Fates of Red Foxes Released into Southeastern Oklahoma

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Abstract: In 1981, the Oklahoma Department of Wildlife Conservation provided 8 red foxes *(Vulpes vulpes)* to the LeFlore County Fox and Wolf Hunter's Association for experimental stocking. On 1 September 1981, 4 wild foxes and 4 pen-reared foxes were released into LeFlore County, Oklahoma. Six of the foxes were equipped with radio-transmitters. By the end of the study, 2 November 1981, 5 of the 6 radio-equipped foxes had died. The radio-transmitter of the sixth fox failed, and the fate of this fox is unknown.

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Despite decades of private stocking into southeastern Oklahoma (Glass and Halloran 1960, Butler 1972), red foxes, while widespread, are still not common in that part of the state (Hatcher 1982). However, since fox hunters often believe that stocking foxes can increase the abundance of these animals, the Oklahoma Department of Wildlife Conservation (ODWC) is frequently petitioned to develop a red-fox stocking program. Therefore, in 1981, the Department provided 8 red foxes to the LeFlore County Fox and Wolf Hunter's Association (LCFWHA) for experimental stocking. This study was initiated to monitor the movements of these foxes.

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Methods

LeFlore County is located in southeastern Oklahoma and consists of 70% forestland, 25% range/pastureland, and 5% cropland. The northern quarter of the county is a smooth plain with low ridges and isolated table mountains dominated by

Table 1. Costs associated with stocking red foxes into LeFlore County, Oklahoma, 1981.

Description of Cost	Cost each
Red fox from Minnesota (2 male, 2 female)	$130
Red fox from Indiana (2 male, 2 female)	150
Average shipping cost per fox	27
Total cost to stock 1 fox	$157–$177[a]

[a]This estimate does not include costs accrued by personnel and vehicles of the ODWC.

post oak-blackjack oak *(Quercus spp.)* forests, while the southern three-quarters is a mountainous area dominated by oak-pine *(Quercus-Pinus)* forests. Elevation ranges from 120 m on the plain to about 810 m at the mountain peaks, mean annual precipation is about 110 cm, and mean annual temperature is about 17° C.

The release site of the foxes was in the Poteau River floodplain of central LeFlore County near Wister Reservoir. This location was chosen by the fox hunters in the hope that the natural northern, western, and southern boundaries formed by Wister Reservoir and the Poteau River would restrict the movements of the foxes and create an opportunity to hunt them.

Eight adult red foxes were purchased (Table 1) by the ODWC for release by the LCFWHA. Two male and 2 female wild foxes were obtained from Indiana, and 2 male and 2 female 2-year-old pen-reared foxes were obtained from Minnesota. A veterinarian certified that each fox was healthy, and each of the wild foxes was wormed and was vaccinated for distemper, hepatitis, leptospirosis, parainfluenza, and parvovirus. Each fox was ear-tagged, and 6 of the 8 (all 4 of the females, 1 wild male, and 1 pen-reared male) were equipped with radio-collars.

For 1 week prior to release, the members of the hunter's association confined all of the foxes within a 2.4-m x 7.5-m wire enclosure containing a rock-lined underground den. The members of the association hoped that the foxes would become accustomed to the area and, after their release, remain within the immediate vicinity and use the artificial den. In addition, the LCFWHA agreed not to run dogs within the vicinity of the release site for 1 year.

All 8 foxes were released at dusk on 1 September 1981, and ground-monitoring with a radio-receiver and a handheld yagi antenna began 2 hours after their release. Locations of the radio-collared foxes were determined by triangulation at intervals that varied from 3 times daily at the beginning to once every 2 weeks at the end of the study. Field work was completed on 2 November 1981.

Results

On 2 September at 0700, each fox was within 2 km of the release site. The radio-transmitter of 1 of the wild females (No. 4) failed later that morning. How-

Table 2. Summary of the movements of the radio-equipped red foxes in LeFlore County, Oklahoma, 1981.

