

Testimony of:

Darrel Rowledge

Director, Alliance for Public Wildlife (Canada)

Author *No Accident: Public Policy and Chronic Wasting Disease (2008)*

Co-author *The Challenge of CWD: Insidious and Dire (2017)*

Co-author *October 2017 Update: CWD: Insidious, Dire, and URGENT (2017)*

Author *Chronic Wasting Disease — A Policy Catastrophe (2020)*

To: Pennsylvania Senate Committees on Chronic Wasting Disease

Date: Wednesday, April 13, 2022

Summary:

There is no more important responsibility in all of government than defining public policy regarding infectious diseases, parasites, pests, or contaminants. A single instance can cause massive, irreversible harm, killing thousands or even millions of people or other animals, and inflicting enormous costs—on people, communities, economies, and ecosystems.

North America's epidemic of chronic wasting disease (CWD), is now the largest, fastest-growing, most contagious biomass of infectious prions in global history. Impacts on wildlife are already severe, and projections include extinction models. Consequences for ecosystems and North America's (> \$170 billion / yr.) wildlife-based economies are dire.

There have, as yet, been no proven transfers to people, but zoonotic risk is significant and exposure levels are beyond alarming. Perhaps most imminent, these facts, costs, and threats represent substantial risk to North America's international trade in agricultural products, to food security, and to our economies. Incredibly, none of these vital 'what if' questions have been openly considered, much less comprehensively assessed. This, obviously precludes any follow-up questions regarding plans to deal with such outcomes.

Canada's experience and failures regarding CWD offer vital lessons in interdisciplinary relationships, and how protecting public interest requires complete and comprehensive analysis on which to base the drafting, amendment, and enforcement of policy. These analyses must be objective, inclusive, adaptive, guided by science and evidence, and must be dedicated to anticipate and prevent, as well as respond to outbreaks, spread, and the cascading impacts of disease.

The reality and threats of chronic wasting disease continue to gain international attention, and thus time is of the essence. We implore all governments, at every level, to immediately mandate, fund, and undertake the emergency directives outlined by experts and stakeholders.

Thank you for your consideration; we look forward to assisting as appropriate.

June 17, 2019

To the URGENT attention of:

Rt. Hon. Prime Minister Trudeau
Hon. Marie-Claude Bibeau
Hon. Ralph Goodale
Hon. Ginette Petitpas Taylor
Hon. Catherine McKenna
Hon. Carolyn Bennett
Hon. Seamus O'Reagan
Hon. Jim Carr
Hon. Bill Morneau

Government of Canada
House of Commons
Ottawa, Ontario
K1A 0A6

Dear Rt. Hon. Prime Minister Trudeau, and Honourable Ministers,

Protecting the health and wellbeing of current and future Canadians is entrusted as the highest priority of our governments. It requires comprehensive analysis of dynamic ecosystems, communities, and economies that scale from local to global. Carefully crafted, well-enforced laws, with monitoring and adaptation can prevent or contain crises, protect our wellbeing, and ensure a favourable and opportune future.

There has been no greater threat to health and wellbeing than infectious diseases—and risks are amplified by the intensity and speed of globalized economies. In 2003, even without infection of people, finding a single cow infected with bovine spongiform encephalopathy (BSE) or 'mad cow' in Alberta triggered devastating trade restrictions with multi-billion dollar consequences across Canada. Our governments learned from the UK's official BSE Inquiry (2000), and enacted aggressive measures to contain the epidemic, protect consumers, and safeguard our economy.

Today, we need a comparable response to a vastly larger epidemic of a sister prion disease called CWD, or "chronic wasting disease." Like BSE, the epidemic of CWD is relatively new and largely manmade. Both are invariably fatal, with no adequate live animal tests, no preventive vaccines, and no treatments; **but CWD is far more virulent because it is highly contagious between living animals.**

CWD is currently afflicting members of the deer family, where it has repeatedly jumped species barriers and many strains have evolved. It was declared a "State of Emergency" by the U.S. Secretary of Agriculture in 2001. Transmission is facilitated via infective (misfolded) prions that are amplified, shed, and present in saliva, feces, urine, blood, lymphoid, and muscle tissue. CWD prions are extremely resilient, can persist in the environment indefinitely, and can spread animal to animal, or via soil, plants, agricultural products, and from contaminated surfaces or equipment. As such, CWD presents profound threats to wildlife and the environment, to agriculture and international trade, to Indigenous rights, traditions, treaties, food security, and, potentially, to human health.

