War on Wildlife

The U.S. Department of Agriculture's "Wildlife Services"

WildEarth Guardians
A Force for Nature

A Report to President Barack Obama and Congress
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MISSION STATEMENT

WildEarth Guardians protects and restores the
wildlife, wild places and wild rivers of the American West.

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Photos: Front cover, Richard Badger; Back cover, Dave Jones.

Executive Summary

Wildlife Services, a branch of the U.S. Department of Agriculture,[1] was a major force in eliminating wolf and grizzly bear populations in the continental United States by 1940. Today, it spends over $100 million annually to kill more than one million animals– primarily birds, and hundreds of thousands of mammals such as black and grizzly bears, beavers, mountain lions, coyotes, and wolves.

In 1994, Wildlife Services then called "Animal Damage Control," prepared a programmatic environmental impact statement (PEIS) under the National Environmental Policy Act (NEPA). In 1997, the agency reissued the document with some corrections, and to this day, Wildlife Services relies on this outdated PEIS. For this report, we reviewed the PEIS and some of the scientific literature that Wildlife Services has issued since 1994. While the major thrust of this report reveals the social, economic, and biological problems associated with eliminating large numbers of native carnivores such as coyotes, wolves, and bears, we also describe eleven biological agents used to kill species, and review the efficacy of trapping, and shooting wildlife from aircraft—a practice termed "aerial gunning."

Wildlife Services aerial guns, traps and snares animals, and broadcasts a panoply of dangerous toxicants—that harm a variety of taxa. Between 2004 and 2007, Wildlife Services killed 8,378,412 animals. The numbers of mammals in the kill has increased in recent years. In 2004, for instance, the agency killed 179,251 mammals compared with 207,341 in 2006. Wildlife Services has escalated the numbers of endangered species it killed in recent years for a total of 2,481 individuals, primarily gray wolves, since 1996.

Yet, Wildlife Services cannot count each poisoned individual. Many toxic bait sites go undocumented. Grizzly bears may trigger an M-44, a device that expels deadly sodium cyanide, only to die unnoticed in the wilderness. Numerous family dogs have been exposed to M-44s, as have people. Tens of thousands of birds, poisoned by DRC-1339, rain down from the sky forcing some homeowners to scoop them up with pitchforks. Because the toxicant can take three days to act, many birds are not found and included in the agency's statistics. Wildlife Services sprays pesticides from helicopters onto cattails in wetlands to reduce breeding sites for migratory blackbirds to benefit the sunflower industry. These treatments likely cause harm to wetland functionality, water quality, and wildlife habitats.

Why the slaughter? Biologists, economists, and federal oversight agencies have criticized the efficacy of Wildlife Services. Biologists have dubbed the agency's predator-control program the "sledgehammer approach" to wildlife management because of the breadth of extermination. Large-scale, predator-killing programs are unsustainable and environmentally harmful. Few livestock producers actually experience predator problems because most unintended cattle and sheep deaths come from birthing problems, disease, or weather, *but not* predation. An economic study shows that lamb prices, wages and hay costs, but rarely

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[1] The full name of the agency is U.S. Department of Agriculture-Animal and Plant Health Inspection Service-Wildlife Services; its acronym is USDA-APHIS-WS; we use the acronym in the tables to save space.

sheep producers. More ominous, several federal agencies determined that Wildlife Services' practices prove hazardous.

Wildlife Services presents a national security threat, according to federal oversight agencies. In a series of audits since 2001, the USDA's Office of Inspector General has sanctioned Wildlife Services for its unsafe handling of lethal biological agents, toxins that could be used in biological warfare. Particularly sodium cyanide and Compound 1080, both of which can be used in chemical warfare and are extremely toxic to humans.

In November 2007, Wildlife Services itself admitted that it had experienced a "wake of accidents" that involve its aerial gunning program, its hazardous chemicals inventory, and more. The aerial gunning program, for instance, caused ten fatalities and 28 injuries to federal employees and contractors. In March 2008, the Environmental Protection Agency issued a notice of warning letter to Wildlife Services for its illegal and unsafe placement of M-44s that resulted in the injury of a U.S. Fish and Wildlife Service biologist and the death of his hunting dog.

Wildlife Services skirts around disclosure laws. For instance, in July 2000, WildEarth Guardians (formerly Sinapu) requested documents pursuant to the Freedom of Information Act concerning aircraft accidents. The response arrived October 2007—seven years late, and incomplete. A major report was missing and 82 of 400 pages were redacted. Wildlife Services finds federal disclosure laws inconvenient. Despite its public status and funding sources, Wildlife Services remains publicly unaccountable.

Most of Wildlife Services' budget comes from federal tax dollars, but states and counties also contribute. The agency receives funding from private cooperators such as the Woolgrowers Association and the Cattlemen's Association. This biologically and fiscally expensive program burdens taxpayers.

Wildlife Services massacres America's wildlife to benefit agribusiness. It argues that the government's role "in preventing and controlling damage caused by wildlife is sensible" because "wildlife belong in common to the country's citizens" (Chapter 3, p. 51). Yet taxpayers are unwittingly funding the death of hundreds of thousands of animals each year. Those deaths are conducted in ways that are harmful to the environment, the public, protected species, and family pets.

Viable non-lethal alternatives to using dangerous toxicants, traps, and aerial gunning are available but go unused. While practical and time-tested non-lethal aids are available to the livestock industry and farmers, the federal government neither heartily uses them, nor does it spend significant resources developing new ones. Wildlife Services is the wildlife equivalent of Blackwater, shooting first and deflecting questions later.

WildEarth Guardians does not believe that Wildlife Services is accountable to the public. Its mode of operation is anachronistic, reckless, and dangerous, and we call upon Congress to abolish this agency.

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List of Acronyms

American Veterinary Medical Association ....AVMA

Animal and Plant Health Inspection Service ....APHIS

Convention on International Trade in Endangered Species ....CITES

Endangered Species Act ....ESA

Environmental Protection Agency ....EPA

Federal Insecticide, Fungicide, and Rodenticide Act ....FIFRA

Freedom of Information Act ....FOIA

General Accounting Office ....GAO

Lethal Dose for 50 percent of animals tested...LD_{50}

Migratory Bird Treaty Act ....MBTA

National Environmental Policy Act ....NEPA

U.S. Department of Agriculture..USDA

U.S. Fish and Wildlife Service ....FWS

Wildlife Services ....WS

A Brief History of Wildlife Services

In 1931, Congress passed the Animal Damage Control Act, which authorized the Secretary of Agriculture to "promulgate the best methods of eradication, suppression, or bringing under control" a whole host of species, including "mountain lions, wolves, coyotes, bobcats, prairie dogs, gophers" (7 U.S.C. § 426) for the benefit of agribusiness.

As a result of the Animal Damage Control Act, massive trapping and poisoning campaigns occurred across the West leaving behind a wake of dead bodies (Edge c. 1930). In response, in 1931, the American Society of Mammalogists called the Predatory Animals and Rodent Control ("PARC"; one of Wildlife Services' previous names) agency, "'the most destructive organized agency that has ever menaced so many species of our native fauna'" (Edge c.1930). Seven decades later, the American Society of Mammalogists again condemned Wildlife Services' practices and called for fundamental reforms (American Society of Mammalogists 1999, 2000), which have not materialized.

The Animal Damage Control Act, although now amended with innocuous-sounding language, continues in practice. Through a plethora of investigations, committee reports and attempts at reform over a period of eight decades, the agency that kills wildlife to benefit agribusiness has only limited its activities when compelled to do so.

In 1964, Secretary of the Interior Stewart L. Udall's Advisory Board on Wildlife and Game Management issued the "Leopold Report" to Congress (named for its chairman, Dr. A. Starker Leopold, son of pioneering ecologist Aldo Leopold). The Leopold Report described the killing agency as a "'semi-autonomous bureaucracy whose function in many localities bears scant relationship to real need and less still to scientific management'" (Robinson 2005, p. 307). Although the Leopold Report offered reform recommendations to Congress, no reforms were undertaken.

In 1971, Secretary of the Interior C. B. Morton convened another investigative committee, this time, chaired by Dr. Stanley A. Cain. The 207-page "Cain Report" lamented that the predator-control program "contains a high degree of built-in resistance to change" and that monetary considerations that favored the livestock industry served to harm native wildlife populations (Cain et al. 1971). The Report called for substantive changes to wildlife management regimes by changing personnel and control methods, valuing "the whole spectrum of public interests and values," and asserting protections for native wildlife (Cain et al. 1971, Robinson 2005). In the end, Congress implemented a citizen panel advisory committee, but the agency selects the sitting members. Given the agency's history of resisting reform, Congress should abolish Wildlife Services.

The Efficacy & Economics of the Federal Wildlife-Killing Program

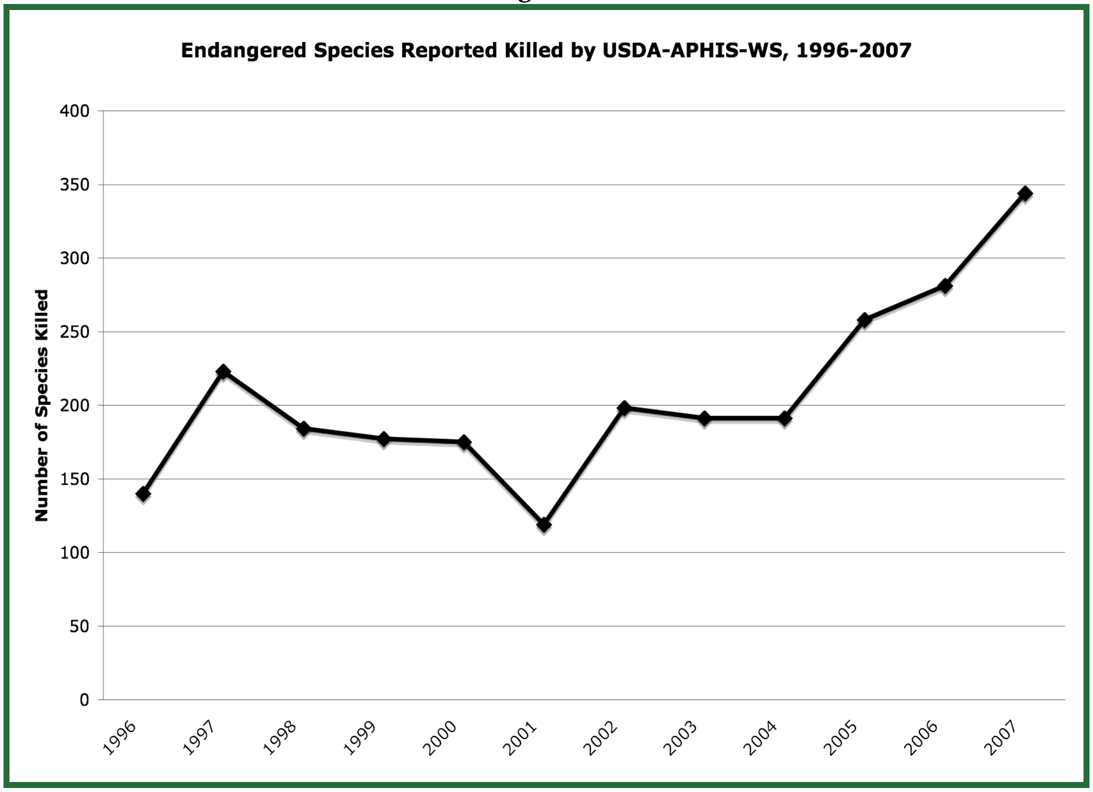
While Wildlife Services continues to emphasize extermination over practical non-lethal solutions, biologists, economists, and federal oversight agencies have criticized the efficacy of Wildlife Services' practices. Few producers actually experience losses from wildlife, yet the killing program is broad-scale, and worse, in the past decade an escalating number of endangered species have been killed. Wildlife Services remains out of sync with most Americans' view of sustainable and responsible wildlife management in the 21st Century. While Americans spend billions of dollars each year on recreational wildlife pursuits, especially watching wildlife, Wildlife Services spends millions to kill them.

Over the past ten years, Wildlife Services has killed increasing numbers of endangered species for a total of 2,481 individuals.

Table 1
Endangered Species Killed by USDA-APHIS-WS from 1996 to 2007
(Data from USDA-APHIS-WS)

	Gray Wolves	Grizzly Bears	Bald Eagles	Mexican Wolves	Louisiana Black bears	Total
1996	140					**140**
1997	222	1				**223**
1998	184					**184**
1999	173	2			2	**177**
2000	174	1				**175**
2001	118	1				**119**
2002	194	2	1		1	**198**
2003	187	3	1			**191**
2004	190			1		**191**
2005	252	2	3	1		**258**
2006	278	0	0	3	0	**281**
2007	340	0		4		**344**
Total	**2,452**	**12**	**5**	**9**	**3**	**2,481**

Figure 1



The average number of endangered species killed between 1996 and 2004 was 177.5. In comparison the average number of endangered species killed between 2005 and 2007 was 294.3, representing a 66 percent increase in the numbers of endangered species killed in the past three years (2005-2007) as compared to the previous nine (1996-2004). Especially noteworthy is the number of wolves. Mexican wolves are considered the most endangered mammal in North America because the entire population is made up of approximately 52 individuals (Mexican Wolf Blue Range Reintroduction Project, 2007). Wildlife Services killed four individuals in 2007.

In 2007, Wildlife Services spent $117 million to kill 2.2 million animals. From 2004-2007, Wildlife Services slaughtered 8,378,412 animals and spent $427,211,379.

Table 2
USDA-APHIS-WS Annual Budget & Kills

Year	Budget	Total Animals Killed	Mammals Killed
2004	$101,490,740	2,767,152	179,251
2005	$ 99,792,976	1,746,248	170,814
2006	$108,590,001	1,642,823	207,341
2007	$117,337,662	2,222,189	196,369
Total	**$427,211,379**	**8,378,412**	**753,775**

The average number of mammals killed in 2004 and 2005 was 175,033, while the average for 2006 and 2007 jumped to 201,855, a 15 percent increase from 2004 and 2005. Wildlife Services' budget has grown too. In the years 2004 to 2006, Wildlife Services spent an average of $103.3 million, but in 2007, spent $117.3, a 14 percent increase. [Table 2.] In comparison, in 2006 alone, Americans spent $110.8 billion to watch, fish, or hunt wildlife.

Table 3
2006 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation

	No. Participants	Expenditures
Hunters	12.5 million	$22.9 billion
Anglers	30.0 million	$42.2 billion
Wildlife Watchers	71.1 million	$45.7 billion

Wildlife Services aerial sprays herbicides on wetlands to benefit the sunflower industry which can harm water quality, ecosystem integrity, and wildlife. Wildlife Services poisons birds that eat fish or grains, it shoots coyotes and other natives carnivores from aircraft, or poisons and traps them to protect livestock, and it kills bears and rodents for harming timber plantations or grazing lands.

Most of these killing activities do little to address systemic problems and the result is a continual and mounting death toll each year, because Wildlife Services relies on extermination techniques rather than innovative non-lethal controls.

The Wildlife Services PEIS states, "of all agricultural communities, the program probably affects the ranching industry the most, particularly the sheep industry" (Chapter 4, p. 130). Wildlife Services then acknowledges that "predator control is one of the most controversial aspects" of its work (Chapter 3, p. 82). Wildlife Services provides enormous resources to protect sheep from predators. Yet, this effort is misplaced and ineffective.

Table 4 Some Aspects of Agriculture Damage (Analyzed by the 1994 USDA-APHIS-WS PEIS)			
Agricultural Sector	**Damage Caused by Wildlife**	**Examples of & Numbers for Species Killed by WS in 2007**[2]	
Crops (alfalfa, corn, fruit, rice, nuts, soybeans, sunflowers, vegetables, and wheat)	Feeding/trampling on crops, burrowing/digging, flooding, fecal contamination of live-stock feed	Blackbirds	307,622
		Starlings	1,176,641
		Finches/Sparrows	19,630
		Beavers	25043
		Ground Squirrels and Prairie Dogs	6,852
		Deer/Hogs	22,377
Aquaculture & Mariculture (bass, bluegill, catfish, trout, minnows, salmon, trout, shrimp)	Predation	Cormorants	15,739
		Egrets	3,138
		Gulls	21,957
		Herons	524
		Ducks	3,337
		Ospreys	41
Commercial Forests (timber plantations, Christmas trees, maple sap tubing)	Girdling saplings and damage to maple sap tubing	Black Bears	511
		Gophers	410
		Porcupines	236
Livestock (cattle, goats, poultry, sheep, and swine)	Predation	Bobcats	2,090
		Coyotes	90,326
		Foxes	4,609
		Mountain lions	336
		Wolves	344

Several research biologists described Wildlife Services' as work haphazard. They dubbed the agency's methods as the "sledgehammer" approach to wildlife management (Treves and Karanth 2003, Mitchell et al. 2004, Stolzenburg 2006). In other words, the scale of predator eradications by Wildlife Services is biologically harmful and unselective for the species killed. In 2004 and 2005, Wildlife Services killed approximately 100,000 mammalian carnivores; the carnivore-kill numbers increased to approximately 120,000 for the years 2006 and 2007, a 20 percent increase over the previous two years (2004 and 2005).

[2] The species included in this table are examples of the kinds of animals that are killed to protect the different categories of agriculture. In the crops category, for example, it is likely that WS killed starlings because they eat grain in fields or in livestock-feeding facilities. Some species killed may fit into more than one agricultural category such as crops *and* livestock: Bears are killed because they may rob apiaries, attack livestock, or girdle saplings on timber plantations. WS's 2007 data only enumerate which species were killed and by what means, but not why each individual was killed and under what category.

Table 5 Mammalian Carnivores Killed by USDA-APHIS-WS (2007)						
	Trap	**Shoot**	**Other[3]**	**Poison**	**Den[4]**	**Total**
Badgers	520	56	1	0	0	**577**
Black Bears	359	151	0	1	0	**511**
Grizzly Bears	1	0	0	0	0	**1**
Bobcats	1,502	585	0	3	0	**2,090**
Cats	759	370	4	0	0	**1,133**
Coyotes	22,204	53,031	1,874	12,897	256	**90,262**
Dogs	270	152	13	91	0	**526**
Arctic Foxes	54	7	10	0	0	**71**
Gray Foxes	1,360	301	6	610	0	**2,277**
Kit Foxes	26	0	0	10	0	**36**
Red Foxes	1,289	516	1	368	238	**2,412**
Swift Foxes	3	0	0	27	0	**30**
Mountain Lions	113	225	0	0	0	**338**
Minks	109	1	0	0	0	**110**
River Otters	377	5	0	0	0	**382**
Raccoons	11,476	803	71	293	0	**12,643**
Ringtails	3	0	0	0	0	**3**
Spotted Skunks	20	1	0	0	0	**21**
Striped Skunks	7,118	566	30	53	28	**7,795**
Weasels	0	2	1	0	0	**3**
Gray Wolves	189	149	0	2	0	**340**
Mex. Wolves	0	4	0	0	0	**4**
Total	**47,752**	**56,925**	**2,011**	**14,434**	**522**	**121,565**

Economist Kim Murray Berger (2006) found that despite Wildlife Services' efforts to kill five million predators at a cost of $1.6 billion for the period 1939 to 1998, it had little effect; 85 percent of U.S. sheep producers went bankrupt in that time period. Two different geographic areas, one where coyotes existed, and one where they were absent, showed identical declines in the sheep industry because of unfavorable market conditions, but not from predator-caused losses (Berger 2006). The most important factors to sheep production are the price of hay, farmhand wages, and lamb prices – these three factors represented 77 percent of production variations from year to year (Berger 2006). Researchers find no correlation between the number of coyotes killed and the number of lambs lost (Knowlton et al. 1999, Mitchell et al. 2004). Simply put: Wildlife Services is both expensive and biologically harmful, but benefits producers little.

[3] Other includes catch polls, pneumatics, and "hand gathering."

[4] Den refers to denning or killing the young in the den, usually with sodium nitrate.

The expedient solution is to employ non-lethal controls such as guard animals and night sheds. But those methods (described more fully below) are seldom instituted by Wildlife Services. According to the U.S. General Accounting Office (GAO), "although written program policies call for field personnel to give preference to nonlethal control methods when practical and effective, field personnel use lethal methods to control livestock predators" (GAO 1995). In 2000, the GAO found that Wildlife Services spent only 15 percent of its budget on research (commendably, 75 percent went to non-lethal research) (GAO 2001). These data are old because Wildlife Services' annual budgets, although available online, do not itemize research expenditures.

The agency's annual budgets are opaque. Since 2001, WildEarth Guardians has, for example, questioned the agency about sums spent on its controversial aerial gunning program. Even with the Freedom of Information Act (FOIA) and the intervention of Congressman Mark Udall, we have been unable to obtain a response. Public accountability is not Wildlife Services' strong suit.

In July 2000 Sinapu (now WildEarth Guardians) requested documents concerning Wildlife Services' safety review of its aerial gunning program under FOIA. Wildlife Services responded in October 2007—long the past the statutory 20-day deadline. The response was incomplete (a major report was missing) and 82 pages were redacted.

In March 2007, Sinapu and Forest Guardians (now WildEarth Guardians) sent Wildlife Services a demand letter requesting that the agency post their 2005 and 2006 online as required by the FOIA and pursuant to a federal court's order. Wildlife Services at first balked, but eventually published the data. In 2008, Wildlife Services posted 53 reports for states and territories, but failed to conduct a national accounting, prompting WildEarth Guardians to do the work in a spreadsheet in order to undertake an analysis on behalf of the public (Barnard 2008 a,b).

Ironically the GAO wrote, "the 1994 EIS concluded that, of the alternatives evaluated, the existing program was the most cost-effective, resulting in a favorable ratio of benefits to costs, and offered advantages such as economies of scale and *nationwide accountability*" (GAO Nov. 2001) (p. 28). A*ccountability* has not been Wildlife Services' strongest hallmark.

The economic data in Wildlife Services' 1994/1997 PEIS come from 1987 and 1988—data that were outdated when the PEIS went to print, but are now woefully obsolete (PEIS Table 3-13, Chapter 3, p. 52). In addition, Wildlife Services' budgets are not transparent: for instance, it uses only a portion to research non-lethal alternatives, but in amounts that are not available to the public through its electronic reading room.

A 2001 GAO report helps dispel some of Wildlife Services' budgetary mysteries and reveals a snapshot of the research budget:

> In fiscal year 2000, the program spent about $80.6 million in funds: about $42.3 million in congressional appropriations and about $38.3 million in

> funds from clients. Of the total funding, research spent about $12.2 million or 15 percent; operations spent about $59 million, or 73 percent; and program administration spent about $9.5 million or 12 percent (GAO Nov. 2001, p. 7).

In 2000, Wildlife Services spent about $9 million on developing non-lethal methods to control wildlife (GAO Nov. 2001). The GAO's data, now eight years old, illuminate by percentages how Wildlife Services outlaid its funds for 2000. Before this GAO report, Wildlife Services' research budget was unknown. This is especially a concern because the public deserves and wants to have its tax dollars spent on developing more ethically-responsible, non-lethal means that do not harm wildlife.

Not only are non-lethal methods seldom implemented, Wildlife Services simply cannot prove that its killing program provides relief to livestock producers and farmers.

Wildlife Services' PEIS correctly asserts that livestock or crop losses caused by wildlife are unevenly distributed among individual producers, but for some, the losses are significant (Chapter 3, p. 53). The GAO affirms this, stating, "a small proportion of producers absorb high losses, whereas the vast majority of producers sustain less serious economic damage" (GAO 2001, p. 36). However, the GAO further notes that:

> . . . although average losses to predators are small compared to overall losses from other causes, such as weather and disease, the damages are not evenly distributed over time or over area. Thus, using a single average statistic to infer overall program effectiveness would not accurately reflect the distributional variations (GAO 2001, p. 36).

In other words, the GAO's investigations reveal that few livestock producers are harmed by wildlife, most losses stem from weather or disease, and Wildlife Services cannot prove that its program provides any meaningful benefits to the very producers it claims to help. Yet, Wildlife Services maintains that its predator-killing program prevents livestock losses. Even the GAO disputes this fundamental notion:

> . . . we found no independent studies that rigorously assessed the costs and benefits of the Wildlife Services program; the only studies that we found were conducted by or in collaboration with Wildlife Services scientists and researchers (GAO 2001, p. 27).
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> * * *
>
> Because of the nature of cost-benefit studies in general, their results should be viewed with some caution. Inherent difficulties bedevil any attempt to quantify the costs and benefits of a program designed to prevent damage. *Key among these difficulties are (1) projecting the degree of losses that would have occurred absent the program*, (2) valuing those losses, and (3) valuing the

> program benefits. Moreover, in some instances, the relevancy of *data available for quantifying the costs and benefits* associated with Wildlife Services' activities may be *limited by the data's age* (GAO 2001, p. 35, emphasis added).

