

# Wolves and Human Well-being: Ecological & Public Health Concerns

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## Synopsis

Wolves play an integral role in maintaining the health and biodiversity of wildlife and ecosystems, and indirectly, livestock and public health. Recognition of this role, long acknowledged by native American Indians as “the good medicine of the wolf” calls for greater respect, protection and increased numbers of wolves in appropriate habitats across North America; and in recognition of their sentience and family bonds, abolition of commercial and recreational trapping, snaring and shooting. Current federal and state government initiatives, backed by diverse vested interests, are continuing to reduce the nation’s existing wolf population which is contrary to the directives of sound science, reason and the public interest in “re-wilding” public lands and designated wilderness areas throughout the wolf’s original range. The opening of public lands for private use, from logging and mining to ranching and other financially-driven incursions calls for vigilant conservation science and praxis, especially considering the adverse consequences of climate change, by responsible state and federal authorities.

## Deer Management = Farming the Wild

State wildlife management practices directed to maximize deer numbers for recreational hunters, rural America’s virtual extermination of the wolf over the past two centuries, coupled with forest management practices and agricultural expansion indirectly providing feed for deer. and the encroachment of real estate housing developments with deer-attracting gardens and vegetation in municipal parks, have had unforeseen consequences associated with high white- tailed deer numbers; and elk in western states. Two of these unforeseen consequences concern public health and potential harm to the livestock industry *which a higher population of wolves across the U.S. would do much to recitify.*

According to the Minnesota Dept. of Natural Resources, “After the young (fawns) are born each spring, there are between 900,000 and 1,000,000 (white-tailed) deer in Minnesota. The hunting season is important to keep the deer population from getting too large. Each year, Minnesota hunters harvest between 150,000 and 200,000 deer”. Concern was voiced in 2014 that Minnesota’s deer population had been reduced excessively by too many DNR hunting permits being sold.

Hunters seek out the healthiest deer, some seeking trophy antler- bearing bucks in particular while most go after young deer for the venison. A seasonal hunt eliminating almost one quarter of the deer population means starvation for wolf in deer-hunted zones at the start of winter. This probably increases their predation on livestock. Increasing deer hunting quotas to better regulate deer numbers is not a biologically appropriate response even though it is a multibillion dollar source of revenue for states and equipment suppliers.

Wolves prey on deer year-round, taking healthy deer as well as those slowed and weakened by injury and disease. They probably play a significant role in controlling diseases carried by deer, notably prion-causing *Chronic Wasting Disease* (CWD). This disease, which is carried by infective deer showing no evident signs of illness initially (1) also affects mule deer, elk and moose. It is now spreading across the U.S. and Canada. Giltch et al (2) summarize their review: “Chronic wasting disease (CWD) is a prion disease of free-ranging and farmed ungulates (deer, elk, and moose) in North America and South Korea. First described by the late E.S. Williams and

colleagues in northern Colorado and southern Wyoming in the 1970s, CWD has increased tremendously both in numerical and geographical distribution, reaching prevalence rates as high as 50% in free-ranging and >90% in captive deer herds in certain areas of USA and Canada. CWD is certainly the most contagious prion infection, with significant horizontal transmission of infectious prions by, e.g., urine, feces, and saliva. Dissemination and persistence of infectivity in the environment combined with the appearance in wild-living and migrating animals make CWD presently uncontrollable, and pose extreme challenges to wild-life disease management. Whereas CWD is extremely transmissible among cervids, its trans-species transmission seems to be restricted, although the possible involvement of rodent and carnivore species in environmental transmission has not been fully evaluated”.

Wolves are, however, probably immune to CWD (3). But if these prions mutate and cross the species barrier and affect livestock, especially since prions have now been found in plants consumed by deer and also in agricultural crops consumed by livestock and humans, the consequences could have devastating economic consequences for the livestock industry. This could mirror the ‘mad cow’ disease-causing prion debacle in the U.K., which led to mass slaughter and export bans to protect consumers of cattle infected with this form of spongiform encephalopathy from acquiring the debilitating and eventually fatal brain degeneration called Creutzfeldt-Jacob disease.