Evidence documenting the severity of the CWD crisis and the necessity of vital responses is clear, compelling, and uncontested. Consensus extends across disciplines, sectors, jurisdictions, departments, agencies, and among virtually all experts, vital interests, and stakeholders—as was reaffirmed at the 2018 One Health Congress, at an Assembly of First Nations meeting last December, at a February 2019 conference of agri-food representatives, and at a comprehensive conference on CWD convened by the Ontario Federation of Anglers and Hunters in March.

The primary driver of all known prion disease epidemics has been intensive agriculture: as scrapie in domestic sheep, TME on mink farms, BSE from “ruminant feed” (feeding cows to cows), and CWD spread widely through schemes to privatize and exploit ‘captive wildlife’ (on game farms). As scientists had warned, CWD was imported to Canada in captive cervids from the U.S. and repeatedly spilled through fences to infect wildlife. Failure to contain the CWD epidemic has allowed continued growth and spread—now confirmed in 26 states and 3 Canadian provinces. Studies in wild deer populations confirm severe impacts and possible extinctions that present catastrophic threats to Canada’s biodiversity, our economy, cultural identity, and food security.

While no human cases of CWD have been confirmed, scientists note that while low, the risk is not zero—and it is evolving. Evidence suggests that CWD conversion is more adaptive than BSE, and following efficient transfer to a second species of non-human primates, Health Canada advised that “*CWD has the potential to infect humans.*” Thousands of CWD-infected animals are being consumed by hunters and their families across North America every year. Even a single transfer to a person—proving that humans are susceptible—would bring catastrophic consequences with limited options. The potential threat to our blood supply cannot be ignored, as demonstrated when BSE cost the UK access to their domestic plasma supply. All of this underscores the need for precautionary measures and preparation of an emergency plan.

It is vital to note, however, that threats to agricultural economies *do not* require human transfer. The capacity to spread CWD to susceptible species of deer all over the world via agricultural crops has already resulted in trade actions. On October 24th, 2018 Norway banned imports of hay or straw from any state or province with CWD. This could easily expand to other products and spread to other economic regions seeking, not just to avoid the threats, but to leverage tens of billions of dollars per year in competitive advantage. Economists describe the prospects for such outcomes as “probable” and the consequences as “severe and probably recessionary, with cascading effects and few immediate remedies.” As recent events have shown, these threats extend to investment markets.

Despite the lessons of BSE and the dire threat posed by CWD, official policy still allows translocation of live animals, products, and equipment from cervid farms, movement of hunter carcasses, and continued human exposure—in violation of basic principles of science, public trust, and professional ethics.

We urge the federal government, in collaboration with provinces and territories to immediately mandate, fund, and undertake emergency directives to:

1. Contain the geographic spread of CWD. Enact and enforce an immediate ban on the movement of all live cervids, all potentially CWD-infected carcasses, animal parts, products, exposed equipment, or other sources of infectious materials. Enact measures to ensure proper disposal of infected carcasses. Eliminate cervid farms with a plan for compensation and/or transition of operations to acceptable alternatives. Contain, mitigate, and where possible, eradicate CWD in wild populations by developing and implementing rapid response plans.
2. Prevent human exposure. Prevent transfer and/or amplification of CWD via food and feed chains by mandating and implementing convenient, cost-free, rapid testing of all animals harvested from CWD-affected areas. Provide hunters and communities with guidance and means for risk reduction. Mandate that all food banks only accept venison following negative test results.
3. Maintain and strengthen the current federal program of human prion disease surveillance and develop a preparedness plan for the possible emergence of human CWD in Canada, including possible impacts to our blood supply.
4. Initiate and fund an independent, interdisciplinary approach dedicated to comprehensive, collaborative, international, nation to nation, science and evidence-based initiatives to:
 - Prevent transfer and/or amplification of CWD via food and feed chains;
 - Contain, mitigate, and where possible, eradicate CWD in wild populations;
 - Ensure Canadians’ future wellness by protecting wildlife, ecosystems, communities, safe, nutritious, sustainable food, and economies; and
 - Invest in research and innovation to support Canadian efforts to better understand and advance scientific, economic, and biomedical insights and opportunities, while reducing threats.

We have assembled a multi-sector coalition of experts and vital stakeholders to support these measures, to inform prudent public policy, and engage in collaborative efforts going forward.

