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Successful use of neck snares to live-capture red foxes

S. Nicole Frey, Biology Department, Southern Utah University, 351 West Center, Cedar City, UT 84720, USA *frey@suu.edu*

Michael R. Conover, Jack H. Berryman Institute, Department of Wildland Resources, Utah State University, Logan, UT 84322-5230, USA

Gary Cook, Utah Division of Wildlife Resources, Cache Valley Hunter Education Center, 2851 West Valley View Highway, Logan, UT 84321, USA

Abstract: Box traps and foot-hold snares are common methods to live-capture study animals. However, these methods are frequently ineffective due to factors such as weather constraints, food availability, and target animal behavior. During a study of red fox (*Vulpes vulpes*) behavior, we examined the use of neck snares to live-trap study animals. We modified the neck snare using swivel cam-locks, deer stops to minimize damage to the animal. Additionally, we utilized our knowledge of red-fox behavior to set traps in a way that would reduce trauma to the captured animals. We snared 21 red foxes during the 3-year study with only 2 fatal injuries. Sixteen of these animals were followed with radio-telemetry for 3 to 28 months. With the data we collected during the radio-telemetry, we calculated home ranges. Home range size estimates calculated during the first few months for each fox were not different than those collected during the rest of the season. Most of the estimated home ranges for these red foxes did not encompass the snare location, suggesting either avoidance of the trap location or that the foxes were caught while investigating the status of another territory. Because captured red foxes were active the evening immediately after capture and all captured females reared young that spring, we determined that neck snares did not greatly affect their behavior. Thus, this method is a successful alternative way to live-capture red foxes for radio-telemetry studies.

Key words: human–wildlife conflicts, live-trapping, red fox, snares, *Vulpes vulpes*

Predation by red foxes (*Vulpes vulpes*) as well as other mammalian predators has contributed to the decline of waterfowl recruitment across the Great Plains and Intermountain West (Ball et al. 1995, Cote and Sutherland 1997). Because of this, many studies have been conducted to determine how to reduce fox predation on nesting waterfowl (e.g., Sargeant et al. 1995, Greenwood and Sovada 1996, Cote and Sutherland 1997, Harding et al. 2001). We were involved in one such study, researching the effects of predator removal on the behavior of the remaining red fox, raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*) populations. Our objective was to determine when and if predator removal would be effective at reducing predator numbers by looking at predator space use (Frey 2004, 2006).

Our study involved tracking radio-collared red foxes, raccoons, and striped skunks from December 1999 to October 2002 to observe their behavior and calculate home range size and location (Frey 2004). Therefore, we conducted trapping several times during the study to capture and radio-collar animals. While raccoons and skunks were caught easily using box traps baited with cat food, we quickly found that soil conditions at the Bear River Migratory Bird Refuge (Box Elder County, Utah) made it nearly impossible to catch red foxes with foot-hold snares. For example, in our first month, our capture rate was 0.5/100 trap nights. Most often, the cause of failure was that the traps rusted overnight and were then detectable by red foxes. Also, the soil surrounding the traps was wet, and we needed to use dry soil within the foot-hold set-up. This contrast in soil condition was difficult to disguise on the surface of the ground and appeared to be detectable by red foxes. Thus we devised a way to use neck snares to live-capture red foxes as a more effective alternative.

Methods

Trappers working in areas with a high density of deer often use deer stops on their neck snares. Such stops are ferrules or steel nuts crimped onto the wire of the snare that prevent the snare from closing completely. These stops allow deer or other animals to remove their feet from the snare loop, should they step into the snare. We incorporated this idea into our use of neck snares. Using taxidermy specimens, we estimated that the neck size of an average sized fox (5–7 kg) was approximately 10 cm. Therefore, we placed stops on our snares approximately 30 cm from where the snare lock attached to the snare, which kept the snare from closing smaller than a circle diameter of 10–12 cm and causing suffocation.

Because we were trying to catch and release

red foxes without causing serious injury and because this was not the general use of a neck snare, we modified both the way snares were set and their placement. We placed our snares so that the bottom of the snare loop would be 9–12 cm off the ground to catch foxes around the abdomen rather than the neck to further reduce chance of severe injury or death to the animal. We preferred to set snares on fox trails in densely vegetated areas because we speculated that foxes moved through these areas at a slower pace than in open habitat. Hitting the snare at a slower pace would prevent the fox from instantly injuring itself and reduce bruising to the neck or abdomen when the animal was caught by the snare. For example, the whipping motion associated with an animal reaching the end of a snare line would be less jarring at a slower speed than a higher speed. In thickly vegetated areas, the fox also has little ability to try to run while on the snare lead and thus less momentum to lunge, which should further reduce chances of injury to the animal. We also suspected that animals caught around the abdomen would have less leverage to lunge at the snare line, possibly reducing the extent of internal injuries.

We used a 2-m-long snare wire with a swivel cam-lock in the construction of the snare. This method allowed the looped snare to twist on its wire, further reducing possible damage to the animal's body. A longer lead would have allowed a trapped fox to increase its momentum while fighting the snare, increasing possible damage to the animal's neck or abdomen. Additionally, we secured the snare to a 0.5-m stake driven into the ground to ensure that the animal would not be able to pull the stake out of the ground (Figure 1).