The only information that shows the benefits of the Wildlife Services' program derive from the agency itself. Meanwhile, independent research biologists and an economist have decried the breadth of the killing because of the environmental harms, the non-selectivity, and the failure to benefit the sheep industry—where most of Wildlife Services' spends its resources. The GAO plainly disputes that the costs associated with Wildlife Services' program have any measurable benefit, and that the data relied on by the agency are dated.

- **Debunking the Cattle and Sheep Losses Myth**

Every year the USDA's National Agricultural Statistics Service (NASS) reports on the U.S. cattle and sheep production inventory. Every five years, NASS counts unintended cattle and sheep deaths from predation, weather, disease, and other causes. The most recent report released for cattle deaths is 2006 and, for sheep, 2005.

Table 6
USDA-NASS, Cattle & Calves Produced in 2005
Total Unintended Mortalities

Total Cattle (Beef, Dairy, Etc.) Produced	Predator-Caused Cattle Deaths	Cattle Deaths From Other Causes*
104,500,000	190,000	3,861,000
100%	0.18% of total production	3.69% of total production

Table 7
***Cattle Mortality from all Other Causes**

Respiratory Problems	1,110,000
Digestive Problems	648,000
Calving	572,000
Unknown	474,000
Weather	275,000
Other	271,000
Disease	174,000
Lameness/Injury	132,000
Metabolic Problems	78,000
Mastitis	67,000
Poison	39,000
Theft	21,000
Total	**3,861,000**

Table 8 USDA-NASS, Sheep and Lambs Produced in 2004 Total Unintended Mortality		
Total Sheep & Lambs Produced in U.S.	Total Predator-Caused Sheep Deaths	Total Sheep Deaths From Other Causes**
7,650,000	224,200	376,100
100%	2.9% of total production	4.9% of total production

Table 9 **Sheep Mortality from all Other Causes	
Illness/Disease	159,350
Lambing	53,400
Unknown	48,100
Old Age	39,900
Weather	39,450
Starve, Dehydrate, Fire	19,400
Poison	10,300
On Their Back	3,800
Theft	2,400
Total	**376,100**

The reports reflect data from the previous calendar year.

In 2005, U.S. producers raised 104.5 million head of cattle (USDA NASS 2005a). Of these, 190,000 (or 0.18 percent) died as the result of predation from coyotes, domestic dogs, and other carnivores (USDA NASS 2006) [Table 6]. In comparison, livestock producers lost 3.9 million head of cattle (3.69 percent) to maladies, weather, or theft (USDA NASS 2006) [Tables 6 and 7].

Coyotes were the primary cattle predators—they killed 97,000 cattle in 2005--followed by domestic dogs, which killed 21,900 cattle. Wolves killed remarkably few cattle, 4,400 head, as did all of the wild cats (USDA NASS 2006).

In 2004, sheep producers raised 7,650,000 animals nationwide (USDA NASS 2005b). Of that figure, native carnivores and domestic dogs killed 3 percent, or 224,200 sheep (USDA NASS 2005c). In comparison, 5 percent of sheep died from illness, dehydration, falling on their backs or other causes (USDA NASS 2005c) [Tables 8 and 9]. Coyotes and domestic dogs were the main carnivores involved in sheep predation in 2004 (USDA NASS 2005c).

In sum, each year, Wildlife Services kills tens of thousands of wild animals and pets, endangers public safety and the safety of its own employees, and spends millions of tax dollars (local, state, and federal) to do so. The 1994/1997 PEIS upon which Wildlife Services relies is anachronistic. Despite the $100 million annual investment in killing over one million animals each year, the GAO, and independent researchers and an economist have shown that the program is ineffective, and the costs outweigh any perceived benefits. Wildlife Services kills wild predators by the thousands using controversial and dangerous methods in futile attempts to bolster the nation's declining sheep industry.

Wildlife Services' claim that predator control benefits the livestock industry goes unproved according to independent biologists, an economist, and the GAO. Furthermore, losses are unevenly distributed and localized. The GAO writes, "*A small proportion of producers absorb high losses, whereas the vast majority of producers sustain less serious economic damage*" (GAO 2001, p. 36). Few livestock are actually killed by predators. Far more die from other unintended consequences such as birthing problems, weather, and disease. The agency kills thousands of native animals for the benefit of a few in agribusiness. Yet, the government's own reports show that predators kill few livestock. Mammalian carnivores killed 0.18 percent of the total U.S. cattle production in 2005 and 3 percent of the sheep production in 2004. The numbers of predators killed to protect livestock is highly disproportionate and several conservation biologists have called killing 100,000 native carnivores a year the "sledgehammer" approach to wildlife management. Lethal controls such as poisons, traps, and aerial gunning are not selective for specific animals, but rather are used to remove the most individuals from an area. Wildlife Services has killed an increasing numbers of mammals and endangered species.
The agency spends little on research of or utilization of viable non-lethal alternatives.

Congress did not give Wildlife Services ultimate authority over wildlife. This is especially important because Wildlife Services has killed more mammals and more endangered species in recent years. Wildlife Services' role in wildlife management is outdated and out of step with the majority of values towards wildlife. People spend billions each year in wildlife-related recreational pursuits. Most watch or photograph wildlife, while others hunt and fish. The public trust doctrine demands that Wildlife Services act in a manner that protects wildlife for all of the public, not just for certain special interests.

National Security Hazard

In 2002, Congress passed the Public Health Security and Bioterrorism Preparedness and Response Act, which required the Secretary of Agriculture to regulate biological agents that could "through acts of bioterrorism" affect the domestic agricultural economy (USDA OIG 2006). To prevent terrorists from causing domestic harm, the USDA issued a safety document for farmers. In it, the Department expressed concerns about the safety of the milk supply, crops, aircraft used to spray pesticides, greenhouses, cattle, and poultry (USDA 2006). In addition, Congress and oversight agencies are likely concerned by food and water safety issues. Wildlife Services uses biological agents, such as strychnine and Compound 1080, that could easily taint water and food.

Between 2002 and 2006, Wildlife Services failed numerous federal audits for its failure to safely inventory, store, and control access to harmful biological agents. In 2007, Wildlife Services itself acknowledged that it has endured a "wake of accidents," and in 2008, the agency was warned by the Environmental Protection Agency (EPA) for failing to comply with another federal pesticide safety law.

In 2002, the Office of Inspector General (OIG) found that APHIS had lost 60 pounds of strychnine-treated bait and over 2,000 sodium cyanide capsules (USDA OIG 2002). The following year, Wildlife Services apparently found these missing and highly dangerous toxins, but it failed to put in place an adequate chemical inventory and tracking system (USDA OIG 2004a). In her 2002 statement before Congress, Joyce Fleishman, Acting Inspector General for the USDA, reported that it found the Animal and Plant Health Inspection Service unaccountable at a state level for its inventory and control of its hazardous pesticides and drugs used on wildlife (Fleischman 2002).

In a 2004 OIG report, Assistant Inspector General Robert Young found Wildlife Services in the same predicament. Materials had been stored in such a way as they could be stolen and used for unauthorized purposes, and they posed a safety threat (USDA OIG 2004a). That year, the Inspector General found that Wildlife Services' aircraft were not secured from potential terrorists (USDA OIG 2004b).

In 2005 and 2006, the USDA OIG again failed Wildlife Services in audits because the agency was not in compliance with the Bioterrorism Preparedness and Response Act. In the first, the OIG found that Wildlife Services had not secured "dangerous biological agents and toxins" (USDA OIG 2005). In the second, the OIG found that Wildlife Services was not in compliance with regulations; unauthorized persons had access to toxicants; individuals using toxicants had inadequate training; and that inventories of hazardous toxicants were open to theft, transfer, or sale (USDA OIG 2006). Of the sites OIG visited, none were in compliance (USDA OIG 2006).

In 2007, Wildlife Services' aerial gunning program crashed twice. In June, a Utah operation ended in two fatalities, and then in September, a Texas operation resulted in two serious injuries (see www.goAGRO.org). Embarrassed by subsequent media attention, Wildlife Services acknowledged its operational problems across its entire program in November. It stated:

> **In the wake of several accidents in WS' programs, WS is conducting a nationwide safety review** focusing on aviation and aerial operations, explosives and pyrotechnics, firearms, **hazardous chemicals**, immobilization and euthanasia, pesticides, vehicles, watercraft, and wildlife disease activities. The review will be conducted by subject matter experts from WS, federal and state government, and private industry. We expect the review to be completed in the next year. (Emphasis added.)

After Wildlife Services' November 2007 disclosure, WildEarth Guardians (then Sinapu) and Public Employees for Environmental Responsibility (PEER) requested that Wildlife Services conduct the national safety review with public transparency. Wildlife Services dismissed our concerns. In a November 14th response, Deputy Administrator William Clay wrote that the agency itself would select auditors who "demonstrated professional expertise" and who were "unaffiliated" with the agency. Wildlife Services planned to embed the outside auditors with agency insiders. Mr. Clay told WildEarth Guardians and PEER that the public would have the opportunity to "read the final [national safety review] document" upon completion. The safety review issued on August 4, 2008. The document failed to look at public safety issues—an enormous omission given the Inspector General reports—but it did look at employee safety matters. In the instance of the aerial gunning program, for instance, the report found that the agency operated in the highest caliber and worthy of a "gold standard." The report stated:

> It is the opinion of the Aviation Resource Management Survey (ARMS) Team that the WS aviation program is being operated in a safe, efficient, and effective manner. The WS aviation program meets the requirements of the ICAP [Interagency Committee on Aviation Policy] Gold Standard Certificate program (USDA 2008b).

Despite its self-congratulating appraisal, the Wildlife Services aviation safety review team recommended that the agency make several new hires to increase the safety capacity of the aerial gunning program. On its face, the review invites suspicion because aerial gunning is an inherently dangerous practice because agents fly at low speed close to the ground, and as we demonstrate herein, the agency has been involved in numerous accidents that have resulted in serious injuries and fatalities.

In March 2008, the EPA dispatched a notice of warning letter to Wildlife Services pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) because it had improperly placed M-44s on federal public lands in Utah. As a result of Wildlife Services' negligence, Sam Pollock, a U.S. Fish and Wildlife Service (FWS) biologist, who was rabbit hunting with his dog, Jenna, was exposed to sodium cyanide after Jenna had asphyxiated and died. Jenna triggered an unmarked M-44 device. Mr. Pollock witnessed Jenna gagging, frothing, and vomiting, and then saw the spent M-44. After handling Jenna's body, Mr. Pollock reported symptoms consistent with cyanide poisoning.

In sum, Wildlife Services' lack of control over its lethal biological agents has directly harmed people, and has led to several failed audits from federal oversight agencies that have expressed concern about Wildlife Services' failure to comply with the Bioterrorism Act. The aerial gunning program has caused the death or physical impairment of its own employees. Its flawed use, storage, and tracking system of lethal toxicants has led to two sanctions from federal agencies. It even acknowledged that it has experienced a "wake of accidents" and called for a national safety review, the outcome of which, because of its closed-door process, its failure to look at public safety issues, and recommendations, seems less than a scrupulous inspection. For these reasons, WildEarth Guardians requests that Congress abolish Wildlife Services.

Carnivores in Ecosystems

Carnivores can modulate prey populations and make them more vigorous (Murie and U.S. Department of the Interior 1940, Leopold 1949, Reprint 1977, Logan and Sweanor 2001). Large carnivores increase biological diversity and functionality of ecosystems (e.g. Smith et al. 2003, Mezquida et al. 2006, Ripple and Beschta 2006). The effects from predation cascade through all the trophic layers—through the herbivores to the producers—and can even influence riparian systems, as theses examples show:

After the wolf reintroduction into Yellowstone National Park in 1995, elk, which had previously decimated willow and aspen stands, were forced to be more mobile to avoid predation. With decreased herbivory from sedentary elk herds, willow communities returned, beavers followed and used the new trees and shrubs to build their dams and lodges. Those structures not only brought water from underground to the surface, but made water flow more dependable. As a result, populations of neotropical and water-wading birds and moose increased (Smith et al. 2003).

The presence of mountain lions (*Puma concolor*) in desert ecosystems can have several top-down effects. Mountain lions increase biological diversity in both plant and animal communities and increase the functionality of rare Western riparian systems. By modulating deer populations, lions prevent overgrazing near rare riparian systems. The result: more cottonwoods, rushes, cattails, wildflowers, amphibians, lizards, and butterflies, and deeper, but narrower, colder stream channels necessary for native fishes (Ripple and Beschta 2006).

Despite their persecution, coyotes play important keystone roles in their ecosystems. Coyotes increase biological diversity by preying upon medium-sized carnivores such as skunks, house cats, foxes, and raccoons. This predation indirectly benefits ground-nesting birds (Crooks and Soule 1999), even greater sage-grouse (Mezquida et al. 2006), a species under consideration for listing under the Endangered Species Act (ESA). Coyotes indirectly protect kit fox populations by reducing red fox densities (because red foxes are small, they can easily enter kit fox dens, whereas coyotes are too big) (Cypher and Spencer 1998). By competing with medium-size predators, coyotes increase diversity of various rodent species (Henke and Bryant 1999).

Large-scale predator eradications are biologically expensive and inherently non-selective (Mitchell et al. 2004). Surveys indicate that 11 to 71 percent of animals killed to prevent conflicts with humans or livestock were not involved in such incidents. If those data are extrapolated to Wildlife Services, the agency overkilled 1.5 to 9.7 million animals indiscriminately. In other words, Wildlife Services killed several million animals that had no negative interactions with humans between 1996 and 2001 (Treves and Karanth 2003). In 2007, Wildlife Services killed 121,524 native carnivores such as coyotes, bobcats, bears, mountain lions, and wolves [Table 5].

Wildlife Services' approach to predator control is blanket, indiscriminate, and wasteful. With lethal methods, the agency cannot pretend to capture the "single offending animal" or use "surgical precision" as it has claimed in the past. Moreover, a 1995 GAO Report found that Wildlife Services rarely used non-lethal methods of predator control. No data suggest that Wildlife Services has otherwise improved its usage of non-lethal alternatives since the 1995 GAO report.

In short, carnivores increase both the richness and complexity of animal life and indirectly contribute to better ecosystem function, free work known as "ecosystem services." Despite these benefits, Wildlife Services and others spend hundreds of millions of dollars annually in attempts to eradicate or scale back predator populations. Not only can this imperil native species and destabilize ecosystems, it has resulted in unintended consequences with generalists such as coyotes, which have increased their range several fold as discussed below. Wildlife Services justifies their work based on spurious economic arguments, and to bolster populations of ungulates—species sought by hunters.

- **Predators and their Prey**

Wildlife Services kills predators to elevate prey species' numbers. Many peer-reviewed studies, however, have shown that killing predators not only destabilizes ecosystem functions, but can fail to increase prey populations—unless prey species are below their carrying capacity (National Research Council 1997, Ballard et al. 2001, Logan and Sweanor 2001). The Colorado Division of Wildlife concluded that the mule deer herd recruitment problems were associated with poor quality winter range conditions and disease, but not predation (Watkins et al. 2002, Pojar and Bowden 2004). But prey populations' decline can come from a variety of factors, including competition with domestic livestock, livestock-borne diseases, over-hunting by humans, fire suppression, habitat fragmentation or loss, too much snow (making foraging difficult), drought, late season frosts, and other stochastic events that cause food failures (National Research Council 1997, Gill 1999, Ballard et al. 2001, Pojar and Bowden 2004).

Mosnier et al. (2008) found that intensively killing bear and coyote populations to protect a threatened and isolated population of caribou in Canada only benefited the caribous for a short duration. The authors suggest that most studies that have looked at predator-prey populations failed to do so for extended periods (Mosnier et al. 2008). Lethal control measures failed to help the caribou in the long-term because coyotes and bears were mobile over long distances, they benefited from alternative prey (moose), and were supplementally fed by hunters who left offal piles behind.

A study on Sonoran pronghorn found that drought, not predation, is the primary cause for the decline of this endangered species (Bright and Hervert 2005). In their "Pronghorn Management Guide," Raymond Lee et al. (1998) found that if habitat is unsuitable, than predator control will fail to create robust prey species populations. For pronghorns, fawn survival is directly attributable to abundance of nutrient-rich grasses and forbs that females need during gestation and lactation (Lee et al. 1998).

Livestock-borne disease is another important factor contributing to the decline of both pronghorn and bighorn sheep. Bluetongue, which is probably passed to pronghorn from cattle, is a serious threat and has caused thousands of pronghorn deaths (Lee et al. 1998). The media have covered numerous stories in the past year about how domestic sheep make their wild cousins "dangerously susceptible to various forms of pneumonia" (Hoffman October 1, 2007). *Smithsonian* reporter Becky Lomax writes, "two centuries ago, an estimated 1.5 million to 2 million bighorn sheep lived in North America; today a mere 28,000 remain" (Lomax 2008, p 22). Bighorn sheep have been largely extirpated because of disease from domestic sheep, competition with livestock for provisions, and trophy hunting (Lomax 2008).

Hall Sawyer and Professor Frederick Lindzey (2002) surveyed over 60 peer-reviewed articles concerning predator-prey relationships involving bighorn sheep and mountain lions. They concluded that while lions are capable of preying upon bighorn sheep, generally *one individual*, not the entire population, "specializes" in bighorn predation, because this is an unusual, acquired skill (Sawyer and Lindzey 2002). Sawyer and Lindzey (2002) conclude that predator control is often politically expedient, but does not address underlying environmental issues including habitat loss, loss of migration corridors, and inadequate nutrition.

Despite this body of empirical knowledge, federal, state and other agencies, and Wildlife Services in particular, kill scores of native carnivores in the misplaced belief that predators dominate the relationships between themselves and their prey. If predators simply killed all of their prey, there would be neither. Myriad influences can determine the size of prey populations including habitat quality and quantity, disease, anthropogenic threats, and stochastic events. The effect of high levels of carnivore killing has enormous implications as the following cases indicate.

- **Canidae**

    - **Coyotes (*Canis latrans*)**

> Between killing contests, Wildlife Services' actions, and state, local and private agencies, it is estimated that 400,000 coyotes are killed each year. That is more than 1,000 coyotes a day--almost a coyote a minute (Finkel 1999).

Despite being the target of elimination campaigns since 1885, coyotes have expanded their range three-fold across North America (Crabtree and Sheldon 1999). After wolves were reintroduced into Yellowstone National Park in 1995, coyote densities declined by 50 percent in some areas and even up to 90 percent in wolf packs' core areas (Crabtree and Sheldon 1999, Smith et al. 2003). Perhaps because coyotes have evolved under pressure from wolves, they became adaptable to persecution pressures. They are seemingly resilient in the face of extraordinary killing measures by Wildlife Services, state agencies (especially South Dakota and Wyoming), and individuals. For the years 2004 to 2007, Wildlife Services has killed 326,694 coyotes.


Photo: Dave Jones

Wildlife Services frequently traps, snares, and poisons young coyotes, not the older or dominant individuals that are usually involved with livestock depredations (Mitchell et al. 2004, Stolzenburg 2006). Coyotes are killed to benefit livestock growers, ostensibly to protect endangered species, or to bolster ungulate populations. Costly coyote eradication programs provide little real benefits to livestock growers (Berger 2006). Coyote-killing programs may make endangered species and other sensitive species more vulnerable to disease or to other predators (Sovada et al. 1995, Cypher and Spencer 1998, Kitchen et al. 1999).

Wildlife Services kills to "benefit" other species, but those schemes are usually an excuse to kill predators. As Dr. Clait Braun, retired Colorado Division of Wildlife grouse expert, wrote, "No one has yet demonstrated that spring recruitment and breeding population size of sage-grouse have been or can be affected by predator control programs."[5] The loss of habitat from fires, grazing, weed invasion, and other factors is largely responsible for declining sage-grouse populations. Grazing is known to degrade sage-grouse habitat by eliminating grassy understories, destroying riparian and wet meadow areas, and causing weed invasion. If there is not sufficient food for hens, the egg quality will be reduced. Moreover, weather—i.e. lack of precipitation - can affect egg quality as well (Braun 2002).

Ironically, Mezquida et al. (2006) found that coyotes indirectly benefit sage grouse populations:

1. coyotes control the number of mesopredators (red foxes, badgers, and ravens) that are more likely to prey on sage-grouse eggs and their young;
2. a decrease in coyotes may result in the increase of jackrabbits, which has two results:
    a. jackrabbits compete directly with sage grouse for sagebrush and forbs (for both food and cover);
    b. an increase in jackrabbits may lead to an increase in golden eagle populations, the key predator for sage grouse adults.

Coyotes indirectly benefit sage grouse and other ground-nesting birds. They contain mesopredator populations. Sage grouse are harmed by myriad threats, and experts do not believe that coyotes are a significant threat.

While humans expend extraordinary resources to exploit coyote populations, these canids have proved incredibly adaptable. Killing coyotes does not work, and these expensive

[5] Declaration of Dr. Clait Braun in Committee for Idaho's High Desert et al. vs. Mark Collinge et al. (April 2002).

control programs are not supported by empirical science. Studies indicate that coyotes compensate for population losses using several strategies:

- Emigration. In an area where coyotes have been killed, an initial decrease in the coyote population density prevails, but soon individual migrants or even packs fill in the void (Knowlton 1972, Crabtree and Sheldon 1999).

- More breeders. Killing regimes result in the reproductive release of reproductively suppressed females. In stable populations, only the alpha pair (dominant) of coyotes breed, not subordinate members of the pack (Crabtree and Sheldon 1999). With exploitation, reproductively repressed females are behaviorally allowed to breed (Crabtree and Sheldon 1999). Stable populations of coyotes tend towards older family structures and lower reproductive rates than hunted populations, while exploited populations are characterized by younger adult members, and larger numbers of breeding members, and increased litter sizes (Knowlton et al. 1999).

- Larger litters. Coyote control can result in a smaller group size, which increases the amount of food per coyote, which leads to higher litter survival rates, as the increase in food availability improves conditions for breeding females and their pups (Goodrich and Buskirk 1995).

Despite over a century of persecution, coyotes have expanded their range three-fold, and the sheep industry has not benefited from millions of dollars of coyote killing operations, because the biggest cost to sheep producers is labor, hay, and lamb prices, not predation. Killing coyotes to benefit other species is often a disguise used to justify predator control. Empirical studies show that coyote-killing operations result in a change in coyote breeding and migration strategies, which overcome killing operations. Because coyotes have proved to be so resilient in the face of relentless persecution by Wildlife Services and others, it makes little economical or biological sense to use lethal control measures to protect livestock.

- **Kit Fox (*Vulpes macrotis*)**

Photo: USFWS

Smaller than swift foxes (*Vulpes velox*), kit foxes range in the West in habitats characterized by desert shrub, saxicoline brush, juniper-sagebrush, and rimrock habitats (Fitzgerald 1994a). Like swift foxes, they dig their own dens and diet on lagomorphs, rodents, and birds (Fitzgerald 1994a). Kit fox populations are in decline throughout their range because of historic predator and rodent control (Meaney et al. 2006). NatureServe indicates they are "critically imperiled" in Colorado, Idaho, Oregon; "vulnerable" in California, Nevada, and Utah; and "apparently secure" in Arizona, New Mexico, Texas—although no populations studies have been conducted in these states (Meaney et al. 2006). Their populations continue to decline because of fragmentation of habitat, oil and gas development, ORV usage, and domestic livestock grazing (Meaney et al. 2006). They are still hunted and trapped in Arizona, New Mexico, and Texas (Meaney et al. 2006). Since 2004, Wildlife Services has killed between 30 and 40 individuals each year. Since kit foxes are fossorial, the agency may kill more than it knows. In denning operations, sodium nitrate canisters will asphyxiate all co-habitants in a burrow. In the years 2004 to 2007, Wildlife Services killed 147 kit foxes.

- **Swift Fox (*Vulpes velox*)**

Photo: Diane Hargreaves

Swift foxes are a tiny, rare grassland species, weighing between 1.5 and 3 kilograms (3.3 to 6.6 pounds) (Fitzgerald et al. 1994a). Adequate den sites seem to be the primary factor that limit swift fox populations (Kintigh and Anderson 2005). In a northeastern New Mexico study, preferred den sites were at higher elevations than the surrounding area—to allow for drainage—and in close proximity to prairie dog towns and "relatively high road densities" (Kintigh and Anderson 2005).

Swift foxes generally hunt at night (Fitzgerald et al. 1994a), and their diet consists of insects (usually grasshoppers when available), lagomorphs (cottontails and jack-rabbits), a variety of rodents (ground squirrels, prairie dogs, pocket gophers, and mice), birds, lizards, and vegetation (Kitchen et al. 1999). During the day, swift foxes spend much of their time around their dens (Kitchen et al. 1999).

Although coyotes are an important swift fox predator (Schauster et al. 2002a, Kamler et al. 2003, Kitchen et al. 2005, McGee et al. 2006), swift foxes do not avoid coyotes' home ranges and are able to cohabit spatially with coyotes (Kitchen et al. 1999). Kitchen et al. (1999) also found that the two species, although they eat many of the same things, specialize on different food items seasonally and with great variation, and so are able to successfully compete.

