

**PENNSYLVANIA GAME COMMISSION  
BUREAU OF WILDLIFE MANAGEMENT  
PROJECT ANNUAL JOB REPORT**

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**TITLE:** Furbearer Research/Management

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**TITLE:** Best Management Practices for Trapping

**PERIOD COVERED:** 1 July 2014 to 30 June 2015

**COOPERATING AGENCIES:** Association of Fish and Wildlife Agencies

**WORK LOCATION(S):** Statewide

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**ABSTRACT** Since 1998, the Pennsylvania Game Commission has worked cooperatively with the Association of Fish and Wildlife Agencies and the Pennsylvania Trappers Association to conduct standardized trap testing studies and to promote the development of Best Management Practices (BMPs) for trapping furbearers in the Commonwealth. Trap testing efforts in Pennsylvania focused on eastern coyotes during 1998 and 1999, red fox during 2000, red and gray fox during 2002, coyotes during 2004, gray fox during 2007 and red fox and coyote during 2011. There was no field testing of devices in Pennsylvania during 2003, 2005, 2006, 2008, 2009, or 2010. Based on results from these studies and work conducted in other states, BMPs have been completed for all furbearers trapped in the lower 48 states (Arctic fox and wolverine are pending). These BMPs are currently being used as trapper education tools for state agencies and trapper organizations. Based on results from the BMP process, the regulated use of cable restraints was legalized during 2004. Regulation changes were proposed in January 2009 and adopted during April 2009, which allow legal furbearers that are incidentally captured in cable restraints to be utilized provided that they have open seasons during that period. Regulation revisions during previous years have resulted in increased efficiency of cable restraints for capturing and restraining coyotes. During 2014, 2 trapper technician teams tested slim locks and the Thompson release locks on cable restraint systems for red fox. BMP trap testing is currently being used by PGC as a means to evaluate lock designs for cable restraint use in Pennsylvania.

**OBJECTIVES**

1. To work cooperatively with the Association of Fish and Wildlife Agencies (AFWA), the Northeast Fur Technical Committee, and the Pennsylvania Trappers Association (PTA) to

develop Best Management Practices (BMP) for trapping.

2. To administer and provide in-kind support (as needed) for field trap testing in Pennsylvania.

## **INTRODUCTION**

In 1996, the AFWA, formerly the International Association of Fish and Wildlife Agencies, initiated a field research-based program to develop BMPs for trapping furbearers in the United States. A BMP is a method to improve an activity by developing recommendations based on sound scientific information while maintaining practicability. Once developed, BMPs for trapping furbearers will be provided to state agencies and trappers for incorporation into trapper education and wildlife management programs. In addition to improving animal welfare in the United States, research results and corresponding BMPs may be used by other countries to improve their wildlife programs. Furthermore, BMPs will be used to address international commitments to identify and promote the use of humane traps and trapping methods for capturing wildlife in North America.

Best Management Practices are currently being developed for each of 5 regions in the United States to address environmental differences (e.g., climate, species trapped, and habitat). Best Management Practices are currently being developed using trap performance profiles that include animal welfare, trap efficiency, trap selectivity, user safety, and practicability. Best Management Practices will include descriptions of the best traps and recommendations for setting traps to maximize their performance and selectivity.

Statistical models of trap performance and computer simulations of field capture events will provide an integral tool to facilitate future development of BMPs for trapping in the United States. These models are being facilitated by Pennsylvania Game Commission (PGC) staff and will provide furbearer managers and state agencies with a cost-effective approach to accelerate the testing, design, and modification of commonly used restraining devices, and may stimulate development of new devices. The results of computer simulations of trap performance are expected to compliment ongoing efforts to sustain the use of regulated trapping through the development and implementation of BMPs.

Funding for BMP development has been provided by a cooperative agreement between AFWA, the U.S. Department of Agriculture Wildlife Services program, and by in-kind contributions by state wildlife agencies, including the PGC. Additional grant monies have been awarded by the International Fur Trade Federation, and the U.S. Fish and Wildlife Service.

## **METHODS**

Trap testing field research, as designed and administered by the AFWA, has been designed to evaluate efficiency, selectivity, and humaneness of live-restraining devices for legal furbearer species throughout North America. Field work for trap testing in Pennsylvania has been coordinated by the PGC but has been performed by cooperating trappers who were selected and annually approved by the Pennsylvania Trappers' Association's BMP committee. Specimens from the trap-testing program are inventoried, frozen, and transported to a central freezer by PGC staff

prior to being sent to wildlife necropsy labs in Wyoming and Georgia.

