Chapter 2

Keeping Nature Healthy: Managing Wildlife Disease in Ontario

Wildlife disease is a threat to biodiversity and people. Are we prepared?

Abstract

Disease is part of life, for both humans and wildlife. But wildlife disease can create risks to human health and the economy, as well as the very survival of some species. The Ontario government is currently doing a good job preventing, detecting and managing wildlife disease, but we can expect to face new threats. At a minimum, the Ontario government should make a formal commitment to sustained funding for the Canadian Wildlife Health Cooperative (CWHC), which has been a critical and cost-effective component of the province's success in dealing with wildlife health issues to date.

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2.1 Introduction: the threat of wildlife disease to species and people

Disease is a part of life, for both humans and wildlife. Wildlife diseases shape the evolution of species and ecosystems, but they also have the potential to have devastating impacts on plants, animals, our economy, and our very own health. Monitoring and managing wildlife health is key to minimizing unacceptable risks from disease. According to the World Organisation for Animal Health, monitoring, preventing and controlling wildlife disease are crucial factors for safeguarding biodiversity, and public and animal health worldwide.

Recent declines in Ontario's populations of bats and moose, and the emergence of illnesses like Lyme disease and West Nile virus, have brought wildlife health to the public's attention. In this chapter, the ECO looks at the Ontario government's efforts to prevent, detect and manage wildlife disease. We looked at the roles of the Ministry of Natural Resources and Forestry (MNRF) and other organizations in managing wildlife health. We also looked at a number of case studies to see how the MNRF is actively addressing wildlife disease.

A northern myotis bat with white-nose syndrome.

Photo credit: University of Illinois/Steve Taylor USFWS, (CC BY 2.0).

> Diseases can cause major population declines, or even local or total extinctions of a species.

2.1.1 The increasing risk of wildlife disease: new diseases, new environmental conditions

Many diseases have a limited impact on wildlife, occurring at levels that leave species and ecosystems relatively stable. But sometimes, diseases can cause major population declines, or even local or total extinctions of a species. Diseases that arrive in new areas and infect wildlife populations that have never developed immunity can be especially destructive.[1] Unfortunately, wildlife disease is likely to continue to spread into new regions in Ontario as a result of several factors: ongoing wildlife trade, spill over from domestic animals (pets and livestock), the movement of goods and equipment across borders, habitat loss, and a changing climate.

> Climate change is worsening the extent and impacts of many wildlife diseases.

Climate change is worsening the extent and impacts of many wildlife diseases.[2] Most pathogens and the organisms that spread them (called "vectors") need specific environmental conditions to reproduce and infect hosts, including the right temperature, precipitation and humidity levels. New climatic conditions can expand the geographic range of some diseases and the organisms that carry them. Changing climatic conditions can also make wildlife more susceptible to disease because they may have to move into new areas in order to survive, their migratory patterns may change, or they may suffer reduced immunity due to heat, nutritional stress or even freezing rain. Some of the diseases that affect Ontario's wildlife

that are expected to worsen with climate change are highlighted in boxes spread throughout this chapter.

One non-Ontario, but tragic, example is what happened to the saiga antelope of Kazakhstan. In the spring of 2015, more than 200,000 saiga antelope died in just three weeks, wiping out more than 60% of this critically endangered species. The culprit was a normally harmless bacteria that is commonly present in the noses of saiga. But unusually humid and warm conditions allowed the bacteria to proliferate, causing the animals to suffer hemorrhagic septicemia, or blood poisoning.[3] Bizarre and tragic events like these will likely become more common as changing climate conditions begin to shift relationships that have evolved between species over many years. Globally, "mass mortality events" – when many animals die from disease over a short period of time – have been increasing in recent decades.[4] Events like this one are warning signs for us in Ontario.

In 2015, more than 200,000 saiga antelope died in just three weeks in Kazakhstan, an event that wiped out more than 60% of this critically endangered species.

Photo credit: Navinder Singh, (CC-BY-SA-4.0).

2.1.2 The link between wildlife health and human wellbeing

Wildlife health and our own health are inextricably linked. In 2003, Canada was struck by a devastating outbreak of Severe Acute Respiratory Syndrome (also known as SARS) – a highly contagious viral infection. In just six months, Canada saw an estimated 375 cases of SARS, including 44 deaths. The disease was first diagnosed in China in late 2002 before quickly spreading around the world to infect more than 8,000 people. It is believed that the disease was first transmitted from bats to civet cats, and then to people, who likely picked up the virus in live animal markets in China.[5]

SARS is just one of the many diseases that can be passed from animals to people (known as zoonoses). Researchers estimate that over 60% of existing infectious diseases are zoonotic,[6] and at least 75% of emerging infectious diseases have animal origins (Figure 1).[7] The frequency of emerging infectious disease events has been increasing significantly.[8] In Ontario, zoonotic diseases like Lyme disease (see Part 1 of the ECO's 2018 Greenhouse Gas Progress Report) and rabies are a serious concern.

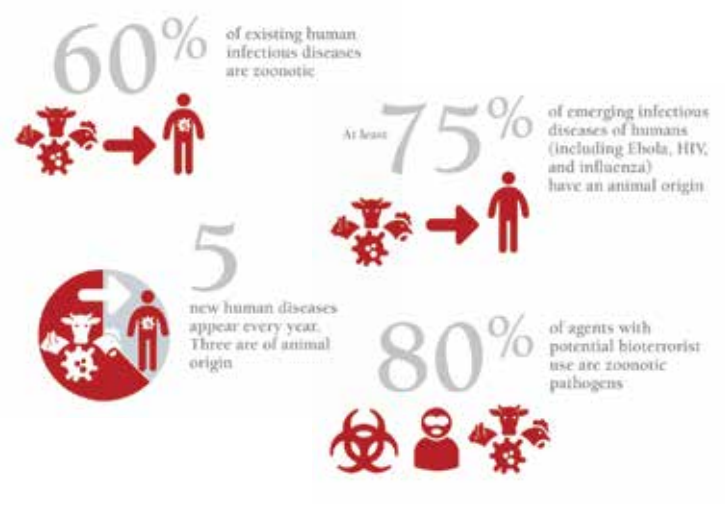

Figure 1. Many infectious diseases originate in wildlife populations.