Prior to settlement by Europeans, swift foxes were abundant across short-and mixed-grass prairies of North America (Schauster et al. 2002b, Kamler et al. 2003, Finley et al. 2005). During the 19th century, however, tens of thousands of swift fox pelts were bartered at trading posts (Schauster et al. 2002b). Later, the cultivation of the Great Plains and predator-killing activities (involving broadcast toxicants—such as Compound 1080, sodium cyanide, and strychnine—shooting, trapping, and predation by domestic dogs) forced swift foxes into dramatic decline (Schauster et al. 2002a, Schauster et al. 2002b). They were largely extirpated (Fitzgerald et al. 1994a). In the 1950s, swift fox populations reportedly began to recover after poisoning campaigns lessened; researchers speculate they benefited the most after Compound 1080 was banned in 1972 (Schauster et al. 2002a).

In February 1992, swift fox were petitioned for listing as endangered under the ESA. In response, ten states formed the Swift Fox Conservation Team (SFCT) (Stuart and Wilson 2006). In 1995, the FWS determined that their listing was warranted, but precluded because of other FWS priorities. In 1997, the SFCT wrote an assessment and drafted a conservation plan. As a result, in 2001, the FWS removed swift fox as a candidate for listing under the ESA despite its precarious status in most states.

Currently, the core area for swift fox populations is found in Colorado, Kansas, and Wyoming—although they are patchily distributed (Schauster et al. 2002a). NatureServe considers them "presumed extirpated" in Manitoba and Minnesota; "critically imperiled in parts of Alberta, Saskatchewan, North Dakota, South Dakota, and Oklahoma; "imperiled" in Wyoming, Nebraska, and New Mexico, and "vulnerable" in Montana, Colorado, Kansas, and Texas.

Researchers consistently comment that swift foxes are naïve and easily trapped (Boggis 1977, Fitzgerald et al. 1994a, Fitzgerald et al. 1994b). Swift foxes tolerate humans, and research animals have walked into traps over and again, and when released would not panic, but would walk away a few meters and then sit and groom themselves (Loy 1981). In a study on the Pawnee National Grasslands of Colorado, trappers were an important cause of mortality (Fitzgerald et al. 1983). Researchers caught animals that had missing feet as a result of swift foxes being caught in traps intended for coyotes (Fitzgerald et al. 1983). Despite their removal from the ESA candidate list, swift foxes are far from recovered, and they continue to face persecution by Wildlife Services and others. In the years 2004 to 2007, Wildlife Services killed 92 swift foxes.

- **Wolves (*Canis lupis*)**

Wolves have been recovered in five percent of their historic range; yet, in February 2007, the FWS published a final rule that removed ESA status for gray wolves in the Western Great Lakes Distinct Population Segment the following month.[6] The delisting decision gave management authority to states, but is currently in litigation. The following year, in February 2008, the FWS removed ESA protections for gray wolves residing in the Northern Rocky Mountain region.[7] The decision took effect on March 28, 2008, and gave authority to the states to regulate wolf populations. As a result, over 100 wolves were killed between March and July 18, 2008, the date a federal court enjoined the FWS' decision to delist. The rate of killing equaled nearly one wolf per day.

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[6] The Great Lakes distinct wolf population segment includes parts of North and South Dakota, Iowa, and Illinois, and the whole of Minnesota, Wisconsin, and Michigan.

[7] This distinct population segment is found in the states of Wyoming Montana, and Idaho and in portions of Oregon, Washington, and Utah.


Photo: USFWS

Mexican gray wolves of New Mexico and Arizona are considered endangered by the FWS but are given "nonessential experimental" status, which allows for liberal killing by federal agents and livestock growers. While their population numbers only about 60 wild individuals, they have lost 9 subjects in recent years because of Wildlife Services' actions (Mexican Wolf Blue Range Reintroduction Project, 2007, www.aphis.usda.gov).

Lethal predator-control measures, and now recreational hunting activities in the Northern Rockies, threaten the success of wolf recovery programs. By reducing wolves in their core areas, the ability for individuals to disperse into suitable habitat outside of reintroduction zones is also diminished. The Southern Rocky Mountain ecoregion, particularly Colorado and Utah, remains starved of wolves. Because dispersal opportunities are diminished due to hunting and control measures, recovery into the Southern Rockies has not occurred.

In the past decade, predator-control activities have resulted in the indiscriminate death of wolves. A sampling of some of these incidental take events demonstrates that Wildlife Services predator-control activities and persons acting as vigilantes may adversely affect wolf recovery:

Sodium Cyanide M-44 Incidents resulting in death of wild wolves:

- January 1995, Priest River, Idaho (uncollared).
- May 1997, Alder, Montana.
- April 1998, Alder, Montana.
- December 1998, Powell, Wyoming.
- In Spring 2001, South Dakota (confirmed by forensic tests (Brokaw 2002)).
- January 2007, two uncollared wolves near Riggins, Idaho.
- December, 2008, radio-collared wolf killed by a "legally placed M-44" near Cokeville, Wyoming.

Compound 1080 Incidents resulting in death of wild wolves:

- March 31, 1999, Idaho (wolf i.d. B-29-M BL).
- May 16, 1999, Idaho (wolf i.d. B-51-F BL).
- August 29, 2000, Idaho (wolf i.d. B-37-F GR).
- August 29, 2000, Idaho (suspected 1080) (wolf i.d. B-89-F GR).
- December 2, 2000, Idaho (wolf i.d. B-96-M GR) (illegal—not Wildlife Services).
- May 19, 2003, Idaho (wolf i.d. B-143-M GR) (illegal—not Wildlife Services).
- January 2004, Clayton, Idaho.

Furthermore, Wildlife Services and the FWS justify wolf-killing on the basis that it increases human tolerance for wolves in the U.S. This has not been the case, as seen with the preliminary delistings of wolves, which have largely occurred as the result of steady state pressure to remove regulatory protections.

At present, with FWS has delisted wolves in the Great Lakes region, and attempted to do so in the Northern Rockies Region. As of July 2008, a court ordered temporary relisting of the Northern Rockies Region population. For all intents and purposes, Mexican wolves enjoy almost no protections. Therefore wolf populations in the U.S. face uncertainty. Wildlife Services has killed almost 2,500 wolves in the years between 1996 and 2007.

- **Felidae**
  - **Bobcats (*Lynx rufus*)**

Photo: Shirley Casey

Historically overexploited, bobcats were listed on Appendix II of Convention on International Trade in Endangered Species (CITES) in 1975 (Woolf and Hubert 1998, Sunquist and Sunquist 2002). Bobcats and lynx appear similar—thus the Colorado Division of Wildlife has taken steps in consultation with the FWS to prevent the incidental take of lynx by bobcat hunters and trappers.

Even with these international CITES guidelines, bobcat populations are subject to liberal state-level hunting and trapping regulations. Wildlife Services has killed 8,704 bobcats in the years 2004 to 2007.

  - **Lynx (*Lynx canadensis*)**

Historically, lynx were easily trapped and poisoned (Schenk 2001, Schenk and Kahn 2002). While they apparently continue to flourish in Canada and Alaska, according to NatureServe, their future in the Lower 48 looks bleak; they rank in the U.S. as either "critically imperiled" or "presumed extirpated." Lynx are listed as a threatened species under the ESA.

Photo: Dave Jones

The Colorado Division of Wildlife

sponsored reintroduction efforts in the years between 1999 and 2006, and released 218 lynx. The agency released over 218 lynx into southwestern Colorado. Over 100 kittens have been born in that time, and the animals have dispersed across several states, especially Wyoming, Utah, and New Mexico. The Division of Wildlife could not document kitten births for 2007 or 2008, and link the decline in the birth rate to a decline in Colorado's snowshoe hare population.

Despite these reintroduction efforts, the August 23, 2005 biological opinion from the FWS fails to limit traps, snares, and M-44s in occupied lynx habitat in Colorado. Wildlife Services uses leghold traps, neck snares, M-44s, and hound hunting either in known lynx habitat or corridors where they are dispersing. Lynx are easily trapped and historically were wiped out because of widespread poisoning campaigns (Schenk 2001, Schenk and Kahn 2002).

Although mitigation measures for traps and snares are discussed in the biological opinion, no effective mitigation can be made for M-44s, which are inherently indiscriminate. Lynx could potentially trigger an M-44 because their close relative bobcats (*Lynx rufus*) are occasionally killed by M-44s. In 2004, Wildlife Services killed 5 bobcats with M-44s. Moreover, FWS considers M-44s a hazard to other cats such as Florida panthers, ocelots, and jaguarundis (FWS 1993). Cats are known to scavenge (Bauer et al. 2005) and thus the scented bait of an M-44 could lure this tufted-ear cat.

Lynx prefer to live and den in old growth forests with large-downed trees at high altitudes. Reproduction and recruitment is the key to their survival. Lynx receive no ESA protections in New Mexico, and thus are subject to indiscriminate traps and poisons set by Wildlife Services and others.

- **Mountain Lions (*Puma concolor*)**

Photo: Richard Badger

Mountain lions generally occur in low densities because they are an obligate carnivore (they eat no plants) and their food is patchily distributed across arid landscapes (Logan and Sweanor 2001). Mountain lions are extraordinarily unsocial; they avoid one another (Logan and Sweanor 2001). Lions establish "home areas"—territories that move along with prey migrations. Males' home ranges are generally larger than those established by females (Logan and Sweanor 2001). Home areas may overlap, but lions avoid each other, usually until the female is available for breeding. Subadult lions are required to strike out and find their own home ranges. They must establish a territory in suitable habitat either by inhabiting a vacant territory or out-competing a resident lion for a territory. Intra-specific strife over competition for territories leads to high levels of mortality in a lion population (Logan and Sweanor 2001).

If the lion in a home range is removed or killed, then the vacancy likely will attract a younger, dispersing animal (Lambert et al. 2006). Younger lions are more likely to have negative interactions with humans than older animals (Beier 1991, Murphy et al. 1999). Ironically, exploiting lion populations can exacerbate negative interactions between mountain lions and people or livestock (Lambert et al. 2006). Sport hunting can change the demographics (sex and age structure) and density of a mountain lion population (Anderson and Lindzey 2005, Stoner et al. 2006, Robinson et al. 2008). Over-hunting a lion population can change a population age structure to one with more young adults or juveniles (Lambert et al. 2006, Stoner et al. 2006, Robinson et al. 2008). The removal of 40 percent of the nonjuvenile population for four years or more reduces the number of individuals in a population, and creates a demographic structure that is younger, produces fewer kittens, and is socially unstable (Stoner et al. 2006). High harvest rates on adult females harms a population's ability to recruit new members (Anderson and Lindzey 2005). Therefore, both hunting and predator-control programs could potentially destabilize a lion population, which could, ironically, lead to increased human and mountain lion conflicts (*see e.g.,* Lambert et al. 2006).

According to a host of mountain lion biologists, "no scientific evidence" exists that suggests that sport hunting reduces the risk of lions attacks on humans (Cougar Management Guidelines Working Group et al. 2005). Mountain lions typically avoid people (Sweanor et al. 2008), and hunting them to prevent future attacks is therefore a notion unsupported in the scientific literature (Cougar Management Guidelines Working Group et al. 2005). In Colorado, since 1890, there have been only two confirmed fatalities from lions and both took place in the 1990s (Baron 2005, Keefover-Ring 2005a, b). Nationwide, approximately 20 fatalities have occurred between 1890 and June 2008 (Sweanor et al. 2008). Approximately 117 non-fatal lion attacks have occurred in the U.S. in the past 100 years (Beier 1991, 1992, Fitzhugh 2003, Sweanor 2008).

The numbers of attacks is very low because mountain lions generally do not view people as prey. If they did, there would certainly be more attacks, because mountain lions are skilled ambush predators and are capable of taking down an animal many times their own size, such as adult elk (Hansen 1992, Logan and Sweanor 2001). Furthermore, common sense precautions in lion country, such as traveling in groups, mindfulness of small children's proximity, and aggressively facing down a lion can curtail or reduce risks (Beier 1991, Fitzhugh 2003).

Mountain lions live in low densities because their food sources are dispersed across arid landscapes. Unsocial, mountain lions, and particularly among males, engage in fights with each other over territories and mates resulting in natural population culling. While mountain lions are an ambush predator, they rarely have interactions with humans. Sport hunting and control actions may actually increase negative human and lion interactions because of disruption of social structures. (In the years 2004 to 2007, Wildlife Services killed 1,371 mountain lions.) Alternatively, precautions while living or recreating in lion country can reduce conflicts.

- **Mustelidae**

  - **Black-Footed Ferret (*Mustela nigripes*)**

Photo: Rich Reading

One of the most endangered mammals in North America, the black-footed ferret, has been protected since 1964 and was included on the initial list of endangered species under the precursor to the ESA. The black-footed ferret is a prairie dog obligate species, meaning that without prairie dogs, no ferrets could persist (Miller et al. 1996; Miller et al. 2000). Its imperiled status is directly linked to the eradication of prairie dogs, on which the ferret depends for over 90 percent of its diet and its shelter needs. The ferret has been the subject of intensive captive breeding and reintroduction efforts (Miller et al. 1996).

Although a ferret recovery plan was developed by 1978, ferret recovery efforts generally have not been successful (Dobson and Lyles 2000). The recovery plan, revised in 1988, calls for establishing at least ten wild, self-sustaining ferret populations of 30 or more breeding adults each throughout the species' original range (FWS 1988). Of the six primary ferret reintroduction sites in the United States (Wyoming, Montana, South Dakota, Arizona, Colorado, and Utah), ferrets are likely self-sustaining only at Shirley Basin, Wyoming. Conata Basin, South Dakota, once a productive site for ferrets, is now threatened by sylvatic plague.

Presently, not enough prairie dog complexes meet the black-footed ferret reintroduction criteria to fulfill the minimum recovery plan goals. Yet, Wildlife Services continues to actively poison the ferret's habitat and prey base, prairie dogs, and disseminate poisons for private prairie dog control. According to the FWS, pesticides that are used to kill "prairie dogs and other mammals or that are toxic directly or indirectly to mammals are likely to continue to adversely impact the black-footed ferret either through direct toxicity or indirectly through the loss of the ferrets food source" (FWS 1993).

Ferrets have theoretically enjoyed federal protection for the past 37 years at the cost of multiple millions of taxpayer dollars. That protection, and the accompanying costly captive breeding program, has proven entirely inadequate, as it has not involved fundamental protections for the ferret's lifeline, the prairie dog. Ferret recovery requires prairie dog conservation, including an end to federal- and state-poisoning programs.

Wildlife Services engages in predator-control activities to purportedly enhance black-footed ferret protections. Studies (discussion supra) show that predator control on coyotes can cause unintended consequences that may actually harm the species the agency is trying to protect.

- **Ursidae**

  - **Black Bears (*Ursus americanus*)**

Photo: Diane Hargreaves

Black bears, the third largest carnivore in North America (behind grizzly and polar bears), survive mainly on plant materials. Black bears prefer forest habitat for forage and movement. They disperse seed and nutrients, and create biological diversity by creating small-scale disturbances that open up the forest canopy. Unfortunately, bear habitat is disappearing due to unprecedented rates of suburban and urban growth. Roads spider-webbing into once pristine habitat makes it easier for hunters and poachers to kill bears (Craighead 2002), and roads increase the opportunity for vehicle-bear collisions.

In arid climates such as Colorado, Nevada, Arizona, and New Mexico, bears are slow to recruit new members to their population and are vulnerable to over-exploitation. A Colorado study showed the females do not breed until they are almost five years of age, and the birth interval comes every two years—depending on sufficient food availability (Beck 1991). In the Pacific Northwest, bears begin to breed at three or four years of age. Stochastic events such as food failures, droughts, or late frosts can decrease forage and increase human-bear conflicts. Winter can add further stresses to a population: adults that start hibernation without adequate nutrition may die in the den, and females that bred in the summer months may not give birth in the spring because bears have an incredible capacity to limit their own populations: If a mother is in poor physical condition during hibernation, her body will absorb the fetuses.

Wildlife Services kills bears because they come into conflicts with humans and because they girdle saplings in even–age timber plantations in the Northwest. In the years 2004 to 2007, Wildlife Services killed 1.582 black bears.

When food availability in the backcountry is scarce, bears may migrate to urban fringes, where they may become accustomed to human food sources and then be killed – either as "nuisance" animals or because of motor-vehicle collisions (Beckmann 2002). Yet, the literature on human-bear conflicts is crystal clear about institutionalizing the usage of bear-proof trash containers to prevent negative bear and human interactions (Beckmann and Berger 2003, Beckmann et al. 2004, Masterson 2006).

Stepped up trash enforcement regimes drastically reduce human-bear conflicts.[8] Clashes between humans and bears come from a lack of law enforcement remedies that discourage intentional or unintentional wildlife feeding (Beckmann and Berger 2003, Masterson 2006).

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[8] Personal communication, Randy Hampton, Public Information Officer, Colorado Division of Wildlife, and Wendy Keefover-Ring of WildEarth Guardians (10/2/07).

In addition to conflicts in urban or exurban areas, Wildlife Services kills bears that damage trees. The timber industry plants even age stands of trees in the Pacific Northwest that encourage bears to peel bark to obtain sugar in the springtime. While altering the conformation and age of trees would lead to significant reduction of bark-peeling behavior by bears (and increase biodiversity), the timber industry prefers to have Wildlife Services kill hundreds of bears each year often using bait, dogs, and body-gripping traps.

Because black bears are slow to reproduce, are seriously affected by drought and habitat loss, and because they are easily over hunted, land management agencies, wildlife agencies, and Wildlife Services have a special obligation to ensure that black bear populations are protected and conserved. Communities must pass and enforce ordinances to prevent the intentional or unintentional feeding of bears, and the timber industry should modify the composition of its tree plantations to discourage bark-peeling behaviors in even-age tree stands. In 2007, Wildlife Services killed 511 black bears.

- **Grizzly Bears (*Ursus arctos horribilis*)**

Grizzly bears, the second largest carnivore in North America—behind polar bears—have large home ranges that include shrub cover, forested land and open areas. Home ranges average between 73 and 414 square kilometers but can be as large as 2,600 square kilometers. Grizzly bears primarily rely on vegetation for sustenance, but occasionally scavenge, fish, or hunt. They are important seed and nutrient dispersers in ecosystems and initiate small-scale disturbances. An umbrella species, grizzly bear populations and habitats continue to shrink from anthropogenic threats.


Photo: USFWS

Historically, grizzly bears ranged in Western North America from the top of Mexico to Canada and Alaska, but, according to NatureServe are “presumed extirpated” across most of their former range (Saskatchewan, Manitoba, North Dakota, South Dakota, Minnesota, Nebraska, Kansas, Oklahoma, Texas, Colorado, New Mexico Utah, Arizona, Nevada, Oregon, and California), are “critically imperiled” in Washington, Idaho, and Wyoming; “imperiled” in Montana; “vulnerable” in Alberta, British Columbia, and the Yukon, but are “secure” in Alaska. According to NatureServe, the North American grizzly bear population likely numbers over 30,000 in Alaska, over 21,000 in Canada, but less than 1,500 in the Lower 48.

In 1975, all grizzly bear populations in the Lower 48 (Yellowstone, Northern Continental Divide, Selkirk, Cabinet-Yaak, North Cascades, and Bitterroot) were listed as threatened under the ESA. In 1991, the FWS found that the North Cascades bears were warranted but precluded from receiving an upgrade to endangered protections, even though the population consisted of less than 20 animals. In 1999, the Selkirk population was also warranted but precluded from receiving endangered species status because of higher priority listings.

On March 22, 2007, the FWS delisted the Yellowstone Distinct Population Segment and determined that grizzly bears were recovered in that region. In April 2007, the FWS initiated a five-year review of all grizzly populations in the Lower 48 states. Ironically, the Selway-Bitterroot has no bears at all and the FWS has acknowledged that a reintroduction is necessary but unfeasible because of a lack of funding. Despite FWS' purported recovery efforts, grizzly bear populations are teetering on the brink of extinction in the contiguous United States.

Grizzly bears are susceptible to sodium cyanide-M-44 ejecting devices. Although one collared animal was discovered killed by an M-44, more deaths could go undocumented if the animals are uncollared. Wildlife Services reports killing two grizzly bears in 2005. Historically, indiscriminate predator-control activities led to grizzly bear population decline. Today, human-caused mortality is the single largest contributor of bear deaths. Sheep-raising particularly attracts grizzly bears (Wilson et al. 2006), and therefore is inappropriate in grizzly bear country given that the species is nearly extirpated.

Recommendation

Because Wildlife Services spends the majority of its resources killing approximately 100,000 mammalian carnivores each year, we have focused in on several species to give decision makers the appropriate context for the Wildlife Services' program. These activities are fiscally expensive, environmentally harmful, and unnecessary. Native carnivores are important ecosystems actors. They increase biological diversity and provide free ecosystem services upon which we all depend. They have an inherent right to exist, and most people enjoy viewing them. For these reasons and others described in the pages herein, the Wildlife Services' lethal predator–control program must be abolished.

In the past handful of years, several biologists have expressed their skepticism about the current course and efficacy of lethal predator controls that involve millions of dollars and tens of thousands of dead carnivores (Treves and Karanth 2003, Mitchell et al. 2004, Berger 2006b, Stolzenburg 2006).

Are lethal controls necessary to the extent they are now being used? Is it necessary to kill predators in order to control them? (Questions paraphrased from Littin and Mellor 2005). The humaneness of predator control by Wildlife Services is certainly controversial (Marks et al. 2004, Littin and Mellor 2005, Hooke et al. 2006), and as we demonstrate here, their usage is neither economically nor biologically feasible when weighed against the danger that toxicants, aerial gunning, traps, poisons, hounding and shooting pose to the public and to non-target species of all stripes.[9]

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[9] Non-target species included two family pets killed by WS on federal lands in Utah in 2006. WS admits in its FY2006 tables that it killed 512 domestic dogs that year—obviously all were not "feral".

Rather than emphasizing killing methods, Wildlife Services should re-invest its budget and consider more sustainable, long-term solutions. Marin County provides an example. County commissioners in Marin County, California stopped their appropriations to Wildlife Services and instead, they invested $40,000 per year in non-lethal alternatives such as fences, bells, and guard animals for ranchers. After five years of this experimental program, Commissioner Stacy Carlsen told a newspaper that ranchers experienced about a 2.2 percent loss of sheep compared to a 5 percent loss when Wildlife Services offered leg-hold traps and lethal controls (Brenner 2005). As the Marin County example shows, long-term non-lethal controls are more effective, and obviously less controversial. The Marin County experiment holds promise for a larger broad scale switch to non-lethal controls.

The Value of Wildlife

A Utah Wildlife Services agent, who shoots coyotes from aircraft for a living, unknowingly confessed to a reporter in a Moab bar, "'no one wants you to see this shit. It's a killing floor'" (Ketchum 2008).

William Bleazard, a pilot for Wildlife Services, wrote about an aerial-gunning mission:

> …the first coyote went down and we both wrongly assumed he was dead, the second was still in the pass and as we crossed over him Bruce fired two times and missed. It took four more runs . . . to kill the second coyote it took several passes to finally dispatch this wounded coyote . . . we must have made eight or ten runs before making the killing shot (USDA Aerial-Gunning FOIA response, 1998 WS Incident Report).

Wildlife Services' approach to wildlife management is to kill as many animals in an area as possible to prevent potential future conflicts (Mitchell et al. 2004). Biologists have condemned this as the "sledgehammer" approach to wildlife management (e.g. Stolzenburg 2006).

Most Americans prefer to observe animals in their natural habitats, rather than use them for utilitarian purposes (Kellert and Smith 2000, Teel et al. 2002, FWS 2007). Yet, Wildlife Services in its 1994/1997 PEIS describes wildlife as a "renewable natural resource and is managed accordingly" (Chapter 1, 3). Wildlife Services' PEIS strongly tracks towards utilitarian values: Its analyses are biased towards killing animals for the benefit of those in agribusiness, rather than balancing the public's interests in wildlife.

People hold various and complex values around wildlife. Independent researchers offer a nuanced look. Kellert (1996) and Kellert and Smith (2000) have described nine categories of wildlife values.

The Value of Wildlife	
Aesthetic	attraction for animals and nature
Dominionistic	subdues and masters nature and wildlife
Humanistic	affection and emotional affinity for nature
Moralistic	shows a moral or ethical responsibility for conservation
Naturalistic	gains pleasure from viewing animals in their natural environment
Negativistic	anxious, fearful, or indifferent to nature
Scientific	studies the function of organisms and their habitats
Symbolic	constructs meanings to communicate about nature
Utilitarian	materialistic interest in exploitation of animals and nature

They also add gender, education levels, and geographic location (urban vs. rural) into the mix. To oversimplify their findings, Kellert and Smith (2000) generally determined that women, those with more education, and those that live in a urban settings show more aesthetic, humanistic, moralistic, naturalistic, and scientific wildlife values. On the other hand, the authors found that men, those educated only through high school, and rural occupants more likely tracked utilitarian and domionistic feelings. On the whole, most people express humanistic and moralistic attitudes (Kellert 1996).

