

July 27, 2017

An Open Letter to Members of Congress and the White House from Scientists and Scholars on Federal Wolf Delisting and Congressional intervention on Individual Species in the Context of the U.S. Endangered Species Act

We, the undersigned scientists and scholars, urge Congress to refrain from delisting gray wolves (*Canis lupus*) in the Western Great Lakes and Wyoming. In particular, we urge you to oppose H.R. 424 and S. 164, S. 1514 and H.R. 2406. Gray wolves should be protected by the Endangered Species Act, 1973 (ESA) until the legal requirements for delisting them are met. All listings and delistings decisions should be undertaken by the U.S. Fish and Wildlife Service (FWS), consistent with the best available scientific data, and pursuant to a robust administrative process that considers input from all stakeholders and experts.

Over the past four decades, we have made incredible progress toward the recovery of wolves. Today, approximately 5500 wolves inhabit about 15% of their historic range within the contiguous United States. While we have made substantial progress toward recovery, the job is not done. Important work remains. In particular, the ESA requires that a species be recovered throughout a larger portion of its historic range than has currently been achieved.¹

The American people are supportive of wolf conservation and the ESA² and we are more than able to handle the work entailed by completing wolf recovery. The essential issues surrounding wolves – livestock losses³, interests pertaining to deer and elk hunting⁴, perceived threats to human safety⁵, and legal/political issues⁶ – are all quite manageable.

Congressional delisting of wolves should be avoided because it would be an inappropriate shortcut. Our treatment of wolves through the ESA is a herald for how we will treat the ESA in general and for the hundreds of species whose well-being depends on ESA protection. Opportunities to work through some important challenges of conservation are cut off 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 of conservation and ESA implementation.

In recent years, Congress has increasingly made efforts to influence the management of individual species in the context of the ESA. These efforts have been motivated by local and special interests. As such, they eviscerate the essential purpose of federal governance and the ESA, which is to conserve species inasmuch as doing so is a national interest. This concern is reinforced by broad public support for wolves and the ESA that transcends political orientation.⁷

¹ See Appendix 1 for an explanation of the legal meaning of recovery under the ESA. The appendices attached to this letter are adapted from testimony provided by Professor John Vucetich for a hearing on wolves held by the oversight subcommittee of the House Committee on Natural Resources. That hearing was held on 21 Oct 2016.

² See Appendix 2 for details about the public's strong support for wolves and the ESA.

³ See Appendix 3 for details about wolves not being a threat to the livestock industry and about how individual livestock owners can capably reduce or eliminate losses.

⁴ See Appendix 4 for details about how wolves do not compromise the interests of deer and elk hunters.

⁵ See Appendix 5 for details about wolves not being a threat to human safety.

⁶ See Appendix 6 for details about legal/political concerns.

⁷ See Appendix 7 for details about American support for the ESA.

We urge Congress to refrain from intervening with respect to the management of any particular species in the context of the ESA.

With respect to wolf recovery, the two most important actions that could be taken to promote wolf recovery are for the FWS to develop: (i) a policy on “significant portion of range” that is consistent with the ESA, and (ii) a robust national plan for wolf conservation and recovery.

We must get wolf recovery right by developing a healthy relationship with wolves, recognizing the important role they play in our ecosystems and refraining from unjustified persecution. Our actions will be judged by future generations of Americans for 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 we are. The American people are supportive of this work and we are more than able to accomplish it.

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Appendix 1. Legal requirements for delisting as provided by the Endangered Species Act (1973)

A species should not be delisted until it is recovered. A species is recovered when it no longer fits the legal definition of an endangered species, i.e., when it is not “in danger of extinction throughout all or a significant portion of its range” and when the species is unlikely to fit the definition in the foreseeable future. The quoted text is the legal definition of an endangered species as specified in the Endangered Species Act (ESA). That legal definition means that the ESA has at least some restorative mandate beyond ensuring that a species is merely not “at risk of extinction.” Recovery requires a species to be broadly distributed throughout portions of its historic range.

