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

Chapter XIV

The Use of Quick-Kill Traps in Wildlife Damage Management

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USE OF QUICK-KILL TRAPS IN WILDLIFE DAMAGE MANAGEMENT

EXECUTIVE SUMMARY

The USDA-APHIS-Wildlife Services (WS) Program uses quick-kill traps to capture a variety of animals, including small rodents, such as mice and moles, larger mammals, such as raccoons and beavers, birds such as woodpeckers, and reptiles. Wildlife can cause damage to property, agriculture, and natural resources or cause human health and safety concerns. Quick-kill traps are used for specific wildlife management projects, primarily where a need exists to resolve a wildlife damage situation (e.g., capture a mole in a field or capture wildlife for disease surveillance). WS uses quick-kill traps extensively for wildlife damage management operations. Quick-kill traps are used in many settings, including urban and rural areas. WS personnel use quick-kill traps in accordance with WS Directive 2.450.

WS evaluated potential human health and environmental risks from the proposed use of all types of quick-kill traps, including rotating-jaw (i.e., body-gripping) traps, snap traps, gopher traps, mole traps, and captive bolt traps. WS determined that the risks to human health and the environment are low. Quick-kill traps can capture nontarget species, but capture rates of nontarget species are low compared to take of captive species. Quick-kill traps pose minimal risks to people, pets, and nontarget species. WS will continue to support and conduct research and education that supports more humane and effective trapping methods and will implement these measures to reduce risk to nontarget species further.

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1 INTRODUCTION

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Wildlife Services (WS) Program uses many different styles of quick-kill traps while conducting wildlife damage management activities and disease monitoring and research. Quick-kill traps are designed to induce the rapid death of target animals that trigger the trap. Quick-kill traps are available in various designs to capture animals, including small rodents (e.g., mice and moles) and larger mammals (e.g., raccoons[1] and beavers), birds (e.g., woodpeckers), and reptiles (e.g., turtles). Some quick-kill traps, such as snap traps, can be modified to capture bird species. Despite variations in size and design, quick-kill traps are passive devices that share a common means of capturing animals and inducing rapid death. A passive device indicates that the device does not require the animal to bite, push or pull a bait. Quick-kill traps generally have one or two capture arms, which, when closed, grip the target animal or, in some cases, impale the target animal with sharp metal spikes (e.g., traps designed for moles in underground tunnels). Some quick-kill traps use a captive bolt fired using compressed carbon dioxide cartridges. In general, quick-kill traps include rotating-jaw traps, snap traps, gopher traps, mole traps, and captive bolt traps, discussed in more detail in the following subsections. While most of these traps are also considered body-gripping traps, we included captive bolt traps and some mole traps that are not body-gripping traps. Thus, we used quick-kill as the all-encompassing term for this document.

Animal welfare and trap selectivity are important topics for furbearer management in North America. With the passage of the Wild Fur Regulation by the European Union in 1991, an international challenge arose. The Wild Fur Regulation prohibited use of foothold traps in many European countries and the importation of furs and manufactured products to Europe from countries that allowed use of foothold traps or trapping methods that did not meet internationally agreed-upon humane trapping standards (White et al. 2021). To address national concerns and requirements of the Wild Fur Regulation, the United States and European Union signed a non-binding bilateral understanding, referred to as the Agreed Minute, that included a commitment by the United States to evaluate trap performance and advance the use of improved traps through the development of best management practices (BMPs) for trapping (White et al. 2021). The BMPs were developed for state regulated fur harvest as discussed in USDA (2019) Chapter 4 “Foothold traps.” The BMP program utilizes international humane trapping standards consistent with the Agreement on International Humane Trapping Standards (AIHTS) and the International Organization for Standardization standards that were under development. BMPs for 22 species/subspecies have been developed through the coordination of the Association of Fish and Wildlife Agencies (AFWA) and cooperating state agencies. Eleven of the BMPs include recommendations for body-gripping traps[2] (AFWA 2017b, 2022).

WS Policy (WS Directive 2.450, 07/29/2021[3]) states that using the BMP trapping guidelines developed and promulgated by AFWA (2017b) for private fur harvest and other trapping activities is valuable and should be followed as practical. WS uses the BMP guidelines as the basis for policy formulation but recognizes that some quick-kill traps used in Wildlife Damage Management (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 for efficiency and durability, for use in federal wildlife management activities. WS Directive 2.450

[1] See the Introduction to Risk Assessments – Chapter I for scientific names. These are only given if not used in that Section
[2] Species with recommended BMPs for body-gripping traps: beaver, fisher, fox (kit, swift), marten, mink, muskrat, nutria, raccoon, ringtail, otter, skunk (AFWA 2017b).
[3] Accessed @ http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/wildlifedamage under Wildlife Damage – WS Program Directives., all WS Policy Directives referenced in this document are available

also states that traps need to 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 attempting to free an animal and getting injured and trap theft. Quick-kill traps are typically placed where the public will not haphazardly stumble onto a trap or a trapped animal. Quick-kill traps also incorporate devices such as “otter-safe” triggers to prevent or reduce the capture of nontarget animals unless such use precludes the capture of the intended target animals.

1.1 Quick-kill Traps

The design of quick-kill traps enables them to close around or strike an animal with enough force to kill the animal quickly. They are available in various designs and sizes to target a wide range of animals. Target animal species may range from small rodents, such as mice and shrews, to birds, such as woodpeckers, and larger animals, such as beavers and badgers.

- **Rotating-jaw traps**, also called body-grip traps (Figure 1), are designed to kill an animal quickly when one or two rotating jaws strike the animal’s neck or chest. The rotating jaw trap generally consists of two rectangular metal frames, also known as jaws, one or two springs depending on the model, a dog (i.e., a latch that holds the spring(s) under tension), a trigger, and safety latches on larger-sized models.The trap is set by compressing the spring(s) and rotating both jaws so that the notch in the dog can be placed onto the opposite jaw over the trigger. The trap is sprung when an animal presses the trigger from either direction, releasing the dog from the opposite jaw, which allows the springs to decompress, closing the jaws onto the animal.

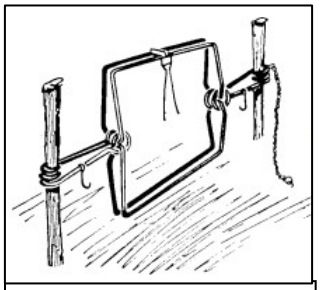

Figure 1. A set rotating-jaw trap (a 330 Conibear®; Miller and Yarrow 1994).

  Rotating-jaw traps are available in various sizes depending on the type of animal to be captured and the manufacturer. Rotating-jaw traps are commonly referred to as Conibear® traps after their inventor (Figure 1). However, Conibear is a specific brand of rotating-jaw trap, other brands include Duke, Belisle, and BMI. The sizes of rotating-jaw traps most often used in WDM are listed below, along with their common target species. This is not a comprehensive list of rotating-jaw trap sizes.

