Exhibit 1

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UNITED STATES DISTRICT COURT
DISTRICT OF NEVADA

WILDEARTH GUARDIANS and WESTERN WATERSHEDS PROJECT, Plaintiffs, vs. U.S. DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICES-WILDLIFE SERVICES, U.S. FOREST SERVICE, and BUREAU OF LAND MANAGEMENT, Defendants.	Case No.: 3:21-CV-00508-LRH-CLB **DECLARATION OF DR. ADRIAN TREVES IN SUPPORT OF PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT**

I, Dr. Adrian Treves, declare as follows:

The following facts are personally known to me, and if called as a witness I would and could truthfully testify to these facts.

INTRODUCTION

1. I am a Professor with the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison, where I founded and direct the Carnivore Coexistence Lab. In 2016, I co-authored a scholarly article, "Predator Control Should Not Be A Shot In The Dark," critiquing the science used to justify predator control, based on my review of literature concerning predator control over the course of sixteen years. The literature does not provide sufficient evidence to conclude that lethal methods prevent predation on livestock (sometimes called depredations). What little high-quality evidence there is gives some support to use of nonlethal methods. No evidence at all supports so-called "preventative" or "proactive" predator- killing, where predators are removed far in time and space from a specific livestock death.

2. Based upon my knowledge and experience, I was asked to: Review Underwood 1992[1] and consider how Underwood 1992 was treated in the FINAL ENVIRONMENTAL ASSESSMENT - PREDATOR DAMAGE MANAGEMENT IN NEVADA ("Nevada PDM EA"); respond to the comments in the Nevada EA, pp. 136-137 (WS017177-78) on my peer-reviewed article Treves et al. 2016[2] and Treves et al. 2019[3]; and summarize the state of the science on predator damage management (PDM) to evaluate whether the Nevada PDM EA meets the scientific standards for a systematic review of evidence.

PERSONAL BACKGROUND AND QUALIFICATIONS

3. I hold B.A. degrees in Biology and Anthropology from Rice University and a

[1] Underwood, A.J., 1992. Beyond BACI: The detection of environmental impacts on populations in the real, but variable, world. J. Exp. Mar. Biol. Ecol. 161, 145-178

[2] Treves, A., Krofel, M., McManus, J., 2016. Predator control should not be a shot in the dark. Front. Ecol. Environ. 14, 380-388

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

Ph.D. in Human Evolutionary Biology from Harvard University.

4. I am presently a Professor with the Nelson Institute for Environmental Studies at the University of Wisconsin-Madison, where I have been teaching and conducting applied research since 2007. I founded and direct the Carnivore Coexistence Lab there. At the University of Wisconsin-Madison, courses I have taught include: Preserving Nature; Introductory Ecology; Wolves, Dogs and People; Conserving Biodiversity; Large Carnivore Conservation; Conservation Biology; and Environmental Planning and Adaptive Management.

5. I have received numerous awards and honors for my work. As of writing, I am collaborating with the Ministry of Environment in lower Saxony, Germany on wolf management through a grant from the OECD (Organization for Economic Cooperation nd Development). Similarly, I serve on the French Ministry of Environment's Wolf Science Council. I have twice been a Fulbright Senior Specialist for conservation of carnivores (Ecuador and Chile), and I was awarded a Fulbright for teaching and research on wildlife biology in Sweden in 2014-15. I formerly served on the DNR Wolf Science Committee until it was disbanded. Between 2004 and 2018, I was a keynote speaker at 12 scientific meetings or conferences. I also was nominated for the Indianapolis Prize for Conservation in 2018 and won the Clements Prize for Outstanding Research & Education in 2017. From 2015 to 2019, I was selected five times by students as an Honored Instructor. In 2010, I won the Award for Best Monitoring and Evaluation methods from the Rainforest Alliance Eco-Index. I am currently a Vilas Associate at University of Wisconsin-Madison, receiving funding for my research on wolves in Germany.

6. I have published more than 175 scientific articles on ecology, management, and conservation, including 101 articles published by scientific journals. I have been investigating human-wolf coexistence in Wisconsin since 2000, with my most recent peer-reviewed scientific article on Wisconsin wolves published on June 18, 2021. My full curriculum vitae is attached.

7. I am not being compensated for preparation of this declaration.

8. This declaration is based upon my knowledge and experiences of researching predator-prey ecology and human-wildlife conflicts over the course of almost three decades, and on my review of portions of Wildlife Services' Nevada Environmental Assessment.

SCIENTIFIC INTEGRITY STANDARDS:
"PREDATOR CONTROL SHOULD NOT BE A SHOT IN THE DARK."

9. Between 2000 and 2016, I intensively and extensively reviewed scientific literature concerning the functional effectiveness of lethal and nonlethal methods in predator management. Functional effectiveness means an intervention prevents livestock losses.

10. Our 2016 article, "Predator Control Should Not Be A Shot In the Dark" resulted from that literature review. It was designed to answer the question, "Do lethal or nonlethal predator control methods show functional effectiveness?"

11. To evaluate existing predator control studies, my co-authors and I borrowed standards from biomedical literature and other fields that have been grappling with efforts to draw the strongest possible inference about the effectiveness of interventions (Mukherjee 2010; Interactive Autism Network 2017). Those other fields coined the term "gold standard" for experiments that adopt randomization to treatment or placebo (control).[4] Randomization (randomizing treatment and placebo control) is widely considered the most important step in eliminating bias (unintentional or intentional slanting of experiments to a particular result) because random assignment eliminates the most prevalent and pervasive bias in experiments, referred to as selection bias (Ioannidis 2005) — see also footnote 7.

12. We concluded that to provide the most useful evidence concerning predator control, experiments needed to meet a gold standard, that is they needed to use randomized design without bias. However, after preliminary screening, we found only two such studies ever occurred in North America or Europe. Both came from a single laboratory and concerned non-lethal methods. Therefore, we relaxed our search criteria and accepted a lower, "silver standard."

[4] This use of the word "control" is different from its use in "predator control." Here, placebo control refers to the experimental control, a condition in which subjects are not given a treatment

13. We defined the silver standard as before-and-after comparisons of interventions without randomization. In silver standard studies, each subject is compared to itself before treatment or before no treatment. For example, the number of livestock losses before a hypothetical predator control is implemented is subtracted from the number of livestock lost after implementation of the hypothetical predator control treatment. Before-and-after comparisons are also called case-control experiments and are often used when randomization is infeasible.

14. Silver is a lower standard than gold because inference is weaker. At a minimum, silver-standard studies introduce a new variable, time, in addition to the treatment, i.e., all subjects underwent treatment or no treatment and also underwent the passage of time. Consider the analogy of a cold remedy. We know most people recover from colds over time. Therefore, any proposed treatment must work faster or better than the natural, healthy person's recovery from a cold. If the putative treatment for colds is tested by silver-standard, the inference that it was effective is difficult to distinguish from the inference that subject patients got better on their own as time passed. That is weak inference compared to the gold-standard which can be two or more times as powerful as I explain below. The analogy is pertinent because livestock may be attacked by predators only once with no repeat, even in the absence of intervention. Observations of such 'no-repeat' predation events have been made since 1983 if not earlier (Tompa 1983).

15. By relaxing our criteria for inclusion of studies in our review to include silver-standard study designs, we were able to add another 10 studies in North America and Europe that met our criteria. (However, by 2018, we had to correct our own assessment and withdraw one of those studies, following Santiago-Avila et al. 2018a. The study we removed was Bradley et al. 2015, which I address again later)

16. Why were there so few (11) studies across two continents that have been studying predator control scientifically for over 40 years?

