

**SUPPLEMENTAL
PUBLIC CORRESPONDENCE**

**WOLF CONSERVATION &
MANAGEMENT PLAN**

**Received:
May 23, 2019 to May 31, 2019**



PO Box 231
Stayton, OR 97383
503-410-6571
info@tradarcheryoregon.com

Traditional Archers of Oregon

May, 2019

Dear ODFW Commissioners,

The Traditional Archers of Oregon (TAO) would like to voice our support on the most recent version of the draft management wolf plan. The plan allows for protection of wolves, along with providing management tools for other valued resources such as big game. The next step in wolf management will be to establish population zones, with limited controlled hunting built into the management actions. TAO would like to see management objective numbers established for wolves in each of the wolf management zones and preserve these numbers via harvested removal.

It is time for the Commission to make a decision on the wolf plan and move toward real management of the species. The current version of the wolf plan does this and the Traditional Archers of Oregon would like you to vote in favor of this plan.

Sincerely,

Riley Savage
President, Traditional Archers of Oregon
Hillsboro, OR 97124
(503) 913-1340

Roxann B Borisch

From: Curt Corder <clcorder@earthlink.net>
Sent: Thursday, May 23, 2019 11:27 PM
To: odfw.commission@state.or.us
Subject: April 2019 Draft Wolf Plan comments

I only recently became aware of the Oregon Wolf Conservation and Management Plan, and thoroughly enjoyed reading the April 2019 draft. All involved should be congratulated not only for the clarity and completeness of the draft Plan, but also for the progress that's been achieved since 2005 in re-establishing Oregon's wolf population. I am particularly impressed by the emphasis throughout the Plan on leveraging the natural, instinctive aspects of wolf migration and dispersal to achieve conservation goals.

Below are six statement excerpts which warranted specific comment, followed by an additional observation.

Thank you for the opportunity to provide comments,

Curt Corder

(1) II. WOLF CONSERVATION AND MONITORING

RE: A. Wolf Distribution; Dispersal and Connectivity; pg 10 line 24.

"Although this Plan does not specifically designate where wolves should occur in Oregon, it sets an expectation that the wolf population in the state will continue to distribute and expand into suitable range in both the east and west side of the state." KUDOS FOR REINFORCING NATURAL, INSTINCTIVE DISPERSION.

RE: A. Wolf Distribution; Wolf Management Zones; pg 12, line 23.

"While wolves will likely not be distributed throughout all of their historic range in Oregon, wolf distribution will not be restricted [...]. Continuing to promote wolf occupancy of available habitat throughout the state is intended to facilitate the long-term survival of wolves in the modern Oregon landscape." KUDOS FOR REMAINING OPEN MINDED AND ALLOWING THE WOLVES TO SELECT THEIR RANGE, NOT THE OTHER WAY AROUND.

RE: B. Population Objectives and Management Phases; Management Population Objective, pg 15 line 34.

"The management population objective for both the East and West WMZs is at least seven breeding pairs for three consecutive years." THIS SEEMS LOW WITH LITTLE MARGIN FOR ERROR. IF I UNDERSTAND YOUR STATEMENTS ON PAGE 17 LINES 5-9, USING SEVEN BREEDING PAIRS AS A THRESHOLD IS ONLY STATISTICALLY VIABLE ONCE THE BASE POPULATION EXCEEDS 300.

RE: C. Potential Conservation Threats; Objective; pg 19 line 7.

"Effectively and responsibly address conflict with competing human values while using management measures which are consistent with long-term wolf conservation in all phases of wolf management status under this Plan." FYI: THE WORLD WILDLIFE FEDERATION REPORTS SUCCESS IN THEIR SOUTH ASIA PROGRAMS (e.g. SNOW LEOPARDS, TIGERS) MANAGING HUMAN-WILDLIFE CONFLICT (HWC) VIA THE "SAFE SYSTEMS" APPROACH. (BROOKS 2015)

RE: C. Potential Conservation Threats; Strategies; pg 19 line 13.

"Track human-caused mortality rates to the extent feasible and assess the effects of human-caused mortality on overall population performance." SUGGEST IMPLEMENTING HIGHER PENALTIES FOR UNLAWFUL KILLING OF A

BREEDER.

(2) IV. WOLF-LIVESTOCK CONFLICTS

RE: C. Tools for Minimizing Livestock Depredation; Compensation; pg 44 line 1.

"In Oregon, compensation is part of the state's integrated approach to addressing damage by wolves. [...] The program is administered by the ODA and uses a combined approach — compensation for direct losses, missing livestock, and reimbursement for non-lethal costs." OUTSTANDING PROGRAM. KEEP IT UP.

(3) ADDITIONAL OBSERVATION

RE: Depredation Rates and the Availability of Natural Prey

With the reintroduction of wolves, being a so-called keystone species, it seems inevitable (and desirable) that shifts will occur in the associated ecosystems. Yet I did not find a discussion on allowing the wolf's natural prey species (deer, elk, etc) to increase in concert with the wolf population in areas where there are active packs. Clearly it is a complex and delicate balance. But it seems plausible that an increase in available natural prey could be a factor in reducing commercial livestock depredation rates.

Roxann B Borisch

From: ODFW Commission
Subject: FW: Wolf Plan Comments

-----Original Message-----

From: elkaholic@eoni.com <elkaholic@eoni.com>
Sent: Friday, May 24, 2019 9:25 PM
To: ODFW Commission <ODFW.Commission@state.or.us>
Subject: RE: Wolf Plan Comments

May 22, 2019

Oregon Fish and Wildlife Commission
4034 Fairview Industrial Drive SE
Salem, OR 97302
odfw.commission@state.or.us

VIA EMAIL

RE: Comments on the Oregon Wolf Conservation and Management Plan Revisions

Dear Chair Finley, Director Melcher, and Members of the Commission:

Thank you for the opportunity to comment on the proposed wolf plan update.

We appreciate the hard work that has gone in to this by the Commission, ODFW staff and the stakeholders. The livestock industry has worked closely with partners and staff to make the plan better and more balanced toward management, versus tighter conservation standards.

We can live with the proposed chronic definition in phase 3 as it more realistically reacts to situations that may require quicker actions to resolve. We also appreciate the added language for collaring in phase 3, we feel it is extremely important and the right thing to do for good management. We must remember, there are far more losses than just the rare confirmed case.

While the proposed plan is a better version for the livestock industry than the one out there a year ago, it still could go further toward defining maximum populations by management areas

or zones statewide. It fails to define a clear path when we reach physical carrying capacity, locally or statewide. In addition, we feel decision making by trained local district biologists is preferred over decisions potentially tainted by politics at higher levels, when dealing with clear wolf predation evidence in potential confirmations.

Again, we appreciate all the efforts put in over the years to get to this point and thank you for the opportunity to be involved. We pledge to work toward normal wildlife management for this species as very soon the impacts felt by the livestock industry will be felt by all rural Oregonians, and the need for management will be more obvious and necessary.

Respectfully Submitted,

Rodger Huffman, Union County Cattleman

Roxann B Borisch

Subject: FW: Comments from CBD on 2019 Proposed Wolf Plan Revisions
Attachments: CBD Comment Ltr for May 23.pdf; CBD Line Item Comments and Cited Papers on 2019 Draft Plan.pdf

From: Amaroq Weiss <AWeiss@biologicaldiversity.org>
Sent: Wednesday, May 29, 2019 4:44 PM
To: 'odfw.commission@state.or.us' <odfw.commission@state.or.us>
Subject: Comments from CBD on 2019 Proposed Wolf Plan Revisions

Commission/ODFW Staff/Michelle Tate:

I had submitted three separate emails (two with attached documents and one with a link). Two of my emails were received in time to get into the first Commission packet, but the third was not. I have combined all of them here, with the two attached comment documents and a new link to the sources cited therein. This way, when you share these documents with key ODFW staff, as well, they will receive all of them.

Please find attached:

- 1) A substantive comment letter from the Center which focuses on two key issues.
ATTACHED

All cited science papers, polls and pertinent Wolf Plan pages are at this link:

<https://spaces.hightail.com/receive/SweBiK3EMT>

(NOTE: link expires June 5)

- 2) A line-item comment/review we also have prepared of the entire proposed revised draft Wolf Plan, which includes cited papers at the end. ATTACHED.

Regards,
Amaroq

Amaroq Weiss
Senior West Coast Wolf Advocate
Center for Biological Diversity
707-779-9613
aweiss@biologicaldiversity.org
www.BiologicalDiversity.org



May 23, 2019

Comments on the proposed 2019 Draft Oregon Wolf Plan Revisions

To the Commission:

These comments on the draft proposed 2019 Oregon Wolf Management and Conservation Plan revisions (“2019 Draft Plan”) are submitted on behalf of the Center for Biological Diversity and our nearly 30,000 Oregon members and supporters.

In this letter, we address two key components of the 2019 Draft Plan revisions which are of greatest concern to our organization and the members and supporters we represent: The definition of chronic depredation, and controlled take.

In addition to this letter, we submit a line-item assessment of multiple parts of the 2019 Draft Plan to address information gaps, text changes, confusing terms or descriptions and to provide citations to additional published peer-reviewed literature and other resources the 2019 Draft Plan should incorporate.

DEFINITION OF CHRONIC DEPREDAATION

Oregon’ Wolf Plan seeks to adaptively manage wolves across a spectrum of three phases, identified as Phase I, II and III. Thresholds met by numbers of breeding pairs are what drive wolves from one phase to the next.

It has long been the conservation community’s position that Phase I requirements before a wolf kill order can be issued, as adopted in 2013, should be the standard across all three phases. Our view has been met by an opposite force – the livestock and sports-hunting industries’ push to remove all impediments to killing wolves.

Attempts by the Oregon Department of Fish and Wildlife (ODFW) to achieve a compromise on this issue --and specifically on the definition of what constitutes chronic depredation / what threshold must be met in Phases II and III before ODFW can authorize that wolves be killed -- have failed.

The proposal ODFW now makes in this 2019 Draft Plan to define chronic depredation in Phase II and III as “2 depredations in a 9-month period” is a threshold that the livestock industry agrees it could accept, but which no conservation group has agreed to or finds acceptable.

We believe a resolution can be reached which is better grounded in real life practice/data from wolf management in Oregon by ODFW, the ever-increasing science concluding that nonlethal methods are more effective than killing wolves to resolve conflicts, and the type of social compromise ODFW hopes to obtain.

The Wolf Plan has a complex history -- with its adoption in 2005, a mandated 5-year update in 2010, a lawsuit and settlement related to the Plan’s allowance of killing wolves for chronic livestock predations, state-delisting of wolves in 2015 (over which a lawsuit is still pending), and a four-year delay in the process of completing the next 5-year Plan update which should have occurred in 2015. Recognizing that there are two newly-appointed commissioners now reading these comment letters and who will vote on the proposed updates from ODFW, we first summarize here the background for how chronic depredation has been defined in the past and presently in the Wolf Plan and why ODFW’s proposed definition is unacceptable to the conservation community:

When the original drafters of the 2005 Wolf Plan (of which I was one, as a stakeholder representative appointed by the Commission to represent “wolf advocacy organizations”) crafted the Plan’s phased management approach, in each phase there were slightly different thresholds for a number of distinct management actions. *The one management action whose threshold remained the same across all three phases was the definition of chronic depredation.* The definition agreed to at the time, due to social compromises made in the stakeholder group – not based on any science nor even any clear discussion of what the word “chronic” means and implies -- was 2 depredations without any prescribed time limit. Clearly 2 predations is not chronic, whether in an unlimited period of time or within a short time span. However, we did understand and agree that the term chronic should mean the same thing in all three Phases, no matter how many wolves, packs or breeding pairs exist at the time. *While it is the number of breeding pairs in the state which move wolf management from Phase I to II to III, it is the circumstances of the predation events themselves which make them chronic, not how many wolves are in the state at the time the predation events took place.*

When, in 2010, while wolves were still in Phase I, ODFW did not abide by the Plan’s requirements to document nonlethal measures were used before killing wolves. The Center for Biological Diversity, Cascadia Wildlands and Oregon Wild sued ODFW when we determined the killing of wolves was violating Oregon’s state endangered species act. We also obtained an injunction prohibiting the further killing of wolves while the case was pending. The Oregon Cattlemen’s Association obtained intervener status to join ODFW as a co-defendant; thus lawsuit settlement talks involved the conservation groups, ODFW and the livestock industry. From those settlement discussions, the thresholds and definition for chronic depredation in Phase I was agreed to by the parties as four depredations within a six month period, plus a host of qualifying actions required by ODFW and livestock operators to ensure nonlethal measures were being used to prevent or halt depredations.

As a result of the mutually-agreed upon settlement, Phase I now had a different definition for chronic depredation than did Phases II and III. Those two phases still had the original crafters' definition – the vaguely worded standard of 2 depredations, with no time-frame sideboards. Discussions of whether or how to change the thresholds for Phases II and III were left for a future date.

While the lawsuit was pending from 2011-2013 and then in the three years following its settlement and before wolves moved into Phase II, no wolves were killed, the use of nonlethal conflict deterrents were required and wolf predations on livestock declined -- despite the fact that during this same time period the wolf population tripled. It was only once wolves moved into the vague realm of Phase II, when requirements for nonlethal were relaxed, that predations on livestock rose.

That future date to decide on a new, better definition for chronic depredation in Phases II and III is now upon us, and determining what that definition will be is a significant issue for this 2019 update of the Wolf Plan.

ODFW is now proposing a definition for chronic depredation in Phases II and III of 2 depredations within 9 months. While the imposition of a time limit is an improvement over the current definition which has no time sidebars, 2 depredations can by no stretch of the imagination be termed “chronic”, as was noted by Commissioner Wolley during the May 17, 2019 Commission meeting.

During the recent stakeholder negotiations in 2018, the livestock industry proposed 1 predation in 12 months. Conservation groups proposed a slight drop from the Phase I requirements down to 3 predations in 6 months. The livestock industry countered that they could probably live with 2 predations in 9 months. The conservation groups countered that we could probably live with 3 predations in 6 or 9 months.

From this discussion, the opportunity for a compromise was clear – a definition of 3 in 9 months. This would have met the conservation groups' willingness to drop from 4 predations to 3; and it would have met the livestock industry's willingness to shorten the time period from 12 months to 9 months. Instead, when there was still one more meeting left of the stakeholders group to try to find that compromise, ODFW announced it planned to propose the option the livestock industry last posed – 2 in 9 months.

During the May 17, 2019 Commission meeting, Commissioner Buckmaster asked ODFW whether the new wording (for chronic depredation) accurately reflected the practice of ODFW, *i.e.*, if ODFW has ever removed wolves immediately under the thresholds of the new wording. ODFW Director Melcher replied that it does not reflect ODFW's actual practice. Buckmaster queried “what would our wording be if our Plan reflected our practice?” Melcher's response – as well as a statement Melcher had made moments earlier -- indicated that ODFW has never initiated a lethal removal at anything less than 3 in 12 months.

The conservation community has been willing to negotiate while standing as firmly on our principles as we can – our stance is that, based on science and based on the on-the-ground

evidence in Oregon – this Plan, this state, this Commission, this agency, should focus on the use of nonlethal conflict deterrence measures instead of making it easy to kill wolves. We hope the Commission understands that agreement by the conservation community to the killing of any wolves for conflicts with livestock -- when the science shows that simply killing wolves is not effective over the long haul, can have unintended negative repercussions for even more conflicts and negative impacts on the social structure of wolves – is all by itself an enormous compromising of our values and world-view.

A threshold of 2 depredations in 9 months is not chronic, is not based in science, not based on ODFW's actual management practices in Oregon, and is not even based on a social compromise reached between the parties. As Commissioners overseeing and setting policy for how wildlife will be managed in the state, we now look to you to take this history and the discussions that have taken place, and direct ODFW to define chronic depredation in such manner that reflects science, Oregon data, and the social pressures in play.

CONTROLLED TAKE

We oppose the 2019 Draft Plan's inclusion of Controlled Take of wolves, and any hunting or trapping of wolves by the public via special permit authorization, Controlled Hunts or General Seasons. We urge that this section be stricken from the Plan.

State-sanctioned wolf hunting as described in the Plan via Controlled Take, Controlled Hunts or General Season Hunts, fail to address current science and changing social mores.

Science and Wolf Hunting

There is ample science demonstrating that allowing the public to hunt wolves does not improve social tolerance for wolves and can have the opposite effect. (Treves and Chapron 2016; Laaksonen et al. 2018; Epstein 2017; Treves 2009)

There is also ample science concluding that allowing the public to hunt wolves, as ODFW has publicly indicated would be appropriate under the precepts of the North American Model of Wildlife Management ("NAM") is, in fact, entirely flawed. (Nelson et al 2011; Vucetich and Nelson 2014; Vucetich et al. 2017; Artelle et al. 2018.) Since ODFW often says it relies upon the NAM in managing Oregon's wildlife, this is of great concern when it comes to wolves in Oregon. In fact, at the May 17, 2019 Commission meeting, ODFW's director reiterated that in Oregon, under the NAM, public hunters are used to help ODFW address problems and that ODFW uses NAM to look across the spectrum of wildlife species and the agency's mission to maintain those populations for current and future generations, as well as recreational opportunities. Further, during the May 17, 2019 Commission meeting, ODFW Director Melcher also stated that "Wolves are a special status game mammal now; we hope that at some time in the future hunting or controlled take is a legitimate management approach."

There is plenty of science, cited to in the Plan, that wolf populations are self-regulated, or regulated by availability of prey, or a combination of both. There is no need for hunting or trapping of wolves as a wolf population regulatory mechanism.

Entirely missing from the 2019 Draft Plan is any discussion of how an agency, a state or society at large can justify hunting apex predators, including wolves. Scientists globally have noted declining populations of apex predators and called for swift action to prevent their human-caused mortality. (O'Bryan et al. 2018; Ripple et al. 2014.)

Social Mores

A 2016 poll showed that 72 percent of Oregonians oppose wolf hunting.¹ Since no one eats wolves nor needs a wolf fur coat to survive an Oregon winter, those polled also clearly understand that hunting of wolves amounts to trophy hunting and they oppose this as well:

- Statewide, 81.9 percent believe that poaching poses a greater threat to deer and elk populations and to hunting opportunities than do wolves. Rural Oregon polled even higher at 87.9 percent, while Metropolitan Portland polled at 83.1 percent and the Willamette Valley polled at 72.9 percent. .
- Statewide, 81.1 percent think that prosecuting poachers would be more effective than hunting wolves, in promoting a healthier deer and elk population and hunting opportunities in Oregon. Rural Oregon polled at 75.9 percent, while Metropolitan Portland polled at 89.1 percent and the Willamette Valley polled at 73.8 percent.
- Statewide, 72.4 oppose trophy hunting of wolves. Rural Oregon polled at 73.8 percent, while Metropolitan Portland polled at 78.3 percent and the Willamette Valley polled at 61 percent.

Alterations Made to the Plan's Provisions Concerning Controlled Take to Avoid Litigation and Science is Shocking

In the 2019 Draft Plan, ODFW has made significant alterations to the thresholds for moving to Controlled Take of Wolves for wolf impacts on wild ungulate populations. As explained by ODFW staffer Kevin Blakely, during the May 17, 2019 Commission meeting, this was done to avoid the potential of litigation regarding lack of science to support killing wolves for ungulate impacts under the original 2005 Plan's threshold.

2005 Plan

The legislation required to designate wolves as a Special Status Game Mammal was proposed by the crafters of the 2005 Plan. This legislation did not get passed by the time of the Wolf Plan's adoption in December 2005. Therefore this section/recommendation was largely removed from the 2005 Wolf Plan and placed at the back of that Plan as Appendix P. *The language regarding*

¹ Oregon Voter Survey – September 2016, Commissioned by the Pacific Wolf Coalition. Conducted by Mason-Dixon Polling.

Controlled Take of wolves for ungulate declines stated that wolves must be “the cause” in order to be subject to controlled take.

2010 Plan/Update

In 2009, the legislation to designate wolves as a Special Status Game Mammal was passed. Therefore when updates were made to the Plan in 2010, that content was removed from Appendix P and placed back into Chapter IV of the Wolf Plan, with some revisions.

The 2010 Plan elaborated on the circumstances when wolves could be killed for impacts on wild ungulates, including even the use of controlled take if elk at artificial feeding stations were affected. This was shocking to see, since it amounts to baiting elk to feeding stations, this artificial concentration of elk serving to bait wolves in, and then killing the wolves for impacting this population. (NOTE: While this language has been deleted from the 2019 Draft Plan, nothing in the draft prohibits wolves from being killed under these circumstances.).

However, *the 2010 Plan at least retained the language of the 2005 version that wolves must be “the cause” of an ungulate decline.*

2017 Draft Plan Revisions

In 2017, ODFW issued two draft versions of Wolf Plan revisions, one in April and a modified version in November. In both versions, ODFW now concocted a completely different threshold for when wolves could be killed via Controlled Take for ungulate population declines:

- The April 2017 version on page 68 states “*if wolves are a significant factor in the population not meeting established ungulate objectives in a WMU.*”
- The November 2017 version on page 31 states “*if wolves are a major cause of the [wild ungulate] population not meeting established ungulate objectives or herd management goals*”. And on page 68, this same November version gives a different standard of “*wolves are a significant factor in the population not meeting established ungulate objectives in a WMU.*”

2019 Draft Plan Revisions

The 2019 Draft Plan revisions, at pages 31-32, states that wolves need only be “*a major factor.*”

Comparing the thresholds stated in the Wolf Plan over time, and now being proposed:

- The 2005 Plan states that wolves had to be “*the cause*” of an ungulate decline.
- The 2017 versions state that wolves had to be “*a significant factor*” or “*a major cause*”.
- The 2019 Draft Plan revisions states that wolves need only be a “*major factor.*”

The bottom line is that from 2017 through 2019, ODFW has made substantial alterations to the threshold for killing wolves for impacts on wild ungulates. The original crafters of the 2005 Plan

had in mind that before wolves could be killed for impacts on ungulates, it must be scientifically demonstrated that wolves were “the cause” for the ungulate population decline.

With a few strokes of its pen, to avoid litigation, and in acknowledgement that it would be very difficult to show scientifically, with statistical significance, that wolves are “the cause” of a localized ungulate population decline, ODFW has decided to make it easier to kill wolves because it won’t need science to justify its decision. ODFW has undone the express intention of the crafters of the 2005 Plan who understood quite clearly that the scientific literature then – and still, now --- concludes that habitat quality and other non-predator-related factors are the chief drivers of ungulate populations.

ODFW Should be the Sole Agent Killing Wolves for Conflicts/Negative Impacts

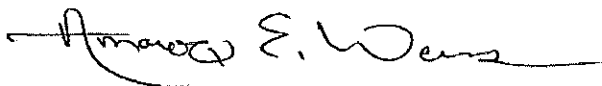
ODFW has expressed no ideas at all of how it will ensure, should members of the public be allowed to kill wolves under Controlled Take, that it will be the “offending wolves” that are targeted and killed. In fact, during the May 17, 2019 Commission meeting, ODFW staffer Derek Broman stated that there could be instances where Controlled Take would be used to effect wolf population reductions, not simply a targeted removal. ODFW also has not provided any assurance that wolves will not be left maimed, after a hunter fails to make a clean kill shot, or that wolf pups won’t be left orphaned because of the time of year that hunting or trapping of wolves for Controlled Take is allowed.

For all of the above reasons, we oppose the use of Controlled Take, Controlled Hunts or General Season Hunting of wolves by members of the public.

In Conclusion

Thank you for taking into consideration our concerns as expressed in this comment letter and in the attached line-item assessment of other specific topics in the 2019 Draft Plan. Please do not hesitate to contact me if you have questions after reviewing these materials.

Sincerely,



Amaroq Weiss, M.S., J.D.
Senior West Coast Wolf Advocate
Center for Biological Diversity
707-779-9613
aweiss@biologicaldiversity.org

Oregon Wolf Plan Proposed Revisions 2019

Specific Page and Line Item Notes from Center for Biological Diversity:

CHAPTER I - INTRODUCTION

Page 1, line 6 – This opening sentence of Chapter I of the Oregon Wolf Plan rightfully acknowledges B-45 as “[o]ne of Oregon’s most famous wolves” and clearly identifies her as female. Writer’s Stylebooks no longer suggest that animals be referred to as “it” if the animal’s gender is known. Using a generic “it” to describe this very famous wolf diminishes her stature. **We urge you to refer to this famous and important female wolf as “she”, not “it.”**

3, line 16 – “American” should be “America.”

Page 5, lines 16-17 – Citing several papers, this sentence states: “Cattle grazing also alters vegetation structure and composition and may? alters [sic] elk behavior and movements.” **In fact, there exist explicit research findings – from ODFW, in Oregon -- showing that cattle grazing does alter elk behavior and movements. The Wolf Plan should cite and describe ODFW’s own multi-year study on elk and mule deer in the Starkey Management Unit.** The research, which has been ongoing for several decades, includes examinations of effects of roads, timber harvest, ATV presence and hunter effects on elk and mule deer; cattle/elk/deer interactions; and predation by cougars and wolves. **Data which has undergone analysis so far concludes that elk avoid/are displaced by cattle and mule deer avoid elk and thus are displaced by both elk and cattle.** A compilation of summaries of the research and data results so far was prepared and provided by ODFW to the Oregon Fish and Wildlife Commission at the commission’s October 6, 2016 meeting.¹ Some specific statements from a Science Update on the Starkey Project (Elk, Deer, and Cattle: The Starkey Project – Pacific Northwest Research Station Science Update. Issue 13, March 2006, at page 6) include the following:

“Elk avoid cattle, and mule deer avoid elk. Elk can select habitats without cattle when cattle are rotated through livestock pastures, but mule deer may not have as many choices for avoiding elk. The diets of cattle and elk differ substantially during early summer, but become increasingly similar during late summer, with more potential for exploitative competition.”

Elk, Deer, and Cattle: The Starkey Project – Pacific Northwest Research Station Science Update. Issue 13, March 2006, at page 2.

Elk, mule deer, and domestic cattle have different foraging ecologies. The three species select and use habitats differently, and they strongly partition their use of habitats, particularly by elevation, slope steepness, and aspect. Cattle are habitat generalists, and elk avoid areas where cattle are concentrated. “Elk just don’t want to hang out with cows,” Vavra remarks, “and mule deer are intimidated by elk.” Elk use low elevations if no cattle are there, but move to higher elevations when cattle are moved on to low-elevation range, showing that cattle can displace elk.

¹ Oregon Department of Fish and Wildlife. October 6, 2016. Oregon Fish and Wildlife Commission Tour Packet.

CHAPTER II – WOLF CONSERVATION AND MONITORING

Page 8, line 13 and line 36 – ODFW lists as an objective to “promote a naturally reproducing wolf population **in suitable habitat** within Oregon, . . .” [Emphasis added] The phrase “in suitable habitat” is a new addition to the draft revisions. Does “suitable habitat” include areas of the state which may not act as core refugia for wolves but which may serve as vital travel corridors for wolves? **We recommend language be added here to explain what ODFW means by this phrase.**

Page 10, line 23 – Here, figures from 2015 are given. However, due to ongoing aggressive state-sanctioned hunting and trapping of wolves in Idaho, these figures have changed. **Updates are needed to bring current the cited Idaho figures for # of wolves and # of packs.**

Page 11, Figure 2 - We appreciate your preparing this improved depiction of the state and federal boundaries from what was in the 2017 draft. This depiction is easier for the general public to understand.

Page 12, lines 18-21 – Here are mentioned “additional zones and phases.” This is added language from what existed in the 2017 draft. It’s not clear what ODFW is thinking of or why ODFW felt the need to add this language. **We recommend that an explanation be provided.**

Page 16 – lines 13-14 – This states that the Drafters of the 2005 Plan relied on information from other state plans and from scientific literature to develop wolf population objectives. As a stakeholder/drafter of the 2005 Plan, who represented wolf conservation groups, I will unequivocally state that, while the referenced information was considered, ultimately, the wolf population objectives decided upon were based on a social compromise. The livestock industry representatives on the stakeholder group wanted zero wolves in any location in Oregon; the conservation group representatives on the stakeholder group wanted wolves at full carrying capacity across the state. The compromise that was reached was extremely low population objectives but without limits on where in the state those wolves could reside. Stating that the objectives were reached based on scientific literature and information from other states fails to inform the reader of the actual basis on which the objectives were ultimately reached. **It is recommended that, for transparency’s sake, this history be included in the Wolf Plan revisions.**

Page 16, lines 26-27 – Here it states that few management changes will occur when the western zone moves from Phase 1 to Phase 2. We disagree – a crucial management change – the new definition for chronic depredation and threshold of when wolves can be killed for conflicts with

livestock changes drastically – from 4 depredations in 6 months to 2 depredations in 9 months. This changed threshold places more wolves at risk of being killed.

Page 16, line 43 – We note that this version of the Draft Wolf Plan revisions has changed the language from “ODFW *will* conduct a zone-specific analysis” in the Nov. 2017 draft, to “ODFW *may* conduct” in this 2019 draft. **It is unclear why this change was made; please explain.**

Page 20, lines 25-27 – We believe you mistakenly refer here to “composition of *human-caused mortality*” when what you mean to state is “composition of *packs*.”

Page 20, lines 40-42 – This appears to be the first mention ever in the Oregon Wolf Plan, since 2005 and its succeeding iterations - including the 2010 Update and the two 2017 draft updates -- of a commission process to authorize hunting seasons or take quotas for wolves. This language validates the alarm conservation groups have been sounding for some time now; in describing what is required to have wolf hunting seasons or quotas, this draft is opening the door to these very practices.

Pages 19-22 – In this section on Potential Conservation Threats / Human-Caused Mortality, this draft has enhanced the discussion on the potential effects of unauthorized take (poaching) on wolf populations, but fails to address three other human activities currently lawful in Oregon which pose a conservation threat to wolves. Regarding poaching, this section cites to papers which suggest poaching rates may be underestimated and contribute to reduced growth rates of a wolf population, and rebuttals to those papers, but fails to cite to published responses to the rebuttals, leaving the reader to assume the rebuttals are the final word on the subject. **This draft should also include the published responses by Chapron and Treves to those critiques.** Please contact Dr. Adrian Treves to obtain copies of these responses. As for the three other human activities which pose a threat to wolf conservation, we brought them to your attention in our comments and testimony in May 2017, yet this 2019 draft still fails to address them: (a) the state allowing of coyote-killing contests; (b) night-hunting of coyotes, and (c) the use of lethal traps and snares for coyotes and other native wildlife in wolf habitat. **This section on Potential Conservation Threats ignores these three key threats and this draft should be revised to address them.**

Page 23, lines 9-10 – Here it states that “no data suggests Oregon’s wolf populations are small and isolated”. Oregon’s wolf population may not be isolated; it is nevertheless small, at only 137 confirmed wolves as of the end of 2018. **We suggest you delete “small and” from this sentence.**

Page 23, lines 13-14 – Here it states that Oregon’s wolves came from dispersers from the growing NRM population in Idaho, Montana and Wyoming. Lest the public be misled, those

states' wolf populations are no longer growing, due to the aggressive wolf hunting and trapping allowed there. **We suggest you replace “growing” with “then-growing”.**

Page 25, lines 38-43 – The phrase about it being important for managers in Oregon to monitor changes in human attitudes towards wolves and management actions of wolves is one which has been in the Wolf Plan from the start. Yet, we are unaware of any attitude surveys, polls, focus groups or research being conducted by ODFW to do just that. **If ODFW is doing so, we recommend you include here an explanation of those efforts, by what means and the results. If ODFW is not doing so, please explain what is limiting or preventing that from happening.**

Page 27, lines 10-13 – We note that no new sample testing has been done since the 2017 version of this Plan? 38 samples are noted then and now in this 2019 draft. **Is there a reason no new sampling has been done? If it has been done, please update this figure.**

Page 27, line 33 – Here it is noted the need to be using “gold standard testing protocols for disease”. This same standard – of relying only on gold standard research – should be applied for determining the effectiveness of Nonlethals and effectiveness of Lethal Removal for resolving livestock-wolf conflicts.

Page 29, lines 23-24 – We appreciate that this draft revision notes that if breeding pairs are dropping below Phase 3 levels, monitoring will remain at the breeding pair level (rather than waiting, as the prior 2017 draft stated, until breeding pair levels drop to Phase 2 levels). We believe the current proposed language is a better, more precautionary approach.

CHAPTER III – WOLVES AS SPECIAL STATUS GAME MAMMALS

Page 31, line 45 – Here the 2019 draft Plan revisions uses a new term -- “Long term, recurring depredation of livestock.” This term is vague, confusing and undefined in the Plan. The reader will not know what it means and this phrase is thus subject to widely varying interpretations.

Page 32, lines 4-5 – The 2017 drafts and this 2019 draft use different terms than did the 2005 and 2010 plans: “Wild ungulate populations not meeting established management objectives or herd management goals.” This is not what the original drafters of the 2005 Plan agreed to. What is the rationale for this language change?

Page 32, line 15 – Here, the threshold for controlled take of wolves is if wolves are “a major cause” of ungulates not meeting objectives. This is a significant departure from the language agreed to by the Drafters of the 2005 plan, of which I was a member. In that Plan, the threshold was that wolves are “the cause” of an ungulate decline. We wanted and expected that scientific research would be done to determine if wolves were “the cause” and if research

results concluded wolves were not “the cause” then this provision would not apply to subject wolves to controlled take. During the Commission conference call meeting on May 17, ODFW Director Curt Melcher explained the threshold was changed on the advice of USFWS, to avoid litigation, since it would be difficult or impossible to arrive at statistical assurance wolves were “the cause.” In making this change, ODFW is admitting it prefers to lower a threshold than submit to science. **This is unacceptable. Controlled Take for ungulate declines should be stricken from the Plan regardless; but if it remains as an option, the original language from the 2005 Plan must be the threshold, not new draft language concocted to avoid litigation and scientific veracity.**

Page 32, line 34 – Here the language for a reward has been changed from information which leads to the “arrest/conviction” of an individual, to information which leads to the “issuance of citation” of an individual. It is not clear to us if this change is helpful or harmful in a law enforcement investigation of unauthorized killing of a wolf.

CHAPTER IV – WOLF-LIVESTOCK CONFLICTS

Page 33, line 22 – Cattle and sheep figures for Oregon from 2012 are still being used. **We recommend replacement with updated data.**

Page 33, line 32 – Figures on losses from coyote are from a NASS 2010 report, though NASS has released updated figures since 2010. **We recommend replacement with updated data.**

Page 34, lines 6-7 – We appreciate the language change noting that wolves can “learn to and begin killing” livestock, in place of the former language which described wolves making a “switch” to livestock. We are unaware of any studies which conclude that wolves switch to livestock; wolves are opportunistic and though they may on occasion and more than once kill and eat livestock, they continue to eat wild prey as well.

Page 37, line 11 – It appears there is an incorrect date given of “Dec 31, 208” – **possibly you intended that to be 2018 instead of 208, and it should be corrected.**

Page 37, lines 42-47 – Please see, and cite to Santiago-Avila et al. 2017, which rebuts the Bradley study.

Page 38, lines -24 – Please see, and cite to Bergstrom 2017 and van Eeden et al. 2018

Page 39 and elsewhere in the Plan – At this page and several later on, you have made some rearranging of sections which result in a better flow and linearity of the discussions. We appreciate your taking the time to do so.

Page 39, lines 23-24 – There is a line gap that needs to be closed.

Page 39, lines 28-40 – We appreciate that you have added into the section on Non-Lethal Strategies the strategy known as “Low-Stress Livestock Handling.” As new strategies are developed and tested, inclusion of them in this Wolf Plan broadens public awareness and hopefully will increase its use.

Page 41, lines 38-39 – See above, Santiago-Avila et al. 2017, should be added and discussed.

Page 42, line 20 – See above, Santiago-Avila et al. 2017, should be added and discussed.

Page 42, lines 47-48 through Page 43, line 1 - It is common when an entire pack is killed, for new wolves/a new pack to move in, if the area is good wolf habitat. It is important that the public understand this concept and also that killing a pack of wolves will not solve the problems if no other changes are made to the livestock operation or circumstances, and is not a long-term solution. The example given in these three lines of Plan provide an opportunity to explain these concepts. **We recommend that a statement be included here to this effect.**

Page 43, lines 18-20 – We were surprised to see that the citation to Bangs et al. 1995 is still in this draft of the Wolf Plan revisions. When we submitted comments on the 2017 draft we expressly noted the impropriety of using this citation to support the statement that “the concept of removing depredating wolves is believed to improve tolerance and reduce illegal take of wolves by the public.” Yet, here it still is in the 2019 draft. The cited paper is 22 years old, did not actually collect or analyze data on whether killing wolves improves social tolerance for wolves and merely states, “We believe more local residents would attempt to kill wolves if agencies did not have an effective control program” and goes on to state “Whether and to what extent the control program has actually enhanced wolf recovery is speculative.” **Please remove this citation.**

Page 43, line 23 – Following the citation to Chapron and Treves 2016, **please add a citation to Laaksonen et al. 2018** In this study from Finland, wolf culling “was justified by the assumed positive impact on social acceptance by rural residents and, consequently, reduction in illegal hunting of wolves.” The paper concludes that “[S]ocial acceptance is not being gained by allowing culling. Rather it seems that culling maintains the social acceptance of aversion towards wolves.”

