



SURVEILLANCE AND MANAGEMENT OF CHRONIC WASTING DISEASE IN MINNESOTA IN FALL 2019 AND WINTER 2020

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SUMMARY OF FINDINGS

During fall 2019, mandatory surveillance for chronic wasting disease (CWD) in hunter-harvested white-tailed deer (*Odocoileus virginianus*) occurred in 3 surveillance areas in the state. In the central surveillance area, the third consecutive year of testing found no wild deer infected with CWD surrounding the formerly positive Meeker county cervid farm; 544 samples were collected. In the north central surveillance area, a positive wild deer was found February 2019 <0.5 miles from an actively operating CWD-positive cervid farm. This led to the creation of a new CWD Management Zone, designated as 604, to enforce carcass movement restrictions and mandatory testing requirements; 3,961 deer were sampled during the fall with no additional detections found. In the southeast surveillance area, the spatial spread and increased number of CWD detections meant 2 new boundaries were created to help enforce a larger area of carcass movement restrictions and testing requirements. The southeast CWD Management Zone was enlarged and a novel CWD Control Zone was established as a buffer around the management zone. During the fall, 11,454 deer were tested in the southeast CWD Management Zone; 23 new hunter-harvested positives were detected. In the southeast CWD Control Zone, 1,159 deer were tested and no positives were found. CWD surveillance and management continued for the southeast into the winter through the use of special late hunts, landowner shooting permits, and agency culling, with 3/567, 0/10, and 7/463 positive deer detected, respectively. Statewide opportunistic sampling of symptomatic deer resulted in 3 out of 413 positive: 2 deer in the southeast where disease was already present and 1 deer in Dakota county, over 100 miles from the nearest CWD positive deer. In total, 18,571 deer were tested between 1 July 2019 and 30 June 2020, with 36 new positives. As of June 2020, there have been 88 CWD-positive wild deer in 6 Minnesota counties: Crow Wing, Dakota, Fillmore, Houston, Olmsted, and Winona.

INTRODUCTION

Chronic Wasting Disease (CWD) belongs to a family of infectious diseases known as transmissible spongiform encephalopathies, or prion diseases. Members of the cervid family are susceptible and infection always results in death, with no vaccine or treatment available (Williams 2005). While a link between CWD and neurological illnesses in humans has not been established (MaWhinney et al. 2006, Sandberg et al. 2010), the Center for Disease Control recommends testing deer or elk (*Cervus canadensis*) from CWD positive areas and abstain from eating known CWD positive meat ([cdc.gov/prions/cwd/prevention.html](https://www.cdc.gov/prions/cwd/prevention.html)).

Minnesota Department of Natural Resources (MNDNR) began CWD surveillance in 2002 following the state's first detection of CWD on a captive cervid farm. Following an initial 3-year statewide surveillance (n=28,000 deer tested) with no positive wild deer found, MNDNR adopted a risk-based response strategy to conduct intense, concentrated surveillance in high-risk CWD areas (2010 CWD Response Plan). CWD risks were defined as positive captive

cervid farms or positive wild deer found along neighboring state borders; likewise, MNDNR makes a concerted effort to test any deer displaying CWD symptoms across the state. Due to the continued detections of CWD in southeast Minnesota, an updated response plan was released in July 2019 that addressed the management of persistent and endemic infections in wild cervids ([Surveillance and Management Plan for Chronic Wasting Disease in Free-ranging Cervids in Minnesota](#)). Based on the low CWD prevalence (<5%), but increasing spatial extent of cases, MNDNR is dealing with a persistent infection of CWD in southeast Minnesota.

Since 2016, MNDNR has actively managed an ongoing outbreak of CWD in wild deer in the southeast; it was first discovered in Fillmore county and cases have now also been detected in Houston, Olmsted, and Winona counties. A CWD-positive deer farm in Winona county was confirmed in 2017 and less than a year later, positive wild deer were found within one mile of that farm. Elsewhere in the state, precautionary surveillance has occurred since 2017 in Crow Wing (north central) and Meeker (central) county areas following the discovery of 2 CWD-positive cervid farms that shared infected animals. In February 2019, a positive wild deer was found dead <0.5 miles from the Crow Wing county farm that remained in operation. A full necropsy was completed by the University of Minnesota's Veterinary Diagnostic Laboratory and the animal was determined to have died of CWD. Shortly after, the Crow Wing county cervid farm culled their remaining animals. Throughout Minnesota's CWD surveillance history, 3 of the 5 wild deer outbreaks have occurred within a few miles of a known positive cervid farm.

As of April 2020, the Minnesota Board of Animal Health (BAH) manages 295 farmed cervid herds totaling 8,771 animals, primarily white-tailed deer (*Odocoileus virginianus*) and elk. In Minnesota, farmed cervids are classified as livestock and are subject to certain regulations including mandatory CWD testing of all deceased adult animals (<https://www.bah.state.mn.us/deer-elk/#chronic-wasting-disease>). Since 2002, CWD has been detected on 10 captive cervid farms with the most recent detections in early 2020 on 2 farms in Douglas and Pine counties that shared infected animals.

During the 2019 Minnesota legislative session, \$2.7 million was appropriated to support activities to monitor and manage CWD. This included a \$1,595,000 appropriation from the State's General Fund, which was the first time funds were ever provided to DNR to support wildlife disease management activities. Additionally, \$1,125,000 was appropriated from the DNR's Game and Fish fund and \$50,000 from its wild cervid health account; both of these funds are generated from hunting license dollars. This financial commitment from Minnesota's legislature underscores the importance of CWD response in Minnesota and the high value that is placed on maintaining a healthy deer herd.