  - #110 – weasel, mink, ground squirrels
  - #120 – muskrat, American marten, prairie dog
  - #220 – nutria, raccoon, skunk, fisher, Virginia opossum
  - #330 – beaver, river otter

- **Snap traps** are common household traps designed to kill rats and mice quickly with a rectangular metal bar or hammer. Snap traps (Figure 2) consist of a rectangular wooden or plastic base, a spring, a hammer, a catch, and a holding bar. The spring holds the hammer down on the base when closed; setting or opening the hammer applies tension to the spring. The holding bar is placed over the hammer to prevent it from closing and is attached to the catch. The catch holds the bar in place while the spring is under tension. The catch is often baited to attract a target animal. As the target animal attempts to feed on the bait, the catch is

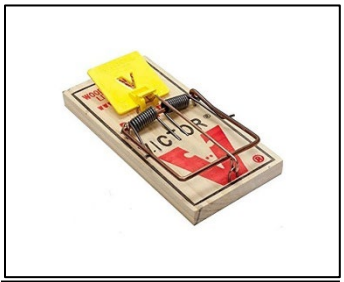

Figure 2. Standard snap trap for mice.

triggered, causing the holding bar to release and allowing the spring to close the hammer onto the target animal forcibly.

Snap traps come in two sizes for trapping mice and rats. Mouse traps are generally 4" x 1 ¾ ", while rat traps are 7" x 3 ¼". Snap traps have also been used for birds, such as woodpeckers.

- **Mole/Gopher traps** are designed to impale or grip moles or gophers quickly inside their tunnels. Traps for moles and gophers generally consist of a spring(s), trigger catch, pan, and impaling or griping mechanism. Traps are available in various designs.

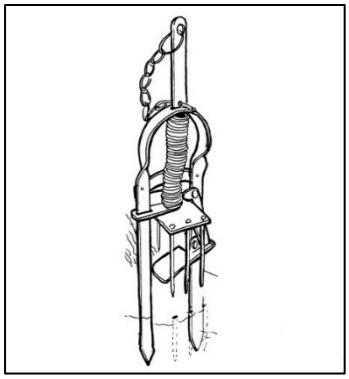

Figure 3. A harpoon -style mole trap, which works best for star-nosed moles. *(Henderson 1994*)

One of the more common mole traps is a spring-powered harpoon trap (Figure 3). As moles tunnel directly under the soil surface, they push the soil upward, causing ridges. The harpoon trap is set on the soil surface, so the catch extends perpendicular across an active tunnel after the soil has been pressed downward to block the tunnel. As the mole pushes the soil upward to re-open the tunnel, the upward force triggers the catch, releasing the spring's tension and forcing the sharp metal spikes downward into the soil to impale the mole.

Other mole trap designs are scissor-jawed traps (Figure 4) and choker loop traps, which are set similarly to harpoon traps. However, a scissor-jawed trap consists of four arms that open when set and quickly close when triggered by a mole. The latch is released when a mole pushes up on the trap pan. The arms close with tremendous force gripping the mole underground. Choker loop traps consist of two "metal loops" with the catch located between the two loops. Choker loop traps are set across a tunnel, so the mole enters inside the loop and contacts the catch. When the mole contacts the catch, the spring uncoils, and the loops are rapidly pulled upward toward the trap frame, gripping the mole.

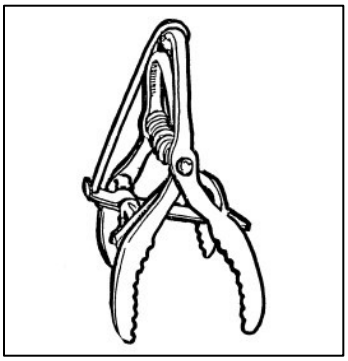

Figure 4. Mole scissors trap (Victor® Out O'Sight Mole Trap) with setting device. (*Henderson 1994*)

Like mole traps, gopher traps are available in various designs, but the use patterns and functions are generally the same. Designs also include traps similar to those described for moles, such as choker loop traps. The Macabee Gopher trap (Figure 5) is one of the more commonly used gopher traps and functions similarly to the mole choker loop traps.

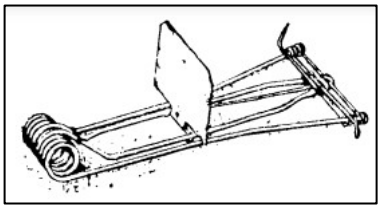

Figure 5. A set Macabee Gopher Trap. *(Case and Jasch 1994*)

- **Captive bolt traps**[4] are designed to kill rodents quickly with a carbon dioxide-powered striker. Captive bolt traps consist of a trigger, bait compartment, striker, and compressed carbon dioxide cartridge. The compressed carbon dioxide fires a captive bolt when a target animal activates the trigger inside a tube (Shiels et al. 2022a). The trap uses a toxin-free paste (i.e., nut butter, chocolate) to draw a target animal to insert its head into the tube, where the trigger for the trap is located. When the trigger is sprung the compressed carbon dioxide is released, causing the captive bolt to forcefully impact the head of the target animal inside the tube. The use of carbon dioxide cartridges allows the trap to reset and fire again when another target animal is drawn to the toxin-free paste and springs the trigger inside the tube. The reduced need to monitor these traps makes them a promising method for remote field areas (Carter et al. 2016). Captive bolt traps (Figure 6) were developed in New Zealand to meet humane standards and were found to quickly kill mice that triggered the device (Shiels et al. 2019). A further review of this style of trap identified the sizes of rodents that have been assessed for susceptibility to this style of trap (Shiels et al. 2022a). WS has not used these traps but will likely do so in the future.

Figure 6. Captive bolt trap (Goodnature A24) attached to a tree on left. (*Picture @ https://www.goodnature.co.nz*)

1.2 Use Pattern of Quick-kill Traps

WS targets mostly mammalian species with quick-kill traps, especially aquatic rodents (80%), burrowing rodents (12%), predators (5%), and terrestrial rodents (3%) (Tables 1a, 1b, and 1c). Mammals are taken to protect a variety of resources, including property, agriculture, aviation, and natural resources, and to determine the abundance of species such as deer mice on an airport (attractant to birds). Most quick-kill traps are lethal, but many nontarget animals, primarily turtles, are released alive (96% of the nontargets released).

From FY11[5] to FY15[6], WS used quick-kill traps to lethally capture an annual average of 21,130 target animals of 90 species and freed an annual average of 3 target animals (Tables 1a, 1b, and 1c)[7]. WS caught target animals in rotating-jaw traps (92.4% of capture), snap and spring traps (4.3%), and gopher and mole traps (3.3%). Mammals accounted for 99.9% of the target take with quick-kill traps, and birds and reptiles accounted for 0.1% (Tables 1a, 1b, and 1c). The use of quick-kill traps by WS is primarily associated with aquatic rodent damage management (i.e., beaver, muskrat, and nutria). The three aquatic rodents accounted for 75% of all animals taken, other rodents and rabbits accounted for 11%, predators 7%, and reptiles 4%. The reptiles captured were mostly nontarget.