The following signatories implore you to recognize the dire nature of this epidemic, of your acknowledgement of the public trust, and the responsibilities of your office. We stand in support of your announcement of the government of Canada's urgent undertaking of all necessary actions to meet these challenges and protect Canadian interests.

Yours truly,



Dr. Neil Cashman, Professor, Department of Medicine, University of British Columbia (former) Scientific Director, PrioNet Canada



Alastair R. Lucas, QC, Professor of Law, Senior Research Associate, Canadian Institute of Resources Law



Dr. Hermann Schaeztl, M.D., Dr.med./PhD, Professor, Prion Biology and Immunology, University of Calgary



Dr. Paul Sockett, Director, Foodborne, Waterborne and Zoonotic Infections Division, Public Health Agency of Canada (1996 - 2008) Science Advisor, First Nations and Inuit Health Branch, Health Canada (2008 - 2012). (Retired)



Dr. Sabine Gilch, Associate Professor, Canada Research Chair in Prion Diseases, University of Calgary



Dr. Michael T. Osterholm, PhD, MPH, Regents Professor, McKnight Endowed Presidential Chair in Public Health Director, Center for Infectious Disease Research and Policy, Distinguished University Teaching Professor, Environmental Health Sciences, School of Public Health, Professor, Technological Leadership Institute, College of Science and Engineering Adjunct Professor, Medical School



Dr. David Swann, FRCP, MLA (Retired)



Dr. Arthur W. Clark, Physician Professor Emeritus, Pathology & Laboratory Medicine and Clinical Neurosciences, University of Calgary



Kat Lanteigne, Executive Director, BloodWatch.org

(Support confirmed via email)

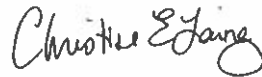
Michèle Brill-Edwards MD, FRCPC
Board Member, Canadian Health Coalition



Norman Yakeleya,
Dene National Chief
AFN Regional Chief



Michael D. Samuel, Professor Emeritus, Forest and
Wildlife Ecology University of Wisconsin-Madison



Christine Laing, Acting Executive Director
Public Interest Law Clinic, University of Calgary



Dave Clausen, DVM, (former) Chair,
Wisconsin Natural Resources Board

(Support confirmed via email)

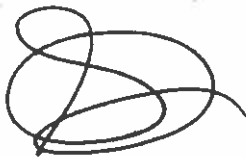
Dr. Greg Douglas, (former) Chief Veterinary Officer
Saskatchewan, (former) Chief Veterinarian, Ontario



Jerry Potts, North Piikani Nation Elder,
Thunder Medicine Pipe Keeper



Dr. Richard Gray, Professor and Grain Policy Chair,
Agriculture & Resources Economics,
University of Saskatchewan



Chief Stanley Grier, Piikani Nation



Dr. Vince Crichton, (former) Co-Chair,
Canada's National Wildlife Disease Strategy



Councillor Brian Jackson, Piikani Nation



Dr. Val Geist, Professor (Emeritus),
Environmental Science, University of Calgary

(Support confirmed via email)

Dr. Lana R. Potts BScN MD CCFP
Indigenous Family Medicine



Darrel Rowledge, Executive Director,
Alliance for Public Wildlife

BILL BOSCH

Bill Bosch, President, BC Wildlife Federation



Serge Lariviere, Director,
Quebec Federation of Anglers and Hunters



Brian Dingreville, President,
Alberta Fish and Game Association



Angelo Lombardo, Executive Director
Ontario Federation of Anglers and Hunters



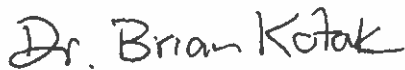
Clark Schultz, President,
Saskatchewan Wildlife Federation



Rick Bates, Canadian Wildlife Federation



David Pezderic, Saskatchewan Wildlife Federation



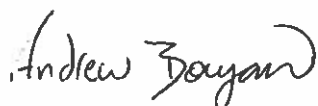
Dr. Brian Kotak, Manitoba Wildlife Federation



Charles Shewen, President,
Yukon Fish and Game Association



Kelli Miller Kichhom, President,
PEI Wildlife Federation



Andrew Bouzan, President
Newfoundland and Labrador Wildlife

Assembly of First Nations

55 Metcalfe Street, Suite 1600
Ottawa, Ontario K1P 6L5
Telephone: 613-241-6789 Fax: 613-241-5808
www.afn.ca



Assemblée des Premières Nations

55, rue Metcalfe, Suite 1600
Ottawa (Ontario) K1P 6L5
Téléphone: 613-241-6789 Télécopieur: 613-241-5808
www.afn.ca