METHODS

Statewide CWD Efforts

During fall 2019, MNDNR conducted hunter-harvested surveillance in 3 areas of the state (central, north central, and southeast) in response to positive captive cervid farms and outbreaks in wild deer. Through implementation of the surveillance and management plan for chronic wasting disease in free-ranging cervids in Minnesota, ([CWD response plan](#)), management and surveillance boundaries were changed based on the type of risk and severity of the outbreak in wild deer. In all surveillance areas, MNDNR staff and students from 5 universities collected medial retropharyngeal lymph nodes for CWD testing, while additional samples (muscle sample and front incisor) were collected in areas with confirmed cases in wild deer. For all samples collected, hunter contact information, harvest location, and age/sex of the deer were recorded. For the first time, all sample data were recorded digitally using tablets equipped with cellphone data packages and ArcGIS Survey123 (Environmental Systems Research Institute, Inc., Redlands, CA). Lymph node samples were sent to Colorado State

University for testing using enzyme-linked immunosorbent assay (ELISA) and all suspect cases were confirmed with immunohistochemistry (IHC) staining. Test results were received within 3-4 business days during archery season and as long as 14 days during the peak of firearms season. On the MNDNR's CWD website, test results were made available in real-time and tallied by surveillance area. Hunters were able to access their individual test results using their hunting license number. MNDNR staffed 31 stations during the firearms season from 9am – 7pm to collect samples and educate the public about the disease. MNDNR recruited and paid 28 taxidermists to collect samples in all surveillance areas. Taxidermists were compensated for their efforts (\$5 / head, \$10 / lymph node only sample in surveillance areas, \$15 / lymph node, muscle, and tooth in management areas). A new building was leased in Rushford on a 3-year agreement as a base for CWD operations in the southeast.

Newly designed self-service sampling stations were available to hunters throughout all of archery season (15 Sept through 31 Dec 2019) in the southeast and north central surveillance areas. Self-service sampling stations were constructed using waterproof, 30 gallon HDPE plastic barrels to permit hunters to drop-off their deer head when MNDNR staff were not present at stations. A 4'x4' map with Township, Range, and Section (TRS) identifiers was attached to a piece of plywood, covered with Plexiglas, and secured to the sampling station. Red paper tags with detachable receipts were located in an attached toolbox and provided space for the hunter to write down their name, phone number, license number, and harvest location information (TRS). The hunter affixed the main red tag to the deer's ear using provided zip ties, retained the perforated receipt for future identification purpose, and placed the deer head in a garbage bag to make sure the information stayed with the correct deer head. MNDNR staff collected the bagged heads 3 times per week and took them back to a central processing facility to remove the samples and record the hunter's information. Two emergency 90-day technicians were hired to support the workload, including one in the southeast and one in the north central.

Fall 2019 surveillance included an inaugural Adopt-a-Dumpster program in areas with carcass movement restrictions, as mandated by the state legislature. This dumpster program provided hunters a convenient place to quarter their deer and dispose of carcass remains in the north central and southeast surveillance areas. Dumpsters, tables, and quartering tripods were available in select locations starting with archery season and the number of locations was expanded during the firearms season (Figure 1). In the north central surveillance area, Crow Wing County Landfill took additional steps to mitigate potential disease spread and worked with MNDNR and Minnesota Pollution Control Agency (MPCA) to utilize an incinerator for all deer waste for the CWD Management Zone in that region.

Communication through the MNDNR website, social media, and local interviews helped define CWD rules and fall plans. The CWD page on the MNDNR website became the primary method for distributing the most up-to-date information. Sampling station locations, dates, and hours of operation were listed in the printed and online versions of the 2019 Hunting and Trapping Regulations booklet. Two new videos were created to give a general overview of CWD in Minnesota and demonstrate how to use a self-service sampling station. Both new videos, along with videos from 2018 (how to cape and quarter a deer), were posted on the CWD website. Social media targeted hunting and non-hunting audiences alike with important messages such as feeding and attractant bans. Pamphlets were developed to hand out to hunters at sampling stations, while posters and general information brochures were created for state and county fairs. MNDNR information officers worked with local wildlife staff in CWD areas to set up interviews for TV, radio, and newspaper articles. Throughout the year, a CWD email account and phone number are available for CWD-specific questions.

CWD Efforts by Surveillance Area

For the central surveillance area, fall 2019 marked the third consecutive year of precautionary surveillance around a depopulated CWD-positive cervid farm in Meeker county. Mandatory testing was only required for deer >1 year old harvested within 15 miles of the cervid farm during opening weekend of the firearms season (9-10 Nov 2019) at 4 staffed sampling stations. There were no carcass movement restrictions or self-service sampling stations in place for this surveillance area. The central surveillance area included portions of Deer Permit Areas (DPAs) 277 and 283 east of State Highway 4, DPA 219 south of State Highway 55, and DPA 285 north of State Highway 7 (Figure 2). Deer feeding was prohibited in Kandiyohi, McLeod, Meeker, Stearns, Renville (north of Hwy 212) and Wright counties during the fall, but will be lifted beginning 1 July 2020.

In the north central surveillance area, a newly created CWD Management Zone, DPA 604, was established as a 15mi buffer around the CWD-positive cervid farm and the CWD-positive wild deer. This new Management Zone was created to enforce carcass movement restrictions for all deer and mandatory testing of all deer greater than 1 year old, including hunter-harvested deer, depredation deer, and car-killed deer. DPA 604 was created from DPAs 242 and 247, as well as portions of DPAs 246, 171, and 155 (Figure 2). Sampling stations were established at 6 locations, self-service during archery season and staffed by MNDNR employees during the 16-day firearms season (9-24 Nov 2019). Hunting opportunities were liberalized through unlimited disease management tags for antlerless deer, available for \$2.50. Deer feeding and attractants were prohibited in Aitkin, Cass, Crow Wing, Hubbard, Mille Lacs, Morrison, Todd, and Wadena counties.

