Animal Welfare Institute

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Testimony in Support of Canyon's Law (H.R. 4951)
Submitted to the House Committee on Natural Resources
Subcommittee on Water, Oceans and Wildlife

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The Animal Welfare Institute ("AWI") thanks Chairman Huffman, Ranking Member Bentz, and the members of the Water, Oceans and Wildlife Subcommittee for conducting a hearing on Canyon's Law (H.R. 4951). We appreciate the opportunity to provide testimony in support of this important legislation, sponsored by Representative Peter DeFazio. Canyon's Law would prohibit the use of M-44 sodium cyanide ejector devices ("M-44s"), also known as "cyanide bombs", on lands owned and managed by the National Park Service, the U.S. Fish and Wildlife Service, the Bureau of Land Management, the Bureau of Reclamation, and the U.S. Forest Service.

The U.S. Department of Agriculture's Wildlife Services program, which conducts wildlife damage management in states across the country ("Wildlife Services"), kills thousands of animals each year using M-44s, both intentionally and unintentionally. M-44s are primarily used to target and kill coyotes (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), and wild dogs, though the device is occasionally used to target gray wolves as well. M-44s are spring-loaded, screwed or pushed into the ground, and topped with scented bait to lure animals to bite. Once the animal's teeth clench on the bait, a spring shoots a pellet of sodium cyanide into the animal's mouth.[1] The sodium cyanide combines with available moisture, including saliva, to produce hydrogen cyanide gas, which is readily absorbed by the lungs and poisons the animal by inactivating an enzyme essential to mammalian cellular respiration.[2] This leads to central nervous system depression, cardiac arrest, respiratory failure, and death.[3]

However, an animal may be exposed to a sublethal dose either due to M-44 malfunction or if the animal were close to, but downwind from, an M-44 triggered by another animal. According to the USDA, chronic or sublethal exposure to hydrogen cyanide gas include: "uncontrolled body

[1] For a history of the development and deployment of M-44s, *see* Blom, F.S. and G. Connolly, Inventing and Reinventing Sodium Cyanide Ejectors: a technical history of coyote getters and M-44s in predator damage control, U.S. Dept. of Agric. (2003).

[2] U.S. Fish & Wildlife Service, *Biological Opinion: Effects of 16 Vertebrate Control Agents on Endangered and Threatened Species*, II-73 (1993) [hereinafter "1993 Biological Opinion"]. Available at: https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/PB96172671.xhtml.

[3] *Id.*; Egekeze, J.O. and F.W. Oehme, Cyanides and their Toxicity: a literature review, 2 Veterinary Quarterly 104 (1980); Hooke, A. L., L. Allen, and L. K. P. Leung. 2006. Clinical signs and duration of cyanide toxicosis delivered by the M-44 ejector in wild dogs. Wildlife Research 33:181-185.

movement and increased urination (Towill et al. 1978). A common sublethal symptom in coyotes is vomiting (Blom and Connolly 2003). A [Wildlife Services] biologist observed partial paralysis in coyotes exposed to a sublethal dose of NaCN, with speculation that a lack of oxygen to the body's tissues caused damage to the lower spinal cord or some part of the brain (Blom and Connolly 2003)."[4]

AWI opposes the use of M-44s for five primary reasons: (1) These devices pose a high risk to humans, companion animals, and non-target wildlife; (2) Effective non-lethal wildlife management options are available to reduce predator-livestock conflicts; (3) Carnivores play a vital role in ecosystems that is undermined by lethal management; (4) M-44s are being used in violations of labeling requirements; and (5) Public opinion opposes the continued use of these devices.

I. M-44s Threaten the Health and Safety of Humans and Companion Animals.

M-44s pose a significant danger to the health and safety of both humans and companion animals. Over the past 20 years there have been dozens of reported instances of human and companion animals' exposure to sodium cyanide as a result of contact with M-44s, involving at least 26 Wildlife Services employees and 18 members of the public.[5] Additionally, from 2010 to 2016, more than 415 dogs were killed by M-44s.[6] The Humane Society of the United States obtained the following data on M-44 exposure of members of the public from a Freedom of Information Act request to the EPA and other sources. This is not an exhaustive list of incidents.

- In 1994, in Oregon, Amanda Wood Kingsley was exposed to sodium cyanide after her dog triggered an M-44 on her private property. Ms. Wood suffered secondary poisoning after she gave her dog mouth-to-mouth resuscitation.

- In 1998, in Texas, Bill Guerra Addington was exposed to an M-44. He documented his encounter: "I noticed what appeared to be a rusted rod sticking out of the ground about 15 ft from the watering tank . . . . I bent over to pull the rod out of the ground. After I grabbed the top and moved the 'metal rod' back and forth to remove it from the ground, it exploded in my hand . . . . I looked at my hand and saw it was all cut up and burned, and there was yellow powder all over it. The yellow powder was even burnt into the burns and cuts on my hand. My hand was bleeding and was starting to swell from the explosion trauma . . . I was

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[4] U.S. Department of Agriculture. 2019. The use of sodium cyanide in wildlife damage management. Chapter VII in Human Health and Ecological Risk Assessment for the Use of Wildlife Damage Management Methods by USDA-APHIS-Wildlife Services. Available at: ttps://www.aphis.usda.gov/wildlife_damage/nepa/risk_assessment/RA7%20Sodium%20Cyanide%20-%2 0 amended%20-%20Peer%20Reviewed.pdf.

[5] See USDA, Human Health and Ecological Risk Assessment for the Use of Wildlife Damage Management Methods by USDA-APHIS-Wildlife Services, Ch. VII: The Use of Sodium Cyanide in Wildlife Damage Management (Oct. 2019), p. 22. Available at: https://www.aphis.usda.gov/wildlife_damage/nepa/risk_assessment/7-sodium-cyanide-amended-peer-reviewed.pdf; see also Tom Knudson, The Killing Agency: Wildlife Services' Brutal Methods Leave a Trail of Animal Death, THE SACRAMENTO BEE (Apr. 29, 2012). Available at: https://law.lclark.edu/live/files/18173-the-killing-agency-wildlife-services-brutal.

[6] Kadaba, D. (2017). The big picture: Cyanide killers. USDA's Wildlife Services kills thousands of animals a year with exploding cyanide capsule. Available at: http://therevelator.org/big-picture-cyanide-killers/.

puzzled why a 'coyote getter' would be on our private land . . . . The pain was really bad for about 2 hours. My hand healed slowly. I had a yellow palm for five or six months."

- On March 3, 1999, while irrigating his farm in Crawford, Colorado, along with his three-year-old daughter and his dog, Paul Wright witnessed his dog's death after the dog triggered an M-44 illegally placed on Mr. Wright's private property. A lawsuit was filed February 2000 in federal court and the matter settled in 2001 for $10,000.

- In December of 1999, a private landowner tried to remove an M-44 placed on property that he was leasing and accidentally triggered the device. He tasted the poison and his wife drove him to the hospital, where he received medical attention.

- In November of 2002, a woman accidentally triggered an M-44 device placed on her property. She experienced increased respiratory rate and eye irritation but was able to drive herself to the hospital.

- On March 12, 2002, a Wildlife Services specialist transported set M-44s in his truck. He reached for bait, triggering one. The cyanide caused his eyes to burn and he had a bad taste in his mouth. He drove to a stock tank to fill an eye flush bottle which "increased exposure time." He went to an emergency room for treatment.

