



# **Ontario Chronic Wasting Disease Surveillance Program 2018 Program Update**

Wildlife Research and Monitoring Section

# 2018

## Program Update

Wildlife Research and Monitoring Section  
Science and Research Branch, Provincial Services Division  
Ministry of Natural Resources and Forestry  
Trent University, Peterborough, Ontario, Canada

Prepared by: Andrew Silver and Larissa Nituch

Ministry of Natural Resources and Forestry  
Wildlife Research and Monitoring Section

March 2019

Photo credit: MNRF

Enquiries about this publication can be directed to:  
Wildlife Research and Monitoring Section, Ontario Ministry of Natural Resources and Forestry  
DNA Building, Block B, 2nd Floor, Trent University  
2140 East Bank Drive,  
Peterborough, ON K9L 0G2

Telephone: (705) 755-2273  
Fax: (705) 755-1559  
Email: [larissa.nituch@ontario.ca](mailto:larissa.nituch@ontario.ca)

## Summary

Ontario's chronic wasting disease (CWD) surveillance 2018 program occurred in two zones; the originally selected zone in southwestern Ontario and in Wildlife Management Unit 65 in eastern Ontario due to a CWD detection in western Quebec. The Quebec cases occurred on a game farm, approximately 15 km from the Ontario-Quebec border (near Hawkesbury, Ontario). A total of **765** white-tailed deer (*Odocoileus virginianus*) and **1** red deer (*Cervus elaphus*) samples were collected and tested (308 white-tailed deer and 1 red deer sample from eastern Ontario and 457 white-tailed deer samples from the SW surveillance zone). CWD was not detected in any of the samples tested. Since the CWD surveillance program began in 2002, 12,476 samples have been analyzed. To date, no cases of CWD have been detected in wild deer populations in Ontario.

## Introduction

CWD is a fatal disease that infects members of the cervid family. The disease is caused by abnormally folded proteins called prions, which cause brain lesions leading to death. White-tailed deer (*Odocoileus virginianus*), elk (*Cervus canadensis*), and mule deer (*Odocoileus hemionus*) have been shown to be very susceptible to CWD and several moose (*Alces alces*) have also tested positive for the disease. The disease is not known to naturally infect species other than those in the cervid family. CWD has been identified in 26 U.S. states and three Canadian provinces (Alberta, Saskatchewan and Quebec), and is now considered endemic in several states in the west (i.e., Colorado and Wyoming) and mid-west (i.e., Wisconsin and Illinois). Since 2003, it has also become established in several eastern U.S. states (e.g., Pennsylvania, Maryland, West Virginia). Currently, CWD is not known to exist in Ontario but has been discovered in all five bordering states: Minnesota (2002), New York (2005), Michigan (2008 in captive animals, 2015 in free-ranging animals), Pennsylvania (2012), and Ohio (2014).

## Ontario surveillance program background

Due to increasing concern about diseases in Ontario's white-tailed deer and restored elk populations, a surveillance pilot project was initiated in 2002 to determine whether CWD was present in Ontario's wild cervid populations. The *Ontario Chronic Wasting Disease Surveillance* program became operational in 2003.

Each year, surveillance samples are collected from hunters during the fall. Small crews of Ministry of Natural Resources and Forestry (MNRF) staff roam patrol areas in the predetermined surveillance area, asking hunters for permission to remove a brain and lymph node samples from their harvested deer. Hunters also have the option of dropping off deer heads at depots within the surveillance area.

Initially in 2003, the province was divided into 14 CWD surveillance zones prioritized by CWD risk factors, with one zone surveyed per year. Between 2005 and 2010, the number of CWD zones surveyed was increased from one to three zones per year. In 2010, when surveillance of all 14 CWD zones was complete, several factors (new research findings, financial pressure, and maturation of the program) led to the development and use of a dynamic risk-based surveillance program, and

a decrease in the number of surveillance zones monitored each year. Instead of following a pre-determined schedule of zones to be tested each year (as in initial years), a dynamic model was developed to predict highest risk areas of the province annually (Figure 1). Risk inputs used in the current model are (in order of importance): 1. game farms and zoos, 2. neighbouring CWD cases/ outbreaks, 3. deer and elk density, 4. prior sampling effort, 5. unstudied elk/red deer populations, 6. deer aggregation areas and 7. winter severity. Each year, new data are input to determine the areas with the highest risk, which informs the choice of surveillance area for that year.

