

State of California
THE RESOURCES AGENCY
Department of Fish and Game

75.04

May '75



SACRAMENTO VALLEY RED FOX SURVEY^{1/}
1975

by

Randall L. Gray
Nongame Wildlife Investigations

ABSTRACT

A survey was conducted to determine the distribution of the red fox in California, with emphasis placed upon the Central Valley population. The valley population is of unknown taxonomic status, probably the result of an introduction of the eastern red fox by man during the late 19th century. The valley population has extended its range north to Trinity County and south to San Joaquin County. The Sierra Nevada red fox is rarely observed and possibly declining in numbers. The major concentration of Sierra Nevada red fox is at Lassen National Park.

^{1/} Supported by Federal Aid in Wildlife Restoration Project W-54-R, Nongame Wildlife Investigations, Job II-1.2, Progress Report.

RECOMMENDATIONS

To gather further knowledge concerning the status of the red fox in California it is recommended that the Department of Fish and Game:

1. Solicit additional red fox sightings through the distribution of red fox observation forms.
2. Determine the taxonomic identity of the valley population of red fox in California.
3. Initiate life history studies.

INTRODUCTION

The red fox (*Vulpes fulva*) is widespread throughout North America. Hall and Kelson (1959) recognized 12 subspecies of red fox which range over a major portion of the North American continent north of Mexico and south of the ice sheet. Red foxes are adaptable and occur in a variety of terrain and vegetation types throughout their distribution. There is some disagreement as to whether or not the North American red fox is a conspecific of the European red fox (*Vulpes vulpes*) or a separate species (Churcher 1959). There is also some evidence that the red fox in the eastern United States is a direct descendant of the European red fox or is a hybrid between the European red fox and the red fox of southeastern Canada (*Vulpes fulva fulva*) and/or the northern plains red fox (*Vulpes fulva regalis*) (Peterson, et al, 1953).

In California the Sierra Nevada red fox (*Vulpes fulva necator*) is known to inhabit the high Sierra Nevada and Cascade Mountains. It is found chiefly above 7,000 feet in elevation, seldom venturing below 5,000 feet. The known distribution of the Sierra Nevada red fox extends from near Medicine Lake, Siskiyou County to possibly Siretta Peak, Tulare County (Schempf and White 1975). The major concentration is centered in the vicinity of Lassen Volcanic National Park with other concentrations at the headwaters of the Kern and Kaweah Rivers, and in the vicinity of Yosemite National Park (Grinnell, et al, 1937).

The Central Valley has a population of red fox of unknown taxonomic status. This valley population was first noted in the latter part of the 19th century near the Sutter Buttes. Ingles (1965) and Grinnell, et al, (1937) have suggested that the valley red fox was introduced by man. Its distribution was then known to include Colusa, Glenn, Tehama, Sutter, and Butte Counties (Schempf and White 1975). Further evidence which supports the introduction of the red fox into the Central Valley was the large number of fox farms in California (Vail 1943). Lack of current knowledge of the red fox in California prompted the Department to include the red fox in their furbearer survey.

SURVEY

To determine the current status of California furbearers, a cooperative six-year research project "A Survey of the Status and Distribution of Carnivores in California" was undertaken in 1972. This project, under the direction of Drs. Marshall White and A. Starker Leopold, is supported by California Department of Fish and Game, U. S. Forest Service and National Park Service. In 1972-73 the Department employed David W. Newberry to compile a bibliography on furbearers (Newberry, 1974) and in 1973-74 a river otter study was undertaken. With funds provided in 1973-74 by the U. S. Forest Service and National Park Service, the University undertook a furbearer survey of the National Parks and U. S. Forest Service lands (Schempf and White 1974, 1975). Recent and historical sightings of Sierra Nevada red fox were documented.

In 1974, Craig Swick was assigned by the Department to initiate a fur trapper survey. He commenced to record red fox sightings with particular attention to the valley population. A Sacramento Valley Red Fox Survey was scheduled in the 1975-76 Nongame Wildlife Investigations work plans and Terry Brumley,

a graduate student at California State University, Chico, was employed to commence the study. Study objectives were to: (1) Determine red fox distribution and abundance in the Sacramento Valley; (2) Determine the taxonomic status of the red fox; and, (3) Recommend measures for protection and management. Licensed trappers, federal and county animal control agencies, informed ranchers and Departmental personnel were interviewed. Red fox sightings were recorded and placed on a 1:500,000 Geological Survey map of California. A furbearer observation leaflet was prepared for publication in "Outdoor California" and field distribution.

