Human Health and Ecological Risk Assessment
for the Use of Wildlife Damage Management Methods
by USDA-APHIS-Wildlife Services

Chapter III

USE OF CABLE DEVICES IN WILDLIFE DAMAGE MANAGEMENT

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THE USE OF CABLE DEVICES IN WILDLIFE DAMAGE MANAGEMENT

EXECUTIVE SUMMARY

Snares and cable restraints such as neck snares, foot cable restraints, foot-nooses, and catch-poles, collectively termed cable devices, are used by USDA-APHIS-Wildlife Services (WS) Program for specific wildlife damage management projects, mostly involving wildlife that are causing damage to property, agriculture, and natural resources or protecting human health and safety. Implementation of WS-specific measures designed to reduce human interactions with cable devices reduces the risk of these types of management tools to the public and workers, and WS will continue to evaluate and implement, where appropriate, new protection measures. Advancements in cable device use and design have resulted in more effective and humane capture of target animals while reducing the potential for nontarget species captures. In fact, nontarget capture by WS has decreased over the last 25 years. For example, the use of break-away cable devices, stops, and exclosure cages for neck snares and consistent use of pan tension devices for foot cable restraints has reduced nontarget captures in cable devices by WS. The annual average target take of individual animals with cable devices by WS from FY11 to FY15 increased about five-fold over the annual target take in FY88 indicating that cable devices are being used more, which mirrors the reduced use of foothold traps and other devices over the 25-year period. During the same time, the take of nontarget species has decreased, which reflects the fact that cable devices are more selective. WS will continue to support and conduct research and education that supports more humane and effective cable device methods and will implement these measures in programs, where appropriate, to further reduce risk to nontarget animals. Overall, the evaluation of risks to human health and safety and the environment from the use of cable devices are minimal. WS personnel are professional with their use of cable devices and try to minimize the identified potential risks. The issue of humaneness is minimized by WS using the Best Management Practices as guidelines for cable devices (AFWA 2017).

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1 INTRODUCTION

Cable devices including snares, cable restraints, foot nooses, and catch poles are used by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) Program for specific wildlife damage management (WDM) projects, mostly involving wildlife that are causing damage to property, agriculture, and natural resources or protecting human health and safety. Cable devices[1], or snares, cable restraints, and foot nooses for this document, are typically made of wire, cable, or monofilament line consisting of a loop, which would be positioned to close around the neck, torso, leg, or foot of a target animal as the animal moves through the loop or the loop is thrown and tightened with a spring-loaded throw-arm. A neck snare may be placed in a vertical position to capture an animal as it passes through the loop (Figure 1) or a foot cable restraint may be used horizontally with a trigger and spring activated throw-arm to capture the animal by the foot or leg when it steps in the loop (Figures 2, 3, and 4). With monofilament line, many loops are set on traps or mats to capture the animal, generally birds, by the foot (Figures 5 and 6). When an animal moves forward into a loop formed by the cable or monofilament line, it tightens and the animal is held. Catch poles, which are used by WS and a cable restraint, are not discussed in this document.[1]

Cable devices may be used as lethal (snare) or live-capture (cable restraint) devices depending on how or where they are used. Snares are typically set to close around the neck of an animal (Figure 1) and are usually intended to be a lethal method, whereas cable restraints are set and positioned to capture the animal around the leg or foot and intended to live-capture the animal (Figures 2, 3, and 4). Monofilament line traps (*e.g.*, bal-chatri and noose mats), which are live-capture devices, are used to snare the foot or feet of a bird and usually placed so that they alight on the ground without injuring themselves (Figures 5 and 6). Terms and illustrations of the different parts of a cable device as well as sets can be found in Olson and Tischaefer (2004), but are generally depicted in Figure 2. Cable devices are also placed so that the animal, especially if it is to be live-captured, does not become entangled into an exposed root, woody vegetation, or post within reach of the animal that is on an extended cable; entanglement with an item usually larger than a half

Figure 1. A mountain lion neck snare made with 3/32" cable with a cage to exclude nontarget animal such as bighorn sheep and deer.

[1] Cable devices (snares, cable restraints, and foot nooses) in this document refers to any type of loop meant to be tightened around an animal whether it is a standard neck snare, foot cable restraint, or foot noose (animal moves through and tightens loop) or a mechanical neck or foot cable restraint that is spring-activated (the loop is thrown up around the head or limb). A cable restraint that is actively placed by a person around the animal (catch pole) is not discussed in this document, but in "The Use of Hand Capture and Disease Sampling in Wildlife Damage Management" risk assessment because animals are close at hand to use them. A cable device is a type of capture device that uses a loop of wire, stranded wire, or wire rope designed and set to close around the neck, torso, foot or leg of an animal. In the 1990s, it more often is associated with a cable device that is set with the intention of being lethal (*i.e.*, snare). Cable restraint is a term used for those devices meant to live-capture an animal. In this document, we use the terms more interchangeably because the same device can often be used as a lethal or live-capture device depending on the species being targeted or by slightly modifying the device (*e.g.*, addition of a stop) or set. The WS Management Information System (MIS) does not differentiate between cable restraints and snares, and has always combined the two categories under the term "snares." Thus, WS does not differentiate whether a snare or cable restraint was set. Snare is the more common term for cable devices used to capture animals. For this document, we try to use the most appropriate term, but realize that it may not be possible.

inch in diameter can result in injuries, which can be inhumane (Olson and Tischaefer 2004) and result in the loss of a target animal because it may be able to apply pressure to the cable to break it or cause the swivel not to work. Thus, the area around the set is surveyed to determine if entanglement could occur and to minimize the opportunity for such events.

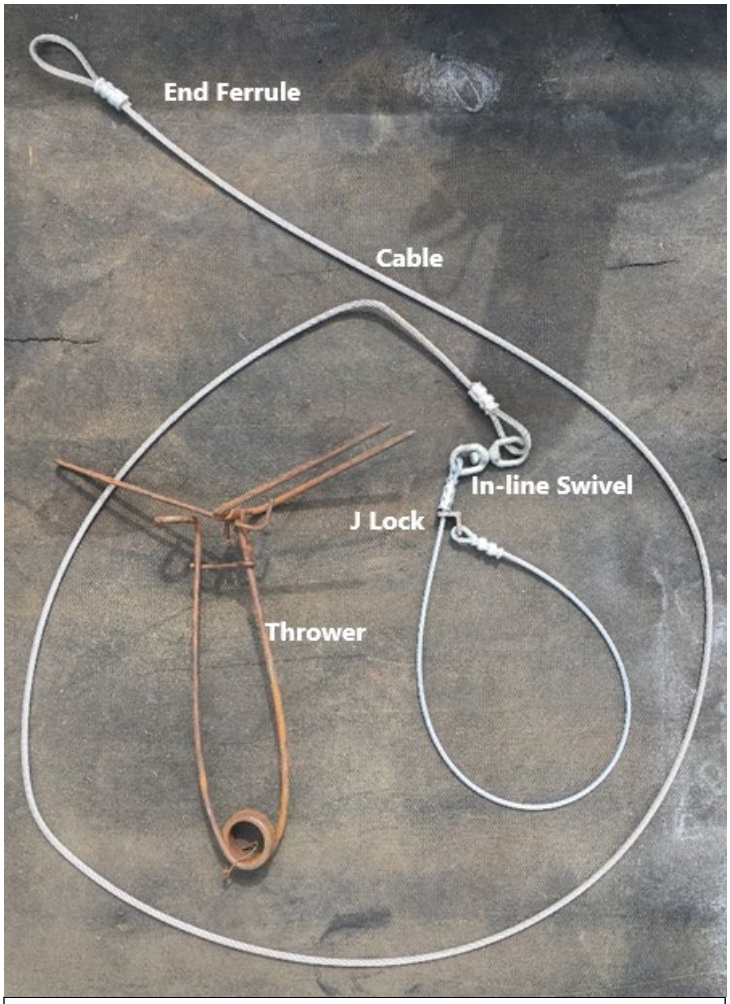

Figure 2. A foot cable restraint with an Aldrich® throw-arm. A standard set for this can be found in Hygnstrom (1994).

