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IMPLICATIONS AND MANAGEMENT OF FERAL MAMMALS IN CALIFORNIA*

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ABSTRACT: "Feral" is defined. For each of the principal species of feral mammals in California we note the broad ecological implications they have on the environment and the potential or actual management approaches being followed. The main emphasis of this paper, and all of the slides shown, was on how wild horses and burros, two controversial feral species, are managed in California and in other western states. The feral pig is about to become the number one big game animal in California, and muskrats (*Ondatra zibethica* (L.)), which were introduced or escaped into the Sacramento Valley--hence locally feral--are the state's number one furbearer. Except for these species, the other feral mammals are, for the most part, much less desirable.

INTRODUCTION-

The distribution, ecological implications and management practices followed for the principal species of feral mammals found in California are discussed. We also explain the somewhat loose definition of feral that is used, for with some species it is not known whether they are intentionally released, escaped, or had both types of introductions. Species not discussed are the commensal rats and mice, escaped pets, and many species like nutria (*Myocastor coypus* (Molina)), which was feral in California for varying time periods but has since been eradicated. Also, California's native valley gray fox (*Urocyon cinereoargenteus* (Schreber)) has crossed with escaped/introduced red foxes (*Vulpes vulpes* fulva (Desmarest)) from southern United States.

The usual definition of "feral" wildlife is an animal that has been held in captivity for many generations or has been domesticated and which has escaped and become established in the wild state. However, the breadth of this definition depends on how the words "captivity," "escape," and "established" are used. Any introduced exotic species, i.e., any species that has been successfully released into a new environment, would, of course, first have to be held in captivity while being transported. But if it later escapes from the originally desired degree of control planned for that species in the new location, it then may be considered by some as feral. All can agree that any formerly domesticated species that is now living as a wild creature without food or protection being provided by man is in that situation truly feral.

Under common usage, feral also often has a derogatory implication amongst many biologists. You will notice further that we respectfully speak of "wild" horses and burros and do not use feral, even though they are feral mammals. At times an introduced or exotic species may be considered undesirable by someone so it is called feral to signify that it is considered a misfit which doesn't belong there. Fortunately, however, most people use the term feral in its more proper ecological meaning. What is meant by the word "established" is also not clearly defined. Can a single animal escape and be considered as feral for the rest of its life, or must a breeding population exist before the species can be considered established? We think it is useful to have the term feral apply to both single individuals and populations, as the case may arise.

EXOTIC MAMMALS

A. Dogs (*Canis familiaris* L.)

A statewide survey by the California Department of Fish and Game of the "dog problem" to wildlife, especially to deer, concentrations of nesting birds, and to livestock, showed that the depredations by true feral dogs appear to constitute only a fraction of the losses. The majority is caused by unrestrained, somewhat vagrant domestic dogs, the result of both an overpopulation of pet dogs and owner irresponsibility (Jones and Stokes 1977). There have been a few examples of "coydogs," hybrids between dogs and coyotes (*Canis latrans* Say), but coyotes have also hybridized with the wolf (*C. lupus* L.) in the northeast of the United States and with the red wolf (*C. rufus* Audubon and Bachman) in the southeast (Nowak 1978). The consensus among animal control officers, game wardens, and biologists is that to abate the uncontrolled dog problems requires better enforcement of current laws, stricter judicial action, and better public awareness of existing laws and the responsibilities of dog ownership. No one has suggested that a desirable ecological niche for wild dogs exists.

B. Cats (*Felis catus* L. = '*domesticus*')

All cats, especially the males, seem to be natural wanderers. Except where man provides garbage or other food, true feral cats are largely solitary hunters of rodents, lagomorphs, ground-nesting birds,

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reptiles, fishes trapped in shallow pools, and insects (Hubbs 1951). Vagrant-to-truly feral cats seem to be scattered throughout California in towns, cities, San Clemente Island, industrial sites, and certainly most of the areas having agricultural developments. The native carnivores probably prevent them from being common in any of the wilder regions.

Because of their depredations on birds, especially eggs and young, many hunters shoot them, particularly during pheasant season. To illustrate that cats hunt for fun as well as food, look at the frequency with which the well-fed house cat brings back to the house uneaten rodents and birds it has successfully killed. However, even though feral cats are not well liked, their ecological impact is not well known; yet it is clear they are opportunistic predators capable of exploiting a wide variety of food (Jones and Coman 1981).