**ANNUAL GENERAL ASSEMBLY
JULY 25, 26, & 27, 2017, REGINA, SK**

Resolution no. 13/2017

TITLE: Chronic Wasting Disease

SUBJECT: Health

MOVED BY: Chief Stanley Grier, Piikani Nation, AB

SECONDED BY: Chief Byron Louis, Okanagan Indian Band, BC

DECISION Carried by Consensus

WHEREAS:

- A. The United Nations Declaration on the Rights of Indigenous Peoples affirms:
- i. Article 29 (1). Indigenous peoples have the right to the conservation and protection of the environment and the productive capacity of their lands or territories and resources. States shall establish and implement assistance programmes for indigenous peoples for such conservation and protection, without discrimination.
- B. First Nations have, since time immemorial, relied on the wildlife we gather and consume for sustenance, survival, and ceremonial purposes. These wildlife resources given to First Nations by the Creator have important purposes in our ceremonies, songs, prayer, and traditional ways handed down through generation after generation.
- C. Chronic Wasting Disease (CWD) is a newly emerged infectious disease affecting deer, elk, moose, and possibly caribou. CWD is always fatal and can remain viable in the soil for years. CWD is similar to mad cow disease, and though the risk of transfer to people may be low, Health Canada advises that no CWD-infected material should be used or consumed by humans or animals. Transfer of CWD via plants has also been demonstrated, threatening agricultural markets and the entire economy.

Certified copy of a resolution adopted on the 27th of July 2017 in Regina, Saskatchewan



PERRY BELLEGARDE, NATIONAL CHIEF

13 – 2017
Page 1 of 2

Head Office/Siège Social

- D. CWD threatens irreparable harm to wildlife and to First Nations rights to hunt, fish and gather as promised under the numbered Treaties across Canada. Impacts on wildlife are already projected to be severe, with direct implications for reliant peoples and communities—especially if the disease is allowed to transfer into caribou that are known to be susceptible. Additional multiplying and socio-economic impacts threaten hundreds of First Nations in Canada.
- E. The complexity and interaction of sciences and disciplines involved in the CWD issue, including First Nations' traditional knowledge, are wide-ranging and extremely challenging, yet virtually all vital stakeholders and experts have been excluded from key policy processes. That flawed approach continues to compromise First Nations interests going forward as shown in a June 30, 2017 update to Canada's CWD protocol.
- F. To secure, maintain, and protect First Nation's rights and interests, full and informed access and meaningful participation in all policy and regulatory processes is vital.
- G. In 2017, Piikani First Nation formalized a working partnership with the Alliance for Public Wildlife (APW). This partnership is ensuring that the Piikani First Nation is included in all policy and regulatory processes on CWD.
- H. The now extreme urgency of the current crisis underscores the need for informed, effective, and cost-efficient representation for all First Nations, and to extend the Piikani / APW partnership nationally to address and adequately represent First Nation interests in confronting this crisis.

THEREFORE BE IT RESOLVED that the Chiefs-in-Assembly:

1. Direct the Assembly of First Nations (AFN) to formally support Piikani First Nation and the Alliance for Public Wildlife (APW) (per their formal partnership) in their efforts of consultation and advocacy in informing Chronic Wasting Disease (CWD) policies and frameworks.
2. Direct the AFN to work in collaboration with the Piikani / APW, federal, provincial/territorial, and First Nations governments to secure necessary resources to address and prevent the impacts of CWD.
3. Direct the AFN to report annually to the Chiefs in Assembly on the progress of this work.

Certified copy of a resolution adopted on the 27th of July 2017 in Regina, Saskatchewan



PERRY BELLEGARDE, NATIONAL CHIEF

Chronic Wasting Disease

A Policy Catastrophe

Darrel Rowledge

Director, Alliance for Public Wildlife

© March 2020

Introduction

“In all of recorded history, few factors rival the influence of infectious diseases. Massive epidemics have so ruthlessly, so indiscriminately, and so dramatically laid waste entire populations that questions about their nature, causes, spread, and, especially, questions of appropriate response, have plagued leaders for millennia.”

“Such was the irony of an invisible force of unfathomable power!”