Fox	Description	Sex	Linear Distance and Direction from Release Site (km)		Number of Days Until:	
			Greatest	At Recovery	Death	Recovery
1	Pen-reared	F	1.6	1.6 E	10–15	31
2	Pen-reared	F	19.2	13.3 SW	40–50	62
3	Pen-reared	M[a]	7.0	—	?	—
4	Wild	F[b]	2.9	2.9 N	37	37
5	Wild	F	10.1	10.1 SE	10–15	24
6	Wild	M	32.0	30.1 E	33–43	62

[a]Transmitter failed after 30 September 1981.
[b]Transmitter failed on 2 September 1981.

ever, on 8 October, its carcass was found near the dam of Wister Reservoir, 2.9 km from the release site (Table 2). The results of a subsequent necropsy indicated that it had been hit by an automobile.

On 2 September, the remaining wild female (No. 5) moved 3 km west of the release site to the edge of Wister Reservoir. It then reversed direction and on 7 September was near the Poteau River, 8 km southeast of the release site. It remained within 1 km of this area until 25 September when its decomposed body was found. It had not moved since 11 September.

By 7 September, the pen-reared male (No. 3) had moved 5 km east of the release site to the edge of a wooded ridge adjacent to a narrow hayfield. It stayed in this area until 30 September when its transmitter stopped working. It was not detected again.

Throughout September, the 2 pen-reared females usually remained within 1 km of the release site. Then, on 1 October, the decomposing body of 1 of these females (No. 1) was found near a barn 1.5 km east of the release site. On this same date, the surviving pen-reared female (No. 2) began a roughly circular journey which took it at least 35 km within 7 days. After 10 October, it remained near the edge of Brush Mountain, 13 km southwest of the release site. Its decomposed body was recovered on 2 November.

During the first few days after his release, the wild male (No. 6) moved eastward until 11 September, when it arrived near the strip mines between Walker Mountain and Poteau Mountain, 32 km from the release site where it remained. Its last movement was noted on 14 October when it was located in an area approximately 1 km north of the strip mines. His bones and fur were recovered on 2 November.

Discussion

This attempt to stock red foxes into southeastern Oklahoma was unsuccessful. Within 2 months after their release, all of the radio-equipped foxes except 1 was

known to have died. The fate of the pen-reared male (No. 3) is unknown due to radio-transmitter failure. A similar unsuccessful attempt occurred when the Arkansas Game and Fish Department released pen-reared red foxes (Pledger 1975). In that instance, 4 of 6 radio-equipped foxes were killed within 5 weeks of their release by either human beings or dogs, while the fates of the other 2 foxes were unknown due to radio-transmitter failure.

Except for the road-killed female (No. 4), the causes of death of the recovered foxes could not be determined. However, the deaths were not attributed to illegal trapping, the reason often cited by fox hunters as the cause of stocking failure for two reasons. First, pelts obtained during the study would have had little commercial value. Second, it is doubtful that a trapper would leave the remains of a fox and its functioning radio-transmitter at the same place—the conditions under which all recoveries except for that of the road-killed female (No. 4) were made.

The released foxes did not adapt to the environment of LeFlore County. They seemed apparently unaware of the potential danger posed by human beings and their activities. The pen-reared male (No. 3) was regularly monitored near a paved road, and on several occasions, radio-equipped pen-reared foxes showed little initial alarm when approached by vehicles. On 1 occasion, 1 of the tagged foxes that had been released without a radio-transmitter came within 2 m of a research vehicle. Because of their apparent lack of fear of human beings, we think it likely that in addition to the road-killed female (No. 4), the deaths of at least some of the other foxes were caused by human-related activities.

Conclusion

Although red foxes occur throughout southeastern Oklahoma, factors such as marginal red-fox habitat by heavily-forested areas of low diversity (Cook and Hamilton 1944, Storm 1965, Ables 1969) and competition with coyotes *(Canis latrans)* (Sampson 1977, Voight and Earles 1983) are probably responsible for the low abundance of red foxes in LeFlore County. Consequently, it is unlikely that simply releasing red foxes into this area will increase population levels or hunting opportunities for sustained periods of time.

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