17. To generate strong inference from a gold- standard study an experiment must also eliminate five types of bias (Ioannidis 2005, Treves et al. 2019) which can be difficult:

a. Selection bias. To avoid this bias, subjects must be assigned to treatment and placebo control randomly from the same set of candidate subjects. Selection bias arises when the choice of which subjects receives the treatment and which subject receive the placebo control is non-random. Selection bias is rife in predator control research because livestock herds are often selected by the owners or by researchers to receive a treatment or not. Selection rather than randomization undermines strong inference about a treatment effect because subjects naturally vary in their response to a treatment and selection bias might lead to subjects more likely to respond in a desirable way to the treatment being chosen for the treatment group. Alternately, a research team may select a region subject to predation on livestock for its treatment and then choose another region for its "control" comparison because that region is convenient, without ascertaining if the two regions are comparable in terms of risk or background predator controls.

b. Treatment bias. This occurs where the treatment or placebo controls are administered haphazardly. It can be avoided by strict quality controls. A common form of treatment bias in predator control is to tailor the intervention method or its intensity to the subjective impressions of the livestock owners, the agents implementing controls, or the researchers preconceptions;

c. Measurement bias. To avoid this bias, one must ensure that measurements are taken uniformly across treatment groups and placebo control groups. Ideally, those collecting data on the treatment and the placebo control are unaware of which the subject received. This is called "blinding." Although challenging, there is no reason not to attempt blinding in lethal methods as we have proven recently (Louchouarn & Treves 2022 summarized further below).

d. Reporting bias. If researchers, in reporting results, omit data or report in a way that is not even-handed with regard to treatment or placebo control, one gets reporting bias. To avoid this bias it is important the researchers follow the

principles of scientific integrity (complete transparency, and reproducibility of methods and data followed by authentically independent review) when describing methods, analyzing the results and publishing them. Reporting bias is most easily avoided if the analysts and reporters of a study are unaware of whether the subject received treatment or the placebo control until after the aggregate statistics are analyzed. It also helps to have more co-authors willing to review the data, analyses, and interpretations with different perspectives, worldviews, and presuppositions.

e. Publication bias: Publication bias arises when the editors, anonymous peer reviewers, or publisher itself decide to publish or not to publish based on factors other than the scientific merit or strength inference of a study submitted to them. For example, many fields of science have noted a positive results bias in which reports that do not catch the attention or enthusiasm of the editors and reviewers do not get published but flashy, startling, or unexpected findings do.

18. If a study both uses a randomized design and avoids the five biases, it satisfies the gold standard. If a study uses before-and-after comparisons and subjects serve as their own controls without randomization, and avoids biases, it satisfies the silver standard.

19. We excluded more than two dozen, putative silver- or gold-standard studies from our review because of bias. In our supplementary information, published as Webtable 1 in "Predator Control Should Not Be A Shot In the Dark," we explained in detail why we excluded each potentially biased study. Several flaws were particularly prevalent in the predator control studies we evaluated:

a. Researchers who were unwilling to use experimental rigor asserted that they were unable to do so. For example, a frequent refrain is that randomized experiments on PDM could not be conducted because of variability between herds and pastures. To credibly make this claim, one must demonstrate quantitatively that the variability between

subjects (herds) would be greater than any treatment effect. To my knowledge, no predator study has ever presented data proving that a randomized trial was impossible. Moreover, there is a well- known remedy for the problem, called cross-over design[5] or reverse-treatment design. A concern about infeasible experiments is often cited by USDA-WS. It should be seen as an unwillingness to subject methods to experimental trials, rather than an inability to do so, as I show further below by citing our own field experiments and those of other research teams around the world.

b. Failure to exercise enough care in selecting livestock herds. Wagner & Conover (1999), for instance, used "control pastures" where predator damage management actions had occurred, and selected them after all treatments had been implemented (i.e., post hoc rather than random selection), which compounds selection bias and treatment bias. After the fact, I discovered the control pastures had a higher density of sheep and a higher past record of livestock losses, both of which are known risk factors for future predation. Both of these factors would likely skew the results to make it appear that the treatment (aerial gunning in the winter) had greater effects the next summer than would have been evident had the control and treatment pastures been carefully selected beforehand to be identical, or, better yet, randomly assigned. In sum,

[5] Cross-over design is when researchers randomize assignment to treatment or placebo control and midway through the experiment, cease both conditions and reverse them, so every subject experiences both the treatment and the placebo control. By so doing, excessive differences between subjects are eliminated by measuring the response of subjects to treatments minus the response of subjects to placebo control. Although this may appear silver-standard at first glance, it is combined with randomization, so some subjects begin as placebo control and end the study in the treatment group, therefore some subjects experienced change over time followed by treatment whereas others experienced the reverse. Ohrens et al. (2019), Fergus (2020), Louchouarn & Treves 2022 describe how to design a gold standard predator control experiment with cross-over design and in so doing lays to rest a number of spurious arguments against the feasibility of such experiments.

post hoc selection of 'control' subjects is a recipe for unreliable results.

c. Failure to measure background levels of predator control. Several studies took place in areas with background levels of predator control. This may be a source of bias, of course, but may be permissible so long as the background level of predator controls are measured and disclosed, and the researcher discloses whether they have control over those levels. Researchers who worked for USDA-WS commonly failed to disclose that, because USDA-WS was providing the "baseline" or background PDM, they had control over that variable, and they did not relinquish that authority before running their so-called experiment. They also did not reliably disclose how much or what kind of PDM had occurred or was occurring. Predator control studies that failed to measure carefully the ongoing predator control actions were fatally flawed at the outset. Given some low level of predator-killing is nearly ubiquitous worldwide, the baseline or background level of PDM should be experimentally controlled through randomization or cross-over designs as described above.

20. Our 2016 evaluations showed that there was scarce evidence for the functional effectiveness of either nonlethal or lethal predator controls, but that the studies concerning nonlethal methods generally have produced stronger inference because they were gold-standard without bias or assiduously avoided bias while using a silver-standard design. Since 2016, yet more gold-standard experiments have been published. I discuss those further below. Thus, the evidence for functional effectiveness of nonlethal methods was better quality by independent standards (Platt 1964; Ioannidis 2005). The scant evidence that existed concerning lethal methods showed that lethal methods could be risky—equal numbers of authors concluded they elevated predation risk or increased livestock losses as concluded that they reduced risk or reduced livestock losses. The plurality of studies showed no effect of lethal methods.

21. Even the single surviving silver- standard study (after Bradley et al. (2015) was removed in 2018 due to a previously undetected bias in 2016) that showed lethal methods reduced livestock losses showed only a small effect. That was the study by Herfindal et al. (2005) of lamb losses to Eurasian lynx. The authors themselves warned the treatment effect was so small as to suggest other methods should be used. Thus, we concluded that lethal methods were risky and we recommended a moratorium on them until gold-standard experiments without bias were completed to prove their functional effectiveness in the particular sites and circumstances they would be applied later (Treves et al. 2019). To my knowledge this has not been done yet.

22. As explained in more detail below, my conclusions have been corroborated with systematic reviews and meta-analyses. Also the findings of gold-standard, randomized experiments on non-lethal methods have now been replicated in peer-reviewed scientific literature from around the world.

23. Unfortunately, I have become aware of many instances in which Wildlife Services has improperly dismissed or maligned my work in an apparent effort to avoid grappling with its implications for their actions.

REVIEW OF WILDLIFE SERVICES' NEVADA ENVIRONMENTAL ASSESSMENT'S DISCUSSION OF UNDERWOOD 1992.

24. That is true of the FINAL ENVIRONMENTAL ASSESSMENT - PREDATOR DAMAGE MANAGEMENT IN NEVADA. Wildlife Services seems to suggest that my work sets an unworkable standard for predator control experiments because it purportedly contradicts an earlier study, Underwood 1992. This is false and is yet more evidence of a simple fact Wildlife Services refuses to acknowledge: there is no high-quality evidence that killing predators works.

25. In the case of PDM interventions, one would like to infer if property damage had been reduced after the intervention. In other words, did the PDM prevent future damage more than no intervention (RCT) or more than was experienced prior to the intervention (randomized

BACI)? That is the definition of functional effectiveness in predator control.

26. In the case of PDM to protect game populations, the question is similar: Is the abundance or health of the game population better after PDM than it was before that intervention?

27. Below I explain why the only way to be confident that a PDM intervention is functionally effective in protecting livestock or wild game is by a randomized design. I also explain why Underwood 1992 agrees with us in every particular by quoting Underwood 1992 extensively.

A. Underwood 1992 supports my work in Treves et al. 2016, 2019 not the work of USDA-WS PDM or claims in the Nevada PDM EA.