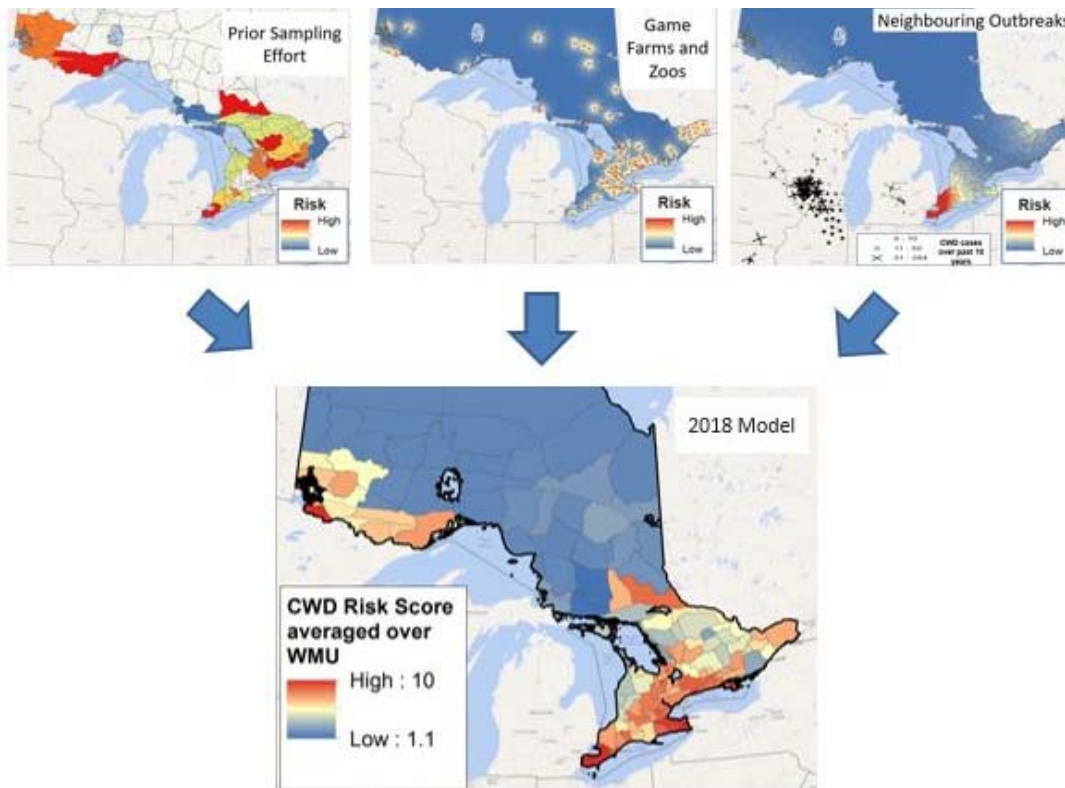


Figure 1. Example of risk layers compiled to produce a spatially quantified risk assessment for chronic wasting disease in cervids to help inform choice of surveillance areas in Ontario.



## 2018 Results

Using the Ontario CWD risk model, MNRF identified an area in southwestern Ontario as having the highest risk of CWD in 2018 (Figure 2). Accordingly, CWD surveillance was conducted in southwestern Ontario, which included [Wildlife Management Units](#) (WMUs) 79C, 79D, 80, 86A, 86B, 87A, 87B, 87C, 87D, 87E, 88, 89A, 89B, 90A and 91B (Figure 3a). Freezer depots were established at seven locations throughout the sampling area. Depots were opened in early October for archery hunters and remained open till December 31<sup>st</sup>, so hunters could drop off their deer heads. Most of the samples (73%) were collected by MNRF roving crews. The remaining samples (27%) were collected from the depots. In total, 457 wild cervids were sampled and screened for CWD, which was not detected in any of the samples. This sample size was close to the target sample size of 460.

On September 10<sup>th</sup>, 2018, the first case of CWD in Quebec was detected on a game farm approximately 15 km from the Ontario-Quebec border near Hawkesbury, Ontario. As a result of a CWD detection in western Quebec, a second CWD surveillance zone in WMU 65 was established in eastern Ontario adjacent to Quebec (Figure 3b). MNRF established six freezer depots within WMU 65 by the first week of October. Depots were opened in early October for the archery hunters and remained open until December 31<sup>st</sup>, so hunters could drop off their deer heads for sampling. Most of the samples (71%) were collected through depots and participating butchers. The remaining samples (29%) were collected from the MNRF roving crews. In total, 308 wild cervids were sampled and screened for CWD in WMU 65; CWD was not detected in any of the samples.

All retropharyngeal lymph nodes were screened for CWD at the Animal Health Lab in Guelph, Ontario, using enzyme-linked immunosorbent assay (ELISA) tests.

[Individual test results are posted on the Internet.](#)

For a third year, MNRF assisted Dr. Aaron Shafer and his students from Trent University in collecting deer genetic samples from the CWD surveillance zone. A pilot project aimed at detecting *Borrelia* in harvested deer was completed by undergraduate thesis student Rachel Daggitt. Two other projects aimed at using genome sequencing to identify the genes linked to important traits in deer, such as antler and body size, and chronic-wasting disease are being led by graduate students Spencer Anderson and Sarah Haworth. The goal of this work is to inform current management strategies with the key contribution being quantifying the biological factors that influence phenotypes and disease progression.

MNRF also collaborated with grad student Dr. Samantha Allen from the University of Guelph in collecting blood samples from harvested deer from the CWD surveillance zone. The project aims to identify whether bluetongue and/or epizootic hemorrhagic disease viruses are present in Ontario's domestic and wild ruminant populations, and to analyze this data in relation to landscape and climatic data. The goal of this work is to help develop any future emergency management preparedness strategies to ensure the continued health of Ontario's domestic and wild ruminant populations.

In 2018, OMAFRA tested a total of 76 farmed cervids comprised of 51 samples taken at slaughter, 21 samples from on-farm deaths and 4 samples provided by MNRF.