An estimated one in every 2,000 people in the U.K. test positive for the protein linked to the human version of mad cow disease, (4) and alarmingly prions have been found to have the ability to develop resistance to therapeutic drugs (5). Problems could result from the consumption of deer and elk antler velvet which can be infected with prions (6).

Johnson (7) with the U.S. Geological Survey, Madison, WI, who found prions in crops and vegetation consumed by deer, concludes that their findings “suggest that prions are taken up by plants and that contaminated plants may represent a previously unrecognized risk of human, domestic species and wildlife exposure to CWD and scrapie agents. To help control this disease, the spreading of which is facilitated when deer congregate in one small area to graze/browse, state deer management authorities should prohibit all “recreational feeding” where land owners plant forage and put feed out to attract deer.

### **Experts explore possible link between prion diseases in deer, people**

Although cases remain uncommon, the incidence of Creutzfeldt-Jacob disease is up 85% nationally and 117% in Wisconsin, according to health officials, while chronic wasting disease is spreading among deer, and some speculation has emerged that the trends could be linked.

Macaque monkeys that ate venison from deer with CWD subsequently contracted chronic wasting disease, researchers in Canada reported, and CDC spokeswoman Christine Pearson said the findings raise concerns.

[Milwaukee Journal Sentinel \(tiered subscription model\)](#) (July 7/2017).

### **Health Products and Food Branch (HPFB) Risk Advisory Opinion: Potential Human Health Risks from Chronic Wasting Disease**

Prepared by: Bureau of Microbial Hazards (BMH), Food Directorate, Health Products and Food Branch, Health Canada Date: April 26, 2017

### Issue:

Chronic Wasting Disease (CWD) is a progressive, fatal, transmissible neurological disease that naturally infects cervids, and has been identified in deer, elk, moose, and reindeer. To date there is no direct evidence that CWD has been or can be transmitted from animals to humans. However, initial findings from a laboratory research project funded by the Alberta Prion Research Institute (APRI) and Alberta Livestock Meat Agency (ALMA), and led by a Canadian Food Inspection Agency (CFIA) scientist indicate that CWD has been transmitted to cynomolgus macaques (the non-human primate species most closely related to humans that may be used in research), through both the intracranial and oral routes of exposure. Both infected brain and muscle tissues were found to transmit disease.

Health Canada's Health Products and Food Branch (HPFB) was asked to consider the impact of these findings on the Branch's current position on CWD in health products and foods.

### Summary and Recommendation:

Health Canada's Health Products and Food Branch (HPFB) is responsible for assessing risks to human health from diseases of animal origin that may be transmitted through health products and food, and for developing regulations and policies to mitigate risks from products regulated under the Food and Drug Act as well as various associated regulations. While extensive disease surveillance in Canada and elsewhere has not provided any direct evidence that CWD has infected humans, the potential for CWD to be transmitted to humans cannot be excluded. In exercising precaution, HPFB continues to advocate that the most prudent approach is to consider that CWD has the potential to infect humans. This position has been aligned with that of the World Health Organization (WHO) since the late 1990s, and remains consistent with the WHO's 2012 position that "No tissue that is likely to contain the bovine spongiform encephalopathy (BSE) agent, nor part or product of any animal which has shown signs of a TSE should enter the (human or animal) food chain." This precautionary position on TSEs is also consistent with the conclusions documented by the Transmissible Spongiform Encephalopathy (TSE) Secretariat in 2003, and a systematic literature review conducted by the Public Health Agency of Canada (PHAC) in 2017. The findings of the macaque experiment do not change HPFB's current position with respect to the safety of food and health products and CWD, which considers that a precautionary approach to the management of the potential risks of exposure through food and health products is warranted.

### Other Diseases of Concern

In October 2013 it was reported that cattle in Wisconsin were diagnosed with contracting insect-born deer *epizootic hemorrhagic disease*,<sup>(8)</sup> a first and a warning for the livestock industry of the need to better monitor deer numbers and disease risks, especially CWD.

Minnesota's 460 deer and elk farms, regulated by the state Board of Animal Health, raise animals for their meat, antler velvet and for fenced-in trophy hunts are a not infrequent source of CWD. They pose a challenge to the state Dept. of Natural Resources to prevent the spread of this disease into the wild deer population.