On standard cable devices, J-locks (Figure 2), relaxing locks, or snare locks (Figure 1) are used to maintain the loop and to prevent the loop from opening again once the loop has closed around an animal. The lock tightens as it is pulled and is stationary or relaxed when no tension is on it. Most cable devices are also equipped with a swivel(s) to minimize twisting and breakage of the cable as well as minimize injuries to captured animals (Figure 2); foot nooses do not typically have any form of swivel. Other additions can be made to improve the selectivity of cable devices and minimize the capture of nontarget species. Loop size and placement are strategies often used to reduce capture of nontarget animals (Phillips 1996); breakaway devices are incorporated into snares that allow the loop to break open and a nontarget animal to escape when a specific amount of force is applied, typically much more than what a target animal is capable of producing because they are larger than the target animal. Loop stops can also be incorporated which are mostly used to reduce capture of animals smaller than the target animal, but can also be used to reduce the capture of larger animals such as deer, which are typically snared around the legs; cable device stops are clamped onto the cable to prevent the loop from either opening or closing beyond a minimum or maximum loop circumference and are very effective (Etter and Belant 2011).

Cable devices can be effectively used wherever a target animal routinely travels through a restricted lane, such as a trail through brush or a crawl space under a fence. For example, cable devices can be set in "*crawl holes,*" an area under a fence that was dug out to allow access to the other side, hunting or perch sites for birds, in water near beaver[2] slides, at the entrance to burrows, or anywhere a target animal is expected to travel. Cable device set placement varies according to species targeted, habitat type, and the presence of nontarget species. Most terrestrial sets, excluding bird noose traps, are disguised by brush (*e.g.*, twigs, leaves, and natural

[2] See the Introduction to Risk Assessments – Chapter I for scientific names of animals. These are only provided if not used in that Chapter.

vegetation) for neck snares and covered with natural debris (*e.g.*, sifted crushed leaves, pine needles, and small twigs) for foot cable restraints. Bait, scents, lures, or carcass "*draw stations*" are often used as attractants to draw the target species to the area. Snares in aquatic sets are typically placed in shallow water where animals come and go from land or near lodges or burrows; scent may be used for aquatic mammals, especially for beaver. Many bird noose traps such as the bal-chatri, a trap designed in India by falconers, incorporate an attractant such as a live prey bird or rodent or are placed on frequently visited perching structures.

Use-pattern data indicate cable devices are used throughout the year by WS. Placement of cable devices is dependent upon target species habits and habitat conditions such as snow. Placement location is selected to minimize exposure to and capture of nontarget animals. Dependent upon cable device type and circumstances, use may occur in rural or urban areas and on privately or publicly owned properties.

Most cable devices are passive capture methods that are only activated by an animal moving through the loop and causing it to close (Figures 1, 5, and 6). However, some systems use power-activation to propel the cable loop onto the body of an animal or increase the speed of loop closure (Figures 2, 3, and 4). When setting a power-activated cable device, a spring is generally held compressed by a trigger or pan, and positioned with the arm set so that the spring throws the cable over the target species appendage. Springs are set to open away from the body of the animal to minimize the likelihood of hitting it, which could cause it not to function properly. Power-activated cable devices rely on the animal to step on a pan (*i.e.*, foot-depressed trigger) or for the target animal to pull the trigger with their mouth or foot. When an animal trips the trigger, the compressed spring releases and pulls the cable loop closed around the animal quickly. Similar to passive cable devices, power-activated cable devices may be used for either live- or lethal-capture. One commonly used power-activated cable device is the foot cable restraint, which consists of a flexible loop of cable placed on the ground along active trails or near bait sites, and covered with dirt or snow (Figures 2, 3, and 4). The foot cable restraint is set as a spring-power-activated nonlethal device, activated when an animal places its foot on the trigger or pan. Several styles of foot cable restraints are available (Figures 2, 3, and 4) and some can include an in-line

Figure 3. A mechanical foot cable restraint, the "Hold-a-Hog Device," with a disengaging jaw.

Figure 4. A coyote WS-T foot cable restraint with a WS-T throw-arm, which incorporates a foothold trap pan and pan-tension device.

spring (shock spring) to minimize the amount of force applied by lunges. However, no data are available to quantify the effects (AFWA 2009). WS uses in line springs for some devices, but it is not a standard use.

Figure 5. Typical bal-chatri trap, a foot noose trap with monofilament line at top and on sides. The trap is baited with a live mouse or bird.

Foot noose traps are different from other cable devices because they incorporate many foot nooses made of monofilament fishing line (usually 20-100# test weight dependent on the target species). These are attached to a cage (Figures 5 and 6) with a live lure (prey), mats that are set along shoreline or perches, or pigeons tethered to a one-pound weight (heavier for eagles) fitted with a harness covered in nooses. Unlike snares, these are monitored frequently when in use. Birds, especially raptors, pigeons, or shorebirds, can be live captured with foot-nooses made of monofilament lines on different types of trap designs. The nooses are typically non-locking.

Figure 6. A flat topped bal-chatri, showing the variation in styles, which could be used for birds as large as eagles.

In 1996 the Association of Fish and Wildlife Agencies (AFWA), working cooperatively with federal and private partners, embarked on a goal to develop voluntary Best Management Practices (BMPs) for trapping furbearers in the United States (Batcheller *et al*. 2000). The stated purpose and intent of AFWA in developing the BMPs was to: "*Scientifically evaluate traps and trapping systems used for capturing furbearers in the United States*." AFWA determined the best methods by species[3], but primarily targeted harvest by private fur trappers and not WDM take. Evaluations of trap and snare performance were based on animal welfare, efficiency, capture rate, selectivity, practicality, safety, mechanical function, cost, quality, durability, weight, and maintenance requirements (Fall 2002). Scientific research on the variety of traps and snares was used by AFWA to develop the BMPs. The evaluation of BMPs continues and BMPs are updated as research results warrant (AFWA 2017). The BMPs were provided to state and federal wildlife agencies, trappers,

[3] Furbearers with AFWA (2017) trapping BMPs include Virginia opossum, beaver, muskrat, nutria, Canada lynx, bobcat, coyote in Eastern U.S., coyote in Western U.S. (both eastern and western United States populations have own BMPs since eastern coyotes are larger as a result of hybridizing with wolves), gray wolves, red fox, swift/kit fox, arctic fox, gray fox, river otter, fisher, American marten, weasel (least, long-tailed, and short-tailed), mink, American badger, ringtail, raccoon, and striped skunk.

and the public in the form of a general overview for traps and trapping, and specifically the most efficient and humane methods for trapping 24 furbearer species in the United States (AFWA 2017). The goals were to promote regulated trapping as a modern wildlife management tool, identify practical traps and trapping techniques while continuing to improve efficiency, selectivity, and the welfare of trapped animals through research, to provide specifications for traps that meet BMP criteria for individual species in various regions of the United States, to provide wildlife management and trap industry professionals with information to evaluate trapping systems in the United States, and to instill public confidence in and maintain public support for wildlife management and trapping through distribution of science-based information. The BMP program uses international humane trapping standards consistent with the Agreement on International Humane Trapping Standards among Russia, Canada, and the European Union. WS has adopted these standards, where feasible, for trapping in the United States and conducts research on different trapping systems.

