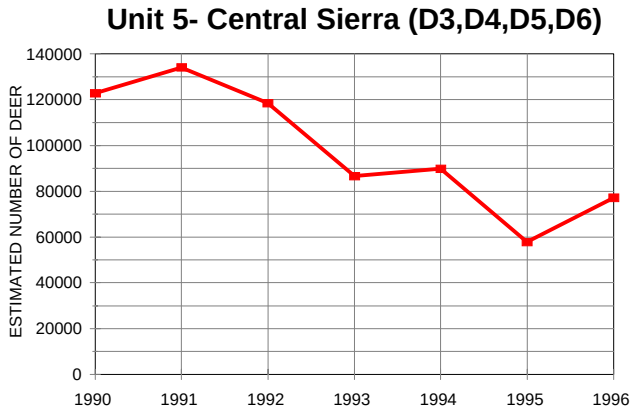



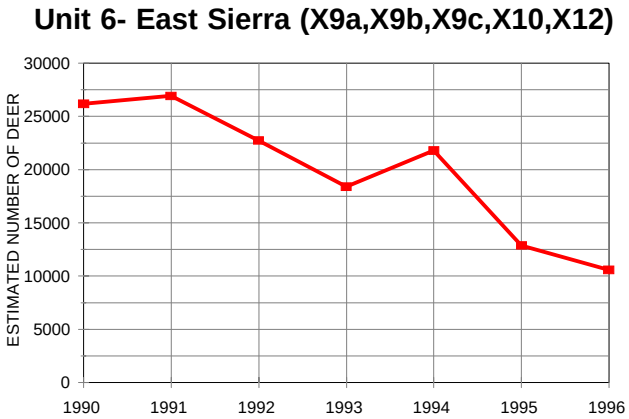





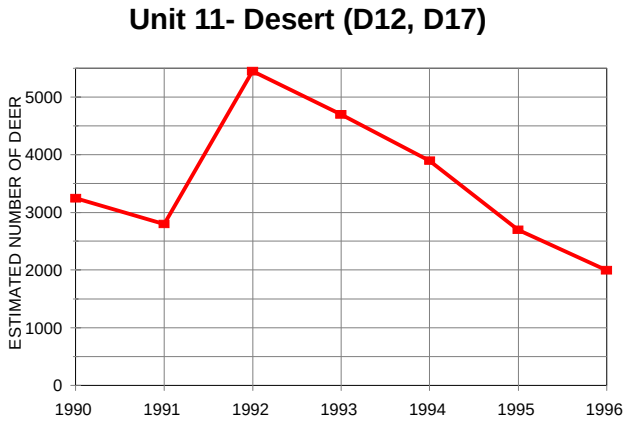




**FIGURE 7. Downward-trending DAUs. Note scales vary among DAUs.**

DFG had no direct ability to implement projects designed to increase the quality of habitats on public or private land, although several interagency efforts were implemented during this period. The agency did have authority to implement approach “b” in 1950 with California’s first special antlerless deer hunts. There were several successful antlerless hunts conducted and these were followed by the first and still controversial “either-sex” deer hunt in 1956 (Dasmann et al. 1958).

Ideally, both approaches “a” and “b” would be used (e.g., Longhurst and Connolly 1970), but in reality the problems identified (declining deer populations were a symptom of the problem) were largely attributable to declining quality of deer habitats rather than an increase in quality. The decline began as a consequence of long-term change in management of wildlands that began in the early 1900s, particularly, the move to more regulated and intensive forest management and improved fire suppression. The institutionalization of these management changes by the federal government (USFS and BLM), state government (California Department of Forestry and Fire Protection), and by large private landholdings meant a decline in disturbance that perpetuates early successional habitats and the beginning of a reversal as far as deer habitat quality was concerned.

An indirect, long-term consequence of these changes includes increased competition with livestock as herbivores had to now share a resource that was declining rather than increasing. Significant reductions in grazing over much of the state occurred as range management evolved. Much of the early successional vegetation created since the start of the gold rush in 1849 was being replaced by forage-limited, second-growth forest (Leopold 1950) and by decadent shrubfields dominated by unavailable or low quality browse and having little herbaceous vegetation (Salwasser et al. 1978, Storer 1932).

Opening of forests as a result of post-World War II logging activities (Laudenslayer and Darr 1990) likely contributed to the final peak in deer numbers in the 1960s. Deer numbers then began to decline as those forests began to “close” again. The relationship between understory forage (herbaceous and shrub) and overstory canopy (Figure 8) is typical of much of California’s forested ranges--as canopy increases, forage decreases. The expansion of urbanization and residential development on private lands into the Sierra Nevada on both the West and East Slope further reduces available deer habitat, virtually eliminating the potential to purposely restore large-scale disturbances, such as fire, into the system in many areas.

It’s well-documented that deer thrive on early successional vegetation in forested communities (Leopold 1950, Wallmo and Schoen 1981), and there is a period encompassing about 2-30 years following major disturbances such as fire or logging when herbaceous and shrub species are abundant, available, and in highest quality (Figure 9). Livestock and perhaps hundreds of largely unstudied species of wildlife such as blue grouse or mountain quail, also rely on the vegetation produced in forest openings where sunlight is allowed to “hit the ground” and enable plants to grow and be available for consumption or as cover.