The GAO discovered that Wildlife Services' agents "feel considerable pressure" to develop non-lethal control methods because of a "changing environment where experts in the field see the loss or diminishing acceptance of traditional control tools like guns, traps, and poisons" (GAO 2001, p. 38). Despite these findings, humaneness issues vex Wildlife Services. That is because its kill methods are inherently indiscriminate, over-reaching, and cruel and not in keeping with the mores of a changing society. Further, Wildlife Services even kills federally-protected, non-target species, which most find objectionable.

Wildlife Services stated in its PEIS that "humaneness is an individual's perception" and individuals "perceive" humaneness "differently" (PEIS, Chapter 3, p. 81). The PEIS notes that livestock producers believe it is "inhumane" when coyotes kill "defenseless" sheep by "attaching at the throat" and "suffocating" and causing "respiratory failure" (PEIS Chapter 3, p. 81). Sheep are not the only victims in this document, so are "unprotected flightless birds" that die from hungry red foxes; nefarious beavers "flood" and "displace" other wildlife; and ravens that "eat the eye out of a ewe" that has "laid down" to lamb (PEIS, Chapter 4, p. 129-30). Invoking Biblical language, the PEIS attempts to paint some wildlife as "pests" and "vermin," thus cultivating the atmosphere necessary to justify its own merciless operations.

Recently, Christian groups have re-entered the debate on the subject of values and the natural world. Roman Catholics and Evangelical Protestants started a movement called "Creation Care," and have excoriated the wanton "exploitation and destruction" of animals and the environment for purely capitalist purposes,[10] which may now surprise the writers of the PEIS.

The PEIS seems consumed with anti-predator despair. The agency laments when predators act like predators (i.e., foxes eating birds). Yet predators are important for ecosystem health. Philosopher Stephen R. L. Clark (1997) writes, "the hyena is not cruel in eating a zebra alive, for he is only seeking food, not the enjoyment of power or the distress of his victim" (p. 17). Clark warns that, "it is simply sentimental to be upset by such a sight" (Clark 1997, p. 17). In the natural world, predators kill, and it is necessary. While caribou herds "may be spared the pain of wolves" the unintended consequences of a "population explosion will lead to overgrazing, disease, famine and a population crash" (Clark 1997, p. 19).

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[10] See for example, a 2005 Washington Post story concerning a 30-million member call to action for creation, http://www.washingtonpost.com/wp-dyn/articles/A1491-2005Feb5.html, (last viewed February 15, 2008). See also, Pope Benedict XVI's April 2005 inaugural mass. He stated, "the earth's treasures no longer serve to build God's garden for all to live in, but they have been made to serve the powers of exploitation and destruction." http://www.vatican.va/holy_father/benedict_xvi/homilies/documents/hf_ben-xvi_hom_20050424_inizio-pontificato_en.html (last viewed February 15, 2008).

Wildlife Services' PEIS recounts "inhumane" acts by coyotes, beavers, foxes, and crows, but absolves the agency's own cruel acts through the claim that scientific research has not developed "objective, quantitative measures of pain or stress" for animals (Chapter 3, p. 81). In a puzzling circle of arguments, Wildlife Services unsuccessfully justifies the inherent cruelty of its lethal control program.

Yet, Wildlife Services admits to some of it problems. Non-target species can be killed if they are attracted to baits set out for a different quarry, and if, in the instance of traps, a non-target species is of a similar size or weight as the intended animal, or if they are in the wrong place, mishaps occur (Chapter 3, p. 46). The PEIS states, "deer or pronghorn antelope may accidentally step on leg-hold traps set for coyotes" (Chapter 3, p. 47). Moreover, Wildlife Services unintentionally kills threatened or endangered species (Chapter 3, p. 47). [See Table 1.] As we demonstrate throughout the lethal toxicants section below, many non-target species, including protected species, can be inadvertently killed because of the non-specific nature of these methods.

Animals viewed as "pests" often have their welfare ignored (Littin et al. 2004, Littin and Mellor 2005). In its environmental analyses, Wildlife Services has failed to assess the duration of "pain, distress or suffering;" the "intensity of pain, distress or suffering;" and the numbers of animals involved (Littin et al. 2004, Littin and Mellor 2005) in its lethal control program.

Pain comes in different forms, and is typically considered acute, chronic, or severe and is considered a "subjective experience" that generally manifests emotionally or behaviorally (Mori 2007). We have known since the 13th Century that animals feel pain—just like humans, because of similar central nervous systems (Mighetto 1991, Mori 2007). Mori (2007) argues that the path towards reduction or even the abolishment of pain depends on the humans' sense of responsibility and civility. Because of the body of available knowledge gathered over the past several centuries, Wildlife Services cannot hide behind its spurious claim that animal pain is subjective and mysterious to human researchers (e.g., Chapter 3, p. 81).

The American Veterinary Medical Association's (AVMA) (2007) Guidelines on Euthanasia clearly define pain and stress, and it provides sound direction on what constitutes a good death (i.e., duration, method, and mental wellbeing of the subject). The Guidelines provide specific considerations for wild animals such as little handling so they are not roused by sight, sound, or tactile stimulants. Distressed wild animals exhibit behavioral and physiologic responses such as vocalizations, struggling, aggression, salivation, urination, defecation, pupil dilation, tremors, or spasms (AVMA, 2007).

The Guidelines are clear about how to cause death. It should be conducted with the utmost respect, free of pain or stress (AVMA 2007, p. 1). A stress-free and painless death might involve the loss of consciousness before the loss of motor activity. Paralysis prior to unconsciousness is not considered euthanasia and those unacceptable agents of death include "depolarizing and nondepolarizing muscle relaxants, strychnine, nicotine, and magnesium salts" (AVMA 2007, p. 6). When using poisons, species-level data must be gathered; one cannot make assumptions that "absorption, distribution, metabolism, excretion, and pathophysiological effects of poison" can be appropriately extrapolated to other species (Littin et al. 2004, p. 3). Paparella (2006) raises the issue that almost all rodenticides are inhumane because they cause "severe pain and suffering, usually lasting for days" (p. 51). Anticoagulates and aluminum and zinc phosphides are extremely inhumane (Paparella 2006). Common sense dictates that the duration of suffering should be quick, and does not include the ability to regain consciousness prior to death (Littin et al. 2004, Littin and Mellor 2005).

As we described Wildlife Services' aerial gunning operations are not within the recommended guidelines for euthanasia. The admission by a federal agent that "it's a killing floor" should give Congress pause (Ketchum 2008). Why is the federal government involved in such barbaric acts? And acts that ultimately cost human life, as we have described.

For some wildlife, some trapping and poisoning methods cause stress and pain for long durations. In the coming pages, we show how Wildlife Services is clearly out of step with suggestions by the AVMA and other researchers concerned by the quality of death. Research shows that most Americans prefer to watch wildlife, and many spend billions of dollars in that pursuit each year.

Non-Lethal Methods

Large-scale carnivore killing threatens populations at the species level (Treves and Karanth 2003). Non-lethal methods of control effectively reduce livestock losses, and with less controversy. Unfortunately, livestock producers are not required to use these methods, and few economic incentives favor these methods because producers enjoy highly-subsidized lethal predator controls. Treves and Karanth (2003) state, "A consensus is emerging that multiple nonlethal defenses must be deployed simultaneously, must be designed and installed with a particular species in mind, and must be modified periodically to avoid habituation by target species" (p. 1495).

Marin County, California stopped their appropriations to Wildlife Services and instead invested $40,000 per year in non-lethal alternatives. Ranchers experienced nearly a 50 percent decrease in livestock losses (Brenner 2005).

To avoid predation, livestock husbandry practices prove useful. Treves and Karanth (2003) suggest, "Risk increases where more livestock are present, when sick or pregnant animals roam far from humans or buildings, when carcasses are left exposed, when humans are distant or absent, and when herds roam near cover" (p. 1495). Changing human and livestock behavior can reduce the risk of predation.

Sheep, because of their docile nature and inability to defend themselves against predators, require special protections (Knowlton et al. 1999). Human herders and several types of guard animals (llamas, some breeds of dogs, and burros) can be used—especially to guard against coyotes and black bears (Andelt 1996, Treves and Karanth 2003). Also, sheep and goats can be bonded with cattle, which more aggressively defend themselves (Andelt 1996).

During lambing and calving season, livestock housed behind barriers such as fences (sometimes electric), barns, pens, or sheds are more protected (Andelt 1996, Treves and Karanth 2003), but barriers can be breached and should be coupled with other non-lethal methods (Treves and Karanth 2003). Research on synchronizing the birthing season with that of wild prey species has also proven effective. Because coyotes (even breeding coyotes) generally do not specialize on sheep, ranchers can minimize their livestock losses by concentrating sheep into small, well-guarded areas (Sacks and Neale, 2002).

Scaring devices, like strobe lights, flashing highway lights, firecrackers, sirens, shock collars (for wolves), and noisemakers or fladry (flags tied to ropes or fences), offer yet other alternatives (Shivik et al. 2003). Aversive conditioning methods also provide means to prevent predation (Shivik et al. 2003). New studies on conditioned taste aversion show promise in protecting eggs, crops, and fruit from mammals (Baker et al. 2005a, Baker et al. 2005b, Baker et al. 2007). Finally, the removal of livestock carcasses prevents scavengers from habituating to the taste of domestic animals (Andelt 1996). The use of two or more methods together has been proven to be the most effective (Andelt 1996).

Investment into non-lethal alternatives are not only more thrifty, but more effective. Several common sense animal husbandry practices can prevent predation on livestock. New studies on aversive conditioning studies show promise, but much more work needs to occur in this arena.

Lethal Control Methods

- **Aerial Gunning**

Photo: Chuck Carpenter

Aerial gunning, that is, shooting animals from planes or helicopters, occurs on both private and public lands—including forests, deserts, sage steppes, canyon lands, and prairies. The federal government, some states (i.e., Wyoming and South Dakota), and private individuals conduct this practice under the auspices of the Airborne Hunting Act. 16 USC 742j-1. While Wildlife Services' PEIS states, "flight operations are conducted close to ground level and at low airspeeds" (Appendix P, 33), a myriad of fatal and injurious accidents have plagued the program (Keefover-Ring 2008). In addition, the practice is inhumane, expensive, and biologically unsound. A federal agent has even shot at people on the ground (Sheriff's Office, Sierra County, CA 1997).

While practiced year-round, the height of Wildlife Services' aerial gunning activities occur in the late winter and early spring. The goal is to remove as many coyotes as possible from an area before livestock are pastured, and particularly to eliminate breeding coyotes, with their needs to provision their pups (Mitchell et al. 2004). From 2001-2007, Wildlife Services reports that it gunned 252,713 species from the air. Of that number, 210,306 were coyotes, or 83 percent of the total animals killed by aerial gunning. Other animals killed from aerial gunning operations include badgers, bears, birds, bobcats, house cats, feral goats and hogs, foxes, and wolves.

Table 10
Animals Shot From Aircraft by USDA-Wildlife Services (2001-2007)

	2001	2002	2003	2004	2005	2006	2007	Total
Badgers	0	0	0	0	2	0	0	**2**
Black Bears	2	0	1	0	0	0	0	**3**
Grizzly Bears	0	0	1	0	0	0	0	**1**
Bobcats	237	263	290	292	247	449	348	**2,126**
Cats	0	0	0	0	2	0	0	**2**
Coyotes	35,856	34,794	28,255	32,408	27,033	25,349	26,611	**210,306**
Gray Foxes	1	1	1	1	0	0	11	**15**
Red Foxes	209	197	127	155	154	81	59	**982**
Feral Goats	62	35	0	1	0	0	0	**98**
Feral Hogs	1,435	2,313	3,764	4,455	6,564	9,565	6,752	**34,848**
Ravens	0	15	0	0	0	2	0	**17**
Gray Wolves	72	56	53	60	34	34	3	**312**
Mex. Wolves	3	1	1	0	0	0	0	**5**
TOTAL	**37,877**	**37,675**	**32,493**	**37,372**	**32,472**	**37,652**	**37,805**	**253,346**

- **Aerial gunning is inhumane.**

Wildlife Services' records show that gunners with poor marksmanship skills can wound animals rather than killing them, and sometimes it can take several passes and multiple shots before animals are killed. Also, breeding animals that are killed leave dependent young behind to starve. The PEIS states that although "this method is highly selective for specific target animals," mishaps can occur. Some animals "may be mistakenly identified" or they may "inadvertently enter the path of fire during harassment activities" (Appendix P, 34).

- **Aerial gunning is biologically unsound.**

Low flying aircraft, punctuated by loud gunshots, stress wildlife. Studies indicate that aircraft noise (including "severe low-frequency sound"), turbulence, and vibrations can even damage the hearing of birds, deer, bighorn sheep, pronghorn, and a whole host of other species (Pepper et al. 2003). The appearance of aircraft can cause flight responses and cause animals to expend energy to escape perceived threats. If food is in short supply, as in the months following winter, it may alter an animal's chance for survival or affect reproduction (Pepper et al. 2003).

Studies on wildlife have included changes in cardiac response, body temperature changes, flushing responses, and bird-aircraft collisions. While some animals may habituate to noise—especially if it is not novel, others do not (Pepper et al. 2003). Many animals must rely on sound to find food, avoid predators, reproduce, or find offspring (Pepper et al. 2003). Studies have shown that some animals flee when frightened—especially ungulates that have no cover for hiding, such as caribou. The heart rates of mountain sheep and desert mule deer have increased, and as a result, a flight response is common and can require "the animal to expend large amounts of energy to escape the perceived threat." In the event of food shortages or other causes of stress, overflights can severely harm some species (Pepper et al. 2003).

- **Aerial gunning is unsafe.**

Flight crews risk physical injury (Appendix P, 34) and death (Keefover-Ring 2008). Since 1979, Wildlife Services has experienced at least 52 aircraft crashes or accidents. The result: approximately 30 injuries and 10 fatalities to federal agents (Keefover-Ring 2008). Non-federal entities (states and individuals) have crashed even more (Keefover-Ring 2008). Flying close to the ground while chasing coyotes, foxes, or wolves has resulted in pilots colliding into powerlines, trees, or land formations. Also, because they are only a few feet off of the ground, aircraft have difficulty recovering from unexpected gusts of wind or even wakes of air turbulence created by the aerial-gunners' own craft (Keefover-Ring 2008).

In June 2007, after a crash in Utah that resulted in two fatalities to Wildlife Services agents, WildEarth Guardians petitioned the Deputy Director and asked that the program cease because of the inherent safety problems to federal employees. Wildlife Services ignored this request, but then crashed again three months later. In that accident, the pilot and gunner sustained injuries. In November 2007, Wildlife Services announced it was undertaking a national safety review because of the "wake" of several accidents, including aerial gunning accidents. Surprisingly, the team conducting the aerial gunning safety review gave Wildlife Services a "gold standard" for its operations (discussion supra).

- **Aerial gunning is expensive.**

The cost of aerial guns and helicopters is several hundred dollars per hour (Wagner and Conover 1999). Colorado Wildlife Services claims it kills an average of 3 coyotes per hour (WS CO PDM EA Oct. 2005 at 61). This suggests that aerial gunning is extraordinarily expensive; especially since aviation fuel prices are climbing sharply. The overhead of maintaining this program should be considered cost-prohibitive, and taxpayers should not be forced pay for it, especially when the program does little to help the livestock industry (discussion supra).

Airborne hunting is particularly problematic for humane, biological, and social reasons. Aerial gunners kill thousands of animals annually, but spook and harass many times more species. Aerial gunners have even threatened members of the public on the ground. Wildlife Services puts the very lives of public employees in jeopardy. Since 1979, Wildlife Services agents or contractors have had over 50 accidents. Aerial gunning is simply an irresponsible use of tax dollars and the federal government should not engage in this activity.

- **Lead Toxicity to Wildlife from Firearms**

Wildlife Services uses firearms to kill hundreds of animals—from armadillos to birds to predators—each year. Invariably, this activity puts lead into the environment and poisons wildlife, especially if carcasses and body parts are not removed. Bullets often shatter when they hit bone—leaving fragments in tissue. Raptors, ravens, and mammalian scavengers consume lead when they feed on carcasses or gut piles that contain bullet fragments (Pain et al. 1997, Meretsky et al. 2000, Redig 2002, Craighead and Bedrosian 2008). California condors are especially at risk from Wildlife Services' predator-control programs. Failure by Wildlife Services and others to mitigate lead in the environment could result in the extinction of this great bird in North America.

Species react differently to the intake of lead. California condors (*Gymnogyps californianus*), unlike turkey vultures (*Cathartes aura*), easily succumb to lead toxicity (Carpenter et al. 2003). In fact, lead poisoning from spent bullets has nearly caused the extinction of condors. In 1980, condors dropped to 30 individuals, which led to a captive breeding program (Meretsky et al. 2000). In the early 1980s, 15 of those condors died (only 4 bodies were recovered—three died from lead poisoning and the fourth from sodium cyanide) (Meretsky et al. 2000). Between 1997 and 2001, four more condors died from lead toxicity (Schoch 2001, Sanborn 2002). Meretsky et al. (2002) have recommended that wildlife managers and others create large-scale, hunting-free reserves for condors or disallow the usage of lead shot in their ranges. California has complied but other states such as Utah, where Wildlife Services' activities are high, have not. In October 2007, it banned lead ammunition for deer hunting in condor habitat (Kemsley 2007).

Other raptors too, and especially their chicks, are vulnerable to lead toxicity from bullet fragments (Pauli and Buskirk 2007, Craighead and Bedrosian 2008). Lead poisoning in raptors can cause either lethal or sublethal effects (Pauli and Buskirk 2007, Craighead and Bedrosian 2008). Lead bullet fragments dissolve with stomach acid, allowing absorption into the bloodstream (Redig 2002). A single lead shotgun pellet or lead sinker that is absorbed in the digestive tract of a raptor is toxic enough to cause mortality (Sanborn 2002). Raptors' stomach pH level of 1—1.4 is extremely low (Pain et al. 1997). A low pH readily dissolves lead and increases toxicity (Pain et al. 1997).

In raptors, non-lethal side effects from lead ingestion can include lethargy, dehydration, blindness, and heart damage (Knopper et al. 2006). Lead poisoning causes anemia, stunts neurological development, lowers bone density, and causes paralysis (Craighead and Bedrosian 2008). Sublethal toxic effects could harm populations because individuals may not survive and reproduce (Pauli and Buskirk 2007). Even minor decreases in an individual raptor's fitness can result in mortality. Sublethal lead exposure can increase risk of collisions with powerlines, decrease weight, and muscle mass (Craighead and Bedrosian 2008). In long-lived bird species such as eagles, lead exposure can skew the entire population towards younger, non-breeding animals that harm the long-term viability of a species (Craighead and Bedrosian 2008).

Mammalian scavengers can also become susceptible to lead toxicity (Knopper et al. 2006). Missouri and other states are currently contemplating lead bullet bans because of toxicity issues (Kemsley 2007).

Wildlife Services' PEIS states that in 1988, the most species shot by Wildlife Services' agents were coyotes, beavers, and blackbirds.[11] Yet, the PEIS claims that the most damage from shooting activities is realized by the shooter himself because of poor handling (i.e., recoil, hearing damage, gunshot wounds) (Appendix P, 32). Not only has Wildlife Services failed to adequately account for the environmental harms that lead shot causes, it has not considered the effects of lead poisoning on its own agents. Shooting contaminates the shooter. A subject who irregularly shot with lead bullets at a shooting range exhibited higher levels of lead levels during periods when he recreated (Gulson et al. 2002). Lead negatively affects human neurological systems (Hardison et al. 2004). Wildlife Services' agents who practice at target ranges or who engage in lots of shooting activities may be at risk for elevated lead levels.

On July 2, 2006, Rich Tosches, a *Denver Post* columnist, wrote that ravens were plaguing Wyoming livestock producers because the birds were stabbing the eyes of lambs and calves and contributing to their mortalities, and as a result, Wildlife Services was killing ravens. If this work is happening in Wyoming, it has never been analyzed, either by the 1994/1997 PEIS, or in a 2007 Wyoming Bird Damage Management EA. Ironically, studies show that elk hunting indirectly contributes to the increase in raven populations because hunters leave

[11] In addition to the lead issues raised here, removing these particular animals by shooting can cause other unintended environmental consequences. Coyotes' breeding dynamics change to make up for exploitation (discussion supra). When beavers are removed from their wetland ecosystem, the whole system can change (discussion supra), and shooting blackbirds near water puts this heavy metal directly into a solution where it dissolves and is readily taken up by plants (Sanborn 2002).

behind gut piles that benefit ravens (White 2005, 2006). In other words, hunters can indirectly harm livestock growers when they do not bury or remove gut piles.

Waterfowl also ingest lead shot either as food or grit. Wildlife Services shoots blackbirds and other wildlife near lakes, ponds, or riparian areas. Lead in the bird's gizzard is ground down, it enters the stomach and is exposed to acid, resulting in the production of lead salts which are then absorbed into the bloodstream (Pain et al. 1997).

Currently, several non-toxic bullets are being developed (Meretsky et al. 2000, Oltrogge 2002), with a tungsten-tin bullet soon to be released and distributed by MDM Muzzleloaders of Maidstone, Vermont (Kemsley 2007). Because of new available options to toxic lead bullets, wildlife and public lands managers must immediately retire lead ammunition and anchor weights. This toxic heavy metal should no longer pollute public lands and waterways. Companies have developed the technology to end this environmentally destructive practice that causes the demise or harm of unknown numbers of native wild birds, mammalian carnivores, aquatic species, and even humans. In the short-term, failure to reduce lead levels in the environment will lead to the extinction of free-roaming California condors.

In short, as our synthesis shows, lead poisoning from bullet fragments can have profound effects on birds and mammals. Especially at risk are California condors. Wildlife Services uses large amounts of firearms across a variety of taxa. Invariably, they are adding to the lead load in the environment. Lead toxicity remains an enormous problem that has received little attention outside of academia. We call upon Congress to remedy this issue with regards to Wildlife Services and its lethal control program.

- **Traps**

While Wildlife Services' 1994/1997 PEIS discussed traps and trapping, the information is woefully outdated. The literature on trapping has been greatly expanded in recent years, and our understanding about the efficacy of trapping, including welfare implications, is better realized.

Photo: Humane Society of the United States

Muth et al. (2006) surveyed 3,127 conservation professionals, who were members of the American Fisheries Society, Society for Conservation Biology, North American Wildlife Enforcement Officers' Association, and The Wildlife Society. Asked whether leg-hold traps should be banned, respondents indicated *yes* by 46 percent, *no* by 39 percent, and *no opinion* by 15 percent (Muth et al. 2006). Further, the leg-hold trap ban was favored by 59 percent of people employed in the private sector, in higher educational institutions, and nongovernmental organizations (Muth et al. 2006).

The professionals cited pain and stress and harm to non-target species as the two primary reasons for favoring a trapping ban (Muth et al. 2006). Secondary reasons included: the lack of need, unsporting nature, and conflicts with public values (Muth et al. 2006). Trapping proponents favored its efficiency, believing it had no effect on furbearer populations (Muth et al. 2006). Ironically, of the respondents that hunted or trapped, 80 percent indicated that they thought leg-hold traps could harm or kill non-target species—including expensive hounding dogs (Muth et al. 2006).

Animal traps fall under two categories: restraining or killing. Restraining traps hold the animal until the trapper arrives to kill the animal (Iossa et al. 2007). While kill traps, are meant to result in immediate death, and are used either terrestrially or underwater (Iossa et al. 2007). The terrestrial versions snap the neck or spine. Underwater traps render the animal unconscious until death. Traps do not discriminate between species and often non-target animals are caught. They can capture or kill threatened and endangered species, birds, domestic animals, and even humans.

The PEIS argues that "quick-kill" traps (also known as "conibears") are designed to "crush captured animals between opposing metal jaws or between the jaw and a wooden or plastic base, or impale the animal with sharp metal spikes in subterranean travel ways" (PEIS, Appendix P, 29).

The environmental hazards of leg-hold traps, according to the PEIS, include the death or injury of animals, including non-target species. Injuries include cuts, sprains, broken bones, or the prevention of blood circulation. Traps leave animals vulnerable to the elements (PEIS, Appendix P, 24). Pets are susceptible.

In 1999, the International Organization for Standardization (ISO) defined humane standards for killing and restraining traps. The ISO assessed trap performance, including capture effectiveness, and efficacy of killing traps (Iossa et al. 2007).

