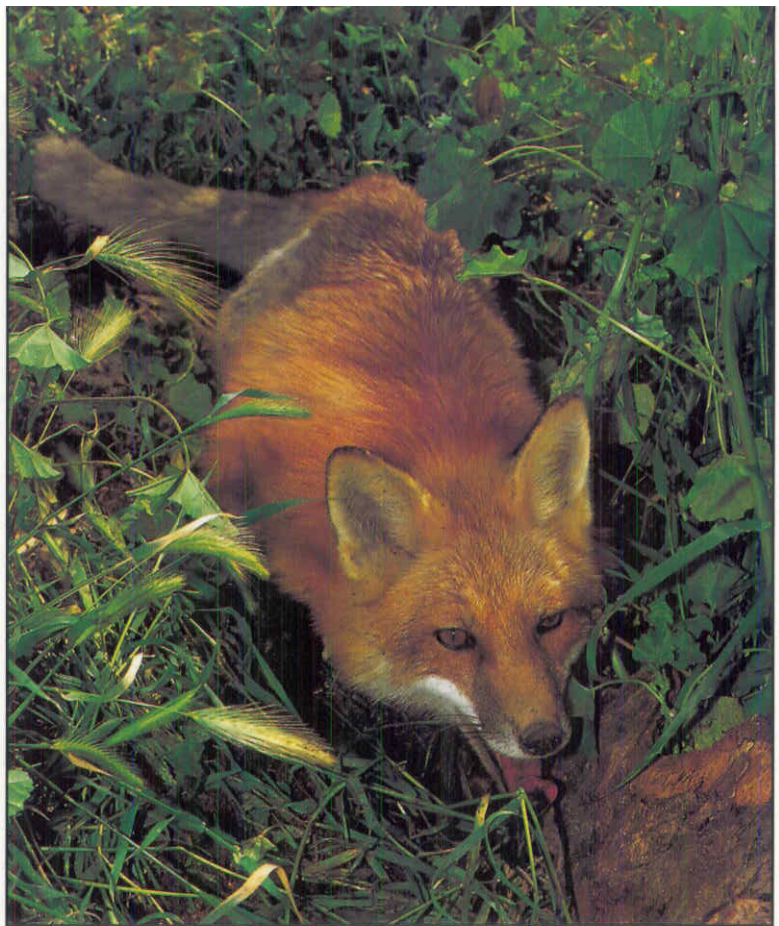


The spread of the red fox

By Esther E. Burkett and
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Like many other non-native species, red foxes are spreading throughout California, imperiling native wildlife. Photo © B. "Moose" Peterson.

Californians seldom see red foxes, yet most know of this animal famed for its cunning. Common phrases associated with this furry red mammal include "sly as a fox," "fox in the hen house" and "outfoxed." Children's fairy tales abound with this small member of the dog family.

One of the most widely-distributed carnivores in the world, red foxes eat mice, rabbits, birds, bird eggs, insects, seeds, fruits and berries. Farmers know well their love of poultry.

Descendants of imported varieties of red foxes now live in lowland and coastal areas once the kingdoms of coyotes, gray foxes and kit foxes. These exotic red foxes are imperiling native wildlife, including a few endangered species.

Sympathetic citizens, animal control agents and wildlife rehabilitation workers have contributed to the problem by releasing red foxes all over the state. This illegal practice continues, spreading wildlife diseases, threatening endangered species populations and possibly causing genetic hybridizations with native red foxes in the Sierra Nevada.

People in urban areas often feed

these non-native red foxes, allowing fox populations to grow beyond the carrying capacity of the land. In areas without coyotes, mortality from disease, vehicles and dogs are the main factors controlling the fox populations.

It is just the latest chapter in the long history of humankind's influence on populations of this animal.

Europeans settling in the eastern part of the country imported red foxes for fox hunting. Red foxes already lived in North America, but only in the northern Midwest and at high elevations of western mountains. As settlers cleared the eastern deciduous forests for farmland, they unknowingly created the perfect, broken habitat favored by red foxes.

As the human population swelled, animals which preyed on red foxes — wolves and coyotes — declined or were eliminated. With favorable habitat and lack of predators, the red fox population grew and spread west.

California's only native red foxes live in high mountainous areas, chiefly above 7,000 feet and ranging from the southern Sierra Nevada to the Klamath Mountains. This is the

rarely-seen Sierra Nevada red fox, listed as a threatened species in California. Biologists know little about the specific habitat needs of this elusive animal. It seems to favor broken timberland with scattered meadows.

Beginning in the 1870s, fox hunting enthusiasts imported non-native red foxes from the Midwest. By the early 1940s, approximately 125 fox farms raised about 20,000 foxes in California. Some of these exotic red foxes probably escaped from cages or were set free during periods of low fur values. Thus, the spread of the red fox continued, this time in the Golden State.

Biologists first discovered exotic red foxes living in the wild in the Sutter Buttes area of the Sacramento Valley in the late 1890s. The animals were common in this area by the late 1930s. However, the potential for damage was not recognized until red foxes invaded the coastal zones of southern California and the San Francisco Bay area in recent decades.

These vast wetland areas were preferred as human settlement sites



Highly adaptable, red foxes live in the most amazing urban settings. This family lived at a southern California sewage treatment plant, where employees contributed to the spread of the red fox by feeding the animals. Photo by Jeffrey C. Lewis.