WS Policy (WS Directive 2.450, 09/24/2014)[4] states that the use of the BMP trapping guidelines developed and promulgated by AFWA (2017) for private fur harvest and other trapping activities are valuable and should be followed as practical. WS uses the BMP guidelines as the basis for policy formulation, but recognizes that some devices used in WDM are not commercially available and that not all devices recommended in the BMP guidelines for general public-use meet the more stringent performance requirements, particularly efficiency and durability, for use in federal WDM activities. AFWA (2017) recognized that trapping for depredation control was different than trapping for fur harvest, but focused their recommendations on private trappers. The Directive also states that cable devices should be set so that captured animals are not conspicuous to the public, particularly along public roads and trails; this reduces the possibility of theft or a member of the public attempting to free an animal and getting injured. Cable devices are typically placed in areas where the public will not randomly stumble onto a device or captured animal. The Directive also states that cable devices are not to be set closer than 30 feet from any exposed animal carcass, or part thereof, to reduce the potential of capturing raptors or other nontarget animals attracted to it[5]. Foot cable restraints incorporate pan-tension devices to prevent or reduce the capture of nontarget animals, unless such use would preclude capture of the intended target animal. The Directive also notes that agency cable device replacements are to be selected from the various commercially available devices or equivalents listed in BMP regional guidelines for each species (AFWA 2017), unless changes are authorized by a WS Regional Director. WS checks cable devices as frequently as possible and in accordance with state law, which helps minimize injuries and unintended fatalities, especially with cable restraints; foot noose traps are checked frequently during the day.

1.1 Use Pattern

Cable devices are used by WS primarily to manage damage caused by mammals, whereas foot noose traps are generally used to manage bird damage (Tables 1 and 2). Neck snares are used mostly for coyotes[6], feral swine, beaver, raccoons, red and gray foxes, and bobcats (Table 1). Additionally, though few are taken, they are effective for mountain lions (Figure 1). The Collarum® and other similar devices have almost strictly been

[4] All WS Policy Directives referenced in this document can be found at http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/wildlifedamage under Wildlife Damage – WS Program Directives.

[5] If an animal carcass could be dragged or moved by scavengers to within 30 feet of set foothold traps, the carcass has to be secured to restrict movement (WS Directive 2.455, Scents, Baits, and Attractants). These restrictions do not apply to animal carcasses used to attract bear (foothold traps cannot be used to capture bear) or mountain lion for approved capture devices, including foothold traps.

[6] See the Risk Assessment Introduction (Chapter 1) for scientific names of animals. These are only provided if they are not used in that Chapter.

used for coyotes (Table 1). From FY11 to FY15, WS took an annual average of 24,660 target individuals (96.5%) of 44 species, and 898 nontarget individuals (3.5%) of 55 species (Table 1) with neck snares.

Table 1. The annual average number of target and nontarget animals captured by Wildlife Services in wildlife damage management from FY11 to FY15 with neck snares including power-activated neck snares such as the Collarum® throughout the United States.

ANIMALS TAKEN WITH STANDARD AND POWER-ACTIVATED NECK SNARES				
	TARGET		NONTARGET	
Species	**Killed**	**Freed**	**Killed**	**Freed**
NECK SNARE				
Virginia Opossum	22	0	7	0.8
Bobcat	432	1	14	0.6
Mountain Lion	45	0	4	0.4
Coyote	14,657	3	10	0.8
Northwestern Gray Wolf	6	0.4	0.2	0
- Great Plains Wolf[T&E]	11	3	0	0
- Feral/Free-Roaming Dog*	103	5	18	21
Red Fox	442	0	15	0.4
Common Gray Fox	436	0.4	16	2
Black Bear	11	0	2	1
River Otter	3	0	15	1
Badger	83	0.4	72	10
Raccoon	882	0	117	5
Striped Skunk	83	0	13	0
Other Predator (3T, 5NT – 7 sp.)[1]	5	2	4	0.8
Feral Swine*	4,560	0.8	14	0
Collared Peccary (Javelina)	0.4	0	178	8
Mule Deer (incl. Black-tailed Deer)	0	0	16	3
White-tailed Deer	0.2	0	81	14
Philippine (Sambar) Deer*	31	0	0	0
Other Hoofed Mammal (7 NT – 7 sp.)[1]**	0	0	9	3
Beaver	2,499	3	0.6	0.2
Nutria*	57	0	1	0
Muskrat	12	0	0	0
Woodchuck	24	0	2	0.4
Porcupine	45	2	104	8
Eastern Cottontail	6	0	9	11
White-tailed Jackrabbit	7	0	3	0
Black-tailed Jackrabbit	30	0	26	0.2
Other Rodent and Rabbit (8T, 2NT – 8 sp.)[1]	14	0	3	0.2
Nine-banded Armadillo	2	0	13	6
Unidentified Domestic Animal	0	0	0	0.2
Bald Eagle	0	0	0.4	0
Golden Eagle	0	0	1	0
Other Raptor (2T, 5NT – 5 sp.)[1]	0.4	0	3	0.4
Waterbird-fowl/Larid/Gallinaceous (3T, 6NT – 8 sp.)[1]	2	0	7	2
Common Snapping Turtle	0	0	6	9
Other Reptiles (3T**, 2NT – 4 sp.)[1]	0.4	0.6	0.6	3
ANIMALS TAKEN W/ NECK SNARES (46T, 51NT, 68 sp.)	**24,511**	**22**	**785**	**112**
POWER-ACTIVATED NECK SNARES (*e.g.*, COLLARUM®)				
Coyote	126	0	0	0
Other Predators/Hoofed Mammals* (3T, 2NT – 3 sp.)	1	0	0	1
ANIMALS TAKEN W/ MECH. N. SNARES (4T, 2NT, 4 sp.)	**127**	**0**	**0**	**1**
TOTAL TAKEN IN ALL NECK SNARES (46T, 51NT, 68 sp.)	**24,638**	**22**	**785**	**113**
% OF ALL TARGET AND NONTARGET SPECIES TAKEN	**96.4%**	**0.1%**	**3.1%**	**0.4%**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 killed and freed or a sensitive or T&E species. Animals listed in "Other Animals" are given in Appendix 1.

* Introduced species ** Introduced Species except pronghorn/alligator **T** – Target **NT** - Nontarget

Of the targets taken with neck snares, 22 were relocated or freed after sampling (0.1% of targets); this is mostly because neck snares are rarely used nonlethally. Of the nontargets, 113 were freed (12.5%) following capture, if it was deemed that the animal would survive; those that would not survive were euthanized. It should be noted that one unidentified domestic nontarget animal[7] was freed from a neck snare and was most likely either a dog or a cow which would not have changed the take number (0.2 freed).

Foot cable restraints have mostly been used for feral swine, black bears, and coyotes (Table 2). They have also been used to take some grizzly bears. Foot noose traps have been mostly used for raptors including red-tailed hawks, American kestrels and Swainson's hawks (Table 2). From FY11 to FY15, WS took an annual average of 1,050 target individuals (99.0%) of 42 different species, and 10 nontarget individuals (1%) of 18 species (Table 2). Of the targets, 447 were relocated or freed after sampling (42.6% of targets). Of the nontargets, 8 were freed (80.0%) following capture and deemed that they would survive (those that would not survive were euthanized). It should be noted that noose mats were used to capture many shorebirds to monitor for highly pathogenic avian influenza in FY06 and FY07 which could occur again and increase the number of shorebird species taken (most all of these were sampled for disease and freed).

Table 2. The annual average number of target and nontarget animals captured with foot cable restraints and foot noose traps by Wildlife Services in wildlife damage management from FY11 to FY15 throughout the United States.