[4] Further information was added regarding captive bolt traps in March 2020 just prior to being peer reviewed.
[5] FY11 equals the federal Fiscal Year 2011 which is October 1, 2010-September 30, 2011 (the year is denoted by FY11, FY12, and so on and is the federal Fiscal Year for 2011, 2012, and so on.
[6] Updated data provided in Appendix 2.
[7] The number of species between Tables 1a, 1b, and 1c is greater than the summary of the 3 tables because the same species may be captured by more than one category of methods.

Table 1a. The annual average number of target and nontarget animals captured with rotating-jaw traps by WS in WDM activities from FY11 to FY15 throughout the United States.

ANNUAL AVERAGE SPECIES TAKEN WITH ROTATING-JAW TRAPS				
SPECIES	TARGET		NONTARGET	
	Killed	Freed	Killed	Freed
American Beaver	15,696	0	0.2	0
Muskrat	393	0	123	0
Nutria	816	0	9	0
Woodchuck	640	0	0.6	0
Yellow-bellied Marmot	258	0	0	0
California Ground Squirrel	618	0	0	0
Eastern Cottontail	11	0	3	0
Desert Cottontail	29	0	0	0
Other Rodents & Rabbits (13T, 4NT – 14 spp.)[1]	25	0	1	0
Virginia Opossum	47	0	5	0.2
Small Asian Mongoose	88	0	0	0
Red Fox	9	0	2	0
River Otter	68	0	374	10
Mink	28	0	3	0
Raccoon	88	0	89	2
Striped Skunk	695	0	2	0
Other Predators (11T, 7NT – 14 spp.)[1]	14	0.4	4	0.2
Other Mammals (2T, 2NT – 3spp.)[1]	1	0	2	0
Birds (3T, 26NT – 27 spp.)[1]	0.6	0.2	23	2
American Alligator	0	0	6	6
Pond Slider	0	0	22	27
Northern Painted Turtle	0	0	8	13
Common Snapping Turtle	2	2	229	460
Other Reptile (1T, 8NT, 9 spp. + Unid.SC turtles – 4 possible)[1]	0.2	0	7	11
American Bullfrog	0	0	0	0.4
Fish (8NT, 8 spp. + Unidentified SC fish - 11 possible-2 max 6	0	0	5	2
BODY GRIP TOTAL (45T, 74NT – 98 spp.)	**19,527**	**3**	**918**	**534**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 taken or are threatened, endangered or sensitive species. All "Other" animals are given in Appendix 1.

T – Target **NT** – (# T and NT species in group, # spp. is all species in group including T and NT)

Table 1b. The annual average number of target and nontarget animals captured with snap and spring quick-kill traps by WS in WDM activities from FY11 to FY15 throughout the United States

ANNUAL AVERAGE SPECIES TAKEN WITH SNAP AND SPRING (e.g., DOC 150-200-250) TRAPS				
SPECIES	TARGET		NONTARGET	
	Killed	Freed	Killed	Freed
Thirteen-lined Ground Squirrel	15	0	0	0
Round-tailed Ground Squirrel	63	0	0	0
Eastern Chipmunk	19	0	0.4	0
Prairie Vole	79	0	0	0
Meadow Vole	68	0	0.2	0
Woodland (*Pine*) Vole	15	0	0	0
North American Deer Mouse	72	0	0	0
White-footed Deer Mouse	48	0	0.8	0
House Mouse	18	0	0	0
Brown (*Norway*) Rat	27	0	0	0
Pacific (*Polynesian*) Rat*	163	0	0	0
Black Rat	219	0	0	0
Other Rodents (7T, 1NT – 8 spp.)	9	0	0.8	0
North American Least Shrew	14	0	0	0
Other Insectivores (5T, 1NT – 5 spp.)	6	0	1	0
Small Asian Mongoose	62	0	0	0
Other Predators (2T – 2 spp.)	3	0	0	0
Birds (10T, 7 NT – 14 spp.)	10	0	2	0
Snakes (2T, 1NT – 3 spp.)	0.6	0	0.2	0
SNAP/SPRING TRAP TOTAL (40T, 13 NT – 46 spp.)	**910**	**0**	**5**	**0**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 taken or are threatened, endangered or sensitive species. All "Other" animals are given in Appendix 1.

* Introduced Species **T** – Target **NT** – Nontarget (# T and NT species in group, # spp. is all species in group including T and NT)

Table 1c. The annual average number of target and nontarget animals captured with quick-kill, gopher/mole traps, by WS in WDM activities from FY11 to FY15 throughout the United States.

ANNUAL AVERAGE SPECIES TAKEN WITH GOPHER/MOLE TRAPS				
SPECIES	TARGET		NONTARGET	
	Killed	Freed	Killed	Freed
Yellow-faced Pocket Gopher	138	0	0	0
Plains Pocket Gopher	40	0	0	0
Botta's Pocket Gopher	200	0	0	0
Camas Pocket Gopher	272	0	0	0
Other Rodents (5T – 5 spp.)	8	0	0	0
Eastern Mole	17	0	0	0
Broad-footed Mole	0.2	0	0	0
Coast Mole	18	0	0	0
GOPHER/MOLE TRAP TOTAL (12T- 12 spp.)	**693**	**0**	**0**	**0**
AVE. ANIMALS TAKEN WITH ALL QUICK-KILL TRAPS	**21,130**	**3**	**923**	**534**
% TARGET AND NONTARGET SPECIES TAKEN	**93.5%**	**0.01%**	**4.1%**	**2.4%**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 taken or are threatened, endangered, or sensitive species. Other animals are given in Appendix 1.
T – Target **NT** – (# T and NT species in group, # spp. is all species in group including T and NT)

WS captured an annual average of 1,457 individual nontarget animals of 83 species and possibly 3 additional species unable to be identified (unknown turtle and fish species). The nontarget species were captured 99.7% of the time with rotating-jaw traps and 0.3% in snap traps from FY11 through FY15. Spring traps and mole/gopher traps did not capture any nontarget species. Of the nontarget species captured, reptiles accounted for 54.2% of the take, while mammals accounted for 43.5%, birds 1.9%, and amphibians and fish 0.4% (Tables 1a, 1b, and 1c).

The WS National Wildlife Research Center and other researchers have recently published studies on captive bolt trap use for invasive rats in Hawaii. As a result of a nontarget bird take, further research is being conducted to determine possible remedies to minimize or nullify nontarget take while maximizing target take. Modifications (e.g., bait type and mounting height) to prevent nontarget lethality of captive bolt traps found little impact on rodent kill rates. However, the addition of bird blockers did affect rodent kill rates (Crampton et al. 2022). Further research on bird blockers in captivity identified mounting heights and novel blocker designs for preventing nontarget deaths (Shiels et al. 2022b), but further research is needed. Nontarget take is minimal, so the trap could be used where sensitive species would not be taken.