For the southeast surveillance area, where disease appears to be persisting on the landscape, a new approach was taken for the first time in Minnesota's history. The original CWD Management Zone, DPA 603, that was created in late fall 2016 after the disease was first detected in Fillmore county encompassed a 15mi buffer around the original discoveries near Preston, was dissolved back to the original DPA boundaries of 347 and 348. All of the DPAs within 15mi of a known positive were renamed into a 600-series delimiter, identifying it as a CWD Management Zone DPA. The following DPAs 345, 346, 347, 348, 349 and portions of 255 and 343 were renamed as 645, 646, 647, 648, 649, 655 and 643 (Figure 2). This created a much larger CWD Management Zone and allowed MNDNR to enforce carcass movement restrictions for all deer and mandatory testing of all deer greater than 1 year old. Deer carcasses could move between southeast DPAs in the CWD Management Zone, but could not move outside of the management zone. Per the CWD Response Plan, liberalized hunting opportunities were established: unlimited disease management tags for antlerless deer were available for \$2.50, cross-tagging of bucks was allowed, and antler point restrictions (APR) were removed. Additionally, hunters were able to take up to 3 bucks within the Southeast CWD Management Zone; 1 each during archery, firearms, and muzzleloader seasons. Within the Southeast CWD Management Zone, 18 sampling stations were established; self-service sampling stations were available during the archery season and MNDNR employees and students staffed the sampling stations during the two 9-day firearms seasons. As an added precaution to prevent and detect disease spread, a CWD Control Zone was created using DPAs 255, 343, and 344 (Figure 2) and acted as a buffer, allowing whole deer carcasses from the Control Zone to move into the Management Zone or other Control Zone DPAs, but were otherwise restricted from moving outside those areas. In the CWD Control Zone, testing was only required for all deer greater than 1 year old during the opening firearm weekends for 3A and 3B seasons (9-10 and 23-24 Nov 2019) at 4 sampling stations. Outside of mandatory testing weekends, hunters were able to provide voluntary samples at self-service sampling stations throughout all of archery and firearms seasons. Deer feeding and attractants were

prohibited in Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Steele, Wabasha, and Winona counties.

Due to the number of positives found in the fall in the southeast, a pair of special late hunts (20-22 and 27-29 Dec 2019) were held to give hunters more opportunity to take deer. The special late hunts occurred in DPAs with recently confirmed positive deer (643, 646, 647, and 648) and retained the same carcass movement restrictions and mandatory testing requirements that were in place during the fall hunting season. Unlimited disease management tags were available for \$2.50 to be used on either-sex deer, additionally hunters could harvest deer with any unused 2019 tags, provided they used the correct method of take (e.g., a deer tagged with an archery tag must be taken by archery equipment). In early December, MNDNR began the process of working with United States Department of Agriculture's Wildlife Services (USDA-WS) to begin preparing for agency culling. Landowners within 3 miles of known CWD-positives in Fillmore, Houston, and Winona counties were contacted by MNDNR to secure permission for USDA-WS to access their property. Concurrently, landowner shooting permits were offered by phone to landowners in those targeted areas; these permits expired prior to USDA-WS culling. USDA-WS began baiting in mid-January 2020 and culling began on 3 February 2020. Non-eviscerated deer were transferred to the Rushford building, where heads were removed for sampling, and the remaining intact carcasses were delivered to a contracted meat processor for packaging. Two emergency technicians were hired to help with equipment management, daily carcass deliveries to the meat processor, and sampling needs. MNDNR partnered with the University of Minnesota to collect additional tissue samples to help validate new CWD testing technology in development at the College of Veterinary Medicine. From each deer, MNDNR staff collected 3 pairs of cranial lymph nodes, tonsils, brainstem, muscle samples, and a front incisor. After results were returned as not detected, the packaged venison was retrieved from the meat processor and given back to the cooperating landowners or distributed to the public through the Share the Harvest Program. Two local deer groups, Minnesota Deer Hunters Association and Bluffland Whitetails Association, assisted in the distribution of venison. Agency culling and sampling occurred Monday through Friday until 20 March 2020, when national concerns due to COVID-19 brought the project to a close. All carcasses obtained through USDA-WS culling went to a lined landfill, while CWD-positive venison was disposed of through alkaline-digestion at the University of Minnesota's Veterinary Diagnostic Lab.

RESULTS

From 1 July 2019 to 30 June 2020, 18,571 deer were tested and 36 new positive cases were discovered (Table 1). In the fall, MNDNR tested a total of 17,118 deer, of which 3,760 (22%) came from self-service sampling stations. No new detections of CWD were discovered in central or north central surveillance areas, but 23 additional positives were found in the southeast management zone during the fall (Figure 3). For MNDNR staffing, 207 wildlife and some fisheries staff worked 25,743 hours, with students from 5 universities filling in 198 weekend shifts.

The taxidermist program outperformed MNDNR's expectations with 1,428 samples submitted, including 4 CWD-positives, and costing a total of \$21,240. Hunter compliance rates for mandatory sampling were very high, with all 600-series DPAs reporting between 93-112% for adult deer. Compliance rates exceeding 100% are due to hunters reporting differing DPAs upon registration and CWD sampling for their harvested deer. An additional 1,040 deer, including 10 CWD positive cases, were harvested during winter management efforts from special late hunts (3/567), landowner shooting permits (0/10) and agency culling (7/463) (Figure 4).

During the agency culling effort, 63 landowners allowed USDA-WS to take deer off their property, in addition to access to state-owned lands, which totaled 15,247 acres (private =

11,603 acres and state land = 3,644 acres). Given the harvest locations of CWD-positive deer discovered during fall, 3 focal areas were selected for agency culling work. While deer removal efforts were successful in the Winona (n = 213, including 2 positives) and Preston/Chatfield/Lanesboro (n = 250, including 5 positives) areas, no landowners from the Houston area would allow USDA-WS access to their property (Figure 4).