Least tern nest at the DFG's Bolsa Chica Ecological Reserve in Orange County. Studies show red foxes eat the eggs of ground-nesting birds, including those of some endangered species. DFG photo by Esther E. Burkett.



Red foxes compete directly with some native fox species, such as these San Joaquin kit foxes — a threatened subspecies. Photo © B. "Moose" Peterson.



Other native ground nesting birds whose eggs fall prey to the red fox include the snowy plover, left, and the endangered clapper rail, top. The snowy plover is a candidate for listing as "threatened" by the U.S. Fish and Wildlife Service. Snowy plover by Hugh P. Smith Jr. from the *OUTDOOR CALIFORNIA* Photography Award Program. Clapper rail photo © B. "Moose" Peterson.

and developed quickly. Habitat changes and lack of predators helped the non-native red fox population to blossom. It wasn't until the 1970s that biologists noted their presence. By the mid-1980s, exotic red foxes were well established in the San Francisco Bay and in the coastal areas of Los Angeles and Orange counties.

Biologists surveying for endangered light-footed clapper rails in southern California salt marshes began counting more red foxes than rails. Biologists also documented red fox predation on the eggs of the endangered California least tern, a small seabird which nests on the ground. Least terns have lost many of their historic nesting sites on the sandy beaches of California, from the Bay Area to the southern border. Their colonial nesting behavior leaves them vulnerable to a predator such as the red fox.

Primarily for these two birds — the least tern and the clapper rail — biologists started removing red foxes from some wildlife refuges and reserves. Professional trappers capture and euthanize the foxes in the same way that domestic pets are "put

to sleep." The cunning nature of the red fox makes cage traps inefficient and cost prohibitive, so rubber-padded leghold traps are used.

Biologists prefer these "soft-catch" leghold traps for capturing foxes and coyotes for radio-telemetry studies. Besides the efficiency of these traps, the incidence of injury is extremely low.

A clapper rail population nearly wiped out at one refuge rebounded quickly when afforded protection through the fox trapping program. In seven years, it surged from a few individuals to almost 100 rails.

A small segment of the public took issue with this approach and sued both the United States Fish and Wildlife Service and the California Department of Fish and Game. Biologists spent valuable time in courts and in preparing environmental documents which evaluated the problem and described alternatives. Some conservationists argued that such time and money would be better spent enhancing endangered species populations than producing voluminous documents.

The list of wildlife species affected by the imported red fox is growing. It includes shorebirds, black-necked stilts, American avocets, Forster's and Caspian terns — all preyed upon or harassed at a level which prevents nesting. Wildlife in the Bay Area have been hit hard in the last few years. The most noticeable impacts have been on snowy plovers and a colony of herons and egrets. The California clapper rail hovers dangerously close to extinction, with only a few hundred individuals remaining. Red foxes forage in clapper rail habitat. Dead rails have been found at red fox den sites. The relationship between burrowing owls and red foxes needs further investigation. It appears foxes displace and prey on the owls.

Red foxes readily take eggs from the nests of birds and bury them to eat later. They can be extremely damaging to ground nesting bird populations, especially when birds nest in colonies. They also kill more prey than can be eaten in one meal, burying or hiding the rest.

The non-native red fox also

impacts the San Joaquin kit fox, a threatened subspecies of the San Joaquin Valley. These small, native foxes have lost most of their pristine valley habitat to agriculture. Exotic red foxes are moving into their range and direct competition is suspected. Red foxes have killed kit foxes, one study concluded.

The DFG provides funding for studies of the exotic red fox population. Biologists place radio telemetry collars on captured animals to trace their movements. One young male fox ended up seven miles away from its capture site, a trip that required it to cross major city streets and pass through housing tracts. At its new location, it raised a family, adding even more individual foxes to the problem.

These non-native foxes thrive in the most amazing urban settings of southern California. Biologists have found them:

- sleeping in a bale of burlap at a

CalTrans equipment yard,

- in a culvert inside a city park overrun with people,
- resting at night, and even denning on a narrow freeway right-of-way.

Power line right-of-ways, urban tree nurseries, oil fields, sewage treatment plants and hotel landscaping buffers also support these non-native foxes. Parks and golf courses are commonly used. Railroad tracks, drainage culverts and flood control channels provide a means of movement throughout the urban landscape, though a jaunt through suburban housing tracts is also in the red fox's bag of tricks.

There is sadness in finding an empty least tern nest and random red fox tracks on a nesting island. That sadness hits harder as one sees hordes of people on the beach in the summertime, where birds historically nested in the thousands. But there is an incredible feeling of happiness and satisfaction in hearing clapper rails calling across the marsh at dusk, as a

cool dampness hangs in the air.

It is unfortunate the red fox trapping effort must be done to protect wildlife. But, it is a necessary response to the errors of the past. Consider the native foxes struggling to survive in the face of the changes humankind throws upon them. Alteration of the landscape by humans has put wildlife species at risk.

California continues to grow by approximately 2,000 people each day. The human population is now about 30 million. Managing development to allow both humans and native animals a place to roam and rest is the real challenge ahead of us. Native wildlife will be dangerously threatened without constant stewardship, but red foxes will still be trotting through golf courses and romping under power line easements. 🐾

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Concerned about the disappearance of endangered least tern eggs from ground nests along the California coast, biologists began capturing and radio collaring young red foxes to learn how far and how quickly they spread from urban areas to sensitive coastal habitat. Photos by Jeffrey C. Lewis.