2 HAZARDS

2.1 Human Health and Safety Hazards

Threats to human health and safety associated with quick-kill traps vary with trap size and the type of trap. For snap traps and rotating-jaw traps, injuries could range from cuts, bruises, or abrasions on fingers and hands to broken or fractured bones if a trap was accidentally sprung. Hazards associated with gopher and mole traps include cuts, bruises, and punctures to hands and feet. Injuries to the fingers or hand could occur if someone sprung the trigger inside a captive bolt trap. Safety hazards are usually related to setting, placing, checking, or removing the traps. Setting and removing quick-kill traps requires repeated bending, kneeling, and pounding and pulling stakes from the ground, which may lead to back sprains. Although quick-kill traps are designed to cause the rapid death of a target animal, on occasion, animals may be captured alive in the traps; therefore, removing animals from various traps may result in animal bites or scratches.

2.2 Environmental Hazards

Environmental hazards associated with quick-kill traps are associated with the unintentional lethal take of nontarget animals and the humaneness of the traps. By definition, quick-kill traps are rapidly lethal to most animals captured in them. Although intended to kill a target animal rapidly, quick-kill traps may unintentionally live-capture target and nontarget animals. If animals are live-captured, injuries and stress could occur. Injuries could range from cuts, bruises, abrasions, or broken bones. Some animals may struggle to escape, which may cause severe injuries. The stress and injuries that could occur to animals unintentionally live-captured in quick-kill traps would be similar to the stress and injuries experienced when live capture occurs in foothold traps (see Chapter IV Foothold Trap Risk Assessment; USDA 2019). If injuries were severe, WS personnel would euthanize those animals.

WS personnel may sometimes use lures and food attractants with quick-kill traps; however, relatively small quantities are used, and those attractants are not hazardous. For example, when conducting small rodent surveys at airports, WS personnel may place a small amount of peanut butter mixed with crimped oats or cracked, mixed grain on the trigger of the trap. Beavers use scent glands to mark their territories, which people can harvest and make into a lure. When using rotating-jaw traps, WS personnel can use those lures to attract beavers. For example, personnel may partially submerge a rotating-jaw trap in water and create a scent mound using a lure made from the scent glands of beavers. Therefore, food attractants and lures used to attract target animals would not be substances that would bioaccumulate in the environment, and those attractants would not cause environmental harm.

3 RISKS

3.1 Human Health and Safety Risks

Risks of human injury associated with using quick-kill traps are generally restricted to the users of these devices. However, the potential use of quick-kill traps in rural and urban environments results in exposure risks to the public. Risks to the public would primarily be restricted to property or resource owners, managers, or employees who receive assistance from WS that then tamper with or unknowingly encounter a quick-kill trap. The resource owner or manager would be made aware of the types of methods used by WS and the general location of those methods on the property they own or manage, reducing the risks to the public. Before using any method, the resource owner or manager requesting assistance would sign a work initiation document or another similar document, which would specify what methods the owner or manager would allow WS to use on the property, they own or manage. Therefore, the owner or manager would be aware of the methods WS could use to resolve their requests for assistance. WS personnel could also use quick-kill traps on public lands when requested and would discuss the use of such in work plan meetings. Under WS Directive 2.450, employees must post appropriate warning signs on the main entrances or commonly used access points to areas where employees are using rotating-jaw traps.

In addition, WS personnel that use rotating-jaw traps with a jaw spread greater than eight inches must use those traps in water sets (i.e., partially or completely submerged) unless a State Director approves exemptions on a case-by-case basis. State Directors may approve exemptions to this requirement when 1) the public cannot access the trapping location by road or by foot, 2) the use of other trapping tools and techniques has proven to be ineffective, or 3) must be in compliance with state and local ordinances and BMPs (see WS Directive 2.450).

Quick-kill traps are passive, mechanical devices that, if left undisturbed, would pose a minimal risk to the public. However, if people intentionally tamper with or unknowingly step on or in a quick-kill trap, depending on the style, injuries could occur. The public did not have any known injuries from quick-kill traps set by WS from FY06 to FY15.

WS field and office employees filed an annual average of 79 Office of Workmen's Compensation (OWCP) claims for strained backs, lacerations, animal bites, burns, and other injuries that occurred on the job from FY13 to FY15. Of these, 0.7 injuries annually were related to the use of quick-kill traps. The injuries included compression and contusion injuries to the hand. One resulted in an infected fingernail that was later treated. These injuries occurred while handling rotating-jaw traps in the field. From FY16 to FY20 0.6 injuries annually were related to the use of quick-kill traps. The injuries included contusion injuries to the hand due to rotating-jaw traps and incidental severe allergic reactions (e.g., hornets) while placing a rotating-jaw trap. Additionally, WS employees had an average of 19 injuries from activities such as falls, slips, twists, and repetitive motions that resulted in lacerations, sprains, contusions, strains, compression bruises, and fractures that were associated with field activities. However, the injury was not readily associated with any specific activity, such as setting quick-kill traps. Considering the number of employees (~1,900) in WS, these claims are relatively few for the number of hours spent afield (the OWCP claims from FY13 to FY15 also includes office employees and injuries such as carpal tunnel syndrome). Thus, risks of setting quick-kill traps are relatively minor to employees.

Typically, when using quick-kill traps most animals are killed, and injuries to WS personnel from animal bites are not a problem. WS personnel did have an annual average of 3 bites or injuries from handling live animals from FY13 to FY15. Most bites were associated with releasing an animal that was live captured using one of many different methods. Because several animals are released alive, especially turtles, a bite could occur while handling them. However, this is expected to be minimal because the bite ratio (quick-kill traps were not included) was 1 bite per 18,000 animals taken from all methods used by WS. Therefore, it is expected that a bite could occur with the use of quick-kill traps, but infrequently because quick-kill traps are lethal.

The use of all quick-kill traps by WS employees must comply with applicable federal, state, tribal, and local laws and regulations related to animal capture for managing wildlife damage in accordance with WS Directives 2.210 and 2.450. WS personnel can only use traps and trapping devices after the landowner or their designee grants WS the appropriate authorization by signing a work initiation document. All employees whose duties involve animal capture are encouraged to participate in a WS-approved trapper education course as recommended by the BMP guidelines (AFWA 2017b), which can help WS personnel identify and consider risks to human safety when conducting activities.

Injuries to WS personnel are negligible, with no reports of contact or injury to the public. When used correctly, quick-kill traps are relatively harmless to the public, especially in aquatic sets. WS will typically not use quick-kill traps on land in areas frequented by people. Quick-kill traps, such as rotating-jaw traps, can be submerged underwater when catching beaver. When near water with quick-kill traps, humans are expected to be cautious. The top of the trap is usually visible unless hidden by a dive stick, and detectable to people. In addition, WS employees must post appropriate warning signs on the main entrances or commonly used access points to areas where employees are using rotating-jaw traps.

3.2 Environmental Risks

WS recognizes that using quick-kill traps results in nontarget species take but strives to minimize this. The different sizes, shapes, and behaviors of the animals that WS personnel could target with quick-kill traps influence how those animals approach traps (AFWA 2017a, b). WS personnel enhance the selectivity of quick-kill traps by placement, trap size, trigger configurations, and baits. For example, when using rotating-jaw traps, personnel can reduce the risk of capturing nontarget animals by using recessed sets (i.e., placing a trap inside a cubby, cage, or burrow), restricting openings, or elevating traps. In another example, when targeting beavers, personnel can set rotating-jaw traps underwater to minimize risks to nontarget animals. Choosing appropriately sized traps for the target species can also exclude nontarget animals by preventing larger animals from entering and triggering the trap. WS personnel can also modify the trigger configurations of traps to minimize nontarget animal capture. For example, offsetting the trigger can allow nontarget animals to pass through rotating-jaw traps without capture.

