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## FERAL BURROS AND WILDLIFE\*

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ABSTRACT: Feral burro have caused devastating damage to the vegetation and soil which has resulted in a deterioration of the entire biota. Wildlife numbers have declined where there is competition with burro for food, water or space.

The Department of Fish and Game made a burro survey in conjunction with bighorn investigations. There are an estimated 3,400 free-roaming wild burro in California. They are found in 7 of the 14 bighorn study areas and have caused problems in each of these areas.

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### INTRODUCTION

In 1968 the State Legislature passed a resolution requesting the Department of Fish and Game to determine the current status of bighorn sheep (*Ovis canadensis*) in California to investigate factors limiting the bighorn herds and develop a management plan for the species. As part of the bighorn study a feral burro (*Equus asinus*) survey was made.

### METHODS

During the course of the bighorn investigation observations were made on burro abundance and their distribution mapped. Feral burro are extremely difficult to count due to rough terrain and the difficulty in distinguishing burro from their background. Estimates were made from reading signs. The abundance of tracks, trails, wallows and feces are factors noted, as well as conditions of the vegetation and water sources. Fixed-wing and rotary-wing aircraft were used to advantage during investigations. However, as much of the desert mountain ranges as possible were covered on foot.

The estimated population of feral burro in California is approximately 3,400. The distribution is shown on the accompanying map, except for approximately 100 that range in Lassen County in northeastern California and on the adjacent portion of Nevada (Figure 1, Table 1).

### HISTORICAL BACKGROUND

Domesticated burro stock originally came from wild asses that inhabit the arid desert plains of northeastern Africa. Due to the severe climatic conditions of their native habitat, these animals are well suited to survival in our own deserts. Their success in competing with our native wildlife for forage, space and water indicates that in many cases their adaptability is superior. The feral burro have no natural predators. Though the Spaniards brought the animal to North America, it probably did not become established in the wild in numbers until later.

Burros were introduced into California desert by early explorers, prospectors and miners. Burros were used as pack animals by these early settlers. They were valuable because they were able to forage from the land. They were gathered and worked as needed and turned out to range at other times. These animals became the nucleus for most of the present day herds of feral burro. Thus animals were introduced in the vicinity of each new mineral strike and left behind when the mining boom was over.

The impact of large numbers of domestic animals on the desert biota goes back over 100 years in some locations. One spring on Hunter Mountain, Inyo County, was first depicted on a map with the name of Jackass Spring as early as 1875. Mules were being raised here for use in the mining industry. One mine in the Argus Mountain Range had as many as 500 mules transporting cord wood and charcoal for the mine. Some early camps had populations at the peak of the boom numbering into the thousands. Even though it was virtually a roadless and harsh land, thousands of people were scattered over the desert before the turn of the century. All required at least one animal for transportation and packing and frequently these people also had other livestock for food. When this use of the land is considered, it is not difficult to understand that the vegetation and animals found today do not represent a natural condition. In one hundred years of grazing by nonnative ungulates, the desert ecosystem has suffered some drastic changes.

