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One sentence summary: This comment presents my accumulated scientific findings from the Carnivore Coexistence Lab 1999 to the present.

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All assertions of fact made below relate to peer-reviewed scientific publications that can be found free of charge here: <http://faculty.nelson.wisc.edu/treves/publications.php> (Also repeated at the end of this document.) I would caution against the idea that without being handed the scientific article you are not legally required to consider it.

Part A. A summary of research from 2002-present by Dr. A. Treves and colleagues.

When a government agency considers and communicates about coexistence with wolves leading to management actions or inaction, the benefits - costs of wolves understood holistically are important. Holistic understanding means the benefits to humans, nonhumans, and ecosystems minus the costs to humans, nonhumans, and ecosystems. Moreover, the interests of wolves as individuals with their own interests (intrinsic value) are another factor.

Efforts to increase benefits often revolve around traditional use fees such as permits to hunt or compensation for dead domestic animals. Neither of these interventions has been shown to raise tolerance for wolves either measured by attitudes or poaching (illegal killing rates). Research on post facto compensation for dead livestock suggests it is less effective in influencing attitudes and behavior than paying incentives before losses occur, when payments are tied to protection of wild predators.

Because wolf attacks on farm animals have been proven highly predictable in Michigan, Wisconsin, and Minnesota, prevention is worth a pound of cure. Non-lethal methods have been proven with randomized, controlled trials on working livestock farms with wild wolves. Specifically, gold standard experiments show the effectiveness of fladry (the color doesn't matter, electrification is not necessary, tie down the bottoms of the flagging, the effect is not related to wind blowing the flags), livestock-guarding dogs (work in packs in wolf range, proper training and raising of pups is essential), range Riders practicing low-stress livestock-handling, have all been shown to protect livestock from wolves. Also, other methods have been shown effective against other predators so should be evaluated against wolves (Foxlights® against pumas and perhaps black bears and coyotes in our region, painting eye-spots on cattle, spiked collars on cattle). Although there is no one-size-fits-all solution and sometimes one needs to switch defenses or use multiple defenses simultaneously, the record of effectiveness of non-lethal methods is unquestioned by scientists globally now.

Continue experimental tests of other methods using randomized, controlled trials of non-lethal methods around working livestock farms in wolf range. Michigan has one of the better records

for use and experimental evaluation of non-lethal methods thanks to Dr. Tom Gehring and his students' efforts. However, the contract with USDA-WS required third-party audit because USDA-WS motives are financially conflicted (receiving monies from counties, state, and federal sources for visits rather than for resolving problems without killing.) A more reasonable program would incentivize farmers to install and maintain the most effective non-lethal methods (above) and the MI DNR would monitor implementation and effectiveness to confirm monies were well spent.

Efforts to raise the benefits of wolves by communicating and measuring the possible reductions in vehicle collisions with deer, the protection of imperiled plants, improvements in forest structure, and control of wildlife and zoonotic diseases are a growth area under-emphasized by wolf managers to date.

Efforts to reduce the costs of wolves by proactive prevention of attacks on domestic animals faces problems that derive from conflicts of interest and inadequate use of science to inform interventions. Liberalizing wolf-killing results in lower tolerance and more poaching. Moreover, Michigan's program for killing wolves has been shown to cause a net increase in the risk for cattle farms rather than preventing losses. Perceptions of conflict with wolves among hunters and farmers are inaccurate regionally and sometimes even locally. Beware of claims that lethal control works might spread across neighborhoods of townships when really the killing is leading to spill over of conflicts from one farm to another. Claims that tolerance will increase if wolf-killing is legalized have proven to lead to more demands for killing. Government policies that loosen protections for wolves, devalue wolves, liberalize hunting of similar species, flood wolf range with anti-wolf groups without supervision by law enforcement, and other traditional interventions have all been proven to lead to lower tolerance, more inclinations to poach, or higher poaching rates. Therefore, tighten law enforcement and anti-poaching interventions; don't loosen protections for wolves, especially during non-wolf hunting seasons, snow cover seasons, and seasons of baiting and hound-training. Measure poaching properly because it has been mis-measured in virtually every wolf agency in the USA.