Page 47, lines 16-19 – In the discussion of Phase 1 non-injurious harassment of wolves, we note for the first time in any Wolf Plan draft the phrase “or otherwise disrupting livestock” as being a

basis to harass wolves. The vagueness of this phrase is quite concerning. This could be interpreted so broadly as to mean when a cow lifts her head from grazing when she observes a wolf in the distance. **We suggest this phrase be removed.**

Page 47, lines 16-19 - In the discussion of Phase 1 non-injurious harassment of wolves, we note that the prohibition on pursuit of wolves to noninjuriously harass them has been deleted. **The prohibition on pursuit should be restored to this draft.**

Page 48, line 6 – In this discussion of potential relocation of wolves, whereas the 2017 draft stated “conducted by state personnel only” it now instead says the action must be “directed by ODFW”. We are concerned by this change. Relocation of wolves (or any wildlife) can be highly traumatizing for the animal and injuries can be sustained or even death from capture myopathy. Relocation of wolves should be conducted only by trained wildlife staff from ODFW.

Page 48, line 13 – We believe you should change the word “third” situation to “fourth.”

Page 49, lines 10-20 – During the Commission meeting on May 17, 2019, when ODFW presented the changes made to this draft of the Wolf Plan revisions, no mention was made that a section allowing for the killing of wolves “[u]nder extreme circumstances” has been added to the Plan. The terms of this new provision allow for the killing of wolves if there are 4 or more confirmed livestock predations by the same wolf or wolves within 7 days. While this same concept had been proposed by ODFW during stakeholder meetings in 2016 or 2017, it met with opposition and ODFW ultimately did not include it in either of the two draft revisions released in 2017. Those of us who opposed it felt that it swallowed the rule; that is, if X number of predations in Y number of months met the threshold for chronic depredation, then a situation of X number or more of depredations within one week was already covered under the existing threshold. Please explain why ODFW has added in an “extreme circumstances” provision that was previously rejected.

Page 49, lines 35-42 – In this discussion of criteria for non-injurious harassment during Phase II on private or public land, there previously existed a requirement that livestock must be present. **This language has been removed and should be restored.**

Page 50, lines 16-17 and 31-32 – In this discussion of lethal take of wolves during Phase II the threshold of 3 in 12 months that was proffered in the Nov 2017 draft has been replaced with 2 in 9 months. During the discussion between ODFW and the Commission during the Commission’s May 17, 2019 meeting, Director Melcher noted that the 3 in 12 months “landed

like a lead balloon.” He is correct. **Knowing this, it is all the more surprising that the new threshold being proposed in the 2019 draft is even lower, at 2 in 9 months, making it even less acceptable to the conservation community.**

Page 50, line 46 – We oppose the use of USDA/Wildlife Services staff for confirmations of predations on livestock. When it comes to killing wildlife and affixing blame to wolves for livestock kills, Wildlife Services’ track record of dishonesty, obfuscation, lack of transparency, incidental take of nontarget wildlife, threatened and endangered wildlife and domestic pets, and disregard for science on predators has justifiably rendered them untrustworthy in the public eye and disqualifies them from this task.

Page 51, lines 19-20 – We oppose the use of USDA/Wildlife Services staff for confirmations of predations on livestock. When it comes to killing wildlife and affixing blame to wolves for livestock kills, Wildlife Services’ track record of dishonesty, obfuscation, lack of transparency, incidental take of nontarget wildlife, threatened and endangered wildlife and domestic pets, and disregard for science on predators has justifiably rendered them untrustworthy in the public eye and disqualifies them from this task.

Page 51, line 34 – – In this discussion of lethal take of wolves during Phase III the threshold of 3 in 12 months that was proffered in the Nov 2017 draft has been replaced with 2 in 9 months. During the discussion between ODFW and the Commission during the Commission’s May 17, 2019 meeting, Director Melcher noted that the 3 in 12 months “landed like a lead balloon.” He is correct. **Knowing this, it is all the more surprising that the new threshold being proposed in the 2019 draft is even lower, at 2 in 9 months, making it even less acceptable to the conservation community.**

Page 51, line 36 – We oppose the use of USDA/Wildlife Services staff for confirmations of predations on livestock. When it comes to killing wildlife and affixing blame to wolves for livestock kills, Wildlife Services’ track record of dishonesty, obfuscation, lack of transparency, incidental take of nontarget wildlife, threatened and endangered wildlife and domestic pets, and disregard for science on predators has justifiably rendered them untrustworthy in the public eye and disqualifies them from this task.

Page 51, line 43 – Here the draft 2019 Plan refers to special permit authorization “for the public”. We are mindful that ODFW removed the term “special permit agent” because of opposition by the conservation community to the whole concept of Controlled Take and the deputizing of specific citizens to kill wolves for ODFW. Removing the term “special permit

agent”, however, does not change our opposition to the concept of Controlled Take. Additionally, with this new phrasing of “authorization for the public” is ODFW now proposing instead to hold Controlled Hunts – which, per ODFW’s own explanations on page 31, lines 33-37 means “planned hunts with a specific time frame, area boundaries and where the number of hunters is limited through a public drawing or other means”? The conservation community is opposed to the killing of wolves by Controlled Take, Controlled Hunts and General Season Hunts on wolves, and also opposed to killing of wolves by trapping. Our opposition remains; here we additionally note that this new language in the draft Plan is confusing. **We request the Controlled Take provisions be stricken from the Plan.**

Page 51, line 46 – Here, as on page 31, the 2019 draft Plan revisions uses a new term -- “Long term, recurring depredation of livestock.” This term is vague, confusing and undefined in the Plan. The reader will not know what it means and this phrase is thus subject to widely varying interpretations.

Page 52, line 18 – We oppose the inclusion of USDA/Wildlife Services staff for wolf-related responsibilities. Wildlife Services’ track record of dishonesty, obfuscation, lack of transparency, incidental take of nontarget wildlife, threatened and endangered wildlife and domestic pets, and disregard for science on predators has justifiably rendered them untrustworthy in the public eye and disqualifies them from this task.

Page 53, line 24 and line 33 – We oppose the inclusion of USDA/Wildlife Services in investigations. Wildlife Services’ track record of dishonesty, obfuscation, lack of transparency, incidental take of nontarget wildlife, threatened and endangered wildlife and domestic pets, and disregard for science on predators has justifiably rendered them untrustworthy in the public eye and disqualifies them from this task.

Page 54, line 32 – We appreciate the addition of including training in “non-lethal methods to reduce depredation” in this section discussing Livestock Producer Assistance.

CHAPTER V – WOLF-UNGULATE INTERACTIONS AND INTERACTIONS WITH OTHER CARNIVORES

Page 56, lines 31-34 – Here the draft 2019 Plan states that in *some* instances, non-predation related mechanisms may be the ultimate driver of ungulate declines. We believe the literature suggests that this is the basis in *most* instances. **We think a more accurate interpretation of the body of literature on this topic merits changing the word “some” to “most.”**

Page 61, lines 1-13 –This paragraph discusses some elk declines in Idaho and in Montana. While discussing ungulate population declines related to wolves in crucial, so, too, is discussing the elk population increases, all-time hunter success rate and all-time harvest records for elk and deer being reported for the past several years in Montana, Wyoming and Idaho, in the presence of around 1600 wolves across that three-state region. All too frequently, members of the hunting community complain that wolves have decimated elk and deer populations in these states despite state agency data to the contrary. For Oregonians who like to hunt and are concerned about potential wolf impacts on elk and deer populations here, it is incumbent upon ODFW to present in this Wolf Plan update the current situation in our neighboring northern Rocky Mountains states. Please check with IDFG, WDFG and MFWP for their information for the past five years.

Page 62, lines 10-12 – This paragraph opens with the statement that there is evidence wolves may reduce black-tailed deer populations. Given the examples provided, which took place on small islands, it seems odd to include the examples at all and to lead with the current statement. **The sentence on lines 16-17, that “These studies are restricted to islands and in areas with single-prey systems, and the results may not translate well to Oregon” is the operative factor here and should be the first sentence in this whole paragraph on Black-tailed deer.**

Page 69, lines 7-8 – Here it is noted that there are no population estimates of the White-tailed deer population in northeastern Oregon. If that is the case, how does ODFW set management objectives or herd management goals for White-tailed deer here? Given the draft Plan’s inclusion of Controlled Take for wolves being a major factor in a herd failing to meet objectives or goals, what is ODFW’s plan for determining this?

Page 72, line 48-Page 73, lines 1-2 – There have been multiple instances of cougars killing wolves that have been documented by WDFW. Please contact their staff for this information to include in this Oregon Wolf Plan revision.

Page 73, line 33 and line 37 – Here, once again, the draft Plan has changed the language from the original Plan Drafter’s “wolves are the cause” to “wolves are a major cause” – to avoid litigation, and because they know they cannot scientifically arrive at this conclusion. Both of these are abysmally corrupt reasons to change the language in the Plan, from the standpoint of science, policy, and public trust. **We oppose the Controlled Take provisions of the Plan and request they be stricken. Should they remain, the original wording should be restored.**

Page 74, lines 1-2 – We repeat here the comments we made regarding page 51, above: Here the draft 2019 Plan refers to special permit authorization “by the public”. We are mindful that ODFW removed the term “special permit agent” because of opposition by the conservation community to the whole concept of Controlled Take and the deputizing of specific citizens to kill wolves for ODFW. Removing the term “special permit agent”, however, does not change our opposition to the concept of Controlled Take. Additionally, with this new phrasing of “authorization for the public” is ODFW now proposing instead to hold Controlled Hunts – which, per ODFW’s own explanations on page 31, lines 33-37 means “planned hunts with a specific time frame, area boundaries and where the number of hunters is limited through a public drawing or other means”? **The conservation community is opposed to the killing of wolves by Controlled Take, Controlled Hunts and General Season Hunts on wolves, and also opposed to killing of wolves by trapping. Our opposition remains; here we additionally note that this new language in the draft Plan is confusing. We request the Controlled Take provisions be stricken from the Plan.**

Page 74, line 11 – Here, reference is made to ungulates at “winter feeding site.” It is simply improper to bait ungulates to an artificial feeding site, where the congregated elk or deer then act as bait which draws in wolves, and then to kill the wolves for impacts on these ungulates.

Page 74, line 14 – Again the word change from wolves are “the cause” to wolves are “a major factor” in impacts to ungulate herd management objectives and goals is presented here. It is an improper change of the original 2005 Plan Drafters’ intent, and a change made to avoid litigation and science. **Controlled Take should be stricken from the Plan; if it remains, the original language should be restored.**

CHAPTER VI- WOLF-HUMAN INTERACTIONS

Page 75, line 24 – The subject of humans killed by cougars should be updated to include the 2018 death of a bicyclist in Washington State.

<https://www.nytimes.com/2018/05/20/us/cougar-attack-washington-state.html>

Page 75, line 37 – This section discusses both wolf attacks and wolf-human encounters. It mentions 80 documented encounters from 1900-1996, with one unprovoked instance of wolf aggression between 1900-1969, and 18 unprovoked wolf-human encounters during 1969-2000. **At lines 36-37 it talks about a “rise in unprovoked attacks”, yet, based on the content of the entire paragraph, in this phrase the word “encounters” should be used, not “attacks.”**

Page 78, line 10 – As this paragraph discusses trapping and reports on instances of trappers incidentally trapping wolves that were released alive, ODFW should also include in this paragraph a mention of the trapper who shot a wolf he found in his trap, which he claimed he had set for bobcats. <https://www.statesmanjournal.com/story/news/2018/03/15/trapper-who-shot-oregon-wolf-sentenced-probation-fined/429568002/>

Page 78, line 11 – Here the draft 2019 Plan singles out hunters and trappers as being ideally suited to help monitor wolf population. **The same can be said for avid hikers, naturalists, trackers and wildlife watchers. We suggest you mention them as well here.**

Page 79, line 10 – We maintain that the last-minute amendment of HB 4046 included language that provides a loophole such that anyone who shoots a wolf and claims they thought it was a coyote will not be subject to this increased penalty. “Subject to ORS 496.690, this section does not apply to the unintentional taking or killing of wildlife incident to an otherwise lawful activity.”

Page 80, lines 8-9 – Here a strategy of implementing a comprehensive public education program that supports coexistence with wolves is mentioned. To our knowledge, this strategy has been a part of the Wolf Plan since its inception yet we are not aware of a comprehensive education program being created or implemented in Oregon. Authorities on wolf conservation and management unanimously agree that public education on wolves is essential and may be the most important factor in achieving coexistence and social tolerance for wolves. **We urge ODFW, the Commission and the state Legislature to make this a priority,**

CHAPTER IX – RESEARCH AND INFORMATION MANAGEMENT

Page 85, lines 36-37 – Here the draft 2019 Plan asserts that “Engaging in partnerships and cooperative research projects ensures a rigorous and sound scientific approach when conducting wildlife research.” While partnerships and cooperative research projects have merits of their own, we disagree that it is through these avenues that scientific soundness and rigor will be ensured. The primary and optimal way to ensure a rigorous and sound scientific approach is through peer review and the use of gold standard scientific methodology.



Carnivore conservation: shifting the paradigm from control to coexistence

BRADLEY J. BERGSTROM*

Department of Biology, Valdosta State University, 1500 N. Patterson St., Valdosta, GA 31698, USA

* Correspondent: bergstrm@valdosta.edu

For 90 years, the American Society of Mammalogists (ASM) has made science-based challenges to widespread lethal control of native mammals, particularly by the United States federal government targeting carnivores in the western states. A consensus is emerging among ecologists that extirpated, depleted, and destabilized populations of large predators are negatively affecting the biodiversity and resilience of ecosystems. This Special Feature developed from a thematic session on predator control at ASM's 2013 annual meeting, and in it we present data and arguments from the perspectives of ecology, wildlife biology and management, social science, ethics, and law and policy showing that nonlethal methods of preventing depredation of livestock by large carnivores may be more effective, more defensible on ecological, legal, and wildlife-policy grounds, and more tolerated by society than lethal methods, and that total mortality rates for a large carnivore may be driven higher than previously assumed by human causes that are often underestimated.

Key words: carnivores, depredation, nonlethal control methods, predator control

“...this is why the caribou and the wolf are one; for the caribou feeds the wolf, but it is the wolf who keeps the caribou strong.”

Eskimo legend as told to Farley Mowat ([Mowat 1973:85](#))

This Special Feature developed from a special thematic session on mammalian predator control at the 94th annual meeting of the American Society of Mammalogists (ASM) held in June 2013 in Philadelphia. Sponsored by the ASM Conservation Committee, the thematic session explored a range of perspectives—from wildlife managers, carnivore biologists, and sociologists—on issues of managing human conflicts involving native large carnivores. For 90 years, ASM has presented science-based critiques of lethal control of native wildlife—particularly large carnivores—by the United States federal government, starting with its 1st published Society resolution ([Jackson 1924](#)) and continuing to the present ([ASM 2012](#); others reviewed in [Bergstrom et al. 2014](#)). Additionally, prominent early ASM members, including Aldo Leopold, C. Hart Merriam, and E. Raymond Hall, individually published letters stating that lethal control of large carnivores, particularly in the western United States, was driven by politics rather than science and was excessive in its direct effects on targeted as well as nontargeted species of native mammals ([Bergstrom et al. 2014](#)).

These concerns by early 20th century mammalogists were well founded, given that, first, grizzly bears (*Ursus arctos horribilis*), and then, by the 1930s, gray wolves (*Canis lupus*) were extirpated from the western contiguous states by private and government agents ([Robinson 2005](#)).

The 1973 Endangered Species Act (16 U.S.C. 1531–1544, 87 Stat. 884, as amended—Public Law 93–205) alleviated concerns of American mammalogists that their government would allow or directly cause extinction or wide-scale extirpations of native mammals. However, in the United States as well as globally, most large carnivores have experienced substantial range contractions and population reductions; in fact, the American black bear (*Ursus americanus*) is the world's only large terrestrial carnivore species that has a global population of more than 200,000 and is one of the very few whose population trend is not “decreasing” ([Ripple et al. 2014](#)). Even in areas still occupied by large carnivores, predator removal locally in less-developed landscapes causes concern about nontarget mortality of certain rare species and indirect effects on biodiversity and ecosystem function from disruption of “top-down forcing” (sensu [Estes et al. 2011](#); [Bergstrom et al. 2014](#)). In the United States, legal public harvest takes 2.5 million native carnivores annually ([Association of Fish and Wildlife Agencies 2014](#)). Additional human-caused mortality of carnivores due to

poaching and road-kill is hard to quantify but may be higher than commonly assumed. Vehicles on roads, for example, have killed 13% of the gray wolf (*C. lupus*) population annually in Wisconsin (Treves et al., [this issue](#)). Lethal control of large carnivores in the United States by professional federal, state, and private agents constitutes a fraction of the total human-caused mortalities nationwide, but they are done primarily to benefit livestock producers in western states, often intensely at a very local scale (e.g., 884 coyotes [*Canis latrans*] killed on a single ranch in Nevada in a 2-year period by aerial gunning—[Knudson 2015](#)), and they can result in removal of 1 or more carnivore species from local ecosystems ([Bergstrom et al. 2014](#)).

Wildlife Services, a division of the United States Department of Agriculture's Animal Plant Health Inspection Services, is tasked by law "to provide Federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist" ([Wildlife Services 2015](#)). Wildlife Services' research scientists do important studies on nonlethal methods of reducing carnivore–livestock conflict (e.g., [Stone et al., this issue](#)), but its field operations in the western United States have been criticized for their over-reliance on lethal means of resolving wildlife conflicts with livestock ([Government Accountability Office \[GAO\] 1995; Niemeyer 2010; ASM 2012; Bergstrom et al. 2014](#)). In Fiscal Year 2013, Wildlife Services killed > 75,000 coyotes (not counting 366 dens destroyed), 320 gray wolves, 345 cougars (*Puma concolor*), 3,546 red and gray foxes (*Vulpes vulpes* and *Urocyon cinereoargenteus*, respectively), and 372 badgers (*Taxidea taxus*—[Wildlife Services 2015](#)). The annual number of control kills of coyotes has remained remarkably constant since 1939, varying between 50,000 and 110,000 and has exceeded 70,000 annually since 1985 ([Berger 2006; Bergstrom et al. 2014](#)). Also typical, Wildlife Services in Fiscal Year 2013 unintentionally killed 397 river otters (*Lontra canadensis*), 14 kit foxes (*Vulpes macrotis*), and 41 swift foxes (*V. velox*—[Wildlife Services 2015](#)). Wildlife Services does not monitor populations of species it targets for control nor those unintentionally killed, but one of the few published estimates of an overall mortality rate is that Wildlife Services, along with state managers, removed 23.2% of the estimated coyote population of Wyoming in 1994–1995 ([Taylor et al. 2009](#)). This level of human-caused mortality of mammalian predators may have negative unintended consequences for native ecosystems and biodiversity. Lethal control of carnivores may also be unnecessary and counterproductive to its ostensible goals (see [Treves et al. 2016](#) for a recent review). We will explore these consequences in this Special Feature. We invited individual research scientists from the National Wildlife Research Center (the research arm of Wildlife Services) to contribute a science-based defense of lethal control of native carnivores to this Special Feature, but they each, as well as the center, collectively via their director, declined the offer (L. Clark, in litt., 13 November 2013).

There are 5 categories of reasons why mammalogists and conservation biologists should be interested in guiding governments—and society at large—toward replacing localized predator removal or population reduction (lethal control) with

nonlethal means of wildlife conflict resolution: 1) potential disruption of top-down forcing and consequent loss of ecosystem resilience and biodiversity; 2) "bycatch" or unnecessary killing of nontarget species of mammals and other wildlife that occurs with nonselective methods of lethal control; 3) population reduction of certain species of native wildlife valued by many parts of society for the benefit of a few favored interest groups; 4) ineffectiveness of lethal control of predators at either reducing livestock depredation or, secondarily, enhancing game populations, over the long term; and 5) ethical considerations about both the intrinsic value of carnivores and humane methods of killing them. Some of these deserve brief attention in this overview, and others will be dealt with in more detail in the 5 other papers in this Special Feature, including new empirical evidence for the efficacy of nonlethal methods as alternatives to lethal predator control.

THE IMPORTANT ROLE OF BOTH APEX PREDATORS AND MESOPREDATORS IN MAINTAINING ECOSYSTEM FUNCTION

With this topic currently under considerable empirical and theoretical scrutiny, the evidence assembled as of 2011 led 23 prominent ecologists to conclude that loss of apex predators was a major driver of destabilization and collapse of their native ecosystems, leading to pandemics, irruptions of invasive species, and lost ecosystem services ([Estes et al. 2011](#)). Aldo Leopold was one of the 1st biologists to argue that mammalian predators played an indispensable role in controlling ungulate prey, thus preventing depletion of their resources, citing the irruption of the early 20th century herd of Kaibab deer (*Odocoileus hemionus*) after widespread predator removal ([Leopold 1943](#)). A recent review of several lines of evidence concluded that Leopold was right ([Binkley et al. 2006](#)). The poor condition of rangelands in much of the western United States can be attributed partly to native ungulates whose predators have been depleted ([Beschta et al. 2013](#)). [Hebblewhite et al. \(2005\)](#) documented that top-down forcing exerted by wolves on browsing prey had indirect positive effects on songbird communities in the Canadian Rockies. Restoration of a putative wolf-driven trophic cascade has restored certain riparian plant and animal communities in Yellowstone National Park (e.g., [Ripple and Beschta 2012](#); though see [Mech 2012](#)). Top-down forcing (also known as a trophic cascade, i.e., the many indirect effects predation has on lower trophic levels and the ecosystem as a whole) by wolves may be enhanced by facilitative interactions with sympatric large carnivores (e.g., cougar—[Atwood et al. 2007](#)), or it may be dampened in more human-dominated landscapes ([Muhly et al. 2013](#)). A possible indirect effect of wolf predation is to reduce abundance of songbirds and rodents in a 4-species interaction chain, by releasing the lowest of the 3 trophic levels of carnivores ([Levi and Wilmers 2012](#)). In some systems, an apex large carnivore causing mesocarnivore suppression and, indirectly, small-carnivore release may be the more natural state. Removal of the apex carnivore, conversely,

causes mesocarnivore release and small-carnivore suppression, which allows an irruption of rodent populations. Such an altered trophic cascade is exemplified by the recent colonization of eastern North America by coyotes following extirpation of wolves and may explain the rapid increase in the incidence of Lyme disease (Levi et al. 2012). Lethal control of the Australian apex predator the dingo (*Canis dingo*) has caused similar state shifts, resulting in dominance of introduced mesopredators and herbivores, which then cause damage to native plant and animal communities (Wallach et al. 2010).

INEFFECTIVENESS AND UNINTENDED CONSEQUENCES OF PREDATOR REMOVAL

The consistent annual efforts by Wildlife Services at lethal control of coyotes in the western United States, described above, did not succeed in ameliorating the long decline of the nation's sheep industry, which began in the post-war years (Berger 2006). And, local-scale removal of coyotes has been found to cause population irruptions and reduced diversity in rodent communities (Henke and Bryant 1999). Use of public harvest of cougars in Washington state to remediate livestock depredation was found to be ineffective (Peebles et al. 2013). Similarly, recreational hunting of Eurasian lynx (*Lynx lynx*) was found to have little effect on sheep depredation unless of a magnitude to cause lynx population decline (Herfindal et al. 2005). Lethal control of gray wolves in the western United States could have such unintended consequences as shifting depredation from cattle to sheep (by mesopredator release of coyotes) and increasing mortality of pronghorn (*Antilocapra americana*) fawns (Berger et al. 2008; Bergstrom et al. 2014). Lethal control of gray wolves in the northern Rocky Mountains, causing total mortality of up to 25% of the estimated population, was found actually to increase depredation on livestock (Wielgus and Peebles 2014; but see Bradley et al. 2015). There are 3 reasons that predator removal is likely to have no long-term effect—or even adverse effects—on depredation of livestock: vacant territories are quickly recolonized (Knowlton et al. 1999; Treves and Naughton-Treves 2005); immigration rate of breeding pairs into the area experiencing lethal control can increase (Sacks et al. 1999); and immigrants are more likely to be subadults, which have a greater propensity for livestock depredation than older adults (Peebles et al. 2013). Simulation results suggest that even moderate nonselective predator control can potentially increase densities of the targeted carnivore species, because nontarget deaths of co-occurring carnivore species decrease competition for the targeted species (Casanovas et al. 2012). Use of nonselective, lethal predator-control methods (e.g., trapping and poison baits) by Wildlife Services has resulted unintentionally in the deaths of individuals of 150 species of vertebrates since 2000 (Knudson 2012) and at least 12 taxa of mammals protected (or candidates for protection) under the Endangered Species Act since 1990 (Bergstrom et al. 2014). Selective local removal of carnivores such as coyotes may eliminate the bycatch problem, but it can still trigger mesopredator release with unintended negative consequences (Mezquida et al. 2006).

The ASM has supported lethal control of large carnivores in certain cases where preservation of critically endangered wildlife species demands it (such as cougar predation on isolated populations of peninsula bighorn sheep, *Ovis canadensis nelsoni*—ASM 2012; Stephenson et al. 2012), but culling apex predators to enhance common game species may be unnecessary at best and harmful at worst. To the latter point, it is well known that wolves preferentially prey on older and diseased individuals (Mech and Peterson 2003; Wright et al. 2006), so natural predation is an important selective agent for the prey. To the former point, recent studies have concluded that gray wolf populations are intrinsically density dependent. That is, rather than being prey-limited, wolf densities are regulated through social interactions, with increasing interpack aggression and mortality at higher densities (Cariappa et al. 2011; Cubaynes et al. 2014). Large mammalian carnivores have been found to limit prey populations, broadly and in specific predator-prey interactions (Binkley et al. 2006; Ripple and Van Valkenburg 2010; Christianson and Creel 2014), but the effect of reduction or removal of predators on densities and dynamics of prey populations in any specific case can be hard to predict. Experiments removing coyotes and cougars in Idaho showed winter weather to be much more important than predation in predicting population trends of mule deer (*O. hemionus*—Hurley et al. 2011). A 7-year effort to remove all mammalian nest predators of ground-nesting birds (coyotes being the largest) from study sites in the southeastern United States concluded that removal of mammalian predators had no net effect on nest predation, primarily because of compensatory increases in predation by snakes (Ellis-Felege et al. 2012). A meta-analysis of 113 predator removal experiments (which was a taxonomically broad sample of animal predators) found that the intended beneficiary prey populations declined in 54 of them (Sih et al. 1985). This illustrates the multiple indirect pathways of potential top-down forcing that may be altered by removal of an apex predator from a complex food web, producing many possible outcomes for prey dynamics. For a mammalian carnivore example, 1 such pathway is through “apparent competition” with an alternate ungulate prey species, mediated through a different predator that increases compensatorily (Serrouya et al. 2015). Another pathway involves release of a mesopredator that preys preferentially on neonates of the same ungulate prey species (Prugh and Arthur 2015).

EFFECTIVENESS OF NONLETHAL CONTROL OF DEPREDATION

Use of nonlethal methods (such as guardian animals and livestock protection collars) to prevent livestock depredation by leopards (*Panthera pardus*), caracals (*Caracal caracal*), and jackals (*Canis mesomelas*) in South Africa was found to be less expensive and more effective than lethal predator control (McManus et al. 2014). In this Special Feature, Stone et al. (this issue) document that, over a 7-year pilot project in prime wolf habitat in Idaho, the adaptive use of a suite of nonlethal deterrent strategies reduced sheep depredation by more than

3-fold compared to sheep allotments in Idaho that used lethal controls over the same time period. Presenting results from a large cattle station in Australia, where full implementation of such nonlethal strategies may be prohibitive, Wallach et al. (this issue) argue that simply ending lethal control of dingoes reduced depredation by allowing the social structure of the predator to stabilize, and additionally that cattle mortality can be reduced most effectively by improving husbandry practices. These 2 studies do not meet the “gold standard” of replicated, randomized experimental design (which few predator-control studies do—Treves et al. 2016), because the latter would have been impossible without intentional further killing of important apex predators of great conservation value (in the case of Idaho gray wolves still legally protected for most of the study). Nonetheless, their results are valuable in providing insights into workable alternatives to lethal control for solving wildlife–livestock conflicts. Both of these studies suggest that stable, naturally regulated populations of social carnivores not significantly exploited by humans are the preferred option for both reducing livestock depredation and restoring the functional role of apex predators to ecosystems. These findings for large canids mirror those for cougars, in which excessive harvest replaces adult males with immigrating adolescent males, which are more prone to depredate (Peebles et al. 2013).

MEMBERS OF ASM ARE ACUTELY AWARE OF GUIDELINES ON HUMANE TREATMENT

There has been much discussion in recent years within the Society about the ethical constraints and obligations pertaining to working with live mammals. While we have striven to ensure that Animal Care and Use regulations imposed on us by extrinsic bodies are not overly onerous and do not prevent us from vigorous pursuit of our science, we nonetheless all feel the obligation to abide by a set of rules for humane treatment of our mammalian study subjects. Not a paper is published in this journal presenting original results from live animal subjects that does not state that the study adhered to these ASM-adopted guidelines (Sikes et al. 2016). Ironically, ASM’s guidelines were developed in large part in response to oversight by United States Department of Agriculture-monitored institutional Animal Care and Use committees at universities where many of us work, yet the agencies in the United States Department of Agriculture, including Wildlife Services, are not obligated to abide by the guidelines that their agency helped produce. Although they follow guidelines of the American Veterinary Medical Association on euthanasia, Wildlife Services claims their “management and operational programs are exempt from Animal Welfare Act (1966, 7 U.S.C. 2131, 9CFR) compliance” (Clay 2012:8).

In this Special Feature, Slagle et al. (this issue) show that, while the United States public accepts that predators may need to be controlled, there is low and declining acceptance of lethal predator-control methods, which are regarded as inhumane. Governments at the federal, state, and local levels are tasked with serving broad constituencies, and in the case of native

wildlife, which are a public trust asset (Bruskotter et al. 2011; Treves et al. 2015), they should be responsive to these public attitudes. In practice, some government resource agencies or the appointed government boards that rule them, or both, have traditionally favored narrower constituencies within the public. State wildlife or game agencies have elected to provide hunting opportunities for certain species, including large carnivores, even if citizens opposed to hunting a particular species of large carnivore greatly outnumber those wishing to hunt it. A case in point is the state of Michigan recently approving a wolf hunt following removal of federal protection by the Endangered Species Act, and in this Special Feature, Vucetich et al. (this issue) argue that the North American Model of wildlife management, to which the profession is supposedly bound, does not support the hunt. In a society in which lethal control of predators is viewed increasingly negatively and scientific consensus is emerging that social carnivores occupying apex-predator trophic levels function best and depredate least when not lethally exploited, killing native large carnivores is an issue that will become increasingly controversial and should receive increasing scientific scrutiny.

Finally, insofar as most states, probably for the foreseeable future, will continue to include large carnivore hunting among their wildlife management tools, it is important that decision-makers in wildlife agencies have valid data on mortality rates from all mortality sources and on the further effects of anthropogenic mortality on recruitment (which may be negative), so that harvest quotas may not push total mortality beyond a sustainable level (see Creel et al. 2015). To that end, Treves et al. (this issue) show that well over a third of mortality of wolves over the past 3 decades in Wisconsin was due to poaching and another 13% was due to vehicle collision, suggesting that total mortality of the population, which was subsequently exposed to harvest, is higher than the management agency assumes. Setting wildlife management goals at reducing carnivore mortality to at most sustainable levels, and eliminating human-caused mortality wherever possible, is in line with the best current ecological, social, and ethical scholarship, as papers in this Special Feature attest.

ACKNOWLEDGMENTS

E. J. Heske, J. K. Braun, and members of the Conservation Committee of ASM encouraged and helped to organize the special technical session on mammalian predator control at the ASM conference, from which this Special Feature developed. A. Treves, J. T. Bruskotter, J. A. Vucetich, K. Slagle, and A. D. Wallach provided comments on the manuscript.

LITERATURE CITED

AMERICAN SOCIETY OF MAMMALOGISTS (ASM). 2012. Presidential letter to United States Department of Agriculture, Animal Plant Health Inspection Service urging redirection of Wildlife Services management operations toward non-lethal control. http://www.mammalsociety.org/uploads/committee_files/ASM-Federal%20wildlife%20control%20letter_0.pdf. Accessed 3 November 2015.

