

Testimony
of

PROFESSOR JOHN A. VUCETICH, PH.D.,
SCHOOL OF FOREST RESOURCES AND ENVIRONMENTAL SCIENCE,
MICHIGAN TECHNOLOGICAL UNIVERSITY
javuceti@mtu.edu

before the

**U.S. SENATE COMMITTEE
ON ENVIRONMENT AND PUBLIC WORKS**

on

The H.E.L.P. for Wildlife Act.

17 July 2017

About the witness: I am a professor in the School of Forest Resources and Environmental Science, Michigan Technological University. I have held a faculty position with Michigan Technological University since 1996. My scholarly expertise is population biology, most frequently examining wolves and their prey. I am also a scholar for certain topics pertaining to the human dimensions of conservation. I have authored or co-authored more than 80 peer-reviewed articles over the past two decades related to these and other subject areas, and have given more than 50 invited talks in the past 12 years.

I have been studying wolves for about 25 years. My predation ecology research includes but is not limited to how predator populations affect their prey and how prey affect predators. The majority of my wolf-related scholarship has been in Isle Royale National Park, located in Michigan and surrounded by Lake Superior. I have been working on the Isle Royale wolf-moose project since the early 1990s, and have been leading the project since 2001. It is the longest running wolf study in the world and the longest study of any predator-prey system in the world.

Further details are offered in my CV, which was submitted with this testimony.

§1. SUMMARY.

As written, The HELP for Wildlife Act is a Trojan horse and should be opposed or amended. It includes some positive provisions, but its most important effect would be to undermine the Endangered Species Act and subvert the conservation of wolves.

Wolves are valuable to ecosystems and most people recognize that wildlife – including wolves – possess value in their own right (For details, please see §7 of this document). Public support for wolves and wolf conservation, in particular, is very high (§2). Public support for the U. S. Endangered Species Act (ESA) is also high - among both liberal and conservative constituents (§2).

Some citizens and special interests express concern that conserving wolves comes at too high a price – raising disquiet about human safety (§3), protecting livestock (§4), unfair competition with hunters for deer (§5). These concerns have been grossly exaggerated. To the very limited extent that the concerns are genuine, they are readily accommodated.

Each of these claims are detailed, demonstrated, and documented in the subsequent sections of this document. In summary:

- Sociological evidence indicates that more than 80% of Americans are either positive or neutral about wolves. Fewer than 10% are very opposed. Sociological evidence also indicate that these positive views have been increasing over the past several decades. Impressions to the contrary rise, for example, from biased media coverage and state agencies who end up hearing the concerns of a few detractors but not the overwhelming majority who are supportive (§2).
- Wolves very simply are not a threat to human safety. This fact is robustly supported by experts and scientists from academia, federal government, and state governments. The false impression that wolves are a threat to human safety is fostered by those who fabricate or exaggerate the threat that wolves represent and thereby exploit a public that is easily and overly impressed by certain kinds of fear (§3).
- Government statistics plainly indicate that wolves are not a threat to the livestock industry. Wolves can be a problem for a small number of individual livestock owners. We have an important obligation to attend those problems. Fortunately, effective tools are available to accommodate that concern – including and especially various forms of financial compensation and nonlethal control. Where there is a need to improve these programs, they should be so improved (§4).
- Overabundant deer are detrimental to human safety (vehicle collisions), private property, agriculture and forestry. There is considerable evidence that deer are overabundant in numerous places where wolves had recently been intensively harvested or where wolves once lived but no longer live. Whatever affect wolves might have on deer would be an overall benefit – including overall benefits to agriculture (§4).
- Wolf delisting is also motivated by very few people with an intense interest to hunt wolves. Their voices have been greatly amplified by state agencies. Their expressed motivation is to promote deer hunting and hunting, in general. The best scientific evidence from wildlife biologists indicates that hunter success is influenced by factors aside from wolves.

Plans for wolf hunting in all three Great Lakes states are at odds with sound science. Moreover, wolf hunting in Minnesota and Wisconsin would be intense enough to place at considerable risk the ecological value of wolves – one of the values to be protected according to the ESA.

Participation in hunting is widely understood to be in long term decline. This cultural shift – not wolves – is the main threat to hunting. Because few participate in hunting now and in the future, the success of hunting depends on the attitudes of non-hunters. Moreover, most non-hunters are supportive of hunting when obtaining meat is the motivation for hunting. And a large majority of Americans oppose hunting when the motivation is hatred for the animal or obtaining a trophy, especially by cruel methods such as traps or neck snares. These are important motivations and methods of wolf hunting. Advocates of hunting who press this kind of hunting will, undoubtedly, be harming the American hunting heritage. (§5)

A few, vocal people assert that wolves demonstrate shortcomings in the U. S. Endangered Species Act (ESA). However, with a 99% success rate, the ESA has been extremely effective at preventing the extinction of listed species. Moreover, sociological evidence indicates that most people do not believe the ESA is overly protective. Finally, the ESA allows for ample flexibility in *how* various endangered species are recovered. What the ESA requires is better implementation. Adequate implementation of the ESA is impaired when Congress:

- (i) intervenes on decisions pertaining to individual species,
- (ii) intervenes on judicial review of decisions made by the executive branch, and
- (iii) fails to provide adequate funding for the ESA.

Adequate implementation also depends on allowing sound science to play its proper role in decision-making – a condition that is not always realized. The ESA does not require statutory revision (§6).

Delisting wolves at this time is bad for wolf conservation. Delisting wolves in the manner it is and has been pursued is deeply damaging to the ESA. Finally, the manner in which states have been (and plan to) manage wolves will have significant adverse impacts on America's hunting heritage. The reasons provided in this testimony indicate how anti-wildlife provisions of the *HELP for Wildlife Act* are inconsistent with the values of the American public and why those provisions should be removed.