Source: World Organisation for Animal Heath (www.oie.int). Used with permission.

In some cases, diseases can also be passed back and forth between wild populations and domesticated animals like livestock, threatening Ontario's agricultural sector, food safety, and trade relationships. Similarly, wildlife disease can compromise the safety or quality of harvested animals like deer and fish. For example, a number of mammals in Ontario, including foxes and coyotes, are afflicted by mange (a skin disease caused by mites). Beyond the painful effects on the afflicted animals, the spread of mange in Ontario impacts the trapping industry – trappers generally have to burn or bury trapped animals that have mange.

Because of these spillover effects, wildlife disease can have serious impacts on both human health and the economy.

Wildlife disease can have serious impacts on both human health and the economy.

2.2 Managing wildlife health and disease in Ontario

Jurisdictions around the world, including Ontario, have adopted a multi-disciplinary "One Health" approach that recognizes the interrelatedness of human, animal and environmental health (Figure 2). To make this work, however, governments must commit sufficient stable funding to keep tabs on animal health and its intersection with human and environmental health. In Ontario, strategies and actions to deal with wildlife health and disease are shared among different organizations and levels of government.

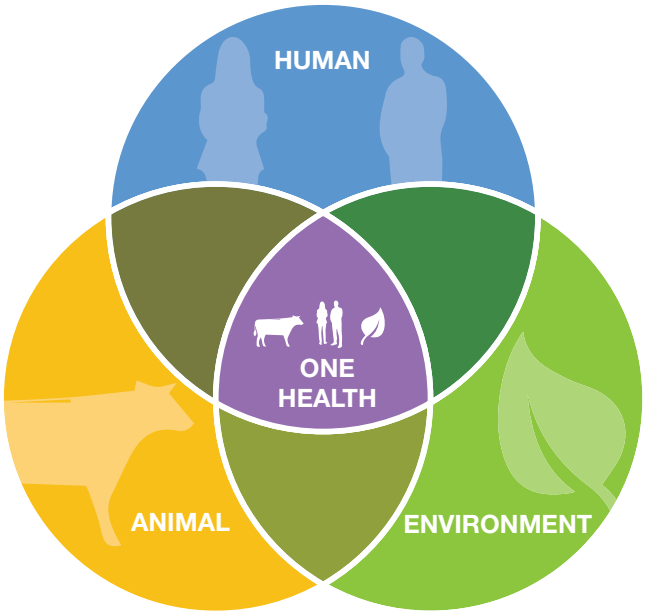

Figure 2. The One Health framework recognizes the interrelatedness of human, animal and environmental health.

The federal, provincial, and territorial governments in Canada share the responsibility of managing wildlife health. Because there are so many facets to wildlife health, there are a variety of agencies and ministries with different interests and obligations, ranging from wildlife management to public health to agriculture and international trade. As a result, it is essential to co-ordinate these responsibilities effectively. The federal, provincial and territorial governments are currently working to develop a National Approach to Wildlife Health in Canada to facilitate a national focus for wildlife health policy.

The Canadian Wildlife Health Cooperative (CWHC) is a national, cost-effective non-governmental hub for information and expertise on wildlife health that co-ordinates efforts to track, diagnose and manage wildlife disease throughout the country. The CWHC runs six regional centres at Canada's veterinary colleges, including the Ontario/Nunavut regional centre based at the University of Guelph. In Ontario, the CWHC and the MNRF work in partnership to address wildlife health issues. The Ministry of Health and Long-Term

Care collaborates with CWHC on diseases that have an impact on public health. Similarly, the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) is involved where livestock could be affected; for example, this ministry provides guidance to livestock owners and industry on appropriate biosecurity strategies. Together, all of these groups collaborate to undertake the key elements of a wildlife health program, including: prevention, detection, response and management, and communication.

Brain worm and winter tick – putting pressure on Ontario's moose

Ontario's moose population has declined by 20% over the last decade.

Photo credit: bcameron54, (CC BY-SA 3.0).

What's harmful to one species can sometimes be relatively benign to another. White-tailed deer are known carriers of brain worm, a parasitic worm. While deer can generally tolerate brain worm, when it is passed along to elk or moose through deer feces, an infection is almost always fatal. Infected moose become disoriented and walk in circles, are unable to eat, and eventually die. Brain worm is not currently widespread in Ontario's moose populations, but deer ranges are moving northwards because of forestry practices and changing climatic conditions. The risk of brain worm is therefore increasing for Ontario's northern cervids, including moose, elk and caribou.[9]

Moose health is also compromised by winter ticks, parasitic ticks that feed on moose during the winter. Affected moose must replenish lost blood, and can suffer hair loss resulting from excessive grooming and rubbing on trees for symptom relief. Ultimately, this blood and hair loss can kill moose, especially in early spring. Moose in Ontario are affected by an average of 3,800 ticks, but some have been found with as many as 83,000. Warmer, shorter winters allow these ticks to flourish,[10] meaning that moose will likely face higher tick loads as Ontario's climate changes.