- ASSOCIATION OF FISH AND WILDLIFE AGENCIES. 2014. U.S. fur harvest 1970-present: statistics by state, region, and nation. United States Furbearer Conservation Technical Work Group, Association of Fish and Wildlife Agencies, Columbia, Missouri.
- ATWOOD, T. C., E. M. GESE, AND K. E. KUNKEL. 2007. Comparative patterns of predation by cougars and recolonizing wolves in Montana's Madison Range. *Journal of Wildlife Management* 71:1098–1106.
- BERGER, K. M. 2006. Carnivore-livestock conflicts: effects of subsidized predator control and economic correlates on the sheep industry. *Conservation Biology* 20:751–761.
- BERGER, K. M., E. M. GESE, AND J. BERGER. 2008. Indirect effects and traditional trophic cascades: a test involving wolves, coyotes, and pronghorn. *Ecology* 89:818–828.
- BERGSTROM, B. J., L. C. ARIAS, A. D. DAVIDSON, A. W. FERGUSON, L. A. RANDA, AND S. R. SHEFFIELD. 2014. License to kill: reforming federal wildlife control to restore biodiversity and ecosystem function. *Conservation Letters* 7:131–142.
- BESCHTA, R. L., ET AL. 2013. Adapting to climate change on Western public lands: addressing the ecological effects of domestic, wild, and feral ungulates. *Environmental Management* 51:474–491.
- BINKLEY, D., M. M. MOORE, W. H. ROMME, AND P. M. BROWN. 2006. Was Aldo Leopold right about the Kaibab deer herd? *Ecosystems* 9:227–241.
- BRADLEY, E. H., ET AL. 2015. Effects of wolf removal on livestock depredation recurrence and wolf recovery in Montana, Idaho, and Wyoming. *Journal of Wildlife Management* 79:1337–1346.
- BRUSKOTTER, J. T., S. A. ENZLER, AND A. TREVES. 2011. Rescuing wolves from politics: wildlife as a public trust resource. *Science* 333:1828–1829.
- CARIAPPA, C. A., J. K. OAKLEAF, W. B. BALLARD, AND S. B. BRECK. 2011. A reappraisal of the evidence for regulation of wolf populations. *Journal of Wildlife Management* 75:726–730.
- CASANOVAS, J. G., ET AL. 2012. Shaping carnivore communities by predator control: competitor release revisited. *Ecological Research* 27:603–614.
- CHRISTIANSON, D., AND S. CREEL. 2014. Ecosystem scale declines in elk recruitment and population growth with wolf colonization: a before-after-control-impact approach. *PLoS ONE* 9:e102330.
- CLAY, W. H. 2012. Letter to American Society of Mammalogists. United States Department of Agriculture, Animal Plant Health Inspection Service, Wildlife Services, Washington, D.C. http://www.mammalsociety.org/uploads/committee_files/Response_from_APHIS_2012.pdf. Accessed 10 September 2016.
- CREEL, S., ET AL. 2015. Questionable policy for large carnivore hunting. *Science* 350:1473–1475.
- CUBAYNES, S., D. R. MACNULTY, D. R. STAHLER, K. A. QUIMBY, D. W. SMITH, AND T. COULSON. 2014. Density-dependent intraspecific aggression regulates survival in northern Yellowstone wolves (*Canis lupus*). *Journal of Animal Ecology* 83:1344–1356.
- ELLIS-FELEGÉ, S. N., M. J. CONROY, W. E. PALMER, AND J. P. CARROLL. 2012. Predator reduction results in compensatory shifts in losses of avian ground nests. *Journal of Applied Ecology* 49:661–669.
- ESTES, J. A., ET AL. 2011. Trophic downgrading of Planet Earth. *Science* 333:301–306.
- GOVERNMENT ACCOUNTABILITY OFFICE (GAO). 1995. Animal damage control program: efforts to protect livestock from predators. United States General Accounting Office [GAO/RCED-96-3].
- HEBBLEWHITE, M., ET AL. 2005. Human activity mediates a trophic cascade caused by wolves. *Ecology* 86:2135–2144.
- HENKE, S. E., AND F. C. BRYANT. 1999. Effects of coyote removal on the faunal community in western Texas. *Journal of Wildlife Management* 63:1066–1081.
- HERFINDAL, I., J. D. C. LINNELL, P. F. MOA, J. ODDEN, L. B. AUSTMO, AND R. ANDERSEN. 2005. Does recreational hunting of lynx reduce depredation losses? *Journal of Wildlife Management* 69:1034–1042.
- HURLEY, M. A., ET AL. 2011. Demographic response of mule deer to experimental reduction of coyotes and mountain lions in southeastern Idaho. *Wildlife Monographs* 178:1–33.
- JACKSON, H. H. T. 1924. Sixth annual meeting of the American Society of Mammalogists. *Journal of Mammalogy* 5:218–221.
- KNOWLTON, F. F., E. GESE, AND M. M. JAEGER. 1999. Coyote depredation control: an interface between biology and management. *Journal of Range Management* 52:398–412.
- KNUDSON, T. 2012. The killing agency: Wildlife Services' brutal methods leave a trail of animal death—wildlife investigation. *The Sacramento Bee*, 29 April 2012.
- KNUDSON, T. 2015. Aerial gunning of coyotes in Nevada by Wildlife Services. Center for Investigative Reporting. <https://www.documentcloud.org/documents/2272327-aerial-hunting-ws-nv.html>. Accessed 31 October 2015.
- LEOPOLD, A. 1943. Deer irruptions. *Wisconsin Conservation Bulletin* 8:3–11.
- LEVI, T., A. M. KILPATRICK, M. MANGEL, AND C. C. WILMERS. 2012. Deer, predators, and the emergence of Lyme disease. *Proceedings of the National Academy of Sciences* 109:10942–10947.
- LEVI, T., AND C. C. WILMERS. 2012. Wolves–coyotes–foxes: a cascade among carnivores. *Ecology* 93:921–929.
- MCMANUS, J. S., A. J. DICKMAN, D. GAYNOR, B. H. SMUTS, AND D. W. MACDONALD. 2014. Dead or alive? Comparing costs and benefits of lethal and non-lethal human–wildlife conflict mitigation on livestock farms. *Oryx* 49:687–695.
- MECH, L. D. 2012. Is science in danger of sanctifying the wolf? *Biological Conservation* 150:143–149.
- MECH, L. D., AND R. O. PETERSON. 2003. Wolf-prey relations. Pp. 131–160 in *Wolves: behavior, ecology, and conservation* (L. D. Mech and L. Boitani, eds.). University of Chicago Press, Chicago, Illinois.
- MEZQUIDA, E., S. J. SLATER, AND C. W. BENKMAN. 2006. Sage-grouse and indirect effects: potential implication of coyote control sage-grouse populations. *Condor* 108:747–759.
- MOWAT, F. 1973. *Never cry wolf*. Bantam Books, Toronto, Ontario, Canada.
- MUHLY, T. B., ET AL. 2013. Humans strengthen bottom-up effects and weaken trophic cascades in a terrestrial food web. *PLoS ONE* 8:e64311.
- NIEMEYER, C. 2010. *Wolfer: a memoir*. BottleFly Press, Boise, Idaho.
- PEEBLES, K., R. B. WIELGUS, B. T. MALETZKE, AND M. E. SWANSON. 2013. Effects of remedial sport hunting on cougar complaints and livestock depredations. *PLoS ONE* 8:e79713.
- PRUGH, L. R., AND S. M. ARTHUR. 2015. Optimal predator management for mountain sheep conservation depends on the strength of mesopredator release. *Oikos* 124:1241–1250.
- RIPPLE, W. J., AND R. L. BESCHTA. 2012. Trophic cascades in Yellowstone: the first 15 years after wolf reintroduction. *Biological Conservation* 145:205–213.
- RIPPLE, W. J., ET AL. 2014. Status and ecological effects of the world's largest carnivores. *Science* 343:1241484.
- RIPPLE, W. J., AND B. VAN VALKENBURG. 2010. Linking top-down forces to the Pleistocene megafaunal extinctions. *BioScience* 60:516–526.

- ROBINSON, M. J. 2005. *Predatory bureaucracy: the extermination of wolves and the transformation of the West*. University of Colorado Press, Boulder.
- SACKS, B. N., M. M. JAEGER, J. C. C. NEALE, AND D. R. McCULLOUGH. 1999. Territoriality and breeding status of coyotes relative to sheep predation. *Journal of Wildlife Management* 63:593–605.
- SERROUYA, R., M. J. WITTMANN, B. N. McLELLAN, H. U. WITTMER, AND S. BOUTIN. 2015. Using predator-prey theory to predict outcomes of broadscale experiments to reduce apparent competition. *American Naturalist* 185:665–679.
- SIH, A., P. CROWLEY, M. McPEEK, J. PETRANKA, AND K. STROHMEIER. 1985. Predation, competition, and prey communities: a review of field experiments. *Annual Review of Ecology and Systematics* 16:269–311.
- SIKES, R. S., AND THE ANIMAL CARE AND USE COMMITTEE OF THE AMERICAN SOCIETY OF MAMMALOGISTS. 2016. 2016 guidelines of the American Society of Mammalogists for the use of wild mammals in research and education. *Journal of Mammalogy* 97:663–688.
- SLAGLE, K., J. T. BRUSKOTTER, A. S. SINGH, AND R. H. SCHMIDT. This issue. Attitudes toward predator control in the United States: 1995 and 2014. *Journal of Mammalogy*.
- STEPHENSON, T. R., ET AL. 2012. 2010–2011 annual report of the Sierra Nevada bighorn sheep recovery program: a decade in review. California Department of Fish and Game, Bishop, California.
- STONE, S.A., ET AL. This issue. Adaptive use of nonlethal strategies for reducing wolf-sheep conflict in Idaho. *Journal of Mammalogy*.
- TAYLOR, D. T., B. S. RASHFORD, R. H. COUPAL, AND T. FOULKE. 2009. An economic analysis of predator management in Wyoming. Final report to Wyoming Animal Damage Management Board, Wyoming Department of Agriculture. 69 p. http://wyocre.uwagec.org/Publications/ADMB_FinalRpt19Jun09.pdf. Accessed 3 November 2015.
- TREVES, A., G. CHAPRON, J. V. LÓPEZ-BAO, C. SHOEMAKER, A. R. GOECKNER AND J. T. BRUSKOTTER. 2015. Predators and the public trust. *Biological Reviews*. doi: 10.1111/brv.12227.
- TREVES, A., M. KROFEL, AND J. MCMANUS. 2016. Predator control should not be a shot in the dark. *Frontiers in Ecology and Environment* 14:380–388.
- TREVES, A., J. A. LANGENBERG, J. V. LÓPEZ-BAO, AND M. F. RABENHORST. This issue. Gray wolf mortality patterns in Wisconsin from 1979–2012. *Journal of Mammalogy*.
- TREVES, A., AND L. NAUGHTON-TREVES. 2005. Evaluating lethal control in the management of human-wildlife conflict. Pp. 86–106 in *People and wildlife: conflict and coexistence* (R. Woodroffe, S. Thirgood, and A. Rabinowitz, eds.). Cambridge University Press, Cambridge, United Kingdom.
- VUCETICH, J. A., J. T. BRUSKOTTER, M. P. NELSON, R. O. PETERSON, AND J. K. BUMP. This issue. The principles of wildlife management and wolf harvesting in Michigan. *Journal of Mammalogy*.
- WALLACH, A. D., C. N. JOHNSON, E. G. RITCHIE, AND A. J. O'NEIL. 2010. Predator control promotes invasive dominated ecological states. *Ecology Letters* 13:1008–1018.
- WALLACH, A. D., D. RAMP, AND A. J. O'NEILL. This issue. Cattle mortality on a predator-friendly station in central Australia. *Journal of Mammalogy*.
- WIELGUS, R. B., AND K. A. PEEBLES. 2014. Effects of wolf mortality on livestock depredations. *PLoS ONE* 9:e113505.
- WILDLIFE SERVICES. 2015. Wildlife damage management: 2014 program data reports. United States Department of Agriculture, Animal and Plant Health Inspection Services. <https://www.aphis.usda.gov/wps/portal/aphis/ourfocus/wildlifedamage>. Accessed 3 November 2015.
- WRIGHT, G. J., R. O. PETERSON, D. W. SMITH, AND T. O. LEMKE. 2006. Selection of northern Yellowstone elk by gray wolves and hunters. *Journal of Wildlife Management* 70:1070–1078.

Special Feature Editor was Barbara H. Blake.

PERSPECTIVE

Carnivore conservation needs evidence-based livestock protection

Lily M. van Eeden¹*, Ann Eklund²*, Jennifer R. B. Miller^{3,4}*, José Vicente López-Bao⁵, Guillaume Chapron², Mikael R. Cejtin^{6,7}, Mathew S. Crowther¹, Christopher R. Dickman¹, Jens Frank², Miha Krofel⁸, David W. Macdonald⁹, Jeannine McManus^{10,11}, Tara K. Meyer¹², Arthur D. Middleton³, Thomas M. Newsome^{1,13,14}, William J. Ripple¹⁴, Euan G. Ritchie¹⁵, Oswald J. Schmitz¹², Kelly J. Stoner¹⁶, Mahdieh Tourani¹⁷, Adrian Treves¹⁸*

1 Desert Ecology Research Group, School of Life and Environmental Sciences, University of Sydney, Camperdown, Australia, **2** Grimsö Wildlife Research Station, Department of Ecology, Swedish University of Agricultural Sciences, Riddarhyttan, Sweden, **3** Department of Environmental Science, Policy, and Management, University of California–Berkeley, Berkeley, California, United States of America, **4** Center for Conservation Innovation, Defenders of Wildlife, Washington, DC, United States of America, **5** Research Unit of Biodiversity, Oviedo University, Gonzalo Gutiérrez Quirós, Mieres, Spain, **6** Department of Natural Sciences, Paul Smith's College, Paul Smiths, New York, United States of America, **7** Lake Placid Land Conservancy, Lake Placid, New York, United States of America, **8** Biotechnical Faculty, Department of Forestry, University of Ljubljana, Ljubljana, Slovenia, **9** Wildlife Conservation Research Unit, Department of Zoology, University of Oxford, The Recanati-Kaplan Centre, Tubney House, Tubney, Abingdon, United Kingdom, **10** Research Department, Landmark Foundation, Riversdale, South Africa, **11** School of Animal, Plants and Environmental Sciences, University of Witwatersrand, Braamfontein, Johannesburg, South Africa, **12** Yale School of Forestry and Environmental Studies, New Haven, Connecticut, United States of America, **13** School of Environmental and Forest Sciences, University of Washington, Seattle, Washington, United States of America, **14** Global Trophic Cascades Program, Department of Forest Ecosystems and Society, Oregon State University, Corvallis, Oregon, United States of America, **15** Centre for Integrative Ecology, School of Life and Environmental Sciences, Deakin University, Burwood, Victoria, Australia, **16** Wildlife Conservation Society Rocky Mountain Regional Program, Bozeman, Montana, United States of America, **17** Faculty of Environmental Sciences and Natural Resource Management, Norwegian University of Life Sciences, Ås, Norway, **18** Nelson Institute for Environmental Studies, University of Wisconsin, Madison, Wisconsin, United States of America

* These authors contributed equally to this work.

* lily.vaneeden@sydney.edu.au (LMVE); ann.eklund@slu.se (AE); jmiller@defenders.org (JRBM); atreves@wisc.edu (AT)



 OPEN ACCESS

Citation: van Eeden LM, Eklund A, Miller JRB, López-Bao JV, Chapron G, Cejtin MR, et al. (2018) Carnivore conservation needs evidence-based livestock protection. *PLoS Biol* 16(9): e2005577. <https://doi.org/10.1371/journal.pbio.2005577>

Published: September 18, 2018

Copyright: © 2018 van Eeden et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Funding: National Science Foundation Couple Human and Natural Systems (grant number 115057). Received by JRBM. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. Ramon & Cajal research contract from the Spanish Ministry of Economy, Industry and Competitiveness (grant number RYC-2015-18932). Received by JVLB. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. National Geographic Society (Grant WW-100C-17), and the George B. Storer Foundation, received by ADM. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. Derse Foundation and US Fulbright program in Sweden. Received by AT. The funder had no role in study design, data collection and analysis, decision to publish, or

Abstract

Carnivore predation on livestock often leads people to retaliate. Persecution by humans has contributed strongly to global endangerment of carnivores. Preventing livestock losses would help to achieve three goals common to many human societies: preserve nature, protect animal welfare, and safeguard human livelihoods. Between 2016 and 2018, four independent reviews evaluated >40 years of research on lethal and nonlethal interventions for reducing predation on livestock. From 114 studies, we find a striking conclusion: scarce quantitative comparisons of interventions and scarce comparisons against experimental controls preclude strong inference about the effectiveness of methods. For wise investment of public resources in protecting livestock and carnivores, evidence of effectiveness should be a prerequisite to policy making or large-scale funding of any method or, at a minimum, should be measured during implementation. An appropriate evidence base is needed, and

preparation of the manuscript. Carnegie Corporation of New York associated to the Global Change Institute to the University of Witwatersrand, Development Bank South Africa, Green Fund, United Nations Environment Program, and the Global Environment Facility. Received by JSM. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. Swedish Research Council Formas. Received by AE, GC, JF, JVLB. The funder had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing interests: The authors have declared that no competing interests exist.

Provenance: Not commissioned; externally peer reviewed.

we recommend a coalition of scientists and managers be formed to establish and encourage use of consistent standards in future experimental evaluations.

Carnivores, such as lions and wolves, are killed in many regions over real or perceived threats to human interests. Combined with habitat loss and fragmentation, human-induced mortality has contributed to widespread carnivore population declines, along with declines of their important ecosystem functions [1]. Balancing the goals of nature preservation, livelihood protection, and welfare of carnivores and domestic animals depends on policies that foster coexistence between humans and carnivores in multiuse landscapes [2, 3]. Central to this aim is a need for rigorous scientific evidence that interventions are effective in preventing predation on livestock. Such policies should be based on strong inference [4, 5], otherwise, we risk wasting resources on ineffective interventions that might harm all involved.

Between 2016 and 2018, we independently published four reviews examining evidence for the effectiveness of interventions to reduce livestock predation by carnivores [6–9]. Here, we focus on the results for livestock losses or carnivore incursions into livestock enclosures (hereafter, “functional effectiveness” [8]). Since each review offered a unique perspective, we reconcile differences to synthesize three messages common to the reviews. First, despite the immense resources spent globally to protect livestock from carnivores, few peer-reviewed studies have produced strong inference about the functional effectiveness of interventions. Second, there was scant consistency of standards of evidence in our four reviews, hindering scientific consensus, and hence clear recommendations to policy-makers, about the relative functional effectiveness of different interventions. Finally, we identified several interventions that were found consistently effective, which deserve promotion in policy, even if only in the general conditions under which they have already been tested, as well as prioritization for further research under conditions in which evidence is lacking.

We suspect that the striking paucity of rigorous evaluation is due to the tendency for decisions about predator control to depend on factors other than evidence-based evaluation of whether a given intervention effectively protects livestock. These other factors—including ethics (should one implement the intervention?), feasibility (can one implement the intervention?), and perception (does one believe the intervention will work?)—might be important subsequent considerations in the implementation and decision-making processes. However, objective scientific evidence of an intervention’s functional effectiveness must remain a foundational prerequisite on which subjective inquiries later build. The lack of scientific synthesis and consensus about functional effectiveness has allowed more subjective factors to dominate decision-making about predator control and likely wasted time and money on interventions that do not optimally protect livestock. Furthermore, shifting ethics and public values in some communities are enabling the return of carnivores to landscapes worldwide or leading to the increased use of nonlethal predator control interventions. We support these initiatives from the perspective of conserving carnivores but insist that scientific evidence for functional effectiveness be considered first to ensure that interventions intended to protect livestock accomplish that goal. This will prevent the inefficient—or worse yet, counterproductive—use of limited resources to protect animals long term.

Additionally, although our reviews collectively reveal a need for more evidence, scientists alone cannot fill this gap. Livestock owners, natural resource managers, and decision-makers each have an important role to play in research partnerships to collaboratively guide the testing of predator control interventions. Here, we appeal to these groups by summarizing the

advantages of evidence-based effective interventions, the best practices of scientific inference, and the role of policy in promoting effective predator control strategies. We start by synthesizing the results of our four independent reviews to provide scientific consensus on the evaluations of predator control interventions. We urge managers and policy decision-makers to use this discussion as a basis for creating policy that promotes evidence-based, effective strategies for protecting domestic animals from carnivore predation.

Synthesis of the science on functional effectiveness

Our four reviews [6–9] jointly screened >27,000 candidate studies. The four sets of inclusion criteria differed in geographic coverage, carnivore species, and standards of evidence and research design (see [S1 Table](#)), which limited overlap in the studies that passed screening (only 19% of studies were included in two or more of the four reviews; no study was included in all four, [S1 Fig](#)). The differing inclusion criteria also meant that it was not possible to conduct a quantitative comparison (meta-analysis) combining the data from our four reviews, but we suggest that such an analysis should be conducted in the future as evidence increases. Nonetheless, our reviews came to remarkably similar conclusions, irrespective of methods, suggesting that our conclusions are robust.

Among the 114 studies that passed screening in one or more reviews ([S2 Table](#)), representing >40 years of research, we found few that yielded strong inference about functional effectiveness. Surprisingly, many widely used methods have not been evaluated using controlled experiments. Also, few interventions have been compared side by side or tested singly under diverse conditions. These deficiencies in the literature are further compounded by disagreement among scientists, managers, and peer-reviewed journals about standards of evidence, such as which study designs produce strong inference [8]. We acknowledge the challenges of regional experiments amid dynamic, complex ecologies, publics, and jurisdictions. However, a handful of random-assignment experimental studies without bias (“gold standard”) have proven that the obstacles are surmountable [8, 10, 11, 12].

We summarize our four sets of results by category of intervention in [Fig 1](#). Our reviews agree that several methods have been tested numerous times with high standards of evidence and have been found effective: livestock guardian animals, enclosures for livestock, and a visual deterrent called fladry. Importantly, we should recognize that the effectiveness of different methods will vary under different contexts, and there is currently a bias among research toward certain geographic regions and predator types ([Fig 2](#)). Further, we agree that standards of evidence have been higher for nonlethal methods, and there remains a need to ensure data on all interventions are collected appropriately and consistently. As such, building on existing criticism of the lack of appropriate data collection in environmental management [13–16], our reviews collectively highlight the need to improve standards of evidence used in evaluating interventions. We need to develop a comprehensive evidence base that allows us to compare the effectiveness of interventions for reducing carnivore predation on livestock and inform consistent policy in any jurisdiction.

Importance of rigorous experimental design and evaluation

Societal values and, accordingly, policies for human–carnivore coexistence have changed over the millennia. The almost exclusive use of lethal interventions has given way to nonlethal interventions as important supplements to or replacements for prior lethal methods. Immense logistical and financial resources are invested in protecting livestock and carnivores, so the scarcity of rigorous scientific evidence for effectiveness should be a concern. We encourage governments to adopt proven methods from similar systems of carnivores and human

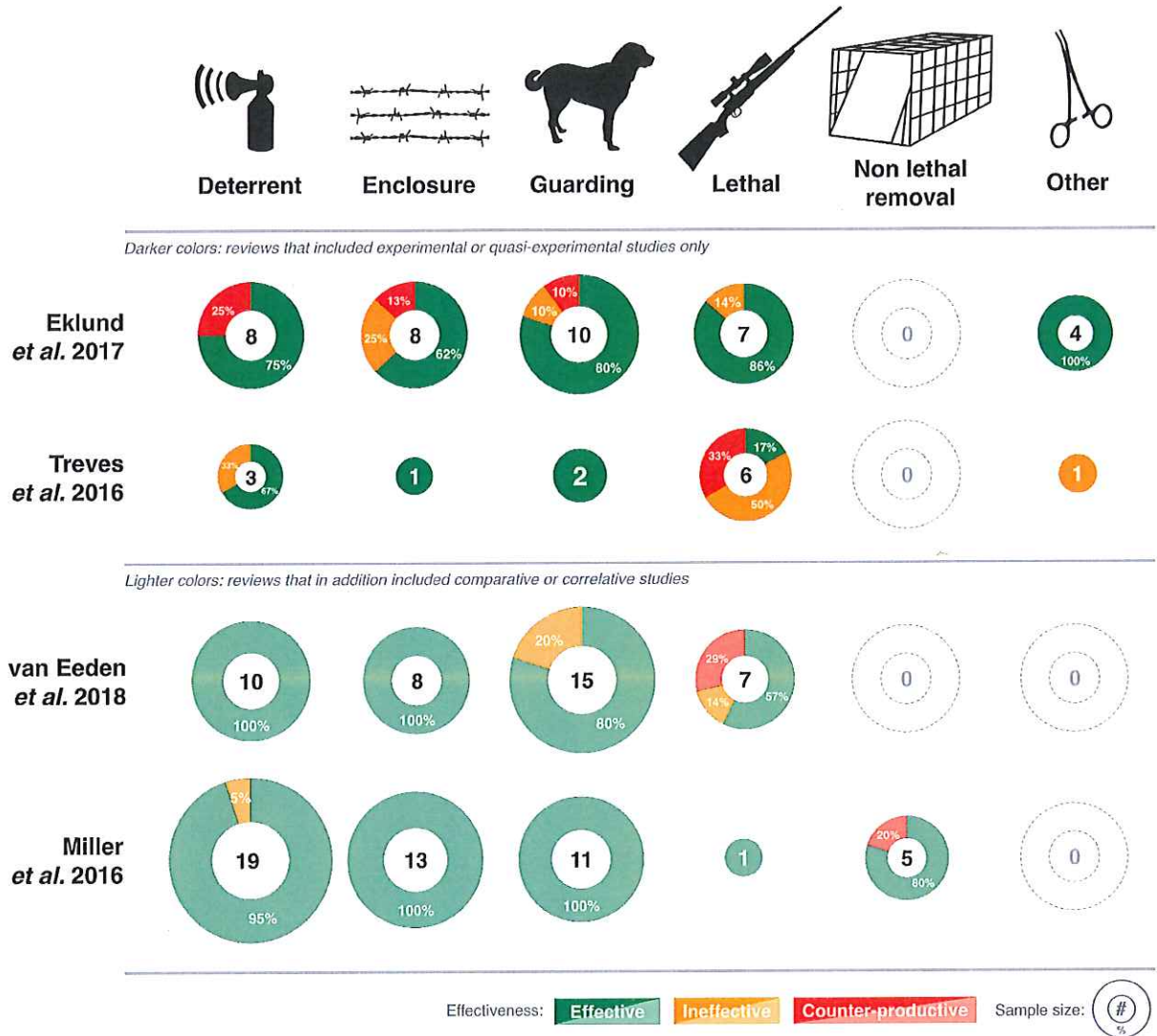


Fig 1. Percent of studies that measured interventions as “Effective,” “Ineffective,” or “Counter-productive” in reducing livestock loss to large carnivores, as measured by four independent reviews in 2016–2018. The sample sizes inside disks represent the number of studies or tests, as some studies reported more than one test of the same or different interventions. Darker colors represent reviews that included experimental or quasiexperimental controls; lighter colors represent reviews that also included comparative or correlative studies (see S1 Table for details). “Deterrents” include nonlethal interventions such as audio or visual deterrents, fladry, and livestock protection collars. “Enclosure/barrier” includes electrified and nonelectrified fencing and corralling. “Guarding” includes human shepherding and livestock guardian animals. “Lethal removal” includes hunting, poison baiting, and other lethal methods. “Non-lethal removal” refers to translocation of carnivores. “Other” includes carnivore sterilization and diversionary feeding. Eklund and colleagues measured effectiveness using RR and classified Effective as $RR < 0.90$, Ineffective = $0.90-1.10$, and Counterproductive $RR > 1.10$. Treves and colleagues measured effectiveness as significant change in livestock loss. Note that Treves and colleagues initially contained 12 studies with 14 separate tests using gold or silver standards, but one test was subsequently removed after review of the methods found it impossible to draw strong inference [17]. van Eeden and colleagues measured effectiveness as Hedges’ d and classified Effective as $d < -0.05$, Ineffective $-0.05 > d < 0.05$, and Counterproductive $d > 0.05$. Miller and colleagues measured effectiveness as percentage change in livestock loss (or carnivore behavior change) and classified Effective as $d > 0\%$ change, Ineffective = 0% , and Counterproductive $< 0\%$. RR, relative risk.

<https://doi.org/10.1371/journal.pbio.2005577.g001>

interests, with systems in place to review and adapt management actions as new evidence becomes available. When governments contemplate large-scale implementation or funding for interventions, scientific evidence of functional effectiveness deserves priority to avoid wasting

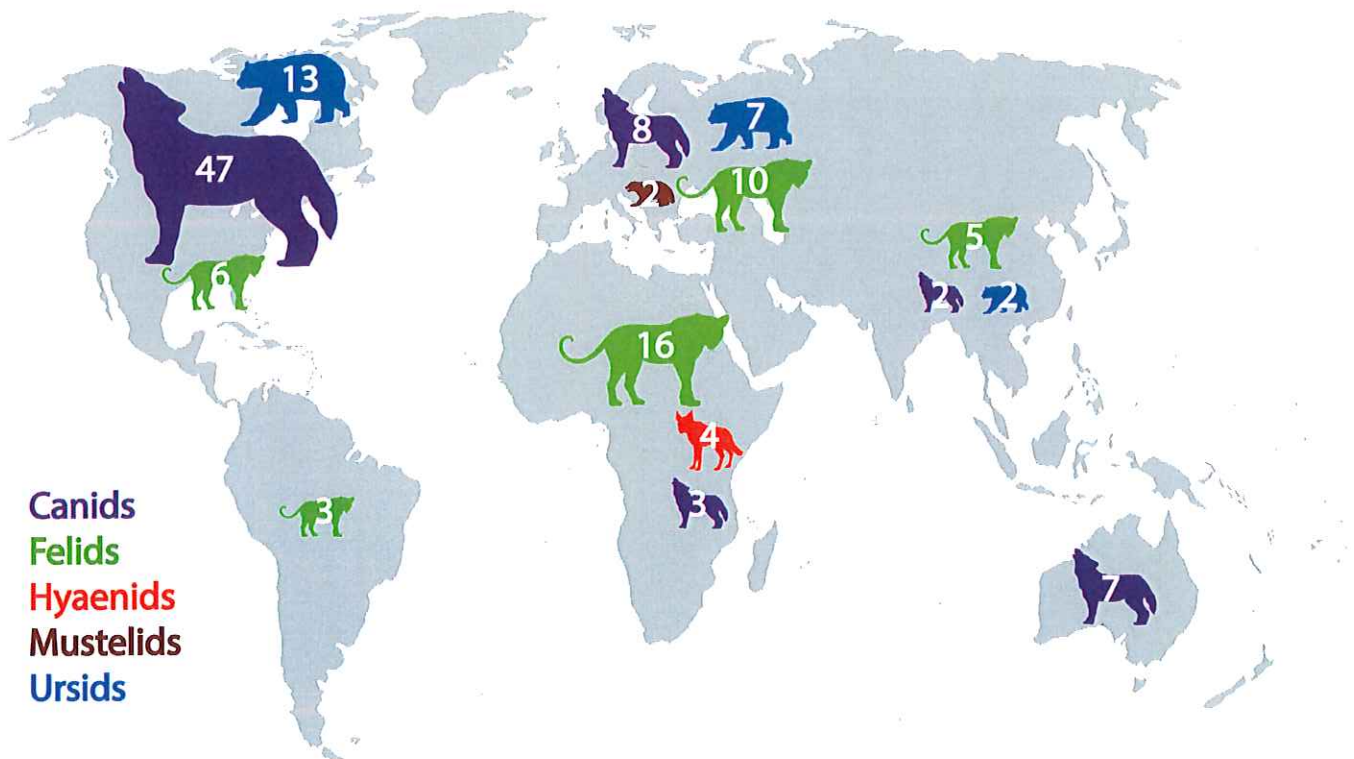


Fig 2. Number of studies included in four independent reviews published in 2016–2018, presented by carnivore family and continent. Canids include gray wolves and subspecies (*Canis lupus*), coyotes (*C. latrans*), dingoes (*C. dingo*), black-backed jackals (*C. mesomelas*), African wild dogs (*Lycaon pictus*), red foxes (*Vulpes vulpes*), and domestic dogs (*C. familiaris*). Felids include Eurasian lynx (*Lynx lynx*), cougars (*Puma concolor*), lions (*Panthera leo*), jaguars (*P. onca*), leopards (*P. pardus*), snow leopards (*P. uncia*), caracals (*Caracal caracal*), and cheetahs (*Acinonyx jubatus*). Hyaenids include spotted hyenas (*Crocuta crocuta*). Mustelids feature wolverines (*Gulo gulo*). Ursids include American black bears (*Ursus americanus*), Asiatic black bears (*U. thibetanus*), brown or grizzly bears (*U. arctos*), and polar bears (*U. maritimus*). Smaller carnivores (e.g., red foxes, hyenas, and caracals) are included in studies that investigated multiple carnivore species of varying sizes.

<https://doi.org/10.1371/journal.pbio.2005577.g002>

resources on ineffective methods, no matter if the latter are ethical or easy to implement. When no proven method is available, scientific evaluation of functional effectiveness should coincide with implementation.

Strong inference in any scientific field demands control over potentially confounding variables and testable claims about functional effectiveness of interventions [8]. In our context, all methods present opposable hypotheses, i.e., method X works or does not work. Several experimental design components are essential to strong inference about that hypothesis, and we focus here on the three of topmost priority for yielding strong inference about livestock protection interventions: controls, randomization, and replication.

The strongest inference results from experiments that achieve the “gold standard” through “random assignment to control and treatment groups without bias (systematic error) in sampling, treatment, measurement, or reporting” [8]. This requires that an intervention be used to protect a livestock herd (treatment) and that its effectiveness is compared against a livestock herd that is not exposed to the intervention (placebo control). Both treatment and control should be replicated using multiple independent herds of livestock that are distributed so that the effects of treatment on one herd do not confound the effects on another herd, which would eliminate independence. Random assignment of treatments avoids sampling or selection bias that is common in our field [8], as in others [18]. Implementing random assignment for actual

livestock herds can be challenging, but several studies have succeeded, such as those conducted by Davidson-Nelson and Gehring [10] and Gehring and colleagues [11]. In the Chilean alti-plano, 11 owners of alpacas (*Vicugna pacos*) and llamas (*Lama glama*) joined a randomized reverse treatment (crossover) experiment to evaluate light devices in deterring carnivores [12]. Moreover, if large numbers of replicates are infeasible or replicates are unavoidably heterogeneous, then crossover, reverse treatment designs should help to increase the strength of inference about interventions [8, 12, S2 Table].

“Silver standard” designs provide weaker inference because of nonrandom assignment to treatment and then repeated measures of the replicate at two or more time points (before-and-after comparison of impact or quasiexperimental designs, also called case control). Both time passing and the treatment might explain changes in replicates, in addition to the extraneous “nuisance” variables present in agro-ecosystems at the outset [8].

The weakest standard of evidence is the correlative study, which compares livestock predation among herds that varied haphazardly in past protection or varied systematically if people intervened only where livestock had died. In correlational studies, confounding variables inevitably create selection or sampling bias. Although correlative studies may be useful as an initial exploratory step and help direct further research, confidence in their findings should be low, especially if there is large variation in the results. Correlative studies cannot substitute for the silver or gold standards described above.

Implementation of interventions must be consistent to avoid treatment bias. For example, the functional effectiveness of livestock-guarding dogs might vary with breed, individual, training, and maintenance of the dog. Likewise, tests of lethal methods have never controlled the simultaneous use of several methods of intervention (e.g., pooling shooting and trapping as one treatment), which is inadvisable for strong inference. Consistent maintenance of interventions throughout a study should also minimize treatment bias [18].

Well-designed experiments should incorporate evaluation along multiple dimensions. Was the intervention implemented as planned? Did attacks on livestock diminish? Measurement bias arises from systematic error in documenting implementation or losses in treatment or response variables. As in biomedical research, which sometimes uses patient self-reports as a subjective measure of effectiveness alongside objective measures of health outcomes, there are valid reasons to measure owners’ perceptions of effectiveness of interventions. In human-wildlife interactions, people’s attitudes can influence the adoption or rejection of interventions independently of scientific evidence [14,19]. Several of the reviews included metrics of perceived effectiveness among livestock owners, yet perception alone is not a reliable measure of functional effectiveness because of widespread placebo effects, whereby patients feel better simply because they have participated. Studies should therefore either “blind” their participants or use an independent, verifiable measure of effectiveness (i.e., livestock loss).

We recognize that gold or silver standards may be difficult to achieve. Systematic errors can be difficult to eliminate entirely, so we urge careful consideration of methods during the design process, including peer review prior to initiation. Ethical considerations about exposing animals to lethal risks may limit experimental designs. This inherent difficulty for controlled experiments may explain why some published experiments were completed in artificial settings (e.g., using captive carnivores or measuring bait consumption rather than livestock loss). Although most of our reviews omitted experiments for protecting property other than livestock, strong inference from such studies merit tests for livestock protection. Nonetheless, given that several examples of gold standard experiments overcame the complexities of people and wild ecosystems [5, 10, 11, 12], we urge greater effort and recommend government support and accolades for the highest standards of experimentation.

Incorporating science into conflict mitigation and conservation

Many governments have institutionalized support for livestock protection from predators and implemented various interventions at landscape scales. The European Council Directive 98/58/EC, concerning protection of animals kept for farming purposes, states that “animals not kept in buildings shall where necessary and possible be given protection from adverse weather conditions, predators and risks to their health.” The Swedish Animal Welfare Act of 1988 mandates care should be given to injured animals as soon as possible. This obligation is in practice relevant subsequent to carnivore attacks. When trained field observers confirm livestock attacks by large carnivores, they also implement rapid response interventions, such as fladry and portable electric fences, to prevent recurrent attacks [20]. In the United States, in 2013 alone, the US Department of Agriculture killed >75,000 coyotes, 320 gray wolves (*Canis lupus*), and 345 cougars (*Puma concolor*) [21]. Similarly, in some Australian states, landowners and managers are required by law to actively control dingoes (*C. dingo*) on their property.

Given the weak state of current evidence about effectiveness, decisions to use interventions are most likely based on subjective factors (e.g., ethics, opinions, or perceptions) or nonscientific (and thus possibly biased) evidence. For example, many people have deeply rooted perceptions that an intervention is effective or not [19]. Therefore, research, promoted by policy, is needed to validate that perceptions align with measurable and scientifically defensible outcomes [14]. This is especially crucial in cases of lethal interventions, which entail multiple drawbacks, including ethical criticisms and the potential to hasten carnivore declines and impede population recoveries.

However, scientists alone cannot transform policies for implementation. The pursuit of science-based management must be truly interdisciplinary and involve carnivore ecologists, animal husbandry scientists, social scientists, natural resource managers, ethicists, and other scholars and practitioners. Political leaders can also play a role to prioritize, coordinate, and fund partnerships across government agencies and nongovernment organizations. Because we anticipate continued debate over the standards of effectiveness, we recommend a coalition be formed to clearly distinguish standards for evaluation and experimental protocols, which would be distinct from coalitions convened to consider local factors that affect decisions. Through collaboration, scientists, managers, and policy leaders can help to protect livestock within healthy ecosystems that include carnivores. Constituents worldwide increasingly support the restoration of carnivore populations and accordingly are calling for human–carnivore coexistence and minimizing conflicts [2]. Enabling coexistence through evidence-based solutions will give the public strong confidence in methods promoted by scientists and governments, particularly when implementation is difficult or the ethics are controversial.

Supporting information

S1 Table. Methods used by authors’ reviews. Methods have been simplified for comparison. Refer to the original articles for a full account of methods used and justification for the use of these methods.

(DOCX)

S2 Table. Studies included in the four reviews.

(DOCX)

S1 Fig. Overlap of studies included in each of the four independent reviews that evaluated evidence of functional effectiveness of interventions in reducing carnivore attacks on livestock.