Darrel Rowledge, 2008

The above quote is from the opening of a book written for Canadian governments twelve years ago. It was offered as context in a plea for a profound shift in perspective—to avoid the futility of belatedly **reacting** to crises, rather than addressing the decisions, policies, and actions that are causing them. In one of many examples, the book explained the transfer of a coronavirus from Chinese horseshoe bats to palm civets, caged by the hundreds of thousands in wet markets in Guangdong, where it amplified, evolved, and jumped to humans as SARS in 2003.

The world is now scrambling to respond to the COVID-19 pandemic. From bats, the new coronavirus (SARS-CoV-2) transferred and amplified to its lethal form in pangolins in Wuhan’s wet markets (or possibly in other domestics). There is a frenzy to muster every available tool and treatment, and to find a safe and effective vaccine. Scientists and leaders are frantic to stop the spread, mitigate harm and “flatten the curve.” We are ill-equipped, and desperate to protect our frontline teams. Our long-distracted, abused, and propagandized populations must be convinced to accept science and abide responsible practices.

These measures are absolutely necessary—BUT they are reactions to a disaster that responsible policy analysis would have anticipated and avoided. The plea to shift to a preventive perspective stands, but the book (and binder of documenting science) I sent to governments in 2008 keyed on a different, far more insidious epidemic. It was entitled:

No Accident: Public Policy and Chronic Wasting Disease in Canada

Chronic Wasting Disease

Chronic wasting disease (CWD) is a sister to so-called 'mad cow disease' (BSE) and emerged at about the same time. Both are progressive and *always* fatal (100%). Unlike mad cow, however, CWD is highly contagious. There are no adequate live-animal tests, no effective treatments, and no vaccines. CWD spreads readily between animals or from the environment, where it can persist and remain infectious indefinitely. CWD has repeatedly jumped species barriers and many strains have evolved, spreading in North American deer, elk, and (some) moose. Caribou are highly susceptible and at severe risk.

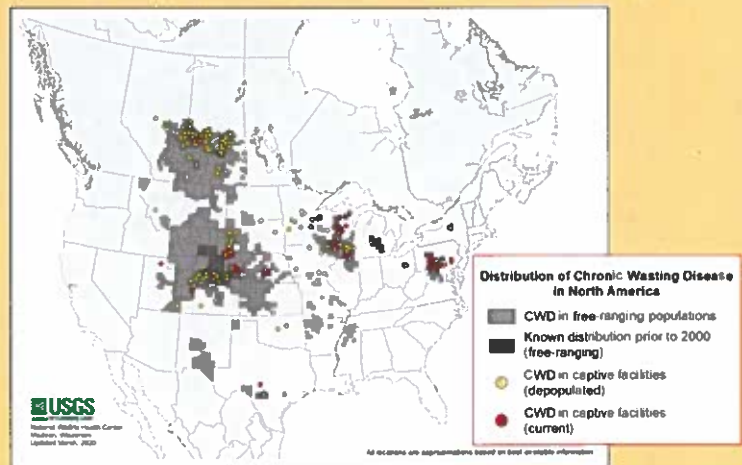
CWD was declared a "State of Emergency" by the U.S. Secretary of Agriculture in 2001, yet the now massive epidemic is not just out of control—all known means of spreading it are still allowed. Negligent policies and practices are inviting unprecedented worst-case outcomes including: severe population declines, extinctions, cascading impacts on ecosystems, crashing economies, and severe cultural and treaty violations. High rates of exposure and multiple avenues of possible transfer of CWD to people portend consequences that can scarcely even be quantified.

First documented in a research facility in Colorado, CWD has been spread widely through commercial operations to exploit "captive wildlife" on game farms. It has been confirmed in 26 states and 3 Canadian provinces, and has repeatedly spilled through fences to infect wildlife.

Among epidemic TSEs or transmissible spongiform encephalopathies, mad-cow (BSE) is described as the mildest threat. At the other end of the spectrum, CWD is the most severe—with infectious 'prions' present in saliva, feces, urine, blood, lymphoid tissues, velvet antler, muscle, and semen.¹

Chronic Wasting Disease (CWD)

The largest, most contagious, most persistent biomass of infectious prions in global history



Experts urge immediate action to contain the epidemic, fund independent, interdisciplinary task force to reduce impacts, prevent threats, and protect public interests

¹ Evolutionary biologists define "virulence" as pathogen induced harm to a host / species—as opposed to transmissibility between individuals / species. While not accurate, "virulence" is sometimes used colloquially to describe the severity or threat of epidemics—representing spread as well as harm (measured in terms of infectivity (R0) AND morbidity / mortality, respectively).