In the ECO's 2016 Environmental Protection Report (see Volume 2, Chapter 3.1), we reported on a 20% decline in Ontario's moose population over the last decade. Researchers have not been able to determine the precise causes of this decline. But in jurisdictions like Minnesota, which has lost roughly 63% of its moose since 2005, brain worm is a major factor. The MNRF is evaluating how a range of environmental factors are affecting Ontario moose, including changes in weather, habitat and the increased prevalence of disease and parasites caused by climate change.

2.2.1 Preventing wildlife disease

The most effective and cheapest way to manage wildlife disease is to prevent it from occurring in the first place. Once a disease becomes established it is often very difficult to control, and management costs and financial impacts can skyrocket.[11] In contrast, early detection can sometimes permit effective steps to be taken to prevent diseases from taking hold, such as: vaccinating vulnerable wildlife, creating buffer zones between domesticated and wild animals, or restricting the importation or movement of wild animals known to harbour diseases. These proactive steps often depend on good communication across different jurisdictions to identify emerging threats.

> The most effective and cheapest way to manage wildlife disease is to prevent it from occurring in the first place.

For example, global amphibian populations have been decimated by the fungal disease known as Bsal Chytridiomycosis. This fungal infection originated in Asia – but quickly spread with the international commercial trade in amphibians.[12] Luckily, Ontario amphibians have not yet been affected. This could change, however, due to shifting climatic conditions and the potential arrival of the Bsal strain of fungus that has devastated salamander populations in Europe.[13] In an attempt to prevent this disease from being introduced to Canada, the federal government banned all imports of foreign salamanders without a permit (which is generally only issued for scientific and research purposes) in May 2017. So far, this ban has been effective. Without the detection of this disease in Europe, and good communication about its spread, Canada would not be able to take these proactive measures to safeguard our amphibians. (For more information on amphibian declines, see Chapter 3.3 in our 2015/2016 Environmental Protection Report.)

Keeping chronic wasting disease out of Ontario

Chronic wasting disease (CWD) is a fatal disease that affects cervids like deer, elk, moose and caribou. CWD is caused by prions, which induce abnormal proteins to accumulate in the brain, leading to brain damage and eventually death. This disease is similar to bovine spongiform encephalopathy, also known as mad cow disease, which has killed several hundred people and was devastating to the European livestock sector. Both wild and farmed cervids are susceptible to the disease – and it can easily spread between farmed deer and elk to wild populations. (For more information on CWD, see Chapter 8.1 in our 2002/2003 Environmental Protection Report.)

Culls of infected animals are often done to control CWD, resulting in potentially huge economic costs. If the disease isn't detected in time, it could spread rapidly in the wild and put entire populations of deer, moose, elk and caribou at risk. The evidence on whether CWD can infect humans is inconclusive, and Health Canada warns that the possibility of human transmission cannot be excluded.[14] As a result, CWD may be a serious health risk to those that consume farmed and wild deer, moose, elk and caribou. All of these risks are of great concern to game farmers, wildlife managers, Indigenous communities, hunters, and other Ontarians.

Farmed deer and elk are more susceptible to infection by CWD and other diseases because they are confined together. Deer and elk farming is a small but significant farm industry in Ontario. CWD could spread to Ontario's wild populations through the escape of infected farm deer or elk, and then through natural migration. Escapes of farmed game animals, such as non-native deer species, have happened in Ontario. It could also be introduced to Ontario through infected wild animals that cross into our province from the United States.

CWD has been a major concern in Canada over the last two decades. It was first discovered in Canada in 1996 in a farmed elk that was imported into Saskatchewan from the United States.[15] Since then, outbreaks have occurred in Saskatchewan and Alberta, in both free-ranging and farmed populations. The disease has also been detected in all five states that border Ontario, but to date the disease has not been found in wild cervids in Ontario (Figure 3).

In September 2018, CWD was detected at a livestock farm north of Montreal, Quebec. Subsequently, their provincial government temporarily shut down deer hunting in the Laurentian and Outaouais regions in order to test if it has spread in wild deer populations.

CWD can spread quickly and there is no treatment. The only way to keep the disease from becoming established is to detect it early and take swift action to eradicate it. The best way to catch it early on is to conduct ongoing surveillance of both farmed and wild cervids.

When CWD was detected in nearby jurisdictions, it prompted Ontario to develop a proactive program to prevent the disease from being introduced here. In 2005, the province developed the Ontario Chronic Wasting Disease Surveillance and Response Plan, which provided for multi-agency co-ordination of prevention, surveillance, control and eradication, recovery and communications efforts. The province also introduced regulatory