(TIF)

References

1. Ripple WJ, Estes JA, Beschta RL, Wilmers CC, Ritchie EG, Hebblewhite M, et al. Status and ecological effects of the world's largest carnivores. *Science*. 2014; 343(6167):1241484. <https://doi.org/10.1126/science.1241484> PMID: 24408439
2. Chapron G, Kaczensky P, Linnell JDC, von Arx M, Huber D, Andr n H, et al. Recovery of large carnivores in Europe's modern human-dominated landscapes. *Science*. 2014; 346(6216):1517–9. <https://doi.org/10.1126/science.1257553> PMID: 25525247
3. Treves A, Bruskotter J. Tolerance for predatory wildlife. *Science*. 2014; 344(6183):476–7. <https://doi.org/10.1126/science.1252690> PMID: 24786065
4. Sutherland WJ, Pullin AS, Dolman PM, Knight TM. The need for evidence-based conservation. *Trends in Ecology & Evolution*. 2004; 19(6):305–8. <https://doi.org/10.1016/j.tree.2004.03.018> PMID: 16701275
5. Platt JR. Strong inference. *Science*. 1964; 146:347–53. <https://doi.org/10.1126/science.146.3642.347> PMID: 17739513
6. Eklund A, L pez-Bao JV, Tourani M, Chapron G, Frank J. Limited evidence on the effectiveness of interventions to reduce livestock predation by large carnivores. *Scientific Reports*. 2017; 7(1):2097. <https://doi.org/10.1038/s41598-017-02323-w> PMID: 28522834
7. Miller JRB, Stoner KJ, Cejtin MR, Meyer TK, Middleton AD, Schmitz OJ. Effectiveness of contemporary techniques for reducing livestock depredations by large carnivores. *Wildlife Society Bulletin*. 2016; 40(4):806–15. <https://doi.org/10.1002/wsb.720>
8. Treves A, Krofel M, McManus J. Predator control should not be a shot in the dark. *Frontiers in Ecology and the Environment*. 2016; 14(7):1–9. <https://doi.org/10.002/fee.1312>
9. van Eeden LM, Crowther MS, Dickman CR, Macdonald DW, Ripple WJ, Ritchie EG, et al. Managing conflict between large carnivores and livestock. *Conservation Biology*. 2018; 32(1):26–34. <https://doi.org/10.1111/cobi.12959> PMID: 28556528
10. Davidson-Nelson SJ, Gehring TM. Testing fladry as a nonlethal management tool for wolves and coyotes in Michigan. *Human-Wildlife Interactions*. 2010; 4(1):87–94. <https://digitalcommons.usu.edu/hwi/vol4/iss1/11>
11. Gehring TM, VerCauteren KC, Provost ML, Cellar AC. Utility of livestock-protection dogs for deterring wildlife from cattle farms. *Wildlife Research*. 2010; 37(8):715–21. <https://doi.org/10.1071/wr10023>
12. Ohrens O, Bonacic C, Treves A. Non-lethal defense of livestock against predators: Flashing lights deter puma attacks in Chile. *Frontiers in Ecology and Evolution*. 2018 (in press). Available from: <http://faculty.nelson.wisc.edu/treves/pubs/Ohrens%20et%20al%202018a.pdf>
13. Mitchell BR, Jaeger MM, Barrett RH. Coyote depredation management: current methods and research needs. *Wildlife Society Bulletin*. 2004; 32(4):1209–18. [https://doi.org/10.2193/0091-7648\(2004\)032\[1209:CDMCA\]2.0.CO;2](https://doi.org/10.2193/0091-7648(2004)032[1209:CDMCA]2.0.CO;2)
14. Ohrens O, Santiago- vila FJ, Treves A. The twin challenges of preventing real and perceived threats to livestock. In: Frank B, Marchini S, Glikman J, editors. *Human-wildlife interactions: turning conflict into coexistence*. Cambridge: Cambridge University Press; 2018. Available from: http://faculty.nelson.wisc.edu/treves/pubs/pre-proof_Ohrens_etal_2018b.pdf
15. Romesburg HC. Wildlife science: gaining reliable knowledge. *The Journal of Wildlife Management*. 1981; 45(2):293–313. <https://doi.org/10.2307/3807913>
16. Treves A, Naughton-Treves L. Evaluating lethal control in the management of human-wildlife conflict. In: Woodroffe R, Thirgood S, Rabinowitz A, editors. *People and wildlife: conflict or coexistence?* Conservation Biology. Cambridge, UK: Cambridge University Press; 2005. p. 86–106. Available from: http://faculty.nelson.wisc.edu/treves/pubs/Lethal_control_2005.pdf
17. Santiago-Avila FJ, Cornman AM, Treves A. Killing wolves to prevent predation on livestock may protect one farm but harm neighbors. *PLoS ONE*. 2018; 13(1):e0189729. <https://doi.org/10.1371/journal.pone.0189729>
18. Ioannidis JPA. Why most published research findings are false. *PLoS Med*. 2005; 2(8):e124. <https://doi.org/10.1371/journal.pmed.0020124> PMID: 16060722
19. Treves A, Wallace RB, Naughton-Treves L, Morales A. Co-managing human-wildlife conflicts: a review. *Human Dimensions of Wildlife*. 2006; 11(6):383–96. <https://doi.org/10.1080/10871200600984265>
20. L pez-Bao JV, Frank J, Svensson L,  kesson M, Langefors  . Building public trust in compensation programs through accuracy assessments of damage verification protocols. *Biological Conservation*. 2017; 213:36–41. <https://doi.org/10.1016/j.biocon.2017.06.033>
21. United States Department of Agriculture. 2016 Program Data Reports: Animal and Plant Health Inspection Service, United States Department of Agriculture; 2017 [cited 2017 6th December]. Available from: https://www.aphis.usda.gov/aphis/ourfocus/wildlifedamage/SA_Reports/SA_PDRs.

RESEARCH ARTICLE

Killing wolves to prevent predation on livestock may protect one farm but harm neighbors

Francisco J. Santiago-Avila^{1*}, Ari M. Cornman², Adrian Treves¹

¹ Carnivore Coexistence Lab, Nelson Institute for Environmental Studies, University of Wisconsin–Madison, Madison, Wisconsin, United States of America, ² Department of Natural Resources, Little River Band of Ottawa Indians, Manistee, Michigan, United States of America

* santiagoavil@wisc.edu



Abstract

Large carnivores, such as gray wolves, *Canis lupus*, are difficult to protect in mixed-use landscapes because some people perceive them as dangerous and because they sometimes threaten human property and safety. Governments may respond by killing carnivores in an effort to prevent repeated conflicts or threats, although the functional effectiveness of lethal methods has long been questioned. We evaluated two methods of government intervention following independent events of verified wolf predation on domestic animals (depre- dation) in the Upper Peninsula of Michigan, USA between 1998–2014, at three spatial scales. We evaluated two intervention methods using log-rank tests and conditional Cox recurrent event, gap time models based on retrospective analyses of the following quasi- experimental treatments: (1) selective killing of wolves by trapping near sites of verified depredation, and (2) advice to owners and haphazard use of non-lethal methods without wolf-killing. The government did not randomly assign treatments and used a pseudo-control (no removal of wolves was not a true control), but the federal permission to intervene lethally was granted and rescinded independent of events on the ground. Hazard ratios suggest lethal intervention was associated with an insignificant 27% lower risk of recurrence of events at trapping sites, but offset by an insignificant 22% increase in risk of recurrence at sites up to 5.42 km distant in the same year, compared to the non-lethal treatment. Our results do not support the hypothesis that Michigan’s use of lethal intervention after wolf depredations was effective for reducing the future risk of recurrence in the vicinities of trap- ping sites. Examining only the sites of intervention is incomplete because neighbors near trapping sites may suffer the recurrence of depredations. We propose two new hypotheses for perceived effectiveness of lethal methods: (a) killing predators may be perceived as effective because of the benefits to a small minority of farmers, and (b) if neighbors experi- ence side-effects of lethal intervention such as displaced depredations, they may perceive the problem growing and then demand more lethal intervention rather than detecting prob- lems spreading from the first trapping site. Ethical wildlife management guided by the “best scientific and commercial data available” would suggest suspending the standard method of trapping wolves in favor of non-lethal methods (livestock guarding dogs or fladry) that have been proven effective in preventing livestock losses in Michigan and elsewhere.

OPEN ACCESS

Citation: Santiago-Avila FJ, Cornman AM, Treves A (2018) Killing wolves to prevent predation on livestock may protect one farm but harm neighbors. PLoS ONE 13(1): e0189729. <https://doi.org/10.1371/journal.pone.0189729>

Editor: Marco Apollonio, Universita degli Studi di Sassari, ITALY

Received: July 9, 2017

Accepted: November 30, 2017

Published: January 10, 2018

Copyright: © 2018 Santiago-Avila et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: Certain privacy issues arise from sharing our data. By agreement with the Little River Band of Ottawa Indians, we try to protect the privacy of the livestock owners involved in depredation events. Therefore, we have redacted the precise locational information of complaints and interventions. Hence, the data being included with this submission does not include the precise locations (section information) of each data point. The complete data, with precise location information, can be obtained by written request to: W. Frank Beaver, Director, Natural Resources Department, Little River Band of Ottawa

Indians, fbeaver@rboi-nsn.gov, 231-398-2191. Requests should describe the rationale for the data request, as well as what steps will be taken to ensure the privacy of livestock owners involved in depredations remains protected.

Funding: Funding and support for this research was provided by the Little River Band of Ottawa Indians, Therese Foundation, Inc. (grant #: MSN204166) and the Nelson Institute for Environmental Studies. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Competing interests: The authors have declared that no competing interests exist.

Introduction

Large carnivores, such as gray wolves, *Canis lupus*, are difficult to protect in mixed-use landscapes because some people perceive them as dangerous and because they sometimes threaten human property and safety. Traditionally, governments kill wild animals in an effort to prevent threats to property and safety [1]. However, a recent summary of peer-reviewed studies that employed experimental or quasi-experimental tests of interventions against carnivore attacks on domestic animals in farms raised doubts about the functional effectiveness of lethal methods [2]. Namely, most tests of lethal methods showed no effect or counter-productive effects (higher livestock losses after intervention), and numerous tests contained biases or flaws that preclude reliable inference [2]. Two tests using quasi-experimental designs showed minimal, regional effect of various lethal methods [3] and a strong, local effect of government trapping and aerial shooting [4], respectively. But none provided the highest standard of evidence [2], which are random-assignment experimental tests of an intervention without bias in sampling treatment, measurement, or reporting [5, 6]. Higher standards of evidence were applied to tests of non-lethal methods generally, and two such tests applied the highest standards that also proved effective in preventing predation events on domestic animals (depredation). The two methods were fladry (a visual deterrent effective against wolves only, thus far) and livestock-guarding dogs [7, 8]. A recent controversy over killing wolves in the Northern Rocky Mountains (NRM) illustrates the difficulty of forming scientific consensus on the effectiveness of lethal methods for preventing depredations when standards of evidence are not consistent.

Two teams [4, 9] came to opposite conclusions when analyzing very similar data from the same region and similar period for the Northern Rocky Mountain wolf population. A deeper look suggests that inferences drawn from these quasi-experimental tests are weakened by uncontrolled variables (Box 1).

Box 1

One test included only wolf-killing by aerial gunning and several ground-based methods from 1989–2008 [4], whereas the other included all permitted wolf-killing, including public hunting, from 1987–2012 [9]. The latter of these two analyses found that killing more wolves was followed by more livestock losses the following year, using a negative binomial regression model controlling for multiple variables [9]. However, that test did not account adequately for the time series underlying several variables that increased over time. For example, over time the wolf population increased in size and also spread geographically, thereby exposing more farm animals to depredations. Because the amount of wolf-killing increased over time as (a) recolonizing wolves left the protection of a national park and wild areas, and (b) policy changes introduced wolf-hunting in addition to killing by government agents [4, 10, 11], we should expect the predictors (wolf-killing, livestock exposed, and wolf distribution) to rise over time in parallel with the observed rise in domestic animal losses over time, which would make a statistically significant association spurious if the time trend were not accounted for properly. Another team conducted the same analysis with the same data while accounting for time series trends and statistical misspecifications, and results suggest killing wolves instead led to an increase in attacks on cattle in the same year and fewer attacks the following year, relative to no killing [12]. However, this analysis seems to have eliminated the possibility of an underlying effect of wolf population size and did not consider the

geographic spread of wolves, an approach that remains to be validated [12]. Proper statistical control for exposure (encounters between wolves and domestic animals) might require a measure of geographic spread of wolves, not just wolf and domestic animal abundances regionally. The remedy would have required spatial information at scales below that of the region. The authors of the analysis of wolf-killing between 1989–2008 incorporated spatial information, yet did not extend spatial analyses sufficiently, and limited their data to a time period when only government wolf-killing was legally allowed [4]. They found a reduction in risk of recurrence subsequent to wolf-killing within a wolf pack territory. The reductions appeared significant and high in magnitude after an entire pack was killed, and appeared significant but lower in magnitude when only part of a pack was killed, compared with no removal [4]. The analysis was restricted to the affected wolf pack territory, despite the researchers' own work documenting how partial removal of wolves could scatter survivors beyond their original pack range [11, 13]. Therefore, the analysis of risk of recurrence of depredations should have examined neighboring areas and even more distant consequences. The importance of examining livestock loss beyond the edges of wolf pack territories had been noted [14]. We examine the analysis of [4] in greater detail in the Discussion.

We tested the hypothesis that two treatments (lethal and non-lethal intervention) following verified depredations had different effects on the risk of a recurrence (occurrence of a subsequent depredation) at that site and at neighboring sites at two larger geographic scales. We tested that hypothesis because the common justification for lethal interventions worldwide is that eliminating problem individuals, or regional predator reductions, will delay or curtail future losses immediately, and for at least one year until wolves are replaced [15]. We retrospectively examined data collected by state and federal agents in the state of Michigan, USA, from 1998–2014, using methods similar to [4], with two main differences. The first difference was that we examined spatial scales beyond the site of the intervention, so we could detect spill-over effects up to a radius of 16.25 km from the site of the intervention (neighborhood of township scale; see [Methods](#) section below). The second difference was that we included 2 distinct interventions: lethal and non-lethal interventions (pseudo-control, see below). Our analysis was retrospective and treatments had not been assigned randomly, thus the highest standard one might achieve would be a silver-standard experiment [2]. With data on the history and locations of events and interventions, we were able to draw stronger inference than a simple comparison of means between interventions. But quasi-experimental tests might be confounded by the effect of time passing (before-and-after) as carnivores, livestock, and people respond to changing conditions and other aspects of the environment change independently.

We had to consider potential bias in treatment. Field agents apparently made subjective judgments about where to implement lethal intervention when that was permitted by the federal government ([Table 1](#) & [16]). Therefore, we had to contend with a pseudo-control as follows: At times, the state agency opted not to kill wolves or opted to offer farmers non-lethal deterrents, and the state advised the complainant on protection of livestock. The latter intervention involved communications and possible deployment of non-lethal deterrents (see below) with unknown characteristics or consistency. We also considered potential measurement errors—that may have been systematic, not random errors—associated with unreported wolf-killing and unreported depredations, both of which occur in neighboring Wisconsin [2, 14], and are believed to occur in Michigan as well [17, 18].

Table 1. Periods for wolf-killing policy signals in WI and MI, derived from Refsnider [16], ESA sec. 4 10(a)(1)(A) and Humane Society of the U.S. et al. v. Jewell (U.S. District Court, D.C., 5 1:13-cv-00186-BAH Document 52, 2014).

Period start (mm/dd/yyyy)	Period end (mm/dd/yyyy)	Federal status	Culling**
4/15/1994	3/31/2003	Listed as endangered	not allowed
4/1/2003	1/30/2005	Down-listed to threatened	allowed
1/31/2005	3/31/2005	Relisted	not allowed
4/1/2005	9/13/2005	Sub-permit for culling issued	allowed
9/14/2005	4/23/2006	Sub-permit rescinded	not allowed
4/24/2006*	7/31/2006	Sub-permit for culling issued	allowed
8/1/2006	3/11/2007	Sub-permit rescinded	not allowed
3/12/2007	9/28/2008	Delisted	allowed
9/29/2008	5/3/2009	Relisted	not allowed
5/4/2009	6/30/2009	Delisted	allowed
7/1/2009	26/1/2012	Relisted	not allowed
1/27/2012	4/14/2012	Delisted	allowed

*States identical except sub-permit issuance on 6 May 2006 to Michigan instead of issuance on 24 April 2006 to Wisconsin [16].

**Killing a wolf that posed a threat to human safety was always allowed under ESA sec. 11(a)(3).

<https://doi.org/10.1371/journal.pone.0189729.t001>

Selection bias—or the tendency to apply different interventions to different subjects or locations based on some anticipated outcome—can powerfully affect the results of experimental tests [5]. In short, we controlled for spatial variation by comparing an intervention site to itself, but we could not control for the intervenors’ subjective decisions. In the Discussion, we identify and discuss potential sources of bias in the dataset provided to us.

Because of the caveats above relating to the strength of inference we might draw from the uncontrolled ‘experiment’ conducted by the State of Michigan, we regard our conclusions as preliminary in the same way that other recent published studies should be considered, pending gold-standard experiments [4, 9, 12]. These studies offer new inferences and testable hypotheses about the effect of interventions, rather than conclusions about the functional effectiveness of the interventions *per se*.

Materials and methods

Data sources

The State of Michigan continuously monitored complaints about wolves and annually monitored the wolves themselves, across the Upper Peninsula (42,610 km²). We used the federal government’s published reports for Michigan’s minimum, late-winter wolf population (https://www.fws.gov/midwest/wolf/aboutwolves/mi_wi_nos.htm), supplemented by Michigan data provided to the Little River Band of Ottawa Indians after their request through a federal Consent Decree. Michigan estimated wolf numbers by snow-track surveys, summer howling, and aerial telemetry of VHF radio-collared wolves primarily [19]. The exception was wolf-year 2012 when Michigan did not census its wolf population, so we interpolated the midpoint of the 2011 and 2013 estimates (Fig 1). Our study spanned wolf-years 1998–2015 (calendar-years 1998–2014); a wolf-year *t* was 15 April of year *t*-1 to 14 April of year *t*.

Michigan provided Wolf Activity Reports with 379 entries. The U.S. Department of Agriculture Wildlife Services (USDA) investigated many of these incidents since 1990 under state contract [20]. Hereafter, we refer to Michigan when referring to government responses to wolf-related complaints, whether by state or USDA field personnel. We discarded 149 entries that consisted of different categories of wolf encounters: observations, perceived threats to

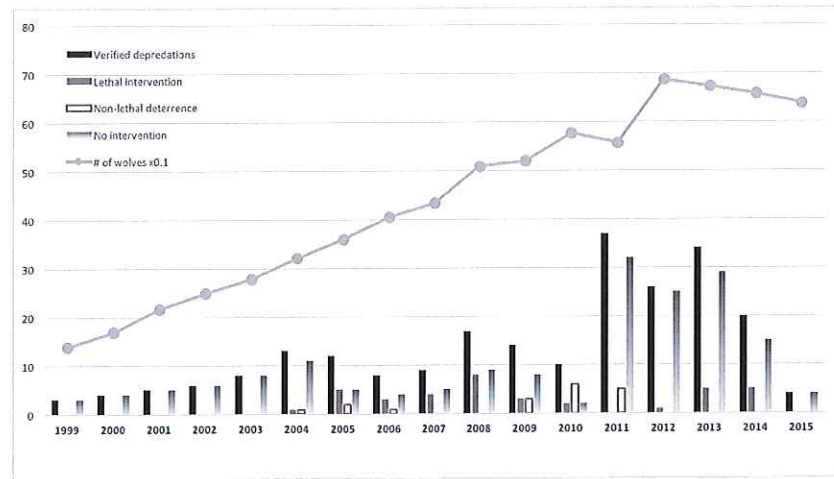


Fig 1. Annual Michigan wolf abundance, verified depredations and interventions. Michigan's annual wolf abundance (divided by 10 to fit the same y-axis as other variables) and two treatments after verified depredations. The x-axis shows wolf-years, which span 15 April of year t-1 to 14 April of year t. Overall n = 230 depredations.

<https://doi.org/10.1371/journal.pone.0189729.g001>

humans or domestic animals, or wolf interactions with hounds engaged in training or hunting, but which lacked verified depredations on a private property. Discarding perceived threats to humans should prevent the introduction of some biases, because the Wolf Activity Report entries suggested that one complainant's 'threat' was another's 'encounter' that did not result in official complaint, investigation or intervention. Considering the potential biasing effects of perceived threats that did not lead to a complaint (false negatives), perceived threats that were simply observations (false positives), and a complete lack of any such reports before 2002, we felt more secure setting aside all entries lacking depredations and ensuing verification. Also, wolf interactions with hounds occur under very different circumstances than depredations in our region [21–24]. In sum, we retained 230 complaints for screening as described below.

We screened complaints for verification and independence between depredations. During the study period, Michigan verified 499 livestock or farm animals injured or killed by wolves in 230 complaints. Depredations were classified as independent if they occurred on a different date.

Michigan responded in several ways to predation: communication only, provision of non-lethal deterrents, or lethal intervention. Lethal intervention consisted of live-trapping on or near the complainant's property for several days to weeks after a depredation, and if successful, the state shot one or more wolves caught alive in leg-hold traps (n = 98 wolves killed overall, with lethal interventions following depredations in 37 occasions, and resulting in the deaths of 56 wolves in 32 interventions and 0 wolves killed in 5 occasions); in a few cases landowners shot wolves after receiving state permits. We omitted 32 cases in which wolves were killed but were not involved in depredations; only two of which occurred in the same townships (geopolitical mapping area of 36 miles² or 92.16 km²) as lethal intervention during our study. We did not include the public hunting season at the end of 2013 because those removals were not targeted at known complaint sites [25]. Non-lethal deterrence was used primarily when no losses occurred in the Wolf Activity Reports, so most such interventions were excluded by our screening criteria above.

We refer to any intervention that did not lead to wolves dying as non-lethal, which implies only that no wolves were killed, but related actions may have entailed a range of communications with the complainant and other responses, including the provision of non-lethal deterrents in some cases. All interventions included communications with complainants but we

had no data to determine if such communications differed between lethal intervention and non-lethal. Non-lethal deterrents included one or more of the following: cracker shells, hazing kits, live-traps, lights, or fencing with various materials, including fladry (a loose flagging hung at regular intervals on fence-lines [26]). We also classified live-trapping (i.e., attempted lethal interventions) that resulted in no wolves killed ($n = 5$) as 'non-lethal'. Differences in non-lethal methods implemented at different sites could be attributed to costs, judgments by state agents about effectiveness in a given situation, willingness of livestock owners to deploy certain techniques, or other undocumented factors. Because of the small sample of occasions when non-lethal deterrents were deployed after depredations ($n = 18$), we pooled all interventions that did not lead to wolf-killing as non-lethal, due to insufficient information on whether the deterrents were actually implemented by the farmer.

A true control would have enacted all the same procedures and time spent on the complainant's property without killing wolves, or installing any non-lethal infrastructure. Therefore, we refer to our non-lethal intervention classification as a pseudo-control because it may have included different communications or a judgment by a state agent that lethal intervention was not likely to succeed. However, given that the federal permit for the state to use lethal control was issued and rescinded several times without regard to events on the ground (Table 1), we infer that the two treatments we analyzed were largely selected because of the broader governmental timelines rather than the events at a particular property. Independent decisions about the availability of lethal intervention would reduce the risk of treatment bias [2]. Regardless, this study represents a silver-standard experiment with possible treatment biases that must be considered preliminary and examined carefully (see Discussion).

With the preceding criteria, our primary sample of 230 depredations (or depredation events, by which we mean a verified, independent wolf depredation incident in the Wolf Activity Report) consisted of 32 depredations followed by lethal intervention, and 198 followed by non-lethal intervention.

Analyses

We used geopolitical sections (regular units of 1 mile² or 2.56 km²) as the smallest mapping units, following [27]. Sections can be read from commercially available road atlases. Sometimes more precise locations were also provided, but inspection revealed that many of these were simply the latitude and longitude of the center of the section. Virtually every livestock pasture lay within the borders of a single section. All livestock pastures were on private property of much less than 1 section in area (average farm size was 0.3 miles² or 0.68 km² in the Upper Peninsula [28]). The state did not record ownership of pastures or the tenure status of complainants. All depredation events are presented in [S1 Data File](#) with certain personal details, property information, and precise locations redacted for privacy.

We determined the sequence of depredation events by reference to the date of the complaint on the Wolf Activity Reports. We calculated the delay to recurrence as the interval in days to the next event in the same vicinity (2.56 km² section or larger geographic unit, see below). If there were no subsequent events in the vicinity that calendar year, we censored that observation of delay to recurrence at 31 December of the same year. Virtually all depredations occurred in the warmer months [20], with most events occurring in the period March–October (90%) and only 3% occurring in November or December, echoing results from Edge et al. [18]. Livestock in the Upper Peninsula are kept within enclosed pastures year-round, usually in small farms, and thus equally available to wolves throughout the year [18, 29]. Therefore, our decision to measure and censor the delay to recurrence within the calendar year provided at least 60 days to detect an effect in 97% of events (recurrence at section scales occurred within a

median of 13 days if it occurred the same year). Had we extended the time horizon as in [4], we saw a risk of conflating the recurrence of depredation events by later wolves with the treatment applied to prior wolves.

We also examined if depredations recurred at two larger spatial scales. At the intermediate scale of townships (36 miles² or 92.16 km²), the area used for measuring recurrence approximated half the core area of an average wolf pack territory [30]. At our largest spatial scale, the neighborhood of townships (320 miles² or 829.44 km²) was equivalent to 9 contiguous townships centered on a depredation event and >4 times the average core area of a wolf pack territory [30]. For analyses of risk of recurrence at the township and neighborhood scales, we replaced the fixed geopolitical unit with a square buffer of the same area centered on each depredation event (Fig 2). We detected no difference in the sequence of depredation events for particular areas when using a circular buffer, possibly due to the coordinates for depredation incidents obtained from the Wolf Activity Reports frequently placing the incident in the center of a section, which both buffer shapes contained. The square buffer was preferred based on its consistency with the underlying Public Land Survey System (USGS, https://nationalmap.gov/small_scale/a_plss.html) layer containing the spatial subdivisions we based our three spatial

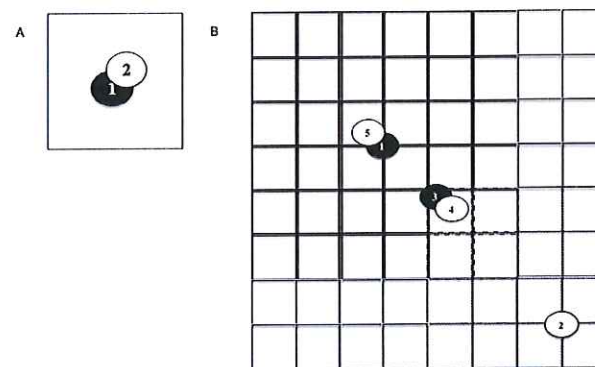


Fig 2. Measuring recurrence between depredation events at multiple spatial scales. Each small rectangle is a section (1 mile²). Each oval is a single event of verified depredation. A 1 indicates the first of such events in its vicinity and year, and higher numbers are subsequent events in chronological order of occurrence in the same year. The intervention is shown with colored ovals: lethal (black), non-lethal intervention (open); and events within the same section are depicted as overlapping each other partially (1 and 2 in A; 1 and 5 or 3 and 4 in B). **A:** Smallest scale of analysis where the vicinity is limited to the section. Datum 1 stratum 1 measures the number of days between events 1 and 2 with lethal intervention. Because there is no event 3 within the vicinity, datum 1 stratum 2 measures the number of days between event 2 and the end of the calendar year but switches to non-lethal intervention (open oval). **B:** Medium-scale of analysis where rectangles are sections in a township (36 miles² centered on event 1). Solid black grid lines indicate buffer around event 1; dotted gray lines indicate buffer around event 2; black dot-dashed lines indicate overlap between buffers. Because event 1 and event 2 are not in the same township-sized buffer, they generate datum 1 and datum 2 with lethal intervention and non-lethal intervention, respectively. Datum 1 stratum 1 measures the number of days between event 1 and event 3. Although event 3 is also within the buffer of event 2 (within black dot-dashed lines), it was assigned to event 1 because it was nearest by Euclidean distance. We did not measure the number of days between events 2 and 3 because event 3 was already used to create datum 1 stratum 1; in this way, we avoided double-counting events. Next, events 3 and 4 are collapsed (treated as a single event) because they occurred in the same section *sequentially*. Because event 3 was followed by lethal intervention (black oval), the resulting single collapsed event was classified as lethal intervention. We then measure datum 1 stratum 2 as the number of days between event 4 and 5, remembering that the collapsed event is classified as lethal even though 4 is followed by non-lethal intervention (any collapsed set of events with a lethal intervention event among them is assigned to the lethal intervention set). Finally, datum 1 stratum 3 is measured by the number of days between event 5 and the end of the calendar year and assigned to non-lethal intervention. If event 2 had zero other events in its township area (not shown), then datum 2 stratum 1 would be measured to the end of the calendar year. A similar process was followed for the largest spatial scale of neighborhood of townships (320 miles²).

<https://doi.org/10.1371/journal.pone.0189729.g002>

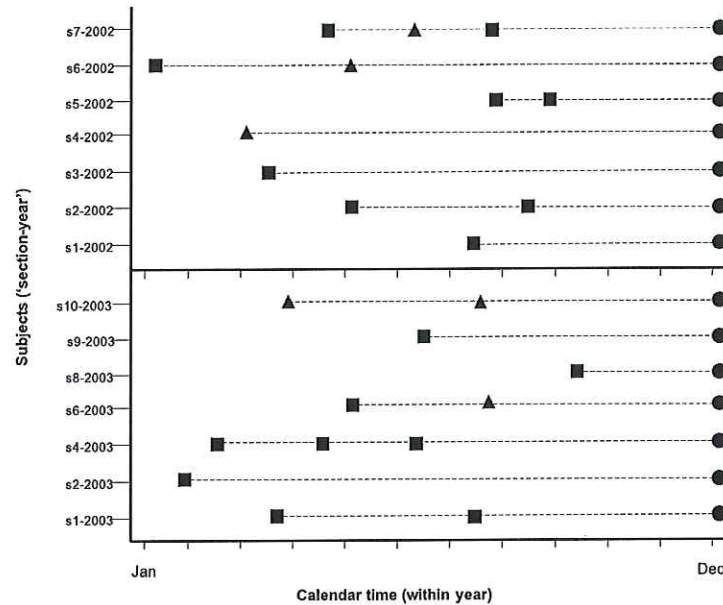


Fig 3. Transforming deprecation records to a survival analysis format. We present lethal interventions (triangles) and non-lethal interventions (squares) connected by a dashed line that measures the delay to recurrence or censorship (circles). We illustrate using data from two subsequent years. Subjects are identified as combinations of vicinity (section, township or neighborhood) and year (i.e.: section s1-2002) on the y-axis. The first figure for each subject represents when the first deprecation event in that year occurred, which is the date follow-up started for that 'section-year'. Each subject then follows a chronology of subsequent deprecation events through the year, treated with either intervention. Stratum 1 considers the initial intervention implemented and the delay to recurrence to the next deprecation event, or censoring if no other events occurred (i.e.: first figure to second figure in dashed line for each subject). Stratum 2 considers the next sequence of deprecation events (i.e.: delay from second figure to third figure). Due to our construction of subjects, a particular section (sections 1, 2, 4 and 6, for example) can appear in multiple years, represented with a different 'section-year' combination (for example, s1-2002 and s1-2003).

<https://doi.org/10.1371/journal.pone.0189729.g003>

scales on. We measured delay to recurrence in that buffer, repeating the process for subsequent deprecation events using each event's buffer (i.e., a moving window). The process of assigning deprecation events at scales larger than the section (Fig 2) was designed to avoid pseudo-replication (once the effect of a pair of events was measured at a lower scale, that estimate of delay to recurrence was never used again at larger scales).

The use of three spatial scales allowed us to detect deprecation recurrence beyond the original sites (spill-over effects) following interventions. Our process for collapsing deprecation events (Fig 2) produced a conservative assessment of spill-over effects because we eliminated pseudo-replication of estimates of risk of recurrence across scales. The disadvantage of our approach was declining sample sizes that reduced the power of the tests at larger scales and thereby potentially increased Type II error.

Statistical tests

We measured delay to recurrence in days between each pair of successive deprecation events as in Figs 2 and 3, and produced survival functions for each treatment following Hosmer, Lemenshow & May [31]. A survival function describes the probability of observing a time interval between two deprecation events, T , greater than some stated value t , $S(t) = P(T > t)$, where t is days. Thus, survival functions provide, for every time t , the probability of 'surviving'

(in this case, not experiencing a depredation event) up to that time, and describe these probability distributions (survival distributions). Survival analysis comprises a set of statistical methods used to quantify and test survival function differences between treatment groups of subjects [32].

At the smallest spatial scale, we defined our subjects as the sections in which depredations occurred. Thus, sections are analogous in biomedical research to the patient receiving treatments. In this case, the section receives lethal or non-lethal treatment of wolves. Note that this differs from prior research that defined wolf pack territories as the subjects [4].

Subjects enter the analysis after the initial depredation event, and remain in the analysis until December 31st of that year; hence, our subjects arise from a particular vicinity (i.e., section, township or neighborhood) in a particular calendar-year (1998 to 2014) (Fig 3). Depredation events, along with their respective treatments and measures of recurrence were organized into strata based on their order of occurrence for each subject (Fig 2). Each year a new set of strata was created, starting with stratum 1 again. The end of each calendar year represented a 'reset' point after which we assumed independence of subjects because both wolves and livestock are mostly removed from each other's reach until the next grazing period. Based on this classification of subjects and strata, we clustered our analysis on a unique identifier reflecting a particular vicinity-year combination, e.g., ID_TRS_Yr [33]. This approach accounts for potential spatial and temporal auto-correlation among strata within subjects, e.g., all depredation events for the same subject experienced during a particular year are assumed correlated. It also avoids pseudo-replication of observed depredation events from the same subject as if they were independent of other depredation events in that same year, e.g., ID_TRS_2000's stratum 1 and stratum 2 observations are correctly identified as belonging to the same subject, rather than belonging to two different subjects (pseudo-replication). In the Discussion, we examine potential pseudo-replication concerns in our dataset and in prior approaches.

We employed general and stratified log-rank tests (Chi-squared statistic) to compare the survival distributions for delay to recurrence in both treatments. We then used a conditional Cox recurrent event, gap time model [31] to compare the associations between treatments and risk of recurrence. The Cox model allowed us to estimate hazard ratios (HR) for relative risk of recurrence between treatments by characterizing how the hazard function (H) changed as a function of survival time and subject covariates; $S(t) = e^{-H(t,x;\beta)}$, where t is study time (the period of observation or follow-up period after inclusion in study until end of the calendar year), x is a covariate we describe below, and β is the parameter estimate of x .

The stratified conditional Cox model accounts for risk of recurrence for the i^{th} depredation event being influenced by the occurrence of a previous $(i-1)^{\text{th}}$ depredation event and the treatment following it, so that each subject is included in the risk set (the number of subjects experiencing a depredation event) for the i^{th} depredation event only if it experienced the $(i-1)^{\text{th}}$ depredation event. For example, in our section-scale analysis, 31 subjects experienced a first recurrent depredation event, whereas 120 did not experience any recurrence (Stratum 1, Tables B & C in S1 File).

The stratified Cox model considers only those subjects experiencing that first recurrent depredation event in the second stratum (Stratum 2, $n = 31$; Table A in S1 File), repeating the process for subsequent strata until end of the calendar year. The stratified Cox model allowed us to estimate general treatment effects while accounting for event order and the treatment applied to the previous event.

We ran univariate and multivariate conditional Cox models at each spatial scale. Univariate models included only our response variable (delay to recurrence) comparing our two treatments, whereas multivariate models incorporated calendar year. Including calendar year was essential because the gray wolf was down-listed to threatened in Michigan on April 1, 2003,

and subsequently went through 12 or more reclassifications and permit issuances that precluded or allowed wolf-killing by the state ([34], and Table 1) as the protection afforded wolves was reduced or increased.

Given that treatment effects could change over time as wolves, livestock, people, and ecosystems might change with environmental conditions, we also ran multivariate models incorporating a time-varying covariate (tvc) for treatments [31]. Our tvc consists of an interaction of treatment with study time. The use of a tvc is strongly recommended for evaluating and handling non-proportional hazards (PH), given PH is an underlying assumption of survival modelling [31]. A non-proportional hazard occurs when the treatment effect changes over time (instead of remaining constant) relative to the pseudo-control, so that the hazard ratio for the treatment changes over time. Hence, if the parameter estimate for the tvc were found to be significant, the conditional Cox model with tvc would be more robust and reliable than without the tvc because it corrected for non-proportional hazards in our treatments. When the tvc is not significant, its inclusion in the model is not warranted.