ANIMALS CAPTURED WITH FOOT CABLE RESTRAINTS AND FOOT NOOSES				
	TARGET		NONTARGET	
Species	Killed	Freed	Killed	Freed
CABLE RESTRAINTS				
Coyote	164	0	0	0
Northwestern Gray Wolf	0.2	0.2	0	0
- Feral/Free-Roaming Dog*	4	1	0.6	1
Mountain Lion	19	0	0.2	0.4
Black Bear	178	14	0	2
Grizzly Bear[T&E]	0.2	6	0	0
Other Predator (7T, 5NT – 8 sp.) [1]	15	0	0.6	2
Feral Swine*	183	0.2	0	0.4
Philippine (Sambar) Deer*	17	0	0	0
Other Hoofed Mammal (3T, 3NT – 5 sp.) [1]	1	0.2	0.4	1
All Rodents (2T - 2 sp.) [1]	4	0	0	0
All Birds (3T, 1NT – 4 sp.) [1]	0.4	0.4	0	0.2
ANIMALS TAKEN IN FOOT SNARES (22T, 13NT – 26 sp.)	**586**	**22**	**2**	**7**
FOOT NOOSE				
Bald Eagle	0	0.4	0	0
Swainson's Hawk	0.2	110	0	0
Red-tailed Hawk	8	160	0	0.2
Ferruginous Hawk	0	12	0	0
American Kestrel	3	113	0	0
Other Raptor (12T – 12 sp.) [1]	0	30	0	0
Other Bird Species (4T, 4NT - 7 sp.) [1]	6	3	0.4	0.6
ANIMALS TAKEN IN FOOT NOOSES (21T, 5NT – 24 sp.)	**17**	**425**	**0.4**	**0.8**
TOTAL TAKEN IN ALL FOOT SNARES (42T, 18 NT, 49 sp.)	**603**	**447**	**2**	**8**
% OF ALL TARGET AND NONTARGET SPECIES TAKEN	**58.1%**	**40.9%**	**0.2%**	**0.8%**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 killed and freed or a sensitive or T&E species. Animals listed in "Other Animals" are given in Appendix 1.

***** Introduced Species **T** – Target **NT** - Nontarget

[7] In MIS the animal was listed as "domestic animal" and the species was not provided.

Nontarget capture by WS has decreased in the last 25 years from a nontarget capture rate of 19.1% in FY88 (USDA 1997, Appendix P, pp. 23-27) to 6.5% annual average between FY11 and FY15 in the 6 states (AZ, CO, NM, OK, TX, and UT) analyzed. The use of pan tension devices for foot cable restraints, break-away snares, stops, exclosure cages, and others improvements, most being implemented in the 1990s, likely accounted for the largest portion of the decrease. Target take by WS increased almost five-fold from FY88 to FY11-FY15 in the six states, from an annual average of 6,944 to 32,241 (464% increase *in* USDA 1997, Appendix P, pp. 23-27).

Animal capture snare nights is a standard comparison measurement of effectiveness or selectivity for cable devices that remain in place for one or more nights, and was determined from MIS data. Noose traps for birds were not included since these are almost always set and taken down daily and checked frequently, at least twice daily if not more, when in use. From FY11 to FY15, WS used standard neck snares for an annual average of 8,222,413 snare nights (snare nights includes neck snares and cable restraints in this standard comparison). An annual average of 25,431 animals were captured in neck snares for a total of 3.1 animals/1000 snare nights[8] with 96% target species and 4% nontarget species. Thus, target mammal take was 3.0/1000 snare nights and nontarget take was 0.1/1000 snare nights. Of the 24,533 target captures with neck snares, 0.1% were relocated. Of the 898 nontarget captures, 12.5% were released at the capture location.

From FY11 to FY15, WS captured an annual average of 128 animals in power-activated neck snares in 22,400 snare nights for a capture rate of 5.7 animals/1000 snare nights with 99% target species and 1% nontarget species. Thus, target mammal capture was 5.7 animals/1000 snare nights and nontarget take was 0.04/1000 snare nights. Of the 127 target captures with power-activated neck snares, none were relocated; the 1 nontarget animal captured was freed. These figures represent a high effectiveness rating for target mammal capture with low nontarget take (especially considering that most neck snares were used passively).

Standard neck snares are light-weight and easy to set out. Power-activated neck snares are not as light-weight as standard neck snares and require two to three times the amount of time to set. Even though fewer animal are captured per 1000 snare nights than compared to foothold traps (10.3 target and 0.7 nontarget animals/1000 trap nights)[9], these are very effective tools because more can be carried and set in the field in a short amount of time. Power-activated neck snares had a higher relative capture rate, but it is likely due to the ability to use scents at bait sites more efficiently for coyotes.

From FY11 to FY15, WS used foot cable restraints, not including noose traps, for an annual average total of 74,700 snare nights. An annual average of 617 animals were captured in foot cable restraints for a total of 8.3 animals/1,000 snare nights with 98.5% target species and 1.5% nontarget species. Thus, target mammal take was 8.1/1000 snare nights and nontarget take was 0.1/1000 snare nights. Of the 608 target captures with foot cable restraints, 3.6% were relocated. Of the 9 nontarget captures, 77.8% were released at the capture location. These figures represent a very high effectiveness rating for target mammal capture with a very low nontarget take. In the hands of a skilled trapper, foot cable restraints are a very selective means available for removing problem animals.

[8] Capture per 1000 snare nights is the standard for comparison, where snare equals any cable device set for overnight use.

[9] See Chapter IV, *The Use of Foothold Traps in Wildlife Damage Management* risk assessment.

2 HAZARDS

2.1 Health and Human Safety

Hazards would primarily occur to WS employees that create, handle, and set cable devices. Abrasions, bruises, and minor cuts to the fingers, hands, and arms of users may result from inadvertent release of the spring mechanism of power-activated snares. Minor cuts to hands and fingers may also occur from broken strands of cable or frayed cable ends. Injuries to employees could also occur from animals that are live-captured in cable deivces from bites, scratches, lacerations, and disease threats. In extreme cases, serious injury to employee or even death could occur from large animals (*e.g.*, bear, feral swine) live-captured in snares or cable restraints.

Similar hazards could occur to the public if they purposefully handled devices placed by WS. Members of the public may come into contact with cable devices set by WS, but are most likely to inadvertently trigger power-activated sets hidden from view. Because foot cable restraints are set underground and "camouflaged" under sifted leaves or other debris, if stepped on, the loop could close on a person's foot or ankle. If a person was wearing shoes, the cable loop would likely close around the shoe but the person would suffer no injuries to the foot. If barefoot or if the cable device closed around the ankle, abrasions, bruises, minor cuts, and swelling potentially could occur. To reduce such possibilities, WS personnel post signs at entrances to properties or on roads in the area to alert the public that cable devices are present. Finally, it is possible for someone to find a captured animal and attempt to free it which could expose them to bites or scratches. WS Policy (WS Directive 2.450, 09/24/2014) states that cable devices should be set so that captured animals are not conspicuous to the public, particularly along public roads and trails; this reduces the possibility of a member of the public getting injured while attempting to free an animal.