Those views of recovery are well supported by considerable 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, Nelson *et al.* 2016, and references therein), congressional intent (HR Report 412, 93rd Congress, 1973), the history of endangered species legislation in the United States (see the section entitled “*Why Focus on Significant Portion of Range?*” Vucetich *et al.* 2006), the Findings section of the ESA (see second from last paragraph of Nelson *et al.* 2016), and are consistent with numerous decisions made by several federal courts (e.g., Enzler and Bruskotter 2009).

By this view of recovery, wolves in the conterminous United States are not recovered and should not be delisted because wolves occupy only about 15% of their former range.

Some have argued that this view of recovery requires a species to occupy all of its former range. The explanation offered above indicates this plainly not true. Moreover, no one working to better understand the legal meaning of recovery has ever suggested this to be the case. For additional discussion on this point see Nelson *et al.* (2016).

The FWS recently argued, in a proposed rule, that wolves should be delisted because they currently occupy all of the range that they can possibly occupy (78 Fed. Reg. 35,664). There are two concerns with this position. First, the inability to achieve recovery is not a reason to delist. Second, abundant evidence indicates that wolves could feasibly occupy portions of their former range that they do not currently occupy. For details, see Bruskotter *et al.* (2014).

The Director of the FWS seems to suggest, in a letter to the editor of the *New York Times* (Sept 4th, 2014) that limited resources available to the FWS are a reason to delist wolves and that delisting wolves would allow the FWS to focus resources on other species in greater need of attention. Limited resources is not an adequate reason to delist a species prior to its being recovered. If limited resources prevent the FWS from actively recovering a species, that species should remain protected by the ESA until the FWS has sufficient resources to actively recover that species. For details, see Nelson and Vucetich (2014).

No less important than the legal meaning of endangerment, is that recovery requires the existence of adequate regulatory mechanisms (Sec. 4(a)(1)(D) of the ESA). There are significant concerns that such mechanisms are not in place. These concerns are reflected, in part, by two federal courts decisions, one pertaining to Minnesota and Wyoming.⁸ Related concerns have been raised for wolves in Wisconsin.⁹

⁸ HSUS *et al.* v. Jewell *et al.* 2014. U.S. District Court, D.C. (1:13-cv- 00186-BAH Document 52) and Defenders of Wildlife *et al.* v. Jewell *et al.* U.S. District Court, D.C (Civil Action No. 12-1833 (ABJ)).

⁹ Dr. Adrian Treves of University of Wisconsin and colleagues sent an open letter to the FWS in 2014, describing concerns about use of the best available science in the State of Wisconsin’s post- delisting monitoring report on gray wolves.

http://faculty.nelson.wisc.edu/treves/reports/Letter%20to%20USFWS/Response_to_Acting_Director_Wooley_USFWS.pdf

Appendix 2. The public is supportive of wolves and the Endangered Species Act

Americans' attitudes toward large carnivores, including wolves, are largely positive. Recent research indicates that attitudes toward wolves have become increasingly positive over the past four decades (George et al. 2016). In fact, three in five Americans hold a positive attitude towards wolves only one in ten Americans have significantly negative attitudes about wolves (George et al. 2016). Even those living in wolf range have a largely positive attitude about wolves. For example, only 18% of non-tribal residents living within the geographic range of wolves in Wisconsin had a very unfavorable view of wolves (Shelley et al. 2011).

Despite widespread positive attitudes about wolves, some have a false impression that the public has a low tolerance for wolves. There are at least three explanations for this misimpression. First, some sociological studies suggest that attitudes toward wolves have become more negative over time; however, these studies tend to focus on hunters, those familiar with hunting, and rural residents living within wolves' range (e.g. Treves et al. 2013, Ericsson & Heberlein 2003).¹⁰ While it is important to address these attitudes (see below), they are not representative of the interests of most Americans.