- On May 3, 2003, Dennis Slaugh, while recreating on federal public land in Utah, triggered an M-44. He thought he was brushing off an old survey stake. The device fired onto his chest, and according to a letter written by his wife to Rep. Peter DeFazio, the powder hit his face and went into his eye. He immediately experienced disorientation and was unable to speak. He reports being severely disabled ever since this encounter with cyanide. A blood test found cyanide poisoning. The EPA wrote: "He stated he was unable to work since the incident because of difficulty breathing, vomiting, and weakness." According to his wife, he suffered for many years and had his life cut short because of the incident.[7]

- On February 21, 2006, U.S. Fish and Wildlife Service biologist Sam Pollock was secondarily poisoned from handling his dog, Jenna, who was lethally asphyxiated by an M-44 illegally set by Wildlife Services to kill coyotes on U.S. Bureau of Land Management land in Utah. Pollock became ill with a headache and faintness, and noticed a metallic taste in his mouth.

- In April 2006, Sharyn and Tony Aguiar's two-year-old German shepherd was killed at a rock quarry in Utah. In a June 21, 2006 internal memorandum to colleagues, then-Utah State Director of Wildlife Services Michael J. Bodenchuk, wrote: "After investigation of the M-44 device in this case followed all applicable laws, regulations and policies and no negligence occurred on our part. It is unfortunate that a dog was killed in this area. I have concerns about the government settling cases with dog owners because it is all too easy for someone to intentionally take a dog into an area posted with signs with the intention of getting the dog killed. I recommend against settling this claim."

[7] Available at: https://www.predatordefense.org/docs/m44_letter_Slaugh_DeFazio.pdf

- On December 23, 2006 a coyote hunter, who had been "calling" coyotes in Utah, sat down near a device that he had not detected. Moments later, his dog pulled the M-44 and died.

- Another incident involved a woman who was exposed to sodium cyanide after trying to resuscitate her dog, who died from an M-44 set on her land without her permission.[8] She tasted the poison and felt disoriented. Over the next several months she experienced tingling in her arms and insomnia.

- On May 17, 2007, a Texas man spraying mosquitoes in an oil field "kicked or stepped" on an M-44 and cyanide was "ejected into his eyes" and he suffered "irritation" and "burning" and was admitted to a hospital. In his Brazoria County Sheriff report, Officer Shanks reports that the victim drove himself to a small business where a woman found him disoriented and asking for help. Officer Shanks was ordered to "go home immediately and take a shower"; he writes: "I informed everyone on the scene who came into contact with the victim to shower immediately also."

- On February 16, 2011, a border patrol agent in Kinney County, Texas kicked an M-44 and then pulled it with his gloved hand, which discharged the device. The agent then read a "nearby M-44 individual device warning sign" and called an ambulance and went to the hospital for medical attention.[9]

- On March 11, 2017, in Casper, Wyoming, two dogs on a family hike died after exposure to sodium cyanide placed for coyotes on unmarked public lands. The family members were also exposed to sodium cyanide when they tried to save their dogs by washing them in a creek and when they hugged and kissed their dying pets.[10]

- On March 13, 2017, in Pocatello, Idaho, 14-year-old Canyon Mansfield walked up a hill from his house. He found an M-44 and thought it was a sprinkler. He pulled it and the poison caused his dog, Casey, to convulse, asphyxiate, and die within minutes of the device being activated.[11] Canyon and the sheriff's deputy who came to investigate were both hospitalized for cyanide exposure. This incident received considerable public attention both nationally and internationally. Canyon was seriously ill following his exposure to cyanide.

Several other reported incidents include pesticide applicators who were poisoned while setting M-44 devices. For example, in May 2001, an applicator accidentally triggered a device. He experienced temporary blindness in one eye, as well as blisters on his tongue and lips. He went to the emergency room to receive medical attention. In January 2002, an applicator accidentally triggered a device and the sodium cyanide capsule hit his face and eye. He flushed his eyes and

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[8] Available at: https://www.predatordefense.org/docs/m44_letter_Kingsley_DeFazio_01-09-07.pdf
[9] Adkins, C. and K. Nokes, Petition to Cancel Registrations of M-44 Cyanide Capsules (Sodium Cyanide) 15 (2017). Available at: https://biologicaldiversity.org/campaigns/carnivore_conservation/pdfs/M44NationwidePetition_08-10-2017.pdf.
[10] Available at: http://www.predatordefense.org/features/m44_WY_Amy_dogs.htm
[11] Available at: https://www.predatordefense.org/docs/m44s_canyons_story.pdf.

went to the hospital for medical attention. In March 2002, an applicator accidentally triggered an M-44 when he reached into a bucket in his vehicle that held the assembled device. He experienced burning of his eyes and could taste the poison, and he drove himself to the emergency room, where he received medical assistance. In April 2005, an applicator accidentally triggered the device while installing it and then administered the antidote. In January 2007, an applicator in Oklahoma triggered an M-44. He experienced eye irritation and disorientation but was able to administer the antidote and drive himself to the hospital. In November 2008, an applicator accidentally triggered the device and the sodium cyanide capsule hit him in the face. After tasting the poison, he administered the antidote and went to the hospital for medical attention.[12]

Additionally, from 2010 to 2016, more than 415 dogs were killed by M-44s.[13] In 2016 alone, Wildlife Services admitted to unintentionally killing seven domestic animals with M-44s.[14] In addition, in 2016, Wildlife Services reported unintentionally killing 22 dogs that were classified as feral, free-ranging or hybrids.[15] Some of these dogs may have been family dogs running off-leash. For a more complete list of incidents involving the poisoning deaths of dogs, see: https://www.predatordefense.org/docs/m44_incidents_pet_killings_human_poisonings.pdf.

As demonstrated by the list above, M-44s put people and companion animals at unreasonable risk of being severely injured, or even killed. These incidents highlight the danger of this pesticide, and the inappropriateness of its continued use on public lands.

II. M-44 Use Threatens Non-Target Wildlife.

Over the decades that they have been in use, M-44s have poisoned and killed thousands of non-target wild animals, including federally protected threatened and endangered species.[16] The U.S. Department of Agriculture's Animal Damage Control program[17] recorded 103,255 animals killed by M-44s between 1976 and 1986, including 4,868 non-target animals (representing approximately 5 percent of all animals killed).[18] The non-target species killed during this timeframe included black bears, mountain lions, badgers, kit and swift foxes, bobcats, ringtail cats, feral cats, skunks, opossums, raccoons, Russian boars, feral hogs, javelinas, beavers, porcupines, nutrias, wild turkeys, rabbits, vultures, ravens, crows, hawks, and a grizzly bear, amongst others.[19]

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[12] *Id.* at 16.
[13] Kadaba, D. (2017). The big picture: Cyanide killers. USDA's Wildlife Services kills thousands of animals a year with exploding cyanide capsules. Retrieved from http://therevelator.org/big-picture-cyanide-killers/.
[14] U.S. Dep't of Agriculture, Wildlife Services, Program Data Report G – 2016 Animals Dispersed/Killed or Euthanized/Removed or Destroyed/Freed. Available at: https://www.aphis.usda.gov/wildlife_damage/pdr/PDRG_Report.php?fy=2016&fld=KILLED_EUTH&fld_val=0.
[15] *Id.*
[16] Kerley, G.I.H., Wilson, S.L. & Balfour, D. (Eds) 2018. Livestock Predation and its Management in South Africa: A Scientific Assessment. Centre for African Conservation Ecology, Nelson Mandela University, Port Elizabeth; Mudder, T,I., and Botz, M.M. 2004. Cyanide and society: a critical review. The European Journal of Mineral Processing and Environmental Protection, 4(1): 62-74.
[17] The Animal Damage Control Program was the predecessor to APHIS-Wildlife Services.
[18] 1993 Biological Opinion at II-74; G. Connolly, M-44 Sodium Cyanide Ejectors in the Animal Damage Control Program, 1976-1986, Proceedings of the Thirteenth Vertebrate Pest Conference (1988).
[19] 1993 Biological Opinion at II-74; Eisler, R., Cyanide Hazards to Fish, Wildlife, and Invertebrates: a synoptic review, 85 Biological Report 6 (1991).