2.2 Environmental

Environmental hazards associated with the use of cable devices include the injury or death of animals, including target and nontarget animals. Animals may die from the cable device, exposure to the elements such as heat or cold, other causes associated with capture, or euthanasia by the WS employee. Cable devices may accidentally capture nontarget animals including other wildlife species, domestic animals, or livestock (Tables 1 and 2 list nontarget species captured from FY11 to FY15). Injuries generally would involve abrasions, cuts, and bruises or constriction of blood flow. Abrasions, cuts, and bruises could occur if an excessively loose loop repeatedly slides or turns on a captured animal, and extensive swelling could occur if the cable were tight enough to partially restrict blood circulation, but not tight enough to kill (AFWA 2009). Shivik *et al*. (2000) found that injuries to coyotes live-captured in several power-activated cable devices included slight swelling, some hemorrhaging, cutaneous lacerations, and minor abrasions around the area of capture, along with tooth damage or loss. Similar injuries were noted for red fox live-captured using power-activated cable devices in Spain with nearly all of the foxes captured showing minor swelling or hemorrhaging (Munoz-Igualada *et al*. 2008). However, Munoz-Igualada *et al*. (2008) did note that a small number of foxes live-captured also had major cutaneous lacerations, severance of minor tendon or ligament, minor skeletal muscle degeneration, and fractures. Canids caught in neck snares that have been necropsied have shown low incidence of significant injury and surpass international humaneness standards (Olson and Tischaefer 2004, Munoz-Igualada *et al*. 2008, Defra 2012). The trapping BMPs (AFWA 2017) provided standards for trapping that looked at much of this literature and new research to develop the best methods to minimize injuries. Much research has been done on selectivity, injuries, humaneness, and other characteristics related to traps which provided AFWA good data to determine BMPs that would minimize problems. WS personnel check

equipment as required by state laws, but as often as possible, which reduces injuries associated with being in cable devices for long periods of time.

Hazards associated with the use of cable devices would primarily be associated with injuries to animals and the humaneness of their use. Those hazards affect both target and nontarget animals. When used as a live-capture method, cable devices could cause injuries to target animals and to nontarget animals or they could cause the unintended death of those animals. When neck snares are used as a lethal method, their use should cause a rapid death by strangulation, which results in asphyxiation of the target animal. However, several factors can influence the performance of cable devices (Phillips 1996, Daoust and Nicholson 2004, AFWA 2009, Short et al. 2012). Entanglement of the cable device cable with nearby objects (*e.g.*, brush, trees, and fences) can increase the risk of injury to animals live-captured (Short *et al.* 2012). Short *et al.* (2012) also recommended that stakes used to anchor the snaring cable not protrude from the ground to avoid entanglement. Cable devices are inspected regularly and repaired or discarded to avoid risks of failure. For example, small kinks can weaken the cable, which could allow the cable to break easier or could prevent the lock from functioning correctly (Daoust and Nicholson 2004). Attaching a swivel to the lock can prevent the cable from kinking as the lock slides along the cable (Daoust and Nicholson 2004). Properly anchoring the snare or cable restraint can prevent an animal from pulling the cable loose. If a cable device is anchored too low, an animal could chew through the cable. During the use of three types of lethally set snares, Phillips (1996) noted that 17 of 131 coyotes caught managed to escape, one by breaking a lock and 16 by chewing through the cable. The failure of snares or cable restraints could lead to animals escaping with the cable device still constricted around the animal, which would likely lead to the death of the animal after several weeks or months (Daoust and Nicholson 2004). The use of diazepam tabs on necks snares has been used successfully to reduce the risk of injuries to coyotes when the coyotes chewed or removed the tab from the cable device (Pruss *et al.* 2002). Diazepam tabs can be used to sedate and calm captured animals, which can reduce aggression and the risk of injuries (Pruss *et al.* 2002), but are not approved for use at this point.

Death of an animal may occur from strangulation, predation by other animals (Short *et al.* 2012), or exposure to the elements. Target animals live-captured in a snare or cable restraint could be euthanized by an employee of WS. In addition, nontarget animals live-captured that were severely injured and unlikely to survive if released, could be euthanized by a WS employee. WS personnel with training, skills, and appropriate knowledge of cable devices can carefully select snaring components and designs that improve the selectivity and humaneness of the cable device selected for a particular damage situation, species targeted, and nontarget species in the area; additionally, site selection appropriate for the target animal without entanglement possibilities also improves selectivity and humaneness (Short *et al.* 2012). WS employees are required to participate in a trapper education course (WS Directive 2.450), which reduces many of the problems such as capture of nontarget animals.

Frey *et al.* (2007) used neck snares to live-capture red fox to be fitted with radio collars for telemetry studies and found that foxes were active the evening following capture and that all females captured reared young the following spring. Therefore, Frey *et al.* (2007) concluded that the use of neck snares to live-capture red fox did not affect their behavior following release. Over the three-year study period, Frey *et al.* (2007) used neck snares to capture 21 red fox with only two fatal injuries occurring from the snares used.

Environmental risks would be greatest for nontarget animals that frequent an area where cable devices are placed and travel along the same trails as the target species. Snares and cable restraints could be used in a variety of habitats; thus, many species of wildlife could be exposed to cable devices used by WS. As the amount of time between capture and checking the device increases, the risk of injuries also likely increases.

The selectivity of cable devices can be improved by cable device design and using techniques designed to reduce the risk to nontargets (AFWA 2009, Short *et al*. 2012). Several designs and techniques are used by WS to reduce the risk of capturing or killing nontarget animals.

One commonly used technique to minimize risk involves adjusting the loop size of cable devices. The loop size used when setting a snare or cable restraint can minimize the likelihood of capturing animals either larger or smaller than the intended species (AFWA 2009, Short *et al*. 2012). For example, when setting a cable device to capture a coyote in areas where wolves could be present, using the smallest loop size necessary to capture a coyote could reduce the risk of capturing a wolf (AFWA 2009). Conversely, using the largest loop size possible to capture beaver increases the likelihood that an otter will pass through the loop without being captured (AFWA 2009).

The height of the snare loop from the ground can also minimize risks of non-capture when using snares by positioning the loop at a level most apt to minimize risk of capture for other animals (AFWA 2009, Short *et al*. 2012). Adjusting the loop height can minimize capture of animals that are either taller or shorter than the target species. Raising the loop can allow smaller animals to pass under the under the snare. Conversely, lowering the height of the loop can allow larger animals to step over the loop. However, lowering the height of the loop too much could result in capturing a larger animal by the leg (AFWA 2009).

Various natural or other materials can be used as "*guide sticks*" to direct the target animal through a snare or to guide a nontarget animal over, under, or around the snare (AFWA 2009). Knowledge of the animal species in an area and the behavior of those animals can be critical in deciding whether to use guide sticks when using cable devices. If guide sticks are used, appropriate placement and size must be considered because the placement and size or rigidity of the guide can influence animal behavior (AFWA 2009). For example, using a large rigid guide stick over a neck snare could cause deer to jump over it avoiding capture; however, placing a large rigid guide stick too high above the snare could encourage a deer to pass underneath the stick, which would increase the risk of capture (AFWA 2009). Gardner (2010) used a diverting wire with neck snares set for wolves to reduce the risk of moose captures; an additional wire was placed at a height that allowed moose to push the wire and push the snare out of the way to prevent its activation.

Baits or lures can be used to attract a target animal to the area where a device has been placed. When deciding on whether to use baits or lures and which ones, consideration is given to nontarget animals that may also be attracted to the bait or lure (Knopff *et al*. 2010). Selecting the appropriate bait or lure can increase or decrease risks of attracting nontarget animals to an area where a snare or cable restraint is set (AFWA 2017).

Loop stops can also be used to minimize the risk of capturing or killing nontarget animals in cable devices (AFWA 2009, Etter and Belant 2011). Minimum loop stops control the minimum diameter of the loop while maximum loop stops control the maximum diameter of the loop (AFWA 2009). Minimum loop stops allow animals smaller than the target animals to escape or allow animals captured in a specific body area, such as the leg, to escape since the loop could only close to minimum diameter, greater than the diameter of the leg. As an example, a minimum loop stop could allow a red fox to be captured but let a marten escape because it is smaller than a fox. Similarly, a minimum loop stop could allow for the capture of a coyote but allow a deer caught by the leg to escape (AFWA 2009). Etter and Belant (2011) compared the efficiency and selectivity of cable restraints to live-capture coyotes based on minimum loop stop diameters of 8.9 centimeters and 10.8 centimeters and found the smaller loop stop diameter was more effective at capturing coyotes and avoiding nontarget capture.