During most years, trap testing in Pennsylvania has been administered by 4 trapper-technician teams. During each trap-testing period, teams were equipped with up to 24 traps of each type, and each team trapped from 13-16 days. Trappers followed AFWA protocols concerning trap preparation, trap placement, and trap maintenance. A technician accompanied each trapper during all phases of trap testing. Technicians randomly assigned trap types to stations (2 traps per station) and recorded set conditions, visitation, trap performance, and capture characteristics. Technicians were responsible for handling, labeling, and freezing dispatched animals. Detailed trapper and technician protocols are available upon request.

## RESULTS

### Best Management Practice Development

At the national scale, greater than 175 types of commercially available restraining devices (including modifications) have been tested since 1997. Innovative trap designs, cage traps, foot snares, modifications to standard trap designs (padding, offset jaws, double jaws), and commonly used models have been tested in an effort to make trapping BMPs as comprehensive as possible.

During 1998, 3 trap types (standard jaw 1.75, a laminated and offset 1.75, and a Sleepy Creek<sup>®</sup> 1.75) were tested in Pennsylvania with eastern coyote designated as the primary species. Four cooperating Pennsylvania trappers captured 53 coyote, 22 red fox, 34 gray fox, 33 raccoon, 36 opossum, and 5 skunks (Table 1). Testing was conducted in the southwest, north central and northeast regions of the state.

Three additional trap types (No. 3 padded, No. 2 laminated offset, and the Belisle<sup>®</sup> foot snare) were tested for eastern coyote in Pennsylvania during 1999. Despite unseasonably warm fall conditions, 4 cooperating trappers captured 35 coyotes, 15 red fox, 49 gray fox, 22 raccoons, 6 opossum, and 3 skunks (Table 1). Testing was conducted primarily in the north central and northeastern regions of the state.

During 2000, the primary focus species shifted to red fox, and 4 trap types (1.5 modified/padded, 1.5 laminated, 1.5 with Humane Hold<sup>®</sup> inserts, and a standard 1.5) were tested in Pennsylvania. Four cooperating trappers captured 50 red fox, 14 coyote, 41 gray fox, 45 raccoon, 50 opossum, and 9 skunks (Table 1). Trap testing during 1999 was conducted in the northwest, northcentral, and northeastern regions.

During 2002, 3 teams tested the 1.5 padded, 1.65 bridger offset laminated, and the Belisle<sup>®</sup> footsnare for gray fox, whereas 1 team continued testing the No. 1.5 padded and No. 2 padded modified traps for red fox. Additional red fox testing was required to increase sample sizes in the Northeast.

During 2004, 4 teams tested 3 additional devices for coyote as part of an independent field validation of the predictive coyote model. These devices included the #3 Montana Special, the new design Victor #1.75 with offset and rolled jaws, and the new #2 Victor with rolled and offset jaws. Trappers in Pennsylvania captured 41 coyotes and 29 red fox during 14 days of trap testing.

During 2007, 3 trapper-technician teams tested 2 additional trap designs (Duke 1.5 laminated and Bridger 1.65 laminated) for capturing gray fox. These trappers captured 18 gray fox during 14 days of trapping.

During 2011, 2 trapper technician teams tested 2 additional trap designs for red fox and coyote. (MB550 and the KB compound 5.5). These trappers accumulated 689 trap nights and caught 12 coyotes. For the MB 550, the mean cumulative injury score was 42.0 (must be  $\leq 55$  to pass), with 95.5% of all injuries in the 3 lower trauma classes (must have at least 70% of all injuries in the 3 lower trauma class). Capture efficiency was 100% with a capture rate of 52/1000 trap nights. The most common injuries were mild edema and minor lacerations. For the KB Compound 5.5, the mean cumulative injury score was 48.1 and 90.5 % of all injuries were in the 3 lower trauma classes. The efficiency of the KB compound was 100% and the capture rate was 23.3/1000 trap nights. Mild edema and minor lacerations were the most common injuries.

During 2013, 2 trapper technician teams tested micro locks and “penny” locks on cable restraint systems for red fox. A total of 55 red fox were captured and collected. Injury scoring results are pending.

During 2014, 2 trapper technician teams tested slim locks and Thompson release locks on cable restraint systems for red fox. A total of 29 red fox and 1 coyote were captured and collected. Injury scoring results are pending. BMP trap testing is currently being used by PGC as a means to evaluate lock designs for cable restraint use in Pennsylvania.