MNDNR tested 413 opportunistically acquired deer statewide across 44 DPAs. Of those deer, 59 were found dead, 46 were reported sick, 102 were vehicle killed, and the rest fell into miscellaneous categories. Three of these deer tested positive for CWD. Two were from a known area of infection in the southeast management zone but the third was a symptomatic deer reported by a member of the community in Dakota county during spring 2020 (over 100 miles from the nearest known wild or captive positive).

The first year of the Adopt-a-Dumpster program was very successful, with more than 200 tons of deer parts collected and disposed of in lined landfills or incinerated, costing MNDNR and their partners \$186,000. Very few issues came up during the first year of the dumpster program; notably, dumpsters were not used as dumping grounds for non-target waste items, which was a concern from several parties. Whenever possible, MNDNR attempts to recover the carcass remains and venison from CWD-positive deer and deliver the material to the University of Minnesota for alkaline digestion. From July 2019 through May 2020, \$2.7 million was spent on CWD management and surveillance in Minnesota.

More than 445,000 people visited one of the CWD webpages between June 2019 and April 2020. The CWD test results page was the most-visited of all of the pages, with 122,619 page-views; 5.54% of that traffic went directly to the test results where a new interactive map was posted. Likely, many others visited the page to see the map and current results as the test results dashboard had 12,284 total searches in that same timeframe. Users were heavily engaged with posts about the Dakota County positive news release (top Facebook post for user engagement, 1,189 users) and the dumpster location information (top Twitter post for user engagement, 232 users).

DISCUSSION

During the 2019 hunting season, the changes implemented through the CWD Response Plan resulted in nearly a disease census of sampled deer over 1 year of age in our CWD Management Zones. This was an unprecedented level of testing for MNDNR and provided fine-scale information about disease presence and absence. The high compliance rates, >93%, when compared to previous years (2017 compliance rates: 92% in north central, 90% in central, and 68% in southeast surveillance areas) demonstrates that the public was aware of CWD testing requirements and most hunters cooperated, which would not have been achievable without a strong communication effort.

In 2019, a new regulation was established in the southeast management zone which allowed hunters to take up to 3 antlered males (1 per season), whereas previously the bag limit was 1 antlered male per hunter, regardless of season. This regulation was intended to remove selection against taking smaller bucks, as hunters could now take multiple throughout the year, as well as provide more opportunities for hunters to harvest deer of both sexes. Throughout all southeast management zone DPAs, 6,319 hunters took 1 buck, 302 hunters took 2 bucks, and 17 hunters took 3 bucks. A very small subset (n=5) took 4 bucks, which was legal under the liberal regulations of the special late hunt which allowed for the unlimited take of either sex.

Following 3 consecutive years (2017-2019) of no CWD detections from 3,621 samples collected in the central zone surveillance area, future sampling will be discontinued in accordance with the CWD Response Plan. The north central surveillance will continue to monitor for the disease

in wild deer for at least 2 more years following the 2019 discovery of the positive wild deer found dead near the positive deer farm. However, surveillance efforts in this area from 2017-2019 have generated nearly 13,000 samples from hunter-harvested deer without detecting any positives, which provides evidence to support that CWD is not established in the local wild deer population.

In the southeast management and control zones, the infection appears to be persisting in the Preston-Lanesboro area with 56% of positive cases in an 8 x 8 mi² core area but is beginning to show some spread. Although CWD prevalence over the last 4 years has remained low ($\leq 1\%$) in the original DPA 603 boundaries, it is beginning a slight upward trend since 2017 (Figure 5). A new area of disease that has shown increased cases is in Winona county, immediately surrounding a formerly CWD-infected deer farm that had a 100% infection rate. We have detected 13 new cases in Winona county as well as a cluster of 4 deer on the same parcel of land in northern Houston County. At this point, we are uncertain if these areas of disease are related or have independent sources for origination of disease.

Future Surveillance Plans

CWD surveillance will be expanded with the discovery of 2 new CWD-positive captive cervid farms in Douglas and Pine counties, as well as the recent discovery of a CWD-infected wild deer in Dakota county. These 3 new areas of concern will be included in surveillance plan for fall 2020, in addition to our continued efforts to monitor disease in the southeast east and north central areas (Figure 6).

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Table 1. Minnesota wild white-tailed deer samples submitted for chronic wasting disease (CWD) testing by operational phase between 1 July 2019 and 30 June 2020, including subsets of each sampling group obtained through self-service sampling stations and taxidermists.

Operational phase	Number of deer sampled	Positive results	Subset specifically from self-service sampling stations	Subset specifically from taxidermists
North Central Fall Hunter Harvested	3,966	0	976	97
Southeast Management Zone Fall Hunter Harvested	11,479	23	2,655	1,187
Southeast Control Zone Fall Hunter Harvested	1,160	0	141	88
Central Fall Hunter Harvested	544	0	Not applicable	5
CWD Special Late Hunts	568	3	47	21
Southeast Landowner Shooting Permits	10	0	10	0
Southeast Agency Culling	463	7	Not applicable	Not applicable
Opportunistic Statewide	358	3	40	30
Totals	18,548	36	3,867 (5 positive)	1,428 (4 positive)