C. Horses (Equus caballus L.) and Burros or Asses (Equus asinus L.)

Feral (commonly called wild instead of feral) horses and burros, present in America since the 1850s, represent one of the most complicated problems of contemporary wildlife management in western United States. Under the protection afforded them by the Wild Free-Roaming Horse and Burro Act (Public Law 92-195) enacted December 15, 1971, populations increased rapidly (Wolfe 1980).

Most of the wild horses are found on public lands in Nevada, but other states with nearly a thousand or more individuals are California, Colorado, Idaho, Montana, Oregon, Utah and Wyoming.

The major wild burro distribution is in an area encompassing mostly public lands in southeastern California, southern Nevada, southern Utah and western Arizona (Herndon 1980).

About 95% of all wild horses (45,000) and burros (12,000) occur on federal land administered by the Bureau of Land Management (BLM) of the Department of Interior (USDI), whereas the remainder on federal land are administered by the Forest Service (FS) of the Department of Agriculture (USDA) in close cooperation with BLM (Anon. 1982). BLM supervises 303 herd areas and the FS 51.

Special management areas have also been established. The Nevada Wild Horse Range (about 160,000 ha) is a joint effort of BLM, Air Force, and Fish and Wildlife Service of USDI. It is within Nellis Air Force Base. The 1965 management plan calls for a maximum of 1,200 mustangs, but current population is in excess of 3,000. The Pryor Mountain Wild Horse Range in parts of Montana and Wyoming has about 17,600 ha and from 100 to 200 horses. It was established in 1968. The third area, created in 1980, is Little Rock Cliffs Wild Horse Range in Colorado (about 11,200 ha), dedicated to the memory of the late Mrs. Velma B. "Wild Horse Annie" Johnston, who was the single greatest force for federal legislation against inhumane treatment and for the preservation of wild horses and burros on public lands.

To at least some Americans the wild horses and burros are like artifacts left by ancient Indian tribes; they are important links to their heritage. The domesticated ancestors of these animals played a significant role in the history of the West, because of their use by explorers, the American Indians, and settlers. Our image of the cowboy and the early prospectors is indelibly stamped with the presence of a horse or burro. Spanish conquistadors introduced both horses and burros to the Americas in the 1500s. Horses that escaped during the Spanish expeditions out of Mexico are presumed to be the nucleus of the first wild horse herds in North America. Others escaped from wagon trains and also were turned loose by farmers and ranchers, especially during droughts.

The burros were brought to the West by Jesuit missionaries and later used by prospectors or miners, who often let them escape or abandoned them.

In some areas of California at least, the feral (now we do not use the word wild) burro has been devastating to the vegetation, causing a deterioration of the entire biota (Weaver 1974). In Death Valley National Monument burros have seriously affected native flora and fauna. They have caused soil damage, accelerated erosion, vegetation destruction, spring and water hole disturbance, and competed with native wildlife for food, water and space (Sanchez 1974). Burros are present in 7 of the 14 California Department of Fish and Game bighorn sheep (Ovis canadensis Shaw) study areas, and have caused problems in all 7 areas. As pointed out by Carothers et al. (1976), "Control of the rapidly expanding herds of wild equines is an undeniable necessity on our public lands. Effective management will not be achieved until the resource managers and scientists alike collect adequate data on habitat destruction and relate it in a convincing manner to the general public."

The main controversy about these feral animals developed after the Second World War when a commercial demand for horsemeat to use in pet foods made harvesting of these animals profitable. The way the wild horses were captured and slaughtered, often considered inhumane, resulted in Mrs. Johnston's getting the Wild Horse Annie Act of 1959 established. This was the first federal law to recognize the existence of the wild horses and burros. It prohibited the use of motorized vehicles and aircraft in harassing or capturing the animals on public lands. Under state or local law they could still be captured.

Prior to 1959 the State of California had laws on the books concerning the protection of the wild (undomesticated) burro. Burros were viewed as the property of the state and could be taken only under prescribed conditions. Permits were issued for their capture and use as pets or beasts of burden. They could not be slaughtered for commercial purposes.

The federal legislation involving the management of both wild horses and burros is thought by many to be based more on emotionalism than scientific facts and concern for the ecology the West. In swaying the legislators, thousands of school children were enticed by those wanting to protect these animals to write their congressmen. As with many controversial issues, the news media in their coverage undoubtedly had a strong influence on the outcome. As a result of this nationwide crusade, Congress passed the Wild Free-Roaming Horse and Burro Act of 1971, with later amendments. The law provides that even those animals that stray onto private property can be removed only by a federal agency. Helicopters are now legal for capturing (driving) the animals. The Act now also provides for the removal of excess animals to protect the range. However, this is often met with opposition from vocal segments of the public.