My policy research suggests U.S. wildlife agencies do not understand the broad public interest in wildlife that is protected by the wildlife public trust. US state and federal agencies generally violate the wildlife public trust when it comes to predator management. Agencies routinely neglect their duty or abdicate it entirely by favoring current private uses over non-consumptive users and future generations. My research on the quality of science in North American wildlife agencies shows generally low standards of transparency, independent review, and other hallmarks of science. Given the quality of training in science is generally low in wildlife agencies and therefore scientific integrity is poorly understood and practiced, I recommend paying for training staff in open science principles.

Although I have not conducted research on the following topics, my extensive readings of the primary scientific literature suggest the following: killing wolves to protect wild ungulates is very tricky to get right and can lead to lower ungulate abundances and survival. The overwhelming effects of habitat quality, disease, and climate on ungulate populations will obscure the minimal effects of predators on their populations. Killing wolves to protect human safety might only work for a known culprit that poses an imminent threat to people (verified by an impartial third party) so widespread killing of many wolves for this reason is deceptive. Too many people lie about their encounters with wolves or exaggerate the fears associated with eye contact or proximity to a wild wolf to make eyewitness statements the basis for wolf-killing programs.

Part B. Integrating facts and values for management planning

1. Disentangling facts from values

A primer on disentangling facts from values: Values are personal perceptions of objects, events, or individuals as good, bad, or neutral. Aggregations of individuals, such as organizations, social groups, populations, can hold similar values. Facts are replicable observations (including measurements) of the universe that are accurate and precise and survive verification and efforts at falsification. There is no overlap in the two categories despite a common practice of (a) stating our preferences as facts (e.g., I need to play), (b) confusing the two (e.g., death is bad), (c) entangling the two (e.g., I prefer living wildlife because they fulfill ecosystem functions), and (d) dispensing with one inappropriately (e.g., dispensing with facts: ‘because I said so’ or dispensing with values: ‘the science tells us what to do’). Many public policy debates create a tangle of values and facts intentionally or unintentionally when people are unclear about the difference.

A management plan is fertile ground for entangling values with facts because the assertion that we need a plan so that we can manage is a value judgment. (If you doubt this, just replace the words ‘a plan’ and ‘manage’ in the previous sentence with ‘anarchy’ and ‘confuse our opponents’.) More specifically, legal mandates (value judgments) require a plan for management and planning and management both require some understanding of the situation one wishes to manage which means one needs facts to make sensible plans and to act reasonably. The entanglement begins there.

Next, I will share some common examples of failures to disentangle facts from values in wolf management that I recommend one avoid. Every action or inaction by a government agency is preceded by a decision even if it is implicit. The decision should include some versions of the question “Should we act?” Or “Ought we not to act?” These are the questions that cue the author, the speaker, and their audiences to listen for a value statement.

Avoidable errors in wolf management that are caused by entangling facts and values: Like any management plan, a wolf management plan should answer value-based questions about ‘what are we planning to attain?’ And ‘why should we manage?’ With clear definitions of terms such as manage and conservation. For example, in Michigan statute, “conserve” means “wise use of natural resources” but is ‘wise’ defined? The management plan should attempt to do so and the definition will require being explicit about the values behind the plan.

A large number of similar decisions are going to be made when writing a wolf management plan. Notably and most controversially, when should a wolf be killed?, when should humans take precautions to advance coexistence? And when should property be protected from wolves or relocated rather than altering wolf behavior and ecology? The value statements that follow from each such question should represent ethical reasoning not a fact or fact claim. For example, “Should we hunt wolves?” requires a value statement, such as “No we should not, because I believe it is wrong to kill a wolf except in extremely rare, verified cases of threats to human safety.” Or “Yes we should hunt a wolf because...”. One should not answer the ought or should question with facts of fact claims, e.g, “Yes, because wolves eat livestock”, because intermediate steps in the ethical reasoning are absent and you and your audience will be confused or start with a misconception of why wolves are being killed. What follows is an example of all of the missing intermediate steps in the above statement that entangles values and facts. “Yes, we should kill wolves because I value livestock more than wolves and I believe the wolves that hunters kill will eventually eat livestock.” Notice a value statement is followed by another that is expressed as a belief and a prediction. Many readers might feel that the prediction is a fact claim but it is not. As stated, it cannot be disproven (it is unfalsifiable) therefore it is a value judgment about individual wolves and their unknowable futures. Science does not address such phenomena. A slight tweak to the phrase could easily make it into a fact claim “wolves that are not afraid of hunters attack livestock”, which

entangles facts and values and is, by the way, not supported by scientific evidence at this time. I am expressing a value judgment above when I encourage policy-makers to disentangle and keep separate facts and values. It makes for more honest and clear plans and management.