§2. PUBLIC SUPPORT FOR WOLF CONSERVATION AND THE ESA IS HIGH.

2.1 Americans' attitudes toward large carnivores, including wolves, are largely positive. Those attitudes have also become increasingly positive over the past four decades, and only 10% of Americans have significantly negative attitudes about wolves (George et al. 2016; See also Suppl. Material #1).

2.2. What accounts for the false impression of low tolerance for wolves?

2.3.1. Some sociological studies suggest that attitudes towards wolves have become more negative over time; these studies tend to focus on hunters and rural residents living within wolves' range (e.g. Treves et al. 2013, Ericsson & Heberlein 2003). While it is important to address these attitudes (see below), they are not representative of the interests of most Americans.

2.3.2. Other research indicates that biased media coverage gives the impression of low and deteriorating tolerance for wolves. For example, Houston et al. (2010) examined

North American news coverage about wolves over a 10-year time period (1999-2008). Of the 6,000 stories they analyzed, 72% of the news media represented negative attitudes about wolves. They also found that these negative expressions had increased significantly over time. The concern is that media coverage does not accurately represent Americans' attitudes (see George et al. 2016).

- 2.3.3. In 2003 the Utah Division of Wildlife Resources hosted a series of scoping meetings concerning wolf management. About 80% of the 900 people who attended those meeting identified 'do not allow wolves in Utah' as a management priority. At the same time (i.e., in 2003), a systematic study of attitudes toward wolves found that 74% of Utahans exhibited positive attitudes toward wolves.

This case illustrates that state agencies can get the false impression of low support for wolves on the basis of their contact with the public. The concern is that agencies' contact with the public is not always representative of the public's attitude on the whole, or even of those who care about wildlife conservation issues. This circumstance is regrettable, but understandable, given that scoping meetings, for example, are often attended disproportionately by stakeholders who are especially upset about an issue. This case and these circumstances are detailed in Bruskotter et al. (2007).

- 2.4. Psychological research indicates that intolerance for wolves (and other large carnivores) may originate from negative emotional reactions toward these species (Slagle et al. 2012) that are at gross odds with scientific knowledge about these species (Johannson et al. 2012). Other sociological research makes the case that negative attitudes about wolves are associated, less so with the negative impact of wolves, and more so with "deep-rooted social identity" (Naughton-Treves et al. 2003; see also Heberlein 2012).

While it is important to ameliorate the adverse impacts of wolves for those few individuals who are actually impacted, doing so is not likely to cause those individuals to have more positive attitudes, as was demonstrated by Naughton-Treves et al. (2003).

- 2.5. Existing data indicate that public support for the ESA is widespread and strong. A sociological study concludes that most Americans (84%) are supportive of the ESA (Czech & Krausman 1997). That study also indicated that 49% of respondents believed that ESA should be strengthened. And, only 16% believed it should be revoked or weakened.

Recent polling data give the same positive impression. One poll indicates that approximately 80 to 90% of Americans are supportive of the ESA (Harris Interactive 2011). Another poll indicates that support for the ESA transcends political ideology. That is, support for the ESA by self-identified liberals, moderates, and conservatives is 96%, 94%, and 82%, respectively (Tulchin Research 2015).

§3. WOLVES ARE NOT A THREAT TO HUMAN SAFETY

- 3.1. Except in the very rarest of circumstances, wolves are not a threat to human safety. Incidents of wolves harming people are incredibly rare. Wolves generally avoid people and in almost all cases people have nothing to fear from wolves in the wild.

In the 21st century, only two known deaths have been attributed to wild wolves in all of North America. There have been no deaths from wolves in the conterminous United States. Far more Americans are killed by bees or dogs than by wolves. Far more Americans are killed in deer-car collisions. Our overall response to any threat to human safety should be, in part, commensurate with the risk of that threat.

On the extraordinarily rare occasions when a wolf has appeared to be even potentially problematic, the appropriate agency (state or federal) has moved swiftly to address any possible threat. For example, in May 2015, the Mexican Wolf Interagency Field Team lethally removed a wolf that was exhibiting unusual activity near residents and populations in Catron County, New Mexico.

3.2. The false impression that wolves are a threat to human safety is fostered by the interaction between (i) a public that is easily and overly impressed by certain kinds of fear and (ii) those who fabricate or exaggerate the threat that wolves represent. The seriousness of these exaggerations is illustrated with two examples from Michigan:

3.2.1. A state Senator from Michigan conveyed a “horrifying and fictional” account of wolves threatening humans. That account was included in a 2011 resolution urging the U.S. Congress to remove ESA protections for gray wolves in Michigan. Later the Senator conceded that the account was not true. This case is documented in Oosting (2013).

3.2.2. Adam Bump, an official from the Michigan Department of Natural Resources, “misspoke” when he was interviewed by Michigan Radio (a National Public Radio affiliate) in May 2013. Bump apparently said to the interviewer: “You have wolves showing up in backyards, wolves showing up on porches, wolves staring at people through their sliding glass door while they’re pounding on it exhibiting no fear.” Later, Bump conceded that this did not happen. This case is documented in Barnes (2013).

§4. AGRICULTURAL CONCERNS.

4.1. According to a 2011 USDA report on cattle death loss, wolf depredation represents less than half of one percent of all losses (USDA 2011). For context, about half of all losses are health-related (e.g., digestive problems, respiratory problems, metabolic problems). Losses due to dogs are almost three times as common as wolf-related losses. Losses due to poisoning and theft are six times as common as wolf-related losses. These statistics are similar within each of the states inhabited by wolves, i.e., MI, MN, WI, MT, ID, WY, WA, AZ and NM. Wolves are not a threat to the livestock industry.