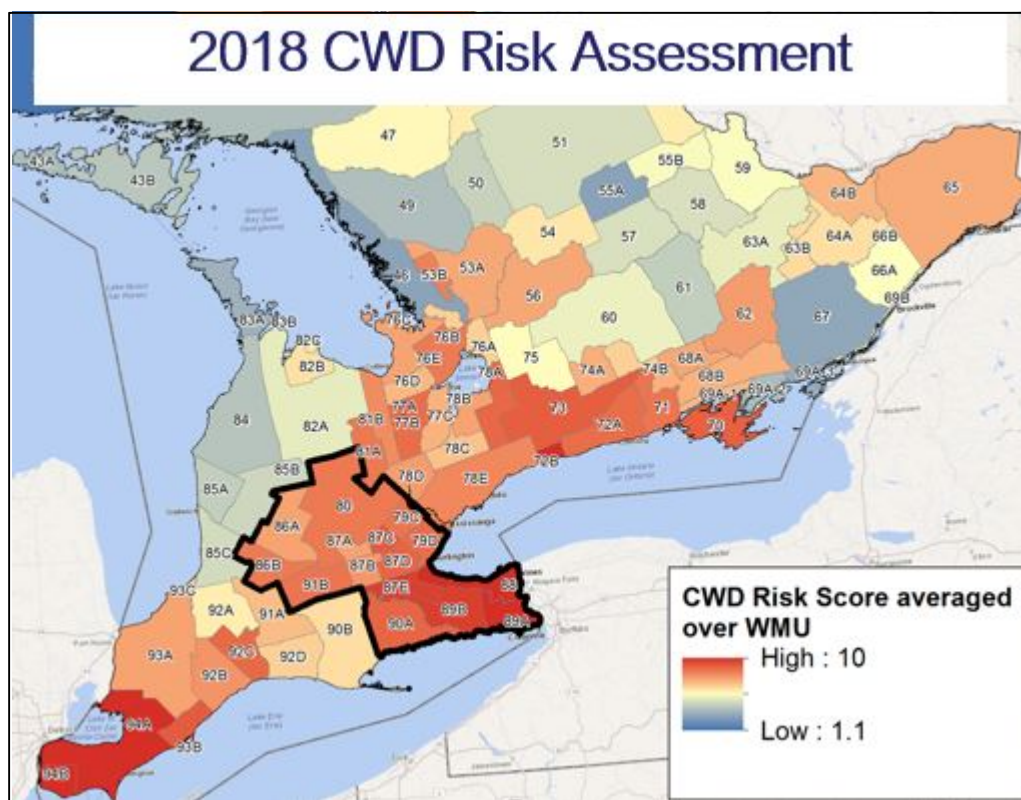


Figure 2. Modelled risk of chronic wasting disease in Ontario for 2018.

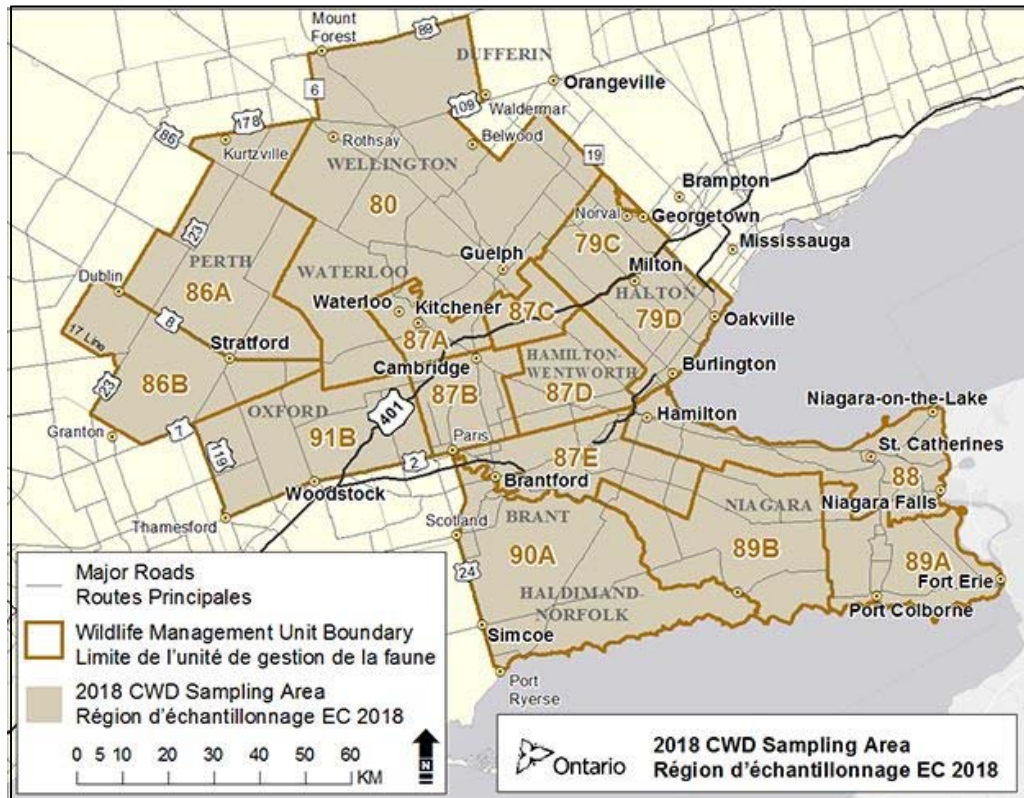


Figure 3a. Area of 2018 chronic wasting disease (CWD) surveillance in southwestern Ontario.