Adjusting trigger tension on power-activated cable devices can also increase selectivity and reduce risks to nontarget animals. Increasing the amount of force required to activate a foot-depressed trigger or a mouth-pulled trigger could minimize the risk of capturing smaller animals or animals without the ability to apply the necessary force to trigger the device (AFWA 2009).

Snare "*loading*" is the process of altering the curvature of the snare loop to increase the sensitivity of the loop to closure and once closure of the loop is initiated by the target animal, the loop closes more rapidly. Snare loading is often used to improve the efficiency of capturing a target animal when using passive snares but may not be suitable for use in all situations, especially when nontarget animals that may encounter the snare are smaller than the target animal (AFWA 2009). If a smaller animal was passing through the loop of the snare and bumped or brushed the snare loop, the modified snare loop could close more rapidly, not allowing enough time for the smaller animal to pass completely through the loop. Adjusting the position of a lock can increase or decrease the sensitivity of the loop to closure, which can be used to reduce risks of capturing or killing a nontarget animal (AFWA 2009).

Breakaway devices on snares allow the snare loop to break open when a certain amount of force is applied, which allows the animal to escape from the snare (AFWA 2009). The devices can be used to prevent holding a nontarget animal that generates more force than the target animal. For example, when setting snares to capture coyotes, breakaway locks or other devices could be used that allow deer to break the device and escape if captured, since deer are able to generate more force than coyotes.

3 RISKS

3.1 Health and Human Safety

The risk of human injury from cable devices is mainly to WS field personnel placing them. Injuries related to neck snares and foot cable restraints, including power-activated cable devices accidentally triggered and striking a person, are relatively minor. One laceration (0.3 annually) from a neck snare being set for feral swine occurred from FY13 to FY15 as documented in WS Office of Worker's Compensation Program (OWCP) claims. Additionally, WS annually had 6.3 lacerations/punctures per year, but we were unable to determine the method in use when the injuries occurred. WS employees engaged in trapping receive trapper education training to reduce risk of injury. WS personnel are encouraged to use gloves[10] and other appropriate protective equipment to minimize injury risk.

WS employees filed an annual average of 79 OWCP claims from FY13 to FY15[11] for strained backs, lacerations, animal bites, burns, and other injuries that occurred on the job. It is unknown how many of the injuries were from cable devices. However, only 59 of these claims occurred in the field. Many of the types of injuries and other maladies that occurred happen over time from using many different WDM techniques (*e.g.*, back issues from bending down to work on sets). It is possible that injuries involving strained muscles or ligaments, compression or contusion injuries, animal bites, laceration and punctures, fractures, insect bites, or foreign body injuries could have occurred as a result of setting cable devices, but we were unable to determine that exact number (these are discussed in detail in the Introduction to the Risk Assessments, Chapter 1).

[10] Setting snares may sometimes require free hands and gloves may not be worn at all times.

[11] FY13 was the first year OWCP claims were managed at a national level rather than at the state level, thus only FY13-FY15 was used. Due to reporting requirements and privacy concerns, data is not tracked by activity, and therefore, all the data as a whole is discussed for injuries on the more than 2,000 personnel employed, but we may not have been able to ascertain all information.

The risk of injury from captured animals is also minimal. Typically, employees dispatch captured target animals slated for lethal removal with a gunshot to the brain. However, most animals targeted for lethal removal with neck snares are killed by the snare relatively quickly and, therefore, would not cause these types of injuries. The highest risk is typically from animals that are trapped in foot cable restraints that are not staked, but are attached to drags; employees may unexpectedly encounter an animal that is snared when approaching the set. Few employees over many years have been injured by such captured animals (most of the few incidents that have occurred over the last 20 years have been with bears). WS personnel enter trapping areas cautiously and know where traps with drags *versus* stakes are placed, using extra caution in the former situation. A more obvious risk is associated with the release of captured animals. WS employees usually carry a catch-pole (a pole with a cable loop that can hold an animal prior to release). Catch-poles are very effective in handling wildlife, but an animal's behavior following release, though mostly predictable, is a primary concern. If an animal is too large or is being trapped for a research project, an animal may be immobilized with drugs. Though usually not a problem, drugged animals are a risk which will be discussed under the Immobilization Risk Assessment.

From FY13 to FY15, WS operational field personnel averaged 3 bites or injuries annually from animals and some of these were from trapped animals, but not in cable devices. However, they illustrate the potential dangers of getting close to live animals in any type of capture device. Of the average of 3 animals per year, one was a coyote captured in a foothold trap that bit the employee before it was euthanized. Another was from a feral cat that had been caught in a foothold trap, and bit the employee while it was in the process of being turned over to a local animal shelter. Another feral cat was captured in a cage trap and bit the WS employee while transferring custody. A black bear in a culvert trap bit a WS employee on the hand before being released after relocation. Two WS employees were bitten by feral or free-roaming dogs being hand gathered, but one escaped capture. Finally, a bat that was caught by another agency, bit a WS employee while the bat was being sampled for a variety of diseases (primarily rabies). Two other dog bites were from property owners' dogs while responding to a request for assistance. For context, WS operations annually killed 43,576 and released 11,432 predators with methods conducive to being bitten from FY13 to FY15. Thus, an average of 2.3 bite incidents per year were related to animal capture, including hand gathering (0.7), transferring custody to another agency after capture (0.7), relocating an animal (0.3), euthanizing a live-captured animal (0.3), and handling an animal for disease sampling (0.3). For bite incidents that occurred from released animals (2.0 per year), WS had a ratio of one bite per 5,700 releases. For animals to be euthanized, the ratio was much less at 1 bite for 145,000 animals killed. Overall, the bite ratio was 1 bite for every 18,000 animals captured with methods where the animal could be captured alive. This is a low risk.

It should be noted that 2 bites in three years occurred as dog attacks. This again is a minimal number as the Centers for Disease Control (2015) estimates 4.5 million dog bites occur annually throughout the United States. Thus again, we believe these risks are low.

In addition to field personnel, from FY13 to FY15, NWRC personnel received an annual average of 1.0 animal bites or injuries from research animals, including bites from a skunk (0.3 ave.) and a rat (0.3 ave.), and a bone fracture from feral swine (0.3 average). Lab animal bites typically come from caged animals during routine maintenance or research. It is not known whether these particular animals were from animals captured with cable devices during field research.

WS personnel could be exposed to animals carrying diseases such as rabies. All recorded bites from FY13 to FY15 and an annual average of two lacerations/splashes were from potentially diseased animals (rabies). No

known animal exposures occurred as a result of an animal captured in a cable device, but this has occurred. The animal bites (average of 5.0 per year) had the potential for transmitting the rabies virus. None of the animals involved in the incidents was subsequently identified as rabid, with the exception of fluids from tissue from a known rabid skunk that splashed into the eye of a researcher. Thus, a potential for 5 animals per year caused concern potentially for exposure to rabies from FY13 to FY15. Personnel that have the potential for exposure to rabid animals have the option of obtaining the rabies prophylactic series with follow up boosters to reduce the potential for contracting the disease if bitten, lacerated, or exposed to bodily fluids. General exposure to animals is common for many WS employees, but considering the number of animals captured or handled, the risk of contracting a wildlife-borne disease is minimal.

The placement of cable devices in urban and rural recreational areas may expose the public to these same hazards; however, WS conducts WDM mostly on private lands where the risks are principally to WS employees and the landowners that receive WS assistance. Cable devices are mostly placed in areas not visible or visited by the public. WS personnel consider the potential for the public to be in an area, and generally do not use cable devices where people would frequent for three reasons: 1) the potential for the public to be exposed to a captured animal, 2) the potential for persons, particularly small children, accidentally stepping on a power-activated foot cable restraint, or 3) the possibility of theft or vandalism. Additionally, neck snares are set in brushy areas or are brushed in to camouflage them and foot cable restraints are frequently set underground with leaves or other natural debris over them, camouflaging the sets from both animals and humans. Someone with knowledge of cable device sets could, however, disturb the sites or steal the cable devices. Since cable devices are often set in remote areas, mostly on private lands, and camouflaged, the likelihood of incidental public contact is minimized. Additionally, WS has received no reports of members of the public being injured by a cable device set by WS, or injured by an animal captured in one. Considering the number of snare nights in a given year (8.3 million), the risk of public exposure is negligible.