Between 2003 and 2007, M-44s killed 68,044 animals, including both target and non-target species.[20] Non-target species killed during this time include bald eagles, marmots, badgers, black bears, dogs, kit and swift foxes, opossums, raccoons, feral hots, javelinas, ravens, ringtail cats, skunks, wolves, and bobcats.[21] For a more detailed list of both target and non-target species killed during this timeframe, see Table 12,[22] below:

Table 12 USDA-APHIS-WS M-44 Mortalities (2003 to 2007)						
	2003	2004	2005	2006	2007	TOTAL
Badgers	4	3	0	0	0	7
Bald Eagle	1	0	1	0	0	2
Black Bears	1	0	4	2	1	8
Bobcats	1	5	15	1	3	25
Coyotes	13,275	10,630	11,569	12,564	12,871	60,909
Crows	0	0	4	0	2	6
Dogs	108	117	92	112	90	519
Foxes, Gray	527	277	301	450	610	2,165
Foxes, Kit	27	29	25	24	10	115
Foxes, Red	494	387	353	394	368	1,996
Foxes, Swift	16	19	8	24	27	94
Hogs (Feral)	7	4	7	9	10	37
Javelinas	2	0	2	0	0	4
Marmots	0	1	0	0	0	1
Opossums	83	96	64	113	54	410
Raccoons	331	291	218	198	189	1,227
Ravens	4	7	2	2	3	18
Ringtails	4	1	2	1	0	8
Skunks, Striped	167	113	59	76	34	449
Wolves, Gray	1	0	0	1	2	4
TOTAL	**15,053**	**11,980**	**12,726**	**13,971**	**14,274**	**68,004**

According to Wildlife Services' data, from 2010-2016, over 2,600 animals were unintentionally taken by M-44s.[23] Wildlife Services' 2016 data shows that 321 animals were unintentionally killed by M-44s in that year alone,[24] including 101 gray fox, 61 red fox, 57 raccoons, one black bear, one

[20] Keefover-Ring, W., Report to President Barack Obama and Congress 53 (2009). Available at: http://pdf.wildearthguardians.org/support_docs/report-war-on-wildlife-june-09-lo.pdf.
[21] *Id.*
[22] *Id.*
[23] U.S. Dep't of Agriculture, Wildlife Services, 2016 Program Data Reports. Available at: https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/sa_reports/sa_pdrs/ct_pdr_home_2016.
[24] U.S. Dep't of Agriculture, Wildlife Services, *Program Data Report G – 2016 Animals Dispersed/Killed or Euthanized/Removed or Destroyed/Freed*. Available at: https://www.aphis.usda.gov/wildlife_damage/pdr/PDR-G_Report.php?fy=2016&fld=state&fld_val=CO

fisher, and seven domestic animals, including family dogs.[25]

In 2017, Wildlife Services reports that it killed at least 13,232 animals with M-44s, over 200 of which were non-target animals, including 110 foxes, a gray wolf, 48 raccoons, 21 opossums, and more.[26] In more recent data, from 2018-2021, 966 animals were unintentionally taken by M-44s, including 680 gray foxes, 166 raccoons, 59 red foxes, 26 Virginia opossums, 12 dogs characterized as feral, free-ranging and hybrids, nine feral swine, seven skunks, three black bears, and two ravens.[27] For example, M-44s killed 217 non-target animals in 2018, including 130 gray fox, 63 raccoons, seven Virginia opossums, four red foxes, four striped skunks, four feral swine, three kit foxes, one swift fox, and one black bear.[28]

M-44s have unintentionally killed threatened and endangered species, including Grizzly bears, California condors, kit foxes, wolves, and other species protected under the Endangered Species Act (ESA).[29] Specifically, in 1978 a threatened grizzly bear in Montana died from an M-44. In 1983, an endangered California condor died from an M-44 in Kern County, California.[30] In 1995, an endangered wolf in the panhandle of Idaho died from an M-44 set for coyotes. A threatened grizzly bear was killed in Montana in 1998.[31] In March of 2001, an endangered wolf died from an M-44 in South Dakota.[32] Two years later, in March of 2003, another wolf died in an undisclosed location.[33] In March of 2005, a bald eagle, protected under the ESA at that time, died from an M-44 in McHenry County, North Dakota. In 2006, one wolf died, and in January of 2007, two wolves died from M-44s in Idaho near Riggins. In December of 2008, an endangered wolf was killed from an M-44 north of Cokeville, Wyoming, in Lincoln County.[34] In May of 2013, a federally protected bald eagle died from an M-44 in Richland County, North Dakota.[35] Between 2003 and 2014, 200 kit foxes were killed by M-44s.[36] More recently, in February 2017, a gray wolf died in northeastern Oregon from an M-44 used by Wildlife Services to target coyotes.[37] The incidents detailed here do

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[25] *Id.*
[26] *Id.*
[27] U.S. Dep't of Agriculture, Wildlife Services, 2018-2021. *Program Data Report G – Animals Dispersed/Killed or Euthanized/Removed or Destroyed/Freed*. Available at: https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/sa_reports/sa_pdrs
[28] U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Program Data Reports, Program Data Report G, Animals Killed or Euthanized*, available at* https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/pdr/?file=PDR-G_Report&p=2018:INDEX: (last visited Feb. 17).
[29] 1993 Biological Opinion at II-74.
[30] Eisler, R., Cyanide Hazards to Fish, Wildlife, and Invertebrates: a synoptic review, 85 Biological Report 6 (1991).
[31] Keefover-Ring, W., Report to President Barack Obama and Congress 53 (2009). Available at: http://pdf.wildearthguardians.org/support_docs/report-war-on-wildlife-june-09-lo.pdf.
[32] Nationwide Wildlife Deaths Caused by M-44s, 2003-2014. Available at: https://www.predatordefense.org/docs/M44_Kill_Data.pdf.
[33] *Id.*
[34] *See id.*
[35] *Id.*
[36] *Id.*
[37] Wolves throughout the State of Oregon are considered "a special status game mammal, protected by the Oregon Wolf Plan." Oregon Dep't of Fish & Wildlife, *Frequently Asked Questions about Wolves in Oregon*. Available at: http://www.dfw.state.or.us/Wolves/faq.asp; Oregon Dep't of Fish & Wildlife, *Press Release: Wolf Dies in*

not include other protected non-endangered wildlife, such as state-listed or "special concern" species, killed by M-44s.

Such verified non-target wildlife deaths almost certainly underestimate the total number of non-target species impacted because the likelihood of locating the carcass of a non-target species is low, as they can die some distance from the M-44 device.[38] Moreover, other animals killed by M-44s may be found but not reported, especially small birds and small mammals. The number of federally-protected animals killed by M-44s is also likely underrepresented as these incidents only reflect deaths reported to the EPA. This is supported by the fact that one-third of the time that M-44s fire, no bodies are recovered (9,759 out of 24,059 total firings in a five-year period).[39] Yet "[o]nce the device is activated and the animal exposed, the likelihood of mortality is high."[40] Therefore, for those firings, it is likely the exposed animals wandered off-site and died, or died and were moved off-site by scavengers.[41]

This potential for high non-target mortality is supported by Shivik et al. (2014), who in their study examining visitation rates to sites where M-44s had been installed, documented coyotes visiting the sites 34 times and investigating the devices 11 times while other species, including black bear, bobcat, domestic cat, domestic cow, crow, white-tailed deer, domestic dog, donkey, red fox, domestic horse, opossum, passerine birds, rabbit, raccoon, domestic sheep, skunk, squirrel, and turkey, visited the sites 1,597 times and investigated the devices on 55 occasions.[42] In a related study, the authors documented 39 instances where the M-44 devices were triggered, including 36 times by coyotes, twice by domestic dogs, and once by a red fox (all of which were target species).[43]

M-44s put non-target wildlife at unreasonable risk of being killed. The continued use of M-44s on public lands, which provide vital wildlife habitat, is unacceptable.