Based on results from these studies and work conducted in other states, BMPs have been completed for all furbearers trapped in the lower 48 states (Arctic fox and wolverine are pending). These BMPs are currently being used as trapper education tools for state agencies and trapper organizations.

### **Cable Restraints**

During October 2003, The PGC Board of Commissioners directed the furbearer section to prepare a report concerning the use of terrestrial snares in wildlife management programs. This report was presented to the commissioners at the following January meeting and facilitated discussions among potentially affected user groups. Based on findings in this report and field-test data from other states concerning cable restraint effectiveness and performance, the PGC board approved regulated use of specific cable restraint devices after 1 January during the 2005-06 established fox and coyote trapping seasons.

The PGC Board of Commissioners also mandated that anyone using these devices attend a special training session on cable restraint use and thereby be certified in the use of these devices by the PGC. To address this mandate a 3.5 hour training course was developed cooperatively by the PGC’s Bureau of Wildlife Management and Bureau of Information and Education, and the PTA. Two pilot classes were held during June 2005 to further modify the course design. Cable restraint certification courses were subsequently held during summer and fall 2005 and 1,515 trappers received certification.

*2005-2006 Season.*--Upon completion of the 2005-2006 furtaking season, a postal questionnaire was sent to all 1,515 certified cable restraint users to assess use, efficiency, selectivity, and capture related injuries or mortalities. The survey contained 8 questions and an area for the trapper to provide input on cable restraint training and use in Pennsylvania. The PTA provided financial support to cover postage costs for this survey.

Nine surveys were returned as undeliverable and 1,080 cable restraint users returned the survey by 1 June 2006 (72% response rate). Four hundred fifty one certified users (41.7% of respondents) indicated that they had set cable restraints during the established 2006 season. Most trappers (81.3%) deployed less than 15 devices on their trapline (e.g., 36.1% of trappers deployed from 1-5 devices and 45.2% deployed from 6-15 devices). Trappers deployed cable restraints from 1 to 55 days during the established season. The median number of days using cable restraints was 15. The majority of trappers (81.4%) used 7X7 cable whereas 13.5% used 7X19 cable (5% did not specify the cable type used). Eighty six percent of trappers used a 180 degree reverse bend washer whereas 7.3% used other types of locks and 6.7% of trappers did not specify the type of lock that was used. Most trappers (82.5%) purchased their cable restraints from established manufacturers. Only 9.1% constructed the devices themselves and 4.0% used a combination of purchased and home constructed devices (4.7% did not specify the source of their devices).

A total of 283 gray fox, 800 red fox, and 234 coyotes were harvested by 64% of the 451 trappers who deployed cable restraints during the season (i.e., 162 of the trappers that used restraints did not capture canids) (Table 2). Cable restraint users also reported captures and subsequent releases for species that were not legal for harvest including 233 raccoons, 14 skunks, 25 opossum, 31 bobcats, 65 deer, 3 groundhogs, 2 fisher, and 2 rabbits. Additionally, 35 domestic cats and 44 domestic dogs were reported captured and released. Cable restraints were highly selective towards capturing and restraining canids. The ratio of canid captures to other wildlife species was 3.6:1. The vast majority of incidental captures involved raccoons; if raccoons are not considered the ratio of canids to other wildlife increased to 9.8:1. The ratio of canid captures to domestic pets was 16.7:1.

The cable restraint users' survey assessed situations wherein animals were captured but escaped from the device due to a variety of causes. The most common situation involved cases where the break-away device (BAD) opened and released the captured animal. Break-away devices are required by regulation to insure that large mammals such as black bear, deer, and livestock are released immediately upon capture. A total of 138 BAD related releases were reported for species including deer (59), coyote (71), red fox (1), raccoon (2), black bear (1), bobcat (1), and fisher (1). Nineteen percent of coyotes that were captured escaped due to opening the BAD. Cable chewing by captured animals has been a concern in live restraint systems. A total of 50 animals escaped by chewing through the cable: coyote (39), fox (3), raccoon (2), and species unknown (6). Fourteen percent of coyotes captured in cable restraints chewed through the cable to escape, whereas only 0.02% of fox escaped by cable chewing. There were 49 instances where the anchoring system failed to hold the captured animal including coyotes (26), deer (5), gray fox (2), red fox (3), and species unknown or stolen (5). Cable restraints were shown to be highly efficient at restraining red fox and gray fox and moderately efficient at restraining coyote (Table 2).