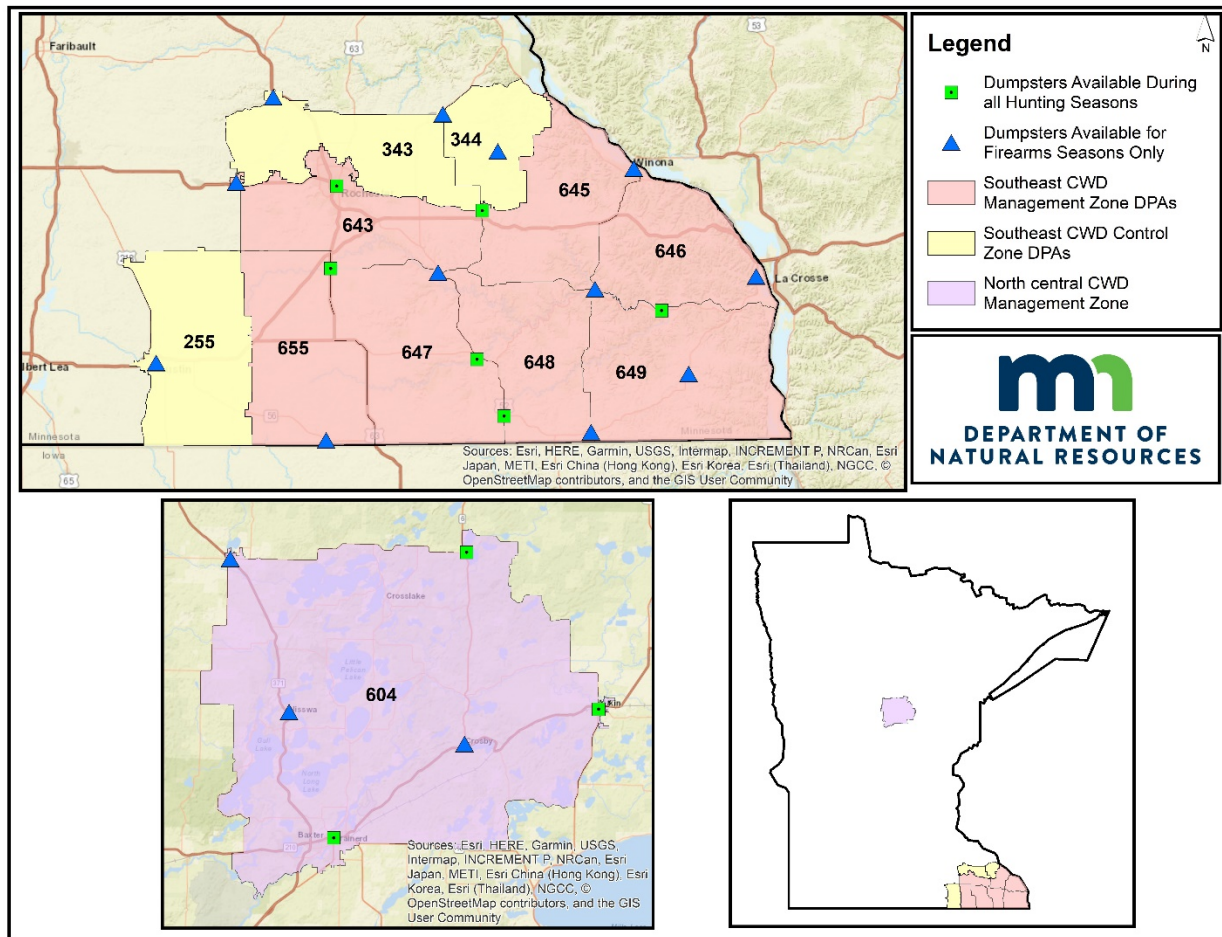


Figure 1. Placement of dumpsters for hunters to dispose of deer remains during chronic wasting disease (CWD) surveillance throughout the north central and southeast CWD Management and Control Zones in Minnesota during fall 2020.