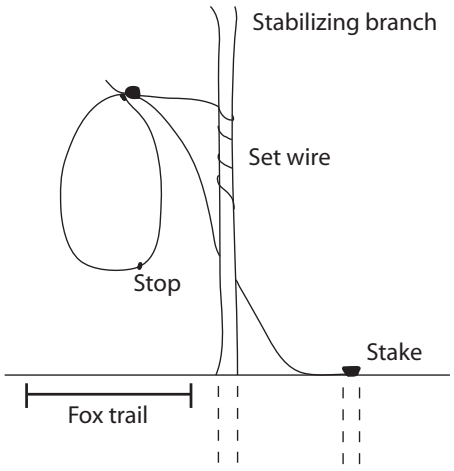

Figure 1. Example of snare set used to capture red foxes on Bear River Migratory Bird Refuge, 1999 to 2002.

Upon arriving at the scene of a snared red fox, we quickly approached the fox and secured it using a loop pole. Next, 1 person took hold of the fox by the scruff of the neck and the body to subdue it, simultaneously releasing the pressure caused by the neck snare. The person handling the fox would then tranquilize the animal using an injection of ≤0.2 mg/kg body weight of an acepromazine/ketamine mixture (0.01 mg acepromazine/0.09 mg ketamine) to ease the fox's stress during handling procedures. We inspected captured foxes for injuries prior to weighing, sexing, and fitting each animal with a radio-collar. Naturally, we could not determine the extent of internal bruising, but we did note the condition of the inside of the mouth and throat, any tears around the mouth, cuts on the paws, etc. We also recorded the position of the animal when found, its behavior, and the condition of the neck snare at the time of handling. For example, if neck snares become twisted, they might exert more pressure on the neck or abdomen of the fox than if they were not twisted. Also, due to variability in fox sizes, some snares were tighter against the body than others. These variables might have affected subsequent red fox survival and territorial behavior; thus, all possible information about the snaring scenario was recorded at the time of handling for future reference.

Results and discussion

We snared 21 red foxes during the 3-year study with only 2 fatal injuries, both of which occurred at the beginning of our study. The 2 red foxes that were euthanized due to their injuries were above average in size (9 and 10.5 kg). Consequently, the neck snare loops were too small for their necks, causing serious damage to their throats. The other 19 foxes were radio-collared and released without any major visible injury, and 17 of these foxes were followed using radio-telemetry. We know that 16 of the animals lived 3–28 months after being captured. However, 1 female red fox was found dead 1 month after capture. Her condition when found suggested that malnourishment might have contributed to her death. Two collared foxes left radio-receiving range soon after release.

We found that placing neck snares in dense vegetation was not without its concerns. While we were correct in supposing that there was less leverage to tug against the snare in this situation, other problems were possible. There was the potential for red foxes to wrap the snare line around trees and woody vegetation during trapping. This could cause bodily harm to the snared fox if it were unable to get in a comfortable resting position or if it became hung

by the snare. For example, on 1 occasion, we set a snare close to a stand of woody shrubs. As we were approaching the snared fox, it ran around a shrub in an attempt to avoid us. Had we not been there to immediately control and tranquilize the animal, it would certainly have been hung by the snare. Thereafter, we placed snares only in short vegetation (<90 cm) that the fox could tear out of the ground.

During the course of the study, we relocated all of our study animals 3 to 6 times a week and identified the locations of collared red foxes over 1,500 times. We used these data to estimate home range sizes and compare space use before and after predator removal occurred. Our data analysis revealed that the radio-tracking locations for our neck-snared foxes during the first month of our study were not different from those collected during the rest of the season. Only 2 foxes were captured with foot-holds, so we were unable to make comparisons between methods. However, the foot-hold-captured foxes' home range size and space use were similar to those of the other study foxes.

Most of the estimated home ranges for neck-snared red foxes did not encompass the snare location. There are several possible reasons for this. First, the foxes might have been caught while investigating the status of another territory. Second, the red foxes may have been avoiding the snare location after their negative experience. However, if they were avoiding the trap location, one would expect to see a hole in the home range coverage or a border of activity that maneuvered around the specific trap location rather than an entire relocation of home range activity away from that general area.

For our study, we needed to capture red foxes in such a way as not to affect their behavior in subsequent months. We considered neck snaring a successful method because captured red foxes were active the evening immediately after capture, as evidenced by our radio-tracking efforts. Additionally, all of the snared females that we were able to track, even those captured around the abdomen, had pups the spring following capture (1–2 months post-capture for the first trapping event). While we cannot determine the extent of bruising or trauma associated with neck snaring around the abdomen, it was evidently not so damaging as to cause a disruption in reproduction.

Conclusions

Often, habitat conditions, weather conditions, and other factors make using foot-hold traps ineffective when trapping red foxes. Additionally, red foxes will usually not approach a box trap. Neck snares take little time to set up, usually cost less than other capturing methods and are effective under most weather conditions. Our results show that it is possible for red foxes to be live-captured using neck snares without causing bodily harm to the animals. When placed in dense habitat and fitted with deer stops and swivels, snares caused superficial scrapes in some instances, but the experience did not disrupt foxes' usual activity. Additionally, the capture procedure does not appear to affect the ability of foxes to reproduce and raise young. Neck snares provide an alternative, effective method of live-capturing red foxes.

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S. Nicole Frey serves as an adjunct professor at Southern Utah University, a USU extension wildlife specialist, and outreach/continuing education coordinator for the Jack H. Berryman Institute. She earned her B.S. degree at West Virginia University and her M.S. and Ph.D. degrees in wildlife biology from Utah State University. Her current projects include studying methods to resolve human-wildlife conflicts and involving local communities in sensitive species research and management.