Second, 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). They found 72% of ~30,000 paragraphs they analyzed, represented wolves negatively. They also found that these negative expressions had increased significantly over time. Yet, media's coverage of wolves does not accurately represent Americans' attitudes, and such media bias could lead to distorted perceptions of public opinion (see George et al. 2016).

Third, the perceptions of wildlife professionals working for state agencies may be distorted by interactions with individuals who are not representative of the broader public or even the interest groups to which they belong. An example serves to illustrate: 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 such interactions. 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).

With respect to the small segment of Americans with negative attitudes about wolves and other carnivores, there is value in understanding the details of those attitudes. Psychological research indicates that intolerance for wolves (and other large carnivores) may originate from negative emotional reactions toward these species, and perceptions of wolves' impacts that are grossly at odds with scientific knowledge about these species (Slagle et al. 2012, Johannson et al. 2012).

¹⁰ A poll of attitudes about wolves was conducted by the state of Montana in 2012. The plurality of respondents in that poll expressed being very intolerant of wolves (Montana Fish, Wildlife & Parks 2012). Methodological details of that poll have not, to our knowledge, been subjected to scientific peer-review. A concern with that poll is that the results are an artifact of disproportionate or misrepresentative sampling.

Other sociological research makes the case that poor attitudes about wolves are associated, less so with the perceived 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 financial losses caused by wolves for those few individuals whose animals are actually harmed, doing so is not likely to cause those individuals to have more positive attitudes, as was suggested by Naughton-Treves et al. (2003) and demonstrated longitudinally by Treves et al. 2013, Browne-Nunez et al. 2015, and Hogberg et al. 2015.

A basic principle of wildlife management is that it be based on sound science. For that reason, it would be poor governance to manage a wildlife population on the basis of attitudes about wildlife that are profoundly untethered from scientific knowledge about wildlife. The proper role of government in a case like this is to work to ease the misperceptions of that small segment of Americans.

Unfortunately, there are notable examples of state governments working to fuel hatred of wolves and inflame tensions between interest groups. For example, days after Congress delisted wolves in Idaho and Montana, the Governor of Idaho declared wolves to be a “disaster emergency” (Zuckerman 2011). That phrasing, “disaster emergency,” is usually reserved for truly tragic events such as catastrophic hurricanes and tornadoes.

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, committed to fairly redressing the concerns and negative attitudes held by a small segment of Americans.

Appendix 3. Wolves and livestock

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. Criminal 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, OR, AZ and NM. *Wolves are not a threat to the livestock industry in any state or region of the country.*

One response to the facts described just above is to argue that no industry of any kind should accept losses on the order of 0.5%. That response would represent a basic misunderstanding of the circumstance. The circumstance is: *Of the lost cattle*, about 0.5% are attributable to wolves. *Of existing head of cattle*, some 92 million head, wolves kill approximately one hundredth of one percent – tantamount to a rounding error.

An industry interested in managing its losses would tend to focus on larger, higher-ranking sources of loss. Of the 20 categories of loss tracked by the USDA, wolves are the 6th least important. For example, even domestic dogs and vultures are each more important sources of loss.

Disturbing images of wolf-killed livestock are sometimes presented as evidence for the failure of efforts to manage wolf-livestock conflicts. This is analogous to presenting emotion-laden images of a car accident as evidence that the nation's transportation system is, on the whole, a failure. A car wreck and a lost head of livestock are certainly both unfortunate events, but neither is evidence of widespread or systematic failure.

In certain instances, wolves 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 FWS, 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 (e.g., range riders, moving female livestock to give birth in safer locations, cleaning up stillborn young, electric fencing, electrified fladry or guard animals). 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 of live wolves. These programs are very beneficial. Where there is a need to improve these programs, they should be so improved.