Authorities on stratified Cox models also express concerns about strong inference depending on the risk set per stratum [31, 35]. The latter authors did not settle on a particular number observations per treatment per stratum; however, the Cox models depend on a measure of variability within-strata to detect deviations from chance differences between treatments, therefore we excluded strata with <10 depredation events or which lacked events for both treatments. This conservative step left us with 3 strata at the section scale, 1 stratum at the township scale, and 2 strata at the neighborhood scales (S1 File). Thus, our final sample at the section scale consisted of 151 subjects (independent section-years) with 199 depredation events, including 56 recurrent depredation events; the final sample at the township scale consisted of 125 subjects with 125 depredation events, including 24 recurrent depredation events; and the final sample at the neighborhood scale consists of 106 subjects with 125 depredation events, including 25 recurrent depredation events (S1 File).

We assessed the robustness of models to within-subject correlation by running a variant of a random-effects approach called frailty models ([35]; S2 File). If high-risk and low-risk farms exist due to factors extrinsic to treatments, years, or the tvc, then subject identity should inform gap time models [17, 36]. Frailty models assess the goodness of fit of the treatment variable by including random effects of subject identity [35], which is considered useful when recurrence time might be influenced by unmeasured factors [31, 37].

We also built models with subsets of the data to evaluate potential confounding effects and robustness of the primary models described above. We built a model with data 'post-2003', after lethal management was episodically permitted, and by reclassifying lethal management with zero wolves killed as 'lethal' because the infrastructure and attendant human influences would be the same whenever traps were laid regardless if wolves were live-trapped and killed. We refer to the latter condition as 'traps placed'. We present alternative models in supporting information (S2–S4 Files).

Finally, we used Spearman rank correlations (r_s) to correlate delay to recurrence with number of wolves killed for lethal treatments only and for 'traps placed'. We conducted all analyses in Stata 14 (StataCorp, College Station, TX, 2015; protocol DOI: [10.17504/protocols.io.j2rcqd6](https://doi.org/10.17504/protocols.io.j2rcqd6)).

Results

Between 1998 and May 2014 there were 199 depredations in Michigan with as many management interventions. Of the 199, 31 resulted in lethal intervention (16%) and 168 resulted in non-lethal intervention (84%) (Fig 1).

Table 2. General and stratified log-rank (χ^2) tests examining difference between treatments' (lethal and non-lethal) survival distributions (measuring risk of recurrence) after wolf depredations, for all spatial scales.

	Spatial scale of analysis		
	Section	Township	Neighborhood
SUBJECTS AND 'FAILURES'			
TOTAL DEPREDATION EVENTS	199	125	125
Failures (recurrent events)	56	24	25
SURVIVAL FUNCTIONS			
Log rank test (χ^2)	0.27	1.44	0.08
p-val	0.603	0.23	0.772
Stratified Log-rank test (χ^2)	0.48	-	0.28
p-val	0.488	-	0.593

<https://doi.org/10.1371/journal.pone.0189729.t002>

Section scale

Log rank tests could not distinguish the survival functions between treatments ($df = 1$, general survival functions test: $\chi^2 = 0.27$, $P = 0.604$; stratified [by order of depredation events for subjects] test: $\chi^2 = 0.48$, $P = 0.488$; Table 2). All univariate (treatment only) and multivariate (treatment and calendar-year) Cox models suggest that lethal intervention was associated with a non-significant reduction in risk of recurrence when compared to non-lethal intervention (Table 3). The section-scale models including a time-varying covariate (tvc) were not significant, so the PH assumption was not violated ($tvc P > 0.05$). The multivariate model including treatment and year suggests lethal intervention only weakly reduced risk of recurrence (slowing recurrence) by 27%, but that was not a statistically significant difference ($HR = 0.73$, $P = 0.326$; Table 3). This model also revealed an increasing risk of recurrence (hastening recurrence) by 9% each calendar-year ($HR = 1.09$, $P = 0.022$). Lethal intervention was not significantly different from non-lethal intervention in our frailty model ($HR = 0.48$, $P = 0.158$; Table A in S2 File), with the model suggesting significant frailty (omitted or unobserved

Table 3. Main results of Cox models measuring risk of recurrence between treatments (lethal and non-lethal) implemented after wolf depredations, for all spatial scales.

	Spatial scale of analysis					
	Section		Township		Neighborhood	
PROPORTIONAL HAZARD MODELS	<i>Interv</i>	<i>Interv & year</i>	<i>Interv</i>	<i>Interv & year</i>	<i>Interv</i>	<i>Interv & year</i>
Standard cox (stratified)						
<i>Intervention HR (SD)</i>	0.77 (0.22)	0.73 (0.23)	0.48 (0.308)	0.46 (0.29)	0.80 (0.340)	0.72 (0.34)
p-val	0.36	0.326	0.255	0.224	0.644	0.486
<i>year HR (SD)</i>	-	1.09 (0.04)*	-	1.05 (0.05)	-	1.14 (0.07)*
p-val	-	0.022	-	0.28	-	0.024
Standard cox with tvc (stratified)						
<i>Intervention HR (SD)</i>	0.48 (0.21)*	0.46 (0.21)	1.87 (1.47)	1.78 (1.38)	0.84 (0.62)	0.80 (0.63)
p-val	0.099	0.091	0.425	0.458	0.818	0.778
<i>tvc(Intervention) HR (SD)</i>	1.01 (0.01)*	1.01 (0.01)	0.97 (0.01)**	0.97 (0.01)**	0.99 (0.01)	1.00 (0.01)
p-val	0.057	0.068	0.001	0.001	0.928	0.852
<i>year HR (SD)</i>	-	1.09 (0.04)*	-	1.05 (0.05)	-	1.14 (0.07)*
p-val	-	0.023	-	0.281	-	0.023

Significance

* if p-val < .05

** if < .01.

<https://doi.org/10.1371/journal.pone.0189729.t003>

Table 4. Spearman correlation between delay to recurrence and number of wolves killed after depredation events followed by lethal intervention (wolves killed ≥ 0), for all spatial scales.

	Section	Township	Neighborhood
Spearman's rho	0.107	0.212	0.295
p-val	0.5591	0.2994	0.1354

<https://doi.org/10.1371/journal.pone.0189729.t004>

covariates) remaining in the model ($P = 0.006$). For those depredation events followed by lethal intervention, we found no correlation between delay to recurrence and the number of wolves killed (Spearman's rho = 0.107, $P = 0.559$, [Table 4](#); 'traps placed': Spearman's rho = 0.076, $P = 0.657$; [Table C in S3 File](#)).

Township scale

Our dataset consisted of 125 depredations, 26 followed by lethal intervention (21%) and 99 followed by non-lethal intervention (79%). Log rank tests could not distinguish the survival functions between treatments ($df = 1$, general test: $\chi^2 = 1.44$, $P = 0.23$; [Table 2](#)). Likewise, all Cox models revealed no significant differences between treatments ([Table 3](#)). The township-scale models including a tvc were significant, suggesting the PH assumption was violated ($tvc P < 0.05$). Hence, we focus our analysis on the model including the tvc. Lethal intervention increased risk (hastening recurrence) by 22%, but this was not statistically significant (treatment HR = 1.78, $P = 0.458$). However, our tvc, which accounts for non-proportional hazards, hints at a minimal (3%) reduction in risk over follow-up time ($tvc HR = 0.97$, $P = 0.001$). Calendar-year was not significant (HR = 1.05, $P = 0.281$). Differences between treatments were not significant in our frailty model (HR = 0.45, $P = 0.242$; [Table A in S2 File](#)). For those events followed by lethal intervention, we found no correlation between delay to recurrence and the number of wolves killed (Spearman's rho = 0.212, $P = 0.299$, [Table 4](#); 'traps placed': Spearman's rho = 0.233, $P = 0.224$; [Table C in S3 File](#)).

Neighborhood scale

Our dataset consisted of 125 depredations, 26 followed by lethal intervention (21%) and 99 followed by non-lethal intervention (79%). Again, log rank tests could not distinguish survival functions between treatments (general test: $\chi^2 = 0.08$, $P = 0.772$; stratified test: $\chi^2 = 0.28$, $P = 0.594$). Similarly, all Cox models revealed no differences between treatments ([Table 2](#)). The neighborhood-scale models including a tvc were not significant, so the PH assumption was not violated ($tvc P > 0.05$). Lethal intervention only weakly reduced the risk of recurrence (slowing recurrence) by 28% but this difference was not significant (treatment HR = 0.72, $P = 0.486$; [Table 3](#)). We found a statistically significant increase in risk of recurrence (hastening recurrence) of 14% every calendar-year (HR = 1.14, $P = 0.024$). The frailty model showed no significant differences between treatments (HR = 0.80, $P = 0.67$; [Table A in S2 File](#)).

For those events followed by lethal intervention, we found no evidence of a correlation between time to recurrence and the number of wolves killed (Spearman's rho = 0.295, $P = 0.135$, [Table 4](#); 'traps placed': Spearman's rho = 0.161, $P = 0.395$; [Table C in S3 File](#)).

For all spatial scales, all effects of treatment remained consistent for the 'traps placed' condition, when limiting the data to post-2003 depredation events, 'skip-a-year' dataset and when removing a special case ([S2–S4 Files](#)).

Discussion

We retrospectively evaluated whether lethal interventions by the State of Michigan in response to wolf predation on domestic animals (depredations) between 1998–2014 resulted in lower

risk of recurrence of depredations than if no wolves were killed. We found the delay to recurrence of depredations was unrelated to the number of wolves killed at all spatial scales. We found lethal management did not significantly shorten or lengthen the interval to the next depredation relative to non-lethal interventions. A small, statistically insignificant reduction in the risk of depredation at the section level was offset by a similar and also statistically insignificant increase in the risk of depredation at the township scale, which is about half the size of a wolf pack territory, and then a similar decrease in risk at the scale of neighborhoods of townships, which are four times larger than the average wolf pack territory [30]. None of these differences were statistically significant using a battery of tests.

Our methods or alternative models accounted for potential violations of the proportional hazards assumption, unlike a prior study of wolves in the Northern Rocky Mountains (see below); accounted for within-subject correlation; were unaffected when we restricted analysis to the period after 2003 when lethal interventions first became legal; and accounted for a change in definition of lethal methods to include the installation of lethal methods that did not kill any wolves (S3 File). There is evidence for the effect of lethal intervention changing slightly over the course of a single calendar year at the township scale, through a minimal reduction in risk over follow-up time. We also detected variation between individual farms in their time to recurrence of depredations. Given the apparent, net ineffectiveness of lethal intervention and the uncertainty about potential biases in a retrospective analysis of sparsely documented government interventions, we recommend ethical, gold-standard, random-assignment experiments be used before further lethal management is authorized to prevent depredations.

Overall, our analysis suggests that any potential beneficial effects of lethal interventions locally would be offset by detrimental effects for neighboring farms in the same township. If the small, local improvements were considered biologically, ethically, or economically important to one farm, then one would also have to admit the associated costs to neighboring farms and the biological, ethical and economic importance to that farm. Therefore, given the evidence available, we cannot conclude that lethal management had the desired effect of preventing future livestock losses.

Over the 17 years of our study, the risk of depredation increased by 9 and 14% per year at the section and neighborhood (smallest and largest) scales, respectively, in our main dataset. However, this effect of year is insignificant in our post-2003 dataset (S4 File). In addition to changes in wolf densities locally that may have occurred, there may also have been changes in proportion of pasture, prey density, land cover, farm size, road density, among other variables that predict depredations at local scales [17, 38]. Also, prior work indicated smaller packs were more often implicated in livestock depredations than larger packs [23]. Therefore, the notion that higher densities of wolves locally will result in more depredations is not well supported, as opposed to the idea that a recolonizing population encounters more livestock as a result of recolonizing more and more of their historic range over time.

We present our results guardedly rather than as a definitive conclusion about effectiveness because of insurmountable uncertainties about the government data. Retrospective analyses to evaluate the effectiveness of interventions to prevent predation on livestock are fraught with uncertainty because of various biases or challenges presented by field conditions [2]. For example, treatments were not assigned randomly and changing conditions over time locally were not documented. The unintentional error may have been random but we are unable to rule out systematic error (bias), whether intentional or unintentional. The government dataset we analyzed had undocumented variability in data collection and intervention, including possible systematic selection bias affecting which areas received which interventions.

Selection (or enrollment) bias would arise if subjects entered the study under varying conditions that affected outcomes. All sections containing farms (subjects) entered our study

because of a verified depredation, but subjects entered at different times and some farm owners might have responded to depredations in undocumented ways including poaching wolves. Likewise, attrition bias would arise if subjects left the study for reasons that were not random with respect to their outcomes. This would occur systematically if a subset of the interventions led farmers not to complain in the future despite facing depredations, or to take matters into their own hands, as above. Compensation was offered throughout the study as well as state-financed non-lethal deterrence when lethal intervention was unavailable, so attrition by withholding complaints seems unlikely to have been frequent or widespread. However, we would guess that non-intervention might be construed as unhelpful by complainants, leading some of them to intervene independently. We consider unreported wolf-killings to be a more pronounced confounding variable after 2003, when state lethal management was allowed (Table 1), substantiated by a recent inference that allowing state killing of wolves seems to have potentially increased poaching of Michigan and Wisconsin wolves [34]. By definition, poaching can only confound tests of non-lethal deterrence because poaching following lethal intervention would only increase the number of wolves killed (undetected in our context), but not change the nature of that lethal intervention. We do not see how poaching could confound the apparent reversal of effects of lethal control across our three geographic scales of analysis.

Furthermore, treatment bias would arise if methods of intervention were not standardized. Treatment bias certainly arose among non-lethal deterrents because different complainants received different types of non-lethal methods and we do not know if they maintained or installed the methods appropriately or identically. Non-lethal deterrents were presumably negotiated with complainants and therefore most prone to treatment bias that would confound our results. However, only 8% of our eventual sample received non-lethal deterrents. Moreover, we have no data on other deterrents or precautions unilaterally implemented by complainants. Lethal interventions were more uniform in method [20] but we did not receive precise, detailed information on implementation (number of trap-nights, exact locations, etc.). Moreover, if lethal interventions were spatially segregated from other types of interventions, then selection bias might have applied systematically because farms perceived to be higher-risk might have received lethal interventions preferentially and also be expected to have recurrent depredations. This might have resulted in significant, between-subject variability. Such a bias would not explain the spill-over effect we detected. Intermittent authority for lethal intervention led to the same spatial units receiving all types of intervention (S1 Data File). Given that authority for the state to kill wolves after verified depredations was granted or withheld by federal decisions unrelated to area attributes or recent depredation complaints and in several years of the study even high-risk areas received no interventions [16], it seems unlikely that lethal control authority for Michigan coincided with risky years. Therefore, any treatment bias (intervening lethally at sites that were inherently more likely to have recurrence of depredation) would have to occur at the spatiotemporal scale of individual farms within years. We addressed within-subject variability using a frailty model (S2 File), which revealed the presence of confounding effects at the section level, but the treatment effect remained statistically insignificant.

Finally, wolf abundance was unlikely to confound our tests because the number of wolves within our spatial units was unlikely to change substantially from one incident to the next within a small area within one year.

In sum, we find ample reason to expect confounding variables would weaken inference from a retrospective, quasi-experimental test of interventions to prevent livestock loss. Our attempts to detect and screen for biases were necessarily imperfect because we could not assign treatments randomly nor could we retrospectively assess if interventions were assigned haphazardly or subjectively. Our analyses controlled for variation in risk due to time and inter-farm differences using tvC and frailty models (S2 File), but could not ultimately control for

transient changes in risk associated with wolves, people, or other wildlife. Moreover, we were not able to account for illegal wolf-killing that might have added to treatment bias affecting non-lethal interventions.

Nevertheless, there is value in the scientific examination of on-the-ground programs of predator management as they are actually carried out by the organizations that discharge them. Avoidance of selection, treatment or measurement biases would require enforcement of strict protocols that are rare worldwide [2, 39–41]. In addition to understanding how the strongest inference arises from gold-standard experiments without bias, wildlife managers have a responsibility to continually evaluate their particular actions and policies to ascertain if they are effective at accomplishing the goals set by the broadest society, and to remedy or terminate them if they are found to be ineffective, as evidence-based policy-making demands.

An example of a gold-standard design that might achieve strong inference would be random-assignment of treatment to different, large areas (e.g., 324 km²) with uniform treatments, in which measurement is unbiased by blinding or independent, third party monitors, and data analysis is conducted by independent, third-party analysts without financial conflicts of interest involving the government or livestock industry. However, such an experiment would have to address the ethical implications for both animals and people of removing wild animals, possibly exposing more livestock to spill-over effects, and the broad public interest in preserving both wildlife and livelihoods. A step in that direction, albeit imperfect, may be to temporarily relocate predators to captivity until the analysis period ended in each area.

If our results are supported by a gold-standard experiment, we propose a hypothesis for two long-standing phenomena about human perceptions of conflicts with predators and the perceived effectiveness of interventions. We observe that killing predators is widely perceived to be effective (e.g., in our region: [42, 43], yet afterwards real and perceived risks appear to increase [44]. The spill-over effect may be responsible. Our hypothesis builds on the idea first articulated by Haber [45] that killing wolves can trigger pack disruption which might lead to more livestock predation than done by intact packs. If our inference about spill-over effects is confirmed, then we hypothesize that the perceived effectiveness of lethal methods stems from a few livestock owners who report preventive benefits, while neighboring livestock owners report increasing losses because of the spill-over effect from the former farms. The adverse effects of killing wolves as a response to depredations might thereby be obscured by anecdotal accounts and misperceptions.

Our results appear to contradict those of the [4] in the Northern Rocky Mountains (NRM) for the period 1989–2012. Although [4] conducted similar survival analyses, they found lethal methods significantly reduced the risk of recurrence, and that killing an entire wolf pack was more effective than the killing of a subset of members of a pack. They reported only a marginal difference between partial pack removal and no removal if wolves were killed within the first 7 days following a depredation event and no difference if 14 days elapsed. Most lethal interventions in Michigan were probably partial pack removals (median wolves killed = 1, [S1 Data File](#)) so our results are consistent. However, other differences in results between their study and ours could be due to different sites and methods.

The analysis in [4] included more varied methods of lethal intervention and the landscapes differ (theirs being mountainous and wider while Michigan's is flatter and surrounded by water on three sides, with attendant differences in vegetation, lake effects, human population density, wolf migration, livestock husbandry practices, etc.). In addition, the survival analyses employed by [4] differed from ours in ways that we could not resolve despite several email exchanges with the lead author and the analyst co-author.

First, [4] did not account for treatment effects beyond a single spatial scale (see [Box 1](#)). Their analysis was restricted to the affected wolf pack territory, despite their own reports that

killing wolves had at times scattered surviving pack members beyond their original territory [10, 13, 46]. This previous research would argue for an analysis that examined neighboring areas potentially affected by spill-over from scattered survivors.

Second, apparent shortcomings of the statistical modeling in [4] may have affected its results. Their measure of delay to recurrence for full pack removals spans the time from death of the last pack member to the time when a new pack attacked livestock in the same territory. This measure of delay to next depredation artificially inflates effectiveness because it incorporates a potentially long timespan before a new pack establishes, which probably includes many time-consuming events unrelated to the intervention (e.g., immigration, breeding). By contrast, our method censored observations at the end of each year, so subjects were compared on a more-equal footing after intervention. For partial removal and no removal interventions in [4], the territory was still occupied by wolves so delays probably did not include as many time-consuming demographic events (if any). Although we understand that their intent was to analyze if depredations could be delayed for longer by killing entire wolf packs, we would argue that the appropriate control for the evaluation of this intervention would be sites with suitable wolf habitat but without an established pack because of events unrelated to killing wolves, such as recolonization of vacant habitat.

Using a biomedical analogy, [4] identified the hospital bed (the pack territory) as the subject rather than the patient (the wolf pack), regardless if the wolf pack is the same or if it dies and is replaced by a new pack. Researchers continued measuring the delay to the next infection (depredation) in that bed over time, without correcting for the delay to arrival of a new patient to that bed if a previous patient dies. The delay to the next infection once a patient dies is contingent on the arrival of a new patient to that empty bed, which has little to do with the intervention implemented to the bed other than making it available for a new patient (with full pack removal). By contrast, in our study the patient (area) is the only patient, each infection receives a treatment, and delay to next infection is always measured for the same patient with a reset each year.

Third, differences with [4] could also potentially arise from different handling of the proportional hazards (PH) assumption. We evaluated the compliance of our models with the PH assumption through the inclusion of a time-varying covariate (tvc) [31]. A significant tvc affects both our treatment hazard ratios and their significance, (e.g., Table 3). We assume that [4]'s team employed other model diagnostics to evaluate their compliance with the PH assumption, but they did not report such diagnostic tests. Until the summary data are published, we cannot agree with the conclusions in [4].

Finally, some might argue that by defining our subjects as area-years and including the same area over different years we pseudo-replicated non-independent samples. In our dataset, only 16 out of 106 sections had depredation incidents in multiple years. To address that concern, we built an alternative model in which areas were omitted in succeeding years (S5 File). Results for this dataset are consistent with our main results at the section scale (S5 File).

Conclusions

Lethal interventions by the State of Michigan against wolves in the vicinities of verified livestock losses did not appear to reduce future losses. We view our findings as preliminary pending experiments with stronger inference. Our inferences could not overcome a lack of systematic information on government interventions and no effort to control for their treatments, despite a call for such shortly after the legalization of lethal removal of wolves in 2003 [47]. We detected a potential spill-over of depredations from the farm receiving lethal intervention onto neighboring farms. Given this evidence for interactions in depredations over

significant areas, we must look with skepticism upon any previous or future results which analyze the functional effectiveness of lethal control but do not take these spatial relationships into account. Further, given the severe ethical issues involved in implementing harmful or lethal interventions, the lack of effectiveness of these interventions argues for their curtailing in favor of non-lethal alternatives that are effective. In the State of Michigan, there is strong scientific evidence [2] for the effectiveness of at least two non-lethal methods (fladry and livestock guarding dogs; 7–8). No peer-reviewed scientific study has ever shown lethal methods to be effective in Michigan. Indeed, our review of [4] above suggests no study in the USA has yet proven with strong inference that killing wolves is effective in preventing future livestock losses [2, 39–41]. Although it may seem obvious that killing a predator whose jaws are about to lock on a calf should protect the calf, government lethal methods are not implemented in that way. Virtually all are indirect methods such as traps placed far from the depredation site and long after a calf is killed. Therefore, rigorous scientific evaluations are a necessary prerequisite before implementing an intervention, especially given the ethical and legal obligations to balance protection of livestock and wild animals for the broad public interest. The US Endangered Species Act mandates the use of the “best scientific and commercial data available” when making conservation and management decision for listed species.

Following recommendations for ethical wildlife management [48, 49], lethal management should be discontinued, as currently the harm it causes wolves and livestock is not offset by benefits. If lethal methods are still necessary in some situations [48, 49], these should be constantly monitored and evaluated by independent third parties to measure their effectiveness or lack thereof [48].

Supporting information

S1 File. Distribution of observations and recurrent events between treatments and strata for all spatial scales.

(DOCX)

S2 File. Results from frailty models for main dataset, for all spatial scales.

(DOCX)

S3 File. Results for ‘traps placed’ dataset.

(DOCX)

S4 File. Results for post-2003 dataset.

(DOCX)

S5 File. Results for ‘skip-a-year’ dataset and outlier exclusion.

(DOCX)

S1 Data File. Livestock depredation events involving gray wolves in the state of Michigan, USA (1998–2014).

(XLSX)

Acknowledgments

We thank H. Robinson and the University of Wisconsin-Madison’s Social Sciences Computing Cooperative for statistical advice. We thank the Michigan Department of Natural Resources, the USDA Wildlife Services, and their staff for fieldwork. This article does not necessarily reflect the views of the institutions or agencies involved.

Author Contributions

Conceptualization: Adrian Treves.

Data curation: Francisco J. Santiago-Avila.

Formal analysis: Francisco J. Santiago-Avila.

Funding acquisition: Ari M. Cornman, Adrian Treves.

Investigation: Francisco J. Santiago-Avila.

Methodology: Francisco J. Santiago-Avila, Adrian Treves.

Project administration: Adrian Treves.

Resources: Francisco J. Santiago-Avila, Ari M. Cornman, Adrian Treves.

Software: Francisco J. Santiago-Avila.

Supervision: Adrian Treves.

Validation: Francisco J. Santiago-Avila.

Writing – original draft: Francisco J. Santiago-Avila, Adrian Treves.

Writing – review & editing: Francisco J. Santiago-Avila, Ari M. Cornman, Adrian Treves.

References

1. Woodroffe R, Redpath SM. When the hunter becomes the hunted. *Science*. 2015; 348(6241):1312–4. <https://doi.org/10.1126/science.aaa8465> PMID: 26089495
2. Treves A, Krofel M, McManus J. Predator control should not be a shot in the dark. *Front Ecol Environ*. 2016; 14(7):380–8.
3. Herfindal I, Linnell JDC, Moa PF, Odden J, Austmo LB, Andersen R. Does recreational hunting of lynx reduce depredation losses of domestic sheep? *J Wildl Manage*. 2005; 69:1034–42.
4. Bradley EH, Robinson HS, Bangs EE, Kunkel K, Jimenez MD, Gude JA, et al. Effects of wolf removal on livestock depredation recurrence and wolf recovery in Montana, Idaho, and Wyoming. *The Journal of Wildlife Management*. 2015; 79(8):1337–46. <https://doi.org/10.1002/jwmg.948>
5. Mukherjee S. *The Emperor of All Maladies: A Biography of Cancer*. New York: Scribner; 2010.
6. Platt JR. Strong inference. *science*. 1964; 146(3642):347–53. <https://doi.org/10.1126/science.146.3642.347> PMID: 17739513
7. Davidson-Nelson SJ, Gehring TM. Testing fladry as a nonlethal management tool for wolves and coyotes in Michigan. *Human–Wildlife Interactions*. 2010; 4:87–94.
8. Gehring TM, VerCauteren KC, Provost ML, Cellar AC. Utility of livestock-protection dogs for deterring wildlife from cattle farms. *Wildl Res*. 2010; 37(8):715–21.
9. Wielgus RB, Peebles KA. Effects of wolf mortality on livestock depredations. *PLoS One*. 2014; 9(12): e113505. <https://doi.org/10.1371/journal.pone.0113505> PMID: 25470821; PubMed Central PMCID: PMC4254458.
10. Bradley EH, Pletscher DH. Assessing factors related to wolf depredation of cattle in fenced pastures in Montana and Idaho. *Wildl Soc Bull*. 2005; 33(4):1256–65.
11. Bradley EH, Pletscher DH, Bangs EE, Kunkel KE, Smith DW, Mack CM, et al. Evaluating wolf translocation as a nonlethal method to reduce livestock conflicts in the northwestern United States. *Conserv Biol*. 2005; 19:1498–508.
12. Poudyal N, Baral N, Asah ST. Wolf Lethal Control and Livestock Depredations: Counter-Evidence from Respecified Models. *PLOS ONE*. 2016; 11(2):e0148743. <https://doi.org/10.1371/journal.pone.0148743> PMID: 26866592
13. Bradley EH. *Evaluation of wolf-livestock conflicts and management in the northwestern United States*: University of Montana; 2004.
14. Treves A, Martin KA, Wydeven AP, Wiedenhoef JE. Forecasting Environmental Hazards and the Application of Risk Maps to Predator Attacks on Livestock. *Bioscience*. 2011; 61(6):451–8. <https://doi.org/10.1525/bio.2011.61.6.7>

15. Linnell JD, Odden J, Smith ME, Aanes R, Swenson JE. Large carnivores that kill livestock: do "problem individuals" really exist? *Wildl Soc Bull.* 1999;698–705.
16. Refsnider RL. The role of the Endangered Species Act in Midwest wolf recovery. In: Wydeven AP, Van Deelan TR, Heske E, editors. *Recovery of gray wolves in the Great Lakes Region of the United States.* New York: Springer; 2009. p. 311–29.
17. Edge JL, Beyer DE Jr, Belant JL, Jordan MJ, Roell BJ. Adapting a predictive spatial model for wolf *Canis spp.* predation on livestock in the Upper Peninsula, Michigan, USA. *Wildl Biol.* 2011; 17:1–10.
18. Edge JL, Beyer DE Jr, Belant JL, Jordan MJ, Roell BJ. Livestock and domestic dog predations by wolves in Michigan. *Human-Wildlife Interactions.* 2011; 5:66–78.
19. Beyer DE, Peterson R.O., Vucetich J.A., Hammill JH. Wolf population changes in Michigan. In: Wydeven AP, Van Deelen TR, Heske EJ, editors. *Recovery of Gray Wolves in the Great Lakes Region of the United States: an Endangered Species Success Story.* New York: Springer; 2009. p. 65–85.
20. Ruid DB, Paul WJ, Roell BJ, Wydeven AP, Willging RC, Jurewicz RL, et al. Wolf–human conflicts and management in Minnesota, Wisconsin, and Michigan. In: Wydeven AP, Van Deelan TR, Heske E, editors. *Recovery of gray wolves in the Great Lakes region of the United States.* New York: Springer; 2009. p. 279–95.
21. Olson ER, Stenglein JL, Shelley V, Rissman AR, Browne-Nuñez C, Voyles Z, et al. Pendulum swings in wolf management led to conflict, illegal kills, and a legislated wolf hunt. *Conservation Letters.* 2014. <https://doi.org/10.1111/conl.12096>
22. Treves A, Jurewicz RR, Naughton Treves L, Rose RA, Willging RC, Wydeven AP. Wolf depredation on domestic animals in Wisconsin, 1976–2000. *Wildl Soc Bull.* 2002; 30:231–41.
23. Wydeven AP, Treves A, Brost B, Wiedenhoeft JE. Characteristics of wolf packs in Wisconsin: identification of traits influencing depredation. *People and predators: from conflict to coexistence* Island Press, Washington, DC. 2004:28–50.
24. Bump JK, Murawski CM, Kartano LM, Beyer DE, Roell BJ. Bear-Baiting May Exacerbate Wolf-Hunting Dog Conflict. *PLOS One.* 2013; <https://doi.org/10.1371/journal.pone.0061708> PMID: [23613910](https://pubmed.ncbi.nlm.nih.gov/23613910/)
25. Flesher J. Michigan hunt targeted problem wolves, DNR says. *Detroit Free Press.* 2014 26 January 2014.
26. Musiani M, Visalberghi E. Effectiveness of fladry on wolves in captivity. *Wildl Soc Bull.* 2001; 29:91–8.
27. Voyles Z, Treves A, MacFarland D. Spatiotemporal effects of nuisance black bear management actions in Wisconsin. *Ursus.* 2015; 26(1):11–20.
28. MAS S. *Michigan Agricultural Statistics.* 2012.
29. Chavez AS, Gese EM. Landscape use and movement of wolves in relation to livestock in a wildland-agriculture matrix. *J Wildl Manage.* 2006; 70(4):1079–86.
30. Wydeven AP, Wiedenhoeft JE, Schultz RN, Thiel RP, Jurewicz RL, Kohn BE, et al. History, population growth, and management of wolves in Wisconsin. In: Wydeven AP, Van Deelan TR, Heske E, editors. *Recovery of gray wolves in the Great Lakes Region of the United States.* New York: Springer; 2009. p. 87–105.
31. Hosmer DW Jr, Lemeshow S, May S. *Applied survival analysis: Regression modelling of time to event data.* Second Edition. Second Edition ed. Hoboken, New Jersey, USA: Wiley-Interscience; 2008.
32. Clark TG, Bradburn MJ, Love SB, Altman DG. Survival Analysis Part I: Basic concepts and first analyses. *Br J Cancer.* 2003; 89(2):232–8. <https://doi.org/10.1038/sj.bjc.6601118> PubMed PMID: [12865907](https://pubmed.ncbi.nlm.nih.gov/12865907/)
33. Lin DY, Wei L-J. The robust inference for the Cox proportional hazards model. *Journal of the American statistical Association.* 1989; 84(408):1074–8.
34. Chapron G, Treves A. Blood does not buy goodwill: allowing culling increases poaching of a large carnivore. *Proceedings of the Royal Society of London B: Biological Sciences.* 2016; 283(1830). <https://doi.org/10.1098/rspb.2015.2939> PMID: [27170719](https://pubmed.ncbi.nlm.nih.gov/27170719/)
35. Kelly PJ, Lim LLY. Survival analysis for recurrent event data: an application to childhood infectious diseases. *Stat Med.* 2000; 19(1):13–33. PMID: [10623910](https://pubmed.ncbi.nlm.nih.gov/10623910/)
36. Treves A, Bruskotter JT. Gray wolf conservation at a crossroads. *Bioscience.* 2011; 61:584–5.
37. Xu Y, Cheung YB. Frailty models and frailty-mixture models for recurrent event times. *Stata J.* 2015; 15(1):135–54.
38. Treves A, Naughton-Treves L, Harper EK, Mladenoff DJ, Rose RA, Sickley TA, et al. Predicting human-carnivore conflict: a spatial model derived from 25 years of data on wolf predation on livestock. *Conserv Biol.* 2004; 18(1):114–25.

39. van Eeden LM, Crowther MS, Dickman CR, Macdonald DW, Ripple WJ, Ritchie EG, et al. Managing conflict between large carnivores and livestock. *Conserv Biol.* 2017;n/a-n/a. <https://doi.org/10.1111/cobi.12959> PMID: 28556528
40. Miller JRB, Stoner KJ, Cejtin MR, Meyer TK, Middleton AD, Schmitz OJ. Effectiveness of contemporary techniques for reducing livestock depredations by large carnivores. *Wildl Soc Bull.* 2016;n/a-n/a. <https://doi.org/10.1002/wsb.720>
41. Eklund A, López-Bao JV, Tourani M, Chapron G, Frank J. Limited evidence on the effectiveness of interventions to reduce livestock predation by large carnivores. *Scientific Reports.* 2017; 7(1):2097. <https://doi.org/10.1038/s41598-017-02323-w> PMID: 28522834
42. Hogberg J, Treves A, Shaw B, Naughton-Treves L. Changes in attitudes toward wolves before and after an inaugural public hunting and trapping season: early evidence from Wisconsin's wolf range. *Environ Conserv.* 2015:1–11. <https://doi.org/10.1017/s037689291500017x>
43. Treves A, Naughton-Treves L, Shelley V. Longitudinal analysis of attitudes toward wolves. *Conserv Biol.* 2013; 27(2):315–23. <https://doi.org/10.1111/cobi.12009> PubMed PMID: 23293913. PMID: 23293913
44. Treves A, Vucetich JA, Rabenhorst M, Cornman A. An evaluation of localized wolf control efforts to prevent subsequent livestock depredation in Michigan. *Natural Resources Report No 2013–4 Little River Band of Ottawa Indians.* 2013.
45. Haber GC. Biological, conservation, and ethical implications of exploiting and controlling wolves. *Conserv Biol.* 1996; 10:1068–81.
46. Brainerd SM, Andrén H, Bangs EE, Bradley EH, Fontaine JA, Hall W, et al. The effects of breeder loss on wolves. *The Journal of Wildlife Management.* 2008; 72(1):89–98.
47. Treves A, Naughton-Treves L. Evaluating lethal control in the management of human-wildlife conflict. In: Woodroffe GL, Thirgood S, Rabinowitz A, editors. *People and Wildlife, Conflict or Coexistence?* Cambridge, UK: Cambridge University Press; 2005. p. 86–106.
48. Lynn WS. Barred owls in the Pacific Northwest: An ethics brief. 2012.
49. Dubois S, Fenwick N, Ryan EA, Baker L, Baker SE, Beausoleil NJ, et al. International consensus principles for ethical wildlife control. *Conserv Biol.* 2017.

S1 File: Distribution of observations and recurrent events between treatments and strata for all spatial scales

Section scale: At the section scale, we restricted analyses to 3 strata due to lack of depredation events ($n < 10$) in subsequent strata (Table A).

Table A. Number of depredation events per intervention type, by strata (S#)

Intervention / Stratum	Number of observations (n)											
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
Lethal	23	3	5	1								
Non-lethal	128	28	12	7	4	3	3	3	3	3	3	1

Table B. Number of censored (0) and recurrent (1) depredation events for non-lethal treatment, by strata (S#)

Rec event / Stratum	Number of observations (n)											
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
0	100	12	8	3	1						2	1
1	28	16	4	4	3	3	3	3	3	3	1	

Table C. Number of censored (0) and recurrent (1) depredation events for lethal treatment, by strata (S#)

Rec event / Stratum	Number of observations (n)			
	S1	S2	S3	S4
0	20	2	1	1
1	3	1	4	

Township scale: At the township scale, we restricted analyses to one strata due to lack of depredation events for both treatments in stratum 2 (Tables D-F).

