Wildlife

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The wildlife research program at the Hopland Field Station has been a cooperative effort involving primarily researchers from the Davis and Berkeley campuses and, occasionally, researchers from other state and federal agencies, California state universities, Oregon State University, and certain private companies. The station has also served as a base of operations for other research projects in nearby counties.

Research objectives have been varied, ranging from basic to applied. However, the bulk of the research has been directed at exploring the interrelationships of wildlife and agriculture, including livestock, planted crops, watersheds, and silviculture. Wildlife management has been investigated from the standpoint both of production for sport hunting and of reducing conflicts with other land uses. To accomplish these objectives, it was frequently necessary to explore the basic biology and ecology of various wildlife species.

Although there has been considerable diversity of research effort, certain topics have dominated. Ruminants, especially deer, have had a high priority. Most major aspects of deer biology and ecology have been investigated with emphasis on parasites, diseases, nutrition, physiology, and the interaction of deer with livestock, particularly sheep. Cattle have been involved in only a few studies.

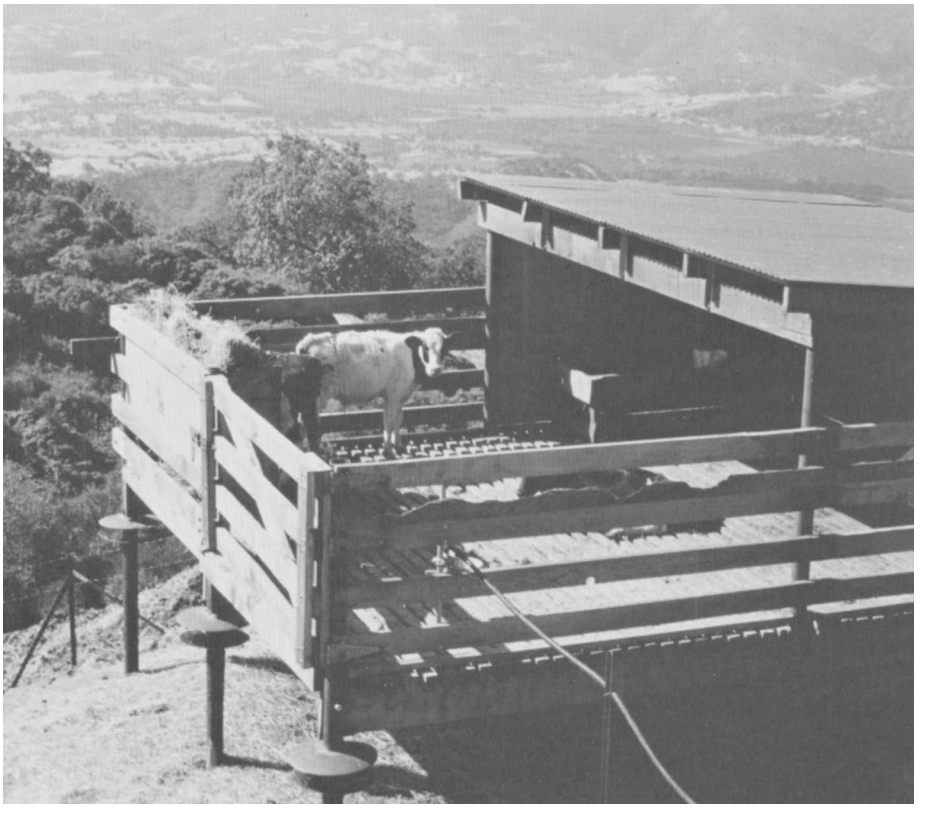
Other wildlife, including rodents, birds, coyotes, jackrabbits, and reptiles have been investigated, primarily from the standpoint of parasites, diseases, nutrition, and physiology. Certain species, such as coyotes, rodents, and deer, have also been studied in relation to controlling the damage they cause to agricultural crops or timber reproduction.

Management studies in regard to utilization through sport hunting have focused mainly on deer. The relative values of various hunting strategies have been ascertained and the cost/benefit relationships evaluated.

research is diverse, productive

A major strength of the wildlife research program has been its interdisciplinary approach to problems. Basically, wildlife ecology and management is more of an interdisciplinary field than many other natural resource areas. Because it involves not only a wide spectrum of wild vertebrate species but also their habitat interrelationships, including factors such as soil, water, weather, and vegetation, a broad approach is necessary for many investigations.

Team efforts have focused on a number of research problems through the years. Some of these investigations have been completed and published, and others have not yet been fully reported. Interdisciplinary projects involving wildlife have included studies on experimental watersheds, experimental sheep-deer pastures, parasites and diseases, ruminant physiology, and radiobiology.



Tick-proof pens help scientists determine disease transmission patterns between wildlife and domestic animals.

Parasites and diseases

The main emphasis was first to survey the kinds of parasites harbored by deer, sheep, and cattle and, subsequently, to determine the kinds of parasites transferred among these animals.

The relative effects of the parasites on these host animals and treatment methods were also investigated. It was found that parasites can contribute significantly to the losses of fawns during their first winter and, to a lesser extent, to the losses of yearlings during their second year. Few older deer carry sufficient numbers of worms to be affected. Losses from parasitism can be increased by severe weather and overstocking. It also was determined that starvation, sometimes accompanied by internal parasites, is the main cause of deer losses at the station.