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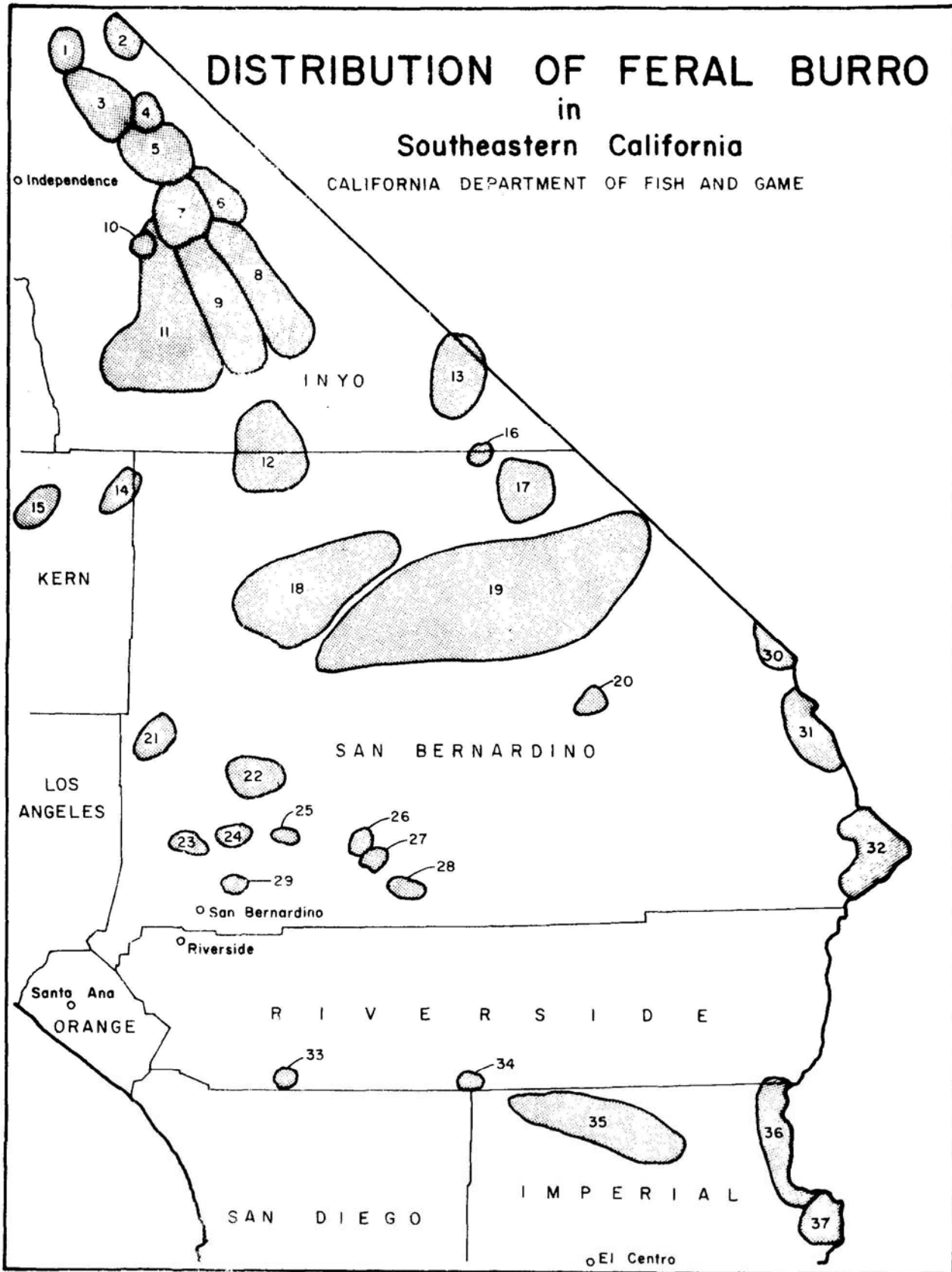


Figure 1. The estimated population of feral burro in California is approximately 3,400 animals. The distribution of these burros is indicated on the map, except for approximately 100 that range in Lassen County in northeastern California and on the adjacent portion of the state of Nevada.

Table 1. Present range and estimated numbers of feral burros in California.

Map Area	County	Mountain Range	Area	Estimate
1	Inyo	Inyo	Marble Canyon	25
2	Inyo	Last Chance	Sand Springs	25
3	Inyo	Inyo Saline } Nelson }	Saline Valley (entire watershed)	350
4	Inyo	Panamint	Tin Mountain	100
5	Inyo	Panamint	Cottonwood } Hunter Mt. }	500
6	Inyo	Panamint	Tucki	100
7	Inyo	Panamint	Wildrose	100
8	Inyo	Panamint	Butte Valley	350
9	Inyo	Panamint	Panamint Valley (east side only)	150
10	Inyo	Argus	Panamint Spring	25
11	Inyo	Argus } Coso }	China Lake } North Range }	250
12	Inyo } San Bernardino }	Slate Eagle Crags } Brown Mt. }	China Lake } Mohave B Range }	200
13	Inyo Mts.	Nopah	Nopah Mts. } Chicago Valley }	25
14	San Bernardino	Lava	Lava	10
15	Kern	Sierra Nevada	Cache Peak	15
16	San Bernardino	Kingston	Kingston	3
17	San Bernardino	Clark } Mesquite }	Clark } Mesquite Mts. }	50
18	San Bernardino	Kelso	Kelso Peak } Old Dad Mt. } Cima Dome }	75
19	San Bernardino	Providence } New York } Granite }	Providence Mt. Area	525
20	San Bernardino	Piute	Fenner Spring	25
21	San Bernardino	Kramer Hills	Kramer Hills	20
22	San Bernardino	Ord	Ord Mts.	20
23	San Bernardino	San Bernardino Mts.	Cajon to Crestline	10
24	San Bernardino	San Bernardino Mts.	Rattlesnake Mt.	10
25	San Bernardino	San Bernardino Mts.	Box S Spring	2
26	San Bernardino	San Bernardino Mts.	Old Woman Spring	15
27	San Bernardino	San Bernardino Mts.	Mound Spring	15
28	San Bernardino	San Bernardino Mts.	Pioneertown	3
29	San Bernardino	San Bernardino Mts.	Slide Lake	5
30	San Bernardino	Dead	Dead Mts.	70
31	San Bernardino	Chemehuevi	Chemehuevi	80
32	San Bernardino	Whipple	Whipple	100
33	Riverside	Santa Rosa	Rockhouse Basin	3

Table 1. (cont.)