Table D. Number of depredation events per type of intervention type, by strata (S#)

Intervention / Stratum	Number of observations (n)		
	S1	S2	S3
Lethal	26	2	
Non-lethal	99	22	3

Table E. Number of censored (0) and recurrent (1) depredation events for non-lethal treatment, by strata (S#)

Rec event / Stratum	Number of observations (n)		
	S1	S2	S3
0	78	19	3
1	21	3	

Table F. Number of censored (0) and recurrent (1) depredation events for lethal treatment, by strata (S#)

Rec event / Stratum	Number of observations (n)	
	S1	S2
0	23	2
1	3	

Neighborhood scale: At the neighborhood scale, we restricted analyses to 2 strata due to lack of depredation events (n<10) in subsequent strata (Table G).

Table G. Number of depredation events per type of intervention type, by strata (S#)

Intervention / Stratum	Number of observations (n)			
	S1	S2	S3	S4
Lethal	20	6	1	
Non-lethal	86	13	5	1

Table H. Number of censored (0) and recurrent (1) depredation events for non-lethal treatment, by strata (S#)

Rec event / Stratum	Number of observations (n)			
	S1	S2	S3	S4
0	72	8	4	1
1	15	5	1	

Table I. Number of censored (0) and recurrent (1) depredation events for lethal treatment, by strata (S#)

Rec event / Stratum	Number of observations (n)		
	S1	S2	S3
0	15	5	1
1	4	1	

S2 File: Results from frailty models, for all spatial scales

Frailty models evaluate the goodness of fit of the treatment variable including within-subject random effects that might confound the effect of treatment [35]. In our context, frailty models assume that there are high-risk and low-risk subjects due to factors extrinsic to treatments or individual depredation events [17, 36]. Frailty models are useful when survival time is influenced by unmeasured factors [31, 37]. Important differences between subjects can confound the apparent effect of treatment [35]. Our frailty model results supported our main models, showing an insignificant reduction in risk of recurrence following lethal intervention, at all scales. Only the section scale frailty model revealed high heterogeneity due to within-subject effects (Table A). The section scale of our models is precisely the level at which one would expect the most frailty (within-subject factors would be felt at the spatial scale closest to an individual farm). For example, two farms with unusually high numbers of depredations (see S5 File) might have been detected by our frailty model. Accounting for this heterogeneity thus increased the magnitude of the coefficient for the effect of the intervention (HR = 52%) relative to our main model, although the coefficient for lethal intervention remains statistically insignificant.

Table A. Results from frailty models measuring risk of recurrence between treatments (lethal and non-lethal) implemented after depredation events, for all spatial scale

	Spatial scale of analysis		
	Section	Township	Neighborhood
Frailty models			
<i>Intervention COEF (SD)</i>	-0.74 (0.522)	-0.73 (0.620)	-0.22 (0.510)
p-val	0.158	0.242	0.67
<i>frailty COEF (SD)</i>	4.65 (1.68)**	0.05	0.03
p-val	0.006	-	-

Significance: * if p-val <.05; ** if <.01.

S3 File: Results for 'traps placed' dataset

In the alternate 'traps placed' model, non-lethal management with zero wolves killed was reclassified as 'lethal' because the infrastructure of killing wolves and attendant human influences on the habitat were treated as similar to lethal intervention in which wolves died.

Log rank tests could not distinguish the survival functions between treatments at any spatial scale (all tests $P > 0.05$, Table A). All Cox models also echo our main results, suggesting a statistically insignificant effect of lethal intervention relative to no intervention (Table B). Our most robust models at each scale suggest that lethal intervention was associated with a statistically insignificant reduction in risk of recurrence compared to no intervention at the section scale (treatment HR=0.76, $P=0.435$); a non-significant increase in risk of recurrence at the township scale (although the hazard ratio increases), signaling a greater risk of recurrence (treatment HR=2.35, $P=0.247$; tvc HR=0.96, $P=0.006$); and a non-significant reduction in risk of recurrence at the neighborhood of townships scale (treatment HR=0.64, $P=0.327$). The risk of recurrence also seemed to increase with calendar-year at all spatial scales (Table B), but this effect was not statistically significant at the township scale ($P=0.153$). Also, consistent with our main results, we found no evidence of a correlation between delay to recurrence and the number of wolves killed at any spatial scale for those depredation events followed by lethal intervention (Spearman's rho $P > .05$; Table C).

Table A. General and stratified log-rank (χ^2) tests examining difference between treatments' (lethal and non-lethal) survival distributions (measuring risk of recurrence) after wolf depredations, for all spatial scales, for the 'traps placed' dataset.

	Spatial scale of analysis		
	Section	Township	Neighborhood
INCIDENTS AND 'FAILURES'			
TOTAL DEPREDATION EVENTS	199	125	125
Failures (recurrent events)	56	24	25
SURVIVAL FUNCTIONS			
Log rank test (χ^2)	0.44	0.86	0.40
p-val	0.5072	0.3534	0.5296
Stratified Log-rank test (χ^2)	0.46	-	0.68
p-val	0.4989	-	0.4094

Significance: * if p-val $< .05$; ** if $< .01$.

Table B. Main results of Cox models measuring risk of recurrence between treatments (lethal and non-lethal) implemented after wolf depredations, for all spatial scales, for the 'traps placed' dataset.

	Spatial scale of analysis					
	Section		Township		Neighborhood	
PROPORTIONAL HAZARD MODELS	<i>Interv</i>	<i>Interv & year</i>	<i>Interv</i>	<i>Interv & year</i>	<i>Interv</i>	<i>Interv & year</i>
Standard cox (stratified)						
<i>Intervention HR (SD)</i>	0.78 (0.26)	0.76 (0.27)	0.60 (0.35)	0.58 (0.33)	0.69 (0.32)	0.64 (0.29)
p-val	0.453	0.435	0.38	0.34	0.430	0.327
<i>year HR (SD)</i>	-	1.09 (0.04)*	-	1.05 (0.05)	-	1.14 (0.06)*
p-val	-	0.022	-	0.292	-	0.022
Standard cox with tvc (stratified)						
<i>Intervention HR (SD)</i>	0.55 (0.25)	0.54 (0.26)	3.46 (2.82)	3.31 (2.70)	0.78 (0.57)	0.75 (0.58)
p-val	0.19	0.191	0.128	0.141	0.737	0.711
<i>tvc(Intervention)</i>	1.01 (0.01)	1.01 (0.01)	0.95 (0.02)**	0.95 (0.02)**	1.00 (0.01)	1.00 (0.01)
p-val	0.129	0.15	0.006	0.006	0.821	0.769
<i>year HR (SD)</i>	-	1.09 (0.04)*	-	1.05 (0.05)	-	1.14 (0.06)*
p-val	-	0.023	-	0.291	-	0.022

Significance: * if p-val <.05; ** if <.01.

Table C. Spearman correlation between delay to recurrence and number of wolves killed after depredation events followed by lethal intervention (wolves killed ≥ 0), for all spatial scales, for the 'traps placed' dataset.

	Section	Township	Neighborhood
Spearman's rho	0.076	0.233	0.161
p-val	0.6571	0.224	0.3954

Significance: * if p-val <.05; ** if <.01.

S4 File: Results for post-2003 dataset

Below we present results for our alternate post 2003 dataset. In this dataset, we limited depredation events to those occurring in or after 2003, after lethal management was episodically permitted.

Log rank tests could not distinguish the survival functions between treatments at any spatial scale (all tests $P > 0.05$, Table A). All Cox models are also consistent with our main results, suggesting a statistically insignificant effect of lethal intervention relative to no intervention (Table B). Our most robust models at each spatial scale suggest that lethal intervention was associated with a statistically insignificant reduction in risk of recurrence compared to no intervention at the section scale (treatment HR=0.67, $P=0.187$); a statistically insignificant increase in risk of recurrence at the township scale (treatment HR=1.21, $P=0.795$; tvc HR=0.97, $P=0.001$, suggesting minimal reduction in risk over follow-up time); and a statistically insignificant reduction in risk of recurrence at the neighborhood of townships scale (treatment HR=0.68, $P=0.413$). The risk of recurrence also seemed to increase with calendar-year at all spatial scales (Table B), but this effect was not statistically significant ($P > 0.05$) at any scale in this dataset. Also, consistent with our main results, we found no evidence of a correlation between delay to recurrence and the number of wolves killed at any spatial scale for those depredation events followed by lethal intervention (Spearman's rho $P > 0.05$; Table C).

Table A. General and stratified log-rank (χ^2) tests examining difference between treatments' (lethal and non-lethal) survival distributions (measuring risk of recurrence) after wolf depredations, for all spatial scales, for the post 2003 dataset.

	Spatial scale of analysis		
	Section	Township	Neighborhood
INCIDENTS AND 'FAILURES'			
TOTAL DEPREDATION EVENTS	174	103	103
Failures (recurrent events)	56	21	24
SURVIVAL FUNCTIONS			
Log rank test (χ^2)	1.11	1.94	0.57
p-val	0.2927	0.1632	0.4495
Stratified Log-rank test (χ^2)	1.15	-	0.88
p-val	0.2845	-	0.347

Significance: * if p-val < 0.05 ; ** if < 0.01 .

Table B. Main results of Cox models measuring risk of recurrence between treatments (lethal and non-lethal) implemented after wolf depredations, for all spatial scales, for the post 2003 dataset.

	Spatial scale of analysis					
	Section		Township		Neighborhood	
<i>PROPORTIONAL HAZARD MODELS</i>	<i>Interv</i>	<i>Interv & year</i>	<i>Interv</i>	<i>Interv & year</i>	<i>Interv</i>	<i>Interv & year</i>
Standard cox (stratified)						
<i>Intervention HR (SD)</i>	0.67 (0.20)	0.67 (0.20)	0.43 (0.28)	0.45 (0.29)	0.66 (0.31)	0.68 (0.32)
p-val	0.169	0.187	0.188	0.215	0.376	0.413
<i>year HR (SD)</i>	-	1.03 (0.05)	-	1.04 (0.08)	-	1.09 (0.09)
p-val	-	0.529	-	0.611	-	0.284
Standard cox with tvc (stratified)						
<i>Intervention HR (SD)</i>	0.42 (0.19)	0.42 (0.19)	1.41 (1.09)	1.44 (1.41)	0.71 (0.51)	0.74 (0.55)
p-val	0.054	0.059	0.661	0.643	0.632	0.690
<i>tvc(Intervention)</i>	1.01 (0.01)	1.01 (0.01)	0.97 (0.01)**	0.97 (0.01)**	1.00 (0.01)	1.00 (0.01)
p-val	0.071	0.072	0.001	0.001	0.886	0.873
<i>year HR (SD)</i>	-	1.03 (0.05)	-	1.04 (0.08)	-	1.09 (0.09)
p-val	-	0.533	-	0.623	-	0.282

Significance: * if p-val <.05; ** if <.01.

Table C. Spearman correlation between delay to recurrence and number of wolves killed after depredation events followed by lethal intervention (wolves killed ≥ 0), for all spatial scales, for the post 2003 dataset.

	Section	Township	Neighborhood
Spearman's rho	0.107	0.212	0.295
p-val	0.5591	0.2994	0.1354

Significance: * if p-val <.05; ** if <.01.

S5 File: Results for 'skip-a-year' dataset and outlier exclusion

Below we present results for our alternate 'skip-a-year' model for the section scale, created to address potential pseudo-replication concerns. In this model, sections are left outside the study for one year if they experienced depredations during the previous year. A one-year period outside the study seems a sensible amount of time for the section to enter the study as a different subject (section-year combination) independent from its prior inclusion..

Consistent with our main and supplementary analyses, log rank tests could not distinguish the survival functions between treatments at the section scale (df=1, general test: $\chi^2=0.83$, $P=0.363$; stratified test: $\chi^2=1.27$, $P=0.488$; Table A). Results for our Cox models are also consistent with our main results, suggesting a statistically insignificant effect of lethal intervention relative to non-lethal intervention (Table B). The models including tvc indicate that violating the proportional hazards assumption is not a concern (tvc $P>0.05$). Our main model, including treatment and year, shows that lethal intervention was associated with a statistically insignificant 45% reduction in risk of recurrence compared to non-lethal intervention at the section scale (treatment HR=0.52, $P=0.145$). The risk of recurrence also seemed to increase with calendar-year (HR=1.07; $P=0.104$), but this effect was not statistically significant. Also consistent with our main results, we found no evidence of a correlation between delay to recurrence and the number of wolves killed for those depredation events followed by lethal intervention (Spearman's rho $P>0.05$; Table C).

Additionally, we ran our tests on the dataset excluding one outlier farm which had an atypically high number of depredations (see http://www.mlive.com/news/index.ssf/2013/11/john_koski_part_1_tour_the_far.html). Although this restricted the analysis to one stratum at each spatial scale, the results for both section and township echo our main results. Furthermore, the result for increased risk for the township scale became stronger ($p=0.093$) in this model.

Table A. General and stratified log-rank (χ^2) tests examining difference between treatments' survival distributions at the section level for the 'skip-a-year' dataset.

	Section
SUBJECTS AND 'FAILURES'	
TOTAL DEPREDATION EVENTS	166
Failures (recurrent events)	38
SURVIVAL FUNCTIONS	
Log rank test (χ^2)	0.83
p-val	0.3633
Stratified Log-rank test (χ^2)	1.27
p-val	0.2602

Significance: * if p -val $< .05$; ** if $< .01$.

Table B. Results of Cox models at the section level for the 'skip-a-year' dataset.

	Section	
PROPORTIONAL HAZARD MODELS	<i>Interv</i>	<i>Interv & year</i>
Standard cox (stratified)		
<i>Intervention HR (SD)</i>	0.55 (0.24)	0.52 (0.234)
p-val	0.166	0.145
<i>year HR (SD)</i>	-	1.07 (0.043)
p-val	-	0.104
Standard cox with tvc (stratified)		
<i>Intervention HR (SD)</i>	0.51 (0.24)	0.48 (0.229)
p-val	0.149	0.125
<i>tvc(Intervention) HR (SD)</i>	1.00 (0.009)	1.00 (0.009)
p-val	0.771	0.826
<i>year HR (SD)</i>	-	1.07 (0.043)
p-val	-	0.105

Significance: * if p -val $< .05$; ** if $< .01$.

Table C. Spearman correlation between delay to recurrence and number of wolves killed for depredation events followed by lethal intervention (wolves killed ≥ 0) at the section level for the 'skip-a-year' dataset.

	Section
Spearman's rho	0.193
p-val	0.3547

Significance: * if p -val $< .05$; ** if $< .01$.

Supplemental Data 1: Livestock depredation events involving gray wolves in the State of Michigan, USA

INC_UID	INC_UID Date	TRS	Intervention(trichotomy)	# wolves killed
1	21 05 1998	**N21W26	None	
2	26 05 1998	**N23W07	None	
3	28 08 1998	**N21W03	None	
4	22 04 1999	**N30W13	None	
5	1 05 1999	**N30W28	None	
6	24 05 1999	**N21W02	None	
7	28 09 1999	**N30W08	None	
8	17 04 2000	**N33W13	None	
9	13 06 2000	**N46W32	None	
10	7 07 2000	**N43W17	None	
11	21 08 2000	**N21W02	None	
12	22 09 2000	**N21W08	None	
13	16 09 2001	**N39W08	None	
14	17 09 2001	**N47W05	None	
15	27 09 2001	**N34W23	None	
16	17 01 2002	**N26W19	None	
17	23 02 2002	**N35W32	None	
18	23 03 2002	**N03W11	None	
19	3 06 2002	**N42W10	None	
20	20 06 2002	**N41W15	None	
21	15 08 2002	**N28W27	None	
22	26 08 2002	**N10W03	None	
23	19 09 2002	**N34W29	None	
24	1 10 2002	**N42W21	None	
25	14 10 2002	**N10W09	None	
26	25 02 2003	**N26W10	None	
27	31 05 2003	**N10W21	None	
28	9 07 2003	**N28W14	None	
29	17 07 2003	**N35W13	None	
30	30 07 2003	**N10W10	Lethal	2
31	4 08 2003	**N10W21	Non-lethal	
32	20 08 2003	**N10W18	None	
33	25 08 2003	**N10W21	None	
34	29 08 2003	**N10W31	None	
35	30 08 2003	**N10W18	None	
36	2 09 2003	**N10W18	None	
37	13 09 2003	**N33W16	None	
38	15 09 2003	**N10W18	None	
39	30 09 2003	**N03W08	None	
40	14 06 2004	**N21W10	Lethal	1
41	22 06 2004	**N23W20	Non-lethal	
42	7 07 2004	**N21W34	None	
43	27 07 2004	**N21W34	None	
44	29 07 2004	**N41W19	Lethal	1
45	6 08 2004	**N13W09	Non-lethal	
46	14 08 2004	**N40W14	Lethal	1
47	27 08 2004	**N35W34	Lethal	1

48	4 09 2004	**N03W01	None	
49	15 10 2004	**N03W01	None	
50	21 10 2004	**N01W13	None	
51	12 04 2005	**N34W21	Lethal	3
52	1 06 2005	**N18W07	None	
53	24 07 2005	**N01W35	Lethal	0
54	27 07 2005	**N01W34	Lethal	0
55	29 07 2005	**N13W07	Lethal	1
56	3 10 2005	**N23W07	None	
57	23 10 2005	**N20W14	None	
58	2 11 2005	**N20W14	None	
59	21 02 2006	**N20W10	Non-lethal	
60	27 04 2006	**N41W15	None	
61	10 05 2006	**N41W15	None	
62	21 05 2006	**N34W21	None	
63	25 05 2006	**N41W15	Lethal	1
65	29 05 2006	**N39W11	Lethal	1
66	3 06 2006	**N41W15	Lethal	4
68	28 07 2006	**N34W12	Lethal	1
69	10 08 2006	**N34W08	None	
70	29 03 2007	**N10W09	None	
71	8 05 2007	**N41W15	Lethal	7
72	26 05 2007	**N38W17	Lethal	2
73	17 06 2007	**N01W32	None	
74	3 07 2007	**N27W25	Lethal	0
75	6 07 2007	**N41W15	None	
76	10 07 2007	**N41W15	Lethal	2
77	17 07 2007	**N10W09	None	
78	12 08 2007	**N34W10	Lethal	2
79	17 08 2007	**N34W20	Lethal	1
80	17 08 2007	**N34W12	None	
81	20 08 2007	**N34W04	None	
82	28 08 2007	**N10W31	None	
83	11 10 2007	**N01E24	None	
84	22 10 2007	**N01W03	None	
85	13 02 2008	**N41W15	Lethal	0
86	25 02 2008	**N41W15	Lethal	4
87	28 03 2008	**N39W09	None	
88	11 05 2008	**N34W03	None	
89	21 06 2008	**N35W24	None	
90	26 06 2008	**N41W15	Lethal	1
91	1 07 2008	**N41W15	None	
92	16 07 2008	**N34W29	Lethal	1
93	21 07 2008	**N27W25	None	
94	30 07 2008	**N41W15	None	
95	4 08 2008	**N10W10	None	
96	19 08 2008	**N34W15	None	
97	1 09 2008	**N39W11	Lethal	2
98	14 09 2008	**N35W24	None	

99	8 03 2009	**N41W15	Non-lethal	
100	27 03 2009	**N41W15	Non-lethal	
101	2 04 2009	**N27W35	Non-lethal	
102	17 04 2009	**N46W14	Non-lethal	
103	1 05 2009	**N41W15	Lethal	1
104	30 07 2009	**N34W22	Lethal	0
105	11 08 2009	**N10W21	Non-lethal	
106	26 08 2009	**N41W15	None	
107	26 08 2009	**N10W31	Non-lethal	
108	13 09 2009	**N10W31	Non-lethal	
109	7 10 2009	**N10W31	Non-lethal	
110	31 10 2009	**N01W08	None	
111	14 11 2009	**N10W09	Non-lethal	
112	23 04 2010	**N41W15	None	
116	27 04 2010	**N43W12	None	
119	3 05 2010	**N41W15	None	
122	6 05 2010	**N10W21	Non-lethal	
124	9 05 2010	**N25W02	None	
125	11 05 2010	**N41W15	None	
126	12 05 2010	**N38W18	None	
127	12 05 2010	**N41W15	None	
128	17 05 2010	**N41W15	None	
129	20 05 2010	**N11W34	Non-lethal	
130	20 05 2010	**N41W15	None	
132	24 05 2010	**N41W15	None	
137	2 06 2010	**N11W34	Non-lethal	
139	6 06 2010	**N41W15	None	
140	7 07 2010	**N10W09	None	
142	23 07 2010	**N38W18	None	
143	1 08 2010	**N41W15	None	
145	8 08 2010	**N47W34	None	
146	10 08 2010	**N41W15	None	
148	18 08 2010	**N34W12	None	
149	19 08 2010	**N38W18	None	
150	20 08 2010	**N10W03	Non-lethal	
151	26 08 2010	**N25W01	None	
152	2 09 2010	**N34W29	None	
153	2 09 2010	**N34W20	None	
154	4 09 2010	**N34W29	None	
155	5 09 2010	**N10W31	None	
156	6 09 2010	**N11W34	Non-lethal	
157	10 09 2010	**N41W15	None	
158	24 11 2010	**N32W01	None	
159	28 11 2010	**N10W31	None	
160	21 03 2011	**N41W15	None	
161	25 03 2011	**N41W15	None	
162	29 03 2011	**N41W15	None	
163	4 04 2011	**N41W15	None	
164	8 04 2011	**N41W15	None	

165	13 04 2011	**N33W33	None	
166	15 04 2011	**N41W15	None	
167	20 04 2011	**N41W15	None	
170	25 04 2011	**N41W15	None	
171	25 04 2011	**N38W18	None	
173	27 04 2011	**N46W14	None	
178	5 05 2011	**N41W15	None	
179	6 05 2011	**N34W15	None	
180	8 05 2011	**N38W17	None	
182	17 05 2011	**N11W34	None	
183	25 05 2011	**N38W17	None	
184	20 06 2011	**N11W34	None	
185	5 07 2011	**N34W20	None	
186	15 07 2011	**N11W34	None	
187	22 07 2011	**N10W03	None	
188	5 08 2011	**N34W12	None	
189	6 08 2011	**N10W31	None	
190	8 08 2011	**N35W24	None	
191	19 08 2011	**N41W15	None	
192	21 08 2011	**N35W26	None	
193	22 08 2011	**N10W31	None	
194	25 08 2011	**N23W04	None	
195	25 08 2011	**N41W15	None	
196	2 09 2011	**N34W12	None	
197	9 10 2011	**N10W31	None	
198	8 11 2011	**N01W02	None	
199	9 04 2012	**N38W17	Lethal	4
200	19 04 2012	**N47W29	Lethal	1
201	23 04 2012	**N35W29	Lethal	1
202	25 04 2012	**N45W07	None	
203	1 05 2012	**N41W15	None	
205	7 05 2012	**N41W15	None	
206	8 05 2012	**N34W15	None	
206.5	28 04 2012	**N34W15	Lethal	1
207	11 05 2012	**N34W29	None	
208	14 05 2012	**N38W27	None	
209	14 05 2012	**N38W17	None	
210	16 05 2012	**N41W15	Lethal	1
211	17 05 2012	**N35W21	None	
212	19 05 2012	**N38W17	None	
213	22 05 2012	**N34W12	None	
214	24 05 2012	**N41W28	Lethal	1
215	25 05 2012	**N35W24	None	
216	25 05 2012	**N38W17	None	
217	25 05 2012	**N41W15	None	
218	2 06 2012	**N34W18	None	
219	2 06 2012	**N41W15	None	
220	25 06 2012	**N41W15	None	
221	14 07 2012	**N41W15	None	

222	14 07 2012	**N10W33	None	
224	18 07 2012	**N41W15	None	
225	22 07 2012	**N26W26	None	
226	23 07 2012	**N10W33	None	
227	1 08 2012	**N41W15	None	
228	7 08 2012	**N10W33	None	
230	27 08 2012	**N41W15	None	
231	4 09 2012	**N41W15	None	
232	27 09 2012	**N41W15	None	
233	8 10 2012	**N11W25	None	
234	14 11 2012	**N19W32	None	
235	13 04 2013	**N01W10	None	
236	29 04 2013	**N35W11	Lethal	2
237	2 05 2013	**N10W15	None	
238	14 05 2013	**N34W18	None	
239	23 05 2013	**N34W18	Lethal	2
240	7 07 2013	**N03W02	None	
241	25 07 2013	**N38W17	None	
242	7 08 2013	**N04W33	None	
243	9 08 2013	**N41W28	Lethal	1
244	16 08 2013	**N34W29	Lethal	1
245	28 08 2013	**N35W24	None	
246	9 09 2013	**N38W17	None	
247	17 09 2013	**N36W03	None	
248	10 10 2013	**N10W27	None	
249	13 10 2013	**N11W25	None	
250	16 10 2013	**N10W27	Lethal	1
251	16 10 2013	**N04W15	None	
252	31 10 2013	**N02W20	None	
253	22 03 2014	**N10W10	None	
254	27 03 2014	**N38W17	None	
255	1 04 2014	**N10W10	None	
256	27 04 2014	**N38W17	None	
258	16 05 2014	**N33W30	None	
259	23 05 2014	**N38W17	None	
260	27 05 2014	**N10W15	None	

Roxann B Borisch

Subject: FW: Grant County Court Letter
Attachments: scan0009.pdf

From: Laurie Wright <wrightl@grantcounty-or.gov>
Sent: Wednesday, May 29, 2019 8:17 AM
To: ODFW Commission <ODFW.Commission@coho2.dfw.state.or.us>; 'odfw.commission@state.or.us' <odfw.commission@state.or.us>; 'odfw.info@state.or.us' <odfw.info@state.or.us>; 'Michelle.N.Dennehy@state.or.us' <Michelle.N.Dennehy@state.or.us>
Subject: Grant County Court Letter

Please find attached a letter regarding the Oregon Wolf Management and Conservation Plan from the Grant County Court.

Thank you,

Laurie Wright
Grant County Court Administrative Assistant –
Human Resources Manager
201 S. Humbolt, Ste. 280
Canyon City, OR 97820
541-575-0059



County Court of Grant County
Scott W. Myers, County Judge
Jim Hamsher, Commissioner
Sam Palmer, Commissioner

May 22, 2019


Chair Findley, Director Melcher, Members of the Commission:


The Grant County Court supports the following phase III changes in the Oregon Wolf Management and Conservation Plan as proposed by Wallowa County:

1. Normalize wolves as another predator on the landscape.
 - Depredation calls made in the field by qualified investigators.
 - This could include Sheriffs, State Police, ODFW Biologist, wildlife services, or a contractor.
2. Continue collaring.
 - Collars are an important part of non-lethal deterrents.
 - Every wolf in Oregon will come into contact with domestic livestock, and a notification system that allows producers to know where wolves are is the most important deterrent we have.
3. Management areas.
 - Establish management areas so that no one place in Oregon becomes overpopulated, and becomes overly burdensome to both wild and domestic ungulates.
4. Notify County government boards and sheriffs.
 - The current draft of the Plan uses language "as needed". This is an absolute need as the compensation committee has a county commissioner on it. 911 is used as an after hour way to report wolf depredations. The sheriff is often times the first point of contact in setting up investigations.

Thank you for your consideration.

Respectfully,


Scott W. Myers
County Judge


Jim Hamsher
Commissioner


Sam Palmer
Commissioner

Roxann B Borisch

From: Sandra Cox <scox@klamathcounty.org>
Sent: Wednesday, May 29, 2019 9:14 AM
To: odfw.commission@state.or.us
Cc: ljohnston@union-county.org
Subject: Letter from Klamath County
Attachments: 05-28-19 letter to Oregon Fish and Wildlife Commission re OR Wolf Plan Phase III.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Categories: Forwarded to Wildlife

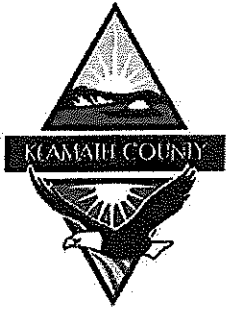
Good Morning,

Please see attached letter from Klamath County Commissioners.

Thank You,

Sandy Cox
Administrative Manager
Board of County Commissioners
541-851-3683





Board of Commissioners

Donnie Boyd, Commissioner
Position One

Kelley Minty Morris, Commissioner
Position Two

Derrick DeGroot, Commissioner
Position Three

May 28, 2019

Chair Finley, Director Melcher,
and Commissioner Members
Oregon Department of Fish and Wildlife Commission
odfw.commission@state.or.us

RE: Oregon Wolf Management and Conservation Plan

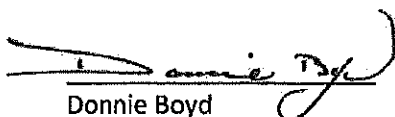
Dear Chair Finley, Director Melcher and Commissioner Members:

Klamath County is no stranger to the impacts of wolf and livestock conflicts and depredations. We support Wallowa County Board of Commissioners' proposed changes to Phase III of the Oregon Wolf Management and Conservation Plan. These changes include:

1. Normalizing wolves as another predator on the landscape.
 - a. Depredation calls should be made in the field by qualified investigators to include Sheriff's Deputies, State Police Troopers, ODFW Biologists and Wildlife Services or Contractors.
2. Continued Collaring.
 - a. Collars are an important part of non-lethal deterrents. Every wolf in Oregon will come into contact with domestic livestock and a notification system that allows producers to know where wolves are is the most powerful deterrent we have.
3. Management Areas.
 - a. Establish management areas so that no one place in Oregon becomes overpopulated and becomes overly burdensome to both wild and domestic ungulates.
4. Notify County Government Board and Sheriffs.
 - a. The current draft of the plan uses language "as needed". The "as needed" should be removed as notification of County Government and law enforcement is an absolute must. 911 is used as an after hours way to report wolf depredations. The County Sheriff is often the first point of contact in setting up investigations.

We appreciate your consideration.

Sincerely,



Donnie Boyd
Chair



Kelley Minty Morris
Vice Chair



Derrick DeGroot
Commissioner

Roxann B Borisch

From: Vanessa Schulz <vschulz@gmail.com>
Sent: Tuesday, May 28, 2019 9:20 AM
To: odfw.commission@state.or.us
Subject: Wolf comment period

Dear ODFW,

We the undersigned would like our voices to be heard that we DO NOT agree with the heavy-handed approach to wolf management in Oregon.

Wolves should not be delisted as long as people have a bloodlust to torture and kill wolves. Selling hunting licenses to kill an animal as social in its family units as a wolf is immoral. Killing pack members (and relocation) disrupts the ability of predators to hunt elk/deer and promotes the taking of easier prey ie. cows and sheep. This is called A SELF-PERPETUATING INDUSTRY OF WOLF CONTROL and should be condemned.

Let's not follow the dismal examples of Idaho, Montana and Wyoming in inflicting so much suffering and heartbreak on the wolves themselves and the people who want and welcome them here—an 80% public majority, while the very vocal minority seems to have the power to persuade federal agents to do their bidding. We would like our voices heard and wolves protected, as is your mandate and perhaps deep down, your humanity.

Signed,

Vanessa Schulz
Shawn Harvey
Caroline Swart
Paul Swart
Diana Blum
Dustin Castleberry
Donna Joslyn

(Contact info for the people listed above available upon request)

Roxann B Borisch

From: Taylor Albertson <taylorpalbertson@gmail.com>
Sent: Thursday, May 30, 2019 5:50 PM
To: odfw.commission@state.or.us
Subject: Public input on 2020 seasons

Hello,

I see that you're considering removing the Juniper Muzzleloader rut tag. I think that's the right move. Low deer density and low quality. Would you possibly consider moving other muzzleloader deer tags closer to the rut time to make up for it? For example, the interstate and silver lake muzzy tags are immediately after the controlled rifle season. With the 1,600+ rifle hunters in the interstate and 2,000+ rifle hunters in the silver lake unit, it really lowers the quality of the muzzy tags following. All the deer are scattered and hiding. If you moved those muzzy tags to November, they would be much better hunts, people would use more points on them, which would help alleviate point creep.

And maybe instead of a Juniper Muzzy tag, you could just change it to High Desert Muzzy so you could basically hunt all of southeast oregon with a muzzleloader during the rut. Bigger hunt area will spread hunters out and offer a better opportunity to harvest a good buck.

I think better, higher quality tags will bring more hunting interest to Oregon. States that are focusing on quality hunts instead of quantity seem to be doing better off. Offering a wider variety of hunts with better seasons would be beneficial.

Has there ever been talk of starting archery season a week earlier, having a muzzleloader season, and then rifle. You could spread more hunters out, and offer more hunts with a better experience, like Nevada and Colorado offer. It would be nice to have a true muzzleloader season for deer and elk in Oregon.

Thanks,

Taylor

Sent from my iPhone

Roxann B Borisch

From: mailagent@thesoftedge.com on behalf of jimbach@comcast.net
Sent: Friday, May 31, 2019 8:43 AM
To: odfw.commission@state.or.us
Subject: Please vote to approve the 2019 Oregon Wolf Management Plan

Dear Dear Commissioners,:

Dear Commissioners,

Please vote to approve the 2019 draft Oregon Wolf Conservation and Management Plan.

I'm one of the more than 17,000 Oregon members of the Rocky Mountain Elk Foundation, a national hunting-based conservation organization that works to ensure the future of elk, other wildlife, their habitat and our hunting heritage.

Gray wolves have significantly impacted big game populations and livestock in Western states. The Oregon Wolf Plan calls for scientific-based wolf management measures, including authorized removal and the consideration of controlled take with hunting and trapping. It is absolutely critical for the Oregon Department of Fish and Wildlife to have the ability to use these tools to ensure the long-term sustainability of wolves, other wildlife and their habitats as well as livestock production.

Thank you for the opportunity to comment on this important proposal.

Sincerely,

Jim Bachmeier
4640 86th Ave NE
Olympia, WA 98516

Roxann B Borisch

From: Krissy Zimnicki <kazimnicki@icloud.com>
Sent: Friday, May 31, 2019 1:02 PM
To: odfw.commission@state.or.us
Subject: Wolves

Please do not allow the hunting of our wolves! Hunting disrupts packs and is unnecessary. Can we please promote sound management of wolves that only involves killing as a last resort?

Kristina Zimnicki
6047 NE Mason Street
Portland, OR 97218

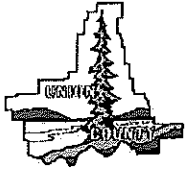
Sent from my iPad

Roxann B Borisch

From: Annette Powers <apowers@union-county.org>
Sent: Friday, May 31, 2019 11:58 AM
To: ODFW Commission; odfw.commission@state.or.us; odfw.info@state.or.us;
Michelle.N.Dennehy@state.or.us
Cc: Lorcinda Johnston (ljohnston@union-county.org)
Subject: Oregon Wolf Management and Conservation Plan
Attachments: doc00785120190531135313.pdf

Hello,
Attached please find a letter from the Union County Commissioners with recommended changes for the Phase III Oregon Wolf Management and Conservation Plan.

Annette Powers
Sr Dept Specialist II
Union County Commissioners & Emergency Services
1106 K Avenue
La Grande, OR 97850
(541) 963-1001
apowers@union-county.org



UNION COUNTY BOARD OF COMMISSIONERS

*Donna Beverage, Commissioner
Paul Anderes, Commissioner
R. Matthew Scarfo, Commissioner*

Shelley Burgess, Administrative Officer

1106 K Avenue

La Grande, OR 97850

PHONE (541)963-1001

FAX (541)963-1079

TTY 1-800-735-1232

May 29, 2019

ODFW Commission Chair Finley
ODFW Director Melcher
Members of the Commission

Union County has one of the highest concentrations of established wolf packs and breeding pairs of wolves in the State of Oregon. We have experienced multiple wolf conflicts with livestock and depredation with multiple livestock species. The Union County Wolf Depredation Compensation Committee was established in January, 2012 and remains active. Many years of conflicts with wolves have proven to be challenging for our area, including livestock producers, law enforcement, wildlife services, Oregon Department of Fish & Wildlife biologists, and the environmental community.

These are the Phase III changes we see necessary in the Oregon Wolf Management and Conservation Plan:

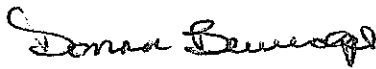
1. Normalize wolves as another predator on the landscape.
 - Depredation calls made in the field by qualified investigators. This could include Sheriffs, Oregon State Police, Oregon Department of Fish and Wildlife Biologists, Wildlife Services, or contractors.
2. Continue collaring.
 - Collars are an important part of non-lethal deterrents. Every wolf in Oregon will come into contact with domestic livestock. A notification system that allows producers to know where wolves are is the most powerful deterrent available.
3. Management areas.
 - Establish management areas so that no one place in Oregon becomes overpopulated and becomes overly burdensome to both wild and domestic ungulates.
4. Notify county government, boards, and Sheriff's.
 - The current draft of the Plan uses the language "as needed". This notification is an absolute necessity. Our wolf depredation compensation committee requires a county commissioner to be on the committee. Our 911 dispatchers often receive notifications after hours of wolf depredation

reports. Many times, the Sheriff is the first point of contact in initializing investigations.