III. The Costs of M-44s Outweigh Benefits due to the Availability of Effective, Non-lethal Predator Management Alternatives.

Wildlife Services often justifies the use of M-44s as necessary to address predator-livestock conflicts. However, there is a growing, worldwide scientific consensus that non-lethal methods are more effective at preventing damage to livestock than lethal methods.[44] These studies

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Unintentional Take in Northeast Oregon (Mar. 2, 2017). Available at: http://www.dfw.state.or.us/news/2017/03_mar/030217.asp.

[38] This is particularly the case if the M-44 is triggered in a manner that delivers only a partial dose of poison or delivers the poison in an area other than the mouth.

[39] U.S. Envtl. Protection Agency, Memo: Sodium Cyanide, Draft Risk Assessment to Support the Registration Review 15 (Sept. 12, 2018) (Docket No. EPA-HQ-OPP-2010-0752-0094).

[40] *Id.* at 4.

[41] *Id.* at 12.

[42] Shivik, J.A., Mastro, L., and Young, J.K. 2014. Animal Attendance at M-44 Sodium Cyanide Ejector Sites for Coyotes. Wildlife Society Bulletin, 38(1):217–220.

[43] *Id.*

[44] Khorozyan, I. and M. Waltert (2019). How long do anti-predator interventions remain effective? Patterns, thresholds and uncertainty. Royal Society Open Science 6(9); Khorozyan, I. and M. Waltert (2020). Not all

indicate that lethal removal strategies are not only catastrophic to ecosystems, but also ineffective at preventing and deterring depredations and counter to the best available science.

There is a significant body of scientific literature demonstrating that lethal predator control is unlikely to prevent future losses of livestock and can cause incidental take of numerous non-target species.[45] The scientific literature also shows there is a high probability that lethal control measures will exacerbate the situation by inducing increases in livestock losses after removal of predators.[46] Many wildlife populations depleted by unnatural means simply reproduce more quickly due to the

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interventions are equally effective against bears: patterns and recommendations for global bear conservation and management. Scientific Reports in press; Lennox, R. J., A. J. Gallagher, E. G. Ritchie and S. J. Cooke (2018). Evaluating the efficacy of predator removal in a conflict-prone world. Biological Conservation 224: 277-289; Miller, J., K. Stoner, M. Cejtin, T. Meyer, A. Middleton and O. Schmitz (2016). Effectiveness of Contemporary Techniques for Reducing Livestock Depredations by Large Carnivores. Wildlife Society Bulletin 40: 806-815; Moreira-Arce, D., C. S. Ugarte, F. Zorondo-Rodríguez and J. A. Simonetti (2018). Management Tools to Reduce Carnivore-Livestock Conflicts: Current Gap and Future Challenges. Rangeland Ecology & Management; Treves, A., M. Krofel and J. McManus (2016). Predator control should not be a shot in the dark. Frontiers in Ecology and the Environment 14: 380-388; Treves, A., M. Krofel, O. Ohrens and L. M. Van Eeden (2019). Predator control needs a standard of unbiased randomized experiments with cross-over design. Frontiers in Ecology and Evolution 7 402-413; van Eeden, L. M., et al. (2018). Carnivore conservation needs evidence-based livestock protection. PLOS Biology: 10.1371; van Eeden, L. M., et al. (2018). Managing conflict between large carnivores and livestock. Conservation Biology doi: 10.1111/cobi.12959.

[45] A. Treves, M. Krofel, O. Ohrens, and L.M. Van Eeden (2019). Predator control needs a standard of unbiased randomized experiments with cross-over design. Frontiers in Ecology and Evolution 7 402-413.

[46] W.J. Ripple, et al., Status and ecological effects of the world's largest carnivores. Science 343 (2014) 1241484; Cooley, H.S. et al., 2009. Source populations in carnivore management: cougar demography and emigration in a lightly hunted population. Animal Conservation 12, 321-328; Cooley, H.S. et al., 2009. Does hunting regulate cougar populations? A test of the compensatory mortality hypothesis. Ecology 90, 2913-2921; K.A. Peebles, R.B. Wielgus, B.T. Maletzke, and M.E. Swanson, Effects of Remedial Sport Hunting on Cougar Complaints and Livestock Depredations, 8 PLoS One 1–8 (2013); C. Lambert et al., Cougar Population Dynamics and Viability in the Pacific Northwest, 70 J. Wildl. Manage. 246–54 (2006); R.B. Wielgus and K.A. Peebles, *Effects of Wolf Mortality on Livestock Depredations*, 9 PLOS ONE 1–16 (2014).; Santiago-Avila FJ, Cornman AM, Treves A (2018) Killing wolves to prevent predation on livestock may protect one farm but harm neighbors. PLOS ONE 13(1): e0189729. https://doi.org/10.1371/journal.pone.0189729. (Last visited 2/11/21); H.M. Bryan et al., Heavily Hunted Wolves Have Higher Stress and Reproductive Steroids than Wolves with Lower Hunting Pressure, 29 Funct. Ecol. 347–56 (2015); Bauer, S., Lisovski, S., Eikelenboom-Kil, R.J.F.M., Shariati, M., Nolet, B.A., 2018. Shooting may aggravate rather than alleviate conflicts between migratory geese and agriculture. Journal of Applied Ecology 55, 2653-2662; Beggs, R., Tulloch, A.I.T., Pierson, J., Blanchard, W., Crane, M., Lindemayer, D.L., 2019. Patch-scale culls of an overabundant bird defeated by immediate recolonization. Ecological Applications 29, e01846; Bradley, E.H., Robinson, H.S., Bangs, E.E., Kunkel, K., Jimenez, M.D., Gude, J.A., Grimm, T., 2015. Effects of Wolf Removal on Livestock Depredation Recurrence and Wolf Recovery in Montana, Idaho, and Wyoming. J. of Wildlife Management 79, 1337–1346; Fernández-Gil, A., Naves, J., Ordiz, A.s., Quevedo, M., Revilla, E., Delibes, M., 2015. Conflict Misleads Large Carnivore Management and Conservation: Brown Bears and Wolves in Spain. PLos ONE DOI:10.1371/journal.pone.0151541, 1-13; Imbert, C., Caniglia, R., Fabbri, E., Milanesi, P., Randi, E., Serafini, M., Torretta, E., Meriggi, A., 2016. Why do wolves eat livestock? Factors influencing wolf diet in northern Italy. Biological Conservation 195, 156-168; Kompaniyets, L., Evans, M., 2017. Modeling the relationship between wolf control and cattle depredation. PLos ONE 12, e0187264; Poudyal, N., Baral, N., T., A.S., 2016. Wolf lethal control and depredations: counter-evidence from respecified models. PLos ONE 11, e0148743; Sacks, B.N., Blejwas, K.M., Jaeger, M.M., 1999. Relative vulnerability of coyotes to removal methods on a northern California ranch. Journal of Wildlife Management 63, 939-949.

sudden drop in competition for resources and changes to social structure from the loss of individuals.[47] For carnivores specifically, studies have also found that killing them fragments social groups, which can increase the likelihood of livestock depredation.[48] This effect is well documented for coyote populations in particular, the species most commonly targeted by M-44s. The indiscriminate killing of coyotes increases their populations over time because it disrupts their social structure, which encourages higher levels of breeding and migration.[49] Additionally, exploited coyote packs are more likely to have increased numbers of pups, and feeding young has been found to be a significant motivation for coyotes to switch from killing small and medium-sized prey to killing sheep.[50]