28. A non-scientist reading the Nevada PDM EA might be misled into believing that Underwood 1992 somehow contradicts Treves et al. 2016. Nothing could be further from the truth. First, the Nevada PDM EA mischaracterizes Treves et al. 2016 and second, Underwood 1992 and Treves et al. 2016 see eye to eye. Finally, the Nevada PDM EA omits other more recent work that agrees with Treves et al. 2016.

29. The Nevada PDM EA, p.136 (WS017177) states incorrectly that "the "gold standard" protocol recommended by [Treves et al. 2016] is called the Before/After-Control/Impact (BACI) protocol…." That statement is misleading. We recommended randomized, controlled trials (RCTs) as gold standard. The quotation is also misleading because we explicitly designated BACI designs without randomized assignment to treatment or (placebo) control as a lower standard called silver. As explained previously, we examined evidence of silver standard designs because so few gold-standard designs without bias existed. That does not equate to recommending silver-standard designs. The gold standard must include random assignment to treatment or control. We recommended randomized, controlled trials (RCT) which can include randomized BACI but cannot include simple BACI without randomization. The Nevada PDM EA, which lumps together both gold and silver standards into a single category of "BACI," misleads the reader. That omission of randomized allows Wildlife Services to create the illusion that we differ from Underwood 1992 when the reality is we completely agree with Underwood 1992 and he would with us. Our work builds on the work of Underwood and others.

30. As noted above, Treves et al. 2016 summarized the results of two types of study discernible by their designs. One design, the biomedical research community has long referred to as the gold-standard experiment, which is a randomized, controlled trial (RCT).[6] The gold standard must include random assignment to treatment or control. The Nevada PDM EA glaringly omits the crucial word "randomized". Thus, there are simple BACI designs and there are randomized BACI designs. A decade after Underwood 1992, statisticians clarified the important role of randomization.[7]

31. By comparing randomized controlled trials that are not BACI (RCT) to randomized BACI, one glimpses how scientists work to strengthen inference about the effectiveness of interventions and one glimpses how USDA-WS does not. Randomization is the critical step in evaluating medical treatments as it is for PDM. Without randomization, no amount of before-and-after comparison will yield strong inference. While it is useful to conduct before-and-after comparisons, it is not irreplaceable, as the many clinical trials of human subjects have shown: one can randomly assign human subjects to the placebo control or treatment condition to evaluate a candidate therapy without knowing anything about the history before the clinical trial. But one cannot dispense with randomization and gain strong inference.

But *combining random-assignment* of sites or herds to PDM or placebo control *and conducting* before-and-after comparisons of interventions for each subject is especially valuable because the analysis is conducted within-subjects (the subject before placebo control or before PDM treatment is compared to itself after intervention). This is called randomized BACI. Just as with my analogy to the common cold, the effect of treatment on randomly-assigned subjects can be better understood when the patient's history is known but avoiding that researchers are deceived by the intrusion of the variable 'time passing' requires random-assignment to control condition or treatment condition. The key to the gold standard is random- assignment.

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[6] For example, Interactive Autism Network, 2017. Gold standard of evidence: The randomized controlled trial (RCT). https://iancommunity.org/cs/understanding_research/randomized_controlled_trials.

[7] *See, e.g.,* Murtaugh, P.A., 2002. On rejection rates of paired intervention analysis. Ecology 83, 1752–1761; Stewart-Oaten, A., 2003. On rejection rates of paired intervention analysis: comment. Ecology 84, 2795–2799 84, 2795–2799.

32. While it is correct that we found only a small set of randomized tests of PDM that met our criteria in Treves et al. 2016, which forced us to examine a lower standard of inference (the BACI without randomization, or silver standard), that does not imply we recommend the silver standard, non-randomized designs. We emphasized then, and have since elaborated in Treves et al. 2019, how simple BACI without randomization provides only weak inference. In fact, in 2019 we quantified this loss of strength of inference for the first time to estimate that BACI without randomization offered half of the strength of inference of RCTs. USDA-WS seems to have overlooked our quantification of weak and strong inference. In my opinion, they overlooked it because they are unwilling to conduct experiments. Possibly the unwillingness stems from their perception (wrong in my experience) that livestock owners will reject the placebo control condition. We have now successfully completed six randomized, controlled experiments in four countries including the USA, with controls for non-lethal PDM treatments and the owners always accepted the placebo control condition (I summarize these below). USDA-WS' refusal to accept the fact or reach out to us to understand how we achieved this in the field is for me the strongest testimony to their unwillingness rather than infeasibility.

33. Underwood 1992, subsequent statisticians (footnote 7), and Treves et al. 2016, 2019 all conclude that one cannot evaluate the functional effectiveness of interventions (PDM or otherwise) with confidence unless one uses a randomized design with control and multiple replicated sites. In PDM the sites or subjects are often livestock herds receiving either PDM or a placebo control. One needs multiple replicated sites to avoid the spurious inference that the change we desire is a simple coincidence unrelated to the intervention.

34. Indeed, Treves et al. 2016 insists on at least 4 replicated sites and recommends randomized control and treatment, just as Underwood 1992 stated:

> Where there is only one control and one potentially impacted site, any data that show differences after the potential impact is presumed to have started will be interpreted to mean that the [human action] is responsible. This is unwarranted given the inadequacies of the sampling design...First, without this increase in number of control locations, there is no logical or rational reason why any apparently detected impact should be attributed to the human disturbance of the apparently impacted location…An appropriate combination of replicated sampling in time and replicated sampling at appropriate spatial

scales is absolutely mandatory before any attempt to determine potential impact is likely to succeed.

35. Underwood warns against the very practice that is business as usual for USDA—WS. Namely, they enter a parcel of land, lay down PDM, and measure the effect at that one site by the satisfaction of the parcel manager or herd owner. When USDA-WS does study multiple sites, they almost never use the control for comparison as Underwood deems mandatory in the above quote.

36. Indeed, Treves et al. 2016, 2019 repeated a point made by Underwood, **"Second, but much more difficult, is the requirement that eventually assessment of environmental impact will only really become scientific when impacts are themselves treated as experiments…"** Building on Underwood 1992 in that quote, we set higher standards in Treves et al. 2016, 2019. We advocated for randomized trials with experimental controls, large samples, and safeguards against bias. In short, we echo a conclusion of Underwood 1992, "**Sampling to detect potential environmental impact in very heterogeneous environments with markedly divergent time courses in the abundances of species of interest, requires rather complicated sampling designs."**

37. Our emphasis on randomization therefore meshes perfectly with Underwood 1992. By twisting our work, and that of Underwood 1992, to claim that high-quality experiments regarding predator control are impossible, the Nevada PDM EA displays one of the common sources of bias we identified in Treves et al. 2016: Researchers who were unwilling to use experimental rigor asserted that they were unable to do so.

B. The Nevada PDM EA fails as a systematic review of evidence because of bias, competing financial interests, and omissions.

38. Here, I employ the standards scientists use for systematic reviews or meta-analyses of evidence. The Nevada PDM EA is an attempt to summarize evidence for PDM but it can be judged against a dozen peer-reviewed articles that present systematic reviews and meta-analyses, many of which were published between 2016-2020. To understand the scientific standards of evidence in the PDM research community, consider the basis for inference.

39. First, the Nevada PDM EA misses Treves 2019 and other recent science and thus

ignores peer-reviewed findings in top journals. I believe they do so because they cast a poor light on practices in USDA-WS. The Nevada PDM EA conceals that USDA-WS has failed for decades to design the appropriate and revealing experiments.

40. Treves et al. (2016) calls BACI without randomization or replication a silver standard — and we spend many pages explaining why the silver standard is inadequate. As evidence for our position and against that of USDA-WS, consider that in Treves et al. 2016 we explicitly dismissed nearly two dozen studies (Appendix 1) — many conducted by USDA-WS or allied scientists — as unreliable because they did not replicate sites (or livestock herds) sufficiently or showed evidence of biased sampling, measurement, treatment, reporting, or publication.