*2006-2007 Season.*--Upon completion of the 2006-2007 furtaking season, a postal

questionnaire was sent to 2,369 certified cable restraint users to assess use, efficiency, selectivity, and capture related injuries or mortalities. The survey contained 8 questions and an area for the trapper to provide input on cable restraint training and use in Pennsylvania. Twenty seven surveys were returned as undeliverable and 1,393 cable restraint users returned the survey by 1 July 2007 (59% response rate). Five hundred twenty eight certified users (40.0% of respondents) indicated that they had set cable restraints during the established 2006 season. As during the previous season, most trappers (78%) deployed less than 15 devices on their trapline (e.g., 32% of trappers deployed from 1-5 devices and 46% deployed from 6-15 devices). Trappers deployed cable restraints from 1 to 75 days during the established season. The median number of days using cable restraints was 15. The majority of trappers (77%) used 7X7 cable whereas 15% used 7X19 cable (7% did not specify the cable type used). Seventy eight percent of trappers used a 180 degree reverse bend washer whereas 2% used other types of locks; 10% of trappers did not specify the type of lock that was used. Most trappers (83%) purchased their cable restraints from established manufacturers. Fifteen percent constructed the devices themselves and 5.0% used a combination of purchased and home constructed devices.

A total of 378 gray fox, 1,199 red fox, and 356 coyotes were harvested by 67% of the 528 trappers who deployed cable restraints during the season (Table 2). Cable restraint users also reported captures and subsequent releases for species that were not legal for harvest including 195 raccoons, 15 skunks, 46 opossum, 39 bobcats, 91 deer, 12 groundhogs, 5 fisher, 10 rabbits, 7 porcupines, and 2 turkeys. Additionally, 144 domestic cats and 93 domestic dogs were reported captured and released. As during the previous season, cable restraints were highly selective towards capturing and restraining canids. The ratio of canid captures to other wildlife species was 4.6:1. The vast majority of incidental captures involved raccoons; if raccoons are not considered the ratio of canids to other wildlife increased to 8.4:1. The ratio of canid captures to domestic pets was 8.2:1.

The cable restraint users' survey assessed situations wherein animals were captured but escaped from the device due to a variety of causes. The most common situation involved cases where the BAD opened and released the captured animal. A total of 194 BAD related releases were reported for species including deer (60), coyote (100), red fox (9), raccoon (1), domestic dog (1), bobcat (1) and species unknown (22). Seventeen percent of coyotes that were captured escaped due to opening the break-away device. A total of 117 animals escaped by chewing through the cable: coyote (105), red fox (3), gray fox (2), raccoon (2), and species unknown (5). Eighteen percent of coyotes captured in cable restraints chewed through the cable to escape, whereas very few fox escaped by cable chewing. There were 51 instances where the anchoring system failed to hold the captured animal including coyotes (32), deer (5), red fox (5), raccoon (1), and species unknown or stolen (8). Cable restraints were shown to be highly efficient at restraining red fox and gray fox and moderately efficient at restraining coyote (Table 2).

Based on results from the initial cable restraint survey, the following regulations were changed during spring 2007. These changes took effect during the 2007-2008 harvest season:

- 1) The 1X19 cable type will be legal for cable restraint use.
- 2) The BAD rating was increased to 375 pounds or less.

- 3) The legal cable length will be increased to 7 feet from the anchor point to the relaxing lock contacting the minimum loop stop.
- 4) The language describing relaxing type locks will specify that the lock may not be constructed of any moving parts.

Regulation changes were proposed in January 2009 and adopted in April 2009 which allow legal furbearers that are incidentally captured in cable restraints to be utilized provided that they have open seasons during that period.

*2009-2010 Season.*--The cable restraint users' survey was implemented again after the 2009 trapping season. A total of 1,746 surveys were returned (63% response rate). Six hundred twenty four trappers indicated they had used cable restraints during the established season. Cable restraint users reported capturing 1,464 coyotes, 1,620 red fox, and 1,515 gray fox. Capture rates and efficiency for red and gray fox were comparable to previous years, whereas, capture efficiency for coyote increased significantly to 88.7% during 2009.

During January 2015, Cable restraint regulations were modified once again. The former definition of "cable restraint" in § 141.63 required the use of "relaxing locks" in cable restraint construction. The term "relaxing lock" has caused confusion for trappers and enforcement personnel due to varying interpretations of lock designs that comply with the regulation. The amendment to § 141.63 allows all lock designs approved by the Commission. The National trap testing program, administered by the AFWA, has been conducting field testing on cable restraints and has currently identified 6 lock designs that have performed at acceptable levels in terms of efficiency, selectivity and animal welfare criteria. By maintaining a list of approved lock designs, the Commission will be able to regularly incorporate results from ongoing cable restraint research.