Map Area	County	Mountain Range	Area	Estimate
34	Riverside	Orocopia	Dos Palmas Spring	4
35	Imperial	Chocolate	U. S. Navy Gunnery Range	30
36	Imperial	Chocolate } Palo Verde }	Vinegar Wash } Midway Well } Palo Verde Mts. }	50
37	Imperial	Chocolate	Picacho Peak	40
38	Lassen		Smoke Creek	30
TOTAL				3,410

**LEGAL STATUS**

Apparently feral burros were being used to some extent in the 1930's for pet food, for in 1939 the State Legislature passed a law prohibiting such use.

As the population of the state increased, more and more people traveled into the desert. The palatability of burro meat became known and many were taken for home consumption. However, in the absence of any controlling regulations other than the law referred to above, burro hunting occurred throughout the year. Many were shot and left by irresponsible persons. The general public became concerned about the wide open take of burros and as a result the State Legislature passed a law in 1953 that prohibited killing feral burros for a period of two years. This law was renewed in 1955 for another two years with amplification to prohibit killing, wounding, capturing, or possessing wild burros. Provision was made for the Department of Food and Agriculture to issue up to twelve permits per year to capture a burro for a pet or beast of burden.

In 1957 this law was renewed on a permanent basis. The restriction on the number of permits that could be issued was changed to be dependent on leaving sufficient burros to properly preserve and maintain the species in relation to the available land.

A burro sanctuary was established in 1957 in southeastern Inyo County. Permits to capture burros can be used in the sanctuary and cattlemen in the area can herd them away from areas of conflict.

Landowners suffering burro damage were authorized in 1957 to obtain killing permits from the Department of Food and Agriculture.

In 1971 the United States Congress passed Public Law 92-195 which places wild burro, as well as horses, found on public land under the jurisdiction of the Secretaries of the Interior and Agriculture. It is now a federal offense to harass, capture, kill, sell, or process into any commercial product these animals. The maximum penalty is a fine of \$2,000 and imprisonment for one year. The act also provides for a citizen's advisory board to make recommendations for management and protection of wild burro and horses.

Most of the wild and free ranging burro in California will be managed under regulations adopted to implement Public Law 92-195. It is a clear mandate that burro will be preserved. Management plans will be formulated by the Bureau of Land Management and the U. S. Forest Service.

Death Valley National Monument and the Naval Weapons Center at China Lake are two large areas with many burros. The federal legislation does not apply to these areas. The Naval Weapons Center is developing supporting data for a management plan that includes a reduction of burro. The National Park Service has developed a management plan for Death Valley that, when adopted, will include fencing, trapping, and direct removal of burro.

**DISCUSSION**

Impact on Soil

Soil disturbance in the form of heavy trampling, trailing, and compaction accelerates erosion. Much of the rainfall that occurs in California desert areas comes as severe

thunderstorms that wash away the disturbed soils. Bare soil in desert areas forms a "desert pavement" which is a gravel or stone surface. This desert pavement, sometimes only one pebble thick, protects the underlying finer soil particularly from normal wind or water erosion. Other soil binders are crusts of dissolved minerals, formed by the evaporation and capillary action, and fungal mycelia.

Soil compaction occurs in heavy use areas such as at springs, where shade is available and on the trails. Rainfall does not penetrate the compacted soils, thus no plant cover can exist to give protection from the erosion process. The aridness of the desert is only intensified by the burro because they contribute to water running off and not penetrating, plus eroding away of the soils--all of which results in less vegetative cover.

The amount of tracking and soil disturbance has been measured in some areas in Death Valley. On these plots 97 to 100 percent of the bare soil areas were disturbed within one mile of Wildrose Spring; up to 5 miles from the water 20-25 percent of the bare soils were disturbed (Sanchez, 1974).

#### Impact on Springs

Burros congregate in the vicinity of water and severely alter the environment. Compaction of soil often reduces spring flow and has been known to dry up a water source. Unless there is a strong flow of water, springs are polluted with feces and urine. Discolored and foul-smelling water is objectionable to people and we would not use such water. Wildlife will use any available water, even that which is aesthetically displeasing to us.