It is more honest and clear because it exposes a desire for what ought to be (a value judgment) from a statement of what is now (fact) or likely to be true (fact claim). Following the above guidelines on structuring decisions will also help policy-makers distinguish their personal or group preferences from the preferences of the people they serve, a point I return to below in the section on duties of government. The preceding section is a short guide on how to avoid entangling values with facts. The next section addresses why values are not optional but should be explicit and many are dictated by U.S. federal and Michigan state laws.

2. Values are not optional: the duties of U.S. government wildlife agencies

Because your agency operates in a democracy with a federal system of laws, the U.S. Constitution and Acts of Congress are supreme and rank above Michigan constitution, statute, common law, and regulations. Therefore, the Michigan wildlife authorities whether elected or appointed should be aware that even when wolves are not federally listed under the Endangered Species Act, some federal laws hold.

For one, U.S. Supreme Court precedents declare wildlife a public trust (Geer v Connecticut 1896; the wildlife trust upheld by Hughes v Oklahoma 1979). Although some attorneys and judges might like to limit the scope of the public trust, courts in many states and federal courts will develop those contours through litigation. I predict that the further agencies stray from their duties as trustees, the stricter courts will become.

At the very least, the legal concept of a wildlife public trust implies that the government is the trustee and is therefore accountable as a trustee to all the beneficiaries, meaning the current and future people of the United States. I would predict that stricter courts will impose fiduciary duties and demand the best available science as part of the accounting by government trustees. But how does this tie to values?

All of the above statements about wildlife public trust reflect values enshrined in law. Those laws represent the values of the broad public in past generations. Indeed, the values of the beneficiaries of the wildlife public trust should have priority. That means personal values of agency staff are irrelevant and personal or organizational values of those who pay to take wildlife are also irrelevant (e.g., the Wildlife Society or Association of Fish & Wildlife agencies' values should be irrelevant to you as a trustee). Rather, the values of the broad public including those of future generations (see below) should guide the value judgments inherent to a management plan.

Similarly, the duties of a trustee should be embedded in a management plan, such as preserving the wildlife assets from substantial impairment, charging reasonable fees for private taking, reclaiming public interests if private ones have taken possession unlawfully or disproportionately, measuring the status of each asset accurately and precisely, reporting transparently with the best accounting, enforcing illegal take energetically, and being accountable to all the beneficiaries yet beholden to none.

How does a trustee measure the values of future generations? There are precedents and steps one can take that would improve on current practice. For one, youth values should be measured scientifically because they are the leaders of the future. Secondly, advocates for future generations exist in the non-profit sector with bona fide credentials to prove they have no competing interests. Third, the over-riding duty of a trustee who must protect an asset from substantial impairment into perpetuity is to prioritize preservation over use.

While much of the above will seem new and almost all of it is untested in court, few courts would fault an agency for proactively fulfilling trustee duties.

3. Facts are not optional: what does best available science mean?

Clearly, federal and state laws and regulations for protecting the environment often call for some version of best available science (BAS). Those laws are value judgments about the special role of facts and evidence. In brief, no decision should be made without information on the current conditions and the likely outcomes of the action and its alternatives. That does not answer the question of which facts and what is BAS? The facts most important to you as a trustee are the effects of your actions (interventions) in changing the current conditions compared to alternatives, and your predictions of the outcomes of your interventions.

4. Best available science and interdisciplinary integration as it relates to coexistence with native wild animals

Just like a good waiter, a public trustee should understand what the broad public wants vis a vis wildlife. Although it may have been easy to pander to like-minded constituents in the past, it is a dereliction of duty to ignore or dismiss the concerns, interests, and legal rights of people who are unlike us. Social science is the tool for understanding people, especially when our own perceptions are limited by implicit cognitive biases or the bubbles in which we live. The agency already knows far too much about what hunters, trappers, hounders, and anglers want. It is time to understand the non-consumptive adults and youths who pay for state park access, wildlife-watching and -feeding permits, general tax revenue, and just plain enjoy wildlife without paying for non-consumptive uses. U.S. agencies are way behind in this task, following decades of neglect of non-consumptive users and neglect of social sciences. There are also highly relevant fields in the humanities such as policy, law, and communication fields that do not lend themselves to the term social science.