Deer, elk and buffalo ranchers across the country may put wildlife and livestock at risk when unwittingly keeping animals infected with CWD and other diseases communicable to ungulates wild and domestic, including *Brucellosis* (Bang's disease) *Johne's disease* and *bovine tuberculosis*. *Eastern Equine Encephalitis* (EEE) is a fatal viral disease of horses that can infect a variety of avian and mammalian species but seldom causes clinical disease. In rare cases, white-tailed deer can be infected and the disease is fatal in affected animals.

Organic farmers and environmentally conscious ranchers have long recognized the role of predators and other wildlife species in helping preserve healthy ecosystems around and within their lands. An ecological approach to states' wildlife management and predator control policies and practices, moving away from what amounts to wildlife farming for recreational sports hunters of deer, elk and other selected species is called for now. In the final analysis the wolf, long reviled by cattle and sheep ranchers and seen as a competitor to be exterminated by many deer hunters, may be the ultimate savior of America's livestock industry and of healthier deer and other wildlife numbers if the prion-induced Chronic Wasting Disease and other deer diseases communicable to livestock and other species, including humans, is to be stemmed biologically through wolf predation. This means more wolves in deer and elk habitat, (and also cougars, bears and lynx).

### Lyme Disease

The Centers for Disease Control have documented over 30,000 cases of tick-born *Lyme disease* in humans in 2012, (other estimates being as high as 300,000), this disease being harbored by rodents and deer and which wolves, coyotes, foxes and other carnivores can play an indirect role in helping control (9,10). Deficient populations of small and large predators will mean higher numbers of Lyme and other tick born disease-carrying rodents and deer and therefore greater probability of human infection. These concerns underscore the need for a revolution in state and federal wildlife and natural resource management. The adoption of principles and practices that enhance biodiversity and healthy ecosystems domestic, commercial and wild, with greater protection for wolves as an integral aspect of a more enlightened and science-based approach to a better environment for all is the core principle of One Health (11). This is now being embraced world wide by medical, veterinary and other authorities and agencies. The North American white-tailed deer population estimated at only 300,000 a century ago and now standing at 30 million (12) is an indicator of eco-dystopia calling for concerted state and federal attention from the holistic perspective of conservation medicine which must include increased predation by indigenous carnivores.

Concerning the rising incidence of Lyme disease in humans, Sam R Telford (13) asserts that reducing deer numbers in many regions is called for but is opposed socio-politically. Even though deer do not transmit Lyme disease to ticks, encouraging large deer populations for the hunting industry will mean an increase in adult female ticks feeding on deer. With fewer deer there would be fewer larval and nymphal-stage ticks being born to feed on small to medium animals, such as mice, chipmunks, shrews, or birds infected with Lyme disease thus lowering human risk.

The science of restoration ecology/ecological medicine clearly needs local and national political and economic support if these wildlands are to continue to exist and healthful biodiversity secured by reintroduction of apex predators such as the wolf. These forest lands are our providers of drinking water and many other sustainable natural resources including botanical products being discovered to treat cancer and other diseases as well as being an essential carbon sink to help combat global warming and climate change. In their totality and vital presence they also enrich, inspire and inform our souls. Where there are wolves, there is hope. As the deer need the wolves, so the rivers need the trees. As wolves learn the ways of the deer for the good of pack so humans must learn the ways of the wolf for the good of all. The documented enhancement of ecological health reflected in greater biodiversity following the reintroduction of wolves into Yellowstone National Park (14) is a stellar example of the key role of the wolf in optimizing ecosystem and

natural wildlife management which humans have been unable to accomplish in the absence of this essential predator.

( Telford, S.R. Deer Reduction Is a Cornerstone of Integrated Deer Tick Management *Journal of Integrated Pest Management*, Volume 8, Issue 1, 1 January 2017, 25,<https://doi.org/10.1093/jipm/pmx024>).

