M44 Non-lethal Device Testing At CEI

on Swift Fox, (*Vulpes velox*) Report (2012)

By

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Introduction

The M44 is an important tool for Wildlife Services operations because of its selectivity towards coyotes (*Canis latrans*). However, there is risk of non-target take by other canids. While identifying ways to reduce non-target take is important in general, it is extremely important in areas where use of M44s overlaps with home ranges of a threatened or endangered canid. In Nebraska, swift fox (*Vulpes velox*) is listed as endangered and occupies areas of western Nebraska's short grass prairie where coyote management is deemed to be essential to livestock producers. Swift fox are the smallest canid in North America, and although it is unlikely they will successfully pull an M44, it is important to identify modifications to the M44 that make it even less likely and allow WS operations to continue to use M44 as one of several management tools in western Nebraska.

A Google scholar search was completed on 5/10/2012 by Predator Research Facility Department of Wildland Resources personnel. Terms included M44, swift fox, *Vulpes velox*, coyote, *Canis latrans*, and pull tension. While previous research has focused on M44's, attempts to modify M44s to reduce risk to swift foxes has not been done.

The objective is to identify modifications to M44 device that reduce the ability of swift fox to trigger the M44 device without reducing the ability of coyotes to trigger the device.

Preliminary Research undertaken at the Predator Research Facility Department of Wildland Resources at Millville were as follows:

Height modification:

The first modification to the M44 Device undertaken by the Predator Research Facility Department of Wildland Resources personnel was to adjust the height at which they are set. Predator Research Facility Department of Wildland Resources personnel tested one coyote at a time and modified height based on each test, using the highest feasible setting to start off with and lowering settings as needed if coyotes were unable to pull successfully at the highest setting. All tests were recorded with camera traps recording behavior of the coyote at and after the pull. Dummy M44 (cornmeal) capsules were used for all tests and coyotes were removed from the experiment after pulling an M44. Coyotes were tested one at a time. Coyotes that did not approach the M44 were removed from the study. Coyotes were categorized as having:
1. not approached M44,
2. approached and investigated,
3. investigated and attempted to pull, unsuccessful at pull, and
4. successful pull.

At least two coyotes reached category 4 for the M44 height before the M44 devices were considered feasible for further tests with swift foxes.

Two height selections for the testing of non-lethal M44 devices on swift fox were chosen by Predator Research Facility Department of Wildland Resources personnel. The height selections were 5 inches above ground (from ground level to the top of the baited head) and 2 inches above ground (from ground level to the top of the baited head).

Pull-tension modification

The second modification to the M44 was to adjust the pull tension needed to trigger the device. Predator Research Facility Department of Wildland Resources personnel used 2-3 higher tension strengths, testing them one at a time, on single coyotes. Dummy M44s cornmeal capsules were used for all tests. All tests were recorded using Bushnell camera traps. Coyotes were tested one at a time. Coyotes that do not approach the M44 were removed from the study. Coyotes were categorized as having:
1. not approached M44,
2. approached and investigated,
3. investigated and attempted to pull, unsuccessful at pull, and
4. successful pull.

At least two coyotes reached category 4 before the M44 pull-tension modifications were considered feasible for further tests with swift foxes.

After the best two models (height & pull-tension) were determined, ten (10) sample models and three (3) camera traps were sent to the Cochrane Ecological Institute for further testing on swift foxes.

Swift fox tests

Ten previously tested (height modification and pull tension modification) and proven M44 sample model devices, five of 1" height and five of 5" height above ground, plus three cameras (Bushnell HD Trophy Camera, brown, Model 119476) were sent to the Cochrane Ecological Institute. Swift fox, *Vulpes velox*, at the Cochrane Ecological Institute are not maintained in single pair enclosures. Swift fox are a very social species of small canid, therefore, to comply with Animal Welfare considerations of swift fox behavioural requirements the foxes are kept in a single group in a large (20 acre) enclosure rather than in pairs in separate pens. The Cochrane Ecological Institute holds a mixed group of adult swift fox, *Vulpes velox*, in a twenty acre enclosure (Figure1). This enclosure also contains striped skunk, *Mephitis mephitis*.