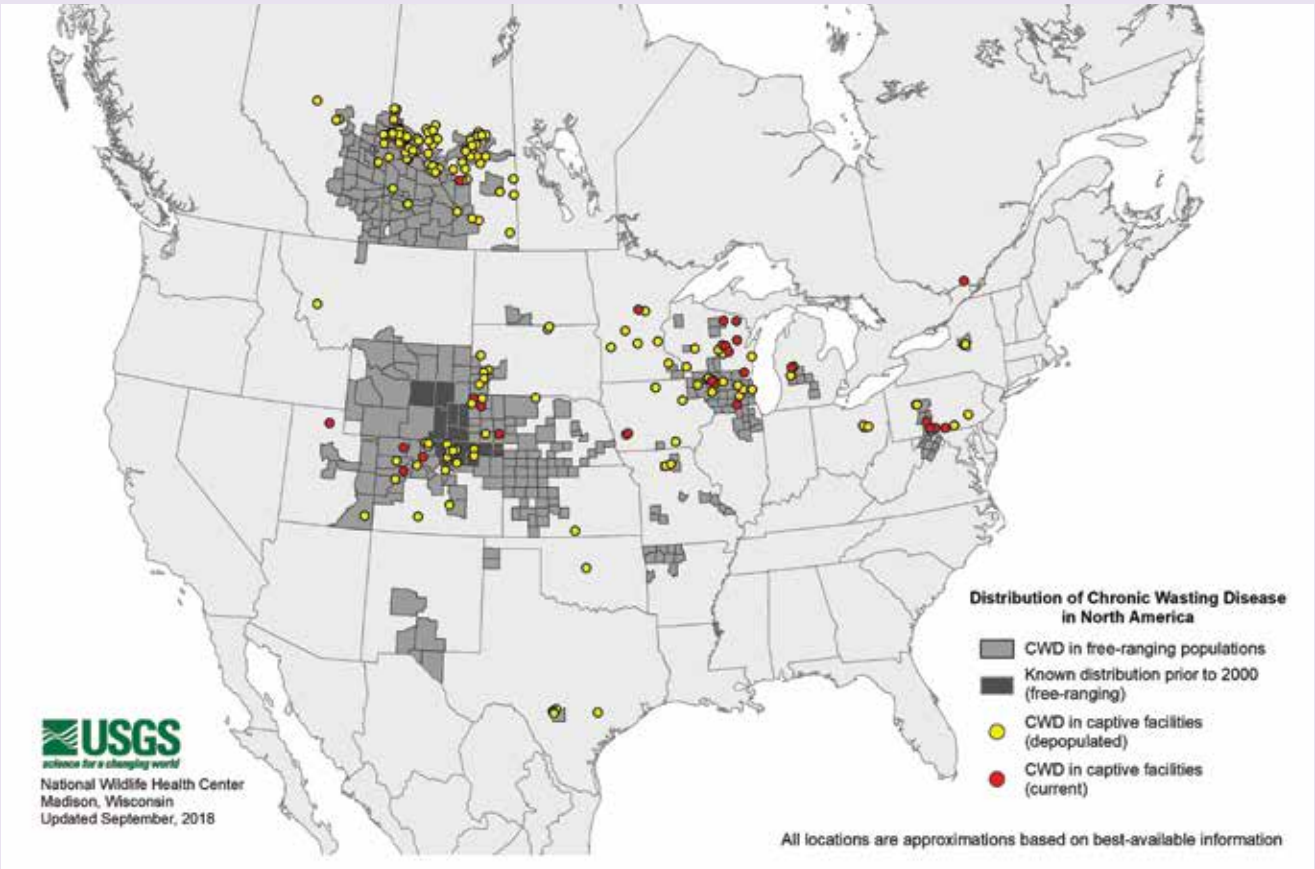

Figure 3. Distribution of chronic wasting disease in North America.

Source: U.S. Geological Survey National Wildlife Health Centre.

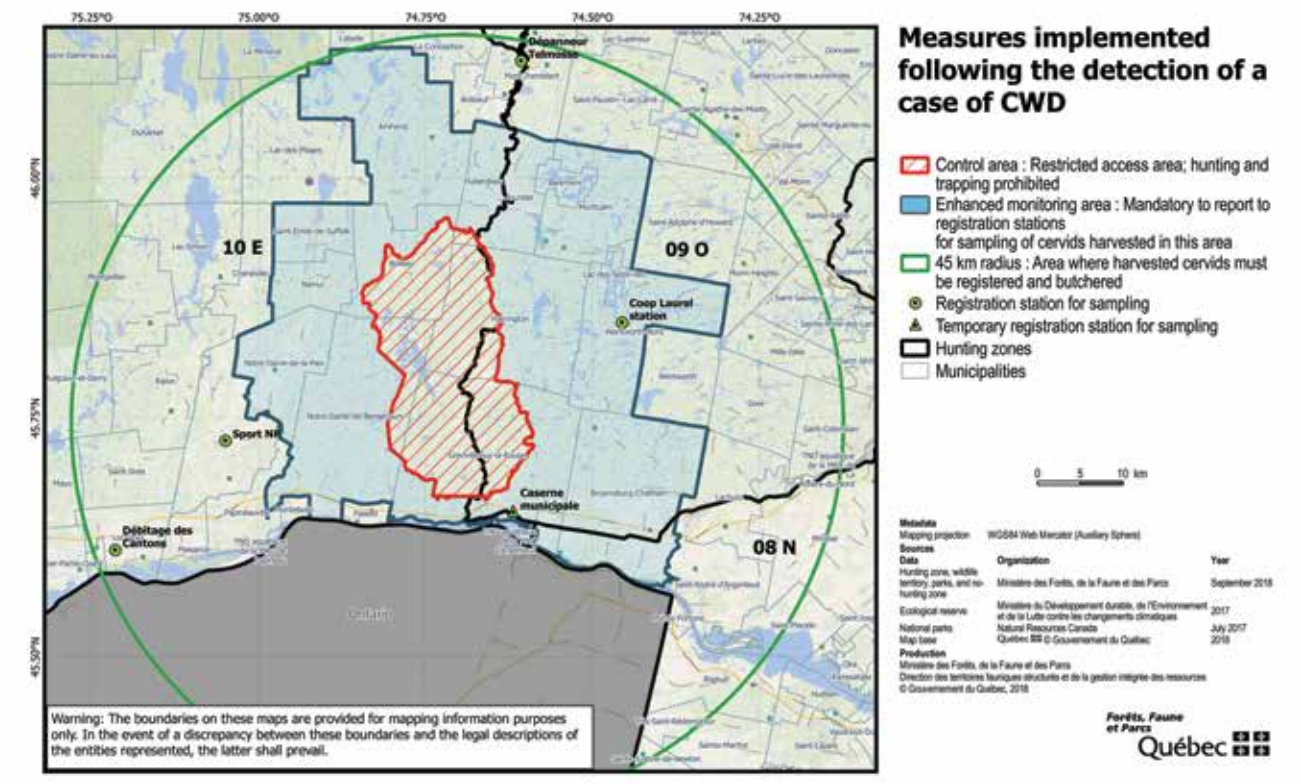

Figure 4. Chronic wasting disease response measures in Quebec.