## **Additional Considerations**

### Wolves & Minnesota's Moose

Federal U.S. Geological Survey wolf biologist and trapper Dave Mech, pointing his finger at rising wolf numbers as responsible in his field-study area for the decline in moose suggests that the Minnesota Department of Natural Resources (DNR) “could allow hunters to kill more wolves in the moose range until the population recovers”. (Star Tribune Nov 2, 2014, p.C18). Ironically, on this same page, reporter Dennis Anderson in his article “Gone From Sight” presents a debate on the dramatic decline in the state’s white tail deer herd, with finger-pointing at DNR mismanagement and over-harvesting. Earlier data indicate that when the wolf was protected under the Endangered Species Act the whitetail deer population flourished. Wolves keep deer on the move, preventing overgrazing/browsing and tree damage. As though to bolster Mech’s questionable opinion, Anderson subsequently published a long interview with Mech ( Star Tribune Nov 16, 2014, pC20) who plays cautious scientist when it comes to climate change and associated debilitating tick infestations being significant factors in the decline of moose especially in northeastern Minnesota. He repeatedly states that while these factors may be “true” or “possible”, “we don’t have evidence of it”, while insisting that wolves are the main cause, along with consecutive bad winters.

Bad winters and too many hunters diminish deer numbers which means more wolves prey on livestock, some 200 wolves being killed for doing so in 2014 by state and federal officials. Regardless, the MN DNR set a wolf quota of 250 animals for the 2014-5 season, some 15,000 people applying for 3,800 licenses to shoot, snare or trap them. DNR wolf manager Dan Stark states that “The hunt isn’t having a significant influence on wolf numbers”, insisting that the de-listing of the wolf as an endangered species was not intended to reduce wolf numbers (because there were too many, which many people argued), but to “have a sustainable hunting and trapping season”. (Star Tribune Nov.16.2014 p C20)

There are many factors involved in the demise of Minnesota’s moose, especially wetland encroachment and drainage for agriculture; parasites, disease and massive winter tick infestations that lead to anemia, weakness, proneness to predation and failure to thrive and reproduce, climate change notwithstanding. While several moose have been killed accidentally by DNR researchers applying radio-collars and some Native American Indian tribes claim their right to kill their entitled annual quota of moose regardless of their threatened status, all involved parties, regardless of their best intentions, surely need to step back. Current wildlife management policies and practices need to be examined. Is the goal to maximize human interests in terms of “sustainable harvesting” of trophy and consumable species of commercial value, or to maximize species diversity for ecosystem health and sustainability? Surely the demands and influence of the human species on other species and their habitats must be constrained for the greater good rather than directed by some economic or social, recreational good. We cannot control the weather but to some degree we can control ourselves. Reducing the wolf kill quota to zero for 2015-6 may be

a good start for the DNR in recognizing that wolves are biologically the better wildlife managers than they.

### Livestock Predation

In their review entitled Effects of Wolf Mortality on Livestock Depredations (PLOS One, Dec.3<sup>rd</sup> 2014) Washington State University, Pullman WA scientists R.B.Wielgus and K.A. Peebles concluded that killing wolves to reduce their numbers is not an effective wildlife management tool nor can it be justified as a way to protect livestock from wolf predation. They summarize their findings as follows:

“Predator control and sport hunting are often used to reduce predator populations and livestock depredations, – but the efficacy of lethal control has rarely been tested. We assessed the effects of wolf mortality on reducing livestock depredations in Idaho, Montana and Wyoming from 1987–2012 using a 25 year time series. The number of livestock depredated, livestock populations, wolf population estimates, number of breeding pairs, and wolves killed were calculated for the wolf-occupied area of each state for each year. . . . . We found that the number of livestock depredated was positively associated with the number of livestock and the number of breeding pairs. However, we also found that the number of livestock depredated the following year was positively, not negatively, associated with the number of wolves killed the previous year. The odds of livestock depredations increased 4% for sheep and 5–6% for cattle with increased wolf control - up until wolf mortality exceeded the mean intrinsic growth rate of wolves at 25%. Possible reasons for the increased livestock depredations at  $\leq 25\%$  mortality may be compensatory increased breeding pairs and numbers of wolves following increased mortality. After mortality exceeded 25%, the total number of breeding pairs, wolves, and livestock depredations declined. However, mortality rates exceeding 25% are unsustainable over the long term. Lethal control of individual depredating wolves may sometimes necessary to stop depredations in the near-term, but we recommend that non-lethal alternatives also be considered”.