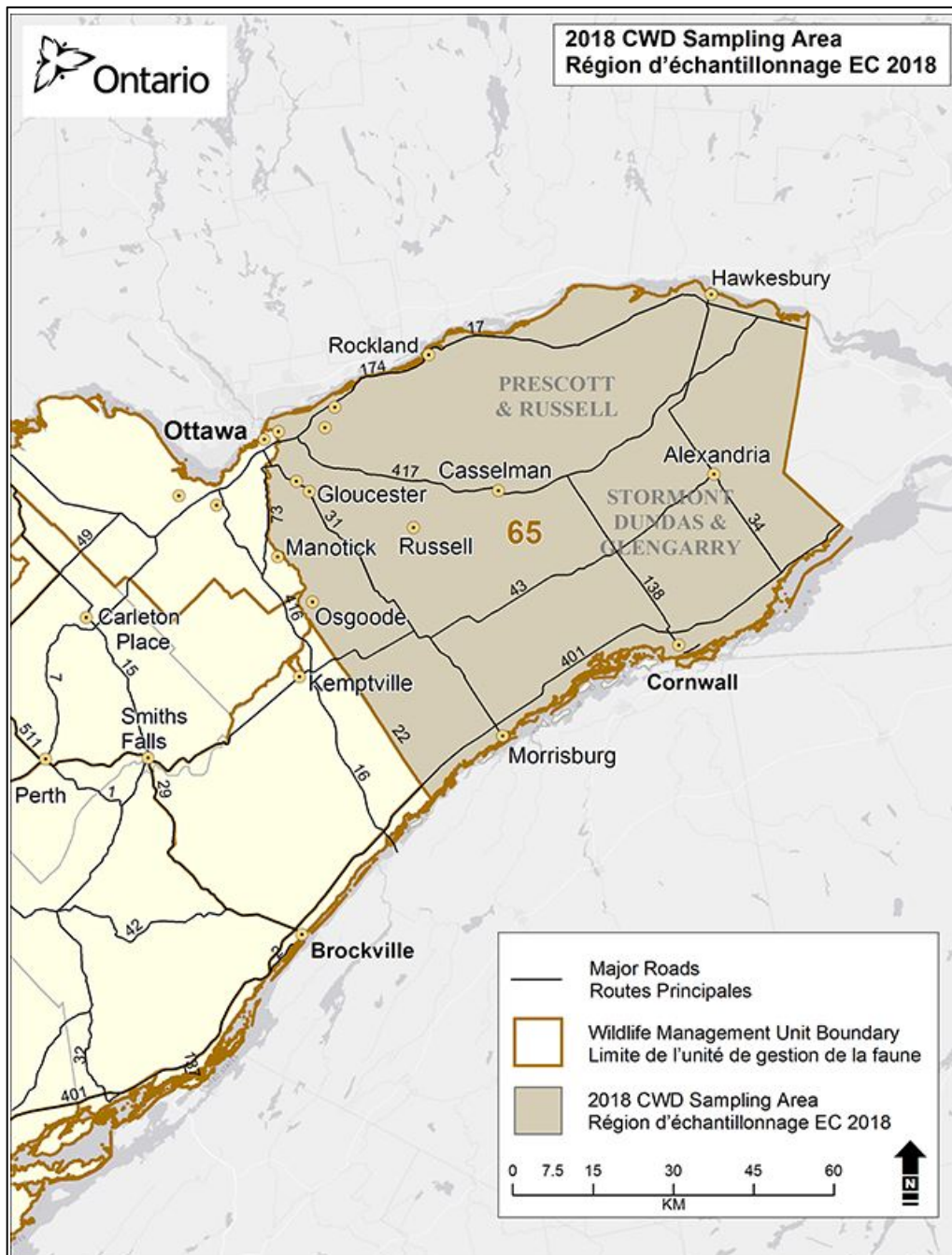


Figure 3b. Area of 2018 chronic wasting disease (CWD) surveillance in eastern Ontario.



## Other sampling

In addition to MNRF's annual systematic surveillance, the ministry also opportunistically tests samples from deer that display CWD-like symptoms, as reported by the public or MNRF offices, throughout the year and across the province. In 2018, eight white-tailed deer with abnormal behaviour or appearance were tested from across the province. Reported symptoms included abnormal appearance or behaviour, emaciation, and disorientation. One moose from Dryden and one from Pembroke were also tested. Three elk (1 from Echo Bay, 1 from Newtonville and 1 from Lindsay area) were also sent in for testing. Four additional animals (2 caribou and 2 white-tailed deer) that harvested outside of Ontario were also submitted for testing. Post-mortems on these animals were performed by the Canadian Wildlife Health Cooperative (CWHC) in Guelph, Ontario. All animals tested negative for CWD. Since 2009, 77 cervids displaying abnormal, CWD-like behaviour have been necropsied and tested for CWD (Figure 4); CWD was not detected in any of the samples.

In November 2018, 2 mule deer that were harvested in Alberta and legally imported into Ontario tested positive for CWD. The hunters had returned to Ontario with the meat prior to receiving the test results. Consistent with MNRF guidelines, the infected meat was collected and destroyed through a medical waste incineration, to avoid any potential risk of contamination.

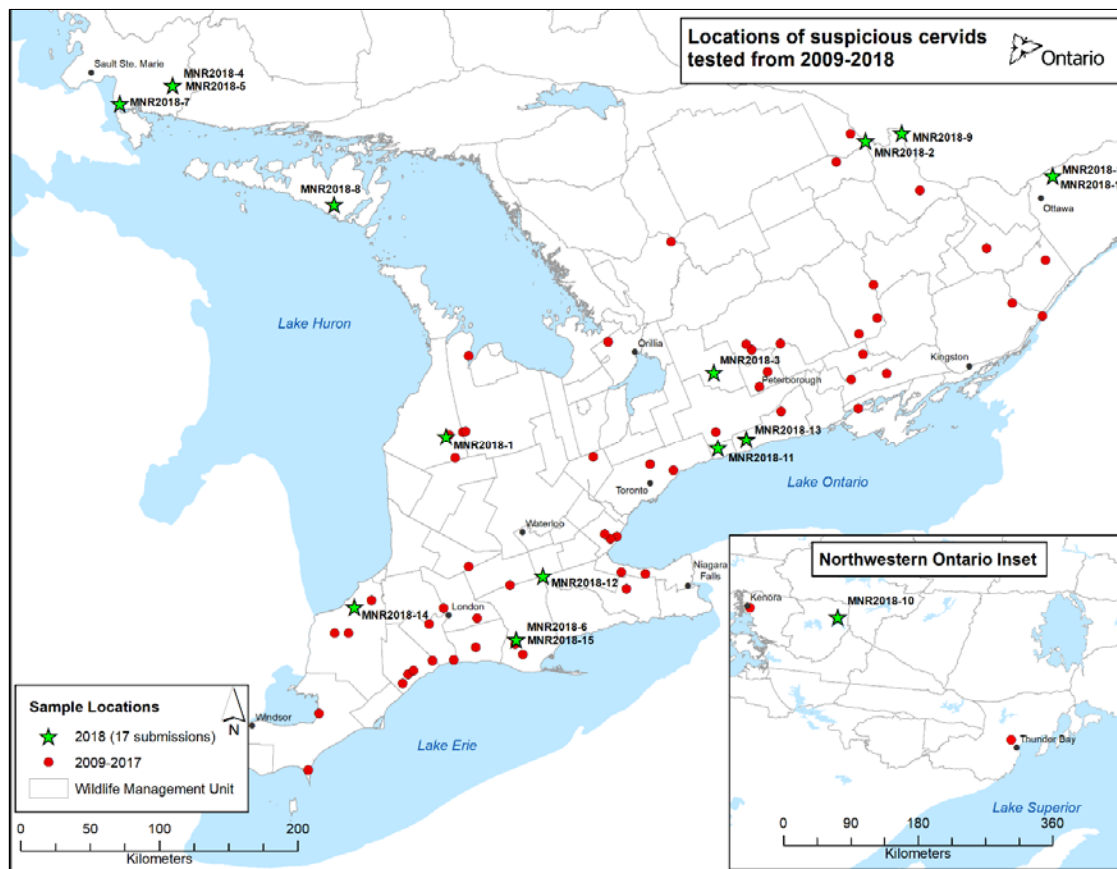


Figure 4. Locations of cervids displaying abnormal or CWD-like symptoms tested in Ontario since 2009. Green star markers indicated 2018 samples.