Source: Gouvernement du Québec

requirements for importing dead and live cervids into the province.[16] A key part of Ontario's CWD efforts is a robust surveillance program, led by the MNRF, that samples some wild deer harvested in high-risk locations to monitor for outbreaks of CWD. The OMAFRA also administers a voluntary CWD surveillance program for farmed animals. These effective surveillance programs are critical to allow Ontario to respond rapidly if an outbreak were to occur.

Ontario's chronic wasting disease surveillance programs provide important disease detection and prevention at a very low cost relative to the potential economic impacts of an outbreak of chronic wasting disease. For example, the OMAFRA's surveillance project has only cost roughly $20,000 per year. In contrast, eradicating the disease from Canadian farms cost over $40 million dollars.[17] Surveillance in wild populations is funded through the fees collected for hunting and fishing.

Ontario's cervids are at a high risk for chronic wasting disease. The Ontario government should commit to continue its essential CWD surveillance programs to ensure that Ontario remains free of the disease. The spread of CWD across North America has resulted in huge costs to the public and the destruction of many confined and wild deer and elk.[18] If CWD became established in Ontario, it would have a huge impact on Ontario's wild cervids, which would cause incredible ecological damage. It could also cause millions of dollars in economic losses caused by efforts to control the disease, the destruction of farmed animals, and the loss of hunting opportunities.[19]

2.2.2 Detecting disease in wildlife

If diseases cannot be prevented, early detection is critical to minimizing potential damage, maximizing the chances that responses will be effective, and reducing the costs of controlling an outbreak – particularly when wildlife diseases pose a risk to humans (Figure 5).

For example, rabies is a significant and dangerous wildlife disease. It used to be that rabies was primarily found in more rural areas, but the introduction of the raccoon strain of rabies to Ontario has resulted in increasing public health risks because the animals that are susceptible to these strains can live in more urbanized areas. Ontario had its first case of raccoon strain rabies in 1999. It is believed that it was introduced by a raccoon from New York State. This strain quickly spread, but early detection allowed Ontario to initiate a quick response – an effective vaccination campaign. By 2007, Ontario declared that it had eliminated raccoon strain rabies. Luckily, Ontario remained vigilant and continued to monitor for the disease. In 2015, the raccoon strain rabies was detected again in the Hamilton area. Again, this early detection allowed the MNRF to launch a proactive surveillance and vaccination program that has consistently helped to reduce the prevalence of the disease.[20] Without this early detection and swift response, Ontarians would certainly be facing a much greater public health risk from raccoon strain rabies.

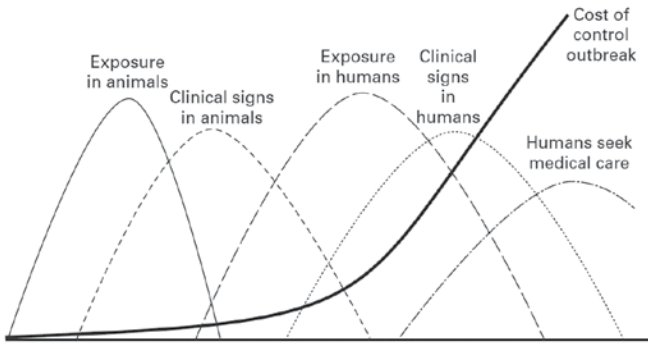

Figure 5. Early control of zoonotic disease reduces costs and minimizes human health risks.

Source: World Bank, 2012.

Because early detection is so important to minimize costs and damage, wildlife disease surveillance is a crucial part of any wildlife health program. Surveillance allows wildlife managers to recognize emerging disease and respond rapidly (when appropriate). It also enables the tracking of changes in the distribution and abundance of diseases over time.

> Wildlife disease surveillance is a crucial part of any wildlife health program.

Most well-designed programs use a combination of passive and active surveillance. Passive surveillance generally involves collecting data from local individuals or groups who interact regularly with wildlife. Hunters, anglers, members of the public and government staff frequently report sick or dead animals. For example, ranavirus, a disease that has caused significant mass mortality events, was recently confirmed in a Canadian reptile for the first time after a researcher discovered a sick turtle in a wetland in Hamilton.

But passive surveillance relies mostly on chance encounters, which often results in a lack of geographic coverage and biased sampling (e.g., species that are easily identified or are of greater public interest may be reported more frequently).[21] In contrast, active surveillance involves targeted sampling of a particular species or community to discover whether a specific pathogen is present. Once the samples are obtained, they can be screened for disease.

The CWHC and provincial governments work together on disease surveillance. The CWHC processes samples that are submitted by members of the public, government staff and researchers. The MNRF is responsible for most on-the-ground surveillance activities and sampling. When the CWHC receives samples, it performs diagnostic tests in order to assess and track wildlife disease (Figure 6).