Prions are extremely resilient, known to resist disinfectants, alcohol, formaldehyde, detergents, protein enzymes, desiccation, radiation, freezing, and incineration at 600°C (1,100°F). Facilities contaminated with CWD have resisted all efforts to remove the infective agent.

Prions adhere to minerals in clay-based soils that can increase infectivity—up to 680 times. Decomposing carcasses create contaminated “super-sites.” CWD can be passed from the surface of plants (exposed to saliva, feces, urine), in plants via root uptake from infected soil, or from contaminated surfaces or equipment. Threats to wildlife populations are dire (10% declines per year) and include possible extinctions within fifty years, with severe impacts on ecosystems, economies, and communities.

No human cases of CWD have yet been confirmed, and the risk of transfer is thought to be low, *but it is not zero*. Moreover, risk is uncertain—and is evolving with new strains (~6 so far), interacting with various co-factors (known and unknown). CWD conversion of human prion protein is more adaptive than BSE, where risk to people was thought to be extremely improbable—but infected and killed at least 230 people as (vCJD). In 2017, following efficient transfer of CWD to a second species of non-human primates, an internal Health Canada advisory warned that “*CWD has the potential to infect humans.*”

Despite the official positions from every major health authority that *people should avoid consumption of any known or potentially infected prion material*, public policy is allowing some 10,000—20,000 CWD-infected animals to be consumed by hunter families and communities across North America every year, and this has notably included products from CWD-infected game farms. Even a single transfer to a person—proving human susceptibility—would bring catastrophic consequences with cascading impacts and limited options. It would question safety of food products and systems, and potentially threaten the safety of blood and blood products, and other medical supplies, procedures, and practices.

It is vital to note, however, that threats to agricultural economies *do not require human transfer*. CWD is a severe threat to deer all over the world, and the proven capacity to spread via agricultural crops and products has already resulted in trade actions. On October 24th, 2018 Norway banned imports of hay or straw from any state or province with CWD. This could easily expand to other products and spread to other economic regions seeking, not just to avoid the threats, but to leverage tens of billions of dollars per year in competitive advantage.

Economists describe the prospects for such outcomes as “increasingly certain.” Expected consequences are considered “severe and probably recessionary, with cascading effects and few immediate remedies” (no known ‘off switch’). As COVID-19 has shown, these threats extend to entire economies and investment markets.

The pandemic proves the crucial wisdom of avoidance and the precautionary approach that are so fundamental to public trust. That no case of CWD infecting people has (yet) been documented, only amplifies the need for immediate, aggressive action to prevent catastrophic, irreversible consequences.

Immediate Response Required

Independent analyses have outlined a clear consensus of vital must-have actions to meet the challenge of CWD—to which there have been no substantive challenges. In a June 17, 2019 letter to the Prime Minister and cabinet, more than 30 leading scientists, experts, and vital stakeholders and interests urged the federal government, in collaboration with provinces, territories, and First Nations, to immediately mandate, fund, and undertake the following emergency directives:

1. **Contain the geographic spread of CWD.** Enact and enforce an immediate ban on the movement of all live cervids, all potentially CWD-infected carcasses, animal parts, products, exposed equipment, or other sources of infectious materials. Enact measures to ensure proper disposal of infected carcasses. Eliminate cervid farms with a plan for compensation and/or transition of operations to acceptable alternatives. Contain, mitigate, and where possible, eradicate CWD in wild populations by developing and implementing rapid response plans.
2. **Prevent human exposure.** Prevent transfer and/or amplification of CWD via food and feed chains by mandating and implementing convenient, cost-free, rapid testing of all animals harvested from CWD-affected areas. Provide hunters and communities with guidance and means for risk reduction. Mandate that food banks only accept venison following negative test results.
3. **Maintain and strengthen the current federal program of human prion disease surveillance and develop a preparedness plan** for the possible emergence of human CWD in Canada, including possible impacts to our blood supply.
4. **Initiate and fund an independent, interdisciplinary approach** dedicated to comprehensive, collaborative, international, nation to nation, science and evidence-based initiatives to:
 - Prevent transfer and/or amplification of CWD via food and feed chains;
 - Contain, mitigate, and where possible, eradicate CWD in wild populations;
 - Ensure Canadians' future wellness by protecting wildlife, ecosystems, communities, safe, nutritious, sustainable food, and economies; and
 - Invest in research and innovation to support Canadian efforts to better understand and advance scientific, economic, and biomedical insights and opportunities, while reducing threats.