Most agencies think they understand wildlife science. Yet most wildlife agency staff have been trained in a brand of science peculiar to North America, called fish and game management. Conservation biologists are often (but not always) trained very differently. The focus of the former is on use of wildlife for human gain whereas the focus of the latter is on prevention of extinction and maintenance of healthy ecosystems. The former tends to be far more anthropocentric than the latter. Look for staff scientists who are diverse in the above senses.

A modern wildlife agency needs experts in many fields to address endangered species, non-native invasions, diseases, habitat transformation, climate change, and human activities that may substantially impair the wildlife trust asset. I predict the scientific issues that will demand U.S. wildlife managers' expertise in the coming years are those I have listed above plus environmental crimes, attitude change, and communication sciences. Graduates of interdisciplinary programs may be better trained to grapple with the many fields listed above and mentally more flexible about novel conditions and new information.

The best available science (BAS) is largely the same in every field that quantifies phenomena by observation and measurement. I don't have much to say about BAS in qualitative fields. But in quantitative science relating to the environment including social sciences and ecological sciences, the fundamentals of good science are all the same: transparency, independent review, accuracy/ precision, and reproducibility of observations, measurements, and inferences.

Transparency underlies all claims to be science-based. Without clear statements of assumptions, worldviews, methods, open data, clearly stated objectives and analyses, and clear and timely presentation, the effort will fall short of BAS. I have seen agencies be secretive about data for years. This easily slips into cover-ups when mistakes occur and can lead to intimidation aimed at staff or independent scientists who catch the errors, try to fix them, or call them out. Striving for the highest standards of transparency will fix all but the worst errors.

Independent review requires that the above steps listed in transparency are subjected to debate and lengthy consideration by independent experts. The latter must be chosen to

have no financial or non-financial competing interests that might distort their critical thinking. The key to independent review is scrutiny of the methods without regard for whether the reviewer likes or dislikes the results. Given the financial might of wildlife agencies generally, your problem will be finding independent reviewers who think differently from you and are willing to criticize your science, not the other way around. Bad practices are asking friends to review one's work or avoiding rivals. Rivals, even opponents, are the best critics. Getting the most out of independent review requires leaving one's ego at the door. In any case, a trustee's ego should not be present in the first place.

Reproducibility or the ability to replicate or repeat an observation or inference is the final and critical hurdle before one can call a management action science-based. A single study is not enough to claim something is fact or reliable evidence. That single finding should be replicated, preferably by an independent team of investigators, before one calls it a fact or calls it reliable. This can seem like a rare event — because so few studies are replicated. That is an illusion that derives from the erroneous notion that a replication must occur in the same place with the same subjects or organisms. It need not. Replication is aimed at reproducing the causal mechanisms in an earlier study. Most causal mechanisms in wildlife science have been studied multiple times. So, look for replication in the broad scientific literature not in your backyard.

Although my summary above is necessarily brief, it shows the starting point for science-based management. There are many more complicated steps to achieving BAS. A shortcut for wildlife agencies is to subject more of their work to peer review for publication in journals. Journals with impact factors and editorial policies (especially if they are members of COPE the Committee on Publication Ethics) provide the independent review, demand transparency, and help authors to assess the reproducibility of findings. There is no better way to gain the trust of the public than to have independent scientists approving your work. By itself it does not suffice but it is an important step to fulfilling a legal duty as a wildlife trustee.

List of scientific publications

[Treves, A., Bruskotter, J.T. 2021.](#) A review of the effects of liberalizing the killing of wolves. Submitted as comments for various public comment periods requested by the U.S. Fish & Wildlife Service and states as these prepare to make rules and complete reviews. Also [find here a version with endnotes and a brief executive summary.](#)

[Treves, A., F.J. Santiago-Ávila, and K. Putrevu 2021.](#) Quantifying the effects of delisting wolves after the first state began lethal management. PeerJ, 9:e11666, doc 10.7717/peerj.11666.

[Treves A, Paquet PC, Artelle KA, Cornman AM, Krofel M, Darimont CT. 2021.](#) Transparency about values and assertions of fact in natural resource management. *Frontiers in Conservation Science: Human-Wildlife Dynamics*, 2:e631998, doc 10.3389/fcosc.2021.631998.

[For a short elevator speech and abstract, click here.](#)

[Treves, A., C. Batavia 2021.](#) Improved disclosures of non-financial competing interests would promote independent review. *Academia Letters*, 2021. Article 514: p. 1-9.