Several studies seriously call into question the efficacy of lethal predator management.[51] For example, in a study based upon a review of 25 years of livestock depredation data, Wielgus and Peebles (2014)[52] found that an increase in the numbers of predators killed resulted in livestock losses increasing the following year. Additionally, Treves et al. (2016),[53] which consisted of a meta-review of 24 studies, showed little or no scientific support for the efficacy of killing predators to protect livestock. According to the authors' analysis, the same number of livestock, if not more, are likely to be depredated after predators are killed. The authors found that indiscriminate killing of coyotes disrupts the stability and equilibrium of their social structure, triggering compensatory breeding and an increase in the coyote population.[54] Specifically, younger pairs begin to breed, pup survival rates increase, and juvenile males move in to fill the gap caused by lethal predator

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[47] F. F. Knowlton, et al., *Coyote Depredation Control: An Interface between Biology and Management*, 52 Journal of Range Management 398, 400-402 (1999). Available at: https://pdfs.semanticscholar.org/43f7/3adf647447dd472db69c0b4712f1c71fab33.pdf; Robert Crabtree and Jennifer Sheldon, Coyotes and Canid Coexistence in Yellowstone, in Carnivores in Ecosystems: The Yellowstone Experience (T. Clark et al., eds, 1999); J. M. Goodrich and S. W. Buskirk, *Control of Abundant Native Vertebrates for Conservation of Endangered Species*, 9 Conservation Biology (1995); Elizabeth Kierepka, et al., *Effect of Compensatory Immigration on the Genetic Structure of Coyotes*, 81 J. Wildlife Mgmt 1394, 1394 (2017). Available at: https://www.srs.fs.usda.gov/pubs/ja/2018/ja_2018_kilgo_002.pdf.

[48] *Id.*

[49] *Id.*; *see also* S.D. Gehrt, *Chicago Coyotes part II*, 11 Wildlife Control Technologies 20-21, 38-9, 42 (2004).

[50] F. F. Knowlton, et al., *Coyote Depredation Control: An Interface between Biology and Management*, 52 J. of Range Mgmt. 398, 403 (1999). Available at: https://pdfs.semanticscholar.org/43f7/3adf647447dd472db69c0b4712f1c71fab33.pdf; B. R. Mitchell et al., *Coyote Depredation Management: Current Methods and Research Needs*, 32 Wildlife Society Bulletin 1209 (2004).

[51] Berger, K.M., Carnivore-Livestock Conflicts: Effects of Subsidized Predator Control and Economic Correlates on the Sheep Industry, 20 Conservation Biology 751 (2006); Harper, E.K., et al., Effectiveness of lethal, directed wolf-depredation control in Minnesota, 72 J. Wildlife Mgmt. 778 (2008); Musiani, M., et al., Wolf depredation trends and the use of fladry barriers to protect livestock in western North America, 17 Conservation Biology 1538 (2003). Available at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1616&context=icwdm_usdanwrc.

[52] Wielgus, R. and K. Peebles, Effects of Wolf Mortality on Livestock Depredations, 9 PLOS ONE e113505 (2014). Available at: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0113505.

[53] Treves, A., et al., Predator control should not be a shot in the dark, 14 Frontiers in Ecology and Envt. 380-388 (2016). Available at: http://faculty.nelson.wisc.edu/treves/pubs/Treves_Krofel_McManus.pdf.

[54] *See e.g.*, Letter from Dr. Robert Crabtree, Yellowstone Ecological Research Center (Revised Draft June 21, 2012), *available at* http://www.predatordefense.org/docs/coyotes_letter_Dr_Crabtree_06-21-12.pdf (presenting research showing that indiscriminate killing of coyotes results in population booms with consequent increases in livestock and wild ungulate predation).

management operations. Increasing the number of juvenile males in a destabilized population increases the likelihood of predation on livestock.[55]

Sacks et al. (1999) questioned the efficacy of using M-44s specifically for killing coyotes, documenting an M-44 susceptibility bias toward younger coyotes on their study site in Northern California while older coyotes demonstrated avoidance behavior.[56] The authors concluded that M-44s would not be effective in controlling coyote depredation because the coyotes responsible for most livestock killings are usually older, breeding animals. This result was similar to what Brand et al. (1995)[57] and Brand and Nel (1997)[58] in their studies of blackbacked jackals, where the older jackals demonstrated avoidance behavior toward the devices.

The harm caused by M-44 use is not outweighed by the benefits of continued use because effective, non-lethal alternatives exist to protect livestock from predation, including practicing good animal husbandry, strategically using control methods, and removing dead livestock.[59] Specifically, the following control methods can be used separately or in combination in lieu of M-44s to effectively deter coyotes and other wildlife: fencing, fladry and electrified fladry (flags tied to ropes or fences), guard animals, including dogs, llamas, and donkeys, range riders, strobe lights and noisemakers,

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[55] *Id.*

[56] Sacks, B.N., Blejwas, K.M. & Jaeger, M.M. (1999). Relative vulnerability of coyotes to removal methods on a northern California ranch. Journal of Wildlife Management, 63, 939-949.

[57] Brand, D.J., Fairall, N. & Scott, W.M. 1995. The influence of regular removal of black-backed jackals on the efficiency of coyote getters. South African Journal of Wildlife Research, 25, 44-48.

[58] Brand, D.J. & Nel, J.A.J. 1997. Avoidance of cyanide guns by black-backed jackal. Applied Animal Behaviour Science, 55, 177-182.

[59] Lennox, R.J., Gallagher, A.J., Ritchie, E.G., Cooke, S.J., 2018. Evaluating the efficacy of predator removal in a conflict-prone world. Biological Conservation 224, 277-289; Miller, J., Stoner, K., Cejtin, M., Meyer, T., Middleton, A., Schmitz, O., 2016. Effectiveness of Contemporary Techniques for Reducing Livestock Depredations by Large Carnivores. Wildlife Society Bulletin 40, 806-815; van Eeden, L.M., Crowther, M.S., Dickman, C.R., Macdonald, D.W., Ripple, W.J., Ritchie, E.G., Newsome, T.M., 2018. Managing conflict between large carnivores and livestock. Conservation Biology doi: 10.1111/cobi.12959; C.G. Radford, J.W. McNutt, T. Rogers, B. Maslen, and N.R. Jordan, Artificial eyespots on cattle reduce predation by large carnivores. Communications Biology Nature 3:430 (2020); O. Ohrens, C. Bonacic, and A. Treves, Non-lethal defense of livestock against predators: Flashing lights deter puma attacks in Chile. Front. Ecol. Environ. 17 (2019) 32-38; S.J. Davidson-Nelson, and T.M. Gehring, Testing fladry as a nonlethal management tool for wolves and coyotes in Michigan. Human–Wildlife Interactions 4 (2010) 87-94; T.M. Gehring, K.C. Vercauteren, M.L. Provost, and A.C. Cellar, Utility of livestock-protection dogs for deterring wildlife from cattle farms. Wildl. Res. 37 (2010) 715–721; T.M. Gehring, K.C. VerCauteren, and A.C. Cellar, Good fences make good neighbors: implementation of electric fencing for establishing effective livestock protection dogs. Human–Wildlife Interactions 4 (2010) 144-149*;* Khorozyan, and M. Waltert, How long do anti-predator interventions remain effective? Patterns, thresholds and uncertainty. Royal Society Open Science 6 (2019); Young, J.K., Steuber, J., Few, A., Baca, A., Strong, Z., 2018. When strange bedfellows go all in: a template for implementing non-lethal strategies aimed at reducing carnivore predation of livestock. Animal Conservation 1-3, doi:10.11/acv.12453; Shivik, J.A., Tools for the Edge: What's New for Conserving Carnivores. 2006. Bioscience Vol. 56, No. 3, 253-59.