WS recognizes that quick-kill traps do result in the death or injury of nontarget wildlife and domestic animals, with an annual average of 923 from FY11 to FY15 that could not be released. When using a quick-kill trap from FY11 through FY15, 93.5% of the animals captured were target animals (Table 1c). In addition, WS was able to release 2.4% of the nontarget animals captured in quick-kill traps from FY11 through FY15. Most nontarget animals captured in quick-kill traps are associated with conducting beaver damage management.

As for domestic animals from FY11 to FY15, an annual average of 2 feral cats, 0.6 feral dogs, and 0.2 feral ducks were killed by quick-kill traps. For the amount of work effort, this is a minimal number. Free-roaming dogs and cats are at the highest risk for being taken in a rotating-jaw set, especially dogs and cats that are active near water where WS is conducting activities associated with aquatic rodents; however, this is typically a minimal risk.

River otters are the nontarget species at the highest risk of being taken lethally in beaver damage management, especially as their population continues to increase nationally. AFWA (2016) recommendations to avoid capturing river otters when targeting beavers included:

- *Staying alert for the presence of river otter sign*
- *Be cautious about using traps sets at high probability river otter travel ways, particularly dam crossings, inlets and outlets to ponds/lakes, narrow streams and ditches that connect to other water bodies, crossover trails along shorelines, dikes, and culverts, and the entrances to inactive beaver bank dens or lodges*
- *Use baited beaver sets where possible*
- *Avoid using beaver lures that may attract river otters*
- *Consider the use of a "side-parallel" position for the trigger wires on rotating-jaw traps (moving the trigger as far as possible to one side of the trap)*
- *Consider the use of tension-adjustable triggers or two-way triggers (those that do not spring when pushed sideways*

Other trigger modifications may also reduce the risk of capturing otters, such as cutting or bending the trigger wires so they are only four or five inches long. However, Sundelius et al. (2021) found that offsetting the trigger of rotating-jaw traps did not completely prevent the unintentional capture of river otters. They recommend that entities discontinue using that approach to reduce the risk of capturing otters.

Captive bolt traps have their greatest utility for invasive rats, minks, and other small predators, especially on islands where threatened and endangered species are often present and impacted by the invasive animals. The take of a nontarget bird in trapping activities has caused researchers to attempt measures to exclude all nontarget animals while still capturing targeted rodents. WS will not use captive bolt traps where threatened, endangered, or sensitive species could be impacted unless the trap can be retrofitted with nontarget animal exclusion measures.

Quick-kill traps are mechanical methods that would not result in the bioaccumulation of chemicals in the environment.

4 UNCERTAINTIES AND CUMULATIVE EFFECTS

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

Cumulative impacts are not expected to occur to target and nontarget animals. However, cumulative impacts are addressed in National Environmental Policy Act documents such as WS (2016) and found to be not significant to any native population. WS also conducts Section 7 consultations, when appropriate, with the US Fish and Wildlife Service to ensure that T&E species are not impacted. 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 shows a significant level of take for any native species. From a human health perspective, using quick-kill traps in WDM will not have any known cumulative impacts.

5 SUMMARY

WS uses quick-kill traps as a component of an integrated approach to managing wildlife issues for several species of animals, including mammals, birds, and reptiles. WS works cooperatively with other natural resource agencies at the state, national and international levels to develop effective and humane trapping measures while minimizing risks to human health and safety and nontarget animals. Quick-kill traps pose a low risk to human health and safety and the environment, and their use is fairly selective for the targeted animals. Advancements in the design of quick-kill traps and the response time to handling animals that are not killed have resulted in more effective and humane trapping of target animals while dramatically reducing the potential for nontarget animal captures. WS will continue to support and conduct research that supports more humane and effective trapping methods and will implement these measures in activities, where appropriate, to further reduce risk to nontarget animals.

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7 PREPARERS

7.1 APHIS WS Methods Risk Assessment Committee

Writers for "Use of Quick-kill Traps in Wildlife Damage Management Risk Assessment":

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Editors/Contributors for "Use of Quick-kill traps in Wildlife Damage Management Risk Assessment":

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7.2 Internal Reviewers

USDA APHIS Wildlife Services

Reviewer: Gary Littauer
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Reviewer: Shelagh DeLiberto
Position: USDA-APHIS-WS Operational Support Staff, Environmental Management Coordinator, Fort Collins, CO
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Experience: Nineteen years of service in APHIS conducting wildlife research. Six years of experience in preparing categorical exclusions and environmental analyses in compliance with the National Environmental Policy Act.

7.3 Peer Review

The Office of Management and Budget requires agencies to have peer review guidelines for scientific documents. The APHIS guidelines were followed to have “Use of Quick-kill Traps in Wildlife Damage Management” peer reviewed. WS worked with the Association of Fish and Wildlife Agencies to have experts review the documents.

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

Kansas Department of Wildlife, Parks and Tourism
Oregon Department of Fish and Wildlife
West Virginia Division of Natural Resources

7.3.2 Comments

In addition to concerns with the risk assessment, peer reviewers provided editorial comments on the manuscript. These were appreciated and incorporated into the final document. Comments regarding concerns with the risk assessment and a response:

1. **Comment:** Without presenting a working definition of "body-gripping traps", the use of that phrase should be reevaluated as it is defined in some state regulations (e.g., California, Washington) to mean any trap that holds an animal (i.e., includes foothold traps). Similarly, the assessment's definition of "box traps" (p7) is useful, but more closely represents cubby or box-sets, whereas "box traps" are more commonly known to be cage live-traps.

   Response: We have edited the Risk Assessment to use body-gripping traps in conjunction with rotating-jaw traps (see Section 1.1), not as a stand-alone term. This will help clarify the meaning and eliminate confusion for states that use the term as a more all-encompassing phrase. We have changed the term "box trap" to "box set" similar to AFWA (2017a) Bodygrip traps on dryland: A guide to responsible use.

2. **Comment:** Outside of describing the common type of rotating-jaw traps, it appears that most places where "conibear" is used, the more general and consistent term of "rotating-jaw" could/should be used. For example, is it necessary to identify the brand of trap used (conibear) when addressing injuries from rotating-jaw traps (p8) or the use of submerged beaver traps(p8) or risk to domestic animals (p9)?

   Response: Although conibear is a brand of trap, some trappers refer to all rotating-jaw traps as conibears. We have changed the wording to rotating-jaw trap throughout unless specifically referencing the brand of trap.

3. **Comment:** Are the injuries reported for handling live animals (bites) for FY13 to FY15 specific to the use of quick-kill traps or across all activities? Regardless, one would assume animal-caused injuries for quick-kill traps are significantly lower when compared to live-traps and may be one of the safer tools available for WDM activities

   Response: The injuries reported for handling live animals (bites) for FY13-FY15 are not specific to the use of quick-kill traps. These injuries are across all WDM activities. We agree that animal-caused injuries for quick-kill traps may be lower compared to live-traps as well as other methods. However, WS did have 0.4 average injuries/year from FY16-FY20 associated specifically with quick-kill traps. We have updated that section to clarify this point.