Snares and cable restraints are passive or power-activated methods that require direct contact to activate; therefore, if left alone, risks to the public would be non-existent. However, the potential exists for a person to inadvertently encounter a snare or cable restraint if that person was unaware that the devices are being used in an area. Appropriate warning signs are posted at main entrances or commonly used access points to areas where cable devices are in use (see WS Directive 2.450). Signs are routinely checked to ensure that they are present, obvious, and readable. Signs are removed when the equipment is no longer in use. The locations where cable devices are placed reduces the risk of the public inadvertently encountering them. Those locations where cable devices could be placed for target animals (*e.g.*, under fences, dense vegetation, or semi-submerged in aquatic habitats) would generally not be areas where people frequently travel.

Flaa *et al*. (2009) indicated that using substandard components and the improper use of foot cable restraints designed for bears could result in device failure, leading to increased risks to personnel from bears that escape as personnel approach to immobilize the bear. One WS employee injury was directly attributable to a snare or cable restraint, a laceration, and was the only report from FY13 through FY15 where the method was positively identified; this is why all injuries are discussed because some of the other injuries could have been associated with cable devices, but we could not determine the method being used for many of the injury reports. Training, experience, and the use of gloves to protect hands and fingers helps ensure the safety of employees.

3.2 Environmental

WS recognizes that cable devices result in some risk of injury or death for nontarget wildlife and domestic animals (3.1% chance in neck snares and 0.2% chance in foot cable restraints of catching a nontarget species – Tables 1 and 2). WS supports efforts to make cable devices as humane as possible for species captured in them as well as minimize the potential to capture nontarget species. WS is actively involved in research efforts to increase humanness while minimizing impacts to nontarget species (Fagerstone and Keirn 2012). WS recognizes the BMPs for trapping as developed by AFWA (2009, 2017) that emphasize animal welfare, efficiency, selectivity, practicality, and safety. Whenever practical, WS will utilize these guidelines when using cable devices. The risk of capturing nontarget animals is minimized by the selection of the suitable cable and loop size, use of pan-tension devices for foot cable restraints, proper cable stops, proper attractants, and appropriate placement location. All of these issues are addressed in trapper education programs required of WS personnel, and reinforced during meetings and discussions with experienced trappers.

The home ranges, habitat preferences, travel corridors, and population densities of both target and nontarget species are considered when selecting locations for the placement of cable devices. WS policy (WS Directive 2.450, 09/24/2014) requires that cable device placement be a minimum of 30 feet away from animal carcasses used as draw stations, to minimize the risk of capturing scavengers such as vultures or eagles. Signs warning of the placement of foothold traps in the area alert people to the presence of traps. Warning signs advise people to restrain pets and limit pet and livestock access in areas where cable devices are being used to minimize the risk of accidental capture. From FY11 to FY15, an annual average 49 feral/free roaming nontarget animals were captured in cable devices nationwide. This includes 41 dogs, 3 cats, and 5 livestock; of these, 18 dogs, 2 cats, and 4 livestock were killed (50%). It is unknown how many of these were feral *versus* free-roaming pets and livestock. However, this is a minimal number and low risk considering the amount of equipment in the field (8.3 million snare nights per year on average).

4 UNCERTAINTIES AND CUMULATIVE IMPACTS

Uncertainty in this risk assessment is negligible as WS has 100 years using cable devices for WDM activities and understands potential risks of using the variety of available devices. The knowledge gained from this experience has helped reduce uncertainties.

Cumulative impacts could occur to target and nontarget animals. However, cumulative impacts are addressed in National Environmental Policy Act (NEPA) documents (USDA 2017) such as WS (2017)[12]. To date, no WS NEPA document has found any significant impact to any native species population. Additionally, the "*Introduction to Risk Assessments for Methods Used in Wildlife Damage Management*" looks at all take from all WDM activities by WS and none of the Risk Assessments shows a significant level of take for any native species. From a human health perspective, the use of cable devices in WDM will not have any known cumulative impacts.

5 SUMMARY

In the hands of a skilled professional, cable devices are a very selective tool available for removal of specific problem animals. WS uses cable devices as tools in its wildlife damage management programs, typically as a component of an integrated approach. WS works cooperatively with natural resource agencies at the state,

[12] WS NEPA documents are available @ https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/programs/nepa.

national, and international level to develop effective and humane trapping measures while minimizing exposure to people, pets, and nontarget animals. Implementation of program-specific protective measures designed to reduce human interactions with cable devices reduces the risk of these types of management tools to WS employees and the public. WS will continue to evaluate and implement, where appropriate, new protective measures. In addition, advancements in cable device use and design have resulted in more effective and humane capture of target animals while reducing the potential for nontarget captures. As discussed, nontarget capture has decreased in the last 30 years from a nontarget capture rate of 19.1% in FY88 (USDA 1997, Appendix P, pp. 23-27) to 6.5% annual average between FY11 and FY15 in the 6 states (AZ, CO, NM, OK, TX, and UT) analyzed; the number of nontargets killed *versus* released was about the same at 91% and 87% for the same time periods, respectively. Cable devices are passive or power-activated methods that offer a comparatively low risk to human health and the environment. Risks to human safety primarily occur to WS employees and may include minor injuries. Risks of nontarget capture occur when using cable devices. Cable devices are set in locations where the likelihood of capturing nontarget animals is minimized. Risks associated with cable devices are greatest for nontarget animals that frequent the areas where the devices are placed and travel along the paths of the target species. Nontarget risks are minimized by modifying the snare or cable restraint, such as by adjusting the size of the loop, adjusting the height of the loop above the ground, and adjusting the pan tension of power-activated devices. Proper loop size and placement can minimize risks to nontarget. The use of breakaway devices and stops allow animals larger than the target species to escape the device. Hazards to nontarget animals associated with the use of cable devices range from minor injuries to potential death. Cable devices are only used by employees experienced in targeting and capturing specific animals, which further minimize risks to nontarget animals. However, risks of nontarget capture occur from the use of cable devices despite these efforts. APHIS WS will continue to support and conduct research and education that supports more humane and effective capture methods, and will implement these methods, where appropriate, to further reduce risk to target and nontarget animals.

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Experience: Special expertise in wildlife biology, ecology, and damage management. Twenty-three years of work experience with WS and the National Wildlife Research Center in CO, HI, and MA. Experienced in a wide range of program activities including airport wildlife management, wildlife disease, and wildlife damage management to protect livestock, aquaculture, public safety, and natural resources.

Editor/Contributor: Michael Green
Position: USDA-APHIS-Wildlife Services (WS), Environmental Coordinator, Fredrick, MD
Education: BS Wildlife and Fisheries Sciences, University of Tennessee
Experience: Special expertise in wildlife biology, ecology, and damage management. Eleven years of work experience with WS in MD and VA. Experienced in a wide range of program activities including nutria eradication, airport wildlife management, and wildlife damage management to protect livestock, aquaculture, public safety, and natural resources. Served as staff biologist in WS Headquarters for two years.

Editor/Contributor: Andrea Lemay
Position: USDA-APHIS-Policy and Program Development (PPD), Environmental and Risk Analysis Services (ERAS), Biological Scientist, Raleigh, NC
Education: BS Plant and Soil Science (Biotechnology) - University of Massachusetts; MS Plant Pathology -North Carolina State University

Experience: Twelve years of service in APHIS conducting risk analysis. Four years of experience in preparing environmental analyses in compliance with the National Environmental Policy Act.

