Sierra Nevada Red Fox fact sheet

What is a Sierra Nevada red fox?

The scientific name of the Sierra Nevada red fox (or SNRF) is *Vulpes vulpes necator*. It is a subspecies (a distinct local variety or race) of the Red Fox (*Vulpes vulpes*). Red foxes are one of the world's most familiar and widespread carnivores, occurring throughout North America, Europe, Asia, and portions of Australia. Red foxes, along with coyotes, wolves and jackals, are members of the dog family (Canidae). Red foxes generally weigh 2 to 4 kg (4.5 to 9 lbs), have a narrow pointed muzzle, long thin legs, and a thick bushy tail with a white tip. Despite their name, red foxes can have black, tawny yellow, or pale gray fur, although the reddish-orange pelt is generally the most common. Although red foxes occasionally have gray fur, they are a distinct species from the Gray Fox (*Urocyon cinereoargenteus*) and do not interbreed with them, nor with dogs, wolves or coyotes. The SNRF is probably the rarest and most endangered red fox subspecies in North America.

Where do SNRF live?

SNRF are the only red fox that occurs naturally in the high mountain habitats of the Sierra Nevada and southern Cascade mountains of eastern California. They live in the open conifer woodlands and mountain meadows near treeline. They do not occur in the coastal mountain ranges or in low elevation habitats. According to recent genetic studies, SNRF are not found only in California; they extend somewhat into the mountains of southern Oregon and western Nevada.

What is their current range or distribution?

Unknown. In the 1930s, SNRF occurred widely, from the Mount Shasta / Lassen Peak area in northern California, the Yosemite / Mono Lake area in the central Sierra Nevada, and the Sequoia-Kings Canyon area in the southern Sierra. More recently, their populations have declined, perhaps becoming extirpated (locally extinct) in some areas. A population is known to occur in the Lassen Peak region, where they are occasionally seen or photographed by people. Some biologists believed that SNRF had become extinct in the southern portions of their range, including the Sierra Nevada. Prior to August 2010, the last verified sighting of red fox in the Sierra Nevada was in 1991, when one was photographed at the Tioga Pass just outside Yosemite National Park.

What is their current conservation status?

In 1980, the SNRF was listed as a "Threatened" species under the California Endangered Species Act. It is not listed under the federal Endangered Species Act (ESA). The US Forest Service considers them a "Sensitive Species," which means that the potential impacts on SNRF are taken into account when management actions are decided. Hunting and trapping of SNRF in California has been prohibited since 1974.

Why are they threatened? How are they being harmed?

Unknown. No one knows exactly why SNRF populations have declined since the 1930s. It is not due to hunting and trapping, because these have been banned since 1974. A recent US Forest Service report on SNRF ecology and conservation (see link below for PDF download) noted that other threats could include habitat destruction and fragmentation, diseases from domestic dogs, and

competition with other species such as coyotes. The report also noted that the current lack of basic ecological information on the SNRF hinders identifying and responding to these threats.

How large is the SNRF population? How many individuals are left?

Unknown. No one has ever determined the size of the SNRF population, in part because they are so difficult to study. The total population size depends somewhat on how much habitat remains and how much area each fox needs. In the Lassen Peak area, biologists believed the total population of SNRF to be fewer than 50 foxes and perhaps as low as 15 foxes. If correct, this population would probably be too small to persist for long. That's one reason why the discovery of additional SNRF populations is so important.

What's so important about the recent detections of SNRF on the Humboldt-Toiyabe and Stanislaus National Forests?

These detections, which consist of photographs and genetic (DNA) evidence, are important because they prove that SNRF still occur in parts of the Sierra Nevada. This means that SNRF are not extinct from the Sierra Nevada and are not limited only to the Lassen Peak area, as some biologists previously believed. Instead, SNRF populations are larger and more widespread than previously believed, which is good news for their conservation.

What's so special about SNRF? Why are they worth protecting?

SNRF are a natural part of the mountain ecosystems in the Sierra Nevada and southern Cascades. Like any species, they have intrinsic value and are part of the natural heritage of all Californians. They may also play an important ecological role, such as reducing populations of mice, gophers and squirrels that could in turn over-consume young trees. Natural ecosystems are complex networks of relationships among species, which are still not fully understood by biologists.

How did we learn about SNRF ecology?