These actions are vital, and beyond urgent. Success in meeting the challenge will cost billions and take decades. Speed, effectiveness, and cost efficiency will all be facilitated through deliberative process and strategic management—redirected to fulfill public trust. Science and evidence-based decisions must abide professional ethics and the precautionary principal to protect public interest for generations to come. The lessons of history are stark, and require comprehensive assessment and preventive actions.

Domestication: Epidemic Disease Accelerator

History, evidence, and laboratory science have shown that confining, taming, and domesticating animals can dramatically accelerate evolutionary processes and outcomes—including pathogens capable of overwhelming “species barriers,” allowing transfer to, and often within new species (see Figure 1). Diseases that transfer from animals to people are called “zoonoses.” Domestication has played a substantial role in almost all zoonotic diseases (see Figure 2). The amplifying factors apply across the spectrum, including in humans—the ultimate “domesticate.”

The following factors contribute to the disease-amplifying effects of domestication:

- Stress:** catching / confining wild animal initiates “fight or flight” responses; if beneficial in the short term, chronic stress impairs metabolic function and compromises innate and adaptive immunity, raising susceptibility and vulnerability to pathogens and disease
- Exposure:** presence / availability of viable infectious pathogens / factors (especially if new), in the environment or brought with the biome of feed storage and distribution
- Density:** concentration and proximity of animals and microbes within confined spaces
- Squalor:** filth: unpleasant, unsanitary, contaminated conditions rife with microbes
- Vectors:** intermediary sources that can harbour, incubate, alter, and transfer pathogens—often attracted to feed (rodents, insects, worms), bringing parasites / pathogens
- Fomites:** surfaces on which pathogens can deposit, persist, and be transferred
- Selection:** susceptible organisms die off, more robust survive—favouring transmissible and (often) more virulent pathogens and more resistant hosts at every level
- Husbandry:** cultivation and selective breeding of plants and animals for characteristics or perceived benefits (convenience, aesthetics, value)
- Antimicrobials:** introduced agents, organisms, or antigens (antibiotics, antivirals, vaccines), that promote growth, create immune responses—often compromising efficacy, requiring higher dosages, additional or alternative agents, with evolutionary influences
- Transport:** often over long distances, carrying entire spectrum of organisms, microbes, parasites, minerals, and toxins to combine and evolve with the spectrum and conditions of a new environment