These are necessary changes needed in Union County to make a challenging situation more tolerable.

Thank you for your consideration.

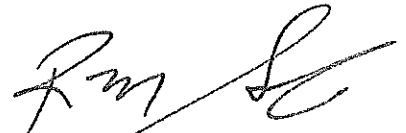
Sincerely,



Donna Beverage
Chair



Paul Anderes
Commissioner



R. Matthew Scarfo
Commissioner

PUBLIC CORRESPONDENCE

Received May 23, 2019 to May 31, 2019

**Subject: Oregon's Wolf Plan Should be
Science-Based, Emphasizing Nonlethal
Management Instead of Killing Wolves**

**669 individuals submitted the attached letter
(List and Letters Attached)**

37 individuals submitted this letter with additional comments

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Raleigh koritz
Minneapolis, MN 55442

Dona	Ward	Eugene	OR	97403	5/17/2019
Benton	Elliott	Eugene	OR	97401	5/17/2019
Charles	Looney	Scappoose	OR	97056	5/17/2019
Samuel	Carl	Salem	OR	97306	5/17/2019
Debra	Rehn	Portland	OR	97202	5/17/2019
Coleen	Stowell	Bend	OR	97702	5/17/2019
Stephen	Karakashian	Portland	OR	97222	5/17/2019
Kendyl	Linn-Sanchez	Seattle	WA	98117	5/17/2019
Peggy	Quentin	Portland	OR	97213	5/17/2019
Pamela	Lasselle	Portland	OR	97224	5/17/2019
sara	sexton	Sanger	TX	76266	5/20/2019
Brittany	Bettis	Portland	OR	97206	5/17/2019
Sharon	Jenda	Oregon City	OR	97045	5/17/2019
Mary	Sooh	Walterville	OR	97489	5/19/2019
Diana	Robertson	Fall Creek	OR	97438	5/21/2019
Kim	Wick	Buxton	OR	97109	5/21/2019
Craig	Soule	Terrebonne	OR	97760	5/17/2019
Meghan	Petersen	Portland	OR	97229	5/18/2019
James	Scoville	North Bend	OR	97459	5/17/2019
H	Gunther	Cornelius	OR	97113	5/17/2019
Redwind	Walker	Burns	OR	97720	5/17/2019
Kat	Ridler	Bend	OR	97701	5/18/2019
Erin	Marshall	Portland	OR	97211	5/17/2019
A.	Todd	Eugene	OR	97404	5/17/2019
Richard	Spotts	Saint George	UT	84790	5/18/2019
Susanna	Askins	Portland	OR	97230	5/17/2019
Kim	Carter	Veneta	OR	97487	5/17/2019
Judith	Rose	Venice	FL	34293	5/20/2019
Jim	Yarbrough	Ashland	OR	97520	5/22/2019
Alice	Larsen	Portland	OR	97203	5/19/2019
Terry	Barber	Springfield	OR	97477	5/17/2019
Kathy	Ransier	Oakland	OR	97462	5/17/2019
Dorinda	Kelley	Portland	OR	97213	5/17/2019
Casey Jo	Remy	Days Creek	OR	97429	5/17/2019
Jacob	Tietsort	Portland	OR	97214	5/17/2019
Eve	Senkovich	Elmira	OR	97437	5/17/2019
Lucy	Cline	Tillamook	OR	97141	5/17/2019
Amanda	Caster	Phoenix	OR	97535	5/17/2019
Melanie	Ryan	Eugene	OR	97404	5/17/2019
Linda	Taravella	Portland	OR	97214	5/17/2019
Petr	Khkyabich	Beaverton	OR	97006	5/19/2019
Remy	Dambrown	Portland	OR	97209	5/17/2019
Alina	Lambert	Portland	OR	97214	5/17/2019
Wally	Sykes	Joseph	OR	97846	5/21/2019
Paul	Borcharding	La Grande	OR	97850	5/17/2019
Susankay	Lester	Roseburg	OR	97471	5/17/2019
Roslyn	Simon	Portland	OR	97229	5/18/2019
Heather	Walker-Dale	Wilsonville	OR	97070	5/17/2019
Rachel	Cairns	Hermiston	OR	97838	5/17/2019
Jessica	Jern	Bend	OR	97701	5/18/2019
Maggie	O'Driscoll	Eugene	OR	97405	5/17/2019
Larry	Gimbel	Gresham	OR	97080	5/17/2019
Hristina	Boncheva	Phoenix	AZ	85001	5/16/2019
Siamak	Fooladi	Eugene	OR	97405	5/17/2019
Marshall	Spencer	Portland	OR	97205	5/17/2019
Yulia	Brockdorf	Hillsboro	OR	97123	5/17/2019
Jody	Caicco	Happy Valley	OR	97086	5/17/2019
Cybele	Knowles	Tucson	AZ	85716	5/16/2019
Debra	Snow	Gresham	OR	97080	5/19/2019
Mark	Whitham	Bend	OR	97703	5/17/2019
Barbara	Lewis	Grants Pass	OR	97526	5/17/2019
Jacqueline	Jenkins	Salem	OR	97303	5/18/2019
Amanda	Moore	Portland	OR	97217	5/17/2019
Jennifer	Dehart	Portland	OR	97222	5/17/2019
Don	Abing	Astoria	OR	97103	5/17/2019
Mark	Wheeler	Portland	OR	97215	5/20/2019
Becky	Rose	Beaverton	OR	97005	5/17/2019
Bruno	Cilione	Salem	OR	97308	5/18/2019
Betsy	Datri	Eugene	OR	97403	5/17/2019
David And Judith	Berg	Eugene	OR	97405	5/22/2019
Julie	Schneider	Bend	OR	97701	5/23/2019

Susan	Mead	Lake Oswego	OR	97034	5/21/2019
Bethany	Lester	Sandy	OR	97055	5/17/2019
Pamela	Pearson	Medford	OR	97501	5/17/2019
Tim	Wilson	Gold Beach	OR	97444	5/17/2019
Richard	Hanes	Grants Pass	OR	97527	5/17/2019
Laura	Stice	Eugene	OR	97402	5/19/2019
Lisa	Weseman	Portland	OR	97233	5/18/2019
Sue	Staehli	Portland	OR	97225	5/18/2019
Joy	Grate	Portland	OR	97223	5/17/2019
Adam	Roske	Cottage Grove	OR	97424	5/20/2019
Lindea	Kirschner	Ashland	OR	97520	5/17/2019
Marcy	Lauer	Independence	OR	97351	5/17/2019
Carol	Lambert	Hammond	OR	97121	5/17/2019
Niki	Wise	Eugene	OR	97405	5/17/2019
Marv	Binegar	Oregon City	OR	97045	5/17/2019
JoAutumn	Brock	Oregon City	OR	97045	5/17/2019
David	Tvedt	Eugene	OR	97404	5/17/2019
anne	vincent	Jacksonville	OR	97530	5/20/2019
Monica	Gilman	Estacada	OR	97023	5/17/2019
Osalyn	Houser	Albany	OR	97321	5/20/2019
Steve	Aydelott	Bend	OR	97701	5/17/2019
Frank	Jones	Talent	OR	97540	5/17/2019
Adrian	Bergeron	Halfway	OR	97834	5/18/2019
Gavin	Bondy	Portland	OR	97222	5/18/2019
halsey	swain	Portland	OR	97217	5/23/2019
Katarina	Carter	Salem	OR	97302	5/17/2019
Liz	Flowers	Portland	OR	97215	5/17/2019
Dan	Overmyer	Nehalem	OR	97131	5/17/2019
Karen	Cole	Wilsonville	OR	97070	5/18/2019
Helen	Moissant	Central Point	OR	97502	5/17/2019
Helen	Moissant	Central Point	OR	97502	5/17/2019
James	Thompson	Portland	OR	97210	5/17/2019
Vallie	Lenzen-Debad	Sandy	OR	97055	5/17/2019
Wendy	Hinsberger	Beaverton	OR	97007	5/17/2019
Cyndy	Miller	Saint Helens	OR	97051	5/17/2019
Ruba	Leech	Portland	OR	97211	5/17/2019
Sandra	Ganey	Portland	OR	97206	5/17/2019
Daniel	Anderson	Eugene	OR	97402	5/17/2019
Romney	Shiffer Taylor	Cottage Grove	OR	97424	5/17/2019
Jane	Kwiatkowski	Eugene	OR	97405	5/17/2019
Rick	Mick	Tucson	AZ	85701	5/16/2019
Rick	Mick	Tucson	AZ	85701	5/16/2019
Rick	Mick	Tucson	AZ	85701	5/16/2019
Patricia	Spicer	Eugene	OR	97405	5/17/2019
Mark	Rochester	Sutherlin	OR	97479	5/17/2019
Kristin	Ebbe	Corvallis	OR	97333	5/17/2019
Wilma	Ingram	Warrenton	OR	97146	5/18/2019
Robin	Katzenstein	Albany	OR	97322	5/17/2019
Jan	Stone	Beaverton	OR	97007	5/17/2019
Philip	Colvard	Medford	OR	97501	5/17/2019
Beth	Marshall	Central Point	OR	97502	5/18/2019
Jennifer	Weaver-Neist	Hillsboro	OR	97123	5/17/2019
Isaac	Ehrlich	Rhododendron	OR	97049	5/18/2019
Michael	Wherley	Eugene	OR	97402	5/17/2019
Crystal	Frisk	Portland	OR	97229	5/17/2019
Patricia	Moore	Talent	OR	97540	5/17/2019
Ashley	Stoneking	Newberg	OR	97132	5/17/2019
Greg	Steinke	Depoe Bay	OR	97341	5/18/2019
Jennifer	Croy	West Linn	OR	97068	5/17/2019
Margo	Slaughter	Eugene	OR	97401	5/17/2019
Cindy	Schultz	Beaverton	OR	97006	5/17/2019
Lisa	Baldwin	Grants Pass	OR	97527	5/17/2019
Martha	Lawler	La Pine	OR	97739	5/17/2019
Charles	Repsher	Eugene	OR	97405	5/17/2019
Erin	Walker	Portland	OR	97206	5/17/2019
Virginia	Pabst	Sisters	OR	97759	5/17/2019
Susan	Croissant	Cottage Grove	OR	97424	5/17/2019
Nancy	Lyles	Grants Pass	OR	97527	5/17/2019
Trisha	Ten Broeke	Portland	OR	97267	5/17/2019
Kimberly	Gossen	Bend	OR	97703	5/23/2019
Harry	Knapp	Riverside	CA	92507	5/16/2019

Tracy	Mott	West Linn	OR	97068	5/17/2019
Gary	Ivey	Bend	OR	97702	5/17/2019
Robin	MacGarghee	Beaverton	OR	97005	5/17/2019
William	Casebier	Klamath Falls	OR	97603	5/17/2019
Kerry	Meads	White City	OR	97503	5/18/2019
Phil	Mlotto	Portland	OR	97219	5/21/2019
Margaret	Glass	John Day	OR	97845	5/17/2019
Jennifer	Johnston	Lake Oswego	OR	97034	5/17/2019
Will	Ritter	Astoria	OR	97103	5/17/2019
Elee	Alleckson	Happy Valley	OR	97086	5/17/2019
Nina	Council	Ashland	OR	97520	5/17/2019
Nina	Council	Ashland	OR	97520	5/20/2019
Gary	Evans	Troutdale	OR	97060	5/24/2019
Dana	Bleckinger	Yachats	OR	97498	5/17/2019
Chris	Mack	Portland	OR	97267	5/17/2019
Eugene	Perkins	Portland	OR	97202	5/18/2019
Shawn	Thompson	Portland	OR	97206	5/17/2019
Mary	Lyda	Cave Junction	OR	97523	5/17/2019
sherrie	kuehn	Gladstone	OR	97027	5/19/2019
Tod Jones	Jones	Eugene	OR	97402	5/17/2019
Lisa	Neste	High Point	NC	27265	5/17/2019
Amy	Hunter	Corvallis	OR	97330	5/17/2019
Mary	Buckley	Portland	OR	97211	5/18/2019
Stephanie	Christensen	Portland	OR	97219	5/20/2019
Christine	Mueller	Portland	OR	97202	5/17/2019
Lois	White	Grants Pass	OR	97527	5/17/2019
Lois	White	Grants Pass	OR	97527	5/17/2019
Sheila	Martin	Astoria	OR	97103	5/17/2019
Susan	Spencer	Gresham	OR	97030	5/17/2019
Linda	Massey	Clinton	WA	98236	5/17/2019
Vida	Lohnes	Rhododendron	OR	97049	5/17/2019
Linda	Voci	Redmond	OR	97756	5/17/2019
Oakley	Taylor	Bend	OR	97702	5/17/2019
Deborah	Carey	Corvallis	OR	97333	5/17/2019
Lisa	Billings	Portland	OR	97221	5/17/2019
Nicole	Rousseau	Beaverton	OR	97007	5/18/2019
Eileen	Stark	Portland	OR	97212	5/17/2019
Teresa	Coble	Springfield	OR	97478	5/21/2019
Karen	Sinclair	Grants Pass	OR	97527	5/18/2019
Patricia	De Garmo	Portland	OR	97215	5/19/2019
Carolina	Hood	Eugene	OR	97402	5/22/2019
Betty	Ensign	Eugene	OR	97405	5/17/2019
Sergio	Padilla	Dravosburg	PA	15034	5/21/2019
Ann	Dow	Hood River	OR	97031	5/19/2019
Bob	Bresky	Oregon City	OR	97045	5/17/2019
Lucie	Stenseth	Eugene	OR	97401	5/17/2019
Kacey A	Donston	Westlake	OR	97493	5/18/2019
Sandra	Crozier	Bend	OR	97702	5/17/2019
Ann	Clarkson	Portland	OR	97202	5/17/2019
Kimberly	Fujita	Cave Junction	OR	97523	5/17/2019
Barbara	Danko	Philomath	OR	97370	5/17/2019
Claudia	McCracken	Happy Valley	OR	97086	5/17/2019
Lisbeth	Gieszler	Portland	OR	97224	5/17/2019
Katrina	Blackburn	Portland	OR	97205	5/17/2019
Gertrude	Turley	Boring	OR	97009	5/18/2019
Kai	Neuenschwander	Portland	OR	97211	5/17/2019
Deb	Buitron	Port Orford	OR	97465	5/17/2019
Judith	Mercer	Roseburg	OR	97471	5/18/2019
Jane	Kenworthy	Medford	OR	97504	5/17/2019
K	F	Salem	OR	97302	5/18/2019
C	Davis	Portland	OR	97209	5/17/2019
Judith	Phillips	Eagle Point	OR	97524	5/17/2019
Margaret	Stephens	Salem	OR	97301	5/17/2019
Dan And Janet	Blair	Joseph	OR	97846	5/20/2019
Amber Gayle	Thalmayer	Eugene	OR	97402	5/20/2019
Delphine	Bez	Tualatin	OR	97062	5/17/2019
David	Harrison	Salem	OR	97302	5/19/2019
Randi	Brinkley	Canby	OR	97013	5/17/2019
Debbie	Schlenoff	Eugene	OR	97405	5/17/2019
Eric	Lambart	Portland	OR	97217	5/17/2019
Elizabeth	Sipos	Portland	OR	97213	5/17/2019

Wendy	Tsien	Eugene	OR	97405	5/20/2019
Clearysage	Lasage	Grants Pass	OR	97527	5/19/2019
Denise	Giago	Springfield	OR	97477	5/17/2019
Peter	Broderick	Portland	OR	97202	5/17/2019
Michael	Halloran	Salem	OR	97305	5/17/2019
Michael	Brown	Eugene	OR	97405	5/17/2019
Karen	Debraal	Springfield	OR	97477	5/17/2019
Dan	Sherwood	Portland	OR	97214	5/17/2019
Sally	Martin	Oregon City	OR	97045	5/17/2019
Julie	Harris	Beaverton	OR	97078	5/17/2019
Paula	Hood	Portland	OR	97211	5/22/2019
Ellen	Kraus	Corvallis	OR	97330	5/17/2019
Sharon	Matticola	Eugene	OR	97404	5/17/2019
Beth	Levin	Portland	OR	97213	5/17/2019
Beth	Levin	Portland	OR	97213	5/17/2019
Beth	Stout	Portland	OR	97201	5/17/2019
Heather	Davis	Beaverton	OR	97003	5/17/2019
Stephanie	Speros	Portland	OR	97229	5/17/2019
Kristen	Swanson	Springfield	OR	97477	5/17/2019
Kim	Koch	Nehalem	OR	97131	5/17/2019
WALTER	Firth	Sparkill	NY	10976	5/16/2019
Jan	Garen	Schenectady	NY	12345	5/21/2019
Christeen	Anderson	Crestview	FL	32539	5/18/2019
M.A.	Kruse	Bend	OR	97703	5/17/2019
JB	Jensen	Corvallis	OR	97330	5/19/2019
Julie	Cockeram	Portland	OR	97229	5/18/2019
Keith	Foisy	Portland	OR	97230	5/17/2019
Amber	La Pointe	Williams	OR	97544	5/17/2019
Cathie	Bell	Portland	OR	97218	5/17/2019
Marilyn	Mooshie	Selma	OR	97538	5/17/2019
Kathy	Hessler	Portland	OR	97224	5/17/2019
Leslie	Drentlaw	Lake Oswego	OR	97035	5/17/2019
Ann	Henry	Lake Oswego	OR	97034	5/17/2019
Carolyn	Taylor	Coquille	OR	97423	5/17/2019
Cottie	Huber	North Plains	OR	97133	5/17/2019
Marcus	Hubley	Salem	OR	97306	5/17/2019
Kristen	Pearson	Central Point	OR	97502	5/17/2019
William	Remy	Days Creek	OR	97429	5/18/2019
Victoria	Fells	Sixes	OR	97476	5/17/2019
Wes	Pettegrew	Medford	OR	97504	5/17/2019
Marylin	Haidri	Portland	OR	97239	5/22/2019
Mike	White	Portland	OR	97233	5/18/2019
Robin	Jenkins	Dallas	OR	97338	5/17/2019
Christine	Anderson	Happy Valley	OR	97086	5/17/2019
Isabel	Ortiz	Beaverton	OR	97003	5/17/2019
Danny	Dyche	Hillsboro	OR	97123	5/20/2019
Jovy	Jergens	Beaverton	OR	97008	5/17/2019
Edith	Montgomery	Ashland	OR	97520	5/20/2019
Mari	Dominguez	Linden	CA	95236	5/19/2019
Sharlane	Blaise	Portland	OR	97201	5/17/2019
melissa	rehder	Portland	OR	97206	5/18/2019
Elizabeth	Von Radlcs	Medford	OR	97501	5/17/2019
Danielle	Anneman	West Linn	OR	97068	5/18/2019
Steve	Sheehy	Klamath Falls	OR	97603	5/17/2019
Alicia	Cohen	Portland	OR	97214	5/17/2019
Inge	Bjorkman	Placerville	CA	95667	5/17/2019
Cynthia	Stein	Jacksonville	OR	97530	5/18/2019
Michael	Earl	Redmond	OR	97756	5/19/2019
Michael	Earl	Redmond	OR	97756	5/21/2019
Jacqueline	Glyde	Portland	OR	97220	5/18/2019
Lucia	Massarella	Eugene	OR	97405	5/17/2019
Jon	Pearson	Talent	OR	97540	5/17/2019
Rick	McDonough	Monument	OR	97864	5/17/2019
Constance	Lee	Beaverton	OR	97008	5/17/2019
janna	piiper	Portland	OR	97293	5/17/2019
George	Snipes	Portland	OR	97206	5/17/2019
Carol	May	Bend	OR	97701	5/17/2019
Juan	Calvillo	Portland	OR	97267	5/17/2019
Tricia	Holman	Salem	OR	97301	5/17/2019
Alan	Hanson	Bend	OR	97703	5/17/2019
Maia	Howes	Springfield	OR	97478	5/17/2019

Jean	Wyman	Portland	OR	97213	5/18/2019
Maura	Price	Portland	OR	97232	5/17/2019
Jack	Wells	Portland	OR	97215	5/17/2019
Carl	Chieffo	Eugene	OR	97402	5/17/2019
Janet	Sleath	Bend	OR	97701	5/17/2019
C	Giles	La Grande	OR	97850	5/17/2019
Latasha	Bibey	Tillamook	OR	97141	5/17/2019
Teresa	Uriarte	Sweet Home	OR	97386	5/17/2019
Jim And Sophie	Swirczynski	Eugene	OR	97404	5/21/2019
Judy	Lee	Ashland	OR	97520	5/18/2019
Maria	Fiorella	Portland	OR	97267	5/17/2019
Deborah	Dowling	Gresham	OR	97030	5/17/2019
Brenda	Riddle	Forest Grove	OR	97116	5/21/2019
Marilyn	Russo	Portland	OR	97236	5/17/2019
Catherine	Leach	Springfield	OR	97477	5/20/2019
Suzanne	Seiber	Ashland	OR	97520	5/18/2019
Nadia	Ayash	Portland	OR	97225	5/17/2019
Karen	Horton	Independence	OR	97351	5/17/2019
Robert	Meyer	Newberg	OR	97132	5/17/2019
Janette	Wells	Bend	OR	97702	5/17/2019
Fran	Young	North Plains	OR	97133	5/17/2019
Richard Eli	Campbell	Woodland Hills	CA	91367	5/17/2019
David	Kenagy	Albany	OR	97321	5/17/2019
Carolyn	Latierra	Portland	OR	97212	5/17/2019
Heather	Stein	Portland	OR	97211	5/17/2019
Claire	Waring	Portland	OR	97206	5/19/2019
Leon-Forrest	Caulkins	Lincoln City	OR	97367	5/17/2019
Rachael	Erickson	The Dalles	OR	97058	5/17/2019
Gabriel	Lopez	Portland	OR	97202	5/17/2019
Joel	Kay	Portland	OR	97222	5/17/2019
John	Rudolph	Bend	OR	97703	5/18/2019
Ljiljana	Milic			11000	5/17/2019
marguery lee	zucker	Eugene	OR	97403	5/17/2019
Karen	Dittrich	Grants Pass	OR	97526	5/18/2019
Charlie	Graham	Hillsboro	OR	97124	5/17/2019
Tom	Coffee	Lake Oswego	OR	97035	5/17/2019
Robert	Cleveland	Portland	OR	97219	5/17/2019
Clivonne	Corbett	Roseburg	OR	97471	5/18/2019
Victoria	Gantz	Portland	OR	97215	5/17/2019
Pam	Rensch	Saint Helens	OR	97051	5/17/2019
Theodora	Tsongas	Portland	OR	97215	5/17/2019
Amanda	Ferguson	Portland	OR	97220	5/21/2019
Kara	Powers	Eugene	OR	97405	5/17/2019
Mary	Knoth	Central Point	OR	97502	5/17/2019
maureen	rogers	Newberg	OR	97132	5/17/2019
Anna	Cowen	Portland	OR	97266	5/17/2019
Gwyneth	Bowman	Ashland	OR	97520	5/17/2019
Andrea	Hungerford	Oregon City	OR	97045	5/17/2019
Betsy	Herbert	Corvallis	OR	97330	5/17/2019
Kim	Kahl	Bend	OR	97703	5/22/2019
Debra	Garoutte	Grants Pass	OR	97527	5/17/2019
Arthur	Noble	Bandon	OR	97411	5/17/2019
Linda	Firestone	Port Orford	OR	97465	5/17/2019
Suzanne	Kindland	Cannon Beach	OR	97110	5/17/2019
Kelly	Mcconnell	Portland	OR	97223	5/17/2019
Marceline	Gearry	Portland	OR	97210	5/17/2019
Brad	Hanscom	Florence	OR	97439	5/18/2019
Leslie	Burpo	Eugene	OR	97405	5/17/2019
Michael	Noack	Seal Rock	OR	97376	5/17/2019
Karen	McGill	Portland	OR	97206	5/22/2019
Ann	Bethune	Portland	OR	97219	5/17/2019
Leah	Hemelstrand	Eugene	OR	97405	5/17/2019
Lorraine	Foster	Portland	OR	97202	5/17/2019
Katie	Abbott	Bend	OR	97703	5/18/2019
Katie	Abbott	Bend	OR	97703	5/18/2019
Lee	Finney	Gold Hill	OR	97525	5/18/2019
Kelsey	Stoneking	Portland	OR	97224	5/17/2019
Kathy	Gray	Shasta Lake	CA	96019	5/20/2019
Lynnette	Chiotti	Saint Helens	OR	97051	5/17/2019
Carla	Williams	Cottage Grove	OR	97424	5/19/2019
Margaret	Thompson	Forest Grove	OR	97116	5/17/2019

Alita	Pearl	Neotsu	OR	97364	5/17/2019
Glen	Koehrsen	Mulino	OR	97042	5/17/2019
Margaret	King	Redmond	OR	97756	5/17/2019
Diane	Luck	Portland	OR	97212	5/17/2019
Beverly	Standish	Portland	OR	97223	5/17/2019
Peggy	Leviton	Jacksonville	OR	97530	5/17/2019
Danika	Sinram	Beaverton	OR	97078	5/18/2019
Carole	Lacock	Trail	OR	97541	5/17/2019
Paul	Keough	Beaverton	OR	97007	5/17/2019
Satya	Vayu	Portland	OR	97206	5/18/2019
Alien	Olson	Minneapolis	MN	55409	5/16/2019
Martha	Metcalf	Grants Pass	OR	97527	5/17/2019
Carol	Alexander	Yachats	OR	97498	5/17/2019
Beverly	Tiemann	Lake Oswego	OR	97034	5/17/2019
Andrew	Oldham	Portland	OR	97217	5/17/2019
Shawn	Fontain	Eugene	OR	97402	5/17/2019
Janine	Perrignon	Medford	OR	97504	5/17/2019
Mark	Smeltzer	Sisters	OR	97759	5/17/2019
Anthony	Davis	Ashland	OR	97520	5/17/2019
Barry	Tsg	College Park	MD	20740	5/16/2019
John	Koenig	Eugene	OR	97405	5/17/2019
Samantha	Peterson	Astoria	OR	97103	5/19/2019
Dale	Marshall	Gold Hill	OR	97525	5/17/2019
Rita	Castillo	Springfield	OR	97478	5/18/2019
Tamara	McCollum	Oregon City	OR	97045	5/17/2019
Nancy L	Carl	Carlton	OR	97111	5/17/2019
Dresden	Skees-Gregory	Hillsboro	OR	97124	5/17/2019
Erica	Maranowski	Portland	OR	97214	5/17/2019
Charles	Baughman	Bend	OR	97703	5/17/2019
Linda	Hanmer	Portland	OR	97229	5/17/2019
Serena	Chakravorty	Happy Valley	OR	97086	5/19/2019
Frank	Rouse	Colton	OR	97017	5/17/2019
Kathryn	Lenstet	Cave Junction	OR	97523	5/17/2019
Amy	Roberts	Albany	OR	97321	5/17/2019
Susan	Killoran	Lake Oswego	OR	97035	5/17/2019
Noelle	Fowler	Portland	OR	97230	5/18/2019
Bob	Karcich	Medford	OR	97504	5/17/2019
Celeste	Howard	Hillsboro	OR	97124	5/17/2019
Maureen	O'Neal	Portland	OR	97223	5/17/2019
Erica	Risberg	Portland	OR	97205	5/17/2019
Laurel	Rudy	Menifee	CA	92586	5/22/2019
Kim	Pearson	Medford	OR	97504	5/17/2019
Mary	McGaughey	Gresham	OR	97030	5/18/2019
Scott	Crockett	Florence	OR	97439	5/17/2019
Maurine	Canarsky	Portland	OR	97282	5/17/2019
Jon	Mohr	Portland	OR	97203	5/20/2019
Mary	Callison	Bend	OR	97701	5/19/2019
Marianne	McClure	Portland	OR	97202	5/17/2019
Marianne	McClure	Portland	OR	97202	5/19/2019
Richard	Viola	Portland	OR	97210	5/17/2019
Phyllis	Grove	Bend	OR	97703	5/18/2019
Marc	Lipman	Brookings	OR	97415	5/17/2019
Julie	Glick	Roseburg	OR	97471	5/17/2019
Julie	Oatfield	Portland	OR	97220	5/20/2019
Randy	Kozar	Hillsboro	OR	97124	5/17/2019
Aaron	Payette	Portland	OR	97220	5/17/2019
Rosalie	Sable	Medford	OR	97501	5/17/2019
Jennifer	Hauge	Salem	OR	97302	5/17/2019
Donlon	McGovern	Portland	OR	97211	5/17/2019
BREENA	SATTERFIELD	Portland	OR	97212	5/17/2019
Greg	Black	Portland	OR	97202	5/18/2019
Cathy	Bledsoe	Portland	OR	97225	5/17/2019
Tammy	Severns	Corvallis	OR	97330	5/17/2019
Sue	Lundquist	Ashland	OR	97520	5/18/2019
Denise	Breece	Gresham	OR	97080	5/17/2019
Linda	Alstad	Salem	OR	97304	5/17/2019
Eli	Rex	Beaverton	OR	97007	5/17/2019
Jane	Jones	Milton Freewater	OR	97862	5/17/2019
Rebecca	Ramage	Sandy	OR	97055	5/17/2019
Alex	Prentiss	Beaverton	OR	97007	5/17/2019
James	Hemmingsen	Eugene	OR	97403	5/17/2019

Janelle	Davidson	Ashland	OR	97520	5/21/2019
Lee	Schondorf	Yoncalla	OR	97499	5/17/2019
Nannette	Taylor	Portland	OR	97233	5/17/2019
Tiffany	McCleary	Portland	OR	97210	5/21/2019
Deshna	Ubeda	Portland	OR	97215	5/17/2019
Cristy	Murray	Oregon City	OR	97045	5/18/2019
Nina	Utigaard	Talent	OR	97540	5/18/2019
Gary	Landiers	Sisters	OR	97759	5/17/2019
Kathleen	McIntyre	Portland	OR	97211	5/17/2019
Brenda	Peterson	Portland	OR	97223	5/22/2019
D	Stirpe	Portland	OR	97214	5/22/2019
Mary Anne	Ericson	Portland	OR	97215	5/17/2019
Marta	Zweben	Portland	OR	97221	5/17/2019
Debra	Wilson	Ashland	OR	97520	5/17/2019
Debra	Wilson	Ashland	OR	97520	5/20/2019
Penelope	Kaczmarek	Siletz	OR	97380	5/17/2019
Rick	Beam	West Linn	OR	97068	5/18/2019
Anne	Montarou	Somerville	MA	2143	5/17/2019
Setsuko	Maruki-Fox	Grants Pass	OR	97527	5/17/2019
Joel	Philippi	Portland	OR	97239	5/17/2019
Nicole	Crawford	Lebanon	OR	97355	5/18/2019
S.	Cook	Portland	OR	97236	5/23/2019
Lynn	Cannon	Eugene	OR	97401	5/17/2019
Jana	Borba	Gold Hill	OR	97525	5/21/2019
Amy	Christenson	Talent	OR	97540	5/17/2019
Diana	Saxon	Salem	OR	97301	5/18/2019
Charlotte	Garber	Albany	OR	97321	5/17/2019
Adele	Dawson	Florence	OR	97439	5/17/2019
Catherine	Tinney Rome	Salem	OR	97304	5/17/2019
Linda	Grabe	Hillsboro	OR	97124	5/17/2019
Linda	Grabe	Hillsboro	OR	97124	5/17/2019
Jonathan	Phelps	Ashland	OR	97520	5/17/2019
Charissa	Clifford	Portland	OR	97211	5/17/2019
Alicia	Liang	Portland	OR	97214	5/21/2019
Kevin	Brown	Silverton	OR	97381	5/18/2019
Linda	Brodeur	Toledo	OR	97391	5/17/2019
John	Murphy	Hood River	OR	97031	5/17/2019
Patricia	Kelly	Port Orford	OR	97465	5/17/2019
Estelle	Voeller	Medford	OR	97501	5/17/2019
Gail	Ohara	Portland	OR	97213	5/17/2019
Magda	Permut	Portland	OR	97214	5/17/2019
Amber	Thomas	Caldwell	ID	83605	5/23/2019
Sarah	Witter	Portland	OR	97202	5/17/2019
Peter	Barry	Joseph	OR	97846	5/22/2019
Suzanne	Fouty	Baker City	OR	97814	5/22/2019
Catherine	Palmer	Portland	OR	97203	5/17/2019
Yvonne	Winsor	Portland	OR	97267	5/17/2019
Jenny	Boulton	Gresham	OR	97080	5/17/2019
Susan	Newton	Portland	OR	97210	5/17/2019
M.	W.	Brookings	OR	97415	5/17/2019
Cynthia	Enlow	Albany	OR	97321	5/17/2019
Wendy	McKee	Corvallis	OR	97330	5/18/2019
Anette	Collins	Klamath Falls	OR	97601	5/17/2019
Tracy	Walker	Cottage Grove	OR	97424	5/17/2019
Susan	Heath	Albany	OR	97322	5/18/2019
Lynn	Haynes	Bend	OR	97702	5/17/2019
Margaret	Kelley	Bend	OR	97702	5/18/2019
Cynthia	Hogan	Salem	OR	97306	5/19/2019
Laurie	Fisher	Portland	OR	97224	5/17/2019
Karen	McCandless-Buck	Beaverton	OR	97005	5/17/2019
Daniela	Molnar	Portland	OR	97214	5/17/2019
Amanda	Bray	Salem	OR	97302	5/17/2019
Kathleen	Ruiz	Seaside	OR	97138	5/17/2019
Elizabeth	Menetrey	Astoria	OR	97103	5/17/2019
Heidi	Perry	Portland	OR	97211	5/17/2019
Nate	Hildebrand	Portland	OR	97212	5/17/2019
Dan	Sauer	Salem	OR	97302	5/17/2019
Marty	Biersner	Coos Bay	OR	97420	5/21/2019
Dana	Smith	Salem	OR	97301	5/17/2019
Lynn	Zurcher Law	Oregon City	OR	97045	5/17/2019
Gisela	Ryter	Bend	OR	97701	5/17/2019

Betty	Massoni	Corvallis	OR	97330	5/20/2019
Steve	Weiss	Portland	OR	97202	5/17/2019
Peter	Teneau	Portland	OR	97217	5/17/2019
Jennifer	Smith	Salem	OR	97317	5/23/2019
Steve	Goldberger	Portland	OR	97209	5/17/2019
Jim	Pillon	Portland	OR	97219	5/17/2019
Jason	Dingeldein	Imnaha	OR	97842	5/17/2019
Jane	Rich	Portland	OR	97205	5/17/2019
Harry	Frelberg	Brookings	OR	97415	5/17/2019
Katherine	Wright	West Linn	OR	97068	5/17/2019
Aura	Wright	Brookings	OR	97415	5/17/2019
Lisa	Bosca	Portland	OR	97214	5/17/2019
Kim	Faulkner	West Linn	OR	97068	5/18/2019
Suzanne	Moulton	Gresham	OR	97030	5/17/2019
Sandi	Cornez	Portland	OR	97219	5/17/2019
Mary	Parham	Portland	OR	97223	5/17/2019
Jennifer	Wynne Arancibia	Portland	OR	97210	5/17/2019
Randa	Law	Eugene	OR	97405	5/17/2019
Jamie	Fillmore	Portland	OR	97224	5/17/2019
Cheryl	Trosper	Portland	OR	97206	5/17/2019
Jim	Massey NMD	Portland	OR	97225	5/17/2019
Robin	Kladke	Roseburg	OR	97470	5/20/2019
Lynn	R	Fort Smith	AR	72903	5/20/2019
Gisele	Albertine	Bend	OR	97707	5/17/2019
Rheama	Koonce	Beaverton	OR	97007	5/17/2019
Lloyd	Vivola	Portland	OR	97266	5/19/2019
Jdefrancesco	Johnson	Silverton	OR	97381	5/17/2019
Edward	Necker	Eugene	OR	97404	5/17/2019
Cynthia	Marrs	Junction City	OR	97448	5/17/2019
Shannon	Hunter	Portland	OR	97227	5/17/2019
Rick	Lambert	Eugene	OR	97401	5/17/2019
Patrick Justice	BOYD	Portland	OR	97224	5/17/2019
Debra	Lutje	The Dalles	OR	97058	5/22/2019
Carol	Nugent	Hillsboro	OR	97124	5/17/2019
Kate	Kenner	Brattleboro	VT	5301	5/21/2019
Jo	Kirsch	Beaverton	OR	97008	5/18/2019
Lauren	Thompson	Portland	OR	97202	5/20/2019
Julie	Redman	Eugene	OR	97401	5/17/2019
Catherine	Dishion	Santa Ynez	CA	93460	5/17/2019
Margarita	Perez	Portland	OR	97203	5/17/2019
Susan	Marsh	Lake Oswego	OR	97035	5/20/2019
Sergius	Tunes	Beaverton	OR	97007	5/17/2019
Cher	Clarke	Beverly Hills	CA	90210	5/16/2019
Laura	Fryburg	Albany	OR	97322	5/17/2019
Michael	Renfrow	Portland	OR	97213	5/18/2019
Lise	Hull	Bandon	OR	97411	5/17/2019
Alexis	Martin	Portland	OR	97223	5/17/2019
Jane	Bicquette	Sherwood	OR	97140	5/17/2019
Tracy	Richards	Clackamas	OR	97015	5/17/2019
Lara	Winn	Portland	OR	97214	5/23/2019
Candice	Mahki	Mc Grath	AK	99627	5/17/2019
Kelsey	Pearson	Medford	OR	97501	5/17/2019
Wilbur	Gregg	Eugene	OR	97402	5/18/2019
Brent	Rocks	Portland	OR	97201	5/17/2019
Jacob	Wallace	Portland	OR	97217	5/23/2019
Nancy	Dudley	Sisters	OR	97759	5/17/2019
Carol	Elkins	Aumsville	OR	97325	5/17/2019
Dvora	Robinson	Portland	OR	97206	5/17/2019
JEFFREY	RICHARDSON	Bend	OR	97702	5/17/2019
Mary	Kwart	Ashland	OR	97520	5/17/2019
Eileen	Rosenthal	Eagle Creek	OR	97022	5/17/2019
Hope	Sloan	Salem	OR	97301	5/18/2019
Douglas	Lee	Welches	OR	97067	5/17/2019
Jane	Heisler	Portland	OR	97214	5/17/2019
Robert	Demyan	Corvallis	OR	97339	5/22/2019
Susan	Arthur	Vancouver	WA	98661	5/17/2019
Cathie	Batavia	Portland	OR	97229	5/17/2019
John	Gasperoni	Corvallis	OR	97330	5/17/2019
Donna	Sharp	Veneta	OR	97487	5/19/2019
Susan	Wechsler	Corvallis	OR	97330	5/17/2019
Hillary	Tiefer	Portland	OR	97219	5/17/2019