lamb sheds and calving pens, and night penning.[60] Numerous studies have demonstrated the effectiveness of non-lethal methods to protect livestock from predators.[61]

Furthermore, an analysis of the 2015 data from the U.S. Department of Agriculture on the loss of livestock to predators demonstrates that the proportion of losses compared to the total number of stock is miniscule. For cattle, 41,680 animals were lost to predators in 2015. This corresponds to 0.053 percent of the total of 7,793,000 cattle in the United States on January 1, 2016. Of the cattle lost to predators, 16,880 (0.022 percent of all cattle) and 2,040 (0.0026 percent of all cattle) were killed by coyotes and wolves, respectively. Predators killed an estimated 238,890 calves in 2015 or 0.7 percent of the total calf inventory from the same year. Of these animals, 126,810 (0.37 percent of all calves) and 8,110 (0.0024 percent of all calves) were lost to coyotes and wolves, respectively.[62] In 2014, 61,713 and 132,683 sheep and lambs were killed by all predators. This corresponds to 1.8 percent of the total inventory of sheep in the United States in 2014 and 3.8 percent of the total estimated number of lambs. Coyotes killed 84,534 sheep and lambs in 2014 (1.2 percent of all sheep and lambs) while wolves killed only 500 (0.007 percent of all sheep and lambs).[63] The total estimated number of goats in the United States in January 2016 was 1,829,600 animals. The goat kid population in 2015 was 1,677,000. In 2015, 38,880 goats (0.02 percent of all goats) and 83,753 kids (0.05 percent of all kids) were killed by predators, respectively. For those goats killed by predators in 2015, 12581 were killed by coyotes (0.007 percent of all goats) and 338 were killed by wolves (0.018 percent of all goats). Coyotes killed 40,249 kids (0.024 percent of all kids) while wolves killed only 55 (0.0032 percent of all kids).[64]

This data demonstrates that using M-44s to kill thousands of carnivores each year to address depredation—which represents a mere fraction of one percentage of livestock losses—is unsupportable as a management practice, considering the effective, non-lethal management alternatives that exist as well as the important role of carnivores in ecosystems, discussed below.

IV. Carnivores Play an Essential Role Ecosystems, which is Undermined by Lethal Management.

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[60] *See, e.g.*, G. Connolly, Animal Damage Control Research Contributions to Coyote Management, Predator Management Methods, Proceedings of the 1995 Joint Fur Resources Workshop (1995); Gese, E.M., et al., Lines of Defense: coping with predators in the Rocky Mountain region.

[61] Shivik, J. A., A. Treves, and P. Callahan, Nonlethal techniques for managing predation: Primary and secondary repellents, 17 Conservation Biology 1531 (2003). Available at http://wscinof.dreamhosters.com/wpcontent/uploads/SHIVAKNon-Lethal.pdf; Lance, N.J., S.W. Breck, C. Sime, P. Callahan, and J.A. Shivik, Biological, technical, and social aspects of applying electrified fladry for livestock protection from wolves (*Canis lupus*), 37 Wildlife Research 708 (2010). Available at: http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=2257&context=icwdm_usdanwrc.

[62] U.S. Dep't of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Animal Health Monitoring System (2017); Death Loss in U.S. Cattle and Calves Due to Predator and Nonpredator Causes (2015).

[63] U.S. Dep't of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Animal Health Monitoring System (2016); Sheep and Lamb Predator and Nonpredator Death Loss in the United States (2015).

[64] U.S. Dep't of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, National Animal Health Monitoring System (2017); Goat and Kid Predator and Nonpredator Death Loss in the United States (2015).

Carnivores targeted by M-44s play an essential role in maintaining ecological balance. Scientific studies clearly reveal the vital role that carnivores play in a diverse array of ecosystem processes that benefit important habitat and species of concern. Their removal results in a cascade of negative, unintended consequences.

It is well documented that the loss of top carnivores causes a wide range of "unanticipated impacts" that are often profound, altering "processes as diverse as the dynamics of disease, wildfire, carbon sequestration, invasive species, and biogeochemical cycles."[65] "Apex" predators, such as coyotes and wolves targeted by M-44s, have few or no predators of their own and occupy the top level of the food chain.[66] Apex predators create beneficial top-down effects that flow through and sustain ecosystems and the web of life,[67] such as by helping to control small mammal and certain ungulate populations, which, in turn, supports the health and diversity of riparian plant communities and stream morphology.[68] There are numerous scientific studies opposing lethal carnivore control on these and other grounds,[69] as discussed in further, species-specific detail below.

Coyotes provide important ecosystem services by helping to control disease transmission by keeping rodent populations in check, consuming carrion, removing sick animals from the gene pool, dispersing seeds, and increasing the biological diversity of plant and wildlife communities.[70] Coyotes play a keystone role in the American West's native ecosystems by preying upon smaller carnivores such as skunks, foxes, and raccoons.[71] This predation indirectly benefits the prey of small carnivores. For instance, the resulting decreased nest predation by smaller carnivores

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[65] Beschta, R.L., and W.J. Ripple, Large predators and trophic cascades in terrestrial ecosystems of the western United States, 142 Biological Conservation 2401 (2009); Levi, T., et al., Deer, predators, and the emergence of Lyme disease, 109 Proc. Nat'l Academy Science 10942 (2012); B.J. Bergstrom et al., License to Kill: Reforming Federal Wildlife Control to Restore Biodiversity and Ecosystem Function, 7 CONSERV. LETTERS 131–42 (2013); J.A. Estes et al., *Trophic Downgrading of Planet Earth*, 333 SCIENCE 301–06 (2011); Bergstrom, B.J., Carnivore conservation: shifting the paradigm from control to coexistence, 98 Mammal 1 (2017).

[66] L. R. Prugh et al., *The Rise of the Mesopredator*, 59 BIOSCIENCE 779–91 (2009).

[67] J.A. Estes et al., *Trophic Downgrading of Planet Earth*, 333 SCIENCE 301–06 (2011); W. J. Ripple, R. L. Beschta, *Trophic Cascades in Yellowstone: The First 15 Years After Wolf Reintroduction*, 145 BIOL. CONSERV. 205–13 (2012); W. J. Ripple, R. L. Beschta, J. K. Fortin, and C. T. Robbins, *Trophic Cascades From Wolves to Grizzly Bears in Yellowstone*, 83 J. ANIM. ECOL. 223–33 (2014).

[68] Beschta, R.L. and Ripple, W.J. 2012. The role of large predators in maintaining riparian plant communities and river morphology. Geomorphology 157-158: 88-98.

[69] *See* Carter, N. H., et al. (2019). Integrated spatial analysis for human-wildlife coexistence in the American West. Environmental Research Letters (highlighting the need for greater consideration of full ecological impact of predator removal).

[70] S. E. Henke and F. C. Bryant, *Effects of Coyote Removal on the Faunal Community in Western Texas*, 63 Journal of Wildlife Management 1066 (1999); K. R. Crooks and M. E. Soule, *Mesopredator Release and Avifaunal Extinctions in a Fragmented System*, 400 Nature 563 (1999); E. T. Mezquida, et al., *Sage-Grouse and Indirect Interactions: Potential Implications of Coyote Control on Sage-Grouse Populations*, 108 Condor 747 (2006). Available at: http://repository.uwyo.edu/cgi/viewcontent.cgi?article=1003&context=zoology_facpub; N. M. Waser et al., *Coyotes, Deer, and Wildflowers: Diverse Evidence Points to a Trophic Cascade*, 101 Naturwissenschaften 427 (2014).