### Minnesota’s Wolves Suffering Mange (Scabies) and Other Diseases

Wolf numbers and population recovery resilience can be especially undermined periodically by outbreaks of the contagious skin disease called mange or scabies. It can become endemic--- literally embedded in a population. Factors such as poor nutrition and stress, (notably a quarter million deer hunters taking one third of their main food source every year, the white-tailed deer, now exacerbated by 6,000 wolf hunters and trappers); also concurrent disease (such as hook worms) make animals susceptible to this contagious parasitic skin disease. It can spread rapidly within packs sharing the same resting-up and denning areas. Reported public sightings and photographing of emaciated wolves with little fur on their bodies and extensive bald patches near Duluth, relayed to the DNR, indicate that the wolves of this part of the state are sick and suffering. For them to be easily seen from the roadside indicates that these normally shy and elusive animals are in dire straits from this disease which is not entirely of their own making, or some ‘natural’ occurrence. Sick animals indicate sick ecosystems.

The parasite responsible for this disease, which can affect many species including humans, *Sarcoptes scabiei*, causes intense and distressing itching, often leading to secondary bacterial and fungal skin infections and extensive alopecia due to hair follicle damage. Infested wolves with little or no insulating fur left on their bodies have been known to seek warmth and shelter in out-

buildings in rural areas, and will die of cold exposure when severely infested and lacking adequate coats. Bill Paul with the USDA Wildlife Service program in Northern Minnesota “believes mange, a skin problem that causes animals to die from exposure, may be reducing overall wolf numbers in Minnesota” according to a 2004 report by John Myers, (Mange keeps MN wolf complaints down, Feb. 12, 2004, TWIN Observer, News Tribune). During the earlier era of America’s war to exterminate predators by any and all means, Montana’s state legislature passes a law in 1905 requiring veterinarians to introduce sarcoptic mange into the wild canine population as part of their extermination efforts, this disease persisting to this day throughout the region according to Dan Flores in his book *Coyote America*.

In a June 9, 2004 article in the *Star Tribune* entitled Is wolf comeback waning? Josephine Marcotty reports that “In the last three to four years, as many as 500 wolves may have died from the disease, said Bill Paul, of the Animal and Plant Health Inspection Service, a federal agency that tracks wolf predation on livestock. “Everyone figured we were headed to 3,000 wolves” in the state, Paul said. “Then mange came.”---It can cause a long, slow death. The parasitic mite burrows under the skin to lay eggs. The mites spread throughout the animal, which loses its fur and scratches uncontrollably, experts said. In winter, wolves can freeze to death from the thinning of their coats or starve because they are too weak to capture prey.---Paul said mange seems to afflict adult females more severely, which limits reproduction. The females either die or become so weak they don’t have litters. If they do give birth, the vulnerable pups are infected.

Milder winters have prolonged and expanded the mange epidemic, according to retired DNR biologist Bill Berg, “The winter weather has not been severe enough to kill off the wolves affected by mange,” Berg said. “They survived to spread it around more.”

More recent mild winters may account for higher wolf morbidity and mortality rates because with little snow cover making it easier for deer to escape, even healthy, mange-free wolves are likely to have lower hunting success rates and be malnourished, affecting their reproductive potential and disease resistance.

According to the U.S. Fish & Wildlife’s *Grey Wolf Western Great Lakes DPS Post-Delisting Monitoring Program* (<http://midwest.fws.gov/wolf/pdm>), the MN DNR is supposed to keep records of wolf diseases such as mange, which should be posted on their website as public information. What was the incidence of mange in wolves killed for preying on livestock by federal and state trappers and by private land owners ‘protecting’ their animals over the past decade? On Jan 28<sup>th</sup> 2013 I spoke with Dr. John Erb with the MN DNR who gave me a mange-incidence estimate from wolf hunters’ and trappers’ reports of about 10 percent, possibly higher, the disease being more common in the NE part of the state. He said the estimate could be low because hunters and trappers might simply abandon any mange covered wolves they got and not file a report. Both he and Grand Rapids-based USDA wildlife biologist and wolf trapper John Hart noted that this disease tended to wipe out entire packs and therefore be somewhat self-limiting. John Hart said there was a downward trend in the incidence of mange reported in wolves trapped for killing livestock which he currently estimates at 5-10 % “scattered through the range with no hot spots;” the incidence being much higher a few years ago when there were more wolves and a succession of mild winters allowing more mange-infested wolves to survive and spread the disease to other wolves.