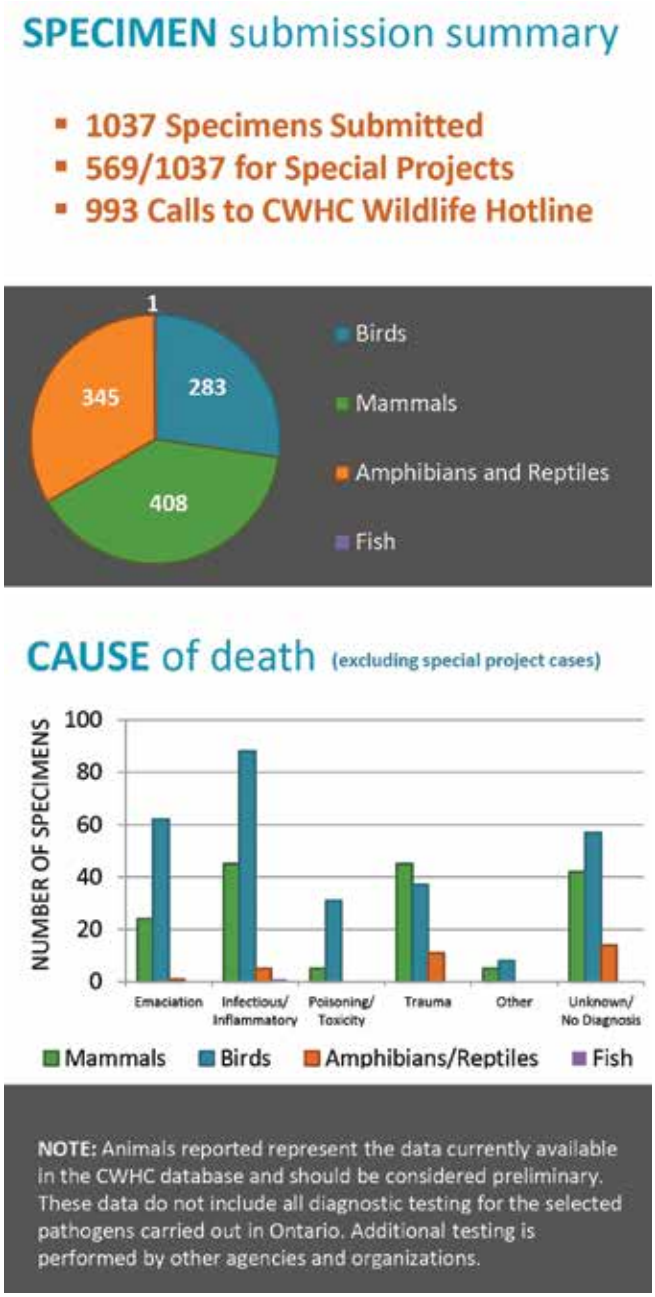

Figure 6. CWHC surveillance in 2017.

Source: Canadian Wildlife Health Cooperative (http://www.cwhc-rcsf.ca). Used with permission.

The MNRF's on-the-ground surveillance efforts vary widely depending on the disease and the wildlife affected. In some instances, the ministry's surveillance efforts are targeted and robust; for example, the ministry conducts extensive sampling for chronic wasting disease. However, other disease detection programs depend on ministry staff taking samples as a secondary task while they are out in the field. For example, the ministry's current efforts to detect the chytrid fungus associated with chytridiomycosis in amphibians largely depend on MNRF staff (like fire crews) voluntarily swabbing animals when they encounter them in the course of their other duties. MNRF staff also conduct field investigations in relation to reported incidents (such as mass die-offs), but their capacity to do so is limited.

The ministry also faces challenges in ensuring that surveillance occurs consistently throughout the province. For example, there are a number of logistical barriers to obtaining samples from more remote areas of the province. In response to this challenge, the CWHC is working on developing a remote reporting system that would allow it to detect trends that may warrant a field investigation. Even with such developments in advanced technology, however, surveillance will continue to be a challenge for the MNRF. Ongoing surveillance is critical for early detection of wildlife disease, but such field work requires a commitment to both staff and financial resources.

Snake fungal disease – an emerging threat

Ontario has 17 native snake species. These predators provide a wealth of pest-control services and play an important role in the food chain. But they are under threat from a variety of pressures, including road mortality, habitat loss and human persecution. Recently, an emerging fungal disease affecting snakes has been raising the alarm across eastern North America and Europe.

Infected snakes develop skin lesions and swelling, and can eventually develop fatal systemic infections. The fungus that causes the disease can persist in the environment, making it difficult to control. Climate change, including warmer hibernation temperatures and wet weather, is linked to outbreaks.

The disease was first detected in Ontario in 2015 in an eastern foxsnake in Point Pelee National Park, and has since been confirmed in several other snake species in the province.[22] A 2017 study concluded that all species of snakes may be susceptible to the disease.[23] Thirteen of Ontario's snake species are already listed as at-risk under the Endangered Species Act, 2007. Snake fungal disease could be an added pressure to snake populations already threatened in Ontario.

In 2017, the CWHC released its threat assessment for snake fungal disease and concluded that it is a credible threat to Canadian biodiversity, but that the magnitude of the threat is not yet clear. The CWHC recommended a precautionary approach to managing this disease, including surveilling vulnerable populations and limiting the further release of the fungus by educating people in the pet trade and herpetologists.

The MNRF is conducting targeted research on fox snakes in Rondeau Provincial Park to determine survivorship of infected snake populations, and is collaborating with the CWHC to investigate the effects of temperature and seasonality on snake fungal disease outcomes in corn snakes. MNRF staff are also sampling snakes for snake fungal disease elsewhere in the province.

Right now, we don't have enough information about snake fungal disease to craft an effective response. But surveillance is still critically important - gathering information about the distribution and transmission of this disease will help us find ways to manage the disease if it continues to spread.

2.2.3 Responding to and managing wildlife disease

Disease is a natural part of ecological systems, and not all wildlife disease needs to be addressed. However, the MNRF needs to assess the risks from a disease to determine when intervention may be necessary to prevent serious biodiversity losses, harm to human health and damage to the economy. Disease can be addressed by managing the pathogen or vector. For example, the Halton Health Department uses larvicides in some catch basins and storm water retention ponds to control mosquito populations in an effort to manage the spread of West Nile virus. Disease can also be addressed by managing the host population. For example, host populations may be quarantined, culled, treated or vaccinated. When choosing how to respond to a disease outbreak, government must try to strike a balance between protecting wildlife, human health and the economy.