4.2. At the same time, the threat to livestock has been exaggerated. In some cases, the exaggerations are fueled by state agencies. In particular, the government of Michigan raised disquiet about what it portrayed as a high and rising number of depredations (wolves killing cattle) in 2012. Subsequently, a FOIA request and investigative journalism determined that most of the livestock losses were attributed to a single livestock owner, who was later charged with violating animal welfare laws. The depredations were very likely attributable to livestock owner’s poor husbandry of his livestock. This case is documented in Vucetich et al. 2017.

4.3. Lethal and non-lethal control

4.3.1. Scientific evidence indicates that lethal control may be less effective than is commonly supposed (reviewed in Treves et al. 2016).

4.3.2. Lethal control is also a source of public controversy, as it is shunned by some stakeholders. A critical component of meeting the challenges represented by lethal control (both the establishment of lethal control policy and the aftermath that can follow some instances of lethal control) is a robust multi-stakeholder committee, such as the Wolf Advisory Group in the state of Washington. The establishment and maintenance of such bodies is effortful, but also very important.

4.3.3. Non-lethal methods are often effective for preventing depredation and avoid conflict before considering lethal control. There is a suite of nonlethal methods and strategies that have been effectively used. These include: nonlethal predator deterrents such as livestock guarding dogs, fencing and fladry; increasing human presence on the landscape through range riders; use of scare tactics and alarms; best management practices for livestock and land such as changing grazing strategies and removing carcasses.

Those tools have been used effectively, for example, in a community-based project in the Wood River Valley of Idaho – an area with between 10,000 to 22,000 sheep grazing per year. During the first 7 years of the project (which began in 2007) fewer than five sheep were killed per year.

4.4. In certain instances, wolves do indeed compete with the interests of *individual livestock owners*. Those instances are important. The American people share a burden to assist in these instances. To this end, the states, the Fish and Wildlife Service, the Department of Agriculture and non-profit organizations all have programs to assist ranchers financially or with tools and management techniques to reduce conflicts with wolves. Several varieties of these programs exist, focusing variously on: compensation for livestock losses; cost-share and technical assistance for the use of nonlethal tools that reduce conflict; and incentive payments such as payment for presence. Programs such as these are widely understood to be essential for realizing vital aspects of carnivore conservation (e.g., Dickman et al. 2011, Vucetich & Macdonald 2017). Where there is a need to improve these programs, they should be so improved. With such programs in place, concerns about wolves and livestock are very reasonably accommodated.

4.5. Deer represent important context about the threat that wildlife can represent to human safety, private property, and agricultural interests. For example, in Michigan, deer kill eight humans and injury another 1300 in deer-vehicle collisions *each year*. Deer ruin private property through more than 100 deer-vehicle collisions *each day*. Deer also cause significant damage to two important sectors of agriculture – crop production and forestry. There are also rising concerns about chronic wasting disease in deer. Whatever effect wolves might have on deer would be an overall benefit.

§5. WOLF HUNTING DAMAGES AMERICA'S HUNTING HERITAGE

5.1. Our treatment of wolf hunting is importantly connected to hunting in general. This connection begins by acknowledging a widely-appreciated circumstance, that participation in hunting has been declining for several decades. The demographic forces behind that decline are expected to continue into the foreseeable future. Those trends are of great concern to state wildlife agencies and advocates of hunting. These groups are searching for ways to reverse those trends.

While participation in hunting is low and declining, support for hunting by non-hunters is high. However, that support depends on the reason that is offered for why hunting takes place. For example, 85% of Americans support hunting when motivated by the acquisition of meat. But only about 26% of Americans support hunting motivated by the acquisition of a trophy. For details, see Duda and Jones (2008).

Another important motivation to hunt wolves is hatred of wolves. In the past, hatred has motivated programs designed to eliminate certain populations of wildlife. But, never before

in the history of America's hunting heritage has hatred been an acceptable or ethical basis for hunting.

Support for hunting by non-hunters also depends on the methods used for hunting. Traps and neck snares are used to hunt wolves. Both methods are widely considered cruelty to animals.

Because motivation for hunting affects support for hunting by non-hunters and because the motivations for wolf hunting are weak, wolf hunting is liable to harm the honor of America's hunting tradition. We should not be surprised to see that wolf hunting works against interests to promote hunting in a society with waning participation in hunting. Congress, the Fish and Wildlife Service, and state wildlife agencies could be effective agents for better promoting our American hunting heritage, but the HELP for Wildlife Act does not serve this interest.

5.2. Other concerns about wolf hunting:

5.2.1. The Findings section of the ESA (Sec 2.(a)(3)) indicates that species are valuable to the Nation and its people, in part, for their "ecological" value. The primary ecological value of wolves is largely associated with their influence on deer populations, including preventing deer from becoming overabundant. Overabundant deer (and elk in some regions of the American west) are detrimental to human safety, private property, agriculture and forestry. There is considerable evidence that deer (and elk in many regions of the western U.S.) are overabundant in numerous places where wolves are intensively harvested or where wolves once lived but no longer live (e.g., McShea et al. 1997, Bradford and Todd 2008; Dickson 2015). The ecological value of wolves is impaired if they are hunted too intensively. Wisconsin and Minnesota had been implementing hunts that were intense enough to very likely impair the ecological value of wolves.

5.2.2. An important prospect for wolves achieving recovery is through dispersal and range expansion from areas where wolf populations are already established. The concern is that range expansion is, at least, significantly curtailed by intensive hunting of wolves.

5.2.3 Wolf hunting is motivated, in part, by state game and fish agencies' interest to satisfy deer hunters. This motivation may be sensible when all of the following conditions hold: (i) wolves cause deer abundance to decline, (ii) wolf hunting (as implemented) results in a significant increase in deer abundance without impairing the health and functioning of the wolf population, (iii) increased deer abundance will translate to hunters' satisfaction with their hunting experience, and (iv) interests to increase deer abundance outweigh interest to decrease deer abundance. In many cases, it is far from reasonably certain that all of these conditions hold.