## Program results to date

This was the 16th operational year of the CWD surveillance program. All areas of the province with significant deer populations have been surveyed at least once, and many of the highest priority areas have been surveyed two or three times. To date, **12,476** wild cervids (11,696 white-tailed deer, 13 elk, 1 red deer, and 1 moose) have been tested for CWD during regular surveillance (Table 1).

Table 1. Numbers of surveillance samples collected per year in Ontario.

Year	Surveillance area	Wildlife Management Units	Deer tested
2002	Owen Sound-Hanover	82, 84 (pilot year)	183
2003	Ottawa-Cornwall	64, 65, 66	471
2004	Toronto-Barrie	76, 77, 78B-E, 81	427
2005 <sup>1</sup>	Guelph-Goderich	79C, 80, 85, 86, 87A, 87C	269
2005 <sup>1</sup>	London-Niagara Falls	79D, 87B, 87D-E, 88, 89, 90, 91, 92	467
2005 <sup>1</sup>	Kingston-Brockville	62, 66A, 67, 68B, 69	500
2006 <sup>2</sup>	Kenora-Fort Frances	5, 6, 7, 8, 9, 10, 11A	491
2006 <sup>2</sup>	Lindsay-Peterborough	60, 71, 72, 73, 74, 75, 78A	520
2006 <sup>2</sup>	Owen Sound-Hanover	82, 83, 84	371
2007	Pembroke-Bancroft	48, 51, 55, 57, 58, 61	393
2007	Windsor-Sarnia	93, 94	249
2007	Sault Ste. Marie-Sudbury	36, 37, 38, 39, 45	239
2008	Kingston-Lanark	59, 62, 63, 67, 68, 69, 70	487
2008	Manitoulin	43, 44	480
2008	Parry Sound-North Bay	42, 46, 47, 49, 50, 53, 54, 56	521
2009	Thunder Bay-Ignace	11B, 11C, 12, 13, 14, 28	110
2009	Ottawa-Cornwall	64, 65, 66	349
2009	Toronto-Barrie	76, 77, 78B-E, 81	298
2010	Guelph-Goderich	79C, 80, 85, 86, 87A, 87C, 92A	518
2010	London-Niagara Falls	79D, 87B, 87D-E, 88, 89, 90, 91, 92D	513
2010	Kenora-Fort Frances	5, 6, 7, 8, 9, 10, 11A	362
2011 <sup>3</sup>	Peterborough-Bancroft	57, 60, 74, 75	495
2012	London-Sarnia	90B, 92, 93	488
2013	Pembroke-Mattawa	48, 55, 58, 59, 63	495
2014	Owen Sound-Goderich	82, 83, 84, 85	496
2015	Parry Sound-North Bay	42, 46, 47, 49, 50	305
2016	Manitoulin - north shore	36, 37, 43A, 43B, 44, 45	475
2017 <sup>4</sup>	Kingston - Cornwall	64A, 64B, 65, 66A, 66B, 67, 69A-2, 69A-3, 69B	513
2018	Mount Forest – Niagara Falls	79C-D, 80, 86A-B, 87A-E, 88, 89A-B, 90A, 91B	457
2018 <sup>5</sup>	Ottawa - Cornwall-Hawkesbury	65	308
Total			12, 476 <sup>1, 2</sup>

<sup>1</sup>An additional 175 samples were collected in 2005, but zones not recorded. <sup>2</sup>An additional 50 samples were collected in 2006, but zones not recorded.

<sup>3</sup>Twelve of the 2011 samples were wild elk harvested from the 2011 elk hunt.

<sup>4</sup>One of the 2017 samples was a harvested moose.

<sup>5</sup>One of the 2018 samples was a harvested red deer.

CWD sampling in Ontario is confined to areas with medium to high deer population densities. Much of northern Ontario either contains very low or no deer populations. Sampling is therefore confined to southern, central, and northwestern Ontario. In southern Ontario, the sampling has been relatively evenly distributed (Figure 5), but with high concentrations in southeastern and southwestern Ontario where some WMUs have been sampled three times. Areas such as Windsor may appear to have had little or no sampling, but this is an artifact of differences in location data (townships vs. bird breeding squares) resulting in sample locations not being displayed on the map. The only areas of southern Ontario that have not received adequate sampling are the Greater Toronto Area (GTA) and Algonquin Provincial Park. This is due to lack of deer hunting in the former and hunting restrictions in the latter. In northwestern Ontario, sample distribution is a function of suitable deer habitat and is focused around the Thunder Bay, Fort Frances, Dryden, and Kenora areas.