> The MNRF needs to assess the risks from a disease to determine when intervention may be necessary.

Once again, the CWHC and provincial government play co-ordinated roles in responding to disease. The CWHC provides valuable support and advice in

developing management response strategies once diseases are detected. For example, when Ontario's bats became afflicted by white-nose syndrome (a fungal disease that has wiped out millions of bats worldwide), the CWHC provided extensive advice and expertise in the development of Ontario's White-nose Syndrome Response Plan (see Chapter 3.2 of the ECO's 2016 Environmental Protection Report). White-nose syndrome is an enormous challenge for wildlife managers across eastern North America. Hopefully the lessons learned in Ontario and neighbouring jurisdictions will help stem the spread of the disease on the western side of the continent.

MNRF staff play a central role in on-the-ground disease response. For example, the MNRF is actively involved in controlling the spread of rabies in wildlife, a fatal disease that can infect all mammals, including humans. Rabies is commonly carried by bats, foxes, raccoons and skunks. As of September 2018, 450 cases of rabies had been confirmed in animals in the province over the last three years.[24] In response, the ministry has distributed over three million oral rabies vaccines baits, as well as operating a trap-vaccinate-release program in areas with outbreaks. The MNRF has also established surveillance zones within 50 kilometres of confirmed cases and tested over 10,000 samples (Figure 7). This incredibly dangerous and destructive disease would undoubtedly be more widespread in the province without the ministry's efforts.

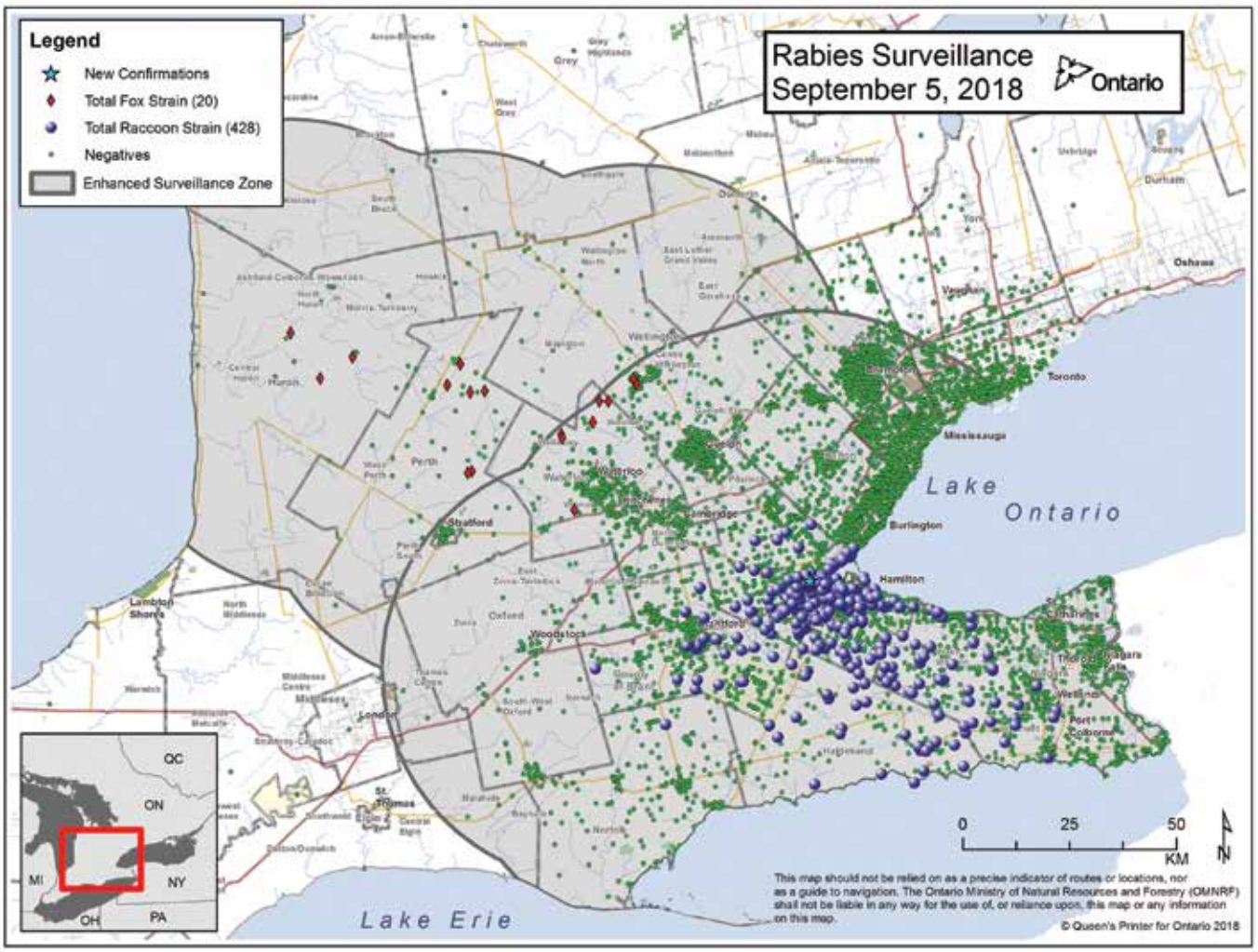

Figure 7. Rabies surveillance zones in southern Ontario.

Source: Ministry of Natural Resources and Forestry, 2018.

Viral hemorrhagic septicemia – a danger to Ontario's fish

Sudden and mass die-offs of fish are alarming to people. The public needs to know what's going on, and if it's still safe to swim, drink and fish in their lake. Several mass fish-kills have been reported in Lake Simcoe in recent years and have been linked to a virus found in many species of fish.

Dead fish in Cook's Bay, Lake Simcoe.