4. **Comment:** Language for body grip traps is not consistent. The terms, body grip, body gripping, rotating jaw and conibear used interchangeably, may be confusing for some readers.

   Response: We have edited the Risk Assessment to make the terminology regarding body-grip traps more consistent.

5. **Comment:** AFWA did not determine the "best methods" for a species. AFWA provided recommendations based on available science.

   Response: We have edited this section to better reflect the goals of AFWA in development of the BMPs.

6. **Comment:** The term “snare” is not consistent with BMP terminology. Because snares or cable devices are not part of this assessment, including reference to these devices is puzzling.

   Response: We have removed the reference to snares in this section.

7. **Comment:** The terms private trapper and private fur trapper should be replaced with “experienced avocational trapper”

   Response: We have removed the sentences with the terms “private trapper and private fur trapper” from the Risk Assessment.

8. **Comment:** It should be noted that AFWA (2017b) BMPs referenced in the footnote on page 1 do not include killing traps or systems for all those species listed.

   Response: We have edited this section to identify the species that have BMPs for body-gripping traps.

9. **Comment:** Providing a statement concerning the development of BMPS based on coyote hybridization with wolves in the Eastern United States serves no purpose. AFWA does not draw any such conclusion in either published BMP for coyotes.

   Response: We have removed this statement from the Risk Assessment.

10. **Comment:** The term “box trap” in reference to a recessed set is confusing and not consistent with other sections in the document.

    Response: We changed the phrase “box trap” to “box set”, similar to language from AFWA (2017) Bodygrip traps on dryland: A guide to responsible use.

11. **Comment:** Beginning in first paragraph, page 1, these traps are referred to several times as “passive.” I would not consider them passive because they are spring powered and the trap kills the animal, the animal doesn’t kill itself in the trap (i.e., most snares are passive). The doc cited in #2 below refers to bodygrip traps as “mechanically powered.” At minimum, whatever makes these “passive” device needs defined.

    Response: The intention of the terminology “passive” is to indicate that the device does not move or attract the target in any way. These types of traps are set along paths traveled by the intended target and the target animal does not have to bite, push or pull a bait to activate the trap. We have included this explanation in the text.

12. **Comment:** End of first paragraph, the explanation of terminology should be unnecessarily. Body-gripping (see AFWA 2017a) trap is the common term for rotating-jaw furbearer traps (also see BMP docs, etc.). Even though several other traps “grip” the body, their common name is snap trap, etc., not body-gripping or bodygrip. I would call the furbearer traps bodygrip traps throughout, clarify that these are the rotating-jaw traps in the appropriate section (p2; other trap types are explained as well), and then remove unnecessary explanations of terminology.

    Response: We have edited the Risk Assessment to use bodygrip and rotating-jaw trap where appropriate. The explanation of terminology at the end of the introduction is necessary to describe the meaning of quick-kill traps in the context of this Risk Assessment.

13. **Comment:** Page 1, last paragraph, this sentence needs clarification: “AFWA determined the best methods by species, but primarily targeted harvest by private fur trappers and not take in WDM activities.” AFWA determined study design and trap types, but not trapping methods (Trappers used their own trapping methods; dirt hole, etc.). Consider: “Most trapping was conducted by private fur trappers during open harvest seasons rather than as part of WDM activities. Each trapper was

accompanied by a technician responsible for recording data and ensuring the AFWA study design was followed." I would move the reference to the species (2) down to where is says "24 furbearer species…"

Response: We have edited the Risk Assessment to better reflect the intention of AFWA in developing the BMPs.

14. **Comment:** Last 2 sentences of Page 1. Cite AIHTS and what is meant by "conducts research on different trapping."

    Response: We have removed this sentence from the Risk Assessment and edited this paragraph for clarification on AIHTS.

15. **Comment:** Middle Page 2, Section 1.1, move the definition currently at bottom of that paragraph to the first sentence: "Quick-kill traps are traps that are designed to close around or strike… They are available in a variety of designs…"

    Response: We have made this change to the section for clarity.

16. **Comment:** Page 2, Rotating-jaw traps, I would start this (and each consecutive trap type) by describing the trap, then describe function second. From the BMP Intro doc, they "are designed to kill an animal when two rotating jaws close on either side of the animal's neck or chest." This is really the key description. In addition to the jaws, the trap consists of one or two springs depending on the model, a dog, a trigger and safety latches on the larger models. The description of function provided is laborious and inaccurate. I wouldn't compare them to scissors (they don't cut) or refer to "arms", the dog doesn't "attach to the trigger" (the trigger disengages it from the jaw), etc. More concise terminology is needed. Something like: the trap is set by compressing the spring(s) and rotating both jaws so that the notch in the dog can be placed onto the opposite jaw over the trigger. The trap is sprung when an animal presses the trigger from either direction, thereby releasing the dog from the opposite jaw, which allows the springs to decompress, closing the jaws onto the animal.

    Response: We have edited this paragraph based on the reviewer's comments for clarity.

17. **Comment:** Last paragraph in that section, are you sure the Conibear is still the most popular, or is the cheaper Duke the most purchased today? In the description (first paragraph) would say they are often referred to as Conibear traps by trappers after their inventor, but Conibear is actually a specific brand of bodygrip trap. The trap size table is also incomplete (see Table 1 in 2017 AFWA bodygrip doc). At minimum, clarify that this is a partial list of available sizes (most popular?). Also note that 110 trap is missing bullet point.

    Response: We have edited this section to modify the statement about popularity and instead included language about the brands of traps and a comment about Conibear as suggested by the reviewer. We have also included language that clarifies the list is a partial list of common trap sizes used in WDM and not a comprehensive list of rotating-jaw traps.

18. **Comment:** Page 3 Snap traps, mole traps, etc. – note that the order of description varies by trap type. Be consistent for each trap type, describe name, overall purpose, sizes/models available, then function in that order. Description of function for each trap type needs reviewed for technical accuracy (is terminology and mechanical function accurate, are the trap component names accurate/used by the manufacturer? (hammer, etc.)). I would use springing or firing the trap rather than "trip" throughout the doc, as trip doesn't seem like a very technical term.

    Response: We have edited these sections to make the format within subsections more uniform. We have reviewed the technical accuracy of the terminology and the mechanical function of each trap. We have changed trip to trigger, or, sprung throughout.

19. **Comment:** How are hazards (Page 5) and risks different (Page 7)? And then you start out the hazards paragraph with "Threats…" These all seem the same to me. If this format not required, I would combine these into 1 section.

    Response: Hazards are the potential source of harm or danger, and risks are the possibility that something bad or unpleasant (e.g., a hazard) will happen. The format of this section is standard for a risk assessment and will not be changed.

