

San Joaquin kit fox pups rush to swarm around and practically mug one of their parents after the adult emerged from the entrance to the family's den.





Carrizo CLAN

Story and Photographs by **Chuck Graham**

Staking out family of San Joaquin kit foxes

Halfway into pitching my tent on the hard-scraped patch of the Carrizo Plain National Monument, I changed my mind and opted to sleep under a canopy of stars. I'd chosen the same area where I'd camped before, an isolated spot off the road and west of the Panorama Hills. The Carrizo Plain is the largest single native grassland remaining in California, and when the sun goes down, everything disappears and is replaced by an impregnable darkness. The winter air felt crisp and cool across the semi-arid grasslands. I lay in my sleeping bag as the Milky Way and Big Dipper presented themselves in the heavens.



Part of a larger family of San Joaquin kit foxes, these pups make their home in a den on the vast grassland of the Carrizo Plains. What started off as a practice session in stalking nearby giant kangaroo rat, changed as soon as one decided playtime skills needed fine tuning. Because of the number of predators on the plains, the pups seldom venture far from their den entrance.

Something stirred in a nearby cluster of green ephedra. I fumbled on my headlamp and stared at several sets of eyes bobbing in the blackness. Staring back were three curious San Joaquin kit foxes that had crept within a few feet of where I'd spread out my sleeping bag. The nocturnal Carrizo Plain was coming to life an hour after sunset.

A couple hours later after I'd fallen asleep, some of the smallest canids in North America returned, intrigued with this sleepy intruder. Giving in to their curiosity, one of them crept in close and woke me up as it gently nudged against my forehead with its wet, black button nose.

Well Equipped

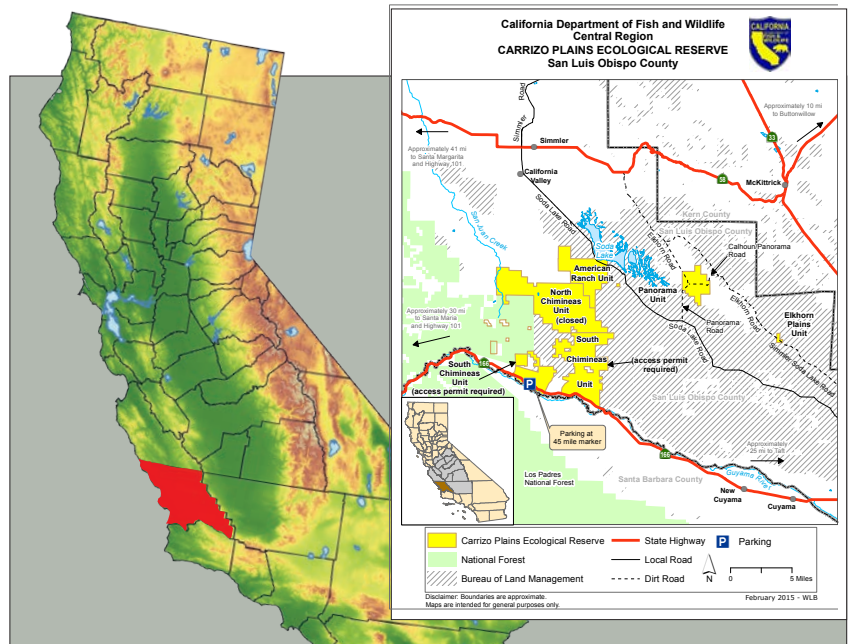
There are 37 species of fox around the world but only a dozen considered "true foxes," belonging to the genus *vulpes*. One of the best known is the kit fox (*Vulpes macrotis*), a species found in the drier regions of the western United States as well as in northern and central Mexico. The San Joaquin kit fox, found only in California, was once common in the San Joaquin Valley and much of California's Central Valley but is now listed under the federal Endangered Species Act.

The San Joaquin kit, which has an average length of 18 inches and a weight not exceeding 5 pounds, has characteristics beyond its small stature that have helped it survive in pockets of the San Joaquin Valley and even adapt to the urban life of Bakersfield, Taft and Coalinga.

In direct contrast with its minimal size, kit foxes possess an abnormally large pair of ears. At nearly 4-inches-long, the ears serve a dual purpose. Wildlife biologists say the sensitivity to sound vibration allows the kit fox to hear its prey from deep within their burrows. Scientists relate how the giant kangaroo rat, a favorite quarry of the kit fox, drums its feet underground as a way of communicating with other giant kangaroo rats in neighboring burrows. The kit fox can hear the drumbeat as it travels from burrow to burrow.

"Kit foxes prey heavily on giant kangaroo rats," said Abigail Gwinn, wildlife biologist for the California Department of Fish and Wildlife. "They seem to do very well when giant kangaroo rat populations are high."