LIFE HISTORY

The red fox is intermediate in size between a coyote (Canis latrans) and the gray fox (Urocyon cinereocargenteus). It is known to weigh as much as 5 kg (11 pounds) (Grinnell, et al, 1937). There are three color phases of red fox--cross fox, silver fox, and black fox--and many intermediate types (Cross 1941). The typical red fox is reddish brown with black markings on the feet and ears. The cross fox is mostly red with an increased amount of black on the legs and underfur; the darkened guard hairs on the shoulders and back form a cross. Silver and black foxes have black fur with white-banded guard hairs giving them a silver effect. All three of these color phases have been observed in the same litter (Murie 1944). One distinctive characteristic of the red fox in any color phase is its white-tipped tail.

There have been many studies dealing with the eastern red fox but little is known of the western subspecies. The home range of the eastern red fox depends upon season and habitat. Various home ranges have been recorded between 56.6 to 591.1 ha (140 acres to 1,460 acres) (Ables 1969, Storm 1965). Red foxes have been known to travel distances up to 394.2 km (245 miles) (Longley 1962, Ables 1965). After the pups are mature they usually disperse within 16 km (10 miles) of their burrow.

The red fox mates between December and February (Scott 1943, Ables 1968, Sheldon 1949). After a 51-52 day gestation period (Ewer 1973) a litter of approximately five pups is born. The pups are usually born in a burrow which the female has prepared. Weaning takes approximately eight weeks. Though red foxes do have the potential for a long life the average life span in the wild is less than one year (Arnold 1956).

The red fox will consume a wide variety of foods. It preys heavily upon rodents and lagomorphs (Ewer 1973) but wild fruits do figure importantly into the diet when available. The depredation of game birds by the red fox has always been controversial. Though red foxes are known to take ring-necked pheasants they seem to have little effect on the population (Scott and Klimstra 1955, Arnold 1956). There is a certain amount of predation on waterfowl, particularly nesting hens, but this relationship needs to be further explored before any conclusions can be drawn (Sargeant 1972).

HARVEST

The fur of the red fox in other states has played an important part in the fur industry; however, in California the trapping of red foxes has never been of much economical importance. Trapping records from California show

that only 135 red foxes were taken from 1940 to 1959. Since 1959, when protected status was given marten, fisher and wolverine, California fur buyers reported an average of only two Sierra Nevada red foxes taken annually. In 1974, the California Legislature prohibited the taking of red fox for commercial purposes and the Fish and Game Commission prohibited the taking of red fox, except as provided in the Fish and Game Code.

RESULTS

Figure 1 is a map of Northern and Central California showing the location of red fox sightings documented as a result of this study. The location of the valley population is shown with dots and the triangles represent Sierra Nevada red fox sightings.

As the map indicates the valley population of red fox has been observed in Sacramento, Sutter, Colusa, Yuba, Butte, Yolo, Tehama, Glenn, Napa, Solano, Shasta, San Joaquin, Trinity, El Dorado, Marin, and Mendocino Counties. On June 26, 1974 a red fox was killed at Dillon Beach, Marin County, and taken to the Museum of Vertebrate Zoology, University of California, Berkeley. A small resident population occurs at the El Dorado Nature Center near Long Beach, Los Angeles County and there have been undocumented reports of other sightings in Southern California. The major concentrations appear along the Sacramento River south of Red Bluff and in the Butte Sink, Colusa County. This distribution of the valley population differs from the original cited by Grinnell, et al, (1937) and Ingles (1965). This indicates a range extension of the valley population of red fox.

DISCUSSION

The valley population of red fox appears to be increasing in numbers as well as extending its distribution farther south. The fact that this population is geographically separated from the Sierra Nevada red fox indicates that these two populations are distinct. Also, the lack of observations preceding the 1890's lends support to the theory that the valley population was introduced by man. This needs to be documented through taxonomic studies to determine the identify of the valley population.

The Sierra Nevada red fox population appears to be very small since few sightings are recorded. The most recent sightings are primarily centered around the Lassen Park area. Schempf and White (1974) believe that the Sierran population is possibly declining in numbers and in a more precarious position than any of the other five carnivores surveyed. This study and the one accomplished by Schempf and White (ibid) points out the need for additional information on the status of the red fox in California. Through publication of this progress report and the Department's furbearer observation leaflet, informed people are encouraged to provide the Department with additional sightings.