Habitat quality constantly changes for better or worse as a result of fire, logging, grazing, succession, and other processes (Wallmo and others 1976), while habitat quantity is continually declining because of urbanization and development. To sustain deer populations, we would need to counter the loss of habitat with more efficient use of remaining habitats.

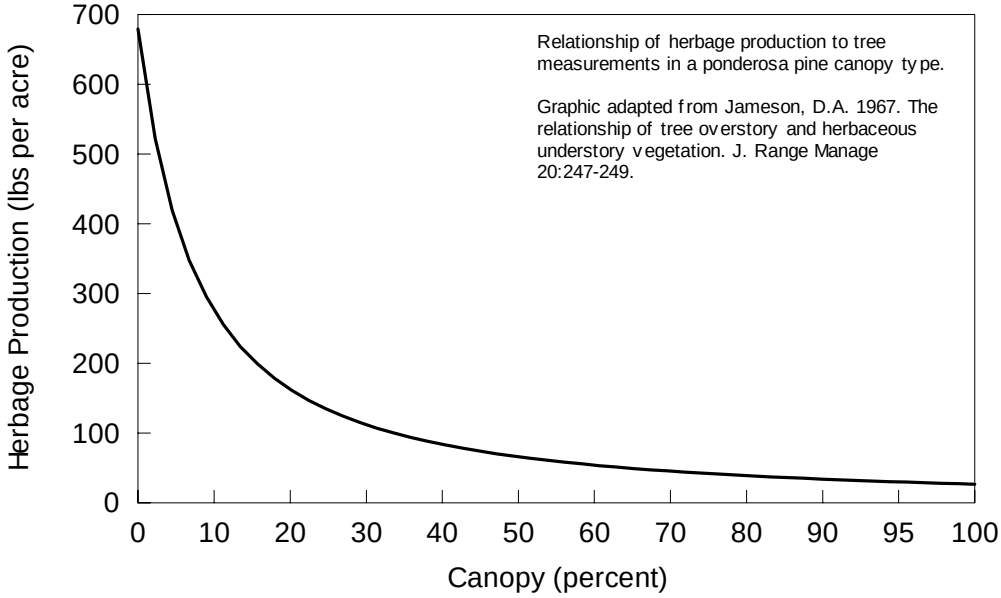



**FIGURE 8. Generalized representation of the relationship between grass/forb herbage production per acre and the overstory canopy on a pine system. Increasing tree canopy cover even a small amount, such as from 10 to 30 percent, causes significant declines in the amount of herbage produced as a result of competition for sunlight, moisture, and nutrients.**

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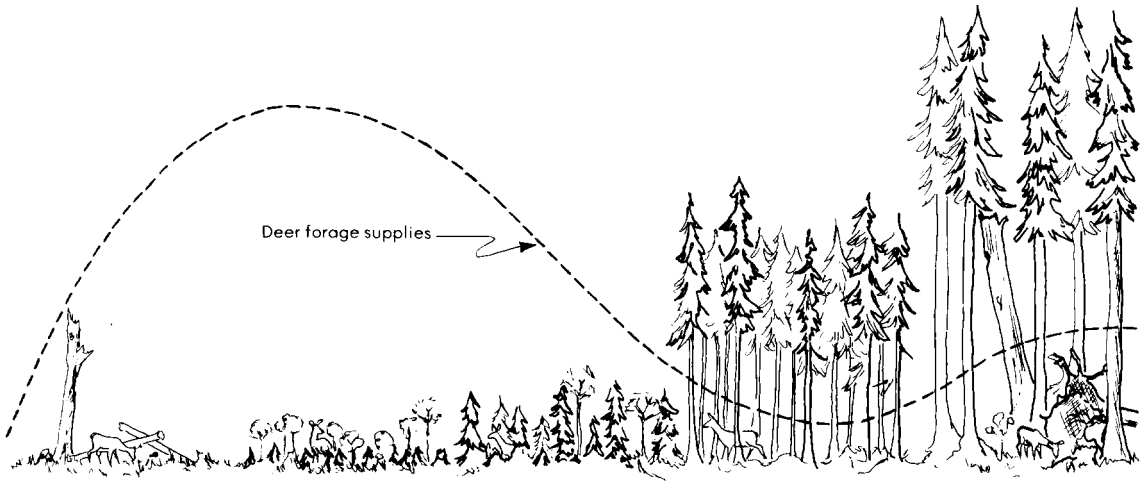


| New clearcut | Seedling conifer | Advanced regeneration | Second growth timber | Old growth forest |
|---|---|---|---|---|
| Forb - grass - sedge | Shrub - herb | Young tree - shrub | Minimum undergrowth | Moderate undergrowth |
| 1-5 years | 6-10 | 10-20 | 20-200 | 200 + |

**FIGURE 9. Generalized representation of the relationship between deer forage supplies and the successional process as influenced by timber harvest and plant succession. Graphic from Wallmo and Schoen (1981). Forest management for deer. Pages 434-457 *in* O.C. Wallmo, Ed. Mule and black-tailed deer of North America. Wildlife Management Institute, Univ. of Nebraska Press.**