41. Treves et al. 2016 reviewed all the peer-reviewed articles we could find on predator control which involved wild mammalian predators (carnivores hereafter) of livestock and working livestock on farms in North America and Europe. We had to set aside two dozen articles as unreliable. In the majority of such unreliable cases, there was no control, or no replication, or the study otherwise violated the principles in Underwood 1992 and other authorities we cited. Ultimately, in Treves et al. 2016, we were left with only 12 reliable studies (and eventually reduced that to 11 by shifting Bradley et al. 2015 into the unreliable column. That article by Bradley et al. 2015 included USDA-WS staff and allied scientists as co-authors, yet was a BACI design without randomization and flaws in various ways we described in 2018 and 2019 (also see Santiago-Ávila et al. 2018 explaining why it is a biased BACI design).

42. We are not critics of USDA-WS. We have demonstrated that careful impact assessments using RCTs and randomized BACI replicated at 6-30 sites with experimental controls is not only feasible but can prove the effectiveness of non-lethal wildlife control methods with even more safeguards against bias (Shivik et al. 2003; Ohrens et al. 2019; Fergus 2020; Louchouarn & Treves 2022). We continue to do so today (Guerrero et al in review; Hermanstorfer et al. in review). The Nevada PDM EA does not acknowledge this work or the progress made in the 30 years since Underwood 1992 was published.

43. Several dozen scientists from around the world have published peer-reviewed meta-analyses and systematic reviews of carnivore control to protect livestock and one review of

carnivore control to protect game populations (Clark & Hebblewhite 2020). Many of these came out prior to 2021 so the USDA-WS should have read and considered them in the final Nevada PDM EA. It did not consider the highlighted ones below, many of which undermine USDA-WS business as usual and the claims in the Nevada PDM EA.

- Clark, T.J., Hebblewhite, M., 2021. Predator control may not increase ungulate populations in the future: A formal meta-analysis. J. Appl. Ecol. 58, 812-824.

- Eklund, A., J.V. López-Bao, M. Tourani, G. Chapron, and J. Frank, *Limited evidence on the effectiveness of interventions to reduce livestock predation by large carnivores*. Scientific Reports, 2017. **7**: p. 2097 | DOI:10.1038/s41598-017-02323-w.

- Khorozyan, I. and M. Waltert, *How long do anti-predator interventions remain effective? Patterns, thresholds and uncertainty*. Royal Society Open Science, 2019. **6**(9). 10.1098/rsos.190826.

- Lennox, R.J., A.J. Gallagher, E.G. Ritchie, and S.J. Cooke, *Evaluating the efficacy of predator removal in a conflict-prone world*. Biological Conservation, 2018. **224**: p. 277-289.

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- Treves, A., M. Krofel, and J. McManus, *Predator control should not be a shot in the dark*. Frontiers in Ecology and the Environment, 2016. **14**: p. 380-388.

- Treves, A., M. Krofel, O. Ohrens, and L.M. Van Eeden, *Predator control needs a standard of unbiased randomized experiments with cross-over design*. Frontiers in Ecology and Evolution, 2019. **7** p. 402-413. 10.3389/fevo.2019.00462.

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conservation needs evidence-based livestock protection. PLOS Biology, 2018. **l 16**(9). e2005577. https://doi.org/10.1371/journal.pbio.2005577.

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- Khorozyan, I. and M. Waltert, *Variation and conservation implications of the effectiveness of anti-bear interventions*. Scientific Reports, 2020. **10,**: p. 15341. 10.1098/rsos.190826. https://www.nature.com/articles/s41598-020-72343-6.

- Khorozyan, I., *Defining practical and robust study designs for interventions targeted at terrestrial mammalian predators*. Conservation Biology, 2021. **in press**: p. 1–11. 10.1111/cobi.13805.

- Treves, A., R.B. Wallace, and S. White, *Participatory planning of interventions to mitigate human-wildlife conflicts* Conservation Biology, 2009. **23**(4): p. 1577-1587.

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- Louchouarn, N.X. and A. Treves, *Low-stress livestock handling protects cattle in a five-predator habitat*. *https://www.researchsquare.com/article/rs-1061804/v1*, *in review Biorxiv pre-print*. *https://www.researchsquare.com/article/rs-1061804/v1*.

- Ohrens, O., C. Bonacic, and A. Treves, *Non-lethal defense of livestock against predators: Flashing lights deter puma attacks in Chile*. Frontiers in Ecology and the Environment, 2019. **17**(1): p. 32-38. 10.1002/fee.1952.

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- Hall, K., Fleming, P.A., 2021. *In the spotlight: can lights be used to mitigate fox predation in a free-range piggery? Appl. Anim. Behav. Sci. 2, 105420.*

- Shivik, J.A., Treves, A., Callahan, M., 2003. *Non-lethal techniques: Primary and secondary repellents for managing predation. Conservation Biology. 17, 1531-1537.*

- Khorozyan, I., Siavash, G., Mobin, S., Soofi, M., Waltert, M., 2020. *Studded leather collars are very effective in protecting cattle from leopard (Panthera pardus) attacks. Ecological S;lutions and Evidence 1, e12013.*

44. Only 3 out of the 17 peer-reviewed articles above were cited in the Nevada PDM EA. These omissions are breaches of scientific integrity for authors writing systematic reviews as in the Nevada PDM EA. They are breaches of integrity because the Nevada PDM EA must provide scientific (*and no other) reasons why they were considered reliable or unreliable. Omitting them dodges the scientific responsibility to consider all peer-reviewed evidence.

45. In addition, USDA-WS was aware of our work since 2016 and would have been wise to communicate with us annually if not more often to learn what we had published. I have been speaking to professional audiences, the public, and to broadcast media about our work on carnivore control since 2005. In 2016, USDA-WS attended my first free online webinar to explain Treves et al. 2016. They did not take the opportunity then to ask questions or clear up the many misunderstandings of our work they seem to hold. When I invited them to identify themselves by name rather than phone number, none spoke up.

46. Another breach is not to mention even in a cursory manner that USDA-WS has a financial competing interest to continue business as usual. All the authors above were obligated by the journals to disclose such competing interests. That is a standard of modern scientific practice called Open Science. Failure to disclose that authors gain financially or through career advancement by the presentation of certain conclusions is considered research misconduct.[8]

47. In summary, the reams of work I cite above come to a consistent conclusion: Most methods of lethal carnivore control have not been studied by the standards set by Underwood (1992) or Treves et al. 2016, 2019) but rather by unreplicated or simple (non-random) BACI or even weaker designs such as correlational analysis. When lethal PDM has been examined by the silver-standard (non-randomized), it seems ineffective. More worrisome, lethal PDM has

[8] NAS National Academies of Sciences, E.M., 2017. *Fostering Integrity in Research, The National Academies Press*, Washington, DC.

emerged often as counter-productive by seeming to raise future livestock damage (Treves et al. 2016; Santiago-Ávila et al. 2018; Grente 2021). Naturally, I respect my own critique of silver standard designs, because they bring half the strength of inference as RCTs or randomized BACIs (Treves et al. 2019). However, those I cite in this paragraph are the most reliable examples of low or no bias and they suggest poor results of lethal PDM. No gold-standard experiments have been conducted on lethal PDM, hence I repeat my call for a moratorium until lethal PDM is proven effective by the gold-standard experimental designs espoused by Underwood 1992.

48. By contrast, for non-lethal PDM, the number of randomized, controlled trials or replicated, randomized BACI with cross-over designs and protection against bias continues to increase. Citations 14-18 above demonstrate randomized trials of non-lethal methods proven effective to protect livestock from carnivores, and a handful showing a lack of effect.

49. Finally, if USDA-WS proposes to improve the situation they must transparently state what their PDM is intended to achieve, then measure the results explicitly, precisely, and transparently. The frequent claims that they are experts are inadequate. Science respects neither authority nor clients' perceptions of USDA-WS interventions. Perceptions of effectiveness are no substitute for measures of safer livestock or healthier game. Underwood 1992 is unstinting in his denouncement of procedures like those used by USDA-WS (without mentioning the agency). **"However assessments of environmental impact are done, two important rules should be obeyed. First, at all times and places where monitoring for environmental impact is attempted, there must be clear statements about the aims of the exercise. Thus, the hypotheses of interest about potential impact must be clearly and unambiguously stated (see, for example, Green, 1979; Underwood, 1990). Only then will it be possible to determine whether the sampling design was appropriate for the job, without imposing confounding in space, time, or both into the data."** Without comparison sites and multiple such sites, without careful monitoring and measurement, such claims are wishful thinking. Underwood goes on to emphasize this point as follows: **"This would not be accepted in normal and routine ecological and experimental analyses. The results would always be**

rejected by reputable journals …"

50. I agree. Wildlife Services cannot simply dismiss the lack of any high quality science supporting its use of lethal PDM by deciding to disbelieve the conclusions of my own work and that of many others based upon a misreading of a 30-year-old paper.