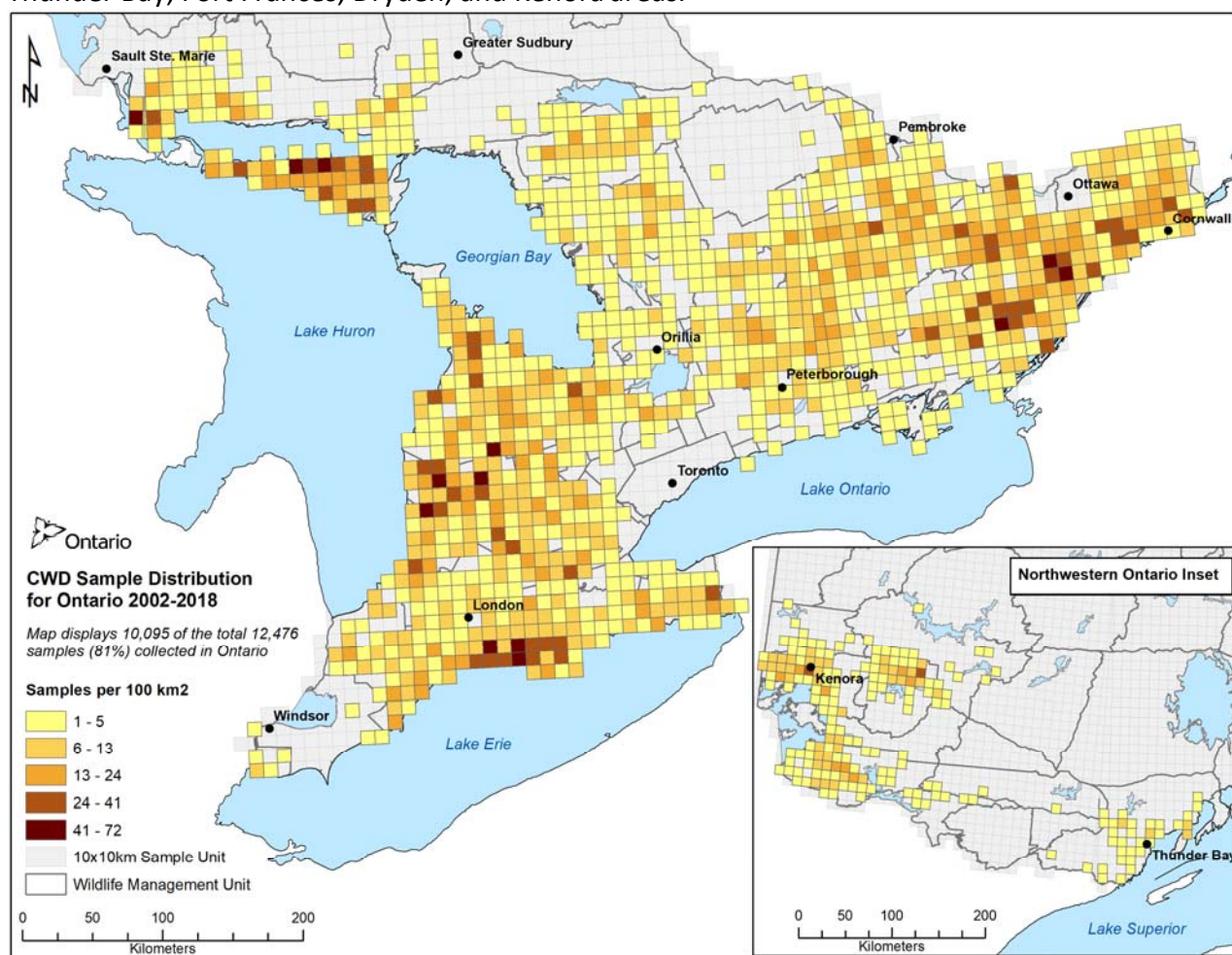


Figure 5. CWD sample collection locations in southern and northwestern Ontario between 2002 and 2018. (Note: Reflects 79% of the total samples collected and tested.)

## Neighbouring jurisdictions

CWD has been detected in all five U.S. states that share a border with Ontario (Figure 6). No further cases have been discovered in New York State since the initial seven cases detected in 2005 (five cases on a cervid farm and two cases in wild white-tailed deer) near Syracuse (130 km south of the Ontario border near Kingston). After extensive testing over six years turned up no new cases of CWD, in 2010 the containment area restrictions were lifted.

In Minnesota, the first case of CWD was discovered in 2010 in a wild deer in the southeast part of the state, which initiated the implementation of a CWD management zone in a seven-mile radius of the case. In mid-2012, a captive European red deer (*Cervus elaphus*) was found infected with CWD in a herd from North Oaks. In late 2016, CWD was discovered in two farmed deer herds in Crow Wing and Meeker Counties, and eleven harvested white-tailed deer tested positive for CWD in southeastern Minnesota. In 2017, six deer harvested in the southeastern tip of the state, and a captive white-tailed buck from Winona County tested positive for CWD. Given no deer with CWD were found in north-central and central Minnesota, the DNR will narrow surveillance next fall to areas closer to the farms where CWD was detected. A fourth precautionary surveillance area will be added in fall 2018 in Winona County. Early in January 2019 a free ranging wild deer tested positive for CWD in Crow Wing County, which marked the first CWD positive wild deer outside the southeastern part of the state, approximately 420 km to Ontario's border (Thunder Bay).

In Michigan, a case of CWD was diagnosed in 2008 on a game farm near the city of Grand Rapids (220 km west of the Ontario border at Windsor). A containment area was established in the townships around the game farm, and extensive testing did not discover any further cases. In May 2015, presumably independently, a free-ranging deer near Lansing was Michigan's first confirmed case of CWD in a wild deer. It was located about 100 km east of the previous case and about 120 km west of Windsor. In early 2017, two female deer from a private cervid farm in Mecosta County (≈300km west of the Ontario border) tested positive for CWD. Since May 2015 when the first CWD deer was found, the DNR has tested over 30,000 deer. As of late- December 2018, there are 62 free-ranging deer that have tested positive in Michigan (more tests pending). Positives were found in Clinton, Eaton, Gratiot, Ionia, Jackson, Kent and Montcalm counties. In October of 2018, CWD was detected in the Upper Peninsula in Dickinson County of Michigan, approximately 280 km from the Ontario border.