[71] Crooks, K.R. and M.E. Soule, Mesopredator Release and Avifaunal Extinctions in a Fragmented System, 400 Nature 563 (1999); Henke, S.E. and F. C. Bryant, Effects of Coyote Removal of the Faunal Community in Western Texas, 63 J. Wildlife Mgmt. 1066 (1999).

increases ground-nesting bird populations like the imperiled greater sage grouse.[72] Coyotes also increase the diversity of rodent species by increasing competition amongst smaller carnivores.[73] For example, one study determined that Ord's kangaroo rat became the dominant species in areas without coyotes.[74] As their numbers increased, so did their competitive advantage. This had an overall negative effect on species diversity and richness throughout the ecosystem. Correspondingly, coyotes were found to keep kangaroo rat populations in check, which removed their competitive advantage and increased overall rodent species diversity.

Large apex predators, such as wolves, help to control populations of large ungulates, such as deer and elk, as well as mesopredator population numbers through predation and inter-specific competition.[75] For example, wolves in Yellowstone and Grand Teton National Parks have been found to benefit a host of species, including aspen, songbirds, beavers, bison, fish, pronghorn, foxes, and grizzly bears.[76] By reducing numbers and inducing elk to move, wolves have reduced browsing on aspen and other streamside vegetation, which has benefitted beavers, songbirds and fish populations. Studies have also shown how wolves and coyotes interact, and how wolves can aid pronghorn populations because "wolves suppress[ ] coyotes and consequently fawn depredation."[77] Wolves also benefit scavengers by leaving carrion derived from predation; hence, wolf removal leads to reduced abundance of carrion for scavengers in specific areas.[78] For instance, the extirpation of wolves works to the detriment of grizzly bears, which are listed as a threatened species and which, in addition to acting as apex predators, can steal wolf kills. A 2013 study

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[72] Mezquida, E.T. et. al., Sage-Grouse and Indirect Interactions: Potential Implications of Coyote Control on Sage-Grouse Populations, 108 Condor 747 (2006).

[73] Ripple, W.J. and R. L. Beschta, Linking a Cougar Decline, Trophic Cascade, and Catastrophic Regime Shift in Zion National Park, 133 Biological Conservation 397 (2006).

[74] S.F. Henke and F.C. Bryan, *Effects of Coyote Removal on the Faunal Community in Western Texas*, 63 J. WILDL. MANAGE. 1066–81 (1999).

[75] Beschta, R. L. and W. J. Ripple. 2009. Large predators and trophic cascades in terrestrial ecosystems of the western United States. Biological Conservation 142: 2401-2414; Ritchie, E. G. and C. N. Johnson. 2009. Predator interactions, mesopredator release and biodiversity conservation. Ecology Letters 12: 982-998; Ripple, W. J., A. J. Wirsing, C. C. Wilmers and M. Letnic. 2013. Widespread mesopredator effect after wolf extirpation. Biological Conservation 160: 70-79.

[76] B.J. Bergstrom et al., *License to Kill: Reforming Federal Wildlife Control to Restore Biodiversity and Ecosystem Function*, 7 CONSERV. LETTERS 131–42 (2013); J.A. Estes et al., *Trophic Downgrading of Planet Earth*, 333 SCIENCE 301–06 (2011); W. J. Ripple, R. L. Beschta, *Trophic Cascades in Yellowstone: The First 15 Years After Wolf Reintroduction*, 145 BIOL. CONSERV. 205–13 (2012).

[77] B.J. Bergstrom et al., *License to Kill: Reforming Federal Wildlife Control to Restore Biodiversity and Ecosystem Function*, 7 CONSERV. LETTERS 131–42 (2013); L. R. Prugh et al., *The Rise of the Mesopredator*, 59 BIOSCIENCE 779–91 (2009); K.M. Berger and E.M. Gese, *Does Interference Competition with Wolves Limit the Distribution and Abundance of Coyotes*? 76 J. ANIM. ECOL. 1075–85 (2007); D.W. Smith, R.O. Peterson, D.B. Houston, *Yellowstone After Wolves*, 53 BIOSCIENCE 330 (2003); R.L. Beschta and W.J. Ripple, *Riparian Vegetation Recovery in Yellowstone: The First Two Decades After Wolf Reintroduction*, 198 BIOL. CONSERV. 93–103 (2016); D.G. Flagel, G.E. Belovsky, and D.E. Beyer, *Natural and Experimental Tests of Trophic Cascades: Gray Wolves and White-tailed Deer in a Great Lakes Forest*, 180 OECOLOGIA. 1183–94 (2016).

[78] W.J. Ripple and R.L. Beschta, *Trophic Cascades in Yellowstone: The First 15 Years After Wolf Reintroduction*, 145 BIOL. CONSERV. 205–13 (2012); C.C. Wilmers, R.L. Crabtree, D.W. Smith, K.M. Murphy, and W.M. Getz, *Trophic Facilitation by Introduced Top Predators: Grey Wolf Subsidies to Scavengers in Yellowstone National Park*, 72 J. ANIM. ECOL. 909–16 (2003); C.C. Wilmers, D.R. Stahler, R.L. Crabtree, D.W. Smith, and W.M. Getz, *Resource Dispersion and Consumer Dominance: Scavenging at Wolf- and Hunter-Killed Carcasses in Greater Yellowstone, USA*, 6 ECOL. LETTERS 996–1003 (2003).

showed that wolves benefit grizzly bears in Yellowstone through another trophic mechanism; specifically, wolf predation on elk has led to less elk browsing of berry-producing shrubs, providing grizzlies with access to larger quantities of fruit.[79]

Notably, the American Sheep Industry Association has recognized the important role that carnivores play in ecosystems:

> Understanding and dealing with depredation is important for sheep producers and for those interested in sustainable management of natural resources. Despite their notoriety, not all predators kill sheep or other livestock. Predators are an integral part of most wildlife communities, and their consumption of rodents, rabbits, and carrion benefits some agriculture. The challenge to sheep producers becomes one of effective depredation prevention without unnecessary adverse impact on the nation's natural resources.[80]

V. M-44s are Being Used in Violation of Labeling Requirements.

In its 1994 Reregistration Eligibility Decision ("RED") pertaining to the use of sodium cyanide capsules in M-44 units, the U.S. Environmental Protection Agency ("EPA") concluded that M-44s did not pose unreasonable risks to humans or the environment if used in accordance with the twenty-six use restrictions listed on the label and criteria established by the U.S. Fish and Wildlife Service to protect endangered species likely to be jeopardized by use of M-44s.[81] The labels[82] for registered sodium cyanide products require users to comply with all twenty-six use restrictions outlined in the Use Restriction Bulletin.[83]

Even though the Federal Insecticide, Fungicide, and Rodenticide Act, under which sodium cyanide is registered for restricted use, requires strict adherence to pesticide labels,[84] registered users do not consistently abide by a number of these use restrictions. The 2017 incident in Idaho involving the Mansfields and the 2017 incident in Wyoming provide ample evidence demonstrating how registered users violate the label requirements and other use restrictions when placing M-44s. The incident in Idaho involved violations of the following use restrictions:

1. "The M-44 device shall not be used: (1) in areas within national forests or other Federal lands set aside for recreational use, (2) areas where exposure to the public and family and

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[79] W.J. Ripple, A.J. Wirsing, C.C. Wilmers, and M. Letnic, *Widespread Mesopredator Effects After Wolf Extirpation*, 160 BIOL. CONSERV. 70–79 (2013).
[80] American Sheep Industry Association, 8 Sheep Production Handbook 905 (2015).
[81] M-44 Use Restrictions at 12.
[82] *See, e.g.*, Label for EPA Registration No. 56228-15 ("Users of this product must follow all requirements of product labeling, including but not limited to, all Use Restrictions, Directions for Use, Precautionary Statements, first aid and antidotal measures, information on endangered species, requirements for posting warning signs, and Storage and Disposal instructions."). *See also* Labels for EPA Registration No. 35975-2, EPA Registration No. 39508-1, EPA Registration No. 13808-8, EPA Registration No. 33858-2, and EPA Registration No. 35978-1.
[83] U.S. Dep't of Agriculture, Animal & Plant Health Inspection Service, WS Directive 2.415, M-44 Use and Restrictions (2017) [hereinafter "M-44 Use Restrictions"]. Available at: https://www.aphis.usda.gov/wildlife_damage/directives/2.415_m44_use%26restrictions.pdf.
[84] 7 U.S.C. § 136j(a)(2)(G).