In addition the Cochrane Ecological Institute also holds 2 captive reared juvenile coyotes, *Canis latrans*, in a 2.5 acre enclosure (Figure 2). These animals were intended for release but in the interests of this testing procedure, were held over. The Cochrane Ecological Institute also holds a mixed group of indigenous species (elk, *Cervus elaphus*, whitetail deer, *Odocoileus virginianus* ,mule deer, *Odocoileus hemionus*, moose, *Alces alces*, buffalo, *Bos bison*, red fox, *Vulpes vulpes*, coyote, *Canis latrans)*, within an 140 acre enclosure (Buffalo enclosure, Fig 3) where, in interests of this current research testing, we decided to set out the 5" sample non lethal models of the M44 devices and camera traps.

Methodology

Three of each of the 5" M44 models and three camera traps were placed in each of the test sites, coyote enclosure (Figure2), swift fox enclosure (Figure 1), and the Buffalo enclosure (Figure.3). The three camera traps (Bushnell HD Trophy Camera, brown, Model 119476) were used to monitor the activity at the three M44 devices in each enclosure at each test site at the CEI. The 1" M44 models were not used.

M44 devices and camera traps were set from Nov. 5th – Nov. 27th 2012.

Dates for the 3 tests

5. Nov – 12. Nov. 2012 in rehabilitated coyote enclosure (Figure 2).

13. Nov – 19. Nov. 2012 in the Swift fox enclosure (Figure 1).

20. Nov – 27. Nov. 2012 in the buffalo enclosure (Figure 3).

Three 5" M44 devices were placed along a well-used trail within each of the test sites, coyote enclosure, swift fox enclosure, and the Buffalo enclosure, randomizing placement per side (e.g., north/south or east/west). Among the other indigenous species with access to the M44 devices in the swift fox enclosure and the Buffalo enclosure, the following set off the camera traps: Striped skunk, *Mephitis mephitis*, red fox, *Vulpes vulpes*, White tail deer, *Odocoileus virginianus*, Mule deer, *Odocoileus hemionus*, Elk, *Cervus elaphus*, Moose, *Alces alces*, Buffalo, *Bos bison*. The M44 devices and the accompanying camera traps were left in each enclosure for eight days. Each day the camera's were checked and new Collarum canine bait smeared on the heads of the M44 divices. All species observed during thew tests were categorized as having:
1. approached and investigated,
2. investigated and attempted to pull,
3. unsuccessful at pull, or
4. successful pull.

Procedures for setting baits and cameras

An iron bar was used to start a hole to hold the M 44 device. The site was prepared by knocking the bar into the ground to make a 5" deep hole with a diameter small enough to hold the base of the M44 devices firmly in the ground. Before being placed in the prepared site in the ground, the trigger of each of the M 44 devices was set and tested and then set again. A rubber mallet was used to tap the M44 devices firmly into place.

Camera traps where put in place about between 5 and 15 feet away from each of the set M 44 devices.

The coordinates for the M 44 devices locations can be found in Table 1.

Frequency and procedures for checking traps

The M 44 divices and camera traps were initially installed in each area in the late afternoon (approximately 4:30PM) and checked at the same time each day (approximately 4:30 PM).

M 44 devices and Camera traps were checked once a day by walking out to the site, checking to see if the M44 device had been triggered, removing and replacing the cards in the camera traps.

Method of labelling resulting pictures and videos in computer files:

For each location we have set up a different computer file folder. One folder is for the rehabilitated captive coyotes in the coyote enclosure (Coyote), one folder is for the swift foxes in the swift fox enclosure (Swift Fox) and one folder is for the buffalo enclosure (Buffalo).

Within the folder for the location are folders labelled using the date of the test (e.g Nov 14-15) and the camera munber (e.g. buffalo enclosure Nov 21-22 no 5). Within these folders are the actual video or pictures for that day and site.

The individual videos or pictures with no animals on them are left as labelled by the camera. When a picture or video was assigned to a category of the test it is labelled accordingly (ee.g. swift fox 3.avi – which would the video contained the observation for a swift foc that was assigned to test category 3 - unsuccessful at pull).