Their large ears also enable the kit fox to stay cool, much the way a dog's tongue helps regulate its body heat. The San Joaquin Valley can be one of the hottest, sunniest regions in California. Kit fox ears are a maze of red blood vessels that are found close to the body's surface, allowing it to cool the blood within. During the hottest time of the day, they will beat the heat by hunkering down inside their dens and emerging after dark to hunt.



Top, to get to the Carrizo Plains, use State Highway 66 for 45 miles east of Santa Maria and 25 miles west of New Cuyama. The parking lot and entrance gate are at mile-marker 45 on the north side of the highway. Above, the author spent four months living on the open prairie as he finished wildlife photography necessary to publish his book.

Adults in this family of San Joaquin kit foxes stay vigilant as pups play near the entrance to the family den. When the pups reach 4 to 5 months old, they will disperse. Occasionally, offspring may remain to assist in the rearing of a next year's litter. Below, the kit foxes appearance changes slightly with age, from cute, left, to cunning, center.



Despite the heat, perhaps the kit fox's most interesting physical characteristic is its ability to go without water. Of course, if water is available, they will drink, but the kit fox can go their whole lives without drinking a drop.

"Kit foxes are able to get all the water they need from their prey," continued Gwinn. "They don't need to find any source of fresh water to drink."

Prey and Predator

It was another sublime day at the entrance to a den of San Joaquin kit foxes, which was one of two kit fox families that I'd watched grow up over the spring. For four months in 2020, from March until the middle of June, I spent four days a week camped on that same sparse site with my

Typically, pups will disperse from their parents at 4-or-5-months-old, but it is not uncommon during years of abundant prey for members of the previous year's litter to remain with their parents and help rear a new litter of pups.

cameras always at the ready. I was finishing work on a book of wildlife photographs on the Carrizo Plains and had discovered the kit foxes

at different locations. The plains are considered one of the last, best bastions of the endangered canid.

Five pups lounged in the open air, above the den, soaking in the late afternoon sun. There was no concealment of the main entrance, the site was in the open and visible to every nearby critter, and the vegetation was worn down by months of consistent activity. California ground squirrels and antelope ground squirrels—two kit fox prey items—kept a constant watch on the den during the day. Giant kangaroo rats took over the task at night.

Time slipped by slowly, the only activity

The giant kangaroo rat, below right, is a favorite quarry of the kit fox. Kangaroo rats drum their feet underground as a way of communicating with other giant kangaroo rats in neighboring burrows, but the large ears of the kit fox can pick up the beat and track the sound back to its source.





A long-tailed weasel, above left, made a rare appearance at a burrow near a family of San Joaquin kit foxes. Weasels are aggressive carnivores that forage through burrows looking for smaller mammals. Above right: Bobcats, golden eagles and great horned owls prey on kit foxes but coyotes cause the most mortalities because they kill over territory. Below, the vast Carrizo Plains is the largest single native grassland remaining in California and its 1,215 square miles holds the 246,812-acre Carrizo Plain National Monument and CDFW's 38,900-acre Carrizo Plains Ecological Reserve.



became a tail that flopped back and forth in the light breeze. Occasionally, one of the pups would raise its head for a lazy scan before lowering it and resuming its nap.

Suddenly, the pups' mood changed like a charge of electricity had shot through them just before a male emerged from the den. The pups launched a collective mugging and swarmed their father with affectionate licks and nuzzles. The playfulness escalated to roughhousing amongst

the pups as the parent assumed a protective role and kept a watchful eye and ear out for any potential threats.

In time, the adult sauntered off, but not far. In all the playfulness of its pack, the adult instinct to provide took over, and he slipped behind some cover and waited. He darted out and pounced on an antelope ground squirrel and then hurried back to the pups. One of the more dominant pups snatched it and dove underground. The others

raced after. In less than two minutes some of the pups reemerged with part of the prey clenched between their sharp teeth. In short order, the brutal lesson had turned from hunting prey to games of keep-away and tug-of-war swirled around the den and its seven different entry and exit points.

The low grasslands of the plains hold the largest concentration of endangered species in California, with more than a dozen under either state or federal government protection. It's interesting that even with the dens so visible, animals that the kit fox prey upon burrow as near as 50 feet from them. Therefore, the adult kit foxes are seldom forced to travel far to hunt. Ironically, those same animals repeatedly sounded the alarm if other threats arose, such as coyotes, raptors, Western Pacific rattlesnakes and badgers.

Several times over the months, frantic chirps by squirrels sent pups scurrying, light plumes of dust wafting skyward and then trailing each as they dove into their den. The adult male stood straight up from its resting position, his large ears at attention in the direction of the threat.