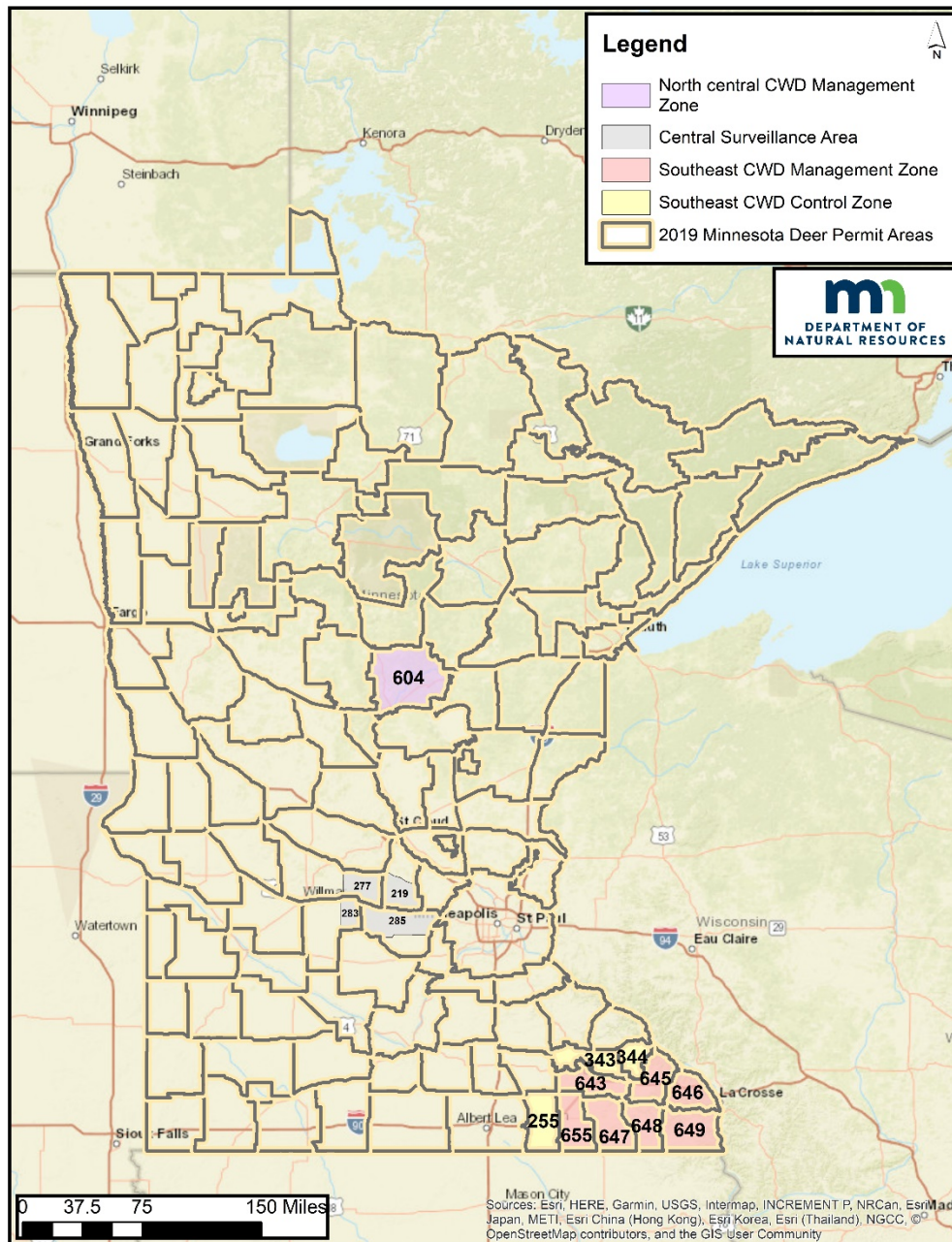


Figure 2. Fall 2019 boundaries for chronic wasting disease (CWD) surveillance in Minnesota, including the north central CWD Management Zone (including Deer Permit Area (DPA) 604), the central surveillance area (including portions of DPAs 277 and 283 east of State Highway 4, DPA 219 south of State Highway 55, and DPA 285 north of State Highway 7), the southeast CWD Control Zone (DPAs 343, 344, and 255), and the southeast CWD Management Zone (DPAs 643, 645, 646, 647, 648, 649, and 655).

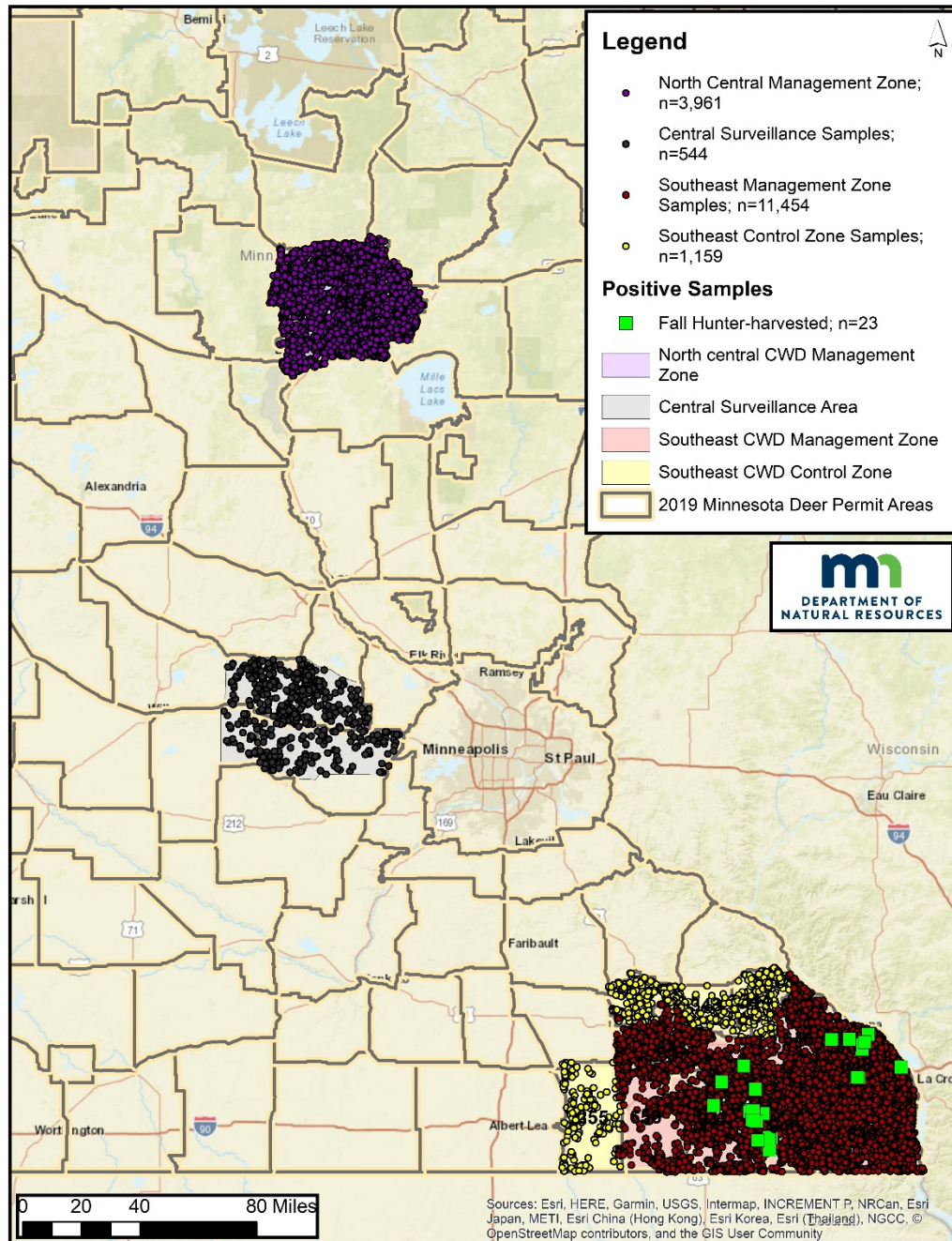


Figure 3. Locations of hunter-harvested deer ($n = 17,118$) sampled for chronic wasting disease (CWD) from north central, central, and southeast surveillance areas during fall 2020 in Minnesota. No CWD-positive deer were detected from deer sampled in the north central CWD Management Zone ($n = 3,961$), the central surveillance area ($n = 544$), or the southeast Control Zone ($n = 1,159$); however 23 new positives were detected in the southeast Management Zone ($n = 11,454$).