- **Kill Traps**

Photo: Humane Society of the United States

According to Iossa et al. (2007), five kinds of kill traps are utilized: 1) *Deadfall traps* which use gravity to kill an animal by crushing its skull, vertebrae, or vital organs. 2) *Spring traps* of two varieties—one has a bar that (usually) crushes the animal's neck; and two, a trap that uses rotating jaws. 3) *Killing snares* of two kinds. The first, a self-locking snare that tightens as the animals pulls to get out, and the second, a power snare that uses springs to quickly tighten a noose. Both asphyxiate. 4) *Drowning traps* that hold the animal underwater until the animal dies from hypoxia, a shortage of oxygen in the blood. 5) *Pitfall traps* have water at the bottom. Rodents or small animals are induced to enter them and drown.

Kill traps' effectiveness is dependent upon many variables, including the species caught, trap size, and trapper ability (Iossa et al. 2007). Field conditions are often not as optimal as laboratories where experiments on traps are frequently conducted (Iossa et al. 2007). Some propose that if the purpose of capturing an animal is to kill it, then killing traps may be more suitable as the animal is not left in pain, shock, dehydrated, and at risk for predation (Harris et al. 2005). Kill traps are enormously faulty, however, and should not be used for the reasons that follow.

- **Welfare Problems Associated with Kill Traps**

One standard for kill traps is that at least 70 percent of the animals trapped must be rendered unconscious in 60 seconds for short-tailed weasels (*Mustela erminea*), 120 seconds for American pine martens (*Martes americana*), Canadian lynx (*Lynx canadensis*) and fisher (*Martes pennanti*), and 180 seconds for all other species (Iossa et al. 2007). European researchers believe that the kill time should be 30 seconds after a kill trap has been triggered (Harris et al. 2005). The AVMA suggests that kill-trap technology must improve and come to the standards as proposed by the ISO (ISO 10990-4 1999), Gilbert (1981), Proulx and Barrett (1991, 1993), or Hiltz and Roy (2000).

Of the 23 kill traps reviewed by Iossa et al. (2007), 18 failed to render the animals unconscious in the recommended time. Other welfare restrictions involve injured animals escaping and mis-strikes. The latter refers to metal clamping down on an unintended body part (Iossa et al. 2007). Iossa et al. (2007) found that mis-strikes occurred up to 10 percent of the time. In neck snares used on coyotes, mis-strikes ranged from 8-14 percent, and the percentage of animals that remained alive in kill traps ranged from 17-86 percent. Furthermore, the authors found that coyotes escaped from kill traps from 3-13 percent of the time. These data show that kill traps are enormously inefficient at quickly killing as is intended. The AVMA echoes these sentiments. It said that kill traps are controversial because they can produce a prolonged and stressful death that is not within the AVMA's criteria for euthanasia (2007).

Photo: Diane Hargraves

Beavers (*Castor canadensis*) and river otters (*Lontra canadensis*), adapted to aquatic life, are adept are swimming and diving for long periods. Thus, death by hypoxia is slow even if the animal struggles; these animals often become distressed while attempting to escape from an underwater trap (Iossa et al. 2007).

Technologies such as water diversion devices behind beaver dams, which prevent flood events, make trapping beavers unnecessary (Muth et al. 2006). In 2007, Wildlife Services killed 50,000 rodents, half of which were beavers.

Table 11 Lagamorpha/Rodentia Killed by USDA-APHIS-WS in 2007	
Beavers	25,039
Mountain beavers	4
Pocket gophers	410
Hares/jackrabbits	1,156
Snowshoe hares	1
Marmots/woodchucks	2,176
Deer mice	27
House mice	368
Rats	653
Muskrats	2,223
Muskrats (roundtailed)	1
Nutria	2,711
Porcupines	236
Black-tailed prairie dog	1,132
Gunnison's prairie dog	11
White-Tailed prairie dog	94
Desert cottontail rabbit	2,442
Cottontail rabbit	4,125
Feral rabbits	2
Swamp rabbits	2
Gray squirrels	145
Eastern gray squirrels	40
Flying squirrels	1
Fox squirrels	108
Western gray squirrels	22
Ground squirrels-CA	3,311
Ground/other squirrels	2,201
Rounded-tail gr. Squirrel	103
Red squirrel	5
Rock squirrels	5
Voles	230
Total Lagamorpha/Rodentia Killed 2007	**48,984**

River otters should not be trapped as their populations are in trouble in many areas in the West. Wildlife Services killed nearly 2,000 river otters for the years 2004-2007.

If an animal gets trapped it may be injured, which contributes to welfare concerns, especially if it escapes (Iossa et al. 2007). Trappers have developed most traps, state Iossa et al. (2007). Their primary concern is undamaged pelts, not quick and humane deaths (Iossa et al. 2007). The literature offers several examples, including improving the striking precision so that death comes more quickly (Harris et al. 2005, AVMA 2007, Iossa et al. 2007). The AVMA (2007) promotes daily trap checks and suggests that kill traps only be employed when all other acceptable means have not worked. For the reasons we have stated herein, Wildlife Services must stop using kill traps because of the myriad of problems associated with them.

- **Restraining Traps**

According to Iossa et al. (2007) restraining traps come in five varieties: 1) *stopped neck snares*: wire loops which are arranged vertically with the intent of having the animal's head enter the wire loop, which then tightens around the neck, but is stopped at a certain diameter. 2) *Leghold snares*: wire loops placed horizontally and designed to restrain an animal's leg(s). 3) *Leg-hold traps*: either padded or unpadded and consisting of two jaws that open to 180 degrees and when triggered, fasten onto an animal's leg or foot. 4) *Box or cage traps*: using an opening and bait to attract an animal, a box trap's trigger causes the door to slam shut and capture the animal. 5) *Pitfall traps*: used to capture small terrestrial mammals into a smooth-sided container, which may contain bait.

- **Welfare Problems Associated with Restraining Traps**

Animals frequently sustain injuries from restraining traps such as physiological trauma, dehydration, exposure to weather, or predation by other animals or death because of restraining traps (Harris et al. 2005). Animals released from restraining traps may later die from injuries and/or reduced ability to hunt or forage for food (Harris et al. 2005). In their review, Iossa et al. (2007) assessed injuries associated with animals restrained by kill traps using international standards.

The ISO assessed trauma levels and assigned points, on a scale to 34, for the most common trap injuries. The ISO's scale ranges from mild trauma to death. Examples from the scale are: Mild injuries include a claw loss; moderate injuries include permanent tooth fracture; moderately severe injuries include compression fractures; severe injuries include the amputation of three or more digits; and death (Iossa et al. 2007). The ISO rated far more injury categories and standardized the welfare performance of traps (Iossa et al. 2007). The major drawback to the ISO standards, however, is their failure to assess pain (Iossa et al. 2007).

While a broken tooth may be low on the trauma score, for humans teeth-related pain is often considered excruciating and unbearable (Harris et al. 2005, Iossa et al. 2007). Broken teeth or missing claws can inhibit carnivores' ability to catch prey and may actually increase the risk of livestock predation (Harris et al. 2005) because domestic stock are easier to capture than more desirable native prey. Moreover, pain and distress, if prolonged, can affect animals' health and ability to survive (Harris et al. 2005). In studies reviewed by Harris et al. (2005), physiological changes from trapping injuries often go unassessed. Trapped animals respond in two ways from traps: psychological stress and or pain, and secondarily from exertion (Harris et al. 2005). The former can significantly alter hormones, enzymes, and electrolytes and lead to long-term muscle damage (Harris et al. 2005).

In reviewing 39 studies, Iossa et al. (2007) found that most leg-hold traps cause significant injuries. Even padded leg-hold traps caused minor and major injuries (Iossa et al. 2007). Animals restrained in leg-hold traps suffer stress, and because of poor selectivity in captures, traps can reduce the survivability of released animals (Iossa et al. 2007).

In a study by the USDA-National Wildlife Research Center, Shivik et al. (2000) found that traps that had the greatest success for capturing animals were the least selective, caught the most non-target species, and caused the most injuries. In a subsequent study, Shivik et al. (2005) found improvements in traps' efficacy, species selectivity, and injury ratings. The authors hint that Wildlife Services has been developing tools to improve trapping (Shivik et al. 2005). Others have worked on electronic-signal technology that immediately alerts a trapper that an animal is caught (Larkin et al. 2003) or tranquilizers on traps and snares to prevent injuries (Marks et al. 2004).

Iossa et al. (2007) found that leg-hold snares are generally humane with little mortality for target species, but that is untrue for non-target species, which may experience high amounts of mortality. In addition, foot swelling from foot-snare injuries, while receiving a low scoring on the ISO scale, may be under-rated because even temporary injuries may affect an individual negatively (Iossa et al. 2007).

Box traps can result in broken teeth or abrasions. Iossa et al. (2007) suggest several ways to improve traps so that injuries are minimized such as reducing mesh size to protect teeth and to use non-abrasive materials on the interior to prevent abrasions. Box traps are less stressful than are leg-hold traps (Harris et al. 2005). Yet, animals held in box traps tested higher for cortisol levels when compared with untrapped individuals (Harris et al. 2005). With all restraining traps, trap check times must be frequent to reduce exposure and damage associated with restraint (Iossa et al. 2007).

- **Society and Traps**

Leg-hold traps are considered inhumane by a number of countries and are banned in 80 countries, including the European Union (Iossa et al. 2007). In the United States, traps are banned or limited in some states. An October 2007, consent decree between Animal Protection Institute and the Maine Department of Inland Fisheries and Wildlife limits leg-hold traps to protect Canada lynx. Arizona passed a 1994 initiative; California, a 1998 initiative; Colorado, a 1996 initiative; Florida, a 1972 regulation; Massachusetts, a 1996 initiative; New Jersey, 1984 legislation; Rhode Island, 1977 legislation; and Washington, a 2000 initiative, all of which ban or limit trap use (Jones and Rodriguez 2003). Given the social resistance to traps, as illustrated by state-level attempts to limit their use, Shivik et al. (2000) call upon trappers to abide by 1997 international agreements concerning acceptable animal injury standards. Not only does the public generally abhor trapping, Muth et al. (2006) studied the response of over 3,000 wildlife professionals and found that most favor a ban on trapping.

In contrast to the depth and breadth of Muth et al.'s finding, Conover (2001), a USDA-affiliated researcher, argues that hunting and trapping helps reduce damage to agricultural interests without harming overall wildlife populations. Like the Conover paper, the PEIS is severely deficient and outdated in its trapping discussions. Meanwhile, dozens of studies concerned with the effectiveness of traps, the welfare of animals, and the attitudes of people have come out since the PEIS was released.

In sum, most people, including conservation professionals, oppose leg-hold traps because of welfare issues. Leg-hold traps are banned in many countries because of humane concerns. Several problems are associated with kill traps, including mis-strikes and escapes. Kill traps may not actually be "quick" while killing, and they may cause suffering or injury to animals that is unacceptable under standards suggested by researchers cited here, the ISO, and the AVMA. Trapping can result in the unintentional orphaning of dependent young. For these reasons, WildEarth Guardians calls upon Congress to abolish Wildlife Services.

Toxicants

Numerically, Wildlife Services kills most species using toxicants. Wildlife Services uses a wide range of poisons on several taxa—from mammals, to birds, to rodents and lagamorphs, and even plants.

The PEIS claims that it used three criteria to assess risks for its chemical methods including an exposure assessment, a toxicological evaluation, and a risk assessment. The evaluation in Wildlife Services' PEIS is based upon chemicals used by the agency for the period 1988 to 1991 (Chapter 4, p. 20). Wildlife Services' risk assessment considered exposure to threatened and endangered species, non-target species, recreationists, residents, and pest control operators. The PEIS claims that, "risk assessment makes the assumption that current use patterns would continue as they have during FY 1988 and 1991" (Chapter 4, p 20).

Given "that even a small quantity of a highly toxic active ingredient released into the environment could have a significant effect upon a nontarget receptor" (Chapter 4, p. 29), Wildlife Services should not be trusted to safely handle these agents. Because Wildlife Services' risk assessment is now 17 years old, and it has had numerous difficulties and has been repeatedly audited for its unsafe handling, use, and storage of toxicants, and since our understanding of these toxicants has improved or changed, Congress should ban Wildlife Services from using these dangerous biological agents.

- **Rodenticides and Anticoagulants**

In their review article concerning rodenticides, Mason and Littin (2003) assessed the humaneness of toxicants used to kill rodents. The first type of toxicants involve ingested baits (such as anticoagulants, zinc phosphide, calciferol, and alpha-chloralose); fumigants (such as sulphur dioxide, carbon dioxide, phosphine and cyanide gas) (Mason and Littin 2003). Ingested toxicants pose several welfare conundrums such as orphaning and death of dependent pups when the mother is killed, the killing of non-target animals, secondary poisoning of non-target animals, and dosage issues (which influences the intensity and duration of the suffering) (Mason and Littin 2003).

Because of genetic resistance, the first generation anticoagulants have been replaced by second generation toxicants that include brodifacoum, fifenacoum, and bromadiolone (Mason and Littin 2003). Anticoagulants are effective because they interfere with Vitamin K-1 metabolism, which affects the clotting of blood and the repair of blood vessels, and exposed animals typically die from blood loss, or cardiac, respiratory, or kidney failure (Mason and Littin 2003). These toxicants are slow acting, and may take several days to kill. Anticoagulants cause several clinical effects including internal hemorrhaging which can produce severe pain because the blood pools in enclosed spaces such as the lungs, kidneys, spinal cord, and eye orbits—which can cause other problems such as inability to breathe (Mason and Littin 2003). The dosage can influence the time it takes an animal to die, but it can be from several hours to days.

Anticoagulant rodenticides are not only inhumane (Paparella 2006), but cause direct secondary affects on mountain lion and bobcat populations (Riley et al. 2007). Secondary poisoning from anticoagulants harms a whole range of species, from birds to mammals, and often goes undetected because liver tissue must be tested using high-performance liquid chromatography (HPLC), and rarely do researchers find un-decomposed bodies in the field (Riley et al. 2007). When testing has been done, the occurrence rate on predators and scavengers has been high. Not all animals that tested positive for anticoagulants died from a lethal dose (Riley et al. 2007).

Further, what constitutes a lethal dose for many wildlife species is unknown (Riley et al. 2007). Anticoagulants can stress bobcats and mountain lions so that they become susceptible to mange (Riley et al. 2007). Mange may result in dehydration, starvation, and then death (Riley et al. 2007). Riley et al. (2007) found anticoagulant toxicants in 35 of the 39 (90 percent) cats they had radio-collared in their study of urban felids in southern California, and nearly 80 percent of the bobcats showed positive for two or more compounds (brodifacoum, bomadialone, difethialone, and prothrombin—all available as household and landscape rodenticides). All four of the mountain lions in the study tested positive for anticoagulant poisoning. The dead bobcats and mountain lions were severely afflicted with mange on their heads and shoulders, and the bobcats typically had mange over their entire body (Riley et al. 2007). Every animal that had died of mange had been exposed to anticoagulants (Riley et al. 2007). The leading cause of coyote deaths in the study area was also anticoagulants—because they and bobcats fed on rodents. Therefore, when lions killed and ate coyotes, they were exposed to large quantities of these toxicants too (Riley et al. 2007).

Anticoagulants persist in tissue, up to 256 days for bromadiolone and more than 250 days for brodifacoum (Riley et al. 2007). Rodents that are targeted with these poisons may ingest doses that surpass lethal dose amounts, which increases the amount of toxicity passed to carnivores (Riley et al. 2007). The PEIS's only reference to brodifacoum is to Weather Blok

(0.005 percent formula), used to kill Polynesian rats in Hawaii to protect sea turtle eggs (Appendix P, p. 245).

Of all the kill methods at its disposal, Wildlife Services kills the most species—across a variety of taxa—by poisoning. We review eleven toxicants here.

- **Alpha-Chloralose, Waterfowl Capturing Agent**

Wildlife Services uses alpha-chloralose to capture birds, but not to kill them (Woronecki and William 1993). In 1992, Wildlife Services gained approval from the U.S. Food and Drug Administration to use alpha-chloralose to capture "nuisance waterfowl" such as coots, and on pigeons (Belant and Seamans 1999, Belant et al. 1999). It is applied in corn baits that are "removed from the site following each treatment" (Appendix P, p. 181). Only Wildlife Services' agents or their designees can apply this pesticide (Woronecki and William 1993). According to Wildlife Services, while it is toxic to rats, mice, dogs and cats, immobilized birds "are immediately removed" so that non-target scavengers and predators are not harmed (Appendix P, p. 182).

Alpha-chloralose rapidly depresses the cortical centers of the brain, which in turn depresses the central nervous system, which then causes abnormally low blood pressure and a decrease in respiratory ability (Belant and Seamans 1999, Seamans and Belant 1999). A sublethal dose causes a lower level of depression, while a lethal dose can result in central nervous system and heart failure (Seamans and Belant 1999). Mute swans that were given 30 mg/kg of alpha-chloralose died (Belant et al. 1999).

Wildlife Services' PEIS claims "no T&E [threatened and endangered] species are expected to be adversely affected by use of this formulated product" (Appendix P, 182). Based on the annual tables that Wildlife Services posts to its site, it is unclear how extensively the agency uses this toxicant, and whether non-target species are poisoned from alpha-chloralose.

- **Aluminum Phosphide**

According to Wildlife Services' PEIS, the agency uses aluminum phosphide to kill pocket gophers, prairie dogs, moles, ground squirrels, muskrats, marmots, voles, and Norway rats.[12] Like zinc phosphide (discussed below), aluminum phosphide changes to phosphine gas when it contacts water; phosphine kills by asphyxiation (Mason and Littin 2003). While zinc phosphide is used as bait, aluminum phosphide comes in tablet form and acts as a burrow fumigant (Mason and Littin 2003).

The PEIS states "aluminum phosphide is known for its extreme inhalation toxicity and reacts in the presence of moisture to release phosphine gas" (Appendix P, p. 243). Witmer and Fagerstone (2003) found that aluminum phosphide is highly lethal to mammals and that a

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[12] Some of these species are considered keystone species in their ecosystems, and all species of prairie dogs have either been petitioned for listing under the ESA, are candidate species, or are listed under the ESA. See discussion for species supra.

human could die from inhaling only a few breathes. It is absorbed into the respiratory system and gains admission to the blood stream where it blocks cells' processes and changes hemoglobin (Witmer and Fagerstone 2003).

Photos: Angelika Wilcox

Phosphine gas causes a painful death to its subjects. According to Mason and Littin (2003), in humans, phosphine gas exposure causes "coughing, choking, breathlessness and pressure in the chest, nausea and vomiting, lung and abdominal pain, headaches and buzzing in the ears, jaundice, intense thirst, and also ataxia [loss of muscular coordination], paraesthesias [skin sensations such as burning, itching, or bricking], intention tremors and convulsions, before leading to coma" along with "pulmonary oedema [build up of fluids in the lungs preventing breathing]" and myocardial damage. Studies on laboratory rodents showed "similar signs of respiratory irritation and pain and other forms of discomfort" (Mason and Littin 2003, p. 14).

While considered by the EPA to be in the highest category of toxicity, Wildlife Services' PEIS claims that secondary toxicity is highly unlikely (Appendix P, p. 243). Though secondary toxicity may not be a large problem, exposure to non-target species, including humans, certainly is.

Aluminum phosphide routinely kills burrowing non-target species. Witmer and Fagerstone (2003) noted susceptible species include rodents, burrowing owls, reptiles and amphibians, lagomorphs, and small carnivores such as raccoons, foxes, weasels, and skunks. Applicators often do not know when non-target species are in the burrows at the times poisons are applied (*Rocky Mountain Animal Defense vs. Colorado Division of Wildlife et al. 2001*).

Unintentional poisonings of humans and companion dogs occur (Goel and Aggarwal 2007). On a global scale, some 300,000 human fatalities from pesticides such as aluminum phosphide occur—mostly in rural areas or in developing countries (Goel and Aggarwal 2007). EPA staff has confirmed that children and dogs could likely be exposed to aluminum phosphide if children or dogs dig up recently poisoned holes and are exposed to the gas (pers. comm. Suzanne Wuerthele, the EPA's Region 8 toxicologist).

In sum, aluminum phosphide is a hazardous toxicant that harms mammals. While a large amount of literature on aluminum phosphide poisoning to humans is available, we have concentrated on effects to wildlife. Aluminum phosphide causes an agonizing, inhumane, and barbaric death. A whole host of non-target species ranging from burrowing owls, coyotes, badgers, reptiles, amphibians, skunks, weasels, foxes, and rabbits can die from this toxicant. It is preferable for wildlife managers to attempt non-lethal solutions as much as possible (Fagerstone 2002).

- **Avitrol, (4-Aminopyridine)**

Avitrol (also known as 4-Aminopyridine or 4-AP), used in corn or grain baits, is meant to target blackbirds, pigeons, house sparrows, crows, grackles, cow birds, gulls, and starlings (EPA 2007). It is used to both kill birds and to "alarm" members of a flock. The agency sets out both treated and untreated grain, and the birds that consume the baited grain experience a loss of motor coordination, may tremble, act erratically, vocalize, and often die, thus frightening away the other flock members (EPA 2007). While the Migratory Bird Treaty Act (MBTA) prevents the killing of migratory birds, broad exceptions are made to protect agricultural interests (16 USC 703-712) .

The EPA considers Avitrol to be highly toxic to most vertebrate species; it attacks the nervous system. Avitrol is acutely toxic to mammals through three routes: orally, dermally, and by inhalation (EPA 2007). The EPA found that Avitrol is "mobile and persistent in the open environment" and can be mobile both in soils and water (EPA 2007). The EPA reports, "the reported LD50 [lethal dose for 50 percent of test animals] for blackbirds, rats and dogs are 2.4, 28.7 and 3.7 mg/kg body weight, respectively. The assumed mean body weights for blackbirds, rats and dogs are 0.07, 0.40 and 10 kg, respectively" (EPA 2007). Avitrol can have secondary poisoning effects, especially on avian predators, including a documented case of the death of a peregrine falcon (a species listed under the ESA at the time of the poisoning incident in 1998) (EPA 2007).

Non-target species such as meadowlarks, mourning doves, and sparrows can die from Avitrol (Appendix P, p. 191). However, any avian or mammal could die from exposure to a lethal dose. Threatened and endangered species include Aleutian Canada goose, Attwater's prairie chicken, and whooping cranes (Appendix P, p. 191). The EPA could not find clinical data for aquatic animals (EPA 2007).

Avitrol, a pesticide presented in a baited grain, kills or frightens members of a flock. It is highly toxic to all vertebrate species, both directly and secondarily, and is mobile and persistent in soils and in water. Avitrol can easily poison non-target species.

- **Sodium Cyanide and Sodium Flouroacetate (Compound 1080)**

Wildlife Services uses sodium cyanide-M-44 devices and Compound 1080-livestock protection collars to kill mammalian carnivores, especially coyotes but many other species, including those that enjoy federal protections such as wolves, California condors, and bald eagles. Both agents are Category I toxicants, the most acute, according to the EPA (EPA 1994, 1995). These deadly biological agents pose imminent harm in the environment and to people and are considered biological warfare agents.

Wildlife Services hopes that these toxicants will benefit livestock growers, but risks associated with their use are great (including mishaps involving humans, pets, and protected species). Wildlife Services has experienced a string of failed OIG audits relative to its toxics program (supra), and because any benefits from these toxicants are vastly over-rated given their inherent dangers, WildEarth Guardians petitioned the EPA in January 2007 to ban these toxicants (Docket number, EPA-HQ-OPP-2007-0944). The EPA reviewed our petition and its four addendums and then organized a public comment period from November 2007 to March 2008. It received several thousand comments. It is unknown when the EPA will render its decision. In November 2007, Congressman Peter DeFazio of Oregon introduced HR4775, legislation to ban the use, manufacture, and distribution of these toxicants.

- **M-44s, Sodium Cyanide Booby Traps**

Photo: USDA

M-44s are spring-loaded devices, topped with smelly baits that lure carnivores. When a carnivore tugs on the M-44, a spring shoots a pellet of sodium cyanide into the animal's mouth. When the cyanide pellet mixes with moisture, it turns into a deadly vapor. Sodium cyanide morphs into hydrogen cyanide gas, which is easily absorbed by the lungs (PEIS 1994). Death is rapid (Goncharov et al. 2006, Hooke et al. 2006).

Sodium cyanide is acutely toxic to both birds and mammals (PEIS), and M-44s kill hundreds of non-target species (*e.g.*, bears, badgers, kit and swift foxes, bobcats, ringtail cats, javelinas, beavers, hawks, and pets) and thousands of target species (particularly coyotes and striped skunks) each year. In 2007, Wildlife Services killed 14,274 animals, and a total of 68,000 animals from 2003 to 2007 with M-44s.

After only two minutes, a subject that triggers an M-44 device can die (Hooke et al. 2006). M-44s are highly dangerous for field personnel to place,[13] and potentially even more dangerous for the unsuspecting humans that might come in contact with them (Petel et al. 2004). Bird deaths from M-44 poisoning are underreported because of birds' ability to leave the vicinity in a few seconds (FWS 1993).