LITERATURE CITED

- Ables, E. D. 1965. An exceptional fox movement. *J. Mammal.* 45:102.
- _____. 1968. Ecological studies on red foxes in Southern Wisconsin. Phd. thesis. Wisc. Univ.
- _____. 1969. Activity studies of red fox in Southern Wisconsin. *J. Wildl. Mgmt.* 33:145-153.
- Arnold, D. A. 1956. Red foxes of Michigan. Michigan Department of Conservation, Lansing. 48 pp.
- Churcher, C. S. 1959. The specific status of the new world red fox. *J. Mammal.* 41:349-360.
- Cross, E. C. 1941. Color phases of the red fox. *J. Mammal.* 22(1):25-39.
- Ewer, R. F. 1973. *The Carnivores.* Cornell Univ. Press, New York.
- Grinnell, J., J. Dixon and J. M. Linsdale. 1937. *Furbearing mammals of California.* Vol. 2. Univ. Calif. Press, Berkeley.
- Hall, R. E. and K. R. Kelson. 1959. *The mammals of North America, Vol. 2,* The Ronald Press, New York.
- Inglis, L. G. 1965. *Mammals of the Pacific States.* Stanford Univ. Press, Stanford.
- Longley, W. H. 1962. Movements of red fox. *J. Mammal.* 43(1):107.
- Murie, A. 1944. *The wolves of Mount McKinley.* U. S. National Park Fauna Series 5.
- Peterson, R. L., R. D. Standfield, E. H. McEwen and A. C. Brooks. 1953. Early records of the red and the gray fox in Ontario. *J. Mammal.* 34:126-127.
- Sargeant, A. B. Red fox spatial characteristics in relation to waterfowl predation. *Jour. Wildl. Mgmt.* 36(2):225-236.
- Schempf, P. F. and M. White. 1974. A survey of seven species of carnivores on National Park Service lands in California. Wildlife-Fisheries Unit, Dept. of Forestry and Conservation, Univ. of Calif., Berkeley. Unpublished.
- _____. and M. White. 1975. Occurrence of six furbearer populations in U. S. National Forest lands of Northern California. Preliminary Report for U. S. Forest Service. Unpublished.
- Scott, T. G. 1943. Some food coactions of the northern plains red fox. *Ecol. Monog.* 13(4):427-79.
- _____. and W. D. Klimstra. 1955. Red foxes and a declining prey population. *South. Ill. Univ. Monograph.* Ser. 1. 123 pp.

Sheldon, W. G. 1949. Reproductive behavior of foxes in New York State.
J. Mammal. 30(3):236-246.

Storm, G. L. 1965. Movements and activities of foxes as determined by
radio-tracking. J. Wildl. Mgmt. 29(1):1-13.

Vail, E. L. 1943. Fox ranching in Southern California. Calif. Fish and
Game 28(2):87-88.

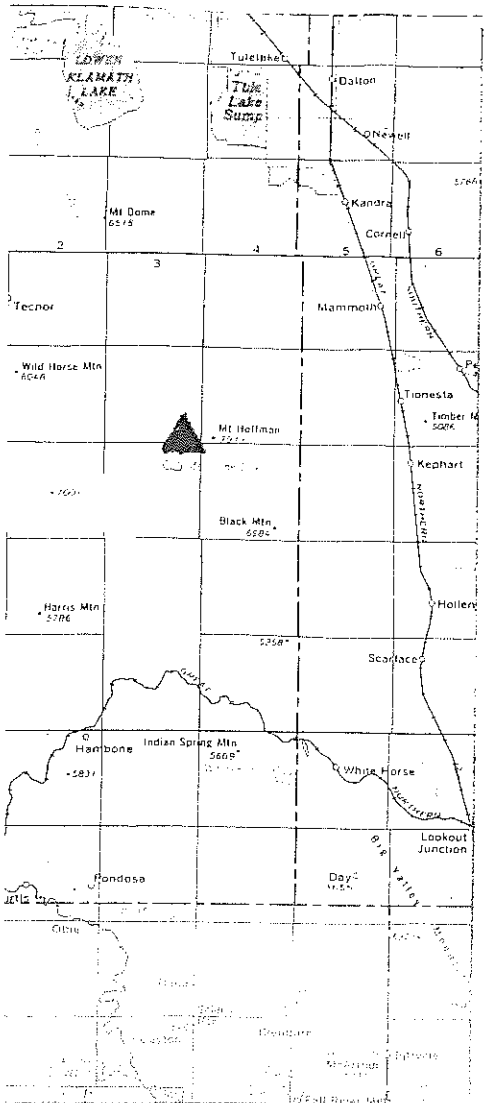


FIGURE 1. Map showing location of red fox in Northern and Central California. 1975.

- red fox - Valley population
- ▲ Sierra Nevada red fox

Scale 1:500,000
1 inch equals approximately 8 miles