Related to this concern, the legalized killing of carnivores to prevent livestock loss does not have a strong record of effectiveness (Treves et al. 2016). Most studies on the topic conclude that the killing has no positive effect and in some cases a counter-productive effect. Two studies of lethal control offer a countervailing sense. One of these studies concluded that lethal control had a slight effect in reducing depredation (Herfindal et al. 2005) and the other reported a significant reduction (Bradley et al. 2015). The concern is that those results are not reliable because both studies are associated with non-trivial methodological shortcomings (Treves et al. 2016).

Treves et al. (2016) also reviewed studies aimed at assessing the efficacy of non-lethal control. Of the studies reviewed, only two were robustly designed (i.e., random assignment of treatments) and thereby capable of providing reliable inference. One of these studies involved livestock-guarding dogs and the other involved “fladry,” a visual deterrent. In both studies the non-lethal control method resulted in reduced depredation.

Appendix 4. Wolves, deer, and elk.

Wolves are not negatively impacting the health or vitality of any deer or elk population. Several considerations indicate that concerns over the impact of wolves on deer and elk hunting are overstated:

1) Healthy wolf populations are vital to the health of ecosystems inhabited by ungulates¹¹, as summarized by the image to the right which 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.

2) Ungulates are widely acknowledged – even by scientists working for state wildlife agencies – to be overabundant in many portions of current and historic wolf range. Overabundant ungulate populations are widely understood to be of significant detriment to agriculture, forestry, private property, and human safety (deer-vehicle collisions).

3) Ungulate hunting is successful in all states where wolves live. For example, in 2015 Idaho experienced record high harvest of white-tailed deer and the highest harvest of elk since 1996. The high numbers were not attributed to the state’s control of wolf predation, but instead to a series of mild winters (Idaho Fish and Game 2016). Moreover, hunters’ dissatisfaction with ungulate harvest, where it occurs, is likely connected less with any discernable effect of wolves and more with ill-informed perceptions of how wolves impact ungulate populations, lack of trust in state wildlife agencies, and unrealistic expectations concerning the harvest levels. It would be valuable for state wildlife agencies to tend those likely sources of dissatisfaction.

4) In many places where ungulates are less abundant, poor habitat is believed to be the limiting factor, not wolf predation.

5) It is normal and healthy for ungulate populations to fluctuate in response to many factors – the most important factors being winter severity, habitat quality, and human hunting. It is a deeply unrealistic expectation to think that ungulate abundance would not fluctuate over time.