Water turbidity and changes in chemistry due to the presence of excreta and repeated disturbance of sediments are factors that probably affect the survival of invertebrates and possibly higher life forms. Certainly the destruction of the phreatophytes around springs reduces the cover available for birds and mammals. In the last five years two slender salamanders (*Batrachoseps* sp.) have been found at desert springs. It is unknown if any unique life forms like these have been lost because the habitat has been altered, but it is a possibility.

#### Impact on Vegetation

The plants native to California deserts evolved without the presence of a large, aggressive herbivore such as the burro. Under natural conditions there is little physical evidence that either desert bighorn sheep (*Ovis canadensis*) or mule deer (*Odocoileus hemionus*) are altering their habitat in the desert. These native animals are living in harmony with their environment. But in the 100 years or so since burros have been foraging on the desert, drastic changes have occurred to the vegetative cover.

The burro is a wasteful feeder, sometimes pulling entire plants up by the roots (McKnight, 1958). Some preferred plant species are eliminated and are no longer found within the first mile from a given water source. Some plants have been seriously depleted as much as 4 miles from water (Hansen and Fodor, 1971). As food is depleted burros are moving further and further from water and eating plants that would normally not be used. The density and size of plants, especially shrubs, is greatly reduced. Even Creosote bush (*Larrea divaricata*) has been recorded as browsed on in some areas. This is a plant that is unpalatable and rarely eaten by any animal. Grasses where available are preferred by burros over other forage. Areas heavily grazed by burros are now shrubland. Six or more miles away from water unmodified desert shrub-grassland associations can be found. It is this shrub grass association that is richest in desert fauna. These areas are most important to the bighorn.

A burro enclosure established by the Park Service in Wildrose Canyon of Death Valley National Monument shows a significant recovery of the vegetation in this area of heavy burro use. After only two growing seasons there is a marked increase in the volume of shrubs favored by burros and the woody perennials show an increased vigor. Burro bush (*Franseria dumosa*), a species favored by burros is more abundant and individual plants are larger within the enclosure. Annual grasses and forbs show a significant difference in abundance within the enclosure. Some species, not recorded in the transect on the outside, have become re-established inside the enclosure. The density of annuals within the enclosure was 73.8 plants per square meter. Density outside the enclosure was 26.7 plants per square meter. The ratios of dead shrubs outside versus inside the Wildrose enclosure was 27:1 (Sanchez, 1974).

## Impact on Wildlife

Burro compete with wildlife for food, water and space. As can be seen from the example of forage depletion given above, there is a direct competition with all sorts of mammals from the smallest rodents, that will suffer because of a decreased seed production in the burro areas, to the bighorn sheep, which like the burro, is primarily a grazer. Thrifty bighorn herds anywhere are found in areas of good grass cover.

Bighorn numbers and habitat have been declining in much of California for years. Concern for the preservation and restoration of these species prompted the State Legislature in 1968 to request the Department of Fish and Game to make a study on their status and limiting factors. It was found in 7 of 14 study areas that burro were a factor affecting the bighorn welfare. Bighorn have declined in all areas where burros have existed for any period of time. Bighorn no longer occupy much of their historic range, some of which is overpopulated by burro. On the other hand, in some areas bighorn and other wildlife are using the same water sources, in spite of pollution by burro urine and feces. However, it has been observed that the burro is dominant and bighorn and deer would not come into water while the burro was present. Deer usually water at night. Bighorn almost always water during daylight hours. Burro will water during both daylight and darkness. A detailed study in the Black Mountains of Arizona documented that acute competition for food existed in the summer months (McMichael, 1964).

Although detailed studies have not yet documented the impact on other wildlife, it is extensive. For example, quail and other small birds need vegetative cover for protection, particularly at water sources where they congregate. Ground nesting birds like quail and chukar partridge also must have suitable cover for protection from predators.

The predators at the top of the food chain are going to be affected also. If there are less small mammals because of a depleted forage, it will affect the fox, badger or coyote and other predators.

It is felt that burrowing creatures will be adversely affected in areas of heavy trampling and compaction, not just the rodents, but also species like the burrowing owl and the tortoise. The tortoise will not dig its life sustaining burrows in hard, compacted soils, and the burrowing owl does not burrow at all and must have the holes made by other animals.

Impacts upon the herpeto fauna of the desert ecosystem is not documented, but undoubtedly their number will be reduced as in the desolated areas around springs.

## CONCLUSION

Burros are known to be competing with wildlife and they are having a detrimental effect on the desert ecosystems. Studies to supply specific data have only recently begun. Management of the burro is needed as mandated in Public Law 92-195. Public acceptance of the need for burro management is necessary before any programs can be successfully implemented.

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