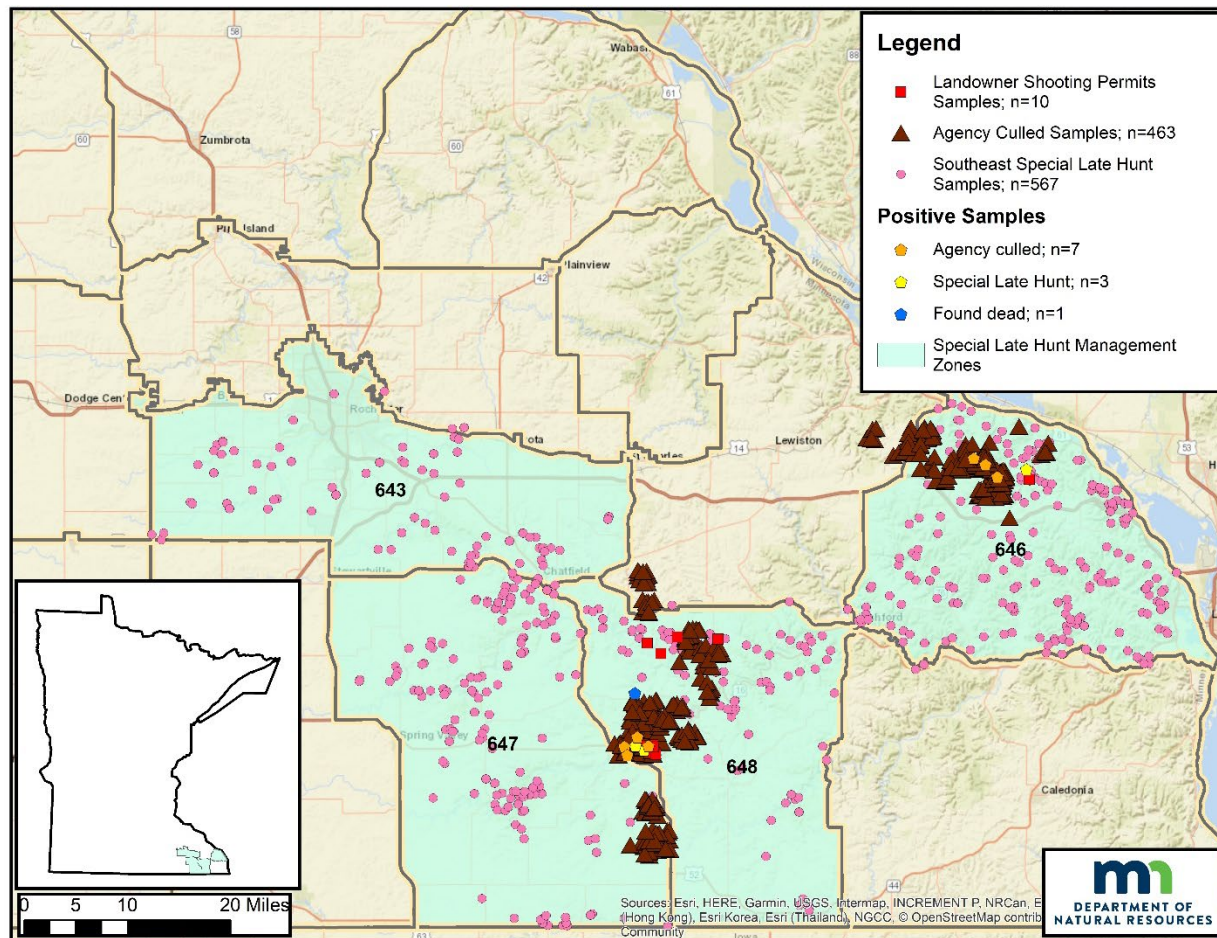


Figure 4. Locations where 1,040 white-tailed deer were sampled for chronic wasting disease (CWD) in Minnesota after the normal fall hunting seasons concluded. These efforts included special late hunts (567 deer harvested, including 3 CWD-positives), landowner shooting permit phase (10 deer harvested), and agency culling (463 deer removed, including 7 CWD-positives) during winter 2020.