The cable restraint user's survey is being modified to better assess device use and success rates. This survey will be distributed during spring of 2016.

## **RECOMMENDATIONS**

1. The PGC should continue to work cooperatively with the PTA and AFWA to test devices and to develop BMPs for trapping until these recommendations are completed for all legal furbearers in Pennsylvania. Additional device testing may be required to keep trapping BMPs current for Pennsylvania trappers.
2. PGC hunter-trapper education specialists should continue to include species-specific trapping BMPs in their training materials.
3. Continued development of cable restraint regulations is warranted to improve capture efficiency of current legal devices. Interaction among agency representatives and restraint manufacturers should expedite this process.

4. The cable restraint users' survey should be implemented during 2015 to continue to assess device efficiency and selectivity.

Table 1. Numbers of each species captured during best management practice trap testing in Pennsylvania during 1998-2010.

Year	Trap <sup>a</sup>	Species					Total	
		Coyote	Red Fox	Gray Fox	Raccoon	Opossum		Skunk
1998	1.75C	22	5	11	14	11	2	65
	1.75LO	18	8	16	11	14	1	68
	SC	13	9	7	8	11	2	50
1999	BEL	8	3	11	6	3	1	32
	3PM	20	6	26	10	3	0	65
	2OLM	7	6	12	6	0	2	33
2000	15PM	11	3	6	10	8	1	39
	15C	16	8	12	14	13	4	67
	15CH	10	1	10	9	14	2	46
	15L	13	2	13	12	15	2	57
2001	165OL	1	11	10	8	9	2	41
	2P	0	13	1	5	8	0	27
	2PM	1	8	2	7	6	0	24
	BEL	4	7	6	3	6	1	27
2003	15PM	3	9	21	10	14	3	60
	2P	4	9	9	8	14	2	46
	BEL	9	4	5	4	14	7	43
2004	175VO	18	11	6	11	9	2	57
	2VO	16	7	5	5	8	3	44
	3MS	7	11	4	12	8	2	44
2007	15DL	4	0	8	0	0	0	12
	165B	2	0	10	0	0	0	12

<sup>a</sup> Trap types: 1.75C =1.75 regular coilspring; 1.75LO =1.7f Laminated offset; SC =1.75 Sleepy Creek; BEL =Belisle foot snare; 3PM = No. 3 Padded modified; 2OLM = No.2 Offset laminated; 15PM = 1.5 padded modified; 15C = 1.5 coil; 15CH = 1.5 victor with Humane hold inserts; 15L = 1.5 Laminated; 15PT = 1.5 Padded; 165OL = 1.65 Bridger Offset laminated; 2P = No. 2 Padded; 2PM = No.2 Padded Modified; 175VO = 1.75 Vactor Offset; 2VO = 2 Victor Offset; 3MS = 3 Montana Special offset laminate; 15DL = Duke 1.5 laminate; 165B = 1.65 Bridger.

Table 2. Numbers of canids captured and escaped as reported by cable restraint users during previous seasons.

Season	No. Captured	No. Restrained	Causes of Animal Escapes			Capture Efficiency
			No. BAD <sup>a</sup> Opened (%)	No. Anchor Failed (%)	No. Cable Chewed (%)	
<i>2005-2006</i>						
Coyote	370	234	71 (19.2)	26 (7.0)	39 (10.5)	63.2
Red Fox	807	800	1 (0.1)	3 (0.4)	3 (0.4)	99.1
Gray Fox	287	283	0 (0.0)	2 (0.3)	2 (0.7)	98.6
<i>2006-2007</i>						
Coyote	593	356	100 (16.9)	32 (5.4)	105 (17.8)	60.0
Red Fox	1,216	1,199	9 (0.7)	5 (0.4)	3 (0.2)	98.6
Gray Fox	380	378	0 (0.0)	0 (0.0)	2 (0.5)	99.5
<i>2008-2009</i>						
Coyote	1,650	1,464	93 (5.6)	24 (1.5)	69 (4.2)	88.7
Red Fox	1,630	1,620	5 (0.3)	4 (0.2)	1 (0.1)	99.3
Gray Fox	1,516	1,515	1 (0.1)	0 (0.0)	0 (0.0)	99.5

<sup>a</sup> BAD = Breakaway Device