In Pennsylvania, the first cases of CWD were discovered in 2012 in two locations within the state. Several cases were detected on game farms in the southeast part of the state (near Harrisburg) and three cases were detected in wild deer shot during the 2012 hunt in the south- central part of the state (120 km east of Pittsburgh). In 2013, another case was discovered in a hunted wild deer from the south-central outbreak area of the state. In September 2014, an adult white-tailed deer died on a game farm 120 km northeast of Pittsburgh. This case was located about 200 km south of the Ontario border at Fort Erie and is considered to be the source of the recent CWD case on an Ohio game farm. In 2015, 12 additional white-tailed deer with CWD were detected in southcentral Pennsylvania (≈400 km south of the Ontario border), more than doubling the cases from 2012 to 2014 cases. During

late 2016 and early 2017, CWD was identified on three captive deer farms in the southcentral part of the state in Bedford, Fulton, and Franklin counties. In late 2017, three white-tailed deer on a hunting preserve in Franklin County and one on a Fulton County hunting preserve tested positive for CWD. The disease was also confirmed in one white-tailed deer on a hunting preserve in Bedford County and one at a Lancaster County breeding operation in early 2018. Over 1,000 cervid game farms are operating in the state of Pennsylvania. Since the disease was discovered in Pennsylvania in 2012, 168 deer have been confirmed to have CWD in the state. The latest CWD-positive case is a concern because of its proximity to Pennsylvania's elk range. More than 100 elk are tested for CWD each year and, thus far, the disease has not been detected among the state's elk. In 2018 (as of November), there have been 45 confirmed cases of CWD in free ranging deer in the state.

In October 2014, Ohio announced their first cases of CWD in the state with 19 positive cases on a game farm located in the northeast part of the state (100 km south of Cleveland). The farm had been under quarantine since April 2014 after an investigation determined that the farm had a known connection with a game farm in Pennsylvania with animals that tested positive for CWD. In early 2018, a single buck on a hunting preserve in Guernsey County tested positive for CWD as part of Ohio's CWD monitoring program for captive white-tailed deer operations. A captive white-tailed deer facility in Holmes County was confirmed CWD positive in January 2018 and was depopulated in February 2018. Another 2 cases in the facility tested positive for CWD. An enhanced disease surveillance area was established around this area to monitor the free ranging white-tailed deer population. Since 2014, a total of 22 captive white-tailed deer have been detected in Ohio.

Two large outbreaks of CWD exist in eastern North America. A very large outbreak in the southern Wisconsin-northern Illinois border area has persisted and grown since 2002, with more than 4,100 cases detected. Approximately 30-40% of adult male deer in the core area of the southwestern outbreak are infected with CWD. The prevalence continues to increase in affected deer populations in Wisconsin. This outbreak area is approximately 550 km west of the Ontario border at Windsor. In Wisconsin, 45 of 72 counties are now considered "CWD-affected". In 2018, 1054 wild white-tailed deer tested positive for CWD in the state. The second, more recent, outbreak area is in the West Virginia-Virginia-Maryland-Pennsylvania area. It is a smaller area with lower prevalence rates of CWD, but the disease is probably spreading. This outbreak area is centered approximately 400 km southeast of the Ontario border at Niagara Falls.

In September 2018, Quebec saw its first case of CWD on a game farm in the Laurentides region (approximately 15km from Ontario's border). At that time Quebec's Ministry of Forests, Wildlife and Parks (MFFP) implemented measures to protect its wild cervid populations and the Canadian Food Inspection Agency (CFIA) ordered a depopulation of the farm. In total, eleven red deer from the Quebec farm tested positive for CWD. All deer on the farm have been culled by the CFIA by the end of December. Only animals older than 12 months were tested as the disease is typically only detectable in adult animals. Since September 2018, MFFP had tested over 1,100 wild cervids in the area surrounding the CWD positive farm in Quebec and all have tested negative for the disease.



Ontario's other neighbour (Manitoba) remains CWD free and maintains an ongoing surveillance program.