Put simply, wolves do not represent significant competition with hunters for deer. Hunter success is influenced by factors aside from wolves, such as winter severity.

5.2.4. Some argue that wolf hunting is important for building tolerance for wolves.

However, sociological evidence suggests that tolerance is not built by legal killing of wolves (e.g., Treves et al. 2013, Browne-Nunez et al. 2015, Hogberg et al. 2015).

5.2.5. Michigan's government promoted wolf hunting through egregious misuse of science and disdain for basic principles of democracy. Voting records indicate, in part, that citizens are aware of and do not support such abuses in the service of wolf hunting. These circumstances are detailed in Vucetich et al. 2017.

- 5.2.6. After a couple years of intense hunting in Minnesota it was determined that the wolf population declined by 25% (between 2008 and 2013). Moreover, the declined caught state officials by surprise, because the population had not been adequately monitored and because state officials misjudged the effects of intense harvesting.

§6. LEGAL CONCERNS

The Fish and Wildlife Service (FWS) delisted gray wolves in the Western Great Lakes in December 2011. The decision was challenged in federal court. In December 2014, the court rejected the FWS's delisting decision and ordered the FWS to restore ESA protections for gray wolves in the Western Great Lakes. An important basis for the court's decision was that a DPS cannot be designated for the purpose of delisting. Details of the court's opinion in this case and other related cases indicate that the root concern is considerably broader.

The broader pattern of court decisions indicate that the ESA requires a species to be well-distributed throughout its historic range. That view is also well supported by conservation scholarship (e.g., Vucetich *et al.* 2006, Tadano 2007, Enzler & Bruskotter 2009, Geenwald 2009, Kamel 2010, Carroll *et al.* 2010, and Bruskotter *et al.* 2014, and references therein). Wolves inhabit about 15% of their historic range within the conterminous United States (Suppl. Materials #2). That circumstance is a key reason for why wolves in the Western Great Lakes wolves should not be delisted. Addressing this concern would require the FWS to:

- (i) Develop policy on "significant portion of range" that is consistent with the ESA. I believe the courts will eventually decide that the current Fish and Wildlife Service policy on this topic is inconsistent with the ESA. ("Significant portion of its range" is a key phrase in the legal definition of endangered species.)
- (ii) Develop a robust national plan for wolf conservation and recovery.

In 2011, wolves in Montana and Idaho were delisted by an act of Congress, i.e., a Congressional rider to the "Department of Defense and Full-Year Continuing Appropriations Act." That action compromised important opportunities for critical concerns and challenges to be worked out and addressed by key stakeholders (e.g., Fish and Wildlife Service, state-governments, NGOs, etc.). Congressional delisting did not ameliorate the concerns and challenges associated with the ESA or wolf conservation.

§7. WOLF CONSERVATION IS VITAL TO AMERICA'S NATURAL HERITAGE.

The health of many of our nation's ecosystems depends on the presence of healthy, functioning wolf populations (see Suppl. Material #3 for a pictorial summary). Wolves are important for a second reason. That is, wolves are important for what they represent. When we Americans talk about wolves we are speaking simultaneously about *both* the four-legged creature *and* a creature that represents our understanding for how we ought to relate to nature. If the bald eagle is sacred as a symbol of our national spirit, then wolves are sacred as a symbol of our relationship with nature on the whole.

America's natural heritage is a certain kind of relationship between humans and nature. To reflect on Americans' understanding of that relationship, think for a moment about the Golden Rule, treat others as you would consent to be treated in the same position. What if that ideal applied not only to humans, but also to wildlife? That ideal would mean that we value wildlife – including wolves – not only for how they might advance human wellbeing, but also because they have a value in their own right. That belief means we embrace an obligation to treat wildlife – including wolves – fairly and with respect. Those obligations can be embraced while at the very same time embracing concern for and accommodating the genuine interests

of those affected by coexisting with wolves. Sociological evidence is clear that Americans embrace these beliefs by a wide margin (Vucetich et al. 2015; Bruskotter et al. 2017). The HELP for wildlife Act does not honor these American values.

§8. CONCLUSION

Our relationship with wolves is a bellweather for our relationship with nature and the nation's natural resources. For similar reasons, our treatment of wolves through the U.S. Endangered Species Act, 1973 (ESA) is also a bellweather for how we will treat the ESA in general and for the hundreds of species whose well-being depends on ESA protection.

For those two reasons, we must get it right by discovering a healthy relationship with wolves. We will be defined, in part, by the kind of relationship we forge with wolves and the fair treatment of our fellow citizens who are impacted by wolves in a genuinely negative manner. Those relationships, whatever they may be, will say much about the kind of people that we are.

Opportunities to work through some important challenges of conservation are impaired if and when Congress intervenes by making decisions about individual species in the context of the ESA. Such intervention can seem like an expedited solution, but its larger effect is to inhibit progress on the broader issues. Congress, the Fish and Wildlife Service, state wildlife agencies, and NGOs can all do better to provide stronger leadership on these issues.

The American people are supportive of this work and we are more than able to handle this work. The values and will-power of the American people, on the whole, support the ESA and wolf conservation. We are also a sufficiently resourceful and generous people to fairly redress the concerns and negative attitudes held by a small segment of Americans.

HELP for Wildlife Act is a Trojan horse and should be opposed. It includes some positive provisions, but its most important effect would be to undermine the Endangered Species Act and subvert the conservation of wolves.