First Name	Last Name	City	State	Zip	Date Submitted
Raleigh	koritz	Minneapolis	MN	55442	5/19/2019
Cody	Hoff	Portland	OR	97266	5/18/2019
Suzanne	Guest	Portland	OR	97212	5/18/2019
Kat	Stone RN	Roseburg	OR	97471	5/17/2019
Dave	Ruud	Portland	OR	97231	5/18/2019
Erlin	McGanty	Salem	OR	97301	5/17/2019
Ron	Cavin	Eugene	OR	97401	5/17/2019
Louise	Lopes	Mulino	OR	97042	5/24/2019
Anna	Shook	Portland	OR	97217	5/17/2019
Anthony	Albert	Corvallis	OR	97330	5/17/2019
Stacey	Dean	Corvallis	OR	97330	5/18/2019
Debra	Culwell	Gresham	OR	97030	5/17/2019
Julia	Fitzgerald	Harrisburg	OR	97446	5/17/2019
Greg	Haggard	Portland	OR	97206	5/17/2019
Carolyn	Borg	Saint George	UT	84790	5/22/2019
Stan	Schmokel	Portland	OR	97202	5/17/2019
Steven	Deutsch	Eugene	OR	97401	5/17/2019
David	Carnese	Portland	OR	97214	5/18/2019
Jonathan	Hanken	Jacksonville	OR	97530	5/17/2019
Cary	Rutherford	Portland	OR	97223	5/18/2019
Elizabeth Carol	Edwards	Cloverdale	OR	97112	5/17/2019
Jan	Rose	Portland	OR	97236	5/17/2019
Shinann	Earnshaw	Bend	OR	97703	5/17/2019
angle	heide	Portland	OR	97214	5/17/2019
The	Undertaker	Troutdale	OR	97060	5/17/2019
Laura	Fleming	Eagle Point	OR	97524	5/17/2019
Veronica	B.	Placerville	CA	95667	5/18/2019
Shelley	Reynolds	Gladstone	OR	97027	5/17/2019
Lesa	Dilorio	Buckeye	AZ	85326	5/18/2019
Dr. Phyllis	Rapport	Talent	OR	97540	5/17/2019
Sharon	Davis	Gladstone	OR	97027	5/17/2019
Eileene	Gillson	Sherwood	OR	97140	5/17/2019
Andrew	McCauley	Portland	OR	97239	5/17/2019
Jasmine	Saavedra	Philomath	OR	97370	5/17/2019
Aaron	Hubbell	Lake Oswego	OR	97035	5/17/2019
Nora	Polk	Portland	OR	97206	5/17/2019
Roberta	Boyden	Eugene	OR	97408	5/17/2019
Henry	Levin	Medford	OR	97504	5/17/2019
Jordan	Antonelli	Portland	OR	97202	5/17/2019
Amanda	Sweet-Bunner	Portland	OR	97224	5/17/2019
Jan	Monical	Warren	OR	97053	5/17/2019
Stephanie	Turnbull	Eugene	OR	97405	5/17/2019
Clarissa	Marsh	Scappoose	OR	97056	5/17/2019
Jacquilin	Singleterry	Portland	OR	97203	5/18/2019
Galen	Andronis	Winston	OR	97496	5/17/2019
Candace	Cooke	Gaston	OR	97119	5/17/2019
Christina	Pasillas	Klamath Falls	OR	97603	5/17/2019
Brandon	Potter	Cottage Grove	OR	97424	5/17/2019
Susan	Delles	Rogue River	OR	97537	5/17/2019
Joan	Viers	Hubbard	OR	97032	5/17/2019
Jim	Fety	Rogue River	OR	97537	5/20/2019
Jeanne	Crowley	Astoria	OR	97103	5/17/2019
Steve	Rauworth	Portland	OR	97214	5/17/2019
Toni	Rubin	Portland	OR	97214	5/17/2019
Cindy	Lowry	Freeport	ME	4032	5/17/2019
Stephanie	Taylor	Sandy	OR	97055	5/17/2019
Sandra	Britton	Palm Coast	FL	32137	5/17/2019
Mark	Nielson	Bend	OR	97702	5/17/2019
Randy	Maxfield	Salem	OR	97301	5/17/2019
Jessica	Serna	Portland	OR	97211	5/17/2019
Maria	Kelly	Ashland	OR	97520	5/17/2019
Laura	Chiang	Beaverton	OR	97008	5/17/2019
Amanda	Feaver	Portland	OR	97217	5/17/2019
Anne	Ryland	Ashland	OR	97520	5/17/2019
Marla	Goodman	Los Altos	CA	94022	5/23/2019
Rachael	Stalker	Portland	OR	97210	5/17/2019
Susan	Strauss	Bend	OR	97703	5/22/2019
Thomas	Scarpinato	Portland	OR	97229	5/17/2019
Phil	Hanson	Salem	OR	97301	5/17/2019
Debra	Lapidus	Ashland	OR	97520	5/17/2019

Peggy	Mischke	Salem	OR	97306	5/17/2019
jen	Eiffert	Medford	OR	97504	5/17/2019
Joan	Walker	Bishop	CA	93514	5/18/2019
Billie	Ambrose	Gresham	OR	97080	5/17/2019
Pamela	Breitwater	Portland	OR	97225	5/17/2019
Matthew	Barmann	Hood River	OR	97031	5/17/2019
Katrina	Shortridge	Corvallis	OR	97333	5/17/2019
Lynn And Roger	Stapes	Dexter	OR	97431	5/17/2019
Richard	Clinton	Corvallis	OR	97330	5/17/2019
Richard	Pasichnyk	Eugene	OR	97402	5/20/2019
Jim	Gibson	Portland	OR	97225	5/18/2019
Rinya	Frisbie	Canby	OR	97013	5/17/2019
Julia	De Castro	Sisters	OR	97759	5/17/2019
John	Nettleton	Portland	OR	97202	5/17/2019
Tangelee	Bushmangesner	Salem	OR	97303	5/17/2019
Wayne	Kelly	Ashland	OR	97520	5/17/2019
Olina	St. Onge	Medford	OR	97501	5/20/2019
Marcel	Liberge	Murphy	OR	97533	5/17/2019
Rebeckah	Berry	Bend	OR	97702	5/17/2019
Dianne	Ensign	Portland	OR	97219	5/17/2019
Maggie	Joyce	Portland	OR	97216	5/17/2019
Ann	Hollyfield	Seal Rock	OR	97376	5/17/2019
Narda	Tolentino	Gresham	OR	97080	5/17/2019
Edward	Winter	Eugene	OR	97402	5/17/2019
Victoria	Holzendorf	Lake Oswego	OR	97034	5/18/2019
Alan	MacComb	La Pine	OR	97739	5/17/2019
Michelle	McEldowney	Oregon City	OR	97045	5/17/2019
Lara	Meyer	Corvallis	OR	97330	5/17/2019
Erin	McDonald	Portland	OR	97216	5/17/2019
Diane	McCallister	Bend	OR	97703	5/17/2019
Jon	Wood	Portland	OR	97205	5/17/2019

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. And do you understand that all life on our world is currently in the middle of the 6th mass extinction and each life is so much more precious than ever. Thank you for carefully considering my input.

Sincerely,

Kathy Gray
Shasta Lake, CA 96019

Dear Oregon Fish and Wildlife Commission,

How can Oregonians trust in the Oregon Department of Fish and Wildlife to responsibly revise the Oregon State wolf plan? Just this week, Oregon's Department of Fish and Wildlife Director Curtis Melcher took it upon himself to unilaterally speak for the state of Oregon by quietly writing to a federal agency saying that in the Lower 48 states and Mexico, the gray wolf no longer meets the definition of an endangered or threatened species under the federal Endangered Species Act. Fortunately, Gov. Brown learned of this and corrected this action. I'm writing yet again, as we have many times over the years, to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Carol Alexander
Yachats, OR 97498

Dear Oregon Fish and Wildlife Commission,

I'm writing as a long term Oregon resident and a strong advocate for the wild wolf populations in Oregon. Wolves are an iconic wildlife species that have been a part of Oregon natural history for eons and should be allowed to again thrive in the state. To me they symbolize the wildness of our natural areas and maintain ecological balance of elk and deer herds. It should not be made easier for the state to kill wolves. I'm also writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

John Koenig
Eugene, OR 97405

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. These 6 proposed revisions are in conflict with the ODFW's Agency's Mission statement to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. The Agency's approach is corrupt because of pressure from special interest groups and is putting money before science. The protection and preservation of endangered species is and should be a priority over any special interest agenda. Thank you for carefully considering my input.

Sincerely,

Frank Rouse
Colton, OR 97017

Dear Oregon Fish and Wildlife Commission,

I won't pretend to know everything about wolf ecology. As an outdoors person with a biology degree under my belt, I do know that wolves play an essential role in Oregon's beloved ecosystems. Now more than ever, we need to protect, not destroy our fellow predators. I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. I can only imagine how frustrating it is for farmers to face predators. However, we need to continue developing & implementing site-specific plans to use nonlethal measures that will be most effective in keeping livestock and wolf populations healthy. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Julie Oatfield
Portland, OR 97220

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Wolves are a part of our natural heritage and are top predators, THEY ASSURE THE HEALTH OF OUR BIOME AND MAKE IMPROVEMENTS TO THE ECOLOGY. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

BREENA SATTERFIELD
Portland, OR 97212

Dear Oregon Fish and Wildlife Commission,

It's a dire situation, and I write to about Oregon's wolves, which belong to all of us in the state. I am not someone who is afraid of nature's wild life. I am not a rancher who has moved into wolf territory and then positioned food animals right in their path. I am one who knows the science about the web of life and how studies show that killing wolves has harmful effects to the social structure of wolves and thus it increases the possibility of wolf poaching and livestock conflicts. I am writing to ask that we abandon the barbaric thinking of the eighteenth century when it was "kill anything that gets in your way," and instead move up to the twenty-first century mindset of looking at the big picture and considering the needs and rights of ALL. Thank you for your attention to this important matter.

Sincerely,

Janelle Davidson
Ashland, OR 97520

Dear Oregon Fish and Wildlife Commission,

Despite this letter arriving via an organizations form letter, please understand that I support the point-of view stated. The proposed Wolf Management Plan devotes far too much on ways to kill wolves, rather than ways to conserve wolves. I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Gary Landers
Sisters, OR 97759

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input. Wolves have feelings too. They are more like dogs than you think. People need to be smarter. Protect livestock with others means and prove it. We should have someone check out how these ranchers are protecting their livestock in person. I know of some who lie just to band wolves. That's not fair please save wolves.

Sincerely,

Jana Borba
Gold Hill, OR 97525

Dear Oregon Fish and Wildlife Commission,

My family owns ag land in 3 NE Oregon Counties. We have ranched, cut timber and had children living on the land. We are not afraid of the Big Bad Wolf --- and you should not be either. Oregonians want wolves ----and not just a few token packs and individuals that are always on the run from shooting. We, the MAJORITY of Oregonians, have made it clear what we want. WHY do you pander to the tiny minority of businessman that raise cattle and sheep? They are out to make a profit like any other business, often on Public Land at a welfare rate. (We would never lease our grazing land for that rate...it is better to let it lay fallow.) No other business in Oregon is virtually guaranteed by the State to minimize any risk and also give compensation. Our local stores have occasional shoplifters--- but the State does not actively protect these stores nor compensate them for losses. As it should be. What system do you believe in anyway...and why? STOP spending our tax money on the killing of wildlife that ALL of us Oregonians 'own' (according to State law). Lessening protection for wolves, controller take, or controlled hunts or even contemplating 'sport' hunting or tripping of wolves, only demonstrates your lack of listening to the public and your single minded representation of only one tiny minority of Oregonians. You are FAILING as stewards, representatives of the People or creatures of our State....and certainly failing as 'leaders.' You ought to resign. Peter Barry I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho.

Sincerely,

Peter Barry
Joseph, OR 97846

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. In addition, wolves, like beavers, have a critical role to play in helping to address climate change by helping to create wetlands and wet meadows by altering elk and deer use of the riparian areas which allows beaver habitat to develop. Beavers in turn help sequester carbon through their ponds, wetlands and wet meadows. In addition, these wolf-beaver created habitats slow flooding and improve conditions during droughts by storing water in the ground and by providing temporary storage in floodplains. We see over and over in the news that flooding and droughts have huge affects on all of us so supporting and protecting wildlife that in turn improves conditions for us and help minimizes impacts of both weather and climate change is critical. It perhaps seems odds to think of abundant and widespread wolf populations as a strategic response to climate change, but they are. In addition, science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. It increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, regardless of who does it. Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence and view wolves in their climate change assistance role. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." Nine months is well beyond a grazing season and this approach rewards poor husbandry to the detriment of all. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping. Finally, work by the Andersons, ranchers in Montana, have demonstrated that one can have a successful livestock operation in the heart of wolf (and grizzly) country. It isn't an either/or. Wolves provide incentive to improve animal husbandry at the same time they enhance habitat conditions for a number of wildlife, including beavers. Time to integrate wolves and their contributions to Oregon's water security into the discussion and protect these keystone species. Thank you for carefully considering my input.

Sincerely,

Suzanne Fouty
Baker City, OR 97814

Dear Oregon Fish and Wildlife Commission,

I'm writing to comment on the revision of Oregon's wolf plan. Certain changes being proposed by the Oregon Department of Fish and Wildlife should be rejected. Oregon's wolves are part of our natural heritage and belong to all of us, not just to people who may find it inconvenient to live with big wildlife and who want to kill wolves when conflicts occur. Studies have long shown that the presence of wolves improves stream and fishery health by controlling the damage done by ungulates to stream vegetation. Thus, other parties and interest groups benefit from the presence of wolves. Yet your proposals only focus on appeasing cattlemen. This is wrong and indicates your agency may have been "captured" by the cattle industry. I hope better measures are taken to prevent this from influencing what should be scientifically based management plans. Studies also increasingly show us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions:

- 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. This is patently ridiculous.
- 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. But the commission does not want to implement it.
- 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting.
- 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. Only scientifically and medically trained individuals should be responsible for euthanizing proven problem animals.
- 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. This proposal causes me to be seriously concerned about the unscientific advice being given to the commission.
- 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho.

Thank you for carefully considering my input.

Sincerely,

Cynthia Hogan
Salem, OR 97306

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. All relevant peer-reviewed scientific evidence indubitably shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. The preponderance of scientific evidence also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this scientific understanding and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry representatives were in support of this proposal. Given this fact, why are non-lethal methods not being implemented? 3) Allowing what the department calls "controlled take" is incompatible and inconsistent with the will of the people when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens provides no assurances or provisions that such deputized persons will actually kill those wolves suspected of depredations or that they won't leave wolves maimed or pups orphaned. The ethical stewardship of Oregon's wolves belongs to all of us in the state. May careful consideration of these comments be met with a spirit of collective understanding and respect for the Oregon's protected species.

Sincerely,

Jason Dingeldein
Imnaha, OR 97842

Dear Oregon Fish and Wildlife Commission,

As an Oregon citizen who is engaged with wildlife habitat and watershed restoration projects, who participates in wildlife surveys in partnership with the U.S. Forest Service, I am writing to urge you to reject certain changes in Oregon's wolf management plan as proposed by the Oregon Department of Fish and Wildlife. In general, I support redirecting Oregon's wolf management plan toward the use of non-lethal methods of population management that are less costly and more effective than the killing of wolves. I also support increasing outreach education to farmers, ranchers, and rural residents to enhance the viability of a successful, non-lethal wolf management program and to better inform our citizens on the scientific evidence that demonstrates how this apex-predator plays an essential role in the environmental health of Oregon and the sustainability of our state's other wildlife species.

Specifically, I join other citizens in objecting to the following measures and revisions as proposed by ODFW: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping. The restoration of wolf populations in Oregon is a wildlife success story, and like all of Oregon's wildlife, the wolf is an integral part of our state's diverse environmental resources, a significant reason why so many of us choose to live here. A modern, measured, science-based management program should be imperative now to better our understanding of the wolf and sustain healthy wolf populations for generations to come.

Sincerely,

Sincerely,

Lloyd Vivola
Portland, OR 97266

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. Killing is NEVER the answer! I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input. ODFW is obligated to consider ALL Oregonians considering this issue. And Wolves are Oregonians too!

Sincerely,

Debra Lutje
The Dalles, OR 97058

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. 7) Finally, there are too few of them and too few of us. Thank you for carefully considering my input.

Sincerely,

Wilbur Gregg
Eugene, OR 97402

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Wolves enhance life for the ecosystem and for all of us. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. The real conflict is not that the wolves are in the wrong place; we are grazing livestock and living in wolf habitat. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Rinya Frisbie
Canby, OR 97013

Dear Oregon Fish and Wildlife Commission,

I'm writing to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. It simply baffles me that the proposed plans would even be considered. I'm writing to urge to keep the strongest possible protections for wolves. We've known for years now that indiscriminately killing wolves is harmful on many levels and can increase the killing of livestock. This argument needs to be laid to rest. Please vote no on the proposed destructive and dangerous proposals. Thank you for carefully considering my input.

Sincerely,

Olina St. Onge
Medford, OR 97501

Dear Oregon Fish and Wildlife Commission,

Wolves play a critical role in the ecosystem, and are still at a fraction of their historic range and population. I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Wolves belong here, and we must find a way to coexist that doesn't involve wiping out entire packs every few years. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Dianne Ensign
Portland, OR 97219

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. Lethal methods actually can increase live stock predation. It is understanding where and how a pack fits into the ecosystem. It is a well established pack with older leaders that then know how to hunt the appropriate prey; wildlife. It is smaller, less experienced wolves and wolf packs that will go for stock as it appears "easy" and accessible. Using non lethal methods to scare packs away allows the pack to grow and learn to become self sufficient on its appropriate prey, thus getting to the point at which they don't go for livestock. It won't be their preference. And the benefit to the rest of the ecosystem is documentable and proven. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Stephanie Turnbull
Eugene, OR 97405

Dear Oregon Fish and Wildlife Commission,

I am writing on behalf of my family of four voters. I am not a scientist but have been interested in the ecology of wolves since I was 16. One does not need to be a rocket scientist to understand the science of wolves and the most recent science shows the way to living in harmony with this animal -- important to the health of Oregon ecosystems, prey health and native to our homeland. What is most alarming to our family is that ODFW doesn't even seem to follow it's own well documented science and science produced throughout the West. In past hearings, I heard scientists suggest that killing wolves -- not so called "controlled takes" or "controlled hunts" -- severely damage the social structure and therefore the successful hunting strategies of wild wolves. This killing of wolves, however the ODFW tries to mask it with pretty words, increases the predation of wolves on livestock out of desperation. As a ranch owner/manager of livestock, I support nonlethal measures of control and so do 72 percent of Oregonians. Wolves are special animals. Science proves that they strengthen the health of prey species and balance populations of other predators. They are also the genetic grandparent of man's best friend and as such, we should make room for them in our country. People who are not able to digest this science should not have so much power and influence in state politics. Oregon's wolves belong to all of us in the state, not just to people who are stuck in arcaic thinking. Revisions to the wolf plan should acknowledge the current science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Only ODFW biologist should implement wolf killings. Allowing "controlled take" of wolves by deputized citizens does not ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. (Rowland et al. 2000, 2005; Wisdom et al. 2004, 2005). 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Susan Strauss
Bend, OR 97703

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. As a former employee of ODFW, all of the decisions made by me on behalf of ODFW were based on the best available science and what was best for the majority of the people of the State of Oregon. Not what I thought or advocated by a vocal minority. The changes to the "Wolf Plan" as proposed by ODFW are not based on best available science nor what is best for the majority of the people of Oregon, instead it appears to cater to a small special interest. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Craig Soule
Terrebonne, OR 97760

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. The proposal the commission is considering is ridiculous, disregards science, is opposite the will of most of Oregon citizens and simply panders to special interest groups who wish to control PUBLIC lands for their personal use. I am vehemently opposed to trophy hunting of any kind. If gov't wants to control populations, then trained gov't employees should do it., not untrained and unsupervised citizens. This whole proposal is a mess and deserves to be summarily dismissed as a veiled attempt to eradicate an animal that is key to a healthy wildlife population and environment. Or do you think God made a mistake by creating the wolf and you need to fix His mistake ? I'm a pissed off citizen tired of assaults on the natural world which deprive future generations of the heritage we currently enjoy.

Sincerely,

Marshall Spencer
Portland, OR 97205

Dear Oregon Fish and Wildlife Commission,

The greatest good is served only by preserving and protecting natural systems on which all lives depend, habitats that constitute them, and wildlife that inhabit them. We are writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

David And Judith Berg
Eugene, OR 97405

Dear Oregon Fish and Wildlife Commission,

I'm writing to you as a professional conservation biologist and as a former ODFW staff biologist. It is my belief that ODFW has a responsibility to present management recommendations based on the best available science. Unfortunately for wolves, ODFW is again making management recommendations based on politics. I know the Commission has already been presented with the best available science regarding wolves, but I'll repeat it again as presented by others... "Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves." Based on this information I am in agreement with the comments and recommendations presented by the Center for Biological Diversity. However, let's look at the even bigger picture. Climate change. Rather than removing wolves or any other predator, we need to be removing cattle and sheep, especially from our public lands and especially here in the arid west and here's why: 1) Livestock, especially cattle and sheep, contribute significant amounts of methane to our atmosphere. If you're not already familiar with the major role that methane plays, look it up. 2) It is not efficient to raise livestock in the arid west, because their diet must be supplemented. Typically that supplementation comes in the form of alfalfa, which is pretty much the thirstiest crop grown. The majority of water diverted from our rivers goes to agricultural production and especially towards the growing of alfalfa. 3) Our native fisheries and overtaxed rivers are already threatened by water withdrawals. Climate change only adds to the stress as warming waters hold less oxygen and river flows dependent upon snow pack will decrease. 4) Entire ecosystems are dependent upon our native fisheries, but our fisheries are struggling to survive. Our native fisheries are more important to protect than ranching. We can do without ranching, but we cannot do without fisheries as that loss will lead to an extinction cascade. 5) Our ecosystems and the wildlife dependent upon them will be challenged and changed by climate change. In order to adapt to these challenges many species will need to move, which requires connectivity. The removal of livestock from our public lands will reduce competition for dwindling resources and allow species, both plant and animal, to move more easily. 6) World population is fast approaching 8 billion. Climate change, including sea level rise, will force billions of people to migrate. We will need to feed an ever increasing number of people with less land and water. Cattle and sheep are inefficient. Cattle and sheep ranching in the west will become a thing of the past. The question is will we take a proactive approach to help ranchers transition, so that we can protect our ecosystems and our native fish and wildlife species. Or will we continue to try to protect ranching at all costs only to eventually have the whole damn thing burn down and we lose everything. You can either continue to keep your eyes held tightly shut with your fingers stuck in your ears going "la la la la - I can't hear you". Or you can open your eyes, listen to the science and make some difficult, but wise decisions. Save the wolves, but get rid of the damn cattle. They were a mistake from the very beginning and climate change is the most important issue of our time. If we don't deal with climate change and the decisions needed to slow it and adapt to it, then everything else is a moot point. Your cattle are going to be gone eventually anyway - wolves or no wolves. Thank you for considering my comments.

Sincerely,

Julie Schneider
Bend, OR 97701

Dear Oregon Fish and Wildlife Commission,

Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. For this reason, I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Scientific research has shown for many decades that as a capstone species the wolf keeps elk and deer herds healthy and at optimal population levels, preventing damage to riparian areas — and thus assuring fish habitat, clean streams, and a reduction of erosion. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction, and pup survival in packs. A pack weakened by loss of members to human hunting and killing will have a harder time hunting for natural, wild prey. This increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves — whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes a holistic approach to stewardship of wild lands and wildlife, including the use of nonlethal conflict deterrence. I specifically object to these following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. It is wrong for the department to call this "chronic depredation" — two events cannot possibly be considered "chronic." Also nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. The people most likely to volunteer for this "job" are people who want to kill wolves and will have no care for their suffering or for the suffering of their pups or pack mates. By deputizing a group of citizens (who will most likely be self-selected for anti-wolf bias) the department is abetting both poor environmental stewardship and cruelty. It is also encouraging actions against wildlife which are opposed by the vast majority of Oregonians. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. As mentioned above, wolves — by naturally culling elk and deer populations — are an essential part of maintaining healthy habitat condition. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping. Thank you for carefully considering my input, by putting the needs of wildlife and a healthy natural environment first.

Sincerely,

Jane Kwiatkowski
Eugene, OR 97405

Dear Oregon Fish and Wildlife Commission,

Killing wolves is harmful to the social structure, stability, reproduction and pup survival in packs and increases the risk of wolf poaching and livestock conflicts. Science shows that nonlethal measures are more effective and less costly over the long haul than killing wolves and thoughtful ranchers support that approach. Revisions to the wolf plan should acknowledge this science and shift the plan's focus away from killing wolves, whether by the state wildlife agency or private citizens deputized to kill wolves through "controlled take." Oregon should have a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. That's nowhere near "chronic depredation". Nine months is well beyond a grazing season and ranchers are already compensated for proven losses to wolves. 2) Failing to require use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. It should be implemented. 3) Allowing "controlled take" of wolves by deputized citizens is a recipe for bad uncontrolled outcomes. 4) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals is scapegoating of wolves. Habitat condition, not predators, is the key factor in the health of deer and elk populations. 5) Any discussion of "controlled hunts" as a future option for wolf management should be removed. Oregonians don't want wolf hunting or trapping. Thank you for considering my comments.

Sincerely,

Michael Wherley
Eugene, OR 97402

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

sherrie kuehn
Gladstone, OR 97027

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. I am one of many Oregonians who value ALL of our wildlife, including predators - and I am deeply troubled that the proposed wolf plan appears to be heading in the direction of making it easier to kill wolves. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to clearly REQUIRE ample use of SITE-SPECIFIC and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. In addition, I am very offended by the biased language used by ODFW within the plan. When wolves prey on livestock - the word "kill" is used, but when humans kill wolves (and other wildlife) it is called "controlled take". This is manipulative language that should not be present in a professional document. Thank you for carefully considering my input.

Sincerely,

Stephanie Christensen
Portland, OR 97219

Dear Oregon Fish and Wildlife Commission,

As a biologist and conservationist, I strongly urge a revision of Oregon's wolf plan, and also a rejection of certain changes currently proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves don't belong to humans, and especially not to people who may find it inconvenient to live with wildlife and want wolves killed when any conflict arises. Science increasingly shows us that killing wolves is not only cruel, but has harmful, irreversible effects to the social structure, stability, reproduction and pup survival in packs. And it also INCREASES the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. Therefore, revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps both were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for brutal hunting and trapping — when a 2016 survey shows that the vast majority Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians DO NOT want any wolf hunting or trapping. Thank you.

Sincerely,

Eileen Stark
Portland, OR 97212

Dear Oregon Fish and Wildlife Commission,

Hello, I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. I have worked in natural resources for over 30 years. I am also a 3rd generation Oregonian who's family have been farmers or loggers. To sustain a healthy ecosystem, we must keep the balance!! As we continue to eliminate the predators (the most), we undermine that balance. Oregonians take pride in our state! Are we going to continue denying science for fear or inconvenience to the few comparably? As ODFW, you are well aware of the science. I don't need to reiterate it. Please do the "right" thing. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Teresa Coble
Springfield, OR 97478

Dear Oregon Fish and Wildlife Commission,

Oregon's wolves belong to all Oregonians, not just to people who find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflicts arise. We're writing to advocate for specific priorities in the revision of Oregon's wolf plan, and we also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife (ODFW). Specific Priorities: Revisions to the wolf plan should acknowledge science, which increasingly shows us that killing wolves has harmful effects on the social structure, stability, reproduction and pup survival of packs. ODFW must shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take" -- a focus that actually increases the incidence of livestock conflicts and can also encourage poaching. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. In our opinion, Oregon should continue to lead the way with a wolf plan that acknowledges science and emphasizes the use of nonlethal conflict deterrence. Specific Objections to measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. ODFW terms this "chronic depredation;" we respectfully suggest that two events in nine months cannot be considered "chronic." Furthermore, nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. We understand that both conservation groups and livestock-industry representatives were on board with this proposal. So our question is: why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. When every five cars in Eastern Oregon bears a bumper sticker reading "SSS" (shoot, shovel, and shut up), we can speculate about who will step up to be deputized, and that there will not be much particularity when a deputized citizen locates a wolf or wolves. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. When populations decrease, one of the loudest memes of the anti-wolf crowd is that it's the fault of the big bad wolf. That charge is refuted by science, which shows clearly that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via Commission approval following a public process for planning and development. But a solid majority of Oregonians don't want wolf hunting or trapping. Let's not borrow from Idaho and Wyoming (our former residence), but stick to Oregon values. Thank you for giving our concerns and recommendations your most serious and thoughtful consideration. We urge a "NO" vote on these misguided proposals.

Sincerely,

Dan And Janet Blair
Joseph, OR 97846

Dear Oregon Fish and Wildlife Commission,

I am proud to live in a state where the wolf is recovering after so many years of persecution and eventual extirpation. They provide an important ecosystem role and are an iconic signal of wildlife for many Oregonians. The numbers of livestock losses from wolf depredation are minuscule compared to other causes. Lethal control disrupts the wolf social structure and has been shown in scientific studies to actually increase depredation; the opposite of the intended effect. I strongly support proactive measures to discourage depredation. I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Debbie Schlenoff
Eugene, OR 97405

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Should we go forward with the well-received measures that have worked so well-- or go backward to where wolves were killed for any or no reason? The answer is obvious -- and supported by the vast majority of Oregonians.. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Jack Wells
Portland, OR 97215

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Wolves and all animals play an essential role on this planet. We have already have many species go extinct over a short period of time with many more about to follow. I am so saddened and sick to my stomach that we as humans are not protecting our planet and the other life forms on it. Humans need to stop being greedy and start helping to change and rejuvenate this planet. Animals wolves, bears, pumas all birds and other creatures all have a role to play, and we need to start playing ours by protecting and cleaning up the earth and all those in it. Thank you for carefully considering my input.

Sincerely,

Latasha Bibey
Tillamook, OR 97141

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. Just because the wolf has come back in numbers does not mean they will stay. If we lift the protection from them people will go on the hunt for them and they will be all but wiped out. People do not know when to stop. These beautiful creatures have as much right as we do to be on this earth. Let us keep the protection up so that everyone alike can enjoy the beauty of such wonderful creatures of God. Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Marilyn Russo
Portland, OR 97236

Dear Oregon Fish and Wildlife Commission,

I'm writing to ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife regarding protections for Oregon's wolves. Oregon's wolves belong to all of us in the state. People who may find it inconvenient to live with big wildlife need to understand that they are in the minority in this state. We are tired of state agencies that wimp out when it comes to protecting our rights as citizens of this state who do not buy into the cruel and selfish desire to kill, kill, kill what is left of our valuable wild co-residents. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves. Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. It is absolutely vital to the support of our living ecosystems to prevent the loss of large predators. The department's definition of 'chronic depredation' is not based on science and is just a false attempt to hide a desire to encourage more killing. The department fails to require ample use of site-specific and suitable nonlethal methods before wolves can be killed as previously agreed. What the department calls "controlled take" is a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. The words and concept of 'controlled take' must be disallowed from any state plans. We have watched while this method continues to take the lives of many other animals, not intended to be trapped or killed, including pets and valued livestock and other endangered species. It is nonspecific and just plain stupid and harmful to the majority of people in this state who have said NO! Loud and Clear!!! Allowing "controlled take" aka killing of wolves by deputized citizens is such a great loophole you can drive a super truck through it. Anyone with a friend in the department can get a license to kill. Whoever thinks these plans up really thinks the public that pay their salaries are stupid. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. Why don't you try working on that for a change? Any discussion of "controlled hunts" as a future option for wolf management cannot be allowed. PERIOD! Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Just do your job and stop making us have to keep monitoring your every move to make sure you are paying attention to what we have said we want. Pay attention to the science and just get over the idea that killing is an option. Thank you for carefully considering my input. We will keep watching your every move.

Sincerely,

Theodora Tsongas
Portland, OR 97215

Dear Oregon Fish and Wildlife Commission,

I'm writing to advocate for specific priorities in the revision of Oregon's wolf plan, and I also ask you to reject certain changes being proposed by the Oregon Department of Fish and Wildlife. I will fight til my dying day for the wolves in this state and the US. I am beyond angry with the lack of political will in Oregon to stand up and protect wolves...my gosh, all of the complaints from ranchers and hunters are ludicrous...how can less than 200 wolves in this state possibly cause all the harm those idiots claim they do. Stop letting a vocal minority dictate the fate of wolves in Oregon and follow the science and opinions of the majority of Oregonians who want wolves protected. I am appalled at the ludicrous plan that you have put forth and demand that it be scrapped. It is irrational and based upon the wrong minded opinions of hunters and ranchers when it should be based upon good science!!! Oregon's wolves belong to all of us in the state, not just to people who may find it inconvenient to live with big wildlife and who wish to see more wolves killed when conflict arises. Science increasingly shows us that killing wolves has harmful effects to the social structure, stability, reproduction and pup survival in packs. And it also increases the risk of wolf poaching and livestock conflicts. The best science also shows that nonlethal measures are more effective and less costly over the long haul than simply killing wolves. That's why revisions to the wolf plan should acknowledge this science and shift the plan's focus away from reliance on killing wolves, whether by the state wildlife agency or by private citizens deputized to kill wolves through "controlled take." Oregon should continue to lead the way with a wolf plan that emphasizes the use of nonlethal conflict deterrence. I specifically object to the following measures and plan revisions: 1) Allowing the department to kill wolves after only two confirmed predations on livestock in a 9-month period. The department calls this "chronic depredation" — but by no means can two events be considered "chronic." And nine months is well beyond a grazing season. 2) Failing to require ample use of site-specific and suitable nonlethal methods before wolves can be killed. Conservation groups and livestock-industry reps were on board with this proposal. Why isn't it being implemented? 3) Allowing what the department calls "controlled take" — a euphemism for hunting and trapping — when a 2016 survey shows that 72 percent of Oregonians oppose wolf hunting. 4) Allowing "controlled take" of wolves by deputized citizens even though the department can't ensure that those people will actually kill the right wolves or that they won't leave wolves maimed or pups orphaned. 5) Allowing "controlled take" of wolves by deputized citizens when local elk or deer herds aren't meeting management goals. The science is clear that habitat condition, not predators, is the key factor in the health of deer and elk populations. 6) Any discussion of "controlled hunts" as a future option for wolf management. The language says that this would happen via commission approval following a public process for planning and development. But Oregonians don't want wolf hunting or trapping — this is Oregon, not Idaho. Thank you for carefully considering my input.

Sincerely,

Kim Kahl
Bend, OR 97703