[Agan, S.W., A. Treves, and E.L. Willey 2021.](#) Estimating poaching risk for the critically endangered wild red wolf (*Canis rufus*). *PLoS One*, 2021. 16(5):e0244261. DOI 10.1371.

[Agan, S.W., A. Treves, and E.L. Willey 2021](#). Majority positive attitudes cannot protect red wolves (*Canis rufus*) from a minority willing to kill illegally. *Biological Conservation* 109321. DOI <https://doi.org/10.1016/j.biocon.2021.109321>

[Louchouart NX, Santiago-Ávila FJ, Parsons DR, Treves A.2021](#). Evaluating how lethal management affects poaching of Mexican wolves. *Royal Society Open Science* 8 (registered report): e2003300.

Just Preservation

In 2018, we published our ethic of public trusteeship, non-anthropocentric, multispecies justice that presents a method to give voice to future generations and to nonhumans when decisions are made to allocate or preserve nature. Start here with the original article [Treves, A., Santiago-Ávila, F., Lynn, W.S. \(equal co-authors\) 2018](#). *Just Preservation*. *Biological Conservation* 229: 134-141.

The newest discussion of Just Preservation played out in 2021 in the journal *Animal Sentience*, which included commentaries by several dozen colleagues and our replies to each: [F.J. Santiago-Ávila, A. Treves \(equal co-authors\), W.S. Lynn, Just preservation, trusteeship and multispecies justice](#). *Animal Sentience* 393. This continues our work on trusteeship, legal standing for nonhumans, and future generations, and equitable consideration of nonhumans as members of our moral community.

To see the abstract of each article, roll your mouse over the authors' names (in blue. If you have trouble accessing copy of articles, please [email Adrian Treves](#).

[Treves, A. and N. J. Balster \(2021 pre-proof\)](#). The effect of extended student hours on performance of students in an interdisciplinary, introductory undergraduate ecology course. *North American Colleges and Teachers of Agriculture Journal*, in press.

[Tshabalala, T., McManus, J., Treves, A., Masocha, V., Faulconbridge, S., Schurch, M., Goets, S., Smuts, B. 2021](#). Leopards and mesopredators as indicators of mammalian species richness across diverse landscapes of South Africa. *Ecological Indicators* 121, 107201.

[Masters thesis](#) by Abi Fergus, M.S. December 2020.

[Santiago-Ávila, F.J., R.J. Chappell, and A. Treves, 2020](#). Liberalizing the killing of endangered wolves was associated with more disappearances of collared individuals in Wisconsin, USA. *Scientific Reports* 10:e13881. <https://doi.org/10.1038/s41598-020-70837-x>.

[Darimont, C.T., Hall, H., Mihalik, I., Artelle, K.A., Eckert, L., Treves A., Paquet, P.](#) Large carnivore hunting and the social license to hunt. *Conservation Biology* 35(4):1111-1119. <https://doi.org/10.1111/cobi.13657>.

[Carroll, C., Rohlf, D.J., von Holdt, B.M., Treves, A., Hendricks, S.A. 2020](#). Wolf delisting challenges demonstrate need for an improved framework for conserving intraspecific variation under the Endangered Species Act. *Bioscience* baa125,1-12. doi:10.1093/biosci/baa125. .

With a podcast from four of the authors to explain the analysis and recommendations, in the wake of 2020 Trump Administration rule to delist the gray wolf nationwide [Listen here \(55 minutes\)](#).

[Treves, Louchouart, Santiago-Ávila. 2020.](#) Modelling concerns confound evaluations of legal wolf-killing. *Biological Conservation*. In press.

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[Treves, A., Krofel M, Ohrens O and van Eeden 2019](#) Predator Control Needs a Standard of Unbiased Randomized Experiments With Cross-Over Design. *Frontiers in Ecology and Evolution* 7:402-413. doi: 10.3389/fevo.2019.00462

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[Treves, A. A. F. J. Santiago-Ávila, V. D. Popescu, P. C. Paquet, W. S. Lynn, C. T. Darimont, K. A. Artelle 2019.](#) Trophy hunting: Insufficient evidence. *Letter in Science* 366(6464):435.