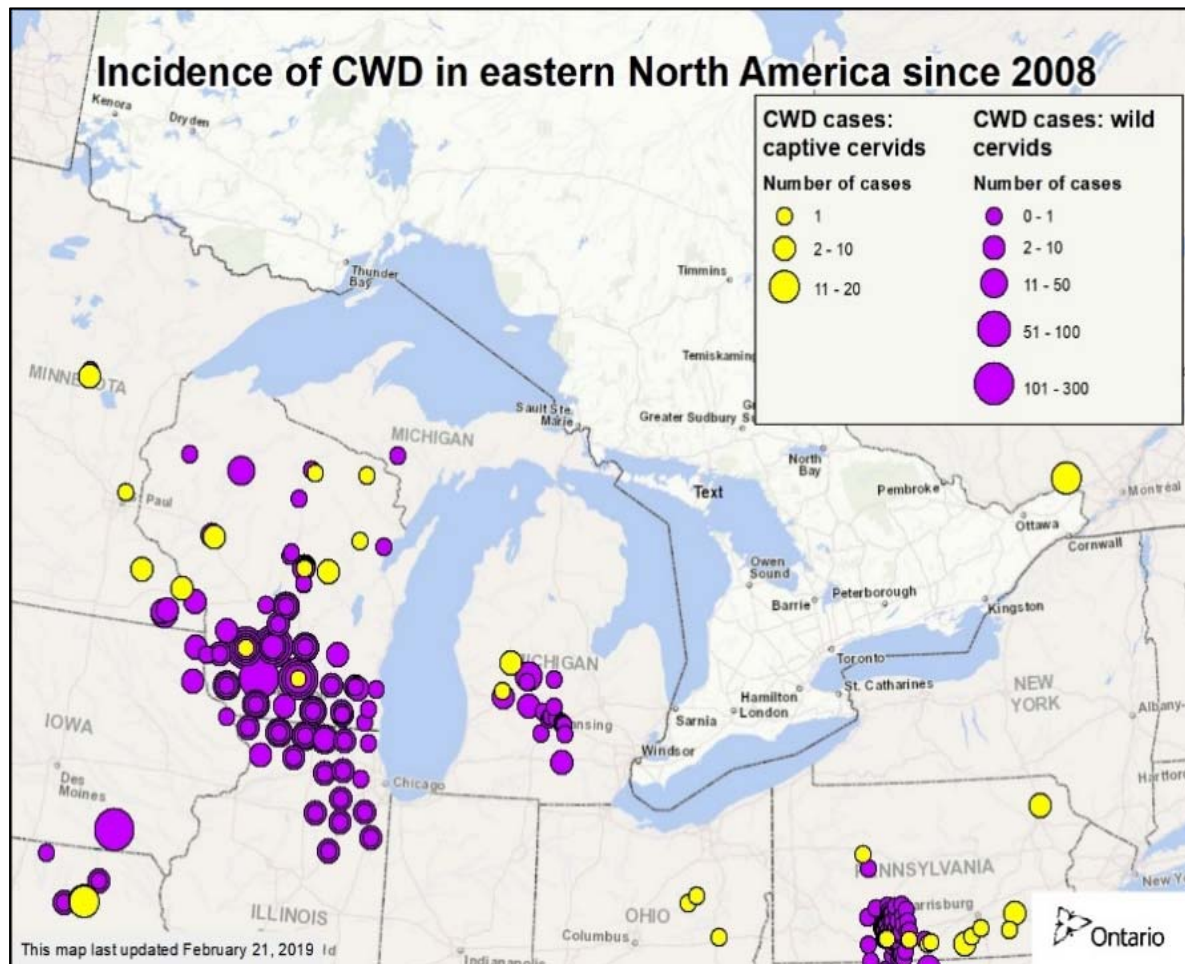


Figure 6. Incidence of chronic wasting disease (CWD) in eastern North America from 2012 to January 1, 2019. Purple markers indicate cases of CWD found in wild white-tailed deer, yellow markers indicate cases detected on game farms. All locations are approximations based on best available data.

In 2016, the first detection of CWD in Europe occurred in a female free-ranging reindeer (*Rangifer tarandus tarandus*) in South-Norway. This is the first detection of natural CWD infection in reindeer worldwide. Additional cases of CWD were detected in 18 reindeer (in Nordfjella), 3 moose, and 1 red deer (in Selbu in the north) in Norway later in 2016. The infected moose and red deer were older animals, suggesting that these were cases of spontaneous disease, which are less likely to be infectious especially considering the more solitary nature of moose. However, the reindeer all lived in the same herd in Nordfjella, a rocky region in the middle of the country. The government quickly implemented a cull the herd of roughly 2000 reindeer, or nearly 6% of the country's wild population, to stop the spread of the disease. The deer's habitat will be quarantined for at least 5 years to prevent reinfection. Plans are also underway to develop more information on CWD prevalence in reindeer and moose in Norway and to evaluate any potential changes in cervid populations.

In early 2018, the first case of CWD was detected in Finland in a 15-year-old European elk (*Alces alces*) found in Kuhmo, eastern Finland. Finland has been monitoring for the disease since 2003, testing 2500 samples, which have all been negative up until this point. Monitoring of the disease will be intensified in the Kuhmo and Kainuu region. Initial analyses suggest that the case is different from the infectious CWD type that is prevalent in North America.

## Acknowledgements

Thank you to staff at 2018 depot locations and cooperating butchers for all assistance provided: Mapleton Taxidermy, Wighty's Repair, White Tanning, Shooter's Choice, Erie Tracker Outfitters, J-Mar Custom Meats, Grimsby Conservation Club, South Nation Archery Supply, Fence Depot and More, Pronature Rockland, Clement Meat Cutter, Boucherie Menard, Vogel Fine Meats and Callan's Artistic Taxidermy. Additional butchers' shops within WMU 65 also supported our surveillance efforts. Staff at the Animal Health Lab in Guelph have processed samples for the past 16 years, providing rapid results and professional service. Staff at the Canadian Wildlife Health Centre in Guelph have performed post-mortem investigations on suspicious deer and coordinated associated CWD testing.

James Byrne at the Ontario Ministry of Agriculture, Food, and Rural Affairs has provided advice about the Ontario captive cervid CWD surveillance program. MNRF staff from the Kemptville, Guelph and Aylmer district offices assisted with logistics, and local knowledge, and inquiries from the public and media. Scott Smithers (Management Biologist - Kemptville), Lisa McShane (Management Biologist - Kemptville), Joff Cote (Management Biologist - Kemptville), Dom Ferland (Management Biologist - Kemptville), Trevor Horvatin (Wildlife Technician – Kemptville) and Conservation Officers from Guelph and Kemptville Districts helped us find samples and depot locations.

Additional MNRF staff support: Charlotte Hooper from Fish and Wildlife Services Branch coordinated hunter information mail-out packages. Freya Long, also of Fish and Wildlife Services Branch, coordinated website updates and assisted with communications. Chris Heydon from Species Conservation Policy Branch developed and maintained MNRF's CWD policies and CWD response plan document. MNRF regional biologists Brad Allison, and Mike Gatt provided regional expertise and advice. Zaur Aliyev of Communication Services Branch assisted with posting test results online.

MNRF Wildlife Research and Monitoring Section staff Sarah Hagey, Kelly Milne, and Val von Zuben created maps for the program. Kevin Middel was an integral developer of the Ontario CWD risk model; the model is now updated annually by Erica Newton. Communications Services Branch assisted with advertising campaigns and designed this year's commemorative crest. Rachel Gagnon helped develop communications products, ensured accessibility of this document and answered the CWD hotline and social media questions regarding CWD. Mark Gibson and Andrew Silver led the surveillance crews and managed depot locations, sample logistics, and supply management.

Crew leaders: Mark Gibson and Andrew Silver.

Crew staff: Steve Bennett, Will Bennett, Hower Blair, Mark Browning, Joff Cote, Josh Cunningham, Clarisa Curtis, Laura Dougherty, Bridget Enright, Tanya Fendler, Dom Ferland, Janet Greenhorn, James Groenwold, Alison Hanes, Issac Hebert, Riley Hotrum, Sophia Konieczka, Charlie Lawson Lee, Evan Lucas, Kelly Milne, Grace McCoy, Travis McGee, Phil McLaren, Barb Piolunowska, Lisa Pollock, Derek Potter, Natalie Pulham, Larissa Simulik, Scott Taylor, Meaghan Tearle, Kristin Thiessen, Katrina Wisniewski and Val Von Zuben

Volunteers: Brian Stevens, Laura Dougherty, Erin Taylor.