In 1976 BLM established the Adopt-A-Horse (or burro) Program nationwide to find suitable homes (up to four animals per person per year) for the surplus animals. The fee went up to \$200 per horse (now \$125) and is \$75 per burro. After proof that you have provided good care of your animals for 1 year, one can receive ownership title to the animals. The animals to be adopted are all freeze-branded with a permanent numbering scheme. The number of horses removed in 1984-1985 was 17,391 (9,091 adopted). A total of 1,560 (1,463 adopted) burros was removed. The surplus is still being held at considerable expense.

We do not mean to imply that wildlife biologists, game managers and landowners are satisfied with the current management of the feral horses and burros. There have been a number of litigations in the courts advocating further reductions of these feral animals on public lands, better protection of private lands from both horses and burros, and to prevent other dispositions of the animals. Early in the 1980s Congress appropriated annually from \$5 to \$7 million to administer the wild horse and burro program. In 1984-1985 it was \$17 million. Many believe that this money could be better spent on other more important wildlife projects and that the surplus animals should be shot and utilized.

D. Pigs or Wild Boar (Sus scrofa L.)

Feral hogs or pigs have been in California since the arrival of the Spanish in 1769, were released by the Russians at Fort Ross in Sonoma County perhaps as early as 1812, and then domestic pigs plus escapees were common from the Gold Rush in the 1850s into the Twentieth Century (Barrett 1978). Settlers were hunting feral hogs in the 1880s. Before many years it became common to release one's hogs to fatten on acorns. Later, there were introductions of the European wild boar. The Department of Fish and Game introduced them on San Clemente Island in the 1950s, along with Columbia black-tailed deer (Dama=Odocoileus hemionus columbianus Hall and Kelson). Many California pig hunters capture pigs and release them into new localities.

Wild pigs are important game animals in California and supervised by the California Department of Fish and Game. Some commercial hunting-management programs on private lands are quite successful. Qualified hunting guides are the key to success in such a scheme in order to manage for trophies and to properly harvest tender or young pork to control population and sex ratio. If not controlled by man or large predators, pigs can multiply rapidly and do considerable environmental damage locally by their rooting. It is the most prolific large free-living mammal in the United States. In some areas the pig causes considerable concern as a disease reservoir for swine brucellosis (Brucella suis) and pseudorabies (Wood and Barrett 1979). Predators and deep snow probably prevent wild pigs from being a problem in the higher California mountains and national parks as occurs in other parts of the United States (Singer 1981).

E. Goats (Capra hircus L.)

Feral goats are primarily found on islands that lack coyotes, mountain lions (Felis concolor L.), and other large carnivores. In California the major goat populations are found on Santa Catalina Island and, until recently, San Clemente Island, but small populations do occur in a number of areas in the coastal ranges where they are not a serious problem, probably because natural predation limits their numbers.

Feral goats are nearly always considered undesirable from an ecological viewpoint. They are implicated in habitat destruction and the alteration of species composition of many sensitive insular ecosystems. It has been demonstrated that their removal has led to rapid recovery of suppressed vegetation (Coblentz 1978). We consider many goat herds that are not properly managed or controlled by predators as being like a slow bulldozer, eventually causing severe erosion and even desertification.

Goats are not easily captured. On San Clemente Island, the Department of the Navy took over the responsibility for the feral animals in 1971. The domestic and feral sheep (Ovis aries L.) were removed in the 1920s. The goat population had been "estimated" at 12,000 or so for many years. The first big effort to remove them from 1975 to 1977 accounted for about 16,000 animals of all ages, and from 1979 to 1982 another 8,000 were removed. With much effort, large numbers of goats were driven into traps with net-wing fences. Shooting was one of the earlier methods employed and has now brought the numbers to a low level.

F. European rabbits (Oryctolagus cuniculus L.)

There have been many introductions of various strains of domesticated rabbits in the United States, but the only established populations have been on islands. In California, rabbits were first released on Santa Barbara Island of Channel Islands National Park, in the early part of the Twentieth Century.

The most recent introduction was in 1941. The last rabbit was shot in August 1982 and dramatic recovery of vegetation is indicated. Rabbits were also released on the small Farallon Islands opposite San Francisco.

The rabbits, which have recently been removed by well-planned shooting, caused habitat modification on Santa Barbara Island with serious impact upon endangered plants such as the giant coreopsis (Coreopsis gigantea). These rabbits were large and do not resemble wild European rabbits. The isolation and low level of predation on these islands have apparently allowed little evolution towards the smaller agouti wild type, as has occurred on certain Australian islands (Edmonds et al. 1981).

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