A conservation assessment of kit foxes in California and other Western states by the Forest Service and the U.S. Department of Agriculture showed survival rates vary significantly from year to year, with one study indicating a 74 percent mortality rate for pups less than a year old. In captivity, kit foxes have lived up to 12 years but average less than half that in the wild.

"It makes sense that any alarm they heard would cause them to retreat to their den," said Tory Westall, wildlife biologist for California State University Stanislaus endangered species recovery program. "Primary cause of mortality is coyotes. They do not eat the foxes but kill them for territory. Kit foxes are also killed by bobcats, golden eagles and great horned owls."

Helping Hand

At a second den site in the Carrizo Plain, a lone adult kept a keen eye on its rambunctious pups. The day was winding down, the temperatures cooling as the pups became more active. Then, another adult emerged. It was not the mother, but a helper, a San Joaquin kit fox from the previous year's litter.

A technical conservation assessment of kit foxes in California and other Western states by the Forest Service and the U.S. Department of Agriculture showed survival rates vary significantly from year to year, with one study indicating a 74 percent mortality rate for pups less than a year old.

The yearling assumed the duties of watching over the pups, providing another set of eyes and ears attentive to the pups' needs as they grow accustomed to their grassland habitat. Average kit fox litters contain about four kits, but the dens

I observed held no less than five pups each.

Familial assistance occurs when a young kit fox is not ready to leave their parents. Kit fox pairs are monogamous and breed with the same partner for life. Typically, pups will disperse from their parents at four to five months, but it is not uncommon during years of abundant prey for members of the previous year's litter to remain with parents and help rear a new litter of pups. The adults accept the help, and the yearling kit foxes get to shore up their hunting skills.

A decade ago, Westall conducted a kit fox study at the university to determine the roles of parents and helpers in pup rearing. Helping behavior had been documented in canids for decades, but direct contributions amongst kit foxes had not.

"My study was on the roles of parents and helpers in pup rearing," said Westall, who studied kit foxes in urban regions. "Helpers had been documented, but their direct contributions to pup rearing had not been quantified. I looked at the amount of time that parents and helpers spent providing care to pups to see if there was a significant amount of care provided by helpers."

Back in the 1990s, a kit fox family was observed in the Elk Hills, located between Bakersfield and Taft. The mother died, but her pups were old enough to where they were able to survive on prey items.

"The helper raised the pups," said Westall, "and likely took over the mother's home range the following year."

Den Swap

Another morning, another den—but there was still a bite in the crisp, clear morning air. Before sunrise, I situated myself about 25 yards east of this new den, a solid, established mound of dirt, well-trampled with several entry points and five pups inside.

See Kit Fox
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Almost as if a family portrait was called, these pups were together for a moment before running off in different directions. Kit foxes tend to be nocturnal but will occasionally remain active during the daytime.

From Kit Fox

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However, something felt wrong. After two hours of no activity, I deemed the den dormant, and I moved away. An alternate den was nearby, and I was able to situate myself in the tall grass and keep an eye on both sites.

Suddenly, I saw something I had not seen in a decade. Poking its narrow head out of the main den site that I had just left was a long-tailed weasel. The slender weasel was investigating the kit fox den, as well as every other burrow within the vicinity.

Weasels are generally smaller and not considered a threat to adult San Joaquin kit foxes, and can, in fact, become the preyed upon. But weasels are aggressive carnivores that forage through burrows and will kill smaller mammals like rabbits by

biting at the base of the skull.

Several times it flushed giant kangaroo rats and then hurriedly chased after them. Catching one was another matter though, and ultimately the weasel gave up and moved on. By early afternoon, the kit fox pups emerged from the alternate den site.

Gwinn, the wildlife biologist, explained that it is not uncommon for kit foxes to use up to 11 dens within a year.

“Kit foxes will often use multiple dens throughout the year, including during the pupping season,” she said. “This can help them avoid flea infestations and gives them multiple possible escape routes when fleeing predators.”

Gwinn stressed that the Carrizo Plain represents some of the largest minimally disturbed habitat for San Joaquin kit foxes.

“However, it’s important not to rely on a

single location to preserve a species,” she said. “Especially given the potential for disease to sweep through populations. Maintaining habitat and corridors throughout their historic range is important for kit fox preservation.”

Chuck Graham published "Carrizo Plains" in January, to coincide with the 20-year anniversary of the National Monument. The 116-page coffee table book comes with 115 photographs and three essays from the author. An introduction is presented by Neil Havlik, president of the Carrizo Plain Conservancy. It can be purchased through the Internet at chuckgrahamphoto.com.