CITED SOURCES

- Barnes, J. 2013. Michigan's wolf hunt: How half truths, falsehoods and one farmer distorted reasons for historic hunt. Nov 3rd, 2013. URL: http://www.mlive.com/news/index.ssf/2013/11/michigans_wolf_hunt_how_half_t.html
- Bradford JB, Hobbs NT. 2008. Regulating overabundant ungulate populations: an example for elk in Rocky Mountain National Park, Colorado. *Journal of Environmental Management*, 86(3), 520-528.
- Browne-Nuñez C, Treves A, Macfarland D, Voyles Z, Turng C. 2015. Tolerance of wolves in Wisconsin: A mixed-methods examination of policy effects on attitudes and behavioral inclinations. *Biological Conservation* 189: 59-71.
- Bruskotter JT, Schmidt RH, Teel TL. 2007. Are attitudes toward wolves changing? A case study in Utah. *Biological Conservation* 139, 211-218.
- Bruskotter JT, Vucetich JA,ENZLER S, Treves A, Nelson MP. 2014. Removing protections for wolves and the future of the US Endangered Species Act (1973). *Conservation Letters* 7(4):401-7. <https://doi.org/10.1111/conl.12081>
- Bruskotter JT, Vucetich JA, Wilson RS. 2016. Of bears and biases: scientific judgment and the fate of Yellowstone's grizzlies. *The Conversation* (June 21st, 2016). URL: <http://theconversation.com/of-bears-and-biases-scientific-judgment-and-the-fate-of-yellowstones-grizzlies-59570>
- Bruskotter JT, Vucetich JA, Nelson MP. 2017. Animal Rights and Wildlife Conservation: conflicting or compatible. *The Wildlife Professional*. July/August issue, pages 40-43.
- Carroll C, Vucetich JA, Nelson MP, Rohlf DJ, Phillips MK. 2010. Geography and recovery under the US Endangered Species Act. *Conservation Biology* 24(2):395-403.
- Cart, J. 2013. U.S. sued over policy on killing endangered wildlife. LA Times 29 May 2013 URL: <http://articles.latimes.com/2013/may/29/local/la-me-0530-endangered-species-lawsuit-2013053>

- Czech, B., Krausman, P.R., 1997. Public opinion on species and endangered species conservation. *Endangered Species Update* 14, 7-10.
- Dickman AJ, Macdonald EA, Macdonald DW. 2011. A review of financial instruments to pay for predator conservation and encourage human–carnivore coexistence. *Proceedings of the National Academy of the United States of America* 108:13937–13944.
- Dickson, T. 2015. Shouldering its responsibility: FWP proposes additional hunting seasons to reduce the size of its burgeoning elk herds in parts of Montana. *Montana Outdoors*, Nov-Dec 2015. URL: <http://fwp.mt.gov/mtoutdoors/HTML/articles/2015/ShoulderSeason.htm#.V9Voxecgkhc>
- Duda, M. D., and M. Jones. 2008. Public opinion on and attitudes toward hunting. Pp. 180–199 in Transactions of the North American Wildlife and Natural Resources Conference, Phoenix, Arizona, 23–28 March 2008 (Wildlife Management Institute Publications Department, eds.). Wildlife Management Institute, Washington, D.C.
- Enzler SA, Bruskotter JT. 2009. Contested Definitions of Endangered Species: The Controversy Regarding How to Interpret the Phrase A Significant Portion of a Species Range. *Va. Env'tl. LJ*, 27, 1.
- Ericsson G, Heberlein TA. 2003. Attitudes of hunters, locals, and the general public in Sweden now that the wolves are back. *Biological Conservation* 111, 149-159.
- George KA, Slagle KM, Wilson RS, Moeller SJ, Bruskotter JT. 2016. Changes in attitudes toward animals in the United States from 1978 to 2014. *Biological Conservation* 201, 237-242.
- Greenwald D. 2009. Effects on species' conservation of reinterpreting the phrase "significant portion of its range" in the US Endangered Species Act. *Conservation Biology* 23(6):1374-1377.
- Harris Interactive (2011), Available at URL: https://www.defenders.org/publications/endangered_species_act_poll.pdf
- Heberlein, T.A., 2012. *Navigating environmental attitudes*. Oxford University Press.
- Hogberg J, Treves A, Shaw B, Naughton-Treves L. 2015. Changes in attitudes toward wolves before and after an inaugural public hunting and trapping season: early evidence from Wisconsin's wolf range. *Environmental Conservation*, doi 10.1017/S037689291500017X.
- Houston MJ, Bruskotter JT, Fan DP. 2010. Attitudes Toward Wolves in the United States and Canada: A Content Analysis of the Print News Media, 1999-2008. *Human Dimensions of Wildlife* 15:389-403.
- Johansson M, Karlsson J, Pedersen E, Flykt A., 2012. Factors governing human fear of brown bear and wolf. *Human Dimensions of Wildlife* 17, 58-74.
- Kamel A. 2010. Size, biology, and culture: persistence as an indicator of significant portions of range under the Endangered Species Act. *Ecology LQ*, 37, 525.
- McDonald-Madden, E. V. E., Baxter, P. W., & Possingham, H. P. (2008). Subpopulation triage: how to allocate conservation effort among populations. *Conservation Biology*, 22(3), 656-665.
- McShea WJ, Underwood HB, Rappole JH. 1997. The science of overabundance: deer population ecology and management. *Smithsonian Institution Press, Washington DC, USA*.
- Naughton-Treves L, Grossberg R, Treves A, 2003. Paying for tolerance: The impact of livestock depredation and compensation payments on rural citizens' attitudes toward wolves. *Conservation Biology* 17, 1500-1511.
- Oosting, J. 2013. Michigan Senator apologizes for fictional wolf story in resolution: 'I am accountable, and I am sorry'. Mlive New Media, Nov. 7th, 2013. URL: http://www.mlive.com/news/index.ssf/2013/11/michigan_senator_apologizes_fo.html
- Slagle KM, Bruskotter JT, Wilson RS. 2012. The Role of Affect in Public Support and Opposition to Wolf Management. *Human Dimensions of Wildlife* 17, 44-57.
- Tadano NM. 2007. Piecemeal delisting: Designating distinct population segments for the purpose of delisting gray wolf populations is arbitrary and capricious. *Wash. L. Rev.*, 82, 795.
- Treves A, Naughton-Treves L, Shelley V. 2013. Longitudinal Analysis of Attitudes Toward Wolves. *Conservation Biology* 27:315-323.
- Treves A, Krofel M, McManus J. 2016. Predator control should not be a shot in the dark. *Frontiers in Ecology and the Environment*, 14(7), 380-388.
- Tulchin Research (2015), Available at URL: <http://earthjustice.org/sites/default/files/files/PollingMemoNationalESASurvey.pdf>
- USDA 2011. Cattle Death Loss. (May 12th, 2011). URL: <http://usda.mannlib.cornell.edu/usda/current/CattDeath/CattDeath-05-12-2011.pdf>
- USFWS 2016. Memorandum to the Regional Director, Southeast Region, dated 12 Sept 2016. RE: Recommended Decisions in Response to Red Wolf Recovery Program Evaluation. URL: <https://www.fws.gov/redwolf/docs/recommended-decisions-in-response-to-red-wolf-recovery-program-evaluation.pdf>