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[13] In Australia, sodium cyanide applicators must have a respirator on hand, special clothing, and an antidote kit (Petel et al. 2004), whereas Wildlife Services personnel are simply warned not to travel with cyanide capsules in the glove box or in tool boxes and to carry an antidote kit (USDA-APHIS 2001).

The EPA's M-44 use restrictions under the FIFRA (EPA Registration No. 56228-15) make it illegal to use them in areas where federally listed threatened or endangered species occur. In its Biological Opinion of 1993, the FWS noted that Animal Damage Control killed several non-target species of concern with M-44s: grizzly bears, kit and swift foxes, and ringtails. The agency found that M-44s could potentially jeopardize the continued existence of jaguarundi, ocelot, and California condors, among other species (FWS 1993). In August 1998, Montana, Fish, Wildlife and Parks documented that a grizzly bear died from an M-44. Bobcats, closely related to Canada lynx, a threatened species, occasionally are killed by Wildlife Services' M-44s, which may mean that lynx could also be harmed by these devices.

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**

Despite federal regulations, Wildlife Services has a track record of killing threatened or endangered species such as wolves (see list supra) and condors, as well as failing to adequately post notices, resulting in dead pets and causing primary and secondary exposure to humans.

- **Wildlife Services' M-44 Use Restrictions Violations**

In 1994, the EPA promulgated twenty-six use restrictions governing the placement of M-44s under FIFRA. Nevertheless, APHIS has, on a number of occasions, violated FIFRA and the ESA. By their very nature, M-44s are indiscriminate. As a result pets and humans have been put into danger. In each of the instances that follow, the use restrictions for M-44s were violated by APHIS. In 2008, the EPA issued a warning letter to Wildlife Services about its mishandling of M-44s.

- In 1994, in New Mexico the APHIS-Animal Damage Control (now Wildlife Services) illegally placed several M-44's in the Gila National Forest. The New Mexico Department of Agriculture fined Animal Damage Control $1,000 and suspended the license of the trapper and his supervisor.

- 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. Wildlife Services illegally placed the device there without her knowledge or permission.

- On March 3, 1999, while irrigating his farm in Crawford, Colorado with his three-year old daughter and his dog, Paul Wright witnessed his dog's death after it had 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. The USDA paid the Wrights $9,500.

- In May 1999, a Virginia couple lost their dog, Rufus, to an M-44.

- In December 1999, two bird-dogs were killed by sodium cyanide during a bird-hunting trip in New Mexico on state lands.

- In January 2000, a dog died from M-44 poisoning in Estacada, Oregon.

- In May 2001, Maggie and Johnny Watson's dog in Gardner, Colorado was poisoned by an M-44. Other neighbors' dogs may have also been similarly poisoned.

- On February 4, 2002, Danielle Clair's dog died by an M-44 in Philomath, Oregon.

- May 3, 2003, Dennis Slaugh, while recreating on federal public land in Uintah County, 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. Reportedly, he has been severely disabled ever since his encounter with cyanide (Ketchum 2008).

- On February 21, 2006, FWS 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 near Vernal, Utah. Pollock became ill with a headache and faintness, and noticed a metallic taste in his mouth. Mr. Pollock filed a tort claim that was denied. In March 2008, the EPA issued a notice of warning to Wildlife Services that found that Wildlife Services violated FIFRA on at least two counts, including placing the M-44 in a public recreation area and within 50 feet of a public road or pathway, and warned that future violations would result in enforcement actions.

- In April 2006, Sharyn and Tony Aguiar's two-year-old German shepherd was killed at a rock quarry in Utah. The couple filed a tort claim lawsuit against Wildlife Services, but it was also denied. In a June 21, 2006, internal memorandum to colleagues, Barbara Knotz and Jeff Green, 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. <u>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.</u> I recommend against settling this claim. (Emphasis added.)

Director Bodenchuk's egregious comments concerning members of the public purposely poisoning their pets to gain compensation reveals an astonishing mindset from a top Wildlife Services official. This statement was redacted from documents requested under federal law that Wildlife Services sent to WildEarth Guardians, but not in documents received from the EPA.

This list of incidents may represent only a sampling of cases—where individuals have come publicly forward. Often people living in rural communities are afraid to speak out when incidents occur. In each of these cases, Wildlife Services denied any culpability.

- **Compound 1080 (Sodium Flouroacetate)**

In 1972, President Richard Nixon banned Compound 1080 (sodium flouroacetate), which was used to poison predators and prairie dogs and others, but in 1985, President Ronald Reagan and Secretary of the Interior James Watt brought this toxicant back in the limited form of Livestock Protection Collars (also known as "LPCs").

At present, Compound 1080 is registered for use only in the following 11 states: Idaho, Montana, New Mexico, Ohio (on a case-by-case basis), Pennsylvania, South Dakota, Texas, Utah, Virginia, West Virginia, and Wyoming, according to officials at the EPA and APHIS. Of those states, Idaho, Utah, Virginia, West Virginia, Ohio, and Pennsylvania are operating under a state label (confidential personal communication, government official, 12/5/06). In 1998, California and Oregon banned Compound 1080.

Compound 1080 is colorless, odorless, tasteless, and quite water soluble; some countries consider this toxin as a threat to water supplies in the event of chemical warfare (Osweiler 1984). Compound 1080 is poisonous in small amounts.

In humans, 2 to 10 mg/kg constitutes a lethal dose (Goncharov et al. 2006). In other words, 182-910 milligrams could kill a 200-pound person. The latency period for Compound 1080 to take affect is hours; in one study on animals between 5.3 to 14.6 (Hooke et al. 2006). Connolly (1998) described a shorter period, one half to two hours. Death to humans takes three to five hours (Goncharov et al. 2006).

Table 13
Toxicity of Compound 1080
(Source: FWS 1993 Biological Opinion)

Species Affected	Lethal Dose for 50% of Test Population (LD_{50})
13 bird species (5 taxas) (unnamed)	5.5 mg/kg body mass
Black-billed magpie (carrion feeding extreme)	1.6mg/kg body mass
Turkey vulture (carrion feeding extreme)	20 mg/kg body mass
Golden eagle	3.5 mg/kg body mass
11 carnivore & 4 herbivore species (unnamed)	0.5 mg/kg body mass
Domestic dog	0.07 mg/kg body mass
Opossum	60 mg/kg body mass
Sheep, Cattle, Mule deer	< 1 mg/kg body mass

Death by Compound 1080 is slow and unpleasant. Symptoms include convulsions, heart blockage, respiratory failure, hallucination, pain, and deep depression (Eason 2002, Goncharov et al. 2006). In January 2004, the FWS found a wolf that had been illegally poisoned by Compound 1080 in Idaho. According to a federal agent, the wolf, which was found near a rock slide, exhibited abrasions on its paws from convulsions, its teeth were clenched, and its body rigid.

Although it has been studied for decades, there is only one less than fool proof remedy: ethanol (Goncharov et al. 2006). Alcohol must be administered immediately to be effective because it is a competitive inhibitor (Goncharov et al. 2006). No antidote exists.

- **Efficacy of the Livestock Protection Collars & Disposal Hazards**

Livestock protection collars strap Compound 1080 onto the necks of sheep or goats (PEIS 1994, Connolly 1998). The collars do not protect the individual that wears the collar, but aim to “target” the predator that bites the collar. While the intention to target the individual animal involved in livestock losses makes more sense than broad-scale indiscriminate killing methods, livestock protection collars have inherent problems. The collars are easily lost; they readily rip and spill their toxic contents; and safe disposal is problematic. Moreover, both poisoned livestock and predator carcasses often go undiscovered.

Photo: USDA

Spills associated with livestock protection collars occur. All of the contents of the spill may not be found, particularly if the carcass of the sheep or lamb is dragged. While some soil micro-organisms can break down 1080, conditions such as extreme cold or drought might cause 1080 residue to persist in the soil for several weeks or months (Eason 2002).

Furthermore, livestock protection collars can be easily lost or punctured by vegetation or barbed wire. In one study, 107 collars were either inadvertently lost or punctured, while coyotes pierced only 57 collars (Watson 1990). Connolly (1998) suggests that coyotes can bury collars or drag them away from sheep carcasses and that about half of missing collars were not recovered in research studies.

Livestock protection collars routinely go missing, according to Wildlife Services' records. WildEarth Guardians reviewed 1990s records from Texas and found that, of the 1,787 sheep or goats that were collared, 1,655 livestock protection collars were returned to storage, while 156 were reported as missing. The numbers do not add up, as 1,787-1,655 =132. The numbers of missing collars or disposed collars equals 156. This means that at least twenty-four collars containing an acutely toxic substance went uncounted.

In at least two instances, more collars were returned to storage than were reported as used. Wildlife Services Cooperator Agreement 20269 indicates that 21 animals on that Texas ranch were collared; yet 36 collars were returned to storage. Agreement 72193 indicates that 6 animals on that ranch were collared; yet 10 were returned to storage.
We cannot know from these records where other discrepancies have occurred, such as if fewer collars were returned to storage than were actually used.

Moreover, of the 1,787 livestock protection collars applied in this Texas sample, only 56 coyotes were "suspected killed by LPC". Of that number, only 3 coyote carcasses were recovered. In other words, 53 Compound 1080-tainted coyote carcasses were not recovered, which poses risks for scavenging animals. Two agreements indicate that the livestock killed while wearing those collars were also not recovered (agreements 29295 and 64202.)

The Texas FOIA also indicated that several collars were punctured by cactus, mesquite trees, and fences. Agreement 64202, for example, states, "most of torn collars had prickly pear [cacti] punctures." When they accidentally burst it is virtually impossible for applicators to recover the disseminated poison, without avoiding environmental contamination.

The EPA and APHIS rely on private individuals to properly dispose of Compound 1080 once a spill has occurred. Livestock producers, who have been trained by licensed applicators, are expected to incinerate or bury everything that has come into contact with Compound 1080. Those that bury the toxicant must do so under three feet of soil (Connolly 1998). The burial site is supposed to be one-half mile from human habitation and away from water sources; no more than 10 collars can be buried at one site; and the sites must be ten feet apart from each other (Connolly 1998). Relying on livestock producers to properly dispose of Compound 1080, without any oversight by certified personnel, presents potential problems, including the theft or improper disposal, which could cause unintentional human poisonings to occur.

Because carcasses and spills associated with Compound 1080 must be handled as hazardous waste (Mitchell et al. 2004), and because the EPA and Wildlife Services rely upon individuals who may or may not be properly trained to handle this toxicant or who purposely do not handle this the waste from this toxicant properly, environmental risks could and probably do occur.

- **Usage Violations Involving Compound 1080**

In 1989, a newly-hired, predator-control agent to the Wyoming office of the Wyoming Department of Agriculture found that those officials had hoarded Compound 1080 despite the ban. They sold 1080 to private individuals who used it to poison wildlife, including bald and golden eagles (Robinson 2005). In 1991, the FWS and the EPA raided the offices of the Wyoming Department of Agriculture; the FWS subsequently engaged in a law enforcement action that led to several convictions (Robinson 2005). But that did not end illegal poisonings.

In 2001, approximately 60 pets were poisoned by 1080 in Grand Junction, Colorado and the investigating police officer, David Palacios, who handled the poisoned animals experienced, "'flu like symptoms, only 10 times worse'" (Lofholm 4/12/01). The Grand Junction police and federal investigators were never able to apprehend the culprit who ultimately dumped the poison into the local sewer system (Lofholm 3/15/01, 4/12/01).

- **Non-target Species, Jeopardy of Special Status Species, and Compound 1080**

Most of the current literature on Compound 1080 research comes from New Zealand and Australia where Compound 1080 is used in baits or in M-44 ejectors. As a result of this practice, researchers have found that numerous non-target species (including herbivores) can die from Compound 1080 (Lloyd and McQueen 2000, Eason 2002, Martin and Twigg 2002, Martin et al. 2002, Marks and Wilson 2005). The FWS found that Compound 1080 used in livestock protection collars is a "direct exposure risk to grizzly bears and gray wolves" and thus made jeopardy determinations related to Compound 1080 for those species (FWS 1993). APHIS found that Compound 1080 may affect golden eagles, bald eagles, ocelot, San Joaquin kit fox, ocelot, and jaguarundi (PEIS 1994).

While birds, such as vultures, ravens, magpies, hawks, and even mammals can flee an area in seconds, because Compound 1080 takes hours to act, their poisoned corpses may not be found readily. Sodium flouroacetate is, in fact, "highly toxic to birds and mammals" (FWS 1993) [See Table 13].

Furthermore, Compound 1080 can cause secondary poisoning to predators and even to herbivores (FWS 1993, Eason 2002). But while Compound 1080 can be eliminated through metabolization by animals that receive non-toxic doses, carrion poisoned with 1080 can be toxic for many months (Eason 2002). The EPA's reregistration eligibility determination for 1080 states that scavengers, including those that are threatened and endangered, could be affected by Compound 1080 if those animals consume the meat around the head or neck of dead livestock that wore livestock protection collars (EPA 1995a).

Since the 1994/1997 PEIS, there has been significant new information showing that M-44s and Compound 1080 present a significant risk to the environment and human health, and their use should therefore end. It is undeniable that the risks posed by the use of Compound 1080 and M-44s far outweigh any perceived benefits, especially when compared with effective non-lethal alternatives.

H.R. 4775 addresses the need to take out of circulation these deadly toxins that excessively kill wildlife, harm people and their pets, and upset wildlife relationships and ecosystem balance.

Because of the toxicity of Compound 1080 and potential for primary and secondary poisonings; the likelihood that livestock protection collars will be inadvertently punctured or lost; and the potential for 1080 to be used as a weapon of terror, Congress should require that Wildlife Services stop the manufacture, distribution, and use of this dangerous toxin.

- **DRC-1339**

The toxicant DRC-1339, a deadly avian toxin, may be the biological agent that Wildlife Services uses the most, because according to their kill tables, it is associated with the largest numbers of deaths.[14] In 2007, Wildlife Services killed 2,145,074 birds—mostly starlings and with this biological agent. [See Appendix B.]

DRC-1339 is permitted for use in poultry and livestock feedlots, buildings, fenced areas where crops are not present, wildlife refuges, gull colonies in coastal areas, and bird staging areas and roosting sites (EPA 1995b). Wildlife Services has used and may use it liberally in North and South Dakota to protect sunflower growers by poisoning large numbers of blackbirds, grackles, and others.[15] Ironically, sunflower seed is often sold as wild bird feed to bird-watching enthusiasts.

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[14] DRC-1339 ($C_7H_9NCL_2$) is known by several names: starlicide, "starlicide complete", 3-chloro-4-methylbenzeneamine hydrochloride, 3-chloro-4-methylaniline-hydrochloride, 3-Chloro-p-toluidine hydrochloride, CPTH, or CTH (USDA 1994, EPA 1995b, Jacobs Undated).

[15] The EPA allows Wildlife Services and others to target the following species with DRC-1339: black-billed magpies, boat-tailed grackles, blackbirds (Brewer's, red-wing, rusty, tri-colored, and yellow-headed), brown-

The EPA writes that DRC-1339 is "slow-acting and highly toxic to target species": death takes one to three days after ingestion. Wildlife Services explains in its 1994/1997 PEIS that, "DRC-1339 is a slow-acting avicide, so many more birds may be affected by consumption of bait and are not necessarily found after treatment is completed" (Appendix P, p. 198). This view is echoed by a recent article authored by Wildlife Services' researchers, who found that *the slowness of the toxicant to act (one to several days) combined with birds' mobility, leaves researchers with few target and non-target species to retrieve* (Johnston et al. 2005). Johnston et al. (2005) write, "with respect to the use of CPTH [DRC-1339] to control pest bird populations, it is highly problematic, if not impossible, to conduct a field baiting study and subsequently determine the number or percentage" of exposed birds.

This fact explains how Wildlife Services' annual kill tables can fluctuate by more than a million individuals in a year. In 2004, Wildlife Services killed 2.3 million starlings, but in other years claimed half of that amount, such as 1.2 million starlings in 2007.

In February 2008, a man described picking up 5 dozen dead or dying starlings in his back yard with a pitch fork in Winchester, Indiana after Wildlife Services had poisoned a nearby dairy feedlot (Slabaugh 2008). In March 2008, a woman in Yakima, Washington reported picking up three trash bags full of dead birds after witnessing the death of thousands (Antone 2008). If people are picking up dead birds by the pitchfork full in back yards, how can Wildlife Services count them? It cannot.

How many blackbirds and other native species are actually killed by Wildlife Services each year? In FY 1988, Wildlife Services claimed *it killed 3.7 million blackbirds in nine states* (PEIS, Chapter 4, p. 64). For perspective, 3.7 million blackbirds is more than double the total kill figure for the entire U.S. in FY 2006, which was 1.6 million. Wildlife Services' PEIS argues that "the red-winged blackbird is the most numerous and widely distributed blackbird species in the United States (Webb and Royall 1970)" (PEIS Chapter 4, p. 64). Yet, the National Audubon Society has recently reported that even "common" species of birds are disappearing. Of 20 common birds (including several sparrows and grackles) surveyed, the average decline was 68 percent (Butcher and Niven 2007). Certainly, broad scale poisoning operations contribute to native bird declines—especially if Wildlife Services killed nearly 4 million birds in a handful of states in a single year.

The recklessness of putting out so much DRC-1339 into the environment gives the FWS considerable anxiety. FWS indicates in several biological opinions that only strychnine (a highly regulated substance) has more potency than DRC-1339. More chilling, Wildlife Services is unaccountable for DRC-1339's damage in the environment. An August 12, 1999 biological opinion from the FWS to Dr. George Linz, a USDA researcher, indicates that despite poisoning 450 sites on North and South Dakota, "virtually no data was [sic] acquired from this effort." Further, the FWS has repeatedly rung alarm bells in a series of biological

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headed cowbirds, common crows, grackles (common and great-tailed), ravens (common and white-necked), gulls (great black-backed, herring , and ring-billed), pigeons, and starlings (EPA 1995b).

opinions about Wildlife Services' failure to account for non-target poisonings. FWS suspects that Wildlife Services could harm and may have harmed federally protected species such as whooping cranes, bald eagles, peregrine falcons[16] and the American burying beetles, according to biological opinions. [See Appendix A].

DRC-1339 kills target species such as blackbirds, but also poisons other species unintentionally through two processes: 1) directly: grain-eating birds consume the toxicant and die; and 2) indirectly: avian predators or scavengers eat dead or dying birds that have been poisoned by DRC-1339.

While DRC-1339 is acutely toxic acute to granivorous birds, laboratory studies indicate that hawks and kestrels experience no adverse effects when fed starlings that had been poisoned by one-percent, active-ingredient baits. However, other carnivorous birds such as crows, ravens, owls, and magpies were more acutely sensitive to DRC-1339 than were hawks and kestrels (EPA 1995b).

Linz et al. (2002) contend that the species susceptible to DRC-1339 include waterfowl (LD_{50} 10-100 mg/kg), doves, galliformes, and owls (LD_{50} < 20 mg/kg). Johnston et al. (2005) describe a much larger non-target species list: Savannah sparrows, killdeers (insectivores that consume little grain), mourning doves, meadowlarks, American pipits, northern cardinals, horned larks, herring gulls, ring-necked pheasants, American robins, American tree sparrows, Canada geese, mallards, northern flickers, downy woodpeckers, dark-eyed juncos, green-winged teals, song sparrows, vesper sparrows, grasshopper sparrows, field sparrows, and rock doves. The FWS documented that a peregrine falcon, then a listed species, died from secondary toxicity after eating starlings near a DRC-1339-baited site (FWS, BO, Oct. 4, 1995).

Poisoning black birds with DRC-1339 fails to protect crops, and these efforts, including using non-lethal controls, do not benefit sunflower growers economically (Linz and Bergman 1996, Blackwell et al. 2003). Given that these methods fail, as Wildlife Services researchers note, there is no purpose or need to use this toxicant, especially in light of the fact that it causes unknown numbers of non-target species' deaths.

The toxicant DRC-1339 is probably the most widely used toxicant by WS. It kills the largest number of species overall. Yet, as recent media reports (Antone 2008, Slabaugh 2008) make clear, Wildlife Services cannot document how many birds it actually kills using DRC-1339. People are picking up birds and by the trash bag full, while numerous others go uncounted. The agency's own researchers indicate that models – not actual data - project how many birds they kill per year (Johnston et al. 2005), thus this explains the huge fluctuations – by one million animals per year – that Wildlife Services numerates. WildEarth Guardians remains concerned about the potential for non-target species to be killed by this toxicant, as well as

[16] FWS specifically indicated in its January 7, 2000 BO that even though peregrine falcons are no longer listed under the ESA, that they are protected by the MBTA.

secondary poison threats to wildlife and to people's pets despite Wildlife Services' assurances to the contrary. We call upon Congress to abolish Wildlife Services.

- **Glyphosate**

Since 1991, Wildlife Services has sprayed over 61,408 acres of cattail marshes with herbicide in North Dakota to reduce blackbirds' roosting habitats (USDA 2008). The enormous amounts of glyphosate, a plant defoliant commercially sold as Rodeo™, poured onto wetlands to benefit the sunflower industry in North and South Dakota is likely contravenes the MBTA, the Bald and Golden Eagle Protection Act, the Clean Water Act, the NEPA, FIFRA, and the ESA.

Wildlife Services poisons cattails with glyphosate, but has failed to determine the effects of this pesticide on wildlife (especially those that are federally protected), people, and the environment. A recent study of glyphosate indicates that those effects are largely unknown, yet Wildlife Services' 2008 environmental assessment only discloses the benefits of this toxicant. Glyphosate could potentially present primary and cumulative poisoning threats to a host of species, especially to whooping cranes (that feed on poisoned invertebrates), bald eagles (that frequently feed on poisoned fish), amphibians (vulnerable to pesticides because of porous skin), to invertebrates, and to fish—including species that may be protected under the ESA such as the Topeka shiner (which historically ranged in South Dakota)[17] and the Pallid sturgeon (a resident of the Mississippi and Missouri Rivers).[18]

Under a recent environmental assessment (EA) for black bird eradication in North and South Dakota, Wildlife Services sprays 70 percent of cattails in particular wetlands with glyphosate so that roosting habitat for blackbirds and common grackles is destroyed to benefit sunflower growers (USDA 2008). The EA claims that this work is beneficial to waterfowl and other wildlife. Further, the EA admits that cattail management fragments cattail populations and "could *slightly limit* the availability of cattail breeding habitat for Red-wing Blackbirds and Yellow-headed Blackbirds in localized areas" (EA at 3). If the treatments only work "slightly," the precautionary principal warns that it is not worth the enormous environmental hazards posed on the environment, wildlife, invertebrates, and people. More alarming is that Wildlife Services proposes to increase this activity in the coming four years.

Native cattails (*Typha glauca*) have hybridized with an invasive species (*Typha latifolia*), and farming practices (soil disturbance from frequent tillage and an increase in soil salinity) have resulted in the spread of this hybrid species into monotypic stands (Ralston et al. 2007). Along with intensive agricultural practices, suppression of prairie wildfires and the creation of roadway ditches have also contributed to cattails' spread (Leitch et al. 1997). Wildlife Services removes cattails by aerially spraying gylphosate on wetlands to benefit farmers.

Removing cattails can benefit some species such as black terns (Linz et al. 1994, Linz and Blixt 1997), certain ducks (Linz et al. 1994, Linz et al. 1996a), some aquatic invertebrates

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[17] See Federal Register, Vol. 69, No. 143, July 27, 2004.
[18] See Federal Register, Vol. 55, No. 36641, September 6, 1990.

(Linz et al. 1999), rails, and shorebirds (Leitch et al. 1997). Other species such as black birds and marsh wrens (Linz et al. 1996b), aquatic invertebrates (Henry et al. 1994, Leitch et al. 1997), fur-bearing species, white-tailed deer (Leitch et al. 1997), and non-migratory birds (Leitch et al. 1997) are harmed by cattail removals because they utilize these habitats during the winter. Despite its widespread use, the PEIS discloses that glyphosate is toxic to fish – "the Roundup formulation (41% a.i. [active ingredient]) was three to 42 times more toxic to aquatic organisms than the technical grade material" and the toxicity increases with temperature rises – it is doubly toxic to rainbow trout at 17° C as it is at 7° C (Appendix P, p. 217).

Ralston et al. (2007) write that current management cattail-removal activities occur on about one percent of wetlands, but "the affects of these management actions on wildlife populations, however, are largely unknown." But Ralston et al. (2007) apparently find this acceptable because they write, "waterfowl are generally considered to be of economic value; whereas, high blackbird populations can cause significant damage in local areas."