Worldwide, red foxes have been well studied because they are widespread, live in many habitats and are an important game species. But few studies have been conducted on the SNRF, and it is unclear whether studies done in profoundly different habitats (such as in the Midwestern US) even apply to SNRF populations. Most of the basic facts of SNRF biology, such as their general distribution, habitat associations, and diet, were learned by fur trappers in the 1920s. Since California banned SNRF trapping and hunting in 1974, only one field ecology study of SNRF has been conducted: From 1998-2002, biologists at UC Berkeley put radio-telemetry collars on a handful of SNRF in the Lassen Peak area, and also documented their activity times and diets. It is unknown whether SNRF in other areas, such as the Sierra Nevada, follow the same patterns as the Lassen foxes. Automatic camera stations are an important new tool for studying rare and elusive carnivores like the SNRF. These cameras can document wild animals without disturbing them.

Why is so little known about SNRF? Why haven't they been better studied by biologists?

SNRF are very hard to study. They live in remote, rugged mountain habitats. They are generally solitary and so do not occur in groups or herds. Like other red foxes, they are nocturnal, meaning they are active mostly at night and sleep during the day. Additionally, they usually avoid people,

although a few have been known to scavenge or beg for food in parking lots and campgrounds. Their remote rugged habitats, low population density, and elusive habits make them very difficult for biologists to study. Hopefully, modern technology such as automatic wildlife cameras, DNA analysis, and satellite telemetry collars will help biologists learn more about SNRF in the future.

How is the SNRF related to other red fox populations in California and elsewhere?

This is one of the few well-known aspects of SNRF ecology, having been recently studied by a collaborative research team from UC Davis, California Polytechnic State University, Kansas State University, and the US Forest Service. It is impossible to tell by eye whether a red fox came from the Sierra Nevada or elsewhere; instead, scientists must examine the animal's DNA. In short, the SNRF is closely related to the red fox subspecies occurring in the northern Cascades and Rocky Mountains, and is less closely related to the red foxes in other areas of North America. SNRF are native to California, whereas the lowland red foxes in the San Francisco Bay Area, the San Joaquin Valley, and along the central and southern coasts are not. The team's most surprising finding was that the red foxes in the Sacramento Valley, long thought to be non-native, are actually native to California and are the closest genetic relatives to the montane SNRF. This finding has dramatically influenced management of the Sacramento Valley red fox population. It is still unknown why the SNRF remains in the high mountains while its close relatives live in the Sacramento Valley.

What can I do to help? What should I do if I see a SNRF?

There are several important things the public can do to help SNRF conservation. First, if you are in the Sierra Nevada or southern Cascade mountains and you think you see a red fox, look carefully to confirm it. Look especially for the white fur on the tip of the tail, which distinguishes red foxes from gray foxes and coyotes. Try to get a photograph if possible without disturbing the animal. Do not feed the animal, or any other wild mammals, and keep children and pets away. (Like most canids, red foxes can carry rabies, which can be fatal to humans. Conversely, red foxes may be susceptible to dog diseases and parasites such as heartworm and distemper.) Report your sighting, including the location, date and time, to a park ranger or campground host, or submit a sighting report on-line at: **http://www.dfg.ca.gov/regions/1/redfoxsurvey/**. This information can help biologists learn where SNRF currently occur, which is an essential step in their conservation.

How can I learn more about SNRF ecology, management and conservation?

There are several websites with information about the SNRF:

The California Department of Fish and Game maintains a SNRF Information Portal, with background information and downloadable PDFs of many recent and historic documents:
https://r1.dfg.ca.gov/Portal/SierraNevadaRedFox/tabid/618/Default.aspx

In August 2010, the US Forest Service published a "conservation assessment" of the SNRF, which summarizes all the currently available science. This 42-page report can be downloaded as a 4.5 Mb PDF document from the following website:
http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=23994

Contacts for more information on Sierra Nevada red fox ecology and management

All listed contacts can provide publication-quality photographs.

Red fox management policies and regulations in California (including Sierra Nevada red fox, Sacramento Valley red fox, and lowland non-native red fox populations)

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Sierra Nevada red fox management by the US Forest Service

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Sierra Nevada red fox field ecology and conservation

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Details of recent Sierra Nevada red fox detections and follow-up surveys in the Sierra Nevada

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