pets is probable, (3) in prairie dog towns, or (4) except for the protection of Federally designated threatened or endangered species, in National or State Parks; National or State Monuments; federally designated wilderness areas; and wildlife refuge areas";[85]

2. "Bilingual warning signs in English and Spanish shall be used in all areas containing M-44 devices . . . Main entrances or commonly used access points to areas in which M-44 devices are set shall be posted with warning signs to alert the public to the toxic nature of the cyanide and to the danger to pets. Signs shall be inspected weekly to ensure their continued presence and ensure that they are conspicuous and legible . . . An elevated sign shall be placed within 25 feet of each individual M-44 device warning persons not to handle the device";[86] and

3. "In all areas where the use of the M-44 device is anticipated, local medical people shall be notified of the intended use. This notification may be made through a poison control center, local medical society, the Public Health Service, or directly to a doctor or hospital. They shall be advised of the antidotal and first-aid measures required for treatment of cyanide poisoning. It shall be the responsibility of the supervisor to perform this function."[87]

In the Idaho incident, the M-44 was placed in an "area[] where exposure to the public and family and pets is probable." As discussed above, fourteen-year-old Canyon Mansfield was walking the family dog, Casey, on a hill just 300 yards behind their home on public land managed by the Bureau of Land Management.[88] As for the requirement for conspicuous warning signs, Dan Argyle, a captain in the Bannock County Sheriff's Office who responded to the incident, told National Geographic that "no warning signs were observed at the scene . . . ."[89] Canyon Mansfield confirmed that: "No signs like these were near the cyanide bomb that took my dog away from me."[90] It has been reported that Wildlife Services made no notifications of the intended use of M-44s to local medical professionals.[91] Canyon Mansfield's father, Dr. Mark Mansfield explains: "We didn't know anything about it. No neighborhood notifications, and our local authorities didn't know anything about them . . . The sheriff deputies who went up there didn't even know what a cyanide bomb was."[92] Records indicate that Wildlife Services notified Idaho hospitals *after* the Pocatello incident, in July 2017, and that Wildlife Services has not made these notifications on an annual basis, as the prior notification to Idaho hospitals occurred in 2013.[93]

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[85] M-44 Use Restrictions at 3.
[86] *Id*. at 10–11.
[87] *Id*. at 12.
[88] Available at: http://news.nationalgeographic.com/2017/04/wildlife-watch-wildlife-services-cyanide-idaho-predatorcontrol/. That placement also violated a November 2016 pledge by Wildlife Services in Idaho not to use M-44s on public land in Idaho.
[89] Available at: http://news.nationalgeographic.com/2017/04/wildlife-watch-wildlife-services-cyanide-idaho-predatorcontrol/.
[90] Available at: https://www.predatordefense.org/docs/m44s_canyons_story.pdf.
[91] Available at: http://www.theblaze.com/news/2017/03/21/cyanide-device-explodes-killing-familys-dog-they-cantbelieve-who-planted-it-behind-their-home/.
[92] Adkins, C. and K. Nokes, Petition to Cancel Registrations of M-44 Cyanide Capsules (Sodium Cyanide) 20-21 (2017). Available at: https://biologicaldiversity.org/campaigns/carnivore_conservation/pdfs/M44NationwidePetition_08-10-2017.pdf.
[93] *Id.*

The incident in Wyoming also demonstrates a violation of the requirement for warning signs.[94] A media report provides that a "few days after the dogs died in Wyoming, Daniel Helfrick returned to the area, looking for signs they might have missed to warn them of the cyanide traps. He didn't see any."[95] A personal account of the incident by one of the family members involved provides further evidence that no signs were posted.[96]

In the RED, the EPA concluded that M-44s did not pose unreasonable risks to humans or the environment if used in accordance with the twenty-six use restrictions listed on the label. These incidents provide evidence that M-44s are not being used in accordance with the use restrictions, and therefore continued use of the device on public lands poses an unreasonable risk.

VI. Public Opinion Does Not Support the Continued Use of M-44s.

A keystone study, the *America's Wildlife Values* project, has documented a substantial shift in public attitudes away from a traditional view of wildlife—a view of human mastery over wildlife and that wildlife should be managed for human benefit—and toward a mutualist view of wildlife, or the belief that humans and wildlife should coexist and that the welfare of animals is important.[97] The use of dangerous and indiscriminate M-44s conflicts with American values that are markedly shifting towards non-lethal strategies for managing conflicts with wildlife.

In 2019, more than 99.9 percent of people commenting on the EPA's proposal to reauthorize sodium cyanide in M-44s supported a ban on these devices, according to an analysis completed by the Center for Biological Diversity and the Western Environmental Law Center.[98] The EPA also acknowledged that "an overwhelming majority" of the 20,000 public comments it had received were submitted in opposition to its proposal to renew the use of cyanide bombs.[99] This demonstrates that banning the use of M-44s on public lands is in line with the majority of Americans' views on the subject.

VII. Conclusion.

M-44s do not belong on America's public lands. These ineffective and indiscriminate devices cause devastating impacts to a wide range of victims, including humans, companion animals, non-target wildlife, and ecosystems. As Dr. Mark Mansfield shared in his moving testimony before the

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94 Available at: http://www.wyofile.com/column/cyanide-bomb-kills-two-casper-dogs/.
95 Available at: http://www.wyofile.com/column/cyanide-bomb-kills-two-casper-dogs/.
96 Available at: https://www.predatordefense.org/features/m44_WY_Amy_dogs.htm.
97 Manfredo, M.J., Sullivan, L., Don Carlos, A.A., Dietsch, A.M., Teel, T.L., Bright, A.D., & Bruskotter, J. 2018). *America's Wildlife Values: The Social Context of Wildlife Management in the U.S.* National report from the research project entitled "America's Wildlife Values." Fort Collins, CO: Colorado State University, Department of Human Dimensions of Natural Resources. https://sites.warnercnr.colostate.edu/wildlifevalues/wp-content/uploads/sites/124/2019/01/AWV-National-Final-Report.pdf.
98 Center for Biological Diversity. (May 8, 2019). Analysis: Public Overwhelmingly Wants EPA Ban on Wildlife-killing 'Cyanide Bombs'. Retrieved August 2, 2022, from https://biologicaldiversity.org/w/news/press-releases/public-overwhelmingly-wants-ban-on-cyanide-bombs-2019-05-08/email_view/
99 Vigdor, N. (August 16, 2019). E.P.A. backtracks on use of 'cyanide bombs' to kill wild animals. *The New York Times.* Retrieved August 2, 2022, from https://www.nytimes.com/2019/08/16/us/epa-cyanide-bombs.html

Subcommittee on July 21, 2022, survivors and victims' families will always carry the trauma from these experiences. To ensure no one else endures what the Mansfield family and many others have experienced, Congress should pass Canyon's Law (H.R. 4951).

For the reasons stated above, the Animal Welfare Institute supports Canyon's Law (H.R.4951), to prohibit the use of M-44s on America's taxpayer-funded lands, and urges swift passage through the House Natural Resources Committee.

Thank you for your consideration of this vitally important issue that impacts the safety of people, companion animals, and wildlife.

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