20. **Comment:** Relative to human hazards and risks (both sections), you start out both human sections by stating all these risks which makes it sound like a threatening activity – which your own data indicates it's not. Instead, a more logical progression would be to state the actual events (which are more important), then cover the theoretical. And start out with a conclusive, over-arching statement (i.e., Threats to people by these traps are negligible). WS employees have experience few and minor injuries associated with the use of these traps. These are the injuries suffered. Other risks by those using the trap may include… There are no documented cases of injuries to bystanders. These are the risks they face…

    Response: Section 2 (Hazards) of this Risk Assessment identifies the potential hazards that could occur from WS use of quick-kill traps while Section 3 (Risks) discusses the likelihood of those hazards occurring along with use patterns, WS Directives, and other factors that can reduce the risks. The formatting for this Risk Assessment is the standard approach WS has taken with identifying and discussing the hazards and risks associated with the methods WS uses to conduct WDM.

21. **Comment:** "In extreme scenarios, a person could drown if a body-grip trap closes on both hands and the person falls into deeper water, especially if the person was wearing hip or chest waders, which is common when setting body-grip traps in water sets." Are you aware of this ever happening? If it has never before happened that you are aware, out of perhaps 100's of millions of trap nights over decades (fur trappers included), is it really a "risk?" I would delete from doc. Other examples of things that are possible but never known to have happened: Person slips while carrying 330, slams head through and dies; swimmer swims into 330 during summer job; 330 falls out of truck, car hits it, blows out tire causing it to hit bridge and killing everyone, etc.

    Response: WS is not aware of this particular scenario occurring to a WS employee. However, it is a potential hazard and is an example of the potential severity of hazards that could occur as a result of using the method. Hazards associated with the use of quick-kill traps can be relatively minor (e.g., scratches) to more serious (e.g., death from drowning). The other examples mentioned are also plausible and are inherent hazards that could occur during work duties; however, as discussed in Section 3, the likelihood of those hazards occurring are extremely low.

22. **Comment:** Environmental sections – Same order as above; What has happened, to what could happen. First paragraph has all these nondescript "could happen" events, when in fact WS widely uses very effectively (i.e. the target animal is usually humanely killed, and nontarget captures are rare), plus these traps pass BMPs. I would first focus on these things, then progress to the negatives that happen on rare occasion.

    Response: See response to Comment 20.

23. **Comment:** Second paragraph seems unnecessarily detailed. Why all the examples? You make your case with the first couple sentences and the last sentence

    Response: The examples included in the second paragraph of Section 2.2 help to illustrate the ways WS may use lures and food attractants in conjunction with quick-kill traps. We have condensed the examples in this paragraph providing one for each of lures and food attractants.

24. **Comment:** Is there a need at the beginning of this doc to state why quick-kill traps are preferable or necessary over live traps? For thoughts, perhaps see AFWA (2017b) bodygrip doc including Sidebar Page 5.

    Response: This statement has been removed from the Risk Assessment.

Comments received not requiring a response.

1. **Comment:** The document needs a complete editorial review for spelling and punctuation. However, the goal to assess the human health and ecological risks associated with the use of quick-kill traps, and the WS response to identify and minimize those risks and hazards, appears to have been be achieved.

2. **Comment:** I have reviewed the risk assessment and believe the methods described are adequate to achieve their purposes.

Peer reviewers provided editorial comments on the manuscript. These were appreciated and incorporated into the final document.

APPENDIX 1. "Other Species" Included in Tables

Table 1a. BODY GRIP TRAPS

Other rodents and rabbits = mountain beaver, black-tailed prairie dog, thirteen-lined ground squirrel, rock squirrel, porcupine, eastern gray squirrel, eastern fox squirrel, bushy-tailed woodrat, desert woodrat, brown rat, mountain cottontail, feral rabbit, and black-tailed jackrabbit.
Other predator = badger, black bear, bobcat, feral cat, coyote, feral dog, long-tailed weasel, short-tailed weasel, least weasel, marten, fisher, arctic fox, gray fox, western spotted skunk.
Other mammals = armadillo, feral swine, white-tailed deer.
Birds = European starling, common grackle, Eurasian collared-dove, Canada goose, trumpeter swan, wood duck, American black duck, feral domestic and wild mallard, blue-winged teal, green-winged teal, common merganser, hooded merganser, red-breasted merganser, American crow, northwestern crow, common raven, Cooper's hawk, red-tailed hawk, barn owl, burrowing owl, pied-billed grebe, double-crested cormorant, American bittern, great blue heron, American coot, Virginia rail, and wild turkey
Other reptiles = southern painted turtle, false map turtle, river cooter, Texas cooter, alligator snapping turtle, common musk turtle, smooth softshell turtle, spiny softshell, unidentified turtle (SC – chicken turtle, pond slider, river cooter, and spiny softshell), and gophersnake
Other fish = bowfin, common carp, white sucker, black bullhead, yellow bullhead, brown bullhead, channel catfish, largemouth bass, and unidentified fish (SC -shortnose sturgeon, Atlantic sturgeon$^{T\&E}$ (not likely because lives in deep waters), longnose gar, bowfin, common carp, grass carp, spotted sucker, lake chubsucker, white catfish, brown bullhead, yellow bullhead, striped bass, and largemouth bass)

Table 1b. SNAP/SPRING TRAP

Other rodents = eastern gray squirrel, red squirrel, Mexican ground squirrel, Richardson's ground squirrel, California vole, northern red-backed vole, Ord's kangaroo rat, and eastern woodrat,
Other insectivores = American pygmy shrew, cinereus (masked) shrew, Elliott's short-tailed shrew, northern short-tailed shrew, and eastern mole.
Other predators = feral cat and short-tailed weasel
Birds = European starling, brown-headed cowbird, rock pigeon*, mourning dove, golden-fronted woodpecker, northern flicker, eastern phoebe, California towhee, eastern towhee, savannah sparrow, gray catbird, American robin, house finch, and house sparrow*
Snakes = common gartersnake, gophersnake, and common kingsnake

Table 1c. GOPHER/MOLE TRAPS

Other rodents = Mexican ground squirrel, desert pocket gopher, Texas pocket gopher, northern pocket gopher, and western pocket gopher

APPENDIX 2. WS Quick-kill Take Data for FY16-FY20.

Data for FY16-FY20 is available and given as an update to the FY11-FY15 data. Take remained about the same for the two five-year averages.

Table 1a. The annual average take of target and nontarget animals by WS in wildlife damage management throughout the United States for FY16-FY20 with rotating-jaw traps (e.g., body-gripping traps).