- Vucetich JA & DW Macdonald 2017. Some essentials on coexisting with carnivores. Open Access Government August edition, (in press) <http://www.adjacentopenaccess.org/>
- Vucetich JA, Nelson MP, Phillips MK. 2006. The normative dimension and legal meaning of endangered and recovery in the US Endangered Species Act. *Conservation Biology* 20(5):1383-90. <https://doi.org/10.1111/j.1523-1739.2006.00493.x>
- Vucetich, J. A., Bruskotter, J. T., & Nelson, M. P. (2015). Evaluating whether nature's intrinsic value is an axiom of or anathema to conservation. *Conservation Biology*, 29(2), 321-332. <https://doi.org/10.1111/cobi.12464>
- Vucetich, J. A., Bruskotter, J. T., Nelson, M. P., Peterson, R. O., & Bump, J. K. (2017). Evaluating the principles of wildlife conservation: a case study of wolf (*Canis lupus*) hunting in Michigan, United States. *Journal of Mammalogy*, 98(1), 53-64. <https://doi.org/10.1093/jmammal/gyw151>

SUPPLEMENTARY MATERIAL #1.

The figure below, referenced in section 2 of this document, is taken from George et al. (2016).

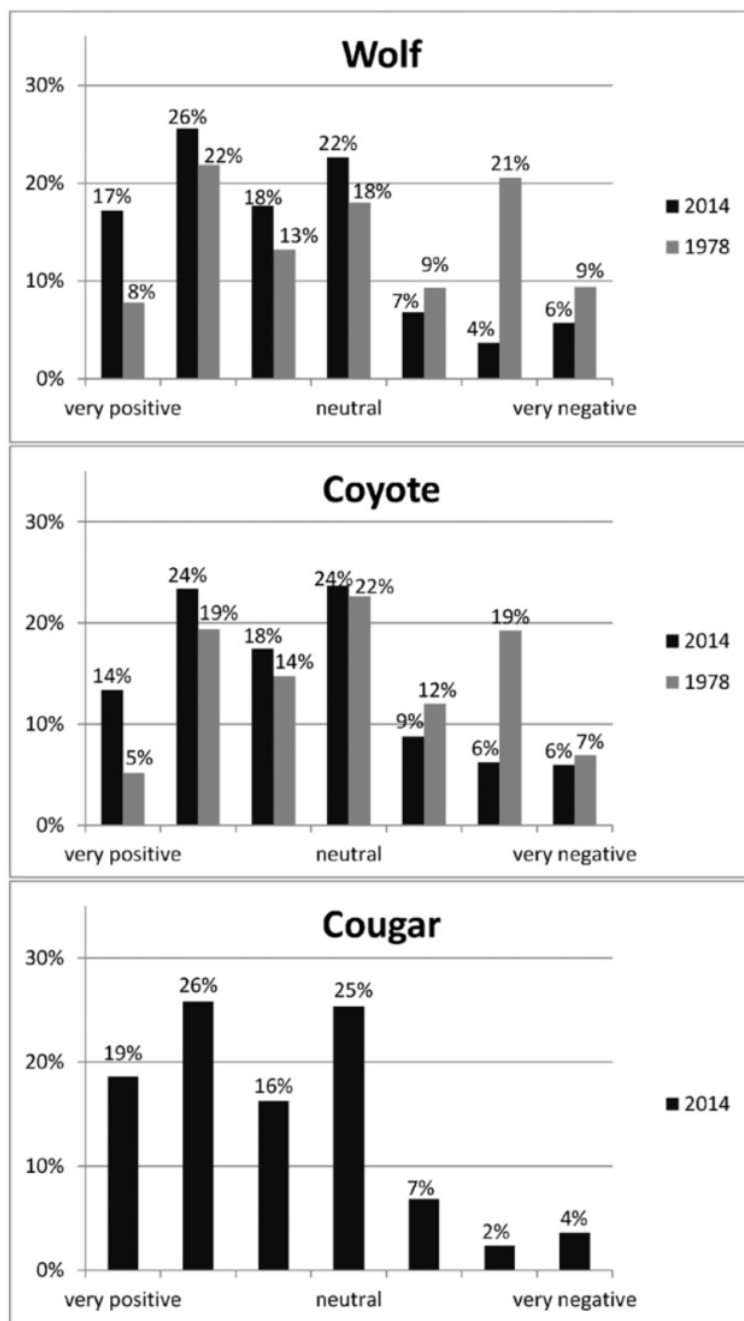
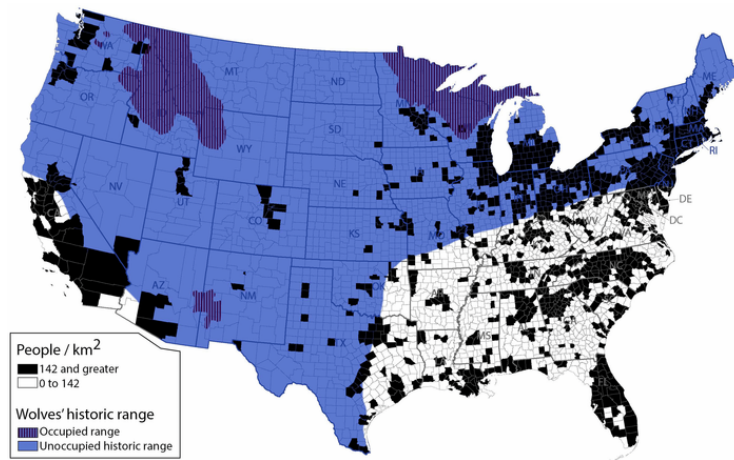


