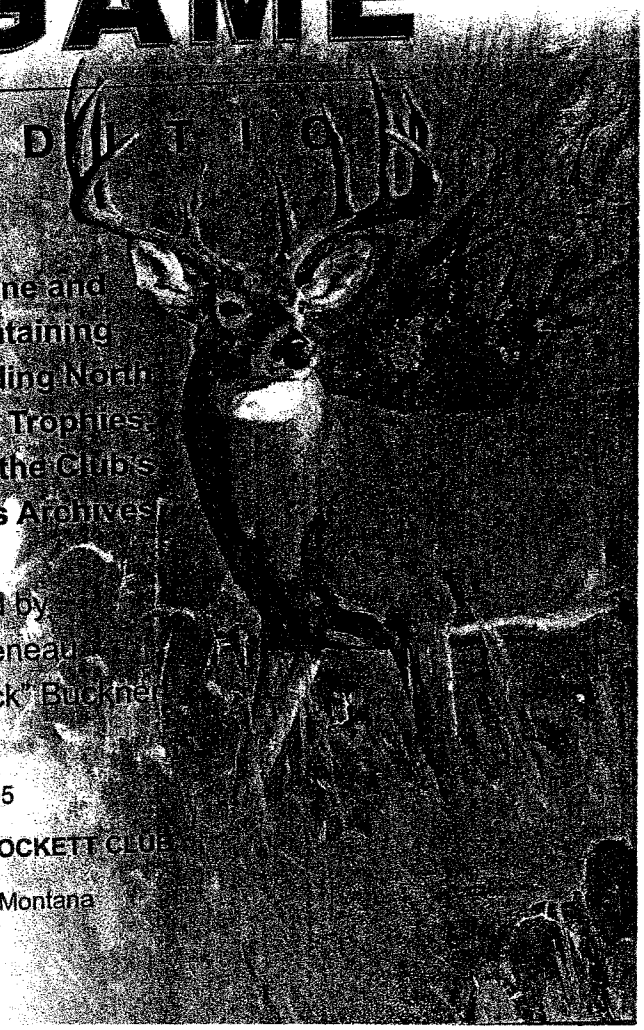
RECORDS OF NORTH AMERICAN BIG GAME

12TH EDITION



A Book of the Boone and Crockett Club Containing Tabulations of Outstanding North American Big-Game Trophies Compiled from Data in the Club's Big-Game Records Archives

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CHAPTER SIX

Management of Mountain Lions in California

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Few animals stir as much emotion as cougars, catamounts, or pumas; these are large felines that most commonly are referred to as mountain lions. In California, the birth place of many politically correct trends, mountain lions are of special interest and have a long and varied management history. That history includes the entire spectrum of management strategies, ranging from year-round open-seasons with no limit on take, to that of persecuted predator, nonprotected predator, carefully regulated game animal, and, eventually, to California's only "special protected mammal."

The diverse management history of mountain lions in the Golden State is rivaled only by the variety of landscapes that occur there. During the early part of California's history, mountain lions were fair game, with no legal status. From 1907 to 1963, records indicated that more than 12,000 bounties were paid. Following cessation of the bounty period in 1963, mountain lions were managed as nonprotected, nongame animals, and no records of take were maintained: anyone with a hunting license could pursue these large carnivores in unlimited numbers, and on a year-round basis.

Mountain lions first received protection under modern wildlife management regulations in 1969, when they were classified as game animals by the California Fish and Game Commission; that status was retained until 1972, when a moratorium on take was enacted. During 1969-1972, 4,953 tags were issued, and 118 specimens were harvested. After the moratorium was in place, the California Department of Fish and Game established a system whereby incidents of livestock or pets and mountain lions have been kept with painstaking consistency. As a result, depredation permits are issued to affected property owners and allow them to "take" the offending mountain lion.

Following extensive investigations, mountain lions were again classified as a game mammal in 1986, but recommendations for limited harvests were challenged in court.