Amphibian populations are rapidly declining and pesticides have been strongly implicated (Hayes et al. 2006). Because most studies have only concentrated on a single pesticide, biologists argue that risks have been grossly underestimated with regards to the role of pesticides and amphibian declines (Hayes et al. 2006). Even low concentrations of pesticides can harm amphibians (Hayes et al. 2006). Frogs exposed to pesticides have retarded growth and less capacity for foraging, predator avoidance, and fecundity -- and this poses alarming population-wide implications (Hayes et al. 2006). Davidson et al. (2007) suggest that environmental contaminants and disease have contributed to amphibians' population declines and that sub-lethal doses suppress immune systems that facilitate epidemics. Apparently, no studies have looked at how glyphosate may influence amphibian populations.

Glyphosate is toxic to organisms but the consequences of its use are largely unknown. Yet, Wildlife Services has sprayed over 61,000 wetland acres in North and South Dakota with this plant defoliant (WS 2008) and claims that it benefits waterfowl and sunflower growers. Such gross negligence should not be allowed and we call upon Congress to investigate this issue.

- **Sodium Nitrate/Nitrite**

Sodium and potassium nitrates are combined with sulfur and carbon in canisters that are ignited and used as rodenticides, predacides, or insecticides in burrows or dens (EPA 1991) in a practice Wildlife Services calls "denning". [See, Table 5]. Target species include rodents (moles, ground squirrels, woodchucks, prairie dogs, and pocket gophers), skunks, coyotes, red foxes, and ground-nesting wasps (EPA 1991). The EPA considers gas cartridges as a Category II toxicant – the second highest degree of toxicity on a scale of four. Because this pesticide is used in burrows and dens, many non-target species, such as desert tortoises, black-footed ferrets, and burrowing owls are susceptible to unintentional poisoning.

Sodium nitrate explodes when heated to 1,000 degrees and produces the toxic fumes of nitrous oxide and sodium oxide (EPA 1991). The gas released is carbon monoxide. Nitrite converts the blood's hemoglobin to methemoglobin, which does not carry oxygen (EPA 1991).

Wildlife Services uses large gas cartridges, which agents bury in dens, to asphyxiate pups of target mammals. EPA Registration Number: 56228-21 (April 1996). Large gas cartridges, only allowed for asphyxiating coyotes, red foxes, and striped skunks, are comprised of a mixture of sodium nitrate (53 percent), charcoal (29 percent), and inert ingredients (19 percent). The EPA's label for the cartridges warns that it will burn with vigor until empty and could cause severe burns and start a fire. It further warns against inhaling, and if symptoms occur (headache, nausea, dizziness) to lie down, stay warm, and breathe pure oxygen if available. This label requires specific considerations for black-footed ferrets, Fresno kangaroo rats in southern Utah, Hualapai Mexican vole, blunt-nosed leopard lizard. It also requires that Wildlife Services not harm red and gray wolves (but does not warn against poisoning Mexican gray wolves or San Joaquin kit foxes).

Small gas cartridges, EPA Registration Number 56228-02 (November 2005), are used for the following rodent species: woodchucks, yellow-bellied marmots, ground squirrels, black-tailed prairie dogs, white-tailed prairie dogs, and Gunnison's prairie dogs (now a candidate species in the montane portion of its range). This label specifically warns about harm to burrowing owls (from May through July), Fresno Kangaroo rats, giant kangaroo rats, Stephen's kangaroo rats, Tipton kangaroo rats, Point Arena mountain beavers, San Joaquin kit foxes, Hualapai Mexican voles, Morro Bay kangaroo rats, Utah prairie dogs, Coachella Valley fringe-toed lizards, Island night lizards, blunt-nosed leopard lizards, San Francisco garter snakes, eastern indigo snakes, and gopher tortoises (but not desert tortoises). The contents of the small canister are nearly the same as the large: sodium nitrate (53 percent), charcoal (28 percent), and 19 percent inert ingredients.

Wildlife Services' PEIS includes analysis of effects of gas cartridges on the following protected species: kangaroo rats, protected mice, Point Arena mountain beavers, gray wolves, New Mexican ridged-nosed rattlesnakes, San Francisco garter snakes, desert and gopher tortoises, Santa Cruz long-toed salamanders, Island night lizard, black-footed ferrets, San Joaquin kit foxes, blunt-nosed leopard lizards, and Utah prairie dogs (Appendix P, p. 249-252). The PEIS also failed to analyze for Mexican wolves.

Any animal in the burrow or den at the time of exposure is likely to die when gas cartridges are used, which is particularly problematic if protected species are present. The EPA specifically mentions burrowing owls, which are ground-nesting birds subject to MBTA protections. Wildlife Services admits, "because it may be difficult for users to determine the presence of some non-targets within an underground burrow, *the label may not be stringently followed in all situations*, and some non-target individuals may be killed" (emphasis added, Appendix P, p. 250).

The AVMA claims that carbon monoxide causes a loss of consciousness without pain or discomfort or even awareness, and death is rapid if correct concentrations are used (AVMA 2007). While the AVMA claims that sodium nitrate canisters can provide a humane death, there are other problems from use of this: many non-target species, including species that are classified as threatened or endangered, may be killed with this toxicant because they are used in underground burrows or dens.

- **Strychnine**

Strychnine, which is bitter, odorless, crystalline, and highly toxic, can kill a wide range of taxa. It comes from the plant *Strychnos nux vomica*, which grows in southern Asia and Australia (CDC 2003). The EPA rates strychnine as a Category I toxicant, the most acute class (EPA 1996a). It affects neurons, switching off muscles and resulting in severe and painful convulsions until breathing is stopped (CDC 2003).

In 1972, strychnine was banned as used for killing predators, and in 1973 for killing skunks (EPA 1996b). In 1988, a federal district court judge banned the above-ground use of strychnine because the EPA and Department of Interior could not show that this substance could be kept away from protected species, especially bald eagles, wolves, grizzly bears, migratory birds and other wildlife.

FIFRA requires that strychnine be used in a manner that could only kill targeted species because it will kill anything that ingests a lethal dose. The EPA, U.S. Department of the Interior, and American Farm Bureau appealed the 1988 decision. The appellate court upheld the lower court's ruling with regards to the ESA, but not the MBTA and the Bald and Golden Eagle Protection Act (EPA 1996b). After the courts' decisions, however, the FWS issued several biological opinions (i.e. on black footed-ferrets and bald eagles), which essentially left the above-ground usage injunction in place (EPA 1996b).

The EPA's re-registration eligibility decision for strychnine claims that its use profile is for pocket gophers only (EPA 1996a). It can be used to protect orchards, agricultural crops, for forestry, and outside of residential dwellings (EPA 1996b). The 1994 PEIS suggests that Wildlife Services is using strychnine for all below-ground rodents such as gophers, prairie dogs, and ground squirrels (Appendix P, p. 220). The steam-rolled oat formulation was used to poison pocket gophers, ground squirrels, and prairie dogs in Nebraska, New Mexico, and Oregon for the period 1988 to 1991 to protect livestock feed, alfalfa, turf, trees, and rangeland (Appendix P, 227).

The PEIS has two conflicting positions on strychnine and secondary poisoning. In the first, it claims that strychnine is the only compound that can cause "significant" secondary hazards to raptors, and it recommends immediate above-ground carcass removal as a mitigation measure (Appendix P, 11). Later, the PEIS contends that raptors are less likely to be poisoned by strychnine than other scavengers because they generally "eviscerate prey and remove the poisoned gastrointestinal tract prior to ingestion" (Appendix P, 222). More current studies and the EPA concur with Wildlife Services' first finding.

Pocket gophers feed on tree shoots that are concentrated in forest plantations, and so strychnine baits are used to kill them (Arjo et al. 2006). Some non-target species such as chipmunks and deer mice can ingest strychnine, die above ground, and cause secondary poisonings to both terrestrial and aerial species—especially species that cache large quantities of carcasses (Arjo et al. 2006). Strychnine baits are directly lethal to songbirds and cause secondary poisoning to raptors (Knopper et al. 2006). The EPA found that strychnine is highly toxic to birds, small mammals, and some fish (EPA 1996b).

The PEIS admits that the steam-rolled oat formulation, which is used below ground, can directly harm the following non-target species: mice, jumping mice, yellow pine chipmunks, black-tailed jackrabbits, and cottontails. The PEIS adds, "some small mammals that consume bait underground are found dead on the surface and do present a secondary hazard to other scavengers and predators" (Appendix P, p. 234). Secondary poisonings could kill cats, dogs, and possibly the following protected species: ocelot, jaguarundi, northern aplomado falcon, bald eagle, and peregrine, wolves (Ibid.).

Grain, usually steam-rolled oats and milo, is mixed with strychnine and commonly used to exterminate pocket gophers, ground squirrels, and prairie dogs. The PEIS states that strychnine can affect any bird or mammal that ingests bait and that predators and scavengers are at risk for secondary poisoning.

Threatened and endangered species have also been killed by strychnine. That list includes Attwater's prairie chickens, whooping cranes, bald eagles, now-delisted peregrine falcons, northern aplomado falcons, jaguarundi, ocelots, and wolves (PEIS 1994).

To reduce the threat of secondary poisoning, the USDA recommends that the carcasses of poisoned birds and mammals be picked up following bait application and "unused bait" be removed (PEIS 1994). The potential or realized death for wildlife is considered acceptable and indeed inevitable as long as the primary targets are pocket gophers, ground squirrels, or prairie dogs, all of which are ecologically important rodents and increasingly imperiled.

Strychnine, even if used only below-ground, can have deleterious effects on non-target species. It can cause mortality to any subject that ingests a lethal dose, whether directly or indirectly through secondary poisonings. Given the enormous hazards associated with strychnine, and Wildlife Services' poor track record, Congress should revoke Wildlife Services' ability to use this dangerous toxicant.

- **Zinc Phosphide**

Zinc phosphide is a dull, grayish black inorganic compound used as a rodenticide throughout the world (Shivaprasad and Galey 2001). According to the EPA, zinc phosphide can only be used to poison rodents such as mice, chipmunks, ground squirrels, prairie dogs, voles, moles, rats, muskrats, nutria and gophers; and lagomorphs such as black-tailed jackrabbits and jackrabbits (EPA 1998). It is available in two forms: 1) over-the-counter for below-ground baits use, *or* 2) as restricted use, above-ground baits (Poppegna et al. 2005). Zinc phosphide is formulated as a bait in solid, dust, granular, pellet, tablet, or wettable powder (EPA 1998).

The EPA allows for liberal use of this toxicant both indoors (for "spot treatments," including where food is handled) and outdoors (around burrows, underground, in orchards, vineyards, and on various croplands and rangelands and in non-crop areas). Zinc phosphide can also be applied broadly, even aerially. The EPA suggests that these broadcast applications allow for coverage over vast areas of land. This agency believes that by allowing "limited broadcast" applications, people may refrain from using toxicants that are more hazardous (EPA 1998). Wildlife Services suggests that zinc phosphide is usually applied by certified applicators that are not federal agents (Appendix P, p. 254). Pre-baiting is required because of bait shyness—the taste and odor is offensive (Mason and Littin 2003) (Appendix P, p. 254).

The EPA assumes that grass exposed to zinc phosphide and then fed to livestock, does not appear as a residue in either milk or meat (EPA 1998). The EPA considers "nonfood" areas to include alfalfa, barley, dormant berries, oats, sugar maple, wheat, no-till corn, macadamia nut orchards, and in orchards and groves that are dormant (EPA 1998). The EPA considers "food areas" to include rangeland grasses, sugarcane, and grapes (artichokes and sugar beets have special California registrations) (EPA 1998).

Zinc phosphide works by interacting with stomach acids to produce phosphine gas which inhibits cytochrome oxidase (an enzyme that helps in respiration) (Mason and Littin 2003). Zinc phosphide has no antidote (Mason and Littin 2003). The toxicity of zinc phosphate varies among species and is dependent on a species' ability to vomit—rodents cannot, and this allows increased selection for rodents (Poppegna et al. 2005). Because stomach acids aid the release of phosphine gas when the bait is ingested, whether or not a subject has a full or empty stomach affects toxicity as well (Poppegna et al. 2005).

Hearts and brains, which require oxygen, are particularly susceptible to impairment (Mason and Littin 2003). Death results from pulmonary edema and hypertension, cardiac failure, and respiratory collapse (Mason and Littin 2003). Phosphine can damage livers and kidneys (Mason and Littin 2003). According to Shivaprasad and Galey (2001), zinc phosphide poisoning creates a bi-phasic mechanism of action. One part is responsible for a rapid release of phosphine gas, and the other acts more slowly, in the gastrointestinal tract, probably resulting in gastroenteritis and other lesions.

Necropsies of rodents show acute swelling in the intestinal tract, gastric ulcers, chemical corrosion, blood in the trachea and lungs, and coronary and liver congestion (Mason and Littin 2003). Rodents exhibit signs of diarrhea, respiratory distress, and depression (Mason and Littin 2003). Poisoned rodents use their hind feet to kick at their stomachs and demonstrate other signs of pain (Mason and Littin 2003). Death is either rapid, 4 to 24 hours, or prolonged, up to three days (Mason and Littin 2003). In delayed cases, liver damage occurs (Mason and Littin 2003).

In a study that reported domestic fowl deaths, authors found lesions including hemorrhage, pulmonary congestion, liver degeneration, heart muscle degeneration, and nephrosis (Shivaprasad and Galey 2001). Shivaprasad and Galey (2001) write that such lesions have been previously described in dogs, cats, birds, and humans due to zinc phosphate poisoning (they cite: Orr, 1952; Stephenson, 1967; Stowe et al. 1976; Casteel and Bailey, 1986; Osweiler et al 1987).

o Non-targets Species and Secondary Poisonings from Zinc Phosphide

Wildlife Services' PEIS distinguishes between "primary" non-target species, granivorous birds and mammals (rodents, lagomorphs, and deer), and those that are secondarily poisoned (e.g., a crow that consumes a poisoned mouse) (Appendix P, p. 263). Non-target subjects can involve several taxa, including humans.

A tiny amount of bait, even a single swallow, could be fatal to a child (EPA 1998). This fact is more alarming considering the fact that there are no known antidotes to zinc phosphate poisoning (Mason and Littin 2003). To mitigate this, the EPA requires that dye and bittering agents be added to this bait (EPA 1998). Poppegna et al (2005) report that this compound is toxic to wild birds, small mammals, and freshwater fish. They report that there have been several cases of non-target wildlife and domestic animal intoxication, including winter-stressed wild turkeys (Poppegna et al. 2005). Geese are "particularly sensitive" to zinc phosphide baits, nutria are the "most sensitive," and the least sensitive are desert kit fox (Appendix P, p. 255). In addition, the Wildlife Services' PEIS identifies protected species such as whooping cranes, woodland caribous, bald eagles, the now-delisted peregrine falcons, and Aleutian Canada geese as potentially vulnerable to zinc poisoning.

The effects of such intoxication is hard to determine since not all non-target species are found because zinc phosphide acts slowly, and thus poisoned animals may leave the baited areas before dying (Appendix P, p. 263). For instance, a barley field poisoned to kill moles burned several months after the zinc phosphide was applied. Uneaten bait was exposed and resulted in the deaths of at least 455 geese in California (Appendix P, p. 264). The PEIS acknowledges that all the geese that were exposed may not have been found.

Studies show that some birds are repelled by zinc phosphide while others swallow the bait only to regurgitate it (Erickson and Urban 2004). Laughing doves died two hours after eating zinc phosphide bait, even though they had regurgitated the bait 20 minutes after ingestion (Erickson and Urban 2004). In a study of red-winged black birds, 14 out of 15 died after eating 1:1 mixture of baited (2 percent active ingredient) and untreated corn (citing Schafer et al. 1970). While a wide range of species are susceptible to zinc phosphide poisoning from directly consuming the bait, others may die as a result of secondary poisonings.

Wildlife Services suggests that secondary non-target species can include predators and scavengers such as ferrets, mongooses, coyotes, kit foxes, mink, black vultures, bald eagles, golden eagles, and great horned owls (Appendix P, p. 264). It then claims that these species are not vulnerable to secondary poisoning because they vomit (Appendix P, p. 264).

In several raptor studies, none of the 19 birds, including great horned owls, spotted eagle owls, kestrels, bald eagles, black vultures, carrion crows, a magpie, and a jay died, but signs of intoxication were noted in several individuals (Erickson and Urban 2004). This is noteworthy because sublethal toxic effects can harm individuals and cause changes in populations processes including survival and reproduction (Pauli and Buskirk 2007). Even minor decreases in an individual raptor's fitness can result in mortality. Sublethal lead exposure in raptors, for example, can increase risk of collisions with power lines, decrease weight, and muscle mass, which could result in the animal's death (Craighead and Bedrosian 2008). Sublethal effects from other toxicants could also harm individuals making then vulnerable to such accidents. A FWS's biological opinion states that zinc phosphide-treated oats may cause some prairie dogs to die above-ground, thus potentially exposing bald eagles, making them "vulnerable to predation or severe weather events during migration" (FWS 1992).

Wildlife Services' PEIS claims "there is no true secondary toxicity" (Appendix P, p. 256) because zinc phosphide is not stored in muscle or tissues, but this is incorrect. A zinc phosphide-poisoned carcass may hold the toxicant in the gut for several days, which may transfer the poison to a scavenger (Appendix P, p. 256). Dogs and cats are particularly susceptible to secondary poisoning (Appendix P, p. 261). In fact, the PEIS itself admits that, "secondary poisoning to predators and raptors is possible, especially if the chemical is not assimilated into the target species" (Appendix P, p. 255).

Brown et al. (2002) help tease out this contradiction. They consider the risk of secondary poisoning from consuming dead mice low since phosphine gas breaks down and does not accumulate in the muscle tissue. Secondary poisoning, however, is dependent upon how the poisoned subject is consumed (i.e., whether or not it is disemboweled before eating). Some studies that Brown et al. (2002) reviewed showed that when poisoned rodents were fed to potential predators, they developed no visible signs of intoxication (citing Parker and Hannan-Jones 1996). In other studies, crows succumbed to secondary poisoning from ingesting poisoned mice. It therefore appears that, if a predator consumes the digestive system of a poisoned subject, it can die from secondary effects from zinc.

- **Efficacy of Zinc Phosphide**

Wildlife Services' PEIS examined different formulas of zinc phosphide and determined their efficacy and toxicity hazards. For the rat control (63 percent formula) for example, the PEIS said that black and Norway rats were poisoned in 5 states between 1988 and 1991. Wildlife Services applied this formula in rat burrows, in and around houses and buildings. It determined that dogs and cats were susceptible to secondary poisoning (Appendix P, p. 261), and it could affect whooping cranes, bald eagles, and peregrine falcons (Appendix P, p. 262). In other situations, Wildlife Services applied zinc phosphide to kill ground squirrels for crop protection; it killed ground squirrels, pocket gophers, and voles to protect pastures; it killed prairie dogs to protect rangelands, crops, pastures, and turf; and finally it killed chipmunks, mice, and squirrels in Vermont to protect maple sap tubing.

In their study, Brown et al. (2002) saw a small decrease in mice numbers despite aerial distribution of the bait in three study sites (80–130 ha). They postulate that although the poison was killing the mice in their study area, there was only a small decrease because new animals migrated into the already-poisoned fields. They propose that if the baiting were to happen at the time of sowing, the field, as well as its perimeter, be baited. This kind of broadcasting may prevent mice from migrating, but these actions create more susceptibility to non-target species (Brown et al. 2002). In addition, they suggest that the average effective bait life of zinc phosphide is 133 days when it is kept dry, but only 18 days in wet conditions. Also, zinc phosphide baits can deteriorate to sublethal doses, which make mice sick and create aversions to the bait.

- **Environmental Hazards Associated with Zinc Phosphide**

The PEIS suggests that the breakdown rate of zinc phosphide in soils is dependent upon soil moisture and pH. Residual zinc phosphide "is not expected to accumulate in the soils between applications or in animal tissues" (Appendix P, p. 254). The PEIS identifies alarming water-borne issues. The 63 percent concentrate used to kill muskrats and nutria involves a special method: material is applied on rafts floating on water and "could therefore represent a direct route of exposure via the water" (Appendix P, p. 254). Zinc phosphide could then runoff of the raft into the body of water, particularly if there is rain. Wildlife Services admits, because of the amount of toxicant used, "the amount of off-site transport of zinc would be significant; environmental modeling is warranted for this active ingredient" (Appendix P, p. 255).

In sum, as the EPA indicates, zinc phosphide is widely used and distributed and can even be aerially broadcast. Rodents, which are unable to vomit, die painful and stressful deaths from zinc phosphide that turns to phosphine gas. Death can either be relatively quick or prolonged. Unintended primary and secondary poisoning events have been documented: cats and dogs, and wildlife. Children can die from a single swallow. Zinc phosphide is a dangerous chemical with no known antidote.

Conclusion

Wildlife Services spends over $100 million annually to kill more than one million animals each year. It relies on a PEIS developed in 1994 that was dated at the time of its printing. WildEarth Guardians reviewed the PEIS, and subsequent relevant literature including the social, economic, and biological problems of the Wildlife Services' program to prepare this report. Large carnivores endure high levels of exploitation from because of Wildlife Services' actions. Many die each year from poisons, traps, and shooting. The program is diffuse and its nets scoop up non-target species in great numbers, including endangered species and pets. Wildlife Services also kills large numbers of bird and ecologically important rodents and other species as the tables in this report numerate.

Despite the scale of animal death, biologists, economists, and federal oversight agencies have criticized the efficacy of the program. Biologists have dubbed Wildlife Services' predator-control program the "sledgehammer approach" to wildlife management because of the breadth of extermination. Predator-killing programs do not work; they create myriad harms in the biosphere. Few livestock producers actually experience problems from predators, and most predation happens to a few operators. Most unintended cattle and sheep deaths come from birthing problems, disease, or weather. Yet, this biologically and fiscally expensive program burdens taxpayers.

Wildlife Services poses a national security hazards, according to federal oversight agencies. It is incapable of safely handling of lethal biological agents, some of which could be used in biological warfare. The program is hazardous to its own employees, at least 10 of which have died during the midst of aerial gunning operations. The public has been poisoned by sodium cyanide that has been recklessly placed on federal public lands.

Not only is Wildlife Services dangerous, it appears to revel in its opaqueness and skirts disclosure laws. Wildlife Services ignores disclosure laws inconvenient to itself, even though it is legally obligated to comply. While most of Wildlife Services' budget comes from federal tax dollars, the agency is unaccountable to the American public. It eschews fulfilling FOIA requests in a timely and thorough manner as required by law, and in the case of misplaced M-44s, rarely takes responsibility for its actions.

While most people enjoy observing wildlife, Wildlife Services massacres our nation's wildlife largely to benefit agribusiness. Taxpayers are forced to fund the death of over 100 million animals each year. Meanwhile, non-lethal alternatives to using dangerous toxicants, traps, and aerial gunning go unused.

WildEarth Guardians does not believe that Wildlife Services is accountable to the public. Its mode of operation is anachronistic, reckless, and dangerous, and therefore, we call upon Congress to abolish this agency.

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Appendix A

Outline of the U.S. Fish and Wildlife Service's Biological Opinions on
Sunflower Protection in North and South Dakota
(1993-2000)

July 9, 1993

DRC-1339-treated rice for reducing black bird damage on sunflowers in not likely to jeopardize bald eagles, peregrine falcons, or whooping cranes in Louisiana, North Dakota, and Texas. Mitigation measures include watching the bait for 2 hrs each day; walking the fields to check for dead birds; and removing dead black birds under roosts so that peregrine falcons and bald eagles do not consume the dead or dying birds and die from secondary toxicity.

Mar 17, 1994

This biological opinion finds that ADC is not likely to jeopardize bald eagles, whooping cranes, peregrine falcons, or American burying beetle if it poisons birds using DRC-1339 as part of a biological study. The study's objectives are: 1) assess the efficacy of DRC-1339 to reduce damage to the sunflower crop; 2) assess efficacy of baiting during the spring migration of black birds; 3) assess potential non-target species (that is, "non blackbirds"). The study is scheduled from March to May for the years 1994 and 1995. The study is to occur in 27 South Dakota counties.

For this study, the FWS allows ADC to kill blackbirds as follows: "Each years up to 4 roosts harboring between 50,000 and 1 million blackbirds will be used in the experiment." Researchers are required to determine if any raptors are affected.

The BO expresses concerns about endangered species: "Concentrations of migrating bald eagles in the eastern half of South Dakota may be found with the spring waterfowl migration concentration or on areas experiencing large winterkills of fish" (p.3). Bald eagles prefer waterfowl and fish, but are opportunistic feeders and therefore could consume dead blackbirds poisoned by DRC-1339. South Dakota provides important bald eagle habitat. The BO suggests that both bald eagles and peregrine falcons could be affected secondarily by eating birds poisoned by DRC-1339. Peregrines migrate through South Dakota in May -- or even as early as March 15. Peregrine falcons consume ducks, pheasants, and medium-sized passerines and thus are susceptible to DRC-1339. South Dakota is a stopping point for whooping cranes between Texas and Canada. Whooping cranes usually migrate along the Missouri River corridor although they have been found on the Black Hills to the eastern boundary of South Dakota.