My Feb. 8<sup>th</sup> 2013 telephone survey of taxidermists serving hunters and trappers across Minnesota helped fill out this picture. Mange was seen as a problem severely afflicting wolves in some parts of the state and not in others. Severely infested wolves showed less fear toward humans,

appearing weak, disoriented and in failing condition. They were more likely to get shot. Some hunters and trappers would kill seriously afflicted wolves to put them out of their misery but did not disclose these actions to the DNR. Mange was very prevalent in coyotes, whose dramatic increase in numbers over the past decade or so was believed to be responsible for the no less dramatic decline in red foxes and for the spread of mange to wolves.

An on-going evaluation of diseases afflicting Minnesota's wolves by MN DNR's Michelle Carstensen et al ( see PDF [Wildlife Health Program - Minnesota Department of Natural Resources](http://files.dnr.state.mn.us/publications/wildlife/research2010/health.pdf) files.dnr.state.mn.us/publications/wildlife/research2010/health.pdf) makes no mention of mange, only the percentage of wolves testing positive for various diseases identified in blood serum samples. Some of these findings raise serious concerns as to the long-term viability of the Gray wolf in the western Great Lakes region when the probable mortality and morbidity rates associated with disease are added to the numbers of wolves killed legally and illegally by trappers and hunters. In this study of the serum of 206 wolves, 75.4% tested positive for canine parvovirus; 76.1% for canine adenovirus; 16.4 % for canine distemper virus; 2.8% for Eastern equine encephalitis; 13.7% for West Nile virus; 9.6% for heartworm; 94.5% for Lyme disease and 83.6% for neosporosis. Nine of 62 fecal samples tested positive for hookworm.

Without adequate monitoring to estimate the severity of mange, Lyme disease, neosporosis and other periodically devastating wolf diseases such as parvovirus and canine distemper which can decimate wolf litters---and which are red flags indicating the population is in under stress/duress from multiple factors that need to be addressed by wildlife managers—how can Minnesota or any state determine accurate annual kill quotas for recreational and commercial killing? The above *Monitoring Program* gives the option to states to set up disease-control and prevention initiatives for mange and other diseases ( such as hookworm, heartworm, rabies, distemper and parvovirus), but such interventions, including oral drug and vaccine baits and selective culling, should be on an emergency basis and not be a substitute for healthy-ecosystem management policies and practices which include putting the interests of wolves and other predators before those of competing, non-indigenous and non-subsistence human predators.

One does not need to be a wildlife scientist or 'expert' to surmise that the impact of humans has enormous effect on the health and well-being of any wild species: Especially on a complex, intricate 'social' pack species like the wolf. When their environment is dramatically changed by thousands of insurgent hunters and trappers, the additional stress of being targets themselves is likely to exponentially exacerbate the stress- disease connection. No one can accurately quantify this, and 'scientific evidence' if any, comes after the fact, too late to prevent their suffering and demise.

Language in this *Monitoring Program* I interpret as a binding agreement that when the MN wolf population falls below 1,500 it will be re-listed and given endangered species protection. But even before that contestable point is reached, a moratorium on all wolf hunts in all states should be instigated until the health status and more reliable population distribution census reports have been completed and posted for public review.

Efforts to protect indigenous wolf clans or cultures need to be redoubled along with their restorative reintroduction into those parts of their original range where there is a viable population of deer and other wild prey for them. Cattle ranchers and other stake holders can establish cooperative programs consonant with wolf protection and re-introduction/ "re-wilding", from adopting non-lethal methods of predator control to re-afforestation. The primary forest habitat of both the wolf and cougar or American lion is in dire straits across much of North America,

notably from: Climate change; invasive species—harmful insects, tree diseases, noxious and inedible plants; habitat degradation by livestock over-grazing; over-browsing by state managed deer and other “game” species: relentless human encroachment from commercial recreational and real estate developments to mining, fracking, damming and logging; acid rain contaminated with industrial and incinerator poisons like lead, mercury, cadmium and dioxins, and with pesticides from the agri-industry sector that now blights many continents.

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