Subsequently, investigations of the life cycles of a number of parasites affecting deer and other wild vertebrates were initiated. Collectively, these studies have developed one of the most extensive and complete parasite lists for a single vertebrate host (Columbian black-tailed deer) that has ever been assembled from one locality, with more than 85 species identified.

The most thoroughly investigated diseases include anaplasmosis and Q-fever. Both are diseases of wildlife and livestock; Q-fever also affects humans.

Radiobiology

Of the many radionuclides released by past atmospheric tests of nuclear weapons, two with a detrimental potential to human health are strontium-90 and cesium-137. When these fallout products are injected into the stratosphere by atomic explosions, they tend to circulate around the globe, carried by high-altitude winds. Most fallout particles eventually return to earth, and a significant number of them adhere to vegetation where they may be subject to ingestion by wild or domestic herbivores. The particles thus become incorporated in a variety of food chains with the possibility of ending up in man.

Radiobiology studies traced the movement of these radionuclides through the food chains involving deer and sheep and assessed their impacts on these species.

Long-term monitoring of strontium-90 accumulation in the mandibles of deer showed that levels in jawbones of yearling deer increased 5,300 percent from 1952 to 1960. From 1962 through 1967, there was significant variation in strontium-90 levels among individual deer. The highest levels occurred in 1963 following extensive U.S. and Russian atmospheric weapons tests that year.

Comparative studies of the metabolism of strontium, calcium, and cesium were made on deer and sheep in relation to their contrasting food habits, with deer being primarily browsers and sheep being grazers.

Differences in body burdens of cesium-137 were found in adjacent subpopulations of resident deer that were separated by altitude and by vegetation type. Rumen contents and muscle of deer feeding in oak woodland areas contained more cesium-137 than those of deer in a chaparral habitat. Ingested lichens, which contained up to 140 times more cesium-137 activity than other forages and made up about 6 percent of the diet of the oak woodland deer, appeared to contribute appreciably to the higher levels of cesium-137 in the oak woodland deer.

Nutrition and physiology

Wildlife nutrition, especially that of deer compared with sheep, has been a major research topic since the early 1950's. Studies have been directed at determining the kinds and quality of vegetation consumed by animals and their effects on growth, reproduction, physiology, and population dynamics.

Another aspect of nutrition receiving considerable attention has been the palatability of food plants for ruminants. Here also, deer and sheep have been the primary species studied. It was found that these ruminants prefer plants that are especially nutritious, but that the nutrient content of forage plants alone cannot explain relative palatability. Ruminants must also eat plants that are compatible with their symbiotic rumen microbes. Ruminants were found to use their sense of smell as the primary means of selecting forage, but taste and touch were also used.

Using tritium oxide, a comparative study of deer and sheep was done to determine their respective body water pools and turnover rates in summer and winter. Deer were found to have a larger body water pool than sheep, but their turnover rate was slower in both seasons.

Habitat manipulation

The major habitat manipulation study evaluated the effects of brush burning on deer. Deer health and reproductive success were compared in unburned chaparral, a 3,000-acre chaparral study area that was spot burned for a number of years, and an area of oak woodland with a grass understory. Deer condition was only slightly improved by burning the chaparral, although the overall carrying capacity of the area was increased. Basically, oak woodland seems to provide a better habitat and food supply for deer than chaparral, but hunter access in chaparral is improved by burning.

Other habitat studies have involved soil fertility and investigations on quail and acorn production.

Animal damage

These studies have been primarily concerned with the effects of deer, coyotes, and rodents on crops, rangelands, or commercial forests, and ways to alleviate damage. In some cases the economic relationships have also been evaluated.

In the case of deer, designs for fences were developed to protect croplands, and public hunting strategies were explored to reduce forest damage. Though fence construction and maintenance costs are high, fencing can be economically justified for certain crops, such as orchards, vineyards, and irrigated pastures. The most useful designs are the upright and slanting or overhanging fences. Electric fences are generally unsatisfactory.

Coyote investigations were directed toward determining how they kill sheep, the relative impacts of control operations on coyote populations, and the development of coyote attractants to aid control operations.

Wildlife management

In addition to habitat manipulation and animal damage studies, wildlife management research has been addressed to various aspects of wildlife utilization as a recreational resource through sport hunting. Although deer have been the main species considered, other species also have been included.

Long-term deer studies suggest that management plans tailored to local conditions should provide for hunts of either sex to utilize the full potential of deer production and habitat improvement. It also was determined that hunting, as currently managed, has virtually no effect on the deer population. Losses primarily from starvation and, to a lesser extent, from disease, parasites, accidents, and predation are the chief regulatory factors in the size of deer herds. Removal of deer from the field station at a rate six times higher than that from other deer ranges in Mendocino County had no discernible effect on deer numbers. The main effect of the larger harvest was a higher rate of fawn production and survival, apparently resulting from reduced competition for food.

Miscellaneous

Various other investigations have been carried out involving jackrabbits, cattle interrelationships with wildlife, rodents, and birds.

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