Whooping cranes use wetland habitats during their migration. They are omnivorous: they feed on invertebrates found in low, wet areas, but also grains (p. 8). Whooping cranes could be poisoned by both secondary poisoning (eating prey poisoned by DRC-1339) and primarily through the ingestion of poisoned grain. [The BO does not indicate the Whooping Cranes could also potentially be poisoned by glyphosate.]

The FWS claims that no populations of American burying beetle are known to exist in South Dakota, but they could occur. This species needs significant humus and topsoil to bury carrion. Blackbird carrion "may be an acceptable prey species for the beetle," suggests the BO. But the FWS believe that DRC-1339 will break down before a beetle detects a dead blackbird's carcass. DRC- 1339 is not toxic to mammals, but is highly toxic to birds and is slow-acting. The FWS did not authorize any incidental take under ESA, but provide that the MBTA & Bald and Golden Eagle Protection Act have more restrictive provisions.

FWS' Recommendations:

1. Because the bait breaks down rapidly and is undetectable, the FWS recommended marking it so that both target and non-target species are easily identified.
2. Because DRC-1339 is slow acting, birds die a distance from the bait. They recommend that ADC acquire adequate field time; survey bait lanes and beyond; and monitor roost sites monitored—especially to prevent predator avian exposure.

<u>10/4/1995</u>

Consultation: whooping cranes, peregrine falcons; and bald eagles. FWS determines that ADC is not likely to jeopardize these species.

ADC requested to conduct a study in North Dakota to reduce damage to sunflower growers from red-winged black birds and common grackles. The objectives of the study are: 1) assess DRC-1339 rice baits on red-winged blackbirds & grackles during spring migration; 2) obtain multi-year estimate of blackbird damage to ripening sunflowers in North Dakota and South Dakota; 3) obtain a multi-year estimate of breeding populations of blackbirds; 4) document non-target species activities in test plots. Approved a three-year study to target 4 roosts of up to 50,000 blackbirds. USDA stated that peregrine falcons could be affected by secondary poisoning.

<u>Jan 11, 1996</u>

Blackbird & grackle control using DRC-1339. No jeopardy determination for bald eagles, whooping cranes, peregrine falcons, or American burying beetle. The study is to focus on the spring migration of blackbirds and grackles into South Dakota. Study period is from: 1) March 15 to April 15 to test the efficacy of the poison and survey non-target species kills; 2) May 15 to June 15 to gather breeding bird surveys; 3) September 15 to October 10 to assess sunflower damage in 1996, 1997, and 1998 in five counties in eastern South Dakota.
For the first time in a century, nesting bald eagles were documented as having returned to South Dakota in 1993.

<u>Feb 25, 1998</u>

The USDA requested permission to double the number of blackbirds poisoned from 250,000 to 500,000. The FWS wrote, "we do not concur with your assessment that your control efforts are unlikely to adversely affect" bald eagles, peregrine falcons, whooping cranes, or American burying beetles. But the BO stated that they were not likely to jeopardize these species so long as the USDA complied with the 1996 BO.

<u>Jun 1, 1998</u>

The BO sets out specifications to protect whooping cranes, peregrine falcons, and bald eagles.

The study proposes to use "decoy" blackbirds to trick red-wing and yellow-headed black birds to bait sites exposed with DRC 1339. Blackbirds prefer ripening crops over grains on the ground – this method is reported in Linz and Bergman (1996), DRC-1339 avicide fails to protect ripening sunflowers. Crop Prot. 15: 307-310.

The FWS authorized no incidental take. The FWS expressed concern that the use of live black bird decoys at bait stations could attract peregrine falcons and bald eagles, which could then find dead and dying black birds and be secondarily poisoned. The study is allowed in North Dakota, at 6 blackbird roosting sites. The study could be expanded to 20 roosts if it appears no non-target species are affected.

<u>MARCH 10 1999</u>

APHIS asked FWS for permission to kill between 950,000 to 2 million spring-migrating red-winged black birds and common grackles during March and April 1999. The FWS responded: "These changes are up to four times greater than previous poisoning efforts during your spring research" (p. 1).

The FWS suggest several unacceptable risks to non-target birds: 1) DRC-1339 adversely affects most avian species at low concentrations; 2) mortalities have been noted for magpies, meadowlarks, cardinals, flickers, juncos, mourning doves, white-throated sparrows, blue jays, bobwhites, quail, and varied thrush; 3) granivorous birds are especially vulnerable; 4) the hazard quotient to non-targets birds is 1,758 (a hazard quotient that exceeds 1.0 suggests potential for an effect) only strychnine poses a greater risk; 5) approximately 68 species of non-target birds have been observed in or near sunflower fields in the spring (32 granivorous species & 9 species "of management concern"; 6) WS warned not to underestimate the risk to non-target species because just because dead birds have not been found in the past because finding dead birds is difficult when using a slow-acting poisons.

The FWS stated, "this is very evident from the small number of blackbirds found in your research efforts when hundreds of thousands were reported as poisoned" (p. 2). The FWS further castigated WS for not answering their basic questions regarding its research & effects on non-target species. The FWS wrote that these efforts were not really to study, but a control sunflower damage because each year since 1994 more and more birds were killed.

The FWS, wrote, "Additionally, the Animal and Plant Health Inspection Service/Animal Damage Control blackbird control efforts this past fall in North Dakota and South Dakota show your agency's impatience in waiting for answers that research may provide. The Animal and Plant Health Inspection Service/Animal Damage Control went forward with fall control efforts which have proven not only to ineffective but inefficient" (p. 2).

FWS stated they failed to conduct NEPA procedures "for operational control." FWS stated that their May 6, 1997 letter outlined concerns re: effects of future operational control on migratory birds, endangered species, FWS's owned land issues, and deficiencies in the field data such as non targets, disease concerns, secondary poisoning issues, alternatives to DRC-1339, and other considerations. Jeopardy determination. Told APHIS that they needed to look at the Jan 11, 1996 Conservation Recommendations; told to implement the BO.

<u>AUG 12 1999 Amendment to 1998 study DRC-1339 on blackbirds in ND (in conjunction with live decoys)</u>

The FWS, wrote, "The live blackbird decoy study was not conducted on account of your agency's implementation of the Emergency Blackbird Control Program of 1998. This program resulted in [the] application of DRC-1339 to over 450 sties throughout North and South Dakota. Unfortunately, virtually no data was [sic] acquired from this effort."

The changes for the new study plan: 1) eliminate the use of live black bird decoys; 2) include South Dakota in the study area; 3) increase the area from 6 roost sites to 40 townships in North Dakota and 5 townships in South Dakota; and 4) conduct study from 1999 to 2000.

<u>Jan 7, 2000</u>

Amendment to the 1996, 1998, and 1999 BOs. APHIS asked to poison 2 million red-winged and yellow-headed black birds and common grackles in spring on Northern Great Plains of North and South Dakota.

FWS lists out several concerns: DRC-1339 adversely affects most avian species in low concentrations; non-target species harmed include magpies, meadowlarks, cardinals, flickers, juncos, mourning doves, white-throated sparrows, blue jays, bobwhite quail, and varied thrush; grain-eating birds are particularly vulnerable; DRC-1339's hazard quotient is only exceeded by strychnine for non-target birds; 68 species of non-target birds are in the sunflower fields in the spring, of which 32 eat grain, and 9 are species of concern; APHIS has underestimated the number of non-target species it has killed. FWS writes, "This is very evident from the small number of blackbirds found in your research efforts when hundred of thousands were reported as poisoned" (p. 2).

FWS adds that since 1994, "you have yet to satisfy these concerns about for non target birds" (p. 2). That research questions and methodologies are deficient when it comes to these species. That ADC's research efforts are more concerned with killing birds than "answering specific basic questions" (p. 2). Nevertheless, each year, WS killed more birds, and that the research was ignored in favor of control efforts. FWS called ADC "impatient" and that killing efforts "have proved not only to be ineffective but inefficient" (p. 2). FWS added, "our recommendations regarding operational control were given little consideration in the fall control effort" (p. 2). The BO states that, "we do not concur with your assessment that your control efforts are unlikely to adversely affect" bald eagles, peregrine falcons, whooping cranes, and American burying beetles (p. 3). Peregrines had been removed from the ESA, "however, this species remains protected under the Migratory Bird Treaty Act" (p. 3).

<u>Jan 25, 2000</u>

Consultation is for bald eagles and whooping cranes. FWS spells out protocols for the study (watching study area time; amount of grain, how grain to be applied.) The decoy trap contains live blackbirds and house sparrows. Bald eagles could be affected by secondary toxicity if an eagle consumes a DRC-1339 poisoned bird. Bald eagles could be especially attracted to the decoy traps and find dead or dying birds near study sites (p. 4). Whooping cranes use the area in their migration corridors, but the chance of a crane feeding at a baited sight is "slight" (p. 4).

Appendix B

Table 14 Birds Killed by USDA-APHIS-WS in 2007	
Anhingas	9
Auklets, Least	10
Avadavats, Red	1,549
Avocets, American	1
Bird, Unidentifiable	12
Bitterns, American	1
Bitterns, Yellow	2
Blackbirds, Brewer's	4188
Blackbirds, Red-Winged	289,090
Blackbirds, yellow-headed	509
Blackbirds, Z-(Mixed Species)	13,835
Bramblings	3
Bulbuls, Red-vented	2,247
Bulbuls, Red-whiskered	21
Buntings, Rustic	4
Caracaras	17
Cardinals, Northern	881
Cardinals, Red Crested	2,962
Catbirds, Gray	1
Chickens, Feral/Free Ranging	237
Coots, American	3,365
Cormorants, Double-Crested	15,732
Cormorants, Neotropic (Olivaceous)	7
Cowbirds, Brown-Headed	335,289
Cranes, Sandhill	43
Crows, American	4,017
Crows, Fish	277
Crows, Northwestern	60
Curlews, Long-billed	2
Doves, Collared, Eurasian	422
Doves, Mourning	12,856
Doves, Spotted	6,751
Doves, Whitewinged	201
Doves, Zebra	12,439
Dowitchers, Long-Billed	30
Dowitchers, Short-Billed	2
Ducks, American Black	8
Ducks, Bufflehead	48
Ducks, Canvasback	1

Ducks, Feral	515
Ducks, Gadwall	123
Ducks, Goldeneye, Barrow's	12
Ducks, Goldeneye, Common	17
Ducks, Mallards	1,814
Ducks, Merganser Common	15
Ducks, Merganser Hooded	10
Ducks, Northern Pintail	52
Ducks, Northern Shoveler	100
Ducks, Redhead	7
Ducks, Ring-Necked	52
Ducks, Ruddy	25
Ducks, Scaup, Greater	86
Ducks, Scaup, Lesser	10
Ducks, Smew	1
Ducks, Teal, Baikal	1
Ducks, Teal, Blue-Winged	76
Ducks, Teal, Cinnamon	4
Ducks, Teal, Eurasian Green-Winged	47
Ducks, Teal, Green-Winged	161
Ducks, Whistling, Black-bellied	2
Ducks, Whistling, West Indian	1
Ducks, Wigeon, American	127
Ducks, Wigeon, Eurasian	2
Ducks, Wood	20
Dunlins	15
Egrets, Cattle	2,839
Egrets, Great	206
Egrets, Snowy	93
Falcons, American Kestrels	211
Falcons, Peregrine	1
Finches, House	4,733
Finches, Purple	4
Finches, Saffron	8
Flamingos, Greater	1
Flickers, Northern	22
Flycatcher, Gray-Streaked	5
Flycatcher, Scissor-tailed	27
Fowl, Guinea	15
Fowl, Pea	1
Francolins, Black	1,404
Francolins, Erckel's	362
Francolins, Gray	1,342
Geese, Brant, Atlantic	113

Geese, Canada	14,463
Geese, Emperor	8
Geese, Feral	103
Geese, Snow, Lesser	47
Geese, White-Fronted, Greater	14
Godwits, Bar-Tailed	7
Grackles, Boat-Tailed	3,015
Grackles, Common	24,843
Grackles, Great-tailed	2,857
Grebes, Pied-billed	4
Grebes, Red-Necked	2
Gulls, Black-Backed, Greater	348
Gulls, Black-Tailed	1
Gulls, Bonaparte's	85
Gulls, California	3,271
Gulls, Franklin's	860
Gulls, Glaucous	3
Gulls, Glaucous-Winged	3,429
Gulls, Heermann's	2
Gulls, Herring	2,448
Gulls, Laughing	6,954
Gulls, Mew	51
Gulls, Ring-Billed	4,281
Gulls, Slaty-Backed	3
Gulls, Western	221
Hawks, Broad-winged	11
Hawks, Cooper's	43
Hawks, Harrier, Northern (Marsh Hawks)	40
Hawks, Red-Shouldered	9
Hawks, Red-Tailed	342
Hawks, Rough-legged	2
Hawks, Sharped-Shinned	18
Hawks, Swainson's	54
Herons, Great Blue	410
Herons, Green	10
Herons, Little Blue	13
Herons, Night, Black-Crowned	73
Herons, Night, Yellow-Crowned	17
Herons, Tricolored	1
Ibises, White Faced	137
Jays, Steller's	1
Junglefowl, Red	1,662
Killdeers	943

Kingbirds, Eastern	1
Kingbirds, Western	56
Kites, Mississippi	23
Kittiwakes, Red-Legged	2
Knots, Red	1
Lapwings, Northern	1
Larks, Horned	386
Magpies, Black-Billed	79
Mannikins, Chestnut	48,609
Mannikins, Nutmeg	2,083
Martins, Purple	5
Meadowlarks, Eastern	861
Meadowlarks, Western	1,174
Mockingbirds, Northern	84
Mynas, (all)	3,956
Nighthawks (All)	66
Olive-Backed Pipit	1
Ospreys	41
Owls, Barred	1
Owls, Common Barn	569
Owls, Great Horned	14
Parakeets, Budgerigar	1
Parakeets, Monk	2
Parakeets, Rose-ringed	98
Pelicans, American White	51
Pelicans, Brown	1
Phalaropes, Red	3
Pheasants, Ring-Necked	666
Pigeons, Feral (Rock)	86,746
Pipits, American	7
Plovers, Black-bellied	35
Plovers, Golden, American	1
Plovers, Golden, Pacific	5
Plovers, Lesser Sand	2
Plovers, Semipalmated	15
Quail, (all)	1
Rails, Clapper	1
Rails, Virginia	3
Ravens, Common	4,178
Redpolls, Common	2
Robins, American	876
Rosefinches, Common	1
Rubythroats, Siberian	2
Ruffs	5

Sandpipers, Buff-Breasted	1
Sandpipers, Common	3
Sandpipers, Least	49
Sandpipers, Pectoral	16
Sandpipers, Rock	2
Sandpipers, semipalmated	3
Sandpipers, Sharp-Tailed	4
Sandpipers, Solitary	1
Sandpipers, Spotted	5
Sandpipers, Terek	2
Sandpipers, Upland	233
Sandpipers, Wood	6
Shearwaters (other)	4
Shrikes (All)	1
Silverbills, Warbling	426
Skylarks, Eurasian	1,123
Snipes, Common	51
Snipes, Wilson's	3
Sparrows, Field	6
Sparrows, House/English	5,522
Sparrows, Java	9,340
Sparrows, Savannah	15
Sparrows, Song	1
Sparrows, White-Crowned	1
Starlings, European	1,176,641
Stints, Long-Toed	2
Stints, Red-Necked	1
Stints, Temminck's	2
Swallows, Bank	12
Swallows, Barn	438
Swallows, Cliff	302
Swallows, Tree	39
Swallows, Violet-Green	23
Swans, Mute	342
Swans, Trumpeter	1
Swans, Tundra	8
Swifts (all)	3
Tattlers, Gray-Tailed	10
Tattlers, Wandering	3
Terns, Arctic	1
Terns, Caspian	3
Terns, Common	1
Terns, Forester	3
Terns, Gull-Billed	1

Thrushes, Eyebrowed	3
Turkeys, Wild	175
Turnstones, Ruddy	6
Vultures, Black	3,201
Vultures, Turkey	1,201
Wagtails, White	1
Warblers, Arctic	6
Waxbills, Commomn	2,035
Waxwings, Bohemian	2
Whimbrels	13
White-Eyes, Japanese	29
Woodpeckers, Gila	24
Woodpeckers, Hairy	3
Yellowlegs, Greater	17
Yellowlegs, Lesser	72
Total Birds Killed 2007	**2,145,074**
Increase from 2006	**768,593**

Appendix C

<u>Global Warming, Human Overpopulation and the Extinction Crisis</u>

The United Nations predicts that the human population may increase by two to four billion people by 2050 (Gaston 2005). Humans did not reach the one billion mark until about 1800, but now it could only take approximately 13 years to increase the human population by a billion (Gaston 2005). The current human population is already at levels beyond is optimally sustainable; it is "three to four orders of magnitude larger than the mean for other mammalian special of comparable body mass and trophic level" (Fowler, 2005, p. 65.) The result: health problems to ecosystems, other species, and to individual humans themselves. Because of anthropogenic causes, the extinction rate of species is on a level never before experienced, except for periods of historic mass extinctions. A force of Nature, humans have caused nearly one-fourth of all mammals on the planet to be at severe risk for extinction.

In order to address the extinction crisis, government must readily address the overarching problem of too many humans on the planet and their effects on species, trophic cascades, ecosystems, and the biosphere itself. Government cannot worry about the delicacy of addressing what may seem a taboo subject. It must wade in and manage the human population problem. Social systems that is, our "political, educational, industrial, ethical, technologic, religious, psychological, social, economic, and behavioral" need to be instituted to curb human overpopulation (Fowler 2005, p 66). Failure to act will result in unintended consequences such as starvation, disease, war, and other means of social disturbance (Fowler 2005). As a species upon the planet that requires functioning, healthy ecosystems, our failure to address this key problem will ensure that in the long run that all species and natural systems will become unhealthy, unsustainable, and we will lose biological diversity—a planetary crisis is at hand. With species loss, ecosystem services will decline or disappear.

Avoiding risk is the key to good management practice; yet, the human population has reached proportions that are extreme and well beyond the "normal range of variation within such distributions" (Fowler 2005, p. 60). The human overpopulation problem is both "abnormal" and "pathologic" (Fowler 2005). Overpopulation has created feedback systems that have resulted in disease, compromised immune systems, and other sicknesses to humans themselves (Fowler 2005). The human overpopulation issue also includes our reliance upon domestic animals and plants, species also in ranges far above what is normal or sustainable (Fowler 2005).

The current species extinction rate is considered "largely unprecedented outside periods of mass extinction," and humans are the "greatest evolutionary force[s] on Earth" (Gaston 2005, p. 239). When humans increase their densities, the preservation of natural areas become more difficult; the numbers of threatened species increase; global extinction rates increase; non-native species invasions increase—resulting in changes to species assemblages; and biological diversity decreases (Gaston 2005).

Human-caused extinctions result from habitat loss and fragmentation, loss of dispersal corridors, overhunting, poaching, the spread of invasive species, the change in species assemblages; changes in ecosystem function, disease, sickness, and a host of other problems (Cardillo et al. 2004, Gaston 2005). Biologists predict that the number of threatened bird and mammals will increase to 7 percent by 2020 and to 14 percent by 2050 (McKee et al. 2004). Already, nearly one quarter of the world's mammals are at "high risk of extinction" with top carnivores reeling from these effects (Cardillo et al. 2004).

Most species, including humans, converge on 25 "global biodiversity hotspots" because these places provide the most availability of environmental energy (Gaston, 2005, p. 240). The prevalence of humans and large-bodied vertebrates results in the decline of those latter species, even when protected areas are near (Gaston 2005). Human population size and density is "positively correlated with levels of forest loss and fragmentation," the transformation of lands, and the increase in non-native species (Gaston 2005). Other biologists have determined that human population density is important, but the speed of mechanized habitat destruction may be more important (Cardillo et al. 2004).

Species are typically driven to extinction by the combination of "deterministic factors" such as habitat loss and overexploitation and "stochastic factors" such as environmental catastrophes (O'Grady et al. 2006). Of stochastic events, inbreeding depression is the most dire to wild species (O'Grady et al. 2006). Inbreeding depression is an enormous threaten to species of mammals and birds whose populations number less than 1,000, however, even in populations that have more than 1,000 members, inbreeding is a serous problem over the long term (O'Grady et al. 2006). Four biological traits can account for extinction risk to carnivores: small available geographic range; low population densities; length of gestation (confers ability to recover because of the speed of life history); and dependence on prey species themselves in decline.

Without curbing human population density, not only will species become extinct, ecological systems will become simpler and less functional. The loss of ecosystem services will harm will humans, the environment, and the planet.

The Earth's temperature has warmed by 0.6 °C over the past century and may increase between one and six degrees in the next century (Wilmers and Getz 2005). The rate of climate change in this century is unusually rapid, which may prevent species to adapt (Sheikh et al. 2007). Climate change may be localized or widespread and it can affect food chains, nutrient flows, and the circulation of both the atmosphere and ocean currents (Sheikh et al. 2007). Scientists have predicted that climate change will result in increased temperatures, stochastic weather events, and changes in precipitation (Sheikh et al. 2007).

Ecosystems that are devoid of keystone species or have small numbers of species may experience greater climate change effects (Wilmers and Getz 2005). Species that live in tropical zones may benefit from greater warming and precipitation (Sheikh et al. 2007). Wildlife respond to global warming by moving their ranges northward, and by shifting breeding and migration patterns (Burns et al. 2003). In national parks of the U.S., Burns et al.

(2003) predict that species go extinct, including a 19 percent loss of carnivores—especially fishers, martens, and ringtails, 44 percent of rodent species, and 22 percent Chiropteran species (bats).

As warming occurs, Burns et al. (2003) predict that there will not be, however, a "drastic loss" of species from their current habitats, but a "fundamental change in community structure as species associations shift due to influxes of new species" (p. 11,476). As a result of these changes, a shift in the trophic dynamics will change too (Burns et al. 2003). Predator-prey interactions will change, mammal communities will shuffle, breeding dates and producers' flowering and budding will alter feeding patterns, and the abundance of species in different trophic levels will change (Burns et al. 2003).

The phenology (that is, the relationship between climate and bird migration, plant flowering, and pollination) may be out of synch. Mismatches between precipitation, flowering, budding and pollination could lead to extinctions, such as the case of two populations of checkerspot butterflies (Sheikh et al. 2007). New assemblages of species will alter ecosystem functionality (Graumlich et al. 2007). The need for improved corridors and connectivity is important to prevent extinctions, but less likely because of the cost of protecting areas has become increasingly expensive (Hannah 2008).

Some pathogens could increase their range (i.e. chytrid fungus that affects frogs—causing extinctions of harlequin frogs, for example), or pathagens' range may diminish (Sheikh et al. 2007). Species' range shifts can be harmful. The mountain pine beetle, which used to feed mainly on lodgepole pine has now shifted to white bark pine and could harm rare grizzly bears. Invasive plants could threaten biodiversity and ecosystem integrity (Pearson and Dawson 2005).
Because the literature on global warming is enormous, we focus here on carnivores.
A shift in global temperatures may especially affect species that hibernate such as black and grizzly bears, and mammalian carnivores that are continuously active (e.g., wolves, foxes, wolverines) will fare better than species that are seasonally inactive (e.g., skunks and badgers (Humphries et al. 2004).

In the Yellowstone ecosystem, wolves act as a buffer to climate change by not only creating greater amounts of carrion, but making it available year round – as opposed to winters only when deep snow act as the culling agent. The scavengers that benefit include bald and golden eagles, grizzly bears, ravens and magpies, and coyotes (Wilmers and Getz 2005). Wolves therefore benefit numerically rare species such as grizzlies and eagles. Wilmers and Getz (2005) write, "wolves extend the timescale over which scavenger species can adapt to the changing environment" (p. 574). Wolves may be important in protecting threatened species such as grizzly bears, whose major food source, whitebark pine, is disappearing also because of global warming (Constible et al. 2008).

Carnivores that live in biological islands, that is, they are cut off from their metapopulations, such as the pine martens and lynx in southeastern Canada and northeastern United States, will be greatly harmed with global warming events (Carroll 2007). A decrease in snowfall make these two species in these regions vulnerable to sympatric carnivores such as fishers, which compete with martens, and coyotes, which compete with lynx (Carroll 2007). Lynx are often caught in snares intended for coyotes (Carroll 2007).

To protect these vulnerable species from the effects of global warming, Carroll (2007) suggests that wildlife managers create bioregional conservation plans, and protect vulnerable populations by reducing trapping not only in their core areas but in critical linkages (p. 1103).

Because global warming will change ecosystems and species' abilities to survive, mitigation planning must begin (Sheikh et al. 2007). Critical habitat as defined by the ESA, habitat conservation planes, and biological opinions for species will have to be redone (Sheikh et al. 2007).

WildEarth Guardians
A Force for Nature