

Fox spit helped Forest Service confirm rare find

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Three weeks ago, when U.S. Forest Service biologists thought they had found a supposedly extinct fox in the mountains of central California, they turned to UC Davis for confirmation.

Photographs taken by a Forest Service trail camera near Sonora Pass seemed to show a Sierra Nevada red fox (*Vulpes vulpes necator*) biting a bait bag of chicken scraps. That would be an amazing discovery, since no sighting of that species has been verified south of Mount Lassen, 200 miles away, since the mid-1990s.

The biologists shipped the bait bag to wildlife genetics researchers Ben Sacks and Mark Statham at the UC Davis Veterinary Genetics Laboratory. Since 2006, they have radically altered our understanding of red foxes in California, supplying information crucial to conservation efforts.

Sacks and Statham scraped saliva from the tooth punctures on the bag and analyzed the DNA within. Before you could say spit, they had the answer: definitely a Sierra Nevada red fox.



UC Davis wildlife genetics researcher Ben Sacks holds a native Sacramento Valley red fox (*Vulpes vulpes patwin*). (UC Davis photo)

"This is the most exciting animal discovery we have had in California since the wolverine in the Sierra two years ago -- only this time, the unexpected critter turned out to be home-grown, which is truly big news," Sacks said. (The wolverine was an immigrant from Wyoming.)

Four years ago, Sacks began analyzing California red fox DNA collected from scat, hair and saliva from live animals, and skin and bones from museum specimens. Until then, the expert consensus was that any red fox in the Central Valley and coastal regions of the state was a descendant of Eastern red foxes (*V. v. fulva*) brought here in the 1860s for hunting and fur farms.

Sacks and his colleagues have confirmed that red fox populations in coastal lowlands, the San Joaquin Valley and Southern California were indeed introduced from the eastern United States (and Alaska). But they have also shown that:

- There are native California red foxes still living in the Sierra Nevada.
- The native red foxes in the Sacramento Valley (*V. v. patwin*) are a subspecies genetically distinct from those in the Sierra.
- The two native California subspecies, along with Rocky Mountain and Cascade red foxes (*V. v. macroura* and *V. v. cascadenis*), formed a single large western population until the end of the last ice age, when the three mountain subspecies followed receding glaciers up to mountaintops, leaving the Sacramento Valley red fox isolated at low elevation.

Sacks' extensive research program focuses on canids, especially red foxes (evolution, ecology and conservation) and dogs (genetics, geographic origins and spread). He and his students also are working on other carnivores, including disease ecology and interactions among fishers, bobcats, coyotes and gray foxes, and population genetics of ringtails and coyotes.

Major funding for Sacks' fox research came from the California Department of Fish and Game and the UC Davis Center for Population Biology.

About UC Davis

For more than 100 years, UC Davis has engaged in teaching, research and public service that matter to California and transform the world. Located close to the state capital, UC Davis has 32,000 students, an annual research budget that exceeds \$600 million, a comprehensive health system and 13 specialized research centers. The university offers interdisciplinary graduate study and more than 100 undergraduate majors in four colleges — Agricultural and Environmental Sciences, Biological Sciences, Engineering, and Letters and Science. It also houses six professional schools — Education, Law, Management,

Medicine, Veterinary Medicine and the Betty Irene Moore School of Nursing.

Additional information:

[Ben Sacks home page, including a place to report fox sightings](#)

[U.S. Forest Service news release on Sierra Nevada red fox discovery](#)

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