IT IS DOUBTFUL THAT THE ABILITY TO MANAGE MOUNTAIN LIONS IN CALIFORNIA AT A LEVEL THAT WOULD AFFECT POPULATIONS OF OTHER UNGULATE PREY WILL BE RESTORED TO WILDLIFE BIOLOGISTS, WHO ARE THE INDIVIDUALS BEST TRAINED TO MAKE THOSE DECISIONS. THAT ABILITY WAS LOST THROUGH THE VOTING INITIATIVE PROCESS, AND CAN ONLY BE RESTORED THROUGH THE INITIATIVE PROCESS, OR BY A FOUR-FIFTHS VOTE OF THE LEGISLATURE; NEITHER IS LIKELY TO OCCUR IN CALIFORNIA.

Photograph by Neal and Mary Jane Mishler

MANY OF THE DEPREDATIONS THAT OCCUR ON DOMESTIC LIVESTOCK OR PETS ARE BY MOUNTAIN LIONS THAT ARE NO LONGER CAPABLE OF KILLING DEER — NOTE THE WORN TEETH. PHOTOGRAPH BY BECKY M. PIERCE.

As a result, no hunting season ever occurred and, in 1990, the voters of California passed a ballot initiative, Proposition 117, which afforded mountain lions the status of specially protected mammal. A subsequent ballot measure, Proposition 197, which would have modified the specially protected status, was defeated in 1996 and reaffirmed total protection as the management strategy for mountain lions in California.

There has been much speculation about whether cessation of sport hunting of lions has had a negative effect on large mammal populations in California. Further, some have argued that cessation of sport hunting has resulted in mountain lions becoming emboldened around humans, thereby creating situations in which citizens are exposed to greater danger of being attacked than had been the norm when lions were hunted. Regardless of whether sport harvest of mountain lions has resulted in lower numbers or reduced populations of large game mammals, or if it has increased risks to humans because those carnivores no longer equate the presence of humans with danger, the management of lions in California remains a contentious issue. Certainly, far fewer management options currently exist than in other states that support healthy populations of those carnivores. The initiative process has altered the ability of professional wildlife biologists to use traditional techniques to manage lion populations, or to provide recreational opportunities to those seeking to harvest a trophy animal. Current law even prohibits the use of hounds to pursue lions for the purposes of photography, an interest held by many citizens that have little chance of photographing one of those elusive carnivores in the absence of assistance from professional houndsmen.