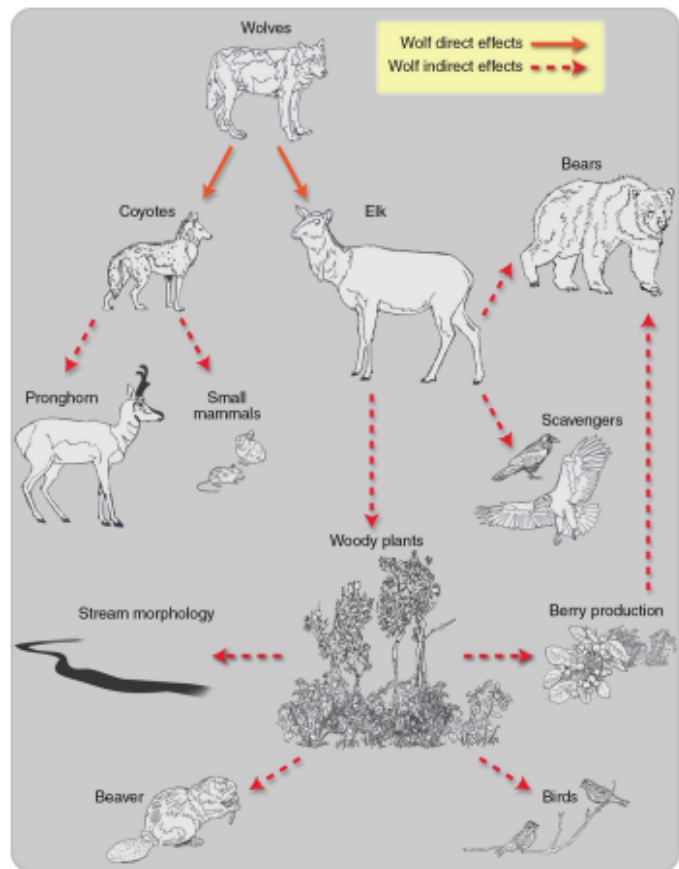


Fig. 4. Conceptual diagram showing direct (solid lines) and indirect (dashed lines) effects of gray wolf reintroduction into the Greater Yellowstone ecosystem. Wolf direct effects have been documented for elk (96) and coyotes (97), whereas indirect effects have been shown for pronghorn (98), small mammals (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.

¹¹ The word “ungulate” is a generic term that refers, in this case, to deer or elk.

Moreover, observing a decline in ungulate abundance is not evidence that wolf predation is the cause of decline. For example, during a Congressional oversight hearing held on Sept 21, Rep. Benishek seemed to suggest that wolf predation was the reason the Michigan Department of Natural Resources has allowed for fewer opportunities to hunt antlerless deer in Upper Michigan in recent years. However, the Michigan Department of Natural Resources indicates those decisions were a response to a string of severe winters that were the primary cause of recent decline in deer abundance (MI-DNR 2016). Three of the last four winters in Upper Michigan have been severe.

- 6) Wolf predation is a relatively small source of ungulate mortality. For example, information provided by the Wisconsin DNR indicates that hunters kill approximately nine times as many deer than do wolves, vehicle-deer collisions kill approximately the same number of deer as do wolves, starvation in a typical winter kills nearly four times more deer than do wolves. In many cases wolves are killing deer that are less fit and vulnerable to starvation. In the absence of wolves, more deer would likely die of starvation (Wisconsin Department of Natural Resources 2009). Finally, poachers and hunters who do not retrieve the deer they shoot likely kill considerably more deer than do wolves.¹²
- 7) Finally, the views of Carter Niemeyer seem appropriate. Mr. Niemeyer is an avid hunter and served for six years as the wolf recovery coordinator for the U.S. Fish & Wildlife Service. He was also a long-time trapper with USDA Wildlife Services, and involved with both lethal and non-lethal control of wolves. Mr. Niemeyer stated in an interview with Outdoor Idaho: “...I don't think [wolves are] any excuse for not being a successful hunter. There's tremendous numbers of game animals available to sportsman and with a little effort and sleuth, you still have great potential to collect a wild animal from hunting. I don't know what the excuse was before wolves, but it has become the main excuse now for unsuccessful hunters. I mean, there are just so many other issues involved in why hunters are not successful, but the wolf is a lame excuse.”

¹² This assumes that wounding losses are about 10% of the harvest and that rates of poaching are on the order of 4%. Those rates of wounding loss and poaching are consistent with peer-reviewed literature (e.g., Unsworth et al. 1993, Van Deelen et al. 1997, Nixon et al. 2001, Mayer et al. 2002, Grovenburg et al. 2011, McCorquodale et al. 2011). By those rates (10% and 4%), these sources of deer death are approximately 40-50% more than what wolves kill, when considered in conjunction with information presented in Wisconsin DNR (2009).

Appendix 5. Wolves and human safety

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 injured or killed in deer-vehicle collisions (U.S. Dept of Transportation). Our overall response to any threat to human safety should be, in part, commensurate with the risk of that threat. Moreover, it should be acknowledged that large carnivores are, on the whole, beneficial to human safety by helping to reduce the number of deer-vehicle collisions (Gilbert et al. 2016).

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.

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:

- A state Senator conveyed a “horrorifying 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. See Oosting (2013) for details.
- 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. See Barnes (2013) for details.