Pursuant to 28 U.S.C. § 1746, I declare, under penalty of perjury, that the foregoing is true and correct to the best of my knowledge and belief.

Executed on September 15th, 2022 at Madison, Wisconsin.

Dr. Adrian Treves

Adrian Treves

Formal education

1991–1997 PhD Harvard University, Human Evolutionary Biology
1987–1990 BA Rice University, double B.A. Biology & Anthropology

Professional positions held since 1997

2007– Professor, Nelson Institute for Environmental Studies, University of Wisconsin–Madison, USA (2011–2017 Associate Professor, 2007–2011 Assistant Professor)
2006–2007 Senior Administrator, Office of the Director, Nelson Institute for Environmental Studies, University of Wisconsin–Madison
2005–2007 Executive Director and founder, COEX: Sharing the Land with Wildlife, Madison, WI
2005–2006 Visiting Assistant Professor Conservation Biology Program, Makerere University, Kampala, Uganda
2003–2005 Extension Coordinator, Wildlife Conservation Society, Bronx, NY
2000–2003 Research Fellow, Conservation International, Center for Applied Biodiversity Science, Washington, D.C.
1999–2000 Post-doctoral Lecturer, Department of Zoology, University of Wisconsin–Madison
1997-2000 Post-doctoral Research Associate and Lecturer, Department of Psychology, University of Wisconsin–Madison

Honors and awards

2021-2023 Vilas Associate Professorship
2021 Scientific Advisor, the Toepfer Academy for Nature Conservation, Ministry of Environment, Lower Saxony, Germany
2018–2025 Member, Scientific Council on wolves, French Ministry of Environment
2004–2020 Keynote speaker or sole speaker at 17professional or public events
2017 Winner of the Clements Prize for Outstanding Research & Education
2018 Nominated for the Indianapolis Prize for Conservation
2020 Professor Recognition, Tri-Delta, UW-Madison Chapter
2015–2019 Honored Instructor, selected by students 5 times
2018–2020 Faculty co-chair of the University of Wisconsin–Madison Teaching Academy (two terms 2013–2015 and 2018–2020) and Fellow since 2010
2014–2015 Fulbright Award for Sabbatical Teaching / Research (Sweden)
2012 Fulbright Senior Specialist for teaching (Chile)
2010 Fulbright Senior Specialist for teaching (Ecuador)
2010 Award for Best monitoring & evaluation methods, Rainforest Alliance Eco-Index

Scientific articles

101 published in refereed journals
75 book chapters, non-peer-reviewed scientific writing, scientists' sign-on letters or public comments to regulators about scientific basis for decisions found at http://faculty.nelson.wisc.edu/treves/CCC.php **. Overall, 36 of my Junior colleagues worked with me as co-authors. Citations 11835, most cited 1718 (15% of total), 51% in the last 5 years, H index 52, i00-index 102, Source: Google Scholar 10 August 2022, all posted online for free at http://faculty.nelson.wisc.edu/treves/publications.php**

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96. Naughton-Treves, L., **Treves**, A., Chapman, C., Wrangham, R.W. 1998. Temporal patterns of crop raiding by primates: Linking food availability in croplands and adjacent forest. Journal of Applied Ecology 35(4):596-606.
97. **Treves**, A., Naughton-Treves, L. 1997. Case study of a chimpanzee recovered from poachers and temporarily released with wild conspecifics. Primates 38:315-324.
98. **Treves**, A. 1997. Primate natal coats: A preliminary analysis of distribution and function. American Journal of Physical Anthropology 104:47-70.
99. **Treves**, A. 1997. Vigilance and use of microhabitat in solitary rainforest mammals. Mammalia 61(4):511-525.
100. **Treves**, A., Chapman, C. 1996. Conspecific threat, predation-avoidance and resource defense: Implications for grouping in langurs. Behavioral Ecology and Sociobiology 39:43-53.
101. T**reves**, A. 1996. A preliminary analysis of infant exploration in relation to social structure in 17 primate species. Folia Primatologica 67:152-156.

Other scientific writing including book chapters and scientific comments (all were reviewed by editors or co-contributors, but not independently, anonymously)

102. **Treves, A.** 2022. Reconsidering best available science in light of the reproducibility crisis. Frontiers in Ecology and the Environment, in press. (guest editorial)

103. **Treves,** A., Darimont, C.T., Santiago-Ávila, F.J., 2022. Comment on correcting Stenglein & van Deelen 2016 & Comment on 2022 correction to Stenglein & van Deelen 2016. PLoS One Comments, https://journals.plos.org/plosone/article/comment?id=10.1371/annotation/1374d1392a1379da-dc1373-1341bb-ad1383-1837ed1707c1948 & https://journals.plos.org/plosone/article/comment?id=1310.1371/annotation/cb45650a-49340-45409e-a45753-ef47579427ab

104. T**reves**, A., Louchouarn, N.X., 2022. Considering a possible error in infant survival estimates in Thiel et al. 2009 and whether Wydeven et al. 2009 might be more precise and accurate. PLoS One Comments 17, https://journals.plos.org/plosone/article/comment?id=10.1371/annotation/ad1336aab1373-f1388e-1374fb1376-b1301b-7405bdab1377ad1370.

105. **Treves, A.** 2019. Standards of evidence in wild animal research. Report for the Brooks Institute for Animal Rights Policy & Law. 30 June 2019 http://faculty.nelson.wisc.edu/treves/CCC.php/standards (reviewed by 6 peers chosen by me)

106. **Treves, A.** 2019. Scientific ethics and the illusion of naïve objectivity. Frontiers in Ecology and the Environment 7:1 (guest editorial)

107. **Treves,** A., Browne-Nunez, C., Hogberg, J., Karlsson Frank, J.,Naughton-Treves, L., Rust, N., Voyles, Z. 2017. Estimating poaching opportunity and potential in Conservation criminology, Ed. Gore, M., Wiley Publications, New York.

108. **Treves**, A., Martin, K.A., Wiedenhoeft, J.E., Wydeven, A.P. 2009. Gray wolf dispersal in the Great Lakes Region. In Recovery of Gray Wolves in the Great Lakes Region of the United States: an Endangered Species Success Story. Eds. Wydeven, A.P., Van Deelen, T.R., Heske, E.H. Springer, New York. p. 191-204.

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110. **Treves,** A., Palmqvist, P. 2007. Reconstructing hominin interactions with mammalian carnivores (6.0 - 1.8 Ma). In Primate Anti-Predator Strategies. Eds. Nekaris, K.A.I., Gursky, S.L. Springer, New York. p. 355-381.

111. **Treves,** A., Naughton-Treves, L. 2005. Evaluating lethal control in the management of human-wildlife conflict. In People and Wildlife, Conflict or Coexistence? Eds. Woodroffe, R., Thirgood, S., Rabinowitz, A. Cambridge University Press, Cambridge. p. 86-106.

112. **Treves,** A., Brandon, K. 2005. Tourist impacts on the behavior of black howler monkeys (Alouatta pigra) at Lamanai, Belize. In Commensalism and Conflict: The primate-human interface. Eds. Paterson, J. Wallis, J. American Society of Primatology, Norman, OK, p. 146-167.

113. **Treves**, A., Pizzagalli, D. 2002. Vigilance and perception of social stimuli: Views from ethology and social neuroscience. In The Cognitive Animal: Empirical and Theoretical Perspectives on Animal Cognition. Eds. Bekoff, M., Allen, C. Burghardt, G. MIT Press, Cambridge, MA. p. 463-469.

114. **Treves,** A. 2002. Predicting predation risk for foraging, arboreal monkeys. In Eat or Be Eaten: Predator Sensitive Foraging. in Nonhuman Primates. Ed. Miller, L.A. Cambridge University Press: Cambridge. p. 222-241.