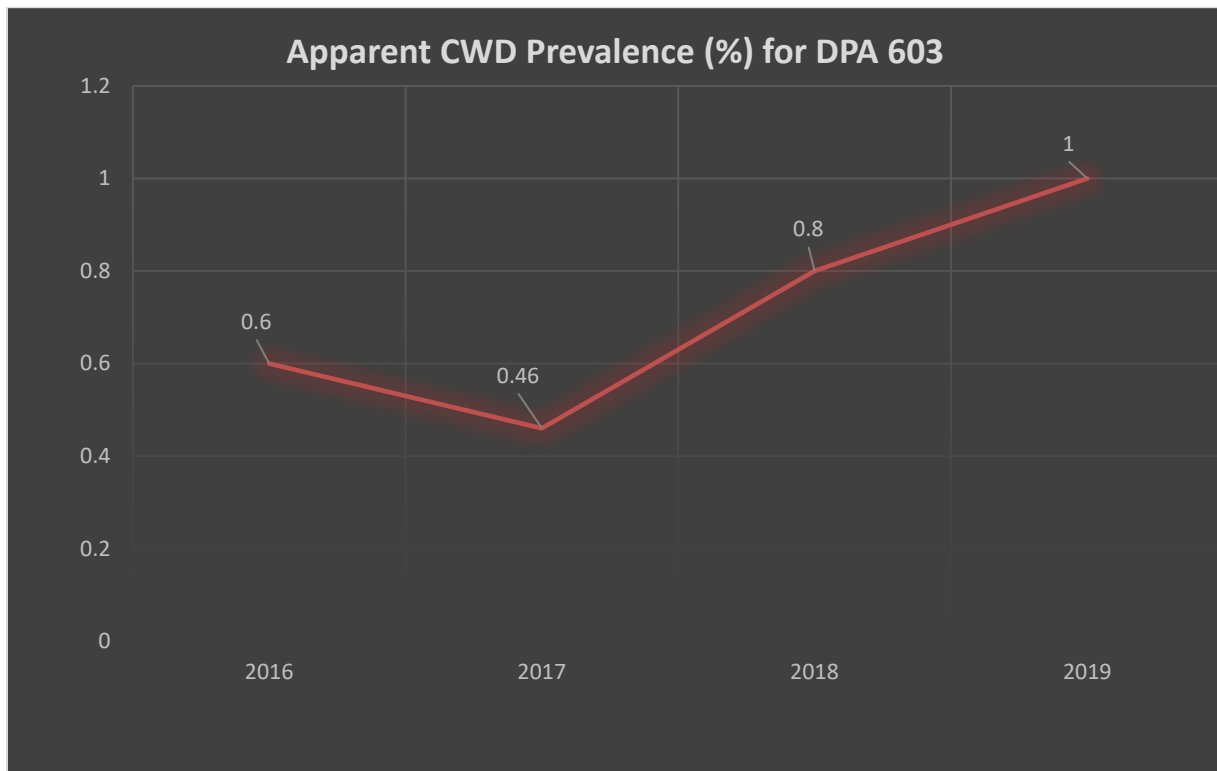


Figure 5. Changes in apparent prevalence of chronic wasting disease (CWD) in deer permit area 603 from 2016-2019, based on hunter harvested deer in Fillmore County, Minnesota.

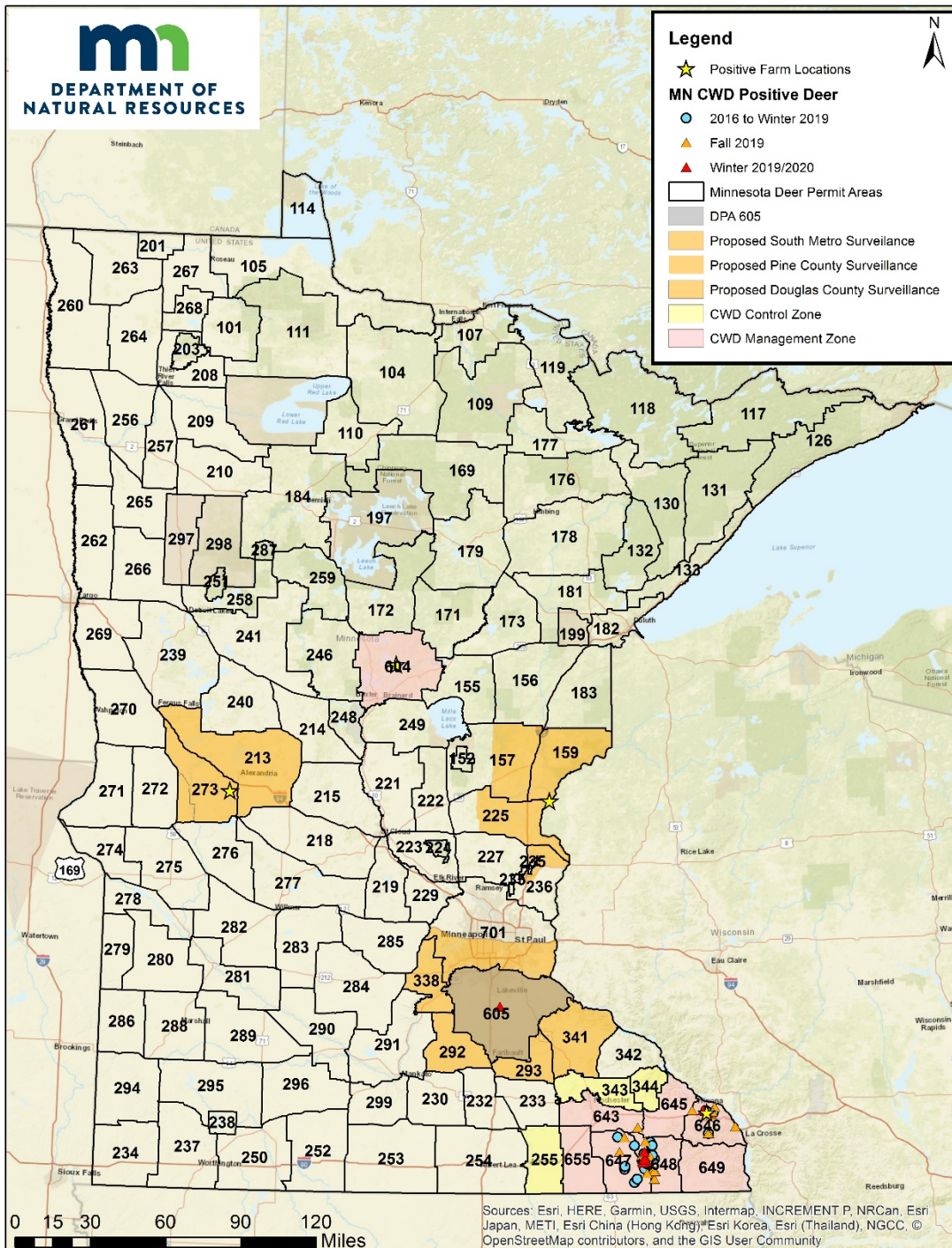


Figure 6. Proposed areas for chronic wasting disease surveillance of hunter-harvested deer planned for fall 2020 in Minnesota.