Appendix 6. Legal/Political Concerns

Some advocates for premature delisting of gray wolves argue that the only reason gray wolves are still protected by the ESA is that special interests have manipulated federal courts. The only reason that the FWS has failed to convince the courts that gray wolves ought to be delisted is because the FWS has failed to follow the legal requirements of the ESA. This conclusion is supported not only by the rationale presented by federal judges. See Appendix 1 for details.

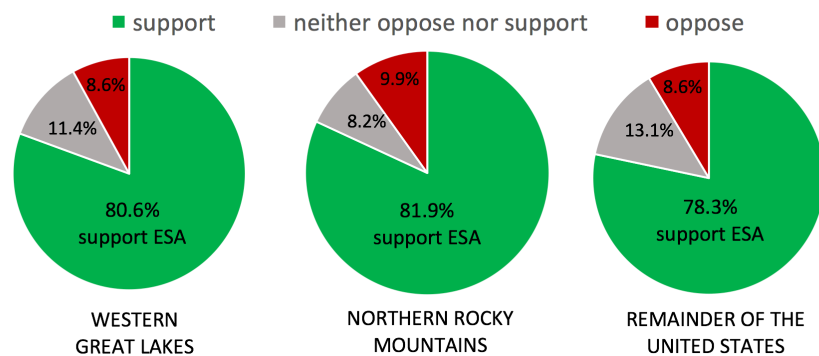
State governments have been asserting that life would be much better if the federal government allowed states to manage wolves. Idaho and Montana demonstrate that life is not appreciably better when wolves are managed by the states. Controversies about wolf management are as inflamed in those states as they were before delisting.

Appendix 7. Public Support for the Endangered Species Act

No less important than positive attitudes about wolves are attitudes about the Endangered Species Act (ESA). Existing data indicate that public support for the ESA is widespread and strong. An earlier, sociological study concluded that four of every five Americans are supportive of the ESA (Czech & Krausman 1997). That study also indicated that 49% of respondents believed that ESA should be strengthened. In contrast, only 16% believed it should be revoked or weakened.

Some advocates of delisting wolves are concerned that continuing to protect wolves under the ESA will erode public support for the ESA. However, recent polling suggests that attitudes toward the ESA have remained positive over the past two decades. In particular, one poll, conducted in 2015, indicates that approximately four of every five Americans are supportive of the ESA (Harris Interactive 2011). Another recent 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). Finally, data collected in 2014 by the research firm GfK indicates that attitudes toward the ESA similarly positive in wolf recovery areas and the remainder of the country (see figure below, J.T. Bruskotter, unpublished data).

Support for the Endangered Species Act (ESA) by region.



LITERATURE CITED IN THE APPENDICES

- Barnes, J. 2013. Michigan's wolf hunt: How half truths, falsehoods and one farmer distorted reasons for historic hunt. Nov 3rd, 2013. Mlive Media
URL:
http://www.mlive.com/news/index.ssf/2013/11/michigans_wolf_hunt_how_half_t.html
- Bradley EH, Robinson HS, Bangs EE, et al. 2015. Effects of wolf removal on livestock depredation recurrence and wolf recovery in Montana, Idaho, and Wyoming. *J Wildlife Manage.* 79:1337–46.
- 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.
- 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.
- Czech, B., Krausman, P.R., 1997. Public opinion on species and endangered species conservation. *Endangered Species Update* 14, 7-10.
- 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.
- Grovenburg TW, Swanson CC, Jacques CN, Deperno CS, Klaver RW, Jenks JA. 2011. Female white-tailed deer survival across ecoregions in Minnesota and South Dakota. *The American Midland Naturalist*. 165(2):426-35.
- 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 TA. 2012. *Navigating environmental attitudes*. Oxford University Press.
- Herfindal I, Linnell JDC, Moa PF, et al. 2005. Does recreational hunting of lynx reduce depredation losses of domestic sheep? *J Wildlife Manage* 69: 1034–42.
- 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* **43**, 45-55.
- 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.
- Idaho Department of Fish and Game. 2016 . Idaho's 2015 whitetail harvest sets all-time record.