115.**Treves**, A., Baguma, P. 2002. Interindividual proximity and surveillance of associates in comparative perspective. In The Guenons: Diversity and Adaptation in African Monkeys. Eds. Glenn, M.E., Cords, M. Kluwer Academic Publishers, NY, p. 157-168.

116.**Treves**, A. 2000. Prevention of infanticide: The perspective of infant primates. In Infanticide by males and its implications. Eds. van Schaik, C., Janson, C. Cambridge University Press. p. 223-238.

117.Ohrens, O., Santiago-Ávila, F.J., **Treves,** A. 2019. The twin challenges of preventing real and perceived threats to livestock. In Human-Wildlife Interactions: Turning Conflict into Coexistence. Eds. Frank, B. Marchini, S., Glikman, J. Cambridge University Press: Cambridge, p.242-264.

118.Santiago-Ávila, F.J., Lynn, W.S., **Treves**, A. 2018. Inappropriate consideration of animal interests in predator management: Towards a comprehensive moral code. Chap. 12, p.227-251, In Large Carnivore Conservation and Management: Human Dimensions and Governance. Ed. T. Hovardos, Routledge, New York.

119.Naughton-Treves, L, L'Roe, J., L'Roe, A. **Treves**, A. 2018. Changes in elephants, bushpigs, farmers, and fears: Comparing local perceptions of crop raiding at Kibale National Park, 1994 and 2012. in Human-Wildlife Conflict: an Interdisciplinary Approach. Eds. K. Hill et al. Berghahn Books, London, pp. 127-147.

120.Bruskotter J.T., **Treves** A., Way J.G. 2014. Carnivore Management. pp. 83-90 in Science and Politics: An A-To-Z Guide to Issues and Controversies. Ed. B.S. Steel, CQ Press, Thousand Oaks, CA, USA.

121.Zimmermann, A., Baker, N., Inskip, C., Linnell, J.D.C., Marchini, S., Odden, J., Rasmussen, G., **Treves**, A. 2010. Contemporary views of human-carnivore conflicts on wild rangelands. in Wild Rangelands: Conserving Wildlife While Maintaining Livestock in Semi-Arid Ecosystems. Eds. du Toit, J., Kock, R., Deutsch, J.C. Wiley-Blackwell, London. p.129-151.

122.Sillero-Zubiri, C., Sukumar, R., **Treves**, A. 2007. Living with wildlife: the roots of conflict and the solutions. In Key Topics in Conservation Biology. Eds. MacDonald, D., Service, K. Oxford, Oxford University Press, p. 266-272.

123.Miller, L.E., **Treves**, A. 2007 edition 1 and 2010 edition 2. Predation on Primates: Past Studies, Current Challenges, and Directions for the Future. In Primates in Perspective. Eds. Campbell, C.J., Fuentes, A., MacKinnon, K.C., Panger, M., Bearder, S.K. Oxford University Press, NY, p. 525-542.

124.Naughton-Treves, L., **Treves**, A. 2005. Socioecological factors shaping local tolerance of crop loss to wildlife in Africa. In People and Wildlife, Conflict or Coexistence? Eds. Woodroffe, R., Thirgood, S., Rabinowitz, A. Cambridge University Press, Cambridge. p. 253-277.

125.Wydeven, A.P., **Treves**, A., Brost, B. [u], Wiedenhoeft, J. 2004. Characteristics of wolf packs in Wisconsin: Identification of traits influencing depredation. In People and Predators: from Conflict to Coexistence. Eds. Fascione, N., Delach, A., Smith, M. Island Press, Washington, DC, p. 28-50.

126.Boinski, S., **Treves,** A., Chapman, C.A. 2000. A critical evaluation of the influence of predators on primates: Effects on group movement. In On the Move: How and Why Animals Travel in Groups. Eds. Boinski, S., Garber, P,. University of Chicago Press, Chicago, p. 43-72.

Non-peer-reviewed scientific writing including 38 scientific sign-on letters 2014–2022, see http://faculty.nelson.wisc.edu/treves/CCC.php

127. Koontz, F., **Treves**, A. 2022. Conserving — not killing — wildlife should drive Wisconsin's natural resources strategy: The Department of Natural Resources needs to shift its priorities. Isthmus, Opinion https://isthmus.com/opinion/opinion/conserving-not-killing/

128. **Treves**, A. 2021. People and Carnivores. (Interview transcript) with L. Upson, People & Carnivores, November 2021.

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130. **Treves**, A. 2020. Nationwide gray wolf delisting rule. Memo to Office of Management & Budget Office of Information & Regulatory Affairs, 29 September 2020.

131. **Treves**, A., Laundré, J.W., 2020. Science does not support the claims about grizzly hunting, lethal removal, In The Missoulian. https://missoulian.com/opinion/columnists/science-does-not-support-the-claims-about-grizzly-hunting-lethal-removal/article_6c345a20-fd48-5f22-a5a2-f13599f4f551.html and the Bozeman Daily Chronicle https://www.bozemandailychronicle.com/opinions/guest_columnists/science-doesnt-support-claims-about-grizzly-hunting/article_1a3809fd-2275-5ed6-b473-a769a503eb16.html accessed August 2020.

132. **Treves**, A., 2020. Elephants and pandemics. Animal Sentience 28(20). https://animalstudiesrepository.org/animsent/vol5/iss28/20/

133. Van Eeden, L., **Treves**, A., Ritchie, E. 2018. Guardian dogs, fencing, and 'fladry' protect livestock from carnivores. The Conversation https://theconversation.com/guardian-dogs-fencing-and-fladry-protect-livestock-from-carnivores-103290

134. **Treves,** A. 2017. Letter to the Editor. Chicago Tribune, August 12, 2017

135. **Treves,** A. 2016. Wolf delisting decision not based on the facts. The Register-Guard, Eugene, OR, 15 February 2016.

136. **Treves**, A., Krofel, M., Lopez-Bao, J. V. 2016. Missing wolves, misguided policy. Science eLetter 350: 1473-1475.

137. Krofel, M.**,** **Treves**, A., Ripple, W. J., Chapron, G., López-Bao. J.V. 2015. "Super-predator" humans: Integrating evolutionary perspectives into large carnivore management. Science (eLetter) 350 (6260): 518.

Research and teaching grants

totaling >$5.6 million (with Treves as lead PI for >$3.0 million), 10 most recent below, for full list see http://faculty.nelson.wisc.edu/treves/archive_BAS/funding.pdf

1. $7,000 (2022) The Organisation for Economic Co-operation and Development (OECD) Co-operative Research Programme: Sustainable Agriculture and Food Systems Fellowship in "Evidence-based policy and husbandry interventions for protecting livestock and biodiversity", **A. Treves**
2. $8,000 (2021) German federal government DAAD grant for a research stay at Leuphana University of Lüneburg and the Alfred Toepfer Academy for Nature Conservation in Lower Saxony, Germany for research and teaching, **PI Treves**
3. $194,572 (2021-2023) Vilas Associate Award, **PI Treves**

4. $25,000 (2020-2021) Vilas Life Cycle Professorship, **PI Treves**
5. $34,661 (2020-2021) National Geographic Society "Range Riders and the Gold Standard for Predator Deterrence" PIs **Treves**, Louchouarn, Englewood
6. $13,500 (2020-2021) Summerlee Foundation "Carnivore Coexistence", PI **Treves**
7. $15,000 (2020-2021) Christine Stevens Wildlife Award from the Animal Welfare Institute "Range Riders and the Gold Standard for Predator Deterrence" Louchouarn, **Treves**
8. $94,450 (2019–2021) Bureau of Indian affairs award to Bad River Natural Resource Dept. sub award for MS research by A. Fergus, PIs **Treves**, Hill-Kasten
9. $29,000 (2016–2021) Therese Foundation "Coexisting with Carnivores" PI T**reves**
10. $178,241 (2018–2021) COLCIENCIAS Fellowship from the Government of Colombia for PhD research by Alexandra Alicia Pineda Guerrero, PI **Treves**