Fig. 1. U.S. Resident's attitudes toward mammalian carnivores: 1978 ($n = 3107$) & 2014 ($n = 1270$). No data for cougar preference were collected in 1978. *Least liked species includes neutral or midpoint (4) on a 1 (strongly like) to 7 (strongly dislike) scale.

SUPPLEMENTARY MATERIAL #2. A SERIES OF THREE ANNOTATED MAPS.

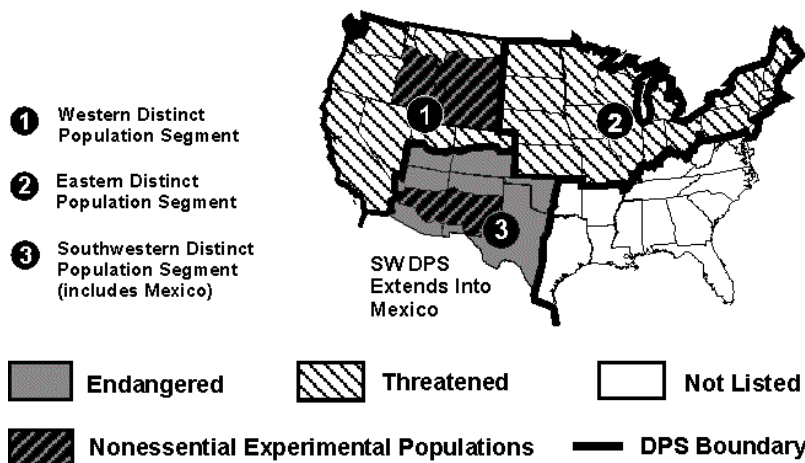
Map 1. Approximate Range (Historic & Current) Of Gray Wolves In The Conterminous United States.



Before human persecution, gray wolves occupied most of the conterminous United States (blue regions on the map). Currently, gray wolves occupy about 15% of their former range (purple regions on the map). The map is taken from Bruskotter et al. (2014) which explains how it would be feasible for wolves to inhabit more geographic range than they currently do. The blackened counties represent areas

where wolves and humans would likely not coexist well, owing to higher human population density. (Note: This map overestimates the size of areas where human population density exceeds 142 people/km².)

Map 2. Distinct Population Segments Of Gray Wolves Established By The United States Fish And Wildlife Service On April 1, 2003.



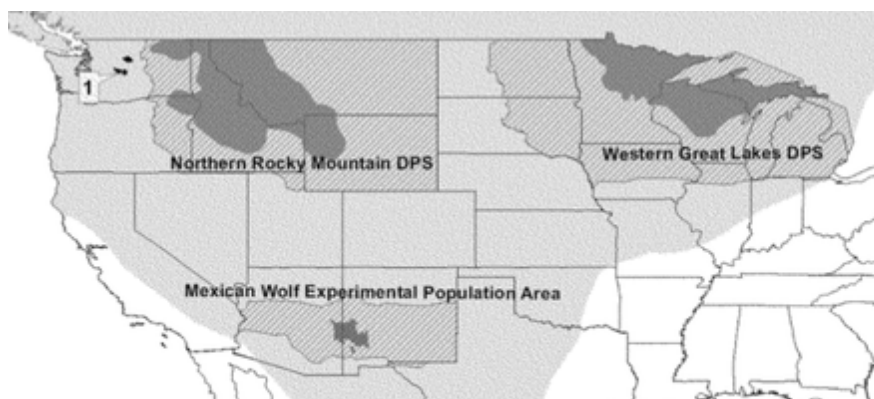
A “distinct population segment” is a listable entity under The Endangered Species Act (ESA). According to FWS policy (61 Fed. Reg. 4722, Feb. 7, 1996) determinations regarding the management of DPSs are to be based on the population’s discreteness, its significant to the species to which it belongs, and whether the population would be deemed endangered

or threatened if treated as a species.

The DPS provision offers flexibility in recovering species that occupy large geographic ranges. For example, if gray wolves living in the Eastern DPS had reached recovery, but wolves in the southwest DPS had not reached recovery, then wolves in the Eastern DPS could be removed from the list of endangered species and wolves from the southwest DPS could continue receiving the ESA protection necessary for recovery. The DPS policy can also enhance FWS’s ability “to address local issues (without the need to list, recover, and consult rangewide) [and] result in a more effective program.” *Id.*

The DPSs represented on the map above depict the gray wolves' historic range. The dark hatched areas within the Western DPS and the Southwestern DPS on the map represent areas in which FWS manages gray wolves as non-essential, experimental populations under section 10(j) of the ESA. That provision authorizes the release of an endangered or threatened species or subspecies outside their current range "if the Secretary determines that such release will further the conservation of such species." Section 10(j)(B). Moreover, species managed under Section 10(j) do not receive the full protection otherwise provided by the ESA. For example, an experimental population deemed "not essential to the continued existence of the species," and which is not located within the National Refuge or National Park systems, is treated as a species proposed for listing and the FWS may not designate critical habitat for that population. Section 10(j)(C)(i)-(ii).