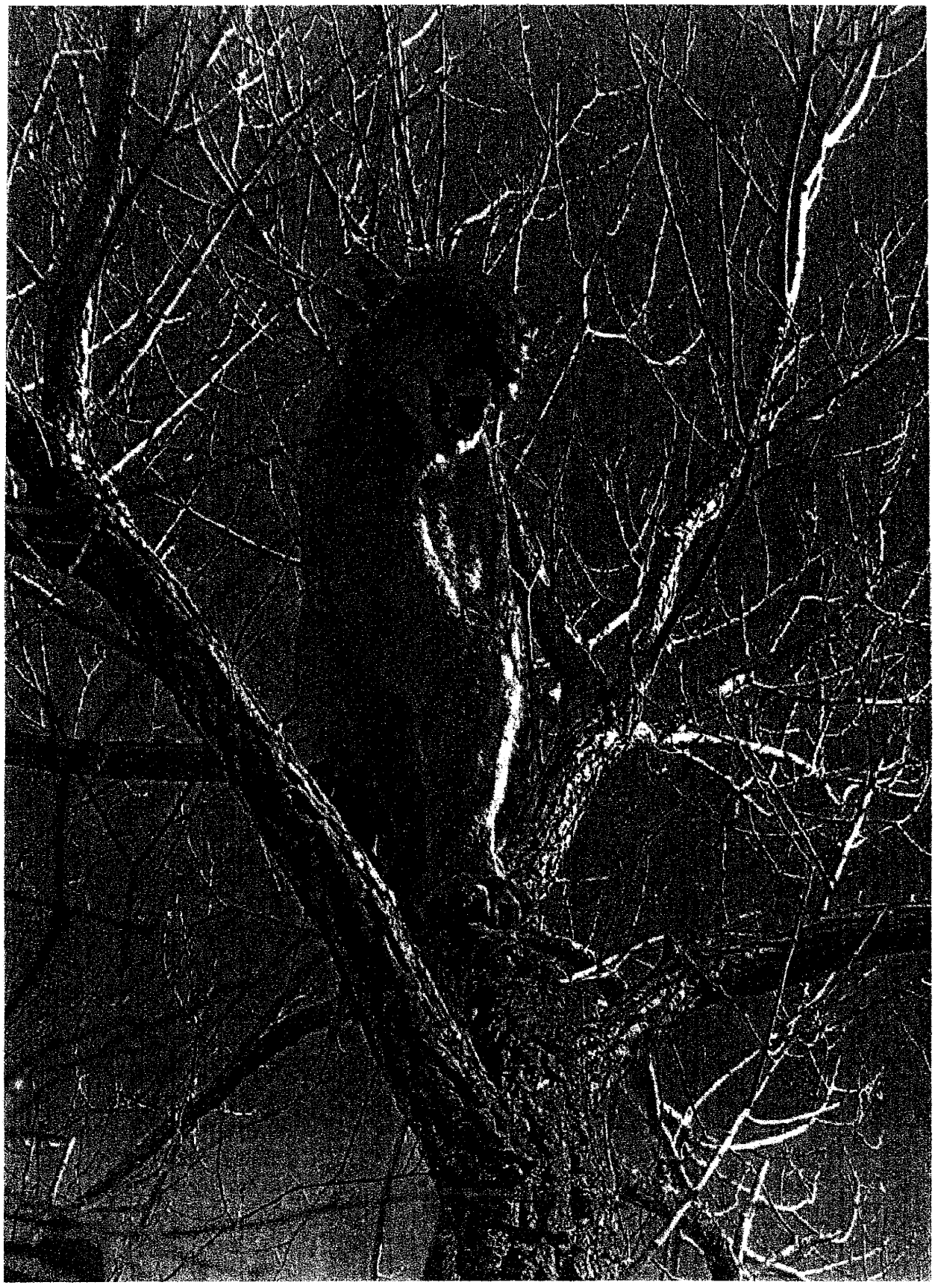
To better describe interactions between mountain lions and their prey, we define several basic terms. Among these are nutritional carrying capacity, density-dependent processes, density-independent processes, compensatory mortality, and additive mortality. Nutritional carrying capacity (K) refers to the number of animals of a particular species that a given environment will support, based on the nutrient requirements of the population involved. Density-dependent processes are those that are a function of the current population density relative to K that influence the demographic characteristics of a population; there is a feedback between population density and the recruitment rate (young added to the population per adult female) of the population. Density-independent factors also influence demography, but there is no feedback between those factors and the

response of a population to those factors; examples of density-independent factors include severe weather and accidents. Compensatory mortality refers to causes of death that are compensated for by increased survival or reproductive output by animals remaining in a population following the removal of some individuals, and one source of mortality compensates for another. For instance, young deer in poor condition and that were killed by a predator likely would have died anyway from malnutrition during winter. Additive mortality refers to deaths that are not compensated for by enhanced survivorship or reproductive output among animals remaining in a population, and that occur in addition to other causes of death. In this example, winter deaths from malnutrition would be added to losses from predation. All of these terms are applicable both to predators and prey.

Prey species of mountain lions (in particular large ungulates) respond to the removal of individuals in a density-dependent manner. That is, when prey populations are limited by the food supply, reproduction and recruitment are low, and body condition generally is poor. Individuals in such populations die of numerous causes, including predation. Losses to predators under such circumstances are often compensatory mortality, because those losses are compensated for by enhanced survival (or, perhaps, reproductive success) among surviving prey. When a population of animals is in poor body condition, mountain lion control likely has little effect on the number of animals in the population: forage is limiting the number of animals in the population, and lion removal does nothing to enhance the availability of resources to individual prey. In such scenarios, control of mountain lions cannot be expected to result in an increase in the prey population.