[Ohrens, O., Bonacic, C., Treves, A. 2019.](#) Non-lethal defense of livestock against predators: Flashing lights deter puma attacks in Chile. *Frontiers in Ecology and the Environment* 17(1):1-7. Gold standard (also platinum and silver standards!) experiments are explained at our new web page about

[standards of evidence in animal research.](#)

[van Eeden, L., Eklund, A., Miller, J.R.B.,...17 co-authors... Treves, A. \(equal first authors\) 2018.](#) Carnivore conservation needs evidence-based livestock protection. *PLOS Biology* <https://doi.org/10.1371/journal.pbio.2005577>

[. 2018. Van Eeden, Treves, Ritchie. The Conversation.](#) A short popular science summary of the above article.

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[Santiago-Avila, F.J., Lynn, W.S., Treves, A. 2018.](#) Inappropriate consideration of animal interests in predator management: Towards a comprehensive moral code. In *Large Carnivore Conservation and Management: Human Dimensions and Governance*, ed. T. Hovardos, Taylor & Francis, London.

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[Treves, A., K. A. Artelle, C. T. Darimont, W. S. Lynn, P. C. Paquet, F. J. Santiago-Avila, R. Shaw and M. C. Wood 018.](#) Intergenerational equity can help to prevent climate change and extinction. *Nature Ecology & Evolution* DOI: 10.1038/s41559-018-0465-y.

[Supporting Data.](#) Credit: Jen Burgess @jenburgessart Credit: Jen Burgess @jenburgessart Hallmarks of science missing from North American wildlife hunting and trapping plans.

[Artelle, K.A., Reynolds, J.D., Treves, A. Walsh, J.C., Paquet, P.C., Darimont, C.T. 2018.](#) Hallmarks of science missing from North American wildlife management. *Science Advances*. 2018.

[short video explaining the findings](#)

[Santiago-Avila, F.J., Cornman, A.M., Treves, A. 2018.](#) Killing wolves to prevent predation on livestock may protect one farm but harm neighbors. PLOS One [here](#).

[Chapron, G. and A. Treves 2016a and b, 2017a and b.](#) We first showed that Michigan and Wisconsin wolf population growth slowed whenever the government liberalized wolf-killing and the slow-down was proportional to the length of time that culling was liberalized, regardless of how many wolves were killed. Then starting a lively debate, Pepin et al. tried to counter our hypothesis but did not succeed in our opinion. That debate improved our model which strengthened its findings, also in the pages of Proceedings of the Royal Society B [Strengthening our findings.](#) and

[a 2017 rebuttal.](#) Then Stien and Olson and his colleagues tried again.

[Those critiques only made our evidence stronger.](#) Olson et al. in particular weakened their own position. Furthermore, independent findings for Mexican wolves presented by David Parsons in 2014 corroborate the idea that relaxing protections slows population growth more than expected.

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<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0180043>.

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[short video explaining the findings](#)

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Ripple, W. With 43 co-authors including A. Treves 2017. Saving the World's Terrestrial Megafauna. BioScience. doi: 10.1093/biosci/biw092

Treves, A., C. Browne-Nunez, J. Hogberg, J. Karlsson Frank, L. Naughton-Treves, N. Rust, Z. Voyles 2017. Estimating poaching opportunity and potential, in Conservation Criminology, M.L. Gore, Editor. John Wiley & Sons: New York. p. 197-212. .

Carter, N. H., J. López-Bao, J. Bruskotter, M. Gore, G. Chapron, A. Johnson, Y. Epstein, M. Shrestha, J. Frank, O. Ohrens and A. Treves 2017. A conceptual framework for understanding illegal killing of large carnivores. *Ambio* 46(3): 251–264.

Treves, A., Chapron, G., Lopez-Bao, J.V., Shoemaker, S., Goeckner, A., Bruskotter, J.T. 2015. Predators and the Public Trust. *Biological Reviews* doi: 10.1111/brv.12227 Take-home messages: Democratic governments have a duty under the public trust to preserve wildlife for current and future generations without substantial impairment. Trust duties are fiduciary duties meaning transparent accounting and prudence at a minimum. Few trustees of predators have lived up these legal and ethical standards.

Krofel, M., Treves, A., López-Bao, J.V. Hunted carnivores at outsized risk. *Science*. 350: 6260. Take-home message: Large carnivores are particularly vulnerable to human-induced mortality and we still know little about how they respond..

Treves, A. Bruskotter, J.T. 2014. Tolerance for Predatory Wildlife. *Science* 344: 476-477. Take-home messages: Tolerance for predators did not reflect individual economic losses but rather social identity and peer group complaints. Intolerance for wolves and inclinations to poach wolves rose when the government culled wolves. Tolerance for wolves did not increase when wolf hunting and trapping season was implemented.

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