ANNUAL AVERAGE SPECIES TAKEN WITH ROTATING-JAW TRAPS				
SPECIES	TARGET		NONTARGET	
	Killed	Freed	Killed	Freed
American Beaver	14,982	0.2	1	0
Muskrat	337	0	147	1
Nutria	459	0	7	0
Woodchuck	701	0	0	0
Yellow-bellied Marmot	115	0	0	0
California Ground Squirrel	156	0	1	0
Richardson's Ground Squirrel	89	0	0	0
Brown (Norway) Rat	32	0	0	0
Black Rat	12	0	0.2	0
Desert Cottontail	112	0	0	0
Other Rodents & Rabbits (8T, 5NT – 10 spp.)[1]	18	0	4	0
Virginia Opossum	26	0.2	2	0
Small Asian Mongoose	41	0	0	0
River Otter	94	0.2	461	11
Raccoon	54	0	44	0.4
Striped Skunk	63	0	3	0
Other Predators (8T, 9NT – 12spp.)[1]	22	0	5	0.4
Other Mammals (1T, 2NT – 2spp.)[1]	5	0	2	0
Birds (2T, 17NT – 18 spp.)[1]	1	0	28	0.4
American Alligator	0	0	10	4
Pond Slider	0	0	21	26
Northern Painted Turtle	0	0	10	7
Common Snapping Turtle	6	4	338	503
Other Reptile (1T, 11NT, 11 spp. + Unid.MS/NC/SC turtles)	0	0.2	6	4
American Bullfrog	0	0	0.4	0
Fish (13NT, 13 spp. + Unidentified NC/SC fish)	0	0	9	2
BODY GRIP TOTAL (36T, 71NT – 86 spp.)	**17,325**	**5**	**1,100**	**559**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 taken or are threatened, endangered or sensitive species. All "Other" animals are given below.

***** Introduced Species **T** – Target **NT** – (# T and NT species in group, # spp. is all species in group including T and NT)

Other rodent and rabbit = eastern fox squirrel, rock squirrel, thirteen-lined ground squirrel, bushy-tailed woodrat, eastern woodrat, house mouse*, North American porcupine, snowshoe hare, eastern cottontail, and swamp rabbit.

Other predator = bobcat, house cat*, coyote, domestic dog*, red fox, swift fox, gray fox, arctic fox, black bear, fisher, mink, badger.

Other mammal = nine-banded armadillo and feral swine*

Birds = Canada goose, trumpeter swan, wood duck, mallard, northern pintail, blue-winged teal, cinnamon teal, green-winged teal, common merganser, hooded merganser, double-crested cormorant, great blue herons, pied-billed grebe, belted kingfisher, American crow, house sparrow*, white-crowned sparrow, and California towhee.

Other reptiles = banded watersnake, cottonmouth, eastern box turtle, wood turtle, Blanding's turtle, Ouchita map turtle, river cooter, common musk turtle, smooth softshell turtle, and spiny softshell turtle.

Fish = bowfin, freshwater drum, long-nosed gar, common carp*, northern hogsucker, river redhorse sucker, white sucker, brown bullhead, yellow bullhead, channel catfish, flathead catfish, largemouth bass, and rock bass.

Table 1b. The annual average number of target and nontarget animals captured with snap and spring quick-kill traps by WS in WDM activities from FY16 to FY20 throughout the United States.

ANNUAL AVERAGE SPECIES TAKEN WITH SNAP AND SPRING (e.g., DOC 150-200-250) TRAPS				
SPECIES	TARGET		NONTARGET	
	Killed	Freed	Killed	Freed
Round-tailed Ground Squirrel	77	0	0	0
Eastern Chipmunk	24	0	0	0
Prairie Vole	87	0	0	0
Meadow Vole	68	0	0	0
North American Deermouse	29	0	0	0
White-footed Deermouse	136	0	0	0
Cactus Deer mouse	19	0	0	0
White-toothed Woodrat	24	0	0	0
House Mouse*	218	0	0	0
Brown (*Norway*) Rat*	100	0	0	0
Pacific (*Polynesian*) Rat*	50	0	0	0
Black Rat*	325	0	0	0
Other Rodents/Rabbits (18T, 2NT – 19 spp.)	36	0	3	0
North Short-tailed Shrew	14	0	0	0
Other Insectivores (6T– 6 spp.)	20	0	0	0
Small Asian Mongoose*	126	0	0	0
Other Predators (2T – 2 spp.)	1	0	0	0
Birds (9T, 11 NT – 19 spp.)	12	0	6	0
Reptiles (1T, 2NT – 3 spp.)	0.4	0	0.4	0
Amphibians (2NT – 2 spp.)	0	0	0.4	0
SNAP/SPRING TRAP TOTAL (50T, 17 NT – 65 spp.)	**1,366**	**0**	**7**	**0**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 taken or are threatened, endangered or sensitive species. All "Other" animals are given below.

* Introduced Species **T** – Target **NT** – Nontarget (# T and NT species in group, # spp. is all species in group including T and NT)

Other rodents/rabbits = eastern gray squirrel, red squirrel, California ground squirrel, rock squirrel, thirteen-lined ground squirrel, white-tailed antelope squirrel, Harris's antelope squirrel, least chipmunk, Arizona pocket mouse, Botta's pocket gopher, Merriam's kangaroo rat, Ord's kangaroo rat, woodland vole, montane vole, southern red-backed vole, California deermouse, meadow jumping mouse, eastern cottontail, and desert cottontail

Other insectivores = star-nosed mole, American pygmy shrew, cinereus shrew, Elliot's short-tailed shrew, North American least shrew, and vagrant shrew

Other predators = short-tailed weasel and striped skunk

Birds = Gambel's quail, feral chicken*, rock pigeon*, spotted dove*, acorn woodpecker, downy woodpecker, northern flicker, black-capped chickadee, northern mockingbird, European starling*, common myna*, house sparrow*, common waxbill*, house finch, common yellowthroat, savannah sparrow, song sparrow, white-crowned sparrow, and California towhee

Snakes = western fence lizard, northern watersnake, and common gartersnake

Amphibian = American toad and Colorado River toad

Table 1c. The annual average number of target and nontarget animals captured with quick-kill, gopher/mole traps, by WS in WDM activities from FY16 to FY20 throughout the United States.

ANNUAL AVERAGE SPECIES TAKEN WITH GOPHER/MOLE TRAPS				
SPECIES	**TARGET**		**NONTARGET**	
	Killed	**Freed**	**Killed**	**Freed**
Yellow-faced Pocket Gopher	395	0	0	0
Plains Pocket Gopher	28	0	0	0
Botta's Pocket Gopher	140	0	0	0
Camas Pocket Gopher	105	0	0	0
Western Pocket Gopher	188	0	0	0
Other Rodents (3T, 1NT – 4 spp.)	1	0	0.2	0
Moles (2T, 1NT – 2 spp.)	9	0	0.4	0
GOPHER/MOLE TRAP TOTAL (10T, 2NT- 11 spp.)	**866**	**0**	**1**	**0**
AVE. ANIMAL TAKE FOR ALL QUICK-KILL TRAPS	**19,557**	**5**	**1,108**	**534**
% TARGET AND NONTARGET SPECIES TAKEN	**92%**	**>0.01%**	**5%**	**3%**

[1] Individual accounts of species are only given for those species that had an annual average of more than 10 taken or are threatened, endangered, or sensitive species. Other animals are given below.

***** Introduced Species **T** – Target **NT** – (# T and NT species in group, # spp. is all species in group including T and NT)

Other rodent = rock squirrel, Mexican ground squirrel, thirteen-lined ground squirrel, and California vole
Moles = eastern mole, Townsend's mole,