Results

Data Summary

A summary of the results can be found in Tables 2.

The categories used in the summary tables are:
1. approached and investigated,
2. investigated and attempted to pull,
3. unsuccessful at pull, and
4. successful pull.

Rehabilitated Coyote Pen:

Interest in baited M 44 devices:

Little interest was shown in the M44 devices by the two coyotes in this pen.

Number of Contacts:

In the seven (7) days the test was conducted the coyotes approached the baits seven times (7). At no time did they attempt to bit the bate and none of the baits were triggered. Some pictures show coyotes looking at the M44 devices, picture shows them sniffing the M44 devices. None of the M44 devices in the rehabilitated coyote pen were triggered.

The baits in the this enclosure were also investigated by red squirrel (1) and magpies (3).

Comments:

The captive reared juvenile coyotes seemed more disturbed by the presence of the M 44 devices than interested in the M 44 devices. The coyote's behaviour changed after the M 44 devices were put in their enclosure, and they became a lot more elusive. The approached to the baits were very cautious and at no time did the coyotes more than sniff the baits.

Swift Fox Pen

Interest in baited M 44 devices:

In the first days the Swift foxes interest in the M 44 devices was high. The swift fox were biting, licking, chewing and urinating on the M 44 devices. On the first day one out of three of the M 44 devices was triggered.

Number of Contacts:

One M 44 device was triggered by a swift fox (Nov 13-14 Camera Site 2). There were 13 category 3 visits (Unsuccessful pull) by Swift fox over the test period. There were 11 category 2 visits (Investigate and attempt to pull) by swift fox; and there were six (6) category 1 visits (Approach and investigate) by swift fox over the seven (7) day test period.

In the Swift Fox enclosure there were two visits to the baits by Magpies (1 Category 1 and 1 Category 2) and 1 Category 1 visit by a skunk.

Comments:

Initially, when the M 44 devices were first set out, the swift foxes showed great interest in the M 44 devices and were obviously very curious about them. The interest started to decrease as the week went by, even though they still investigated the devices. The 20 acre swift fox enclosure, although large, is extremely familiar to each swift fox contained within the enclosure, therefore the foxes will notice any novelty within the enclosure. It could be considered that captive swift fox within a confined area may show more interest in a novelty item (M44 device) than would swift fox in the wild.

The Swift fox were the only species to trigger a M44 device during the study.

Buffalo Enclosure (Wild Coyotes)

Interest in baited M 44 devices:

Little interest in M 44 devices was exhibited by wild coyotes. The first day one, or possibly two, wild coyotes investigated an M 44 device twice without triggering it.

Number of Contacts:

Two coyotes visited the device on the first day of the tests in the buffalo enclosure. Both visits were Category 1 (Approach and investigate).

Over the seven (7) day test period the device was also visited seven (7) times by buffalo (all Category 1), and two (2) times by deer (both Category 1).

Comments:

It was only on the first day the wild coyotes showed any interest in the devices. And even then they were extremely cautious and hesitant to touch the device.

The next days the only coyotes we would see were passing by.

On one occasion a red fox was picked up by the camera, but the video doesn't show it having any interest in the device.

The interest in the device by the buffalo and deer was interesting but interaction was limited to sniffing and licking the device.

Concluding Remarks

The swift foxes are highly drawn to the bait on the devices, and they have no problem reaching the tops of the device to trigger them. The only device triggered during the study was triggered by a swift foxes.

As far as I can see these traps could potentially kill swift foxes as well as coyotes. In our results the swift fox was more interested in the device than any other animal, and they where the only animal who actually triggered a device. The coyotes seemed to have an extreme caution when exploring the device, and seemed less likely to trigger them, than the swift foxes. However we see on some of the videos that the swift foxes are pulling pretty hard on the device without triggering them. We did not see a coyote pull on one of the device, but they are both bigger and stronger and should not have a problem triggering the device if they start to pull on them.

Table 1: Locations for the devices in the three study areas.