When members of an ungulate population are well below K and not affected by nutritional constraints, individual prey are likely to be in excellent body condition, and reproduction and recruitment are expected to be high. In such populations, any animal removed by predation likely would not have died of nutrition-related factors, and the resulting decrease in competition provides little benefit in reproduction for remaining individuals. Therefore, deaths resulting from predation likely are additive, because they occurred in addition to losses from other causes.

Populations of mountain lions were thought to be self-regulating for many years. Sophisticated new techniques, coupled with research questions firmly entrenched in an evolutionary context have, however, produced results that are contrary to previous hypotheses. We were the first to demonstrate that mountain lion populations were regulated by their food supply (that is, population levels were determined by the nutritional carrying capacity of their environment), and not primarily by "social mechanisms." The confusion was a result of the relatively long time lags between growth trends in prey populations and resulting responses in the predator population. Because populations of large carnivores like mountain lions recruit only a small number of individuals each year, effects on recruitment may not be apparent for extended periods of time. Recent work by others has been consistent with our conclusions; together, these results have important implications for the management of mountain lions.



The number of mountain lions inhabiting a particular geographic area is largely determined by the availability of primary prey, which frequently is mule deer. Thus, a population of lions would be expected to increase until food availability became a factor that limited the ability of individual animals to successfully reproduce and recruit young into the population; the rate of growth of the population of lions would vary with its density relative to prey populations, and would exhibit density dependence. If food availability did limit a population of mountain lions, the removal of individual lions (whatever the cause) would represent compensatory mortality because these animals would have died of other causes anyway. To drive such populations downward (that is, to limit the population of lions below what the prey base would support, or K), adult mortality must exceed the ability of the population to recruit young. Intensive harvest, either through the use of bounties, professional hunters, or by sport hunting, is a means by which such a population of lions might be held below the level dictated by the prey base. In most areas, and, especially with a stable prey base, however, removals are not adequate to offset the ability of the population to replace individuals lost to guns or traps.

Under other circumstances, as in an area where a population of mountain lions is responding positively to increasing prey, the removal of individual lions would represent additive mortality, because those deaths are in addition to those that might be expected to occur in the absence of removals by humans. In such scenarios, increases in the population of mountain lions might be slowed relative to what would be expected in the absence of removals, and may speed the rate of increase of prey. Management that results in additive mortality for the predator has potentially important implications for the recovery (or increase) of prey populations that are at low densities, either as a result of predation or for other reasons.

Forage availability, prey, and predators interact in a number of ways, all of which result in feedback mechanisms that have important implications for the management of mountain lions in the absence of political or legislative intervention. Further, the abundance of secondary prey further complicates the responses of mountain lions and other predators to direct management actions, or to actions affecting their primary prey. For example, investigators in New Mexico have reported that beef calves on rangelands appear to have "subsidized" mountain lions where deer are not abundant, and their availability may be a factor exacerbating rates of lion predation on mountain sheep in the absence of intensive lion control.

If a management goal is to maintain populations of ungulates at high levels (e.g., to support a high sport harvest), removal of mountain lions will help do so only when prey populations exhibit characteristics that include good body condition and high reproductive rates and recruitment, among other traits. Thus, in populations of prey that have declined substantially as a result of a catastrophic event and are not nutritionally constrained, predation can be a factor that limits the growth rate of that population and control of mountain lions could lead to an increased rate of growth in the prey population.

GPS RADIO COLLARS ARE ALLOWING FOR MUCH GREATER ACCURACY IN THE MONITORING OF MOUNTAIN LIONS.

PHOTOGRAPH BY STEVE DEJESUS

When prey populations decline in the absence of a secondary species of prey (that would help maintain the population of lions at a high level if it were present), however, lion numbers will eventually decline, lagging behind their prey even in the absence of harvest. As a result, additive mortality among prey will decrease, and the prey population will again grow until it reaches a level commensurate with the nutritional carrying capacity of its environment. At that point, lion predation will again become a source of compensatory mortality for the prey population.