Keynote oral presentations

1. Keynote speaker "Scientific evidence for lethal management: one view from U.S. wolves", A. Treves, NABU (Nature Conservation NGO), Berlin, Germany, 7 October 2021.
2. Keynote webinar for Rewilding Earth and Project Coyote "A critical evaluation of legal and illegal killing of native predators" A. Treves, June 30, 2020.
3. Keynote speaker "Coexistencia y conflicto entre carnívoros y humanos: La importancia de criterios rigurosos para la evaluación de intervenciones" A. Treves, Univ. of Medellin, Colombia, 16 December 2019.
4. Keynote speaker hosted by Friends of the Wisconsin Wolf for at "Wildlife Day on the Farm", Cain's Orchard, Hixton, WI, 16 August 2019.
5. Keynote webinar for the Wolf Conservation Center (NY) "Best available predator science and the law" A. Treves, 4 December 2018.
6. Keynote speaker for #wildlifeday organized by Endangered Species Coalition and Friends of Wisconsin Wolves and Wildlife, "The Wildlife Trust", Treves, A., State Capitol Building, Madison, WI, 11 April 2018.
7. Keynote speaker for Antioch University of New England, Center for Tropical Ecology & Conservation 12th Annual Symposium, "Rethinking biodiversity preservation and conservation conflicts", Treves, A., Antioch, NH, 15 April 2017.
8. Keynote Panelist for Public Interest Environmental Law Conference (2 talks), "Wolves and the public trust", Wood, M.C. and Treves, A. And "Predators and the Public Trust", Treves, A., Eugene, OR, 4 March 2016.
9. Keynote speaker for Human-wildlife conflict and coexistence at DICE, University of Kent, Treves, A., "Predators and the public trust", Canterbury, U.K., 26 May 2016.
10. Keynote speaker for Wolf Symposium NABU,"Predators and the Public Trust", Treves, A., Wolfsburg, Germany, September 2015.
11. Keynote speaker for Brookfield Zoo Wilderness Coalition, "Predators, public trust, predicting and preventing poaching and predation on property", Treves, A., Chicago, IL, 25 September 2014.
12. Keynote speaker for Democracy, science, and Advocacy: Wolf and Wildlife Coexistence Conference, Ho Chunk Nation, Friends of Wisconsin Wolves and Wildlife, Nelson Institute for Environmental Studies, "Predators and the Public Trust" and "The role of science in the Public Trust". Treves, A., Ho Chunk Casino, WI, 14-15 July 2015.
13. Keynote speaker for Universidad de Azuay, (in Spanish) "Balancing human needs with carnivore conservation", Treves, A., Cuenca, Ecuador, 10 May 2010.
14. Keynote speaker for Landowner workshop (in Spanish) "Understanding and managing human-wildlife conflicts", Zhoray, Ecuador, Treves, A., 12 August 2007.

15. Keynote speaker for Wildlife Conservation Society Conference on Biodiversity Policy in Bolivia (in Spanish) “National policy on interventions to mitigate human-wildlife conflicts”, Treves, A., La Paz, Bolivia, 5 May 2006.
16. Keynote speaker for Wildlife Conservation Society workshop on Conservation Planning in Bolivia (in Spanish) “Intervenciones por conflictos entre humanos y vida silvestre”, Treves, A., LA Paz, Bolivia,Bolivia, 10 January 2005.
17. Keynote speaker for Wildlife Conservation Society, Albertine Rift Program workshop on Conservation Planning (in French and English) “Landscape species”, Treves, A., Beni, DR Congo, 10 March 2004.

+72 invited presentations available upon request (recent examples below)

18. Panelist “Intervening to protect domestic animals from wolves, bears, and cougars”, A. Treves, Oregon Wildlife Alliance hosted the Oregon Wildlife Caucus of state legislators, online 14 Apr 2022.
19. Invited panelist, “The science does not support state claims about liberalizing wolf-killing”, Treves, A., International Wildlife Coexistence Network, online webinar 19 Jan 2022.
20. Panelist (one of four) “Why do commissions exist? And how should they be constituted and trained for wildlife public trust duty?” A. Treves, Wildlife for All Panel, 2 December 2021,
21. Invited speaker “Human-carnivore coexistence and other sustainability challenges”, A. Treves, Environmental science Program, Leuphana University, Lüneburg, Germany, 14 October 2021.
22. Invited speaker “Human-Carnivore Coexistence and Conflict”, A. Treves, Social and Ecological Sustainability Institute, Leuphana University, Lüneburg, Germany, 28 October 2021.
23. Invited speaker “C Selection and design of interventions to protect livestock and wolves”, A. Treves invited talk at Conference on Livestock Protection hosted by the Alfred Toepfer Academy for Nature Conservation, Walsrode, Germany, 30 September 2021.
24. Invited speaker “Livestock Protection”, A. Treves invited talk at Conference on Livestock Protection hosted by the Alfred Toepfer Academy for Nature Conservation, Walsrode, Germany, 29 September 2021.
25. Invited speaker “Carnivore Coexistence Research 2000-2021”, A. Treves invited talk at Board of Visitors of the Alfred Toepfer Academy for Nature Conservation, Camp Reinsalen, Germany, 7 September 2021.
26. Invited speaker “Human tolerance for wolves and the effectiveness of lethal and non-lethal management”,A. Treves, The Wolf Office section, Lower Saxony Water Management, Coastal Defence and Nature Conservation Agency (NLWKN), Ministry of Environment, Energy, Construction and Climate Protection, Lower saxony, Germany, 9 February 2021.
27. Invited speaker “Wolf policy and its effects on illegal killing, human tolerance, and recovery”, A. Treves, Wed Nite@The Lab, Madison, WI, 3 March 2021 and Weston Sustainability Series, Madison, WI 25 March 2021.
28. Invited speaker “Non-lethal and lethal management of carnivores: effectiveness and side-effects” California Fish & Wildlife Commission, online 19 August 2020.
29. Invited speaker “Standards of evidence for promoting methods of predator control”, A. Treves, WWF Salzburg, Austria, 23 January 2020.

+60 Contributed Public Presentations at Conferences available upon request

+19 Outreach presentations for practitioners and the public, in three languages (all invited) available upon request, 1 example provided

Kiwanis Club of Middleton, “Wolf policy and science”, A Treves, online 18 March 2022

Teaching

Leadership

2019–2020 Faculty co-chair of UW–Madison Teaching Academy
2013–2015 Faculty co-chair of the UW–Madison Teaching Academy
2010– Fellow of the University of Wisconsin–Madison Teaching Academy
2013– University Committees on Disability Access and Inclusion (see below)

Invited presentations on pedagogy

1. Invited panelist on "Disability and Pedagogy, a Roundtable" University Committee on Disability Access and Inclusion, 4 March 2019, HC White 7191, Madison, WI
2. University of Wisconsin–Madison Teaching & Learning Symposium, Invited panelist on "Beyond Disability Accommodation Letters: Inclusive Instructional Design to Enhance Learning for All" May 16, 2019, Madison, WI.
3. University of Wisconsin–Madison Teaching & Learning Symposium "Active learning in the Lakeshore Nature Preserve", Treves, A., 18 May 2017, Madison, WI.
4. Office of Professional Instructor Development UW System, (poster) Henke, J., Martin, B., Treves, A. Introducing UW-TEACH: Teaching, Exploration and Collaboration Habitat University of Wisconsin–Madison, March 2016, Eau Claire, WI.
5. Teaching Academy Winter Retreat, Treves, A., Martin, E. (co-organizers) RELATE: Rethinking Effective Learning and Teaching Engagement. Why Does the Scholarship of Teaching and Learning Matter? January 2015, Madison WI.
6. University of Wisconsin–Madison Teaching & Learning Symposium Panel "Writing Global Learning Outcomes for your Science Course", M. Van Eyck, L. Van Toll, Treves, A., C. Allen, 23-24 May 2012, Madison WI.
7. University of Arizona–Tucson "Interventions to mitigate human-wildlife conflicts", Treves, A., October 3, 2011, Tucson, AZ.
8. UW–Madison, DoIT ENGAGE Faculty Advisory Group, "Wolf Sim and Risk maps", Treves, A., May 2, 2011, Madison, WI.
9. North Carolina State University, "Teaching and training in human dimensions of fish and wildlife", Treves, A., November 2006, Raleigh, NC.