- URL: <https://idfg.idaho.gov/press/idahos-2015-whitetail-harvest-sets-all-time-record>
- 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.
- Mayer MS, Fuller TK, Deblinger RD, McDonald Jr JE. 2002. Can low-precision population and survival estimates of deer be accurate?. *Wildlife Society Bulletin*. 30: 440-8.
- McCorquodale SM, Wik PA, Fowler PE. 2011. Elk survival and mortality causes in the Blue Mountains of Washington. *The Journal of Wildlife Management*. 75(4):897-904.
- Michigan Department of Natural Resources. 2016. DNR releases 2016 Michigan Deer Hunting Prospects report.
URL: <http://www.michigan.gov/som/0,4669,7-192-47796-394499--,00.html>
- 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.
- Nelson MP and Vucetich JA. 2014. The Future of conservation and the tragedy of triage. *Huffington Post*, 23 Sept 2014. URL: http://www.huffingtonpost.com/michael-p-nelson/the-future-of-conservatio_b_5870568.html
- Nelson MP, Vucetich JA, Bruskotter JT. 2016. Ecological value and the US Endangered Species Act: Comment on Waples et al. (2015). *Endangered Species Research* 30:187-90.
- Nixon CM, Hansen LP, Brewer PA, Chelsvig JE, Esker TL, Etter D, Sullivan JB, Koerkenmeier RG, Mankin PC. 2001. Survival of white-tailed deer in intensively farmed areas of Illinois. *Canadian Journal of Zoology*. 79(4):581-8.
- 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.
- Ripple WJ, Estes JA, Beschta RL, Wilmers CC, Ritchie EG, Hebblewhite M, Berger J, Elmhagen B, Letnic M, Nelson MP, Schmitz OJ. Status and ecological effects of the world's largest carnivores. *Science*. 2014 Jan 10;343(6167):1241484.
- 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.
- Shelley, V. S., Treves, A. & Naughton-Treves, L. (2011). Attitudes to wolves and wolf policy among Ojibwe Tribal members and non-tribal residents of Wisconsin's wolf range. *Human Dimensions of Wildlife* 16, 397–413.
- Smith PA. 2014. Study sheds light on top causes of deer mortality. *The Milwaukee-Wisconsin Journal Sentinel*. 25 January 2014. URL: <http://archive.jsonline.com/sports/outdoors/study-sheds-light-on-top-causes-of-deer-mortality-b99190938z1-241992741.html>
- 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):380-8.
- Tulchin Research (2015), Available at URL: <http://earthjustice.org/sites/default/files/files/PollingMemoNationalESASurvey.pdf>
- Unsworth JW, Kuck L, Scott MD, Garton EO. 1993. Elk mortality in the Clearwater drainage of northcentral Idaho. *The Journal of Wildlife Management*. 57(3):495-502.

- USDA 2011. Cattle Death Loss. (May 12th, 2011).
URL: <http://usda.mannlib.cornell.edu/usda/current/CattDeath/CattDeath-05-12-2011.pdf>
- USDOT. 2008. Wildlife-Vehicle Collision Reduction Study: Report to Congress.
URL: <https://www.fhwa.dot.gov/publications/research/safety/08034/exec.cfm>
- Van Deelen TR, Campa III H, Haufler JB, Thompson PD. 1997. Mortality patterns of white-tailed deer in Michigan's Upper Peninsula. *The Journal of Wildlife Management*. 61:903-10.
- 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.
- Wisconsin Department of Natural Resources 2009. Wolves and Deer in Wisconsin. Dated: October 2009.
URL: <http://dnr.wi.gov/topic/wildlifehabitat/wolf/documents/wolvesdeer2009.pdf>
- Zuckerman, L. 2011. Idaho governor declares wolves a "disaster emergency." Reuters.
URL: www.reuters.com/article/us-wolves-idaho-idUSTRE73J0I120110420