Camera positions Rehabilitated Coyote Pen:	
No.1:	N 51°21.235' W 114°35.638'
No.2:	N 51°21.250' W 114°35.642'
No.5:	N 51°21.251' W 114°35.649'
Camera positions Swift Fox Pen:	
No.1:	N 51°21.351' W 114°35.743'
No.2:	N 51°21.362' W 114°35.728'
No.5:	N 51°21.359' W 114°35.760'
Camera positions for Buffalo Enclosure:	
No.1:	N 51°21.351' W 114°35.743'
No.2:	N 51°21.362' W 114°35.728'
No.5:	N 51°21.359' W 114°35.760'

Table 2: Summary of the results from all three study areas.

Date	Test area	Camera Site	Category 1	Category 2	Category 3	Category 4
Nov 5-6	Coyote Enclosure	1				
Nov 5-6	Coyote Enclosure	2	red squirrel			
Nov 5-6	Coyote Enclosure	5	coyote			
Nov 6-7	Coyote Enclosure	1				
Nov 6-7	Coyote Enclosure	2	magpie			
Nov 6-7	Coyote Enclosure	5	coyote			
Nov 7-8	Coyote Enclosure	1				
Nov 7-8	Coyote Enclosure	2	magpie			
Nov 7-8	Coyote Enclosure	5	coyote coyote magpie			
Nov 8-9	Coyote Enclosure	1				
Nov 8-9	Coyote Enclosure	2				
Nov 8-9	Coyote Enclosure	5				
Nov 9-10	Coyote Enclosure	1				
Nov 10-11	Coyote Enclosure	1				
Nov 10-11	Coyote Enclosure	2				
Nov 10-11	Coyote Enclosure	5	coyote coyote coyote			
Nov 11-12	Coyote Enclosure	5	magpie			
Nov 11-12	Coyote Enclosure	1				
Nov 11-12	Coyote Enclosure	2		magpie		
Nov 13-14	Swift fox enclosure	1	swift fox Skunk Swift fox	swift fox		
Nov 13-14	Swift fox enclosure	2	swift fox	swift fox swift fox	swift fox	swift fox
Nov 13-14	Swift fox enclosure	5	swift fox			
Nov14-15	Swift fox enclosure	1	magpie		swift fox swift fox swift fox	
Nov 14-15	Swift fox enclosure	2			swift fox swift fox swift fox swift fox	
Nov 14-15	Swift fox enclosure	1			swift fox	
Nov 15-16	Swift fox enclosure	1		swift fox swift fox		
Nov 15-16	Swift fox enclosure	2				
Nov 15-16	Swift fox enclosure	5				
Nov 16-17	Swift fox enclosure	1		swift fox		

Date	Test area	Camera Site	Category			
			1	**2**	**3**	**4**
Nov 16-17	Swift fox enclosure	2	Camera Malfunction			
Nov 16-17	Swift fox enclosure	5				
Nov 17-18	Swift fox enclosure	1		magpie		
Nov 17-18	Swift fox enclosure	2	Camera Malfunction			
Nov 17-18	Swift fox enclosure	5				
Nov 18-19	Swift fox enclosure	1	swift fox		swift fox swift fox	
Nov 18-19	Swift fox enclosure	2	Camera Malfunction			
Nov 18-19	Swift fox enclosure	5	swift fox		swift fox swift fox	
Nov 20-21	Buffalo Encloure	1	Coyote Coyote			
Nov 20-21	Buffalo Encloure	5				
Nov 21-22	Buffalo Encloure	2				
Nov 21-22	Buffalo Encloure	5				
Nov 21-22	Buffalo Encloure	1				
Nov 22-23	Buffalo Encloure	2	Camera Malfunction			
Nov 22-23	Buffalo Encloure	5				
Nov 22-23	Buffalo Encloure	1				
Nov 23-24	Buffalo Encloure	2				
Nov 23-24	Buffalo Encloure	5				
Nov 23-24	Buffalo Encloure	1				
Nov 24-25	Buffalo Encloure	2	buffralo			
Nov 24-25	Buffalo Encloure	5				
Nov 24-25	Buffalo Encloure	1	buffalo buffalo buffalo buffalo			
Nov 25-26	Buffalo Encloure	5	Mule Deer			
Nov 25-26	Buffalo Encloure	1	buffalo			
Nov 25-26	Buffalo Encloure	2				
Nov 26-27	Buffalo Encloure	1	Buffalo			
Nov 26-27	Buffalo Encloure	2				
Nov 26-27	Buffalo Encloure	5	Deer			