Domestication: Disease Accelerator

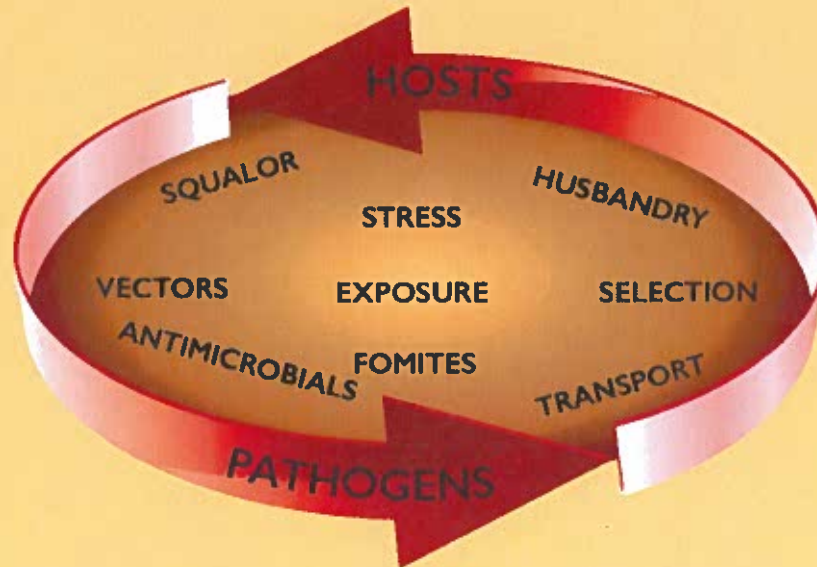


Figure 1

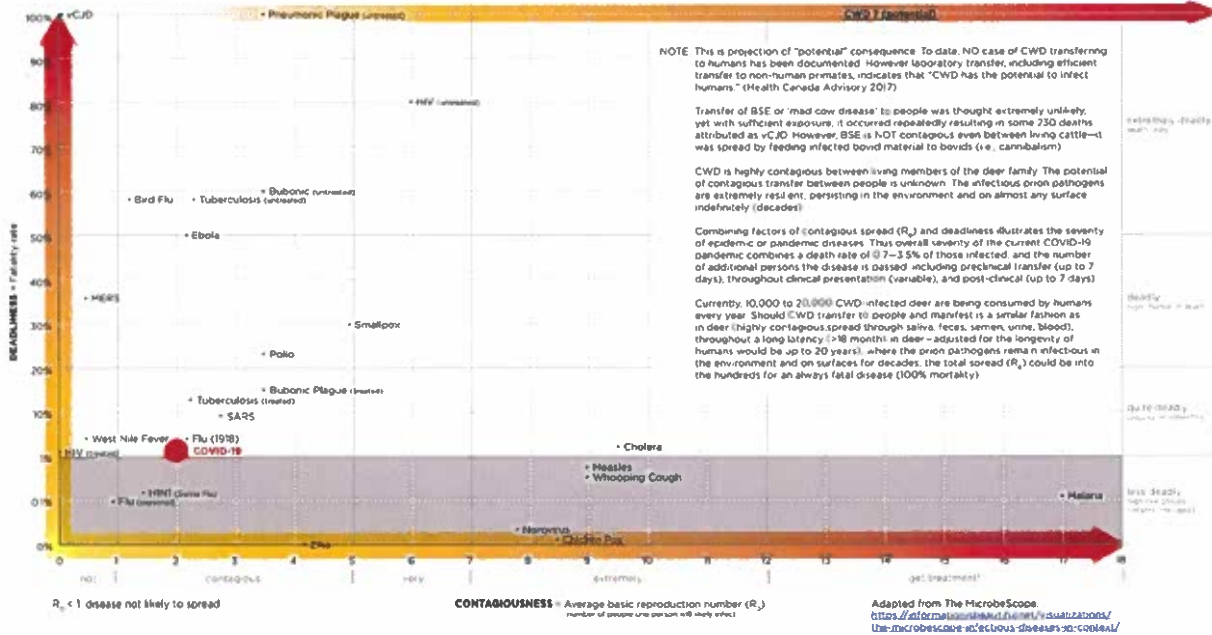
Human Disease	Animal Origin
Tuberculosis	goats
Measles	cattle
Mumps	pigs
Whooping Cough	pigs
Malaria	fowl / mosquito / macaques
Dengue	mosquito / bats / monkeys
Cholera	cattle
Small Pox	camels / rodents
Typhoid	chickens
Anthrax	sheep
Influenza	fowl / swine
Leprosy	water buffalo
Common Cold	cattle / horses / bats
Peptic Ulcers / GI cancers	sheep
Trichinosis	pigs
Hepatitis / Liver Cancer	dogs, pigs, horses, primates
Marburg / Ebola	monkeys / bats
AIDS	chimpanzees
vCJD	cattle
SARS	palm civets / bats
MERS	camels / bats
COVID-19	pangolins / pigs / bats
	domestic / wild origin

Figure 2

Scale and Prudence

It has long been clear that CWD presents an unprecedented scale of risks and consequences. It combines extended, highly contagious latency with untreatable, certain death. As the current coronavirus pandemic escalates, historical reflection presents a grim reality.

SEVERITY OF EPIDEMIC/PANDEMIC DISEASES



The continuing epidemic spread of CWD represents a systemic failure of governance, not science. The implications—for wildlife, ecosystems, wildlife economies and communities, for First Nations treaties, culture, and food security—were foreseeable and all but certain decades ago. Impacts have now been documented in peer reviewed science for more than five years.

But there is a far more profound teaching: The vital actions described above are now-desperate **responses** to a predictable crisis that competent analysis would have avoided entirely. The enabling and promotion of profit-based exploitation of 'captive wildlife' did not just occur in the absence of comprehensive analysis, but while governments ignored warnings and denied repeated science-based requests for such assessment.

Further inaction—by all accounts *waiting* for proof of transfer to people—is a preposterous invitation of a catastrophic outcome that will be too late. Delay amplifies risk and jeopardy on every level. In the wake of COVID-19, there is little question that reaction to even the prospect of human susceptibility to CWD will be severe; and consideration of epidemic spread will not be limited to the world's deer.