Historical levels of removal may have severely affected some mountain lion populations, particularly during periods when bounties were paid. Indeed, there is strong evidence that intensive lion control during the early 1900s was a factor important in the population dynamics of mountain sheep in California's San Gabriel Mountains. There is also evidence that cessation of bounty hunting, when combined with habitat changes resulting from fire suppression, resulted in extreme dynamics of mule deer (the primary prey) and ultimately contributed to the decline of mountain sheep in that range. What is clear is that lion removal was intensive, and it was implemented by individuals that were rewarded financially for their efforts. Whether regulated sport hunting can occur at rates sufficient to effect ungulate population dynamics is unclear; in the absence of high rates of harvest of their primary predators, however, few benefits to ungulate populations are likely to accrue.

The initiative process has "tied the hands" of professional wildlife managers in California by eliminating a number of management options that were formerly available. Further, initiatives in other states have eliminated the use of hounds as a method of pursuing mountain lions. Although lions have been afforded special protection in California, recent legislation has provided the Department of Fish and Game the authority to remove lions that threaten the persistence of any population of mountain sheep. That legislation was passed by a near unanimous vote in the State Legislature, and has returned to the Department some of the authority that had been usurped by the initiative process. As a result, management programs to protect small populations of mountain sheep have been implemented on a localized basis, with good success, and without public outcry. It is doubtful, however, if the ability to manage mountain lions at a level that would affect populations of other ungulate prey will be restored to wildlife biologists, who are the individuals best trained to make those decisions. That ability was lost through the initiative process, and can only be restored through the initiative process, or by a four-fifths vote of the legislature; neither is likely to occur in California.

ABOUT THE AUTHORS: *Vernon C. Bleich (left) received B.S. and M. A. degrees from California State University Long Beach, and a Ph.D. from the University of Alaska Fairbanks (UAF). He holds academic appointments at UAF and at Idaho State University (ISU). Vern has been employed by the California Department of Fish and Game (CDFG) for over 30 years; he is Senior Environmental Scientist and Project Leader for the Sierra Nevada Bighorn Sheep Recovery Program. He and co-author Dr Becky Pierce began investigating*

ecological relationships between mule deer and mountain lions in 1991, and the resulting Round Valley Project has become well-known as an outstanding, long-term research effort.

Vern has received numerous awards during his career, including Wildlife Officer of the Year (Shikar Safari International), Professional of the Year (Western Section of the Wildlife Society), Trail Blazer Award (California Chapter of the Foundation for North American Wild Sheep), and the Desert Ram Award (Desert Bighorn Council). In 2002, he was recognized as the Outstanding Alumnus by the College of Science, Engineering, and Mathematics at UAF, and he received the Alumni Achievement Award for Professional Excellence from the UAF Alumni Association that same year Vern has been a Professional Member of the Boone and Crockett Club since 1998. He lives with his family on the eastern slope of the Sierra Nevada Mountains, one of the most spectacular mountain ranges in North America.

Becky M. Pierce (right) is an Associate Wildlife Biologist with CDFG. She and co-author Dr. Vern Bleich have been studying mountain lions in the eastern Sierra Nevada Mountains since 1991; currently, she is the Predator Ecologist for the CDFG Sierra Nevada Bighorn Sheep Recovery Program. Becky's research has addressed predator-prey interactions between mountain lions and mule deer, and the population biology and behavior of mountain lions. Recently, her focus has been the interactions between mountain lions and endangered Sierra Nevada bighorn sheep. In 2004, Becky received the CDFG Director's Achievement Award for her contributions toward recovery of Sierra Nevada bighorn sheep.

Becky is an affiliate assistant professor in the Department of Biology and Wildlife, and a research associate in the Institute of Arctic Biology at UAF; additionally, she holds an appointment as affiliate faculty at ISU. She serves as an associate editor for Western North American Naturalist, and publishes regularly in the peer-reviewed literature. In her spare time, Becky enjoys the outdoors, is vice president of the Inyo County Search and Rescue (SAR) Team, and is currently training a K-9 for SAR.