Map 3. Revised Distinct Population Segments Of Wolves Established By The United States Fish And Wildlife Service.



The Northern Rocky Mountain DPS was created in April 2009 (74 FR 15123). Except for the state of Wyoming, gray wolves are delisted in this DPS.

The Western Great Lakes DPS was created in December 2011 (76 FR

81665). The Fish and Wildlife Service also delisted wolves in this DPS in December 2011. Three years later, in December 2014, a federal court ordered the Fish and Wildlife Service to reinstate full ESA protection for wolves living in this DPS.

The most recent census of the wild Mexican wolf population living in Arizona and New Mexico, conducted in December of 2015, found only 97 individuals. Mexican wolves are listed as a subspecies. The Fish and Wildlife Service has been actively working on a recovery plan for Mexican wolves for the past 15 years.

Red wolves are not represented on this map, but are discussed in section 3 of this testimony.

SUPPLEMENTARY MATERIAL #3.

The figure below, referenced in section 7 of this document, is taken from Ripple et al. 2014, which was published in *Science*. The figure represents a conceptual summary of 12 scientific publications, and is a conceptual representation of what is known about how wolves influence the health of ecosystems.

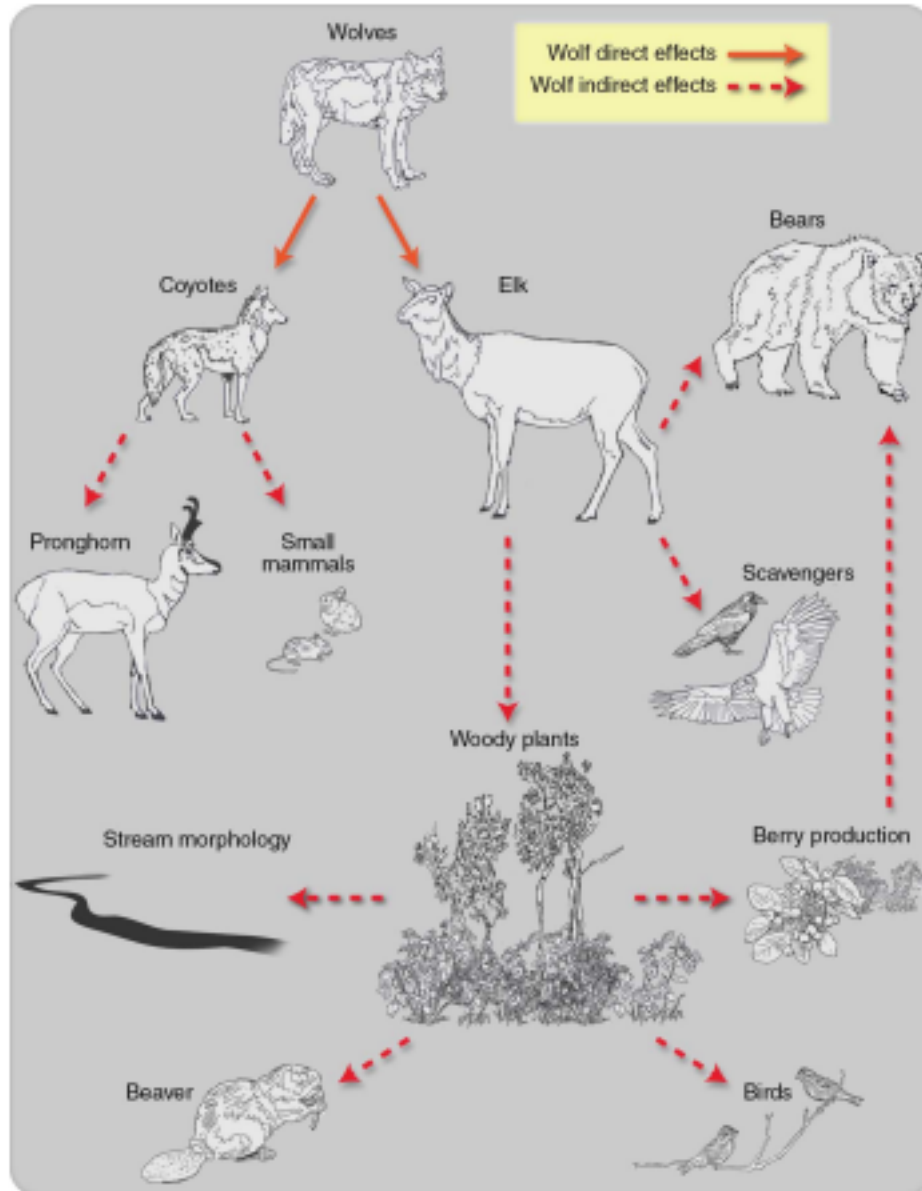


Fig. 4. Conceptual diagram showing direct (solid lines) and indirect (dashed lines) effects of gray wolf reintroduction into the Greater Yellowstone ecosystem. Wolf direct effects have been documented for elk (96) and coyotes (97), whereas indirect effects have been shown for pronghorn (98), small mammals (99), woody plants (100), stream morphology (54), beaver (55), birds (101), berry production (63), scavengers (53), and bears (56, 63). This is a simplified diagram, and not all species and trophic interactions are shown. For example, the diagram does not address any potential top-down effects of pumas, bears, and golden eagles (*Aquila chrysaetos*), which are all part of the Yellowstone predator guild where juvenile or adult elk are prey.