Editor/Contributor: Fan Wang-Cahill
Position: USDA-APHIS-Policy and Program Development (PPD), Environmental and Risk Analysis Services (ERAS), Environmental Health Specialist, Riverdale, MD
Education: B.S. Biology and M.S. Hydrobiology - Jinan University, Guangzhou, China; Ph.D. Botany (Ultrastructure/Cell Biology) – Miami University
Experience: Joined APHIS in 2012, preparing human health risk assessments and providing assistance on environmental compliance. Prior experience before joining APHIS includes 18 years environmental consulting experience specializing in human health risk assessments for environmental contaminants at Superfund, Resource Conservation and Recovery Act (RCRA), and state-regulated contaminated facilities.

Editor/Contributor: Jim Warren
Position: USDA-APHIS-Policy and Program Development (PPD), Environmental and Risk Analysis Services (ERAS), Environmental Toxicologist, Little Rock, AR
Education: B.S. Forest Ecology and M.S. Entomology – University of Missouri; Ph.D. Environmental Toxicology – Clemson University
Experience: Seven years of experience working for APHIS preparing ecological risk assessments and providing assistance on environmental compliance. Prior experience before joining APHIS includes other government and private sector work regarding ecological risk assessments related to various environmental regulations.

Data Contributor: Joey Millison
Position: USDA-WS Information and Technology (IT), Junior Applications Developer
Education: Information and Technology coursework from various sources
Experience: Eleven years of experience in APHIS, WS Management Information System (MIS) Group. Retrieves WS field data from the MIS for writers, reviewers, and editors.

7.2 Internal Reviewers

USDA APHIS Wildlife Services

Reviewer: Michael Yeary
Position: USDA-APHIS-WS, State Director/Supervisory Wildlife Biologist, Lakewood, CO
Education: BS in Wildlife Ecology, Texas A&M University
Experience: Special expertise in wildlife damage management including applying and supervising M-44s and their use. Thirty-eight years of service in APHIS Wildlife Services in TX, KS, CO, and WS Regional Office with experience in a wide variety of programs (livestock, aquaculture, dairy, property, natural resources, and human health and safety protection) including predator, bird, beaver, feral swine, and rodent damage management activities.

7.3 Peer Reviewers

The Office of Management and Budget requires agencies to have peer review guidelines for scientific documents. The APHIS guidelines were followed to have "The Use of Foothold Traps in Wildlife Damage Management Risk Assessment" peer reviewed. WS asked AFWA to have experts review the documents. AFWA selected reviewers from several state agencies with the appropriate types of expertise.

7.3.1 Peer Reviewer Agencies Selected by the Association of Fish and Wildlife Agencies

Michigan Department of Natural Resources
California Department of Fish and Wildlife
Kansas Department of Wildlife, Parks & Tourism
North Dakota Game and Fish Department

7.3.2 Comments

Comments regarding concerns with the risk assessment and a response:

1. **Comment:** Snares and cable restraints are not the same and cannot be used interchangeably; use of these words should edited.
   Response: Terminology for cable devices was adjusted and clarified throughout the document.

2. **Comment:** Too much discussion about irrelevant injuries to people.
   Response: This was clarified in the document, and though seemingly irrelevant, the information illustrates the relative risk of cable devices to people as this is an overarching concern of the public and risks.

3. **Comment:** Inconsistent time periods – FY13-FY15 and FY11-FY15.
   Response: Data for OWCP claims was only available for FY13-FY15 – this has been clarified in document. FY11-15 was the period used for all other analyses because take levels are best averaged over at least a five-year period to reflect all animal species taken.

4. **Comment:** Consider adding discussion of how cable restraint check times are important to reducing or preventing injury/death.
   Response: This information has been included in the document.

5. **Comment:** In the first paragraph of the Introduction, an erroneous statement indicates a stop can be used to make a snare non-lethal. The primary components of the snare that make it non-lethal are the lock type and cable diameter. A significant external feature is presence of entanglement. Several statements in this document seem to display a misunderstanding of what it takes to live restrain with a snare (*i.e.* a cable restraint). As an aside, I believe use of stops as a mechanism of live restraint were tested and failed BMP standards.
   Response: WS has used stops on neck snares to make them mostly nonlethal, but not commonly. They are mostly used to prevent neck snares from being lethal to nontarget species.

6. **Comment:** Use of terminology to describe snares is somewhat inconsistent. The document refers to “passive” and “power-activated” snares. The document reference “standard” and “mechanical” neck snares. Again, I would recommend adopting terminology from citation above.
   Response: These were changed and made more consistent throughout the document.

7. **Comment:** Consider discussing how in-line springs on foot snares can reduce or prevent injury/death.
   Response: This information has been included in the document.

8. **Comment:** Consider more illustrations of the methods, especially foot nooses.
   Response: More pictures were included in the document.

Commenters provided editorial suggestions and these were appreciated and corrected. They also gave comments on the risk assessment not requiring a response, including:

1. **Comment:** Nontarget injury and lethal take clearly are the biggest risks with the use of cable devices. Data summarized was sufficient to demonstrate devices are being used in an efficient and safe manner.

2. **Comment:** Assessment adequately addressed all components- providing appropriate details relative to the use and risks of a specific device as well as practices used to minimize risks associated with each tool.

3. **Comment:** Assumptions and uncertainties were identified and addressed adequately.

4. **Comment:** References were appropriate.

5. **Comment:** Data was sufficient in the risk assessment to assess effectiveness and safety in the risk assessment.

6. **Comment:** Authors admit to potential for animal injury but also lay out best management practices to reduce injury to non-target animals as well as humane treatment of target animals.

7. **Comment:** Basically I think the document pretty much covers everything I had in mind concerning techniques to humanely remove animals, reduce non-target capture rates, and BMPs in general. I liked seeing all the numbers documenting target vs non-target captures as well as success per trap nights and such. I don't have anything more to add.

Appendix 1. "Other Species" Included in Tables.

Table 1

NECK SNARES

Other predator = feral house cat*, swift fox, kit fox, mink, ringtail, hog-nosed skunk and western spotted skunks

Other hoofed mammal = sika deer*, axis deer*, pronghorn, blackbuck*, feral cattle*, goat* and feral sheep*

Other rodent and rabbit = western gray squirrel, eastern gray squirrel, yellow-bellied marmot, hoary marmot, brown rat, mountain cottontail, desert cottontail and feral European rabbit*

Other raptor = turkey vulture, black vulture, red-tailed hawk, great horned owl and crested caracara

Other bird = glaucous-winged gull, Canada goose, American black duck, fork-tailed storm-petrel, ancient murrelet, wild turkey, gray francolin* and feral domestic chicken*

Other reptile = American alligator, southern painted turtle, black spiny-tailed iguana* and ball python*

POWER-ACTIVATED NECK SNARES

Other predator and hoofed mammal = domestic dog*, common gray fox and feral swine*

Table 2

FOOT CABLE RESTRAINTS

Other predator = feral house cat*, swift fox, kit fox, mink, ringtail, hog-nosed skunk and western spotted skunks.

Other hoofed mammal = mule deer, white-tailed deer, Philippine deer*, feral cattle* and feral sheep*

All rodents = beaver and woodchuck

All bird = red-tailed hawk, herring gull, wild turkey and ring-necked pheasant

FOOT NOOSES

Other raptor = turkey vulture, black vulture, red-tailed hawk, great horned owl and crested caracara

Other bird = black skimmer, mew gull, northern flicker, yellow-headed blackbird, American crow, tree swallow and loggerhead shrike

* Introduced