Classroom Teaching

30 semesters university level + field courses in 3 countries in English, French, Spanish.
Course name**,** enrollment, semesters and years

1. Forward: Pandemic, Resilience and the Wisconsin Idea First-Year Seminar in the Social Sciences: I taught one module entitled "COVID-19 and humanity's relationship with animals" (team-taught online, enrollment 200+)
2. Preserving Nature, 7-31, Summer 2018–present (online)
3. Introductory Ecology.120-200, Fall 2011–present (in-person and online)
4. Wolves, dogs and people (First year interest group), 11–20, Fall 2015–2017, 2019 (in person, service-learning, field-based course)
5. Conserving Biodiversity, 36–74, Spring & Summer 2014–2018 (online)
6. Community Environmental Scholars Program seminar (2013-2019, little instructional role)
7. Large carnivore conservation, 8–14, Spring 2008–2014 (in person)
8. Conservation Biology, 28–64, Spring 2009–2014 (online 2013-2014, service-learning, field-based when in person 2009-2012)
9. Environmental planning, monitoring, and adaptive management, 7, Fall 2007 (in person)
10. Environmental planning & monitoring, 7, Fall 2005, (Makerere University), (in person)
11. Ethology, 118–125, Fall 1999–2000 (in person)
12. Animal Biology (co-taught 33%), 811, Spring 2000 (in person)
13. Psychometric Methods, 55, Spring 1999 (in person)
14. Animal Behavior: The Primates, 118, Spring 1998 (in person)

Guest discussion during field course on "Habitat restoration and monitoring, and social outreach at a restored orchard", A. Treves, L. Naughton, invited by Dr. V. Temperton and 12 undergraduates, Leuphana University, Lüneburg, Germany, 29 October 2021.

Guest lecture in "Introduction to Environmental Science" (120 undergrads) at Leuphana University of Lüneburg, 27 October 2021.

Guest lecture on wolf-hound interactions in Wisconsin for Dr. Megan Senatori's class on Animal Law at Lewis & Clark College, 20 July 2021

Other guest lectures: Geog 434 People, wildlife and landscapes (2006–20016), Geog 339 Environmental Conservation (20015-present), Zoo/ES 360 Extinction of Species (2015-2016), ES/AmInd 306 Indigenous Peoples and the Environment (2019), Agroecology seminar (grad. level, 2010), Environmental Observation Informatics (grad-level. 2020)

Teaching products
Service-learning products are available at http://faculty.nelson.wisc.edu/treves/courses.php
Wolf predation risk map: An online open-access map of the risk that wolves attack livestock in Wisconsin. users can enter any state address and visualize the risk in that vicinity overlaid by Google Earth layer and our published risk model (Bioscience 2011)
http://faculty.nelson.wisc.edu/treves/wolves/interactiveRiskMap.php
Audiovisual tools: http://faculty.nelson.wisc.edu/treves/Videos.php

Mentoring
graduated since 2004: 27 MS (including 7 non-thesis), 5 PhDs (Omar Ohrens 2018 chair, Sagan Friant 2017 committee, Francisco Santiago-Ávila 2019 chair, Chelsea Andrews 2019 committee, Suzanne Agan at Antioch University of New England 2020 committee), 3 post-docs (C. Browne-Nuñez 2013, O. Ohrens 2019, F. Santiago-Ávila 2020)
current, K. Putrevu, anticipated PhD (chair)
current, D. Bantlin, anticipated PhD (chair)
Current, N. Louchouarn, anticipated PhD (chair)
Current, A. A. Pineda Guerrero, anticipated PhD (chair)
Current, B. K. Schuh, anticipated PhD (chair)
Current S, Hermanstorfer, anticipated MS (chair)

7 undergraduate mentees for thesis or independent research projects since tenure (23 before) and informal mentoring for graduate students from other universities: Erasme Uyizeye (Rwandan, PhD, Antioch University of New England 2018-2020) Laura Jaimes Gonzalez (Colombian, Univ. of Sussex DICE, 2020), Estefanía Salazar Giraldo (Colombian, U. Medellin 2020), Alina Szabo (Romanian, U. Bucharest 2013), and J. McManus, South African citizen, earned her PhD at University of Witwatersarand, Johannesburg, South Africa in 2019.

Service to the public and professional organizations

Broadcast Media: selected from >1,800 stories, most available at http://faculty.nelson.wisc.edu/treves/press.php **:**

Professional service to organizations or editorial boards
Board of director (unpaid):
Present or testify to legislative bodies and Government agencies: Minnesota legislature (2014), .S. Congress Capitol Hill briefing (2018), California Fish & Wildlife Commission (2020), Senator Booker's

Office (2018-present), Ministry of environment of lower Saxony, Germany Toepfer Academy furniture conservation (2021-present), Ministry of environment for France Wolf science council (2019-present)
Board of Directors, P.E.E.R. Public Employees for Environmental Responsibility (20 May 2022-19 May 2025)
President, Future Wildlife (2020)
Board member Wildlife for All (Sep. 2021-present) and interim president (Jan-Aug 2022)

Science advisor (unpaid):
Project Coyote (2012–)
Occasional informal advice: Northeast Wolf Coalition, Endangered Species Coalition, Friends of the Wisconsin Wolf, Living with Wolves, Rocky Mountain Wolf Coalition, Earth and Animal Advocates, Benton County's Agriculture and Wildlife Protection Program, Wild Earth Guardians, Protect our Wildlife VT, Colorado wild cat science advisory board, Green Fire Law

Member (unpaid):
Union of Concerned Scientists (2015–),
IUCN Bear Specialist Group task-force on human-bear conflicts (2012), IUCN Wolf specialist (2016–),
Public Employees for Environmental Responsibility (2015–2019).

Expert declarations (unpaid):
Wi Federated Humane Societies et al. v Stepp. 2013. WI Court of Appeals District IV;
WEG v Colorado Parks and Wildlife Commission et al. 2017. District Court, Denver Country, Colorado;
Western Watersheds Project et al. v USDA Wildlife Services. 2018. U.S. District Court for the District of Idaho 1:17-cv-00206-BLW Doc 22-3;
CBD & Cascadia Wildlands v WDFW 2018. Superior Court of Washington for Thurston County. 18-2-04130-34.
CBD v WDFW et al. 2019. Superior Court of Washington for Thurston County, 18-2-02766-34.
Huskin et al. v WDFW et al. 2019.
Superior Court of Washington for King County 19-2-20227-1 SEA.
Great Lakes Wildlife Alliance et al. v. Cole et al. Circuit Court Dane County, Wi 2021cv002103 Branch 9 Circuit Court Summons Dane County, WI, Case 2021CV002103 Document 5 Filed 08-31-2021

Paid service as external reviewer or speaker (nominal fee <$5000 or expenses only)
Swiss-NSF SPARK (2019), Antioch University of New England (2018–2020), Landmark Foundation (2017), various publishers (2007–2017), U.S. Fish & Wildlife Service (2019), French Ministry of Environment, Scientific Council on Wolves (219-present), Ministry of Environment, Alfred Toepfer Academy for Nature Conservation, Lower Saxony, Germany (2021-present), NABU, Germany (2015, 2021)

Professional service to the University of Wisconsin–Madison
Permanent Committee: Nelson Institute for Environmental Studies Governance Faculty, Executive Committee; Occasional committees: Undergraduate Committee (2010–present), Academic Planning Council (2011–2012, 2015–2016, 2017–2021), WIN Diversity Committee (chair 2017–2018), Admissions and Program Committees (CBSD, ER, EC 2007–2012), Promotion & Tenure (Zedler 2016, Gibbs 2017, Patz 2018, Holloway 2019, Schneider 2019-2020)
Temporary committee tasks: Peer review of teaching for Z. Peery (2017), L. Horowitz (2019), 5-year reviews for promotion, & tenure (2013-2020), Annual report review for Nelson Institute

(2018); Moderator for panel of Mandela Fellows “Protecting Wildlands and Waters in a Time of Global Change” July 11, 2019, Madison, WI

University Committees: Campus Climate Survey Task force 2022-present, Teaching Academy: Executive Committee 2011–2020, 2022-2025, faculty co-chair 2013–2015, 2018–2020), Disability Access & Inclusion (2018–2021, chair 2020-2021 AY), Access & Accommodation in Instruction (2013–2018), African Studies (FLAS selection committee twice), Latin American, Caribbean, Iberian Studies Tinker Awards selection (2017–2021)