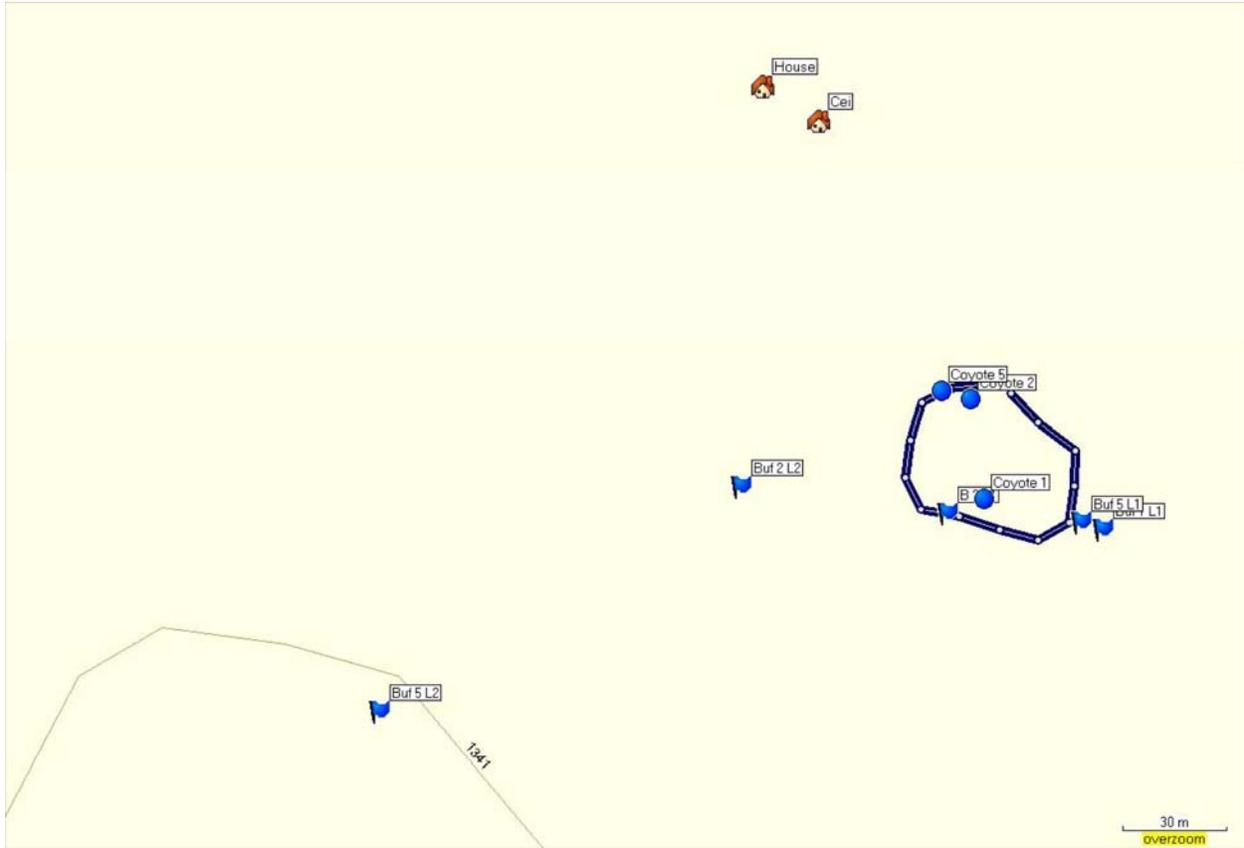**Figure 1: Test locations in the Swift fox Pen.**

Figure 2: Test location in the Rehabilitated coyote pen.

Figure 3: Test location for sites in Buffalo enclosure.

Figure 4: General outline of test sites on CEI property.