Photo credit: Heidi Riedner/Georgina Advocate. Used with permission.

Viral hemorrhagic septicemia (VHS) is a disease that has been found in Ontario since 2005. Infected fish tend to have bulging eyes, bloated abdomens, pale gills, darker bodies, and experience hemorrhaging in their bodies. It is not always fatal, but sick fish have much higher mortality rates when put under additional stressors (e.g., poor water quality and/or warmer water, which holds less oxygen). This means that VHS is becoming a much bigger risk to Ontario's fish as climate change causes warmer lake temperatures.

The virus spreads in water, and by contact with infected fish or their body fluids. People can spread the virus by moving contaminated fish, live bait, water, boats and other equipment. The MNRF is taking action to attempt to slow the spread of the disease, including: educating anglers; restricting the movement of commercial baitfish; restricting the collection of and treatment of wild spawn for stocking; random sampling across Ontario; and sampling from high-risk lakes and from reported die-offs. The ministry is giving the public reassurance about the safety of their lakes, and providing them with tools to prevent the further spread of this disease in Ontario. Continued monitoring of this disease will help us evaluate the best approaches to manage it.

2.2.4 Communication

Communicating information on wildlife diseases to all of the parties involved in managing wildlife health is key – both within the province and across jurisdictions. This helps to ensure that wildlife managers are aware of emerging risks. It also makes it easier to determine if management actions are working and guide continuous improvement.

The CWHC maintains a national wildlife disease database that allows critical information to be shared between researchers, wildlife managers, decision-makers and other stakeholders. The CWHC also reports quarterly and annually on its activities and findings (see Figure 6).

Epizootic hemorrhagic disease – Ontario sees its first cases of the deadly deer disease

In September 2017, Ontario saw its first confirmed cases of epizootic hemorrhagic disease, a highly fatal deer disease. Outbreaks of this disease in the United States have decimated local deer populations; a 2012 outbreak in Michigan killed nearly 15,000 deer. Infected deer experience a sudden onset of symptoms, including loss of appetite and fear of humans, weakness, fever, excessive salivation and a rapid pulse and breathing. They eventually experience extensive hemorrhaging and typically die within 36 hours. There is no known way to treat or control the disease.

The disease is not spread deer to deer. Instead, deer become infected when they are bitten by midges that carry the virus. The spread of the disease is highly dependent on environmental conditions – the midges that carry the virus are killed with the onset of frost and winter weather. Epizootic hemorrhagic disease is likely to become more common as climate change causes warmer temperatures and shorter winters, which can prolong the midge breeding season and the conditions that allow the transmission of the virus.

The MNRF is working with the CWHC, as well as the OMAFRA, the Canadian Food Inspection Agency, and stakeholder organizations to actively monitor for epizootic hemorrhagic disease in Ontario. In its efforts to monitor the disease, the MNRF has made extensive communications efforts through social media, fact sheets, media interviews and public presentations. This type of surveillance program is necessary in order to ensure that deer populations are managed effectively.

The MNRF's Facebook post about epizootic hemorrhagic disease reached 1.4 million people and was shared almost 20,000 times.

Photo credit: MNRF/Facebook.

2.3 Conclusion: Ontario needs a strong commitment to wildlife health

Wildlife diseases are a threat to Ontario's biodiversity, economy and public health. This threat should not be underestimated. In general, the MNRF is responsive to wildlife disease, particularly where there are risks posed to humans or the potential for large economic losses, as evidenced by its chronic wasting disease and rabies programs.

In the coming years, managing wildlife health will become more challenging and important than ever – there are new threats on the horizon. As Ontario's climate becomes warmer and wetter, some diseases and the organisms that spread them will thrive, reducing the health of host populations. The movement of goods and wildlife across borders also increases the risk of introducing new diseases. Ontario needs to be prepared for both increasing incidences of new wildlife disease and worsening impacts from diseases that are already established in the province.

To meet these rising challenges, the government needs to maintain, and strengthen when necessary, its critical surveillance work. One of the most important parts of preparedness is the early detection of wildlife disease (see Chapter 1 of this volume for a discussion of the importance of biodiversity monitoring). This requires an ongoing commitment of staff and financial resources to conduct disease surveillance, including the collection and analysis of samples.

A critical element of the success of Ontario's wildlife health efforts to date has been the Ontario government's continued support and collaboration with the Canadian Wildlife Health Cooperative. Most of the CWHC's funding comes from the federal and provincial/territorial governments. In 2017/2018, the Ontario government provided a total of $371,000.[25] In addition to providing regular funding to the CWHC, the MNRF regularly provides funding for Ontario-specific special projects to address emerging and significant threats. For example, it has supported special CWHC projects to develop diagnostic testing capacity for chytrid fungus, snake fungal disease, canine distemper, white-nose syndrome, and epizootic hemorrhagic disease.

> There are no formal commitments to sustained funding of the CWHC, which precludes effective strategic planning and makes the program vulnerable.

Ontario is benefitting greatly from its partnership with the CWHC at a very small cost. Without the CWHC, the Ontario government would have to find a way to replace the expertise and services it provides, undoubtedly at a much higher price. However, there are no formal commitments to sustained funding of the CWHC, which precludes effective strategic planning and makes the program vulnerable. Without the essential work that the CWHC does, Ontario's wildlife would be at a much greater risk from disease. **The ECO recommends that the provincial government provide a formal commitment to sustained funding to the Canadian Wildlife Health Cooperative.** When it comes to the shared health of Ontarians and our wildlife, it is critical that we are not penny wise and pound foolish.

Endnotes

1. For example, see Peter Daszak et al, "Emerging Infectious Diseases of Wildlife – Threats to Biodiversity and Human Health" (2000) 287 Science 443.
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