

The origin of recently established red fox populations in the United States: translocations or natural range expansions.

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The origin of recently established red fox populations in the United States: translocations or natural range expansions? FREE

Mark J. Statham, Benjamin N. Sacks, Keith B. Aubry, John D. Perrine, Samantha M. Wisely 

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Abstract

Red foxes (*Vulpes vulpes*) are native to boreal and western montane portions of North America but their origins are unknown in many lowland areas of the United States. Red foxes were historically absent from much of the East Coast at the time of European settlement and did not become common until the mid-1800s. Some early naturalists described an apparent southward expansion of native foxes that coincided with anthropogenic habitat changes in the region. Alternatively, red foxes introduced from Europe during Colonial times may have become established in the east and subsequently expanded their range westward. The red fox also was absent historically from most lowland areas of the western United States. Extant populations of red foxes in those areas are considered to have arisen from intentional introductions from the east (and by extension are putatively European), escapes or releases from fur farms, or range expansions by native populations. To test these hypotheses we compared mitochondrial DNA sequences (cytochrome *b* and D-loop) from 110 individuals from 6 recently established populations to 327 native (primarily historical) individuals from Eurasia, Alaska, Canada, the northeastern United States, and montane areas in the western contiguous United States, and to 38 individuals from fur farms. We found no Eurasian haplotypes in North America, but found native haplotypes in recently established populations in the southeastern United States and in parts of the western United States. Red foxes from the southeastern United States were closely related to native populations in eastern Canada and the northeastern United States, suggesting that they originated from natural range expansions, not from translocation of European lineages, as was widely believed prior to this study. Similarly, recently established populations in the Great Basin and in western Oregon originated primarily from native populations in western montane regions,

but also contained a few nonnative North American haplotypes. In contrast, populations in western Washington and southern California contained nonnative, highly admixed stock that clearly resulted from intracontinental translocations. Several common haplotypes in these populations originated in regions where fur-farm stocks originated. Although European red foxes translocated to the eastern United States during Colonial times may have contributed genetically to extant populations in that region, our findings suggest that most of the matrilineal ancestry of eastern red foxes originated in North America.

Keywords: [fur farm](#), [mitochondrial DNA](#), [museum samples](#), [phylogeography](#), [red fox](#), [translocation](#), [*Vulpes vulpes*](#)

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